BASIC REMEDIATION COMPANY

SOIL AND GROUNDWATER CLEANUP TEAM

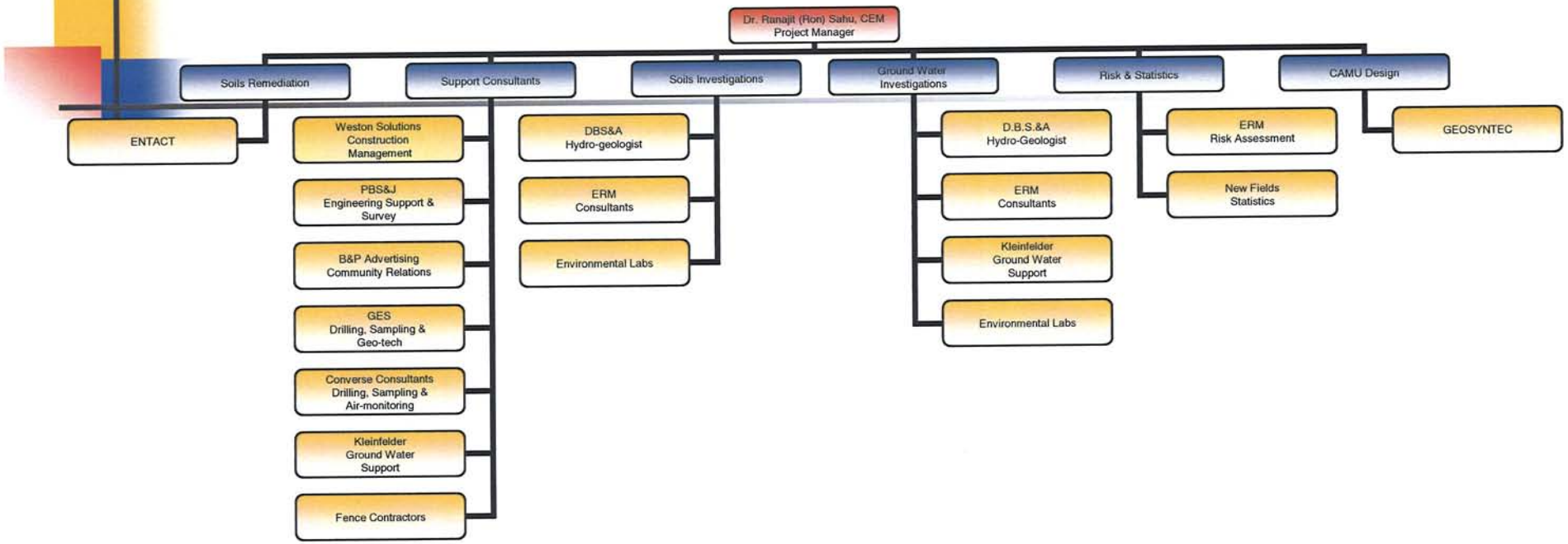
PROFESSIONAL PROFILES

April 9, 2009

Basic Remediation
COMPANY

Dr. Ranajit Sahu, Ph.D. C.E.M.
Program Manager
875 West Warm Springs Road
Henderson, Nevada 89011

Remediation Team 2009



Basic Remediation
COMPANY

BRC Project Team
By Last Name Alpha

Last Name	First Name	Company
Barajas-Albalawi	Maria	Environmental Resource Management (ERM)
Blanchard	Mark	Weston Solutions
Blandford	Neil	Daniel B. Stephens & Associates (DBS&A)
Bowland	Mark	Environmental Resource Management (ERM)
Brennecke	Dan	Weston Solutions
Bronson	Kali	Daniel B. Stephens & Associates (DBS&A)
Carlson	Mike	ENTACT
Carter	Gary	Kleinfelder
Cannon	Melody	Brown & Partners Associates
Christianson	Eric	Post, Buckley, Schuh, & Jernigan, Inc. (PBS&J)
Cooke	Richard	Geotechnical & Environmental Services, Inc. (GES)
Corcoran	Gregory	Geosyntec Consultants
Cox	Jim	Geosyntec Consultants
Cullen	Stephen	Daniel B. Stephens & Associates (DBS&A)
Davis	Douglas	Kleinfelder
Davis	Richard	Weston Solutions
DeSart	Gregory	Geotechnical & Environmental Services, Inc. (GES)
Dodge	John	Daniel B. Stephens & Associates (DBS&A)
Farris	Lee	Basic Remediation Company
Flynn	Becky	Geosyntec Consultants
Funderburg	Earney	ENTACT
Gegenheimer	Rob	Converse Consultants
Gehringer	Erik	ENTACT
Goebel	Kurt	Converse Consultants
Grogan	Donna	Basic Management Inc. & Affiliates
Hagan	Karin	Kleinfelder
Hall	Aren	Kleinfelder
Hansen	Kyle	Geotechnical & Environmental Services, Inc. (GES)
Havens	Andrea	Converse Consultants
Jones	Mark	Environmental Resource Management (ERM)

BRC Project Team
By Last Name Alpha

Last Name	First Name	Company
Kaiser	Phil	Daniel B. Stephens & Associates (DBS&A)
Kellogg	Richard	Basic Management Inc. & Affiliates
Kiefer	Kenneth	Environmental Resource Management (ERM)
Kircher	Charles	Post, Buckley, Schuh, & Jernigan, Inc. (PBS&J)
Koski	Bill	ENTACT
Laubinger	Richard	Weston Solutions
Mehlhorn	Monty	Geotechnical & Environmental Services, Inc. (GES)
Mikacich	Tony	Montgomery Watson Harza (MWH)
Mulhearn	Sandra	Environmental Resource Management (ERM)
Norris	Adam	Montgomery Watson Harza (MWH)
Pederson	Mike	Post, Buckley, Schuh, & Jernigan, Inc. (PBS&J)
Quillin	Jill	Environmental Resource Management (ERM)
Reaber	Douglas	Daniel B. Stephens & Associates (DBS&A)
Rouhani	Shahrokh	NewFields, Inc.
Sahu	Ranajit (Ron)	BEC/BRC Program Manager
Shibata	Mark	Environmental Resource Management (ERM)
Shull	Lee	Environmental Resource Management (ERM)
Spata	Angelo	Post, Buckley, Schuh, & Jernigan, Inc. (PBS&J)
Street	Daniel	Geosyntec Consultants
Torgrimson	Ellen	Daniel B. Stephens & Associates (DBS&A)
Vogler	Matt	ENTACT
Walsh	Dale	Converse Consultants

BRC Project Team
By Company

Last Name	First Name	Company	Roll
Farris	Lee	BMI & Affiliates	Project Manager
Grogan	Donna	BMI & Affiliates	Administrative Assistant
Kellogg	Richard	BMI & Affiliates	Chairman of Board BMI & Affiliates
Sahu	Ranajit (Ron)	BMI & Affiliates (Independent Consultant)	Program Director
Cannon	Melody	Brown & Partners	Community Relations
Gegenheimer	Rob	Converse Consultants	Principal Project Manager
Goebel	Kurt	Converse Consultants	Principal Geologist & Environmental Division Manager
Havens	Andrea	Converse Consultants	Senior Project Manager
Walsh	Dale	Converse Consultants	
Blandford	Neil	Daniel B. Stephens & Associates	Technical Specialist One
Bronson	Kali	Daniel B. Stephens & Associates	Project Scientist
Cullen	Stephen	Daniel B. Stephens & Associates	Technical Specialist-Lead Hydrogeologist
Dodge	John	Daniel B. Stephens & Associates	Senior Hydrogeologist
Kaiser	Phil	Daniel B. Stephens & Associates	Staff Engineer
Reaber	Douglas	Daniel B. Stephens & Associates	Senior Scientist
Torgrimson	Ellen	Daniel B. Stephens & Associates	Technical Editor
Carlson	Mike	ENTACT	Project Engineer - Night Shift
Funderburg	Earney	ENTACT	Day Shift Superintendent
Gehringer	Erik	ENTACT	Project Director
Koski	Bill	ENTACT	Night Shift Superintendent
Vogler	Matt	ENTACT	Cost and Scheduler
Barajas-Albalawi	Maria	ERM	Project Chemist
Bowland	Mark	ERM	Senior Risk Assessor
Jones	Mark	ERM	Project Manager/Risk Assessor/GIS Specialist
Kiefer	Kenneth	ERM	Senior Risk Assessor/Database Manager
Mulhearn	Sandra	ERM	Risk Assessor/Data Validation Specialist
Quillin	Jill	ERM	Geologist/Hydrogeologist
Shibata	Mark	ERM	Ecological Risk Assessor
Shull	Lee	ERM	Principal Risk Assessor

BRC Project Team
By Company

Last Name	First Name	Company	Roll
Corcoran	Gregory	GeoSyntec	Senior Project Engineer
Cox	Jim	GeoSyntec	Senior Project Manager
Flynn	Becky	GeoSyntec	Staff Engineer
Street	Daniel	GeoSyntec	CQA Site Manager
Cooke	Richard	Geotechnical Environmental Services (GES)	Geologist
DeSart	Gregory	Geotechnical Environmental Services (GES)	President GES
Hansen	Kyle	Geotechnical Environmental Services (GES)	Environmental Program Manager
Mehlhorn	Monty	Geotechnical Environmental Services (GES)	Project Geologist
Carter	Gary	Kleinfelder	Environmental Department Manager
Davis	Douglas	Kleinfelder	Geologist/Staff Professional II
Hagan	Karin	Kleinfelder	Staff Geologist
Hall	Aren	Kleinfelder	Environmental Professional
Mikacich	Tony	MWH (Ground water)	Senior Hydrogeologist
Norris	Adam	MWH (Ground water)	Senior Geologist
Rouhani	Shahrokh	NewFields	Geostatistician
Christianson	Eric	PBS&J	Mapping Services Manager
Kircher	Charles	PBS&J	Vice-President, Director of Survey Services
Pederson	Mike	PBS&J	Sr. Project Manager
Spata	Angelo	PBS&J	Sr. Project Manager
Blanchard	Mark	Weston Solutions	Technical Advisor
Brennecke	Dan	Weston Solutions	Construction Project Manager
Davis	Richard	Weston Solutions	Project Engineer
Laubinger	Richard	Weston Solutions	Construction Manager

35 MONTAGNA MIRAGE ST. • HENDERSON, NV 89012-5641
PHONE 702-566-1940 • E-MAIL DESGROGAN@MSN.COM

DONNA GROGAN

EDUCATION

2000-2002 Santa Barbara City College — Santa Barbara, CA
High School Diploma

WORK EXPERIENCE

09/06-Current Basic Management Inc. & Affiliates — Henderson, NV
Administrative Assistant

Coordinate and distribute monthly AIG submittal, including approvals with accounting, legal counsel, consultants and Director of BRC. Website Administrator responsibilities. Codes, catalogues and maintains all BEC/BRC files, records and reports. Conducts administrative duties of BEC/BRC/TLC, including scheduling, meetings, incoming and outgoing correspondence, maintaining reports and records of environmental activities, notarizing documents, and travel accommodations. Coordinate and maintain environmental process i.e., contracts, master agreements, and task orders. Support project managers with other related administrative assistance.

08/06-09/06 Basic Management Inc. & Affiliates — Henderson, NV
Receptionist

Answer phones, greet clients, organizing Conference Rooms and assisting Administrative staff when necessary. General clerical duties include, copying, filing, typing, faxing, scanning, email, shipping and mail preparations.

11/01-12/04 M. Timm Development — Santa Barbara, CA
Administrative Assistant

Assist Director of Multi Family Housing Property Management for 10 Apt. complexes located in Nebraska, Colorado and Texas. Responsibilities included, processing tenant forms, posting rents, monitoring delinquent tenant accounts, light A/P and A/R, monitoring and posting all rent deposits, processing security deposit refunds, quarterly manager commissions, assist on-site Property Managers with all aspects of their jobs making sure Policies and Procedures were followed. Clerical duties included, filing, faxing, copying, organizing, multi-tasking and meeting deadlines.

07/01-09/01 Santa Barbara Staffing — Santa Barbara, CA
Recruiter Coordinator

Responsibilities included, searching for potential candidates seeking employment via the internet/company database, candidates were contacted via phone or email and asked to come in to complete paperwork and go through an interview process. Assisted with faxes, organized files and followed up with Company Clients when necessary.

09/00-07/01 Santa Barbara Staffing — Santa Barbara, CA
Personnel Coordinator

Receptionist, answering phones, greeting applicants, setting up applicants for registration and testing, data entry, filing, faxing, copying, and assisting recruiters when necessary.

07/97-08/00 Tri-Counties Better Business Bureau — Santa Barbara, CA
Office Manager

Complaint handling, data entry, typing, faxing, filing, answering phones, all aspects of setting up arbitration hearings and processing paperwork, run monthly billing for BBB Members, light A/R, supervised staff of 4, ordered supplies, assisted V.P. and President, in charge of running business while owners were away.

SKILLS

Customer service, great people skills, excellent phone skills, type 50wpm, MS Word, Yardi Advantage, Microsoft Outlook, Internet, Excel, Power Point, Adobe Acrobat, and all standard office duties.

Richard C. Kellogg, Jr.

2716 University Boulevard
Houston, Texas 77005 USA
713-557-9775
713-660-9319 (fax)
rkellogg1@houston.rr.com (e-mail)

Employment History:

Basic Management, Inc. (and affilitates)
Henderson, Nevada
1989-present

Director (1989 to present).
Chairman of the Board (1993 to present). Conceived, developed and now implementing a conceptual land use and water rights strategy for this 50-year old industrial utility and land holding company with four operating companies located in the Las Vegas Valley. Refocused the Company on land development, while maintaining traditional utility operations; since refocus, the Company has sold over $100 million in horizontally-developed land for commercial and residential development; Company awarded NAIOP prizes for excellence in commercial development (2001); presently in the annexation, remediation, and redevelopment phases of a 2,400 acre master-planned mixed-use community, *Provenance*, the largest brown-field redevelopment project in the world today.

Pioneer Companies, Inc.
Houston, Texas
1988-2001

1988-97: Chairman of the Board and Chief Executive Officer. Conceived and led the leveraged buy-out of the Stauffer Chlor Alkali Company from Imperial Chemical Industries plc in 1988. Led six subsequent add-on transactions: Saguaro Power Company (1989), All Pure Chemical Company (1990), Imperial West Chemical Company (1990), GPS Pool Supply (1994), Kemwater North America (1996), TC Products, Inc. (1996); and conceived of two others: Occidental Chemical Company- Tacoma plant (1997), ICI- Canadian Forest Products Division (1997). Implemented Total Quality Improvement and Associate Empowerment programs. Assembled senior corporate staff from scratch. Took the Company public in 1995 through acquisition by NASDAQ-traded company and associated issue of high-yield financing. Overall profit and loss and strategic responsibility for the Company, comprising 17 manufacturing facilities. Extensive public relations, government relations, labor relations, arbitration, and litigation experience, as well as banking and investment banking experience.
1997-2001: Director.

Grupo Transmerquim S.A.

San José, Costa Rica
1984-present

Member, Board of Directors. Co-founder of this chemical distribution business, started from grassroots, which now operates in 18 locations in 9 countries from Mexico to Peru.

Pioneer Partners 2000 LLC
Henderson, Nevada
2000-present

Chairman of the Board.

Wilmoth-Clark Exploration & Production Company, LLC
Glen Campbell, Pennsylvania
2001-present

founder and member Board of Managers

Trans Marketing Houston, Inc.
Houston, Texas
1983 to 1993

Co-founder and Vice-president. Developed and supervised an international petroleum products arbitrage trading business with annual revenues of $1 billion+.

Aectra Refining and Marketing
Houston, Texas
1981 to 1983

Partner. International refined petroleum products trading company. Responsible for gasoline trading activity. Invited to testify before U.S. House of Representatives committee investigating the impact of reformulated gasoline.

Carbonit B.V.
Amsterdam, The Netherlands
1979 to 1981

General Manager (1980-81) located in Houston and Amsterdam. Responsible for the Company's aromatics and petroleum naphtha trading activity in North America.

Holland Chemical International
Amsterdam, The Netherlands
1976 to 1979

District Manager (1978-79) located in Guatemala City. Responsible for HCI's Guatemalan subsidiary.
Trader (1976-78) located in Houston.

Industria Hondureña Exportadora, S.A.
San Pedro Sula, Honduras
1974 to 1976

Manager of this small firm engaged in the production of railroad crossties. Company expropriated by Honduran government in 1976.

Professional Affiliations:

The Chemical Manufacturers Association
Arlington, Virginia
1993 to 1997

Co-founder and member Executive Committee, Board of Directors, Chlorine Chemistry Council (C3). Drafted the mission statement for C3 and the position specification for its executive director. Served on the search committee for the executive director.

The Chlorine Institute
Washington, D.C.
1990 to 1993

Member, Board Task Group on Outreach.

The American Historical Association
Washington, D.C.

Member (no. M40268)

The Pennsylvania Forestry Association
Mechanicsburg, Pa.

Member

Education:

Rice University
Houston, Texas
1997-present

M.A,, Medieval History (January 2002). Fields studied: medieval Iberian history, medieval Spanish literature, and medieval Islamic history. Ph.D. candidate, Medieval Iberian History. Dissertation research focuses on the economic impact of anti-Semitism in late-14th and early-15th century Crown of Aragon.

University of Virginia
Charlottesville, Virginia
1970-74

B.A., Environmental Sciences, with Distinction (1974). Dean's List. University Scholar.

Landon School
Bethesda, Maryland
1966-70

High School diploma (1970), National Merit Letter of Commendation.

Civic Activities:

St. Mark's Episcopal School
Houston, Texas
1989-present

Member, Board of Trustees 1989 to present;
Chairman, Education Committee 1990;
Vice-chairman and member, Executive Committee 1990-92;
Chairman, Finance Committee 1990 to 98; 2001-present
Treasurer 1992 to present.
Supervised the creation and installation of computerized, activity-based accounting system. Instituted annual audit procedures. Responsible for the acquisition, financing, and renovation of an adjoining property which has become St. Mark's middle school. Responsible for the financing of a new gymnasium/classroom facility through the issuance of long-term bonds. Represented the School before the Bishop of Texas, other diocesan organizations, and accrediting bodies. Responsible for construction of annual budgets. Oversight responsiblity for financial performance. Responsible for the the financial aspects of reaccreditation.
Financing campus renovation through issuance of tax-free VRDB's.

Landon School
Bethesda, Maryland
1991-1999,
2000-present

Trustee 1991 to 1999; 2000-present;
Chairman, Future Planning Committee 1991-93, 2001-present;
Chairman, Finance Committee 1994 to 1999;
Member, Executive Committee 1991 to 1999, 2001-present;
Co-chairman, Endowment Campaign 2000-2001.
Developed a strategic planning methodology that links mission, program, budget, and finance. Developed an annual budget process, which is "bottom-up," by line item. Oversight responsiblity for school's financial performance. Created activity-based accounting system. Redirected funds expenditure to prioritize faculty and scholarship segments of the operating budget. Authored 10-year strategic plan, which led to endowment campaign and expanded middle school. Led a tax-exempt VRDB bond financing for construction of new middle school building and renovation of other classroom buildings. Chaired a study on adding early primary grades.

Lamar High School
Houston, Texas
1999-2001

member (elected), Parents Advisory Council

Episcopal High School
Houston, Texas

Co-founder, 1982.

Christ Church Cathedral
Houston, Texas
1993-2000

layreader

Jefferson Scholars Foundation
University of Virginia

Charlottesville, Virginia
1999-present

member, Board of Trustees
Chairman, Graduate Fellows Committee
member, Houston regional selection board (undergraduate scholars)
member, national selection board (graduate student scholars)

Nevada State College Foundation
Henderson, Nevada
2000-present

founding Board member;
Co-chairman, Architectural Planning Committee.

Center for Furniture Craftsmanship
Rockport, Maine
2001-present

Trustee;
Chairman, Capital Campaign Committee

Papers Presented:

"Partnership Between Board of Trustees and Head-of-School." Paper presented to the Annual Convention of the National Association of Independent Schools (NAIS), San Francisco, Ca., March 5, 1992.

"Prostitution as Paradigm in Fernando de Rojas' *Celestina.*" Paper presented at the Texas Tech Conference on Latin American and Iberian Languages, Literatures and Cultures: *A principios del siglo:* Reflections on Current Trends in Hispanic Literatures and Cultures, Texas Tech University, Lubbock, Tx., April 15, 2000. (Awarded first prize at Rice University for best essay in the Study of Women and Gender—Spring 2001).

"Strategic Planning: The Process Developed at Landon School." Paper presented to the Spring Meeting of the Association of Independent Schools of Greater Washington (AISGW), Bethesda, Md., April 5, 2001.

"The Organization and Structure of School Budgeting." Paper presented to the Biennial Convention of the National Association of Episcopal Schools (NAES), Houston, Tx., November 16, 2002.

Personal:

Birth date:	July 11, 1951
Civil status:	married February 25, 1978 to Janice Virginia Clark
Children:	Clark, age 22 (4th year student at the University of Virginia)
	Winnie, age 19 (1st year student at the University of Virginia)
Languages:	fluent in Spanish; reading proficiency in French and Latin
Hobbies:	woodworking, fly-fishing, photography, hiking, golf

Extensive world-wide travel

references available upon request

RANAJIT (RON) SAHU, Ph.D, QEP, REA I, CEM (Nevada), CPP (SCAQMD)
311 North Story Place
Alhambra, CA 91801
Phone: 626-382-0001
e-mail (preferred): sahuron@earthlink.net

EXPERIENCE SUMMARY

Dr. Sahu is an independent consultant who is currently the Director of Environmental Services for Basic Environmental Company (BEC) as well as the Program Manager of Basic Remediation Company (BRC) responsible for the cleanup in Henderson Nevada.

Dr. Sahu has over fifteen years of experience in the fields of environmental, mechanical, and chemical engineering including program and project management, design and specification of equipment, hazardous waste remediation, air pollution control and equipment design, combustion engineering, process engineering, energy studies, multimedia environmental regulatory compliance, transportation air quality impact analysis, multimedia compliance audits, water pollution regulatory compliance and control, multimedia permitting, multimedia/ multipathway, health risk assessments for toxics, air dispersion modeling, regulatory strategy development, and design for pollution prevention. He has over ten years of project management experience and has successfully executed over 300 projects in this time period. This includes basic and applied research, design, regulatory compliance, permitting, energy, risk, and public interface projects. He has provided comprehensive multimedia compliance assistance (encompassing all media - air, water, solid and hazardous waste, mixed waste, noise, and community issues) to numerous industrial, government, and commercial clients. His major clients include petroleum refineries, steel plants, cement companies, and the government sector. Dr. Sahu has performed projects in over 40 states, numerous local jurisdictions and internationally.

In addition to consulting, Dr. Sahu has been teaching a number of courses in several Southern California universities including UCLA, UC Riverside, and Loyola Marymount University for the past 8 years. In this time period he has also taught at Caltech, his alma mater and at USC and Cal State Fullerton.

Dr. Sahu has also provided expert witness services in a number of areas discussed above.

Attachments A, B, and C contain additional details on Dr. Sahu's air quality, remediation, and risk assessment experience. Please contact him for specific recent project experience.

EXPERIENCE RECORD

2000-present **Independent Consultant.** Providing a variety of private (industrial and law firms) and public clients with air quality, hazardous waste management, and project management consulting services.

1995-2000 Parsons ES, **Associate, Senior Project Manager and Department Manager for** Air Quality/Geosciences/Hazardous Waste Groups, Pasadena. Responsible for the management of a group of approximately 24 air quality and environmental professionals, 15 geoscience, and 10 hazardous waste profesionals providing full-service consulting, project management, regulatory compliance and A/E design assistance in all areas.

Parsons ES, **Manager for Air Source Testing Services**. Responsible for the management of 8 individuals in the area of air source testing and air regulatory permitting projects located in Bakersfield, California.

1992-1995 Engineering-Science, Inc. **Principal Engineer and Senior Project Manager** in the air quality department. Responsibilities included multimedia regulatory compliance and permitting (including hazardous and nuclear materials), air pollution engineering (emissions from stationary and mobile sources, control of criteria and air toxics, dispersion modeling, risk assessment, visibility analysis, odor analysis), supervisory functions and project management.

1990-1992 Engineering-Science, Inc. **Principal Engineer and Project Manager** in the air quality department. Responsibilities included permitting, tracking regulatory issues, technical analysis, and supervisory functions on numerous air, water, and hazardous waste projects. Responsibilities also include client and agency interfacing, project cost and schedule control, and reporting to internal and external upper management regarding project status.

Important regulatory and project experience is summarized below:

Regulatory Compliance Experience:

Responsible for tracking regulatory issues at the Federal, state, and local levels and their impacts on the regulated community. At the Federal level these include the following statutes and their consequent regulations: National Environmental Protection Act, Clean Air Act and Amendments, Clean Water Act, Toxic Substances Control Act, Resource Conservation and Recovery Act, Safe Drinking Water Act, CERCLA, SARA, OSHA (issues related to industrial and process safety), NOAA coastal oil spill regulations, and US Coast Guard regulations relating to marine pollution.

Currently familiar and experienced with regulations in the following states: California, Oregon, Washington, Nevada, Arizona, Colorado, Hawaii, New Mexico, Utah, Kansas, North Dakota, Texas, Missouri, Illinois, Indiana, Georgia, Louisiana, Florida, North Carolina, South Carolina, Virginia, New Jersey, and Massachusetts. Extremely familiar with California's local multimedia regulatory issues covering air pollution (SCAQMD Rules and Regulations, RECLAIM), water issues, hazardous waste pollution, solid waste management, and industrial safety issues in various California regions (e.g., South Coast, Bay Area, Ventura County etc.). Extensive Agency contacts at EPA (various offices and regions), state (e.g., Cal-EPA, ARB, DTSC, IWMB etc. in California), and local levels (SCAQMD, BAAQMD, Los Angeles RWQCB, Long Beach DTSC etc.).

In addition to tracking regulations such as those described above as to their impacts, Dr. Sahu has extensive experience in the changing and evolving regulatory philosophy and framework arena such as command and control versus market-oriented approaches, technology-based versus risk-based approaches, single versus multi-media approaches, incorporation of pollution prevention concepts into compliance, and permit streamlining.

Project and Client Experience:

Petroleum Refineries – For over 10 years, Dr. Sahu has extensive experience in permitting, controls, strategy development, and multimedia regulatory compliance in the US petroleum refining industry, including refineries in the SCAQMD and BAAQMD in California and other refineries in Washington, Indiana, Pennsylvania, Louisiana and Arkansas. His refinery experience includes projects with BP Oil, Unocal, Tosco, Chevron, Ultramar, Mobil, Marathon, Arco, and Shell Oil at over 15 US refineries.

Chemical Industry - Dr. Sahu has provided various consulting services to several clients (mostly small industrials) in the chemical and roofing industries. Tasks he has assisted in include: air permitting, AB2588 Plan and Report preparation, compliance assistance for EPA stormwater NPDES permitting, and plant design modifications.

Steel Industry -Specifically for the steel mini-mill industry, Dr. Sahu has been providing a variety of strategic regulatory and air pollution consulting services for the last 7 years including compliance audits, NSR/PSD regulatory compliance, permitting (including Title V), dispersion modeling and risk assessments, BACT determinations, pollution equipment conceptual design and analysis, opacity failure assessments, and regulatory strategy development. He has also, on occasion, provided consulting services in hazardous waste/remediation and water pollution control (including stormwater) matters. His clients and past clients in this industry include California Steel Industries, Oregon Steel Mills, Rocky Mountain Steel Mills, Cascade Steel Rolling Mills, GST Steel, Birmingham Steel, CitiSteel, Nucor Steel, J&L Specialty Steel, Sheffield Steel, the Steel Manufacturers of America, and the Specialty Steel Industries of North America.

Cement Industry - Dr. Sahu's clients and past clients include Holnam Cement Company, the largest producer of cement in the US, for whom he has conducted numerous air quality permitting and regulatory multimedia compliance projects including the preparation of complete Title V applications for 9 of its plants in the US. His other clients include Riverside Cement, and Southdown Cement.

Aerospace - Dr. Sahu's clients in this industrial sector include AlliedSignal (now Honeywell/GE) – for whom he was the program manager for over 10 remediation projects. In addition, past clients include Northrop Grumman Corporation. For Northrop, Dr. Sahu was the project manager for a Title V assessment project. He has done numerous comprehensive compliance audits for Northrop-Grumman at several of its plants.

Power Industry – Dr. Sahu has broad experience in air issues affecting the power industry including emissions calculations and emissions inventory issues, NSR/PSD issues (including pre- and post-WEPCO), NSPS issues, SIP compliance, Title V and permitting issues, audits, BACT for NOx, SO2, and other pollutants, and emerging technologies for mercury reduction. His experience including providing such support for coal-fired utilities, gas-fired plants, and at selected cogeneration and peaking units. In addition to several current confidential clients, Dr. Sahu has assisted the Los Angeles DWP, San Diego Gas and Electric (now Sempra), the California Energy Commission, Los Alamos National Labs, and others. He was also a member of the Grand Canyon Visibility Transport Committee and, in that project, dealt extensively with power plant emissions as well as the applicability of control technologies at coal-fired power plants.

DOE Facilities (LANL) - Dr. Sahu was the task manager for the mitigation of hazardous and mixed-waste compliance issues at the Los Alamos National Laboratory, working as part of the Ralph M. Parsons team, assisting EM-7 and EM-8 with various regulatory and design issues relating to the proposed Radioactive Liquid Waste Treatment Facility (RLWTF) and various other waste characterization issues.

DOE Facilities (Biomass Gasifier Project) - Dr. Sahu managed all of the environmental permitting and assessment (EA) for a DOE/State of Hawaii jointly-funded pilot project located in the Maui, designed to demonstrate the feasibility of using biogas (derived from various biomass feedstocks such as bagasse) in a number of applications such as producing electricity and methanol.

Title V Air Permitting - Dr. Sahu is currently assisting several industrial and government clients in Title V compliance. These clients include Northrop Grumman Corporation, AlliedSignal Corp., Oregon Steel Mills, Arco, the Steel Manufacturers Association (SMA), US Air Force Air Mobility Command, California Portland Cement, Birmingham Steel Corporation, GST Steel Corporation, Cascade Steel Corporation, Holnam Cement Company and others. These projects typically include strategic planning aspects, air quality audits, and the preparation of complete permit application packages. Applications include development of complete air emissions inventories, comprehensive determination of all applicable requirements, implementation of strategies for operational flexibility, requirements relating to monitoring, recordkeeping, and reporting, requirements for enhanced monitoring including appropriate protocols, compliance plans, etc. In addition, Dr. Sahu has been assisting facilities with preparing for life under Title V permits, focusing on minimizing corporate and individual liabilities via better compliance, properly designed audits, training, etc. Since Title V is the vehicle for implementation of all aspects of the Clean Air Act Amendments of 1990, Dr. Sahu has also assisted the clients mentioned above and others with Title I (RACT, PSD, NSR), Title III (MACT, 112(g), 112(r)), Title VI, and Title VII compliance.

Process Safety - Experienced in chemical and mechanical process engineering including design of equipment, hazard and operability analyses, safety, and control issues. Assisted in Hazop conducted for the Coca-Cola bottling plant in Downey, California.

Modeling - Familiar with the major air-dispersion models used by EPA and other regulatory agencies (SCREEN, ISC, PLUVUE, etc.). This includes models for calculating spatial and temporal concentrations of criteria pollutants and air toxics, and visibility models.

1989-1990 Kinetics Technology International, Corp. **Development Engineer.** Involved in thermal engineering R&D and project work related to low-NOx ceramic radiant burners, fired heater NOx reduction, SCR design, and fired heater retrofitting.

1988-1989 Heat Transfer Research, Inc. **Research Engineer.** Involved in the design of fired heaters, heat exchangers, air coolers, and other non-fired equipment. Also did research in the area of heat exchanger tube vibrations.

EDUCATION

B. Tech (Honors), Mechanical Engineering, 1983, IIT Kharagpur, India

M. S., Mechanical Engineering, 1984, Cal Tech, Pasadena, CA.

Ph.D., Mechanical Engineering, 1988, Cal Tech, Pasadena, CA.

TEACHING EXPERIENCE

Caltech

"Thermodynamics," Teaching Assistant, California Institute of Technology, 1983, 1987.

"Air Pollution Control," Teaching Assistant, California Institute of Technology, 1985.

"Caltech Secondary and High School Saturday Program," - taught various mathematics (algebra through calculus) and science (physics and chemistry) courses to high school students, 1983-1989.

"Heat Transfer," - taught this course in the Fall and Winter terms of 1994-1995 in the Division of Engineering and Applied Science.

"Thermodynamics and Heat Transfer," Fall and Winter Terms of 1996-1997.

U.C. Riverside, Extension

"Toxic and Hazardous Air Contaminants," University of California Extension Program, Riverside, California. Since 1992.

"Prevention and Management of Accidental Air Emissions," University of California Extension Program, Riverside, California. Since 1992.

"Air Pollution Control Systems and Strategies," University of California Extension Program, Riverside, California, Summer 1992-93, Summer 1993-1994.

"Air Pollution Calculations," University of California Extension Program, Riverside, California, Fall 1993-94, Winter 1993-94, Fall 1994-95.

"Process Safety Management," University of California Extension Program, Riverside, California. Since 1992.

"Process Safety Management," University of California Extension Program, Riverside, California, at SCAQMD, Spring 1993-94.

"Advanced Hazard Analysis - A Special Course for LEPCs," University of California Extension Program, Riverside, California, taught at San Diego, California, Spring 1993-1994.

Loyola Marymount University

"Fundamentals of Air Pollution - Regulations, Controls and Engineering," Loyola Marymount University, Dept. of Civil Engineering. Since 1993.

"Air Pollution Control," Loyola Marymount University, Dept. of Civil Engineering, Fall 1994.

"Environmental Risk Assessment," Loyola Marymount University, Dept. of Civil Engineering. Since 1998.

University of Southern California

"Air Pollution Controls," University of Southern California, Dept. of Civil Engineering, Fall 1993, Fall 1994.

"Air Pollution Fundamentals," University of Southern California, Dept. of Civil Engineering, Winter 1994.

University of California, Los Angeles

"Air Pollution Fundamentals," University of California, Los Angeles, Dept. of Civil and Environmental Engineering, Spring 1994, Spring 1999, Spring 2000.

International Programs

"Environmental Planning and Management," 5 week program for visiting Chinese delegation, 1994.

"Environmental Planning and Management," 1 day program for visiting Russian delegation, 1995.

"Air Pollution Planning and Management," IEP, UCR, Spring 1996.

"Environmental Issues and Air Pollution," IEP, UCR, October 1996.

PROFESSIONAL AFFILIATIONS AND HONORS

President of India Gold Medal, IIT Kharagpur, India, 1983.

Member of the Alternatives Assessment Committee of the Grand Canyon Visibility Transport Commission, established by the Clean Air Act Amendments of 1990, 1992-present.

American Society of Mechanical Engineers: Los Angeles Section Executive Committee, Heat Transfer Division, and Fuels and Combustion Technology Division, 1987-present.

Air and Waste Management Association, West Coast Section, 1989-present.

PROFESSIONAL CERTIFICATIONS

EIT, California (# XE088305), 1993.

REA I, California (#07438), 2000.

Certified Permitting Professional, South Coast AQMD (#C8320), 1993.

QEP, Institute of Professional Environmental Practice, 2000.

CEM, State of Nevada (#EM-1699). Expiration 10/07/2001.

PUBLICATIONS (PARTIAL LIST)

"Physical Properties and Oxidation Rates of Chars from Bituminous Coals," with Y.A. Levendis, R.C. Flagan and G.R. Gavalas, *Fuel*, **67**, 275-283 (1988).

"Char Combustion: Measurement and Analysis of Particle Temperature Histories," with R.C. Flagan, G.R. Gavalas and P.S. Northrop, *Comb. Sci. Tech.* **60**, 215-230 (1988).

"On the Combustion of Bituminous Coal Chars," PhD Thesis, California Institute of Technology (1988).

"Optical Pyrometry: A Powerful Tool for Coal Combustion Diagnostics," *J. Coal Quality*, **8**, 17-22 (1989).

"Post-Ignition Transients in the Combustion of Single Char Particles," with Y.A. Levendis, R.C.Flagan and G.R. Gavalas, *Fuel*, **68**, 849-855 (1989).

"A Model for Single Particle Combustion of Bituminous Coal Char." Proc. ASME National Heat Transfer Conference, Philadelphia, **HTD-Vol. 106**, 505-513 (1989).

"Discrete Simulation of Cenospheric Coal-Char Combustion," with R.C. Flagan and G.R.Gavalas, *Combust. Flame*, 77, 337-346 (1989).

"Particle Measurements in Coal Combustion," with R.C. Flagan, in "**Combustion Measurements**" (ed. N. Chigier), Hemisphere Publishing Corp. (1991).

"Cross Linking in Pore Structures and Its Effect on Reactivity," with G.R. Gavalas in preparation.

"Natural Frequencies and Mode Shapes of Straight Tubes," Proprietary Report for Heat Transfer Research Institute, Alhambra, CA (1990).

"Optimal Tube Layouts for Kamui SL-Series Exchangers," with K. Ishihara, Proprietary Report for Kamui Company Limited, Tokyo, Japan (1990).

"HTRI Process Heater Conceptual Design," Proprietary Report for Heat Transfer Research Institute, Alhambra, CA (1990).

"Asymptotic Theory of Transonic Wind Tunnel Wall Interference," with N.D. Malmuth and others, Arnold Engineering Development Center, Air Force Systems Command, USAF (1990).

"Gas Radiation in a Fired Heater Convection Section," Proprietary Report for Heat Transfer Research Institute, College Station, TX (1990).

"Heat Transfer and Pressure Drop in NTIW Heat Exchangers," Proprietary Report for Heat Transfer Research Institute, College Station, TX (1991).

"NOx Control and Thermal Design," Thermal Engineering Tech Briefs, (1994).

.....

"From Puchase of Landmark Environmental Insurance to Remediation: Case Study in Henderson, Nevada," with Robin E. Bain and Jill Quillin, presented at the AQMA Annual Meeting, Florida, 2001.

"The Jones Act Contribution to Global Warming, Acid Rain and Toxic Air Contaminants," with Charles W. Botsford, presented at the AQMA Annual Meeting, Florida, 2001.

PRESENTATIONS (PARTIAL LIST)

"Pore Structure and Combustion Kinetics - Interpretation of Single Particle Temperature-Time Histories," with P.S. Northrop, R.C. Flagan and G.R. Gavalas, presented at the AIChE Annual Meeting, New York (1987).

"Measurement of Temperature-Time Histories of Burning Single Coal Char Particles," with R.C. Flagan, presented at the American Flame Research Committee Fall International Symposium, Pittsburgh, (1988).

"Physical Characterization of a Cenospheric Coal Char Burned at High Temperatures," with R.C. Flagan and G.R. Gavalas, presented at the Fall Meeting of the Western States Section of the Combustion Institute, Laguna Beach, California (1988).

"Control of Nitrogen Oxide Emissions in Gas Fired Heaters - The Retrofit Experience," with G. P. Croce and R. Patel, presented at the International Conference on Environmental Control of Combustion Processes (Jointly sponsored by the American Flame Research Committee and the Japan Flame Research Committee), Honolulu, Hawaii (1991).

"Air Toxics - Past, Present and the Future," presented at the Joint AIChE/AAEE Breakfast Meeting at the AIChE 1991 Annual Meeting, Los Angeles, California, November 17-22 (1991).

"Air Toxics Emissions and Risk Impacts from Automobiles Using Reformulated Gasolines," presented at the Third Annual Current Issues in Air Toxics Conference, Sacramento, California, November 9-10 (1992).

"Air Toxics from Mobile Sources," presented at the Environmental Health Sciences (ESE) Seminar Series, UCLA, Los Angeles, California, November 12, (1992).

"Kilns, Ovens, and Dryers - Present and Future," presented at the Gas Company Air Quality Permit Assistance Seminar, Industry Hills Sheraton, California, November 20, (1992).

"The Design and Implementation of Vehicle Scrapping Programs," presented at the 86th Annual Meeting of the Air and Waste Management Association, Denver, Colorado, June 12, 1993.

"Air Quality Planning and Control in Beijing, China," presented at the 87th Annual Meeting of the Air and Waste Management Association, Cincinnati, Ohio, June 19-24, 1994.

Attachment A

Air Quality Experience

In the air pollution area, Dr. Sahu has been extensively involved in: compliance audits, permitting (including Title V as well as state and local air permitting), emissions inventory preparations for criteria and air toxic emissions for numerous sources; control technology determinations for NSPS, NESHAPS, PSD, BACT/RACT/MACT/LAER particularly for NOx, PM10, and air toxics control including cost-effectiveness determinations; and regulatory compliance for stationary and mobile sources for a number of industries, both heavy (petroleum refining, steel, aerospace, cement, chemical process industries, pulp and paper) and light (small business entities) as well as government institutions (Air Force, Navy, DOE) and agencies. His experience also includes regulatory planning, permitting, special studies (scrapping of automobiles, visibility analysis, odor control, community management strategies etc.), dispersion modeling (all major US EPA air regulatory models), health risk risk assessment (for air toxic compounds), and design support for new and modified plant changes.

Dr. Sahu has experience in Federal, state (California, Hawaii, Washington, Oregon, Texas, New Jersey, Indiana, Illinois, Pennsylvania, Alaska, Colorado, Utah, Mississippi, South Carolina, Michigan, Ohio, Arizona, and New Mexico) and local (e.g., various regions in California) air permitting requirements and regulations. He is a Certified Permitting Professional at the SCAQMD and an EIT in the state of California.

In addition to consulting for urban air pollution issues noted above, Dr. Sahu has performed several projects in the Stratospheric Ozone Depletion area (pollution prevention, CFC phase-out, design modifications) and in the assessment of CO2 and greenhouse gas emissions from major sources. Dr. Sahu has also taught courses (at the University level and for foriegn delegations) in Global Climate Change, particularly focussed on the issues of emissions inventories for greenhouse gases, the development of CO2 mitigation strategies, cost-effectiveness issues, public and governmental acceptance issues, and issues related to the scientific uncertainties in current Global Climate Change Models.

Attachment B

Remediation

Dr. Sahu's environmental management and consulting experience covers the last 11 years. However, specific environmental remediation management experience in the last 5 years is as follows:

At Parsons Dr. Sahu was Manager of Hazardous Waste, Geosciences, Industrial Wastewater and Air Quality Departments in Pasadena, California. As Manager of this group of over 50 professionals (including engineers, geologists, environmental scientists), he was responsible for the proper execution of over 100 environmental management projects every year. His involvement in these projects extended from (a) strategic planning (i.e., defining the problem, determining the best method to move forward, interacting with regulatory agencies, etc.); (b) conducting and overseeing the development of environmental documents such as Phase I/II Site Assessments, Remedial Investigations, Feasibility Studies, Remedial Action Plans, Work Plans, Development of Conceptual and Detailed Designs for soil and groundwater remediation, permits, etc.; (c) conducting and overseeing various technical analyses such as modeling of contaminant and media flows in groundwater and air pathways and conducting risk assessments; (d) interacting with external laboratories relating to sampling and analysis; (e) ensuring regulatory acceptance of project strategy, methodology, and results; and (f) direct project management. Most of the work was performed for industrial clients, public clients, and the Federal DOD. Clients include Honeywell/AlliedSignal, Basic Remediation Company, Los Angeles Unified School District, various oil companies (Shell, Arco), and numerous small/medium businesses. Federal DOD clients included the Navy and the Air Force.

For the last 10 years, he has been actively involved in regulatory compliance consulting for numerous clients – this includes conducting compliance audits, determining permitting and recordkeeping needs, and interacting with agencies such as EPA, over 30 state agencies such as various DEQs, DEPs, DHECs, etc., various air quality districts such as SCAQMD in Southern California, Department of Toxics Substances Control in California, and various Regional Water Quality Control Boards in California.

Management of RCRA Waste - For several clients, he has also provided services in waste management activities (i.e., auditing, waste characterization and identification, proper waste storage, labeling, and handling, waste manifesting and disposal, record-keeping). This includes RCRA wastes, "California" wastes, and Universal wastes. He has personally managed numerous such projects during the last 10 years.

Site Investigation – Conducted and supervised over 20 such investigations over the last 2 years alone – mostly industrial clients.

Response/CleanUp to/of Release of Hazardous Substance – involved in 2 response situations in the past 2 years.

Attachment C

Risk Assessment

General Health Risk Assessment

Dr. Sahu has managed over 200 projects in the areas of risk assessment (covering hazard identification, dose-response assessments, exposure analysis, and risk determination), risk management, risk communication, and risk perception analysis. These projects covered a variety of situations with multimedia exposures in urban and rural settings, and were conducted in order to support permitting and legal drivers.

Dr. Sahu's specializes in both the technical as well as the communication and perception aspects of risk assessment and management. On the technical side he is an expert in hazard identification, pollutant fate and loading analysis, exposure analysis (using traditional non-statistical exposure algorithms as well as probabilistic methods using Monte Carlo methods), and risk determination due to chemical and non-chemical (radioactive) insults resulting in both cancer and/or non-cancer outcomes in humans. He is also very familiar with current developments in chemical toxicity and the determination of toxicological parameters from animal and epidemiological studies. He is also familiar with recent developments in ecological risk assessments.

He is familiar with the entire range of currently used models and guidance in this area covering hazard identification, exposure analysis, and risk determination - with expertise not only on the current underlying basis of these models but also in the uncertainties inherent in them. These includes models and guidance include those developed by US EPA, DOE, and FDA and by several states such as California as well as by professional organizations such as ASTM. He is also expert in probabilistic analysis tools such as Crystal Ball and @Risk.

Non-Ionizing Radiation

In a related area, Dr. Sahu has expertise in the area of assessing risks from non-ionizing radiation such as from electromagnetic forces (EMF) generated in transportation and power distribution systems. He has conducted a number of assessments of EMF impacts from proposed Maglev transportation systems.

Process Safety and Risk Management

Finally, Dr. Sahu has over 7 years of direct consulting and teaching experience in the area of prevention and analysis of accidental risks such as due to industrial malfunctions and accidents. His expertise includes the preparation of OSHA Process Safety Management (PSM) documents, and EPA Risk Management Plan (RMP) documents.

Teaching

In addition to consulting, Dr. Sahu teaches/has taught various pollution control and risk analysis courses since 1994 at the graduate level at the University of California Los Angeles, University of California Extension, Riverside, USC, and Loyola Marymount University.

Certifications

He is an REA in California as well as a CEM in Nevada. He is also a QEP as defined by the IPEP. Finally, Dr. Sahu has attended various Risk Assessment and Risk Communication courses conducted by EPA.

Example Project Experience

US DOE/PICHTR Biomass Gasifier Risk Assessment Study - Maui, HI - this comprehensive multipathway, multi-receptor (infant, child, adult - worker and public), cancer and non-cancer risk assessment was prepared to support permitting of a process gasifier in a sensitive area in Maui, HI.

Port of Portland Swan Island Risk Assessment - this air pathway risk assessment due to emissions from a shipyard and its impacts on residential neighbors included extensive regulatory agency and public interaction as well as

challenging technical analyses focussing on the critical impacts of relevant toxicological parameters (unit risk factors, PELs. etc.) and exposure assessment factors on risk. Additionally, the project involved extensive public outreach efforts and risk communication issues with the general public.

DOD Confidential Landfill - this risk assessment included the analysis of offsite risks associated with prior wastes disposed at this landfill.

Pesticide Pit, UCR - this assessment focussed on the risks posed by pesticides disposed of at this site.

AlliedSignal/Honeywell – Risk assessment was used extensively as a tool during this project (consisting of over 8 sites in various southern California and Oregon locations) which involved site characterization for soils and groundwater, design of remedial alternatives, regulatory negotiations, and site closure, risk assessment [using DTSC Preliminary Endangerment Analysis (PEA), ASTM RBCA methods, and EPA guidance]. Most of the site closures were risk based. Contaminants included TPH, BTEX, and chlorinated solvents.

Los Angeles Unified School District – assisting in the assessment of suitability of many sites for potential school uses. This includes risk screening using DTSC PEA methods and EPA guidance. Typical contaminants include TPH, BTEX, chlorinated solvents, metals, and pesticides.

Basic Remediation Company – program manager for risk-based closure and restoration (to residential land uses) of a large historically contaminated site in Henderson, Nevada, with extensive prior industrial effluent disposal. He is providing oversight for the many risk assessments being conducted as part of the project including statistical sampling based confirmatory data analysis, geospatial analysis, COPC determination methods, assessment of site background conditions, DQO activities, risk pathway selection, assessment of exposure parameters (deterministic and probabilistic), and the presentation of risk calculations to regulators and the public. COPCs at the site include selected VOCs, semi-volatiles, organochlorine pesticides, asbestos, various metals including lead and arsenic, dioxins, perchlorate, PCBs, and radioactive nuclides.

In addition to the above, he has completed/managed over 30 risk assessments in a variety of industries including aerospace, refineries, and steel plants in the last 5 years.

Melody J. Cannon

Henderson, NV 89074
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SUMMARY

Government affairs, public information and outreach professional with more than 12 years experience developing, managing, and implementing public relations, public outreach and marketing communication strategies that achieve results. Accomplished in building positive relationships with media professionals, community leaders and business associates. Experienced managing a wide range of public relations activities, including event planning, advertising strategies, creation of multi-media presentations, and Web site development.

AREAS OF EXPERTISE

- Community Relations
- Marketing Strategies
- Event and Meeting Planning
- Graphic Design
- Government Affairs
- Print Production
- Web Site Management
- Strategic Planning
- Media Relations
- Multi-Media Presentations
- Promotional Materials
- Public Speaking

EDUCATION

Eastern Illinois University, Charleston, IL *1990*
B.A., Journalism

EXPERIENCE

B&P Advertising, Media & Public Relations, Las Vegas, NV Sep. 2007 - Present
Senior Public Relations Account Manager
Responsible for managing needs of public relations clients. Write, edit and distribute general news releases, advisories, and other information for distribution to local, regional, national and trade media outlets. Writing and editing of newsletter articles and various other documents for clients. Coordinate media interviews and respond to media requests for information.

Las Vegas Valley Water District, Las Vegas, NV Jul. 2005 - Sep. 2007
Public Information Coordinator
Coordinated development of Internet and Intranet projects through collaborative efforts. Prepared comprehensive communication outreach plan for each project. Developed and updated procedures and policies for projects. Conducted research and provided project management to identify needs, external and internal, that could be improved or enhanced through services offered on the Web site. Researched, developed plans and prepared for Web site redesigns. Coordinated Web site messaging with other departments. Managed email form submissions, forwarding to appropriate departments or providing answers to customers.

PBS&J, Henderson, NV Oct. 2003 - Jun. 2005
Public Information Officer
Responsible for managing the public outreach efforts of major projects, including direct relationship with client, the Nevada Department of Transportation. Coordinated project office staffing. Identified public outreach needs and made recommendations to client. Coordinated and participated in government briefings, town hall meetings, and public information meetings to maximize public involvement and keeping

the affected neighborhoods informed of construction news. Redesigned and created new collateral material including a tri-fold brochure, an electronic newsletter and a project outreach web site. Supervised door-to-door survey for major transportation study.

Nevada State College, Henderson, NV May 2003 - Aug. 2003
Public Information Officer
Assisted in public affairs and external communications. Wrote and edited news releases. Planned, developed and executed advertising in state-wide newspapers. Acted as spokesperson. Developed advertising and marketing budget for 2003/2004 year.

Santa Barbara County Assoc. of Governments, Santa Barbara, CA Sep. 2001 - May 2002
Public Information / Government Affairs Coordinator
Planned, organized, and coordinated the overall public relations activities, evaluated community outreach and desired impact, developed new methods of outreach and positive media relations to increase credibility, and monitored process to ensure compliance with state and federal regulations. Developed and implemented redesign of Website to increase available information and understanding of technical programs and planning. Wrote, produced, and disseminated press releases, newsletters, and an informational brochure. Coordinated public meetings and events to maximize public involvement in the transportation planning process. Researched and monitored legislation, reporting to the Board on possible consequences. Prepared and presented detailed staff reports for board presentations on various projects, including a revised public participation plan and Disadvantaged Business Enterprise plan. Acted as spokesperson.

U.S. House of Representatives, Farmington, MO Apr. 1998 - Oct. 2000
District Office Manager
Represented Member of Congress at local meetings and events, developed positive relationships with constituents, media and government agencies, making resources of the Congressional office more accessible and assisted constituents with problems or challenges. Planned and managed events and meetings with constituents and media for Member of Congress. Coordinated between state and federal agencies when rural hospital shut down to keep necessary licenses in place while other options were being explored. Attended and spoke at county-wide public meetings to keep residents informed of progress. Met with county elected officials to discuss options.

Krekeler Jewelers, Farmington, MO Aug. 1997 – Apr. 1998
Retail sales and marketing
Assisted customers with retail jewelry purchases including diamonds, gems and watches. Set up a new retail pricing and coding computer-based system. Responsible for setting up displays as needed.

REFERENCES

References available upon request.

Robert J. Gegenheimer, C.E.M.
Senior Project Manager

EDUCATION

BS Geology, University of Nevada, Las Vegas, NV 1986

REGISTRATIONS/CERTIFICATIONS

CEM, Nevada (EM-1228)
OSHA 40-Hour Hazardous Waste Site Operations Course
8-Hour Supervisory Hazardous Substances & Waste Health and Safety Course
DOT-49 CFR Hazardous Material Transportation Regulations Course

MEMBERSHIPS

Air & Waste Management Association
National Ground Water Association

EXPERIENCE

Mr. Gegenheimer has been an environmental consultant since 1989. He has been in responsible charge of a variety of environmental projects including environmental property evaluations, subsurface investigations, underground storage tank removal oversight, remedial system design and installation, regulatory compliance issues and air quality permitting efforts. Principle areas of responsibility included site reconnaissance, records review, personal interviews, aerial photograph review, report generation, Quality Assurance/Quality Control, technical review, and report preparation of Phase I Environmental Assessments. Mr. Gegenheimer has worked on a large number of projects related to UST work. His responsibilities have included oversight of UST removal activities, designing and conducting subsurface investigations, design and implementation of remedial measures, management of Petroleum Fund Cases, overall project management activities, client maintenance, and interaction with regulatory officials. Mr. Gegenheimer has worked closely with a variety of regulatory agencies and maintains a working relationship with personnel from the State of Nevada and Clark County Department of Air Quality Management. Prior to his work in the environmental consulting field, Mr. Gegenheimer was employed for 3 years at the Nevada Test Site as a Radiological Safety Technician specializing in the disposal of low-level nuclear waste.

REPRESENTATIVE PROJECTS

UNDERGROUND STORAGE TANKS

Former National Rent A Car, Las Vegas, Nevada – This facility was formerly operated as the National Car Rental facility at McCarran International Airport. Mr. Gegenheimer is currently managing a project here that involves quarterly groundwater monitoring and sampling and temporary remedial activities at this site. The facility had an underground storage tank (UST) system for fueling of fleet vehicles. Impacts to groundwater consist of petroleum hydrocarbons including MTBE. Sampling is conducted quarterly using standard purge and sample methods. Temporary remedial activities consist of the use of a mobile vacuum truck to conduct periodic dual phase extraction events. Two events are conducted per month. Petroleum hydrocarbon concentrations in groundwater have generally been decreasing since remedial efforts began. The site was recently demolished and all rental car agencies are moved to a new facility. At that time, the UST system was removed, impacted soil was excavated and the use of a permanent remedial system is being evaluated. Mr. Gegenheimer has worked closely with staff from the

NDEP during this project in determining site characterization and remedial activities, and in attempting to have the facility enrolled in the Petroleum Fund.

Former Red Rock Mini Mart, Las Vegas, Nevada - The project site was previously used as a gasoline station/convenience store. During UST removal activities, petroleum hydrocarbon impacts were noted. Site characterization activities were conducted, and remediation of the identified impacts was undertaken. Initial remedial efforts consisted of groundwater extraction and treatment technologies. Over time, groundwater levels decreased at the site making this technology infeasible. A new remedial approach has since been implemented consisting of the injection of a dilute hydrogen peroxide solution. An Underground Injection Control Permit was obtained for the site in order to conduct the injection activities. Currently, hydrogen peroxide is injected twice a month and monitoring is conducted quarterly. All work is being conducted with approval of the NDEP. This site is eligible for reimbursement under the State of Nevada Petroleum Fund and Converse has worked closely with their staff to ensure maximum possible reimbursement of costs. As Project Manager, Mr. Gegenheimer was responsible for the technical approach to remedial activities, Petroleum Fund submittals, client interaction and senior review of all correspondence. Also responsible for day to day management of the project including scheduling field activities, managing budgets, preparing permit applications as needed and preparing reports and client maintenance.

Underground Storage Tank Removal, Former Expressway Automotive, Las Vegas, Nevada - Converse oversaw the removal of 5 underground storage tanks (USTs) and associated dispensers/piping from a former gas station as a part of the US 95 Expansion Project for the Nevada Department of Transportation. The USTs consisted of one 12,000 gallon capacity tank used for gasoline, two 10,000 gallon capacity tanks used for gasoline, one 10,000 gallon capacity tank used for diesel, and one 550 gallon capacity tank used for used oil. The USTs were installed in 1992 and were constructed of double walled fiberglass. The associated piping was also double walled fiberglass. In addition, three hydraulic lifts and associated reservoirs were removed from inside the service building located at the site. Converse documented the conditions of the UST system during removal; conducted appropriate sampling of native soil beneath the tanks, product dispensers, and hydraulic lifts; and prepared documentation for submittal to the Clark County Health District to facilitate closure of the facility. As Project Manager, Mr. Gegenheimer, coordinated all local activities for Nevada Department of Transportation associated with the removal of underground storage tanks and the demolition of the facility.

Terrible Herbst Oil Company - Was responsible for the oversight of all environmental activities at over 20 petroleum hydrocarbon impacted sites. Site status ranged from the initial assessment phase, enrollment in state petroleum funds, development of corrective action plans to implementation of corrective action measures.

Multiple Clients– Conducted UST removal oversight and site investigation activities at multiple facilities. Projects ranged from assessment to remediation and included drilling oversight, well installation, sampling, implementing corrective action, and obtaining site closures. Clients include Texaco Refining and Marketing, Inc., Unocal Corp., Western Energetix, Flying J Inc., Chevron and Mobile.

GENERAL INVESTIGATION/ASSESSMENT ACTIVITIES:

Basic Remediation Company – Mr. Gegenheimer is currently managing a project that involves quarterly groundwater monitoring and sampling of approximately 109 groundwater monitoring wells located East of Boulder Highway and South of the Las Vegas Wash. The wells are sampled for a wide variety of compounds including general chemistry, volatile organic compounds, perchlorate and a radiological suite. Daily activities include coordination with multiple Laboratories to ensure proper hold times are met, confirmation of sample deliveries and quality

assurance utilizing chain of custody protocols. Two teams of two are used in the sampling event. Each team utilizes and is proficient in low-flow portable bladder pump and dedicated bladder pump sampling equipment

PCE Investigation/Remediation, University Plaza, Las Vegas, Nevada - Converse conducted site characterization activities related to a release of PCE from a dry cleaning facility. Included installation and sampling of groundwater monitoring wells, evaluation of aquifer characteristics through aquifer testing, design of a remedial alternative and preparation of a corrective action plan which has been approved by the State of Nevada. As Project Manager, Mr. Gegenheimer was responsible for all aspects of this project including designing site assessment activities, design and selection of an appropriate remedial alternative, preparation of a corrective action plan and interaction with the State of Nevada, Division of Environmental Protection.

Rainbow Gardens Assessment, Rainbow Gardens Geologic Preserve, Las Vegas, Nevada - Converse conducted an assessment of multiple areas of concern throughout the property. Areas of concern included mine tailings, stained soil, wire burn "pits" and target shooting areas. The assessment was conducted to identify potential contaminants in surface soil, and hazardous waste determinations were made. As Project Manager, Mr. Gegenheimer was responsible for all aspects of this project including designing site assessment activities, preparation of a sampling plan, conducting field sampling and report preparation.

Sunrise Highlands, Las Vegas, Nevada - The site consists of approx. 160 acres of land planned for a single family residential development. Formerly, the site was used as a gravel pit and cement/asphalt plant. Facility operations, buildings, a garage/lube building, truck scales and a concrete batch process plant were located on the site. Vehicle fueling and maintenance operations were conducted in this area and there were aboveground storage tanks for diesel fuel. Former underground storage tanks for gasoline, used and new motor oil were also located on the property. During completion of Phase I and Phase II site assessments, Converse identified several areas of concern associated with the former uses of the site. An aggressive remedial approach was undertaken consisting of the excavation and removal of impacted soil combined with the preparation of a risk assessment for impacted soil that was not removed. Over 150,000 tons of impacted material was removed from the site for treatment at a licensed treatment facility. As Project Manager, Mr. Gegenheimer was in charge of the overall clean up of impacts identified during previous site characterization efforts. Responsibilities included coordination and negotiation with the State of Nevada regarding clean up goals and activities, oversight of day to day remedial efforts and client interaction.

Confidential Client - Provided Phase I and Phase II evaluations of an approximate 950-acre facility consisting of 31 separate areas utilized for the production of small rocket propellants, including two open burn pits for the treatment of propellant waste.

U.S. Army Corps of Engineers – Provided hazardous material assessment at a former fire training area to evaluate the possibility of past fire training activities resulting in a release of hazardous materials.

Nevada Power Company – Provided assessment of PCB storage yard, inclusive of surface soil sampling and shallow subsurface drilling.

Nevada Power Company– Provided assessment and cleanup of a release from a transformer at a remote site near Jean, Nevada. Responsibilities included sampling, remediation, and site restoration activities.

State of Nevada, Department of Transportation – Provided assistance with issues relating to Underground Injection Control at various sites throughout Nevada.

AIR QUALITY AND REGULATORY COMPLIANCE

Las Vegas Paving Corporation – Provided development of emissions inventories and prepared permitting documents for modifications to aggregate processing and hot mix asphalt facilities. Submitted documentation designed to have certain facilities removed from major source status.

Powertrusion 2000 – Developed emissions inventory and prepared permitting documents for a pultrusion facility in Clark County, Nevada. Duties included detailed negotiations with County personnel regarding new MACT standards for the industry.

Various Hotel/Casino Resorts - Developed emissions inventories, calculated potential emissions, and prepared permitting documents for all sources of regulated air pollutants at various facilities. Facilities for which I have provided such services include The Bellagio, Paris, Fiesta, Lake Las Vegas, Hilton Grand Vacations, Four Seasons, and The Cannery.

Multiple Clients – Provided visible emissions observation (opacity) testing at multiple sites, inclusive of regulatory agency coordination consisting of protocol documentation and final result reports submittal. Clients include Las Vegas Paving Corporation, CSR Associated, Denman Construction, PABCO Gypsum, and James Hardie Gypsum.

Multiple Clients – Provided assistance in preparation of annual reports and emission inventories for a variety of industry types. Clients include Denman Construction, James Hardie Gypsum, and Valence Technology.

Clark County Health District - Conducted an assessment of the need for establishing a small business assistance program within Clark County to aid businesses with permitting and compliance issues related to air quality regulations. Project consisted of identifying affected business types, a regulatory review, conducting various surveys, reviewing federal small business assistance program requirements, interviewing existing programs, evaluating all data and presenting the results to the Board of Health.

Las Vegas Valley Water District – Provided countywide evaluation of LVVWD facilities relating to regulatory compliance issues; identified specific areas of concern and provided assistance with establishing company's conformity with such issues. His involvement Included the establishment of the LVVWD environmental program.

PABCO Gypsum Company – Provided assistance in the preparation of permitting documents for a proposed modification to a gypsum wallboard manufacturing facility, inclusive of all documentation. Completed an extensive review of Part 70 operating permit and prepared documentation designed to modify many of the permit conditions.

James Hardie Gypsum (BPB Gypsum) – Mr. Gegenheimer conducted an in-depth analysis of all emission units at the wallboard manufacturing facility to evaluate applicable NSPS regulations and submitted documents in assistance with company's Title V Permitting activities.

Clark County Health District - Conducted an evaluation of the effectiveness of wet suppression systems to control fugitive dust emissions from aggregate processing plants. Consisted of negotiating with existing plant operators to obtain usage of their facilities in the study, developing a work scope, work plan preparation, coordination and oversight of all field activities, data

evaluation/interpretation and presentation of a final report to the Particulate Matter Research Advisory Committee.

CSR Associated – Developed of emissions inventories and prepared permitting documents for modifications to a facility consisting of two concrete batch plants and an aggregate processing plant, inclusive of all applicable documents. Submitted documentation designed to have the facility removed from major source status.

California Portland Cement Company - Provided development of emissions inventories and prepared permitting documents for proposed Portland cement bulk storage and delivery facility inclusive of all applicable documents.

Las Vegas Block, LLC – Provided permitting documents preparation for a proposed block manufacturing facility, inclusive of all applicable documents.

HAZARDOUS MATERIAL ASSESSMENT

Nevada Test Site - Provided monitored cleanup of contaminated areas and equipment, processing waste manifests and receiving and off-loading incoming material at the low-level radioactive waste facility.

Parball Corporation - Conducted a review of facility activities to determine hazardous wastes generated and prepared a hazardous waste management plan for facility operations.

United States Postal Service – Prepared *Biennial Hazardous Waste Reports* for two separate USPS facilities.

Valence Technology, Inc. – Prepared *Biennial Hazardous Waste Reports* for waste generated during the 2001 calendar year.

LANDFILL

Clark County Public Works Department - Provided an evaluation of present landfill covers at various rural landfills utilizing the HELP model. Prepared a report that allowed the County to obtain closure status for these landfills without having to modify existing covers.

Republic Services of Southern Nevada – Provided oversight of the Surface Emissions Monitoring program at the APEX Regional Landfill. Project included using a SEM 500 methane detection meter and a GPS system to evaluate surface emissions at the closed cells at the landfill.

SANITARY SEWER/WASTEWATER

Clark County School District – Provided technical specifications and bidding document for upgrade of an on-site sanitary sewer system including installation of a wastewater pretreatment system for the removal of metals from the wastewater stream.

Clark County School District – Provided technical specifications and bidding documents for upgrade of an on-site sanitary sewer system. Responsibilities included obtaining bids and providing ongoing construction oversight activities.

POLLUTION PREVENTION

United States Postal Service – Provided Pollution Prevention Plans for two USPS vehicle maintenance facilities. This consisted of conducting waste stream evaluations, quantifying amounts of waste generated, evaluating possible methods by which to reduce waste and providing recommendations for waste reduction.

U.S. Army Corps of Engineers – Provided research and prepared reports for approximately 26 facilities regarding regulatory compliance issues relating to PCB usage, discharge to storm sewer systems, CFC usage, underground and above ground storage tanks.

LEAD BASED PAINT

Housing Authority of the City of Las Vegas, Las Vegas, Nevada. Senior Project Manager – provided lead based paint survey of over 100 units preparing a preliminary field services manual and final report.

Kurt A. Goebel, P.G., C.E.M.

Senior Vice President
Environmental Division Manager

EDUCATION

M.S., Geology, University of Nevada Las Vegas, 1989
B.S., Geology, Western Illinois University, 1985

REGISTRATIONS/CERTIFICATIONS

Nevada Certified Environmental Manager, EM-1231
40-Hour Health and Safety Training and 8-Hour Refresher
8-Hour Health and Safety Supervisors Training
Professional Geologist – Nevada
Registered Hazardous Substances Professional, RHSP-294

MEMBERSHIPS

American Institute of Architects (AIA) Committee on the Environment (COTE) - Steering Committee
Air & Waste Management Association (AWMA) – Chairperson (past)
American Council Engineering Companies (ACEC) – SGAC Environmental Subcommittee Chairman
Geological Society of Nevada –past President
UNLV Continuing Education Instructor -- active
American Institute of Architects (AIA) -- Member

ADDITIONAL TRAINING

- How to Manage Projects, Priorities & Deadlines
- How to Supervise People
- Pesticides: Risk Evaluation and Site Mitigation
- Perchlorate Stakeholder Forum
- Nevada State Petroleum Fund Workshops
- UST Site Assessment and Sampling Technology Seminar
- NWWA/ AWMA/GSN/ ACEC/ - Air Quality, Water Quality, Green Building, Field Techniques

EXPERIENCE

CONVERSE CONSULTANTS (since 1991). Mr. Goebel is a Senior Vice President, Principal Geologist, and Environmental Division Manager. He has a M.S. Degree in Geoscience form the University of Nevada, Las Vegas. As a Certified Environmental Manager, Mr. Goebel is responsible for technical quality, project staffing and business development for environmental services in Nevada. The environmental group provides services for Phase I's, Phase II's, soil and groundwater investigation and remediation for a wide range of contaminants, regulatory compliance and permitting, asbestos services, indoor air quality, outdoor air quality, health & safety, industrial hygiene, lead assessment, risk assessments, and fungal assessment and clearance.

Mr. Goebel has been working in Las Vegas since 1985 and has been with Converse since 1991. He understands the business community and has worked with numerous community leaders and clients, providing solutions for a wide range of environmental issues. Mr. Goebel understands the need to satisfy regulatory requirements for compliance, yet he works in the clients' interest, to

minimize risk and provide quality technical service. His clients include casino/hotel facilities, small and large industry, local government (city, county, state), private developers, and property managers. He is a Certified Environmental Manager and is well versed at interfacing with State regulators on the client's behalf.
Through his years of working in the local community, Mr. Goebel has technical experience that includes; soil and groundwater sampling, drilling, monitoring well construction, air quality sampling, asbestos work review, facility auditing and compliance, RCRA waste management, hydrocarbon assessments and remediation, PCE (dry cleaning) and other solvent assessment and remediation, lead remediation, fungal work oversight, permit preparation, specification preparation, aquifer characteristic assessment, dewatering investigations, risk analysis work, and landfill work.

REPRESENTATIVE PROJECTS

Evaluation of Fire Protection Re-Use Water System (Reliant Energy), Primm, Nevada – As Environmental Division Manager, Mr. Goebel supervised work conducted at this site, which included researching analytical methods, assessing human health risks, reviewing treatment standards for potable versus wastewater, sampling treated water, reviewing the process, and preparing the report, which will be used to establish future protocols. Converse conducted evaluation of water quality standards and history of re-use water systems as it relates to risks to fire fighters. This includes water quality testing, engineering design review, risk assessment reviews, reporting, and public presentations.

Risk Assessment and Hydrocarbon Remediation, Private Developer, Clark County, Nevada – Converse worked with a national developer to take an impacted property that was formerly used for industrial processes and make it a marketable product. This process required major investment into the property including treatment of over 400,000 tons of hydrocarbon-impacted soils. This also includes a detailed risk evaluation to address potential future concerns from users of the property. The risk assessment evaluated potential exposure pathways for VOCs, hydrocarbons, metals, and pesticides.

Phase II Assessment and Risk Assessment, Private Developer, Henderson, Nevada – Converse worked with a small local developer to address upgradient groundwater impacts from a perchlorate release. This process required bringing fill material and building a subdrain to create separation of final grade and impacted groundwater. This also includes a detailed risk evaluation to address potential future concerns from users of the property. The risk assessment evaluated potential exposure pathways for perchlorate, VOCs, hydrocarbons, metals, and pesticides.

Dust Compliance and Monitoring, Private Developer, Clark County, Nevada – Converse worked with a national developer to change their dust compliance issues into a model of program for the County. Our client was received a letter of recognition and an award. Our work included establishing a strict compliance program and providing dust monitors to work with our client's field staff and contractors.

Landfill Assessment (Republic Services of Southern Nevada), Clark County, Nevada - Converse has been supporting ongoing work at the Republic Services of Southern Nevada, former Sunrise Mountain Landfill. Converse has been providing 1-2 staff on a daily basis. Our work includes supporting the hydrogeologic investigation, helping to define the waste limits, determining the suitability of the existing cap material, and conducting surface emission monitoring. In addition, we are providing the stormwater monitoring for the landfill, which consists of sampling discharges from various locations where stormwater exits the site during precipitation events.

Meadows PCE Dry Cleaning Remediation (National Retail Company), Clark County, Nevada – The ongoing work consists of mitigating Perchloroethyne (PCE) in the groundwater at a dry cleaning site that is located upgradient of the original Las Vegas groundwater well field. Converse delineated the extent of the plume (500+ feet) and initiated an ozone air sparging system to mitigate the plume. Mr. Goebel oversees the remediation phase of this C-sparging groundwater remediation site. Mr. Goebel was responsible for conducting the investigation to determine the extent of groundwater impacts.

Former Vogue Dry Cleaner, Private Land Owner, Clark County, Nevada – The ongoing work consists of mitigating Perchloroethyne (PCE) in the groundwater at a dry cleaning site. Converse delineated the lateral and vertical extent of the plume and initiated HRC injection to mitigate the plume. Mr. Goebel oversees the remediation of groundwater remediation site..

Risk Analysis for Development of Former UPRR Site, Las Vegas, Nevada - Converse completed a qualitative and quantitative risk analysis for the 61-acre parcel formerly operated by Union Pacific, which is now owned by the City of Las Vegas. We completed a comprehensive risk analysis that identified areas of concern, potential of encountering contamination, free product, dissolved product, and reviewed the agreement between the former owners and Union Pacific to identify potential issues. Mr. Goebel was the client contact and oversaw completion of the risk analysis for the City. His work included reviewing former contracts and agreements and initiating risk analysis for future workers and occupants of the site.

Sunrise Acres Elementary School Risk Analysis for Development (Clark County School District), Hadland Park, Las Vegas, Nevada - Converse completed a quantitative risk assessment for two parcels of land that were owned by the Clark County School District and the City of Las Vegas. The work was done for the school district to identify potential health risk issues for building a school in an area where there was a closed groundwater remediation site. The work included compiling existing data, collecting additional data and working with a risk assessor to derive Site Specific Target Levels (SSTLs) for the site. Based on our work, the site was developed for use as a school and City Park.

Montrose Chemical Company, Henderson, Nevada - Mr. Goebel coordinated the sampling of RCRA monitoring wells at this former pesticide chemical manufacturing plant. In addition, Mr. Goebel coordinated the transportation and treatment of the fluids recovered from the leachate recovery trench to a RCRA-licensed treatment facility, supervised technicians, compiled data and prepared reports to client and state.

Dry Cleaning Mitigation, Las Vegas, Nevada - Mr. Goebel coordinated fieldwork for delineation and mitigation of dry cleaning chemicals at a dry cleaning site located upgradient of the original Las Vegas groundwater well field. Currently he is overseeing implementation of an ozone/air sparging treatment system. Mr. Goebel also managed the contract, compiled data, supervised technicians, and prepared reports to client and state.

Clark County School District, Clark County, Nevada - Mr. Goebel supervised technicians for a subsurface geophysical survey for roadway improvements along Rochelle Avenue. In addition, Mr. Goebel supervised the installation of monitoring wells, the groundwater remediation system, designed the groundwater remediation system, supervised the preparation of architectural specifications for the installation of the groundwater remediation system and reviewed reports.

Nevada Power Company, Moapa, AST Terminal - Free Product Assessment and Remediation, Moapa, Nevada - Converse assisted NPC to address source reduction and

remediation of free-phase hydrocarbons, evaluation of potential impacts to an operating dewatering system, and determination of potential impacts to an adjacent river. Currently, a pump and treat product remediation system is reducing product levels at the site.

CALNEV Pipeline Company, Las Vegas AST Terminal; Mitigation, Assessment, and Remediation, Las Vegas, Nevada - Converse worked at several CALNEV sites. After completing the assessment work and completing design specifications at their AST bulk storage terminal, we initiated an ambitious remediation program, which incorporated air sparging for the dissolved-phase plume, pump and treat for the free product, and soil vapor extraction for the vadose zone. We also are provided assessment and interim remediation services for free product along a fuel pipeline where it crosses below a county intersection. This includes product recovery (90 feet below ground surface) occurring concurrently with assessment.

Nevada Division of Environmental Protection, Bureau of Corrective Action - Mr. Goebel managed the environmental mitigation, assessment, and remediation (EMAR) contract with the State. The contract was for sites with non-responsive responsible parties who are involved in legal action.

Environmental Assessment, Electrical Utility Company – Mr. Goebel scoped and coordinated work required for an Environmental Assessment (EA). The EA was being required by the BLM for water rights land acquisition. The EA required addressing numerous facets, including biology, archaeology, mining, environmental justice, visual, water resources, geotechnical, air quality, and socio-economic factors. The EA included several separate sites within one valley. The EA was submitted to meet the requirements of the BLM.

Hidden Valley Environmental Assessment, Various Locations, Hidden Valley, Nevada - Mr. Goebel coordinated work for an Environmental Assessment (EA) in accordance with BLM requirements. The EA was required for siting water resource wells for the Harry Allen Power Station. The EA included evaluating cultural resources, endangered plants and animals, mining, geology, water resources, air quality, environmental justice, socio-economic resources and visual resources.

Southern Nevada Water Authority, NPDES Sampling, Clark County, Nevada - Mr. Goebel coordinated weekly lake sampling at Lake Mead to meet the NPDES permit requirements during construction of the 2nd intake pipeline. In addition, Mr. Goebel compiled data, supervised technicians, and prepared reports.

Rite Aid (formerly Thrifty Payless) - Mr. Goebel managed the remediation of perchloroethylene (PCE) resulting from a former dry cleaning operation at this site. The system consisted of in-situ air sparging and vapor extraction.

The Venetian - Mr. Goebel was the supervisor for work conducted to investigate the source of hydrocarbons in the groundwater. Hydrocarbons were encountered during dewatering activities. Mr. Goebel oversaw the design of the treatment system for the site. This included sizing the air strippers, carbon vessels, and assessing the aquifer properties. He also provided regulatory interfacing to acquire the NPDES permit. Continuous dewatering of the structure requires continuous operation of the treatment system, which collects impacted groundwater from the french drain surrounding the hotel.

Harrah's Las Vegas Casino - Mr. Goebel was the supervisor for work conducted to investigate the source of hydrocarbons and solvents in the groundwater. Hydrocarbons and solvents were encountered during dewatering activities for the sub-road entrance into Harrah's. Mr. Goebel

oversaw the design of the treatment system for the site. This included sizing the carbon vessels, assessing the aquifer properties.

Bridger & 4th Street Project - Mr. Goebel was the supervisor for work to conduct construction dewatering and implement subsequent carbon treatment for shallow groundwater. Mr. Goebel oversaw the design of the treatment system for the site. This included sizing the carbon vessels, assessing the aquifer properties.

Desert Inn Arterial - Mr. Goebel was the supervisor for work conducted to mitigate TCE in the groundwater. TCE was encountered during dewatering activities. Mr. Goebel oversaw the design of the treatment system for the site. This included sizing the carbon vessels, and assessing the aquifer properties. He also provided regulatory interfacing to acquire the NPDES permit. Due to the expense of treating Nitrate concentrations, he assisted in acquiring a temporary permit from the Clark County Sanitation District to discharge TCE treated water to their sewer system.

Las Vegas Convention Center South Hall Expansion - During construction of a major south expansion of the existing facility, Mr. Goebel assisted in dewatering treatment, which was required in an area documented to contain Trichloroethylene (TCE) and high nitrate values. He provided permitting assistance, regulatory interfacing, and construction dewatering treatment of TCE for this expansion project. The treatment system consisted of reusing the water for beneficial use (dust control).

Boyd School of Law (State of Nevada Public Works Board), University of Nevada Las Vegas, Las Vegas, Nevada - Mr. Goebel was Principal-in-Charge for several renovation phases of work conducting asbestos surveys and asbestos abatement specifications. Converse performed a complete asbestos survey of the former UNLV library. The two buildings involved were renovated for the Proposed Boyd School of Law. As part of our services to State Board of Public Works, Converse provided asbestos abatement specifications for the abatement project. Converse also provided project monitoring during abatement activities and for emergency response actions at the site.

Caesars Palace Hotel & Casino (Desert Palace), 3570 Las Vegas Boulevard South, Las Vegas, Nevada - Mr. Goebel was Principal-in-Charge for several phases of work conducting asbestos surveys and asbestos abatement specifications. Converse performed a complete asbestos survey of the Caesar's Palace complex. As part of our services to Caesar's Palace, Converse has provided asbestos abatement specifications for numerous asbestos abatement projects. Converse also provided project monitoring during abatement activities and for emergency response actions at the site.

Clark County Buildings (Clark County Real Property Management), Clark County, Nevada - Mr. Goebel was Principal-in-Charge for several phases of work conducting asbestos surveys and asbestos abatement specifications. His work included consultation for exposure liability and air monitoring issues. Converse is in the process of providing a general Operation and Maintenance Program (O&M) for all of Clark County buildings containing asbestos materials. The purpose of an O&M plan is to provide a safe work place and control the release of asbestos fibers until the asbestos-containing material in the buildings are abated through renovation or demolition activities. In addition, as part of our contract with Clark County General Services, Converse provides consultation, building surveys, and air monitoring during periods of renovation and demolition of Clark County buildings.

Clark County Regional Justice Center, Clark County, Nevada - Mr. Goebel was Principal-in-Charge for several phases of work that included conducting asbestos surveys and asbestos abatement specifications for several buildings related to the Regional Justice Center. Converse

performed a complete asbestos survey of the approximately 19 buildings on three blocks in downtown Las Vegas to be replaced as part of the construction of the new Regional Justice Center. Converse also provided asbestos abatement specifications and project monitoring.

Andrea L. Havens, C.E.M.
Senior Project Manager

EDUCATION

B.S. Biology/1983/University of Texas, Arlington

REGISTRATIONS/CERTIFICATIONS

Nevada Certified Environmental Manager, EM - 1754
Certified Environmental Inspector
Certified Environmental Specialist
40-Hour HAZWOPER

MEMBERSHIPS

Environmental Assessment Association

EXPERIENCE

Mrs. Havens has over 15 years experience as a Project Scientist and Project Manager. Her principle areas of responsibility include proposal preparation and management of Phase I, Phase II, and Phase III Environmental Due Diligence Assessments, project coordination and management of Leaking Underground Storage Tank (LUST) sites, and conducting groundwater and soil sampling. Mrs. Havens also conducts site reconnaissance, records review, personal interviews, aerial photograph review, and report generation. She is also responsible for all Phase I, Phase II, and Phase ESAs with respect to Quality Assurance/Quality Control and Technical Review.

REPRESENTATIVE PROJECTS

Nevada Power Company: Production Well RW-2 - Coyote Spring Valley, Nevada – Provided oversight of permit stipulations for access to well site by BLM. This included contractor compliance with NPDES permit, tortoise monitoring, vegetation removal and replanting, and other environmental issues related to restoration of site.

Southern Nevada Liteweight: Hidden Valley, Clark County, Nevada – Mrs. Havens completed an EA in accordance with BLM requirements for a water well site. This included evaluating cultural resources, endangered plants and animals, mining, geology, water resources, air quality, environmental justice, socio-economic resources, and visual resources.

Union Pacific Railroad Yard Risk Analysis for Development, Las Vegas, Nevada – As Project Manger for a qualitative risk analysis for the 61-acre parcel formerly operated by Union Pacific, Mrs. Havens performed a comprehensive risk analysis that identified areas of concern, potential of encountering contamination, free product, dissolved product, and reviewed an agreement between Lehmann Brothers and Union Pacific to identify potential issues.

CALNEV Pipeline Corporation, Nevada – As Project Manager, Mrs. Havens oversaw and participated in drilling and sampling of monitoring and remediation wells and oversaw the installation, operation and maintenance of a groundwater remediation system.

Clark County School District, Clark County, Nevada – Mrs. Havens was responsible for the management of several projects including UST removal and closures, excavation of automobile hydraulic lifts and remediation of a water well impacted with propane. Duties included overall project management, field work, interpretation of analytical data and generation of final reports.

PCE Groundwater Assessment, Maryland Square, Las Vegas, Nevada – As Project Manager, Mrs. Havens coordinated all field activities including drilling, soil sampling, and groundwater sampling. Also, prepared reports for submittal to the NDEP and made recommendations for further action.

Carey Avenue Pipeline, Clark County, Nevada – Mrs. Havens coordinated the installation of the remediation systems, coordinated all field activities including sampling of monitoring wells and hydrogen peroxide injection, provided oversight of operation and maintenance activities on the remediation system, compiled data, prepared reports for submittal to the NDEP and made recommendations for continued work.

PCE Dry Cleaning Remediation, Las Vegas, Nevada – As Project Manager, Mrs. Havens coordinated all field activities including drilling, soil sampling, and groundwater sampling, assisted in design of the remediation system for the facility and coordinated oversight during the installation of the remediation system.

I-515/I-215 Interchange, Henderson, Nevada – Mrs. Havens acted as Project Manager for the project. Prepared a scope of services for the project, attended client meetings, and coordinated field activities including drilling, soil sampling, and groundwater sampling. Converse completed drilling and health and safety services for assessment activities at the future I-515/I215 Interchange. Dioxin burn pits were present, and investigation activities were completed to assess the extent of Dioxin and potential risk to Nevada Department of Transportation workers.

Vogue Cleaners PCE Groundwater Remediation - The ongoing work consists of delineating and mitigating Perchloroethyne (PCE) in the soil and groundwater at a dry cleaning site that is located upgradient of the original Las Vegas groundwater well field. It will involve groundwater recovery and treatment. Converse will be responsible for the long term operation and maintenance of this system. Mrs. Havens is Project Manager for the project. Prepared a workplan/scope of services for the project, attended client meetings, coordinated all field activities including drilling, soil sampling, and groundwater sampling, arranged for disposal of drill cuttings and purged groundwater, compiled data, prepared reports for submittal to the NDEP, and made recommendations for further action.

Various Oil and Gas Producing Fields throughout Texas – Mrs. Havens conducted Phase I Environmental Assessments on over 900 well sites in 10 oil and gas producing fields located in Texas. The scope of work involved reviewing company files, visiting regulatory agencies to identify past violations and complaints, interviewing appropriate personnel, conducting site reconnaissance of all properties, and preparing a report documenting the findings and providing recommendations for Phase II investigations.

Various Grocery Stores, Texas – As Project Manager, Mrs. Havens reviewed historical information, contacted regulatory agencies, conducted site reconnaissance of all properties, and prepared reports documenting the findings and providing recommendations for prepurchase environmental assessment package of 32 grocery stores.

Various Law firms, Insurance Companies, Private Companies and Financial Institutions, throughout the Southwest and Mexico – Mrs. Havens was responsible for project management and execution of all phases of the assessments.

Various Exploration and Production Companies, Texas – Mrs. Havens conducted multiple Phase I regulatory searches consisting of identifying applicable agencies governing the targeted properties, contacting key personnel, and researching files for pertinent information and preparing reports.

Various Oil Companies, Texas – As Project Manager, Mrs. Havens reviewed completed petroleum fund claims, interfaced with the client, and tracked budgets.

Dale W, Walsh, CIH, CSP, CEM

Certified Industrial Hygienist
Corporate Health and Safety Officer

EDUCATION

M.S., Toxicology/Industrial Hygiene, University of Arizona, 1986
B.S., Biochemistry, University of Arizona, 1983

TRAINING

40-Hour OSHA Hazardous Waste Operations Equivalency Training and Refreshers
8-Hour OSHA Supervisor Training
24-Hour EPA "Safety and Health Decision Making for Managers" Course
24-Hour EPA "Orientation to Indoor Air Quality" Course
24-Hour AIHA "Indoor Air Quality" Course
8-Hour AIHA Professional Development Course on "Indoor Air Quality and Radon"
40-Hour AHERA Asbestos Building Inspector/Management Planner Course and Refreshers
40-Hour AHERA Asbestos Project Supervisor Course and Refreshers
8-Hour AHERA Asbestos Project Designer Refresher
40-Hour OSHA "Safety for the Industrial Hygienist" Course
24-Hour "The Risk Assessment Practical Techniques and Methods Seminar"
8-Hour "Nuclear Gauge Operator Training"

REGISTRATIONS/CERTIFICATIONS

Certified Industrial Hygienist (CIH)
Certified Safety Professional (CSP)
Nevada Certified Environmental Manager 1215
Nevada Licensed Asbestos Consultant IJPM0402

MEMBERSHIPS

American Industrial Hygiene Association, on Local Section Board of Directors
American Society of Safety Engineers, on Local Section Board of Directors
American Academy of Industrial Hygienists

EXPERIENCE

As a Certified Industrial Hygienist (C.I.H.), Mr. Walsh is responsible for the development, implementation and tracking of all health and safety issues regarding environmental services. This includes writing Health and Safety Plans, performing industrial hygiene monitoring of employees, providing 40 hour health and safety training, conducting air quality assessments, and keeping abreast of all current legislation.

REPRESENTATIVE PROJECTS

HAZMAT, AIR QUALITY, INDUSTRIAL HYGIENE

Clark County Department of Aviation, McCarran International Airport, Las Vegas, Nevada - Provided air quality assessment of sewer odors in Southwest Airlines terminal as well as an

assessment of the airport's ventilation system. Also provided sampling and remediation oversight services of the cleaning of duct work and ventilation units at the airport fire station.
Las Vegas Finishing, Las Vegas, Nevada - Supervised air quality permitting for chromium plating facility as well as providing industrial hygiene monitoring of employees for chromium and nickel exposure.

North Star Steel, Kingman, Arizona - Provided industrial hygiene assessment of potential emissions from steel recycling processes. Also supervised the collection of air samples for the evaluation of employee to various contaminants such as metals.

U. S. Postal Service, Las Vegas, Nevada - Mr. Walsh provided industrial hygiene air monitoring services for dust in various postal facilities as well as noise, carbon dioxide, carbon monoxide and asbestos.

Valence Technologies, Henderson, Nevada - Provided various services including industrial hygiene monitoring of various processes, training of emergency response team, asbestos remediation, oversight, air quality permitting, storm water permitting and Fire Marshal report preparation.

Kerr-McGee, Clark County, Nevada - Currently providing oversight of industrial hygiene monitoring for various metals.

TIMET, Clark County, Nevada – Performed various industrial hygiene services including particulate and metal monitoring, noise dosimetry, chlorine and heat stress monitoring at a titanium metal production facility. Services also included comprehensive safety audit and forklift training.

MGM Grand, Inc., Las Vegas, Nevada - Environmental Health & Safety Consultant. Mr. Walsh performed comprehensive environmental health and safety services including, indoor air quality assessments, writing of the MGM Grand Health and Safety and Hazardous Material Management Plan for OSHA compliance and employee monitoring.

Clark County Risk Management, Las Vegas, Nevada - Provided comprehensive indoor air quality assessments. Projects have included assessment, design, and remediation oversight of fungi contamination in a building's basement. Other assessments have included a ventilation assessment of the coroner's facility as well as various other IAQ surveys.

Las Vegas Convention and Visitors Authority, Las Vegas, Nevada - As Industrial Hygienist, Mr. Walsh provides planning, oversight and reporting of results for various fungal remediation projects for the Convention Center and Cashman Field. In addition, Mr. Walsh provides a hazard communication class for the LVCVA photo shop regarding the chemicals used in processing photographs.

Las Vegas Valley Water District, Las Vegas, Nevada - Conducted comprehensive facility environmental, health and safety audit at a pump station facility.

Alyeska Pipeline Company, Anchorage, Alaska -Performed comprehensive industrial hygiene assessment along the Alaska Pipeline.

East Valley Water District, San Bernardino, California - Provided 40-hour OSHA Emergency Response Training for chlorination facility personnel.

BMI Landfill Assessment, BMI Complex, Henderson, Nevada - As Principal Industrial Hygienist, Mr. Walsh oversaw health and safety concerns regarding project, which consisted of completion of an environmental investigation for landfill siting study at BMI. Work included drilling and sampling of 12 soil borings to assess numerous environmental parameters, such as Volatile Organic Compounds (VOCs), semi-(VOCs), metals, radionuclides, pesticides, and perchlorate. **Department of Child and Family Services (Clark County Public Works), 6171 West Charleston Boulevard, Las Vegas, Nevada** - As Principal Industrial Hygienist, Mr. Walsh has provided consulting services regarding fungal contamination of several state buildings on the Department of Child and Family Services campus.

Landfill Assessment, Former Sunrise Mountain Landfill (Republic Services of Southern Nevada), Clark County, Nevada - As Principal Industrial Hygienist, Mr. Walsh oversees health and safety concerns regarding this ongoing project. Converse has been providing 1-2 staff on a daily basis. Mr. Walsh's work includes supporting the hydrogeologic investigation, helping to define the waste limits, determining the suitability of the existing cap material, and conducting surface emission monitoring. In addition, we are providing the stormwater monitoring for the landfill, which consists of sampling discharges from various locations where stormwater exits the site during precipitation events.

McCarran International Airport Unknown Drums and Various Soil Assessment (Clark County Department of Aviation), 5757 Wayne Newton Boulevard, Las Vegas, Nevada - As Principal Industrial Hygienist, Mr. Walsh oversees health and safety concerns regarding this ongoing project. Projects include the on-call initial assessment Hazard Categorization (HAZCAT) and determination of potential hazardous waste drums found on various parcels of acquired land.

Various Indoor Air Quality Surveys, Various Locations (Clark County Real Property Management, Clark County, Nevada - As Principal Industrial Hygienist, Mr. Walsh has provided various indoor air quality surveys for Clark County including fungal assessments. The ongoing work includes providing numerous indoor air quality surveys for Clark County including fungal assessments at a variety of locations consistently for the past seven years.

Polytechnical School, Pasadena, California - Project Manager. AHERA inspection and management plan preparation for a private school with approximately 23 buildings.

NPC, Baton Rouge, Louisiana - Supervised team of three to five safety technician's at large hazardous waste remediation site. The site was contaminated with petrochemical wastes and was anticipated to require 200 to 300 years to clean up.

ASBESTOS

Boyd School of Law, University of Nevada Las Vegas, Clark County, Nevada - As Principal Industrial Hygienist, Mr. Wash provided review of reports and overall management of employees conducting services. The project included the complete asbestos survey of the former UNLV library. The two buildings involved were renovated for the Proposed Boyd School of Law. As part of our services to State Board of Public Works, Converse provided asbestos abatement specifications for the abatement project. Converse also provided project monitoring during abatement activities and for emergency response actions at the site.

Bridger Building, 225 Bridger Avenue (Clark County Real Property Management, Las Vegas, Nevada – As Principal Industrial Hygienist, Mr. Walsh provided management services of Converse personnel conducting project, which included overseeing contractors performing

asbestos abatement of a 10-story office building, followed by the complete demolition and removal of all interior non-asbestos containing materials. He reviewed periodic reports generated during project.

Caesars Palace Hotel & Casino, 3570 Las Vegas Boulevard South, Las Vegas, Nevada - As Principal Industrial Hygienist, Mr. Walsh provides review of reports and overall management of employees conducting services for this ongoing project. Converse performed a complete asbestos survey of the Caesar's Palace complex. As part of our services to Caesar's Palace, Converse is providing asbestos abatement specifications for numerous asbestos abatement projects. Converse also provided project monitoring during abatement activities and for emergency response actions at the site.

Clark County Buildings (Clark County Real Property Management) - As Principal Industrial Hygienist, Mr. Walsh provides provided review of reports for asbestos bulk and air sampling. He also provided asbestos awareness training for County and Contractor personnel. Converse is in the process of providing a general Operation and Maintenance Program (O&M) for all of Clark County buildings containing asbestos materials. The purpose of an O&M plan is to provide a safe work place and control the release of asbestos fibers until the asbestos-containing material in the buildings are abated through renovation or demolition activities. In addition, as part of our contract with Clark County Real Property Management, Converse provides consultation, building surveys, and air monitoring during periods of renovation and demolition of Clark County buildings.

Eleven Catholic Schools (Catholic Diocese of Las Vegas), Various Locations in Las Vegas, Clark County, Nevada - As Principal Industrial Hygienist, Mr. Walsh provided review of reports and overall management of Converse employees conducting services, which included three inspections under the Asbestos Hazard Emergency Response Act (AHERA) for eleven Catholic schools in Las Vegas, Nevada.

Port of San Diego International Airport - As Project Manager, inspected San Diego International Airport for asbestos containing materials using AHERA guidelines.

T. Neil Blandford, P.G.

Specialization

Numerical simulation of groundwater flow and contaminant transport; water rights analysis and water supply investigations; geostatistics and aquifer testing methods; wellhead protection area delineation and remediation well field design.

Academic Degrees

M.S., Hydrology, New Mexico Institute of Mining and Technology, 1987

B.A., Environmental Science, University of Virginia, 1984

Registrations

Professional Geoscientist, No. 1034, Texas

Representative Professional Assignments

- ***Analysis of Municipal Water Supply Sources from the Southern Ogallala Aquifer, City of Lubbock, Texas:*** Project manager and principal investigator for assessment of sustainability of the City's Bailey County well field and pumping groundwater from beneath the City to assist with meeting peak water demands. Ogallala aquifer water quality beneath the City was also considered, as was the contributing zone for proposed water supply wells. Project included the development of historical water level maps and other hydrogeologic analysis, along with development of detailed groundwater flow models for the City of Lubbock area and the Bailey County well field area (northern Bailey and Lamb counties, and southern Parmer and Castro counties).

- ***Groundwater Supply Evaluation for the Eastern New Mexico Regional Water System, East Central New Mexico, CH2M Hill, Inc.:*** Applied regional groundwater flow modeling to evaluate the sustainability of future municipal water demand in Curry and Roosevelt Counties, eastern New Mexico. Groundwater from the Ogallala aquifer was one alternative evaluated as part of a long term regional water supply study.

- ***Monitor Well Construction and Hydraulic Testing, Phelps Dodge Tyrone, Inc., Tyrone, New Mexico:*** Project Manager for design, permitting, installation and development of 26 monitor wells 200 to 900 feet in depth completed in granite and conglomerate. Conducted hydraulic (aquifer) testing and analysis of aquifer parameters for 10 wells.

- ***Evaluation of New Mexico Office of the State Engineer (OSE) Administrative Model for Lea County Underground Water Basin, Lea County Water Users Association, Lea County, New Mexico:*** Assisted with evaluation of the OSE administrative model developed for the High Plains aquifer of the Lea County Basin. Purpose of the evaluation was to determine the suitability of the model for predictive water resources analysis. Project included evaluation and comparison of aquifer base elevation values and assignment of aquifer hydraulic properties.

- ***Design of Groundwater Capture System for State Road 114 Superfund Site, Texas Commission on Environmental Quality (TCEQ), Levelland, Texas:*** Principal investigator for development and application of a groundwater flow and solute transport model to design a remediation well field for the State road 114 Superfund site. An existing regional model for the Southern High Plains (the Southern Ogallala GAM) was modified to improve the historical calibration in Hockley County, and a nested, multi-layer local model was developed to simulated groundwater flow in the vicinity of the DCE plume and design a groundwater capture system.

- ***Assistance with Development of Groundwater Management Strategies, Hemphill County Underground Water Conservation District, Canadian, Texas:*** Assisted the district with evaluation of existing

T. Neil Blandford, P.G.

Representative Professional Assignments Continued

hydrogeologic data and groundwater management approaches, and provided recommendation regarding alternative approaches and application of the Northern Ogallala groundwater availability model (GAM).

- ***Return Flow Analysis and Expert Testimony, Berrendo Cooperative Water Users Association, Roswell, New Mexico:*** Planned and supervised test drilling and used finite element variably saturated flow modeling and other hydrogeological analyses to assess volume and timing of return flow from septic leach fields for large water cooperative with more than 1,500 service connections. Provided expert testimony regarding timing and volume of return flow for a variety of hydrogeologic conditions that occur within the cooperative service area.
- ***Expert Testimony Regarding Numerical Groundwater Flow Modeling and Evaluation of Salinity Encroachment for City of Alamogordo, New Mexico:*** Provided expert review and testimony regarding evaluation of multiple groundwater flow models applied to predict hydrologic effects of a proposed groundwater appropriation of 10,000-acre-feet per year by the City of Alamogordo. Also conducted an assessment and provided testimony regarding the potential for encroachment of saline groundwater due to pumping the well field.
- ***Expert Testimony Regarding Water Rights Transfer Near Seven Rivers, Glenn's Water Well Service, Roswell Basin, New Mexico.*** Conducted hydrogeologic analysis and provided expert testimony regarding source of water, hydrologic effects of a proposed transfer, and discharge areas of subject water.
- ***Assessment of Water Rights Purchase, Confidential Client, West Texas:*** Provided recommendation regarding purchase of Ogallala aquifer groundwater rights in West Texas. Reviewed aquifer conditions and hydraulic parameters, assessed effects of nearby pumping, and conducted predictive groundwater flow modeling to evaluate expected drawdown.
- ***Expert Testimony Regarding Mine Closure/Closeout Issues, Phelps Dodge Tyrone, Inc., New Mexico:*** Provided expert testimony during New Mexico Environment Department and New Mexico Water Quality Control Commission hearings. Areas of testimony included groundwater hydrology of the Tyrone Mine area under current and closure/closeout conditions, locations of reasonably foreseeable future use in the vicinity of the mine, and the potential for mining operations to have adverse impacts on groundwater resources and adjacent users. Testimony was based on modeling and other quantitative analyses of seepage through stockpiles and tailing ponds and influence of multiple open pits on groundwater flow.
- ***Water Supply Analysis and Expert Testimony for Water Rights Applications, Private Client, Tularosa Basin, South-Central New Mexico:*** Principal investigator and expert witness for multiple water right applications for private client in the Tularosa Basin. Project involves analytical and numerical groundwater flow modeling, evaluation of local and regional hydrogeologic conditions, well field design and expert testimony in support of application to appropriate water.
- ***Litigation and Negotiation Support Regarding Natural Resource Damage Assessments (NRDA), Two Confidential Clients, New Mexico:*** Provided expert advice and testimony (deposition) regarding NRDA issues for two clients in New Mexico. Both cases involve the assessment of potential impacts of contaminants to groundwater resources.
- ***Development of Groundwater Availability Model for Southern Ogallala Aquifer, Texas Water Development Board:*** Principal investigator for development and application of numerical groundwater flow model for entire Southern Ogallala aquifer (29,000 square miles) in Texas and New Mexico. Project involved extensive data collection and incorporation into a numerical groundwater flow model using geographic information system (GIS), model calibration and verification, presentation at public meetings, and detailed study documentation. Final model is being applied by water conservation districts and other stakeholders to assist with planning efforts.

T. Neil Blandford, P.G.

Representative Professional Assignments Continued

- ***Evaluation of Proposed Groundwater Appropriations on Remediation Well Field Effectiveness, Lynx Ltd., NASA White Sands Test Facility, New Mexico:*** Conducted an evaluation of potential effects of several applications for appropriation of groundwater on remediation system effectiveness in the Jornada Basin in New Mexico. Conducted drawdown, capture zone and sensitivity analyses for several alternative water development scenarios.
- ***Litigation Support and Modeling, Tucson Airport Authority, Tucson, Arizona:*** Technical leader and task manager for over five major modeling tasks for cost allocation and litigation support at major Superfund site. Modeling tasks included historical calibration of groundwater flow and solute transport models, predictive simulations, and local-scale multiphase (air, water, dense non-aqueous phase liquids) simulation. Advanced geostatistical techniques (block kriging and indicator kriging) were applied during model development.
- ***Groundwater and Surface Water Impact Analysis and Expert Testimony, Hubbard Enterprises, Inc., Lincoln County, New Mexico:*** Developed three-dimensional groundwater flow model of upper reaches of Hondo Underground Water Basin for groundwater and surface water (streams and springs) impact analyses. GIS was used as integral component of model development. Provided deposition and expert testimony regarding groundwater and surface-water impacts.
- ***Expert Review of Water Supply Studies and Hydrologic Analyses, City of Albuquerque, New Mexico:*** Provided expert third-party review of modeling and other studies conducted by another consultant on behalf of the City to support their water resources management strategy and associated water rights application for combined surface water and groundwater use.
- ***Evaluation of Return Flow of Treated Effluent, Rancho Encantado, Tesuque, New Mexico:*** Planned and supervised test drilling and associated laboratory analysis for the assessment of potential for return flow at a commercial facility. Assisted with development of innovative techniques (high pressure injection into clay units) for subsurface disposal of treated effluent.
- ***Groundwater Modeling Assessment of Alumina Refinery, ALCOA, Ludwigshafen, Germany:*** Principal investigator for groundwater modeling assessment of the potential for impacted seepage from a closed alumina refinery to impact a public water supply well field. A combined semi-analytical capture zone and solute transport model was applied to identify wells that could potentially be impacted and the timing of possible impacts.
- ***Technical Assistance for Water Rights Transfer, Confidential Client, Santa Fe, New Mexico:*** Analyzed hydrologic impacts of water rights transfer and designed return flow plan critical to proposed project's viability. Also developed sub-regional groundwater flow and solute transport models. Technical interface with Office of the State Engineer and New Mexico Environment Department.
- ***Water Rights Settlement Negotiations, The Hopi Tribe, Hopi Indian Reservation, Arizona:*** Provided technical assistance during water rights negotiations, developed groundwater flow models of critically impacted areas, applied regional models for water resources planning, analyzed and critically reviewed work of other experts, developed regional groundwater management plans, and presented technical information on behalf of the tribe during meetings of critical stakeholders.
- ***Technical Assistance and Expert Testimony for Water Rights Protest, Village of Corrales, New Mexico:*** Provided technical assistance to the Village of Corrales with regard to their protest of a major water rights application made by an adjoining municipality. Analyzed groundwater models developed by applicant and OSE, conducted a well survey within the Village, and provided expert testimony (deposition).
- ***Water Rights, Hydrologic and Environmental Analysis, Pueblo of Acoma, New Mexico:*** Conducted hydrologic water rights analyses, provided training on hydrologic issues and water resources, developed

T. Neil Blandford, P.G.

Representative Professional Assignments Continued

spring sampling plan, conducted detailed review and analysis of complex regional groundwater flow model, and assisted with development of water quality standards and water code.

- ***Remediation Well Field Design and Contaminant Transport Simulation, AlliedSignal Technical Services, NASA White Sands Test Facility, New Mexico:*** Project manager and principal investigator for design of remediation well field for multi-component contaminant plume that extends several miles from source areas within alluvial sediments and adjoining, structurally complex, fractured rock. Alternative well field designs were tested using three-dimensional groundwater flow, groundwater pathline tracking, and solute transport models. Model was also used to support site risk assessment.
- ***Pit Lake Formation Modeling, Phelps Dodge Tyrone, Inc., New Mexico:*** Principal investigator for the development of three-dimensional numerical pit lake formation model for multiple open mine pits that intersect regional groundwater. The model was both calibrated and validated to historical changes in pit water levels, accounting for groundwater seepage, surface water inflow and evaporation. The model has been used to predict pit lake water levels and capture zones under various closure/closeout conditions.
- ***Remediation Well Field Design, New Mexico Environment Department, Hobbs, New Mexico:*** Developed three-dimensional groundwater flow model for municipal wells underground storage tank (UST) site. Model was applied to determine remediation well locations and pumping rates to maximize contaminant mass removal, provide plume containment, and provide wellhead protection to four municipal water supply wells in plume vicinity.
- ***Expert Opinion on Mine Application, New Mexico Mining and Minerals Division, Copper Flat Mine, New Mexico:*** Conducted detailed review and provided expert opinion on impact analysis modeling and other hydrogeologic analyses conducted for mine permit application.
- ***Hydrologic and Contaminant Transport Analysis, Confidential Client, Southern California:*** Project team member for multi-million-dollar cost allocation analysis for Superfund site. Assignments included innovative hydrogeological analysis, development and application of transient groundwater pathline tracking code, evaluation of effects of retardation on historical contaminant migration, and evaluation/critique of previous simulation efforts.
- ***Hydrogeologic Analysis and Groundwater Flow Modeling, Waste Management, Inc., San Juan County, New Mexico:*** Conducted hydrogeologic studies and sustained yield modeling for permitting regional landfill. Analyzed aquifer test and other hydrogeologic data, and conceptualized and simulated groundwater flow within multiple sandstone units.
- ***Sustained Yield Analysis, Texzona Cattle Feeders, West Texas:*** Conducted groundwater modeling to determine sustainable groundwater resources of cattle feedlot. Planned and managed three-day aquifer test at site. Technical conclusions were used in support of negotiations during real estate transaction.
- ***Capture Zone Modeling, Various Sites:*** Applied or reviewed application of various computer models for delineation of extraction well capture zones at several UST sites in New Mexico and Virginia. Modeling approaches ranged from simple analytical models to complex numerical codes.
- ***Three-Dimensional Groundwater Flow Modeling, New Mexico Office of the State Engineer, Roswell, New Mexico:*** Participated in construction, calibration, and verification of multi-layer numerical model of Roswell Groundwater Basin to assist state engineer with water rights adjudication and water resources planning. Modeling simulated impacts to Pecos River flows resulting from changes in groundwater pumping.
- ***Water Resources Analysis, County of Santa Fe, New Mexico:*** Participated in review and analysis of County groundwater resources and assisted with development of recommendations for future groundwater management strategies and policy.

T. Neil Blandford, P.G.

Representative Professional Assignments Continued

- ***Little Colorado River Sediment Transport, Hopi Tribe, Northern Arizona:*** Investigated primary sources and transport mechanisms/characteristics of suspended and bedload sediment in Little Colorado River (LCR) system. Tasks included development of rainfall-runoff relationships and simulation of sediment yield throughout LCR basin.
- ***Borehole Geophysical Analysis, Hopi Tribe, Kykotsmovi, Arizona:*** Task manager and lead investigator for application of borehole geophysical techniques to determine potential for inter-aquifer leakage and groundwater quality degradation for three 1000-feet-deep water supply wells.
- ***Public Supply Well Wellhead Protection, Southwest Florida Water Management District, Hernando County, Florida:*** Project manager and principal investigator for delineation of Wellhead Protection Areas (WHPAs) for approximately 60 major public supply wells. Conducted methods-comparison study, using semi-analytical modeling, flow-path delineation, and three-dimensional numerical groundwater flow modeling combined with three-dimensional particle tracking to delineate WHPAs. Presented final recommended WHPAs to Hernando County Board of County Commissioners and Southwest Florida Water Management District in public hearing and incorporated them into County comprehensive Water Resource Protection Plan. District used results of comparative analysis to guide WHPA delineation efforts in other counties.
- ***Model Development and User Support, U.S. Environmental Protection Agency (EPA) Office of Solid Waste, Washington, D.C.:*** Provided regulatory support and modeling-related tasks for EPA Office of Solid Waste. Developed Monte Carlo simulation module for implementation in EPACMS groundwater flow and solute transport code. Supervised statistical analysis of nationwide hydraulic conductivity data set for contaminated sites. Developed graphical postprocessor for EPACMS code, analyzed model sensitivity, and implemented code modifications.
- ***Saltwater Intrusion Modeling, St. Johns River Water Management District, Orange County, Florida:*** Project manager and principal investigator in evaluation of regional groundwater resources using density-dependent groundwater flow and solute transport simulation techniques. Phases included development and calibration of regional, three-dimensional groundwater flow model (MODFLOW) and delineation of WHPAs for major municipal supply wells, cross-sectional and three-dimensional simulations of density-dependent groundwater flow and contaminant transport.
- ***Model Development, Documentation and Testing, EPA Office of Ground Water Protection, Washington, D.C.:*** Project manager for EPA-sponsored development and application of PC-based, user-friendly computer code to delineate WHPAs for commonly encountered hydrogeologic settings. Code incorporates state-of-the-art analytical groundwater flow solutions, uses particle tracking to delineate several types of capture zones, and includes module that allows effects of uncertain input parameters on the extent of capture zones to be assessed. EPA distributes the WHPA code developed in this project nationwide for use by state and local technical staff.
- ***Modeling Short Course Development and Presentation, EPA Office of Ground Water Protection, Washington, D.C.:*** Project manager and principal investigator for development and presentation of nationwide workshops on capture-zone modeling and application of EPA WHPA code. Developed and presented modeling portion of two-day courses on delineation of WHPAs in fractured, confined, and karst aquifers.
- ***Regulatory Support and Permit Evaluation, Florida Water Management Districts, Central Florida:*** Supervised and conducted modeling and review tasks, including critical reviews of modeling studies submitted in support of permit renewal for major municipal well fields, and development and assessment of proposed saltwater intrusion criteria for determination of saltwater intrusion impacts. Supervised and reviewed cross-sectional density-dependent groundwater flow and solute transport modeling to determine

T. Neil Blandford, P.G.

Representative Professional Assignments Continued

extent of proposed Water Use Caution Area (WUCA). Conducted quasi-three-dimensional sharp-interface saltwater intrusion modeling in support of WUCA determination.

- ***Model Development, Documentation and Testing, EPA Office of Ground Water and Drinking Water, Washington, D.C.:*** Project manager for development, validation, and application of VIRALT and CANVAS groundwater flow and viral transport computer codes developed for EPA Office of Ground Water and Drinking Water (OGWDW). Codes developed incorporate composite modeling approach: one-dimensional groundwater flow and solute transport modules for unsaturated zone are linked with two-dimensional simulation modules in saturated zone. Codes include menu-driven pre-processor and graphical post-processor. OGWDW staff used models in development of Ground Water Disinfection Rule.
- ***Groundwater Flow Modeling, City of El Paso, Texas:*** Applied USGS MODFLOW code to free surface water table and other complex boundary conditions to analyze impacts of municipal well field on multi-layer aquifer system.
- ***Model Parameter Estimation and Uncertainty Analysis, New Mexico Office of the State Engineer, Columbus, New Mexico:*** Conducted parameter estimation and uncertainty propagation analysis for Columbus Basin using finite element modeling, geostatistics, and non-linear optimization techniques. Managed project from data collection through documentation of model results. Calculated uncertainties in predicted model heads using first-order techniques.
- ***Development of Surface Impoundment Transport Model, EPA Office of Solid Waste, Washington, D.C.:*** Developed and applied Monte Carlo driver coupled with semi-analytical groundwater flow and transport code (EPACMS). Code was used to examine effects of uncertain parameter inputs on magnitude of aquifer contamination caused by leaky surface impoundments.
- ***Contaminant Transport Modeling, Confidential Client, Washington:*** Applied transient, semi-analytical particle tracking code to assess propensity of petroleum-based contaminants released in aquifer to reach major municipal supply well.***Model Development, Testing, and Application, Los Alamos National Laboratory, Los Alamos, New Mexico:*** Developed, tested, and applied Monte Carlo uncertainty analysis module for Disposal Unit Source Term (DUST) code for Mixed Waste Disposal Facility. Developed new simulation approach that resulted in reduced simulation run times. Assisted with screening analyses to rank radionuclide mobility and toxicity.

Additional Professional Training

Numerical Model Calibration and Predictive Analysis Using PEST and MODFLOW 2000, 2001

Introduction to ArcView GIS, 1998

Assessing Passive Biodegradation at Leak Sites, 1997

Dissolved Organic Contaminants in Ground Water, 1994

Diagnosis and Remediation of DNAPL Sites, 1993

Digital Geographic Information Systems, 1989

Wellhead Protection Area Delineation, 1989

T. Neil Blandford

Professional Experience

Daniel B. Stephens & Associates, Inc., Albuquerque, New Mexico, 1994 to Present
Vice-President, Water Rights Services, 2002 to Present
Chief Operations Officer/Senior Hydrologist, 1998 to 2002
Projects Group Leader/Senior Hydrologist, 1995-1998
Senior Hydrologist, 1994

HydroGeoLogic, Inc., Herndon, Virginia, 1988-1994
Project Hydrogeologist, 1989-1994
Associate Hydrogeologist, 1988-1989

New Mexico Institute of Mining and Technology, Socorro, New Mexico, 1984-1987
Research Assistant

Publications and Presentations

Blandford, T. N., D. J. Blazer and A. Dutton. 2005. The effect of a priori knowledge on conceptual model refinement through numerical model development - a case study for the Southern High Plains of the United States. Presented at ModelCARE 2005, Fifth International Conference on Calibration and Reliability in Groundwater Modelling, From Uncertainty to Decision Making, The Hague, The Netherlands. June 6-9, 2005.

Blandford, N. and N. Sweetland. 2005. Is your remediation system a source of groundwater contamination? Southwest Hydrology 4(3):10-11.

Blandford, T.N., 2005. Evaluation of return flow to groundwater in New Mexico. In Proceedings of New Mexico Water Law Conference. Sponsored by CLE International, Santa Fe, New Mexico. August 15-16, 2005.

Blandford, T. N., D. J. Blazer, A. R. Dutton and R. Smith. 2004. Regional groundwater availability modeling of the Southern Ogallala aquifer of West Texas and Eastern New Mexico. In K.A. Rainwater and T.M. Zobeck (ed.) 2004 High Plains Groundwater Resources: Challenges and Opportunities, Conference Proceedings, Lubbock, Texas. December 7-9, 2004.

Blandford, T. N., and R. Smith. 2004. Conceptual model evaluation and refinement through numerical model development - a case study for the Southern High Plains of the United States. Presented at Finite Element Models, MODFLOW, and More: Solving Groundwater Problems Conference, Karlovy Vary, Czech Republic. September 13-16, 2004.

Blandford, T. N., and D.J. Blazer. 2004. Hydrologic relationships and numerical simulations of the exchange of water between the Southern Ogallala and Edwards-Trinity aquifers in southwest Texas. In R.E. Mace, E.S. Angle, and W.F. Mullican, III (ed.) Aquifers of the Edwards Plateau. Texas Water Development Board, Report 360, Austin, Texas.

Stephens, D.B., and N. Blandford, 2004. Hydrogeologic analysis, transport and modeling for environmental litigation: A case study. Presented at National Ground Water Association Ground Water and Environmental Law Conference, Chicago, Illinois. May 5-6, 2004.

Blandford, T.N., D.J. Blazer, K. C. Calhoun, A.R. Dutton, T. Naing, R. C. Reedy and B. R. Scanlon, 2003. Groundwater availability of the Southern Ogallala aquifer in Texas and New Mexico: numerical simulations through 2050. Groundwater Availability Modeling (GAM) report completed for the Texas Water Development Board, 160 pp.

Blandford, T.N., D.J. Blazer, A.R. Dutton and T. Naing. 2003. Regional groundwater availability modeling of the southern High Plains aquifer of west Texas and eastern New Mexico. In Proceedings of MODFLOW

T. Neil Blandford, P.G.

Publications and Presentations Continued

and More, 2003 - Understanding through Modeling. Sponsored by International Ground Water Modeling Center, Colorado School of Mines, Golden, Colorado. September 16-19, 2003.

Blazer, D.J., K.C. Calhoun and T.N. Blandford. 2003. Development of the southern Ogallala groundwater availability model using GIS. In Proceedings of MODFLOW and More, 2003 - Understanding through Modeling. Sponsored by International Ground Water Modeling Center, Colorado School of Mines, Golden, Colorado. September 16-19, 2003.

Blandford, T.N., 2003. What is a groundwater flow model and how do you know if you have a good one? In Proceedings of New Mexico Water Law Conference. Sponsored by CLE International, Santa Fe, New Mexico. August 18-19, 2003.

Blandford, T.N., D.J. Blazer, and A.R. Dutton. 2003. Regional groundwater availability modeling of the southern Ogallala aquifer of west Texas and eastern New Mexico. Presented at New Mexico Symposium on Hydrologic Modeling. Sponsored by New Mexico Water Resources Research Institute, Socorro, New Mexico. August 12, 2003.

Blandford, T.N., D.J. Blazer, A.R. Dutton and R.M. Smith, 2003. Regional Groundwater Availability Modeling of the Southern Ogallala Aquifer in West Texas and Eastern New Mexico. Presented at National Ground Water Association Southwest Focus Conference – Water Supply and Emerging Contaminants, Pheonix, Arizona. February 20-21, 2003.

Blandford, T.N., M. J. Ronayne and T.L. Shelley, 2003. Lake Formation at Multiple Mine Pits – Model Development and Application. Presented at National Ground Water Association Southwest Focus Conference – Water Supply and Emerging Contaminants, Pheonix, Arizona. February 20-21, 2003.

Blandford, T.N., D.J. Blazer, A.R. Dutton and R.C. Reedy, 2002. Regional groundwater flow modeling of the Southern High Plains Aquifer - Conceptual models applied and insights gained. Presented at Geological Society of America Annual Conference Special Session on Hydrogeology and Water Resources of the High Plains Aquifer: Issues for Public Policy Over the Next 50 years, Denver, Colorado. October 27-30, 2002.

Blandford, T.N., M.J. Ronayne, and D. Earley, III. 2001. Simulation of lake formation at multiple mine pits in a block faulted porphyry copper deposit. In Proceedings of MODFLOW 2001 and Other Modeling Odysseys, An International Ground Water Modeling Conference and Workshops. Sponsored by International Ground Water Modeling Center, Colorado School of Mines, Golden, Colorado. September 11-14, 2001.

Stephens, D.B. and T. N. Blandford. 2001. Hydrogeologic analysis, transport and modeling for environmental litigation, a case study. Presented at the First International Congress on Petroleum Contaminated Soils, Sediments, and Water Analysis, Assessment and Remediation, August 14-17, 2001, London, United Kingdom.

Ronayne, M.J., T.N. Blandford, D. Earley, and R.Schmidt-Petersen. 1999. Simulation of mine pit lake recovery in a block-faulted porphyry copper deposit. Presented at the Annual Meeting of the Geological Society of America in Denver, Colorado, October 25, 1999

Hsu, K.-C., D. Jordan, T.N. Blandford, D.W. Reaber, and J.L. Wilson. 1998. Evaluation of local-scale contaminant migration within a heterogeneous alluvial basin in the southwest, Presentation at National Ground Water Association 1998 annual convention and exposition, Las Vegas, Nevada, 1998.

Stephens, D.B., K.C. Hsu, M.A. Pricksat, 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(1):156-165.

T. Neil Blandford, P.G.

Publications and Presentations Continued

Jordan, D.L., T.N. Blandford, and R.J. MacKinnon. 1996. Source term analysis for a RCRA mixed waste disposal facility. In Proceedings of the International Topical Meeting on Nuclear and Hazardous Waste Management Spectrum '96, Seattle, Washington, August 18-23, 1996.

Blandford, T.N., N.-S. Park, and P.S.Huyakorn. 1994. Comment on "Well catchments and time-of-travel zones in aquifers with recharge" by D.N. Lerner. Water Resources Research 30(5):1627-1628. May 1994.

Birdie, T. and T.N. Blandford. 1994. Groundwater flow and solute transport modeling study for Seminole County, Florida, and adjoining regions. St. Johns River Water Management District Special Publication.

Blandford, T.N. and T. Birdie. 1993. Development of wellhead protection areas for the major public supply wells in Hernando County, Florida. Final report completed for the Southwest Florida Water Management District and Hernando County, Florida.

Huyakorn, P.S., J.B. Kool, and T.N. Blandford. 1993. An overview of modeling techniques for solute transport in groundwater. In H. Allen, M. Perdue, and D. Brown (ed.) Metals in Groundwater. Lewis Publishers, Inc., Chelsea, Michigan.

Park, N., T.N. Blandford, and Y.S. Wu. 1993. CANVAS: A composite analytical-numerical model for viral and solute transport simulation. Code documentation prepared for EPA Office of Ground Water and Drinking Water.

Park, N., T.N. Blandford, and P.S. Huyakorn. 1992. VIRALT: A modular semi-analytical and numerical model for simulating viral transport in groundwater. Code documentation prepared for EPA Office of Ground Water and Drinking Water.

Blandford, T.N. and T. Birdie. 1992. Regional groundwater flow modeling for east-central Florida with emphasis on Orange and Seminole Counties. St. Johns River Water Management District Special Publication SJ92-SP17.

Blandford, T.N. 1991. Vertical cross-sectional modeling analysis of groundwater flow and saltwater transport in Orange and Brevard Counties, Florida. Prepared for St. Johns River Water Management District by HydroGeoLogic, Inc., Herndon, Virginia.

Blandford, T.N., T. Birdie, and J.B. Robertson. 1991. Regional groundwater flow modeling for east-central Florida with emphasis on eastern and central Orange County. St. Johns River Water Management District Special Publication SJ91-SP4.

Blandford, T.N. and P.S. Huyakorn. 1990. WHPA: A modular semi-analytical model for the delineation of wellhead protection areas. EPA Office of Ground-Water Protection.

Blandford, T.N. and J.L. Wilson. 1988. Large scale parameter estimation and uncertainty propagation in the Columbus Basin, New Mexico. EOS, Transactions of the American Geophysical Union 69(16):367.

Blandford, T.N. and J.L. Wilson. 1987. Large scale parameter estimation through the inverse procedure and uncertainty propagation in the Columbus Basin, New Mexico. New Mexico Water Resources Research Institute Report No. 226, Las Cruces, New Mexico.

Blandford, T.N. 1984. The mineralogy of an andesine anorthosite body near Montpelier, VA. Rocks and Minerals 61(2):57-61.

Huyakorn, P.S. and T.N. Blandford. 1989. A comprehensive model for capture-zone delineation and particle tracking contaminant transport analysis. Presented at the 28th International Geological Congress, Washington, D.C.

T. Neil Blandford, P.G.

Publications and Presentations Continued

Huyakorn, P.S., J.B. Kool, and T.N. Blandford. 1989. An overview of modeling techniques for metal transport in groundwater. Presented at Workshop on Metal Speciation and Transport in Groundwaters, Jekyll Island, Georgia.

Blandford, T.N. and P.S. Huyakorn. 1988. An interactive WHPA delineation model that incorporates a methodology for uncertainty analysis. Presented at Wellhead Protection Conference, New Orleans, Louisiana.

Blandford, T.N. 1986. Variogram estimation for transmissivity in the Columbus Basin, New Mexico. Presented at New Mexico Geological Society Conference, Socorro, New Mexico.

Daniel B. Stephens & Associates, Inc.

Kali M. Bronson

Specialization

Hydrogeology, water resources, water conservation, contaminant transport, and Superfund and contaminated soil and groundwater site assessment and investigation.

Academic Degrees

M.S., Hydrology & Water Resources, University of Arizona, In progress

B.S., Environmental Science (geology emphasis), Northern Arizona University, 1995

Representative Professional Assignments

- ***Northeast New Mexico Regional Water Plan, New Mexico:*** As part of the regional water plan for Northeast New Mexico, developing water supply and demand assessments to include information on groundwater resource assessments, and historical and projected water uses and conservation methods for municipalities, agriculture, riparian evapotranspiration, and other users.
- ***Taos Regional Water Plan, New Mexico:*** As part of the regional water plan for Taos Planning Region, developing water supply and demand assessments to include information on climatic conditions, groundwater resource assessments, and historical and projected water uses for municipalities, agriculture, riparian evapotranspiration, and other users.
- ***Artesia 40-Year Water Plan, New Mexico:*** As part of the 40-year water plan for Artesia, developing water supply and demand assessments to include information on groundwater resource assessments, historical and projected water uses, surface and groundwater quality assessments, and water conservation assessments.
- ***McCarty Construction Company Site, Ruidoso, New Mexico:*** As site geologist, responsibilities include work plan and scope development, client relations, supervision of monitor well installation, soil and groundwater sampling, well log construction, data analysis, and report preparation.
- ***Groundwater Characterization, Effluent Disposal Site, Nevada:*** Provided technical assistance for the evaluation of data, including soil and groundwater data, to support the description of the conceptual site model. Analyzed new and historical hydrogeologic data and aided in preparation of reports for submittal to the client.
- ***State Road 114 Groundwater Plume Superfund Site, Levelland, Texas, Texas Commission on Environmental Quality (TCEQ):*** Responsibilities included subcontractor procurement and coordination of site investigation activities, including collecting soil samples from Geoprobe points, interpretation of analytical data, capture zone modeling using WHPA, support for preparation of site data quality objectives (DQOs), and preparation of quarterly groundwater monitoring reports and the site Technical Memorandum (TM).
- ***Litigation Support and Technical Assistance, Confidential Client, Southern California:*** Analyzed contribution to groundwater contamination by many potentially responsible parties to a large groundwater plume in southern California. Provided analysis and interpretation of geological and hydrogeological data.
- ***Post-Remedial Investigation Feasibility Study, Harvey Industries State Superfund Site, Athens, Texas, Texas Commission on Environmental Quality (TCEQ):*** Site manager for site investigation activities, including landfill gas characterization and groundwater characterization. Responsibilities include implementation of soil gas landfill investigation using temporary drive-point methods for testing of methane and other landfill gases; coordination and supervision of field investigation activities for landfill soil vapor survey; coordination and supervision of quarterly groundwater monitoring activities; preparation of soil vapor survey report; interpretation of soil and groundwater physical and analytical data; and preparation of quarterly groundwater monitoring reports.

Kali Bronson

Representative Professional Assignments Continued

- ***Superfund Pre-feasibility Study, Marshall Wood Preserving State Superfund Site, Marshall, Texas, TCEQ:*** Site manager for pre-feasibility study at former wood-treating site. Responsibilities include development and implementation of work plans under minimal supervision, delineation of dense non-aqueous phase liquids (DNAPLs), light non-aqueous phase liquids (LNAPLs), and dissolved semi-volatile organic compounds (SVOCs) and metals in groundwater, coordination and supervision of field investigation activities including monitor well installation, soil sampling, geotechnical soil sampling, and low-flow groundwater sampling, interpretation of hydrogeological data, interpretation of analytical data, and preparation of site investigation reports.
- ***Litigation Support, Confidential Clients, Chickasha, Oklahoma and Corpus Christ, Texas:*** As site geologist, responsibilities included field sampling plan (FSP) preparation. Field investigation activities included sampling of surface and subsurface soil, surface water and groundwater; monitor well installation; interpretation of field, geologic, and analytical data; and final report preparation.
- ***Superfund Site Remediation Operation and Maintenance, Sikes Disposal Pits, Crosby, Texas, TCEQ:*** As site manager, responsibilities included development and implementation of work plans, monitoring concentrations of dissolved volatile organic compounds (VOCs) and metals in groundwater, coordination and supervision of field investigation activities including groundwater sampling and site maintenance, interpretation of hydrogeological data, interpretation of analytical data, and preparation of site investigation reports.
- ***Superfund Remedial Investigation, Phipps Plating and Rio Chemical, San Antonio, Texas, TCEQ:*** As staff geologist, responsibilities included surface soil sampling, well installation, well development, groundwater sampling, well log construction, and data analysis.
- ***Superfund Site Discovery and Assessment, Multiple Sites in Texas, TCEQ:*** As site geologist, responsibilities included site scoping, site reconnaissance, surface soil and groundwater sampling, and report preparation under rigorous U.S. Environmental Protection Agency (EPA) Level IV quality assurance guidelines.
- ***Brownfields Site Investigation, Carrizo Springs, Texas, TCEQ:*** As staff geologist, responsibilities included subcontractor procurement and coordination of site investigation activities, including collecting soil samples from Geoprobe points and groundwater samples from temporary sampling locations, interpretation of analytical data, and support for preparation of site investigation report.
- ***Leaking Petroleum Storage Tank Site Assessment and Investigation, TCEQ, Multiple Sites, Texas:*** As site geologist for more than 15 leaking petroleum storage tank (LPST) sites, responsibilities included work plan development, supervision of monitor well installation, soil and groundwater sampling, well log construction, data analysis, and report preparation.
- ***LPST Responsible Party Remediation, San Saba Butane, San Saba, Texas:*** As site manager and site geologist, responsibilities include work plan and scope development, client relations, supervision of monitor well installation, soil and groundwater sampling, well log construction, data analysis, and report preparation.
- ***LPST Site Contaminant Characterization Research, City of Tucson Office of Environmental Management, Tucson, Arizona:*** Conducted research at Thomas O. Price Center LPST site to characterize contaminant plumes in vadose zone and to test efficacy of remediation systems. Work focused on use of gas-phase partitioning and non-partitioning tracers to improve contaminant characterization in vadose zone. Responsibilities included organization, supervision, and setup of field-scale partitioning tracer tests; system design and implementation for tracer delivery, monitoring and sampling in vadose zone; use of

Kali Bronson

Representative Professional Assignments Continued

dataloggers, pressure transducers, and associated computer programs; data collection and analysis, and report preparation.

- ***Remedial Investigation under Base Realignment and Closure Act, U.S. Army Corp of Engineers, Camp Navajo, Belmont, Arizona and Hawthorne Army Depot, Hawthorne, Nevada:*** Responsibilities included geologic mapping, supervision of well installation, well development, sieve analysis, sampling of surface and subsurface soil, sediment, surface water, sub-aqueous, groundwater, and passive soil gas, and development of standard operating procedures.
- ***Colorado River Research Expedition, Northern Arizona University, Colorado River, Arizona:*** Participated in research study on backwater rejuvenation after flood release from Glen Canyon Dam. Responsibilities included performing slug tests using pneumatic pressure transducers and dataloggers, and measuring synoptic water levels.

Additional Professional Training

OSHA Hazardous Waste Operations and Emergency Response Training (40-Hour)

Professional Affiliations

Rocky Mountain Water Environment Association

American Water Works Association (AWWA), Joint New Mexico Involvement Committee, committee member

National Ground Water Association

Water for People, Rocky Mountain Division subcommittee chairman

Professional Experience

Daniel B. Stephens & Associates, Inc., Albuquerque, New Mexico, 1999 to present
Hydrogeologist

Department of Soil, Water, and Environmental Science, University of Arizona, Tucson, Arizona, 1997-1999
Research Assistant

Tetra Tech, Inc., San Francisco, California, 1995-1997
Geologist

Northern Arizona University, Colorado River Research Expedition, June 1996
Field Technician

Daniel B. Stephens & Associates, Inc.

Stephen J. Cullen, Ph.D., P.G., REA II, CPSS, CEM

Specialization

Areas of expertise include hydrocarbon and halocarbon site investigations, contaminant source identification, hazardous and solid waste landfill investigations and monitoring systems, metals and radionuclide investigations, land disposal of biosolids and sewage effluent, vadose zone and groundwater flow and transport modeling, land treatment facilities, intrinsic bioremediation as well as active approaches to soil and groundwater remediation. Expert opinions and testimony: resolution of a wide range of groundwater and vadose zone characterization, monitoring, and remediation problems.

Academic Degrees

Ph.D., Geography, University of California at Santa Barbara, 1996

M.Sc., Soil Physics, Montana State University, 1981

B.Sc., Soil Science and Hydrology, University of California at Davis, 1977

Professional Registration

California Professional Geologist, No. 7399

California Registered Environmental Assessor – Level II, REA II- No. 20107

Certified Environmental Manager, State of Nevada, No. 1839

Certified Professional Soil Scientist, Reg. No. 03169, ARCPACS

Registered Nuclear Soil Water and Density Gauges, CPN No.19336

Representative Professional Assignments

Expert Testimony: Petroleum Hydrocarbons, Chlorinated Hydrocarbons, Perchlorate, Metals, Polynuclear Aromatic Hydrocarbons

- ***Site Characterization, Feasibility Study, Remedial Action Plan, Statistical Analysis, Modeling, Texaco Exploration and Production, Inc., Santa Maria California:*** Provided expert litigation support to major oil exploration company in a matter pertaining to oilfield restoration in Santa Maria, California. Plaintiff contended that fill soil received from the oil company was actually hazardous waste that resulted in injury to the plaintiff's property and should have been more appropriately disposed of in a Class I landfill. Concurrently, regulatory oversight agency ordered oil company to immediately investigate and remediate alleged problem. Contaminants of concern included total petroleum hydrocarbons, metals, polynuclear aromatic hydrocarbons, diluent, volatile organics, semivolatile organics, and asbestos. Dr. Cullen's staff provided oversight and observation of site construction activities while subject soil was placed in a so-called waste pile. Conducted historical and forensic investigation to determine validity and source of reported elevated chemical concentrations in soil samples. Additionally, he conducted an independent field investigation of soil pile for all constituents in the complaint and specified laboratory analytic protocols specific to classification of waste soil. Using a sampling scheme designed to produce a statistically valid sample of the pile, subsequently performed a statistical analysis that clearly demonstrated the soil pile waste stream did not meet criteria for hazardous waste under California Code of Regulations, Title 22. Also conducted modeling to demonstrate soil constituents did not represent a threat to groundwater. After Dr. Cullen prepared a Feasibility Study and Remedial Action Plan, and conducted negotiations with regulatory agencies, it was determined soils were suitable for beneficial reuse as road base on local roadway construction projects. Provided expert declaration, deposition testimony, and sole expert testimony for defendant at jury trial in Superior Court. Court ruled in favor of defendant. Subsequently, trial effort was named by *National Law Journal* as one of the top 20 defense trial victories in 2002.

Stephen J. Cullen, Ph.D., P.G., REA II, CPSS, CEM

Representative Professional Assignments Continued

- ***Chlorinated Hydrocarbon Site Characterization and Remediation, Cost Allocation, Confidential Client, Santa Barbara, California:*** Provided estimate of time since release and evaluated adequacy of characterization data for estimating the cost of site remediation. Also developed weighted cost and responsibility allocation scheme based on scored attributes relating to time of investment (whether landlord or operator) and other key site involvement parameters. Expert report was submitted for use in litigation proceedings. Matter was removed to arbitration where Dr. Cullen is providing expert technical support for banking institutional client.

- ***Chlorinated Hydrocarbon Site Characterization and Remediation, Confidential Client, Santa Ana, California:*** Provided expert report on fate and transport of PCE at former electronics and aerospace manufacturing facility operational as long ago as 1959. Led team that researched historical regulatory and commercial documents to interpret use of chemicals at site. Evaluated historical environmental sampling data and interpreted fate and transport of site constituents. Also evaluated adequacy of site characterization data to form basis of remedial cost estimation. Dr. Cullen's team was also able to obtain environmental samples and fingerprint resulting data to provide time boundaries to date a portion of site release. Dr. Cullen's team provided oversight of field activities and assessed technologies appropriate to remediate site contamination.

- ***Hydrogeologic Conditions Conducive to Mold Invasion in Coastal Multi-unit Dwelling, Confidential Client, Santa Barbara, California:*** Provided Expert Witness deposition and trial testimonial opinion as to the surface and subsurface hydrologic conditions that are conducive to water vapor intrusion into the near subsurface and subsequently through concrete slab-on-grade foundation and into structures. Dr. Cullen evaluated the site environment and developed calculations of water and water vapor flux based on the effects of shallow groundwater, capillary rise, boring log data, geotechnical sampling data, salinity effects of reclaimed wastewater irrigation, and the Site geomorphology.

- ***Chlorinated Hydrocarbon Site Characterization and Remediation, Litton Industries, Santa Clara, California:*** Provided Expert Witness deposition and testimonial opinion regarding the potential release, and resulting impact, to groundwater by multiple suspected sources of chlorinated hydrocarbon compounds. Aerial photographic interpretations and evaluation of site investigation data were used to reconstructed the time and mechanisms of release regarding computer chip and printed circuit board manufacturing operations which took place more than 20 years prior to the litigation.

- ***PCE Site Characterization and Remediation, Law Office of John DeLoreto, Santa Barbara, California:*** Provided Expert declaration and deposition testimonial opinion regarding delineation of potential sources and cost allocation of multiple releases of chlorinated hydrocarbons at a site of complex hydrogeology in Central California. The opinion was provided at the request of a landlord of a dry cleaning facility and resulted in the identification of additional responsible parties, including the operator of a publicly owned sewage treatment system. The opinion resulted in reduction of the landlord's liability for the commingled halocarbon plume.

- ***Retail Gasoline Service Station, Petroleum Hydrocarbons, UNOCAL, Stockton, California:*** Provide... Expert Testimony to California State Water Resources Control Board (SWRCB) in Sacramento. Testimony presented the methods and findings of a site and regional investigation concerning the regional water quality, where salt water intrusion due to historical pumping has occurred, and the evidence indicating that the subject sites were undergoing natural attenuation and intrinsic biodegradation. The SWRCB subsequently voted to declare the site suitable for closure and no further action, pending one additional year of quarterly monitoring.

- ***U.S. EPA v. Hawker Pacific et al., Hawker Pacific, Inc., Sun Valley, California:*** Developed Expert Opinion and a presentation to a special master in a settlement hearing on behalf of a manufacturer of aircraft landing gear. The client was initially sued by the USEPA for $17 million as a potentially

Stephen J. Cullen, Ph.D., P.G, REA II, CPSS, CEM

Representative Professional Assignments Continued

responsible party in the North Hollywood Operable Unit of the San Fernando Valley Superfund Site. After a initial evaluation of the site conditions and data, Dr. Cullen recommended that, because of the extensive depth to groundwater at the site, the limited volume of impacted soil, and the geologic conditions likely to prevent vertical migration, the client should abort plans to remediate the Site, aggressively defend themselves against USEPA's lawsuit, and perform additional characterization in order to report to the LARWQCB that cleanup of site soils was unwarranted. Dr. Cullen directed a focused site characterization, evaluated and interpreted on- and off-site data, collaborated with consultants and attorneys for nearby Allied Signal, evaluated and ran the multi-phase, 3-dimensional fate and transport code used by the USEPA as the basis for their lawsuit. The opinion and presentation was based on site field investigation, review of previous site investigation reports, modeling, and a study of the regional hydrogeology and regional contaminant (chlorinated hydrocarbon) distributions. As a result of the presentation of the opinion, the suit was settled out of court and the client was not held responsible for any portion of the groundwater problem in the North Hollywood Operable Unit. Final out-of-pocket costs to the client as the result of the litigation were less than $300,000.

- ***TCE Migration, Hershewe & Gulick, LLP, Joplin, Missouri:*** Provided Expert Witness declaration opinion regarding the fate and transport and potential exposure routes of trichloroethylene (TCE) to residential homes adjacent to a Midwestern ball bearing manufacturing plant in an area of karst hydrogeology.
- ***Petroleum Hydrocarbon Remediation, Kern County School District, Bakersfield, California:*** Provided Expert Opinion Report evaluating the cost efficiency and necessity for active remediation of a site impacted by petroleum hydrocarbons in Central California. The resulting opinion was used to streamline and reduce the amount of active remediation in favor of an approach that included and accounted for in-situ passive bioremediation of the site chemicals.
- ***Pesticide Migration, Great Lakes Chemical Corporation, Irvine, California:*** Project Manager and Hydrologic Specialist for a complex litigation project with an industrial client involving a private party cost recovery lawsuit at a formerly operating chemical distribution plant in the City of Irvine, California. Constituents of concern (COCs) included pesticide, chlorinated solvent, and fuel hydrocarbon impacts to surface water, soil, and groundwater.
- ***DBCP Impacts to Groundwater; Shell et al. v. FMC et al., FMC Corp., Various Locations, USA:*** Provided hydrologic technical support and vadose zone modeling for a Fortune 500 manufacturer and distributor of chemicals. The support included modeling of multiple sites across the United States to reconstruct the timing of impact to groundwater from releases at company facilities and projects for the purpose of determining eligibility for insurance cost recovery.

Transactional Support

- ***Power Generation Assets:*** Dr. Cullen led a team that combined the capabilities of environmental investigation and remediation division and combustion engineering to complete three due diligence projects for Orion Power Holdings, LLP. Two of the target acquisitions were located on the west coast and one located on the east coast. The latter of the three projects, the Con Edison Astoria facility in New York State, resulted in the acquisition of a $550 million asset by the client. These projects represented fast-paced challenges in a multi-faceted environment, comprised of both power generation experts and individuals with years of investment banking experience.

  Pacific Gas and Electric Co. Sale of the Potrero, Contra Costa, Pittsburg, and the Geysers electrical generating plants: Dr. Cullen's team obtained and reviewed the Phase I and Phase II reports on the sites, along with well plot plans, on a highly constrained time schedule. Following review, a teleconference was arranged with client power generating experts to discuss the implications that information gleaned from

Stephen J. Cullen, Ph.D., P.G, REA II, CPSS, CEM

Representative Professional Assignments Continued

the reviewed material could have on the purchase bid preparation. Based on the review and the discussions with the power generating experts, a written memo was prepared for review and critique by the investment bankers. The review included an evaluation of: emissions control capital upgrades; NPDES permit and cost issues; groundwater monitoring issues; comments on the draft environmental impact report (EIR) prepared by the seller; and environmental issues typically associated with historic manufactured gas plant (MGP) facilities. Dr. Cullen provided the client with comments to the lead regulatory agency regarding preferred subsurface remediation alternative selection. Dr. Cullen's team was able to identify potential savings of $18 million dollars in proposed remediation cost.

San Diego Gas and Electric Sale of the Encina Power Plant and Combustion Turbines: The Encina Power Plant is located in northern San Diego County, within the City of Carlsbad. The Plant consists of five steam turbine units and one combustion turbine. The steam turbines are fueled primarily by natural gas with residual fuel oil for back up. The combustion turbine is fueled primarily by natural gas with diesel fuel oil for back up. Dr. Cullen's team identified items of potential environmental concern regarding soil, groundwater, and surface water including impacts of discharged cooling water to the marine environment, ongoing dredging and dredge spoils disposal associated with Agua Hedionda Lagoon, and impacts to soil due to historic or ongoing fuel hydrocarbon releases. Dr. Cullen provided an estimate of the costs associated with achieving compliance, through site investigation and remediation, for the assets subject to bid package. The client was also provided an assessment of air emission risks as well along with a decision making tool for dealing with air emissions from the existing Plant.

Con Edison Sale of the Astoria, New York Generation Station Bundle: Dr. Cullen's team provided an assessment of environmental liabilities and potential remediation costs at three New York facilities included in the Con Edison Astoria Generating Station (GS) Bundle: Astoria Generating Station (GS) and Fuel Depot; Gowanus Gas Turbines; and Narrows Gas Turbine. Regional information available in our company files was used to augment the information provided by the seller on CDROM. The review and recommendations provided to the client relied on professional interpretations and conclusions presented in the documents provided by the seller which represented the views of previous project consultants. In a confidential document to the client, who subsequently won the auction, Dr. Cullen's team identified areas of potential environmental concern and liability as a factor to be considered in the formulation of the final bid.

- ***Confidential Regional Medical Center Property Acquisition, Los Angeles Metro Area.*** Dr. Cullen was contracted to conduct a due diligence investigation of property being considered for acquisition by a Regional Medical Center. Dr. Cullen and his team developed a brief history of the property and its uses, a summary of environmental conditions at the Downey, California property, and provided a discussion for the potential buyer of potential future environmental requirements based on the current environmental conditions at the property, proposed future property end-use, and Regional Water Quality Control Board, Los Angeles Region (RWQCB-LA) decision-making trends and policies. Remediation cost estimates were provided to the client and formed the critical basis for decision-making relative to the purchase. Chlorinated hydrocarbons were detected in the site soil and groundwater, attributable to previous manufacturing activities that occurred on site. Though, in Dr. Cullen's opinion, site environmental investigations had not been fully completed, sufficient data and information were in hand to offer a 3-secenario remedial economic/risk analysis for the prospective purchasers. After Dr. Cullen's team conducted an abbreviated feasibility study, three remedial cost estimates were developed based on the worst case (most costly and longest term), best case (least costly and shortest term), and most probable case (based on experience with similar sites in RWQCB-LA region). An order-of-magnitude cost estimate and remediation schedule were factored into the decision-making process and provided the basis for the Medical Center Executive Board to move ahead on the property acquisition project.

Stephen J. Cullen, Ph.D., P.G, REA II, CPSS, CEM

Representative Professional Assignments Continued

Perchlorate Investigations

- ***Perchlorate Treatability Study – Environmental Tracer Study of Long-term Recharge Rates in the Mojave Desert, United States Air Force:*** As part of a remediation effort associated with Environmental Restoration Program at Edwards Air Force Base, California, Dr. Cullen lead a team of investigators in a treatability study to determine the rate of historic groundwater recharge and the potential for leaching of Site perchlorate to groundwater in an arid climate. A tracer study was conducted in a background area representative of the perchlorate-impacted site hydrogeology. Nominal depth to Site groundwater was 100 feet below ground surface. Boreholes soil samples were analyzed for chloride and tritium. Dr. Cullen specified the unique helium in-growth analytic technique to measure tritium content in samples with low soil moisture content. A portion of the boreholes were completed as vapor monitoring wells from which soil-gas samples were analyzed for chlorofluorocarbons (CFCs). Groundwater samples were also collected and analyzed for the tracer compounds. Interpretation of the Site data indicated very low Site recharge rates, on the order of thousands of years to reach groundwater. The calculated range of recharge rates was consistent with those calculated in other published studies conducted in other similar arid regions. In addition to traditional methods, Dr. Cullen developed a method that utilized the soil chloride profile as the conceptual basis to identify steady-state conditions and determines long-term recharge based on unsaturated flow calculations.

- ***Groundwater Characterization, Effluent Disposal Site, Nevada:*** Dr. Cullen prepared and implemented a hydrogeologic characterization workplan for 2,332-acre confidential chemical disposal site in Nevada. Dr. Cullen, acting in the role of Lead Hydrogeologist, conducted the characterization effort in response to regulatory agency comments that insufficient groundwater characterization data were available to create a comprehensive description of the groundwater and the subsurface environment beneath the Quaternary Alluvium at the site. The purpose of the investigation was to characterize site groundwater at a level of detail sufficient to complete the description of a conceptual site model. Site consists primarily of former wastewater effluent ponds (now dry) into which various wastewaters from the site and vicinity industrial activities were discharged from the early 1940s through 1976, and the system of conveyance ditches that were used to transport those wastewaters to the ponds. The site also includes active, lined ponds. In addition to the active and former effluent ponds and conveyance ditch segments, the site also includes adjoining lands to a nearby ephemeral stream that spills into a nearby major river. A primary constituent, among many, that was discharged was perchlorate. The scope of work included:

    - An extensive intrusive field investigation, utilizing multiple drilling techniques to collect chemical and physical data
    - Laboratory analysis of the chemical and physical samples
    - Entry and management of the data in the project geographic information system (GIS)/relational database
    - Evaluation of the data to support the description of the conceptual site model
    - Reporting of the findings and recommendations

  Specifically, hydrostratigraphic units (water-bearing stratigraphic units) that underlie the site were investigated. These stratigraphic units include an alluvial aquifer, the tertiary Muddy Creek Formation, and the Muddy Creek aquifer. Site fieldwork included:

    - Eighteen exploratory borings below the identified upper surface of the Upper Muddy Creek aquifer to a total depth of 400 feet and geophysical logging of nine of the exploratory borings
    - Continuous core soil sampling (19 samples) to nominal depths ranging from 175 to 225 feet below ground surface

Stephen J. Cullen, Ph.D., P.G, REA II, CPSS, CEM

Representative Professional Assignments Continued

- Collection of 119 *in-situ* water "grab" samples
- Installation and quarterly monitoring of 44 monitoring wells
- Collection of 115 discrete-depth soil samples representing intervals throughout the vadose zone, and beneath the water table, for broad suite chemical, physical, and hydrologic parameter analyses
- Data interpretation and reporting of the conceptual site model

- ***Perchlorate Groundwater Investigation, Vadose Zone Source Identification, Southern California:*** Dr. Cullen was the lead hydrogeologist on a groundwater basin-scale investigation that determined the source of perchlorate impacts to municipal groundwater supply wells in order to support litigation efforts. The scope of the investigation included: a detailed interpretation of stratigraphic and lithologic influences on groundwater flow and perchlorate transport; review of U.S. Geological Survey technical data and reports and assistance in obtaining documents from other parties; evaluation the groundwater basin and the nature and extent of the perchlorate vadose zone and groundwater impacts; source identification; assist with regulatory negotiation; advise the City regarding appropriate remediation alternatives for the perchlorate impacts; prepare presentations and participate in any settlement conferences, administrative proceedings, arbitration, depositions or trial as required.

Petroleum and Chlorinated Hydrocarbon Investigations

- ***Regulatory Negotiation, Former Illegal Methamphetamine Lab Site:*** Building and construction permits were mired by a regulatory agency order to conduct site characterization and possible cleanup. In addition, the additional expense represented a significant project cost overrun. In order to assist with appeal of the regulatory agency order, Dr. Cullen reviewed Site history and regional hydrogeology, interviewed Site owner for historical information, and scheduled a meeting with the agency. As a result of his efforts, the regulatory agency reconsidered the need for further environmental work at the site, and rescinded its order. The project was resumed on its original budget and schedule.

- ***Remedial Investigation, Feasibility, and Implementation:*** Dr. Cullen participated in a team of specialists to provide Site investigation and remediation services for the burning grounds a the Pantex Plant, a DOE owned, contractor-operated facility, managed by BWXT Pantex LLC (BWXT) in Carson County, Texas, whose current mission is to perform activities related to nuclear weapons for the nation's stockpile. Approximately 9,100 acres at Pantex are, and have been, used for industrial operations, burning grounds, firing sites, and other uses. Dr. Cullen's team developed and implemented a plan for interim corrective measures to address VOCs in contaminated soil at the Plant burning grounds operations. Dr. Cullen was responsible for describing the site hydrogeology, and identifying the nature and extent of impacts to the Site, including impacts to the underlying Ogallala aquifer. He also directed the modeling of the anticipated effects of the planned Soil Vapor Extraction technology as a remedial measure, and articulated the Site Conceptual Model that facilitated understanding of past migration and current Site impacts.

- ***Design and Implementation of Innovative In-Situ TCE Remediation, Garden Plaza, Santa Barbara, California:*** Dr. Cullen played a key role in a guaranteed remediation contract with a redevelopment investment group for a former vehicle maintenance yard property slated for development into a retail shopping center in Santa Barbara, California. A directive to clean up moderate levels (10-100 ppb) of tetrachloroethene (PCE) in shallow groundwater beneath the site was previously issued by the Regional Water Quality Control Board, Central Coast Region (RWQCB). The contract guaranteed cleanup of groundwater and regulatory closure for recognized contamination beneath the site. In addition, Dr. Cullen's team assisted the client in securing a separate property transfer liability (PTL) policy that protected the client from any undiscovered contamination. This combination of remediation guarantee and supplemental PTL insurance effectively eliminated environmental contamination issues from the real estate deal, and was essential in permitting the lending institutions to approve both take out and

Representative Professional Assignments Continued

construction loans for redevelopment of the property, enabling the deal to go forward. The total contract price for remediation was paid prior to remediation by the client and placed in an interest earning escrow account. Draws from the escrow account were paid out in accordance with a carefully laid out schedule based on achieving groundwater cleanup progress in accordance with clearly defined project milestones.

Upon evaluating previous site characterization data, it was recommended that an innovative, *in situ* reactive zone (IRZ) approach be implemented to promote naturally occurring biodegradation of the chlorinated VOCs in groundwater beneath the site via molasses injection. Because the extent of impacted groundwater was quite small and the VOC concentrations were relatively low, conventional pump-and-treat technologies were not considered cost effective. In addition, because of a large upgradient plume, groundwater pumping was not recommended. Also, because of laterally continuous low permeability layers, other potentially viable in-situ techniques such as air sparging were not an option.

Following preparation, submittal and approval from the RWQCB of a workplan for molasses injection, a pilot test using this technology was implemented at the site. During the twelve month duration of the pilot test, PCE concentrations were observed to decrease 60%, from 75 ug/L to 28 ug/L in a treatment zone monitoring well, with no production of vinyl chloride. Although the results were promising, the expected complete destruction of PCE was not observed suggesting the presence of a previously undocumented ongoing PCE source to groundwater. An upgradient, offsite groundwater Hydropunch investigation program was soon thereafter designed and implemented. Data from this investigation demonstrated that, in fact, reductions in PCE concentration in site groundwater from the pilot program were actually below documented upgradient groundwater contamination. Following regulatory negotiations and demonstration of attainment of VOC concentrations below background, closure of the site was granted.

- ***Innovative Reduction of Ammonia IDLH Health and Safety Hazard, Equilon, Carson, California:*** Dr. Cullen was contacted to assist with the demolition and decommissioning of the Equilon's Lube Oil Plant in Carson, California. A preliminary investigation revealed relatively shallow soil impacts by lube oil and gasoline compounds. However, excavation, could not be conducted without great expense in the allowable timeframe due to the presence of levels of ammonia gas above concentrations considered immediately dangerous to life and health (IDLH) emanating from a pilot trench in the area. The ammonia presence had shut down site work and placed the pending closure of the sale of the property in jeopardy. Because of the ammonia gas danger, the excavation cost would be increased dramatically due to additional H&S personnel protection equipment that would be required (SCUBA). An immediate solution was required to allow the time-sensitive real estate transaction to be completed. Dr. Cullen suggested the innovative approach of using hydrolysis to induce an in-situ transformation of the ammonia gas to the nongaseous ammonium ion. The final approach was enhanced by utilizing slightly acidified water to safely increase the rate of in-situ reaction. The approach was implemented by mixing an acidified solution in a large storage tank and creating a temporary recharge basin to infiltrate the acidified water into the affected area. Within two weeks the ammonia gas hazard was reduced from IDLH levels to nondetect resulting in conditions in which workers could operate using only minimal personal protective equipment. The excavation was completed at a cost 2-3 orders-of-magnitude lower than what it would have cost without remedying the ammonia gas problem. A No-Further-Action letter was issued by the regulatory agency for the site soils and the real estate transaction was successfully concluded on time.

- ***Retail Gasoline Service Station Investigation and Litigation Support, UNOCAL, Stockton, California:*** Conducted technical review of relevant data collected during previous environmental investigations for two gasoline service stations under the regulatory oversight of the San Joaquin County Public Health Department (SJCPHS) and the Central Valley Regional Water Quality Control Board (CVRWQCB). Client requested that investigations be conducted in such a way that data and information derived would be defensible in court and in a planned appeal to the State Water Resources Control Board in Sacramento,

Stephen J. Cullen, Ph.D., P.G, REA II, CPSS, CEM

Representative Professional Assignments Continued

California. Dr. Cullen negotiated a site workplan and directed a limited subsurface investigation to provide additional data necessary to delineate the vertical and lateral impacts to soil and groundwater. Site issues addressed in Dr. Cullen's evaluation included assessed the regional and site-specific hydrogeologic setting, results of simultaneous groundwater and soil sampling beneath the water table, and the general water quality in the vicinity of the site. Dr. Cullen also made an evaluation of the suitability of the site for combined air sparging and soil vapor extraction as well as for a natural attenuation approach. The report concluded that the site was self-remediating through the mechanisms of natural attenuation and intrinsic biodegradation, notwithstanding the poor water quality of the site. The report provided the basis for estimating the mass of constituents in the subsurface, the volume of impacted soil and groundwater, and the basis for formulation of a Corrective Action Plan. On the basis of the report, UNOCAL requested Dr. Cullen to present an appeal to the SWRCB for case review and closure status. Dr. Cullen presented expert testimony to the SWRCB presenting the methods and findings of his investigation, and his expert opinion on the site. The SWRCB voted to declare the site suitable for closure and no further action, pending one additional year of quarterly monitoring results.

- ***Former Aerospace Manufacturing Facility, AlliedSignal, Los Angeles, California:*** Project Manager and lead scientist of a team investigating a chlorinated hydrocarbon release at the former site of an AlliedSignal Aerospace facility near Los Angeles International Airport. The team was contracted initially to review, within a two week period of time, 10 previous years of hydrogeologic investigation reporting, which cost the client more than $16M, and determine if previous interpretations were supportable. As a result of the data interpretation of Dr. Cullen's team, the regulatory agency withdrew its intention to issue an official Cleanup and Abatement Order in lieu of a voluntary investigation to be conducted under Dr. Cullen. The client was allowed to retain complete control of site investigation and remediation activities. This gave them the freedom to optimize site financial expenditures and implement a positive community relations program. Dr. Cullen's investigation, reporting, and regulatory interface resulted in a negotiated cleanup goal of 10,000 parts per billion total halogenated volatile organic compounds (VOCs) using soil vapor extraction, with the balance to be addressed under an intrinsic remediation plan. It was also established that numerous other potential responsible parties existed that likely contributed to the extent of the halocarbon plume. The total cost of the program to the client was less than 1/16 of the cost of the previous investigations.

- ***Former Aerospace Facility, AlliedSignal Aerospace Equipment Systems, Rancho Dominguez, California:*** Project Director on a focused site investigation to delineate the extent of chlorinated VOC impacts to groundwater beneath a former AlliedSignal Aerospace facility, located in a heavily industrialized area of Rancho Dominguez, California. Estimated costs submitted by other consultants to remediate the existing soil and groundwater "plume" beneath the site were $1.4 million. Results of the investigation indicated TCE impacts to perched groundwater as high as 1,700 µg/L, with rapid lateral and vertical attenuation. Dr. Cullen and his team demonstrated multiple lines of evidence indicating that intrinsic biodegradation of the chlorinated VOCs was ongoing. Dr. Cullen was successful in gaining written site closure for both soil and groundwater the same day that he presented the findings of his site investigation to the regulatory authority, based on a careful and convincing presentation. The entire program was implemented within a 5-month period, at a total cost to the Client of about $50,000 resulting in a cost savings to the client of $1.35 million.

- ***Lawrence Livermore Reports, State of California, State Water Resources Control Board, University of California and Lawrence Livermore National Laboratory Study, State-wide Investigation of Leaking Underground Fuel Tanks Impact on Groundwater:*** Dr. Cullen co-authored a study, in association with faculty from the University of California and the Lawrence Livermore National Laboratory, to determine whether passive bioremediation of petroleum hydrocarbons leaked from underground fuel tanks can be an effective alternative to actively engineered remediation processes. The study, based on the survey of

Stephen J. Cullen, Ph.D., P.G, REA II, CPSS, CEM

Representative Professional Assignments Continued

1,200 sites, was sponsored by the California State Water Resources Control Board and involved the collection of data across a broad geographic area including all nine regional water quality control boards. The study resulted in the widely referenced reports entitled, *Recommendations to Improve the Cleanup Processes for California's Leaking Underground Fuel Tanks* and *California Leaking Underground Fuel Tank (LUFT) Historical Case Analyses* also known as the "UC-Lawrence Livermore Reports". As a result of the study, the State Water Resources Control Board recommended to its nine regional water boards that passive remediation should be considered the primary remediation tool in most cases once the fuel leak source has been removed.

The study found that during the previous decade only 0.5% of California's 28,000 reported fuel leaks had any contaminating effects on drinking water wells. Benzene was found to effect only 0.0005% of the State's total groundwater storage capacity at concentrations greater than California's minimum cleanup level; one part per billion. It was estimated that about $3 billion of California's state resources were affected by the report's recommendations. The study has had enormous impact on how underground storage tank programs are handled throughout California, the U.S., and even on an international level.

The study involved collaboration between researchers from five campuses of the University of California (UC), the State Water Resources Control Board, nine Regional Water Quality Control Boards, and the Lawrence Livermore National Laboratory (LLNL). Dr. Cullen played a key role in evaluating the enormous data set, identifying critical technical issues to be addressed, guiding the collaborating group to reach a consensus on the interpretation of the data, and presenting the results and conclusions of the studies at numerous public and technical meetings conducted at the state, national, and international levels.

- ***Multi-Agency Petroleum Hydrocarbon Remediation Demonstration Project:*** Dr. Cullen participated as a principal investigator in a multi-agency collaborative effort to demonstrate innovative and alternative risk-based cleanup strategies at ten Department of Defense (DOD) sites throughout the state of California. Collaborating agencies included: the U.S. Navy, U.S. Air Force Center for Environmental Excellence, Lawrence Livermore National Laboratories, State Water Resources Control Board, the various appropriate Regional Water Quality Control Boards, the U.S. Army, the National Park Service, and the U.S. Marine Corps.

  Dr. Cullen was seated as a part of an expert panel to visit the various DOD sites and evaluate the quality of the site characterization, modeling and remediation efforts performed to date. Based on their review, the panel submitted evaluation comments to improve and enhance the quality of the site characterization and modeling, to evaluate sources of contamination, and to suggest and recommend alternative innovative remediation approaches to cleanup petroleum hydrocarbons that have contaminated soils and groundwater at the respective sites.

  As a part of his involvement, Dr. Cullen provided training to DOD environmental personnel and attended meetings set up to develop a consensus as to appropriate remediation methodologies to apply at the respective sites.

  The project was a follow up project to the earlier evaluation of approaches to cleanup of petroleum hydrocarbons throughout the state of California. The purpose of the project was to demonstrate at DOD sites, the application of the recommendations published as a result of Dr. Cullen's earlier investigations, and to implement the process of risk-based corrective action and bioremediation at a number of sites. Sites were selected in the jurisdiction of various California State Regional Water Quality Control Boards in order to develop a state-wide understanding and consensus as to appropriate approaches for the cleanup of petroleum hydrocarbons in the subsurface.

Stephen J. Cullen, Ph.D., P.G, REA II, CPSS, CEM

Representative Professional Assignments Continued

Based on successes achieved in the project, the DOD expressed interest in extending the approach nationwide. The U.S. Environmental Protection Agency (EPA) participated in the project and investigated the merits of applying the recommendations of the previous report on a broad scale nationwide. Portions of the findings of the previous work conducted by Dr. Cullen have been incorporated into EPA guidance and policy.

- ***Intrinsic Remediation Sites, Texaco, Victorville, California; Roadway, Fresno, California:*** Project Manager of intrinsic natural attenuation assessment programs at two operating service stations (Texaco) and an operating trucking terminal (Roadway) to determine whether natural constituent attenuation in the subsurface would result in acceptable constituent reduction rates over time and result in an agency-accepted passive remedial approach. The programs included the installations of innovative monitoring networks including soil vapor monitoring, barometric and thermal monitoring, and neutron monitoring, and computer fate and transport modeling. One of the three sites has already been approved for closure based on this approach, the other is currently pending closure approval, and the third is awaiting completion of the assessment.

- ***Dry Cleaning Facility, DeLoreto Family Trust, Santa Barbara, California:*** Project Manager of a large area investigation and remediation for a multiple source, multiple chemical release site involving chlorinated hydrocarbons in Central California. The investigation includes collection and evaluation of soil matrix, soil gas, and groundwater data. The soil vapor survey encompassed the sample collection and analysis of some 120 soil vapor samples at a shopping plaza to track halocarbon releases associated with two dry cleaning facilities, a US Post Office vehicle maintenance yard, historic leaking underground storage tank sites, a City sanitary sewer network, and a former Army Hospital. The following phased investigation included soil sampling within operating businesses, a soil vapor extraction remedial testing program, installation of groundwater monitoring wells, groundwater pump testing, and preparation of a Remedial Investigation/Treatability Study Report. Ongoing work includes implementation of a Feasibility Study/Remedial Action Plan (FS/RAP), design, construction and operation of a soil remedial system, and installation of a groundwater treatment system.

- ***Refinery Remediation, Texaco Refining & Marketing, Bakersfield, California:*** Designed a pilot vapor extraction and vapor recovery test to facilitate the final design of a recovery system for petroleum reformate contaminating the vadose zone at a Texaco refinery in Central California. Designed final extraction system for impacted soils 90 feet deep over an area 25 acres in size. To date, over 1.5 million gallons of petroleum reformate have been extracted from the vadose zone well field designed by Dr. Cullen.

- ***Petroleum Hydrocarbon Fate and Transport, Western States Petroleum Association, California:*** Manager of the vadose zone modeling group charged with the task of determining fate and transport of heavy crude oil products and byproducts. The direct client was the Western States Petroleum Association and Dr. Cullen coordinated exchange of data with the research group of the American Petroleum Institute in Washington, DC.

- ***Vadose Zone Monitoring, US EPA, Alton, Missouri:*** Demonstrated and installed a vadose zone monitoring system at a Superfund hazardous waste land treatment site (formerly a wood treatment facility) managed by the USEPA, southeast Missouri. The main chemical of concern was polychlorinated biphenyls (PCB).

Radionuclide and Metals Investigations

- ***Waste Soil Pile Remedial Investigation, Bakersfield, California:*** Dr. Cullen directed the soils phase of a remedial investigation at a former waste recycling/treatment facility in Bakersfield, CA under the

Stephen J. Cullen, Ph.D., P.G, REA II, CPSS, CEM

Representative Professional Assignments Continued

regulatory oversight of the DTSC. The work was conducted on behalf of a Potential Responsible Party (PRP) group comprised of a number of Fortune 100 companies, regional companies, and Caltrans. The work scope involved the characterization of five aboveground piles comprising 80,000 cubic yards of soil potentially impacted by Title 22 metals, VOCs chlorinated hydrocarbons, petroleum hydrocarbons, fuel oxygenates, semivolatile organic compounds (SVOC), polynuclear aromatic hydrocarbons (PAH), PCBs, pesticides, and herbicides. Leachate testing was conducted via the California WET and federal TCLP protocols. Dr. Cullen designed and supervised an investigation that was developed to facilitate classification of waste soil for the purpose of disposition and to provide the basis for a feasibility study. An innovative field-sampling plan utilizing direct push technology, hand augering, and a custom-made hybrid between a direct push rig and an extending fork lift was developed to extract the necessary representative samples while simultaneously optimizing sample spatial distribution and worker safety. The sampling and data analysis approach was based on a stratified, random-start grid design. Dr. Cullen conducted a statistical analysis of the sampling data used to identify the appropriate method of waste disposition. Confidence intervals of the student-t distribution for the strata were compared against the respective regulatory standard in order to characterize the stratified waste streams. Dr. Cullen subsequently participated in regulatory negotiations and discussions with the DTSC in Berkeley, California.

- ***Low Level Radioactive Waste Disposal, EG&G, Rocky Flats Nuclear Manufacturing Facility, Colorado:*** Reviewed performance evaluation modeling of vadose zone and groundwater modeling to assess viability of remediation by entombment of radionuclides and mixed wastes at Rocky Flats plant, Colorado.
- ***National Lab Site Characterization, Lawrence Livermore National Laboratory, Livermore, California:*** At the invitation of the Environmental Restoration Division, Dr. Cullen served as reviewer and consultant to Lawrence Livermore National Laboratories. Specifically, he is designed an infiltration experiment to determine the influence of precipitation on the entry into and migration of contaminants, including radionuclides, through the vadose zone. He also developed laboratory protocols for hydrologic testing of soil core samples, and designed an experiment to measure diffusion coefficients of tritiated water vapor in undisturbed soil cores.
- ***Metals Soil Column Study, Springfield Township Committee, Springfield, Michigan:*** Project manager of a study to design, implement, and report on the findings generated from a carefully controlled laboratory study conducted to compare the results of soil column leaching to the Synthetic Precipitation Leachate Procedure batch testing methodology (EPA Method 1312). The study was conducted to demonstrate attenuation of metals and PCB's within soil media through soil sorption.
- ***Heap Leach Mining, Confidential Client, Kingman, Arizona:*** Project Manager for the installation, testing, and reporting of vadose zone monitoring systems including suction lysimeters and gypsum block arrays for a heap leach mining facility in Kingman, Arizona.
- ***Vadose Zone Monitoring, Santa Barbara County, Santa Ynez, California:*** Provided neutron moderation logs to the Santa Barbara Public Works Department to document background soil moisture conditions in the vadose zone below a leaking underground storage tank contaminating groundwater at Santa Ynez Airport (August, 1989).

Modeling

- ***Tritium Migration Modeling, Brookhaven National Laboratory, Upton, New York:*** Modeled and provided opinion of the significant factors affecting tritium migration beneath the High Flux Beam Reactor at Brookhaven National Laboratories.

Stephen J. Cullen, Ph.D., P.G, REA II, CPSS, CEM

Representative Professional Assignments Continued

- ***Petroleum Hydrocarbon Fate and Transport Analysis, Farmland Industries, Coffeyville, Kansas:*** Modeled the potential impacts to groundwater of residual vadose zone concentrations of petroleum hydrocarbons at an 85-year old refinery operated by Farmland Industries in Coffeyville, Kansas.
- ***Hydrologic Research, USEPA, Santa Barbara, California:*** Supervised a comparison of three functional forms for representing soil moisture characteristic curves.
- ***Landfill Siting, Spokane Regional Solid Waste Disposal Project, Spokane, Washington:*** Developed and wrote a predictive scenario model for the Spokane Regional Solid Waste Disposal Project to approximate the 120-day travel distance of a wetting front below a breach in an earthen liner at three potential solid waste landfill disposal sites.

Federal and Public Works Investigations

- ***California School Siting under DTSC Oversight, William S. Hart Union School District, Santa Clarita, California:*** Dr. Cullen served as Technical Advisor and project reviewer for a comprehensive Preliminary Endangerment Assessment (PEA) performed at the William S. Hart Union High School District in Santa Clarita. The investigation was conducted under DTSC's environmental oversight program for schools siting. The project provided the critical environmental evaluation for siting of the District's new Golden Valley High School. Project challenges included: rugged inaccessible terrain; oil drilling and production, and explosives manufacture and testing on adjacent properties; active community participation in the siting process; and an aggressive overall construction schedule linked to the construction of a major automobile thoroughfare through the property. Comprehensive chemical analyses were conducted on 100 soil, and 150 soil-gas samples collected from over 50 borings within and around the 50-acre school site. Ambient air monitoring systems were deployed at strategic site locations. Based on the project findings, the school district funded the final construction of the school. Upon review of the PEA report, a No Further Action memorandum was issued by the State DTSC for the site and the project was endorsed by the State School Board. Opening of school operations was scheduled for fall of 2002.
- ***Low-level Radioactive Waste Disposal, EG&G, Rocky Flats Nuclear Manufacturing Plant, Golden, Colorado:*** Designed a vadose zone characterization program and monitoring system at Operable Unit 4 located at the Department of Energy (DOE) Rocky Flats Plant in Rocky Flats, Colorado. Project work involved development and implementation of a field investigation to identify contaminant release sources, a conceptual model of the subsurface geology, mechanisms and pathways for contaminant migration, candidate remedial approaches, and viable monitoring approaches during closure and post closure. Contaminant of concern included nitrates and a variety of actinides.
- ***Vadose Zone Monitoring Program, Lawrence Livermore National Laboratories (LLNL), Livermore, California:*** Dr. Cullen served as reviewer and consultant to Lawrence Livermore National Laboratories (LLNL). Specifically, he designed an infiltration experiment to determine the influence of precipitation on the entry into and migration of contaminants through the vadose zone. He also assisted in the development of laboratory protocols for hydrologic testing of soil core samples.
- ***Geographic Information System, Vandenberg Air Force Base, Lompoc, California:*** Conducted a one-day workshop at Vandenberg Air Force Base for Air Force and US Bureau of Reclamation personnel to demonstrate the value of Geographic Information Systems (GIS) in developing groundwater and vadose zone remedial action plans (February, 1991).
- ***Geographic Information System, Multiple Agencies, Santa Barbara County, California:*** Developed an interagency cooperative agreement between UCSB, USEPA, the US Bureau of Reclamation, and the US Air Force Space Command to develop GIS suitable for use in decision-making in ground water and vadose zone characterization and remedial investigations.

Stephen J. Cullen, Ph.D., P.G, REA II, CPSS, CEM

Representative Professional Assignments Continued

- ***Geographic Information System, U.S. Bureau of Reclamation, Vandenberg Air Force Base, California:*** Principal investigator of a project team which designed a GIS for the US Bureau of Reclamation to facilitate remediation of approximately 1,000 underground storage tanks (USTs) at Vandenberg Air Force Base, California. Dr. Cullen also reviewed USBR field investigation strategies and protocols and served in a training capacity with respect to vadose zone hydrogeology.

Research and Education

- ***Vadose Zone Research Laboratory, University of California, Santa Barbara:*** Formerly Principal Investigator and lead research scientist at the Vadose Zone Research Laboratory of the Institute for Crustal Studies at the University of California at Santa Barbara. Dr. Cullen has given invited lectures in Engineering Geology, Hydrogeology, Geography, and Environmental Engineering courses on the subject of vadose zone hydrologic processes. Course instruction for upper division course on soil processes.
- ***University of California Faculty, University of California, Santa Barbara, California:*** Adjunct faculty member and Co-principal Investigator formerly managing day-to-day operations of a research group pursuing the evaluation of state-of-the art techniques used to monitor fate and transport of contaminants in the vadose zone. His research was conducted under cooperative agreement with the U.S. Environmental Protection Agency (USEPA).
- ***EPA Guidance Document, USEPA, Washington, D.C.:*** Principal author on a national EPA guidance document under RCRA Subtitle C entitled "Vadose Zone Monitoring at Hazardous Waste Sites". The work was a compilation of research efforts conducted at the Vadose Zone Monitoring Lab at the University of California at Santa Barbara. The requirement for the work was motivated by EPA's strong position on the merit's of vadose zone monitoring as a realistic and rational approach to prevention of contaminant migration to the nation's groundwater resources (under RCRA, Subtitle C) from hazardous waste landfill sources.
- ***Vadose Zone Monitoring:*** Provided vadose zone monitoring case histories to NUS Corporation and the USEPA for the purpose of developing an agency position and rationale upon which national vadose zone monitoring regulatory requirements have been developed and promulgated under the RCRA.
- ***Environmental Standards Development:*** Developed national standards for vadose zone monitoring through ASTM (formerly the American Society of Testing and Materials) and serves as task force leader for D-18.04 Hydrologic Properties of Soil - Laboratory Techniques. Authored or co-authored four national standards:
    - Standard Test Method for the Determination of a Soil Water Retention Curve by Pressure Plate Extraction, ASTM D2325
    - Standard Test Method for the Determination of Soil Water Retention Curve by Pressure Membrane Extraction, ASTM D3152
    - Standard Guide to Soil Pore-Liquid Sampling in the Vadose Zone
    - Standard Guide to Soil Core Sampling in the Vadose Zone, and reviewed numerous others
- ***Lysimeter Evaluation, USEPA, Santa Barbara, California:*** Conducted research for the USEPA to evaluate the use of pressure-vacuum lysimeters for obtaining representative vadose zone water samples containing volatile organic compounds.

Biosolids and Sewage Effluent

- ***Biosolids Land Application, City of Santa Barbara, Santa Ynez, California:*** Evaluated the general suitability of the Santa Ynez Valley for land application of dewatered anaerobically digested sewage

Representative Professional Assignments Continued

sludge. In addition, a more site-specific evaluation was made where current operations were underway. Project work included development of a model to calculate, assess, and forecast nitrogen balance for the site. Recommendations were made foe the site-specific agronomic loading rate, based on local cropping patterns, biosolids chemical analysis, operational constraints, and climatic factors. In addition, maximum annual and cumulative biosolids application rates were determined based on phosphorous and heavy metal loadings. A monitoring system to tract nitrates, heavy metals, and pathogens was designed and implemented. Monitored media included surface water, groundwater, soils, and soil pore liquids.

- ***Biosolids Landfarming Monitoring, Numerous Cities, Santa Barbara, California:*** Lead scientist. Designed and installed a comprehensive water-monitoring network (surface-, ground-, and vadose-zone water) to insure compliance of sites used by five central coast cities for land application of municipal sewage sludge. Dr. Cullen also modeled and evaluated the application of biosolids at an agronomic rate and recommended procedures to prevent leaching of nitrates to groundwater.
- ***Reclaimed Water Irrigation, Facilities Management, University of California, Santa Barbara, California:*** Principal investigator of a team studying feasibility of using reclaimed wastewater from sewage treatment plants for irrigation of large municipal and private land holdings.

Landfills

- ***Solid Waste Assessment Tests, Kern County, Bakersfield, California:*** Participated on a number of Solid Waste Assessment Test (SWAT) Investigations, monitoring programs, and closure plans for landfills in the County of Kern. On the first project, Dr. Cullen assisted in completing a Water Quality SWAT investigation a large sanitary landfill in the County of Kern, formerly the County's largest municipal landfill. The project also involved the preparation of a Report of Waste Discharge, Report of Disposal Site Information, CEQA Documents (Negative Declaration), Auto-Shredder Feasibility Study, and Infectious Waste Feasibility Study. Much of the data developed during the SWAT investigation was used in the preparation of the other documents. In addition, Dr. Cullen assisted in preparing detailed site expansion plans for both vertical and horizontal expansion of the landfill. During field work for this project, a previously unknown Holocene fault which traverses the proposed lateral expansion area and continues under the existing landfill. After completion of groundwater monitoring wells to depths on the order of 500 feet into bedrock was identified, it was determined that the fault affects the groundwater flow regime beneath the landfill. It was therefore recommended that the site not be expanded horizontally but vertically. The County subsequently implemented this recommendation. As a follow-up project, Dr. Cullen participated in the completion of a Final Closure Plan, Post-Closure Maintenance Plan, Vadose Zone Monitoring Program Report, Gas Monitoring Program Report, Buffer Zone Evaluation Report, Special Impact Studies, and Supplemental Groundwater Monitoring Report. The Closure and Post-Closure Plans were deemed complete by RWQCB and CIWMB.
- ***Solid Waste Landfill Monitoring, Calaveras County, Angels Camp, California:*** Supervised the installation of an innovative, automated vadose zone monitoring system at a Calaveras County solid waste landfill. This system is the beginning of an attempt to develop a second generation of vadose zone monitoring networks that provide reliable, real time, early warning monitoring of contaminant migration beneath landfills.
- ***Landfill Monitoring System Design, Monterey County, Johnson Canyon Road Landfill:*** Designed constructed and installed a unique vadose zone monitoring system at Johnson Canyon Road solid waste landfill in Monterey County, California that combined direct pore-liquid, indirect pore-liquid, and soil-gas monitoring techniques. He has also designed and made retrofit installations of these monitoring devices to depths of over 300 feet below grade.

Stephen J. Cullen, Ph.D., P.G, REA II, CPSS, CEM

Representative Professional Assignments Continued

- ***Landfill Monitoring System Design, Woodward Clyde, Flagstaff, Arizona:*** Technical Advisor and Lead Designer for the design and installation of a vadose zone monitoring system at a landfill in Arizona. The design was notable in that it was implemented as a preventative plan and used in lieu of a groundwater monitoring system.
- ***Vadose Zone Landfill Monitoring System Design, Santa Barbara County, Santa Barbara County, California:*** Advised Santa Barbara County Solid Waste Disposal Unit regarding application of vadose zone monitoring techniques to the groundwater monitoring strategy being developed for use at Foxen Canyon Landfill.

Instrumentation

- ***Instrumentation Development, Soilmoisture Equipment Corp., Santa Barbara, California:*** Managed Environmental and Agricultural research and monitoring instrumentation product and market development for Soilmoisture Equipment Corp. Product applications included hydrogeology, environmental engineering, research, well drilling, oil exploration, and natural resource management in over 50 countries. Dr. Cullen was responsible for advertising, promotion, short- and long-term marketing planning, marketing budget management, marketing policy development, business negotiations, new business development, market positioning, new product development, customer service, technical applications, and technical societies liaison. Dr. Cullen took the lead role at Soilmoisture in the product development and refinement of in situ permeameters, pressure vacuum lysimeters, tensiometers, time domain reflectometers, soil sampling equipment, pressure plate and pressure membrane extraction apparatus, transducers, and porous ceramics for soils and vadose zone research.
- ***Landfarm Monitoring System Design, Wood Treatment Facility, Alton, Missouri:*** Filmed instructional videotape for the USEPA Region VII Laboratory, Reidel Environmental Inc., and Ecology and Environment, Inc. that demonstrated vadose zone monitoring techniques and methodologies.
- ***Laboratory Soil Hydrologic Studies, Oklahoma, Michigan:*** Developed, in the laboratory, the conductivity-pressure head relationship for mine spoils in Oklahoma and a compacted clay liner in Michigan.
- ***Instrumentation Design and Development, USEPA:*** Conceived and supervised the construction of an innovative air permeameter in which the soil-water matric potential can be precisely controlled. The device permits quantification of soil air permeability under changing pore liquid content conditions. An application is now in process for patenting the instrument.

Natural Resource, Water Resource and Agricultural Investigations

- ***Strategic, Long-term, Groundwater Management Plan, Owens Valley, Los Angeles Department of Water and Power (LADWP), Los Angeles, California:*** Dr. Cullen conducted a study of the "Green Book", a technical groundwater management guidance document created as the result of decades of litigation between the City and Inyo County over the groundwater resources of Owens Valley. The goal of the parties is twofold: 1) produce and adequate water supply to the City of L.A., and 2) protect the integrity of the ecosystems of Owens Valley. An evaluation of a proposed methodology to calculate the evapotranspiration coefficient was conducted along with an evaluation of proposed research programs designed to improve the groundwater and ecosystem database. Over a period of one year, Dr. Cullen directed a team in a detailed analysis of the instrumentation used for making measurements in Owens Valley, conducted mathematical analysis of the algorithms used to make groundwater pumping decisions, and evaluated the scenarios that would result from following the directives of the Green Book. Dr. Cullen also evaluated the state-of-the-art methodologies for measuring and estimating evapotranspiration and compared them to the methodologies historically used in the Owens Valley and at other similar sites. To

Stephen J. Cullen, Ph.D., P.G, REA II, CPSS, CEM

Representative Professional Assignments Continued

evaluate the research programs proposed, Dr. Cullen empanelled a team of experienced hydrogeologists to form an evaluation committee. Lastly, Dr. Cullen wrote a proposed approach to the strategic management of groundwater in the Owens Valley. The findings and conclusions were reported in a four-volume report to the LADWP. Since that submittal, LADWP has embarked on a large-scale program to reevaluate and reconstruct, as appropriate, the approach to groundwater and ecosystem management in the Owens Valley, focused on the concepts recommended in Dr. Cullen's report.

- ***Natural Resource Inventory, Santa Cruz, Inc., Cazadero, California:*** Performed a contract investigation of the geologic, hydrologic, soils, and biological resources on a 3,000 acre ranch in northern California and wrote a plan to develop the water resources and a profitable agricultural enterprise.
- ***Agricultural and Irrigation Consulting, Various Private and Corporate Farms, Montana and South Dakota:*** Successfully established and managed an agricultural consulting firm with a clientele of over 100 Midwest farm managers. Dr. Cullen supervised an interdisciplinary team of consultants in all phases of irrigation and crop production and managed all functions related to technical information transfer, market planning, new business development, advertising and promotion, public relations, training, personnel, and finance. Dr. Cullen's technical specialty was in dryland soil water management, irrigation management, and the use and management of pesticides.
- ***Hydrologic, Soil and Geotechnical Research, U.S. Forest Service, Libby, Montana; Darby, Montana; Bozeman, Montana:*** As a research faculty member of Montana State University, Dr. Cullen designed, conducted, and wrote research on the effect of trafficking on the hydrologic, chemical, physical, and engineering properties of compacted soils. Dr. Cullen also lectured to introductory soil science classes and soil physics laboratory sessions.
- ***Geologic, Hydrologic, and Soil Resource Inventory, U.S. Forest Service, Sitka, Alaska:*** Surveyed watershed resources for Tongass National Forest and project level planning. He wrote technical manuals on slope stability, floodplain logging, and soil and hydrologic survey work. Dr. Cullen participated in constructing the first Level 3 soils maps of northeast Chichagof and Admiralty Islands, southeast Alaska.
- ***Hydrologic and Soil Resource Inventory, U.S. Bureau of Land Management, Salem, Oregon:*** Conducted watershed surveys and wrote a handbook and map of the Mollala area soils and watershed in the Western Cascades (Oregon) with associated management guidelines for the U.S. Bureau of Land Management. Also developed a map detailing nonpoint sources of pollution relating road engineering features to stream sediment loading.

Additional Professional Training

OSHA 40-hour Health and Safety Training

OSHA Hazardous Waste Supervisor Training

Professional Affiliations

American Society of Agronomy
American Society of Testing and Materials, 1985 - 2000
- Soil and Rock Committee (full voting member)
- Hydrologic Properties of Soils Subcommittee
- Chairman of Task Group on Hydrologic Properties of Unsaturated Soils
- Vadose Zone Monitoring Subcommittee
- Waste Disposal Committee (full voting member)

Association of Groundwater Scientists and Engineers

Stephen J. Cullen, Ph.D., P.G., REA II, CPSS, CEM

Professional Affiliations Continued

Coast Geologic Society
Environmental Assessment of Commercial Real Estate Transactions Committee (full voting member)
Groundwater Resources Association of California
Soil Science Society of America
Southern California Water Utilities Association

Professional Experience

Daniel B. Stephens & Associates, Inc., Santa Barbara Co., California, September 2004 to present
Hydrogeologist, Senior Vice President, California Operations

MWH Americas, Inc., Santa Barbara Co., California
Hydrogeologist, Vice President, Domestic Energy and Infrastructure, June 2002 to September 2004

Director, National Experts Group, June 2002 to September 2004

IT /Shaw Group, Santa Barbara, California, May 2000 to August 2002
Hydrogeologist, Vice President, Environment and Infrastructure

Arcadis Geraghty & Miller, Inc., Santa Barbara, California
Hydrogeologist, Associate Vice President, February 1998 to May 2000
Hydrogeologist, Area Operations Manager, June 1997 to February 1998
Principal Scientist, Office Manager, November 1992 to February 1998

Metcalf & Eddy, Santa Barbara, California, November 1990 to November 1992
Senior Environmental Scientist

Kaman Sciences Corporation, Santa Barbara, California, August 1989 to November 1990
Senior Environmental Scientist

Soilmoisture Equipment Corp., Santa Barbara, California, June 1985 to August 1989
Director of Technical Marketing and Product Development

Private Environmental Consultant, Santa Rosa, California, June 1984 to August 1985

Steffen Robertson Kirsten, Lake County, California, March to June 1984
Geotechnical Laboratory Support, Heap Leach Mining

Centrol, Inc., Webster, South Dakota, September 1981 to February 1984
Consulting Operations Manager

Montana State Cooperative Extension, Fairfield, Montana, May to August 1981
Extension Specialist, Irrigation Management and Nitrate Groundwater Pollution

Montana State University, Bozeman, Montana, September 1979 to April 1981
Faculty, Assistant Research Soil Scientist

United States Forest Service, Tongass National Forest, Sitka, Alaska, January 1978 to September 1979
Forest Soil Scientist

United States Bureau of Land Management, Salem, Oregon, July to September 1977
Soil Scientist

United States Forest Service, Klamath National Forest, Sciad Valley, California, June to August 1976
Soil, Geologic, Hydrologic, and Timber Survey Intern

Stephen J. Cullen, Ph.D., P.G., REA II, CPSS, CEM

Publications and Presentations

Cullen, S.J. 2005. Invited speaker, The Driving Force to Perchlorate Leaching: Application of Methods To Date Historic Meteoric Recharge Travel Time to Groundwater, "*Environmental Forensics: Focus on Perchlorate*", Workshop sponsored by the International Society of Environmental Forensics, La Fonda on the Plaza, Santa Fe, New Mexico, September 21- 22, 2005

Sahu, R., S. Cullen, and M. Jones. 2005. An Update on Remedial Investigations of the BMI Site Common Areas Properties, Henderson, Nevada, presented to the BMI and Vicinity - All Companies Meeting, May 24, 2005, Henderson, Nevada.

Cullen, S.J. 2005. Invited speaker, Theory and Application of Vadose Zone Instrumentation, The Santa Barbara Groundwater and Vadose Zone Instrumentation Workshop, Soilmoisture Equipment Corp., May 17, 2005, Goleta, California.

Cullen, S.J. 2005. Invited speaker, Commercial Applications of Laboratory and Field Groundwater and Vadose Zone Instrumentation, The Santa Barbara Groundwater and Vadose Zone Instrumentation Workshop, Soilmoisture Equipment Corp., May 17, 2005, Goleta, California.

Cullen, S.J. 2005. Invited speaker, Theory and Application of the Guelph Permeameter, The Santa Barbara Groundwater and Vadose Zone Instrumentation Workshop, Soilmoisture Equipment Corp., May 17, 2005, Goleta, California.

Cullen, S.J. 2005. Invited speaker, The Importance of Environmental Protection of Soil and Groundwater Worldwide, The Santa Barbara Groundwater and Vadose Zone Instrumentation Workshop, Soilmoisture Equipment Corp., May 16, 2005, Goleta, California.

Cullen, S.J., W. Allmon, and T. Battey. 2005. An Evaluation of Baseline Recharge Conditions at a Perchlorate-Impacted Site in an Arid Environment, a technical poster presentation to the California Groundwater Resources Association meeting, "Artificial Recharge: Nexus of Quantity and Quality in California", March 16-17, 2005, Sacramento, California.

Cullen, S.J. 2004. Fate and Transport of Perchlorate in the Subsurface. Invited presentation to the American Chemical Society, Annual Meeting, March 31, 2004, Anaheim, California.

Cullen, S.J. 2002. Dry Cleaners: Characterizing and Remediating Multiple Sources of PCE in a Complex Hydrogeologic and Legal Environment. Invited presentation to Entech West 2002, November 12, 2002, Long Beach, California.

Cullen, S.J. and M. Lupo, 2001. Soil Bioventilation and Modeling of Air Flow. *In* American Microbiological Society (eds.), Manual of Environmental Microbiology, 2nd Edition, American Microbiological Society Press, Washington, D.C.

McNab, W.W., Jr., B.P. Dooher, D.W. Rice, S.J. Cullen, L.G. Everett, M.C. Kavanaugh, W.E. Kastenburg, M.C. Small, and P.C. Johnson. 1998. Risk-Based Assessment of Appropriate Fuel Hydrocarbon Cleanup Strategies for the Base Exchange Service Station at Vandenberg Air Force Base, California. Report submitted to the Air Force Center for Environmental Excellence, Environmental Restoration Directorate, Technology Transfer Division, Brooks Air Force Base, Texas. Lawrence Livermore National Laboratory, Livermore, CA.

Everett, L.G., S.J. Cullen, D.W. Rice, W.W. McNab, Jr., B.P. Dooher, M.C. Kavanaugh, P.C. Johnson, W.E. Kastenberg, and M.C. Small. 1998. Risk-Based Assessment of Appropriate Fuel Hydrocarbon Cleanup Strategies for the Naval Exchange Gasoline Station, Naval Construction Battalion Center, Port Hueneme, California. Submitted to the Naval Facilities Engineering Services Center, Port Hueneme, CA. Lawrence Livermore National Laboratory, Livermore, CA.

Stephen J. Cullen, Ph.D., P.G., REA II, CPSS, CEM

Publications and Presentations Continued

Kavanaugh, M.C., D.W. Rice, W.W. McNab, Jr., M.C. Small, S.J. Cullen, P.C. Johnson, L.G. Everett, and W.E. Kastenburg. 1998. Risk Based Assessment of Appropriate Fuel Hydrocarbon Cleanup Strategies for Site 390, Marine Corps Air Station (MCAS), El Toro, California. Report submitted to the U.S. Navy, Southwest Division, Naval Facilities Engineering Command, San Diego, CA. Lawrence Livermore National Laboratory, Livermore, CA.

Small, M.C., W.W. McNab, Jr., D.W. Rice, S.J. Cullen, L.G. Everett, M.C. Kavanaugh, W.E. Kastenburg, and P.C. Johnson. 1998. Risk-Based Assessment of Appropriate Fuel Hydrocarbon Cleanup Strategies for Presidio at San Francisco, Building 637 Area. Report submitted to the U.S. Army Corps of Engineers, Sacramento District, Sacramento, California. Lawrence Livermore National Laboratory, Livermore, CA.

Kavanaugh, M.C., W.W. McNab, Jr., D.W. Rice, P.C. Johnson, M.C. Small, W.E. Kastenburg, L.G. Everett, and S.J. Cullen. 1998. Risk-Based of Appropriate Fuel Hydrocarbon Cleanup Strategies for China Lake Naval Air Weapons Station Navy Exchange Gas Station Site. Report submitted to the U.S. Navy, Southwest Division Naval Facilities Engineering Command, San Diego, California. Lawrence Livermore National Laboratory, Livermore, CA.

Springer, D.S., H. Loaiciga, S.J. Cullen, and L. Everett, 1998. Air Permeability of Porous Materials Under Controlled Laboratory Conditions, Groundwater , vol. 36, No. 4, pp 545-704.

McNab, W.W., Jr., B.P. Dooher, D.W. Rice, M.C. Kavanaugh, P.C. Johnson, S.J. Cullen, L.G. Everett, W.E. Kastenberg, and M.C. Small. 1997. Assessment of Appropriate Fuel Hydrocarbon Risk-Management Strategies for George Air Force Base, Victorville, California, Using a Risk-Based Approach. Report submitted to the Air Force Center for Environmental Excellence, Environmental Restoration Directorate, Technology Transfer Division, Brooks Air Force Base, Texas. Lawrence Livermore National Laboratory, Livermore, CA.

McNab, W.W., Jr., D.W. Rice, S.J. Cullen, L.G. Everett, P.C. Johnson, W.E. Kastenberg, M.C. Kavanaugh, M.C. Small, and T.M. Carlsen. 1998. Risk-Based Assessment of Appropriate Fuel Hydrocarbon Cleanup Strategies for Area 43 MWR Gas Station, Marine Corp Base, Camp Pendleton, California. Report submitted to the U.S. Navy, Southwest Division, Navy Facilities Engineering Command, San Diego, CA. Lawrence Livermore National Laboratory, Livermore, CA.

McNab, W.W., B.P. Dooher, D.W. Rice, M.C. Kavanaugh, S.J. Cullen, L.G. Everett, W.E. Kastenberg, M.C. Small, and P.C. Johnson. 1997. Draft Final Assessment of Appropriate Fuel Hydrocarbon Cleanup Strategies for Travis Air Force Base, Fairfield, California, Using a Risk-Based Approach. Report submitted top the Air Force Center for Environmental Excellence, Environmental Restoration Directorate, Technology Transfer Division, Brooks Air Force Base, Texas. Lawrence Livermore National Laboratory, Livermore, CA.

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Cullen, S.J., and J.C. Michaelsen, 1997. Factors affecting the Occurrence and Distribution of Selected Petroleum Hydrocarbon Compounds in California's Alluvial Aquifers (in review).

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John J. Dodge, P.G.

Specialization

Environmental liability management and consulting, assessment and remediation of impacted industrial properties, contaminant hydrogeology, project management and client services.

Academic Degrees

M.S., Geology, University of Georgia, 1991

B.S., Geology, University of Delaware, 1986

Professional Registration

Professional Geologist No. 6495, California

Licensed Geologist/Hydrogeologist No. 1097, Washington

Representative Professional Assignments

- ***Confidential Industrial Client, Worldwide Manufacturing Company, Southern California:*** Provided reserve management, cost allocation/recovery, and overall management and technical consulting services to worldwide aluminum manufacturing company, primarily for their recent acquisition of four former aerospace fastener manufacturing plants in southern California impacted with chlorinated solvents. Completed supplemental site investigation and remedial action planning, and evaluated groundwater containment system capture zone with aquifer testing and numerical groundwater flow modeling. Evaluated applicable innovative groundwater treatment technologies, including oxidation and enhanced reductive dechlorination (bioaugmentation/biostimulation) with recirculation.

- ***Confidential Industrial Client, Foil Manufacturing Facility, Southern California:*** Developed detailed scope of work, cost estimate, and schedule for insured guaranteed fixed-price project for soil and groundwater treatment and closure at active classified foil manufacturing facility impacted with chlorinated solvents in saturated low permeability clay, applying in-situ soil mixing with zero-valent iron (ZVI).

- ***Former U.S. Navy Incinerator Site Excavation, Confidential Client, Norco, California:*** Received client commendations for rapid removal action plan development with critical DTSC review and approval, and subsequent field implementation on schedule and under budget (30%) for arsenic, lead, dioxin, and PCBs excavation at former U.S. Navy incinerator site in Norco.

- ***Worldwide Manufacturing Company, Facility Remediation, Southern California:*** Provided comprehensive and strategic environmental investigation, remediation design, and liability and reserve management services to the Director, Environmental, Health, and Safety, for worldwide electronics manufacturer for their two largest environmental remediation projects (over $4 million). Managed project team during design, installation, and operation and maintenance of groundwater extraction and hydraulic containment system, and design and implementation of in-situ reactive zone (IRZ) groundwater remediation program using molasses injection, for Santa Ana industrial property impacted with chlorinated solvents.

- ***Supplemental Site Investigation and Remediation, Former Aerospace Facility, Newport Beach, California:*** Consistently under budget for five years ($800,000 budget) for supplemental site investigation and remediation of residual trichloroethene (TCE) groundwater impacts at former aerospace plant redeveloped into residential community ($8M cleanup). Designed and implemented enhanced reductive dechlorination application in low permeability Monterey formation. Evaluated remedial technologies for potential application, including funnel and gate technology and oxidation.

John J. Dodge, P.G.

Representative Professional Assignments, Continued

- ***Strategic Planning, Pharmaceutical Manufacturing Facility, Irvine, California:*** Responsible for technical approach and project management of fast-paced strategic planning project for manufacturing property impacted by chlorinated solvents from multiple industrial tenants. Summarized critical hydrogeologic data and developed matrix of remedial options, costs, and probable regulatory requirements and response for senior officer and attorney review in preparation for tenant/owner litigation.
- ***Demolition, Remediation, and Consulting Services, Defense Electronics Manufacturer, Los Angeles, California:*** Managed facility demolition and soil and groundwater remediation consulting project for defense electronics manufacturing facility ($2M) impacted with polychlorinated biphenyls (PCBs) in Los Angeles.
- ***Senior Technical Review, Innovative Technology Applications, Northern and Southern California Aerospace Sites:*** Provided technical and geologic review and assisted experts with design, costing, and/or implementation of enhanced reductive dechlorination applications for perchlorate and chlorinated solvent impacted groundwater in Redlands, Beaumont, and Rancho Cordova, California, and the Jet Propulsion Laboratory, Pasadena.
- ***U.S. Navy Remedial Investigation/Feasibility Studies, Barstow and Camp Pendleton, California:*** Designed 72-hour aquifer test and hydrogeologic modeling plan for wellhead protection and radionuclide vadose-zone transport model. Expedited reporting stage with collaborative technical and client review to compress schedule.
- ***Mobil Oil Corporation/Chevron U.S.A. Site Investigation, Coalesced Release, El Cajon California:*** Managed financial recovery and final cost negotiations for $980,000 coalesced gasoline release project. Completed comprehensive hydrogeologic assessment to explain anomalous historical data.
- ***Former Kaiser Steel Mill Tar Pits, RI/FS and Remedial Action Planning, Fontana, California:*** Managed overall remedial project plans and budget for in-situ soil stabilization project for 1.6 acre (34,000 cubic yards) waste decanter sludge (coal tar) ponds, under critical DTSC review.
- ***Deep Hydrogeologic Investigation of Radionuclide Transport, Shoal Test Site, Fallon, Nevada:*** Developed project plans and detailed subcontractor specifications for 1,800 foot drilling and stochastic radionuclide transport groundwater modeling project at recently declassified nuclear device test site.
- ***Expedited Site Investigation and Risk Assessment, Medical School Construction Site, Los Angeles, California:*** Completed rapid subsurface investigation and RBCA evaluation of human health risk while maintaining strict daily construction schedule to document that unexpected benzene-contaminated groundwater will not impact school occupants.
- ***U.S. Navy Remedial Investigation/Feasibility Study, Naval Air Warfare Center, Trenton, New Jersey:*** Received client commendations for performance as assistant project manager and technical lead for 12-month investigation of operating military aircraft engine performance testing facility contaminated by trichloroethene DNAPL released to fractured argillite and sandstone. Determined complex, anisotropic groundwater flow and contaminant transport parameters in heavily fractured media. Minimized pumping rate and effluent disposal cost of interim remediation system by analysis of hydrogeologic model. Expedited project schedule with simultaneous field operations.
- ***Investigation and Closure of PCE Impacts in Groundwater, Rancho Dominguez, Los Angeles County, California:*** Completed investigation and risk evaluation of aerospace property impacted with PCE in soil and groundwater. Received agency approval for low-risk groundwater closure without active remediation.

John J. Dodge, P.G.

Representative Professional Assignments, Continued

- ***Investigation and Risk-based Closure, Dry Cleaner Property, Thousand Oaks, California:*** Completed cost-effective investigation of soil and groundwater impacted with PCE in preparation for health risk assessment. The impacted dry cleaner property was the liability component of a larger commercial real estate portfolio. Challenged by the client to obtain Ventura County agency closure within 12 months without being required to conduct active remediation. The Site was closed ahead of schedule in 8 months.
- ***RCRA Program Management, Impacted Recycler Facility, Los Angeles:*** Project manager and client advisor for RCRA facility investigation (RFI), Corrective Measures Study (CMS), operation and maintenance (O&M) of interim corrective measures implementation, and related tasks at recycler Site with free-phase LNAPL and dissolved metals and VOC impacts above municipal aquifers in Los Angeles county. Recognized that the early investigation-phase IRM could be discontinued since LNAPL was residualized, migration ceased, and the IRM was no longer effective.
- ***Guaranteed Fixed-price Offering, Basin-wide Groundwater Impacts, Los Angeles County:*** Developed detailed scope of work, cost estimate, and contracting documents for insured guaranteed fixed-price offering to assume liability for basin-wide groundwater impacts in Los Angeles.
- ***Stormwater Quality Investigation, Fort Irwin, California:*** Designed and implemented comprehensive stormwater testing and analytical program for multiple locations across the National Training Center at Fort Irwin, while providing technical oversight, guidance and support to US Government 8a subcontractor.
- ***Impact Assessment and Removal Action, Oilfield Residential Development, Orange County, California:*** Provided on-call consulting services for residential developer during initial excavations in former oilfield properties. Completed rapid assessment, excavation, and offsite transport/disposal of metals-impacted soil under planned roadway.
- ***Post-acquisition Due Diligence and Facility Investigation, Electronics Plant, San Jose, Costa Rica:*** Developed scope of work and cost estimate and completed soil and groundwater investigation of electronics manufacturing facility in Costa Rica recently acquired by a U.S. corporation. Executed advance field and laboratory equipment and supplies shipping and return through strict U.S. Customs review and processing. Determined undocumented locations of former degreaser units and soil solvent impacts. Recommended annual groundwater quality testing of onsite supply well that later detected TCE impacts.
- ***Baseline Environmental Assessment, Electronics Plant, Matamoros, Mexico:*** Completed preliminary environmental assessment of soil and groundwater conditions as a baseline before a new electronics manufacturing facility was built on undeveloped land in Matamoros, Mexico near the Texas border.
- ***Inactive Sludge Disposal Beds Assessment and Excavation, Steel Mill Site, Fontana, California:*** Managed scope of work and cost development and field implementation of sludge bed testing and removal at wastewater treatment plant at the former steel mill in Fontana, California. Two adjacent unlined pits had been utilized for disposal of waste sludge removed from the settling ponds and digesters at the treatment plant. A statistical comparison of metals and polynuclear aromatic hydrocarbon compounds detected in the sludge and in background soil was conducted to develop agency approved cleanup levels. The sludge ponds were later excavated and the material was transported offsite for proper disposal.

John J. Dodge, P.G.

Representative Professional Assignments, Continued

- ***Sewage Treatment Plant Assessment, Steel Mill Site, Fontana, California:*** Project manager and client advisor for investigation of sewage treatment plant impacted with mercury released from failed liquid seals components in the trickling filter swing arms. Evaluated options for mercury metal removal under strict health and safety requirements for controlled-air environment. Completed angle borings under the digesters, clarifiers, chlorine treatment tank, filters, and settling basins for soil testing and comprehensive reporting and data analysis for agency review and approval of no-further-action (NFA) status for the plant soil. Provided oversight for trickling filter cleanout and upgrade.
- ***Field-scale Pilot Testing of In-situ Solidification/Stabilization, Tar Pits Disposal Ponds, Fontana, California:*** Project Manager and client Advisor for design and implementation of in-situ stabilization/solidification pilot testing at inactive coal tar decanter sludge ponds in Fontana, California. A 15x15 foot testing cell was isolated from the larger 1.6 acre ponds for reagent application and testing. Subsurface test-area and background temperature logging was completed over the duration of the testing to document the heat of reaction and the potential for fugitive VOC release with an increase in ambient tar temperature. Once the reagent solidified in the test cell, a diamond core barrel was advanced into the stabilized tar for core collection. The cores were tested for bulk density and compressive strength testing to document the new stabilized material would withstand the weight of vehicles during engineered cap construction. The results of the pilot testing were included in a Remedial Action Plan (RAP) for the full-scale solidification/stabilization of the ponds in preparation for cap emplacement.
- ***Recirculation Well Design and Scoping, Perchlorate-impacted Groundwater, Redlands, California:*** Member of technical team tasked with scoping, design, and costing of innovative in-situ groundwater capture and treatment system utilizing recirculation well technology at a large perchlorate-impacted groundwater basin in Redlands, California. The recirculation well approach was proposed as an alternative to more costly traditional groundwater extraction and ex-situ treatment.
- ***Site Investigation and Geophysical Survey, Oilfield Property, Los Angeles:*** Completed site investigation of potential impacts and geophysical survey for buried infrastructure and abandoned oil wells at inactive oilfield property in Los Angeles. The results of the investigation and survey were used for remediation costing and planning in preparation for redevelopment of the Site.
- ***Landslide Investigation, Resort Golf Course, Rancho Palos Verdes (Los Angeles) California:*** Client advisor for insurance investigation of $80M landslide at new golf course resort development site on coastal Los Angeles county property where several historical landslides have occurred in the past. Completed geologic characterization of the tilted Monterey Formation in the area and vadose zone infiltration analysis to assist with an evaluation of the cause of the landslide that occurred within one day of the resort's opening.
- ***In-situ Oxidation/Oxygenation and Site Investigation, Asphalt Manufacturing Plant, Compton, California:*** Client advisor and Project Manager for historical review of Site environmental documents in preparation for comprehensive historical Site summary and supplemental investigation at an active asphalt plant in Compton, California. Groundwater at the Site is impacted with LNAPL and dissolved benzene. An area supply well search was also completed to document that initial agency claims that active municipal wells were located adjacent to the Site were incorrect. In-situ groundwater remediation by oxidation and oxygenation using sodium percarbonate was planned and agency-approved to address benzene groundwater impacts at a former UST area where residual soil impacts had been left in place and backfilled after tank removal was completed years before.

John J. Dodge, P.G.

Representative Professional Assignments, Continued

- ***Program Management, Facility Demolition, Investigation and Remediation, Bulk Solvent Blending and Shipping Facility, Vernon, Los Angeles County, California:*** Client advisor and Program Manager for comprehensive site investigations, demolition, and soil and groundwater remediation at closing solvent blending, shipping and bulk transfer facility in Vernon, California. The Site was heavily impacted with solvents in soil and groundwater. All facility structures, including a solid sodium hydroxide pellet storage silo, were systematically demolished and removed in preparation for soil excavation, UST removal, soil vapor extraction, and in-situ groundwater treatment by enhanced anaerobic reductive dechlorination.

- ***Tank Farm Removal and Impact Assessment, Bulk Solvent Blending and Shipping Facility Maintenance and Storage Yard, Los Angeles, California:*** Project Manager for scoping, planning, and costing of UST tank farm removal adjacent to an inactive railway in Los Angeles, California. Fifteen USTs were consecutively emptied, cleaned, and removed from the Site in preparation for post-excavation soil sampling and analysis. Sitewide investigations commenced once impacted soil and groundwater had been identified at the Site and multiple impacts were identified.

- ***Remedial Action Planning and Costing, Inactive Oil Refinery, Mid-west U.S.:*** Completed review of scope and cost for $240M remedial action plan for inactive oil refinery in the mid-west U.S. that is undergoing shutdown and cleanup in preparation for redevelopment. The Site has several areas of concern including former waste disposal ponds, dissolved groundwater impacts, and areas with LNAPL in groundwater. Remedial technologies that will be applied at the Site include excavation, hydraulic containment, capture and ex-situ groundwater treatment, in-situ enhanced reductive dechlorination, and dual-phase extraction with ex-situ containment and disposal/recycling.

- ***Remedial Investigation/Feasibility Study, Solvent Storage and Shipping Facility, Pacoima, Los Angeles County, California:*** Project advisor for investigation and remedial planning for solvent storage and shipping facility in Pacoima, California. This site is heavily impacted with VOCs and in-situ remediation by enhanced reductive dechlorination is the agency-approved remedy for groundwater. Dissolved impacts downgradient co-mingle with groundwater impacts from an adjacent manufacturing facility.

- ***Investigation and Remedial Planning, Missile Testing Silo, San Diego, California:*** Project Advisor for investigation and remedial planning at inactive missile testing silo later used as a solid and liquid industrial waste disposal cell. A variety of industrial waste was dumped into the silo including PCBs, metals, and VOCs. The groundwater level in the silo cycles up and down with the tides and a comprehensive groundwater investigation was completed to evaluate the potential effects of tides on contaminant transport at the coastal facility. An evaluation of potential contaminant transport pathways to San Diego Harbor was also conducted, including sitewide geophysical surveys and downhole camera and pipeline video surveys conducted during low-tide conditions when groundwater levels had declined and the lines were accessible.

- ***Site Investigation and Remedial Action Planning, Central Nevada Nuclear Device Testing Area, central Nevada:*** Technical team member for assessment and remedial action planning at former nuclear device testing grounds in central Nevada. A subsurface nuclear device was detonated by the U.S. Department of Energy years ago to compare its acoustic blast signature with that of natural earthquakes detected across the globe. The detonation resulted in a 12-foot high radial scarp in surface soil about several thousand feet across. Soil and groundwater testing for residual radionuclide impacts was conducted in preparation for soil excavation and offsite disposal.

- ***U.S. Army Corps. of Engineers Remedial Investigation, Naval Station, Charlestown, Rhode Island:*** Project team leader for investigation of multiple contaminant sources released to glacial aquifer and swimming pond.

John J. Dodge, P.G.

Representative Professional Assignments, Continued

- ***U.S. EPA Remedial Investigation/Feasibility Study, Petrochemical Facility, Long Island, New York:*** Project team member for investigation of solvent blending facility and glacial aquifer heavily impacted by solvents.
- ***Argonne National Laboratory Site Investigation, Military Proving Ground, Fort Belvoir, Virginia:*** Project team member for comprehensive investigation of large military proving ground facility impacted by multiple sources of organic and inorganic contaminants.
- ***Geophysical Survey and Site Investigation, former Lime Sludge Disposal Pond, Haledon, New Jersey:*** Completed geophysical survey to evaluate total volume of lime sludge deposited into a rock valley at a paint, pigment, and dye manufacturing plant in Haledon, New Jersey. Several soil borings were completed sitewide to supplement the geophysical survey. Deep fractured rock wells were also installed in the basalt units at the Site to characterize groundwater impacts.
- ***Erosion Quantification Study, Brandywine River, Newark, Delaware:*** Mobilized specialized survey equipment during field during peak discharge after storm events to collect data for mathematical modeling and quantification of riverbank erosion.

Additional Professional Training

Intelligent Decision Technologies, Landfill Groundwater Statistics, 1997

ASTM Risk-Based Corrective Action (RBCA) training, 1996

National Groundwater Association/Robert Cleary: *Groundwater Pollution and Hydrology and IBM-PC Applications to Groundwater Pollution and Hydrology,* 1995-1996

University of California, Irvine; Environmental Hydrogeology, Environmental Chemistry, 1994

Professional Affiliations

Society of American Military Engineers

Groundwater Resources Association of California

Association of Environmental and Engineering Geologists

American Association of Petroleum Geologists

Professional Experience

Daniel B. Stephens & Associates, Inc., Newport Beach, California, 2007 to present
Senior Hydrogeologist

Mission Geoscience, Inc., Irvine, California, 2004-2007
Associate

ARCADIS Geraghty & Miller, Irvine/Fullerton, California, 1997-2004
Project Manager

John J. Dodge, P.G.

Representative Professional Assignments, Continued

IT Corporation, Irvine, California, 1994-1997
Project Manager

IT Corporation, Somerset, New Jersey
Project Geologist, 1989-1994

McCrone Environmental Services, Atlanta, Georgia, 1988-1989
Electron Microscopist

U.S. Environmental Protection Agency, Athens, Georgia, 1987-1988
Marine Scientist/Technician

Delaware Geological Survey, Newark, Delaware, 1984-1985
Hydrology Technician

Publications and Presentations

Dodge, John J. 2005. Engineering Budget Estimation, Work-breakdown Structure (WBS), and Timeslips® Accounting. Presentation to Mission Geoscience, Inc. Irvine, California, July 2005.

Dodge, John J. 1999. Elements of a Long-term Pumping Test. Presentation to International Technology Corporation, Irvine, California, October, 1995; ARCADIS Geraghty & Miller, Fullerton, California, June, 1999.

Dodge, John J. 1991. History of the IBM-PC and DOS, Part II: Structure and Control of Disc Operating Systems. Presentation to International Technology Corporation, 1991.

Dodge, John J. 1991. History of the IBM-PC and DOS, Part I: Development of the Integrated Circuit and Microprocessors. Presentation to International Technology Corporation, September, 1991.

Dodge, John J. 1989. A Data Sheet for Electron Diffraction Analysis of Amphibole Asbestos. The Microscope: McCrone Associates, Chicago, August, 1989.

Philip M. Kaiser, Ph.D.

Specialization

Conducting field research and monitoring programs; extensive expertise in biological transformation of chemical compounds in the subsurface.

Academic Degrees

Ph.D., Chemical Engineering, Virginia Polytechnic Institute and State University, 1998

M.S., Chemical Engineering, Columbia University, 1991

B.Ch.E., Chemical Engineering, University of Delaware, 1988

Representative Professional Assignments

- ***Installation and Testing of Vadose Zone Monitoring System, County Sanitation Districts of Los Angeles County (LACSD), Whittier, California:*** Project manager for Phase II of vadose zone monitoring program at LACSD's Palmdale Water Reclamation Plant Effluent Management Site. Led installation activities for four vadose zone monitoring stations, including calibration and testing of all passive capillary lysimeters, pressure/vacuum lysimeters and data loggers. Conducted sampling and troubleshooting of malfunctioning data loggers.
- ***Quantification of Nitrogen Removal, Eastern Municipal Water District (EMWD), Riverside County, California:*** As task manager, coordinated sampling at two groundwater recharge sites, sampled lysimeters, and maintained equipment. Trained EMWD staff on sampling protocol. Assisted in data interpretation.
- ***Water Balance Analysis and Hydrologic Monitoring, Private University, California:*** Conducts monthly groundwater and soil moisture monitoring using a neutron probe in accordance with National Pollution Discharge Elimination System surface discharge permit. Tracks temporal and spatial changes to groundwater regime and evaluate impacts of water use on water quality and geotechnical instability. Prepares monthly report of monitoring results and interpretation. Prepared water balance model tracking irrigation, evapotranspiration, surface runoff, deep percolation and soil storage. Provides advice on management of wastewater generation and use, water quality enhancement, and irrigation efficiency. Assists in preparing responses to regulatory agency comments on monitoring procedures and reporting.
- ***Corrective Action Management Unit Conceptual Site Model Preparation, Confidential Client, Southern Nevada:*** Interpreted extensive spatial and temporal data for large chemical manufacturing and disposal facility comprising 486 analytes including asbestos, radionuclides, metals, VOCs, SVOCs, pesticides, herbicides, aldehydes, organic acids, general chemistry, dioxins and furans, and PCBs. Provided review and oversight of data quality assurance for tables, figures, and reporting. Prepared sections of reports.
- ***University of California Davis Groundwater Remediation Field Laboratory, Vandenberg Air Force Base, California:*** As Director, led field research team running two concurrent projects: (1) investigated the characteristics of the biological degradation of MTBE and TBA; monitoring separate plumes for the fate of MTBE and TBA generated from a controlled release; chose sampling protocol to generate the data required to determine degradation rate constants; and (2) tested and compared four methods to measure mass flux of ground water contaminants using a conservative tracer; evaluated the methods against the known rate of mass addition to the subsurface. Analyzed data, prepared interim reports for stakeholders, and prepared manuscripts of research efforts.

Philip M. Kaiser, Ph.D.

Representation Professional Assignments Continued

- ***National Risk Management Research Laboratory, Office of Research and Development, U.S. EPA, Ada, Oklahoma:*** Developed an internal Environmental Management Systems plan as part of EMS team. Evaluated facility aspects and impacts. Defined specific objectives, targets, and devised management plans. Prepared awareness and responsibility training programs. Amended elements of the EMS in response to findings of an audit to meet requirements.
- ***National Risk Management Research Laboratory, Office of Research and Development, U.S. EPA, Ada, Oklahoma:*** As Research Chemical Engineer, conducted the following: (1) designed and developed a spill containment system using connected drains to exclude ground water, characterized site with direct-push hydraulic conductivity tests and analyzing core samples, executed the design to minimize the disruption of normal site operations, conducted monitoring sessions of depth to water and chemical parameters and evaluated system performance by analyzing chemical data and performing pumping tests; (2) initiated investigation to use zeolites to remove MTBE from water, designed and tested batch and continuous flow experiments for zeolites capabilities to remove MTBE by both adsorptive and catalytically destructive mechanisms; (3) constructed and monitored sets of microcosms to determine if acetogenic bacteria were capable of degrading MTBE; (4) constructed and monitored cultures designed to enrich for anaerobic bacteria that would degrade MTBE and account for the loss of MTBE in soil samples; (5) constructed and monitored cultures designed to enrich for sulfate reducing bacteria that would degrade TBA and account for the loss of TBA in soil samples; and (6) analyzed chemical data from microcosms and cultures to determine if contaminant losses were due to biological degradation.
- ***Department of Chemical Engineering, Virginia Tech, Blackburg, Virginia:*** As Laboratory Instructor, developed objectives for processes in the Unit Operations Laboratory to explore heat transfer, extrusion, reaction kinetics, fluidization, vacuum filtration, and microbubble generation. Defined operating conditions that would provide relevant data; and help determine methods of analysis that would yield the desired results and/or relationships from which the proper conclusions could be made.

Additional Professional Training

The Groundwater Pollution and Hydrology Course, Princeton Groundwater, Inc., February 2002

The Complete Ground-Water Monitoring Field Course, The Nielsen Environmental Field School, Inc., 2001

Fundamentals of Engineering Certification, 2002

OSHA 40-hour HAZWOPER Certification

Professional Affiliations

American Chemical Society, Member

American Institute of Chemical Engineers, Member

Ada Recycling Coalition, Member, Board of Directors

Professional Experience

Daniel B. Stephens & Associates, Inc., Goleta, California, 2006-present
Staff Engineer

University of California Davis Groundwater Remediation Field Laboratory, Vandenberg Air Force Base, California, 2005-2006
Director

Philip M. Kaiser, Ph.D.

Professional Experience Continued

National Risk Management Research Laboratory, Office of Research and Development, EPA, Ada, Oklahoma
Independent Contractor, 2004-2005
Research Chemical Engineer, 2000-2004

Department of Chemical Engineering, Virginia Tech, Blacksburg, Virginia
Laboratory Instructor, 1993-1996
Teaching Assistant, 1991-1996

Biospherics Incorporated, Beltsville, Maryland, 1987
Laboratory Technician

Publications

Kaiser, P., M. Nozawa-Inoue, I. Chakraborty, M. Einarson, K. Scow, D. Mackay. 2007. Impact of Ethanol on Anaerobic Transformation of MTBE to TBA. 17th Annual AEHS Meeting & West Coast Conference on Soils, Sediments, and Water. March 2007.

Kaiser, P., M. Einarson, D. Mackay, M. Nozawa-Inoue, S. Goyal, M. Annable, S. Rao, K. Hatfield, M. Goltz, J. Huang, M. Brooks, M. Velasco, and C. Justice. 2006. Comparison of Mass Flux Measurement Methods at Vandenberg Air force Base, California. Groundwater Resources Association of California Symposium: High Resolution Site Characterization & Monitoring. September 2006.

Kaiser, P., S. Shevade, and J.T. Wilson. In review. The Removal of MTBE from Water with the Zeolite ZSM-5 by Adsorption and Catalytic Destruction. In review.

Wilson, J.T., P.M. Kaiser, C. Adair. 2005. Monitored Natural Attenuation of MTBE as a Risk Management Option at Leaking Underground Storage Tank Sites; EPA-600/R-04/179. Environmental Protection Agency. 2005.

Kaiser, P., J.T. Wilson, T. Kuder. 2004. Anaerobic MTBE Biodegradation in Laboratory Microcosms. Poster at the Remediation of Chlorinated and Recalcitrant Compounds: The Fourth International Conference, May 2004.

Kaiser, P., S. Shevade, and J.T. Wilson. 2004. The Removal of MTBE from Water with the Zeolite ZSM-5 by Adsorption and Catalytic Destruction. Poster at the Remediation of Chlorinated and Recalcitrant Compounds: The Fourth International Conference, May 2004.

Kaiser, P., J.T. Wilson, and J. Thacker. 2004. Source Control by Hydrological Isolation: Application of the Ankeny Moat. Platform presentation at the 16th Annual UST/LUST National Conference, March 2004.

Kaiser, P., J.T. Wilson, and J. Thacker, 2003. Source Control by Hydrological Isolation: Application of the Ankeny Moat. Poster at the In Situ and On-Site Bioremediation: The Seventh Annual Symposium, June 2003.

Kuder, T., J.T. Wilson, P. Kaiser, R. Kolhatkar, P. Philip, and J. Allen. 2005. Enrichment of Stable Carbon and Hydrogen Isotopes during Anaerobic Biodegradation of MTBE : Microcosm and Field Evidence. Environmental Science and Technology. January, 2005.

Wilson, J.T., C. Adair, P. Kaiser, and R. Kolhatkar. 2005. Role of Anaerobic Biodegradation in the Natural Attenuation of MTBE at a Gasoline Spill Site. Ground Water Monitoring and Remediation. Vol. 25, no. 3. Summer, 2005.

Wilson, J.T., P.M. Kaiser, C. Adair. 2005. Monitored Natural Attenuation of MTBE as a Risk Management Option at Leaking Underground Storage Tank Sites. EPA Report EPA/600/R-04/179. January, 2005.

Douglas W. Reaber, P.G.

Specialization

More than 18 years of professional experience in the environmental industry, serving a variety of federal, state, and commercial clients. Served as project manager and technical lead for landfills operating under RCRA, as well as facilities being addressed under CERCLA, also known as Superfund. Managerial and technical support in environmental litigations, including cost allocation, tort litigation and cost recovery matters. Extensive experience in field methods, having personally installed hundreds of monitoring wells, trained staff on field methods, and taught a short course on drilling.

Academic Degrees

M.S., Geology, San Diego State University 1986

B.A., Earth Science, University of California, Berkeley, 1982

Professional Registration

Professional Geologist No. 5033, California

Professional Geologist No. 2372, Texas

Representative Professional Assignments

- ***EPA Remedial Action Contract (RAC II) for Region 6:*** Serving as the DBS&A Program Manager for all work being performed for the EPA under the RAC II contract. In this capacity he coordinates with all project managers, as well as teaming members, in preparing and executing scopes of work for remedial investigations (RIs), feasibility studies (FSs), remedial designs (RDs) and remedial actions (RAs) for those sites that are funded by the EPA.
- ***Hydrogeological Support Services for the City of Las Cruces, New Mexico:*** Currently serving as project manager and regulatory specialist for the City of Las Cruces during the performance of the RI at the Griggs-Walnut Street Plume in Las Cruces, New Mexico. Served as regulatory specialist during the negotiation of the Special Notice Letter and Agreement on Consent with EPA and has served as the City's technical lead during the development of all project scoping documents. Provided senior review and comments for those deliverables prepared by EPA and its consultants
- ***Remedial Investigation/Feasibility Study, State Road 114 Superfund Site, Levelland, Texas, Texas Commission on Environmental Quality:*** Served as project manager at a State Lead Superfund Site in the final stages of the remedial investigation (RI). The site was used as a refinery from the mid 1940s through the 1970s, with releases from the site threatening the local water supply. Previous activities included soil gas and groundwater studies; current work includes a soil investigation, predictive groundwater modeling and routine monitoring of wells and treatment systems. Work includes technical oversight of field staff and negotiation of scope with representatives of the EPA and state of Texas.
- ***Compliance Monitoring Plans, Cyprus Amax Minerals Company, Pecos, New Mexico.*** Currently serving as project manager during negotiation and implementation of compliance monitoring plans for the El Molino and Pecos Operable Units of the Cyprus Amax Minerals Company mine Near Pecos. Additional activities managed include monitor well installations and abandonments, quarterly groundwater and surface sampling, and groundwater modeling
- ***Hydrogeological Support Services for the City of Las Cruces, New Mexico:*** Currently serving as project manager and regulatory specialist for the City of Las Cruces in preparing a response to a Special Notice Letter for the Griggs- Walnut Street Plume in Las Cruces, New Mexico. Project has included meeting with the City and Dona Ana County as well as the EPA and New Mexico Environment Department (NMED) regarding the status of site activities to date and requirements for completing the RI.

Douglas W. Reaber, P.G.

Representative Professional Assignments Continued

- ***United Creosoting Superfund Site, Conroe, Texas, Texas Commission on Environmental Quality:*** Served as technical lead and project manager aiding the Texas Commission on Environmental Quality in determining whether the groundwater remedy selected for the site by EPA is appropriate. Work included the installation of more than 10 wells into the two uppermost aquifers beneath the site in order to delineate the extent of contamination. Additional wells will be required, and the EPA has concurred with the TCEQ's and DBS&A's conclusion that DNAPL in the shallow aquifer has not been remediated, and that MNA is not an appropriate remedy.
- ***Remedial Investigation, Many Diversified Interests Superfund Site, Houston, Texas:*** Served as technical lead at the MDI Superfund Site. The project was broken into an on-site RI (OU 1) and an off-site RI (OU 2). Acted as field program manager overseeing a staff of 14 employees and various contractors. Field activities included soil, sediment, surface water and groundwater sampling in order to delineate the extent of contamination. Served as primary author for the OU 1 and OU 2 RI and feasibility (FS) reports and technical memorandum supporting a monitored natural attenuation remedy.
- ***Garland Creosote Company Superfund Site, Longview, Texas:*** Served as technical lead during preparation of scoping documents including filed sampling plan and quality assurance project plan for the investigation of an abandoned wood treating facility. Managed a field staff of 10 performing work under CLP protocols. Served as primary author of the RI report submitted to the EPA.
- ***Remedial and Field Investigations, Tucson International Airport Superfund Site, Tucson, Arizona:*** As project manager, responsible for negotiating scope of work for remedial investigation and feasibility study (RI/FS) program with regulatory agencies. RI included evaluation of solvents in dissolved and DNAPL phases and heavy metals in the vadose zone and groundwater. Field investigation performed over the course of three years included the included the installation of approximately 35 shallow and 5 deep groundwater monitoring wells, passive and active soil gas sampling, collecting approximately 200 surface soil samples and analyzing the samples in the field using portable XRF equipment. Documentation on the project included a Preliminary Site Characterization Summary, RI report, as well as localized reports in support of a removal action.
- ***Sampson Horrice Superfund Site, Dallas, Texas:*** As Removal Action Project Manager, worked with the TNRCC to characterize an abandoned drum site at a former quarry. Work included Level B trenching to delineate drum nest, and groundwater characterization. Removal action at the site resulted in more than 350 drums being excavated.
- ***Environmental Insurance Coverage and Tort Litigation, Tucson International Airport Superfund Site, Tucson, Arizona:*** Served as Project Manager, which included compilation of environmental data collected over a 13-year period at site and an analysis of release timing for a number of sources from different occupants at the site. Provided depositional testimony for the project and was named as an expert witness.
- ***CERCLA Litigation Defense Ekotec Refinery, Salt Lake City, Utah:*** Served as Project Manager. Project included a review of historical records, environmental reports, and depositions of former employees. Through a review of shallow soil data and historical aerial photographs, demonstrated that the contamination was a result of activities that occurred many years after client left site. Applied "Gore Factors" to argue that client was a de-minimis contributor.
- ***Five Installation Restoration (IR) Sites, Naval Station Treasure Island, San Francisco, California:.*** As Project Manager, responsible for development of closure strategies for 5 sites following Preliminary Assessment/ Site Inspection (PA/SI) guidance. Three of the sites were closed with a No Further Action (NFA) determination while the two remaining sites were administratively transferred.

Douglas W. Reaber, P.G.

Representative Professional Assignments Continued

- ***Basewide Hydrogeologic Characterization, China Lake Naval Air Weapons Station, Ridgecrest, California:*** Served as senior geologist on a multi-year project summarizing the hydrogeology of the China Lake Naval Air Weapons Station in Ridgecrest, California. The project included drilling exploratory borings and installing monitoring wells in three aquifers to depths as great as 1200 feet, and collecting soil and groundwater samples for chemical and isotopic analysis. The information is being used to assess the sustainability of water as a resource within the basin as well as potential impacts to the regional water supply as a result of base activities.
- ***Western Gas Resources Sour Gas Plant, Edgewood, Texas:*** Manager and technical lead for site characterization activities at a former natural gas refinery in eastern Texas. Characterization activities focused on delineating groundwater impact as a result of the disposal of elemental sulfur. Project was performed for two oil companies, eventually resulting in active remediation and cost allocation.
- ***Construction and Demolition Debris Landfill Siting, Nambe, New Mexico:*** As Project Manager, negotiated characterization language used in Record of Decision between the facility operators, a northern pueblo, and the Bureau of Indian Affairs. Prepared Hydrogeological Characterization work plan to include siting of groundwater detection monitoring network.
- ***Air Permit, Vulcan Materials, Albuquerque, New Mexico:*** As Project Manager, oversaw modeling activities during preparation of a Title V air permit at an industrial facility in New Mexico.
- ***Due Diligence and Phase I and II Investigations, Everex Semiconductor, St. George, Utah:*** Served as manager for project, which included collection of soil samples and statistical analysis of data. Analysis showed that metal concentrations in soil above risk levels were in fact background.
- ***Chemical Waste Landfill, Sandia National Laboratories:*** Managed field programs for a chemical waste landfill undergoing interim status closure in New Mexico. Programs included extensive vadose zone characterization and monitoring well installations to depths of more than 500 feet. Contaminants of concern included DNAPL, VOCs, radionuclides, PCBs, and heavy metals. Responsibilities included presenting results to State of New Mexico regulators and negotiating changes in technical scope.
- ***RCRA Facility Investigation (RFI) Laidlaw Environmental Services, Imperial Valley, California:*** Manager and technical lead during RFI at a hazardous waste landfill in southern California. Investigation was performed to ensure that contaminants (VOCs, SVOCs, and metals) had not migrated away from landfill as airborne particulates. Report was submitted to California Department of Toxic Substances Control (DTSC) and approved without comment.
- ***Laidlaw Environmental Services, Imperial Valley, California:*** Served as Primary Consultant responsible for all aspects of groundwater monitoring, including design and installation of saturated and unsaturated zone monitoring networks, preparation of sampling and analysis plans, institution of sampling protocols meeting requirements of the DTSC, Regional Water Quality Control Board, and the EPA and preparation of final reports. Served as certifying Registered Geologist on reports to state.
- ***Hydrogeologic Characterization, Laidlaw Environmental Services, Buttonwillow, California:*** Managed field operations during installation of groundwater monitoring network at a RCRA hazardous waste landfill in central California. Responsible for all field personnel, as well as daily interaction with the client, subcontractors, and regulatory agencies. Field program included the installation of 24 monitoring wells to depths between 130 and 270 feet.
- ***Interim Remedial Measures, Hewlett-Packard Superfund Site, Palo Alto, California:*** Managed field operations including the installation of DNAPL recovery wells, groundwater and vapor extraction wells, and groundwater monitoring wells.

Douglas W. Reaber, P.G.

Representative Professional Assignments Continued

- ***Preparation of Operations Manual, Sea Launch, Long Beach, California:*** Manual prepared in accordance with 33 CFR 154 that details the transfer of hazardous materials from a marine transfer facility to a vessel in Long Beach Harbor. Project involved coordination with ship builders in Russia and operating crews from Norway, as well as the Coast Guard and local and state regulatory agencies in California.
- ***Integrated Contingency Plan, Sea Launch, Long Beach, California:*** Project manager for analysis of all potential hazards, which included a discussion of training, authority, and response notification requirements in compliance with DOT, OSHA, RCRA, and Coast Guard regulations.
- ***Environmental Site Assessments, Cell Tower Sites throughout New Mexico:*** Managed the performance and reporting associated with cell tower siting requirements in the state of New Mexico in accordance with ASTM, NEPA, and FCC requirements. The project included preparation of ESA documentation on 24 sites and preparation of NEPA documentation at 7 sites.

Additional Professional Training

Managing Uncertainty with Systematic Planning for Environmental Decision Making, Environmental Protection Agency, 2005

RCRA Refresher, McCoy & Associates, 2005

Toxic Release Inventory Training, Environmental Protection Agency, 1999

Introduction to Geographical Information Systems, New Mexico Engineering Research Institute, 1998

Proving the Technical Environmental Case, University of Wisconsin, 1997

Advanced RCRA Topics, McCoy and Associates, Inc., December 1995

Risk Assessment, Environmental Education Enterprises, September 1994

Radioactive Waste and Mixed Waste Generator Training, Sandia National Laboratories, 1994

Radiological Worker Training Series (20 hours), Sandia National Laboratories, 1994

Hazardous Waste Generator Training, Sandia National Laboratories, 1993

Environmental Regulations, Sandia National Laboratories, 1993

Groundwater Pollution and Hydrology, "The Princeton Course," 1990

OSHA 8-hour Hazardous Waste Operations Supervisor/Manager Training , 1988

OSHA 40-hour Hazardous Waste Operations and Emergency Response Training and yearly updates

Professional Experience

Daniel B. Stephens & Associates, Inc Albuquerque, New Mexico, 2004-present
Senior Geologist

Tetra Tech EM Inc. Albuquerque, New Mexico, 2000-2004
Senior Geologist

AGRA Earth & Environmental, Inc., Albuquerque, New Mexico, 1999-2000
Program Manager, Environmental Services

Douglas W. Reaber, P.G.

Professional Experience Continued

Daniel B. Stephens & Associates, Inc., Albuquerque, New Mexico, 1995-1999
Program Manager

INTERA, Inc., Albuquerque, New Mexico, 1993-1995
Project Geologist

ENVIRON Corporation, Emeryville, California, 1989-1993
Associate

Harding Lawson Associates, Novato, California, 1987-1989
Project Geologist

Berlogar Geotechnical Consultants, Pleasanton, California, 1986-1987
Project Geologist

Geofirm, Laguna Beach, California, 1985-1986
Project Geologist

Publications and Presentations

Hsu, K.C., D. Jordan, T.N. Blandford, and D.W. Reaber. 1998. Evaluation of local-scale Contaminant Migration within a Heterogeneous Alluvial Basin. Presented at the National Ground Water Association meeting in Las Vegas, Nevada. December 13-16.

Hsu, K.C., D. Jordan, D.W. Reaber, N. Blandford, and M. Thurgood. 1998. Modeling Contaminant Migration in the Tucson Basin, Tucson, Arizona. Presented at Western Geophysics Meeting in Taipei, Taiwan. July 21-24.

Forbes, J.R., R. Schmidt-Petersen, B. Casadevall, and D. Reaber. 1996. Comparison of Field and Laboratory Methods for VOCs and Major Gases in Soil Vapor. Abstract from proceedings of HSRC/WERC Joint Conference on the Environment, Albuquerque, New Mexico, May 21-23

Londergan, J., D.W. Reaber, and C. Crowe. 1995. Environmental Drilling and Groundwater Monitoring: A Field Course. Three day short course presented in Albuquerque, New Mexico.

Eberle, S., D.W. Reaber, and D. Thomas. 1995. The Use of Global Positioning Systems within the Environmental Restoration Project at Sandia National Laboratories, Albuquerque, New Mexico. Presented at the Seventh Annual Technology Information Exchange Workshop, Cincinnati, Ohio.

Londergan, J., D.W. Reaber, D.B. Kaminski, and C. Crowe. 1994. Environmental Drilling and Groundwater Monitoring: A Field Course. Three day short course presented in Austin, Texas.

Ardito, C.P., T.A. Duval, and D.W. Reaber. 1994. Characterizing a DNAPL site through real-time analysis of vapors. International Symposium on Volatile Organic Compounds in the Environment, ASTM Committee E-47 on Biological Effects and Environmental Fate, Montreal, Canada.

Reaber, D.W., E.A. Mair, and J. Mirand. 1993. Innovative Use of Bladder Pumps for Deep Well Purging and Sampling at a RCRA hazardous waste landfill. Hazmacon '93 Conference and Exposition, San Jose, California.

Duval, T.A., C.P. Ardito, and D.W. Reaber. 1993. Characterizing a DNAPL Source in the Unsaturated Zone via Real-time Analysis of Soil Vapor. Fourth National Technology Information Exchange Workshop, Department of Energy, Knoxville, Tennessee.

Douglas W. Reaber, P.G.

Publications and Presentations Continued

Reaber, D.W. and T.L. Stein. 1990. Design and Installation of a Detection Monitoring Network at a Class I Landfill in an Arid Environment. Fourth National Outdoor Action Conference on Aquifer Restoration, Ground Water Monitoring and Geophysical Methods, Las Vegas, Nevada.

Reaber, D.W. and K.K. Bertine. 1986. Factors Controlling the Formation of Dolomite at Laguna Mormona, Baja California Norte, Mexico. Geological Society of America Cordilleran Section Meeting, Long Beach, California.

Ellen J. Torgrimson

Specialization

Technical document development and editing; technical publications management; document organization and design; development of public information materials.

Academic Degrees

M.M. Piano Pedagogy, Southern Methodist University, 1977

B.M. Piano, Louisiana State University, 1973

Awards

Merit in Technical Communication, Society for Technical Communication 2002-2003 Southwest Regional Technical Publications Competition, for *Jemez y Sangre Regional Water Plan Alternatives Analysis*

Representative Professional Assignments

- Review technical reports and proposals, editing for clarity, readability, organization, grammar, mechanical style, consistency, format, and adherence to company style and standards of quality. Examples of the various types of reports edited include:
  - *Groundwater Availability of the Southern Ogallala Aquifer in Texas and New Mexico: Numerical Simulations Through 2050* (available at http://www.twdb.state.tx.us/GAM/ogll_s/ogll_s.htm), prepared for Texas Water Development Board
  - Regional water plans for six State-mandated water planning regions in New Mexico, including for example, *Northeast New Mexico Regional Water Plan* (available at http://www.ose.state.nm.us/isc_regional_plans1.html). Five of the water plans have been accepted by the New Mexico Interstate Stream Commission (ISC); the sixth is in review.
  - *Closure/Closeout Plan* for a mine in southwestern New Mexico, prepared on behalf of the mine operator for submission to the New Mexico Environment Department
  - *Kirtland Air Force Base Fish and Wildlife Plan*, prepared for Department of the Air Force
  - *Hopi Wetlands Program Summary Report, Including the Hopi Wetland Conservation Plan and the Talastima (Blue Canyon) Watershed Protection Plan*, prepared for the Hopi Tribe
  - *Review of Methods to Estimate Moisture Infiltration, Recharge and Contaminant Migration Rates in the Vadose Zone for Site Risk Assessment*, prepared for publication by the American Petroleum Institute (publication 4643)
  - Numerous reports related to the Tucson International Airport Superfund Site, including *Preliminary Site Characterization Summary* and *RI/FS Work Plan,* submitted to the U.S. Environmental Protection Agency, Region IX
  - *Final Remedial Design/Quarterly Report, Hobbs City Wells UST Site,* prepared for New Mexico Environment Department (NMED)
  - *Operations and Maintenance Manual* for water and wastewater utility system, prepared for Pueblo of Sandia
- Responsible for coordination of the document production process and interaction with technical staff regarding document production. Duties include supervision of editorial, word processing, graphics, computer support, and reproduction and binding staff, development of procedures, and establishment and

Ellen J. Torgrimson

Representative Professional Assignments Continued

maintenance of standards concerning style and level of quality. This leadership has resulted in a company reputation for consistently producing high-quality documents that accomplish project goals.

- Support the public involvement process for six regional water planning efforts, including managing steering committee and stakeholder mailing lists and communications, preparing, designing, and formatting flyers, fact sheets, PowerPoint presentations, and other information for public meetings, tracking and managing meeting minutes and other public input for inclusion in final plans, as well as editing the final Regional Water Plans.
- Provide editorial support to the New Mexico Interstate Stream Commission in development of the initial *New Mexico State Water Plan* (available at http://www.ose.state.nm.us/water-info/NMWaterPlanning/2003StateWaterPlan.pdf). Developed format and template to streamline document editing and production. Met with ISC and Office of the State Engineer staff to develop consistent organization among sections written by various authors and to clarify and fine-tune the language of the policy statements and implementation strategies that provided the backbone of the Plan. Coordinated (primarily by e-mail communication) reviews and revisions by numerous authors and reviewers, incorporating all changes into one final document for submission to the ISC. The time frame from notice to proceed (November 25, 2003) to adoption of the 85-page Plan (December 17, 2003) was roughly three weeks.
- Provide editorial review of supporting documentation for a successful application for the New Mexico Quality Award, Piñon Level. Text was edited for adherence to editorial specifications of the Board of Examiners, including conciseness and target audience, as well as the highest standards of quality attainable in a limited time frame with respect to clarity, consistency, and readability. The review included extensive reorganization and revision of one application section to improve clarity and streamline text. This application resulted in the company's successful attainment of the Piñon Level on its first attempt at winning this award.
- Provide editorial review and coordinate production of *Existing Data Report* for a mine site in southwestern New Mexico. To ensure that all data were of appropriate type and quality to be used in studies supporting all current and potential regulatory requirements, the report was prepared in accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) guidance for remedial investigation/feasibility studies (RI/FSs). Specific tasks included review of text, tables, and figures for internal consistency and adherence to company style and standards, coordination with technical reviewers, document authors, and support staff throughout review/revision process, redesign of complex tables to effectively present information, and problem solving to achieve a high-quality yet cost-efficient document.
- Coordinate production of winning proposal for a major, multiyear contract with Kirtland Air Force Base. Tasks included writing selected sections of the proposal text, compiling and reviewing all proposal components, coordinating among members of the proposal team, including in-house staff, the teaming partner, and subcontractors, monitoring proposal content to ensure that all requirements of the Request for Proposal were addressed, and maintaining production schedule to ensure that the proposal deadline was met.
- Prepare complex technical documents, including elaborate tables and equations, using word processing software. Manipulate large reports to achieve optimal pagination and layout, incorporate graphics, pull together multiple smaller documents, and generate cross references, lists, indexes, and tables of contents.
- Review proposal for and prepublication draft of college-level textbook for Harcourt Brace Jovanovich. Project included an assessment of the market for the textbook and an evaluation of its effectiveness in meeting the requirements of the intended audience.

Ellen J. Torgrimson

Additional Professional Training

Technical Writing (3 semester hours), University of New Mexico, Albuquerque, New Mexico, 1991.

University of New Mexico Division of Continuing Education classes:

- Graphic Design and Layout, 1994
- Typography, Level 1, 1995
- How to Work With the Printing Industry, 1997
- Photographic Composition, 1997
- Introduction to Computer Graphics, 1998
- Editorial Design, 1998
- Drawing Basics for Graphic Design, 2001
- Beginning Dreamweaver, 2001

Managing the Publications Department, EEI Communications, Alexandria, Virginia, 1998.

Adobe online training: Pagemaker 6.5 Basics, Adobe Acrobat 5.0 Introduction, Basic Skills, and Advanced, 2003.

PageMaker7 – Level 1, New Horizons Computer Learning Centers, Albuquerque, New Mexico, 2005.

Workshop on Estimating Documentation and Training Projects, Society for Technical Communication Kachina Chapter, 2006.

Professional Affiliations

Society for Technical Communication

Professional Experience

Daniel B. Stephens & Associates, Inc., Albuquerque, NM, 1990 to Present
Production Manager

University of New Mexico, Albuquerque, NM, 1985-1990
Lecturer

University of Montevallo, Montevallo, AL, 1978-1983
Assistant Professor

Michael Carlson

ENTACT

PROJECT MANAGER

2001 - Present

Mr. Carlson is a member of ENTACT's Technical Services Team and has provided engineering support on multiple ENTACT projects for over 7 years. Additional responsibilities include assisting with the review of regulatory requirements for federal, state, or voluntary cleanup programs in preparation for negotiations with state and federal agencies; aiding in the development and implementation of site investigations and remedial design approaches that are protective of the human health and the environment, meet regulatory requirements, and are cost effective.

ENTACT EXPERIENCE SUMMARY

Taylor Springs Superfund Site – PUBLIC RELATIONS SENSITIVE
Taylor Springs, Illinois
Mr. Carlson assisted with the coordination and implementation of a Time Critical Removal Action residential soil sampling approach which targeted over 200 homes near a former Zinc Smelter facility. He assisted with sample collection, XRF screening, performed all surveying tasks related to delineation soil sampling, and managed all XRF and laboratory analytical data into a GIS system.

Former National Zinc Smelter
Cherryvale, Kansas
Mr. Carlson provided engineering design and surveying support during this corrective action project. This included permit acquisition, production of all engineering redesign drawings, RTK-GPS surveying support, final as-built earthwork volume calculations for invoice purposes and final reporting. Scope of work included excavation of over 290,000 cubic yards of lead and arsenic impacted soils and approximately 4,200 cubic yards of impacted sediment; on-site consolidation of removed materials; construction of a 23-acre clay and vegetative cap; site restoration including backfilling and seeding; and construction of a catchment dike system at the confluence of two creeks.

Former Deming Mill Site – CELL CONSTRUCTION
Deming, New Mexico
Mr. Carlson assisted with the coordination of all remedial design aspects for this voluntary cleanup Site. This included engineering analysis and design of a 44 acre on-site consolidation cell and soil cover system. He also assisted with the preparation of all remedial design documents and remedial construction drawings and provided engineering and surveying support during remedial construction activities.

Chromium Soil Remediation
Jersey City, New Jersey
Mr. Carlson provided RTK-GPS surveying support for this corrective action project. Mr. Carlson managed all earthwork as-built surveying tasks for both schedule analysis and payment purposes. Scope includes excavation of approximately 960,000 cubic yards of chromium contaminated soils and other materials. To enable removal activities to occur, ENTACT designed, constructed, and is currently operating a vacuum well point and deep well groundwater extraction system to lower the groundwater elevation and water content of waste materials as much as practicable.

Old American Zinc Superfund Site – PUBLIC RELATIONS SENSITIVE
Fairmont City, Illinois
Mr. Carlson was part of the Technical Team that led an extensive multi-media Remedial Investigation (RI) at a 130 acre former smelter site. His duties included designing and implementing a detailed GPS approach to document RI sampling activities. He assisted with the collection of surface water, waste, sediment, groundwater, and subsurface soil samples; installed monitoring wells, conducted soil logging and water

quality testing, and integrated analytical data with GPS survey data into an interactive relational GIS database for RI mapping and data evaluation.

Former Dearing Smelter – CELL CONSTRUCTION
Dearing, Kansas
Mr. Carlson coordinated all remedial design aspects for this voluntary cleanup. This included engineering analysis and design of a 13 acre on-site consolidation cell and soil cover system. He also prepared all remedial design documents and remedial construction drawings.

Midvale Slag (OU2) Superfund Site – PUBLIC RELATIONS SENSITIVE
Midvale, Utah
Mr. Carlson was the Field Engineer for this $16.5 million dollar Superfund project, and responsible for all remedial action engineering activities. He managed all Real Time Kinematics GPS (RTK-GPS) surveying activities to ensure remedial design elevations and grades were constructed in accordance with approved design specifications. He documented and prepared all engineering as-built drawings for the 2 million cubic yards of earthwork, and managed all geotechnical-engineering aspects of this project. Mr. Carlson provided engineering design support during the Remedial Design by producing all engineering design drawings under the direction of the lead design engineer, and calculated material quantities for project scheduling and costing analysis.

Juncos Superfund Site – CELL CONSTRUCTION, GEOSYNTHETICS, PUBLIC RELATIONS SENSITIVE
Juncos, Puerto Rico
Mr. Carlson provided engineering design and surveying support for this Superfund Site. Responsibilities included the preparation of all engineering redesign drawings and earthwork calculations using Autodesk Land Desktop/Civil Design software applications. Additionally, he performed all RTK-GPS surveying tasks to aid construction activities.

Federated Metals RCRA Corrective Action Site – CELL CONSTRUCTION
Whiting, Indiana
Mr. Carlson provided engineering design and surveying support during this corrective action project. This included the preparation of all engineering redesign drawings, RTK-GPS surveying support, earthwork calculations, and geotechnical sample collection.

Former Owen Zinc Smelter
Caney, Kansas
Mr. Carlson assisted with the site investigation phase of the former Zinc Smelter facility. This included X-Ray Fluorescence screening to determine horizontal and vertical extent of cadmium and lead impacts on site, utilization of an RTK-GPS system to document sample locations and site features, and preparation of all engineering design drawings for the Corrective Action Plan (CAP).

JTA Development
Chicago, Illinois
ENTACT is guiding this site through the Illinois Site Remediation Program (SRP) in order to facilitate residential redevelopment of the property. Mr. Carlson assisted with the SRP document preparation, field investigation, and sampling. He also utilized RTK-GPS to survey boring locations, monitoring wells, and site features. He generated all engineering design drawings and ensured that all SRP requirements were satisfied for Phase I and II.

Johnson Controls, Inc. Controls Group Facility
Goshen, Indiana
Mr. Carlson was the technical lead responsible for operations & monitoring for a soil vapor extraction (SVE) system, which was installed to remediate chlorinated solvent contamination in subsurface soils at an active manufacturing facility under the Indiana Department of Environmental Management's Voluntary Remediation Program (VRP). System monitoring included the collection of periodic vapor samples and soil samples. Mr. Carlson produced semi-annual reports outlining SVE system performance and generated the Site Remediation Completion Report.

Shiawassee River Superfund Site
Howell, Michigan
Mr. Carlson was one of the technical leads at this Superfund Site. Project activities included the removal of PCB-impacted sediments and floodplain soils along the Shiawassee River. Specifically, Mr. Carlson assisted with the planning of the site pre-design investigation, the collection of over 250 river sediment and floodplain soil samples, and subsequent analytical data validation. He surveyed all sample locations and river features utilizing a Total Optical Station and RTK-GPS, managed survey and sample result data in a GIS, and assisted with the preparation of the final design documents.

Former Manufactured Gas Plant Site – PUBLIC RELATIONS SENSITIVE, LEVEL B
Oak Park, Illinois
Mr. Carlson was a Quality Assurance/Quality Control Coordinator at this Former Manufactured Gas Plant Site located in a residential community. Primary activities include the management of over 200,000 tons of coal tar impacted material and off-site disposal via rail to a certified landfill in Michigan. Mr. Carlson's primary responsibilities included daily site surveying, CAD design, sample collection, analytical validation, compaction testing, and administrative coordination with the project's stakeholders. In addition to these responsibilities he also took part in other nonspecific tasks such as overseeing and performing O&M of the on site water treatment system, and assisting with equipment operation and labor when the need arose as well as training new associates in the arts of QA/QC.

Lakeland Disposal Landfill Superfund Site – CELL CONSTRUCTION, GEOSYNTHETICS
Claypool, Indiana
Mr. Carlson was a supplemental QA/QC Coordinator at the Lakeland Disposal Landfill. Responsibilities included client interaction, collecting, submitting and tracking samples for environmental, geo-technical, and health & safety requirements, data submittals, and daily reports. He was responsible for ensuring that work performed by ENTACT and their sub-contractors was performed in accordance with project specifications. Mr. Carlson performed survey work for the project utilizing his knowledge of a TRIMBLE RTK-GPS in concert with AutoCAD to spot check CAP elevations, stake out points, and collect relevant data for analysis. Specifically, Mr. Carlson calibrated a Trimble RTK-GPS to Site-PLS-Certified Control Points; used RTK-GPS to verify that the landfill sub-grade specifications were achieved; and used Land Desktop 3 to calculate excavation/fill volumes for project scheduling.

Former Gulf, Mobile & Ohio Rail Yard
Murphysboro, Illinois
Mr. Carlson was the Quality Control/Quality Control Coordinator for this project requiring excavation and treatment of lead impacted soil. His responsibilities included performing all required QC testing at the site to ensure and document compliance with the remedial objectives. This included X-Ray Fluorescence screening to guide lateral and vertical extents of excavations, confirmatory sampling to ensure clean up objectives were met, and confirmatory sampling of stabilized materials. In addition, Mr. Carlson coordinated monitoring of personnel for air born lead particles, utilizing ELF personal air monitor pumps.

EDUCATION

B.S., Environmental Studies & Applications (Environmental Economics Specialization)
Michigan State University, East Lansing, MI

Currently working on course work for a M.S. in Environmental Engineering
Warren National University

TRAINING & CERTIFICATIONS

OSHA 29 CFR 1910-120 - Hazardous Material and Emergency Response 40-Hour
OSHA 29 CFR 1910-120 - Hazardous Material and Emergency Response 8-Hour Refresher
OSHA 29 CFR 1910.120 – 8-Hour Hazardous Materials Supervisor Training
Medic First Aid / CPR Training - March 2006
Asbestos Worker Certified – June 2005
38-Hr Army Corp of Engineers Wetland Delineation & Management Training – November 2005
Autodesk Civil 3D 2008 Training – November 2007
Autodesk Land Desktop/Civil Design 2005 Advanced Training – June 2004
Trimble® Certified Real-Time Kinematic Advanced Training – June 2002
McKoy's RCRA Training Seminar – March 2003
Troxler Nuclear Soil Moisture/Density Gauge Certified - 2001
CSX Railroad on Track Safety Certified – 2002
2003 Zero Accidents
Defensive Driving
Loss Prevention System (LPS) Behavior Based Safety

Earney Funderburg

ENTACT

DAY SHIFT SUPERINTENDENT

2004 - Present

Mr. Funderburg has 23 years experience in environmental and heavy construction fields. His field experience includes civil works construction, landfill construction and capping, deep slurry wall installations (over 80+ feet), large excavation and backfilling projects, large pipeline construction, demolition of abandoned/old buildings/tanks, thermal treatment, UXO removal, utilization of mobile containment structures for excavations, waste water treatment plant construction and operation, incinerator construction and operation, construction of a 850 mega watt coal fired generator plant, and government contracting. Mr. Funderburg has supervised numerous projects with responsibility for managing project operations, managing budgets, direct supervision of field crews, procurement of project material, and client interface.

ENTACT EXPERIENCE SUMMARY

PCB Impacted Sediment and Floodplain Soil Removal Action – PUBLIC RELATIONS SENSITIVE, CELL CONSTRUCTION

Southern Indiana

Mr. Funderburg is the Project Manager for this high profile, multi-year/multi-phased $54M+ PCB impacted sediment and floodplain soil removal project. Site activities include the excavation, handling, transportation and disposal of 800,000 tons of PCB impacted materials and site restoration, and total material handling of over 1,200,000 tons. Other activities include the management of an on-site borrow area, to include the loading of materials for other contractors on site.

ENTACT is additionally responsible for the construction of a 40-acre onsite landfill performed under EPA guidelines. Complete tarping and mulching of the impacted soil during the construction of the landfill is required to minimize dust issues and to control stormwater. Other remediation activities include the complete excavation and restoration of ancillary runoff tributaries from the plant.

Remediation activities include extensive construction of access/haul roads in and around creek and flood plain areas to enable ingress and egress to the removal areas; the construction of loadout areas ranging in size from 3.5 acres to 6.5 acres to expedite the transport of impacted material; and the construction of diversion channels, 2 miles in total length, to enable sediment removal from the creek bed and flood plain. Water management is a 24 hours a day, 7 days a week activity that includes containment and treatment of millions of gallons of water in contact with the impacted areas.

Two (2) 1,000 GPM water treatment systems were designed and installed by ENTACT, and operated simultaneously. The systems involved initial settlement through an interconnected series of ten or more baffled 20,000 gallon frac tanks, skimmer removal of free product, polymer injection to promote settling, solids removal via sand vessels and bag filters, and removal of dissolved organics via carbon adsorption vessels.

PREVIOUS EXPERIENCE

Shaw Environmental & Infrastructure, Inc.
1991 – 2004

Rocky Mountain Arsenal – LEVEL B, CELL CONSTRUCTION
Denver, Colorado
Mr. Funderburg was the Project Manager for this multi-million dollar landfill project in Colorado. Scope of work included solidification of impacted soils and sediments, construction of an 8-acre cap and site restoration activities. Portions of this scope were performed in Level B. Mr. Funderburg was responsible for personnel and resource allocation, contract administration, customer communication, operational implementation, and the overall successful execution of this project.

Old Midland Superfund Cleanup – PUBLIC RELATIONS SENSITIVE, LEVEL B
Ola, Arkansas
As the Construction Manager, Mr. Funderburg was responsible for managing and overseeing all non-incineration operations and assisting with the incineration of 75,000 tons of hazardous waste. Responsibilities included ensuring all excavations were met within the excavation grades provided by the client; completing excavation and backfilling activities within sprung enclosed structures; coordinating all subcontractors; and overseeing construction and operation of an on site waste water treatment plant. All work was conducted in Level B with controlled air units on workers and machinery. Mr. Funderburg was also responsible for participating in local television interviews and interfacing with the public.

Reese Air Force Base – CELL CONSTRUCTION, GEOSYNTHETICS
Lubbock, Texas
As the Project Manager, Mr. Funderburg was responsible for (9) task orders working simultaneously in an expeditious manner to complete the tasks by date given prior from the client. Scope included the capping of (2) landfills, the removal and disposal of oily water separators, the demolition of above ground petroleum tanks as well as several underground gasoline storage tanks, the construction and operation of (2) ground water treatment plants and pipe associated with supplying contaminated water to the plants, and the successful lining of an existing industrial drain line using the best technology of installation available.

Abandon Landfill & UXO Cleanup
San Antonio, Texas
Mr. Funderburg was the Project Manager for a project involving a $4-million project of removing existing wastes at abandoned landfills that the U.S. Army utilized through the 1940's to 1975. Hazardous waste encountered was in the form of medical, house hold garbage, construction debris, and lead affected soils. All waste was transported to permitted landfills with proper manifests. Explosive Ordinance was also encountered during excavations, in which UXO personnel were involved to clear the area prior to excavation tasks.

Fort Sill Rail Containment Facility
Fort Sill, Oklahoma
Mr. Funderburg was the Site Project Manager responsible for overall production on a Civil Works Project. Project scope of work included the removal of 140,000 cubic yards of soil, some of which was stockpiled and some to be used as compacted fill for structures and rail roads. Approximately (6) miles of PVC, RCP and HDPE pipe was placed. An area of (28) acres of finished grade was lime stabilized. 12,000 Yards of 650 Flex concrete was placed as loading areas for the U.S. Army to use for load out of artillery vehicles for training exercise as well as war time efforts. Approximately 125,000 tons of different types of rock were placed to support 6.5 miles of new rail as well as the new concrete placed. Construction of (2) metal buildings was constructed as well as a concrete/ metal building was constructed. Performed client inter face as well as monthly pay estimates, Daily QC documentation, managing the budget for the project and coordination of personnel and equipment.

Little Dell Dam
Salt Lake City, Utah
Mr. Funderburg was the General Superintendent on a $32-million construction of an earthen dam of 4.5 millions cubic yards of soil. Responsibilities included over all production; selection of project staffing in the field; communication with all sub contractors; compliance and regulations within the scope of work; coordination of all equipment for maximum production; and interface with the client.

Brio Superfund Site – PUBLIC RELATIONS SENSITIVE, LEVEL B, GEOSYNTHETICS
Houston, Texas
Mr. Funderburg was the Construction Manager for the construction of a high temperature incinerator to destroy contaminates of concern in the soil. Additional site activities included demolition of existing tanks that contained liquid/sludge and stored the material on site for incineration. Large scale excavation (23 acres of contaminated soils) was conducted under sprung enclosed structures in Level B. Mr. Funderburg was also responsible for timely information and communication to local community and media, weekly meetings with local stakeholders, and participating in local television interviews and interfacing with the public.

Pine Bluff Arsenal – PUBLIC RELATIONS SENSITIVE, LEVEL B, GEOSYNTHETICS
Pine Bluff, Arkansas
Mr. Funderburg was the Project Manager for this site. Scope of work included large scale excavation of 75 acres of contaminated soils (DDT and corbenzine); landfill construction (geomembrane, GCL, geocomposite); and significant Level B and Level A (work at night assisted by Army personnel to retrieve suspected nerve gas agents) work. Public relations role included acting as liaison to Army Corp of Engineers PR contact person and providing timely and consistent information to community.

Dam Reconstruction
Heavener, Oklahoma
Mr. Funderburg was the Project Manager for the reconstruction of an existing earthen dam with 60 feet plus of water on the lake side.

McAlester Army Ammunition Plant
McAlester, Oklahoma
Mr. Funderburg was the Project Manager for a lead soil removal project at this ammunition plant.

Longhorn Army Ammunitions Plant – CELL CONSTRUCTION, GEOSYNTHETICS
Karnack, TX
Mr. Funderburg was Project Manager for this large scale cell construction project.

EDUCATION

Course work completed at Pines Technical College, Pine Bluff, Arkansas
Course work completed at Arkansas Tech College, Russelville, Arkansas.

TRAINING AND CERTIFICATIONS

Certified Construction Manager, (CCM), 1992
U.S. Corps of Engineers Quality Control Training 2004
Safety Trained Supervisor, (STS), 2001
Professional Project Manager (PMP), 2003
40-Hr OSHA CFR1910-120 Training
8-hr Hazardous Training Supervisor
Competent Excavation Training
Competent 8- hr Construction Techniques
Environmental Awareness Training
8-hr Environmental Compliance Regulatory Standards
DOT Hazardous Waste Training
DOT HM-126F Training
Defensive Driving

Erik R. Gehringer, EIT

ENTACT

PROJECT MANAGER

2002 – Present

Mr. Gehringer is a Civil/Environmental Engineer with more than 15 years of experience in the environmental and construction industries. He has been a key member of the management team on large environmental/civil works projects in several states. His experience includes work in all aspects of construction management including project engineering, scheduling, subcontractor coordination, contract administration, health & safety, procurement, estimating, field crew oversight/supervision, equipment operation, customer communication, and the overall success of ENTACT projects.

ENTACT EXPERIENCE SUMMARY

Residential Soil and Marsh Sediment Remediation – SENSITIVE PUBLIC RELATIONS
Confidential Location, South Carolina
Mr. Gehringer is the Project Manager for this multi-phase remediation project. ENTACT is completing removal of lead and arsenic impacted soils from residential and commercial areas and along a road maintained by the South Carolina DOT. In addition, ENTACT is removing near-shore sediment from within a tidal zone of the adjacent river, and complete site restoration activities of disturbed areas.

Active Refinery Stormwater Pond Remediation
Paulsboro, New Jersey
Mr. Gehringer was the Project Manager overseeing the complex in situ-stabilization/solidification stormwater ponds project at this active refinery. Scope of work included construction of a dewatering system; in-situ stabilization/solidification of over 75,000 cubic yards of sediment, catalyst material, and adjacent soil from two ponds (between 10 and 11 feet deep); installation of a new drainage system; PCB hot spot removal and disposal; importation, grading, and placement of 73,000 cubic yards of clean fill material for the cap; installation of access roads and a stone cover across the site; and site restoration.

Whitehouse Waste Oil Pits Superfund Site – SENSITIVE PUBLIC RELATIONS, GEOSYNTHETICS
Jacksonville, Florida
Mr. Gehringer was the Project Manager for remediation of this former waste oil and sludge disposal facility. Scope of work included in-situ stabilization of 45,000 cubic yards of hydrocarbon sludges at this former waste oil pits site. Additional site activities included relocation of half-mile of an existing stream away from the former waste pits; excavation of 10,000 cubic yards of impacted sediments from within a cypress swamp; installation a 3,100 linear foot perimeter slurry wall up to 80-feet in depth; construction of an 11.5-acre RCRA compliant capping system (LLDPE, GCL, Geocomposite)over the entire site; installation of an extensive underdrain network which serves as a stormwater collection system (included approximately 9,000 lineal feet of 4" to 30" HDPE and reinforced concrete pipe); installation of a gas collection system, and wetlands restoration.

Macalloy NPL Site – SENSITIVE PUBLIC RELATIONS, GEOSYNTHETICS
Charleston, South Carolina
Mr. Gehringer was the Project Manager for this large-scale remediation project. Site activities included excavation, management, and off-site disposal of (low level rad) radiological debris-contaminated soil; in-situ chemical reduction of chromium VI impacted groundwater; installation of approximately 207 temporary injection wells, and 20 temporary wells to monitor treatment success; removal of approximately 2,200 cubic yards of surficial sediments within a creek bed, followed by capping the affected excavation area with a geotextile and an 18-inch sand layer; chemical reduction, on-site placement, and capping of 205,000 cubic yards of chromium VI impacted soils (over 50-acres); construction of an extensive stormwater management system (consisted of 5,600 lineal feet of 12" to 60" reinforced concrete conveyance pipe, 18 precast concrete structures, and two 42" water control valves); and site restoration. ENTACT utilized amphibious low ground

pressure (LGP) equipment in order to minimize impact to the surrounding tidal marsh during excavation and capping activities. The area impacted by the dredging traffic was restored using a combination of natural regeneration, seeding and plugs of the marsh grass, and spartina alterniflora.

Ashley Redevelopment Projects
Charleston, South Carolina
Mr. Gehringer was the Project Manager for multiple phases of work at this redevelopment-driven site. Scope of work included demolition, size reduction, and off-site disposal of a former stainless steel processing facility including the old foundry building (approximately 600' x 150' x 40' high), warehouse, laboratory, offices, and miscellaneous structures. Additional scope involved over 250,000 cubic yards of on site earthwork to construct the site cover system, drainage channels, and retention basins.

Emmett Reed Park Removal Project – SENSITIVE PUBLIC RELATIONS
Jacksonville, Florida
Mr. Gehringer was Project Manager for this removal action of lead impacted soils at this park for the City of Jacksonville. Scope of work included excavation, on-site stabilization, and off-site disposal of approximately 7,000 tons of lead impacted soils; placement of a geogrid/barrier fence prior to backfill placement; and site restoration. The cleaned up park was purchased by various professional athletes who donated a tennis court on the property for the community residents.

Magnolia Demolition Project
Charleston, South Carolina
Mr. Gehringer was the Project Manager for this demolition project. Scope of work included demolition of 6 buildings and various concrete structures including former warehouses, auto/diesel garages, and office buildings. This project also included the removal and recycling of more than 1,000 feet of railroad track and the proper disposal of the cross ties. Over 10,000 tons of concrete foundations, footings, slabs, and other structures were size reduced for future use.

Former Oil Refinery – CELL CONSTRUCTION
Casper, Wyoming
Mr. Gehringer was Project Manager for some of the closure activities at this former refinery. Scope of work included excavation, stabilization, relocation, and consolidation of approximately 100,000 cubic yards of organic and metal-impacted soils and sediments from several SWMU's to an on-site CAMU; excavation of approximately 6,400 lineor feet of 12" diameter abandoned transite-covered water pipe located beneath four active gas lines and disposal of removed material; and site restoration activities.

Active Battery Manufacturing Facility – CERCLA 106(a) Non-Time Critical Removal
Winston-Salem, North Carolina
Mr. Gehringer was Project Manager at this site where work was being conducted in response to an USEPA Emergency Removal Order. The scope of work included the excavation and stabilization of lead-impacted soils and sediments, installation/upgrading stormwater piping, construction of new sedimentation basin, and removal of three (3) existing sediment basins from service.

Former Manufactured Gas Plant
Lake Charles, Louisiana
Mr. Gehringer was Project Manager for remediation of this former manufactured gas plant located adjacent to the Calcasieu River. The Project objective was to remove significant amounts of point source wastes that were contributing to upper groundwater aquifer contamination. Scope of work included dewatering, excavation, characterization, and off-site disposal of over 5,000 tons of mixed wastes; treatment of impacted groundwater intercepted during remediation activities; and backfilling and restoring affected areas.

PREVIOUS EXPERIENCE

IT Corporation, *Miami Lakes, Florida* **1997 – 2002**
Worked on-site on many projects in the Everglades Restoration and Watershed Program.

Stormwater Treatment Area 3/4 Supply Canal Project - *South Florida Water Management District*
Mr. Gehringer was the Project Manager for a large civil construction project located in South Florida. The project consisted of clearing approximately 600 acres of existing vegetation, the mass excavation of over 3 million cubic yards of material from over 30 miles of canals, and the construction or improvement of over 20 miles of levees. Mr. Gehringer is responsible for all aspects of the job including client relations, overall site coordination, resource allocation, scheduling, progress/production tracking, human resource issues and all the financial responsibilities including estimating, preparing monthly client invoices, cost tracking/reporting, and margin analysis. He also assisted in the generation of additional work, which included estimating and proposal development.

Project Controls Engineer/Health & Safety Officer - *Kissimmee River Florida Project, Reach 1, Lorida, Florida*
This large civil works project involved mass earthmoving 12 million cubic yards of fill material, dredging over 190,000 cubic yards of original river channel, demolition of existing water control structures, levee/haul road degradation, and the installation of miscellaneous items including staff gauges, project signs, and safety barriers. Mr. Gehringer was responsible for developing/updating project controls systems to track/report production vs. daily cost. He also prepared monthly invoices to submit to the client (U.S. Army Corps of Engineers), prepared subcontractor bid packages, evaluated quotes, and awarded subcontracts. In addition, he also participated in project review/partnering meetings with the USACE and South Florida Water Management District (SFWMD), developed/updated the integrated project schedule using Primavera scheduling software, assisted with engineering duties including establishing grade control, layout, and other surveying. Finally, he was responsible for handling all financial aspects of the job including communications with the Project Manager and the home office of the current costs, revenue, margin, and cash flow.

Project Engineer/Superintendent - Harry Pepper & Associates, Stormwater Treatment Area 1 West, *Loxahatchee, Florida*
This civil works project involved the construction of levees, canals, and water control structures to provide a Stormwater Treatment Area (STA) in the Florida Everglades. This project consisted of the excavation of over 23 miles of canals and associated levees, construction of 24 water control structures, disking and preparation of approximately 15,000 acres of sugarcane fields, and the demolition of existing facilities including a bridge, storage buildings, and an abandoned pump station which required soil testing/remediation. Mr. Gehringer provided oversight to multiple survey crews, including verification/quality control of work performed, updated the project schedule, and prepared monthly invoices utilizing Primavera (P3) scheduling software. He also prepared, reviewed, and coordinated vendor submittals throughout the approval process to ensure materials and equipment were utilized per the project specifications. Mr. Gehringer supervised field crews including subcontractors and HPA personnel, prepared as-built drawings for water control structures, levees, canals, and other structures, and implemented HPA and contract health & safety plans in accordance with OSHA regulations. He also resolved daily personnel issues such as maintaining the crew, wage determination, and safety.

Project Controls Engineer/Field Engineer - *Maxey Flats Waste Disposal Site Morehead, Kentucky*
This project was an abandoned low-level radioactive waste site, which required remediation. It consisted of pumping over 850,000 gallons of leachate from the ground, mixing it with cement to form grout, and disposing of it into a 300' x 100' x 10' concrete bunker. During the construction phase of the work, over 5,000 cubic yards of concrete were poured, thousands of feet of piping were assembled, and countless other tasks were completed including constructing drainage ditches, clearing & grubbing, and the demolition of existing structures. Mr. Gehringer scheduled work activities involving the prime contractor and its subcontractors, prepared monthly progress/cost reports for the client and the home office, analyzed cost vs. revenue and margin analysis, participated in monthly project review meetings with the

project coordinator (client) & project manager, and participated in contractor/client negotiations including change orders/task plans. He also developed task plans/change orders including estimates and schedules, prepared monthly invoices including approval of timesheets, vendor invoices, and subcontracts, developed/updated integrated project schedule using Primavera (P3) scheduling software, and participated in supervisor weekly health and safety meetings/activities. Finally, he performed field engineering duties including scheduling daily activities, surveying, and utilizing the 2-week look ahead and overall schedule to requisition material and equipment using Primavera (P3) & Suretrak® scheduling software.

Concrete Finisher/Bricklayer/Laborer **1992 - 1997**
Precision Masonry, Franklinville, New Jersey
Mr. Gehringer worked on various projects while working for over 5 years in the masonry trade. These ranged from small residential jobs to large commercial projects. Work was done in many areas of the masonry trade including concrete, brick, block, and stone. He was primarily responsible for supervising work crews, procuring materials, laying brick and block, tying rebar, constructing formwork, and placing/finishing concrete. He was also involved in the bidding process for obtaining new work and worked closely with building inspectors and clients to maintain the product required by the plans and specifications.

EDUCATION

B.S., Civil/Environmental Engineering - Construction Management emphasis
Rutgers College of Engineering, Rutgers University, New Brunswick, New Jersey

TRAINING & CERTIFICATIONS

Primavera® Project Management Training Program, Philadelphia, Pennsylvania
OSHA 40-Hour HAZWOPER Training - 29 CFR 1910.120
OSHA 8-Hour Supervisor Training – 29 CFR 1910.120 (e)(4)
OSHA Excavation Competent Person – 29 CFR 1926.65 (b)
OSHA Hearing Conservation Training Program – 29 CFR 1910.95 (k)
OSHA Hazard Communication – 29 CFR 1910.1200 (h)
OSHA Confined Space Entry Supervisor/Attendant/Entrant – 29 CFR 1910.146 (g)
LPS Behavior-Based Safety Training
Engineer-in-Training (EIT): New Jersey (transferable to most states)
Certified S.C.U.B.A Diver (PADI)
IT Site Safety Officer Training
Defensive Driving Course
Trained on the proper inspection of Excavators, Dozers,
Water Trucks, Haul Trucks and Compactors to ensure proper maintenance and safe operation – 2926.600 and 1926.602, Subpart O.

Bill Koski

ENTACT

[redacted]

2007 - Present

Mr. Koski has more than 15 years of experience in the cleanup of hazardous substances, oil and other contaminants or pollutants at various sites, including the development of site safety plans, heavy equipment operation and field construction.

Mr. Koski has on-site experience including structural decontamination, demolition, temporary construction, polychlorinated biphenyl (PCB) extraction, high voltage electrical equipment decommissioning, excavation, site health and safety management, oil and gas well drilling, construction of natural gas pipelines and well feeder lines, and compressor station installation.

Mr. Koski has recently joined ENTACT

PREVIOUS EXPERIENCE

Taracorp Superfund Site Remediation – PUBLIC RELATIONS SENSITIVE
Granite City, Illinois
Mr. Koski was responsible for coordinating crews of up to 16 personnel during the removal of approximately 250,000 tons of lead-contaminated soils from more than 1,000 residential yards associated with the NL Industries/Taracorp Superfund Site. Responsible for various aspects of work including excavation, transportation, backfill, and restoration of affected residences.

Sawyer AFB– LEVEL B
Marquette, MI
Mr. Koski was Site Safety Officer during an underground pit clean out at K.I. Sawyer AFB in Marquette, Michigan. Project involved excavating to discover the limits of four AFB landfills. Personnel wore Level B personal protective equipment (PPE) due to unknown soil contamination. Mr. Koski was responsible for field technicians and coordination of the site-specific health and safety program.

Ellsworth AFB – CELL CONSTRUCTION
Responsible for the supervision of field operations. Supervised more than 40 company and subcontractor personnel during the installation of a soil vapor extraction (SVE) and LNAPL recovery system at Ellsworth AFB. Responsible for the startup and shakedown of these systems. Supervised a drilling subcontractor during installation of extraction wells. Responsible for other activities at this site that included supervision of the construction landfill caps, demolition and disposal of contaminated buildings, excavation of impacted soils, and lab packing chemicals from various warehouses.

Emergency Response – PUBLIC RELATIONS SENSITIVE
Missouri River and Independence Creek
Supervised field crews and managed multiple subcontracts during an emergency response for a ruptured high-volume diesel pipeline spilling into Missouri River and Independence Creek. Third largest recorded fuel spill on the Missouri River. Deployed 60+-person crew, boats, containment boom, absorbents, skimmers, and vacuum trucks. Coordinated the T&D of contaminated debris and water for recycling.

Lambert Airport – PUBLIC RELATIONS SENSITIVE
St. Louis, Missouri
Project Manager for maintenance of environmental-concerns contract in place at Lambert Airport, St. Louis, Missouri. Primary Emergency Response Contact for all airport facilities. Removed underground storage tanks and aboveground storage tanks on airport property. Cleaned, decommissioned, and removed fuel and ethylene glycol tanks.

Cook Composites and Polymers – LEVEL B
Kansas
Mr. Koski was Project Manager at this site, directly responsible for site health and safety during lockout/tag out procedures, confined space entries into tanks, and operation of a 17,000-psi water laser. Performed tank decontamination using Level B personal protection and coordinated T&D of the wastes generated during tank decontamination.

Excavation and Capping Project – CELL CONSTRUCTION
Woburn, Massachusetts
Mr. Koski was Site Safety Officer for a large-scale excavation, capping (100 acres) and wetlands construction and restoration project.

CCP Site – LEVEL B
Houston ,Texas
Mr. Koski's responsibilities were the removal of a collapsed warehouse structure and removal of all drums destroyed or not under the debris. Directed the HAZ CAT with on site chemists for consolidating containers that were compatible for proper DOT packaging and shipment to an accepted disposal facility. Install engineered cables and supports for the salvage and rebuilding of the structure not totally destroyed.

Emergency Response - USPS Anthrax Attacks – LEVEL B, PUBLIC RELATIONS SENSITIVE
Washington, D.C.; Kansas City, MO; Trenton, NJ
Mr. Koski was Superintendent and Site Manager for several sites. Scope included cleaning of all duct work, and removal and shredding of machinery and recycling for disposal.

Exxon-Mobil Monterey II Coal Mine Remediation
Albers, Illinois
Mr. Koski's duties included scheduling and organizing all field activities. Scope included demolition of structures, reclaiming of areas back to agriculture use, capping of all exposed refuse, draining of ponds for refuse removal, water treatment, construction of a concrete spillway design, installation of a slurry wall, and re-vegetation.

TRAINING & CERTIFICATIONS

OSHA 40-Hour HAZWOPER Training
OSHA 8-Hour HAZWOPER Refresher (annual)
8-Hour Regulatory Awareness Training
DOT HM-181 Training, 1993
Site-Safety Officer Training, 1991
CWM Supervisor Training, 1991
Clark Operator Safety Training, 1991
Confined Space Entry, 1994
First Aid/CPR Training
OSHA 10-Hour Construction Training

Matthew G. Vogler

ENTACT

COST AND SCHEDULE

2003 - Present

Mr. Vogler possesses an extensive background in field services and management related duties. His tasks include project planning, estimation, daily communication with customers/regulatory oversight, management of personnel, and numerous other tasks related to the proper and timely execution of ENTACT projects.

ENTACT EXPERIENCE SUMMARY

PCB Impacted Sediment and Floodplain Soil Removal Action – CELL CONSTRUCTION, PUBLIC RELATIONS SENSITIVE
Southern Indiana
Mr. Vogler is the Administrative Project Manager for this for this high profile, multi-year/multi-phased $54M+ PCB impacted sediment and floodplain soil removal project. Site activities include the excavation, handling, transportation and disposal of 800,000 tons of PCB impacted materials and site restoration, and total material handling of over 1,200,000 tons. Other activities include the management of an on-site borrow area, to include the loading of materials for other contractors on site. ENTACT is additionally responsible for the construction of a 40-acre onsite landfill performed under EPA guidelines. Complete tarping and mulching of the impacted soil during the construction of the landfill is required to minimize dust issues and to control stormwater. Other remediation activities include the complete excavation and restoration of ancillary runoff tributaries from the plant.

Active Facility Drum and Soil Removal – LEVEL B, PUBLIC RELATIONS SENSITIVE
Nebraska
Mr. Vogler was the Administrative Project Manager for this remediation project. Scope of work included the removal, characterization and disposal of hazardous waste drums and excavation of impacted soils from former unregulated burn & burial disposal sites. This site is located in close proximity to residences requiring stringent volatile emission controls during excavation and bulking operations. Mr. Vogler's responsibilities included management of personnel, daily record keeping and project tracking/scheduling, progress tracking, scheduling, and direct contact with Owner's Representatives.

BNSF Lindenwood Rail Yard
St. Louis, Missouri
Mr. Vogler was the Administrative Project Manager for the remediation of lead-impacted material located along 1,200 feet of rail line, which extended approximately 50 feet from the rail line down a steep slope. The slope densely covered with brush and trees, ranged from 2H: 1V to 1.5H: 1V. A creek was located at the base of the slope, approximately 100 feet from the rail. ENTACT performed in-situ stabilization and removal of lead-impacted material directly adjacent to the rail line, then on the entire slope. Mr. Vogler's responsibilities included management of personnel, daily record keeping and project tracking/scheduling, oversight and coordination of all field activities, progress tracking, scheduling, and direct contact with Owner's Representatives.

PREVIOUS EXPERIENCE

Earthsafe Systems, Inc., Willowbrook, IL / *Project Manager* **2000 - 2003**

- Managed numerous emergency power system installations for mission-critical facilities simultaneously throughout the eastern U.S.
- Coordinated shop production to ensure the products met customer needs in both quality & schedule
- Coordinated various skilled trades in the efficient production of quality products & field services
- Negotiated with vendors/subcontractors for competitive pricing in regards to materials & services
- Managed project aspects related to scheduling, installation quality, & technical understanding of crews

Chempet Corporation, Addison, IL / *Quality Control Chemist* **1997 - 2000**

- Analyzed outgoing metalworking fluids for physical characteristics and chemical content to ensure quality and verify required customer specifications
- Instructed production crew on accurately making necessary adjustments to unsatisfactory products
- Analyzed customer samples to monitor the conditions of their fluid systems and ensure effective performance
- Utilized wet chemistry methods on a daily basis

EDUCATION

B.S., Chemistry - Mathematics Minor
Indiana University, Bloomington, Indiana

TRAINING AND CERTIFICATIONS

OSHA 29 CFR 1910.120 – 40-Hour HAZWOPER Training
OSHA 29 CFR 1910.120 – 8-Hour HAZWOPER Refresher (annual)
LPS Behavior Based Safety Training

Maria Barajas-Albalawi

Project Chemist

Ms. Maria Barajas-Albalawi has 7 years of experience in environmental chemistry, and her focus has been on ensuring delivery of consistent quality data from laboratories. Her expertise includes validating and reviewing analytical data, coordinating analyses and corrective actions with laboratories, and evaluating data quality. She has assisted clients in project quality assurance/quality control requirements, and has participated in the management and oversight of laboratories.

Ms. Barajas-Albalawi duties as an environmental chemist include the technical review and validation of laboratory-generated data to assure quality assurance and regulatory compliance. She has 6 years of experience within environmental laboratories, producing laboratory reports and assuring that quality requirements were met.

Fields of Competence

- Environmental chemistry
- Data review and validation
- Laboratory coordination
- Sample and data tracking
- Coordination of QA/QC program for laboratories
- Data management

Education

- B.A., California State University, Fresno, California, 1999

Languages

- English
- Spanish

Key Industry Sectors

- Government
- Aerospace
- Chemical
- Waste Management
- Utilities
- Pulp & Paper Products
- Oil & Gas

Key Projects

Chemistry and Data Management for a Multiple-Facility Industrial Complex, Basic Remediation Company, Clark County, NV, (2006 through 2007).
Currently managing the chemistry component of a large commercial program consisting of multiple analytical requirements. Primary responsibilities include coordinating with environmental laboratories and subcontractors; assembling data tables; and reviewing data for completeness and quality. Responsible for preparing subcontract cost proposals and conducting data validation for internal reports. Review electronic data deliverables (EDDs) to ensure they meet project/clients criteria. Communication with both external and internal clients.

Laboratory Project Management for clients, such as Mare Island, CA; Whittaker Bermite, Santa Clarita, CA; US Corp of Engineers, Sacramento, CA; Dow Chemical, Pittsburg, CA; Tourtelot, Benicia, CA; Henderson Landfill, Henderson, NV (2002 through 2004).
Managed complex local, state, and federal programs in an environmental setting. Provided technical expertise/support to clients and laboratory throughout every phase of a project. Interfaced with laboratory personnel and upper management in order to provide client with timely project status. Assessing situations requiring in-depth scientific evaluation of various factors. Managed production of reports, data retrieval, and EDDs. Ensured acceptable guidelines were followed in every project in order to meet client quality standards. As needed, assisted in the translation (English/Spanish) of documents/technical literature for the company's international customers.

Laboratory Project Management for Landfill, Benicia, CA (2002).
Worked in sample receiving logging and tracking incoming environmental samples. Prepared price proposals and assisted clients with analytical reports and/or technical inquiries. Modified and created forms that made the tracking of incoming and in-house work more effective. Worked with the Organics and Inorganics departments in prioritizing daily workload, and delegated responsibilities to effectively meet production goals and deadlines.

Laboratory Project Management for UST sites such as Chevron, Shell, Ultramar, CA (2000 through 2002).
Prepared and edited business letters, proposals, and documents for company clients and vendors. Organized workload and managed project duties, including initiation of program phase and invoicing. Addressed technical issues, and ensured project objectives were met. Developed cost effective task plans to complete work in a timely manner.

Sample Control Management for Chevron, Shell, Ultramar, CA (2000).
Coordinated and logged incoming environmental samples from various sites; documented and tracked chain of custody, performed sample disposal per laboratory guidelines, and assisted with sample pick-ups and drop-offs. Practiced good laboratory procedures to avoid cross-contamination of delivered samples.

Data Management for UST sites such as Chevron, Shell, BP, (1999 through 2000).
Updated and managed the underground storage tank (UST) database and MTBE database using Microsoft Access, Excel, and Word. Assisted staff engineers with projects and maintained UST files. Communicated with local agencies regarding UST and MTBE databases, and monitored reports to ensure companies were in compliance with NPDES permit requirements.

Mark A. Bowland

Senior Risk Assessor

Mr. Bowland is an REA II with over 14 years experience providing risk assessment and toxicological assistance to a variety of public and private clients. He specializes in human health and environmental risk assessments, toxicological research, and risk-based cleanup-level development. He has performed risk assessments for numerous Superfund, RCRA, Voluntary Cleanup Program, schools, private and public client facilities throughout the United States.

Health risk assessment projects have included complex, multiple-site, focused risk assessments, multi-pathway and multi-chemical exposures, probabilistic analyses, and ecological components (qualitative/quantitative). His experience encompasses a wide range of in a variety of environmental settings, including Brownfield redevelopments, hazardous waste sites, landfills, former service stations, incinerators, industrial sites, and other residential and workplace environments.

Mr. Bowland has also conducts and manages sampling plan development, fate and transport assessments, data evaluations, Phase I , Phase II, focused site investigation, and Preliminary Endangerment Assessments. Mr. Bowland also provides strategic advising services to school Districts including but not limited to Preliminary Site Assessments, Preliminary Environmental. Mr Bowland also assists school districts with the ongoing and dynamic process of school site environmental guidance and policy development. For the Coalition for Adequate School Housing (CASH), Mr. Bowland has participated on the Toxics Advisory Committee, which serves to review and develop improvements to California EPA's school site program.

Professional Affiliations and Registrations

- Registered Environmental Assessor II (REA II), 2007
- Society for Risk Analysis
- Society of Environmental Toxicology and Chemistry (NorCal)

Fields of Competence

- Human health and ecological risk assessments
- Toxicology
- Exposure assessment
- Vapor intrusion evaluations
- Preliminary Endangerment Assessment/Phase II investigations
- Risk communication

Education

- B.S., Environmental Toxicology, University of California, Davis, 1992

Recent Publications

- Co-Author. Evaluating Incremental Risks to Southeast Alaska Subsistence Harvesters. Presented at the 1999 Society for Risk Analysis meeting, Atlanta, Georgia.
- Co-Author. Development of Risk-Based Concentrations of Heavy Metals in Inorganic Fertilizers. Presented at the 1998 Society for Risk Analysis meeting, Phoenix, Arizona.
- Co-Author. Short-Term Analysis of Mercury Bioaccumulation and Exposure Potential in Areas Proposed for Off-Channel Gravel Mining. Presented at the 1996 Society for Risk Analysis meeting, New Orleans, Louisiana.
- Co-Author. Human Health Risk Assessment Used to Direct Land Development Efforts Adjacent to a Multiple-Facility Industrial Complex. Presented at the 1995 Society for Risk Analysis Annual Meeting, Honolulu, Hawaii. December 1995.

Key Projects

Risk Assessment/Risk Communication

Human Health Risk Assessment, Treco Property, Basic Remediation Company, Clark County, Nevada.
Human health risk assessment and development of risk-based soil corrective action levels. Constituents of concern include radionuclides, metals, pesticides, and chlorinated hydrocarbons. Receptors evaluated included future commercial receptors, construction workers, trespassers, and restaurant patrons.

Human Health Risk Assessment, Borrow Area, Basic Remediation Company, Clark County, Nevada – Human health risk assessment and development of risk-based soil corrective action levels. Constituents of concern include radionuclides, metals, pesticides, and chlorinated hydrocarbons. Receptors evaluated included future commercial receptors, construction workers, trespassers, and maintenance workers.

Baseline Deterministic and Probabilistic Human Health Risk Assessment at a Metals Refinery (Region 8 EPA) as Part of a RCRA Facility Investigation (RFI). Western Zirconium, Salt Lake City, Utah.
Project manager for a risk assessment which evaluated 30 SWMUs and 9 AOCs. Chemicals assessed included metals, VOCs, dioxins, PAHs, PCBs, nitrate/nitrite and radionuclides. Pathways included direct contact (incidental ingestion, dermal contact) with soils and indirect contact (inhalation of fugitive dusts and vapors, as appropriate) with soil and groundwater COPCs for future on-site workers and construction workers, and indirect contact (inhalation of fugitive dusts and vapors, as appropriate) with soil and groundwater COPCs for down wind off-site residents. RESRAD was utilized to estimate exposures and risks from radionuclides. Results Used to Determine No Action Required on many of the SWMUs and AOCs. Risk assessment in regulatory review.

Human Health and Ecological Risk Assessment, Santa Susanna Field Laboratory (SSFL), CA.
Assisted in completion of a site wide risk assessment methodology (SRAM), and completed numerous human health and ecological risk assessments at multiple sites and site groups at SSFL. Receptors of concern included future residents, commercial workers, construction workers, trespassers, and representative ecological receptors for multiple trophic levels. Chemicals of potential concern included metals, VOCs, PARs, SVOCs, TPH, organochlorine pesticides, PCBs, and perchlorate in soil, soil gas, ground water, surface water, and sediments.

Human Health Risk Assessment Including Risk Based Concentration Development, Sacramento, CA.
Completed deterministic and probabilistic multipathway human health risk assessments for a former crop duster airport. Soils containing chlorinated pesticides, TPH and volatile organics, and groundwater containing VOCs, TPH and chlorinated VOCs were the focus of this deterministic and probabilistic risk assessment. Multiple receptors were assessed, including a future worker, future on-site resident, and construction worker. Modeling was conducted to predict potential vapor intrusion into homes. Provided strategic planning for additional soil and groundwater investigations, environmental fate and transport of the VOCs, and evaluation of potential public health impacts. Regulatory negotiations are ongoing.

Human Health Risk Assessment Including Risk Based Concentration Development, Sacramento, CA. Project manager for deterministic and probabilistic multipathway human health risk assessments at a former cropduster airport (California Superfund Site) with soils containing 50 pesticides. Intent of the project was to reopen negotiations to replace regulatory agency-selected residential cleanup values with more appropriate commercial property values based on proposed land use. Successful reopening of applicable cleanup standards achieved. Regulatory negotiations on-going. Tulare County, CA.

Human Health Risk Assessment, Olathe, KS.
Completed human health risk assessment at a former chemical facility. Groundwater containing numerous volatile organic compounds (VOCs) migrated under surrounding residential areas. Qualitative and quantitative risk assessment conducted on measured and modeled VOCs in indoor air, PCBs and metals measured in surface water sediments. An ecological screening evaluation was also conducted. Negotiations ongoing.

Human Health Risk Assessment, Westport, MA.
Completed multipathway Method 3 human health risk characterization on a currently operating garage. Soils and groundwater containing TPH, PAHs, MTBE, and metals were assessed.

Review and Comment on the Proposed Texas Risk Reduction Program (TRRP) Rule. Both the May 15, 1998 and February 19, 1999 drafts of the proposed Texas Risk Reduction Program (TRRP) rule were reviewed and the equations and parameters employed within the rule for calculating the risk-based exposure levels (RBELs) were identified and evaluated. The extent of uncertainty and variability inherent within the parameters and equations for calculating RBEL values were also evaluated by conducting a standard probabilistic (Monte Carlo) analysis. The results of the evaluation were used to produce comments on the draft rule.

Human Health and Ecological Risk Assessment, and Development of Risk Based Soil and Groundwater **Acceptable Levels, Pico Rivera, CA – Risk assessment** project manager for deterministic and probabilistic multipathway human health risk assessments for an active electronics recycling center. Soils containing PCDDs and PCDFs, polychlorinated biphenyls, volatile and semi-volatile organics, and metals, and groundwater containing VOCs and PCBs were the focus of this deterministic and probabilistic risk assessment. Multiple receptors were assessed, including a current worker, future worker, off-site resident, recreational receptor, and passerby. Modeling was conducted to predict fugitive dust impacts to off-site areas, and groundwater concentrations spatially removed from the site. Potential impacts to ecological receptors were addressed qualitatively. Acceptable levels for constituents in both soils and groundwater were calculated. NewFields also provided strategic planning additional soil and groundwater investigations, environmental fate and transport of the PCDDs/PCDFs, and evaluation of potential public health impacts. Regulatory negotiations are ongoing.

Human Health Risk Assessment including Preliminary Endangerment Assessment and General Advisory Services of a Proposed New School on Former Agricultural Land, Davis **CA – Davis Joint Unified** School District.

Prospective Human Health Risk Assessment on a 25-acre Industrial Pesticide Formulation Site in Henderson, NV. Montrose Chemical Corp.; Seattle, WA (2002-present).

Development of Soil Risk-Based Cleanup Levels (Human Health and Ecological Risk Assessment) for Arsenic, Chromium VI, and Copper at a Wood-Treating Facility. Coast Wood Preserving, Inc. Ukiah, CA. (2001).

Human Health Risk Assessment including Preliminary Endangerment Assessment and General Advisory Services of a Proposed New School on Former Agricultural Land. Stockton Unified School District, Stockton, CA (2001-present). Project manager responsible for development of work plans and completion of PEAs for two proposed new school developments in Stockton, California.

Human Health Risk Assessment including Preliminary Endangerment Assessment and General Advisory Services of a Proposed New School on Former Agricultural Land. Lodi Unified School District, Lodi, CA (2002-present). Project manager responsible for development of work plan and completion of PEA for a proposed new school development in Lodi, California.

Human Health Risk Assessment on a 65-acre Rural Residential Development of a Former Orchard with Soils Containing Arsenic, Lead, Organochlorine Pesticides. Conte Asset Management; Sacramento, CA (2000-present).

Human Health Risk Assessment on a 180-acre Rural Residential Development of a Former Orchard with Soils Containing Arsenic, Lead, Organochlorine Pesticides. Actium Development Corp.; Sacramento, CA (1999-present).

Health Assessment for Compliance of Multiple **Products with Proposition 65; Anonymous – Project** manager responsible for oversight and completion of risk analysis to determine Proposition 65 compliance for numerous catalogue-based firearm products. On-going.

Development of a Risk-Based Methodology for Decision Making Regarding the Presence of Arsenic in Soils of Placer County. Anonymous Developers in Placer County (2000-present).

Prospective, Human Health Risk Assessment for Prop 65 Purposes Involving Lead and Cadmium in Skin Care Products. Anonymous Law Firm (1999-present).

Prospective, Human Health Risk Assessment for Prop 65 Purposes Including Derivation of a Dermal Cancer

Potency Factor for Coal Tar in Shampoo Products. Anonymous Law Firm (1999-present).

Prospective, Human Health Risk Assessment for Volatile Organic Compounds in and Beneath a Residential Property. Anonymous. Northern California. Project manager responsible for oversight and completion of a human health risk assessment for chlorinated solvents discovered in indoor air, soils, and water beneath a residential property.

Human Health Risk Assessment including Preliminary Endangerment Assessment and Regulatory Negotiation of a Proposed New School on Former Agriculture Land Containing Residues of Toxaphene, **Galt, CA – A preliminary endangerment assessment** (PEA) human health screening assessment was conducted on a proposed new school site located on former agricultural land pursuant to SB 162 and AB 387. Standard PEA assumptions and equations were used. In addition, a site-used specific risk assessment was conducted and presented in the uncertainty section to demonstrate the conservative nature of the PEA based assessment when used for school sites. The PEA was approved by the DTSC project manager.

Human Health Risk Assessment on a 65-acre Rural Residential Development of a Former Orchard with Soils Containing Arsenic, Lead, Organochlorine **Pesticides, Sacramento, CA – A tiered human health** risk assessment was conducted on former orchard soils containing arsenic, lead, and organochlorine pesticides that is proposed for redevelopment as a residential area. Deterministic and probabilistic methodologies were used to assess risks at the property.

Human Health Risk Assessment on a 180-acre Rural Residential Development of a Former Orchard with Soils Containing Arsenic, Lead, Organochlorine **Pesticides, Placer County, CA – A tiered human health** risk assessment was conducted on former orchard soils containing arsenic, lead, and organochlorine pesticides that is proposed for redevelopment as a residential area. Deterministic and probabilistic methodologies were used to assess risks at the property. DTSC toxicologists have agreed the approach and conclusions are valid.

Preliminary Endangerment Assessment Human Health Risk Screening Assessment on a 46-acre Rural Residential Development of a Former Orchard with Soils Containing Arsenic, Lead, Organochlorine **Pesticides Placer County, CA – A preliminary** endangerment assessment equivalent human health risk assessment was conducted on former orchard soils containing arsenic, lead, and organochlorine pesticides that is proposed for redevelopment as a residential area. Deterministic methodologies were used to assess risks at the property. DTSC toxicologists have agreed the approach and conclusions are valid and approved the PEA results, which conclude that redevelopment of the property poses no significant risk to public health.

Development of a Risk-Based Methodology for Decision Making Regarding the Presence of Arsenic in Soils of Placer County, CA. Anonymous Developers in Placer County (2000-present).

Preliminary Endangerment Assessment for Lead **Impacted Soils at a Tile Facility, Sacramento, CA –** Project manager for a human health risk assessment and ecological evaluation as part of a Preliminary Endangerment Assessment for a former evaporation ponds at a tile manufacturing plant. Blood lead levels were predicted for site workers and hypothetical residential receptors at the site. A preliminary site walk was conducted to document the potential for significant ecological habitat and exposures at the site.

Tiered Risk Assessment at Proposed Transitional Living Facility Located on Chlordane Impacted Soils, **Sacramento CA – Project manager responsible for** regulatory negotiation and completion of a tiered risk assessment at a residential property formerly used to store pesticide application equipment. Property is proposed for redevelopment as a transitional living facility. Soils had residues of chlordane and other chlorinated pesticides. Though the assessment showed soils at the property posed no significant risk to public health based on the anticipated land use, the assessment was used to identify areas for possible mitigation to alleviate neighbor concerns.

Human Health Risk Assessment and Geostatistical Evaluation Using GIS (ArcView) as Part of an Analysis of Historically Released DDT at a Manufacturing Facility. Latham and Watkins, San Francisco, CA (2000).

Human Health Risk Assessment and Development of Materials Safety Data Sheet for Planting Mix, **Monterey, CA – Assisted in the assessment of human**

health risks associated with lead present in landscaping planting mix containing elevated levels of lead. The assessment showed that use of the product in accordance with the label results in acceptable exposure levels to workers and residents that might be exposed post-placement. Produced a materials safety data sheet for the material.

Human Health Risk Assessment and Development of Risk-Based Soil Corrective Action Levels Used to Direct Land Development Efforts Adjacent to a Multiple-Facility Industrial Complex; Basic Remediation Company; Clark County, Nevada – Involved in risk assessment activities and GIS services for a complex industrial site of over 2,000 acres. A comprehensive tiered risk assessment is being prepared for impacted former evaporation pond soils. The risk assessment is evaluating three potential future land uses: commercial/industrial, residential, and recreational (golf course) uses. Chemicals at the site include heavy metals, pesticides, chlorinated hydrocarbons, and radionuclides. Based on the results of the risk assessment, risk-based corrective action levels for soil will be developed for each potential land use. These corrective action levels will be used to determine the future course of land development at the site. GIS services include development of base map for the site, geostatistical analysis of risk assessment results, and remediation and land development planning.

Derivation of Risk-Based Concentrations of Lead, Cadmium and Arsenic in Commercial Fertilizer; California Department of Food and Agriculture – Assisted in the development of a multi-pathway, multi-environment, multi-crop probabilistic risk assessment deriving risk-based acceptable concentrations for lead, cadmium, and arsenic in commercial fertilizers. A deterministic risk assessment has been completed for over 45 fertilizers, three receptors, six crop categories, and two application scenarios. Fate and transport analyses included fugitive dust generation and dispersion, surface runoff into surface water bodies, accumulation in soil of heavy metals from applied fertilizers, and transfers into agricultural products (i.e., produce, beef, milk). The results of this analysis were used to recommend fertilizers, receptors, inter-media transfers, and crop categories for no further evaluation in the next phase of work. Based on the results and recommendations of the deterministic analysis, a focused, probabilistic risk assessment was prepared to estimate risk-based acceptable levels of metals in commercial fertilizers.

Baseline Human Health and Ecological Risk Assessment at a Former Pulp and Paper Mill; Alaska – Involved in the preparation of a multiple-pathway, baseline human health and ecological risk assessment for the site. Chemicals present at the site included PCDDs and PCDFs, polyaromatic hydrocarbons, and heavy metals in surface soils, surface waters and sediments in both fresh water and marine environments, and biota. Food chain transfer modeling and exposures to subsistence receptors were estimated, as well as hypothetical industrial, residential, and recreational exposure scenarios. A quantitative uncertainty analysis was also conducted for the human health component. As a result of the analysis it was concluded that the discharges from the mill did not result in risks to the subsistence user risk above acceptable levels. This conclusion was included as part of the Alaska Department of Environmental Conservation's (ADEC) Record of Decision (ROD) for the site.

Human Health Risk Assessment Associated with Future potential Uses of Groundwater at a Former Naval Facility. Alameda, CA – Completed a prospective human health risk assessment for future hypothetical beneficial uses for impacted groundwater beneath a former Naval facility slated for commercial redevelopment. Chemicals of concern included chlorinated hydrocarbons, and BTEX. The assessment included a qualitative screening of many future potential groundwater uses to focus the quantitative portion of the risk assessment to the two or three scenarios of greatest concern. Measured groundwater concentrations were kriged to estimate areal average concentrations of each constituent, and subsequently three scenarios were quantitatively assessed: two worker scenarios and a school scenario. All scenarios were shown to be below acceptable hazard indices and EPA's risk range.

Baseline Human Health and Ecological Risk Assessment and Development of Risk-Based Corrective Action Levels; Safety-Kleen Corp., Springfield, OR– Prepared a risk assessment at solvent recycling center as part of a RCRA facility investigation. Use of a fractionation risk assessment approach for TPH was negotiated and approval of the risk assessment with the Oregon DEQ Western Region.

Risk Assessment Review; Frontier Fertilizer Superfund Site; Davis, California – Served as a technical reviewer for a local oversight group of an EPA prepared risk assessment. Involved in report review and preparation of technical comments on the risk assessment.

Baseline Human Health Risk Assessments and Development of Risk-Based Corrective Action Levels; Safety-Kleen Corp., California, Oregon – Assisted in the preparation of risk assessments at multiple solvent recycling centers in California and Oregon as part of a RCRA facility investigations. A fractionation risk assessment approach for TPH was negotiated and used.

Human Health Risk Assessment for Lead Impacted Soils at an Industrial Facility, Sacramento, CA – Completed a human health risk assessment for workers exposed to soils impacted with lead-based paint particles subsequent to sandblasting activities. Blood lead levels were predicted for site workers, remediation workers and pregnant site workers using EPA's new lead methodologies. Site-specific cleanup levels were estimated based on these results.

Focused Human Health Risk Assessment at a former chemical facility, West Sacramento, CA – Assisted with exposure and human health risk assessment of volatile organic chemicals in groundwater. Performed assessed exposure and risk to volatized chemicals under the future land use conditions of a professional sports stadium.

Human Health and Ecological Risk-Based Cleanup Level Development; U.S. Army Corps of Engineers, Sacramento District, Hamilton Army Airfield, Novato, CA – Part of the risk team assisting the Corps' primary contractor in the development of the human health and ecological risk-based cleanup levels and residual risk assessment portions of the GSA Phase II Sale Area assessment. Responsibilities involved exposure and human health risk assessment of inorganic and organic chemicals in soil and sediments, development of sediment target concentrations for chemicals based on recreational fish ingestion using partitioning and dilution fate and transport models for chemical transfer from sediments to fish, preparation of the final human health and ecological risk assessments for the report, data evaluation and statistical analyses.

Human Health Risk Assessment at an agricultural chemical formulation and distribution facility, Stockton, CA – Assisted with exposure and toxicity assessment of over twenty chemicals in soil and groundwater. Performed environmental fate assessment in soil and groundwater using the SESOIL and VHS environmental fate and transport models. Provided statistical characterization and distribution analysis of soil and groundwater concentrations.

Baseline Human Health Risk Assessment and Development of Preliminary Soil Remediation Goals as Part of a RCRA Facility Investigation; Hughes Aircraft Company, Fullerton, CA – Prepared a screening-level and baseline human health risk assessment, and developed preliminary remediation goals for the site as part of an RFI report. Chemicals of potential concern detected in site soils included heavy metals and volatile organic compounds (VOCs). Exposures to hypothetical future commercial/industrial workers, construction workers, residents, and recreational receptors were assessed for 6 areas of interest based on site operations and the presence of solid waste management units (SWMUs) on-site.

Screening Baseline Human Health Risk Assessments and Regulatory Negotiation Involving Chlorinated Solvents and Petroleum Hydrocarbons, Cloquet, MN

Baseline Human Health and Ecological Risk Assessment and Development of Risk-Based Corrective Action Levels; Safety-Kleen Corp, Hebron, Ohio – Completed a risk assessment at solvent recycling center as part of a RCRA facility investigation. Chemicals present at the site included chlorinated volatile organic compounds and mineral spirits in soil, groundwater, sediments and surface waters of an adjacent river. The risk assessment involved extensive vadose zone, groundwater, air, and surface water fate and transport modeling. Negotiated with EPA Region V on the acceptance of the risk-based cleanup levels for the site.

Retrospective, Deterministic, Multi-pathway Baseline Human Health (children, adults) Risk Assessment Associated with Incidental Exposure to DDT and Toxaphene, Roseville, CA

Baseline Human Health Risk Assessment and Development of Preliminary Soil Remediation Goals as Part of a RCRA Facility Investigation; Delco Systems, Goleta, CA – Prepared a screening-level and baseline human health risk assessment for the site as

part of an RFI report for 4 SWMUs and one area of concern. Chemicals of potential concern detected in site soils included heavy metals, VOCs, semi-volatile organic compounds (SVOCs), and polychlorinated biphenyls (PCBs). Exposures to hypothetical future commercial/industrial workers, construction workers, and residents were assessed. Preliminary soil remediation goals were also developed for each SWMU and area of concern.

Baseline Human Health Risk Assessment and Development of Site-Specific Cleanup Goals for a Former Service Station; B.P. Oil Company, Puyallup, WA – Prepared a baseline human health risk assessment and developed site-specific cleanup goals for the site. Total petroleum hydrocarbons (TPH) as gasoline, diesel, and heavy oils were detected in soils and groundwater at the site. Limited indoor and outdoor air modeling were conducted for the site. Exposure estimates and cleanup goals for protection of future indoor workers and construction workers were developed for each TPH component using Washington and Alaska TPH guidance, and Washington MTCA Method C procedures.

Baseline Exposure Potential Analysis for a Former Bilge Water Underground Storage Tank (UST) Site; Portland, OR – Post excavation, limited residues of heavy-end petroleum hydrocarbons ethylbenzene, toluene, and xylene were detected at a former oily-bilge water UST site located on the banks of the Willamette River. Direct human exposure to these residues in soils were restricted by the presence of clean-fill, rip-rap and armor rock. Shallow groundwater under the site was believed to be hydraulically connected to the Willamette River during certain parts of the year. Migration of chemicals of potential concern into the river via shallow groundwater was conservatively estimated, and a baseline human health risk assessment for possible worker and recreational receptors was completed. Potential exposure pathways included recreational contact with surface water and ingestion of recreationally caught fish. A screening ecological risk assessment was also completed by comparing conservatively estimated surface water and sediment concentrations with available ambient water quality and sediment criteria.

Baseline Human Health and Ecological Risk Assessment and Development of Risk-Based Corrective Action Levels at a Solvent Recycling Center as part of a RCRA Facility Investigation; Safety-Kleen Corp, Hebron, OH – Involved in the preparation of a baseline human health risk assessment and development of corrective action levels for the site. Chemicals present at the site included chlorinated volatile organic compounds and mineral spirits in soil, groundwater, sediments, and surface waters of an adjacent river. The risk assessment involved extensive vadose zone, groundwater, air, and surface water fate and transport modeling. Based on the results of the fate and transport modeling and risk assessment, risk-based cleanup levels protective of both human health and aquatic organisms in the river were developed. Alternative cleanup levels were also developed based on the elimination of direct groundwater exposure pathways. Negotiations with EPA Region V are ongoing.

Baseline Human Health and Ecological Risk Assessment and Development of Risk-Based Corrective Action Levels; Safety-Kleen Corp., Springfield and Clackamas, OR – Assisted in completion of risk assessments at two solvent recycling centers as part of RCRA facility investigations. Part of the project was Negotiation of the use of a fractionation risk assessment approach for TPH and approval of the risk assessments with the Oregon DEQ.

Baseline Risk Assessment; Anderson Consulting, Sacramento County, CA – Completed a risk assessment at a future residential development site off Twin Cities Road. The site was formerly an orchard, and contained soils impacted with toxaphene. The assessment evaluated risks to future residents at the site.

Human Health Risk Assessment; Galt High School, Galt, CA – Assisted in preparation of a risk assessment for toxaphene and DDT for a former agricultural site to be converted to a school.

Baseline Human Health Risk Assessment at a Future Residential Development; Wallace Kuhl, Placerville, CA – Prepared a baseline human health risk assessment for lead-arsenate impacted soils at the site of a future residential development. Assessed risks to future hypothetical senior residents at the site and suggested measures to mitigate exposures to impacted soils.

Baseline Human Health Risk Assessment on Petroleum Hydrocarbons in Bark Waste at a Mill Site; **Wheeldon & Associates, Latrobe, CA – Project** manager for a prospective, deterministic risk assessment, which includes differentiating naturally-occurring hydrocarbons in bark from diesel-range organics. Developed risk-based cleanup levels based on worker exposures to the bark pile and on residential exposures from using the bark in landscaping activities.

Baseline Human Health Risk Assessment Associated with Incidental Exposure to DDT and Toxaphene; Shell and Associates, **Roseville, CA – Performed a** retrospective, deterministic, multipathway human health (children, adults) risk assessment associated with DDT and toxaphene in soil that is part of a road bed.

Probabilistic Risk Assessment for Toxaphene; Property **Developer, Brentwood, CA – Assisted in the** preparation of a probabilistic risk assessment for toxaphene for a former orchard site to be converted into a residential development. Actively involved in regulatory negotiations of acceptable soil levels.

Human Health and Ecological Risk Assessment at a Former Pesticide Formulation Facility; Latham and **Watkins, Coachella, CA – Involved in a probabilistic,** multi-pathway risk assessment for a former pesticide formulation site with soil (DDT, toxaphene) and groundwater (1,2-DCP, EDB) contamination. The risk assessment involved air and dust accumulation fate and transport modeling to both on and off-site locations. Based on the results of the fate and transport modeling and risk assessment, risk-based cleanup levels protective of human health were developed and approved by DTSC.

Baseline Risk Assessment; San Diego Unified Port District, San Diego Convention Center Expansion Site, **San Diego, CA – Completed a risk assessment at the** expansion site for the San Diego Convention Center, formerly an open burn dump. Chemicals identified at the site included heavy metals, polycyclic aromatic hydrocarbons (PAHs), and petroleum hydrocarbons. The assessment evaluated risks to both construction workers and potential impacts to the bay.

Human Health Risk Assessment Used to Direct Land Development Efforts Adjacent to a Multiple-Facility Industrial Complex; Victor Valley Land Co., **Henderson, NV – Assisted in the preparation of a** predictive risk assessment designed to assist decision-makers in the non-industrial development of 2,000 acres adjacent to an industrial complex. Maximum credible release scenarios involving volatile gases (chlorine, ammonium, titanium tetrachloride, hydrogen chloride, hydrogen sulfide) were modeled using the ISCST air dispersion model to derive isopleths of potential human health impacts for 80 different potential exposure scenarios.

Development of Risk-Based Cleanup Levels for Building Surfaces; U.S. Army Corps of Engineers, Sacramento District, Sacramento Army Depot, **Sacramento, CA – Developed risk-based cleanup levels** for metals and organic chemicals on the interior surfaces of several buildings at the Sacramento Army Depot. Because of the lack of guidance from regulatory agencies on exposures to contaminated surfaces, assumptions regarding worker exposure were predominantly based on methods available in the scientific literature. Exposure pathways assessed included incidental ingestion, dermal contact with impacted surfaces, and inhalation of resuspended dust.

Tiered Risk-Based Corrective Action (RBCA) **Evaluation; Vacaville, California – Served as project** manager for a tiered risk assessment for a retail service station with petroleum-contaminated soil and groundwater. Results of the evaluations have provided the basis for negotiating site closure with lead regulatory agencies.

Human Health and Ecological Risk Assessment; U.S. Army Corps of Engineers, Alaska District, King **Salmon Airport and Naknek Camps, Alaska –** Involved in the preparation of baseline risk assessments as part of remedial investigation and feasibility studies (RI/FS) at military installations within Alaska. Chemicals present at the sites included metals, petroleum hydrocarbons, PCBs, and chlorinated solvents. Because the site was located in a sensitive ecological environment and subsistence issues were of concern, the assessment quantitatively evaluated both human health and ecological risks associated with the site. Risks to local residents that subsist on fish and wildlife resources in the area were also evaluated. The risk assessment also incorporated a number of fate and transport modeling including food chain, groundwater, surface water, vadose zone, air, and surface runoff modeling.

Probabilistic Risk Assessment and Risk-Based Cleanup Level Development; Garvey Elevators, Hastings, **Nebraska – Assisted in the completion of a risk** assessment for a site in Nebraska with carbon tetrachloride-impacted soil and groundwater. Assessed risks to on-site workers, off-site residents, and potential impacts to groundwater. Soil and groundwater risk-based cleanup levels developed based on these exposure scenarios.

Probabilistic Human Health Risk Assessment; Bell South Telecommunications, **Jacksonville, Florida –** Completed a retrospective probabilistic risk assessment at a electrical component processing center in Florida. The risk assessment evaluated the past risks to workers disassembling electrical components which contained lead and mercury. Risks associated with inhalation, incidental ingestion, and dermal contact exposures during disassembly operations based on past practices were evaluated. The risk assessment was performed probabilistically using a Monte Carlo analysis. Probability density functions for the exposure parameters in the analysis were based on knowledge of past practices, scientific literature values, and best professional judgment.

Prospective Screening Deterministic Human Health Risk Assessment and Qualitative Ecological Assessment on Copper in Soil at a Golf Club. Aqua-Terra Environmental, Auburn, CA (1994).

Retrospective, Deterministic Human Health Risk Assessment and SESOIL Modeling on Petroleum Hydrocarbons (benzene, toluene, and xylene) at a Former Gasoline Station Site Currently Used as a Commercial Office Building. Anonymous, CA (1993).

Deterministic and Probabilistic Development of Risk-Based Cleanup Levels; Aerospace Testing Facility; **Ventura County, CA – Developed risk-based cleanup** levels for metals, chlorinated organics, pentachlorophenol, polycyclic aromatic hydrocarbons (PAHs), and dioxins/furans for an aerospace facility in southern California. The risk-based cleanup levels were developed both deterministically and probabilistically to provide a range of possible cleanup levels.

Baseline Risk Assessment and Development of **Alternative Cleanup Levels; ALCOA, Corona, CA –** Assisted in the completion of a risk assessment and alternative cleanup level development for chlorinated solvents in groundwater. The development of alternative cleanup levels was based on exposure to chemicals volatilizing from groundwater into an on-site building and on the establishment of an alternative point of compliance for groundwater. The alternative point of compliance was established at a downgradient property line and groundwater modeling was used to backcalculate to acceptable chemical concentrations at the source which would not exceed regulatory levels at the property line. This approach, in tandem with the air modeling results, was used to establish alternative cleanup levels for chlorinated solvents at the site protective of both human health and off-site groundwater quality.

Baseline Risk Assessment; Former Wood Treatment **Facility, Reed City, Michigan – Prepared a risk** assessment for a former wood treatment facility in Michigan. The risk assessment evaluated risks to human health associated with PAHs and metals in soils. Risks to future residents, industrial workers, construction workers and maintenance workers were evaluated. Because of its large size, the site was subdivided into residential lot size plots. Risks were then evaluated for each of the individual plots. This approach was used to identify those areas of the site posing a risk, thus focusing subsequent remedial actions to those areas.

Health-Based Cleanup Level Development for Stoddard Solvent; Fairchild Industries, Commerce, CA **– Assisted in the development of health-based cleanup** levels for stoddard solvent at an industrial site in southern California. Cleanup levels were developed using a fractionation approach for evaluating complex petroleum hydrocarbon mixtures. The fractionation approach involved the subdivision of TPH into categories of compounds and the selection of indicator compounds for each of these categories. A toxicity criteria was then developed based on these indicator compounds and the levels of each within the category and TPH in general. Health-based cleanup levels for TPH (as stoddard solvent) in soil were then established based on this toxicity criteria.

Preliminary Ecological Risk Assessment Screening; **ARCO Alaska, Prudoe Bay, Alaska – Involved in the** preparation of a preliminary screening report for an ecological risk assessment for oil field reserve pit on the North Slope of Alaska. Screening report assessed the feasibility of preparing an ecological risk

assessment and served as a means for identifying potential chemicals of concern and ecological receptors of concern for evaluation in the ecological risk assessment. Involved with the collection and review of relevant toxicological literature and exposure parameter data for the eventual preparation of the ecological risk assessment.

AB2588 Health Risk Assessment; Sawmill Facility, Northern CA – Involved in the preparation of an updated AB2588 health risk assessment for a sawmill in northern California. The risk assessment included both a standard risk assessment according to regulatory requirements and a modified risk assessment. The modified risk assessment included site-specific and chemical-specific data as well as more reasonable exposure parameters. The modified risk assessment was presented with the regulatory required version for comparison purposes. Emissions of Arsenic, PAHs, Benzene, Dioxins/furans, Chloroform, Acetaldehyde, Formaldehyde, Lead, Cadmium, Chlorine, Copper, Manganese, Mercury, Naphthalene, Zinc were assessed.

Risk Assessment Feasibility Study; California Department of Food and Agriculture – Involved in the preparation of a feasibility study investigating approaches to establishing safe levels of heavy metals in fertilizer products. Study involved the review and evaluation of existing single and multi-pathway fate and transport models for metals and the development of a recommended approach for the project. Feasibility study led to a subsequent project for establishing these safe levels of metals in fertilizers.

Baseline Human Health Risk Assessments and Development of Risk-Based Corrective Action Levels for Petroleum Hydrocarbon Impacted Soils; Southern CA – Prepared and developed risk assessments and health-based cleanup levels for over ten former retail petroleum service stations in Southern California. Estimated risks and cleanup levels were calculated using the American Society for Testing and Materials' (ASTM) Tier 3 RBCA methodology. Movement of petroleum hydrocarbons in the unsaturated zone was modeled using SESOIL.

Human Health Risk Assessment for Lead at a Former Burn Dump; County of Kern, CA – Completed a multiple pathway health risk assessment for a trailer park located on a former burn dump. Potential lead intakes due to exposure to contaminated soils were determined, and blood lead levels in children were estimated using U.S. Environmental Protection Agency's (EPA's) Uptake/Biokinetic Model.

Baseline Human Health Risk Assessment for a Sanitary Landfill; South Stage Landfill, Jackson, Oregon – Performed human health and ecological risk assessments for volatile and semivolatile organic compounds and heavy metal emissions associated with sanitary landfill. Present and future hypothetical non carcinogenic and carcinogenic risks were established in the quantitative human health risk assessment. The project also included identification of applicable state and federal environmental quality standards, recommended criteria, and available non human toxicity data. This information was used to qualitatively evaluate the potential for adverse ecological impacts posed by existing and continued site operations.

Baseline Risk Assessment; Dial Corporation, City of Industry, CA – Performed a risk assessment for an industrial facility with dodecylbenzene-impacted soils. Risk assessment evaluated the potential risks to on-site workers and potential impacts to groundwater. Assessment included the development of health-based toxicity criteria for dodecylbenzene.

Preliminary Analysis of Mercury Accumulation Potential Used to Direct Land Development Efforts Adjacent to Cache Creek; Yolo County Aggregate Producers Association, Yolo County, CA – Assisted in the analysis of mercury accumulation potential in fish and other media in off-channel mining wet-pits adjacent to Lower Cache Creek. The analysis included collection of groundwater, surface water, soil, sediment, and biota samples from existing wet-pits and areas of proposed gravel mining. The project also included an analysis of the existing regulation of mercury in fish, water, and other media, comparison of measured mercury concentrations to mercury in other regions of California and the U.S., and the assessment of potential for incremental increase in mercury exposure to humans and ecological species. The project was conducted in response to a draft environmental impact report.

Risk Assessment Feasibility Study, Petroleum User's Group, Alaska – Assisted in the completion of a feasibility study evaluating whether a risk assessment would be possible or applicable for a seaport area consisting of 14 different properties owned by oil

companies and the federal government. The study included evaluation of different methods for performing a risk assessment at a site with petroleum hydrocarbons and complex mixtures, the development of both human and ecological site conceptual models, and identification of data needs for performing a risk assessment for the area as well as the feasibility of doing a risk assessment. Methodologies for selecting indicator compounds for complex waste mixtures such as gasoline, diesel, and jet fuel were researched and evaluated for the area.

Prospective, Deterministic Human (Onsite Worker and Residential Receptors Assumed) Health Risk Assessment on Industrial Slag Containing Lead, Mercury, Cadmium, Chromium, Thallium, Arsenic, Antimony. Lowney Associates, Mountain View, CA (1992).

Baseline Human Health Risk Assessment; Washington - **Assisted in preparation of a risk assessment for soils** and groundwater at an industrial facility containing metals, chlorinated solvents, volatile and semivolatile organics. Characterization of risks to on site workers and off site residents was performed using state of Washington MTCA Methods B and C.

Preliminary Endangerment Assessment; Ventra, Inc., **Los Angeles, CA - Performed the human and** ecological health screening evaluation as part of a preliminary endangerment assessment for a southern California site with soils containing metals, chlorinated solvents and petroleum hydrocarbons. Activities included characterization of human health risks associated with ingestion, inhalation, and dermal exposures.

Prospective, Deterministic Human Health Risk Assessment and Regulatory Negotiation Associated with Lead at an Industrial Site. Bergsoe Metals Corporation, Oregon.

Proposition 65 Human Health Risk Assessment for a New Granular Fertilizer and Pesticide Carrier; Western Environmental Health Associates, Woodland, **CA - Conducted a multiple pathway human health** risk assessment for a new granular fertilizer and pesticide carrier as part of a new product registration process. The carrier is made of recycled post consumer paper and contains polychlorinated biphenyls, metals, chlorinated hydrocarbons, semivolatile organic compounds, furans and dioxins. The assessment was conducted in accordance with California's Proposition 65. Use of the granule for commercial agricultural and home lawn and garden care was evaluated. Risks to both residential (adults and children) and occupational (applicators, mixer/loaders) were characterized. Health based toxicity criteria were derived and toxicological profiles were also prepared.

Respirable Dust Evaluation of a New Granular Fertilizer and Pesticide Carrier; Western **Environmental Health Associates, Woodland, CA -** Conducted a respirable dust evaluation of a new granular fertilizer and pesticide carrier. Worst case ambient total and respirable air dust levels resulting from anticipated granule use scenarios were measured concurrently with a real time aerosol monitor and personal air samplers. The results of this evaluation were used in part to complete a human health risk assessment as part a new product registration process and Proposition 65.

Human Health Risk Assessment of the Potential Impacts of Sulfur Dioxide on Mild or Moderate, Exercising Asthmatics; Magma Copper, San Manuel, **Arizona - Involved in an exposure assessment designed to respond to EPA's proposed 5-minute** national ambient air quality standard (NAAQS) of 0.6 ppm for sulfur dioxide (SO2). The research project estimated the risk of SO2 air levels to physically active, unmedicated, mild and moderate asthmatic individuals, which included the performance of a random telephone survey of 1,400 individuals.

Cleanup Level Survey for North Slope Drilling Mud **Components; ARCO Alaska, Anchorage, Alaska -** Researched soil and water cleanup level criteria for numerous heavy metals, salts and radionuclides as part of Resource Conservation and Recovery Act (RCRA) closure activities for a North Slope drilling reserve pit. Federal, state and international standards were compiled and evaluated as to their applicability relevance to cleanup of a site containing drilling muds and cuttings.

Screening Level Indoor Air Human Health Risk **Assessment; Southern CA - Conducted a screening** level risk assessment for an office building that was constructed over chlorinated hydrocarbon contaminated soils. The assessment characterized human health risks to workers due to intrusion of chlorinated hydrocarbon vapors into the building.

Risk Communication Document for a Former Gun Club Firing Range; Folsom, CA - Prepared a risk communication document for a gun club that was converted into a residential area after site remediation activities were completed. The document included a concise description of the site history, remediation activities, results of a human health risk assessment completed at the site, and addressed some common questions and concerns about lead in the environment as they relate to human health.

Toxicological Evaluations

Proposition 65 Developmental Toxicity Risk Assessment, CA - Assess availability of developmental toxicology and bioavailability information for an inorganic species in a skin cream in response to Proposition 65 suit. Evaluate potential exposure through typical use relative to California Proposition 65 "No Significant Risk Level." Project on going.

Proposition 65 Reassessment of Carcinogenicity Evaluation and Slope Factor CA - Assisted in the reassessment and recalculation of the cancer slope factor for dermal exposures to polyaromatic hydrocarbons and coal tar in commercially available dandruff shampoos under Proposition 65.

Reproductive Toxicology Review, CA - Assisted in review of available reproductive toxicology information for response to Proposition 65 listing. Established database of reproductive toxicity studies. Evaluated significance of toxicology data to California Proposition 65.

Geographic Information Systems

Geographic Information System (GIS) Development for background metal concentrations in North America - Assisted in the development of a database of surface water and soil concentrations for cadmium, copper, lead, and zinc from available data. Database was designed for use in a geographic information system (GIS) for the purpose of evaluating spatial relationships in metal background concentrations. ArcView was used in the development of the GIS.

GIS (ArcView) Assistance on the Transfer of 9000-Acre Army Base from the U.S. Government to the Private Sector. Oz Entertainment Company, Los Angeles, CA (1999-present).

GIS Development for Environmental Investigation of Proposed School Site on Former Agricultural Land Containing Toxaphene Residues. Northern California.

Peer Review

Alternative Pipeline Alignment Review, National Audubon Society Mayacamas Sanctuary, CA - Project manager for the review of three proposed City of Santa Rosa reclaimed water pipeline alignments, each of which would pass through the Mayacamas Sanctuary owned by the National Audubon Society. Review of the available conceptual design plans and performance of reconnaissance was conducted by project engineers and the most suitable alignment that would minimize impacts to the Sanctuary was recommended. Project on-going.

Peer Reviewer: Bureau of Reclamation's "Draft EIR/EIS: Salton Sea Restoration Project", California - Project manager and peer reviewer of the DEIR/DEIS for the Salton Sea Restoration Project. Coordinated peer review of project engineers, biologists and toxicologists, and comment generation, formatting and submittal concurrent with National Audubon comment submittal. California Audubon Society, Sacramento, CA (2000-present).

Expert Peer Reviewer Assistance: U.S. EPA's Report entitled: "PCBs in the Environment near the Oak Ridge Reservation - a Reconstruction of Historical Doses and Health Risk", Eastern Research Group, Lexington, MA (2000)

Expert Peer Reviewer Assistance: U.S. EPA's report entitled: "Hudson River PCBs Reassessment, Human Health Risk Assessment Report." Eastern Research Group, Lexington, MA (2000).

Expert Peer Reviewer Assistance: U.S. EPA's "Risk Characterization Handbook", Eastern Research Group, Lexington, MA (1999).

Expert Reviewer, Assistance: Revised Texas Risk Reduction Program (TRRP), Texas Natural Resource Conservation Commission; Reviewed the Proposed Rule, Conducted Uncertainty Analysis. Fulbright & Jaworski (1998-99).

Expert Peer Reviewer, Assistance: U.S. EPA guidance on "Methodology for Assessing Health Risks Associated with Multiple Exposure Pathways to

Combustor Emissions". Eastern Research Group, Lexington, MA (1998).

Risk Assessment Review; Frontier Fertilizer Superfund Site; Davis, CA - Served as a technical reviewer for a local oversight group of an EPA prepared risk assessment. Responsible for the report review and preparation of technical comments on the risk assessment.

Litigation Support

Toluene Exposure Litigation Support; Longyear, Odea, and Lavra, Sacramento, CA - Involved in the litigation support of a case involving alleged exposure to a solvent by a construction worker. Investigation included the research and review of relevant toxicological studies, exposure assessment activities, and physical and chemical properties evaluation. Toxicological research included an analysis of the immunotoxicological properties of the solvent.

2,4-D Exposure Litigation Support. Northern CA - Involved in the litigation support of a case involving alleged exposure to a 2,4 D pesticide formulation. Investigation included the research, compilation and review of relevant toxicological studies.

Litigation Support; Boutin, Lassner, Gibson, and Delehant, Sacramento, CA - Performed an investigation to determine the potential role a ceramics company may have played in the contamination of a Sacramento industrial site. The project included reviewing and evaluating site soil characterization and sampling reports, and determining the validity of regulatory actions and remedial activities already conducted. Also researched industrial processes which occurred at the site, including waste generation histories, and researched chemical information relevant to these processes. This formed the basis to evaluate the correlation between ceramics production activities, the site contamination, and the validity of the liability assignments.

Litigation Support, California - Researched information for expert report. Lawsuit regarding potential health effects from exposure to PCE, TCE and nitrate impacted groundwater. Reviewed database of groundwater analytical results for completeness and reliability. Evaluated exposure levels for toxicological significance, comparing water levels, length of exposure to known toxicology of substances. Performed focussed risk assessment of exposure to contaminants by showering. Clients had law suit against them dropped based on scientific and toxicologic principles of risk assessment.

Litigation Support; Phoenix, Arizona - Litigation support as part of a legal defense of a class-action case involving alleged exposures to chemicals contained in a plume of smoke resulting from a fire in a circuit manufacturing plant. Activities included research and review of relevant testimony and medical records, research and review of relevant toxicological studies, exposure assessment activities, and physical and chemical properties evaluation. Settled.

Parathion Exposure Litigation Support; Chico, CA - Assisted in the compilation of toxicological and exposure information for part of legal defense preparation in an ongoing lawsuit in Chico, California. Activities conducted included review of relevant testimony and medical records, and research into the available toxicokinetic, fetotoxic, and teratogenic properties of parathion. This information was used to aid in the reconstruction of a possible exposure scenario and maximum plausible dose related response to a parathion exposure.

Litigation Support for Toxicology Expert for the Plaintiff on a Case Involving Dairy Cattle and Sewage Sludge Application to Farmland. Decker and Hallman, Atlanta, GA.

Litigation Support for Testifying Toxicology and Risk Assessment Expert for the Defense on a Case Involving Potential Health Impacts to Nearby Residents Associated with Emissions from a Class III Landfill. DeCuir and Somach, Sacramento, CA.

Litigation Support for Testifying Toxicology and Risk Assessment Expert for Plaintiff on a Case Involving Alleged Illegal Disposal of Hazardous Waste by a Furniture Stripping Company. In Progress. California State Department of Justice (2000-present).

Litigation Support for Testifying Toxicology and Risk Assessment Expert for the Defense on a Case Involving Environmental Damages Resulting from an Accidental Release of Cl-containing Gases. Settled. David Gard et al v. Placer County Water District et al. (1999-2000).

Litigation Support for Testifying Toxicology and Risk Assessment Expert for the Defense on a Case

Involving Migration of VOCs and Methane from an Adjacent Landfill into a Commercial Building. Settled. Boroski v City of Rocklin; DeCuir and Somach, Sacramento, CA (1999-2000).

Litigation Support for Testifying Toxicology and Risk Assessment Expert for the Defense on a Case Involving Alleged Health Effects in Inmates in California's Tehachapi Prison Associated with Hazardous Substances in Groundwater at the Prison. Successful outcome resulting from case dismissal by the court under Daubert motion. California State Department of Justice, Department of Corrections (1998-99).

Litigation Support for Non-testifying Toxicology and Risk Assessment Expert for the Defense on a Personal Injury and Property Damage Case Involving DDT and Related Substances. Settled. Shell and Associates, Roseville, CA (1995-96).

Litigation Support for Testifying Toxicology and Risk Assessment Expert for the Defense on a Personal Injury and Property Damage Case Involving Lead and Other Substances at a Former Burn Dump. Positive Jury Decision. County Counsel, Kern County, Bakersfield, CA (1994-95).

Litigation Support for Testifying Toxicology Expert for the Defense on an Alleged Chemical-Induced Human Fatality at an Auto Repair Facility. Settled. Johnson and Bell Ltd., Chicago, IL (1994-95).

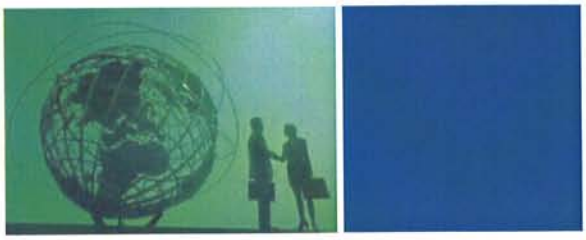
Litigation Support for Non-Testifying Toxicology and Health Risk Assessment Expert for the Defense on a Groundwater Contamination Issue. Salt River Project, Phoenix, AZ (1994–present).

Litigation Support for Testifying Toxicology and Technical Expert for the Defense on an Alleged Individual Exposure to Aerially Applied Herbicides. Settled. Reid, Axelrod, Ruane, Kearney & McCormack, Corte Madera, CA (1994).

Litigation Support for Non-Testifying General Technical Expert for the Plaintiff Associated with a Product Registration Suit Brought by a Private Manufacturer Against the State of California. Suit withdrawn. Steptoe and Johnson, Washington D.C. (1993-95).

Mark K. Jones

Program Manager/Risk Assessor/GIS Specialist



Mr. Jones is an environmental scientist with over 20 years of professional experience in the fields of toxicology, risk assessment/risk communication, biology, and geographic information systems (GIS). He provides toxicological and risk analyses on behalf of both governmental and private clients. He specializes in human health risk assessments, exposure assessment, toxicologycal research, risk-based cleanup level development, and GIS development and analysis. He has a thorough knowledge of federal regulations and methodologies as well as numerous state regulations. He has provided technical and support work for U.S. Environmental Protection Agency (USEPA), and has managed risk assessments projects for several government and private-client facilities throughout the United States. His experience encompasses a wide range of substances, including petroleum hydrocarbons, chlorinated organics, pesticides, PCBs, dioxins/furans, metals, PAHs, VOCs, and radionuclides, in a variety of environmental settings, including hazardous waste sites, landfills, defense sites, industrial sites, and other environments, including residential and workplace environments.

Mark also provides GIS project management, GIS development and analysis, and data evaluation services. He has developed and maintained multiple GIS projects, and has experience with several types of mapping. He provides spatial analysis of data and the development of thematic maps for a wide range of environmental applications. Mark is also a 3D GIS specialist with experience in 3D visualization, and spatial and 3D modeling, as well as geostatistical analyses.

Professional Affiliations & Registrations

- Society of Toxicology
- Society of Environmental Toxicology and Chemistry
- Society for Risk Analysis
- North American Cartographic Information Society

Fields of Competence

- Human health risk assessment
- Toxicology
- Geographic Information System (GIS)
- Regulatory negotiations
- Risk communication
- Ecological risk assessment
- Probabilsitic risk assessment
- Fate and transport modeling
- Spatial analysis
- 3D analysis and modeling
- Risk-based cleanup level development

Education

- M.S., Toxicology, University of Arizona, Tucson, Arizona, 1986
- B.A., Biology, Willamette University, Salem, Oregon, 1982
- Geographic Information Systems (GIS) Certification Program, ongoing

Key Industry Sectors

- Government
- Department of Defense
- Aerospace
- Chemical
- Utilities
- Redevelopment
- Pulp & Paper Products
- Oil & Gas

Key Projects

Risk Assessment

Human Health Risk Assessment and Development of Risk-Based Soil Corrective Action Levels Used to Direct Land Development Efforts Adjacent to a Multiple-Facility Industrial Complex; Basic Remediation Company; Clark County, Nevada. Project manager for risk assessment activities and GIS services for a complex industrial site of over 2,000 acres. A comprehensive tiered risk assessment is being prepared for impacted former evaporation pond soils. The risk assessment is evaluating three potential future land uses: commercial/industrial, residential, and recreational uses. Chemicals at the site include heavy metals, pesticides, chlorinated hydrocarbons, and radionuclides. Based on the results of the risk assessment, risk-based corrective action levels for soil will be developed for each potential land use. These corrective action levels will be used to determine the future course of land development at the site. GIS services include development of base map for the site, geostatistical analysis of risk assessment results, and remediation and land development planning.

Site-Wide Human Health and Ecological Risk Assessment; The Boeing Company, Santa Susana Field Laboratory, California. Human health risk assessment project manager for risk assessments being conducted at individual RFI sites within the SSFL property. Responsible for coordinating activities for the human health risk assessment effort and regulatory interactions with DTSC. Chemicals of potential concern include energenics, organochlorine pesticides, volatile organic compounds, and metals. Coordinated the revisions to the Site-Wide Risk Assessment Methodology.

Site-Wide Human Health and Ecological Risk Assessment; U.C. Davis, LEHR/SCDS Superfund Site Restoration, Davis, California. Human health risk assessment project manager for the Site Wide Risk Assessment for UC Davis and DOE areas of the LEHR/SCDS Superfund site. Responsible for coordinating activities for the human health risk assessment effort and regulatory interactions with EPA Region 9. Chemicals of potential concern include radionuclides, organochlorine pesticides, volatile organic compounds, and metals.

Human Health Risk Assessment on a 180-acre Rural Residential Development of a Former Orchard with Soils Containing Arsenic, Lead, Organochlorine Pesticides. Actium Development Corp., Sacramento, California. A tiered human health risk assessment was conducted for a former orchard containing arsenic, lead, and organochlorine pesticides that is proposed for redevelopment as a residential area. Deterministic and probabilistic methodologies were used to assess risks at the property. A strategic risk assessment/GIS/geostatistical approach was used. DTSC toxicologists have agreed with the approach and conclusions, negotiations with DTSC project managers are ongoing.

Supplemental Human Health and Ecological Risk Assessment; Boeing Corporation, Olathe, Kansas. Prepared a risk assessment for off-site receptors to supplement an existing on-site risk assessment for the Superfund site. Off-site receptors included indoor air exposures to homes above a chlorinated VOC groundwater plume, and ecological receptors in off-site drainage features. Involved in regulatory negotiations with EPA Region 7.

Human Health Risk Assessment and Development of Risk-Based Cleanup Levels; Whittaker Corporation; Hollister, California. Project manager for risk assessment activities for an industrial site in the foothills above Hollister, California. A comprehensive risk assessment was prepared evaluating a number of on-site and off-site receptors. The risk assessment evaluated potential impacts of perchlorate and chlorinated VOC contaminated groundwater to off-site agricultural production wells. On-site risks were evaluated for future residential land use, as well as construction and commercial worker receptors. Extensive fate and transport modeling was conducted to evaluate impacts from soil to groundwater, and from soil and groundwater to indoor air.

Human Health and Ecological Risk-Based Cleanup Level Development; U.S. Army Corps of Engineers, Sacramento District, Hamilton Army Airfield, Novato, California. Served as risk assessment project manager for assisting the Corps' primary contractor in the development of the human health and ecological risk-based cleanup levels and residual risk assessment portions of the GSA Phase II Sale Area assessment. Responsibilities involved preparation of the final human health and ecological risk assessments for the report, data evaluation and statistical analyses.

Risk Assessment and Risk-Based Cleanup Level Development; State Ventures, Inc., Sacramento,

California. Served as risk assessment project manager for a risk assessment for the Natomas Airpark, a former crop duster airport to be developed for both commercial and residential uses. The risk assessment was conducted both deterministically and probabilistically.

Derivation of Risk-Based Concentrations of Lead, Cadmium and Arsenic in Commercial Fertilizer; California Department of Food and Agriculture. Served as project manager in the development of a multi-pathway, multi-environment, multi-crop probabilistic risk assessment with the objective of deriving risk-based acceptable concentrations for lead, cadmium, and arsenic in commercial inorganic fertilizers. Results of the risk assessment are currently being used in rule-making for the establishment of regulatory levels of heavy metals for fertilizers by the state of California.

Baseline Human Health and Ecological Risk Assessment and Development of Risk-Based Corrective Action Levels; Safety-Kleen Corp., Springfield and Clackamas, Oregon. Served as project manager for risk assessments at two solvent recycling centers as part of RCRA facility investigations. Negotiated the use of a fractionation risk assessment approach for TPH and approval of the risk assessments with the Oregon DEQ.

Human Health and Ecological Risk-Based Cleanup Level Development; U.S. Army Corps of Engineers, Sacramento District, Crissy Field, Presidio of San Francisco. Assisted the Corps in the development and negotiation of risk-based cleanup levels for impacted areas of the Crissy Field portion of the Presidio. The area is scheduled for development as a wetlands habitat. Attended several stakeholder meetings and negotiation sessions.

Risk Assessment Review; Frontier Fertilizer Superfund Site; Davis, California. Served as the technical reviewer for a local oversight group of an EPA prepared risk assessment. Responsible for the report review and preparation of technical comments on the risk assessment.

Public Health Assessment for the Sutter Power Project Siting Case; Calpine, Sutter County, California. Prepared an assessment evaluating the risks to public health associated with emissions from a proposed power plant in northern California. Also evaluated the potential impacts of cooling water discharges on ecological receptors and human health. Activities included preparation of written testimonials, and public meeting participation.

Environmental Effects Assessment for the Headwaters Forest Acquisition EIR/EIS; PALCO, California. Prepared an ecological and public health evaluation of herbicide use as part of the Headwaters Forest Acquisition EIR/EIS. Evaluation included a review of the toxicity of herbicides proposed for use and potential exposures to ecological receptors and humans.

Baseline Human Health Risk Assessment; Jet Propulsion Laboratory, Pasadena, California. Served as risk assessment project manager for preparing a baseline risk assessment at the JPL Superfund site. The risk assessment focused primarily on groundwater, which included perclorate as a chemical of potential concern.

Human Health and Ecological Risk-Based Cleanup Level Development; U.S. Army Corps of Engineers, Sacramento District, Presidio of San Francisco. Served as risk assessment project manager for assisting the Corps primary contractor in the development of the human health and ecological risk assessment portions of the Fuel Products Action Level Development Report for the Presidio of San Francisco. Initial responsibilities involved oversight of risk assessment activities for the report. Subsequent responsibilities included attendance and presentations at public and agency meetings, major revisions to the draft report, and preparation of the final human health and ecological risk assessments for the report. The FPALDR has served as a benchmark for similar COE projects at other military installations.

Human Health and Ecological Risk Assessment at a Former Pesticide Formulation Facility; Latham and Watkins, Coachella, California. Involved in an innovative, probabilistic, multi-pathway risk assessment for a former pesticide formulation site with soil and groundwater contamination. The risk assessment involved air and dust accumulation fate and transport modeling to both on and off-site locations. Based on the results of the fate and transport modeling and risk assessment, risk-based cleanup levels protective of human health were developed and approved by DTSC.

Baseline Human Health and Ecological Risk Assessment at a Former Pulp and Paper Mill; Alaska. Involved in the preparation of a multiple-pathway, baseline human health and ecological risk assessment for the site. Chemicals present at the site included dioxins, polyaromatic hydrocarbons, and heavy metals in surface soils, surface waters and sediments in both fresh water and marine environments, and biota. Food chain transfer modeling and exposures to subsistence receptors were estimated, as well as hypothetical industrial, residential, and recreational exposure scenarios. A quantitative uncertainty analysis was also conducted for the human health component.

Baseline Human Health Risk Assessment at a Currently Operating Formulation and Distribution Facility; Sierra-Pacific Group, Stockton, California. Involved in the preparation of a work plan and a multi-pathway baseline human health risk assessment involving agrochemicals in soils and groundwater.

Baseline Human Health Risk Assessment and Development of Preliminary Soil Remediation Goals as Part of a RCRA Facility Investigation; Delco Systems, Goleta, California. Prepared a screening-level and baseline human health risk assessment for the site as part of an RFI report for 4 SWMUs and one area of concern. Chemicals of potential concern detected in site soils included heavy metals, VOCs, semi-volatile organic compounds (SVOCs), and polychlorinated biphenyls (PCBs). Preliminary soil remediation goals were also developed for each SWMU and area of concern.

Development of Risk-Based Cleanup Levels for Building Surfaces; U.S. Army Corps of Engineers, Sacramento District, Sacramento Army Depot. Served as risk assessment project manager for the development of risk-based cleanup levels for metals and organic chemicals on the interior surfaces of several buildings at the Sacramento Army Depot. Because of the lack of guidance from regulatory agencies on exposures to contaminated surfaces, assumptions regarding worker exposure were predominantly based on methods available in the scientific literature.

Development of Analytical and Health Risk Assessment Procedures for Mineral Spirits; Safety-Kleen Corp, Elgin, Illinois. Project manager for an ongoing process to develop a state-of-the-art risk assessment procedure on mineral spirit, which involves recommending appropriate analytical approaches to be used for characterizing virgin and spent mineral spirits residues in environmental media (soil, water), and developing appropriate toxicity criteria to be used by the client and its consultants in assessing potential health impacts and in deriving site-specific risk-based cleanup levels for mineral spirits. The approach has been used at facilities throughout the country.

Baseline Human Health and Ecological Risk Assessment and Development of Risk-Based Corrective Action Levels; Safety-Kleen Corp, Hebron, Ohio. Served as project manager for a risk assessment at solvent recycling center as part of a RCRA facility investigation. Chemicals present at the site included chlorinated volatile organic compounds and mineral spirits in soil, groundwater, sediments and surface waters of an adjacent river. The risk assessment involved extensive vadose zone, groundwater, air, and surface water fate and transport modeling. Negotiated with EPA Region V on the acceptance of the risk-based cleanup levels for the site.

Development of Tiered Risk-Based Corrective Action Approach for TPH; Seattle, Washington. Involved in the development of a tiered risk-based corrective action approach to be adopted by the State of Washington Department of Ecology. The tiered approach is based on an indicator chemical and fractionation approach. The tiered involves the development of risk-based look-up tables for initial tiers and recommendations for risk assessment and fate and transport methodologies for later tiers in the approach.

Tiered Risk-Based Corrective Action (RBCA) Evaluations; BP Oil; Washington, Oregon, and California. Served as project manager for several tiered risk assessments for retail service stations and terminals with petroleum-contaminated soil and groundwater. Results of the evaluations have provided the basis for negotiating site closure with lead regulatory agencies.

Baseline Risk Assessment; Mobil Oil Tappan Terminal, Hastings-on-Hudson, New York. Served as project manager for a risk assessment at terminal facility along the Hudson River as part of a RI/FS. Based on the results of the fate and transport modeling and risk assessment, risk-based cleanup levels protective of

both human health and aquatic organisms in the river were developed.

Baseline Risk Assessment; San Diego Unified Port District, San Diego Convention Center Expansion Site. Served as project manager for a risk assessment at the expansion site for the San Diego Convention Center, formerly an open burn dump. Chemicals identified at the site included heavy metals, polycyclic aromatic hydrocarbons (PAHs), and petroleum hydrocarbons. The assessment evaluated risks to both construction workers and potential impacts to the bay.

Human Health Risk Assessment Used to Direct Land Development Efforts Adjacent to a Multiple-Facility Industrial Complex; Victor Valley Land Co., Henderson, Nevada. Project manager for a predictive risk assessment designed to assist decision-makers in the non-industrial development of 2,000 acres adjacent to an industrial complex. Maximum credible release scenarios involving volatile gases (chlorine, ammonium, titanium tetrachloride, hydrogen chloride, hydrogen sulfide) were modeled using the ISCST air dispersion model to derive isopleths of potential human health impacts for 80 different potential exposure scenarios.

Human Health and Ecological Risk Assessment; U.S. Army Corps of Engineers, Alaska District, King Salmon Airport, Naknek Camps, and Bethel, Alaska. Involved in the preparation of baseline risk assessments as part of remedial investigation and feasibility studies (RI/FS) at military installations within Alaska. Chemicals present at the sites included metals, petroleum hydrocarbons, PCBs, and chlorinated solvents. Because the site was located in a sensitive ecological environment and subsistence issues were of concern, the assessment quantitatively evaluated both human health and ecological risks associated with the site. Risks to local residents that subsist on fish and wildlife resources in the area were also evaluated.

Probabilistic Human Health Risk Assessment; BellSouth Telecommunications, Jacksonville, Florida. Served as project manager for a retrospective probabilistic risk assessment at an electrical component processing center in Florida. The risk assessment evaluated the past risks to workers disassembling electrical components that contained lead and mercury. Risks associated with inhalation, incidental ingestion, and dermal contact exposures during disassembly operations based on past practices were evaluated. Probability density functions for the exposure parameters in the analysis were based on knowledge of past practices, scientific literature values, and best professional judgment.

Preliminary Ecological Risk Assessment Screening; ARCO Alaska, Prudoe Bay, Alaska. Involved in the preparation of a preliminary screening report for an ecological risk assessment for oil field reserve pit on the North Slope of Alaska. Screening report assessed the feasibility of preparing an ecological risk assessment and served as a means for identifying potential chemicals of concern and ecological receptors of concern for evaluation in the ecological risk assessment. Involved with the collection and review of relevant toxicological literature and exposure parameter data for the eventual preparation of the ecological risk assessment.

AB2588 Health Risk Assessment; Sawmill Facility, Northern California. Involved in the preparation of an updated AB2588 health risk assessment for a sawmill in northern California. The risk assessment included both a standard risk assessment according to regulatory requirements and a modified risk assessment. The modified risk assessment included site-specific and chemical-specific data as well as more reasonable exposure parameters. The modified risk assessment was presented with the regulatory required version for comparison purposes.

Risk Assessment Oversight; EPA Region 10, Seattle, Washington. Involved in the oversight of several risk assessments for Superfund sites for EPA Region 10. Tasks included the technical review of potentially responsible parties (PRP)-conducted risk assessments, development of remedial action objectives (RAOs), including MTCA cleanup level development, and preparation of risk assessments.

Risk Assessment for Remedial Alternatives Analysis; Exxon Co., USA, Kalispell, Montana. Prepared a risk assessment for a state Superfund site in Montana. Assessment was for an on-site remediation system. Activities included air dispersion modeling, exposure assessment, and characterization of risks associated with the system to on-site workers and off-site residents and environmental receptors. Also evaluated the potential health impacts associated with excavation and soil handling activities at the site. Served as project manager and was involved in

working with the client and regulatory agencies for final approval of the risk assessment and permitting of the treatment unit.

Geographic Information Systems (GIS) Projects
Geographic Information System (GIS) Development and Geostatistical Analysis for Natomas Airpark, State Ventures, Inc., Sacramento, California. Developed a GIS for the airpark to be used in preparing a site mitigation strategy. GIS involved geostatistical analyses based on the risk assessment results for the site.

Development of a Geographic Information System (GIS) for LEHR/SCDS Superfund Site Restoration, Davis, California. Developing GIS base map for spatial analyses to be conducted at the site associated with risk assessment and groundwater modeling activities. GIS also used to develop strategic sampling design.

Geographic Information System (GIS), Beazer, Inc., Denver, Colorado. Assisted in geostatistical and spatial analyses. Analyses used to develop a comprehensive, strategic sampling design for the site.

Development of a Geographic Information System (GIS) for Background and Ambient Concentrations of Cadmium, Copper, Lead, and Zinc in North American Soils and Waters. Involved in the development of an comprehensive GIS containing measured water and soil concentrations of cadmium, copper, lead, and zinc in the U.S. and Canada.

Development of a Geographic Information System (GIS) for the Sunflower Army Ammunition Plant, De Soto, Kansas. Developed an extensive GIS for the Sunflower Army Ammunition Plant (SFAAP) to assist in site transfer from Army control to private ownership. The GIS is being used by all interested parties to delineate clean versus impacted areas of the site The GIS includes a historical aerial photo database, and will include all environmental samples collected at the site. GIS used for site classification purposes, environmental sample planning, property delineation, theme park planning, and aerial photographic analysis.

Development of a Geographic Information System (GIS) to Assist Land Development Efforts Adjacent to a Multiple-Facility Industrial Complex; Basic Remediation Company; Clark County, Nevada. Developed a GIS for a 2,000-acre site near Las Vegas. This site has been used for heavy manufacturing industrial purposes for over 50 years. The GIS was developed in support of risk assessment, sample plan development, remediation, and land use planning. The GIS is also being used to identify sampling locations, and to delineate clean versus impacted areas based on risk assessments for the site.

Development of a Geographic Information System (GIS) to Prepare a Listing of Properties for Proposition 65 Notification; California. Developed a GIS to support air modeling conducted for several commercial facilities for Proposition 65 warning requirements. The GIS was used to develop a mailing list database for properties within the air emissions plume using GIS geocoding.

Development of a Geographic Information System (GIS) for a former Petroleum Facility; Huntington Beach, California. Developed a GIS to guide remediation decisions at a site with petroleum waste adjacent to the Pacific Ocean.

Development of a Geographic Information System (GIS) for a former Pulp and Paper Mill; Port Angeles, Washington. Developed a GIS to guide sample and analysis planning for a former pulp and paper mill and the surrounding community. The GIS integrated aerial photography, past sampling activities, topography, and building locations for the sample plan development.

Development of a Geographic Information System (GIS) to Support Strategic Project Management; Placer County, California. Assisted in a GIS prepared for a property development at a former orchard site. The GIS was used to geographically integrate risk assessment results with sample locations, and future property planning. Risk-based cleanup decisions were based on the results of GIS geostatistical analyses. Subsequent remediation alternative decisions were also based on the GIS developed for the site.

Toxicological Evaluations
Reproductive Toxicology Review. Involved in the review of available reproductive toxicology information for response to Proposition 65 listing. Established database of reproductive toxicity studies. Evaluated significance of toxicology data to California Proposition 65.

Toxicological Review on the Carcinogenicity of Trichloroethylene (TCE). Involved in the review of scientific literature on the subject of TCE carcinogenicity in laboratory animals and humans and development a report of major findings. Report addressed the subject of threshold vs. non-threshold concept of TCE carcinogenesis.

Toluene Litigation Support; Sacramento, California. Involved in the litigation support of a case involving alleged exposure to a solvent by a construction worker. Investigation included the research and review of relevant toxicological studies, exposure assessment activities, and physical and chemical properties evaluation. Toxicological research included an analysis of the immunotoxicological properties of the solvent.

TCDD Laboratory Research. Conducted in vivo research on mechanisms of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) toxicity in rats. Research included the use of radioimmunoassays, high pressure liquid chromatography, spectrophotometry, and receptor binding and enzymatic assays. Research involved the study of hormonal circadian rhythm alternations in response to TCDD.

Teratogenicity Screening Analysis. Assisted in the evaluation of using sea urchin embryos as a screening tool for teratogenicity of drug compounds. Responsibilities included the gas chromatographic analysis quality assurance/quality control of drug preparations in sea water, milking of sea urchins, and examination of sea urchin embryos for physical deformities.

Ecological Effects of Mercury. Assisted in a study of the ecological effects of a proposed dam in Idaho. Study focused on predicted levels of mercury in fish tissue based on existing levels of mercury in soil in the proposed dam area. Comparisons were made to other dams in the area. Responsibilities included the preparation and analysis for mercury in fish tissue, soil, and water.

Fate and Transport Analyses and Exposure Assessments
Assessment of the Potential Impacts of Sulfur Dioxide on Mild or Moderate, Exercising Asthmatics; Magma Copper, San Manuel, Arizona. Involved in an exposure assessment designed to respond to EPA's proposed 5-minute national ambient air quality standard (NAAQS) of 0.6 ppm for sulfur dioxide (SO2). The research project estimated the risk of SO2 air levels to physically active, unmedicated, mild and moderate asthmatic individuals, which included the performance of a random telephone survey of 1,400 individuals.

Vadose Zone Fate and Transport Modeling, Litigation Support, Chico, California. Evaluated the fate and transport of a dinoseb spill in northern California. Analysis involved predicting when the spill likely occurred based on fate and transport modeling and existing site information. Results of analysis were used in litigation support.

Effect of Exxon Valdez Oil Spill on Subsistence; Native Alaskan Corporation, Anchorage, Alaska. Part of a team studying the effects of the Exxon Valdez oil spill on the natural resources used by Alaska natives for subsistence purposes. Responsible for the review and interpretation of existing data on human health effects from consumption of impacted subsistence resources. Also responsible for evaluating current and future risks associated with consumption of impacted subsistence resources.

Lead Exposure Assessment; Benecia, California. Prepared an exposure assessment for establishing soil target cleanup levels at an industrial site with lead contamination. Determined soil cleanup levels based on worker exposures to contaminated soils. Methodology used for establishing cleanup levels of lead in soil for an industrial site has been presented at a national conference.

SESOIL Modeling. Have performed unsaturated soil zone modeling using SESOIL for a number of sites, including a Superfund site in Texas with volatile organic and PAH contamination. Modeling typically done to assist in the development of target soil cleanup levels.

Regulatory Compliance and Site Assessment
Air Toxics Emissions Inventory Report; Georgia-Pacific, Fort Bragg, California. Prepared major revisions to the original report Revisions included changes in input materials, emitting process data, and data on the emissions of listed substances. Process rates and units, and annual and maximum hourly emissions for each substance for each source were calculated. New AB2588 report forms were prepared electronically for ease of use and incorporated into the report.

Washington MTCA Evaluations. Responsible for developing cleanup levels using state of Washington MTCA Method B and C for a number of sites with leaking underground storage tanks for several major oil companies. Work included the development of routine and site-specific cleanup levels for gasoline constituents as well as site-specific cleanup levels for additives and chlorinated solvents.

Water Quality Screening; California Department of Transportation, San Francisco, California. Responsible for evaluation of potential water quality impacts to San Francisco Bay for a site adjacent to the bay with petroleum hydrocarbon, metal, PCB and PAH contamination. Developed a statistical sampling scheme and evaluated collected data for stockpiles soils on the site.

Environmental Audits. Conducted numerous environmental audits at facilities throughout the western United States. Audits have ranged in size from retail service stations to large industrial and commercial facilities. Audits were conducted to evaluate compliance with specific federal, state, and local requirements. Audits included a site visit to review areas of environmental concern related to the generation, use, storage, or disposal of hazardous materials, review of documentation, and assessment of information provided by various regulatory agencies.

RCRA Closure Plan; U.S. Army, Fort Hunter Liggett, California. Assisted in the preparation of a Resource Conservation and Recovery Act (RCRA) closure plan and operating record for a military installation in northern California. Activities included an audit of the facility.

Phase I and II Site Assessments; Exxon Co., USA, western United States. Performed Phase I and II site assessments for real estate transfers. Phase I investigations included record searches, on-site inspections, and site history development. Phase II investigations involved soil and groundwater sampling and analysis and soil-vapor surveys.

Soil Vapor Surveys; Exxon Co., USA, southern California. Conducted several soil-vapor surveys at retail gasoline station sites with leaking underground fuel tanks. Responsible for performing surveys, operating gas chromatograph, and report preparation.

Safety, Health and Emergency Response Plans; U.S. Army Corps of Engineers, Bartolo Well Field, California. Prepared various health and safety plans including safety, health, and emergency response plans (SHERP), and site-specific quality management plans (SSQMP) for Superfund sites in southern California.

Emergency Response Team; Riverside County Department of Health. Part of a county fire/health department emergency response team responsible for responding to all hazardous materials incidents including cleanup of clandestine drug labs, tanker spills, pesticides, fuel and acid spills, and abandoned drums.

Regulatory Compliance Audits; Riverside County, California. Conducted numerous regulatory compliance audits for a local regulatory agency at facilities generating hazardous wastes. Inspections included thorough walk-through of all processes and record searches at plating, manufacturing, aerospace, construction, and service facilities.

Air Monitoring Study; Georgia Pacific Corp., Toledo, Oregon. Involved in a project studying the effects of slash burn operations of a clear cut on nearby residents. Assisted in the collection of ambient air samples during the slash burn.

Publications and Presentations

Jones, M.K., K.L. Kiefer, L.R. Shull, A. Fairbrother, J. Clark and A. Green. Characterization of Background Concentrations of Metals in Soils and Waters of the U.S. and Canada Using GIS. Presented at the 2001 Society of Environmental Toxicology and Chemistry meeting, Seattle, Washington.

Schmidt, C.E., Jones, M., Kiefer, K., Copeland, T.L., Hubbard, E. Comparison of Measured Versus Modeled Surface Flux of VOCs from Contaminated Groundwater. Presented at the Annual 1999 AWMA Conference, June (Abstract No. 447).

Jones, M.K., L.R. Shull, M.A. Bowland, S.A. Klasing and S.D. Wong. Development of Risk-Based Concentrations of Heavy Metals in Inorganic Fertilizers. Presented at the 1998 Society for Risk Analysis meeting, Phoenix, Arizona.

Woodman, P.W., M. Garcia-Surette and M.K. Jones. Comparison of Regulatory Risk Assessment Approaches for Environmental Petroleum Contamination. Workshop presentation at the 1997 Conference on Contaminated Soils University of Massachusetts at Amherst.

Jones, M.K., K.J. Yost, B.A. Call, R. Henderson and E.M. Makhlouf. Development of Risk-Based Cleanup Levels for Petroleum Hydrocarbons at the Presidio of San Francisco. Presented at the 1997 Society of Environmental Toxicology and Chemistry meeting, San Francisco, California.

Shull, L.R., K.J. Yost and M.K. Jones. Development of Toxicity Criteria and Risk Assessment Methodology for Mineral Spirits. Presented at the 1996 Society for Risk Analysis meeting, New Orleans, Louisiana.

Yost, K.J., L.R. Shull and M.K. Jones. Cross-Sectional Study of Potential Impacts of SO2 on Mild or Moderate Exercising Asthmatics. Presented at the 1996 Society for Risk Analysis meeting, New Orleans, Louisiana.

Bowland, M.A., M.K. Jones, L.R. Shull and Evans K. Human Health Risk Assessment Used to Direct Land Development Efforts Adjacent to a Multiple-Facility Industrial Complex. Presented at the 1995 Society for Risk Analysis meeting, Honolulu, Hawaii.

Jones, M.K. and K.J. Yost. Review of the Inhalation Carcinogenicity and Environmental Fate of Hexavalent Chromium. Presented at the 1995 Society for Risk Analysis meeting, Honolulu, Hawaii.

Yost, K.J., M.K. Jones, L.R. Shull, M.A. Bowland, J.K. Nachmanoff, K.R. Graham and J. Peterson. Human Health and Ecological Risk Assessment Methodology for Petroleum Hydrocarbons at an Air Force Base in Alaska. Presented at the 1995 Society for Risk Analysis meeting, Honolulu, Hawaii.

Bowland, M.A., M.K. Jones, L.R.Shull and C. Callegari. A Retrospective Probabilistic Human Health Risk Assessment for Lead and Mercury in an Electrical Component Processing Center. Presented at the 1994 Society for Risk Analysis meeting, Baltimore, Maryland.

Jones, M.K., R. Kaminsky, K.J. Yost and L.R. Shull. Effects of Oxygenating Agents on the Mobility of Gasoline in Subsurface Environments and on the Toxicity of BTEX. Presented at the 1993 Society for Risk Analysis, Baltimore, Maryland.

Lawton, L.J., S.L. Sager and M.K. Jones. A Comparison of Methods Used to Evaluate Lead Exposure Based on Blood Lead Levels. Toxicologist, 12:247, 1992. Presented at the 1992 Society of Toxicology meeting, Seattle, Washington.

Jones, M.K., M.J. O'Brien and S.L. Sager. Application of a Screening-Level Estuarine Model for a Risk Assessment at a Petroleum Hydrocarbon-Contaminated Site. Presented at the 1991 Society of Environmental Toxicology and Chemistry meeting, Seattle, Washington.

Sager, S.L. and M.K. Jones. Assumptions Used to Evaluate Health Risks from Exposure to Lead in the Absence of Toxicity Values. Toxicologist, 11:196, 1991. Presented at the 1991 Society of Toxicology meeting, Dallas, Texas.

Jones, M.K., L.R. Freeberg, H.K. Chamseddin and B.J. Mickelson. A Practical Application for Unsaturated Zone Fate an Transport Modeling Using SESOIL for a Risk Assessment at a Fuel-Contaminated Site. Proceedings of the Fourth National Outdoor Action Conference on Aquifer Restoration, Ground Water Monitoring and Geophysical Methods, Las Vegas, Nevada, 2:797 810, 1990.

Jones, M.K., W.P. Weisenburger, I.G. Sipes and D.H. Russell. Circadian Alterations in Prolactin, Corticosterone and Thyroid Hormone Levels and Down Regulation of Prolactin Receptor Activities by 2,3,7,8-Tetrachlorodibenzo-p-dioxin. Toxicology and Applied Pharmacology, 87:337 350, 1987.

Jones, M.K. W.P. Weisenburger, I.G. Sipes and D.H. Russell. Serum Prolactin (PRL) and PRL Stimulated Ornithine Decarboxylase (ODC) Alterations in Response to TCDD. Toxicologist, 6:43, 1986. Presented at the 1986 Society of Toxicology meetings, New Orleans, Louisiana.

Russell, D.H., M.K. Jones, W.P. Weisenburger and I.G. Sipes. Profound Modifications of Circadian Rhythms of Serum Prolactin (PRL) and Corticosterone in Response to 2,3,7,8-Tetrachlorodibenzo-p-dioxin and Receptor Down-Regulation. Pharmacologist, 28, 1986.

Kenneth L. Kiefer

Senior Risk Assessor /Database Manager

Mr. Kiefer has over 10 years of experience in the risk assessment and environmental toxicology fields both in a research setting and as a consultant. He has expertise in regulatory support, probabilistic and deterministic health risk assessment, environmental fate and transport modeling, toxicology, Geographic Information Systems (GIS), data management, and analytical chemistry.

Provided professional consulting services for litigation support, property divestiture liability assessments, CERCLA, RCRA, property redevelopment, and voluntary cleanup projects. As a project manager, I have had oversight of site investigation, risk assessment and engineering activities and personnel.

He developed environmental parameters needed to characterize the behavior of chemicals in the environment. He has conducted exposure assessments using multimedia environmental fate and transport modeling. He has developed GIS projects for strategic project management, geostatistical analyses, and geographic evaluations. He has developed Quality Assurance Project Plans for site investigations. He has reviewed analytical data ensuring compliance with Quality Assurance Plans and regulatory specifications. He has performed field sampling and chemical analysis. He has performed environmental compliance reviews of federal facilities.

Professional Affiliations

- Society for Risk Analysis
- Society of Environmental Toxicology and Chemistry

Fields of Competence

- Human health risk assessment
- Toxicology
- Database Management
- Vapor intrusion evaluations
- Environmental chemistry
- Geostatistics
- Geographic Information Systems (GIS)

Education

- M.S., Agricultural and Environmental Chemistry, University of California, Davis, 1998
- B.S., Environmental Toxicology, University of California, Davis, 1993

Recent Publications

- Co-Author. *Exposure to Emissions from Alternative Fuel Combustion: Bioassay and Chemical Analysis of the Particle and Semi-Volatile Emissions from Hydrogenated Biodiesel Fuels.* Draft Final Report to the U.S. Department of Energy. 1998

- Co-Author. *Chemical and Bioassay Analyses of the Particle and Semi-Volatile Emissions from Biodiesel Soy Methyl Ester Fuel.* Draft Final Report to the National Renewable Energy Laboratory and the U.S. Department of Energy. 1998

- Co-Author. *Evaluation of Factors that Affect Diesel Exhaust Toxicity.* Draft Final Report to the California Air Resources Board under Contract no. 94-312. 1998.

Key Projects

Project/Client Service Management
Development of Removal Action Work Plan on a 65-acre Rural Residential Development of a Former Orchard with Soils Containing Arsenic, Lead, Organochlorine Pesticides. Conte Asset Management Sacramento, CA (2000-2005). Served as client service manager and project manager for site redevelopment project. Managed project through site-investigation, risk assessment, and removal action work plan phases. Provided regulatory support for client with county and state regulatory agencies.

Prospective, Deterministic Baseline Human Health Risk Assessment of 1,4-Dioxane in Groundwater at Air Force Plant 44 in Tucson, Arizona. Raytheon Corporation, Tucson, AZ. (2003-2005).

Development of Removal Action Work Plan on a 180-acre Rural Residential Development of a Former Orchard with Soils Containing Arsenic, Lead, Organochlorine Pesticides. Actium Development Corp., Sacramento, CA (1999-2004). Served as client service manager and project manager for site redevelopment project. Managed project through site-investigation, risk assessment, and removal action work plan phases. Provided regulatory support for client with county and state regulatory agencies.

Development of Removal Action Wrok Plan on a 40-acre Rural Residential Development of a Former Orchard with Soils Containing Arsenic, Lead, Organochlorine Pesticides. Sacramento County, CA (2000). Served as client service manager and project manager for site redevelopment project. Managed project through site-investigation, risk assessment, and removal action work plan phases. Provided regulatory support for client with county and state regulatory agencies.

Database Management
Environmental Database Management System (EDMS) Development – Incorporated site data into EDMS for use in the management of the redevelopment of a complex industrial site of over 2,000 acres. Customized EDMS for project use and provided QA/QC over data entry. (2000-present)

Risk Assessment
Human Health Risk Assessment, Treco Property, Basic Remediation Company, Clark County, Nevada – Human health risk assessment and development of risk-based soil corrective action levels. Constituents of concern include radionuclides, metals, pesticides, and chlorinated hydrocarbons. Receptors evaluated included future commercial receptors, construction workers, trespassers, and restaurant patrons.

Human Health Risk Assessment, Borrow Area, Basic Remediation Company, Clark County, Nevada – Human health risk assessment and development of risk-based soil corrective action levels. Constituents of concern include radionuclides, metals, pesticides, and chlorinated hydrocarbons. Receptors evaluated included future commercial receptors, construction workers, trespassers, and maintenance workers.

Human Health Risk Assessment for the redevelopment of a complex industrial site of over 2,000 acres - Henderson, NV (2005-Present). Conducted hujman health risk assessments for multiple sites. Evaluation includes asbestos, dioxins/furans, PCBs, TPH, metals, radionucleides, SVOCs, and VOCs.

Human Health and Ecological Risk Assessment of Rocket Testing Facility - Boeing, Ventura, CA (2004-Present). Continued development of site-wide risk assessment methodology (SRAM). Conducted hujman health and ecological risk assessments for multiple RFI sites. Development of site-specific vapor migration model ad vapor migration model validation field study. Evaluation includes dioxins/furans, PCBs, TPH, metals, SVOCs, and VOCs.

Human Health and Ecological Risk Assessment of Superfund Site - Former Radionuclide Research Facility and University Landfills. University of California, Davis, CA (2001-2005). Risk assessment for a former radionuclide research facility and university landfills. Evaluation included tiered ecological and human health evaluation. Evaluation includes metals, VOCs, and radionuclides.

Prospective, Deterministic Baseline Human Health Risk Assessment (Vapor Intrusion) at a Sacramento Brownfield Site. Kennedy and Jenks, Chico, CA. (2005). Industrial Site Redeveloped to Multi-family Land-use. Chemicals of Potential Concern are BTEX and 1,2-DCA..

Prospective, Deterministic Baseline Human Health Risk Assessment of 1,4-Dioxane in Groundwater at Air

Force Plant 44 as Part of the TIAA Superfund Site in Tucson, Arizona. Raytheon Corporation, Tucson, AZ. (2003-2005). Conduct baseline human health risk assessment to address the discovery of 1,4-Dioxane in groundwater at TIAA Superfund Site and Air Force Plant 44.

Human Health Risk Assessment on a 65-acre Rural Residential Development of a Former Orchard with Soils Containing Arsenic, Lead, Organochlorine Pesticides. Conte Asset Management Sacramento, CA (2000-2005). A tiered human health risk assessment was conducted on former orchard soils containing arsenic, lead, and organochlorine pesticides that is proposed for redevelopment as a residential area. Deterministic and probabilistic methodologies were used to assess risks at the property.

Area-Specific Risk Assessment. Honeywell Industrial Complex, South Bend, Indiana (2004). Performed an area-specific risk assessment and developed of risk-based cleanup levels (RBCLs). The assessment included modeling to evaluate the potential of site constituents in soil to migrate to on-site indoor air and off-site groundwater. The evaluation included VOCs and PCBs.

Soil Vapor Characterization and Risk Assessment. Honeywell Site, Los Angeles, CA (2004). Developed strategy address concerns regarding potential risks due to exposure in on-site and off-site indoor air to site related VOCs. Assissted in developing site characterization work plan to support future risk assessment.

Human Health Risk Assessment on a 180-acre Rural Residential Development of a Former Orchard with Soils Containing Arsenic, Lead, Organochlorine Pesticides. Actium Development Corp., Sacramento, CA (1999-2003). A tiered human health risk assessment was conducted on former orchard soils containing arsenic, lead, and organochlorine pesticides that is proposed for redevelopment as a residential area. Deterministic and probabilistic methodologies were used to assess risks at the property. DTSC toxicologists have agreed the approach and conclusions are valid.

Human Health Risk Assessment of Air Emissions from a Proposed Waste to Energy Facility. Hong Kong (2001-2002). A health risk assessment was conducted on estimated emissions from a proposed Waste to Energy Facility in Hong Kong. Evaluation included metals, VOCs, and dioxins.

Risk-Based Cleanup Level Development for Wood Treating Faciltiy. Coast Wood Preserving, Inc. Ukiah, CA (2001-2002). Risk-based cleanup levels were developed for arsenic, copper, and hexavalent chromium. Cleanup levels were developed for protection of current and future workers as well as groundwater quality.

Human Health Risk Assessment on a 40-acre Rural Residential Development of a Former Orchard with Soils Containing Arsenic, Lead, Organochlorine Pesticides. Sacramento County, CA (2000). A human health risk assessment was conducted on former orchard soils containing arsenic, lead, and organochlorine pesticides that is proposed for redevelopment as a residential area. Deterministic methodologies were used to assess risks at the property. Sacramento County has approved the risk assessment.

Preliminary Endangerment Assessment Human Health Risk Assessment of a Proposed New School - Performed a Preliminary Endangerment Assessment Human Health Risk Assessment for a proposed new school on former agricultural property. Folsom, CA (2000).

Preliminary Endangerment Assessment Human Health Risk Assessment of a Proposed New School - Performed a Preliminary Endangerment Assessment Human Health Risk Assessment for a proposed new school on former agricultural property. Brentwood, CA (2000).

Preliminary Endangerment Assessment Human Health Risk Assessment of a Proposed New School - Performed a Preliminary Endangerment Assessment Human Health Risk Assessment for a proposed new school on former agricultural property. Dixon, CA (2000).

Development of a Risk-Based Methodology for Decision Making Regarding the Presence of Arsenic in Soils of Placer County. Anonymous Developers in Placer County (2000-present).

Baseline Human Health and Ecological Risk Assessment and Development of Risk-Based Corrective Action Levels; Safety-Kleen Corp.,

Clackamas, Oregon –Risk assessment at a solvent recycling center as part of RCRA facility investigations. Implemented a fractionation risk assessment approach for TPH. Performed environmental fate assessment of chemical constituents from soil into groundwater using the SESOIL and Summers environmental fate and transport models. Performed environmental fate assessment of chemical constituents from soil into indoor air using the Johnson and Ettinger environmental fate and transport models. Provided statistical characterization and distribution analysis of soil and groundwater concentrations.

Baseline Human Health and Ecological Risk Assessment and Development of Risk-Based Corrective Action Levels; Safety-Kleen Corp., **California –Risk assessment projects at solvent** recycling centers throughout California as part of RCRA facility investigations. Assisted in developing a consistent risk assessment approach with DTSC for use at all facilities, including the use of a fractionation risk assessment approach for TPH. Assessments are ongoing. Performed environmental fate assessment of chemical constituents from soil into groundwater using the SESOIL and Summers environmental fate and transport models. Performed environmental fate assessment of chemical constituents from soil into indoor air using the Johnson and Ettinger environmental fate and transport models. Provided statistical characterization and distribution analysis of soil and groundwater concentrations.

Human health risk assessment and geostatistical evaluation using GIS (ArcView) as part of an analysis of historically released DDT at a manufacturing facility. Latham and Watkins, San Francisco, CA (2000).

Human Health Risk Assessment Associated with Future potential Uses of Groundwater at a Former Naval Facility. Alameda, California. Completed a prospective human health risk assessment for future hypothetical beneficial uses for impacted groundwater beneath a former Naval facility slated for commercial redevelopment. Chemicals of concern included chlorinated hydrocarbons, and BTEX. The assessment included a qualitative screening of many future potential groundwater uses to focus the quantitative portion of the risk assessment to the two or three scenarios of greatest concern. Measured groundwater concentrations were kriged to estimate areal average concentrations of each constituent, and subsequently three scenarios were quantitatively assessed: two worker scenarios and a school scenario. All scenarios were shown to be below acceptable hazard indices and EPA's risk range.

Focused Human Health Risk Assessment at a former **chemical facility, West Sacramento, California –** Assisted with exposure and human health risk assessment of volatile organic chemicals in groundwater. Performed modeling to assess exposure and risk to volatized chemicals under the future land use conditions of a sports stadium.

Human Health Risk Assessment at a former U.S. Army **Airfield, Novato, California – Assisted with exposure** and human health risk assessment of inorgainc and organic chemicals in soil and sediments. Developed sediment target concentrations for chemicals based on recreational fish ingestion. Modeled transfer from sediments to fish for bioconcentrating chemicals including PCBs, Dioxins, Furans, PAHs, and chlorinated pesticides.

Human Health Risk Assessment at a former agricultural chemical formulation and distribution **facility, Stockton, California – Assisted with exposure** and toxicity assessment of over twenty chemicals in soil and groundwater. Performed environmental fate assessment in soil and groundwater using the SESOIL and VHS environmental fate and transport models. Provided statistical characterization and distribution analysis of soil and groundwater concentrations.

Prospective, Human Health Risk Assessment for Prop 65 Purposes Involving Lead and Cadmium in Skin Care Products. Anonymous Law Firm (1999-present).

Risk Based Corrective Action (RBCA) Evaluation at a **gasoline station, San Bruno, California – Performed** Tier 1 and 2 San Francisco Regional Water Quality Board RBCA evaluation for gasoline related compounds. Provided statistical characterization and distribution analysis of soil and groundwater concentrations.

Risk Based Corrective Action (RBCA) Evaluation at a **gasoline station, Daly City, California – Performed** Tier 1 and 2 San Francisco Regional Water Quality Board RBCA evaluation for gasoline related compounds. Provided statistical characterization and

distribution analysis of soil and groundwater concentrations.

Risk Based Corrective Action (RBCA) Evaluation at a gasoline station, Burlingame, California - Performed Tier 1 and 2 RBCA evaluation for gasoline related compounds. Provided statistical characterization and distribution analysis of soil and groundwater concentrations.

Risk Based Corrective Action (RBCA) Evaluation at a gasoline station, Arvin, California - Performed Tier 1 and Tier 2 RBCA evaluation for gasoline related compounds. Performed environmental fate assessment in soil using the SESOIL environmental fate and transport model. Provided statistical characterization and distribution analysis of soil and groundwater concentrations.

Distribution Statistics Development for Probabilistic Risk Assessment Model - Developed distribution statistics for the CalTOX model landscape inputs, climate and soil characteristics. Reviewed and compiled landscape data for the state of California. Developed distribution statistics for each CalTOX lanscape input for use in probabilistic analysis.

Environmental Fate and Transport

Sub-surface Migration to Groundwater - Performed environmental fate assessment of chemical constituents from soil into groundwater using the SESOIL, VLEACH, and Summers environmental fate and transport models in support of multiple site-specific risk assessments and development of risk based clean-up levels.

Sub-surface Volatilization to Indoor and Outdoor Air - Performed environmental fate assessment of chemical constituents from soil into groundwater using the Johnson and Ettinger and Hannah environmental fate and transport models in support of multiple site-specific risk assessments and development of risk based clean-up levels.

VOC Volatilization due to domestic use - Performed environmental fate assessment of chemical constituents from domestic water use into indoor air using published air stripping methodologies in support of multiple site-specific risk assessments as well as litigation support.

Air Dispersion Modeling - Performed air dispersion modeling based on the accidental release scenario using EPA's ALOHA model. Used model outputs to estimate probable exposure levels for comparison with toxicity information.

Litigation Support

Litigation Support for Non-Testifying Toxicology and Risk Assessment Expert for Defense on a Case Involving Pesticide (e.g., Atrazine) Application in Forestlands and Alleged Impacts on Surface Water Quality and Human Health. In Progress. Downey, Brand, Seymour & Rohwer; Sacramento, CA (2000-present).

Litigation Support for Testifying Toxicology and Risk Assessment Expert for Plaintiff on a Case Involving Alleged Illegal Disposal of Hazardous Waste by a Furniture Stripping Company. Evaluated available data for ability to determine amounts material illegally disposed. In Progress. California Department of Justice (2000-present).

Litigation Support for Testifying Toxicology and Risk Assessment Expert for the Defense on a Case Involving Environmental Damages Resulting from an Accidental Release of Cl-containing Gases. Settled. David Gard et al v. Placer County Water District et al. (1999-2000). Researched information and performed air dispersion modeling for expert report in support of a lawsuit regarding phytotoxic effects from an accidental release of chlorine gas. Reviewed phytoxicity studies of chlorine gas to develop toxicity threshold for pine trees and determine the long term effects from an acute exposure event. Performed air dispersion modeling based on the accidental release scenario using EPA's ALOHA model. Used model outputs to estimate probable exposure levels for comparison with toxicity information.

Litigation Support for Testifying Toxicology and Risk Assessment Expert for the Defense on a Case Involving Alleged Health Effects in Inmates in California's Tehachapi Prison Associated with Hazardous Substances in Groundwater at the Prison. Sucessful outcome resulting from case dismissal by the court under Daubert motion. California Department of Justice, Department of Corrections (1998-9). Researched information for expert report. Lawsuit regarding potential health effects from exposure to PCE, TCE and nitrate impacted groundwater. Reviewed database of groundwater analytical results

for completeness and reliability. Evaluated exposure levels for toxicological significance, comparing water levels, length of exposure to known toxicology of substances. Performed focussed risk assessment of exposure to contaminants by showering.

Geographic Information Systems
Development of a Geographic Information System (GIS) to Support Strategic Project Management; California - Prepared GIS for a property development at a former orchard site. The GIS was used to geographically integrate risk assessment results with sample locations, and future property planning. Risk-based cleanup decisions were based on the results of GIS geostatistical analyses. Subsequent remediation alternative decisions were also based on the GIS developed for the site.

Development of a Geographic Information System (GIS) to Prepare a Listing of Properties for Proposition 65 Notification; California - Assisted in development of a GIS to support air modeling conducted for several commercial facilities for Proposition 65 warning requirements. The GIS was used to develop a mailing list database for properties within the air emissions plume using GIS geocoding.

Development of a Geographic Information System (GIS) for Background and Ambient Concentrations of Cadmium, Copper, Lead, and Zinc in North American Soils and Waters - Developed database of surface water and soil concentrations for cadmium, copper, lead, and zinc from available data. Database was designed for use in a geographic information system (GIS) for the purpose of evaluating spatial relationships in metal background concentrations. Access and ArcView were used in the development of the GIS.

Geographic Information System Development for California soils data - Developed GIS database of soils characteristics for use in the exposure and risk assessment model CalTOX. Data from the USDA STATSGO database was used for the development of GIS database of CalTOX soil inputs. ArcINFO was used in the development of the GIS.

Toxicological Evaluations
Derivation of a Dermal Cancer Potency Factor in Support of Proposition 65 Evaluation. Derived dermal cancer potency factor for Coal Tar in Shampoo Products. Applied derived potency factor in Human Health Risk Assessment for Prop 65 Purposes Anonymous Law Firm (1999-2000).

Reproductive Toxicology Review for DDT and DDE, California - Review of available reproductive toxicology information for response to Proposition 65 listing. Established database of reproductive toxicity studies. Evaluated significance of toxicology data to California Proposition 65 (1998-1999).

Peer Review
Expert Peer Reviewer Assistance: U.S. EPA's Report entitled: "PCBs in the Environment near the Oak Ridge Reservation - a Reconstruction of Historical Doses and Health Risk", Eastern Research Group, Lexington, MA (2000)

Expert Peer Reviewer Assistance: U.S. EPA's report entitled: "Hudson River PCBs Reassessment, Human Health Risk Assessment Report." Eastern Research Group, Lexington, MA (2000).

Expert Peer Reviewer Assistance: U.S. EPA's "Risk Characterization Handbook", Eastern Research Group, Lexington, MA (1999).

Expert Peer Reviewer Assistance: U.S. EPA guidance on "Breast Milk Pathway" in "Methodology for Assessing Health Risks Associated with Multiple Exposure Pathways to Combustor Emissions". Eastern Research Group, Lexington, MA (1998).

Environmental Compliance
Environmental Compliance Reviews. U.S. Postal Service (USPS), Southwest Area (2001). Performed on-site environmental compliance reviews at USPS facilities in the Southwest Area. Provided immediate notification of findings of existing noncompliance with federal, state, or local regulations. Provided written reports detailing all findings. Provided categorization of findings based on existing regulatory noncompliance, potential or know future regulatory noncompliance, USPS policies and procedures noncompliance, and best management practice with regard to environmental practice. Provided breakdown of findings by regulatory area as well as by the core business and enabling processes. Provided corrective action recommendations for all findings.

Sandra J. Mulhearn

Project Risk Assessor/Data Validation

Ms. Mulhearn is a toxicologist and risk assessor with ten years of diverse experiences that includes risk assessment, data validation, quality assurance, and Phase I environmental site assessments. She currently specializes in human health and ecological risk assessments, toxicological research, and risk-based cleanup-level development. She has performed risk assessments for numerous Superfund, RCRA, and private and public client facilities throughout the United States.

Health risk assessment projects have included complex, multiple-site, focused risk assessments, multi-pathway and multi-chemical exposures, and ecological components (qualitative/quantitative). Her experience encompasses a wide range of substances (including asbestos, petroleum hydrocarbons, chlorinated organics, PCBs, dioxins, metals, PAHs, and radionuclides) in a variety of environmental settings, including hazardous waste sites, landfills, former service stations, industrial sites, and other environments, including residential and workplace environments.

Ms. Mulhearn provides project management, risk assessment project execution, fate and transport assessments, data evaluation, toxicology assistance and data validation. Ms. Mulhearn has managed human and ecological risk assessment projects for private clients in California.

Fields of Competence

- Human health risk assessment
- Ecological risk assessment
- Radionuclide risk assessment
- Asbestos risk assessment
- Data validation
- Data management
- Toxicology

Education

- BS/BSc, Environmental Toxicology, University of California (Davis), 1995

Key Industry Sectors

- Aerospace
- Manufacturing
- Petroleum
- Utilities
- Redevelopment

Organizations/Memberships

- Society of Risk Analysis

Key Projects

Human Health Risk Assessment, Treco Property, Basic Remediation Company, Clark County, Nevada – Human health risk assessment and development of risk-based soil corrective action levels. Constituents of concern include radionuclides, metals, pesticides, and chlorinated hydrocarbons. Receptors evaluated included future commercial receptors, construction workers, trespassers, and restaurant patrons.

Human Health Risk Assessment, Borrow Area, Basic Remediation Company, Clark County, Nevada – Human health risk assessment and development of risk-based soil corrective action levels. Constituents of concern include radionuclides, metals, pesticides, and chlorinated hydrocarbons. Receptors evaluated included future commercial receptors, construction workers, trespassers, and maintenance workers.

Human Health Risk Assessment and Development of Risk-Based Soil Corrective Action Levels Used to Direct Land Development Efforts Adjacent to a Multiple-Facility Industrial Complex; Basic Remediation Company; Clark County, NV.
A comprehensive tiered risk assessment is being prepared for impacted former evaporation pond soils. The risk assessment is evaluating three potential future land uses: commercial/industrial, residential, and recreational uses. Chemicals at the site include heavy metals, perchlorate, pesticides, chlorinated hydrocarbons, asbestos, and radionuclides. Based on the results of the risk assessment, risk-based corrective action levels for soil will be developed for each potential land use. These corrective action levels will be used to determine the future course of land development at the site. Tasks performed include statistical analysis of the background dataset, data validation of historical datasets, and interim risk assessments.

Human Health and Ecological Risk Assessment Support, The Boeing Company, Santa Susanna Field Laboratory (SSFL), CA.
Developed a DTSC-approved perchlorate soil-to-plant uptake factor for use in human health and ecological risk assessments. Participated in development of a soil and ground water background dataset, and other revisions to the site-specific risk assessment methodology. Conducted several multi-pathway human health and ecological risk assessments for sites at the Santa Susanna Field Laboratory. Participated in a public meeting for the facility.

Baseline Human Health Risk Assessment at a former Gasoline Station, Wallace Kuhl, Rio Vista, CA. Project Manager.
Project manager for a baseline human health risk assessment of VOC and TPH-impacted soil and ground water at this former gas station and site of a current commercial facility. Assessed risks to future hypothetical residents, current commercial workers, current maintenance workers at the site.

Human Health Risk Assessment for Lead Impacted Soils, D.B. Stephens, Santa Barbara, CA. Project Manager.
Managed and completed a human health risk assessment for residents and workers exposed to soils impacted with lead associated with a historic streambed. Blood lead levels were predicted for residents, site workers, construction workers and pregnant site workers using EPA's lead methodologies.

Baseline Deterministic and Probabilistic Human Health Risk Assessment at a Metals Refinery (Region 8 EPA) as Part of a RCRA Facility Investigation (RFI). Western Zirconium, Salt Lake City, Utah.
The risk assessment evaluated 30 SWMUs and 9 AOCs. Chemicals assessed included metals, VOCs, dioxins, PAHs, PCBs, nitrate/nitrite and radionuclides. Pathways included direct contact (incidental ingestion, dermal contact) with soils and indirect contact (inhalation of fugitive dusts and vapors, as appropriate) with soil and groundwater COPCs for future on-site workers and construction workers, and indirect contact (inhalation of fugitive dusts and vapors, as appropriate) with soil and groundwater COPCs for down wind off-site residents. RESRAD was utilized to estimate exposures and risks from radionulcides. Results Used to Determine No Action Required on many of the SWMUs and AOCs. Risk assessment in regulatory review.

Investigation of Potential Sediment Contamination in Shuman Creek, Vandenberg Air Force Base, CA.
Assisted in report writing and preparation for the investigation of sediments in Shuman Creek within Vandenberg Air Force Base boundary. The report was in support of a screening-level assessment of potential adverse impacts to biota as result of chemical releases from off-site sources. Specifically, information was collected necessary to determine whether persistent organic compounds and/or metals are present in

sediments of Shuman Creek (within Base boundaries) and whether persistent chemicals detected in sediments in Shuman Creek may be toxic (i.e., pose an unacceptable level of risk) to sediment-dwelling biota. To meet these objectives, sediment samples from two depths were collected from Shuman Creek and analyzed for metals, PCBs, organochlorine pesticides, dioxins, polyaromatic hydrocarbons. Screening-level ecological risk assessment was performed that included spatial characterization of anthropogenic chemicals, as well as comparison to sediment benchmarks.

Baseline Human Health Risk Assessment Update, Confidential Chemical Plant, Superfund Site, Brunswick, GA.
Performed a baseline human health risk assessment update to incorporate changes requested by USEPA. These changes included subdividing the property into four quadrants, updating toxicity criteria, revising datasets to reflect soil removals, and reviewing and revising the selection of chemicals of potential concern.

Human Health Risk Assessment, Confidential Former Industrial Facility, Los Angeles, CA. Project Manager.
Managed and performed a human health risk assessment for a former industrial property and current car rental property near a large airport. The assessment included vapor intrusion modeling to evaluate the potential of site constituents in ground water to migrate to on-site indoor air. The evaluation also included vapor intrusion modeling of groundwater located at the property boundary to evaluate potential risks to off-site residents.

Risk-Based Screening Level Development. Pesticide Blending Facility, GA.
Risk based screening levels consistent with Georgia Department of Natural Resources Environmental Protection Division (EPD) Hazardous Site Response regulations (Chapter 391-3-19; GA EPD Reg 391-3-19) were developed for on-site workers (direct contact with soils, inhalation of volatiles and/or fugitive dust), off-site future residents, leaching from soil to groundwater with protection of Maximum Contaminant Levels (MCLs), GA EPD Reg 391-3-19 Appendix III groundwater values, worker risk based groundwater values, and resident risk based groundwater values.

Area-Specific Risk Assessment, Confidential Industrial Complex, South Bend, IN.
Performed an area-specific risk assessment and developed of risk-based cleanup levels (RBCLs). The assessment included modeling to evaluate the potential of site constituents in soil to migrate to on-site indoor air and off-site groundwater. The evaluation included VOCs and PCBs.

Toxicological Literature Review and Ecological Risk Assessment, Vandenberg Air Force Base, CA.
Performed toxicological literature review for the benefit of developing avian and mammalian toxicity reference values. Constituents of concern included metals, VOCs, and pesticides by ingestion and inhalation pathways. Performed a base-wide ecological risk assessment for far-ranging receptors. Calculated risk-based soil screening levels for ecological receptors.

Vapor Intrusion, Multiple Sites at Castle Air Force Base, CA.
Conducted vapor intrusion modeling utilizing the USEPA spreadsheet version of the Johnson and Ettinger model and review for multiple sites in support of closure at Castle Air Force Base. Screening human health risk assessments for potential future receptors at the sites were also conducted based upon the results of the indoor air vapor intrusion modeling.

Vapor Intrusion, Multiple Sites at Mather Air Force Base, CA.
Conducted vapor intrusion modeling utilizing the U.S.EPA spreadsheet version of the Johnson and Ettinger model and review for multiple sites in support of closure at Mather Air Force Base. Screening human health risk assessments for potential future receptors at the sites were also conducted based upon the results of the indoor air vapor intrusion modeling.

Human Health and Ecological Risk Assessments, University of California at Davis/LEHR, Davis, CA.
Performed a tiered multi-site, multi-pathway human health and ecological risk assessment for this former landfill and radionuclide research facility which is also a Superfund site. Coordinated on-time submittal of the ecological risk assessment to regulators. Constituents of concern included metals, VOCs, pesticides, and radionuclides. Performed radionuclide risk assessment using RESRAD for human health and the RAD-BCG calculator for ecological risks.

Ecological Risk Assessment, General Chemical Co., Bay Point Works, Pittsburg, CA.

Performed an ecological risk assessment for terrestrial and aquatic receptors at this industrial facility.

Human Health Risk Assessments, Raytheon, Tucson, AZ.
Performed a human health risk assessment based on evaluation of ground water concentrations of 1,4-dioxane distributed by Raytheon's ground water treatment system. The risk assessment also incorporated a review of USEP A's cancer slope factor for 1,4¬dioxane, as well as presented supporting information for the use of a different slope factor.

Literature Research, Kelleher & Associates, CA.
Performed an extensive search of existing literature and current research surrounding perchlorate and plant uptake. Compiled all information into an informational memo for the client.

Literature Search, Montrose Chemical Corp, NV.
Performed an extensive literature search for of toxicological research on effects of para-chlorobenzenesulfonic acid (PCBSA), a by-product of DDT manufacturing.

Human Health Risk Assessment, The Boeing Company, Olathe, KS.
Assisted with a human health risk assessment at a former industrial chemical storage and recycling center. Ground water containing numerous volatile organic compounds (VOCs) migrated under surrounding residential areas. Qualitative and quantitative risk assessment conducted on measured and modeled VOCs in indoor air, PCBs and metals measured in surface water sediments. Also performed an ecological screening evaluation.

Human Health Risk Assessment, US Navy, Alameda Annex, Alameda, CA.
Completed a prospective human health risk assessment for future hypothetical beneficial uses for impacted ground water beneath a former Naval facility slated for commercial redevelopment. Chemicals of concern included chlorinated hydrocarbons and BTEX. The assessment included a qualitative screening of many future potential groundwater uses to focus the quantitative portion of the risk assessment to the two or three scenarios of greatest concern. Measured groundwater concentrations were kriged to estimate areal average concentrations of each constituent, and subsequently three scenarios were quantitatively assessed: two worker scenarios and a school scenario. All scenarios were shown to be below acceptable hazard indices and EPA's risk range.

Human Health Risk Assessment, Mid-American Energy Company, Iowa City, IA.
Performed a human health risk assessment for a former manufactured gas plant site.

Jill Quillin, R.G., C.E.M.

Project Manager, Hydrogeologist

Ms. Jill Quillin has 17 years of experience in applied geology and hydrogeology and large-scale investigation and remediation program management. Many of these programs have involved extensive interaction and negotiation with regulatory and resource agencies, close coordination and communication with nationwide clients, and public and stakeholder coordination. For example, she has managed the high-profile strategic cleanup program for the redevelopment of a 240-acre former rail yard in downtown Sacramento. Issues have included environmental and cultural resources impact assessment, public and worker safety, proposed land use, public and stakeholder involvement, and water quality and hydrological impacts.

She has overseen and conducted numerous projects involving hydrogeologic field activities and data analysis (lithologic, chemical, and potentiometric data) and technical reporting. Ms. Quillin's projects have involved characterization and/or remediation of soils and ground water impacted by TPH, metals, pesticides, polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCS), asbestos, perchlorate, dioxins/furans, and radionuclides. These projects were conducted to protect human health (under various future land uses), ecological health, water quality, and in some cases these projects addressed ecologically sensitive areas (e.g., shoreline and wetlands).

Several of Ms. Quillin's projects have been conducted under privileged and confidential status as support for litigation property transfer and/or politically sensitive redevelopment plans. In addition, she has worked with the Department of Defense, property developers, and attorneys, as well as oil and gas, transportation, semiconductor, and other manufacturing industries.

Registration

- Registered Geologist, California (#6024)
- Environmental Manager, Nevada (#EM-1707)

Fields of Competence

- Remedial Investigation/Feasibility Studies (RI/FS) Superfund programs
- Brownfields property redevelopment
- Hydrogeologic assessment
- Geologic and geophysical site investigation
- Remedial action plans
- Regulatory agency negotiation
- Data management
- Hydrologic modeling
- Hydrogeologic computer applications
- Litigation support

Education

- B.A., Geology, Wellesley College, 1979
- M.S., Geology, University of Oklahoma, 1984
- M.S., Environmental Science/Ground Water Quality Management, University of Oklahoma, 1988

Publications

- Co-author of *From Purchase of Landmark Environmental Insurance to Remediation: Case Study in Henderson, Nevada.* Air and Waste Management Association Conference. 2001.
- Co-author of *Sludge Treatment, Utilization and Disposal.* Journal of the Water Pollution Control Federation, Vol. 60, No. 6. 1988.
- Co-author of *Field Study of Fracture Characteristics as a Function of Bed Curvature in Folded Dolomites.* AAPG Bulletin, Vol. 70, No. 5, p. 636 (abstract for paper given at AAPG National Convention, Atlanta, Georgia). 1986.

Key Projects

Managed RI/FS program at 240-acre California Superfund/Brownfields site overseen by California Department of Toxic Substances Control (DTSC) and Water Quality Control Board (RWQCB), Central Valley Region. Performed senior technical review of site characterization reports, feasibility studies and remediation workplans (including Remedial Action Plans and Removal Action Workplans) prepared for individual study areas, in which soil and ground water were impacted with VOCs, SVOCs,TPH, metals, and/or asbestos. The remedial strategy selected for the site consisted of source removal in soils, ground water source containment, localized ground water extraction and treatment at the source and toe of the plume (multiple water-bearing zones), and monitored natural attenuation. Implementation of this strategy has resulted in a stabilized ground water plume boundary, and appreciable decreases in chemical concentrations within it. This strategy also proved to be cost-effective, resulting in significant cost savings to the client over more traditional pump-and-treat approaches.

Worked with construction management team to develop workplans for identifying and handling asbestos-containing soil found in portions of State Superfund site in Sacramento, California. These workplans were approved and the implementation was overseen by the DTSC and Sacramento Metropolitan Air Quality Management District (SMAQMD).

Assisted DTSC in development of NEPA/CEQA documentation (Agency Checklist, Negative Declaration, Initial Study) required for remediation projects at State Superfund site in Sacramento, California. Directed development of cultural resources management plan and implementation of archaeology oversight during excavation in historically sensitive areas, and directed management of elderberry bush growth (a protected habitat of an endangered species) on the site.

Actively supported negotiations with State and local regulators regarding redevelopment of State Superfund site in Sacramento, California. Negotiations included developing land-use specific remediation approaches as part of the plan for future site development. Co-authored environmental oversight guidance that identified requirements and procedures to be followed to ensure public safety during and after development of the property, and which was adopted by the City of Sacramento.

Managed remedial investigation at 1,000-acre Nevada State Superfund site with multi-party, potentially responsible party group, and later the land owner, upon transfer of environmental responsibility. Directed generation of project plans for site characterization (Environmental Conditions Investigation Workplan, Project Management Plan, Data Management Plan, Data Collection Quality Assurance Plan, and Health and Safety Plan). Directed multi-phased field investigation, identified areas of concern based on comparison to applicable standards, and prepared report of findings. Oversaw development of Remedial Action Objectives and preparation of Remedial Alternatives Study to mitigate human health exposures associated with future redevelopment land uses, including industrial, commercial, golf course, and residential. The selected remedy was approved by the Nevada Division of Environmental Protection (NDEP). Developed Conceptual Site Model, data quality objectives, and workplan to support site closure. Directed data review/validation process in support of data useability evaluation for risk assessment. Compounds of concern included metals, pesticides, radionuclides, dioxins/furans, perchlorate and asbestos.

Managed technical team supporting negotiations associated with sale of 1,300 acres of shoreline and submerged land adjacent to and within San Francisco Bay for use as State Park. Evaluated historical environmental data to assess site conditions, identified potential areas of concern and appropriate remediation approaches, and developed costs associated with remediation. Identified areas of concern based on comparison to criteria protective of human and ecological health and bay water quality. Compounds of concern were primarily metals and TPH. Successfully negotiated completion of site assessment and remediation approaches with buyer (East Bay Regional Park District and State Parks & Recreation) and RWQCB, San Francisco Region. Received No Further Action status, which allowed for completion of property transfer.

Directed more than 50 projects for private California developer. Many of these projects consisted of Phase I investigations for properties considered for purchase throughout the U.S. The findings were used by the client to negotiate beneficial sale terms considering environmental liabilities identified during the Phase I investigations and potential impacts to property

values. Other project work included: hazardous waste audits of current tenant operations, asbestos abatement, indoor air quality investigations, and shallow soil and ground water sampling to assess potential environmental impacts associated with site operations (tenant and/or former owner).

Directed and conducted various field investigations (primarily San Francisco Bay area) to determine hydrogeologic parameters and extent of chemical occurrence due to leaking above- and underground storage tanks (VOCs and TPH). Installed and developed monitoring wells, logged soil descriptions, conducted soil and ground water sampling, conducted pumping and slug tests, measured water level variations over time to determine extent of tidal influence, analyzed hydrologic data, and coordinated field activities. Performed work on behalf of railroads, U.S. Navy, petroleum industry, and semiconductor industry. Successful completion of these activities resulted in timely site closure in several cases. For ongoing projects, significant progress was made in moving the projects through the site closure process at a pace that was mutually agreeable to both the oversight agencies and clients.

Managed and provided technical support for multiple-event ground water monitoring programs at various sites in California and Nevada. Developed and negotiated sampling schedule and analytical methods with regulatory agencies. Conducted oversight to ensure compliance with workplans and standard operating procedures. Coordinated field and laboratory activities, with support from data manager and project chemist.

Conducted hydrologic modeling using U.S.G.S MODFLOW program, for site in Silicon Valley. Used results to predict possible remedial effects upon potentiometric surfaces, interpret remediation effectiveness, and estimate time required to accomplish cleanup.
Provided technical support in generation of NCP-compliant Project Plans for California State Superfund Site. These Plans included: an overall site workplan (with site history description and site-specific standard operating procedures), Quality Assurance Project Plan, and Laboratory Quality Assurance Plan. Upon DTSC approval of these plans, oversaw data management in accordance with the Plans (database generation, data validation, and data report production), and monitored laboratory performance.

Managed RI/FS/RAP program for impacted soils and ground water at former drum storage area at site in Sacramento, California. Compounds of concern at this RCRA unit included VOCs, PAHs, TPH, and metals. Supervised soil and ground water sampling events, evaluated resultant data to determine extent of chemical occurrence in soils and ground water. Generated remedial investigation report, and directed generation of feasibility study and remedial action plan. Developed and tracked multi-million-dollar budget and schedule, and served as primary regulatory interface. Directed performance of SVE system pilot study, the results of which were used to successfully implement a final remedy for site soils and as source removal for VOC-impacted ground water.

Served as technical advisor for various legal cases involving contamination of soil and ground water. Nature of work involved researching and preparing technical positions regarding potential impacts to real estate property by historical operations at adjacent sites (e.g., petroleum pipelines, USTs, and manufactured gas plants). Compounds of concern included TPH, VOCs, and PAHs.

Managed projects for private developers at sites in Nevada, including Phase I and Phase II investigations. Field tasks included soil, and ground water sampling for characterization of environmental conditions, abatement and disposal of asbestos-containing materials (scattered within shallow soils and/or attached to concrete debris), and general technical support during sale negotiations. Completed activities and received No Further Action status from NDEP for several properties, including some formerly included within Nevada Superfund site. Provided technical support for client in environmental insurance carrier selection and underwriting process.

Mark F. Shibata

Ecological Risk Assessment

Mr. Shibata is an environmental scientist with over 20 years of professional experience in the fields of ecology, risk assessment/risk communication, toxicology, statistics, and biomechanical engineering. To support ecological risk assessments, Mr. Shibata has conducted a comprehensive review of available exposure and toxicity data for mammals, birds (including raptors, waterfowl, and shorebirds), reptiles, amphibians, soil invertebrates, plants, sediment-associated biota, and aquatic biota. He has constructed a toxicity database that contains over 4000 records. Mr. Shibata has successfully developed and negotiated regulatory approval of over 250 plant and wildlife exposure and toxicity values for his clients. At the request of his clients, Mr. Shibata has designed and directed biological studies (surveys, bioassays, bioaccumulation tests, bioaccessability tests) to verify findings of ecological risk assessments. He has successfully designed, completed, and negotiated regulatory approval of ecological risk assessments for his clients at over 150 sites throughout the western United States.

In support of ecological projects, Mr. Shibata has authored several USEPA guidance documents on biological characterizations, monitoring, and statistics. He has assisted USEPA National Estuary Programs in establishing estuary-wide monitoring programs, and designed and directed an estuary-wide biological characterization for Morro Bay. Mr. Shibata has performed sediment assessments for the US Air Force and port authorities.

Mr. Shibata is an active participant in the Department of Defense's Tri-Services Ecological Risk Assessment Work Group. He has published papers and given multiple presentations on both technical and regulatory topics. Mr. Shibata has taught a course in ecological risk assessment for the Society of Mining Engineers and has accepted a guest lecturer opportunity at the University of California, Davis, for a course specializing in applied environmental assessments.

Professional Affiliations & Registrations

- Society of Environmental Toxicology and Chemistry
- Society of Risk Analysis
- Ecological Society of America
- American Society of Zoologists
- Western Society of Naturalists

Fields of Competence

- Ecology
- Ecological risk assessment
- Biological characterization
- Ecological risk guidance preparation
- Statistics
- Sediment assessment
- Regulatory negotations
- Community relations/interaction

Education

- B.A., Zoology, University of California, Berkeley, 1981

Key Industry Sectors

- Aerospace
- Mining
- Government
- Department of Defense
- Petroleum
- Utilities

Key Projects

Mr. Shibata has secured the leadership role in technical negotiations required to complete site-specific ecological risk assessments (ERA) at Vandenberg AFB. In addition, Mr. Shibata currently directs all ecological risk activities related to a cumulative (or basewide) ERA for Vandenberg AFB. His responsibilities include representing the base in technical negotiations with regulatory agency representatives, evaluating potential risks to far-ranging wildlife, incorporating field studies to verify predicted ecological risks, and, if requested, recommending possible risk management options (including cleanup goals).

Ecological Risk Assessment

Ecological Risk Assessments, Vandenberg AFB, Edwards AFB, and March AFB, CA – Directed over 50 ecological risk assessments for the U.S. Air Force at Vandenberg AFB, Edwards AFB, and March AFB, CA. Responsible for (1) managing all ecological risk assessment activities, (2) conducting meetings/negotiations with regulators, Air Force Center for Environmental Excellence (AFCEE), and base staff, (3) preparing baseline ecological risk assessments in support of the Remediation Investigation (RI) report, (4) conducting field studies to verify predicted ecological risks, (5) developing site-specific cleanup goals for the Feasibility Study (FS) report, and (6) providing expert witness/litigation support for Vandenberg AFB's Formal Dispute Resolution process. The results of these risk assessments are used to determine the need for and the scope of cleanup activities at these sites. Habitats of concern include marine intertidal, coastal dune strand, coastal sage scrub, riparian, freshwater aquatic (streams and ponds), chaparral, and annual grassland habitats on these Air Force bases. Special status species include the snowy plover, least tern, red-legged frog, southwestern pond turtle, and Stephens' kangaroo rat. Constituents of concern include metals, PCBs, dioxin/furans, organochlorine and organophosphate pesticides, VOCs, SVOCs, PAHs, fuels, and munitions.

Ecological Risk Assessments for Santa Susana Field Laboratory, CA and Chemical Commodities, Inc., KS - Boeing Company

Task/Technical Lead - Responsible for (1) directing the majority of ecological risk assessment activities for sites at the SSFL and CCI facilities, (2) supporting negotiations with state regulators, (3) reviewing SSFL's Standard Risk Assessment Methodology (SRAM) for consistency with current guidance, (4) preparing ecological risk assessments in support of the RCRA Facility Investigation (RFI) reports, (5) overseeing plant surveys at SSFL in support of the ERAs, and (6), where needed, recommending site-specific corrective measures (CMs). Media of concern include soil, shallow groundwater, Chatsworth Formation groundwater, surface water, and sediments. Mr. Shibata initiated and completed ERA support for the CCI facility in 2002. He began in 2005 and currently continues to provide ERA-related support to Boeing staff at SSFL.

Programmatic Biological Assessment for ESA-Listed Anadromous Fishes, Oroville Facilities Relicensing, Department of Water Resources, CA – Mr. Shibata is responsible for managing and coordinating all activities related to development and submittal of a biological assessment for Endangered Species Act (ESA)-listed anadromous fishes that may be impacted by activities proposed under the new license for the Oroville Dam and Hydropower Facilities. In addition to preparing the biological assessment report, Mr. Shibata's responsibilities include participating in Section 7 consultations with NOAA Fisheries, preparing an Essential Fish Habitat (EFH) for Pacific salmon, and preparing a special section that specifically evaluates potential hatchery-related impacts to ESA-listed anadromous fishes.

Ecological Risk Assessments and Regulatory Strategy, LEHR/SCDS Superfund Site, University of California at Davis, CA – Mr. Shibata managed the ecological risk assessment activities at over 15 areas of concern for the University of California at Davis. He was responsible for (1) conducting meetings/negotiations with regulators, (2) evaluating potential risks to terrestrial and aquatic plants and wildlife, (3) incorporating field studies to verify predicted risks, (4) preparing a baseline ecological risk assessment in support of the Remediation Investigation (RI) report, and (5) recommending possible risk management options to UC Davis' environmental and legal staff. The results of the risk assessment was used to determine the need for and the scope of cleanup activities at these sites. Habitats of concern include annual grassland, riparian, and freshwater aquatic (Putah Creek) habitats. Constituents of concern include metals, PCBs, dioxin/furans, organochlorine pesticides, VOCs, PAHs, and radionuclies.

Fish Investigations in Support of Fish Passages, Department of Water Resources, Sacramento, CA – The greatest recent change in the hydrodynamics of the Delta is associated with diversions of water from the Delta. River flows are captured, stored, and released to support the needs of the state's populace and economy, which in turn, has disrupted natural hydrologic flow patterns. Direct impacts of water diversion include entrainment, transport of species to new areas, changes in the distribution of temperature and conductivity isopleths, and alteration of migration patterns of spawning adults or outmigrating young. Mr. Shibata is the Program's Biological Investigation lead and will be managing all program activities related to biological investigations of fish in the Sacramento-San Joaquin delta. His responsibilities will include (1) establish biological investigation objectives, (2) describe methods and sampling strategy, (3) prepare research study plans, (4) performing research, (5) evaluate data, (6) make resource management recommendations, and (7) prepare final investigation reports.

Environmental Assessment, Andersen AFB, Guam – Andersen Air Force Base (AFB) is a critical link in the southern air bridge that supports rapid deployment and operation of United States military forces in the Pacific and Indian Oceans, and other strategic areas. A reliable water supply is critical to the Base's ability to support ongoing peacetime and wartime activities. Mr. Shibata is currently managing all activities related to preparing an Environmental Assessment/Finding of No Significant Impact (EA/FONSI) for the proposed replacement of the off-base water supply system and construction of an on-base water supply system at Andersen AFB, including: (1) conduct a kick-off teleconference call, (2) conduct critical habitat and cultural resource surveys; and (3) prepare EA/FONSI report.

Five-Year Record of Decision (ROD) Review, McClellan AFB, CA – Mr. Shibata is currently responsible for providing an analysis of whether existing RODs and ongoing remedies at McClellan AFB are (1) still protective of ecological resources or (2) should be re-examined due to new information that has been developed since the last review. He is responsible for managing all ecological risk assessment review activities, preparing review memorandums, and assisting in strategic negotiations with regulators. Habitats of concern include annual grassland, vernal pools, riparian, and freshwater aquatic habitats. Constituents of concern include metals, PCBs, dioxin/furans, organochlorine pesticides, VOCs, PAHs, fuels, and radionuclides.

Ecological Risk Assessment, Mountain Pass Mine, CA – Directing ecological risk assessments for Molycorp's Mountain Pass Mine, CA. Responsible for (1) coordinating and managing all ecological risk assessment activities, (2) conducting meetings with local, state, and federal regulators and Mountain Pass Mine technical staff, and (3) preparing baseline and predictive ecological risk assessments. The results of the risk assessments will support preparation of the Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the Proposed Mine Expansion Project and provide the basis for comparing ecological risks associated with current operations and the proposed future expansions. Habitats of concern are primarily desert scrub-Joshua Tree and desert wash habitats that support the desert tortoise, a federally listed threatened species. Constituents of concern are primarily metals, lanthanide metals, and radionuclides.

Ecological Risk Assessments, National Surface Impoundment Study – Directing a nationwide ecological risk assessment for the Office of Solid Waste, U.S. Environmental Protection Agency. Responsible for (1) managing all ecological risk assessment activities, (2) preparing ecological risk assessments at over 90 surface impoundments across the nation, and (3) developing risk-based clean up goals. Mr. Shibata is also responsible for coordinating and maintaining consistency with other risk assessment efforts conducted by the U.S. Environmental Protection Agency.

Remedial Investigation/Feasibility Study, Arizona National Guard and U.S. Army Corps of Engineers, Camp Navajo, AZ – Directed over 25 ecological risk assessments for the Arizona National Guard at Camp Navajo, AZ. This project required the development and use of risk-based soil and surface water benchmarks to quickly and cost-effectively screen for ecological risks. Responsible for (1) managing all ecological risk assessment activities, (2) conducting ecological risk assessments in support of the Remediation Investigation (RI) report, and (3) developing site-specific cleanup goals for the Feasibility Study (FS) report. Habitats of concern included woodland, annual grassland, and freshwater aquatic habitats. Constituents of concern included

metals, PCBs, chlorinated pesticides, VOCs, SVOCs, and PAHs.

Remedial Investigation/Remedial Actions/Feasibility **Study, Port of Long Beach, Long Beach, CA – Directed** several ecological risk assessments for the Port of Long Beach. Responsible for (1) managing all ecological risk assessment activities, (2) conducting interviews with federal, state, and local regulatory agencies, (3) determining potential present and future ecological risks due to the release of chemicals at Port of Long Beach sites, (4) preparing ecological risk assessments for the Remediation Investigation report, and (5) developing site-specific cleanup goals for the Feasibility Study (FS) report. These projects evaluated the potential impacts of metal and petroleum releases associated with past port activities adjacent to estuarine and marine habitats. Special status species included snowy plover, least tern, peregrine falcon, and several marine mammals. Constituents of concern were primarily metals, TPH, SVOCs, and PAHs.

Pollution Prevention and Environmental Support, U.S. **Air Force, Vandenberg AFB, CA – Directed an** ecological risk assessment to evaluate the potential for adverse ecological impacts due to the reclamation and reuse of landfill leachate as a dust suppressant at the main landfill at Vandenberg AFB. The assessment provided estimates of ecological risks that were used by managers to determine the need for leachate conditioning prior to application to the main landfill surface soils. Information generated by this screening-level ERA was used 1) to develop appropriate leachate conditioning goals that minimize or preclude long-term risk to potentially exposed biological receptors and 2) to design an appropriate leachate conditioning system. Responsible for (1) managing all ecological risk assessment activities, 2) preparing the ecological risk assessment in support of the Leachate Reclamation and Use Report, and (3) calculating risk-based leachate conditioning action goals. Constituents of concern include metals, PCBs, organochlorine pesticides, VOCs, SVOCs, PAHs, and fuels.

Ecological Risk Assessments, Pacific Gas & Electric, **Company, Wasco and Grass Valley, CA – Directed** ecological risk assessments for manufactured gas plants and service stations for the Pacific Gas & Electric Company (PG&E). These projects evaluated the potential impacts of metal and petroleum releases associated with past activities near riparian and riverine habitats. Responsible for managing all ecological risk assessment activities, characterizing biological resources at PG&E sites, estimating exposures, and evaluating the ecological risks to exposed plants, fish, and wildlife resources. Habitats included stream and riparian habitats. Constituents of concern were primarily metals, PCBs, PAHs, SVOCs, and VOCs.

TPH Screening Action Levels for East Bay Parks Sites, **San Francisco Bay Area – Evaluated proposed** screening/action levels for total petroleum hydrocarbons (TPH) in groundwater for East Bay Parks sites in the San Francisco Bay area. Responsible for evaluating existing toxicological studies and providing comments on the RWQCB (Region 2) guidelines for TPH in groundwater.

Ecological Risk Assessment, National Oceanic and Atmospheric Administration (NOAA), Gulf of the **Farallones National Marine Sanctuary (GFNMS) –** Participated in the ecological risk assessment of radioactive waste disposal activities to living resources in the Gulf of the Farallones National Marine Sanctuary (GFNMS) for the National Oceanic and Atmospheric Administration (NOAA). Responsible for (1) assessing risk to biological resources in the GFNMS due to radionuclides present in the area, (2) developing alternative site management options, and (3) constructing the GFNMS disposal site management decision framework and designing a phased site monitoring program. Constituents of concern were primarily radionuclides.

Ecological Risk Assessments, Pt. Mugu Naval **Weapons Station, CA – Task Leader responsible for** the development of a sampling plan to support ecological risk assessments at Pt. Mugu Naval Weapons Station, California. Responsible for 1) reviewing, selecting, and describing collection, handling, analytical, and quality assurance/quality control (QA/QC) methodologies for water, sediment, and biological samples and 2) preparing the field sampling methods manual for Pt. Mugu Naval Weapons Station, California.

Phase II Sampling Plan to Support Ecological Risk Assessments, Bolsa Chica Wetlands, Huntington **Beach, CA – Designed Phase II sampling efforts** needed to support a predictive ecological risk assessment. Designed biological surveys and executed a complex sampling and analysis program. Constituents of concern included metals, PCBs,

dioxins/furans, chlorinated pesticides, VOCs, SVOCs, and PAHs. All field sampling activities were completed within three weeks and a complete site assessment report with validated analytical data was submitted in less than three months since the inception of the project. Results of the sampling plan lead to 930 acres of wetland mitigation credits for the Ports of Long Beach and San Pedro Bay.

NESHAP Guidance Document, U.S. EPA – Developed guidance for examining human health and ecological risk trade-offs using multimedia modeling techniques to evaluate effective mitigating alternatives to control emissions of contaminants to the environment from petroleum refineries. Responsible for developing the approach and describing critical issues for assessing ecological risk to terrestrial and aquatic systems as a result of activities at petroleum refineries. This work with EPA's National Environmental Research Laboratory-Athens (ERL-Athens) promises to provide the "blueprint" for incorporating ecological risk assessment into other EPA remediation projects.

Ecosystem Modeling
San Francisco Estuary Regional Monitoring Strategy, San Francisco Estuary Project, San Francisco, CA. Work assignment leader responsible for the development of ecosystem models for the San Francisco Estuary Project (SFEP). Designed, wrote, and implemented models examining effects of dredged material disposal and pollutant loading to San Francisco estuary resources. Conceptual models were used to identify specific management and monitoring objectives and to assist in developing a regional monitoring program.

Ecosystem Modeling. Work assignment leader responsible for designing and constructing ecosystem models examining effects to the southern California bight resources due to POTW emissions. Conceptual models were used to identify management and monitoring objectives and to assist in developing a regional POTW monitoring program.

Marine And Estuarine Monitoring Program Design
Monitoring Program Guidance, U.S. EPA, Washington, D.C. Co-authored the Monitoring Program Guidance document for the National Estuary Program. Responsible for the development of the conceptual design of a regional monitoring strategy. Mr. Shibata managed, wrote, and compiled the methods section of the NEP Monitoring Guidance document. Mr. Shibata also co-authored the Technical Characterization Guidance document for the National Estuary Program. Wrote the sections addressing conceptual models and data/information management strategies.

Development of a Regional Monitoring and Data Management Strategy for the San Francisco Estuary Program (SFEP) and the Galveston Bay National Estuary Program (GBNEP). Work assignment leader responsible for the development of a regional monitoring and data management strategy for the San Francisco Estuary Program (SFEP) and the Galveston Bay National Estuary Program (GBNEP). Responsibilities include 1) project's overall conceptual design and coordination, 2) assessment of existing monitoring in the estuary, 3) ecosystem models development, 4) preparation of regional management and technical workshops, 5) development of a regional data and information management strategy and system, 6) development of regional monitoring implementation and funding strategies, and 7) production of the regional monitoring and data management strategy reports.

Assessment of Ongoing Water Quality Monitoring in the Monterey Bay National Marine Sanctuary (MBNMS) and Its Adjacent Watersheds, NOAA. Task leader responsible for an assessment of ongoing water quality monitoring in the Monterey Bay National Marine Sanctuary (MBNMS) and its adjacent watershed. Responsibilities include 1) compilation and review of existing information describing ongoing monitoring efforts in the Sanctuary, 2) assessment of ongoing monitoring effort in the Sanctuary and its adjacent watersheds, 3) participation and presentation for a NOAA-sponsored regional monitoring workshop, and 4) preparation and production of a regional monitoring assessment report designed to assist in the coordination of ongoing water quality monitoring efforts in the Sanctuary and its adjacent watersheds.

Regional Monitoring Strategy Training Workshops, U.S. EPA, Office of Wetlands, Oceans, and Watersheds. Work assignment leader responsible for a series of regional monitoring strategy Training Workshops for the Office of Wetlands, Oceans, and Watersheds. Responsibilities include 1) project's overall conceptual design and coordination, 2) preparation of workshop agenda and materials, 3) workshop logistics, 4) workshop training

presentations (e.g., Monitoring Program Guidance Document, ecosystem models, implementation and funding strategies), and 5) production of workshop proceeding.

Development of the Use Attainability Analysis (UAA) Guidance Document for the Water Quality Program, U.S. EPA, Region IX. Project leader responsible for the development of the Use Attainability Analysis (UAA) Guidance document for the Water Quality Program, U.S. EPA Region IX. Developed the conceptual design for the UAA process for intermittent streams of arid western states. Directed and wrote sections addressing 1) net environmental benefit analysis, 2) selection of analytical methods and sampling deign, 3) determination of site-specific criteria, and 4) design of monitoring programs.

Integrated Training Workshop, Near Coastal Waters and San Francisco Estuary Programs, U.S. EPA, Region 9. Project coordinator for an Integrated Training Workshop for Region 9's Near Coastal Waters and San Francisco Estuary Programs. Workshop demonstrated how regional EPA programs could integrate and cooperate to better manage water bodies of concern. Designed and prepared workshop materials, including a case study for the San Francisco Estuary.

San Diego Ocean Dredged Material Disposal Site (ODMDS LA5) Monitoring Program, U.S. EPA, Region IX. Participated in the design of the San Diego Ocean Dredged Material Disposal Site (ODMDS LA5) Monitoring Program. Responsible for the overall conceptual design of the LA5 ODMDS Monitoring Program. Responsible for designing technical monitoring methods concerning bioaccumulation and biological resources at LA5 ODMDS.

Data/Information Management Systems

Task Coordinator directing the Biological Characterization and Assessment Study for the Morro Bay National Estuary Program. Responsible for designing sampling plan, collecting biological data, populating biological database, constructing biological layers for GIS, assessing the status of Morro Bay resources, and recommending future actions.

Ocean Data Evaluation System (ODES), U.S. EPA, Washington, D.C. Work assignment leader for the Ocean Data Evaluation System (ODES). Responsible for system administration and coordination, technical support, reviewing data submission, and managing the system QA/QC.

ODES Tool Manual, U.S. EPA, Washington, D.C. Project leader for the production of the ODES Tool Manual for the Office of Marine and Estuary Protection (OMEP). Developed the document's overall structure and function and provided its final review. Responsible for managing the preparation and review of the manual's technical sections that described the statistical background and use of available ODES tools.

Ocean Data Evaluation System (ODES) User Support and Training Workshops, U.S. EPA, Washington, D.C. Project leader for the Ocean Data Evaluation System (ODES) User Support and Training Workshops. These workshops provided user support to agencies and dischargers submitting monitoring data to ODES. Responsible for (1) developing workshop agendas and workshops materials, (2) managing workshop staff, and (3) giving workshop presentations covering the overall design of ODES, its purpose, and available graphical and statistical tools.

Regional Monitoring and Data Management Strategy for the San Francisco Estuary Project (SFEP) and the Galveston Bay National Estuary Program (GBNEP), Galveston Bay Estuary Program. Work assignment leader for the regional monitoring and data management strategy for the San Francisco Estuary Project (SFEP) and the Galveston Bay National Estuary Program (GBNEP). Mr. Shibata supervised the staff and (1) conducted a regional data needs assessment, (2) evaluated existing data management systems for incorporation in whole, or part, into the regional DIMS, (3) developed alternative regional DIMS designs, 4) met with potential users of the system to gain their input, and (5) recommended the regional DIMS design best suited for managing regional monitoring data for Galveston Bay.

Naval Air Station Fallon, U.S. Navy, Western Division, Fallon, Nevada. Task leader responsible for the design and implementation of the ecological and biological literature database to support field surveys at Naval Air Station Fallon Nevada. Mr. Shibata designed the database, compiled and reviewed relevant ecological and biological literature populated the database, and completed data QA/QC.

California Commercial Passenger Fishing Vessel Program's (Sportfish CPFV) Computerized Data Entry Program, Marine Resources Division, California Department of Fish and Game. Designed, wrote, and implemented the California Commercial Passenger Fishing Vessel Program's (Sportfish CPFV) computerized data entry program for the Marine Resources Division, California Department of Fish and Game. The data entry program allowed for the efficient entry, error-checking (QA/QC), and editing of sportfish catch data.

Sportfish CPFV Data Analysis Program, Marine Resources Division, California Department of Fish and Game. Designed, wrote, and implemented the Sportfish CPFV data analysis program for the Marine Resources Division, California Department of Fish and Game. The data analysis program provided a user-friendly environment from which statistical analyses of several sportfish catch parameters could be conducted.

Environmental Data Analyses

Regional Statistical Workshops, U.S. EPA, Washington, D.C. Work assignment leader managing the design, preparation, and execution of regional statistical workshops for U.S. EPA. Responsible for workshop agenda and design, workbook and other materials, computer-aided demonstrations, and supervising workshop staff.

403(c) Support, U.S. EPA Region IX, San Francisco, CA. Conducted statistical analyses and assisted in the production of the technical report that assessed impacts to benthic communities due to contaminants in the discharges of exploratory and/or production wastes of 403(c) oil and gas related projects.

Field Survey Report, Hyperion 301(h) Ocean Outfall EIR/EIS, City of Los Angeles, Los Angeles, CA. Performed statistical analyses and assisted in the production of the Field Survey Report for the City of Los Angeles Hyperion 301(h) Ocean Outfall EIR/EIS. Responsible for data analyses interpretation, and managing the production of the Field Survey Report. Analyses examined spatial and temporal changes in physical and chemical properties of the sediment and benthic macroinvertebrate community structure and function.

301(h) Support, Orange County 301(h) Discharge, U.S. EPA, Region IX, San Francisco, CA. Conducted statistical analyses to identify and assess potential impact of the Orange County 301(h) discharge to nearfield habitats and benthic communities. Assessed changes in the condition of the benthic communities and evaluated their potential causes including sewage outfall and physical disturbances.

3-Year Gill-Net Restriction, California Department of Fish and Game, Central Coast Region of California. Provided statistical analyses to assess the effects of California Department of Fish and Game's 3-year gill-net restriction on the quantity and the quality of the sportfish catch for the Central Coast Region of California.

Lee R. Shull, Ph.D.

Partner/Corporate Risk Assessment Practice Leader

Dr. Shull is a professional toxicologist, risk assessor and businessman with over 31 years of experience, including over 13 years as a tenured University professor and over 20 years as a consultant in toxicology and risk assessment. While a professor at Michigan State University and the University of California-Davis, he conducted research in the disciplines of biochemical and environmental toxicology. He has authored and co-authored numerous research publications, several invited reviews and textbook chapters, and a toxicology textbook. He has instructed a variety of University and professional development courses in toxicology and risk assessment. As a professional consultant, Dr. Shull has served both public and private sector clients including strategic planning, performing scientific evaluations and assessments on a wide range of settings and hazardous substances, advising major corporations on environmental issues, providing expert testimony in numerous litigation cases and public hearings, providing risk communication to non-technical audiences, and guiding clients in complying with state and federal environmental laws and regulations. He has completed environmental consulting assignments in several Asian and European countries. Dr. Shull has been an invited speaker at numerous scientific symposia and conferences on a wide range of environmental topics, has been active in several international professional societies, has served on the editorial boards of several scientific journals, and has served on several national advisory boards. He founded and managed an environmental consulting company, which was later acquired. He holds a PhD in nutrition/toxicology and MS in nutrition/physiology, both from Oregon State University, and a BS in biology from the Southern Oregon University.

Professional Affiliations & Registrations

- Society of Environmental Toxicology and Chemistry
- Society of Toxicology - Northern California Chapter, President - 1995
- Society of Risk Analysis
- American Chemical Society
- Council of Agricultural Science and Technology

Fields of Competence

- Toxicology
- Human health risk assessment
- Litigation support/expert testimony
- Public health
- Expert review
- Regulatory negotiations
- Risk communication
- Community relations/interaction

Education

- Ph.D., Animal Nutrition/Toxicology, Oregon State University, 1975
- M.S., Animal Nutrition/Physiology, Oregon State University, 1972
- B.S., Biology, Southern Oregon State College, 1969

HONORS

- Elected to Active Membership, European Academy of Sciences and Arts
- Theta Delta Phi - academic honorary
- Sigma XI
- Phi Sigma (biological sciences honorary) award
- New Investigator Research Award. NIH

Key Projects

Health Risk Assessment and Public Health Evaluations Including Regulatory Negotiation

Strategic Planning, Risk Assessment, Toxicology, and Regulatory Interaction associated with addressing existing petroleum soil and groundwater contamination issues at the 700-acre, CPC refinery in Kaohsiung, Taiwan, and also addressing property cleanup (e.g., derivation of risk-based cleanup levels) for possible future redevelopment. Primary Chemicals of Potential Concern Include Petroleum Hydrocarbons and Metals. Chinese Petroleum Company, Kaohsiung, Taiwan. (2005-present).

Strategic Planning and Risk-based Closure and Property Redevelopment of a Former Petroleum Refinery (Brownfield Site) in El Dorado, KS; Primary Chemicals of Potential Concern Include Petroleum Hydrocarbons, Metals (Pb). El Paso Corporation, Houston, TX. (2005-present).

Strategic Planning and Risk-based Closure and Property Redevelopment of a Former, 140-acre Refinery (Brownfield Site) in Wichita, KS; Primary Chemicals of Potential Concern Include Petroleum Hydrocarbons, Metals (Pb), and Chlorinated Solvents (e.g., TCE, PCE). El Paso Corporation, Houston, TX. (2005-present).

Prospective, Deterministic Baseline Human Health Risk Assessment (Vapor Intrusion) at a Sacramento Brownfield Site; Industrial Site Redeveloped to Multi-family Land-use. Chemicals of Potential Concern are BTEX and 1,2-DCA.. Kennedy and Jenks, Chico, CA. (2005-present).

Risk Assessment and Toxicology Support Associated with the Development of a Large Aggregate Quarry. Granite Construction Company, Sacramento, CA. (2005-present).

Risk Assessment and Strategic Planning Support at a MS Manufacturing Site; Chemicals of Potential Concern Include Hydraulic Fluid Beneath a Facility Foundation. The Whirlpool Corporation Oxford Division, Oxford, MS. (2005-present).

Baseline Human Health Risk Assessment Support in Evaluating Prospective Airborne Health Risks From a Food-Processing Facility on a Planned Future Residential Development (Southcreek) in Stockton, CA; Primary Chemicals of Potential Concern Included Propylene Oxide, CrVI, Methyl Bromide, Ammonia, Benzene and Cadmium. Neil 0. Anderson Associates, Inc., Lodi, CA. (2005).

Baseline Air Quality and Noise Health Risk Assessment. Performed Analysis and Communication of Findings to City Officials and the Public at Community Forums. Department of Health and Human Services, City of Long Beach, CA. (2004-5)

Prospective, Deterministic Baseline Human Health Risk Assessment of 1,4-Dioxane in Groundwater at Air Force Plant 44 in Tucson, Arizona. Raytheon Corporation, Tucson, AZ. (2003-present).

Risk Assessment, Toxicology and Strategic Planning Support to Chevron and ConocoPhillips at a Brownfield Site in Stockton, CA (the Former Bulk Terminal Site Known as the L&M OU); Chemicals of Potential Concern Include Petroleum Hydrocarbons, Solvents, Metals (Arsenic), and PAHs; Property is Proposed for Multi-use (Residential, Commercial) Redevelopment. Earth Tech, San Jose, CA. (2003-present).

Prospective, Deterministic Occupational Risk Assessment Involving Hexachlorobenzene (HCB) in Workers at a Large Manufacturing Facility. Confidential Client. (2002-2004).

Remedial Action Work Plan for Arsenic-Impacted Soil at the Former Valencia Substation (Brownfield Site) in Support of Residential Redevelopment. Pacific Gas & Electric, San Francisco, CA. (2003).

Risk Assessment and Toxicology Support to the MWH Federal Group for Selected Environmental Corrective Action Issues at Several USAF BRAC Bases (e.g., Loring AFB, Mather AFB, Hill AFB). Air Force Center For Environmental Excellence (AFCEE), Brooks City, TX and Air Force Real Property Agency (AFRPA), Washington D.C. (2002-present).

Risk Assessment and Planning Support for Brownfield Risk-based Cleanup and Closure of the Santa Susana Field Laboratory (SSFL), a Former Rocket Testing Facility, as Part of the RCRA Corrective Action Program; Chemicals of Concern Include are Wide-ranging Including Solvents (e.g., TCE, PCE, TCA, DCA, Freon), Liquid Rocket Fuels (e.g., Kerosene, JP-4, Hydrazine), Oxidizers (e.g., Nitrogen Tetroxide), Metals (e.g., Arsenic), Energetic Materials (e.g.,

Perchlorate, RDX, HMX), PCBs, Dioxins and Furans, Radioactive Materials, and Biocides. The Boeing Company, Rocketdyne Propulsion and Power (Rocketdyne); the National Aeronautics and Space Administration (NASA); and the U.S. Department of Energy (DOE) (2002-present).

Prospective, Deterministic Occupational Human Health Risk Assessment Associated with Property Redevelopment of the Kai Tac Channel in Hong Kong; Of Primary Concern are Worker and Future Residents in Potential Contact with Sediments Containing Chemicals of Potential Concern (e.g., PAHs, metals) and Methane Intrusion in Indoor Air. ARUP. Hong Kong, China (2003).

Prospective, Probabilistic Risk Assessment on Arsenic in a Micronutrient Fertilizer Product. Ironite Company (2002-2003).

Prospective, Deterministic Human Health and Ecological Risk Assessment Involving Chlorinated Solvents (e.g., TCE, Chloroform, PCE) and Metals (e.g., Arsenic, Cadmium, Selenium) on a Former Industrial Chemical Storage and Recycling Center in Olathe, Kansas, including Regulatory Negotiation with EPA Region 7 and KDHE. The Boeing Company, Canoga Park, CA. (2001-2003).

Human Health Risk Assessment on a 65-acre Rural Residential Development of a Former Orchard (Brownfield Site) with Soils Containing Arsenic, Lead, Organochlorine Pesticides. Howard P. Marguleas Development; Sacramento, CA (2000-2003).

Prospective, Environmental Human Health and Ecological Risk Assessment of a Former Department of Energy (DOE) Research Facility with Soil and Groundwater Contamination of a Wide Range of Solvent, Pesticides, Metals and Radiological Substances. University of California at Davis, Davis, CA. (2001-present).

Prospective, Deterministic Human Health Risk Assessment on Chlordane and DDT/DDE/DDD in Residential Soil including Regulatory Negotiation. Mercy Homes, Sacramento, CA. (2002-present).

Prospective Occupational Risk Assessment Associated with Exposure of Workers to Residues of Chlorinated Dioxins/Furans Following a Transformer Fire. Sacramento Municipal Utility District, Sacramento, CA. (2002)

Prospective Human Health Risk Assessment on a 25-acre Industrial Pesticide (DDT and related chemicals) Formulation Site in Henderson, NV, including Regulatory Negotiation with the Nevada DEP, and Strategic Planning. Montrose Chemical Corp.; Seattle, WA (2002-present).

Development of Soil Risk-Based Cleanup Levels (Human Health and Ecological Risk Assessment) for Arsenic, Chromium VI, and Copper at a Wood-Treating Facility. Coast Wood Preserving, Inc. Ukiah, CA. (2001-02).

Human Health Risk Assessment including Preliminary Endangerment Assessment and General Advisory Services of a Proposed New School on Former Agricultural Land. Stockton Unified School District, Davis, CA (2000-2).

Human Health Risk Assessment including Preliminary Endangerment Assessment and General Advisory Services of a Proposed New School on Former Agricultural Land. Davis Joint Unified School District, Stockton, CA (2000-02).

Human Health Risk Assessment including Preliminary Endangerment Assessment and Regulatory Negotiation of a Proposed New School on Former Agriculture Land Containing Residues of Toxaphene. Galt Unified School District; Galt, CA (1998-01).

Human Health Risk Assessment on a 180-acre Rural Residential Development of a Former Orchard with Soils Containing Arsenic, Lead, Organochlorine Pesticides. Actium Development Corp.; Sacramento, CA (1999-03).

Development of a Risk-Based Methodology for Decision Making Regarding the Presence of Arsenic in Soils of Placer County. Anonymous Developers in Placer County (2000-02).

Prospective, Human Health Risk Assessment for Prop 65 Purposes Involving Lead and Cadmium in Skin Care Products. Anonymous Law Firm (1999-00).

Prospective, Human Health Risk Assessment for Prop 65 Purposes Including Derivation of a Dermal Cancer

Potency Factor for Coal Tar in Shampoo Products. Anonymous Law Firm (1999-00).

Prospective, Multi-pathway Human Health Risk Assessment Involving Agrichemicals at a Currently Operating Formulation and Distribution Facility. Sierra-Pacific Group, Inc., Stockton, CA (1997-99).

Human Health Risk Assessment on a 2000 Acre Residential Development of a Former Heavy Industry Site. Basic Management, Inc., Henderson, NV (1996-present).

Probabilistic Human Health Risk Assessment on Chloroform Emitted from a Lumber Mill. Ketchikan Pulp, Ketchikan, AK (1995-96).

Derivation of Risk-Based Concentrations (RBCs) of Lead, Cadmium and Arsenic in Commercial Fertilizers using Probabilistic Risk Assessment. California Dept. Food and Agric., Sacramento, CA (1995-98).

Screening Baseline Human Health Risk Assessments and Regulatory Negotiation Involving Chlorinated Solvents and Petroleum Hydrocarbons. Safety-Kleen Corp., Cloquet, MN (1995-96).

Baseline Deterministic Human Health Risk Assessment on Petroleum Hydrocarbons in Bark Waste at an Old Mill Site. Wheeldon and Associates, Placerville, CA (1995-96).

Prospective, Probabilistic, Multi-pathway Human Health and Ecological Risk Assessment Involving DDT, toxaphene, 1,2-DCP, EDB at a Former Pesticide Formulation Facility. Latham and Watkins, Costa Mesa, CA (1995-96).

Baseline Human Health and Ecological Risk Assessment and Development of Risk-Based Corrective Action Levels at a Solvent Recycling Center as Part of a RCRA Facility Investigation. Safety-Kleen Corp., Hebron, OH (1995-96).

Demographic Study, Human Health Risk Assessment and Negotiation with U.S. EPA Regarding the Potential Impacts of Sulfur Dioxide (SO2) on Mild or Moderate, Exercising Asthmatics. Magma Copper Company, San Manuel, AZ (1995-96).

Retrospective, Deterministic, Multi-pathway Baseline Human Health (children, adults) Risk Assessment Associated with Incidental Exposure to DDT and Toxaphene. Shell and Associates, Roseville, CA (1995).

Prospective, Deterministic, Multi-pathway Human Health and Ecological Risk Assessment of Petroleum Hydrocarbons (gasoline, diesel, jet fuel) at an Air Force Base in Alaska Using the Fractionation Method. U.S. Army Corp. of Engineers, Alaska Region (1994-95).

Maximum Credible Release Analysis Involving Volatile Gases (e.g., chlorine, ammonium, titanium tetrachloride, hydrogen sulfide) and Prospective Human Health Risk Assessment as Part of a 2000 acre Development Adjacent to a Multiple-Facility Industrial Complex. BMI, Henderson, NV (1995).

Retrospective Probabilistic Health Risk Assessment to Characterize Occupational Risks to Lead and Mercury at a Telecommunications Materials Disposition Center. Bell South Telecommunications, Jacksonville, FL (1993-94).

Probabilistic Health Risk Assessment to Develop Cleanup Levels of Metals, Pesticides and Chlorinated Solvents in Soil at a Aerospace Test Facility. Anonymous, Ventura County, CA (1994).

Prospective Screening Deterministic Human Health Risk Assessment and Qualitative Ecological Assessment on Copper in Soil at a Golf Club. Aqua-Terra Environmental, Auburn, CA (1994).

Retrospective, Deterministic Human Health Risk Assessment and SESOIL Modeling on Petroleum Hydrocarbons (benzene, toluene and xylene) at a Former Gasoline Station Site Currently Used as a Commercial Office Building. Anonymous, CA (1993).

Human Health Risk Assessment (AB 2588) of Emissions of Arsenic, PAHs, Benzene, Dioxins/furans, Chloroform, Acetaldehyde, Formaldehyde, Lead, Cadmium, Chlorine, Copper, Manganese, Mercury, Naphthalene, Zinc from a Large Lumbermill. Anonymous, CA (1992-94).

Proposition 65 Baseline Prospective, Deterministic, Human Health (Worker) Risk Assessment on Polychlorinated dioxins/furans, PCBs and Heavy Metals in Particulate Emissions Associated with a Pesticide Carrier. Anonymous, California (1993).

Retrospective/Prospective Deterministic Multi-pathway Health Risk Assessment on Emissions of Volatiles and Leaching of Inorganics and Organics into Surface and Groundwater from a Municipal Solid Waste Landfill. South Stage Landfill, Medford, OR (1992-93).

Prospective, Deterministic Human Health Risk Assessment and Regulatory Negotiation Associated with Lead at an Industrial Site. Bergsoe Metals Corporation, OR (1992-93).

Qualitative Ecological Risk Assessment and Regulatory Negotiation Associated with Arsenic, Cadmium, Copper, Lead and Zinc in Soil, Sediment and Ambient Water at a Former Mining Site. Shiny Rock Mining Corporation, OR (1992).

Prospective, Deterministic Human Health Risk Assessment Associated with TCE and Boron in Groundwater at a Former Quarry Site. U.S. Department of Justice, Washington D.C. (1992).

Prospective, Deterministic Human (Worker) Health Risk Assessment Involving DDT/DDE/DDD in Soil at a Petroleum Terminal. Anonymous (major oil distributor), Seattle, WA (1991-92).

Prospective, Deterministic Human Health Risk Assessment on Chemicals Volatilized and Leached from a Municipal Landfill. WES Technology, Loomis CA (1992-93).

Prospective, Deterministic Human (Onsite Worker and Residential Receptors Assumed) Health Risk Assessment on Industrial Slag Containing Lead, Mercury, Cadmium, Chromium, Thallium, Arsenic, Antimony. Lowney Associates, Mountain View, CA (1992).

Prospective, Deterministic Multi-pathway AB-2588 Human Risk Assessment on Air Emission of Crystalline Silica, Hexavalent Chromium, Formaldehyde, Phenol, Nickel, Phosphorous, Manganese from a Foundry. Waterman Foundry, Exeter, CA (1991-92).

AB 2588 Screening-level Health Risk Assessment and Risk Communication on Air Emissions of Arsenic, Benzene, Beryllium, Cadmium, Chloroform, Dioxane, Formaldehyde, Mercury, Methylene Chloride, Nickel and Selenium from a Commercial Sugar Refinery. C&H Sugar, Crockett, CA (1990-91).

Prospective, Deterministic, Multi-pathway Baseline Human Health Risk Assessment at a Cropduster Airport (California Superfund Site) Performed to Identify Remediation Zones of Soil Containing 50 Pesticides, Lead and Petroleum Hydrocarbons. Tulare County, CA (1991-93).

Prospective, Deterministic, Multi-pathway Baseline Human Health Risk Assessment on Former Agricultural Land Containing Organochlorine Pesticides Being Converted to a Residential Development. Davis Community Housing Sites. Wallace-Kuhl Associates, West Sacramento, CA (1991).

Prospective, Deterministic, Multi-pathway Baseline Human Health Risk Assessment on Lead in Soil at a Proposed Residential Development, Using U.S. EPA's Biokinetic Uptake Model to Determine Site-Specific Soil Clean-up Levels. Renown Enterprises, Folsom, CA (1990-91).

Prospective, Deterministic, Screening Health Risk Assessment and Risk Communication (Public Meetings) of a Proposed Hazardous Waste Incinerator. Combustion Technology, Inc., Denver, CO (1991-93).

Site Environmental Evaluation and Prospective, Deterministic, Multi-pathway Health Risk Assessment of a Proposed New School on Former Agriculture Land Containing DDT/DDE in Soil. Davis Joint Unified School District, Davis, CA (1990-91).

Prospective, Deterministic, AB 2588 Multi-pathway Human Health Risk Assessment on Air Emissions Containing Hexavalent Chromium, Benzene, Formaldehyde, PCE, Toluene, Xylene, Sodium Hydroxide and Copper from a Commercial Printing Company. Arcata Graphics San Jose, CA (1990-91).

Prospective, Deterministic, Multi-pathway Baseline Human Health Risk Assessment on 1,1-DCA, 1,1-DCE, PCE, MEK, Benzene, Dichlorobenzenes, 1,1,1-TCA, Ethylbenzene, Xylene, Toluene and Mineral Spirits at a Solvent Recycling Center. Safety-Kleen, Syracuse, NY (1990-91).

Public Health Section of an EIR on a Proposed Waste Recycling and Minimization Process (Hazardous

Waste Incinerator). WES Technology, Rocklin, CA (1990-92).

Prospective, Deterministic, Multi-pathway Baseline Human Health Risk Assessment on Mineral Spirits and Chlorinated Solvents at a Solvent Recycling Center. Safety-Kleen, Wichita, KS (1990-92).

Prospective, Deterministic, Multi-pathway Baseline Superfund Public Health Evaluation on VOCs (TCE, PCE, TCA, VC, 1,1-DCE, 1,2-DCE, etc.) in Groundwater. Teledyne Components and Spectra-Physics, Mountain View, CA (1989-91).

Prospective, Deterministic, Multi-pathway Baseline Superfund Public Health Evaluation on VOCs (TCE, VC, 1,1 DCE, 1,1-DCA, PCE, 1,1,1-TCA, dichlorobenzene.) in Groundwater. Advanced Micro Devices, Sunnyvale, CA (1989-91).

Technical Advisor for a Toxicologic Evaluation and Baseline Human Health Risk Assessment Performed on an Fertilizer Manufacturing Facility. Bechtel Environmental, San Francisco, CA (1992).

Field Study, Performance of a Prospective, Deterministic, Multi-pathway Baseline Human Health Risk Assessment and Regulatory Negotiation on Cyanide-Contaminated Soil at a Former Industrial Site Anonymous, Fresno, CA (1991-93).

Qualitative Public Health Evaluation on Arsenic in Mine Tailings at a Residential Development. Development Company, Sutter Creek, CA (1990).

Public Health Evaluation of Agricultural Drainage Water Contamination in the San Joaquin Valley of California: Feasibility of Quantifying Toxic Impacts of Selenium, Arsenic, Boron and Molybdenum and Qualitative Evaluation of Remediation Options. U.S. Dept of Interior, Sacramento, CA (1989-90).

Superfund Baseline Public Health Evaluation on DDT/DDE/DDD, Endosulfan, Malathion, Ethion, Cadmium and Chromium in Soil and Groundwater at a Former Pesticide Formulation Facility. FMC Corporation/Bechtel Environmental, Inc.; Yakima, WA (1989-90).

Quantitative Superfund Ecological Risk Assessment on Organochlorine and Organophosphate Pesticides and Heavy Metals (Cd, Cr, Zn) in a Wetland Adjacent to a Former Pesticide Formulation Facility. FMC Corporation/ Bechtel Environmental, Inc.; Yakima, WA (1989-90).

Qualitative Evaluation of Environmental Behavior and Public Exposure Potential Associated with Heavy Metals (Arsenic, Lead, Chromium, etc.) in Commercial Fertilizers. ConAgra, Omaha, NE (1989).

Prospective, Deterministic, Multi-pathway Baseline Health Risk Assessment Associated with Conversion of Former Agricultural Land Containing DDT and arsenic to a Residential Development. Stanley Davis Homes, Woodland, CA (1989).

Prospective, Deterministic, Multi-pathway Baseline Human Health Risk Assessment of a Proposed Residential Development of a Site Containing Lead, Arsenic and Mercury. Folsom, CA (1989).

Field Study and Prospective, Deterministic, Multi-pathway Baseline Human Health Risk Assessment of a Proposed Residential Development Adjacent to a Superfund Site Containing Pesticides (DDT, Endosulfan, Methoxychlor, 2,4-D, Carbaryl, Disulfoton, Parathion). Anonymous, Lodi, CA (1989).

Prospective, Deterministic, Multi-pathway Baseline Human Health Risk Assessment and Risk Communication of a Proposed Residential Development at a Former Landfill Site Containing Methyl Ethyl Ketone, Xylene, Petroleum and Cadmium). Kaufmann and Broad Inc., Milpitas, CA (1988-89).

Prospective, Deterministic, Multi-pathway Baseline Human Health Risk Assessment of a Former Pesticide Formulation Site Containing Dieldrin, DDT, Heptachlor, Chlordane, Aldrin, Parathion, Dinoseb, Pentachlorophenol. FMC Corp./Bechtel Environmental, Inc., San Francisco, CA (1988-89).

Superfund Baseline Public Health Evaluation and Regulatory Negotiation at a Semi-conductor Site with Groundwater Contamination 1,1,1-Trichloroethane, Vinylidene Chloride, PCE, Freon 113, Xylene, Isopropyl Alcohol and Acetone. Landels, Ripley and Diamond, San Jose, CA (1987-89).

Qualitative Public Health Evaluation and Public Testimony Associated with a Proposed Fluidized-Bed

Incinerator for Biomass-to-Energy Conversion. A Community Organization, Willits, CA (1988).

Qualitative Public Health Evaluation and Technical Advising Associated with Remediation of Chromium Contaminated Soil. Grisanti and Associates, Kingsburg, CA (1988).

Qualitative Public Health Evaluation and Public Testimony Associated with a Proposed Fluidized-Bed Incinerator for Biomass-to-Energy Conversion. Black and Kopper, Davis, CA (1987-88).

Qualitative Environmental Risk Assessment Associated with Pesticides (DBCP, EDB, CCl4, Disulfoton, 1,2 Dichloropropane and 1,3-Dichloropropene) in Soil and Groundwater at a California Superfund site. Luhdorff and Scalmanini Engineering, Woodland, CA (1987-88).

Qualitative Human Health Risk Assessment of Soil Containing 2,4-D, Atrazine and Other Pesticides at a Crop-duster Airport. Luhdorff and Scalmanini, Woodland, CA (1988).

Prospective, Deterministic, Multi-pathway Baseline Human Health Risk Assessment of Soil Containing DDT, Endosulfon and Lindane at a Former Nursery Site Proposed for Residential Development. Wahler and Associates, Palo Alto, CA (1988).

Toxicology Projects

Technical Report on the Current Status of USEPA and Cal/EPA Arsenic Carcinogenic Toxicity Criteria. Earth Tech and the Santa Clara Valley Transit Authority (2005)

Comprehensive Toxicology and Risk Assessment Review on 1,4-Dioxane. U.S. Air Force Institute for Operational Health, Brooks City Base, San Antonio, TX (2004-present).

Comprehensive Toxicology Literature Survey and Review of Human Studies on Hexachlorobenzene. Anonymous (2002).

Comprehensive Literature Review of the Reproductive Toxicology of DDT and DDE. Anonymous (1998-99).

Comprehensive Toxicology Literature Review and Development of Toxicity Criteria on 32 Chemicals for the Office of Environmental Health Hazard Assessment (OEHHA), California EPA, Under the California Air Toxic 'Hot Spots' Information and Assessment Act of 1987. Western Environmental Health Associates, Inc., Davis, California (Contract 1991-95).

Toxicological Review on the Carcinogenicity of Trichloroethylene (TCE). Nestle USA (1992-93).

Toxicology Literature Review on Crystalline Silica with an Emphasis on the Issue of Human Carcinogenesis. Anonymous, (1992-93).

Development of Database on a the Southern Pacific Metam Sodium Spill in the Upper Sacramento River Including QA/QC of Analytical Data and Identification of Data Gaps. Cal/EPA (1991-92).

Toxicology Review of 15 Herbicides for Development of Soil Cleanup Levels at Contaminated Sites in the Pacific Northwest. Woodward-Clyde Consultants, Seattle, WA (1991).

Environmental Fate, Toxicological Profile and Current Regulatory Status of Pentachlorophenol for the Purpose of Deriving Health-based Clean-up Levels at Wood-treating Sites. Woodward-Clyde Consultants, Seattle, WA (1990).

Toxicological and Public Health Evaluation of a Proposed Method for Mitigating Methane Gas From Beneath Commercial Buildings. City of San Rafael, CA (1990).

Toxicological Review, Written Response and Participation in Public Hearing Regarding California Department of Food and Agriculture (CDFA) Proposal to List Ethyl Parathion as a Toxic Air Contaminant (AB 1807). Cheminova, Copenhagen, Denmark (1988).

Hazard Evaluation of Volatile Organic Chemicals Inadvertently Added to California Rice While Aboard a Ship, Advised Client on Safe Disposition. Rice Growers Assoc., Sacramento, CA (1987).

Comprehensive Literature Review in Support of a Qualitative Human Health and Ecological Assessment and Risk Communication Associated with Pentachlorophenol & Polyaromatic Hydrocarbons in Soil/Groundwater at a Woodtreating Facility. Koppers Co., Oroville, CA (1985).

Research Management and General Advising
General Advising: 300+ acre property development adjacent to contaminated properties. Anonymous, California. 2000-present.

General Advising: Development of a risk-based decision-making approach for arsenic in Placer County soil. Coalition of California Property Developers (2000-present).

Expert Advising: Remedial Action Management, Risk-based Decision Making, Risk Management, Regulatory Negotiation in Conjunction with Army Base Land Transfer to Private Sector. The Oz Entertainment Company (1998-present).

Expert Advisor/Reviewer: Review of Environmental Corrective Action Approach and Progress at 4 San Francisco, CA-area U.S. Navy Bases. Center for Naval Analysis (1998-99).

Research Management: Research to Determine the Oral Bioavailability of DDT in Soil: Contractor Selection, Experimental Design. The Montrose Chemical Company (1998-present).

Research/Project Advisor: Regulatory Negotiation and Research Advising Associated with Product Development and EPA Registration (FIFRA) of a Anti-Microbial Consumer Product. The Christal Company of California (1996-present).

Project Technical Expert and Advising: Redevelopment of Urban Property from a Mill Site into Commercial Land Use. The CHY Company, Sacramento, CA (1998-present).

Toxicology and Risk Assessment Advising on a U.S. Army Corp of Engineers Project involved with Environmental Restoration and Privatization at Hamilton Air Force Base. IT Corp., Novato, CA (1997-present).

Project Technical Expert and Advising Associated with a Site Investigation and Remediation Program Implemented at a Granite Mining Quarry. The CHY Company, Sacramento, CA (1997-98).

Project Technical Expert, Advising and Regulatory Negotiation Associated with Property Transfer of Lumber Mill Property Contaminated with Chlorinated Dioxins and Furans. Setzer Forest Products, Sacramento, CA (1992-96).

Technical Counsel, General Advising and Research Management
Strategic advising, technical counsel to the wood products industry on public health implications associated with formaldehyde emissions from urea-formaldehyde manufactured wood products; public testimony in regulatory hearings. Composite Panel Association (Washington DC), California Wood Industries Coalition (Sacramento, CA). 2006-present.

Strategic advising, technical counsel and regulatory interaction to a property development company regarding arsenic issues associated with former orchard land use and lead arsenate application. MDK Properties, Sacramento, CA. (2006-present).

Strategic advising, technical counsel and regulatory interaction on a vapor intrusion issue at Castle Airforce Base, Merced, CA. AFRPA, Sacramento, CA. (2005-2006)

Strategic advising, risk communication, regulatory interaction, risk assessment review at the Empire Star Mine in Grass Valley, CA. Provided toxicology and risk assessment expertise in public and employee meetings. Newmont Mining Co., Denver, CO. (2006-present).

Strategic planning, technical advising and regulatory interaction associated release hydraulic fluid at an active manufacturing facility. Advised on a SESOIL modeling approach to determine potential impacts on groundwater. Whirlpool Corporation, Oxford, MS. (2005-present).

Strategic planning, risk assessment and toxicology technical counsel, risk assessment review, and regulatory interaction/negotiation associated with the permitting of a mining quarry; arsenic is substance of primary concern. Granite Construction Company, Sacramento, CA. (2005-present).

Strategic advising, risk communication, risk assessment review, regulatory negotiation support on a superfund project in Scottsdale, AZ involving chlorinated solvents in groundwater. Montgomery and Associates, Scottsdale, AZ. (2005-present).

General Advising: 300+ acre property development adjacent to contaminated properties. Anonymous, California. 2000-present.

General Advising: Development of a risk-based decision-making approach for arsenic in Placer County soil. Coalition of California Property Developers (2000-3).

Expert Advising: Remedial Action Management, Risk-based Decision Making, Risk Management, Regulatory Negotiation in Conjunction with Army Base Land Transfer to Private Sector. The Oz Entertainment Company (1998-2001).

Expert Advisor/Reviewer: Review of Environmental Corrective Action Approach and Progress at 4 San Francisco, CA-area U.S. Navy Bases. Center for Naval Analysis (1998-99).

Research Management: Research to Determine the Oral Bioavailability of DDT in Soil: Contractor Selection, Experimental Design. The Montrose Chemical Company (1998-2001).

Research/Project Advisor: Regulatory Negotiation and Research Advising Associated with Product Development and EPA Registration (FIFRA) of a Anti-Microbial Consumer Product. The Christal Company of California (1996-2000).

Project Technical Expert and Advising: Redevelopment of Urban Property from a Mill Site into Commercial Land Use. The CHY Company, Sacramento, CA (1998-present).

Toxicology and Risk Assessment Advising on a U.S. Army Corp of Engineers Project involved with Environmental Restoration and Privatization at Hamilton Air Force Base. IT Corp., Novato, CA (1997-2000).

Project Technical Expert and Advising Associated with a Site Investigation and Remediation Program Implemented at a Granite Mining Quarry. The CHY Company, Sacramento, CA (1997-98).

Project Technical Expert, Advising and Regulatory Negotiation Associated with Property Transfer of Lumber Mill Property Contaminated with Chlorinated Dioxins and Furans. Setzer Forest Products, Sacramento, CA (1992-96).

Expert Reviewer

Expert Peer Reviewer: Agency for Toxic Substances and Disease Registry (ATSDR):

- Toxicology Profile on Polybrominated Biphenyls. 1994, 2002.
- Toxicology Profile on Tetrachloroethylene. 1995.
- Toxicology Profile on Wood Creosote, Coal Tar Creosote, Coal Tar, Coal Tar Pitch, and Coal Tar Pitch Volatiles. 2000.
- Toxicology Profile on Polybrominated Biphenyls and Polybrominated Diphenyl Ethers. 2002.

Expert Peer Reviewer: "Housatonic River Human Health Risk Assessment", SRA International, Arlington, VA (2003)

Expert Peer Reviewer: U.S. EPA's Proposed "Farm Food Chain Module and Data Collection for the Hazardous Waste Identification Rule (HWIR)", Eastern Research Group, Lexington, MA (2001).

Expert Peer Reviewer: Center for Disease Control (CDC), Office of Smoking and Health report entitled: "Tobacco Products Ingredients." Eastern Research Group, Lexington, MA (2000)

Expert Peer Reviewer: U.S. EPA's Report entitled: "PCBs in the Environment near the Oak Ridge Reservation - a Reconstruction of Historical Doses and Health Risk", Eastern Research Group, Lexington, MA (2000)

Expert Peer Reviewer: Bureau of Reclamations's "Draft EIR/EIS: Salton Sea Restoration Project". California Audobon Society, Sacramento, CA (2000-1).

Expert Peer Reviewer: U.S. EPA's report entitled: "Hudson River PCBs Reassessment, Human Health Risk Assessment Report." Eastern Research Group, Lexington, MA (2000).

Expert Peer Reviewer: U.S. EPA's "Risk Characterization Handbook", Eastern Research Group, Lexington, MA (1999).

Expert Reviewer: Revised Texas Risk Reduction Program (TRRP), Texas Natural Resource Conservation Commission; Reviewed the Proposed Rule, Conducted Uncertainty Analysis. Fulbright & Jaworski (1998-99).

Expert Peer Reviewer: U.S. EPA guidance on "Breast Milk Pathway" in "Methodology for Assessing Health Risks Associated with Multiple Exposure Pathways to Combustor Emissions". Eastern Research Group, Lexington, MA (1998).

Expert Peer Reviewer: U.S. EPA guidance on "Methodology for Assessing Health Risks Associated with Multiple Exposure Pathways to Combustor Emissions". Eastern Research Group, Lexington, MA (1998).

Project Technical Expert: Toxicology Review, and Regulatory Interaction and Negotiation Assisting the Client in Achieving Registration in California of a Product that Chelates Silver Rendering it Non-Hazardous. Isolyser Corporation, Atlanta, GA. (1993-94).

Project Technical Expert: Toxicology and Chemistry, Regulatory Interaction and Negotiation Assisting the Client in Achieving Approval to Market a New Wood Preservative in California. J.H. Baxter, San Francisco, CA. (1993).

Technical Reviewer of a Cal/EPA Baseline Human Health Risk Assessment for a State Superfund Site. Bay Area Drum Site PRP Committee, San Francisco, CA (1992-93).

Development of Analytical and Human Health Risk Assessment Procedure for Mineral Spirits. Safety-Kleen Corporation, Elgin, IL (1990-96).

Project Advisor: Hospital Air Quality Study Associated with Substances Emitted from a Hospital Incinerator. Georgia Baptist Hospital, Atlanta, GA (1992).

Project Advisor: Risk Communication and Public Health Issues Associated with a Proposed Mining Overburden EIR. Granite Rock, Watsonville, CA (1992-94).

Project Advisor: Managed Field Investigations and Studies and Regulatory Negotiation Associated with Inorganic (Lead, Zinc, Boron) Contamination and Remediation Alternatives at a Former Industrial Site . Boutin, Lassner, Gibson & Delehant, Sacramento, CA (1992-93).

Project Advisor: Site Investigation of an Abandoned Wood Products Mill with Environmental Residues of Chlorinated Dioxins and Furans Associated with Pentachlorophenol Wood Treatment. Wheeldon Geotechnical, Placerville, CA (1991-92).

Peer Review of a Baseline Deterministic Human Health Risk Assessment on Chloro-Dioxins and Furans in Soil. WES Technology, Newcastle, CA (1991-92).

ARCSWEST Program Health Risk Assessment Peer Reviewer, U.S. EPA Regions IX and X. Bechtel Environmental, Inc., San Francisco, CA (1991).

External Risk Assessment Reviewer on a CERCLA Site at which the RI/FS is Being Conducted by the U.S. EPA. FMC Corporation, Fresno, CA (1990).

Project Advisor: Quantitative Human Health Risk Assessment, Field Studies, Risk Communication and Regulatory Interaction Associated with a Proposed Commercial Hazard Waste Incinerator and Landfill. ECOS, Seattle, WA (1990-4).

Toxicology and Risk Assessment Advisor and Expert Witness to the U.S. Department of Justice (Environmental Enforcement Section) on CERCLA Hazardous Waste Sites in New Jersey and Pennsylvania Involving Asbestos, TCE and Lead. U.S. DOJ, Washington D.C. (1990-92).

Toxicology and Risk Assessment Advisory Service to U.S. Department of Justice, Civil Division/Torts Branch on a California Superfund Site Involving Lead, Solvents, Petroleum Hydrocarbons and Paint-Based Chemicals. U.S. DOJ, Washington D.C. (1990-92).

Toxicology and Risk Assessment Adviser to Nestle Foods Corporation, Providing Toxicology, Risk Assessment and Risk Communication Expertise Associated with Environmental Cleanup Programs at Contaminated Sites. Nestle Food Corp., Purchase, NY (1988-93).

Technical Reviewer of U.S. Forest Service FEIS on Potential Health Impacts Associated with Pesticide Usage in Vegetation Management for Reforestation. Timber Association of California, Sacramento, CA (1989-90).

Expert Review of EIR and Potential Impacts of Health-Based Regulations Associated with the Acquisition of a Fluidized-Bed Incinerator for Biomass-to-Energy Conversion. Chrysler Capital Corp., Greenwich, CN (1987).

Interviewer and Test Question Formulator for Sacramento Sanitation District in Assessing Environmental Toxicology and Chemistry Knowledge of Candidates for Hiring. Sacramento Sanitation District, Sacramento, CA (1988).

Environmental Issues Advisor on Environmental Health Issues on an As-Needed Basis. Davis Joint Unified School District (1991-98).

Site Characterization and GIS Projects
Human health risk assessment and geostatistical evaluation using GIS (ArcView) as part of an analysis of historically released DDT at a manufacturing facility. Latham and Watkins, San Francisco, CA (2000).

GIS (ArcView) Assistance on the Transfer of 9000-Acre Army Base from the U.S. Government to the Private Sector. Oz Entertainment Company, Los Angeles, CA (1999-present).

GIS (ArcView) Assistance on a Large Land Development Project in Henderson, NV. Basic Remediation Company, Henderson , NV (1999-present).

Development of a GIS (ArcView) Program Tabulating and Mapping Background and Ambient Concentrations of Cadmium, Lead and Zinc in North American Soils and Waters. Subcontractor to Parametrix, Inc., Corvallis, OR (1999-present).

Managed the Characterization and Regulatory Negotiation of a Lumber Mill Site Containing Chlorinated Dioxins and Furans in Soil Associated with a Property Transfer. Setzer Forest Products, Sacramento, CA (1992-6).

Managed the Characterization of a Former Lumber Mill Site, Including Strategic Sampling for Risk Assessment Purposes; Substances Included Chemicals Associated with Wood Preservation (e.g., Pentachlorophenol, Arsenic) and Secondary Products (e.g., Dioxins, PAHs). Anonymous (1992-94).

Managed the Characterization and Regulatory Interaction Associated with a Release of Dinoseb into Soil and Groundwater, Including Design of a Soil and Groundwater Remediation Program and Testimony and Arbitration Hearings. Private party, Chico, CA (1991).

Litigation Support and Expert Testimony
Testifying Toxicology and Risk Assessment Expert for the Defense Involving Petroleum, PCE and PCBs Contamination at Former Manufacturing Facility in Ontario, CA; Deposition Provided. Settled. Manatt, Phelps and Phillips, Los Angeles, CA. (2005-2005).

Testifying Toxicology and Human Health Risk Assessment Expert for the Plaintiff in the Matter of Ironite Products Company (Scottsdale, AZ) v. Washington Toxics Coalition et al. Case No.: CIV 02-1748 PHX-SMM. United States District Court for the District of Arizona. Provided Expert Report. Settled. Gallagher & Kennedy, Phoenix, AZ. (2005).

Testifying Toxicology and Human Health Risk Assessment Expert for the Defense on Indoor Air Intrusion of Petroleum-Related VOCs. Settled. Confidential Client (2004).

Testifying Toxicology and Human Health Risk Assessment Expert for the Defense on a Worker Hexachlorobenzene Exposure Case. Confidential Client. (2002-present).

Testifying Toxicology and Human Health Risk Assessment Expert for Defense on a Case Involving Soil/Groundwater Contamination (PAHs, arsenic, pentachlorophenol) and Cleanup at a Former Industrial Property Used for Wood Preservation and Other Industrial Purposes. Deposition given. Settled. Steptoe and Johnson; Washington D.C. (2001).

Testifying Toxicology and Risk Assessment Expert for Defense on a Case Involving Pesticide (e.g., Atrazine) Application in Forestlands and Alleged Impacts on Surface Water Quality and Human Health. Settled. Downey, Brand, Seymour & Rohwer; Sacramento, CA (2000-2001).

Testifying Toxicology and Risk Assessment Expert for Plaintiff on a Case Involving Alleged Illegal Disposal of Hazardous Waste by a Furniture Stripping Company. In Progress. California Department of Justice (2000-present).

Testifying Toxicology and Risk Assessment Expert for the Defense on a Case Involving Environmental Damages Resulting from an Accidental Release of Cl-containing Gases. Settled. David Gard et al v. Placer County Water District et al. (1999-2000).

Testifying Toxicology and Risk Assessment Expert for the Defense on a Case Involving Alleged Health Effects in Inmates in California's Tehachapi Prison Associated with Hazardous Substances in Groundwater at the Prison. Successful outcome resulting from case dismissal by the court under Daubert motion. California Department of Justice, Department of Corrections (1998-9).

Testifying Toxicology and Risk Assessment Expert for the Defense on a Case Involving Migration of VOCs and Methane from an Adjacent Landfill into a Commercial Building. Settled. Boroski v City of Rocklin; DeCuir and Somach, Sacramento, CA (1999-2000).

Testifying Toxicology Expert for the Plaintiff on a Case Involving Dairy Cattle and Sewage Sludge Application to Farmland. In Progress. Decker and Hallman, Atlanta, GA (1998-present).

Testifying Toxicology and Risk Assessment Expert for the Defense on a Case Involving Potential Health Impacts to Nearby Residents Associated with Emissions from a Class III Landfill. In Progress. DeCuir and Somach, Sacramento, CA (1997-present).

Non-testifying Toxicology and Risk Assessment Expert for the Defense on a Natural Resource Damage Act (NRDA) Case Involving PCBs in Marine Sediments. Settled. Lasky, Haas and Cohler (1997-8).

Non-Testifying Toxicology and Risk Assessment Expert for the Defense on a Personal Injury and Property Damage Case Involving Organic and Inorganic Emissions from a Carbon Recovery Facility. Settled. Weintraub, Genshlea & Sproul, Sacramento, California (1995-96).

Non-testifying Toxicology and Risk Assessment Expert for the Defense on a Personal Injury and Property Damage Case Involving DDT and Related Substances. Settled. Shell and Associates, Roseville, CA (1995-96).

Testifying Toxicology and Risk Assessment Expert for the Defense on a Personal Injury and Property Damage Case Involving Lead and Other Substances at a Former Burn Dump. Positive Jury Decision. County Counsel, Kern County, Bakersfield, CA (1994-95).

Testifying Toxicology Expert for the Defense on an Alleged Chemical-Induced Human Fatality at a Auto Repair Facility. Settled. Johnson and Bell Ltd., Chicago, IL (1994-95).

Testifying Toxicology and Technical Expert for the Defense on Alleged Human Health Impacts Associated with an Industrial Fire at an Electronics Manufacturing Facility. Settled. Streich Lang, Phoenix, AZ (1994-95).

Non-Testifying Toxicology and Health Risk Assessment Expert for the Defense on a Groundwater Contamination Issue. In Progress. Salt River Project, Phoenix, AZ (1994-present).

Testifying Toxicology and Technical Expert for the Defense on an Alleged Individual Exposure to Aerially Applied Herbicides. Settled. Reid, Axelrod, Ruane, Kearney & McCormack, Corte Madera, CA (1994).

Non-Testifying General Technical Expert for the Plaintiff Associated with a Product Registration Suit Brought by a Private Manufacturer Against the State of California. Suit withdrawn. Steptoe and Johnson, Washington D.C. (1993-95).

Testifying Toxicology and Risk Assessment Expert for the Defense on an Alleged Worker Exposure to Toluene. Settled. Longyear, O'Dea and Lavra; Sacramento, CA (1993).

Testifying Expert and Technical Advisor for the Plaintiff on a Pesticide (Dinoseb) Spill. Settled. Downey, Brand, Seymour and Rohwer; Sacramento, CA (1993-94).

Testifying Toxicology and Risk Assessment Expert for the Defense on Site Cleanup Litigation. Settled. Pillsbury, Madison and Sutro, San Francisco, CA (1993-94).

Testifying Toxicology Expert for the Defense on the Silicone Breast Implant Litigation. Settled. Confidential. (1993-95).

Testifying Toxicology and Technical Expert for the Defense on an Alleged Occupational Exposure to Hydrogen Sulfide During an Oil Well Blowout. Settled. Lord, Bissel & Brook, Los Angeles, CA (1993).

Testifying Toxicology and Risk Assessment Expert for the Defense on Alleged Health Impacts Associated With Emissions from an Electroplating Facility. Settled. Carroll, Burdick & McDonough, Sacramento, CA (1992-93).

Testifying Toxicology and Risk Assessment Expert for the Defense on Alleged Adverse Health Impacts Associated with Petroleum Hydrocarbon Contaminated Soil. Positive court decision. Bronson, Bronson & McKinnon, Walnut Creek, CA (1992).

Non-testifying Toxicology and Risk Assessment Expert for the Defense on Alleged Pesticide (Trifluralin) Poisoning in Dairy Cattle. Settled. California Farm Insurance Company, Sacramento, CA (1992).

Testifying Toxicology and Risk Assessment Expert for the Plaintiff (U.S. Dept of Justice; Environmental Enforcement Sect) Involving Human and Ecological Impacts of Asbestos, Boron, Lead, TCE and Mercury at CERCLA Sites. Positive court decision. U.S. Dept of Justice, Washington D.C. (1991-92).

Testifying Toxicology and Risk Assessment Expert for the Defense in a Criminal Case Involving Alleged Illegal Storage of Hazardous Materials. Negative court decision. Black and Kopper, Davis, CA (1990).

Testifying Toxicology Expert for the Defense in a Suit Alleging Pesticide (Phosphine)-induced Liver Failure in a Truck Driver. Settled. State Compensation Insurance Fund, Ventura, CA (1990-91).

Testifying Toxicology Expert for the Defense in a Suit Alleging Thymic Cancer Due to Occupational Exposure of Workers to Solvents in the Electronics Industry. Settled. Major electronics company (confidential), Sunnyvale, CA (1990-91).

Testifying Toxicology and Risk Assessment Expert in a Suit Alleging Pesticide-induced Death of a Migrant Farm Worker due to Pesticide Exposure. Settled. Confidential. (1988-90).

Testifying Toxicology Expert for the Defense in a Suit Alleging Renal Toxicity of Lithium. Settled. Bolling, Walter and Gawthrop, Sacramento, CA (1989-90).

Testifying Toxicology and Chemistry Expert for the Defense in a Suit Alleging Pentachlorophenol Toxicosis in an Individual. Settled. Willard Chemical Company, Redwood City, CA (1987-90).

Testifying Toxicology and Exposure Expert for the Defense in an Alleged Worker Exposure to Pesticides Due to Aerial Application. Settled. Aerial application company (confidential). (1989).

Testifying Toxicology and Risk Assessment Expert for the Plaintiff on Proposition 65 Labeling Methodology. Negative court decision. Law firm representing the ICC (confidential), Sacramento, CA (1989).

Testifying Toxicology and Exposure Expert for the Defense in a Worker Compensation Case Alleging Occupational Exposure to Workplace Chemicals as Causation of Kidney Failure. Positive court decision. Wilbanks International, Inc., Hillsboro, OR (1988-89).

Testifying Toxicology and Risk Assessment Expert for the Defense in an Alleged Groundwater Nitrate Intoxication of Humans and Livestock. Settled. Law firm representing developer (confidential), Tracey, CA (1988).

Testifying Toxicology Expert for the Plaintiff in an Alleged Nitrate Intoxication in Dairy Cattle. Settled. Dairy farmer (confidential). (1988).

Testifying Toxicology and Risk Assessment Expert for the Defense in an Alleged Monensin Toxicosis in Horses. Positive court decision. Law firm representing defendant (confidential). (1987-88).

Testifying Toxicology Expert for the Plaintiff in an Alleged Pentachlorophenol/Dioxin Contamination of Livestock. Unknown status, withdrew from case. Law firm for plaintiff, Hattysburg, MS. (1984).

Non-testifying Toxicology Expert and Research Manager for the Defense in the Heptachlor Contamination of Hawaiian Dairy Cattle. Settled. Castle and Cooke Inc., Honolulu, HI (1982-84).

Testifying Toxicology and Exposure Expert for the Defense in an Alleged Pentachlorophenol

Contamination in Cattle. Positive Court Decision. Law firm for defendant, Hot Springs, SD (1980).

Testifying Toxicology Expert for the Plaintiff in a PCB-Contaminated Silo/Cattle Contamination Suit. Unknown status, Aithdrew from Case. Law firm for dairy farmer, Port Huron, MI. (1979).

Non-testifying Toxicology Expert for the Defense in an Alleged Pentachlorophenol Toxicosis in Cattle Associated with Exposure of Cattle to Treated Wood.Settled. Law firm representing Morton Building Co., Columbus, OH 1978-79).

Current and Recent Past Representative Public Service
City of Sacramento, CA. Economic Development Strategy Plan Development. Focus Group Member. 2005.

University of California-Davis, Davis, CA. Department of Environmental Toxicology Advisory Board Member. 2004-present.

Association for Environmental Health and Sciences (AEHS). Member of West Coast Advisory Board. 2003-present.

University of Arizona. Member of the 'Superfund Research Program Industrial/Governmental Advisory Board. 1998 to present.

Association for the Environmental Health of Soils (AEHS). Member of West Coast Advisory Board. 1995 to present.

Association for the Environmental Health of Soils (AEHS). Member of Scientific Advisory Board. 1995 to present.

Arizona Association of Industries (AAI). Member of 'Risk Assessment' Ad Hoc Committee. 1994 to 1997.

Total Petroleum Hydrocarbon Criteria Working Group (TPHCWG). Member; National Organization. 1994 to present.

Trichloroethylene Issues Group (TIG). Washington, D.C., Co-founder, Member of Technical Committee. National Organization. 1993 to present.

Advisory Committee to the Regional Forester, U.S. Forest Service, on the usage of herbicides in vegetation management and reforestation programs, appointed by the Regional Forester (southwest region), 1986-88.

Teaching Experience
Formal on-campus teaching
Toxicology in Food-producing Animals; 1978-80; Michigan State University (MSU).

Biological Effects of Toxicants; 1982; University of California, Davis (U.C. Davis).

Principles of Environmental Toxicology; 1982-88; U.C. Davis.

Mammalian Toxicology; 1984-86; U.C. Davis.

Food Toxicology; 1989-91; U.C. Davis.

Seminar Courses; Instructor-in-charge, graduate or undergraduate; 1982-7; U.C. Davis.

Off-campus teaching (courses)
Principles of Toxicology. Core course in Environmental Hazard Management Program, University Extension, U.C. Davis; co-instructor; 4-day course; 20-70 students (off-campus professionals); 1983-96.

Risk Assessment. Elective course in the Environmental Hazard Management Program, University Extension, U.C. Davis; 2-day course; 30-70 students (off-campus professionals); 1989-97.

Toxicology for Attorneys. 1.5-day course; April 1986, San Francisco, CA.

Risk Assessment in Alaska. 2-day course; sponsored by EMCON & ARCO Exploration; 3/3-4, 1993.

Risk Assessment: Practical Techniques and Methods. 2-day course; Phoenix, AZ; sponsored by EMCON and Arizona State University; November 4-5, 1993.

Risk Assessment: Practical Techniques and Methods. 2-day course; Las Vegas, NV; sponsored by EMCON and University of Nevada at Las Vegas; May 5-6, 1994.

Elements of Toxicology and Risk Assessment. 1-day University Extension course; U.C. Riverside (September 1988); U.C. Davis; May 1989.

Risk Assessment in Occupational and Public Health. One-day course for California Water Resources Control Board staff; taught four times; 1988-89.

Introduction to Environmental Toxicology. University Extension, U.C. Davis; 1-day course; 1990.

Pesticide Officials Pilot Program. University Extension/EPA course for Sr. personnel; co-instructed a half-day session on risk assessment; 1990.

Principals of Hazardous Materials Management. Lecture on toxicology and risk assessment; U.C. Davis University Extension (1990, 1992, 1993), U.C. Berkeley University Extension (1991).

Expert Witness. 3-hour short course at the 5th Annual West Coast Conference, the Association for the Environmental Health of Soils (AEHS), Long Beach, CA, March 1994.

Recent Representative Invited Presentations

Naturally Occurring Asbestos: A Overview of NOA and the Related Risks and Health Concerns. Michael Manwaring P.G., Co-presenter. Presented to Standard Pacific Homes Company, Roseville, CA. June 24, 2005

Those Pesky Emerging Contaminants: Will We Ever be Done with Them? Invited symposium kick-off speaker. AEHS West Coast Conference, San Diego, CA; March 16, 2005.

Producing a Product-Specific Metals Risk Assessment for Evaluation of Arsenic in Fertilizer. Invited speaker; Agrochemical Division, American Chemical Society Annual Conference; Philadelphia, PA; August 25, 2004.

Environmental Toxicology: A Perfect Foundation for Professional Adventures. Invited keynote speaker, **Department of Environmental Toxicology "Friends Day", University of California Davis, Davis, CA. June** 4, 2004.

1,4-Dioxane and Other Emerging Contaminants: Potential Site Re-openers. Invited speaker; National Groundwater Association annual meeting. New Orleans, LA. November 13, 2003.

Risk-Based Decision Making Tools: Property Redevelopment and Arsenic Case Study. Invited speaker; Brownfields 2003. Portland, OR. October 27, 2003.

Optimizing Environmental Risk-Based Decision Making in DoD. Invited speaker; 2003 MWH Breckenridge Conference, Colorado Springs, CO. October 17, 2003.

Dealing with Arsenic at Property Redevelopment Sites. Invited Presentation to Pacific Gas & Electric Environmental Department. San Francisco, CA. June 26, 2003.

Demystifying the California Department of Toxic Substances Control (DTSC) Process: Understanding How Consultants Can Streamline or Complicate the Approval Process. Invited speaker; California Coalition for Adequate School Housing (CASH) Annual Conference. Ontario, CA. June 27, 2003.

Implementing the Environmental Investigation Process at California School Sites. Invited speaker; California Network of Educational Charters (CANEC) Annual Conference; Anaheim, CA. March 29, 2003.

Use of Data in Risk Management; Invited speaker, Metals Forum, American Association of Plant Food Control Officials (AAPFCO) mid-year meeting, Sacramento, CA. February 19, 2003.

Practical Use of Risk Assessment Results; Invited speaker at the 2003 Air Force Center for Environmental Excellence Workshop, San Antonio, TX. February 24-27, 2003.

Impaired Water Use: Science and Risk; Invited speaker at the 23rd Biennial Groundwater Conference and 10th Annual Meeting of the Groundwater Association of California. October 30-31, 2001.

Risk Assessment of Heavy Metals in Inorganic Fertilizers; Presentation at the 5th Annual Fertilizer Research and Education Program Conference; Sacramento, CA; November 18, 1997.

Developing Rational Toxicity Values to Refine Risk-Based Cleanup Levels; Presentation at the 2nd Annual Foster Wheeler Environmental Corp. Fall Training **Conference on 'Risk-Based Strategic Environmental Management', Las Vegas, NV; November 6-7, 1997**

Overview of the U.S. Revised Cancer Assessment Guidelines; Presentation at the 21st Biennial Ground Water Conference; Sacramento, CA; September 16, 1997

Introduction to Risk-Based Corrective Action (RBCA); Presentation in a 1-day Symposium on "Risk Assessment in Italy"; Milan, Italy; Sponsored by Foster Wheeler Italia; February 4, 1997.

Recent Developments in Risk Assessment. Presentation in a 1-day Symposium on "Risk Assessment in Italy"; Milan, Italy; Sponsored by Foster Wheeler Italia; February 4, 1997.

Current Issues in Risk Assessment. Presentation at the 2-day FW Environmental Technical Conference; Las Vegas, NV; Nov. 14-15, 1996.

Recent Developments in Risk Assessment. Presentation in a 1-day Symposium on "The Expertise on Risk Assessment"; Paris, France; Sponsored by FW Conception Etudes Entretien; Nov. 7, 1996.

Development of Risk-Based Concentrations of Lead, Cadmium and Arsenic in Commercial Fertilizers. Assoc. Am. Plant Food Control Officers annual meeting. San Diego, CA. August 5, 1996.

Preparing to Meet the Challenges of Environmental Management. Invited speaker, Association of Edison Illuminating Companies, Detroit, MI. May 28, 1996.

Health Risk Assessment: The Path to International Harmonization. Keynote Speech. Environmental Committee, U.S. Council for International Business. New York, NY. April 3, 1996.

Risk Assessment Case Studies. AZ Assoc. Industries Seminar. Phoenix, AZ. March 29, 1996

Perceptions, Risks and Probabilities. Resource Development Council. Anchorage, AK. Nov. 17, 1995.

Should Trichloroethylene Be Considered a Probable Human Carcinogen? Keynote speaker at the Groundwater Res. Assoc., So. Cal. Branch Nov. meeting. Anaheim, CA. Nov. 15, 1995.

Current Strategies for Addressing TCE Cleanup Levels – An Industry Perspective. Presentation to the Assoc. Eng. Geol./Groundwater Res. Assoc., Sacramento, CA. October 1995.

Use of Experts in Complex Contamination Cases. Environmental Law Section, Sacramento Chapter of the California Bar Association, Sacramento, CA. April 4, 1995.

The Role of Risk Assessment in Siting Solid and Hazardous Waste Management Facilities. Conference on: Siting of Solid Waste Management Facilities. UCLA; Westwood, CA; March 1994.

Risk Assessment in Environmental Decision-Making. ARCO Soils Workshop. ARCO Alaska, Inc., Anchorage, AK. October 26, 1993.

Air Modeling and Health Risk Assessment. Conference on "Air Quality Compliance for Businesses in the San Joaquin Valley." Fresno County & City Chamber of Commerce; Fresno, CA. June 23, 1993.

Risk Assessment: The Environmental Remediation Wave of the Future. Air and Waste Management Assoc., Alaska Chapter, Anchorage, Alaska. March 2, 1993.

The Changing Face of Risk Assessment at the Federal Level. Association of Engineering Geologists, Sacramento Chapter, February 1993.

Possible Impacts on Industry of California's Cancer Risk Assessment of Crystalline Silica; Conference sponsored by: Cal/EPA, U.S. EPA, Inter Soc. for Environ. Epidemiol., Monterey Bay Unified Air Pollution Control District, Western Consortium for Public Health. September 1992.

The Billion Dollar Question About Trichloroethylene; EMCON Technical Conference. September 1992. Bothell, WA.

Dietary Risk: Real or Perceived? Communicating Dietary Risk; 1992 Western Agricultural Chemical Association (WACA) meeting. August, 1992. Sacramento, CA.

Carcinogenic Risk Assessment of Crystalline Silica; California Mining Association, 1992 Annual Meeting. March 1992. San Diego, CA.

Quantitative Health Risk Assessment: Implications for Agriculture; Amer. Registry Prof. Animal Scientists, October 1991. Harris Ranch, CA.

Cancer Risk Assessment: Does It Make Toxicological Sense; 1991 Annual Underground Storage Tank Conference, September 1991. San Diego, CA.

Risk Assessment: Fact or Fiction; Sacramento Area Water Works Association, August 1990. Sacramento, CA.

The Risk of Doing Risk Assessments; California Groundwater Assoc., July 1990. Sacramento, CA.

International Experience

Strategic Planning and Risk Assessment Consultation to the Chinese Petroleum Company (CPC), Kaohsiung, China. 2006-present.

Assistance with Technology Transfer Associated with Modernization of Agriculture and Fisheries in the Philippines: Rice Growers Association of California. 2000-01.

AEHS Course Co-Instructor: "The Role of Risk Assessment in Environmental Decision Making". The Kuwait Foundation for the Advancement of Science (KFAS). Kuwait City, Kuwait. February 14-18, 1998.

Foster Wheeler Environmental Presenter; Risk Assessment Seminar. Milan, Italy. February, 1997.

Foster Wheeler Environmental Program Manager; Development of Indirect Offset Credit Environmental Projects in Spain, Taiwan and China. Client: McDonnell Douglas Aircraft. 1996-7.

Foster Wheeler Environmental Program Manager; Development of Environmental Projects in Thailand. 1996-7.

Foster Wheeler Environmental Presenter; Risk Assessment Seminar. Paris, France. November, 1996.

EMCON Representative; Joint Venture Business Development in Malaysia. 1992.

Project Toxicologist; Assessment of Public Health and Environmental Impacts of Lead (Pb) in Commercial Fertilizer in Bangladesh. Client: Asian Development Bank (ADB). Joint ADB and World Health Organization (WHO) project. June-December, 1992.

Publications

Representative Peer-Reviewed Research Publications

Kinzell, J.H., N.K. Ames, S.D. Sleight, J.D. Krehbiel, C. Kuo, M.J. Zabik and L.R. Shull. 1981. Subchronic administration of technical pentachlorophenol to lactating dairy cattle: perfor¬mance, general health and pathologic changes. J. Dairy Sci. 64:42-51.

Forsell, J.H., L.R. Shull and J.R. Kateley. 1981. Subchronic administration of technical pentachlorophenol to lactating dairy cattle: immunotoxicologic evaluation. J. Tox. Env. Hlth. 8:543-558.

Shull, L.R., M. Foss, C.R. Anderson and K. Feighner. 1981. Usage patterns of chemically treated wood on Michigan dairy farms. Bull. Env. Contam. Tox. 26:561-566.

Shull, L.R, M.R. Blevins, B.A. Olson and R.J. Aurelich. 1982. Polychlorinated biphenyls (Aroclors 1016 and 1242): Effect on hepatic microsomal mixed-function oxidases in mink and ferrets. Arch. Environm. Contam. Toxicol. 11:313-321.

Kinzell, J.H., M.T. Yokoyama, L.R. Shull, C.J. Flegal, J.D. Krehbiel, S.D. Sleight, J.R. Anstead and W.T. Magee. 1982. Effects of long-term feeding of dehydrated poultry waste to steers on performance, blood and urine parameters, liver drug metabolizing enzyme activities and carcass traits. Can. J. Animal Sci. 63:381-389.

Shull, L.R., G.F. Rush, B.A. Olson, S.D. Sleight, R.J. Aurelich and J.A. Wisniewski. 1983. Biological and induction effects of phenobarbital and 3 methyl cholanthrene in mink (Mustella vison). Drug Metab. Dispos. 11:441-445.

Bursian, S.J., D. Polin, B.A. Olson, L.R. Shull, H.L. Marks and H.S. Siegel. 1983. Microsomal enzyme induction, egg production and reproduction in three lines of Japanese quail fed polybrominated biphenyls. J. Toxicol. Environm. Hlth. 12:291 307.

Forsell, J. H., B.W. Jesse and L.R. Shull. 1985 A technique for isolation of bovine hepato¬cytes. J. Animal Sci. 60:1597-1609.

Kinzell, J.H., R.M. McKenzie, B.A. Olson, D.G. Kirsch and L.R. Shull. 1985. Metabolic fate of [U-14C] pentachlorophenol in a lactating dairy cow. J. Agric. Food Chem. 33:827-833.

Hughes, B.J., J.H. Forsell, S.D. Sleight, C. Kuo and L.R. Shull. 1985. Assessment of pentachlorophenol toxicity in newborn calves: clinicopathology and tissue residues. J. Animal Sci. 61:1587-1603.

Shull, L.R., B.A. Olson, B.J. Hughes, R.M. McKenzie and J.H. Kinzell. 1986. Effect of pentachlorophenol on microsomal mixed-function oxidases in cattle. Pest. Biochem. Physiol. 25:31-39.

Shull, L.R., D.G. Kirsch, C.L. Lohse, G.P. Carlson, L.K. Doody and J.A. Wisniewski. 1986. Xenobiotic metabolism in suspensions and primary cultures of isolated hepatocytes pre¬pared from the caudate process of bovine liver. Am. J. Vet. Res. 47:2043-2052.

Helferich, W., E. Carroad, M. Easter, D. Moody, B.D. Hammock and L.R. Shull. 1986. Effect of medroxy-progesterone acetate (Depo-provera) on hepatic and placental drug metabolism in rats. Biochem. Pharmacol. 35:3655-3658.

Gillette, D.M., R. Corey, W.G. Helferich, J.M. McFarland, D.E. Moody, B.D. Hammock and L.R. Shull. 1987. Comparative toxicology of tetrachlorobiphenyls in mink and rats. I. Changes in hepatic enzyme activity and smooth endoplasmic reticulum. Fund. Appl. Toxicol. 8:5-14.

Gillette, D.M., L.J. Lowenstine, R. Corey and L.R. Shull. 1987. Comparative toxicology of tetrachlorobiphenyls in mice and rats. II. Pathologic changes. Fund. Appl. Toxicol. 8:15-22.

Wisniewski, J.A., D.E. Moody, B.D. Hammock and L.R. Shull. 1987. Interlobular distribu¬tion of hepatic xenobiotic-metabolizing enzyme activities in cattle, sheep and goats. J. Animal Sci. 64:210-215.

Narloch, B., D. Moody, B.D. Hammock, M. Lawton and L.R. Shull. 1987. Induction of hepatic xenobiotic enzymes comparing pure and technical dicofol in rats. Pest. Biochem. Physiol. 28:362-370.

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Shull, L.R., M.K Jones, M.A. Bowland, J.Nachmanoff and R. Currie. 1999. Development of Risk-Based Concentrations for Arsenic, Lead and Cadmium in Inorganic Commercial Fertilizers. In Preparation.

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Books

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Shull, L. 1993. Risk Assessment Methodologies for Addressing Petroleum Hydrocarbons in Environmental Media. EMCON Industrial Hazardous Waste Conference. Atlanta, GA. September 24-26, 1993.

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Shull, L.R. and G. Allen. 1991(draft), 1992 (final). Technical Bulletin on Mineral Spirits. Prepared for Safety-Kleen Corp., Elgin, IL.

Brown, K.W. , J.B. Robertson, E. Meyer and L.R. Shull. 1992. Expert Report for Salford Quarry Site, Lower Salford Township, Pennsylvania. Report to U.S. Department of Justice. Environmental Enforcement Section, Washington D.C.

Brown, K.W. , J.B. Robertson, E. Meyer and L.R. Shull. 1992. Expert Report for Dietzman Tract, Third Operable Unit, Asbestos Dump Superfund Site, Morris County, NJ. Report to U.S. Department of Justice. Environmental Enforcement Section, Washington D.C.

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Shull, L., and C. Soskolne. 1993. Asian Development Bank Consultant's Report: Evaluation of Zinc Oxysulfate Fertilizer Containing Hazardous Waste in Bangladesh. ADB, Manila, Philippines. September, 1993.

Shull, L., M. Jones and K. Yost. 1994. Health Risk Assessment of Petroleum Hydrocarbons in Environmental Media. Proceedings of HMCRI. Federal Restoration and Waste Minimization Conference III.

Shull, L. 1994. Trichloroethylene: The Billion Dollar Question. California Manufacturer. Summer, 1994.

Shull, L., S. Klasing, C. Kirkham, et al. 1994. Comprehensive Literature Search for Hot Spots Chemicals: Arochlors. Prepared for the Office of Environmental Hazard Assessment, California EPA, under Cal EPA contract #91-12854.

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Shull, L., S. Klasing, B. Kesser, et al. 1996. Comprehensive Literature Search for Hot Spots Chemicals: Arsenic. Prepared for the Office of Environmental Hazard Assessment, California EPA, under Cal EPA contract #94-E0056.

Shull, L., S. Klasing, B. Kesser, et al. 1996. Comprehensive Literature Search for Hot Spots Chemicals: Selenium. Prepared for the Office of Environmental Hazard Assessment, California EPA, under Cal EPA contract #94-E0056.

Shull., L., K. Kiefer, M. Jones and M. Bowland. 2000. A Risk-Based Decision-Making Approach for Arsenic in Placer County Soils. Prepared for Coalition of Property Developers, Sacramento, CA.

Prior Professional Experience

Principal/Director, Health & Risk Services Program, NewFields, Inc. 1998-2001. Toxicology and risk assessment consulting, strategic planning, litigation support, operations manager.

Corporate Director of Toxicology, Associate Director of Risk Services, Foster Wheeler Environmental Corp., 1995-1997. Toxicology and risk assessment consulting, strategic planning, litigation support, program management.

Western Regional Director of Life Sciences, EMCON. Technical leadership of the firm's life sciences program, including toxicology, risk assessment, ecology, biological sciences. 1995.

Corporate Director of Toxicology and Risk Assessment, EMCON. Technical oversight of toxicology and health risk assessment activities nationwide. 1992- 1995.

Senior Toxicologist/President, Western Environmental Health Associates, Inc., 1989-1995.

Toxicology Consultant, Sole proprietor. Performed wide-range of duties in toxicology and risk assessment. 1978-1987 (part-time), 1988-1989 (full-time).

Professor (tenured), Department of Environmental Toxicology, University of California, Davis. 1981-1987. Biochemical toxicologist with 60 percent research appointment and 40 percent teaching appointment. Adjunct Professor, 1988-1992.

Professor (tenured), Department of Animal Science, Michigan State University. Animal toxicology research (60%), animal toxicology teaching (20%), Extension toxicologist (20%). 1975-1981.

GREGORY T. CORCORAN, P.E.
Senior Project Engineer

geotechnical engineering
geosynthetic engineering
construction services

EDUCATION

Drexel University: M.S., Civil Engineering, 1994
Drexel University: B.S., Civil Engineering 1992

PROFESSIONAL REGISTRATION

Registered Professional Engineer, State of California No. C58876
Registered Professional Engineer, State of Oregon No. 65140PE
Registered Professional Engineer, State of Arizona No. 37705

PROFESSIONAL HISTORY

GeoSyntec Consultants, San Diego, California
Senior Project Engineer, 2001-Present
Project Engineer, 1999-2001
Assistant Project Engineer, 1998-1999
GeoSyntec Consultants, Huntington Beach, California, Senior Staff Engineer, 1997-1998
Roy F. Weston, Inc., West Chester, Pennsylvania
Associate Project Engineer, 1996-1997
Engineer, 1994-1996
Golder Construction Services, Mt. Laurel, New Jersey, Staff Engineer, 1994
NTH Consultants, Ltd., Exton, Pennsylvania, Assistant Lab Manager, 1993
Drexel University, Philadelphia, Pennsylvania, Research/Teaching Assistant, 1992-1994
Gundle Lining Systems, Houston, Texas, Research Engineer, 1992
Golder Construction Services, Mt. Laurel, New Jersey, Engineering Technician, 1989-1991
Greiner Engineering, King of Prussia, Pennsylvania, Engineering Technician, 1988-1989
E.I. DuPont, Wilmington, Delaware, Designer/Draftsman, 1987-1988

REPRESENTATIVE EXPERIENCE

Mr. Corcoran's experience in civil and geotechnical engineering practice and construction includes technical contributions to many geosynthetic, foundation, embankment, gas barrier system, gas control system, gas monitoring system, landfill liner system, and landfill closure system designs. Mr. Corcoran has over 12 years of landfill design and construction experience and has been involved with the design and construction of over 60 landfill bottom liner and final cover systems consisting of geosynthetic and natural soil and aggregate materials. Mr. Corcoran has vast experience with geosynthetic materials, including polyvinyl chloride (PVC), polypropylene (PP), low density polyethylene (LDPE), very low density polyethylene (VLDPE), linear low density polyethylene (LLDPE), high density polyethylene (HDPE), ethylene interpolymer alloy (EIA), and spray applied (Liquid Boot and polyurea) geomembranes, nonwoven and woven geotextiles, drainage composites, geonets, geosynthetic clay liners (GCL), and geogrids. Major projects he has worked on are summarized below.

Pasco Landfill Interim Action Implementation, Pasco, Washington

This project involves performing operation, maintenance, and monitoring of a landfill gas extraction system consisting of 26 extraction wells, a condensate recovery system, a flare, and a condensate flare injection system. The project also entails the routine monitoring and maintenance of a final cover system for a 35 acre municipal solid waste landfill and 4 industrial waste disposal areas (drum and solids disposal areas). As the Project Manager, Mr. Corcoran is responsible for interfacing and communicating with the client, providing construction management support, staffing, budgeting and scheduling activities.

Hewlett-Packard Manufacturing Site, San Diego, California

This project involves the design, construction, and operation of a soil gas remediation system consisting of a soil vapor extraction system consisting or one extraction well and a granular activated carbon vapor treatment system. As the Project Manager, Mr. Corcoran is responsible for interfacing and communicating with the client, providing construction management support, staffing, invoicing the client, budgeting and scheduling design and construction activities.

Palomar Airport Landfill, Carlsbad, California

Estimated design, construction capital, monitoring, and operation and maintenance costs for several groundwater/surface water seep remediation alternatives for a municipal solid waste landfill at the site. Remediation alternatives included collection and treatment, groundwater pump and treat, and vertical cut-off. Oversaw the subsurface investigation of a drainage pipe for the purposes of controlling the effluent from the pipe outlet. In addition, a feasibility study was prepared for groundwater remediation at each of the three landfill units at the site. Remediation alternatives included pump and treat, biological enhancement, and zero valent iron permeable reactive barrier.

San Marcos II Landfill, San Marcos, California

This project involved the assessment of an existing corrective action system, preparation of a revised operation and maintenance manual, revisions to the corrective action system piping, design and installation of a groundwater treatment system, and operation and maintenance of the groundwater remediation system. In addition, leachate production modeling using HELP was performed to verify quantity of leachate effluent from lined portion of the landfill. As the Project Manager, Mr. Corcoran is responsible for interfacing and communicating with the client, staffing, invoicing the client, budgeting and scheduling activities.

San Pasqual Landfill, Escondido, California

Estimated design, construction capital, monitoring, and operation and maintenance costs for several remediation alternatives for both a burn ash and a municipal solid waste landfill at the site. Remediation alternatives included clean-closure and final cover system installation.

Otay Landfill, Canyon 3, Phase 3A Disposal Cell, Chula Vista, California

This project involves performing construction quality assurance for the construction of a horizontal expansion for a 10-acre municipal solid waste landfill, consisting of 80-mil thick HDPE geomembrane, geocomposite, piping, and natural soil and aggregate materials. As the Project Manager and Engineer of Record, Mr. Corcoran is responsible for interfacing and communicating with the client, providing construction management support, staffing, budgeting and scheduling construction activities.

Ramona Landfill, Stage III, Phase 3 Disposal Cell, Ramona, California
This project involves performing construction quality assurance for the construction of a horizontal expansion for a 5.5 acre municipal solid waste landfill and sedimentation basin, consisting of geosynthetic clay liner, HDPE geomembrane, filtration/cushion geotextile, and natural soil and aggregate materials. As the Project Manager and Engineer of Record, Mr. Corcoran is responsible for interfacing and communicating with the client, providing construction management support, staffing, budgeting and scheduling design and construction activities.

Pasco Landfill Interim Action Implementation, Pasco, Washington
This project involves performing construction quality assurance for the construction of a final cover system for a 35 acre municipal solid waste landfill and 4 industrial waste disposal areas (drum and solids disposal areas), consisting of geosynthetic clay liner, HDPE and LLDPE geomembrane, filtration geotextile, geogrid reinforcement, and natural soil and aggregate materials. As the Project Manager, Mr. Corcoran is responsible for interfacing and communicating with the client, providing construction management support, staffing, budgeting and scheduling construction activities.

Los Reales Landfill Cell 2, Tucson, Arizona
This project involves the design and construction of a composite bottom liner system, consisting of geosynthetic clay liner, HDPE geomembrane, cushion geotextile, and natural soil and aggregate materials. As the Design Manager, Mr. Corcoran is responsible for interfacing and communicating with the client, providing construction management support, staffing, budgeting and scheduling design and construction activities. Mr. Corcoran was also responsible for preparation of design calculations, construction level drawings, technical specifications, and a construction quality assurance plan.

Former K-Tube Manufacturing Site, San Diego, California
This project involves the design, construction, and operation of a groundwater and soil gas remediation system consisting of a dual phase extraction system including 5 extraction wells and treatment compound. As the Project Manager, Mr. Corcoran is responsible for interfacing and communicating with the client, providing construction management support, staffing, invoicing the client, budgeting and scheduling design and construction activities. Mr. Corcoran is also responsible for preparation of design calculations, construction level

drawings, technical specifications, operation and maintenance and monitoring plan, and a final construction report upon completion of the construction.

Home Depot Retail Store, Monterey Park, CA

This project involves the design and construction of a gas monitoring and control system, consisting of a gas extraction system and a real-time gas monitoring system for the construction of a new retail store. As the Project Manager, Mr. Corcoran was responsible for interfacing and communicating with the client and design team members, providing construction management support, staffing, invoicing the client, budgeting and scheduling design and construction activities. Mr. Corcoran was also responsible for preparation of design calculations, construction level drawings, technical specifications, operation and maintenance and monitoring plan, and a final construction report upon completion of the construction.

Secondary Containment System, Watkins Manufacturing, El Cajon, California

This project involved the design of a concrete secondary containment system for two 3,000 gallon steel tanks holding epoxy resin. GeoSyntec performed an environmental baseline survey of the soil and groundwater underlying the proposed secondary containment system, along with geotechnical subsurface exploration and associated testing. As the Project Manager, Mr. Corcoran was responsible for interfacing and communicating with the client, staffing, invoicing the client, and budgeting and scheduling field and design activities.

Leachate Pumping and Storage System, Sycamore Landfill, Santee, California

This project involved the design of a leachate pumping system, storage tanks, and a concrete secondary containment system. The pumping system was designed using solar panel technology to provide a visible alarm when leachate levels reached a point where the leachate has to be pumped out, at which time a generator is used to provide power to the pumping system. As the Project Manager, Mr. Corcoran was responsible for interfacing and communicating with the client, staffing, invoicing the client, and budgeting and scheduling design activities. Mr. Corcoran was also responsible for preparation of construction level drawings.

Home Depot Retail Store, Oregon City, OR

This project involves the design and construction of a gas monitoring and control system, consisting of a geomembrane gas barrier (spray applied geomembrane), an active gas extraction system, and a real-time gas monitoring system for the construction of a new retail store. As the Project Manager, Mr. Corcoran is responsible for interfacing and communicating with the client and design team members, providing construction management support, staffing, invoicing the client, budgeting and scheduling design and construction activities. Mr. Corcoran was also responsible for preparation of design calculations, construction level drawings, technical specifications, operation and maintenance and monitoring plan, and a construction quality assurance report upon completion of the construction.

Confidential Client, Phoenix, AZ

This project involves the preparation of construction cost estimates and the evaluation of the viability of several post-closure development options for two landfill properties. Mr. Corcoran prepared a detailed construction cost estimate for landfill related items required for several development options, reviewed project files obtained from the regulatory agencies, participated in a meeting with regulatory officials, and participated in several team meetings.

Extended Stay America Hotel, San Jose, CA

This project involves the peer review of a gas monitoring and control system for the construction of a new hotel within 1,000 feet of a landfill. Mr. Corcoran was selected by the Local Enforcement Agency (LEA) to provide a peer review of the engineering design. As the Project Manager and Peer Reviewer, Mr. Corcoran is responsible for interfacing and communicating with the client, the design engineer, preparing a letter report summarizing the recommended changes to the proposed system, and providing construction support.

Sycamore Landfill Waste Excavation, San Diego, CA

This project involves the preparation, permitting, and implementation of a waste excavation plan for the excavation of asbestos containing materials (ACM) and municipal solid waste (MSW) materials. As the Project Manager and lead engineer, Mr. Corcoran was responsible for preparation of the waste excavation plan; air monitoring during waste excavation activities, staffing, invoicing the client, budgeting and scheduling.

Home Depot Retail Store, Honolulu, HI

This project involves the operation and maintenance and management of the gas monitoring and control system. As the Project Manager, Mr. Corcoran is responsible for interfacing and communicating with the client and subcontractors, preparing annual reports, staffing, invoicing the client, budgeting and scheduling operation and maintenance activities. In addition, stack sampling of the gas extraction system effluent is performed and reported to the regulatory agency to show compliance with the permit.

Sycamore Landfill Groundwater Monitoring, San Diego, CA

This project involves performing groundwater monitoring and maintenance of six monitoring wells and one corrective action pumping well at an active landfill. As the Project Manager, Mr. Corcoran was responsible for preparation of semi-annual reports, staffing, invoicing the client, budgeting and scheduling reporting and field activities. Semi-annual reports include time series plots of chemical concentrations, groundwater elevation contour maps, tables summarizing groundwater data, and description of sampling activities.

Ramona Landfill Groundwater Monitoring, Ramona, CA

This project involves performing groundwater monitoring and maintenance of five monitoring wells and four corrective action pumping wells at an active landfill. As the Project Manager, Mr. Corcoran was responsible for preparation of semi-annual reports, staffing, invoicing the client, budgeting and scheduling reporting and field activities. Semi-annual reports include time series plots of chemical concentrations, groundwater elevation contour maps, tables summarizing groundwater data, and description of sampling activities.

235 on Market Street, San Diego, CA

This project involved the design and construction of a vapor control system, consisting of vapor monitoring, vapor barrier (spray applied geomembrane), and vapor extraction systems beneath the structure. In addition, the project included preparation of an operating, maintenance, and monitoring plan and providing vapor monitoring services for the completed vapor control system. As the Project Manager and Engineer of Record, Mr. Corcoran was responsible for staffing, invoicing the client, budgeting and scheduling design and construction activities. Mr. Corcoran was also responsible for preparation of design calculations, construction level drawings, technical specifications, operation, maintenance, and monitoring manual, and a construction quality assurance plan.

Sycamore Landfill, San Diego, CA

This project involved the design of a geosynthetic lined expansion of the existing landfill. The bottom liner system consists of GCL, HDPE geomembrane, geosynthetic drainage composite, 32 oz./SY geotextile cushion, and natural soil materials. As the Project Manager, Mr. Corcoran was responsible for interfacing and communicating with the client, including operations personnel, invoicing the client, budgeting and scheduling activities. In addition, Mr. Corcoran was responsible for preparation of the design calculations, construction drawings, construction specifications, construction quality assurance plan, and waste fill plan.

Borrego Landfill, Borrego Springs, CA

This project involved the preparation of conceptual design drawings for a geosynthetic lined expansion, Stage I and Stage II fill plans, cut and fill quantities for both waste and soil materials, and geosynthetic material quantities. As the Project Manager, Mr. Corcoran was responsible for interfacing and communicating with the client, invoicing the client, budgeting and scheduling activities. In addition, Mr. Corcoran was responsible for preparation of the waste fill plans and quantities.

California Polytechnic University AGRIScapes Project, Pomona, CA

This project involved the design of a gas monitoring system, consisting of vertical gas monitoring wells adjacent to the proposed structures and horizontal gas monitoring probes beneath the proposed structures. As the Project Manager, Mr. Corcoran was responsible for staffing, invoicing the client, budgeting and scheduling design and construction activities. Mr. Corcoran was also responsible for preparation of construction level drawings and technical specifications.

Hoag Hospital, Newport Beach, CA

This project involved the quality control of the construction of a HDPE geomembrane gas barrier and gas monitoring system beneath a new multi-level building and parking structure. As the Project Manager, Mr. Corcoran was responsible for staffing, invoicing the client, budgeting and scheduling construction activities.

Confidential Client

This project involved the evaluation of an existing gas barrier and gas control system located beneath a building where high levels of gas presented problems. The evaluation consisted of a carefully executed gas monitoring program and the evaluation of the design basis and methods utilized to construct the gas barrier and gas control system. Recommendations for the remediation and repair of the troublesome gas barrier and gas control system were presented to the client. As the Project Manager, Mr. Corcoran was responsible for site evaluation, recommendations report preparation, staffing, invoicing the client, budgeting and scheduling activities.

Home Depot Retail Store, Tucson, AZ

This project involved the design and permitting of a gas monitoring and control system, consisting of gas monitoring wells, horizontal and vertical gas extraction systems, and a real-time gas monitoring system, for the construction of a new retail store. In addition, the project involved preparation of several alternative approaches to the environmental conditions on the site, including engineer's estimates, and preparation of a final cover system conceptual design for permitting purposes. As the Project Manager, Mr. Corcoran was responsible for staffing, invoicing the client, budgeting and scheduling design and construction activities. Mr. Corcoran was also responsible for preparation of design calculations, construction level drawings, technical specifications, a monitoring and reporting plan, an operation and maintenance plan, and a contingency plan.

Home Depot Retail Store, Honolulu, HI

This project involved the design and construction of a gas monitoring and control system, consisting of a geomembrane gas barrier, an active gas extraction system, and a real-time gas monitoring system for the construction of a new retail store. As the Project Manager, Mr. Corcoran was responsible for interfacing and communicating with the client, providing construction management support, staffing, invoicing the client, budgeting and scheduling design and construction activities. Mr. Corcoran was also responsible for preparation of design calculations, construction level drawings, technical specifications, monitoring and reporting plan, operation and maintenance plan, and contingency plan, and a construction quality assurance report upon completion of the construction.

McColl Superfund Site Remediation, Fullerton, CA

This project involved the construction of a geosynthetic final cover system consisting of a HDPE geomembrane, GCL, geocomposite, geotextile, geogrid, piping, concrete, and earthen components. Mr. Corcoran served as a lead CQA monitor for certain key portions of the geosynthetic installation.

Sullivan County Landfill Expansion, Monticello, NY

This project involved designing a horizontal expansion for an existing, double composite lined MSW landfill. Serving as the Geotechnical Engineer, Mr. Corcoran was responsible for liner system design, leachate collection system design (HELP), slope stability, seismic, settlement, and bearing capacity. The bottom liner system consists of HDPE geomembrane, GCL, geotextile, drainage composite, aggregate, and soil materials.

JLG Industries, McConellsburg, PA

This project involved several recommendation reports for the construction of four new structures. As Geotechnical Engineer, Mr. Corcoran was responsible for proposals, client communication, hiring of subcontractors for subsurface investigation, oversight of subcontractors, design analyses, economic impact analyses, and foundation recommendation reports. Key design considerations included settlement analyses, bearing capacity, shallow and deep foundation design, and economic impacts of different design approaches.

Town of Clarkstown Landfill Closure, Clarkstown, NY

Mr. Corcoran also served as Geotechnical Engineer on this project that involved the closure of a 90-acre municipal solid waste landfill. Key design considerations included settlement analyses, tension and veneer stability of the lining system, slope stability, drainage layer performance (HELP model), and depth of frost penetration. The final cover system consisted of geotextile, geosynthetic drainage composite, PVC geomembrane, and natural soil materials.

Philadelphia Department of Aviation, Landfill Closure, Philadelphia, PA

Mr. Corcoran served as Geotechnical Engineer on this project, which involved the closure of a landfill Superfund Site to accommodate the construction of a new runway overlying the landfill. Design analyses required for this project included staged construction of an earthen embankment utilizing vertical drains for strength gain of weak soil, slope stability,

geotextile design, drainage layer performance, and depth of frost penetration. In addition, settlement of weak soils was accelerated using vertical drains outside of the landfill perimeter and surcharge loading above the landfill final closure. As Geotechnical Engineer, Mr. Corcoran was responsible for construction quality assurance of jet grouting of natural thin clay vertical barrier underlying landfill, as well as the construction of the final cover system, including geotextile, geonet, LDPE geomembrane, earthworks, and associated appurtenances.

USACE, Incinerator Ash Landfill, Childersburg, AL

Mr. Corcoran served as Design Engineer for the Incinerator Ash Landfill project for the USACE. This project involved slope stability, bearing capacity, settlement analyses, and construction support for a horizontal expansion of the bottom liner and final cover systems for a contaminated soil incinerator ash landfill. The base liner and final cover systems consisted of geotextile, PVC geomembrane, geosynthetic drainage composite, and natural soil materials.

MSW Incinerator Ash Landfill, Shelton, CT, Connecticut Recovery Authority

Mr. Corcoran served as Design Engineer for the MSW Incinerator Ash Landfill project for the Connecticut Recovery Authority. He performed slope stability analyses, seismic stability analyses, and liquefaction analyses to determine if a constructed cell would meet the required Subtitle D regulations, which were to be enforced at this site by the state of Connecticut.

Foundation Design, Dover, DE, USACE

This project included designing a deep foundation for two 10,000 bbl fuel storage tanks and shallow foundations for ancillary structures associated with the fuel storage tanks. As Design Engineer, Mr. Corcoran was responsible for design analyses including settlement, bearing capacity, and auger-cast pile foundation design.

Landfill CQC, Pleasantville, NJ, Atlantic County Utilities Authority

Mr. Corcoran served as CQC Engineer responsible for construction quality control of double composite liner system for residual waste landfill. Monitored geosynthetic installation including geotextile deployment and sewn seams; HDPE geomembrane deployment, fusion and extrusion welding, destructive and non-destructive testing; and geonet deployment. Also monitored earthwork construction including nuclear moisture-density testing, sand-cone

moisture-density testing, compacted clay liner test pad construction, and Boutwell infiltrometer testing to obtain field permeability of compacted clay liner test pad.

Geosynthetic Conformance Testing, Exton, PA, Various Clients

As Assistant Lab Manager, Mr. Corcoran performed conformance testing of geosynthetic materials. Instructed various ASTM testing practices and standards, performed testing, evaluated results, and managed personnel.

HDPE Geomembrane Wedge Welding Research and Development, Houston, TX, Gundle Lining Systems

Project required developing a wedge welding "window" based on welder speed, wedge temperature, and nip roller pressure. As Research and Development Engineer, Mr. Corcoran performed all seaming of 60-mil HDPE geomembrane, all destructive testing, and data reduction.

Landfill CQC, Laytonsville, MD, Browning-Ferris Industries

This project involved construction quality control of composite liner system for a MSW landfill vertical expansion and two leachate storage lagoons. As Engineering Technician, Mr. Corcoran monitored all aspects of soils construction including all pipe work and manholes associated with both the leachate collection system and the landfill gas collection system. Monitored geogrid, geotextile, geonet, and HDPE geomembrane installation.

Landfill CQA, Morrisville, PA, Waste Management of Pennsylvania

This project focused on construction quality assurance of 10 double lined MSW landfill cells. As Engineering Technician, Mr. Corcoran monitored soil subgrade construction and geosynthetic installation, including: HDPE geomembrane, geotextile, geonet, and geosynthetic clay liner installation.

Landfill CQA, Oxford, NJ, Warren County Pollution Control Financing Authority

This project focused on construction quality assurance of double composite liner system for a MSW incinerator ash landfill. As Engineering Technician, Mr. Corcoran monitored geosynthetic installation and soils construction including, bentonite amended soil liner, embankment construction, and leachate collection piping and manholes.

PROFESSIONAL AFFILIATIONS

International Geosynthetics Society
North American Geosynthetics Society
American Society for Testing and Materials, Committee D35 on Geosynthetics
American Society of Civil Engineers

LIST OF PUBLICATIONS

Kavazanjian, E., Corcoran, G., "Combined Leachate Collection/Operations Layer for Side Slopes", (2002), WasteCon 2002, Long Beach, California.

Corcoran, G., Leverenz, C., Mikolaitis, J., Kavazanjian, E., "Combined Leachate Collection and Operations Layer for Side Slope Liner Systems", (2002), Arizona Hydrological Society, 2002 Scientific Landfill Symposium, Tucson, Arizona.

Narejo, D., Corcoran, G., (2002), "Geomembrane Protection, Design Manual", (2002), GSE Lining Technology, Inc., Houston, Texas.

Narejo, D., Corcoran, G., Zunker, R., (2002), "An Evaluation of Geosynthetic Clay Liners to Minimize Geomembrane Leakage Caused by Protrusions in Subgrades and Compacted Clay Liners", International Symposium on Clay Geosynthetic Barriers (IS Nuremberg 2002), Nuremberg, Germany.

Kavazanjian, E., Hendron, D., Corcoran, G., (2001), "Strength and Stability of Bioreactor Landfills", SWANA's 6th Annual Landfill Symposium, San Diego, California.

Sanglerat, T.R., Corcoran, G.T., Riotte, D.W. (2000), "Engineering Solutions to Subsurface Gas Control for Brownfield Redevelopment" Presented to Southern California Association of Governments, Los Angeles, California.

Corcoran, G.T., Riotte, D.W., Sanglerat, T.R. (2000), "Gas Control System Experience", Presented to Blue Ribbon Citizens' Oversight Committee and Augmented Facilities Committee (Los Angeles School Board Public Meeting), Los Angeles, California.

Riotte, D.W., Corcoran, G.T., Sanglerat, T.R. (2000), "Design and Construction of Subsurface Gas Control System for Buildings", Presented to Los Angeles Department of Toxic Substances Control, Los Angeles, California.

Corcoran, G.T. and J.A. McKelvey (1995), "Stability of Soil Layers on Compound Geosynthetic Slopes," *Waste Tech '95*, New Orleans, Louisiana: Environ. Industry Associations, p. 242-254.

Corcoran, G.T., Cheng, S.C. and A. Speer (1994), "High Normal Stress Compression of Geosynthetic Lining Systems," *Proceedings of the 5th International Conference on Geotextiles, Geomembranes and Related Products*, Singapore: IGS.

Corcoran, G.T., Cheng, S.C., Miller, C., and Y. Lee (1994), "The Use of a Spray Elastomer for Landfill Cover Liner Applications," *Proceedings of the 5th International Conference on Geotextiles, Geomembranes and Related Products*, Singapore: IGS.

Firm

Geosyntec

Years of Experience

35

Education

- Course work in Civil Engineering –1961-1963 Santa Anna Junior College

Special Training

- OSHA 29 CFR 40-Hour Hazardous Waste Site Training
- OSHA 29 CFR 10- Hour Construction Safety
- Rad-Worker II Training
- Rad-Worker Supervisor Training
- OSHA 29 CFR Supervisor Training

Certifications/Registrations

- Recipient of DOE Hammer Award

Relevant Experience	
15 years general construction management	✓
15 years project management	✓
14 years civil/earthwork	✓
10 years chemical and hazardous materials	✓
10 years radioactive contaminated materials	✓
10 years supervisory of rad materials	✓

JAMES COX

SENIOR PROJECT MANAGER

Summary of Relevant Qualifications

Mr. Cox has over 35 years of professional experience as a project manager in the nuclear and hazardous waste industry. Projects have included large excavation and removal projects for radioactive materials and remediation of hazardous waste sites. He also has extensive experience in highway and bridge construction. He is highly skilled in project management with capabilities to perform project planning, estimating, scheduling, and management of field activities. A highlight of Mr. Cox's achievements was the development of a streamlined design and procurement process within the CERCLA project at Monticello, UT for the movement of radioactive materials. Using performance based designs and specifications he was able to greatly reduce the requirements for regulatory agency reviews and reduced the overall project schedule. Mr. Cox was the recipient of the DOE Hammer Award for these efforts.

Work Experience

Teledyne Ryan, San Diego, CA
Senior construction manager for a $1.4 million risk-based remediation project. Remediation activities for volatile organic compounds, including PCE, TCE, cis-1,2-DCE, and vinyl chloride, consists of direct push injection of over 900 injection points for application of enhanced in-situ bioremediation. Chemical oxidation, using ferrous sulfate, was employed for the treatment of hexavalent chromium. Seven excavations were performed to remove TPH and VOC impacts in the site soil.

Los Alamos Ash Removal, Los Alamos, NM
Senior project engineer for the removal of radioactive contaminated incinerator ash from the Los Alamos airport site. Provided technical oversight for the removal of contaminated incinerator ash off of a steep hillside at Los Alamos. The project required rappelling a crew of personnel off the top of the mesa to perform sampling and retrieval of incinerator materials. Set up a cable system used in the lumber industry for rapidly moving material on steep slopes. Developed a method for vacuuming ash from the hillside. Developed specifications for a haul road and methods of packaging material for shipment to disposal sites.

Hamilton Army Base, Novato, CA
Senior Project Manager for the Wetlands Restoration project for the US Army Corps of Engineers at the Hamilton Army Base. Developed the work plans, health and safety plans, and construction plans for the remediation of 180,000 CY of DDT/PAH contaminated soil. This was a firm fixed price $3 million project that was performed three weeks ahead of schedule for a three-month job. Work required construction work on the San Francisco Bay. The project was part of the restoration of the San Francisco Bay. Work required laser guided excavation to accurately measure the amount of material removed. The project had weather and water issues that had to constantly be dealt with. ITSI constructed 3,500 linear feet of bulge levee.

Gentile AFB, Kettering, OH
Site Manager for the Gentile AFB expedited contaminated soil removal project. Executed this $1.8 million expedited response action to remediate trichloroethylene (TCE) - contaminated soil at two sites at Gentile Air Force Station in Kettering, OH. Managed the removal action consisting of the

excavation of approximately 13,950 tons of contaminated soil and remedial action-operations for contaminated groundwater.

Prepared the work plan, a sampling and analysis plan (SAP), Quality Assurance Project Plan (QAPP), a site safety and health plan addendum, and a long-term groundwater monitoring plan for the project. The Air Force Center for Environmental Excellence (AFCEE) required an expedited response to meet a 30 September 2002 "Last Remedy in Place" deadline. The US Congress had been briefed and expected the project to be completed by the deadline. Mr. Cox partnered with AFCEE and regulators

and applied value engineering processes to deliver the project ahead of schedule and under budget.

Caselton Wash Tailing Sites, NV
Program Manager for stabilization of 90 acres of arsenic, lead and cyanide contaminated mine tailings. Work was performed for the Bureau of Reclamation. Developed work plans, developed methodology for stabilization, determined health and safety constraints for work on the contaminated areas. Constructed access roads to bring equipment to the ponds and gain access for spraying. Sprayed entire area with surfactant to prevent movement of contaminated soils. Constructed a one-mile diversion channel to divert storm water from entering into mine tailing ponds.

Monticello Utah Mill Site Remediation Project, Monticello, UT
Project Manager for the design of a RCRA C facility to receive 2.6 million cubic yards of uranium mill tailings for the Department of Energy. Prepared the technical approach, budget, and schedule for two alternative methods for disposal of mill tailings. Performed critical review of design documents for constructability concerns including designs for the repository, facilities to support a truck haul, remediation of contaminated properties adjacent to the mill site, and haul road upgrades. Developed a streamlined design and procurement process within the CERCLA project requirements using performance based designs and specifications. Reduced the number of regulatory agency reviews stated in the project Federal Facility Agreement. Conducted an analysis of haul route safety and proposed highway upgrades required to improve safety and conducted negotiations with the Utah Department of Transportation.

Mexican Hat Remediation Project, Mexican Hat, UT
Project Manager for the movement of 2.2 million cubic yards of uranium mill tailings including uranium boulders, raw ore, and building debris from the Mexican Hat site. The tailings and debris had to be transported 19 miles to an existing cell and eventually covered. The work was performed for the Department of Energy under the Uranium Mill Tailings Remediation Act (UMTRA) program.

Climax Millsite Remediation Project, Grand Junction, CO
Project manager for the construction of a 58-acre disposal cell for remediation of 6.2 million cubic yards of uranium mill tailings under the DOE UMTRA program. Constructed 9 miles of haul road including 2 bridges over highway 50. Transported tailings 18 miles to a disposal cell by a combination of rail and truck. Designed a unique waste bin for efficient movement and dumping of loads that saved considerable cost and schedule for the entire project.

West Best Freight System, Missoula, MT
Responsible for the efficient operation of a 100 truck transportation

operation. Supervised all fleet operations, including driver personnel. Managed estimating, budgeting, equipment maintenance, equipment specifications, scheduling, DOT compliance, HAZMAT compliance, and weight/dimension compliance for the fleet.

Geosyntec
consultants

REBECCA B. FLYNN
Staff Engineer

Remediation Design, Construction, Operation
Landfill Design

EDUCATION

Northeastern University: B.A. Sc., Civil Engineering, 2006

PROFESSIONAL HISTORY

Geosyntec Consultants, San Diego, California, July 2004 – Present
Geocon, Inc, San Diego, California, August 2003 – November 2003
U.S. Army Corps of Engineers, Concord, Massachusetts, January 2003 – March 2003

PROJECT EXPERIENCE

Corrective Action Management Unit, Henderson, NV
This project involved the conceptual design and permitting for a Corrective Action Management Unit (CAMU) on Basic Remediation Company property in Henderson, NV. Ms. Flynn was responsible for preparing the Remedial Action Plan (RAP) permit, which included design calculations, construction drawings, a Construction Quality Assurance (CQA) plan, and technical specifications. Ms. Flynn was also responsible for preparing the Remedial Alternative Study (RAS) which evaluated alternatives to remediate existing solid waste disposal areas located beneath the proposed CAMU.

Disposal Cell – White Mesa Mill, Blanding, UT
This project involved the design/construction of a double lined, approximately 42 acre disposal cell and the design of an adjacent double lined, approximately 40 acre disposal cell. Ms. Flynn was responsible for responses to regulatory inquires as well as assisting in design calculations, preparation of technical specifications, CQA Plan, and construction drawings.

Operations and Maintenance – Hewlett Packard Facility, San Diego, CA
This project involved the pilot test study of a Soil Vapor Extraction (SVE) system to address the presence of chlorinated volatile organic compounds (VOCs) in soil. Ms. Flynn was responsible for performing field testing of the influent and effluent streams, collecting vapor and forwarding them to the off-site laboratory for analytical testing, condensate monitoring and management, blower maintenance, and radius of influence testing and monitoring.

Operations and Maintenance – Palomar Airport Landfill, Carlsbad, CA
This project involved the interim treatment of potentially impacted water collected from a sub-drain system at the Palomar Airport Landfill. Ms. Flynn was responsible for the ongoing maintenance associated with the site including sampling, carbon change-outs, and system monitoring.

Operations and Maintenance – San Marcos II Landfill, San Marcos, CA
This project involved the interim treatment of potentially impacted groundwater collected from a series of wells at the San Marcos II Landfill. Ms. Flynn was responsible for the ongoing maintenance associated with the site including sampling, carbon change-outs, and system monitoring.

Gas Monitoring and Control System – Home Depot, West Covina, CA
This project involved the design of a gas monitoring and control system for a property within 1000 feet of a closed landfill. Ms. Flynn was responsible for preparation of Construction Drawings, Technical Specifications, Design Calculations, and a CQA plan. She was also responsible for addressing concerns and requirements from the City Fire Department.

Gas Monitoring and Control System – Home Depot, Huntington Beach, CA
This project involved the design of a gas monitoring and control system for a property near an abandoned oil well. Ms. Flynn was responsible for preparation of Construction Drawings, Technical Specifications, Design Calculations, and a CQA plan. She was also responsible for addressing concerns and requirements from the City Fire Department.

Vapor Control System – Plymouth and Colony Rowhomes, Mountain View, CA
This project involved the design of a vapor control system for a site impacted by Volatile Organic Compounds (VOCs). Ms. Flynn was responsible for preparing Construction Drawings, Technical Specifications, Design Calculations, and a CQA plan.

Vapor Control System – confidential client, Hajdunanas, Hungary
This project involved the design of a vapor control system for a site impacted by Volatile Organic Compounds (VOCs). Ms. Flynn was responsible for preparing Construction Details and Technical Specifications.

Construction Quality Assurance – Waterman Landfill, San Bernardino, CA
This project involved the construction of a methane monitoring and control system for a two story office building located above adjacent to a landfill. Ms. Flynn was responsible for onsite CQA activities including monitoring geocomposite, geotextile, and geomembrane installation. In addition, smoke testing and repairs were documented in daily field notes and with photographs. Ms. Flynn was also responsible for preparing the final Construction Completion Report summarizing the onsite CQA activities.

Off-site Removal Action – Former PureGro Facility, Brawley, CA
This project involved the excavation and stockpiling of approximately 15,000 cubic yards of pesticide-impacted soil from an off-site property on to the PureGro property. The soil was stockpiled on a 60-mil high density polyethylene (HDPE) geomembrane and protected from erosion with best management practices (BMPs). Ms. Flynn was responsible for preparing the Removal Action Completion Report (RACR) summarizing construction activities, which was approved by the Department of Toxic Substances Control (DTSC). She was also responsible for the bi-weekly stockpile inspections documenting the integrity of the stockpile.

Environmental Site Characterization – Solana Beach Burn Dump, Solana Beach, CA
This project involved the evaluation of the presence of burn ash on two parcels adjacent to a known burn dump and identification of viable remedial alternatives in a residential neighborhood. Ms. Flynn was responsible for conducting sampling at the site. She was also responsible for preparation of the Removal Action Workplan (RAW) based on the remedial alternatives identified earlier.

Environmental Site Characterization – Encinitas I Burn Dump, Encinitas, CA
This project involved a limited site investigation, preparation of a Preliminary Site Characterization Report, and preparation of a Mitigation Feasibility Study summarizing the potential for redevelopment of a burn dump. Ms. Flynn was responsible for sampling and preparation of the preliminary Site Characterization Report.

Phase II Environmental Site Assessment – Hanson Aggregates, San Marcos, CA
This project involved a subsurface site investigation to evaluate the conditions at an aggregates mining facility under consideration for redevelopment. Ms. Flynn was responsible for logging soil conditions and collecting soil and groundwater samples for off-site analysis.

Bioremediation Pilot Test Study – Jamacha Landfill, Rancho San Diego, CA
This study involved the evaluation of the ability of enhanced in-situ bioremediation (EISB) to effectively degrade chlorinated hydrocarbons in groundwater. Ms. Flynn was responsible for groundwater sampling after the injection of the microbial culture and electron donor.

PROFESSIONAL AFFILIATIONS

- American Society of Civil Engineers

Geosyntec consultants

engineers | scientists | innovators

CHARLES DAN STREET

waste containment
construction management
construction quality assurance
environmental remediation
surveying and design

EDUCATION

University of Texas, Tyler, Texas, Major Math and Science 1983 - 1985
Arapaho Community College, Littleton, Colorado, Major Math and Science 1981 – 1983

REPRESENTATIVE EXPERIENCE

Mr. Street has over 30 years experience in heavy civil construction, the majority of which has been in the waste containment industry (landfills, impoundments, etc.). His experience and capabilities include multidiscipline supervisory and management responsibilities in the fields of waste containment facility construction, environmental remediation, site development, heavy civil construction and surveying. Highlights of Mr. Street's capabilities are summarized below.

Waste Containment Industry.

Mr. Street has 20 years experience in the waste containment industry focusing on the design, installation, construction management and construction quality assurance (CM/CQA) of clay and geosynthetic liners and related components. As a project supervisor for several geosynthetic installation companies and earthwork contractors, Mr. Street has overseen the installation of over 100 million square feet of geosynthetic materials including: Polyethylene geomembranes, geosynthetic clay liners (GCLs), geonets, woven and non-woven geotextiles. Projects include: dams, leach pads, ponds, landfill cells and caps, multi-phase, multi-layer combination projects with clay barrier layers, drainage layers, leachate collection, and gas collection systems.

As a CM/CQA Site Manager, Mr. Street has continued his expertise in the waste containment field in the role of construction oversight and coordination, performing quality control and quality assurance activities for earthwork and geosynthetic applications. This combination of practical installation experience, combined with third-party testing and verification, gives him a wealth of experience and a well-rounded perspective of how to execute successful projects that meet the design objectives, owner's, and regulatory requirements.

Mr. Street is highly experienced in earthwork construction methods, long term modeling of sites, and field evaluation and laboratory test methods (moisture-density relationships, hydraulic conductivity, shear strength behaviors, etc.). Dan also possesses strong working knowledge of geosynthetics installations, review of MQC and Quality Assurance and project reporting.

Environmental Remediation

Mr. Street's experience in this area includes environmental assessment and modeling of sites through the use of state of the art surveying techniques, ground penetrating radar, test pits, soil and water sampling, establishing air quality and groundwater monitoring points all of which requires close interaction with clients, engineering, onsite/offsite laboratories and regulatory agencies such as the U.S. and State Environmental Protection Agencies (USEPA) and Army Corp of Engineers (ACOE). His experience in overseeing the implementation of remedial actions on Superfund and other environmentally sensitive projects from design through construction makes Mr. Street a valued team member. This experience includes both physical and biological onsite water treatment plants. As a CM/CQA Site Manager Mr. Street has coordinated the efforts to investigation, segregate, recover, and relocate unsuitable materials to designated closure limits.

Landfill Gas Systems

Experience and responsibilities in this area include the development of landfill gas systems both passive and active. Overseeing the installation of vertical and horizontal landfill gas collection/extraction wells and trenches associated lateral collection, header and forcemain piping, coordinate asbuilt surveying, and review final drawings. Mr. Street has been directly involved with the installation of two flare systems and provided oversight and technical support for the operations and maintenance of those systems.

Site Development and Heavy Civil Construction

In the early part of his career as a project surveyor Mr. Street gained considerable experience in the area of site development and heavy civil construction which included developing site plans through preliminary data gathering, ongoing construction stakeout, and final asbuilt surveys for residential housing and commercial developments including highway and road construction, underground utilities layout and installation. Mr. Street has been involved in the design and construction of single and multi-story buildings, mechanically stabilized earthen structures and segmental retaining walls of numerous types. His experience includes the construction of stormwater systems and wastewater conveyance and treatment facilities, and was responsible for varied project assignments including delineating wetlands and building constructed wetlands for both private and public projects. Other relevant projects include mine construction and reclamation of mining activities

Surveying

Mr. Street's surveying experience includes performing land and boundary surveys, staking potential well sites for the petroleum industry, staking and coordinating construction of site roads and pipelines. Survey work done by private companies for the BLM, USGS, ACOE and US Forest Service included section breakdowns, recovery of existing monuments and establishing section and quarter corner monuments. Construction staking experience includes site grading, utilities, curb and gutter, multi-story buildings,

concrete and asphalt roadways. Mr. Street also performed hydrographic surveys of ship channels, harbors, and reservoirs.

Recent Representative Projects

Most projects with which Mr. Street has been involved in while at Geosyntec Consultants are described below.

Municipal Solid Waste Landfill. Allied Waste Services, Blue Ridge Landfill, Fresno, Texas

- 2008 LFG Expansion System – Expansion to existing landfill gas and condensate conveyance system, oversee installation of 2000 lf of forcemain, 22 new gas extraction wells to average depths of 60 feet, various condensate knockouts and 1 lateral gas and condensate collection trenches,

Municipal Solid Waste Landfill. Allied Waste Services, McCarty Road Landfill, Houston, Texas

- 2008 LFG Expansion System – Expansion to existing landfill gas and condensate conveyance system oversee installation of 4000 lf of forcemain, 8 new gas extraction wells to depths in excess of 100 feet, various condensate knockouts and 2 lateral landfill gas and condensate collection trenches,

Municipal Solid Waste Landfill. Allied Waste Services, Golden Triangle Landfill, Beaumont, Texas

- 2008 LFG Expansion System – Expansion to existing landfill gas conveyance and condensate storage – oversee installation of 2000 lf of forcemain, 60 x 60 concrete dual containment retention wall and new 105,000 gallon condensate storage tank, (in progress)

Industrial Solid Waste Landfill. Allied Waste Services, Gulf West Landfill, Anahuac, Texas

- Landfill I Final Closure – Geosynthetic Liner Cap System – 43 acres of composite liner system including a compacted grading layer, a Geocomposite Clay Liner, a 40 ml LLDPE geomembrane and double sided geocomposite drainage layer. Vegetative cover and associated road and stormwater improvements.

Municipal/Industrial Solid Waste Landfill. Waste Management of Texas, Covel Gardens RPDF, San Antonio, Texas, Bexar County.

- Phase V Central Liner System – 6.5 acres of composite liner system.
- Phase VI Central Liner System – 10.3 acres of composite liner system.
- Phase V & VI South Liner System – 8.5 acres of composite liner system.
- Evaporation Pond C – 3.0 acres of double-lined leachate storage/evaporation pond.
- Phase I-III North Slope Final Cap – 6.2 acres of compacted soil-only alternative final cover system. Phase III South Slope Final Cap – 3.1 acres of compacted soil-only alternative final cover system.

- Pond E and F Closure – clean closure of two former industrial stormwater impoundments.
- Phase VII North Liner System – 12.7 acres of composite liner system

Municipal Solid Waste Landfill. Waste Management of Texas, Lacy-Lakeview RDF, Waco, Texas.

- Phase 3 Cell 3-4 Liner System – 6.9 acres of composite liner system including an underdrain system for groundwater conveyance, a recompacted clay soil liner in conjunction with a 60 ml HDPE geomembrane and geocomposite drainage layer.

Municipal Solid Waste Landfill. Waste Management of Texas, Williamson County Landfill, Hutto, Texas. Projects completed to date include:

- Phase 2B Liner System – 8.5 acres of composite liner system.
- Phase 2C Liner System – 10.0 acres of composite liner system.
- Phase I Slope Final Cap – 4 acres of compacted soil-only alternative final cover system.
- Phase I Landfill Gas Expansion system – oversee construction of 8 new LFG gas extraction wells associated lateral gas collection piping and 1500 lf of new header system.

Municipal Solid Waste Landfill. Waste Management of Texas, Comal County Landfill, New Braunfels, Texas. Projects completed to date include:

- Phase I & II Slope Final Cap – 18.5 acres of compacted soil-only alternative final cover system.
- Phase 2B Liner System – 3.5 acres of composite liner system cell construction.

Municipal Solid Waste Landfill. Waste Management of Arizona, Northwest Regional Landfill, Surprise, Arizona

- Phase 2 Module 1 Liner System – 2 million cy excavation and 20 acres of composite liner system including a GCL and geomembrane liner system and associated stormwater improvements

Superfund Site Landfill Closure. Yeoman Creek Remediation Group, Yeoman Creek Phase I, Lake County, Illinois. Mr. Street served as the CQA Site Manager during the remedial action phase of this Superfund project. The site was an abandoned landfill, and the main component of the remedy was to regrade the waste and install a final cap. Mr. Street provided CQA oversight and construction coordination for an 80-acre landfill closure including: wetland excavation and reclamation, excavation and relocation of waste, relocation of utilities, and recovery, relocation and storage of buried drums. Installation of an active landfill gas system and flare system, Installation of a multi-layered cap including: a tire chip gas collection layer, 24"low permeability clay barrier, 40 ml LLDPE geomembrane, single sided geocomposite drainage layer, and a 36" vegetative cover soil system.

Superfund Site Landfill Closure. Terra Nova Resources, Inc. (on behalf of BFI Waste Systems), Elgin Landfill NPL Closure, St. Charles Township, Kane County, Illinois, 2001. As the CQA Site Manager Mr. Street established an on-site geotechnical laboratory and provided lead CQA monitoring services for a 20-

acre single cap system, including: an active gas collection system, top soil, select fill, single sided geocomposite, or geotextile, protective cover, and approximately 900,000 ft^2 of 40-mil thick LLDPE geomembrane smooth/textured cap and random fill.

Municipal Solid Waste Landfill. Waste Management Oakridge Landfill, Cell 5, Phase 1, Dorchester County, South Carolina, 2001. Mr. Street served as Site CQA Manager and provided lead CQA monitoring services for a 5-acre liner, including: protective cover layer, geonet composite, 217,800 ft^2 of 60-mil thick HDPE textured geomembrane, and compacted soil liner and a leachate collection system.

Municipal Solid Waste Landfill. Waste Management R & B Landfill, Cell 5, Banks County, Georgia, 2000. Geosyntec established an on site geotechnical laboratory and provided CQA sampling, testing, and monitoring services for a new 10.8-acre composite liner system, including: a constructed clay barrier, a low permeability geocomposite clay liner, a 60 ml HDPE textured flexible membrane liner, a geocomposite drainage layer, an HDPE leachate collection and transmission system, and a sand protective cover layer. Position: Site CQA Manager.

Industrial Landfill. International Paper Board Company, Inc., Area 2, Sub cell 2 expansion, Augusta, Georgia, 2000. Mr. Street served as Site CQA Manager as Geosyntec provided CQA oversight services for 7-acre composite lining system including: subgrade preparation of a constructed clay barrier, a low permeability geosynthetic clay liner, a 60 ml HDPE geomembrane flexible membrane liner, a geocomposite drainage layer, a drainage aggregate, and an HDPE pipe leachate collection system.

Municipal Solid Waste Landfill. Pappy, Inc., Waste Management Oak Avenue Rubble Landfill, Phase 4 Liner and Leachate Collection System, Joppa, Maryland, 1999. Mr. Street served as Site CQA Manager as Geosyntec provided CQA oversight of subbase preparation and installation of a 60 ml HDPE geomembrane liner, protective soil cover, and HDPE leachate collection system.

Mr. Street's role on these projects that spanned multiple years was the Site CQA Manager and construction coordinator. The projects involved installation of a variety of low-permeability clay layers and geosynthetics components. Mr. Street established an on-site geotechnical laboratory for sampling and testing of soils, and also conducted field testing (e.g., nuclear moisture/density gauge testing, obtaining undisturbed samples, etc.). Mr. Street led efforts to observe, monitor, document, sample, and test materials to verify that the project was constructed in accordance with the project documents and regulatory requirements. He took the lead on preparing the various Final Construction Documentation Reports for the above projects. He also coordinated construction efforts on many occasions as requested by the owner (e.g., conducted meetings, reviewed contractor submittals, scheduled suppliers, installers, and surveys, checked invoices, etc.).

PROFESSIONAL HISTORY

Geosyntec Consultants, Austin, Texas, Site CQA Manager, 2000 – to date

RML Consulting, Atlanta, Georgia, General Manager 1998-2000
T.L. James Company, Ruston, Louisiana, Project Surveyor/Earthwork Foreman, 1997 – 1998
National Seal Company, Pittsburgh, Pennsylvania, Project Superintendent, 1995 – 1997
Rocky Mountain Liners, Denver, Colorado, General Manager, 1992 – 1995
Gundle Lining Construction Company, Houston, Texas, Project Superintendent, 1987 – 1992
DiCesare Bentley Engineer, Groton, Connecticut, Project Surveyor, 1986 – 1987
Colorado Department of Highways, Lakewood, Colorado, Engineer Aide II, 1985 – 1986
Bill Burton and Associates, Tyler, Texas, Project Surveyor 1983 - 1985
Gingery Engineer, Englewood, Colorado, Project Surveyor, 1980 – 1983
R.W. McKinney & T.L. James, Nacogdoches, Texas, Foreman, 1978 – 1980
Morrison Knudsen, King Salmon, Alaska, Foreman, 1976 – 1978
Alyeska Pipeline Services, Fairbanks, Alaska, Foreman, 1975 – 1976

PROFESSIONAL ACTIVITIES AND CERTIFICATATIONS

Certified, Troxler Nuclear Moisture/Density Gauge Operator
Certified, American Red Cross CPR/First Aid Training
Certified, 8-Hour Supervisor Hazardous Waste Occupational and Health and Safety (29 CFR 1910.120)
Certified, 40-Hour Hazardous Waste Occupational Health and Safety (29 CFR 1910.120)
Certified, SIT, Professional Land Surveyors Association of Texas, 1984
Certified, SIT, Registered Land Surveyors Association of Colorado, 1982
Certified National Institute for Certification in Engineering Technologies (NICET Level-1)
Member, International Geosynthetics Society (IGS)
Member, North American Geosynthetic Society (NAGS)

RICHARD A. COOKE
GEOLOGIST
GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

EDUCATION

1992 MS Geology, University of South Carolina, Columbia, South Carolina
1978 BA Fine Arts, West Chester University of Pennsylvania, West Chester, Pennsylvania

REGISTRATIONS

- 29 CFR 1910.120 OSHA 40-hour Hazardous Waste Training (1994)
- 8-hour Hazardous Waste Training annual refreshers (updated 2001)
- Radiological Worker I Training (1993)
- Seismic Data Acquisition and Quality Control, Society of Exploration Geophysics (1993)
- CPN Nuclear Gauge
- Clark County Department of Air Quality Management Dust Control at Construction Sites Training Program (No.20010940I)

Responsible for environmental and geotechnical field operations. Maintains and organizes analytical data for reports. Duties include site reconnaissance, supervision of drilling and trenching activities, soil logging and interpretation, soil and groundwater sample collection and handling, government records review and research, drafting and report preparation. Coordinates projects for laboratory, drilling and sampling needs. Also responsible for training new employees for soil logging and interpretation.

Representative Projects

Environmental Engineering

Southern Nevada Water Authority
Oversaw borehole drilling and collection of soil samples at selected depth intervals. Described lithology and submitted soil samples to laboratory for geotechnical analyses. Measured groundwater levels in boreholes. Prepared and edited borehole location map, computer drafted boring logs, and site description.

Former Landfill Investigation, Clark County, Nevada
Oversaw borehole drilling and logging lithology. Responsible for measuring groundwater levels and maintaining an organized log of core boxes. Challenges encountered included identifying changes in geologic formations and determining ground water yield rates in saturated zones. This was important when making a decision whether to continue drilling or delay further drill advancement while groundwater was analyzed for a suite of chemical parameters. Another challenge was keeping up to date on progress at all drilling locations on the site. This was necessary since delays in drilling at one location may require logging lithology at another site with little notice.

Industrial Complex Development, Henderson, Nevada
Oversaw drilling and performed groundwater and soil sampling for three phases of a subsurface investigation. Samples were collected according to a complex sampling plan requiring each borehole have its own sampling requirements. The chemical constituents to be analyzed varied from borehole to borehole, sampling interval and type of material sampled (soil or groundwater). Drill rigs varied as well from a Mobile B-4500 to a CME Track rig.

Sandy Valley School, Clark County School District
Performed percloration test in school property in Sandy Valley, Nevada to obtain data on drainage rates of soil. The result of this test determined the design of a new septic system for the school.

Sage Hills
Oversaw grading work at a 13 acre residential parcel in Summerlin. This required monitoring progress cutting material from a portion of the site and placing the fill material elsewhere in the site. Performed moisture density tests on the soil, collected bulk samples of material to be used as backfill and delivered the soil samples to the GES laboratory for analyses.

Clark County School District
Oversaw the drilling of boreholes, maintained logs of lithology, and collected soil samples at selected intervals. The borings were done in order to determine soil properties for planned school construction sites at locations throughout Las Vegas.

Terracina Pipeline
Conducted geophysical survey for a 42-inch pipeline right of way using electric resistivity method. The purpose of the resistivity testing was to determine soil properties along the pipeline right of way. The resistivity tests were performed at measured intervals along a 10,200' route. The method used was a Wenner Four-Pin array with a Nilsson Model 400 soil resistance meter. Each test site was located using a hand held G.P.S. unit.

Sand & Gravel Quarry, Eldorado Valley, Nevada
Oversaw borehole drilling using hollow stem auger method and rock coring. This project was performed in order to assist property transaction to a new owner. Maintain log of lithology and collect soil samples and core samples. Hand auger former settling ponds and collect soil samples for chemical analyses. Located all sampling sites with hand held GPS unit.

Las Vegas Springs Preserve, Las Vegas, Nevada
Oversaw borehole drilling and logging lithology for a subsurface investigation and installation of PVC casing in six boreholes for the purpose of geophysical logging. Technical and special care was required for work in this environmentally sensitive area. Technical hurdles included utilizing different drilling techniques (hollow stem auger coring) for different lithologies; installing PVC casing to 100 feet below ground surface with no deviation from vertical; and grouting boreholes from the bottom-up via tremmie pipe. All work was completed within tight time schedules and permitted other projects in the same location to begin on time.

Silverwood Ranch
Oversaw construction of concrete perimeter walls around foundations of residential homes in Las Vegas, Nevada. This required monitoring the trench depth, concrete forms construction, setting reinforcing bars in the existing foundation, collecting samples of concrete from each concrete pour, and testing soil backfill for moisture density to assure the trenches were properly backfilled.

American Pacific Corporation
Oversaw drilling boreholes using mud rotary drilling techniques. This work was performed as part of a ground water remediation system and installation of injection and extraction wells at a site in Henderson, Nevada. The boreholes were logged for lithology to 200 feet. The wells were installed with the pre-pack screens and would serve as part of a remediation system. Groundwater samples were collected prior to

drilling for baseline chemical analyses. Groundwater was sampled again, after the wells were installed and developed.

Southern Highlands (145 acres) and Terracina (130 acres)
Marked out exploratory borehole locations and coordinated with underground utilities locator service. Oversaw drilling 33 boreholes (Southern Highlands) and 30 boreholes (Terracina) logged and sampled soil at specified depth intervals. Also field test soil for moisture content and dry density using nuclear gauge. Prepared borehole location site map, site description, and drafted borehole logs.

Pacific Crossroads, Clark County, Nevada
Performed Phase I ESA on subject property, which included research of historical data, interviews and title search. Reviewed aerial photographs, topographic maps, geologic maps and hydrogeologic information. Reviewed site visit records to determine existence of any visible hazards or areas of concerns as well as assessing soil and surface conditions. Reviewed State and Federal listings for evidence of any known environmental concerns on or adjacent to subject property. Prepared report for final review and submittal to client.

Peak Drive Storm Drain & Sewer, Clark County, Nevada
Performed site visits to mark exploratory boring locations and coordinated with underground utilities locator service. Logged soils and penetration blow counts. Obtained logged and collected soil samples. Assisted preparing geotechnical reports, drafted boring logs and compiled laboratory data for geotechnical division manager's review and approval.

Pahrump Master Plan, Pahrump, Nevada
Performed a Phase I Environmental Site Assessment on property for proposed residential development. Duties included reviewing aerial photos, topographic maps, geologic maps, and hydrogeologic information for specific parcels of land. Additional information was compiled from a title search and State and Federal listings of recognized sites of environmental concerns. Responsibilities also included a site visit in order to document site description and any items of environmental concern. Reviewed historical data and conducted interviews with appropriate key persons. Prepared report for submittal to client.

Arco Properties, Clark County, Nevada
Phase I Environmental Site Assessments (ESAs) were conducted at four active gasoline service facilities in Las Vegas, Nevada. Site visits were performed in order to note any recognized environmental conditions. These locations presented challenges for the site visit due to the complexity of the sites and surroundings and the high volume of traffic. Personnel at the sites were interviewed as well. The ESAs also required reviewing Federal and State listings of impacted sites within the minimum search distances. In addition, aerial photos, topographic geologic maps, hydrologic data, and title searches were reviewed for historic uses of the sites and adjacent properties. A Phase I ESA report was prepared for each site and submitted to the client.

The Phase I ESAs were followed by limited Phase II ESAs at 3 of the 4 locations. Borehole locations were marked out and Underground Service Alert was notified prior to drilling. Supervised drilling, logged soil, and collected soil and groundwater samples for laboratory analyses. The sites presented challenges due to restricted spaces in which to set up equipment and perform tasks. Another concern was maintaining public safety and safety for the drilling crew. This required constant vigilance during all aspects of the work. Careful positioning of the borehole locations and drilling equipment. Allowed the projects to be completed on time and with minimal impact on the facility's operations. The Phase II ESAs also required report preparation, developing site maps and boring logs for each site.

Nevada Power Company Parcel
The project was an Environmental Investigation of subsurface soil and groundwater. Oversaw drilling boreholes, collect soil and groundwater samples, and describe lithology. Also field screened soil samples and ambient air conditions using a photoionization detector in order to maintain safe working conditions. The site was marked out and coordinated with underground utilities locator service prior to drilling activities.

Summerlin Gardens Residential Development, Las Vegas, Nevada
Performed a Phase I Environmental Site Assessment of a 22-acre site for proposed development of a residential community. Reviewed all appropriate maps including aerial photos, topographic maps, geologic maps and hydrogeologic information. Performed title search and reviewed historical data pertaining to subject property. Reviewed State and Federal listings for listings of any areas of recognized environmental conditions on or near property. Completed site visit for any obvious hazards or concerns. A phase I ESA report was prepared and submitted to the client.

Closed Landfills, Western South Carolina
Monitoring of gas emission levels at several closed landfills was carried out to determine if the landfill sites complied with county (Greenville County) guidelines for gas emissions. Gas monitoring was conducted in order to develop public parks or recreational areas. Responsibilities included visiting each landfill site daily and measuring methane and other gas emissions. The gas emission using a hand held LEL meter. data was tabulated and included in a report to Greenville County.

Retail Gasoline Convenience Store, Kissimmee, Florida
Excavated approximately 1,400 cubic yards of fuel-impacted soil due to leaking USTs. The impacted soil was then transported by truck to incinerators for thermal treatment. Clean fill rock was then transported to the site to fill the excavation. Several monitor wells had to be destroyed during the excavation and new wells were installed after the excavation was complete. Responsibilities included preparation of a proposal outlining these actions and the costs for all activities and materials required. Solicited bids for soil transport, thermal treatment of soils, transport of clean fill rock (crushed limestone), geotextile for lining the excavation pit, drilling monitor wells, and injection of Organic Release Compound (ORC) into the groundwater for bioremediation. Collected soil samples for analysis by EPA method 8021 (MTBE and BTEX), FLPRO, and for RCRA metals. Overcame project challenges such as hiring subcontractors for their services, contractor coordination, and maintaining the most efficient schedule.

GREGORY P. DESART, P.E., C.E.M.
PRESIDENT
GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

EDUCATION

1987 B.S. Geological Engineering, University of Nevada, Reno, Nevada

REGISTRATIONS & CERTIFICATIONS

- Nevada Professional Civil Engineer (No. 9543)
- California Professional Civil Engineer (No. 46575)
- Nevada Certified Environmental Manager (No. 1172)

PROFESSIONAL SOCIETIES

- American Consulting Engineers Council of Nevada – President-Elect
- Air & Waste Management Association, Las Vegas Chapter – Past Chairman
- American Public Works Association - Member
- Southern Nevada Home Builders Association - Utilities & Off-sites Committee Member
- International Council of Building Officials – Member
- National Society of Professional Engineers, Southern Nevada Chapter- Former Director
- Nevada Water Resource Association - Member

Responsible for the coordination of all company operations and the management of various public infrastructure projects including geotechnical, construction materials testing, and environmental projects. His experience with these services has included geotechnical recommendations that aid in the design of foundations, pavements, underground utilities, drainage channels, retaining structures and dams. He has directed construction materials testing, inspection, and construction management services. Environmental experience includes preparation and implementation of sampling and remediation plans, site characterization, Phase I & II site assessments, design & installation of groundwater monitoring wells, and UST management. He has worked on over 700 projects in Nevada.

Representative Projects

Geotechnical Engineering

Las Vegas Wash Erosion Control & Groundwater Monitoring

Project Manager and primary contact for the client, Southern Nevada Water Authority. Determined scope of geotechnical engineering investigation for the design of 3 weirs, to be constructed in the Las Vegas Wash for erosion control. Performed contract administration, coordination of geotechnical manager, 2 drilling crews, field geologist for geotechnical subsurface exploration and oversight of laboratory supervisor and three laboratory technicians for materials testing. The geotechnical report addressed embankment stability, subsurface seepage, settlement and installation of sheet piles.

Clark County Sanitation District Administration Building

As the principal engineer, coordinated with both the geotechnical and environmental project managers during the design of this new administration building. GES prepared Phase I and Phase II environmental site assessments (ESA) related to the former location of underground storage tanks within the proposed building area. The Phase II ESA field sampling was performed in conjunction with the geotechnical drilling to reduce costs to the client. Performed technical reviews of all environmental and geotechnical design reports for the project.

Clark County Sanitation District Primary Effluent Pump Station (PEPS)
Provided overall technical direction and client liaison as the principal engineer during design and construction of this component of the expansion of the CCSD Central Plant. During design, coordinated the preparation of recommendations and conclusions related to foundation design, site grading and dewatering. Also attended project coordination meetings with prime designers and owner to explore available design options. During construction, performed site observations of site conditions and approvals of contractor submittals related to geotechnical and dewatering issues. Performed troubleshooting related to contractor's dewatering methods.

Kay Carl Elementary School
Provided overall technical and administrative oversight during preparation of geotechnical investigation and during performance of construction materials testing of soils, concrete, masonry and asphalt.

Red Rock Detention Basin
Provided technical oversight as principal engineer for a geotechnical evaluation related to reconstruction of a bridge and retaining walls near the inlet to the detention basin. The reconstruction was necessary due to damage that occurred during a flood event in the summer of 1998.

Terracina 42" and 24 " water mains in Southern Highlands
Principal engineer who performed technical review and overall project administration for a geotechnical investigation of approximately 4 miles of water main. The evaluation included field drilling and testing, laboratory testing and engineering analysis related to slope stability, excavatability, pipe corrosion and thrust block design parameter

Clark County Sanitation District Central Treatment Plant Expansion
Coordinated the preparation of geotechnical investigations with Black & Veatch, Montgomery Watson, Carollo Engineers, CH2MHill and Clark County Sanitation District (CCSD) staff; for expansion of DAFTS, headworks, filters, disinfection, aerated grit basin facilities, clarifiers, and effluent pump station. Contract administrator and primary contact for the owner and client. Prepared scope of work, and negotiated contracts for the field exploration/drilling program, the laboratory testing program, dewatering testing and evaluations. Developed geotechnical recommendations and design criteria for 60 foot deep 14" x 14" precast driven piles to support the headworks facility and reduce settlement to less than 1 inch; for preloading plans for the DAFT facility and the filters/disinfection project to limit settlement; and for groundwater dewatering for use by the general contractors. Assured prompt transfer of project information by use of a project web-site. Responsible for overall quality control of field investigation, laboratory materials testing and geotechnical engineering design.

Arden Peak Communications Tower
Provided senior principal review of geotechnical investigation and construction earthwork specifications. Project included borings through uncontrolled fill down to bedrock at the top of Arden Peak. Geotechnical report presented recommendations for drilled pier footings for the tower. Negotiated contract for construction materials testing.

Commerce Street
A 0.5-mile section of proposed roadway and a bridge for the extension of Commerce Street between Craig Road and Lone Mountain Road and a 10-year storm drain system. Managed the geotechnical investigation including fissure reconnaissance mapping, trenching, laboratory materials testing, engineering analyses, and geotechnical engineering report. Reviewed and approved recommendations for earthwork, settlement mitigation, fissure remediation, structural fill, soil shrinkage, slopes, corrosion protective measures, design recommendations for bridge abutment foundations, asphalt concrete

pavement sections (California Department of Transportation Highway Design Manual method), storm drainage system pipe bedding and pipe zone material, trench backfill, and drainage.

2145 Zone Pumping Station Addition & Pipeline

Responsibilities included managing the preparation of a geotechnical investigation in final design phase for an above-grade pumping station and an associated 16-inch diameter waterline in North Las Vegas which was to be constructed to Las Vegas Valley Water District and City of North Las Vegas standards. The geotechnical report provided recommendations on earthwork, concrete construction, foundations and trench excavation and backfill. Responsible for project management , quality control during construction. Reviewed daily reports of soils, concrete, steel reinforcement testing and inspection and laboratory results.

2635 Zone South

Responsibilities included the preparation of a geotechnical investigation for an approximately 1.5-mile-length of 42-inch- diameter, mortar-lined and coated-steel pipe. The field investigation included drilling and sampling 8 borings, at a spacing of about 1,000 linear feet, to depths below the planned pipe invert level. Field electric resistivities were performed at a spacing of about 500 linear feet to depths ranging from 5 to 20 feet. The laboratory testing program included single point soil resistivity, soil corrosivity, R-values and physical engineering properties of the soil. Design recommendations were developed for anchorage of pipe horizontal thrust using restrained joints, lateral pipe deflection, valve vaults, manholes and soil corrosivity.

West Airport Diversion Channel

Responsibilities included the preparation of a geotechnical investigation and supervision of construction testing for the proposed reconstruction of the West Airport Diversion Channel. The project was performed for the City of Boulder City Public Works Department and was intended to bring the area out of the 100-year flood zone. The diversion channel is a trapezoidal, concrete-lined channel, about 1.5 miles in length. The geotechnical investigation included field and laboratory testing and preparation of recommendations for earthwork including removal of soil cement existing in portions of the channel, gravel bedding, weep holes, cutoff walls and soil corrosivity to concrete. Construction services included testing and observations of the earthwork, gravel bedding, steel reinforcement and concrete used in the lining.

Desert Breeze Park

Coordinated with CCPR, the contractor, and field personnel as to unexpected field conditions. Supervision of field and laboratory technicians during geotechnical investigation, drilling, laboratory testing. Evaluated the engineering properties of the soils. Performed construction quality assurance special inspection and testing services. Responsible for generating correspondence as each phase of construction is completed.

Aaron Way Sediment Basin

A geotechnical investigation was provided for expansion of the existing Aaron Way sediment basin to alleviate flood damage. The expansion included providing additional acreage to the existing basin and additional depth to the basin, with a final capacity of up to 17 acre-feet. Evaluated soil and groundwater conditions including excavatibility and slope stability of the existing and proposed embankment. Oversaw field investigation including drilling and sampling of fourteen 40- feet-deep soil borings through unconsolidated sand and gravel deposits to bedrock. Reviewed laboratory investigation included grain size distributions, laboratory maximum dry densities, and direct shear strengths. Directed slope stability analyses performed for static loading, draw-down, and earthquake conditions for the existing embankment height of 10 feet and the proposed embankment height of 15 feet using the program XSTABL. Analyzed field and laboratory data to develop recommendations and to prepare a report, which aided in the design and construction of the detention basin.

Whitney Ranch

Coordinated with client while overseeing design of field hydrologic testing procedures for evaluation of groundwater conditions and permeability of on-site soils. Provided a feasibility level design of a groundwater dewatering system appropriate for the proposed site development based on hydraulic conductivity data determined by Hvorslev and Bower-Rice analytical methods and calculation of parameters for dewatering system spacing and sizing. Reviewed Groundwater Evaluation report and approved engineer's cost for dewatering.

Environmental Engineering and Consulting

Perchlorate In-Site Bio Remediation Pilot Study, Henderson, NV

Coordinated with Client, NDEP and Geosyntech to install extraction and injection wells for purpose of a Perchlorate in-site bio-remediation pilot study. Wells were installed to a depth of 180 feet with a screened interval of 160 to 180 feet. Wells were developed using a combination of surging, bailing and pumping for approximately 12 hours.

Former Ammonium Perchlorate Manufacturer, Henderson, Nevada

Coordinated with site owner, NDEP, and the USEPA Region IX to develop closure reports related to in-place PCBs and remediation of lead in soil. Developed verification sampling plan. Oversaw two-man field crew during remediation observations and verification sampling. Remedial excavation of lead-impacted soil from one-to ten-feet below grade. Prepared the subsequent closure report. Based on this report, the NDEP required "No Further Action" at this site. Groundwater, surface water, and subsurface geologic characterization in a five-square-mile area extending from Lake Mead Drive to the Las Vegas Wash to investigate the occurrence of perchlorate in the groundwater and surface water. Performed all contract negotiations and determined scope of work. Responsible for the contract administration and management of environmental aspects. Assured quality control with respect to technical performance, project schedules, and costs. Prepared and/or reviewed and approved all correspondence and reports prior to client and agency submittal. Primary interface for all City, State, and Federal agencies. Designed hydrogeologic investigation including design of groundwater monitoring well field consisting of installation of over 45 wells, hydrogeologic data review, sampling of existing and new wells, identification of potential contaminate sources and migratory pathways, and monitoring impact to Las Vegas Wash surface water. Prepared a presentation to EPA Region IX summarizing the distribution of perchlorate in the groundwater.

Horizon West Development, Henderson, Nevada

Coordinated the preparation of a Phase I Environmental Site Assessment for the City of Henderson for the proposed Horizon West Development. The 110-acre parcel is located near the Seven Hills Residential Development. Based on our findings, no recognized environmental conditions were identified. Prepared a Phase I Environmental Site Assessment in accordance with ASTM 1527 through site reconnaissance, government records search, review of historical maps and aerial photographs, a chain-of-title search, and interview of the City of Henderson property manager. The property was found to have no recognized environmental impacts.

Boulder City Wetland Study, Boulder City, Nevada

Evaluated water management alternatives for the operation of the Boulder City Constructed Wetlands located in Veterans Park near the intersection of Buchanan Boulevard and Georgia Avenue. Examined engineering and environmental issues associated with effluent reuse by presenting a series of Technical Memorandums that discussed background information, system capacity and demands and water rights. Lead workgroups consisting of two City Staff, two Boulder City residents, and one representative of the Veteran's Cemetery and the U.S. Bureau of Reclamation, and a subconsultant to discuss the issues and to participate in the evaluation of the effluent reuse alternatives. Presented the results of evaluations of cost and non-cost

factors associated with implementation of four alternatives to the Boulder City - City Council. The report and its conclusions were unanimously accepted by the City Council. Construction Management.

Moapa Valley Roads
Coordinated with GES Technician, Clark County Public Works (CCPW) On-Site Inspector, CCPW Project Manager and Contractor for on-call quality assurance materials testing of soils, aggregate, concrete and asphalt. Project consisted of 1.2 miles of two lane street improvements including Cottonwood Avenue, Vista View Street and Pat Avenue. All testing was performed in accordance with version 1.02 of CCPW Manual Series 1.

City of Las Vegas On-Call Materials Testing
Negotiated contract and coordinated with City Inspectors and GES Staff to provide on-call materials testing services to the City of Las Vegas. GES provided testing of soils, asphalt and concrete as requested. Scope of services also included geotechnical drilling and evaluations as needed.

Desert Research Institute Nevada Science Center
Acted as Principal Engineer overseeing GES Project Manager, Inspectors and technicians during construction of this 5-story masonry building for the State of Nevada Public Works Board. GES provided materials testing and construction and observation during grading, concrete, masonry and structural steel construction.

Lorna J. Kesterson Elementary School
Responsibilities included the preparation of a geotechnical investigation and supervision of construction testing of a new school building for the Clark County School District. The school building was a one-story steel structure with block masonry walls and slab-on-grade floors. The geotechnical investigation included drilling, sampling, and laboratory testing. Recommendations were provided for foundations, slabs-on-grade, retaining walls, utility trench backfill, soil corrosivity pavements and moisture protection measures. Construction services included testing and observations of the earthwork, concrete, block masonry, asphalt and steel.

Commerce Street, North Las Vegas, Nevada
Managed GES construction management services during project's construction. Performed site visits with construction manager (PBS&J), designer (Carter & Burgess, Inc.), and the City of North Las Vegas to evaluate suitability of use of native soil as structural fill, evaluate the presence of fissures, and observe subgrade conditions within existing channel. Provided geotechnical review of contractors submittals for geogrid fabric use, and supplemental geotechnical recommendations when soft subgrade and exposed utilities were encountered. Supervised the GES geologist who performed field observations and testing.

RTC/RFCD Administration Building Phase II, Las Vegas, Nevada
Responsible for quality assurance for all field daily reports documenting soils, concrete, steel reinforcement, structural steel, welding, lightweight concrete, metal decking, and masonry testing and inspection. Reviewed laboratory materials testing results. Interpreted plans and specifications as needed for field personnel. Assured conformance with project contract and testing standards. Provided engineering recommendations in response to unexpected field conditions. Consulted with Carter & Burgess Project Manager, the contractor, and field personnel as needed. Responsible for generating correspondence as each phase of construction is completed.

Kyle S. Hansen

1700 Estrella Street
Las Vegas, Nevada 80117

K56Hansen@hotmail.com
Mobile: (801) 949-6663

EDUCATION

MS, Geochemistry Iowa State University, Ames, Iowa, 1983
BS, Geology, Brigham Young University, Provo, Utah, 1981

TRAINING

(Due to absence from the environmental field since 2002 the certifications have expired)
40-Hour OSHA and U.S. EPA 29 CFR 1910.120 Hazardous Materials Site Safety training course
8-Hour OSHA and U.S. EPA 29 CFR 1910.120 Hazardous Materials Supervisory training course
40-Hour MSHA underground metal, non-metal training certification
Aquifer Testing and Analysis, short course sponsored by Harding Lawson Associates, 1989
EPA/AHERA Asbestos Inspector/Management Planner training
Utah asbestos inspector certification (UT #759)
Utah underground storage tank closure certification training
Utah underground storage tank installer certification training
Utah Groundwater and Soil Sampler Certification (GS0900)
Utah Division of Environmental Response and Remediation Certified Consultant (CC002-1996)

EMPLOYMENT HISTORY

12/04-present	GES, Inc.- Environmental Program Manager
6/02-9/04:	Traco Manufacturing, General Sales Manager
6/01-6/02:	MWH, Supervising Geologist
6/00-6/01:	Harding ESE, Associate Environmental Division Manager
7/96-5/00:	HBH Enterprises, VP Sales/Research and Development Manager
3/89 - 6/96:	Harding Lawson Associates, Associate Geologist/Environmental Manager
6/87 - 3/89:	Dames & Moore, Project Geologist
8/85 - 5/87:	Tropaquatics, Manager/Partner
11/83 - 8/85:	Integrated Resources Exploration Corporation, Staff Geologist
6/82 - 9/83:	Iowa State Mining & Mineral Resource Research Institute, Geochemist

REPRESENTATIVE RESPONSIBILITIES

Management

Western Zirconium, Ogden Utah – Provided project management and technical direction for the Resource Conservation and Recovery Act Facility investigation. Responsible for all documents, subcontracts, budgets, schedules and invoicing. Able to decrease program costs by 30% through collaborative efforts with the regulatory authorities and streamlined investigative processes.

Salt Lake City Corporation - Provided project management and technical direction for all environmental services required by the city for the 1994-1997, 2000-2001 fiscal years.

Sacramento Corps of Engineers - Yerrington, Nevada - Provided project management and technical development of remedial actions for contaminated mine shafts by illegal dumping activities. Saved 34% on remediation cost estimates through networking and disposal reductions.

Fort Ord Military Base, Fort Ord, California - Provided project management and technical support for the Basewide Remedial Investigation/Feasibility Study. Primary responsibilities included data evaluation, report generation, and quality assurance supervision.

Rocky Mountain Arsenal (RMA), Denver, Colorado - Provided project management for the Interim Response Action (IRA) Monitoring Program. Assumed overall responsibilities for all documents, subcontracts, budgets, schedules and invoices. Also provided technical guidance, coordinated staffing needs and ensured technical adequacy of field, laboratory, data management, and evaluation activities involved in the program.

Sunstrand aircraft component manufacturing facility, Denver, Colorado - Provided project management and geotechnical expertise for a hydrogeologic investigation involving drilling, sampling, leaking tank removal and contaminant plume delineation in a populated area.

Van Waters & Rogers's chemical repackaging facility, Omaha, Nebraska - Provided project management, field support, and document preparation for a site characterization study of a decommissioned bulk chemical storage and transfer facility.

RMA, Denver, Colorado - Provided project management and technical support for the RMA Offpost Remedial Investigation/Feasibly Study drilling program. Responsibilities also included land access negotiations and public relations. Was able to acquire land access from private landowners in areas where the government agency was not thus reducing project schedule duration by 20%.

Wasatch Chemical repackaging facility, Salt Lake City, Utah - Provided site supervision and technical support for a site characterization study of an active bulk chemical storage and transfer facility.

Sales/Marketing Management

Traco Manufacturing, Orem, Utah – Manufacturer of shrink film and equipment. Manage the Western Region of the US and Canada. Sales growth averaged 21% in areas of responsibility during a down economy. After 7 months of territory sales was promoted to General Sales Manager with 12 staff employees.

HBH Enterprises, Springville, Utah – Manufacturer of centralized aquatic retailing systems (Wal-Mart) and ornamental fish feeds. Direct national sales strategy and managed day-to-day production and sales staff efforts of up to 17 staff employees. Headed up the research and development division of for bringing to market of 38 new products. Sales growth averaged over 32% annually for accounts personally assigned. Implemented just-in-time inventory control systems and provided primary contact for all major national accounts.

Tropaquatics, Denver, Colorado - Directed regional sales, supervised work force of 12 full/part time employees, and responsible for numerous client presentations and training sessions in relation to the tropical fish wholesale industry.

Hydrogeologic Experience

RMA, Denver, Colorado - Designed and managed the installation of deep domestic groundwater supply wells through upper contaminated aquifers on impacted private property saving litigation costs for the inadvertent impact to private property for the client.

Hewlett Packard electronics manufacturing facility, Colorado Springs, Colorado - Directed a hydrologic investigation involving drilling, sampling, contaminant plume delineation, and report preparation.

Syntex Landfill, Loveland, Colorado - Conducted a contaminant migration study for a chemical landfill, including geologic structural mapping, monitoring well installation, and groundwater modeling.

Bunker Hill Superfund site, Kellogg, Idaho - Provided technical supervision of a hydrogeologic site characterization study involving drilling, well installation and development, and sampling.

Air Monitoring

Wasatch Chemical site remediation, Salt Lake City, Utah - Performed the EPA required air monitoring during the remediation phase using PM-10 samplers, PUF samplers, and Summa Canisters.

Asbestos

Project inspector for numerous asbestos surveys, including site investigation coordination, evaluation, specification preparation, and remediation monitoring.

Other

Eagle Mine Superfund site, Minturn, Colorado - Provided project and technical oversight during the remediation phase of the Eagle Mine tailing piles.

Anaconda Minerals Superfund site, Anaconda, Montana - Directed the drilling and soil-sampling program for the Anaconda Minerals Corporation.

Conducted numerous environmental and hydrogeologic investigations in support of environmental assessments and property audit projects.

Integrated Resources Exploration, Denver, Colorado - Responsibilities included evaluation and delineation of subsurface stratigraphic structures, potential hydrocarbon generation and migration pathways for oil and gas prospects in the mid-west region of the U.S. Also conducted economic evaluations of prospects based on risk, production potential, chemistry, porosity and permeability.

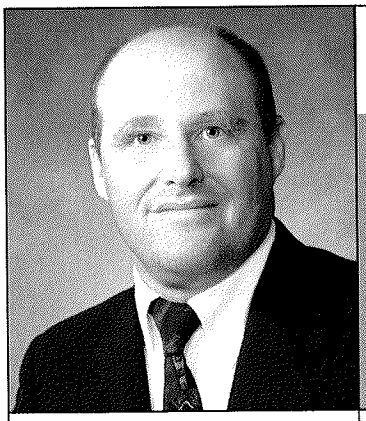
REPRESENTATIVE PUBLICATIONS

1998 The Role of Pigments in the Reproductive Cycle of Koi. Pondscapes Publications.

1996 Feeding Your Pond, Nutritional requirements of Koi during various phases of development. Pondscapes Publications.

1991 Stable isotopes in the sulfate evaporites from southeastern Iowa, USA - Indications of postdepositional change. *Chemical Geology*, 90:79-90(with S. M. Richardson).

1983 The geochemistry of sulfate evaporites in Iowa. Presented at and published in the proceedings of the Geological Society of America Annual Meeting, Madison, Wisconsin.



MONTY MEHLHORN
Staff Geologist

Mr. Mehlhorn has 10 years experience in geologic reconnaissance mapping, exploratory subsurface investigation, and analysis of subsurface geologic and geophysical data. He is responsible for environmental and geotechnical field operations. He maintains and organizes analytical data for reports. Mr. Mehlhorn's duties include site reconnaissance, supervision of drilling and trenching activities, soil logging and interpretation, soil and groundwater sample collection and handling, government records review and research, drafting and report preparation. He coordinates projects with the Environmental Program Manager for laboratory, drilling and sampling needs.

Education
Master of Science, Geology, University of Idaho, 1992
Bachelor of Science, Geology, Fort Lewis College, 1986

Registrations & Certifications
OSHA 40-Hour Safety Training, Hazardous Waste, Certified
OSHA 1910.120
Radiological Worker II Training, Certified
American Red Cross Standard First Aid/CPR Training
Health and Safety at Hazardous Waste Sites, Certificate, 1992
Basic Hazardous Materials Transportation Training, Certified
Basic Hazardous Waste Training, Certified
Basic Radioactive Material Training, Certified
ATI Portable Nuclear Density/Moisture Gauge Use and Safety Training, NV 2006

BRC Deep Background Sampling Soil Borings - As the Geologist on this project, Mr. Mehlhorn assisted the Project Manager in performing a site reconnaissance which included locating boring sites with the Trimble unit, documentation of boring location conditions and performing sample boring location mark-outs and performance of USA located call-ins. Drilling responsibilities included the preparation of detailed boring logs, inclusive of describing particle size distribution, angularity, mineralogic / ligthologic composition, bedding structures and other features. Mr. Mehlhorn also sampled groundwater from bailers where encountered and oversaw sample organization for samples to be shipped to multiple laboratory locations for analysis. The use of sonic drilling required working faster and having to work 12 hour field days to meet project deadlines. (2007)

Tropicana Mega Resort - Mr. Mehlhorn in the capacity of Staff Geologist performed the initial location mark outs which involved surveying the locations of all borings to be drilled as a part of this project. This phase of work involved meeting with the Project Manager and Facility Engineer to perform mark outs and boring locations. Additionally, he oversaw 50% of the drilling activities at the site which included logging drill rates through caliche and complex geology. Mr. Mehlhorn also logged all hollow stem auger borings within the courtyard area, inclusive of drilling through cliché layers under a strict drilling deadline. (2006)

PEPS Phase 3 Expansion - As the Field Geologist, Mr. Mehlhorn performed an initial USA location and boring survey, which involved a site visit to clear the site for underground utilities. He oversaw and supervised drilling, performed soil logging samples and noted the depths at which there were transitions from fill materials to native soils. One aspect of this job required establishing whether the soils were pre-loaded to prepare them for the placement of foundation mats associated with the CCWRD facilities. It was crucial to establish this boundary as uneven settlement of the foundation mat may occur if this factor was not properly determined. (2007)

Emergency Interceptors - As a Project Geologist Mr. Mehlhorn assisted in logging borehole geology and sampling of a groundwater monitoring well. He logged cores from selected borings, and photographed all core for the project report, with wet and dry core photos. Mr. Mehlhorn also edited borehole logs for the final report. The project consists of an above grade emergency interceptor sewer pipeline at the Clark County Water Reclamation District's Central Plant. Our scope included reviewing available soil reports for the site vicinity, performing one geotechnical boring at the location of a flow splitting structure, performing laboratory tests and preparing a design level geotechnical recommendations report. The Fast-Track includes construction of three epoxy 1,500 foot long 84-inch diameter underground interceptors. Prepare underground 60-inch diameter pipe at the Clark County Water Reclamation District's Central Plant. (2007.)

GARY A. CARTER, P.E., C.E.M.

Environmental Group Manager

Summary of Experience

Mr. Carter has 18 years of experience in air quality, water, and hazardous waste management and has earned recognition as an outstanding environmental project manager. He has a diverse background in environmental engineering including air quality engineering and permitting, groundwater monitoring, discharge permitting and compliance, Resource Conservation and Recovery Act (RCRA) permitting, hazardous waste remediation, site characterization, field programs, and environmental compliance auditing. He has demonstrated exceptional technical leadership and project management on many air quality characterizations and permitting projects that include waste treatment facilities, boilers and power plants, mines and mine processing facilities, wood products facilities, military bases, pipeline compressor facilities, and many other unique industrial facilities. He has also provided strong leadership and key technical support on many other environmental projects that include remediation, groundwater monitoring, Brownfields redevelopment, Phase I and Phase II environmental site assessments, development of RCRA closure plans, RCRA facility audits, stormwater management, and spill prevention, control, and countermeasures (SPCC) plans. Mr. Carter has established an outstanding ability to communicate and work effectively with regulatory agencies on behalf of clients.

Education

BS, Civil Engineering, University of Washington, Seattle, 1990

Additional Training

Loss Prevention System® Training, 2007
Loss Prevention System® Refresher, 2008

Registrations/Certifications

Professional Engineer (Environmental), #16740, Nevada (11/4/04)
Professional Engineer (Environmental), #39130, Washington, 2002
Professional Engineer (Environmental), #5150948-2202, Utah, 2002
Certified Environmental Manager, #1909, Nevada, 2005
Registered Brownfield Professional
8-Hour OSHA Health & Safety Annual Update Certification, 2005
8-Hour OSHA Supervisor's Certification, 1991
40-Hour OSHA Health & Safety Certification, 1990

GARY A. CARTER, P.E., C.E.M.
Environmental Group Manager

Professional Memberships
Air & Waste Management Association
Institute of Brownfield Professionals

Select Project Experience
A representative selection of Mr. Carter's project experience is included below.

New Source Review Air Permitting

Authority-to-Construct Air Permitting, City of North Las Vegas, Nevada. Managed project that consisted of determining applicability of the Authority-to-Construct (ATC) air permitting requirements for each of five facilities that were not registered with the Clark County Department of Air Quality and Environmental Management (DAQEM), development of detailed air emissions inventories for the five subject facilities, compiling ATC permit applications for three of the facilities, and a permit exemption letter for two of the facilities. The project also consisted of compiling annual emissions inventories for all existing sources operated by the City of North Las Vegas.

NOC Permit Application, Pacific Northwest National Laboratory, Richland, Washington. Project manager for an NOC permit application prepared for the future Physical Sciences Laboratory (PSF) located in Richland, Washington. The proposed PSF would replace a number of existing research laboratories in the Hanford Site 300 Area that are currently occupied by Pacific Northwest National Laboratory (PNNL) and that are scheduled for demolition and removal as part of the DOE's river corridor restoration project. A unique SCREEN3 modeling approach was used to demonstrate compliance with ambient air quality standards for criteria pollutants and acceptable source impact levels (ASILs) for toxic air pollutants.

NOC Permit Application, Pacific Northwest National Laboratory, Richland, Washington. An NOC permit application was required for the Horn Rapids Test Site (HRTS) operations. The HRTS is the site used to test both engineering-scale and large-scale systems for the bulk vitrification technology to be used as a low-activity waste supplemental treatment at Hanford, Washington. As the environmental project manager, developed the overall approach, dispersion modeling protocols for ISCST3, emissions calculations,

fugitive dust control plan, and the NOC package. Also performed extensive screening modeling for NOx and fugitive particulate matter.

Bulk Vitrification System (BVS) Pre-Conceptual Design, Hanford, Washington. Served as a permitting and regulatory compliance expert on this bulk vitrification system. The BVS was one of three processes evaluated as an alternative for low-activity waste (LAW) treatment by the U.S. Department of Energy Office of River Protection. The primary focus on the project team was oversight of maximum achievable control technology (MACT) compliance, development of a regulatory strategy document, and providing key regulatory drivers as design input.

Hanford Waste Treatment Plant (WTP), Hanford, Washington. Served as air permitting lead responsible for the development and submittal of air quality permit applications and technical support documents. This waste treatment plant was designed to treat high–level radioactive and hazardous liquid waste stored in underground tanks and to convert it into a solid borosilicate glass for final disposal in a geologic repository. Was lead of a team of engineers and scientists assisting in putting together a best available radionuclide control technology (BARCT) analysis, radionuclide notice-of-construction (NOC) application, best available control technology for toxic air pollutants (T-BACT), toxics NOC application, concrete batch plant and quarry NOC, Prevention of Significant Deterioration (PSD) permit application, and soil excavation radionuclide NOCs. Also provided overall air quality and general environmental engineering support for the project.

Eielson Air Force Base, Alaska. Compiled a PSD application for all new sources installed at the Base after 1981 including new sources installed in 1997. The PSD application consisted of a detailed emissions summary, a BACT analysis for the new sources, and an air quality impact analysis that included detailed computer dispersion modeling. Worked closely with the agency in negotiating permit conditions that were satisfactory to both the agency and the Base.

NOC Application for Sulfuric Acid Plant, Washington State. Served as lead engineer responsible for the development of an expansion of a sulfur recovery unit (SRU) at a sulfuric acid plant. The SRU was modified to increase its capacity of H_2S processed. The expansion resulted in increased

emissions of sulfur dioxide (SO_2) and sulfuric acid mist. Engineering modifications to various pieces of process equipment was conducted and summarized in the NOC, along with detailed emissions calculations, BACT analyses, and air dispersion modeling.

River Road Cogeneration Project, Longview, Washington. Served as lead project engineer in developing a BACT analysis and emissions calculations for a proposed 250-MW gas turbine. Emissions calculations included short-term 1-hour and annual emissions of all primary pollutants and ammonia from the turbine and the startup boiler. The BACT analysis evaluated the feasibility of nitrogen oxides (NO_x), carbon monoxide (CO), and volatile organic compounds (VOC) controls. This project also included research into other turbine facility emissions reports to find a history of consistent compliance with NO_x permit limits. The intent was to discover a precedent for a proposed very low NO_x concentration of 3.4 ppm for this project.

Thirteen (13) Natural Gas Pipeline Compressor Station Expansions, Washington, Oregon and Idaho. Provided key engineering support to the permitting tasks related to multiple compressor station expansion projects for Northwest Pipeline. Wrote several BACT analyses, conducted dispersion modeling, visibility modeling, and noise measurements and analysis. Prepared several NOC applications for different station expansions.

Refinery Upgrade, March Point, Washington. Prepared a BACT analysis for particulate matter control for this client's CO boilers and fluidized catalytic cracking unit (FCCU). This task required close contact with refinery personnel involving interpretation of regulations and criteria for emissions calculations. Prepared a full "top-down" analysis for particulate matter control and updated emissions calculations. The BACT analysis included a full economic, environmental and energy impact analysis for a baghouse and an electrostatic precipitator (ESP).

Oil-Fired Package Boiler, Hanford, Washington. Served as project manager in charge of preparing an NOC permit application for a newly installed oil-fired package boiler rated at 50,000 lbs/hr. steam. The application contained detailed emissions estimates, a BACT analysis for NO_x and SO_2, and dispersion modeling. Also assisted the client in negotiations with the Department of Ecology after Ecology's submittal of a draft permit.

2025E Condensate Treatment Facility, Hanford, Washington. Served as project manager in charge of all facets of preparing a federal National Emissions Standards for Hazardous Air Pollutants (NESHAPs) Compliance Report, along with BARCT and T-BACT reports, for air emissions from this treatment facility. The facility was designed to treat process condensate from the Hanford PUREX Plant and the nearby 242-A Evaporator.

Anheuser-Busch Brewery, Northern California. Prepared an Authority to Construct permit application for a modification project at a large brewery in northern California. The modification entailed replacement of a Strainmaster unit with a new lauter tub and new brew kettles. The project resulted in an increase of precursor organic compounds emissions. The application consisted of a process description, emissions calculations, regulatory approach, permit application forms, and Title V update forms.

Proposed Cogeneration Facility, Fredrickson, Washington. Conducted a BACT analysis for NO_x and SO_2 in support of a permit application for this proposed cogeneration facility. The proposed plant was a combined-cycle cogeneration facility with a steam turbine capable of producing 240 megawatts of power and 270,000 lbs/hr of steam. Used the "top-down" approach in analyzing NO_x and SO_2 control alternatives.

Leachate Evaporator, Klickitat County, Washington. Prepared a BACT analysis for NO_x, CO, and VOC control at a leachate evaporator designed to treat leachate at a remote landfill site. The design had the vapors being drawn through a combustor to destroy odors and VOCs. Prepared a detailed engineering summary on the leachate evaporator system. Used the "top-down" BACT process to evaluate control technologies for all three pollutants. Cost estimates were based on contacts with vendors and pollution control journals. Also assisted with the entire NOC permit package for the leachate evaporator that included a SEPA checklist and the facility overview.

Pulp Mill, Western Washington. Conducted a BACT analysis for SO_2 emissions in support of an NOC permit application. The mill had planned to modify their hog fuel combustion by including clarifier sludge that will result in larger SO_2 emissions. The analysis evaluated caustic scrubbing and sodium bicarbonate duct injection.

Kraft Pulp Mill, Tacoma, Washington. Prepared a reasonably achievable control technology (RACT) analysis. This mill is located inside a non-attainment area for PM_{10} at the highly industrialized Tacoma Tideflats area. Conducted research on other Kraft mills within Washington State and elsewhere around the nation, and proved the client had comparable emissions to other mills. Prepared an economic feasibility analysis comparing modification costs to emissions reduction.

Title V Air Permitting

Eielson Air Force Base, Alaska. Served as project manager in the development of the Title V permit application. Compiled the Title V permit application for the Base. Performed a Base-wide air emissions inventory and report, and detailed PSD, NSPS, and Title V compliance audits for the air emission sources. From the audits, uncovered PSD permitting issues for several sources installed after 1981.

Elmendorf Air Force Base, Alaska. Served as lead engineer in the development of the Title V permit application. Performed a detailed compliance audit of the air emission sources, and compiled an off-site monitoring plan and emissions modeling report as part of the Title V contract. Compiled the Title V permit application for the Base.

Several Wood Products Facilities, Idaho. Served as project manager for the Title V air operating permit project. This project consisted of emission source identification, development of location map drawings and process flow diagrams, identification of all applicable requirements, development of compliance methods for the requirements, and gathering of all pertinent permit application materials. The project covered four wood products facilities that included plywood mills, sawmills, a particle board mill, and planer mills. Major effort was devoted to compiling emission factors for plywood and particleboard operations, including fugitive emissions from material handling. Developed calculations to allow the facility to demonstrate compliance with particulate emission limits for large material handling cyclones.

University of Alaska-Fairbanks. Served as lead engineer in the development of a Title V permit application. Performed an initial campus-wide emissions inventory focusing primarily on the power plant and miscellaneous combustion sources, and compiled the Title V permit application.

Environmental Compliance Auditing

Several Graymont Limestone Mines and Processing Facilities, Multiple States. Served as lead auditor and project manager on multi-media environmental compliance audits. Each audit project consisted of comprehensive reviews of permits, plans, and process information, and the development of a detailed audit checklist. The audit activities included detailed site inspections of all environmental media, reviews of permits, data records, and other pertinent environmental documentation, discussions with key operations and environmental staff, a post-audit debriefing to obtain consensus on the audit findings, and development of an audit report and compliance action plan.

Kennecott Utah Copper Corporation, Magna, Utah. Performed a comprehensive air quality compliance audit for this company's smelter, refinery, rail facility, and power plant. Served on four-member, multi-media audit team focusing on compliance with Title V operating permits and Utah Division of Air Quality approval orders, air emissions and controls, and record keeping and reporting. The project consisted of a week long audit of each of the subject facilities, review of environmental programs and issues pertinent to existing laws and permits, review of records and reports, verbal daily briefings on findings, oral presentation of findings and recommendations at conclusion of audit, and a written audit report.

RCRA Permitting and Audits

Hanford Demonstration Bulk Vitrification System (DBVS) RD&D Regulatory Compliance Support, Hanford, Washington. Developed detailed compliance matrices that broke out the key conditions of the Research, Development, and Demonstration (RD&D) permit specific to design, documentation, and operational procedures. These matrices were designed to point out specific conditions that pose challenging compliance methods and potential schedule

impacts. Also developed a conceptual approach for complying with organics Destruction and Removal Efficiency (DRE) requirements. Discovered a significant design shortfall in the off gas treatment system that would prevent the facility from meeting the 99.99 percent DRE requirement. The shortfall was presented to the client and the design team in time to make the appropriate modifications prior to construction.

Hanford Waste Treatment Plant, Hanford, Washington. Provided technical support for the preparation of the Dangerous Waste Permit Application (DWPA) for the Hanford Waste Treatment Plant. Prepared a closure plan for the facility as part of the DWPA, conducted engineering reviews of design drawings to assess consistency with the DWPA's engineering information, coordinated work efforts to be done by key project design staff, and addressed agency and customer comments to draft sections of the DWPA.

Solvent Recovery Facility, Tacoma, Washington. Served as the lead engineer for the development of a DWPA. Developed compliance methods for Subpart AA, BB, and CC air emissions standards. Developed strategies for achieving compliance with Subpart CC requirements for tanks, containers, and railcars. Responsible for engineering design for solvent distillation and vapor recovery systems, and new piping and structural components. Prepared an inspection plan, waste analysis plan, contingency plan, training plan, and closure plan.

Industrial Parcel, Beaverton, Oregon. Served as the lead engineer in conducting a RCRA Facilities Audit (RFA). The parcel was investigated for historical and current process waste management activities and adverse environmental conditions. A summary document was prepared that included a historical review of all solid waste management units (SWMUs) and areas of concern (AOCs), a summary of the historical environmental records review, and a summary of the site reconnaissance.

Reactive Metals Processing Facility, Albany, Oregon. Served as field operations manager for a RCRA visual site inspection and compliance audit. Evaluated process and control systems including fluidized-bed reactors, scrubbers, tanks, sumps, and piping systems for RCRA compliance and potential corrective action. Assisted in the development of a unique relational database for assessing compliance with RCRA permit conditions. The database contained operational information, engineering parameters,

emissions data, and compliance status. Evaluated all data input, gathered necessary additional information and organized the database to present vital information for use in permitting, corrective action, and compliance determinations.

RCRA Dangerous Waste Permitting (Part B), Sol-Pro, Inc., Tacoma, Washington. Project entailed the development of a comprehensive Dangerous Waste Permit Application (DWPA) for a solvent recovery facility. Project also included design of facility upgrades for compliance with RCRA requirements. In the role of lead environmental engineer, was responsible for the development of a DWPA. Developed compliance methods for Subpart AA, BB and CC air emissions standards; developed strategies for achieving compliance with Subpart CC requirements for tanks, containers and railcars; responsible for engineering design for solvent distillation and vapor recovery systems, and new piping and structural components. Also prepared an inspection plan, waste analysis plan, contingency plan, training plan, and closure plan.

Hazardous Waste Remediation and Investigations

Union Park Former Rail Yard Brownfield Redevelopment Project, State of Nevada Brownfields Program and the City of Las Vegas, Nevada. Provided oversight and senior technical input for a comprehensive soil and groundwater management plan for the entire 61-acre former rail yard site. Oversaw the development of a site-specific sampling and analysis plan in support of the soil and groundwater management plan. These plans were developed for the City of Las Vegas to provide guidelines and procedures and allow for consistent long term management of potentially contaminated soils and groundwater encountered during excavation work. Also providing ongoing CEM oversight during the excavation work on the construction projects at the site to ensure proper sampling and soil management are executed per the plan.

Naval Defense Reutilization and Marketing Organization (DRMO) Site, Bremerton, Washington. Served as site engineer for a soil remediation project at this site. The project consisted of excavation and disposal of approximately 7,000 cubic yards of lead-contaminated soil, paving, backfilling, installation of a manhole, and replacement of a rail turnout. In charge of manifesting all waste shipments from the site, coordinated support activities, such as wastewater

removal and treatment, with the Puget Sound Naval Shipyard, was the liaison to the Navy and the subcontractors, and filled in as site superintendent for extended periods.

150,000-Gallon Tank Farm at a Bulk Chemical Facility, Salt Lake City, Utah. Provided occasional construction management during the decommissioning and reconstruction of this tank farm. Provide oversight of personnel working on bulk product removal, demolition activities, concrete and paving activities, storm sewer pipeline removal and replacement, subsurface investigations, and sanitary sewer replacement. Developed the excavation and installation plan for the storm sewer.

Coal Gasification Clean-Up Site, Tacoma, Washington. Served as sampling coordinator for field investigation and remediation pilot plant activities conducted at this site. The site was contaminated with metals, polychlorinated biphenyls (PCBs) polyaromatic hydrocarbons (PAHs), and oil gases. The activities consisted mainly of a batch plant demonstration that involved the mixing of coal tar, auto fluff, and soils with batch material into one-half cubic yard blocks. Conducted the batch sample packing and organized the curing of the sample coupons. Coordinated the analytical and physical analysis of the sample coupons with two laboratories, and kept logs of the daily sampling activities.

Dual Phase Extraction System, Former Stead Air Force Base, Nevada. Prepared detailed design specifications for a dual phase extraction system to be used to treat three different source areas contaminated with chlorinated solvent. Developed detailed design specifications for temporary facilities, mobilization/demobilization, protection of utilities, removal of asphalt and concrete, soil excavation and removal, backfilling and compaction, site surveying and field engineering, well construction, well-head installation, testing and start-up, and project close-out.

Groundwater and NPDES Projects

Groundwater Aquifer Testing, Basic Remediation Company, Henderson, Nevada. Provided field and logistical coordination and project management support for a series aquifer tests on the Landwell property in Henderson, Nevada. These tests consisted of a series of step and constant rate tests

measuring the projected performance of extraction and re-injection wells and the effective drawdown from nearby monitoring wells. The tests were performed to provide critical data for future groundwater flow modeling of the site in support of Landwell's restoration project and agreement with NDEP.

Quarterly Groundwater Sampling, Molycorp Mine, Mountain Pass, California. Project manager overseeing the quarterly monitoring at Molycorp's mine near Mountain Pass, California. The project consists of measuring water levels at the sampling points, recording physical groundwater parameters during purging before sample collection, and collection of groundwater samples for laboratory chemical analyses for up to 60 sampling points. Low flow sampling methods are performed on select wells that meet the criteria for using such methods.

Annual Groundwater Sampling, American Pacific Corporation, Henderson, Nevada. Manager in charge of all aspects of annual groundwater monitoring for over 150 wells in Henderson, Nevada as part of a mandated perchlorate plume tracking effort. The work included groundwater sampling, water level measurements, recording physical parameters during purging using low-flow methods, and collection of samples for laboratory analytical analyses for perchlorate and other inorganic constituents. Many of the wells were retrofitted with dedicated tubing and check-valves for ease during future sampling events. Ten wells are artesian and were retrofitted with specially designed caps connected to dedicated PVC piping, pressure gauges, and ball valves for easier purging and sampling in the future. Prepared a detailed report that presented the results of the analytical testing as well as a potentiometric surface and perchlorate isoconcentration maps for the aquifers and associated water zones.

Groundwater Aquifer Testing, American Pacific Corporation, Henderson, Nevada. Provided field oversight and project management support for a series of aquifer tests near Boulder Highway in Henderson, Nevada. These tests consisted of a series of step and constant rate tests measuring the projected performance of extraction and re-injection wells and the effective drawdown from nearby monitoring wells. The tests were performed to support the design of a full scale treatment system for remediation perchlorate in the groundwater.

NPDES Permitting and Compliance, Allure Condominium Project, Las Vegas, Nevada. Project manager for permitting and compliance under the National Pollution Discharge Elimination System (NPDES) for dewatering activities at the Allure Condominium site in Las Vegas, Nevada. Compiled a complete permit application, ensure monthly monitoring is correctly executed, and prepare monthly Discharge Monitoring Reports (DMRs) to NDEP during the construction phase of the project.

NPDES Compliance, Regional Justice Center, Downtown Las Vegas, Nevada. Project manager ensuring quarterly compliance with the RJC's NPDES permit. Ensure that the quarterly sampling is properly conducted and prepare quarterly DMRs indicating the results of the sampling and analyses for submittal to NDEP.

NPDES Compliance, Tomiyasu Ranch, Las Vegas, Nevada. Was project manager ensuring monthly compliance with Tomiyasu Ranch's NPDES permit. Oversaw the quarterly and annual sampling and prepared DMRs indicating the results of the sampling and analyses for submittal to NDEP.

Phase I and Phase II Environmental Site Assessments

Phase I ESAs, Nevada Power Company, Las Vegas, Nevada. Currently serving as project manager on multiple Phase I ESAs for land to be acquired for new substations. This project has been ongoing since spring 2006 with Kleinfelder assigned to perform the ESAs based on Nevada Power's land acquisition schedules. Many of the properties are owned by BLM requiring Kleinfelder to interface with BLM's realty specialists to obtain historic and other pertinent information. Kleinfelder has been using the new ASTM 1527-05 standard for all of these Phase I ESAs.

Phase I ESAs (City of Las Vegas Brownfields Program) Las Vegas Land Partners, LLC, Las Vegas, Nevada. Served as project manager responsible for the proper completion of Phase I Environmental Site Assessments for multiple real properties located throughout downtown Las Vegas, Nevada. Many of the sites contained multiple parcels. The subject properties consist of many buildings constructed in the early 1900s including former residences now serving as offices or business such as bail bonds, apartment buildings, and motels. The client endeavors to develop some or all of the subject

properties. The Phase I assessments were funded under the City of Las Vegas Brownfield Grant Process to perform these Phase I assessments. Ensured timely coordination of activities, site visits, historic file reviews, and report preparation which was critical to meeting the client's needs for swift closure of the due diligence process.

Phase I Environmental Site Assessment, Multiple Clients, Las Vegas, Nevada. In responsible charge of all Phase I ESAs performed by out of the Las Vegas office since January 2005. Managed over 50 Phase I ESAs since becoming the Las Vegas Environmental Department Manager. Successfully implemented Kleinfelder's new report template on ESAs beginning in March 2006 that adheres to the new ASTM 1527-05 standard.

Phase II ESA, Ace Painting, Las Vegas, Nevada. Was project manager responsible for the execution of a limited Phase II ESA for a property near downtown Las Vegas, Nevada. The project consisted of extending two soil borings 4 feet below groundwater and sampling soil and groundwater at strategic locations on the subject property. One boring was at the onsite location of a former UST that had been closed, the other was located downgradient of offsite former UST sites that have also been closed. The sampling results were successfully used to demonstrate that the site had no current issues related to the past UST closures.

Phase II ESA, Former Holiday Texaco Station (for Allure Condominium Project), Las Vegas, Nevada. Kleinfelder performed a limited subsurface investigation at the Holiday Texaco property with regard to a potential release from the underground storage tanks (USTs) on the property. Four borings were drilled in the proximity of three existing USTs. Samples were analyzed for TPH and VOCs. Was project manager in charge of the drilling and field sampling, ensuring proper sampling protocols were met, evaluation of the analytical data, and preparation of a detailed report.

Phase II ESA, Apcar Property (City of Las Vegas Brownfields Program), Las Vegas, Nevada. Kleinfelder performed a limited subsurface investigation at the Apcar property in downtown Las Vegas with regard to a potential impact from the neighboring Union Pacific Railroad property. Three soil borings were drilled below the groundwater and four surface soil grab samples were taken at one foot below ground surface (bgs) at select locations on the property.

Soil and groundwater samples were analyzed for TPH and for total metals. Groundwater was analyzed for VOCs and TPH. Was project manager in charge of the drilling and field sampling, ensuring proper sampling protocols were met, evaluation of the analytical data, and preparation of a detailed report.

Phase II and Phase III Site Investigation and Remedial Actions, Univar Bulk Chemical Facility, Salt Lake City, Utah. Provided field oversight of Phase II soil investigations to evaluate the extent of contamination and impacts after multiple tank explosions at the facility. During Phase III, provided construction management for the decommissioning and reconstruction of the 150,000-gallon tank farm. Provided oversight of personnel during the subsurface investigation, product removal, demolition activities, concrete and paving activities, storm sewer pipeline removal and replacement, subsurface investigations, and sanitary sewer replacement.

Other Environmental and Process Engineering Projects

Soil Vapor Study for Input in Human Health Risk Assessment, Las Vegas Performing Arts Center Foundation, Union Park Site, Las Vegas, Nevada. Oversaw the execution of a soil vapor study on land located within 61 acres of a former rail yard designated as a Brownfield Redevelopment Area. The LVPACF intends to construct a performing arts center (PAC) on a 4.7 acre parcel. The purpose of the soil vapor survey was to develop the information necessary to address the health hazards that may be associated with the migration of vapors from subsurface soil or groundwater into the occupied spaces of the PAC. A hollow-stem auger drill rig was used to complete 16 soil borings for the installation and construction of the vapor sampling wells. Six-liter Summa canisters were used for collection of the soil vapors which were analyzed per Method TO-15. Soil samples were also collected from seven of the borings and analyzed for PAHs, BTEX compounds, and RCRA 8 metals.

Soil Vapor Study for Input in Human Health Risk Assessment, Newland Communities Reserve Block of Parcels, Union Park Site, Las Vegas, Nevada. Oversaw the execution of a series of soil vapor studies on land located within the 61 acre Union Park site. Similar to the LVPAC, the purpose was to develop the information necessary to address the health hazards that may be associated with the migration of vapors from subsurface soil or groundwater

into the occupied spaces of the buildings planned for development. Summa canisters were used for collection of the soil vapors which were analyzed per Method TO-15. Soil samples were also collected from the borings and analyzed for PAHs, BTEX compounds, and RCRA 8 metals.

Spill Prevention, Control, and Countermeasures (SPCC) Plan and Storm Water Pollution Prevention Plan (SWPPP), Potlatch Consumer Products Facility, North Las Vegas, Nevada. Served as project manager and lead author of an SPCC Plan and SWPPP for Potlatch's paper products facility. The facility has various machinery equipped with oil-containing reservoirs, bulk storage of oil products, and transformers. The SPCC Plan was put together following the requirements set forth in 40 CFR 112. The SWPPP was developed following the requirements outlined in the State of Nevada's General Stormwater Permit.

Placer Dome Mine Processing Facility, Crescent Valley, Nevada. Served as project manager for a technical and economic feasibility analysis for mercury emissions controls. The feasibility analysis consisted of a process engineering evaluation of the client's off-gas systems, identification of available mercury control systems used in the mining industry, an evaluation of technical feasibility based on process, mechanical, and layout variables, assessment of mercury capture efficiency for each of the feasible controls, and a detailed cost evaluation. Recommendations for the most efficient and cost effective control options were made to the client based on the results of the analysis.

Bulk Chemical Facility, Salt Lake City, Utah. Prepared a work plan and conducted indoor air sampling. The sampling followed EPA Method TO-15 using SUMMA canisters and flow regulators. The samples were packaged and sent to a laboratory for analysis of various chlorinated solvents and aromatic VOCs. Prepared a report that was used in support of a Risk Evaluation, which was part of a multi-phased voluntary clean-up action.

Natural Gas Terminal, Washington State. Served as project manager for a Second Tier Health Impact Analysis for formaldehyde emissions from two new compressor engines. Air dispersion modeling of the emissions indicated an exceedance of the acceptable source impact level. The Second Tier Analysis was conducted per Washington State Air Toxic regulations which included air dispersion modeling and corresponding health risk calculations for

formaldehyde, a toxicological profile of formaldehyde, and a best available control technology for toxic air pollutants (T-BACT) analysis.

Eielson Air Force Base, Alaska. Organized an approach and performed an Aerospace MACT compliance audit based on the complex hazardous air pollutant inventory conducted as part of the Title V work at the Base. Conducted a detailed review of the regulations, organized an audit task plan, prepared an audit field form, and performed the audit. The audit focused mainly on the aircraft painting operations and their Material Safety Data Sheets that indicated the amount of VOCs contained in their paints.

Offshore Terminal, Riverhead, Long Island. Conducted a technical and economic feasibility analysis for installing VOC control equipment at this offshore terminal. This project consisted of researching, through vendor contacts, the latest control methods for marine vapor recovery and calculating the costs for retrofitting them onto the offshore terminal. The conclusions, gathered from thorough research, showed that such an installation is unprecedented and is economically infeasible when compared to New York State's threshold of $5,000 per ton of VOC removed.

Natural Gas Terminal Expansion, Ferndale, Washington. Prepared a permit strategy document for this expansion project. Identified all required county, state, and federal permits and approvals needed prior to commencing construction of this project. Initiated discussions with Whatcom County, Washington State Department of Ecology, the Federal Railroad Administration, and the Northwest Air Pollution Authority. Obtained information on the permits and approvals that would be required and level of detail the client must include in their application. Prepared a detailed permit strategy document based on the information gathered from the authorities and data obtained from a wetlands survey.

U.S. Department of Energy, Office of River Protection, Hanford, Washington. This project entailed a comprehensive engineering analysis that evaluated the pertinent design details of Hanford, Washington's Waste Treatment Plant (WTP) waste dewatering system and it's off-gas control system as it was potentially subject to RCRA Subpart AA rules as a distillation unit. The WTP is a multi-billion dollar facility designed to treat high-level and low-level radioactive and hazardous liquid waste stored in underground tanks and

convert it into a solid borosilicate glass for final disposal in a geologic repository. In the role of senior environmental engineer, prepared a key technical "white paper" that presented a defensible argument for the system to not be included in the RCRA conditions with Subpart AA requirements based on engineering principles in its design and the robust nature of the off-gas controls to be installed and regulated under the toxic air pollutant permit conditions and T-BACT.

Air Emissions Stacks, Outboard Marine Corp., Culver, Oregon. Assessed technical and environmental feasibility of modifying air emissions stacks at this boat manufacturing facility to minimize ambient impacts caused by styrene emissions. Coordinated with the Oregon Department of Environmental Quality to receive their input on a modeling approach; developed a dispersion modeling protocol; reviewed physical stack lay-outs and physical details; and determined which stacks could be extended. Managed the execution of ISCST3 to conduct iterative modeling runs to assess the optimum stack configurations. Compiled a detailed engineering report based on the lay-out assessment and iterative modeling results that presented a conclusion on which were the most feasible stacks to modify.

Plume Dispersion Modeling Analyses and Field Protocols, U.S. Army, Fort Lewis Army Base and Yakima Firing Range, Washington. Developed plume dispersion modeling analyses and field protocols for the United States Army for their use of smoke generators at the Fort Lewis Army Base and also the Yakima Firing Range in Washington. The smoke generators were used in training to create target camouflage. As the lead engineer, led a team of dispersion modeling experts and atmospheric scientists in developing an approach to model various smoke generating scenarios under different meteorological conditions to determine ideal locations and wind speeds for conducting training exercises without violating pollution nuisance regulations off-site.

Publications

Carter, Gary A. 1992. Regulatory Issues of Gas Turbine Air Emissions. Environmental Aspects of Cogeneration Specialty Conference sponsored by Air and Waste Management Association, November 11, 1992, Pittsburgh, PA.

GARY A. CARTER, P.E., C.E.M.

Environmental Group Manager

Carter, Gary A. and Alan Carpenter. 1993. An Inside Look at BARCT Determinations for Air Emissions at Three Hanford Facilities. Presented at the PNWIS/AWMA Annual Conference and Exhibition, November 9, 1993, Victoria, B.C., Canada.

DOUGLAS S. DAVIS

Geologist/Staff Professional II

Summary of Experience

Mr. Davis has over 20 years experience as a professional geologist. He began his career in mining and mineral exploration where he worked for 12 years performing geologic mapping, planning mineral exploration programs, logging core borings, and managing sampling. Since 2001, Mr. Davis has worked in the Las Vegas Valley as a geologist supporting both geotechnical and environmental work, including geotechnical soil and core logging and sampling.

Education

MS, Geology, University of Minnesota, Duluth, 1987
B.Sc., Geology, Oregon State University, 1985

Additional Training

Loss Prevention System® Training, 2007
Loss Prevention System® Refresher, 2008

Certifications

Professional Geologist, #5428601-2250, Utah
Nuclear gauge certification, #39893, February 26, 2003
8-Hour HAZWOPER Refresher Class
Certificate of Training – Mine Safety & Health Administration, #4851, 2008

Select Project Experience

A representative selection of Mr. Davis's experience is included below.

Phase I Environmental Site Assessment, Future Regional Transportation Commission Development, Las Vegas, Nevada (2007). Performed a Phase I Environmental Site Assessment on a 2.57-acre parcel of land proposed for development as a two-story structure and associated parking facilities. The ESA was performed in accordance with ASTM standards.

Phase II Environmental Site Assessment, Future Regional Transportation Commission Development, Las Vegas, Nevada (2007). The results of Kleinfelder's Phase I Environmental Site Assessment identified the presence of PCE-impacted groundwater in the vicinity of the proposed construction. Accordingly, geologic logging and environmental sampling of six soil borings, as well as groundwater sampling, was performed as part of a Limited Phase II Site Investigation at the 2.57-acre site.

Phase II Environmental Site Investigation, Las Vegas, Nevada (2007). The approximate 11.76-acre project site was proposed for development of residential

and commercial properties as well as associated parking facilities. Performed geologic logging and environmental sampling of three soil borings located at the proposed site as part of a Limited Phase II Site Investigation. Groundwater sampling was also performed.

Union Park Development, Soil Management Oversight, Las Vegas, Nevada (2007). Mapping of excavation and environmental soil sampling of the project site as part of a soil management plan for a Brownfields site in downtown Las Vegas, Nevada. Provided environmental sampling, mapping and volume calculations for soil piles generated by excavation to determine a cost and method of disposal as defined by an NDEP-approved Soil Management Plan for the site.

Newland Soil Vapor Extraction, Las Vegas, Nevada (2007). Soil boring and installation of wells for soil vapor extraction at Brownfields site in downtown Las Vegas. Geologic logging and environmental sampling of soils during drilling. Performed soil vapor sampling from wells.

Cornerstone Redevelopment, Phase II Site Investigation, Henderson, Nevada. The City of Henderson is desirous of redeveloping this approximately 100 acres (formerly an aggregate mine) into a public park facility with a storm water retention basin. Kleinfelder is providing quarterly groundwater and surface water sampling .A previous Phase I assessment determined petroleum hydrocarbon had been reported in the soil at an earlier date and later excavated and removed. Assisted the project manager at the time of report preparation by providing information for inclusion in client's final report.

Former Tiffany Cleaners, Phase II Site Assessment, Las Vegas, Nevada. Based upon a discovery of a release of PCE which occurred as a result of previous dry cleaning operations, installed and sampled three soil borings and groundwater monitoring wells to evaluate exterior property. In addition to the soil borings and groundwater monitoring wells, Kleinfelder developed a Remedial Action Plan (RAP) and Waste Management Plan (WMP) to address the PCE-impacted soils (found up to 5,200 micrograms per kilogram (mg/kg) within the interior of the building). The RAP has been implemented by the property owner and Kleinfelder is providing soil confirmation sampling as well as quarterly groundwater monitoring services.

Allure Condominiums, NPDES Weekly Discharge Monitoring, Las Vegas, Nevada. Kleinfelder was retained to provide weekly groundwater monitoring services during the construction of the first phase of this major high-rise

structure. As the construction continues, Kleinfelder will again be on-site to perform groundwater monitoring. Responsible for collection of discharge samples, handling, labeling, and transportation to the approved analytical laboratory following chain-of-custody protocols. Also assisted the project manager in compiling the monthly discharge monitoring reports.

BRC Aquifer Test, Henderson, Nevada (2007). Detailed logging of soil core obtained with roto-sonic core drilling method. Installation of wells for groundwater monitoring and aquifer testing. Oversight of detailed environmental sampling of core samples in the field. Slug testing of selected, pre-existing wells.

Lake Mead Intake #3, Las Vegas Nevada (2006). Assisted the project manager during the performance of geologic reconnaissance mapping of the northern portion of Saddle Island where proposed alternate alignments for Lake Mead Intake No. 3 may traverse the island. Detailed core logging and packer testing of boreholes for hydrologic properties along the proposed alignment for Intake #3. Field program consisted of core drilling along proposed alignment for Intake #3 on land and bottom of Lake Mead. Core was logged in detail, photographed and sampled in the field. Upon completion, core holes were packer tested with dual packer system and logged for geophysical parameters. Core was re-photographed and selected intervals point-load tested at core storage area.

Molycorp, Inc. Groundwater Monitoring Program, Mountain Pass, California. Kleinfelder has been providing quarterly monitoring wells groundwater sampling at this mine site for the past nine years. Field program consists of low-flow groundwater sampling methods performed on over 90 wells. Field tasks include measuring water levels at the sampling points, recording physical groundwater parameters during purging before sample collection, and collection of groundwater samples for laboratory chemical analyses.

Lac Minerals, Bullfrog Mine, Beatty, Nevada (1988-1991). Logged thousands of feet of exploration and mine site cores at the Bullfrog Mine near Beatty, Nevada. Detailed core logs, RQD of core, percent recovery, marking fore for splits to sample, photographing core for both still photo and video log. Constructed geologic sections from core logs and reconciled with surface mapping.

Western States Minerals, Northumberland Mine, Kingston, Nevada (1992-1994). Logged thousands of feet of exploration and mine site cores at Northumberland gold mine, near Round Mountain, Nevada. Detailed core logs, RQD of core, percent recovery, marking fore for splits to sample, photographing core for both

still photo and video log. Constructed geologic sections from core logs and reconciled with surface mapping.

Inmet Mining, Reno, Nevada (1994-1998). Geologic logging of cores provided by other companies wanting Inmet to buy into their property. Constructed geologic sections from core data, and evaluated for bulk mineable potential.

City of Las Vegas Discharge Pipeline, Las Vegas, Nevada (2002). This pipeline alignment extended from the Wastewater Treatment Plant located on Hollywood Boulevard to Lake Mead. Performed detailed logging of cores, RQD of cores, percent recovery, and delineation of representative samples for laboratory testing.

Las Vegas Wash, Weir 810, Las Vegas, Nevada (2003). Detailed logging of cores, percent recovery, RQD and construction of geologic sections for determination of fault hazards in area to be developed by the Las Vegas Water District and partners.

Project Geologist Experience

- Performed reconnaissance scale and detailed geological mapping and sampling of project areas
- Detailed geologic and geotechnical logging and sampling of drill cuttings and core
- Responsible for mine site and district exploration for precious metals mineralization at the Northumberland mine in central Nevada, including detailed logging of core
- Performed geologic mapping and sampling of Bullfrog open pit mine for ore control and geologic modeling, including detailed logging of core
- Responsible for permitting drilling programs and interacting with government regulatory agencies
- Responsible for project management, including supervision of contract geologists, and drill crews
  - Preparation of technical reports
  - Presentation of results to clients
  - ArcGIS and related GIS mapping
  - Hydrologic characterization
  - Environmental sampling of drill cuttings
- Environmental sampling of well and surface water for analysis by EPA methods
  - Environmental sampling of soil for analysis by EPA methods

DOUGLAS S. DAVIS

Geologist/Staff Professional II

- Phase I ESA site investigations
- Responsible for planning and implementing statewide reconnaissance as well as detailed, project-level mineral (gold, copper) exploration programs in Nevada
- Assisted in budgeting for statewide mineral exploration and project work

KARIN HAGAN
Staff Geologist

Summary of Experience
Ms. Hagan has over four years of experience performing hydrogeologic investigations, Phase I Environmental Site Assessments, and geotechnical sampling. She also has experience in the oversight of groundwater extraction and monitoring well construction / monitoring well rehabilitation. Other project experience includes assisting in construction management of pipeline, pump station, and canal lining projects. In addition, Ms. Hagan has approximately 2 years of experience in providing remote Geographic Information Systems (GIS) support for geotechnical, environmental, and geophysical projects in Nevada, California, Utah, Arizona, Idaho, and Texas, while working from Kleinfelder offices in California and Nevada.

Education
MS, Geographic Information Systems, Pennsylvania State University, 2006
MS, Geology, Hydrogeology Concentration, California State University System: Bakersfield, California, 2002
BS, Geology, Chemistry Minor, California State University System: Bakersfield, California, 1997

Additional Training
40-Hour HAZWOPER, #7537472
Hazwoper 8-Hour Refresher Class, May 2007
Contaminant Chemistry and Transport in Soil & Groundwater, 2007
Hydrogeology Certificate Program, #0024, 1999
Environmental Resource Management Certificate Program, 1999
Loss Prevention System® Training, 2007
Loss Prevention System® Refresher, 2008
Heartsaver® AED (CPR) Program, February 2008
Certificate of Training – Mine Safety & Health Administration, #9913, 2008

Professional Affiliations
Association for Women Geoscientists (AWG)
American Geological Institute (AGI)
Nevada Geographic Information Society (NGIS)

Select Project Experience
The following is a representative selection of Karin Hagan's project experience.

KARIN HAGAN
Staff Geologist

Water

Aquifer Test, Henderson, Nevada. Kleinfelder performed step-drawdown and constant rate pumping tests on three groundwater wells. As a hydrogeologist, Ms. Hagan's responsibilities included assisting in the setup of the test equipment and monitoring of the test progress.

Shallow Groundwater Study, San Joaquin Valley, California. Investigated the pattern and source of shallow groundwater by acquiring and correlating groundwater level, groundwater quality and geologic data. Demonstrated that the shallow groundwater impacting the landowners was due to irrigation water creating perched aquifers, and not to the client's groundwater banking activities as previously thought.

Monitoring Well Rehabilitation, Antelope Valley, California. Supervised two of the client's engineers and the contractor during rehabilitation of groundwater quality monitoring wells and installation of new submersible pumps which saved the expense of constructing new wells.

Irrigation Well Construction, San Joaquin Valley, California. Oversaw construction of irrigation water wells that the client will use to extract banked groundwater during dry years. Tasks included logging sediment samples; reviewing electric, caliper and video logs; and performing pump testing.

Irrigation Well Construction, San Joaquin Valley, California. Assisted in supervising construction of an irrigation water well and a nested piezometer. Tasks included logging sediment and drilling mud samples; reviewing electric, caliper and video logs; performing pump testing; and collection of water quality samples and monitoring groundwater levels in the new wells and off-site wells. The wells demonstrated that the selected site is suitable for groundwater banking by the client.

GIS Services

Groundwater Development Project, Clark, Lincoln and White Pine Counties, Nevada. Kleinfelder is providing geotechnical and geologic services which have included location of geotechnical explorations and geophysical surveys, and reconnaissance-level geologic mapping. As the GIS Professional for this $800,000+, 62-mile project, Ms. Hagan's responsibilities included setup,

maintenance, and conversion of GPS datasets, QA/QC and submittal of the exploration datasets to the client, and analysis and presentation of the exploration datasets and geologic mapping.

EPP Preservation Ranch, Napa County, California. Kleinfelder oversaw baseline surveys, construction monitoring and land management which involved: (1) Wildlife, botanical and fishery studies, including Threatened and Endangered Species (California Spotted Owl, Coho and Steelhead Salmon); (2) GIS (data management and analysis, predictive management tool, and multi-dimensional graphic displays); (3) Permit Scheduling and Minimization Strategies, Tracking Processing; (4) Wetland Delineations, habitat characterization and mapping; (5) Preconstruction permit requirements; and (6) Post Construction Mitigation Monitoring and Permit Compliance for Reclamation. As the GIS Analyst for this 20,000 acre, $5.9M project, Ms. Hagan's primary responsibilities included data compilation, QA/QC, analysis and presentation for this very remote site.

San Ramon Habitat Assessment, San Ramon, California. Kleinfelder conducted habitat assessments, wetland delineation surveys and a California Red-legged Frog pre-construction survey on Coyote Creek, San Ramon Creek, and Norris Creek. As the GIS Analyst for this 11,000 linear foot project, primary responsibilities included data compilation, QA/QC, and presentation.

Union Park Brownfields, Las Vegas, Nevada. Kleinfelder preformed a Phase1 Environmental Site Assessment update for a portion of the site, including creating a soil management plan based upon historical records of site remediation, and Certified Environmental Manager oversight for new construction. As the GIS Analyst and a part of the Environmental Staff for this 61 acre project site, primary responsibilities included data compilation, QA/QC, and presentation.

Environmental Assessments

Phase I and II Site Assessments, Dole Sanborn Road, Salinas, California. Phase I and II research, discovery and sampling efforts for subject site which has been developed as light industrial property since between 1940 and 1947, and which the client would like to sell. This site contained multiple historical USTs, some of which had been removed; a waste oil pit which had been closed; and a wash rack area for agricultural equipment. Ms. Hagan met with client representatives, performed site visit and file review, drafted Phase I report,

recommended sampling and drafted sampling plan for wash rack and oil change pit areas, and reviewed summary document of Phase II results.

Phase I and II Site Assessments, Gilroy Unified School District, Proposed Christopher High School, Gilroy, California. Phase I and II research, discovery and sampling efforts for subject site which has been developed as agricultural property since at least 1952. Ms. Hagan met with client and State representatives, drafted sampling work plan for the field area of the property, performed sampling for naturally-occurring asbestos and PCBs, and drafted the PEA report with results. She also drafted the sampling plan and Phase I Addendum for the residential area of the property, which included sampling for lead in soil from lead-based paint on the buildings and sampling for organochlorine pesticides used as termiticides around the building foundations.

Phase I and II Environmental Assessments, Proposed School Expansion, Gilroy, California. Phase I and II research, discovery and sampling efforts for subject site which has been developed as agricultural (specifically orchards) property since approximately 1938. Ms. Hagan finalized the Phase I report, met with School District and State representatives, and drafted the sampling work plan for naturally-occurring asbestos, PCBs, lead in soil from lead-based paint on the buildings, and organochlorine pesticides used as termiticides around the building foundations. She also drafted the PEA report with the results and finalized the PEA report for submittal to DTSC and the public for comment.

University Master's Thesis/Project

MS Geology Master's Thesis. Ms. Hagan assembled groundwater quality and groundwater level data through an aquifer test, contour maps, and other graphical methods to conclude that the White Wolf fault is only a partial barrier to groundwater movement in the southern San Joaquin Valley, Calfornia. This new interpretation of the fault will affect the groundwater banking activities of the local water districts.

MGIS Master's Project. Ms. Hagan utilized GIS and multivariate linear regression to combine and correlate groundwater well data and geology to map the base of active groundwater circulation in three sub-basins of the Susquehanna River Valley, Pennsylvania. This study will aid in the protection of groundwater in Pennsylvania.

KARIN HAGAN
Staff Geologist

Publications and Papers

Author, *The effects of the White Wolf Fault on groundwater hydrology in the southern San Joaquin Valley, California*, Master's Thesis, Assembled groundwater quality and groundwater level data through an aquifer test, contour maps, and other graphical methods to conclude that the White Wolf fault is a partial barrier to groundwater movement. This new interpretation of the fault will affect the groundwater banking activities of the Arvin-Edison and Wheeler Ridge-Maricopa Water Storage Districts.

Co-author, *A paleoclimate record for the past 250,000 years from Summer Lake, Oregon, USA: I. Chronology and magnetic proxies for lake level*, Journal of Paleolimnology, As an assistant to Dr. Robert Negrini, collected and interpreted paleomagnetic, paleolimnologic and paleontologic data from Pleistocene lake sediments, calculated Remanant Magnetization and correlated data with global paleomagnetic records.

AREN HALL

Environmental Professional

Summary of Experience

Mr. Hall has a variety of environmental project experience. He has performed on groundwater sampling and monitoring projects, soil investigations, watershed and habitat monitoring and Phase I and Phase II environmental assessments and monitoring.

Education

B.A., Philosophy, with specialized studies in Environmental Science, Buffalo State College, Buffalo, New York, 2005.

Additional Training

Loss Prevention System® Training, 2007
Loss Prevention System® Refresher, 2008

Certifications

OSHA- HAZWOPER 40-Hour
Hazwoper 8-Hour Refresher Course, May 2007
Certificate of Training – Mine Safety & Health Administration, #3765, 2008

Select Project Experience

A representative selection of Mr. Hall's project experience is included below.

Quarterly Groundwater Sampling, Molycorp Inc, Mountain Pass, California. Kleinfelder has been performing monitoring well groundwater quality sampling to satisfy the requirements of the Lahontan Regional Water Quality Control Board for the past nine years. Recently served as environmental technician for quarterly groundwater monitoring of an area impacted by rare earth element (REE) mining activities. Groundwater sampling occurs at well sites located around the mine site located at this facility and along the discharge water pipeline that runs from the main southeastward to the playa south of Primm, Nevada. Groundwater samples are collected using the low flow pumping sampling technique, and preserved in compliance with Molycorp's analytical laboratory's standards and procedures. Field tasks have included measuring water levels at sampling points, recording physical groundwater parameters during purging before sample collection, and groundwater samples collection for laboratory chemical analyses.

Semi-Weekly Environmental Remediation Monitoring, Former Peppermill Service Station/Truck Stop, Mesquite, Nevada. Remediation is in response to the now removed diesel LUSTs on site. The remediation system consists of three dual-recovery pumps that recover separate streams of groundwater and free-phase diesel product from the shallow groundwater in three separate wells. Field tasks

included semi-weekly monitoring of both water and free-product levels in 7 monitoring wells and 3 recovery wells. In addition, hand bailing of product was required from the 3 recovery wells.

Watershed/Habitat Monitoring, Preservation Ranch PPV, Northwestern Sonoma County, California. A complete water quality assessment was prepared by Kleinfelder to understand the current condition of aquatic habitat in the streams located on Preservation Ranch, located in the Gualala River Watershed. Integral to this assessment is a bio-assessment of the fish communities in the various streams. This fish bio-assessment reported on the abundance and distribution of salmonid and other fish species, and will be integrated into the water quality assessment of the subject property. Performed duties that contributed to the water quality assessment that included water temperature monitoring, automatic flow monitoring, stream channel typing, and stream habitat typing assessments. To fully complete these tasks skill was utilized in the areas of mountainous terrain/off-road vehicle use in conjunction with using a Trimble GPS unit and topographic maps.

Multiple Phase I Environmental Site Assessments, Nevada Power, Las Vegas, Nevada. Kleinfelder provided multiple environmental assessments for Nevada Power within the city of Las Vegas. Land consisted of vacant parcels owned by the Bureau of Land Management. In the role of environmental professional, performed on-site visits as well as review of pertinent maps, aerial photographs, databases, and other city, state and Federal documents as well as compiling the Phase I reports.

Phase I Environmental Site Assessment, Investment Equity, Las Vegas, Nevada. A previous Environmental Site Assessment was completed for the subject property but due to that report being more than six months old, a new Phase I ESA was necessary to search for any recognized environmental conditions. Assisted the project manager in developing a historical profile of the property after reviewing aerial photographs, topographic maps, performing a site visit and searches of several pertinent databases.

Phase II Environmental Site Assessment, BRAC Operations Facilities, Nellis Air Force Base, Las Vegas, Nevada. Due to the presence of petroleum hydrocarbons in the soil and/or groundwater, a Phase II Assessment was necessary. Borings were advanced to assess soils due to nearby 50,000-gallon LUSTs and the removal of USTs at the site. Served as field sampling lead which duties consisted of daily safety briefings, collection of samples, QA and QC

activities, and maintenance of sample control and chain-of-custody. Also coordinated drilling activities on the project site.

Monthly 0&M and EFR Event on SVE/Air Sparge System, Former Truck Stop, Mesquite, Nevada. Due to the presence of petroleum hydrocarbons in the groundwater and associated soil smear zone, a soil vapor extraction system was installed by Mactec on this former gasoline station. Duties include monthly Operation and Maintenance on the SVE and Air Sparge system and supervision of monthly Enhanced Fluid Recovery (EFR) by means of a vacuum truck.

BRC (a Landwell Company) Environmental Drilling, Soil Sampling and Monitoring Well installation, Henderson, Nevada. Served as field lead tasked with borehole location, soil logging, and level IV QA/QC environmental soil sampling. Continuous coring rotary sonic drilling was performed on over 300 acres of former heavy metals evaporation ponds. Environmental soil sampling consisted of heavy metals, RCRA metals, TPH, pesticides, PCBs, Radionuclides, Radon, sVOCs and VOCs, Mercury and Hexavalent Chromium. Monitoring wells were installed following drilling and sampling activities.

Sub-Slab Soil Vapor Sampling, Bozeman Solvent Site (Superfund Site), Bozeman, Montana. Sub-slab, indoor and outdoor air samples were collect from a commercial shopping plaza to test PCE concentrations associated with a solvent leak from a former dry cleaning business. Holes were drilled through the concrete slabs of two businesses located on the premises, implants were installed and the holes sealed. Samples were obtained with summa canisters after pumping hydrogen gas into the wells for leak detection. Ability to conduct work while minimizing impacts to open businesses and their customers was critical at this PCE superfund site.

Soil Vapor Sampling, Union Park Brownfields, Las Vegas, Nevada. Union Park is a former Union Pacific Railroad cleaning and maintenance yard. Contaminated surface soils have been excavated from large tracts of the site but hydrocarbons are still known to be present. Soil vapor wells will be drilled in the footprints of future building sites to mitigate concerns of soil vapor intrusion. Field professional duties entailed drilling/installing soil vapor wells and soil vapor sampling on installed wells using summa canisters. Wells were purged and checked for any leaks before sampling events.

On-Call Environmental Support for American Pacific Corp. (AMPAC) In-Situ-Bio-remediation Plant, Henderson, Nevada. AMPAC has installed a bio-remediation

plant to treat an ammonia perchlorate plume in the groundwater of northeast Henderson, Nevada. Groundwater is extracted through a series of wells, pumped to their plant where microbes are mixed with the groundwater and both are then pumped to down-gradient re-injection wells where a mixture of microbes, donor and groundwater break down the perchlorate. On-call services include well gauging, water sampling, drilling/well installation, tracer testing and well rehabilitation using a nitrogen hydro-pulse and chemical treatments.

Tony P. Mikacich

Professional Geologist

EXPERIENCE SUMMARY

Mr. Mikacich has approximately eight years of experience in environmental consulting and project management, and has worked on projects for clients in California, Oregon, and Nevada. Mr. Mikacich has a broad range of experience, including environmental site characterization and remediation. Mr. Mikacich has designed field-sampling programs and has authored documents that interpret the data collected in support of environmental characterization and compliance efforts, including quarterly and annual reports, proposed plans, fact sheets, letter reports, and technical memoranda.

Currently, Mr. Mikacich's responsibilities include supervising and performing field work; soil, sediment, groundwater, surface water, and borehole sampling; field screening for PCBs and VOCs; supervising injection of in-situ treatment chemicals; drilling operations (direct push, hollow-stem auger, and sonic methods); well installations; and all forms or environmental compliance and technical documentation.

EDUCATION

B.S., Geology, California State University, Chico

CERTIFICATION

Environmental Manager, Nevada, #EM1859

REPRESENTATIVE PROJECT EXPERIENCE

Project Geologist, BMI Complex, BRC, Henderson, NV (2003 to Present)—Mr. Mikacich is a contributing investigator and author to the Supplemental Subsurface Characterization, Landfill Corrective Action Management (CAMU) Unit for the BMI Complex, an inactive industrial area of Las Vegas, NV that is slated for reuse as a residential area. He recently led the field effort in support of the Hydrogeologic Investigation which consisted of drilling, sampling and monitoring more than twenty wells and their associated borings. He also performed and documented the collection of more than 50 soil and sediment samples as part of an asbestos investigation.

Project Geologist, Pilot Study for In Situ Chromium Reduction, Marley Cooling Tower Facility, Stockton, CA—Mr. Mikacich performed field activities including the installation of monitoring wells, soil and groundwater monitoring and sampling, injection of reductant material, quality control oversight of subcontractors, regulatory permitting, and subcontractor procurement and scheduling, and cost estimating. Mr. Mikacich assisted the project manager with coordination of schedules for field activities.

Assistant Project Geologist, Remedial Investigation Feasibility Study Risk Assessment at the Former Remco Hydraulics Facility, Willits Environmental Remediation Trust, Willits, CA—Mr. Mikacich is the assistant project geologist for a $2 million/year project involving a former facility that manufactured hydraulic cylinders, as large as 48-inches in diameter, from raw steel. The process of precision milling, painting and chrome plating led to subsurface impact of soil and groundwater with VOCs and chrome. Mr. Mikacich's responsibilities include assisting the project manager in the implementation of comprehensive Remedial Investigations, and Treatability Studies.

Supervising Field Geologist, Routine Groundwater Monitoring and Sampling Program at the Former Remco Hydraulics Facility, Willits Environmental Remediation Trust, Willit, CA—Mr. Mikacich's responsibilities are the management of a $200,000 annual monitoring and sampling program that includes multiple sites. Tasks include writing public notification letters for start of work, scheduling field crews, supervising field crews, tracking budgets, data evaluation, and report writing.

Field Geologist, Soil Focused Remedial Investigation (FRI) and Soil Vapor Survey Investigation. Weir Floway, Fresno, CA—Mr. Mikacich oversaw the collection of 50 soil vapor survey samples to identify and characterize VOC source area. Sample data was used to help define and design remediation activities, which included source removal activities.

Field Geologist, Verification Soil Sampling for Underground Storage Tank (UST) Closure Site, BFS, Salem, OR—Mr. Mikacich performed field activities that included the collection of soil samples from borings utilizing direct push technology to assess soil near a former UST.

Project Geologist—Performed field activities and managed approximately 20 active UST sites for Chevron Products Company and Union Oil Company of California. Mr. Mikacich was instrumental in closing two UST sites for Chevron Products Company in Technical writing skills include Limited Phase I and Phase II Work Plans, Addendums and Reports. Experience evaluating soil and groundwater data to insure the most appropriate remedial technology is utilized for the project. Estimated project budgets, oversight and directing fieldwork utilizing various technologies for site assessment and remediation.

UST Release Investigation—Investigation design, work plan writing, field work, and summary reporting for UST Release Investigations for multiple sites in Northern California for independent petroleum retailers.

UST Decommissioning—Sampling and reporting for UST decommissioning, for multiple sites in Northern California for independent petroleum retailers.

Staff Geologist—Managed approximately 12 active UST sites in various stages of environmental assessment and remediation Independent petroleum retailers in Northern California. Experience included technical writing of Work Plans, Monitoring and Sampling Reports, Site Closure Plans, Addendums and Memorandums. Drafted site

plans, well design figures, and geologic cross-sections utilizing AutoCad. Performed various aspects of fieldwork associated with environmental site assessment and site remediation.

Geologist/Field Technician—Mr. Mikacich's responsibilities included permitting with local agencies, UST fuel system removals and performed preliminary site investigations for multiple sites in the northern California. His experience includes logging soil borings, groundwater monitoring, well design and installation, and soil and groundwater sampling.

Field Technician—Worked with natural gas drill team in Willows, CA. Sampled and analyzed drill mud for gas content and soil characteristics. Developed stratagraphic columns and monitored drill rates and depths. Reported specific soil gas data collected and analyzed in the on-site laboratory to the drillers.

MWH

Adam W. Norris

Senior Hydrogeologist

EXPERIENCE SUMMARY

Mr. Norris possesses 12 years of professional experience working as a geologist investigating and remediating hazardous waste sites, conducting environmental assessments, and implementing water resource studies and projects. His experience includes managing environmental field activities associated with industrial and federal site investigations, accelerated site remediation for redevelopment, oversight of RCRA site closure activities, wharf construction, and drilling operations (hollow-stem-auger, air rotary, casing hammer, caisson, bucket auger, downhole hammer, dual-tube, reverse water circulation, mud rotary, and rock core drilling). His experience also includes sampling and logging soil and bedrock, production of geostratigraphic logs, geophysical log interpretation, custom well design, groundwater well construction and development (monitoring wells, extraction wells, and municipal production wells), lysimeter construction, vapor well construction (monitoring wells and extraction wells), cone penetrometer testing, geoprobe direct-push sampling, hydropunch sampling, groundwater well sampling, lysimeter soil moisture sampling, soil vapor sampling, aquifer testing, well abandonment, remediation of contaminated soil and groundwater, NPDES permit compliance sampling, storm water pollution prevention plan compliance monitoring, oversight of underground storage tank (UST) removal, and preliminary environmental assessment site reconnaissance.

Mr. Norris' experience also includes procurement of contractors and subcontractors; and preparation of proposals, cost estimates, workplans, preliminary environmental assessment reports, groundwater monitoring reports, subsurface investigation reports, RCRA closure reports, UST closure reports, and well installation reports. He is proficient in reducing geologic and hydrogeologic data obtained from the investigations and studies. Mr. Norris regularly applies a variety of computer software packages, including word processing, database, spreadsheet, and graphical applications. He successfully interacts with clients, regulatory agencies, contractors, and subcontractors on a regular basis.

EDUCATION

M.S., Geology, University of California, Los Angeles, 1991

Hydrology Coursework, University of California, Los Angeles, 1990

B.S., Geological Sciences, University of California, Santa Barbara, 1989

PROFESSIONAL LICENSES

Registered Geologist # 6557, California, 1996

Certified Environmental Manager # 1861, Nevada, 2003

REPRESENTATIVE PROJECT EXPERIENCE

Pier S - Port of Long Beach, California
Oil Well Reabandonment Contract - Pier S Megaterminal Development Project
Environmental Coordinator and Construction Inspector
Oversaw contractor sampling of water generated from excavation dewatering for NPDES discharge permit compliance. Supported negotiation of sitewide NPDES permit updates in accordance with revised Regional Water Quality Control Board regulations. Conducted sitewide storm water pollution prevention plan compliance monitoring.

Provided contractor oversight during excavation adjacent to the Cerritos Channel to expose 28 oil wells requiring reabandonment prior to execution of Cerritos Channel widening (dredging), and wharf construction contracts. Documented debris and oil well structures encountered and remaining at each oil well in well specific excavation reports. The excavation reports will be used to facilitate later channel widening and wharf construction efforts.

March Air Reserve Base, Moreno Valley, California
Well head Modification Program at Site 18 and Nearby Flightline Areas
Task Manager
Managed and supervised modification of 13 wellheads from above-grade to flush-mounted surface completions; and oversaw abandonment of one shallow groundwater monitoring well by pressure-grouting. Mr. Norris's responsibilities included workplan preparation, subcontractor procurement, scheduling, supervision of field program implementation, and preparation of a brief report documenting completion of the specified scope of work. The client indicated that the wellhead modification program was very well organized and executed.

March Air Reserve Base, Moreno Valley, California
Site 33 Supplemental Characterization
Senior Hydrogeologist/Field Team Leader
Conducted supplemental characterization of JP-4 jet fuel impacts in subsurface soil and groundwater at the March ARB flightline fueling station and location of historic subsurface fuel tanks and associated fuel distribution system (Site 33). The characterization included completion of cone penetrometer (CPT) borings including screening for subsurface JP-4 impacts using ultraviolet-induced fluorescence (UVIF) technology. Locations for six new shallow groundwater monitoring wells were selected for areal coverage at Site 33. Location selection for two of the six new wells was additionally influenced by findings from the CPT/UVIF borings. The six new monitoring wells were screened across the current water table. The water table had been rising in recent years and had submerged most of the screen intervals of the existing monitoring wells at Site 33. Following installation, the six new groundwater monitoring wells were developed and sampled. Mr. Norris participated in preparation of the workplan, oversaw implementation of the field program, and was a key participant in completion of the Site 33 Supplemental Characterization Report.

Major Aerospace Facility, Long Beach, California
Groundwater Characterization
Task Manager/Field Team Leader
Served as Task Manager and Field Team Leader for facility-wide groundwater characterization and detailed assessment of identified free-phase and dissolved-phase Jet A Fuel Plume in groundwater. The results of the investigation efforts will facilitate refinement and implementation of the groundwater remediation program. The work efforts have been conducted on an accelerated schedule to facilities pending property transactions and redevelopment.

The role involved managing staff, tracking budgets and schedule, and ensuring work product quality. Mr. Norris oversaw and participated in field and office activities. The field activities included well installation, well development, groundwater sampling, cone penetrometer testing, hydropunch sampling, exploratory borings, and geophysical logging. The office activities include preparation of workplans, reports, subcontracts, and change orders. Mr. Norris also participates in proposal preparation and interacts with the client on a regular basis. The Regulatory oversight is provided by the Los Angeles RWQCB.

March Air Reserve Base, Moreno Valley, California
Long Term Groundwater Monitoring Program
Senior Hydrogeologist/Quality Assurance Oversight
Oversaw initiation of Year 2000 Long Term Groundwater Monitoring Program (LTGM). The role involved working with the selected field team leader to set-up a functional field office at March ARB and facilitate successful implementation of the year 2000 LTGM. Groundwater sampling included Westbay multi-level well sampling and submersible pump sampling of conventional monitoring wells.

The Year 2000 LTGM program at March ARB has been successful. Montgomery Watson was awarded the LTGM contract for Year 2001 at March ARB.

United States Army Corps of Engineers
Seven Oaks Dam Site, San Bernardino, CA
Hydrogeologist/Field Team Leader
Oversaw drilling and installation of a groundwater production well to supply water to Seven Oaks Dam Visitor Center. The well was successfully drilled and installed in fractured bedrock and overlying alluvium. Mr. Norris oversaw a step-drawdown pump test and 24hour constant rate discharge pump test. The well was sampled and tested for drinking water standards.

Major Aerospace Facility, Los Angeles, California
Demolition and Environmental Closure
Field Program Manager
Served as On-Site Environmental Field Program Manager during demolition and environmental closure activities at a 50-acre former aerospace manufacturing facility parcel in Los Angeles, California. Regulatory oversight was provided by the Los Angeles RWQCB and the Cal EPA-DTSC.

Soil characterization and remediation were conducted during demolition activities to facilitate rapid site closure and redevelopment. Subgrade soils were sampled during demolition of twelve buildings. Historically the buildings were used for aluminum

production, airplane parts manufacturing, general and hazardous materials storage, and housing for a pump which provided facility-wide furnace fuel distribution. Additionally, numerous subgrade structures including clarifiers, oil and water separators, sumps, transformer pads, underground storage tanks, and subgrade product pipelines were removed and the adjacent soils were characterized.

Contaminants encountered included waste oil, solvents, fuel hydrocarbons, metals, PCBs, and semi-volatile organic compounds. Impacted soils with analyte concentrations exceeding the health-based remediation goals were excavated and properly disposed. A total of approximately 60,000 cubic yards of impacted soils were excavated and properly managed. Clean import soil was used to regrade the site in preparation for redevelopment.

Mr. Norris directed and participated in all environmental field activities. Mr. Norris managed up to ten workers at a given time. Mr. Norris interacted directly with the client, the regulatory agencies, the demolition/excavation contractors, subcontractors, and other Montgomery Watson staff on a regular basis.

Homestead Air Force Reserve Base, Homestead, Florida
Monitoring Well Cataloging and Abandonment Program
Field Supervisor
Produced database cataloging of nearly 1000 historic monitoring wells at HAFB. Negotiated approval from the Florida Department of Environmental Resource Management to abandon 164 monitoring wells. Directed abandonment of approximately 200 monitoring wells and 9 production wells. Facilitated and participated in production of the Well Abandonment Report.

Mr. Norris directed and participated in all environmental field activities. Mr. Norris managed up to 5 workers at a given time. Mr. Norris interacted with the HAFB Base Closure Administration, subcontractors, and other Montgomery Watson staff on a regular basis.

Ekotek Superfund Site, Former Waste Oil Recycling Facility, Salt Lake City, Utah
Hydrogeologic Investigation
Rig Geologist
Served as a rig geologist during installation of five 180-foot-deep monitoring wells. The drilling method was dual wall reverse air circulation casing hammer. The wells were successfully keyed into a basal clay layer after drilling through heaving sand and gravel. Mr. Norris produced a geostratigraphic log for each well bore.

Major Aerospace Facility, Palmdale, California
RCRA Part B Closure
Assistant Project Manager/Field Supervisor
Served as Assistant Project Manager and Field Supervisor during closure of two paint waste water treatment systems, two flight-line fueling stations, and a hazardous waste storage facility for Rockwell International Corporation (now Boeing North American) at U.S. Air Force Plant 42, Site 3 in Palmdale, California. All closure activities were conducted in accordance with RCRA part B guidelines. Closure regulatory oversight for this project is provided by the Cal EPA-DTSC.

During the field program, Mr. Norris completed the following tasks: supervised decontamination and demolition of two interceptor pits, two clarifiers, two subsurface pipelines, and two ion-exchange systems; supervised removal of five above ground storage tanks; supervised removal of two underground storage tanks; supervised in-place abandonment of three subsurface pipelines; supervised decontamination of the hazardous waste storage facility and took confirmation wipe samples; took environmental samples of confirmation soil, decontamination rinsate, and demolition waste; managed waste disposal; and supervised site restoration. Upon completion of the field programs, Mr. Norris produced the site closure reports.

Douglas Aircraft Company, Long Beach, California
Feasibility Study
Hydrogeologist
Conducted aquifer tests as part of a feasibility study for Douglas Aircraft Company in Long Beach, California. The aquifer tests consisted of constant rate single-well pump tests. The aquifer transmissivity and hydraulic conductivity were determined from the aquifer test data. Regulatory oversight for this job is provided by the LARWQCB.

U.S. Marine Corp Logistics Base, Barstow, California
Monitoring Well Installation
Rig Geologist
Served as a rig geologist during installation of three 200-foot-deep wells at the U.S. Marine Corp Logistics Base in Barstow, California. Two of the wells were monitoring/extraction wells and one was a dual nested sparge well. The drilling method was air rotary - casing hammer. Mr. Norris produced a geostratigraphic log for each well bore.

Hughes Research Laboratories, Malibu, California
RCRA Part B Closure
Assistant Project Manager/Field Supervisor
Served as Assistant Project Manager and Field Supervisor during RCRA Part B closure of an above ground acid treatment tank and a hazardous waste storage facility for Hughes Research Laboratories in Malibu, California. Mr. Norris produced the site closure report. Closure regulatory oversight for this project is provided by the Cal EPA-DTSC.

Major Oil Company, Universal City, California
Assistant Project Manager
Provided project management support to a major oil company in Universal City, California. Support efforts dealt primarily with an EPA Superfund site located in Fillmore, California.

Water Replenishment District of Southern California
Monitoring Well Installation
Construction Manager and Field Hydrogeologist
Served as construction manager and field hydrogeologist for the Water Replenishment District of Southern California during installation of two multipiezometer monitor wells. The wells extended to a depth of approximately 800 feet and each was screened in four aquifers. Well design was based on geophysical and lithologic log interpretation. The drilling methods consisted of bucket-auger and mud rotary drilling.

Los Angeles County Sheriff's Department, Northern Los Angeles County
Phase II Remedial Investigation
Associate Hydrogeologist
Served as on-site field hydrogeologist and field team leader during the Phase II Remedial Investigation of an abandoned landfill for the Los Angeles County Sheriff's Department (LASD) in Northern Los Angeles County. The field effort involved installation of 41 bedrock borings, 4 groundwater monitoring wells, and 6 piezometers. During drilling associated with this scope of work, discrete bedrock samples were retrieved and geostratigraphic logs were produced. Additional field activities included well development, groundwater sampling, soil gas survey with on-site mobile laboratory, and aquifer slug-testing. Provided technical and report production support including production of groundwater contour maps, geologic cross-sections, aquifer slug-test data reduction, and generation of figures and data tables.

Hill Air Force Base, Salt Lake City, Utah
Groundwater Sampling
Field Hydrogeologist
Participated in groundwater sampling at Hill Air Force Base - Operable Unit 3, located north of Salt Lake City, Utah. More than 40 wells were sampled successfully within project schedule.

Major Fuel Hydrocarbon Distribution Terminal and Tank Farm, South Gate, California
Associate Hydrogeologist
Conducted recovery well development and a product bail-down recovery investigation at a major fuel hydrocarbon distribution terminal and tank farm in Southgate, California. Produced a corrected free-product thickness contour map for the site and calculated the approximate product volume. There was estimated to be 1,300,000 gallons of free-floating product on the water table.

Petroleum Products Manufacturing and Distributing Company, Los Angeles, California
Remedial Excavation
Field Geologist
Under DTSC oversight, supervised remedial excavation at a petroleum products manufacturing and distributing company located in Los Angeles, California. Technical tasks included lithologic classification of excavated soils and confirmatory soil sampling.

Former Gasoline/Service Station, Huntington Park, California
Subsurface Investigation
Field Geologist
Served as on-site field geologist and field team leader during a subsurface investigation at a former gasoline/service station in Huntington Park, California. Thirteen soil borings were installed while chasing contamination with an on-site mobile laboratory. Two vapor extraction wells were also installed.

Berth 142, Port of Los Angeles, California
Monitoring Well Installation
On-Site Field Hydrogeologist
Served as on-site field hydrogeologist and field team leader during installation of a monitoring well screened within a confined aquifer at Berth 142, Port of Los Angeles, California. A steel conductor casing was installed to prevent cross contamination of the upper and lower aquifers. Drilling operations were completed using bucket auger and

hollow-stem auger rigs. Mr. Norris also supervised well development and conducted groundwater sampling.

California Superfund Site, Former Chlorinated Paraffin Manufacturing Plant, Southern California
Groundwater Extraction Well Installation
Field Hydrogeologist
Under DTSC oversight, served as on-site field hydrogeologist and field team leader during installation of three extraction wells at a former chlorinated paraffin manufacturing plant in Southern California. Drilling operations were completed using bucket auger and mud rotary drill rigs. Steel conductor casings were installed through surficial landfill material at each well. Mr. Norris produced a geostratigraphic log of each boring.

Del Amo Superfund Site
Remedial Investigation/Feasibility Study
On-Site Sample Manager and Field Geologist
Served as on-site sample manager and field geologist at the Del Amo Federal Superfund Site Remedial Investigation/Feasibility Study in Carson, CA. Office responsibilities included database management, sample tracking, chain-of-custody documentation, liaison between project managers and analytical laboratories. Field responsibilities included well completion, well development, groundwater sampling, and free product remediation.

Numerous Light Industrial Sites, Southern California
Preliminary Environmental Site Assessments
Geologist
Conducted preliminary environmental site assessments at several light industrial sites in Southern California. These sites included wrecking yards, automotive repair shops, and a rendering plant. Mr. Norris' responsibilities included site historical analysis, site reconnaissance, hydrogeologic setting analysis, and report writing. During these projects Mr. Norris interacted with clients and regulatory agencies.

Sears Automotive Sites in Cost Mesa and Inglewood, California
Monitoring Well Installations
Field Geologist
Served as on-site field geologist during drilling/installation of numerous soil borings and groundwater monitoring wells at Sears Automotive Sites in Costa Mesa and Inglewood, CA. During this scope of work, geostratigraphic logs were produced and discrete soil samples were retrieved. Additional field efforts at these sites included well development, product sampling, and groundwater sampling.

Biomedical Engineering Site, Irvine, California
Subsurface Investigation
On-Site Field Geologist
Served as on-site field geologist during a limited subsurface investigation at a biomedical engineering site in Irvine, CA. The field effort included drilling and sampling 16 soil borings with associated Hydropunch groundwater sampling and on-site mobile lab analysis.

AFFILIATIONS

National Association of Groundwater Scientists and Engineers

PUBLICATIONS

Norris, A. W., and Yin, A., 1991, Evolution of an Intraplate Triple Junction During the Laramide Orogeny, Southern Bighorn Mountains, Wyoming, Abstract No. 31519 and Poster Session, 103rd Annual Meeting, Geological Society of America, October 21-24, San Diego, CA.

Paylor, E., Yin, A., and Norris A. W., Analysis of Laramide Crustal Strain Distribution Using Relative Slip Circuits, Abstracts with Program, Vol. 24, No. 6, pg. 69, Rocky Mountain Section Meeting, Geological Society of America, May 1992.

HEALTH AND SAFETY CERTIFICATIONS

OSHA 40-Hour Hazardous Waste Operations and Emergency Response, 1992

OSHA 8-Hour Health and Safety Supervisor, 1992

OSHA 8-Hour Health and Safety Refresher, 2003

Adult CPR (American Red Cross), 2003

Standard First Aid (American Red Cross), 2001

NEWFIELDS

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EDUCATIONAL BACKGROUND

Ph.D.	1983	Harvard University	Environmental Sciences Engineering
S.M.	1980	Harvard University	Economics
B.A.	1978	University of California, Berkeley	
B.S.	1978	University of California, Berkeley	Civil Engineering

PROFESSIONAL EXPERIENCE

President	NewFields, Inc.	1995 - Present
Adjunct Professor	School of Civil and Environmental Engineering Georgia Institute of Technology	1996 - Present
Associate Professor	School of Civil and Environmental Engineering Georgia Institute of Technology	1990 - 1996
Senior Consultant	Dames & Moore Atlanta, GA	1990 - 1995
Chairman	National Ground Water Hydrology Committee, Hydraulics Division, American Society of Civil Engineers	1991 - 1992
Expert Member	ASTM/EPA/USGS/DOD Geostatistics Standardization Committee	1991 - Present
Associate Editor	*Water Resources Research* American Geophysical Union	1989 - 1994
Assistant Professor	School of Civil Engineering Georgia Institute of Technology	1983 - 1990
Chairman	Task Committee on Geostatistical Techniques in Geohydrology, American Society of Civil Engineers	1987 - 1989
National Science Foundation	Centre de Géostatistique, Ecole Nationale Supérieure	1987 - 1988

Visiting Scientist des Mines de Paris, France

PROFESSIONAL REGISTRATION
Licensed Professional Engineer Georgia (Registration Number 19369)

FIELDS OF INTEREST
Geostatistics
Decision Analysis
Environmental Statistics
Geostatistical and Stochastic Hydrology
Surface and Groundwater Hydrology

HONORS AND AWARDS

Tau Beta Pi (National Engineering Honor Society)	1977
Chi Epsilon (Civil Engineering Honor Society)	1978
Phi Beta Kappa (National Honor Society for Students in Social Sciences)	1978
Watson Award, Division of Applied Sciences, Harvard University	1979-82
Sigma Chi (Scientific Research Society)	1987
1990 Who's Who (Rising Young Americans)	1990
ASCE Task Committee Excellence Award, Hydraulics Division (S. Rouhani, Chairman of ASCE Task Committee on Geostatistical Techniques in Geohydrology)	1991
Dictionary of International Biography - 22nd Edition	1992
Two Thousand Notable American Men, First Edition	1992

SELECTED LIST OF PUBLICATIONS

Published Books and Parts of Books

1. Rouhani, S., and T.J. Hall, "Geostatistical Schemes for Groundwater Quality Management in Southwest Georgia," in *Pollution, Risk Assessment, and Remediation in Groundwater Systems*, pp. 197-223, R.M. Khanbilvardi and J. Fillos, Eds., Scientific Publications Co., Washington, DC, 1987.
2. Rouhani, S., and R. Kangari, "Landfill Site Selection," in *Expert Systems: Applications to Urban Planning*, Ch. 10, T.J. Kim *et al.*, Eds., Springer-Verlag, 1989.
3. Lennon, G.P., and S. Rouhani, Eds., *Ground Water*, Proceedings of the ASCE International Symposium on Ground Water, ASCE, 1991.
4. Rouhani, S., R. Srivastava, A. Debarats, M. Cromer, and I. Johnson, Eds., "*Geostatistics for Environmental and Geotechnical Applications*," STP 12 83, ASTM, 1996.

ASTM Standards (Main Author/Contributing Author)

1. D 5549 Standard Guide for Reporting Geostatistical Site Investigations
2. D 5922 Standard Guide for Analysis of Spatial Variation in Geostatistical Site Investigations
3. D 5923 Standard Guide for Selection of Kriging Methods in Geostatistical Site Investigations
4. D 5924 Standard Guide for Selection of Simulation Approaches in Geostatistical Site Investigations

Environmental Guidance Documents (Main Author/Co-Author)

1. Department of Navy, "Guidance for Environmental Background Analysis, Volume 1: Soil," NFESC,

UG-2049-ENV, April 2002.

2. United States Environmental Protection Agency, "Guidance on Surface Soil Cleanup at Superfund Sites: Applying Cleanup Levels," Draft under Review, September 2002.
3. Department of Navy, Guidance for Environmental Background Analysis, Volume 2: Sediment, NFESC, Draft Final, November 2002.

Published Journal Papers (refereed)

1. Rouhani, S., "Variance Reduction Analysis", *Water Resources Research*, Vol. 21, No. 6, pp. 837-846, June, 1985.
2. Rouhani, S., "Comparative Study of Ground Water Mapping Techniques", *Journal of Ground Water*, Vol. 24, No. 2, pp. 207-216, March-April 1986.
3. Rouhani, S., and Fiering, M.B., "Resilience of a Statistical Sampling Scheme," *Journal of Hydrology*, Vol. 89, No. 1, pp. 1-11, December, 1986.
4. Rouhani, S., and Kangari, R., "Landfill Site Selection: A Microcomputer Expert System," *International Journal of Microcomputers in Civil Engineering*, Vol. 2, No. 1, pp. 29-35, March, 1987.
5. Rouhani, S., and Hall, T.J., "Geostatistical Schemes for Groundwater Sampling," *Journal of Hydrology*, Vol. 103, 85-102, 1988.
6. Rouhani, S., and Cargile, K.A., "A Geostatistical Tool for Drought Management," *Journal of Hydrology*, Vol. 106, 257-266, 1989.
7. ASCE Task Committee on Geostatistical Techniques in Geohydrology (S. Rouhani, Chairman and Principal Author), "Review of Geostatistics in Geohydrology, 1. Basic Concepts," *ASCE Journal of Hydraulic Engineering*, 116(5), 612-632, 1990.
8. ASCE Task Committee on Geostatistical Techniques in Geohydrology (S. Rouhani, Chairman and Principal Author), "Review of Geostatistics in Geohydrology, 2. Applications," *ASCE Journal of Hydraulic Engineering*, 116(5), 633-658, 1990.
9. Rouhani, S., and H. Wackernagel, "Multivariate Geostatistical Approach to Space-Time Data Analysis," *Water Resources Research*, 26(4), 585-591, 1990.
10. Rouhani, S. and D.E. Myers, "Problems in Space-Time Kriging of Geohydrological Data," *Mathematical Geology*, 22(5), 611-624, 1990.
11. Loaiciga, H.A., R.J. Charbeneau, L.G. Everett, G.E. Fogg, B.F. Hobbs, and S. Rouhani, "Review of Ground-Water Quality Monitoring Network Design," *ASCE Journal of Hydraulic Engineering*, 118(1), 11-37, 1992.
12. Rouhani, S., R. Ebrahimpour, I. Yaqub, and E. Gianella, "Multivariate Geostatistical Trend Detection and Network Evaluation of Space-Time Acid Deposition Data, 1. Methodology," *Atmospheric Environment*, 26A(14), 2603-2614, 1992.
13. Rouhani, S., R. Ebrahimpour, I. Yaqub, and E. Gianella, "Multivariate Geostatistical Trend Detection and Network Evaluation of Space-Time Acid Deposition Data, 2. Application to NADP/NTN Data," *Atmospheric Environment*, 26A(14), 2615-2626, 1992.
14. Casado, L., S. Rouhani, C. Cardelino, and A. Ferrier, "Geostatistical Analysis and Visualization of Hourly Ozone Data," *Atmospheric Environment*, 28(12), 2105-2118, 1994.
15. Rouhani, S., Geostatistical Estimation: Kriging, in Rouhani et al., Eds., "*Geostatistics for Environmental and Geotechnical Applications*," STP 12 83, ASTM, 1996.
16. Wild, M. R., and S. Rouhani, Effective Use of Field Screening Techniques in Environmental Investigations: A Multivariate Geostatistical Approach, in in Rouhani et al., Eds., "*Geostatistics for Environmental and Geotechnical Applications*," STP 12 83, ASTM, 1996.
17. Lin, Y. P., and S. Rouhani, "Geostatistical Analyses for Shear Wave Velocity," *J. of The Geological Society of China*, Vol. 40, No. 1, p 209-223, 1997.
18. Lin, Y.P., and S. Rouhani, "Multiple-Point Variance Analysis for Optimal Adjustment of A Monitoring Network," *Environmental Monitoring and Assessment*, 69(3), pp. 239-266, 2001.
19. Lin, Y. P., Y. C. Tan, and S. Rouhani, "Identifying Spatial Characteristics of Transmissivity Using

Simulated Annealing and Kriging Methods," *Environmental Geology*, 41:200-208, 2001

PROFESSIONAL ACTIVITIES

1. American Geophysical Union:
   Member, 1981-Present.
   Associate Editor, *Water Resources Research*, 1989-1994.
2. American Society of Civil Engineering:
   Associate Member, 1983-1987.
   Member, 1987-Present.
   Chairman, National Ground Water Hydrology Committee (Standing Committee), Hydraulics Division, Oct. 1991-1992.
   Chairman, ASCE Task Committee on Geostatistical Techniques in Geohydrology, Ground Water Hydrology Technical Committee, American Society of Civil Engineers, Hydraulics Division, Oct. 1987-Sept. 1989.
   Contact Member, ASCE Task Committee on Groundwater Monitoring Network Design, Probabilistic Approaches to Hydraulics and Hydrology Committee, Hydraulic Division, Oct. 1988- Sept. 1990.
   Secretary, ASCE Water Resources Committee, American Society of Civil Engineers, Georgia Section, 1988.
   Special Session Organizer,
   Special Session on "Development and Applications of Geostatistics in Geohydrology," 1989 ASCE National Conference on Hydraulic Engineering, New Orleans, August 14-18, 1989.
   Special Session Organizer and Chairman,
   Special Session on Geostatistics in Geohydrology, 1990 ASCE Water Resources Conference, Fort Worth, April, 1990.
   Symposium Organizer,
   International Symposium on Ground Water, 1991 ASCE National Conference on Hydraulic Engineering, Nashville, July, 1991.
3. International Water Resources Association: Member, 1985-Present.
4. American Water Resources Association: Member, 1986-Present.
5. North American Council on Geostatistics, 1987-Present.
6. International Geostatistical Association: Member, 1989-Present.

ERIC CHRISTIANSON, PLS
Senior Surveyor

Mr. Christianson has more than two decades of experience in land surveying and engineering throughout Nevada. As Mapping Services Manager, he is responsible for all plats, parcel maps, records of survey, and ALTA surveys prepared by PBS&J.

PROJECT EXPERIENCE

ROADWAY PROJECTS

Horizon Ridge Parkway, Henderson, Nevada. PBS&J provided survey services in support of 5 miles of roadway design in Henderson, Nevada. This project consists of the design of full-street improvements for a major arterial with 100-foot right-of-way standards. As survey manager, Mr. Christianson was responsible for quality control and assisted with manpower scheduling.

Cactus Avenue, Las Vegas Boulevard to Maryland Parkway, Las Vegas, Nevada. Improvements include upgrading to six travel lanes, including two-way left-turn lanes with raised medians at major intersections, storm drainage facilities, curbs, gutters, sidewalks, utility modifications, street lighting, and traffic signals. Right-of-way design engineering includes right-of-way delineation, topographic survey, right-of-way legal descriptions and exhibits, and a Record of Survey. As survey manager, provided direction and quality control on aerial mapping, field surveys, and right-of-way engineering.

Burkholder Boulevard Roadway and Trail, Henderson, Nevada. This project includes the design of 2 miles of street improvements that included four lanes, a center median, and two paved bike lanes for an 80-foot-wide major arterial on Burkholder Boulevard from Lake Mead Parkway to Racetrack Road with 3.2 miles of trail improvements. The scope of services includes preliminary and final alternative designs for the roadway and trail, aerial mapping, existing right-of-way research, geotechnical engineering, traffic analysis, and drainage analysis. As survey manager, provided direction and quality control on aerial mapping, field surveys, and right-of-way engineering.

St. Rose Parkway Right-of-Way Services, Henderson, Nevada. Phase 1, 2A & 2B of this project involved the widening of St. Rose Parkway from I-215 and Pecos to the I-15 Interchange. PBS&J is responsible for this full turnkey right-of-way project. Services include right-of-way mapping and legal descriptions, appraisals, appraisal reviews, and offers to purchase required parcels. Residential and business relocations will be necessary, along with the demolition of improvements and the closure of two residential wells. Approximately 45 parcels are required from fifteen ownerships. In addition, at least three billboard relocations will be necessary. All work is being performed in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 and the Relocation Act Amendments of 1987 (Uniform Act). All boundary survey determination for right-of-way takes including legal descriptions, exhibits, and closure calculations were performed in accordance to Nevada Department of Transportation (NDOT) standards.Mr. Christianson managed all facets of document preparation including quality control and preparation.

US 50A Right-of-Way Services, Fernley, Nevada. For this roadway widening project, PBS&J is providing professional right-of-way services including project management, appraisal, appraisal review, acquisition, settlements and closings, preparation of condemnation case information and providing depositions and testimony in a court of law, sign/billboard acquisition and relocation, and business and residential relocation assistance. We are coordinating the process to establish a grade separation over Union Pacific Railroad (UPRR) tracks, which involves identifying existing railroad right-of-way,

identifying UPRR needs, coordinating with the Nevada Department of Transportation (NDOT) bridge division, submitting plans to UPRR, identifying relocation impacts, costs, preparing the railroad grade separation application for the Public Utility Commission petition, coordinating railroad plans, checking railroad plans, reviewing the railroad agreement, and coordinating with utility inspectors. As project manager, preparing R/W plans for Phases 4 and 5 of this NDOT project. We are performing field surveying to locate land corners throughout the corridor for control of the R/W. PBS&J is providing surveying to locate exiting utilities and all encumbrances affecting the project. From this information, we are preparing base mapping for mapping the R/W plans in MicroStation CADD format. Once survey information has been drafted, R/W plans will be prepared for each phase. As survey manager, Mr. Christianson is directing all survey activities related to right-of-way including quality control, project management, and legal descriptions.

I-580 Plumb Lane Interchange Modification, Reno, Nevada. This project involves modifying the existing Plumb Lane tight urban diamond interchange to a modified single-point urban interchange; realigning the northbound off ramp requiring right-of-way acquisition from the Reno/Tahoe International Airport; widening the eastbound Plumb Lane right-turn lane to southbound I-580, requiring right-of-way acquisition; modifying of the existing median island configuration to allow for duel left-turn lanes; mill and open grade overlay on Plumb Lane from Harvard Way to Terminal Way; modifying existing signals, signs, and lighting; adding bicycle lanes; and providing intersection improvements at Harvard Way and Terminal Way. The PBS&J Reno office identified all right-of-way needs, including permanent and temporary easements, to begin the acquisition process. To allow sufficient time for acquisition, PBS&J fast-tracked a 60 percent design to begin setting right-of-way in 5 months from project kick-off. As project manager, performed the land surveying necessary to acquire as-built information for 2 miles of existing Plumb Lane. This project included modification to the interchange at Plumb Lane and 3-R pavement rehab. We performed field surveying to locate all improvements within the Plumb Lane right-of-way. We then performed additional topographic surveying at I-580 for modifications of the northbound ramp. All base mapping was prepared for the design team in AutoCAD format. Coordinated field surveys.

I-515/Galleria Interchange, Henderson, Nevada. PBS&J prepared several preliminary concepts for this interchange. Design alternatives included braiding ramps with the interchange ramps at Sunset Road and a concept that involved the construction of collector distributor roads between the interchanges. PBS&J prepared and submitted an Environmental Assessment and Change in Control of Access Report to Nevada Department of Transportation (NDOT) and the Federal Highway Administration. PBS&J coordinated with resource agencies and conducted public involvement activities, including public scoping meetings and design review meetings. PBS&J performed and supplied all topographic information in association with the preliminary design of the interchange. Control was based upon NDOT control and tied to the right-of-way for delineation of control lines for I-515, as well as adjoining streets. Survey and right-of-way design services encompassed utility and existing improvements within the affected corridors, and the coordination of all aerial topography, alignment, and legal description preparation.

Northern Beltway/I-15, Clark County, Nevada. PBS&J conducted 3 miles of topographic survey and right-of-way alignment for design of the Northern Beltway from Pecos Road to I-15. The project included aerial mapping and alignment control drawings and extensive coordination with utilities within the corridor including several fuel and gas line companies. PBS&J also had responsibility for coordination with the UPRR for three separate bridge crossings. PBS&J prepared agreements between Clark County Public Works and UPRR and provided extensive coordination and required documents for right-of-way approvals from the Public Utilities Commission, Nevada Division of State Lands, Bureau of Land Management, and NDOT.

I-15 Southbound Widening from Erie Bridge to California State Line, Clark County, Nevada. PBS&J designed the widening of I-15 southbound from the southern limits of NDOT contract 2929

(milepost 26.12) to Primm and northbound from Primm to milepost 2.00. Included in the design was widening of the southbound structure at the Jean interchange, the seismic retrofit of both the north and southbound structures at Jean, restoration of existing asphalt pavement in both directions from Primm to milepost 16.35, drainage modifications, modifications to the Primm interchange ramps, lowering of SR 161 to provide vertical clearance for the Jean interchange structural widening and retrofit of the right-of-way fence to incorporate a tortoise fence. As with the previous I-15 widening projects, management of traffic during construction was a prime concern. PBS&J developed a fifteen phase traffic control and staging plan to safely convey traffic through the work zone. Coordinated with the NDOT Geodesy Department. Supervised and coordinated with field crews.

I-15 Northbound Widening, Primm to Sloan, Nevada. This project for the Nevada Department of Transportation (NDOT) consisted of preparing final plans, cost estimates and special specification provisions for the widening of Interstate 15 from Primm to Sloan south of Las Vegas. The final construction documents were prepared to NDOT's standards. The project consisted of adding one additional northbound lane within the existing median and increasing the inside shoulder width to meet current American Association of State Highway and Transportation Officials standards. The new pavement was comprised of both plantmix bituminous surface and portland cement concrete pavement. To accomplish the widening, two bridge structures, one at the Jean interchange and another at the Sloan interchange, were widened to the median. The existing bridge structures at Sloan in both directions were seismically retrofitted as well. One cost saving element incorporated into the project included a new design for a rumble strip on concrete pavement. Instead of the typical NDOT ground in rumble strip a raised rumble strip was developed by using raised pavement markers. This modification will eliminate the costly removal and reconstruction of the concrete shoulder in future widenings. As survey manager responsible for coordination with the NDOT Geodesy Department and supervision and coordination of field crews.

I-15 3R Mill and Overlay, Sloan to Blue Diamond, Clark County, Nevada. This project involved mill and overlay with bituminous asphalt paving on I-15, from the beginning of asphalt paving near Sloan Interchange to the beginning of concrete paving, south of Blue Diamond (SR -160 Interchange). Mileposts CL-26.12 to CL-32.50. The scope for this 3R project consists of a one inch (1") mill of the full width of pavement (58 feet of width), an additional two inch (2") mill and fill of the middle and outside lanes and two feet (2') of the outside shoulder (26 feet of width), and open grade the full width of pavement (58 feet of width). Pave emergency vehicle median cross-overs, and replace missing/damaged roadside guideposts. PBS&J's services also included the design of construction traffic control plans to accommodate traffic during night work only. The project is a task order under PBS&J's On-Call Roadway Design Contract with the Nevada Department of Transportation. As project manager, coordinated with the NDOT Geodesy Department. Supervised and coordinated with field crews.

I-15/Silverado Ranch Boulevard Interchange, Las Vegas, Nevada. PBS&J provided survey support for the design of this interchange in Clark County, Nevada. Items provided include delineation of right-of-way lines, legal descriptions and exhibits in support of right-of-way takes. An overall right-of-way map indicating the required right-of-way to be acquired was prepared for Nevada Department of Transportation's Right-of-Way Division requirements. A Record of Survey was prepared memorializing the right-of-way control. A topographic survey was also performed to establish the location and elevation of existing features that may affect the project. As survey manager, coordinated with the NDOT Geodesy Department. Supervised and coordinated with field crews. Established horizontal and vertical control for aerial topographic. Established right-of-way. Prepared legal description and exhibits for right-of-way takes. Prepared a record of survey.

Valley View Boulevard, Las Vegas, Nevada. This project for CCPW consisted of water and storm drain pipeline, open channel improvements, electrical components, and streetlights. Full street improvements,

including medians and a railroad crossing, were constructed. Survey monumentation destroyed during construction was restored and documented. Led project kick-off meeting. Coordinated field activities. Assisted in problem resolution of engineering plan discrepancies.

Hacienda/Koval Extension Phase 2, Las Vegas, Nevada. PBS&J provided construction staking of roadway, including rough grading, relocation of utilities, new utility locations, drainage facilities, curb, and gutter, and final monumentation of 2 miles of new roadway and realignment. Assisted in developing project scope. Facilitated initial start-up coordination meeting with staff. Coordinated with contractor. Tracked work addendums. Surveyor responsible for setting final monumentation.

Lake Mead Drive Widening, Henderson, Nevada. This project consisted of collecting information for the expansion of the existing Lake Mead Drive alignment through the southern part of Henderson for NDOT. PBS&J provided all survey-related information for the project. One facet was to coordinate with NDOT to set up control monumentation to aid the project through construction; this involved the setting of official monuments provided by NDOT, which totaled 26 monuments across 7 miles of alignment. All survey-related items were based upon this control, which was set per NDOT standards and tied to the High Accuracy Reference Network (HARN) in the valley. A GPS static survey was used to accomplish this. Aerial topographic mapping was provided along with additional topography for drainage areas. As survey manager, provided coordination of all Global Positioning System (GPS) activities with NDOT for control constraints in relation to HARN network. Planning and calibration of static survey.

UTILITY/PIPELINE PROJECTS

Paradise Road 8-inch Natural Gas Pipeline, Las Vegas, Nevada. Survey services manager for the design of a 2-mile long stretch of 8-inch steel natural gas pipeline to be placed in Paradise Road between Tropicana Avenue and Desert Inn Road for the Southwest Gas Corporation (SWG). This design includes placement of the pipeline within an existing road containing many existing utilities and requires a connection to a new pressure regulating station being designed by SWG. Survey services for this project included preparation of design topographical survey, easement and right-of-way research, and construction alignment staking. The completion of the final bid documents is anticipated to be January 2006.

Las Vegas Boulevard 16-inch Steel Gas Line, LeBaron to Cactus, Las Vegas, Nevada. This project consists of the design of approximately 1.5 miles of 16-inch steel gas line along Las Vegas Boulevard between Serene Avenue and Cactus Avenue. The scope of services included gas line plan and profile design, preparation of NDOT Encroachment Permit, coordination with on going development projects along the project alignment, utility coordination, and processing the environmental documents. Survey services for this project included preparation of design topographical survey, easement and right-of-way research, and construction alignment staking.

Lake Mead Gas Line, Southwest Gas Corporation, Henderson, Nevada. Managed GPS controlled surveying services for topographic surveying, right-of-way research and construction staking of the alignment. As-built information of weld locations during construction was also provided.

James Hardie Gas Line, Southwest Gas Corporation, Clark County, Nevada. Provided management and coordination with NDOT for land surveying services to collect design information including topographic survey, right-of-way and easement research and construction staking of the alignment. Provided as-built information of weld locations during construction through contractor.

Horizon Ridge Gas Line, Southwest Gas Corporation, Henderson, Nevada. Provided management and control planning for survey design information including topographic survey, right-of-way and

easement research and construction staking of the alignment. Provided as-built information of weld locations during construction through contractor.

Las Vegas Cogen II Gas Line, Southwest Gas Corporation, North Las Vegas. PBS&J performed land surveying to tie controlling monumentation along the route. Managed GPS technology for the control for a comprehensive network to control the alignment. The field information was compiled and compared to record information obtained through the Clark County Assessor and Recorder offices to delineate the centerline of rights-of-way to control the placement of the pipe. Topographic information was collected to aid in the pipeline alignment placement. Staking of the tap site property corners were also provided. Upon the selection of an alignment, parcel drawings and legal descriptions were provided to obtain right-of-way from owners along the alignment not having existing right-of-way abutting their property.

Kern River Tap, Northwest Reinforcement, Southwest Gas Corporation, Clark County, Nevada. Oversaw survey control and mapping services including design topography, construction staking, and as-built of 16 inch gas line installation in northwest Las Vegas.

Las Vegas Valley Water District, Contract Number C1122, Modifications to Well Number 2A and 5A, Las Vegas, Nevada. PBS&J provided surveying services to support both the design of new construction on the well sites and new pipeline construction. PBS&J performed field surveys on both well sites to determine existing boundaries. The surveys were tied and referenced to controlling corners within the rectangular survey system per the legal descriptions of the parcels. Records of Survey were prepared for both sites. All mapping was prepared in accordance with LVVWD requirements and recorded with the Clark County Recorders Office. As a subconsultant to PBS&J, an aerial company provided contours on the well sites and along Vegas Drive. Aerial target panels were set and field surveyed to determine their horizontal and vertical locations; the panels were then provided to the aerial company for control of their mapping. The aerial company provided a 1-foot interval contour map. All other relevant items, including utilities, in the range of the aerial control were mapped. Horizontal control will conform to HARN NAD 83. Coordinates will be derived in both NAD 83 and State Plane coordinates. Vertical control will conform to NAVD 88 datum.

Las Vegas Valley Water District, Contract Number C1116, Miscellaneous Vaults, Reconstruction, and Repair, Phase I, Las Vegas, Nevada. In support of developing legal descriptions on existing facilities, PBS&J provided surveying services on all six sites to determine existing conditions. Survey services included topography of the existing water facilities, adjacent curb and gutter, driveways, sidewalk, and walls. This information was used to locate easements in the correct positions. Surveys were tied and referenced to controlling corners within the rectangular survey system. Once complete, each area was described with a metes and bounds description and accompanied by an exhibit. All legal descriptions and exhibits were stamped by a Nevada Professional Land Surveyor.

Las Vegas Valley Water District, Contract Number C1082, West Central Well Field, Las Vegas, Nevada. PBS&J provided services in support of a topographic survey related to design on the subject property. As a subconsultant to PBS&J, an aerial mapping company provided a new topographic map for the entire site. Adjacent streets and improvements were shown. Panel targets were set, and survey control collected and forwarded to the aerial mapping company to control the mapping. Due to the slight percent of slope through the area, additional survey points were collected along the east side of the property to supplement the mapping. Additional points were also shot to verify existing conditions along Charleston Boulevard. The AutoCAD drawing provided of the grading plan and the Record of Survey was used as the base and updated with this information.

Las Vegas Springs Preserve Contract 2168 Water Facilities, Las Vegas, Nevada. Topographic survey on more than 100 acres and detail survey of all existing facilities. As survey manager, provided direct

supervision of all activities including both those in the field and in the office. Performed calculations for aerial topo control points, GPS control reduction to Water District control, and detail survey mapping of all facilities to Water District mapping requirements.

Carlton Square Pipeline, Clark County, Nevada. For this Southern Nevada Water Authority project PBS&J provided engineering design services for approximately 22,000 linear feet of 42-inch-diameter welded steel pipe. All aspects of land surveying were performed for this project. Initially, existing land corners and monuments were recovered to control all street alignments affected by future water line installation. Topographic mapping of the seven-mile alignment was performed using aerial photography. Additional topography by conventional methods was performed on structures being tied to this project. Property and land ownership along both sides of the right-of-way were researched and identified. All properties along the route were tied to the existing survey control. Once this was complete, properties that needed to dedicate right-of-way for project construction were identified. Legal descriptions and exhibit mapping were produced for the right-of-way acquisition of these parcels.

North Valley Lateral Transmission System, SNWA Contract 140-B, North Las Vegas, Nevada. Along with the design of approximately 22,000 linear feet of 42-inch-diameter welded steel pipe, PBS&J provided engineering design and method-of-construction services for 8-inch sewer pipeline relocation. The relocation design included plan and profile of proposed and existing sewer pipeline and manholes, and detailed drawings and specifications. Directed coordination of field and mapping activities, calculation of topography, primary and secondary control, centerline, and section line determination.

Durango Interceptor Sewer, Centennial Parkway, Durango Drive to Hammer Lane, Las Vegas, Nevada. More than 3 miles of large-diameter sanitary sewer pipeline to accommodate ties for future development in the area. As survey manager, coordinated and directed work of field crews. Responsible for cut sheet checks and stamping of final plans. Coordinated as-built survey.

Clark County Water Reclamation District Surveying, Flamingo Road to Stephanie Street, Las Vegas, Nevada, Nevada. This project involved topographic mapping of all District property and design for drainage, pre-load areas, and utilities. As survey manager, coordinated mapping activities. Set up datum conversions for horizontal and vertical information used by all contractors.

Desert Breeze Recycled Water Distribution System, Las Vegas, Nevada. PBS&J provided survey services for design of the 10-mile section of the Desert Breeze system including right-of-way and centerline control alignment of the route, horizontal and vertical control on the project for topography, and photography including booster pumping station location planned facilities. Project benchmarks were also installed for construction. As manager of survey services, supervised field and office activities, attended client meetings, reviewed procedures, and performed quality control of deliverables.

Duck Creek Channel, Tomiyasu Lane to Warm Springs Road, Las Vegas, Nevada. PBS&J verified monumentation and benchmarks shown on the plans to assure horizontal and vertical control for the project. We set construction benchmarks and provided stakes at 50-foot intervals for construction of open-channel sections. Additional stakes were provided for transition areas, riprap, and bridge placement. We also provided bluetops and redheads on stationing for vertical and control of finished grade. As survey manager, attended initial meetings to develop scope. Supervised coordination of field activities. Assisted in tracking job progress. Performed quality control on field procedures.

CIVIL PROJECTS

Tuscany Master Planned Community, Henderson, Nevada. PBS&J is responsible for right-of-way survey and condemnation support for state right-of-way and utility corridors on more than 600 acres of

land previously used for gravel extraction. PBS&J is also providing other surveying necessary including boundary and topographic surveying for design and construction for this single-family, multi-family, commercial, and public development master planned golf community. Mr. Christianson coordinated the construction staking for this project.

D.R. Horton – The Twilights, Clark County, Nevada. PBS&J is providing construction staking and mapping services for D. R. Horton throughout the Las Vegas Valley. This project, comprised of 250-residential lots, requires the following services final subdivision mapping, rough and finish grading, utilities, curb and gutter, house plot plans, house location surveys and certifications for drainage and finished floor elevations. Mr. Christianson is responsible for reviewing delivery orders; developing preliminary work plans, schedules, and assigning the appropriate staff members to complete the tasks.

Glendale Holding Company – Riverview Project, Clark County, Nevada. PBS&J provided conceptual planning and design services for 6,700 acres north of Las Vegas as well as due diligence services for the proposed Riverview project. PBS&J provided topography, boundary, and American Land Title Association (ALTA) mapping for approximately 1,950 acres within the Riverview project. Due to the vast expanse of the parcels surveyed, multiple crews were required to perform land surveying and identify aerial target locations for topography. Mr. Christianson supervised and coordinated with field crews.

Pedestrian Grade Separation, Clark County, Nevada. This project consists of building three bridges for pedestrian access across Las Vegas Boulevard and Spring Mountain Road. Surveying consists of setting horizontal and vertical project control. Construction stakes are provided to control all work, including curb and gutter, drainage and utility pipes including manholes and drop inlets, junction structures, and streetlight and traffic signal pole locations. Grade stakes will be provided for asphaltic pavement areas at subgrade and finished grade. Reference stakes will be placed for construction of the towers, bridges, and columns. Control was provided for pedestrian and median containment systems. Stakes were also provided for retaining walls. PBS&J also verified structures and spans for constructability. As survey manager, coordinated control network, client communication, and field scheduling. Construction plan advisor to crews.

Clark County School District, Clark County, Nevada. PBS&J has successfully completed more than 90 school facility designs throughout Clark County. Working with local architectural firms as well as directly with the Clark County School District, PBS&J has provided consulting engineering services on various school projects that have included: boundary and topographic surveys, feasibility studies, offsite roadway design, traffic analysis, hydrology analysis, retaining wall structural design, site grading, utility design, fire system design, horizontal control plans, and construction observation/management. PBS&J has performed boundary and topographic surveys for more than 90 elementary, junior high, and high schools throughout Clark County.

Basic Management Inc., Henderson, Nevada. PBS&J provided mapping, planning, site engineering, and infrastructure design within the 1,500-acre Basic Management, Inc. (BMI) property. Staking for multiple tracts for commercial and industrial development was included in the services. PBS&J continues to provided services for this industrial park on an as need basis. Lead on surveying coordination for construction on various projects including landscaping and drainage projects for two miles on Lake Mead Drive and Gates 8 and 9 at the Industrial Park.

Desert Inn Master Plan Las Vegas Wash Improvements, Las Vegas, Nevada. PBS&J's Water Resources division performed hydraulic analysis of a 6,800-foot reach of the Las Vegas Wash for a proposed 200-acre residential master planned community, and assisted in the design of the Las Vegas Wash improvements. In support of this effort, oversaw all facets of land development surveys for John

Laing Homes, including coordination of right-of way concerns; mapping approach for subdividing the property; coordination of land owned by the City of Las Vegas for access to the site; and the preparation of numerous legal descriptions for access purposes, such as utility easements.

Valley of Fire State Park, Clark County, Nevada. PBS&J prepared documents for construction of five miles of new roadway into the park area. Hydrologic and hydraulic calculations were performed to address stormwater flows. Road designs included an inverted cross section to collect and capture runoff and Arizona Wash crossings for existing washes in order to minimize potential erosion due to non-cohesive soils prevalent in the area. Horizontal and vertical control, topographic survey, and road alignment calculations.

Spring Mountain Ranch State Park, Clark County, Nevada. PBSJ& designed the entrance area, which was coordinated with NDOT, and the reconstruction and rehabilitation of the existing access road (6,700 linear feet) from SR 159 to the visitor's center/picnic area. Redesign occurred as a result of safety concerns and the overall condition of the existing road. Improvements included reconstructing three Arizona crossings and reconstructing and expanding to an existing parking lot. The project also included the design of a septic tank leach field system and water service to a prepared contact station. PBS&J prepared improvement plans for construction of approximately 6,700 linear feet of entrance/access road from SR 159 into the existing park. Horizontal alignment and topographic survey.

ENVIRONMENTAL PROJECTS

Pittman East Detention Basin, Henderson, Nevada. PBS&J provided construction staking on this 150-acre detention basin in Henderson. The project included staking for the detention basin including spillway and outlet works, drainage channel improvements, flow diversion structures, access roads to the project, and access roads on the detention berm. Additional staking was provided to accommodate the adjoining properties of Seven Hills and the Henderson Executive Airport. As survey manager, provided overall supervision, coordination, and administrative support to survey crews.

Las Vegas Valley Disposal Boundary Environmental Impact Statement, Clark County, Nevada. PBS&J is preparing a comprehensive Environmental Impact Statement (EIS) for all Bureau of Land Management (BLM) managed properties within the Las Vegas Valley Disposal Boundary. Realty Management required legal descriptions of all lands within the disposal boundary. Responsible for project coordination on all survey and right-of-way facets including research, legal descriptions, and exhibits for BLM approval to release the property for auction. Conducted research in association with this task, including land status and land use authorizations shown on the public lands records system, BLM Master Title Plats, historical indices, and the LR2000 database for withdrawals, segregations, and other land status information. Once complete, a detailed legal description of the disposal boundary was prepared that included all private and public lands for an area of approximately 330,000 acres. Legal descriptions for all BLM-managed public land parcels within the Las Vegas Valley Disposal Boundary were also prepared and tabulated along with pertinent information that related to each parcel. This project totaled approximately 50,000 acres.

Moapa Power Station, Clark County, Nevada. This project consists of topographic surveying and subdivision mapping of plant area and power corridors. As survey manager, coordinate GPS survey for determination of property lines for 3,200 acres of land. Provide control for aerial topography on 56 acres. Supervise field procedures. Responsible for parcel mapping of plant site. Review all work for completeness. Route survey from site to Harry Allen Substation.

Moapa Paiute Energy Center, Clark County, Nevada. This project consists of 12 miles of right-of-way alignment, research, primary and secondary control, topography, and record of survey for plant site. As

survey manager, directed coordination of GPS field procedures and mapping activities, calculated GPS control, topography control, primary and secondary control, and determined section line on 24 square miles of property.

EDUCATION
Brinker School of Surveying and Mapping, 1981

REGISTRATION
Professional Land Surveyor: Nevada 8895 (1990); Colorado 37077 (2002)

PROFESSIONAL AFFILIATIONS
Nevada Association of Land Surveyors
Southern Nevada Association of Land Surveyors

Charles D. Kircher, PLS, WRS

Vice President, Director of Survey Services
PBS&J

Registrations

Profession Land Surveyor
- Nevada
- Utah
- Arizona
- Colorado
- Texas

Water Rights Surveyor
- Nevada

Professional Affiliations

Nevada Association of Land Surveyors (NALS)
American Congress of Surveying and Mapping (ACSM)
Utah Council of Land Surveyors

Mr. Kircher oversees coordination of all survey activities including field services and base mapping for public works and private sector projects. He is experienced in preparing right-of-way parcel maps and strip mapping used for property acquisition. He is well versed in surveying standards employed by federal, state, and local governments. He has more than 29 years of survey experience in land development and public works surveying.

Lake Mead Widening, Henderson, Nevada. This project consists of 7 miles of primary horizontal and vertical control monumentation and topography. As director of survey services, review Global Positioning System (GPS) activities and Nevada Department of Transportation requirements for control constraints. Track cost control on job. Review and provide quality control of deliverables.

Desert Breeze Waterline, Las Vegas, Nevada. This project consisted of topography and alignment for 10 miles of waterline. As director of survey services, supervised field and office activities. Reviewed procedures. Clarified contract issues. Performed quality control of deliverables.

Lakes Detention Basin, Las Vegas, Nevada. This project consisted of 8miles of drainage pipe design and detention basin. As director of survey services, provided oversight of survey operations, including boundary/right-of-way delineation, topography control, and GPS control.

Moapa Paiute Energy Center, Clark County, Nevada. This project consists of 12 miles of right-of-way alignment, research, primary and secondary control, topography, and record of survey for plant site. As director of survey services, provide cost control. Perform quality control checks and adhere to quality assurance procedures. Attend design meetings and client meetings. Mission planning of survey.

Lakes Detention Basin, Las Vegas, Nevada. this project consisted of 8 miles of drainage pipe design and detention basin. As director of survey services, provided overview of survey operations including boundary/right-of-way delineation, topography control, and GPS control.

Las Vegas Valley Water District, On-Call Survey Services. Performed boundary surveys, tied existing water district properties and wells to control, water right surveys, staked new well locations, and provided design surveying.

2745 Zone Pipeline Phases I and II, Las Vegas Valley Water District. Prepared legal descriptions for right-of-way encroachment to construct offsite improvements. Performed field topography survey. Provided state plane coordinates.

2300 and 2420 Zone Pipeline Phases I and II, Las Vegas Valley Water District. Responsible for boundary survey, topography, and horizontal and vertical control for design of approximately three miles of 36- and 42-inch water pipeline. Provided state plane coordinates.

2300 Zone South Pipeline Project, Las Vegas Valley Water District. PBS&J performed a boundary survey of existing right-of-way for construction of approximately three miles of 36-inch water transmission pipeline. Services also included aerial and horizontal control survey for pipeline design. Provided state plane coordinates.

Central Reservoir Water Transmission Main, City of North Las Vegas, Nevada. Performed right-of-way research and field surveying for right-of-way delineation and topography. Performed potholing services for 7,400 linear feet of water transmission main.

Needles Highway Producing Analysis Memorandum, Clark County Department of Public Works, Nevada. Performed the right-of-way boundary survey, aerial control, and topographic survey on 11.5 miles of the Needles Highway from State Route 163 to the California state line. Services included research of existing mapping, right-of-way dedication/requirements, verification of existing monumentation, and establishment of project control monumentation for future construction work.

Industrial Road, Clark County Department of Public Works, Nevada. PBS&J performed boundary and topographic survey services for re-design of 1.8 miles of Industrial Road between Spring Mountain Road and Sahara Avenue. Prepared strip mapping and legal descriptions for the acquisition of right-of-way needed to construct offsite improvements.

Michael Pederson
Senior Facilities Project Manager

Education
A.S., Civil Engineering

Professional Affiliations
American Society of Civil Engineers
International Council of Shopping Centers
City of Henderson Chamber of Commerce

Michael Pederson is a senior project manager at PBS&J. He has more than 23 years experience in residential and commercial land development, roadway design, and construction management. He has expertise in the direction and completion of various development project elements such as development design; project schedules and budgets; construction documents; plans and specifications; regulatory permitting and stormwater pollution prevention plans for commercial, residential, and industrial developments; municipal roadway; and railway projects.

Project Experience

- Project Manager, LandWell 2200 Acre Master Plan Civil Design, Clark County/ Henderson, NV
- Project Manager, Black Mountain Industrial Center Various Parcels Civil Design and Layouts, Clark County/Henderson, NV
- Project Manager, Traverse Point/Gibson Business Park Various Parcels Civil Design and Layouts, Henderson, NV
- Project Manager, Las Flores Shopping Center Civil Design, North Las Vegas, NV
- Project Manager, Lone Mountain Regional Park Design, Clark County, NV
- Project Manager, Northgate Subdivision Design, Clark County/Henderson, NV
- Project Manager (early stages), Tuscany-Athens Road Design, Henderson, NV
- Civil Department Manager, Krech Ojard and Associates, P.A., Duluth, MN
- Project Manager, Staples Distribution Center Civil Design, Beloit, WI
- Project Manager, PolyMet–NorthMet Mine Design and Master Plan, Babbitt, MN
- Project Manager, Mesabi Nuggett Commercial Iron Production Plant Site Design and Master Plan, Hoyt Lakes, MN
- Project Designer, Cheyenne Commons Civil Design, North Las Vegas, NV
- Project Designer, Cheyenne Crossings Civil Design, North Las Vegas, NV
- Project Designer, Rainbow Plaza Civil Design, Las Vegas, NV

Angelo Spata, PE
Senior Transportation Project Manager

Education
B.S., Civil Engineering

Registrations
Professional Engineer,
Nevada (15753)

Professional Affiliations
American Public
Works Association
American Society of
Civil Engineers

Commendations

"There are many PBS&J employees that should be commended pertaining to this job, especially Angelo Spata. He has continued to exhibit professionalism and has been comprehensive in the execution of his duties. He consistently responded to requests, coordinated all aspects of the project, and kept the NDOT project manager well informed regarding project developments.
- Casey Connor, PE, NDOT

"I cannot praise Angelo enough...I look forward to future projects with him as his professionalism, attention to detail, thought process, design savvy, and promptness are off the charts. He far exceeds my expectations and it's a pleasure to work with him.
- Valerie Flock, PE, City of Las Vegas

Angelo Spata has 21 years of civil engineering experience on a wide range of public works projects, with a focus on planning and design of transportation facilities. His expertise includes freeway and urban arterial design with drainage, utilities, traffic signing/striping, and right-of-way coordination. His experience in the Henderson, Nevada, area includes serving as project or design manager for the I-515/Auto Show Drive and I-515 Galleria Drive interchanges, Galleria Drive, Horizon Ridge Parkway, Burkholder Boulevard.

A southern Nevada resident since 1976, Angelo's thorough commitment to exceeding client expectations has earned him a reputation with local agencies as a "go-to person" for multidisciplinary project coordination efforts.

Project Experience

- Project Manager, Galleria Drive Half-Street Improvements Design, Henderson, NV
- Project Manager, I-515/Auto Show Drive Interchange Environmental Assessment (EA) and Design, Henderson, NV
- Project Manager, I-515/Galleria Drive Interchange EA and Design, Henderson, NV
- Design Manager, Horizon Ridge Parkway Improvements Design, Henderson, NV
- Project Manager, Burkholder Boulevard Roadway and Trail Improvements Design, Henderson, NV
- Project Engineer, I-15 Widening Design (I-215 to California State Line), Clark County, NV
- Project Engineer, I-15/Silverado Ranch Boulevard Interchange EA and Design, Clark County, NV
- Project Engineer, I-15/Northern Beltway Interchange EA and Design, Clark County, NV
- Project Manager, Cactus Avenue Design (Las Vegas Boulevard to Maryland Parkway), Clark County, NV
- Design Manager, McCarran Airport Terminal D Infrastructure Design, Clark County, NV
- Design Manager, Lakes Detention Basin and Associated Collection and Outfall Facilities Design, Clark County, NV
- Project Engineer, US 95 Widening Design, Las Vegas, NV
- Design Manager, Buffalo Drive (Tropicana Avenue to Sahara Avenue), Las Vegas, NV
- Roadway Design Manager, Oakey-Meadows Storm Drain and Street Rehabilitation Design, Las Vegas, NV
- Design Manager, Donovan Way Design, North Las Vegas, NV

MARK BLANCHARD, P.G. — TECHNICAL ADVISOR

Qualifications Summary

- Sixteen years of professional experience.
- Thirteen years of experience conducting Phase II and Phase III hydrogeologic investigations at RCRA facilities, former military installations, airport facilities, and UST sites.
- RCRA facility permitting and compliance management.
- Writing and preparation of environmental assessment work plans, sampling and analysis plans, remedial investigation/feasibility studies, and corrective action plans.
- Risk-based corrective action analysis of UST releases.
- Statistical analysis of geologic/hydrogeologic data.
- Computer modeling and analysis using AQTESOLV, ArcView, Bioplume, Bioscreen, RBCA Tier 2 Spreadsheet System, SpillCAD, Surfer, and Thwells.
- Geologic database management using GIS\key and Access.
- Development and implementation of groundwater, surface-water, soil, and soil gas sampling programs.
- Lithologic logging with air/mud rotary, hollow-stem auger, air hammer, and Geoprobe drilling rigs.
- Aquifer testing including pump tests, slug tests, and product recovery tests

Fields of Competence

Geology; hydrogeology; project management; hazardous waste site investigation; Resource Conservation Recovery Act (RCRA) facility investigation (RFI); remedial investigation (RI); remedial design; RCRA permitting and compliance; Facility Operation Area (FOA) program development; aquifer testing; mapping; groundwater flow and transport modeling; statistical analysis; natural attenuation modeling; risk-based corrective action analysis; report preparation; monitor well installation; core logging; Geoprobe surveys; groundwater and surface-water sampling; soil sampling; and hazardous waste remediation; computer modeling and analysis: Aqtesolv, ArcView, Bioplume, Bioscreen, RBCA Tier 2 Spreadsheet System, SpillCAD, Surfer, Thwells.

Education/Training/Certifications

- Professional Geologist in the State of Nebraska (G-0110)
- Professional Geologist in the State of Texas (3882)
- Professional Geologist in the State of Utah (5557421-2250)
- M.S., Geology—University of Wyoming (1990)
- B.S., Geology—Michigan State University (1988)
- Site Health and Safety Coordinator Course—Level B, OSHA 29 CFR 1910.120(e)(4), WESTON (1995)
- National Ground Water Association
- Colorado Ground Water Association
- Understanding Migration, Assessment, and Remediation of Non-aqueous Phase Liquids, Short Course (1995)
- 40-Hour Hazardous Waste Site Training Course, 29 CFR 1910.120(e)(3), WESTON (1994)
- 8-Hour Hazardous Waste Refresher Course, OSHA 29 CFR 1910.120(e)(8), WESTON (2001)
- Bloodborne Pathogens Training, OSHA 29 CFR 1910.1030, WESTON (2001)
- Site Health and Safety Coordinator Course, OSHA 29 CFR 1910.120(e)(4), WESTON (1995)

Employment History

1994 – Present	WESTON
1991 – 1993	U.S. Peace Corps, Gabon, Africa
1990 – 1991	University of Wyoming, Department of Atmospheric Sciences
1988 – 1990	University of Wyoming, Department of Geology and Geophysics

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Key Projects

Remedial Investigation/Site Assessment

Facility Operations Area (FOA) Application and Management Plan Development, Petroleum Refinery, Texas, Confidential Client, Project Manager. Managed the analysis of site geology and hydrogeology for development of facility wide groundwater contamination management program to replace portions of requirements specified under an existing RCRA Permit at an active refinery in western Texas. The modification was implemented in accordance with Facility Operations Area requirements of the Texas Risk Reduction Program (TRRP) and addresses corrective action for multiple units within a single permit. Project involved surface and subsurface mapping of five geologic units; characterization of three hydrostratigraphic units; identification of potential contaminant flow pathways; development of proposed groundwater monitoring program; and development of associated spill response and sampling and analysis plans. Supported client at meetings with regulatory agency and assisted with preparation of response materials to comments made by regulatory agency regarding client's application. The project was completed on time and within the proposed budget.

Property Redevelopment Closure Plan Technical Review, Nevada, Confidential Client, Technical Manager. Conducted third party review of closure plan for remediation and redevelopment of former industrial property located outside of Las Vegas, Nevada. Property is over 2000 acres and has had multiple historical uses. Performed technical and regulatory review to assist client in preparation for presentation of the closure plan to the Nevada Division of Environmental Protection. Plan includes site history, site conceptual model, data quality objectives, and risk assessment methodology.

Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI), Petroleum Refinery, Texas, Confidential Client, Project Manager. Supervised project team of twelve people to complete investigation of sixteen solid waste management units (SWMUs) at petroleum refinery. Project included completion of over 120 soil borings, installation of over thirty monitoring wells, characterization of site geology and hydrogeology, and definition of extent of soil and groundwater contamination. Project was completed on time and within the proposed budget.

Affected Property Assessment Report, Aviation Gasoline Release Site, Texas, Confidential Client, Project Manager. Managed the field investigation program, evaluation of extent of impacts due to aviation gasoline release, and preparation of Affected Property Assessment Report (APAR). The client had conducted previous investigative activities internally and determined that the results would not be sufficient to demonstrate a complete definition of the extent of impacts to soil and groundwater. By using a solid understanding of the regulatory requirements and procedures, the project team was able to demonstrate to the TCEQ that certain areas of the spill site were already covered by another regulatory program. This has allowed the client to realize a more focused remediation effort.

Affected Property Assessment Report, Storage Tank Farm, Texas, Confidential Client, Project Manager. Managed the field investigation program, evaluation of extent of impacts due to historical releases, and preparation of Affected Property Assessment Report (APAR). The client had conducted previous investigations but had not been able to demonstrate to the Texas Commission on Environmental Quality that the extent of impacts to soil and groundwater had been defined. Project team conducted a complete evaluation of groundwater, surface water, surface and subsurface soil, and stream sediments in order to fully define the extent of hydrocarbon impacts stemming from historical operations at the tank farm. Developed an approach that satisfied the regulatory requirements by incorporating a minimal amount of additional field data with data collected from previous investigations. This approach minimized additional field data collection costs yet addressed the concerns of the TCEQ.

Affected Property Assessment Report/Remediation Design, Heavy Cycle Oil Release, Texas, Confidential Client, Project Manager. Managed the field investigation program, evaluation of extent of impacts due to release, and preparation of Affected Property Assessment Report (APAR). Release from pipeline had occurred in recharge area of fractured karst aquifer. Project team conducted a complete evaluation of groundwater, surface water, surface and subsurface soil, and stream sediments in order to fully define the extent of hydrocarbon impacts stemming from the release. Developed a proactive approach in which the remedial measures were developed concurrently with evaluation of impacts from release in order to accelerate remediation and protection of downgradient property. The project team developed the remediation system design and oversaw the installation of the system.

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Compliance Support, Former Rubber Chemicals Complex, Texas, Confidential Client, Technical Manager. Coordinated the preparation of an ecological risk assessment as part of a RCRA Facility Investigation, including field biological survey and environmental exposure pathway analysis. Prepared Annual Facility Report to satisfy reporting requirements for Hazardous Waste Permit, including review of statistically significant increases in wells located downgradient of closed hazardous waste unit.

Hydrogeologic Investigation, Petroleum Refinery, Texas, Confidential Client, Project Manager. Directed investigation of refinery facility to define nature and extent of free-phase hydrocarbon contamination on perched water table and to collect necessary data for remediation system design. Field investigation included groundwater monitor well design and installation, lithologic logging with air/mud rotary rig, soil sampling, and well development and sampling. Analyzed geologic and hydrologic data to develop site conceptual model and worked with engineering department to design and install remediation system. Remediation within an active refinery required Class I/Division I safety ratings and extensive interaction with plant operations and plant personnel. A technically sound, cost-effective approach to remediation was developed and was constructed. The system is currently recovering a significant volume of free product. An additional benefit to the remediation system has been to reduce benzene emissions in this area of the facility because the free product is being removed from the subsurface.

RFI Work Plans, Texas, Confidential Client, Project Manager. Managed the preparation of work plans for RFI Phase III, Corrective Measures Studies, and Baseline Risk Assessment of ten SWMUs. Worked closely with client to develop work plans that satisfied regulatory requirements yet provided enough flexibility to address the regulatory agency's as-of-yet unreleased comments on the RFI Phase II Investigation.

Hydrogeologic/Geotechnical Investigation, Texas, Confidential Client, Site Manager/ Hydrogeologist. Directed rapid turnaround site investigation to support client property transfer. Conducted field investigation program that required daily adjustments in technical program based on incoming data in order to collect all data required by the client. Performed lithologic logging with Geoprobe unit and air-rotary rig, soil and groundwater sampling, and property assessment. Met regularly with the client on-site to discuss ongoing project results and direction. Developed site conceptual model to explain nature and extent of contamination.

RCRA Facility SWMU Investigation, Texas, Confidential Client, Site Manager/ Hydrogeologist. Conducted investigation of SWMUs as part of RFI. Performed groundwater monitor well design and installation, lithologic logging, sediment sampling, well development and sampling, and SWMU waste sampling. Analyzed the geologic and hydrogeologic data collected for use in a SWMU status change assessment.

Hydrogeologic/Geotechnical Investigation, Texas, Confidential Client, Site Manager/ Hydrogeologist. Performed groundwater monitor well design and installation, lithologic logging and coring, geophysical logging, sediment sampling, well development, well sampling, and aquifer testing. Analyzed the geologic and hydrogeologic data collected for use in a remedial investigation/feasibility study (RI/FS). Met regularly with the client on-site to discuss ongoing project results and direction. Developed site conceptual model, determined nature and extent of contamination, and worked with engineering department to design remediation system.

Surface and Subsurface Soil Contamination Investigation and Mapping Project, Texas, Confidential Client, Site Manager/Geologist. Mapped surface geology of 8-square-mile-area surrounding RCRA facility and coordinated soil sampling program for the collection of surface and subsurface samples. Conducted statistical analysis of the concentration of Skinner List metals in background soils to provide information for comparison to impacted soils.

Hydrogeologic/Geotechnical Investigation, Pennsylvania, U.S. Army Corps of Engineers (USACE), Assistant Geologist. Performed lithologic logging, sediment sampling, groundwater monitor well design and installation, and well development. Also coordinated sediment sampling quality assurance/quality control (QA/QC) program.

Hydrogeologic Investigation, Colorado, EPA Response, Engineering, and Analytical Contract (REAC) Team, Assistant Geologist. Assisted with 120-hour pump test of fractured crystalline aquifer contaminated with carbon tetrachloride. Set up equipment, collected water quality samples, monitored drawdown in nearby private wells, and downloaded data.

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Hydrogeologic/Geotechnical Investigation, Manufacturing Facility, Washington, Confidential Client, Assistant Geologist. Performed groundwater monitor well design and installation, lithologic logging and coring, sediment sampling, well development, and well sampling. Assisted with design, equipment set-up, and implementation of study of tidal influence on aquifer.

Hydrogeologic/Geotechnical Investigation, Texas, Confidential Client, Assistant Geologist. Performed groundwater monitor well design and installation, lithologic logging and coring, geophysical logging, sediment sampling, well development, and well sampling. Analyzed the geologic and hydrogeologic data collected for use in a RI/FS.

Remediation Design/Corrective Action

Sitewide Remediation Program Development, Petroleum Refinery, Texas, Confidential Client, Project Manager. Managed the development of a sitewide corrective action program. Directed staff working on three separate process design packages for three high priority remediation projects. Also directed staff working on phytoremediation pilot project and two separate Monitored Natural Attenuation (MNA) studies. Negotiated with facility operations staff on behalf of client's remediation group. Working with client to design corrective action program that will meet the EPA 2008 Corrective Action Baseline Facility goals.

Closure of RCRA Interim Status Unit, Hydrocarbon Sludge Holding Pond, Texas, Confidential Client, Project Manager. Managed the first phase of hazardous waste management unit closure project under an existing RCRA Permit at an active refinery in western Texas. Scope of work included negotiating closure criteria with Texas Commission on Environmental Quality, preparing modification to the closure plan, and working with construction subcontractor to implement closure construction activities. The wastes within the unit were considered listed hazardous wastes in accordance with RCRA regulations and carried the waste code "F037" designation. Negotiations with agency included demonstrating that the use of nontraditional agents, including non-hazardous waste, was the best and most practical approach to closing the unit. The agency approved the conversion of the unit in accordance with 30 TAC 305.69 and 40 CFR 264.113(d). The unit was successfully stabilized in 2004 and the remaining capacity converted to disposal of non-hazardous waste.

Affected Property Assessment Report/Response Action Plan, Pentane Release Site, Texas, Confidential Client, Project Manager. Managed the field investigation program, evaluation of extent of impacts due to pentane release (APAR), implementation of interim corrective measures and development of Response Action Plan (RAP). Developed an investigation plan that provided the supplemental data required but minimized intrusive activities in a busy portion of the refinery complex. Coordinated the design and installation of an interim measures hydrocarbon recovery system. Helped client to minimize costs by demonstrating through a detailed hydrogeologic analysis that the interim measure recovery system should be sufficient.

RCRA Facility Corrective Action Implementation, Petroleum Refinery, Texas, Confidential Client, Project Manager. Managed the implementation of a revised corrective action plan at a waste management unit of an oil refinery. The revised plan required additional field investigation, geologic and hydrogeologic modeling, and contaminant plume modeling to support the conversion from an existing pump-and-treat approach to a performance-based approach. The new approach allows the client to operate the system as needed and remain in compliance, and may result in turning off the system entirely in the future, which would result in significant cost savings.

Hydrogeologic Investigation and Remedial System Design, Petroleum Refinery, Texas, Confidential Client, Project Manager. Managed investigation into free-phase hydrocarbon seeps that were impacting surface water. The project included field investigation of nature and extent of contamination, conceptual design of remediation systems to stop the hydrocarbon seepage, presentation of site hydrogeology and conceptual designs to site stakeholders, and finalization of system design.

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Surface Water Studies

Evaluation of Impacts of Wastewater Treatment System Effluent on Surface Water, Texas, Confidential Client, Project Manager. Supervised project team of seven people to complete characterization of three miles of secondary tributary and two miles of primary river reach. Project included completion of three dye tracer tests, stream bed characterization, in-stream flow measurements and water sampling using ultra low detection protocols. Developed and negotiated work plan with state agency, prepared final characterization report, and supported client in negotiations regarding results of study. Project was completed on time and within the proposed budget.

Evaluation of Surface Water Impact Sources, Refinery Outfall Site, Texas, Confidential Client, Project Manager. Client recognized that hydrocarbon impacts to surface water needed to be addressed, but was uncertain as to the relative impacts of two different sources. An evaluation of the different sources was needed in order to focus system repairs and identify appropriate future remediation options. The project identified that a significant reduction in hydrocarbon impacts could be gained by a simple upgrade of an existing sump collection system. This upgrade allowed the client to eliminate a significant source of contamination for a minimal cost.

Evaluation of Impacts of Release of Deicing Agent to Third Creek, Colorado, Denver International Airport, City and County of Denver, Project Hydrogeologist. Conducted evaluation of impacts to surface water and potential impacts to nearby domestic supply wells from release of deicing agent (propylene glycol). Project included evaluation of six miles of stream that flowed from airport facility to a sensitive lake habitat. Coordinated sampling of domestic supply wells with representative from local county health department, which had received complaints from residents following the release. Conducted quarterly sampling over two year period to verify that impacts to surface water had been minimal and that no impacts to water supply wells had occurred.

Rural Freshwater Fisheries Development, Gabon, Africa, U.S. Peace Corps, Extension Agent. Provided technical assistance to the Gabonese Ministry of Water and Forestry for the development and maintenance of derivation pond systems in southern rural Gabon. Directed the work of eight farmers in five different villages. Worked with farmers to develop feeder canal and cascading pond systems.

Underground Storage Tank (UST) Sites

UST Site Closure Evaluation, Utah, United States Postal Service, Project Manager. Managed project to characterize whether or not there were residual impacts from former UST site. Worked with client and regulatory agency (Utah Division of Environmental Response and Remediation) to conduct work in manner acceptable to all stakeholders. Worked with project staff to analyze hydrogeologic and analytical data to demonstrate that residual impacts were negligible. Based on work performed the DERR decided to close the site.

UST Site Subsurface Investigation, Colorado, City and County of Denver, Site Manager/ Hydrogeologist. Conducted field investigation of UST site to define nature and extent of free-phase and dissolved-phase contamination and to collect necessary data for remediation system design. Field tasks included groundwater monitor well design and installation, lithologic logging with Geoprobe unit and hollow-stem auger rig, soil sampling, and well development and sampling. Analyzed geologic and hydrologic data to develop site conceptual model and worked with engineering department to design remediation system.

UST Site Subsurface Investigation, Utah, Utah Department of Environmental Quality, Assistant Geologist. Performed lithologic logging with Geoprobe rig, soil sampling, groundwater monitor well design and installation with hollow stem auger rig, groundwater sampling, product bail-down tests, and sewer sampling. Analyzed the geologic and hydrogeologic data to develop a site conceptual model, determine nature and extent of subsurface hydrocarbon contamination, and recommend appropriate abatement action for the site. Assisted with community relations.

UST Site Subsurface Investigation, Colorado, Private Landowner, Site Manager/Hydrogeologist. Conducted subsurface investigation for private landowner affected by adjacent property UST releases. Compiled the site history and the geologic and hydrogeologic data. On behalf of the landowner, prepared

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and submitted to State of Colorado a petition under the Colorado Voluntary Cleanup Program (VCP). State granted landowner a No Action Determination, allowing him to sell the property.

UST Site Corrective Action Plan Development, Colorado, City and County of Denver, Hydrogeologist. Analyzed background data of study site comprised of four separate fuel farms. Analyzed geologic and hydrologic data to develop site conceptual model and to determine nature and extent of contamination. Lead author of Corrective Action Plan (CAP) that was approved by the State of Colorado on first draft.

UST Site Removal and Investigation, Colorado, City and County of Denver. Provided oversight of removal of seven tanks on site owned by City of Denver. Conducted field documentation and soil sampling of excavations. Analyzed data and reported results of assessment of site at closure.

Geologic and Hydrogeologic Modeling

Remediation by Natural Attenuation Modeling for RCRA Facility Compliance Plan Development, Texas, Confidential Client, Hydrogeologist. Conducted modeling of natural attenuation of U.S. Environmental Protection Agency (EPA) Appendix IX list contaminants at petroleum refinery. Used results of modeling to determine validity of reliance on natural attenuation versus groundwater recovery to ensure protection of human health and the environment.

RBCA Investigation of UST Site, Texas, Confidential Client, Site Manager/Hydrogeologist. Conducted field investigation to collect data for risk-based corrective action (RBCA) analysis of UST site. Field tasks included groundwater monitor well design and installation, lithologic logging, sediment sampling, well development and sampling, staff gauge installation, surface-water sampling, and soil gas survey utilizing on-site laboratory. Analyzed the geologic and hydrogeologic data using RBCA analysis software. Met regularly with the client on-site to discuss ongoing project results and direction. Developed site conceptual model, determined nature and extent of contamination, and developed CAP.

ArcView Geographic Information System (GIS) Mapping Project, Texas, Confidential Client, Hydrogeologist. Developed series of geologic and hydrogeologic maps using ArcView software for use in a RI study. Worked with in-house data management staff to develop maps from site database.**Remedial Action**

Hazardous Waste Remediation, Colorado, Rocky Mountain Arsenal (RMA), U.S. Army, Assistant Geologist. Performed remediation of polychlorinated biphenyls (PCBs) and unknown chemical agents on a Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (Superfund) (CERCLA) site.

Subsurface Hydrocarbon Contamination Remediation, Colorado, City of Colorado Springs, Assistant Geologist. Assisted with the construction and installation of UST site bioventing system.

Geochemistry

Study of Cloud Water Chemistry, Wyoming, University of Wyoming, Department of Atmospheric Sciences, Geochemist. Developed peroxide measurement technique for study of cloud water chemistry. Part of a four-person team working at remote research station on Elk Mountain in southern Wyoming.

Hydrogeochemistry Study, Wyoming, University of Wyoming, Department of Geology and Geophysics, Research Assistant. Conducted field and laboratory research in hydrogeology and water chemistry. Taught physical geology and geochemistry laboratories.

Acid Mine Drainage Characterization, Leadville, Colorado, U.S. Geological Survey (USGS), Intern. Collected sediment and water samples in the field. Prepared samples in the laboratory and conducted carbon analyses.

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DAN BRENNECKE, P.E. — CONSTRUCTION PROJECT MANAGER

Qualifications Summary

- Twenty-seven years of design-related experience preparing multidisciplinary plan and specification contract documents for environmental restoration projects and municipal improvement projects ranging in size from $500 to $33 million in construction.
- Thirteen years experience providing on-site engineering services for the Department of Energy within a secured site.
- Responsible for the design of a 2.3 million cubic yard capacity RCRA equivalent repository for radioactive uranium mill tailings and other associated process related wastes at a CERCLA remediation site.
- Responsible for 30% design of a 0.4 million cubic yard capacity RCRA-equivalent, Subtitle C, repository for radioactive waste at a CERCLA remediation site.
- Designed wastewater treatment and collection improvements for municipalities in Colorado, Wyoming, and Utah.
- Designed water treatment/ distribution improvements for municipalities in Colorado and Utah.
- Developed new rates for municipal water and sewer charges.
- Designed and performed construction inspection of street improvements.
- Performed construction management and contract administration.
- Managed design activities of up to 25 staff involving AutoCAD computerized drafting and other miscellaneous computer applications.

Fields of Competence

RCRA landfill design; remedial action design; water distribution; sewer collection; street improvements; storm drainage; waste water treatment improvements; water treatment improvements; municipal water and sewer rates; water rights augmentation; plan and specification preparation; water storage; construction management and contract administration.

Education/Training/Certifications

- M.A., Business Administration—Western State College (1987)
- B.S., Civil Engineering—Iowa State University (1979)
- National Society of Professional Engineers
- Professional Engineers of Colorado
- American Society of Civil Engineers
- American Water Works Association
- Water Environment Federation
- Risk Assessment Methodology for Water (RAM-W), Weston (2002)
- Vice-Presidential Hammer Award (1996)
- 40-Hour Hazardous Waste Site Training Course, OSHA 29 CFR 1910.120(e)(3), Dames and Moore (1992)
- RAD Worker Training, MACTEC-ERS (2000)
- RCRA Regulations, Government Institutes, Inc. (1990)
- OSHA Construction Safety Standards, Trinidad State Junior College (1992)
- Environmental Laws and Regulations Compliance, Government Institutes Inc. (1989)
- Colorado Environmental Law Compliance, Government Institutes, Inc. (1991)
- Environmental Law, CSU Surge Class (1994)
- Engineer as Manager, Battelle Professional Development Center (1993)
- Introduction to Facilitation, EG&G (1992)
- AutoCAD 2000 for New Users, Mesa State College (2000)
- Construction Projects Administration and Claims Avoidance

Employment History

1996 – Present	WESTON
1987 – 1996	RUST Geotech, Inc.
1979 – 1987	RUST Geotech, Inc.

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Key Projects

Enhanced Hazardous Waste Landfill Liner Construction Project, Rocky Mountain Arsenal, TetraTech FW, Inc., Commerce City, Colorado, Project Manager. Project Manager for the construction of a $19 million CERCLA hazardous waste landfill. Construction included approximately 800,000 cy of cell excavation, 290,000 cy of berm embankment, placement of primary, secondary, and tertiary compacted clay liners, installation of over 3 million square feet of 60 mil textured HDPE, installation of over 2 million square feet of geocomposite drainage fabric, installation of duel contained HDPE gravity pipe, and miscellaneous buildings, controls and other structures. The construction duration of 2 years was completed on schedule with an outstanding safety record.

Repair Wastewater Treatment System at N-01 Missle Alert Facility, Vicinity of New Raymer, CO, F. E. Warren Air Force Base (AFB), WY, U.S. Air Force, Project Manager. Project Manager for the construction repair of an existing 2,000 gallon per day (gpd) wastewater treatment plant. Repair work involved excavation and berm construction for 2 evaporation ponds (1.5 acre and 0.5 acre in size), installation of a 30 mil PVC geomembrane, installation of miscellaneous 8 inch diameter sewer lines, and installation of a package treatment plant. WESTON will provided Construction Management and Quality Control services during the construction. Work was authorized by a TO issued through the AFCEE Environmental Remediation and Construction (ENRAC) contract.

Peterson East Stormwater Drainage Management Plan, Peterson AFB, Colorado Springs, CO, U.S. Air Force, Project Manager. Project Manager for the preparation of a Storm Water Management Plan for approximately 100 acres of undeveloped land to guide storm water management infrastructure development on the east side of Peterson Air Force Base. The Management Plan required the coordination of 1 foot contour aerial mapping, historical and future hydrology analysis of onsite runoff and offsite runon, and analysis of storm water infrastructure improvements for the area. Work was authorized by a Time and Materials TO issued through the 4-P A-E contract.

Fitness Center Asbestos Remediation, Buckley Air Force Base, U.S. Army Corps of Engineers, Aurora, Colorado, Project Manager. Project Manager for a $6 million asbestos cost plus fixed fee remediation project conducted under the U.S. Corp of Engineers RAPID contract. As the general contractor, coordinated WESTON and subcontractor staff to excavate approximately 33,000 cubic yards of asbestos contaminated material. Approximately 18,000 cubic yards were transported and disposed of at a local landfill. All ACM removal activities were conducted in accordance with all Federal and Colorado state requirements. Level C personal protective equipment was required for all workers within the contaminated zone. WESTON prepared a Work Plan, Sampling and Analysis Plans, and a Health and Safety Plan and provided construction management, health and safety oversight, transportation and disposal, air monitoring, confirmation sampling, and final reporting services. To comply with the zero asbestos emissions requirement of CDPHE, excavation and loading operations required disturbed soils to be continuously wetted during intrusive operations. Wet, muddy, cold, and unfavorable conditions made equipment operation very difficult and required strict attention to personal health and safety issues. Real time air monitoring was performed to provide project management with timely information regarding air quality in order to ensure that site work practices were protective of the site workers and the public. Over 950 asbestos air samples were taken with none exceeding the site trigger level of 0.005 fibers/cubic centimeter. Used technology (MonitorFastSM and TeamLink) to ensure compliance with strict regulations and saved the client an estimated $375,000. The TeamLink web interface connected WESTON, USACE, Buckley AFB, and regulatory agencies with diverse technology platforms and real time information.

Parkerson Hangar Site Development, Parkerson Hangar, LLC, Grand Junction, CO, Project Engineer/Project Manager. Prepared site development plans for a 0.8 acre site for a new 7 airplane hangar with commercial retail. Services included geometric layout of parking lot, preparation of a grading and drainage plan, design of storm drainage improvements, and preparation of a drainage report summarizing historic and developed storm water runoff volumes.

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High Side Brewery Site Development, Jim Jeffryes, Grand Junction, CO, Project Engineer/Project Manager. Prepared site development plans for a 1.4 acre commercial site for a new brewery/restaurant. Services included geometric layout of 100 car parking lot, preparation of a grading and drainage plan, design of 500 linear feet of half-street improvements that included pavement, curb and gutter, and storm drain improvements, and preparation of a drainage report summarizing historic and developed storm water runoff volumes.

Orphan Mine Site Reclamation, Grand Canyon National Park, AZ, National Park Service, Lead Engineer. Conducted preliminary technical support services for the NPS in support of conducting a CERCLA investigation and cost recovery at the Orphan Mine Site, located within the Grand Canyon, Arizona. The site consisted of a 3 acre Upper Mine site and a smaller Lower Mine site approximately 1,000 feet below the canyon rim, both contaminated with heavy metals and low level radioactive waste. Performed an initial site visit and a data-gap analysis and prepared a draft Engineering Evaluation and Cost Analysis (EE/CA) Work Plan to be used for negotiation purposes with the potentially responsible party.

Treatment and Disposal of V-Tank Wastes and Associated Equipment at the Idaho National Engineering and Environmental Laboratory, Bechtel BWXT Idaho, Inc, Department of Energy Idaho Operations Office, Idaho, Falls Idaho, Project Engineer. Coordinated design team located in multiple office locations in the preparation of 30%, 60%, and 100% design drawings, specifications, calculations, and design report for the remediation of the V-tank CERCLA Remediation Site located in Waste Area Group 1. The design addressed removal of four underground storage tanks and treatment, transportation, and disposal of 12,000 gallons of liquids and sludges contaminated with radionuclides, heavy metals, organic compounds, and polychlorinated biphenyls. Exposure levels from the approximately 200 curies of radioactivity (predominantly Cs-137, Co-60, and Sr-90) were expected to be up to 7 R/hr on contact. Heavy metals included lead (592 mg/kg) and mercury (2110 mg/kg). Organics included Trichlorethene (22,000 mg/kg) and tetrachloroethane (2600 mg/kg). PCB levels were greater than 600 mg/kg. Coordinated the design with DOE, EPA Region 10, the Idaho Department of Environmental Quality, and Bechtel to resolve review comments at all stages of design. Design services included preparation of a Remedial Design/Remedial Action Work Plan, a Field Sampling Plan, a Health and Safety Plan, and a Decontamination Plan.

HHH Minor Subdivision Lot 3 Site Development, Western Slope Oil Field Services, Rifle, CO, Project Engineer/Project Manager. Prepared site development plans for a 2 acre site for a new industrial shop building. Services included geometric layout of parking lot, design of a grading and drainage plan, design of a detention pond for a 25 yr, 24 hour storm event, asphalt pavement thickness design, and preparation of a drainage report summarizing historic and developed storm water runoff volumes.

Raw Water Settling Pond Liner Installation Quality Assurance, Clifton Water District, Clifton, CO, Quality Assurance Engineer/Project Manager. Provided quality assurance inspection for the installation of 40,000 square feet of 60 mil HDPE liner and 16 ounce geotextile on the sideslopes of a new raw water earthen settling pond with a concrete floor. Provided oversight of the Quality Control activities provided by the liner installation contractor. Activities included review and approval of construction submittals, material inventory, inspection and approval of liner subgrade, monitoring of deployment, seaming, non destructive air testing, and onsite destructive testing, and preparation of an inspection report documenting all liner installation activities.

Multiple Projects, Colorado and Utah, Department of Energy, Manager of Engineering and Geosciences. Responsible for day-to-day operations of a multi-company team of more than 60 engineers and scientists for the Department of Energy-Grand Junction Office. Responsibilities include task order preparation and management, financial planning of $20M per year budget, technical oversight of projects, client and regulatory interaction.

Vulture Mill Mine Tailings Remediation, Wickenburg, Arizona. Arizona Department of Environmental Quality. Technical Advisor. Provided technical oversight, review, and guidance to Project Engineer during remedial design of a former 35 acre gold milling operation contaminated with lead and arsenic within a residential area. Design plans, specifications, a design report and cost estimates were prepared to excavate and consolidate approximately 40,000 cubic yards of contaminated soils in an

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on-site capped landfill structure. Project included a site assessment of extent of contamination, earthwork design, hydrologic analysis, hydraulic analysis for affects from 100-year floodplain using HEC-RAS, erosion protection for landfill side slopes, and revegetation. Contaminated areas were privately owned and required negotiation with property owners to allow concurrence with the final design. [

Millsite Remediation, Monticello, UT, Department of Energy, Project Engineer. Project Engineer for a $33 million CERCLA remediation project to clean up over 100 acres of radioactive contamination on an old millsite owned by the DOE. Design included a 2.3 million cubic yard capacity, RCRA-equivalent, Subtitle C, repository for radioactive uranium mill tailings and other associated process wastes. Repository design consisted of 35 acres of double-lined, double-composite HDPE liner, a leachate collection/detection system, pumps and miscellaneous electrical controls, 2100 lf of gravity-flow double-walled HDPE transmission piping, a 60 gpm wastewater treatment plant, and a 8 ½ foot thick vegetative evapo-transpiration cover. The evapo-transpiration cover satisfied UMTRA and RCRA cover requirements and consisted of a 2 foot thick radon barrier, a 60 mil HDPE liner/geocomposite textile, a 12 inch thick sand drainage layer, a 12 inch thick rock biointrusion layer, 2 ½ feet of water storage material, and 2 feet of topsoil material with a gravel admixture incorporated into the top 8 inches of the topsoil layer. The cover was vegetated with native seed and plantings. Worked closely with the Project Manager and the DOE technical representative to turn the project around and restore credibility with the regulators. Managed a design team of approximately 25 individuals consisting of engineers, scientists, drafters and clerical staff to produce Draft, Intermediate, and Pre-Final Designs that were accepted by the regulators and ready for bidding within six months. Received the Vice-Presidential Hammer Award for cutting government spending by streamlining the design process. Provided support during bidding and award. Provided ongoing construction management support to the Construction Project Manager regarding plan and specification interpretation and enforcement, change order negotiations, and contract dispute resolutions. Responsible for up to 3 resident engineering staff that provided on-site quality assurance, submittal review, specification clarification, and design modifications. Provided support in the preparation of the Long Term Maintenance and Monitoring Plan for the site which will be used to support future CERCLA 5-year reviews.

Bear Creek Valley Environmental Management Waste Management Facility, Oak Ridge, TN, Jacobs Engineering, Lead Design Engineer. Served as lead design engineer in preparation of 30% design drawings and specifications for a double lined low level radioactive and hazardous waste containment facility at a CERCLA remediation site. The containment facility was designed to have an initial capacity of 0.4 million cubic yards and allow for expansion to an ultimate capacity of 1.3 million cubic yards. The design included a 2 million gallon capacity HDPE double lined leachate lagoon, a 3 million gallon capacity detention/sedimentation basin, approximately 1600 linear feet of dual containment leachate pipeline, an interim waste storage facility, a decontamination pad and a vegetative cover.

Tuba City UMTRA Groundwater Project, Tuba City, AZ, Department of Energy, Technical Advisor. Provided technical oversight, review, and guidance to Project Engineer during design and construction of a groundwater pump and treat system for low level radioactive contaminated ground water. Project included a 100 gallon per minute distillation treatment plant, a 2.6 acre HDPE double lined leachate containment pond, 14 injection wells, 21 extraction wells, an infiltration trench, and approximately 24,000 linear feet of 2" to 6" diameter infiltration/exfiltration piping.

Cheney Reservoir Containment Pond Improvements, Grand Junction, CO, Department of Energy, Technical Advisor. Provided technical oversight, review, and guidance to Project Engineer during design and construction of improvements to an existing lined 40,000-gallon capacity pond for the containment of low level radioactive contaminated water. Project included removal of existing liner and replacement of liner with a new single 60-mil HDPE liner and geotextile cushion. Project also included approximately 2,000 linear feet of 4" PVC piping to allow for transfer of radioactive contaminated water between two ponds.

Remediation Technical Needs Assessment, Grand Junction, CO, Department of Energy, Staff Engineer. Assisted in the preparation of a Technical Needs Assessment report for the DOE that summarized and categorized hazardous wastes nationwide within the DOE complex that will require future remedial action. Responsible for researching and compiling available treatment technology databases and for providing quality control for all information that was collected and assembled.

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Uranium Mill Tailings Remedial Action Program, Grand Junction, CO, Department of Energy, Project Engineer. Coordinated and oversaw the design of over 3500 uranium mill tailings remedial actions around Vicinity Properties in Grand Junction, Colorado for the Uranium Mill Tailings Remedial Action Program under the direction of the Department of Energy. Designs involved removal and replacement of existing surface features in and around residential and commercial properties to accommodate tailings removal. Remedial construction costs ranged from $500 to $2 million. Created General Construction Specifications for use during remediation rather than creating individual specifications for each design. Produced over 800 designs per year at the peak. Managed up to 10 staff consisting of engineers, architects, and AutoCAD personnel.

Access Road and Track Improvements, Craig, CO, Moffat County School District, Project Engineer. Designed and provided resident engineering construction inspection and contract administration of access road and athletic running track surface and storm drainage improvements to repair extensive heaving damage caused by expansive clay soils. Prepared plans and specifications to bid both asphalt and concrete as alternates for access road pavement surfaces. Conducted asphalt and concrete pavement thickness designs. Specified a resilient synthetic surface for the athletic running track.

Street Improvement Project, Fruita, CO, City of Fruita, Design Engineer. Designed curb, gutter, sidewalk, water, storm drainage and sewer line replacement for 14 miles of residential street which included virtually every street within the city limits. Subgrade soils required lime stabilization to provide adequate bearing capacity for pavement design. Provided construction inspection and assisted the Project Engineer with construction contract administration.

Annual Street Improvements, Rifle, CO, City of Rifle, Assistant Project Engineer. Performed design and resident engineer construction inspection of annual street improvements in residential areas. Improvements consisted of asphalt removal and replacement, curb, gutter, sidewalks, water and sewer line replacement, and storm drainage improvements for approximately 2 miles of streets. Performed asphalt pavement thickness design and prepared right-of-way access drawings. Responsible for the construction contract administration under the direction of the Project Engineer.

Parking Lot Improvements, Fruita, CO, Mesa County School District, Design Engineer. Designed pavement and storm drainage improvements for an existing gravel parking lot at the Fruita Monument high school. Performed asphalt pavement thickness design, created the drainage plan, laid out the parking plan.

Dugway Proving Grounds Infrastructure Improvements, Dugway, UT, U.S. Army Corps of Engineers, Assistant Project Engineer. Prepared water and wastewater master plans and designed subsequent water and wastewater infrastructure improvements at the Dugway Proving Grounds, Dugway, Utah consisting of water distribution and sewer collection replacement, chlorination improvements at raw water wells, a new 250,000 gallon elevated water storage tank, sewer effluent evaporation ponds, and categorization and outlining of miscellaneous maintenance and repair items. Conducted TV inspection of sewer collection lines to evaluate root intrusion and infiltration. Water distribution lines were evaluated to provide improved fire flows.

Wastewater Treatment Improvements, Telluride, CO, City of Telluride, Design Engineer. Designed wastewater treatment improvements consisting of an interceptor line, mechanical oxidation ditch, ultraviolet disinfection, clarifier, and miscellaneous structures. Assisted the Project Engineer in construction contract administration.

Wastewater Treatment Plant Improvements, Montrose, CO, City of Montrose, Design Engineer. Designed wastewater treatment plant improvements consisting of an interceptor line, inlet structure with mechanical bar screen and screw pumps, oxidation ditch, chlorination chamber, and other miscellaneous structures. Assisted the Project Engineer in construction contract administration.

Wastewater Treatment Plant Improvements, Laramie, WY, City of Laramie, Design Engineer. Designed wastewater treatment plant improvements consisting of a new 8" diameter force main, an inlet structure with mechanical bar screens, and other miscellaneous structures.

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Wastewater Treatment Plant Improvements, Rifle, CO, City of Rifle, Design Engineer. Designed approximately 4 miles of 18" and 24" diameter interceptor line and miscellaneous structures for aerated lagoon wastewater treatment plant improvements. Improvements included design of an new influent structure, a third settling lagoon, an influent pump station, new aerators, and a chlorination retention basin. Worked directly with the City attorney to negotiate right-of -way easements from property owners that were adjacent to the interceptor line. Assisted the Project Engineer in construction contract administration.

Water Rights Augmentation Study, Rifle, CO, City of Rifle, Design Engineer. Conducted field inspections, reviewed aerial mapping, reviewed crop records, reviewed historical water rights, performed consumptive water use calculations for irrigated crop lands and worked with water rights attorneys to establish the water rights associated with land proposed for development in surrounding areas of Rifle, Colorado.

Sewer Collection System Improvements, Fruita, CO, City of Fruita, Design Engineer. Designed sewer system improvements involving a duplex package lift station, force main, and interceptor. Assisted the Project Engineer in construction contract administration.

Water Treatment Plant Improvements, Silt, CO, Town of Silt, Design Engineer. Designed water treatment plant improvements consisting of a raw water river inlet structure, raw water settling pond, backwash ponds, and miscellaneous plant piping.

Water Distribution Improvements, Dinosaur, CO, Town of Dinosaur, Design Engineer. Designed a new water storage tank.

Wastewater Treatment Plant Improvements, Cortez, CO, City of Cortez, Design Engineer. Designed wastewater treatment plant improvements to expand plant to a 1.0 million gallon per day capacity. Improvements involved design of oxidation ditch aeration equipment, a french drain, interceptor line, and miscellaneous concrete plant structures including aeration supports and a chlorine retention basin.

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RICHARD J. DAVIS, P.E.

Qualifications Summary

- More than 27 years of professional experience.
- More than 25 years of management experience in organization leadership and relationship building with the public, clients, and fellow team members.
- Produced plans and specifications for design of a 1.04-million gallon wastewater pump station to serve a developing area at Lake Las Vegas in Henderson, NV.
- Lead engineer for Yosemite National Park–Yosemite Creek lift station force main rehabilitation and Yosemite Valley sanitary sewer system capital improvement plan.
- Project manager for $8 million Bay Street reservoir and system transmission improvements.
- Co-founder of the Pipe Users' Group of Northern California to encourage communication among agencies and consultants for various development projects.
- Experience with UBC, IBC, AWWA, CPM, AASHTO, APWA, ANSI, AND ASTM standards.
- Extensive experience with Microsoft Word, Excel, PowerPoint, MS Project, AutoCAD, WordPerfect, Hansen, Oracle, Pipecar, MathCAD, and other general-purpose computer software.

Registration

Registered Professional Engineer in the States of Nevada (No. 17689; 2006), Utah (No. 6791933-2202; 2007), Arizona (No. 44454, California (No. C27804), and Idaho (No. 13123; 2008)

Fields of Competence

Project management; civil engineering procedures; planning/ design/specification writing; construction cost estimating; environmental compliance issues; research/analysis; pipeline construction/rehabilitation; problem-solving communication/ negotiation; construction oversight; leadership/mentoring.

Education

40-hr HAZWOPER Training(2008)
Project Management Boot Camp (2008)
M.S., Civil Engineering—California State University at Sacramento (1981)
B.S., Civil Engineering—San Jose State University (1975)
A.A., Engineering Science—Ohlone Community College (1972)

Credentials

Water Environment Federation (WEF)
Nevada Water Environment Association (NWEA)
North American Society for Trenchless Technology (NASTT)
American Water Works Association (AWWA)
American Society of Civil Engineers (ASCE)
Pipe Users Group of Northern California, Co-Founder and Past Chairman

Employment History

2008-Present	WESTON
2006-2008	Stanley Consultants
2004-2006	Kennedy/Jenks Consultants
2001-2004	URS Corporation
1981-2001	Union Sanitary District

Employment History (Continued)

Key Projects

BRC Eastside Common Areas Soils Remediation, Henderson, NV, Basic Remediation Company (BRC), Engineer. Duties include reviewing and processing construction submittals, Requests for Information (RFIs), design changes, and construction time schedules; monitoring construction; and attending meetings with contractor and owners to correct any problems. This project includes the construction and filling of cells for the disposal of an estimated 1.9 million cubic yards of contaminated soil and sludge.

Pump Station Design, Lorin C. Williams Pump Station Site, Henderson, NV, Lake Las Vegas, Project Manager/Project Engineer. Was responsible for design of a 1-million gallons per day (mgd) wastewater pump station. Project included submersible pumps, control system, building design, and odor control facilities to serve a developing area at Lake Las Vegas in Henderson, NV.

Pump Station Design, Laughlin, NV, Boulder City Investments, Project Engineer. Project involved design of a wastewater pump station to serve the residential area encompassed by this project. Managed sizing and design of pump stations.

QA/QC, McCullough Lateral, Las Vegas, NV, Southern Nevada Water Authority (SNWA), QA/QC Manager. Managed the quality assurance/quality control (QA/QC) for the entire project. Wrote the QA/QC manual for the project, and was also responsible for all QA/QC reviews.

Water System Design, Henderson, NV, Lake Las Vegas, Northshore, Project Engineer. Managed the design for water system for the third phase (Northshore) of overall development. This work included the design of a reservoir, pump stations, and associated piping.

QA/QC, Henderson Gibson Relief Sewer Design, Nevada, City of Henderson, Project Engineer. Provided QA/QC of the plans and specifications for the project. The project included installation of 9,000 feet of 36-inch sewer, 200 feet of sewer rehabilitation, installation of 4,500 feet of 12-inch water mains, and 1,000 feet of 6-inch water main.

Expert Testimony, Myers/Nave Dixon vs. Hartford et al., California, City of Dixon, Expert Witness. Provided expert witness testimony for the litigation between the City of Dixon and others. Project was done as part of the Dixon relief trunk line Phase 2.

Development of Plans and Specifications, Las Vegas, NV, Pulte/Del Webb-Las Vegas Comfort Station, Project Manager. Supervised the development of plans and specifications and ensured that project came in within budget. Obtained permits in a timely manner.

Permitting and Proposal Review, Kingman, AZ, Rhodes Homes Golden Valley Ranch Road Project, Project Engineer. Was in charge of obtaining miscellaneous wastewater/water permits and review of WWTP proposals from vendors. Reviewed/evaluated proposals, met with client and local officials, and reviewed wastewater planning documents.

Sanitary Sewer Investigation, Indian Springs, NV, Indian Springs Collection System, Clark County Water Reclamation District (CCWRD), Project Manager. Was Project Manager for

Key Projects (Continued)

the investigation into the current sanitary sewer system for Indian Springs, NV. Investigated the condition of the system, designed various repairs, and prepared as-built drawings for the system.

Screening System for BOMO WWTP Headworks, Nevada, City of Las Vegas, Project Manager. Responsible for an estimated $750,000 headworks project. Developed plans and specifications and ensured that project came in within budget. Project involved design of a new screening system for a WWTP for the City of Las Vegas.

Yosemite Creek Lift Station Force Main Rehabilitation, California, Yosemite National Park, Lead Engineer. Was responsible for office management for a $4.9 million construction management project. Reviewed construction submittals, Requests for Information (RFIs), and construction clarifications.

Yosemite Valley Sanitary Sewer System Capital Improvement Plan Phases 1A and 1B, California, Yosemite National Park, Lead Engineer. Served as Lead Engineer for the rehabilitation of the Yosemite National Park's sanitary sewer system; these two projects were estimated at $4 million. Was responsible for production of plans and specifications to rehabilitate various sewer lines throughout the park. Techniques included cured-in-place pipe (CIPP), pipe bursting, and replacement of existing sewer lines.

Water Pipeline, Northern California, Linda County Water District, Design Engineer. Produced plans, specifications, and cost estimates for a $250,000 water pipeline. Designed pipeline and interfaced with client to produce construction plans.

Sewer Rehabilitation, Dixon Sewer Trunk Line Phase 2, California, City of Dixon, Design Engineer. For this $1 million sewer rehabilitation project, was responsible for design and construction management of various techniques to rehabilitate a 42-, 30-, and 27-inch sewer. Techniques included segmented cured-in-place liner, joint grouting, manhole lining and replacement, and installing 309 feet of 36-inch sewer.

Design of Sacramento Force Main, Sacramento, CA, Sacramento County Regional Sanitation District (SCRSD), Lead Design Engineer. For the Sacramento force main of the Lower Northwest Interceptor Program for SCRSD, was responsible for the design of 15,000 feet of twin, 66-inch diameter force mains. Coordinated the work of various employees and subconsultants and met with clients and other engineers.

Preparation of Interceptor Sewer Design Manual, California, SCRSD, Project Engineer. Participated in the preparation of a new design manual to be used for all future interceptor design work in Sacramento County. Was specifically responsible for pipe materials and appurtenant structures sections of the pipeline design segments.

Design of Water Transmission Main, Bay Street Reservoir and System Transmission Improvements, California, City of Santa Cruz, Project Manager. Was Project Manager for the design of an $8 million water transmission main project. Was responsible for preparing design proposal; reports; negotiation contracts; overseeing subconsultants' work; interfacing with the City of Santa Cruz and other agencies; overall design of the project; development of a project negative declaration; scheduling work; and project budgets and progress reports. Project included 10,000 feet of 36-inch water transmission main, 1,200 feet of 36-inch tunnel under a

Key Projects (Continued)

river and city and state streets, and all appurtenances.

Sewer Replacement and Rehabilitation Project, Summit Avenue/Ora Drive, California, Napa Sanitation District, Project Manager. Was responsible for design of a sewer replacement and rehabilitation project for the Napa Sanitation District. Work included 4,000 feet of new 6- and 8-inch sewer, lining of 3,900 feet of 6- and 8-inch sewer, and replacement of 105 sewer laterals at a cost of $745,000. Specific responsibilities included negotiation of contracts, work scheduling, project budgeting, designing the project, bidding, and coordinating subconsultant work.

Newark Pump Station Access Road, Newark, CA, Union Sanitary District, Project Manager. Served as Project Manager for this $100,000 all-weather access road to the Union Sanitary District's pump station. Work included design of access road, including drainage and roadway cross section; producing plans and specifications; completing environmental documentation; overseeing construction inspector's work; negotiating change orders; reviewing progress payments; and finalizing project.

Development of Geographic Information System (GIS), Fremont, CA, Union Sanitary District, Project Manager. Served as Project Manager for development of a $1.5 million GIS for the Union Sanitary District. Work included choosing hardware and software; developing an implementation plan; database design development; development and implementation of various interagency agreements; and making presentations to the Union Sanitary District personnel and Board of Directors.

Development of Flow Model, Fremont, CA, Union Sanitary District, Project Manager. Responsibilities included negotiating contracts with the design firm, evaluating various flow models, overseeing inputting of data by a consultant, running the final model, and training the staff in the model's use.

Hatch-Hetchy Sewer Rehabilitation Project, Newark, CA, Union Sanitary District, Project Manager. Was responsible for design and construction of a $4 million sewer rehabilitation project. Work included reviewing the closed circuit television (CCTV) records, evaluation of an existing trunk sewer system, preparing project report, choosing appropriate rehabilitation methods, and initiation of plans and specifications.

Miscellaneous Pump Station Improvements, Union City, CA, Union Sanitary District, Project Manager. Was responsible for $1.5 million upgrade of various Union Sanitary District pump stations, which included selection of design engineers, negotiation of contracts, review of project plans and specifications, negotiating project change orders, and construction inspection.

I-Street Corridor Sewer Replacement Project, Union City, CA, Union Sanitary District, Construction Manager. Was responsible for $2.1 million sewer replacement project. Work included construction of 10,000 feet of 18-inch sewer by open cut and micro tunneling. Duties included overseeing the construction inspector's work, negotiating change orders, determining construction progress payments, meeting and answering questions from the public in the field, attending various construction meetings, and project closeout.

Jarvis Avenue Sewer Replacement Project, Newark, CA, Union Sanitary District, Project

Key Projects (Continued)

Manager. Was responsible for $1.2 million replacement of existing 21-inch trunk sewer 9,000 feet long in the City of Newark, CA. Was responsible for negotiating contracts; reviewing schedules, plans, and specifications; obtaining permits; overseeing the construction inspector's work; negotiating construction change orders; providing design clarifications to the contractor; and serving as District's representative during construction.

El Camino Santa Barbara Sewer Replacement, Fremont, CA, Union Sanitary District, Project Manager. Was responsible for $800,000 sewer main replacement including designing a 10- and 12-inch sewer; developing plans and specifications; obtaining easements and completing environmental documentation; overseeing construction inspector's work; negotiating change orders; reviewing progress payments; and finalizing project.

Replacement of Inlet Sewer, Newark, CA, Union Sanitary District, Project Manager. Was responsible for a $1 million replacement of a 48-inch sewer. Duties included plans and specifications developed by a consulting engineer; obtaining permits; overseeing construction inspector's work; negotiating construction change orders; and serving as District's representative during construction.

Carmen Sewer Relocation, Fremont, CA, Union Sanitary District, Project Manager. This $300,000 sewer main relocation included designing new 8-inch and sewer side connections from the backyards of homes to the public street; developing plans and specifications; negotiating construction easements with landowners; completing environmental documentation; overseeing construction inspector's work; negotiating change orders; reviewing progress payments; and finalizing project.

Miscellaneous Sewer Rehabilitation Projects, Various Locations, Union Sanitary District, Project Manager. Was responsible for the planning, design, and construction of various sewer rehabilitation projects such as lining 470 feet of a 30-inch sewer with a 27-inch polyvinyl chloride (PVC) (Vylon) liner; lining 1,000 feet of 39-inch sewer with a 36-inch high density polyethylene (HDPE) liner; installing 700 feet of Rib-Loc and Rib-Steel liner; and grouting various sewers. Specific responsibilities included project budgeting; design of lining plans and specifications; obtaining various permits, including CalTrans and City encroachment; bidding and awarding contracts; negotiating change orders; and construction inspection.

Development of Rehabilitation Specifications, Northern California, Pipe Users' Group, Co-Founder. Aided in the development of various rehabilitation specifications for the Pipe Users' Group. Included specifications for CIPP, and folded plastic liner deformed pipe. Reviewed various rehabilitation specifications, interviewed technical representatives, and wrote portions of specifications.

Development of Irvington Basin Master Plan, Fremont, CA, Union Sanitary District, Project Manager. Was responsible for the development of the Irvington Basin Master Plan. The area contains 266 miles of sewer and 3 pump stations. Responsibilities included negotiating consultant contracts, reviewing TV records, evaluating design criteria, evaluating proposed alignments, reviewing various reports, and prioritization of projects.

Implementation of Master Plan, Fremont, CA, Union Sanitary District, Project Engineer.

Key Projects (Continued)

Responsibilities included acting as liaison between the consultant and the District, and evaluation of reports.

RICHARD LAUBINGER — SITE SUPT./ASST. CONSTRUCTION MANAGER

Qualifications Summary

- Over 31 years of professional experience.
- Experienced Superintendent managing subcontractors and craft personnel on a DOE site.
- Installed drainage improvements and geosynthetic liner cap.
- Experienced Construction Manager providing oversight of subcontractors and management team at Superfund projects.
- Miscellaneous structures demolition throughout Rocky Mountain Arsenal.
- Experienced Field Supervisor at low level radioactive waste disposal facilities.
- Operations Manager supervising emergency response operations and construction crews.
- President/Owner of a Fortune 500 company performing service station installation and closures for a number of major oil companies.
- Experienced Project Manager managing hazardous waste landfill.

Fields of Competence

Safe excavation, loading, and hauling of radioactive materials; installed drainage improvements and geosynthetic liner cap; remediation of existing sanitary landfill; installation of RCRA closure caps, consisting of installation of gas ventilation system (GVS), geosynthetic replacement (geogrid), geosynthetic clay liner (GCL), flexible membrane liner (FML), and geocomposite drainage layer (GDL); concrete and gabion retaining walls, road alignment, concrete demolition, installation of a precast concrete channel, and other related construction of a DOE site; working with underground and aboveground storage tanks, including both installation and removal, and complete service station installations; emergency response operations; installation of complete fueling systems; installation of concrete structures, buildings, and retaining walls. Safe excavation, handling of suspected chemical agent soils.

Education/Training/Certifications

- Hydraulics License in the Commonwealth of Massachusetts (No. 048366)
- Master Pipefitter in the Commonwealth of Massachusetts (No. 012773; 1978)
- Construction Supervisor License in the Commonwealth of Massachusetts (No. 003798; 1991)
- Certified Fiberglass Tank Installer, Owens Corning, Yerxes
- Certified Steel Tank Installer, Massachusetts Engineering, Buffalo Tank
- Undergraduate Studies, Fire Science—Massasoit Community College (1978 to 1979)
- Project Management Training, PM200 25/2000 PM300, Tetra Tech (2002)
- Negotiations Skills Training, U.S. Fish & Wildlife (2000)
- Superintendent Training Seminars (3), (2004)
- Asbestos Supervisor Training, Tetra Tech (1999); Refresher (2003)
- Competent Person Excavation Training, United (2002)
- Odor Management Training, Odor Service Engineering (2002); Refresher (2003)
- Effective Meeting Training, National Conservation Training Center, U.S. Fish and Wildlife Service (2000)
- 40-Hour Hazardous Waste Health and Safety Training, OSHA, Atlantic (Marine Chemist) (1991)
- 8-Hour Hazardous Waste Health and Safety Supervisor Training, OSHA (1997)
- 8-Hour Hazardous Waste Health and Safety Refresher Course, OSHA
- 40-Hour Health and Safety Officer Course, Tetra Tech (1997)
- First Aid and CPR, National Safety Council (2002)
- Radiological Worker Training (RAD 2), Savannah River Site, DOE (2004)
- Training at Massachusetts State Firefighting Academy (1979)

Employment History

2006 – Present	WESTON
1996 – 2006	Tetra Tech
1994 – 1996	Tyree Organization
1991 – 1994	ATEC Environmental
1989 – 1991	Kessler Installations
1980 – 1989	Genserco Corporation
1974 - 1981	Bridgewater Fire Department

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Key Projects

General Separations Area Consolidation Unit Project, Savannah River Site, Aiken, SC, U.S. Department of Energy (DOE), Superintendent. This project is a DOA facility. Work scope included the safe excavation, loading, hauling, and placement of approximately 45,000 cubic yards of radioactive waste materials from four areas on the site. Relocated backfill with approximately 281,000 cubic yards of common fill, structural fill, and topsoil; provided new subsurface drainage systems; and installed a geosynthetic cap liner system on approximately 80 acres. Closed in place 18" VCP pipe lines with CLSM concrete slurry mix through worksites, under roads, and steam lines. Each waste site was backfilled and capped per design upon achieving cleanup criteria.

Superfund Site Cleanup, Rocky Mountain Arsenal (RMA), Denver CO, Multiple Clients, Superintendent/Project Manager. This Superfund site manufactured weapons including chemical warfare agents, napalm and munitions, pesticides, and herbicides. It is now in the process of being converted to a National Wildlife Refuge. While employed by Tetra Tech, clients included the U.S. Army, the U.S. Fish and Wildlife Service, and Shell Oil Company. Worked on and managed four projects on this site.

Hazardous Waste Landfill (HWL) and Basin A Consolidation Area, Denver, CO, RMA, Multiple Clients, Project Manager. While employed by Tetra Tech, managed all aspects of operations of the double-lined Hazardous Waste Landfill and the Basin A Consolidation area at the Rocky Mountain Arsenal Superfund site. Management responsibilities included 18 PMC employees and 8,000,000 (annual) of subcontractor activities. Responsibilities included development of and regulatory negotiations for an operations manual, fiscal budgets and funding, development of procurement packages, contractor selection and management, daily ODOR monitoring requirements, and intense client (U.S. Army, Shell Oil Company, and U.S. Fish and Wildlife Service) and regulatory (CDPHE, U.S. EPA, and Tri-County Health Department) interface. Coordinated change management. Accomplished specialty projects such as Sludge Management Pad, Perimeter Access Road, Installation of 120 safety bollards, and removal and installation of a new Sanitary Sewer Holding Tank. Both projects were chosen for audits to recertify both ISO 14001 and VPP Star Status. Both were recertified with favorable comments made toward the landfill's commitment to safety, detail, and doing it right. Established new RMA record for receiving the most truckloads per day in an 8-hour period (670). Assisted with the development of the Enhanced Hazardous Waste (triple lined) Landfill Operations Plan and Hazardous Waste Landfill Cap Redesign. In 2003, identified a reduction of level of effort for HWL and Basin A to be performed by the subcontractor; this resulted in a substantial savings for the program through renegotiations. Also assisted in developing an interim operations phase-down approach to support the program while the Enhanced Landfill was being constructed.

Remediation of Existing Sanitary Landfills, Sections 1 and 4, Denver, CO, RMA, Multiple Clients, Construction Manager. While employed by Tetra Tech, provided oversight to perform remediation of an existing sanitary landfill that was buried after WWII, and included munitions debris and suspected chemical agents (mustard, lewisite) for the U.S. Army, Shell Oil Company, and the U.S. Fish and Wildlife Service. All excavation operations were monitored for agent with R tap units whenever any work was being performed. All workers were under Level B protection in exclusion zones. Managed and coordinated Agent Monitoring Subcontractor personnel, and supervised six Unexploded Ordnance Personnel (UXO), three field engineers, one QA/QC engineer, one Health and Safety technician, project controls, and waste tracking personnel. Attended weekly meetings with subcontractors, client, and regulators. Coordinated change management as needed; project came in on schedule, under budget, and no lost time injuries. Maintained excellent Health and Safety record.

Demolition and Removal of Miscellaneous Structures, Denver, CO, RMA, Multiple Clients, Construction Manager. While employed by Tetra Tech, provided oversight to Prime Subcontractors to perform the demolition of 100 structures located throughout RMA, and inert, clean, remove, and dispose of four USTs for the U.S. Army, Shell Oil Company, and the U.S. Fish and Wildlife Service. Managed project team consisting of two field engineers, two UXO technicians, one QAQC engineer, one Health and Safety supervisor, one waste tracker, and one secretary. Attended weekly meetings with subcontractors, client, and regulators. Coordinated change management as needed. Project was completed ahead of schedule, under budget, and no lost time injuries. Maintained excellent Health and Safety record.

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Liner Installation and Capping of Areas Inside a Low Level Radioactive Waste Disposal Facility, Savannah River Site, Aiken, SC, DOE, Project Superintendent. Project included installation of RCRA Closure Caps consisting of installation of Gas Ventilation System (GVS), Geosynthetic Reinforcement (Geogrid), Geosynthetic Clay Liner (GCL), Flexible Membrane Liner (FML), and Geocomposite Drainage Layer (GDL), along with the installation of storm and subsurface drainage systems. The subsurface drainage system, which incorporated an 800' run of 48" HDPE Water Tight Pipe hydrostatically tested with five 8" pipe inverts that tied into a trench drain filled with stone and 8" perforated pipe, was built at the top of the slope, thus controlling runoff at the top on liner cap under vegetative material 2' below. All flat work was compacted to 95% compaction. All slope work, including 3:1 and 4:1 slopes, was compacted to 90% compaction. Project also included concrete and gabion retaining walls, road alignment, concrete demolition, installation of a precast concrete channel, and development and closure of borrow areas. Coordinated with local unions for manpower needs and built an excellent working relationship with each business agent. The work effort included in excess of 200,000 hours without a lost time injury. Awarded Bechtel's Safety Incentive Award and contract bonus for outstanding safety record on this project.

Dynamic Compaction (DC) of Radiological Burial Ground, Savannah River Site, Aiken, SC, DOE, Project Superintendent/Health and Safety Officer. Project involved DC of 10.3 acres located in the DOE Low Level Radioactive Waste Disposal Facility, current managed by Westinghouse Savannah River Co. Coordinated work with SRS and supervised field surveying, proof rolling, installation and testing of blanket material, structural fill, dynamic compaction, vibration monitoring, and crater fill. This included processing documentation and records as required. Also provided coordination and supervision between DC and CAP work, and performed supervision. DC was accomplished by using a 20-ton weight dropped from a height of 35 feet. Placement of blanket layer and structural layer of material was performed on all DC areas. Supervised full development of a borrow pit area, retention pond, and culvert piping to support DC project. Attended weekly progress meetings with client. Coordinated with local unions for manpower needs. Came in ahead of schedule and under budget.

Miscellaneous Construction Projects, Anderson, SC, Eliskim, Project Superintendent. This project involved landclearing; construction of roadways, emergency spillway, creek diversion dam, and sump drain; and HDPE piping and manway installation. Biopolymer drain platform consisted of 12,000 yards of material placed and properly compacted to meet specifications. This work was done in preparation of a 70-foot deep trench excavated for the water treatment system and slurry wall.

Upgrade of Refueling Facilities, Massachusetts, U.S. Air Force, Site Supervisor/ Environmental Operations Manager. This project involved preparing a Site Health and Emergency Response Plan (SHERP), obtaining approval from the U.S. Army Corps of Engineers (USACE), implementing the SHERP, and oversight removal of 48 underground storage tanks (USTs) containing various petroleum and hazardous materials products. All tanks were cleaned by confined space entry. Conducted investigative work relative to the release of oil and hazardous materials, and remediation of oil, gasoline, and hazardous material encountered. Supervised proper materials handling and removal of approximately five miles of fuel lines across the base. Completed demolition and disposal of three operating pump houses. Constructed a new pump house facility including state-of-the-art piping system to all aboveground tanks supplying jet fuel to the runway. This project also involved the construction of 11 spill containment concrete mats complete with underground oil/water separator systems to each zone for the protection from a spill during tanker offloading procedures. Three 750,000-gallon aboveground storage tanks (ASTs) were properly cleaned and certified for hot work. Replaced one floating roof on a 750,000-gallon AST. Completed shoring system to install two 20,000-gallon double wall fiberglass USTs, 20 feet in depth. All work was performed to OSHA regulations. In addition, four facilities were built for fueling vehicles. All concrete work was self performed. Asphalt access roadways were installed per specifications. Forced water mains were installed along with fire hydrants and stormwater drainage systems. Met with government officials weekly to review project.

Closure and Installation of New USTs, Maine, U.S. Naval Air Station, Site Supervisor. On-site supervisor and manager of a project involving the closure and new system installation of four 20,000-gallon double wall fiberglass underground storage tanks containing gasoline petroleum products and leak detection system, complete with canopy and fueling islands. Installed shoring system. Contaminated soils were properly remediated and disposed of.

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Closure of a U.S. Army Base, Massachusetts, U.S. Army, Site Supervisor. Responsible for project management and on-site supervision involving the closure of a U.S. Army Base. The project involved preparing a SHERP, implementing the SHERP, and daily coordinating the removal, cleaning, and disposal of 120 USTs. Thousands of tons of contaminated soils were remediated and properly prepared for disposal. Seven concrete spill containment areas were installed, complete with liner and oil/water separator systems. Stormwater drainage system (RCP) pipe was installed per specifications. All areas were restored, seeded, and hydroseeded.

Closure of USTs, Puerto Rico, U.S. Coast Guard, Site Supervisor. Responsible for project management, procurement, and on-site supervision of a project involving the closure of 12 USTs. Oversaw replacement of concrete-contained aboveground tanks with secondary containment and associated piping. Concrete mats were poured and finished for all tanks. All soils were screened and properly handled. Interfaced with government officials and inspectors. Areas were restored and seeded.

Closure of USTs, Fort Drum, NY, U.S. Army, Project Manager. Responsible for project management and procurement involving the removal and closure of 20 USTs. Contaminated soil was remediated and properly disposed of. Concrete mats were replaced, and all areas were restored.

Removal and Replacement of USTs, Fort Richie, MD, U.S. Army, Site Supervisor. On-site supervision, procurement, and Health and Safety to remove and replace 18 USTs. USTs were replaced with Owens/Corning double-wall fiberglass tanks, with excavations in accordance with OSHA requirements. Soils were remediated, screened, and disposed of. Interfaced daily with government inspectors.

Environmental Operations, Various Locations in New England, Multiple Clients, Environmental Operations Manager. Clients included Mobil Oil, Getty Oil, Texaco, Exxon, and Shell Oil Company. While employed by Tyree Environmental Technologies, scheduled several crews and prepared daily on-site work. Coordinated subcontractors and purchasing. Acquired permits and supervised QA/QC on sites. Estimated bid proposals, read blueprints, and provided job assessments. Other duties included cost controls, troubleshooting, and project management. Responsible for daily operations of vacuum trucks, flatbed trucks, all necessary permitting, and manifesting to transport and dispose of petroleum products and 55-gallon DOT H drums at approved facilities. Supervised Emergency Response teams for containment and cleanup of spills. Delegated work to crews, and enforced Health and Safety regulations at each site. Attended weekly meetings with the management team in regard to business development and strategies.

Operations Managements/Construction, Rockland, MA, Multiple U.S. Government Clients/ATEC Environmental, Operations Manager/Construction Supervisor. Supervised and delegated work to eight crews working on several U.S. Government projects throughout the country. Operated heavy equipment and installed USTs and ASTs. Involved with concrete finishing and was a "hands-on" manager. Worked closely with government officials and held weekly job meetings. Responsible for remediation and proper disposal of contaminated soils. Purchased, coordinated, and negotiated with subcontractors.

Service Station Installation and Closures, Various Locations, Multiple Clients, President/ Owner. While employed by Genserco Corporation, performed service station installation and closures for a number of major oil companies, including Sunoco and Shell Oil Company. Duties included gasoline tank installations and complete service station installation; worked with dewatering and shoring systems. Prepared bid documents, prepared estimates, read blueprints, operated heavy equipment, poured and finished concrete, installed asphalt pavement, and installed all service station related piping. Worked in the field as a "hands-on" owner. Also a Sand & Gravel Yard was a part of the business. Hauled contaminated soils to appropriate disposal facilities throughout New England.

Perform Emergency Responses, Bridgewater, MA, Bridgewater Fire Department, Full-Time Firefighter/Emergency Medical Technician. Drove fire apparatus and fought fires. Also worked on ambulance as an Emergency Medical Technician providing patient care and extrication during motor vehicle accidents and emergency situations. Assisted in teaching CPR/First Aid.

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