



Susan Crowley  
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May 29, 2009

Ms. Shannon Harbour, P.E.  
Special Projects Branch  
Nevada Division of Environmental Protection  
2030 E. Flamingo Road, Suite 230  
Las Vegas, Nevada 89119-0818


RE: Transition of Environmental Oversight Role  
NDEP Facility ID H-000539 - Tronox LLC, Henderson, Nevada

Dear Ms. Harbour:

This letter is to inform you that Tronox LLC has selected Northgate Environmental Management, Inc. (Northgate) to oversee environmental investigative activities for the Tronox Henderson Project. Northgate is currently overseeing the Phase B Environmental Conditions Assessment (ECA). AECOM has been assisting Northgate with this transition, but no longer serves as the project manager for Tronox. I have attached appropriate revisions to the project organizational chart, description of key staff roles, and resumes for the new management team. I have also included an updated list of contact information.

We look forward to completing the ECA and will continue to keep you apprised of our progress with remedial activities at the Tronox Henderson Project. Please let me know if you have any questions on the enclosed items. Thank you.

Sincerely,



Susan M. Crowley  
Environmental Specialist

Susan Crowley  
Staff Environmental Specialist

Enclosures: Project Organizational Chart  
Description of Project Roles  
Resumes of Key Staff  
Project Contact List

CC: Brian Rakvica, NDEP  
Deni Chambers, Northgate  
Derrick Willis, Northgate  
Dr. Keith Bailey, Environmental Answers

**Tronox. Adding value beyond the product.**

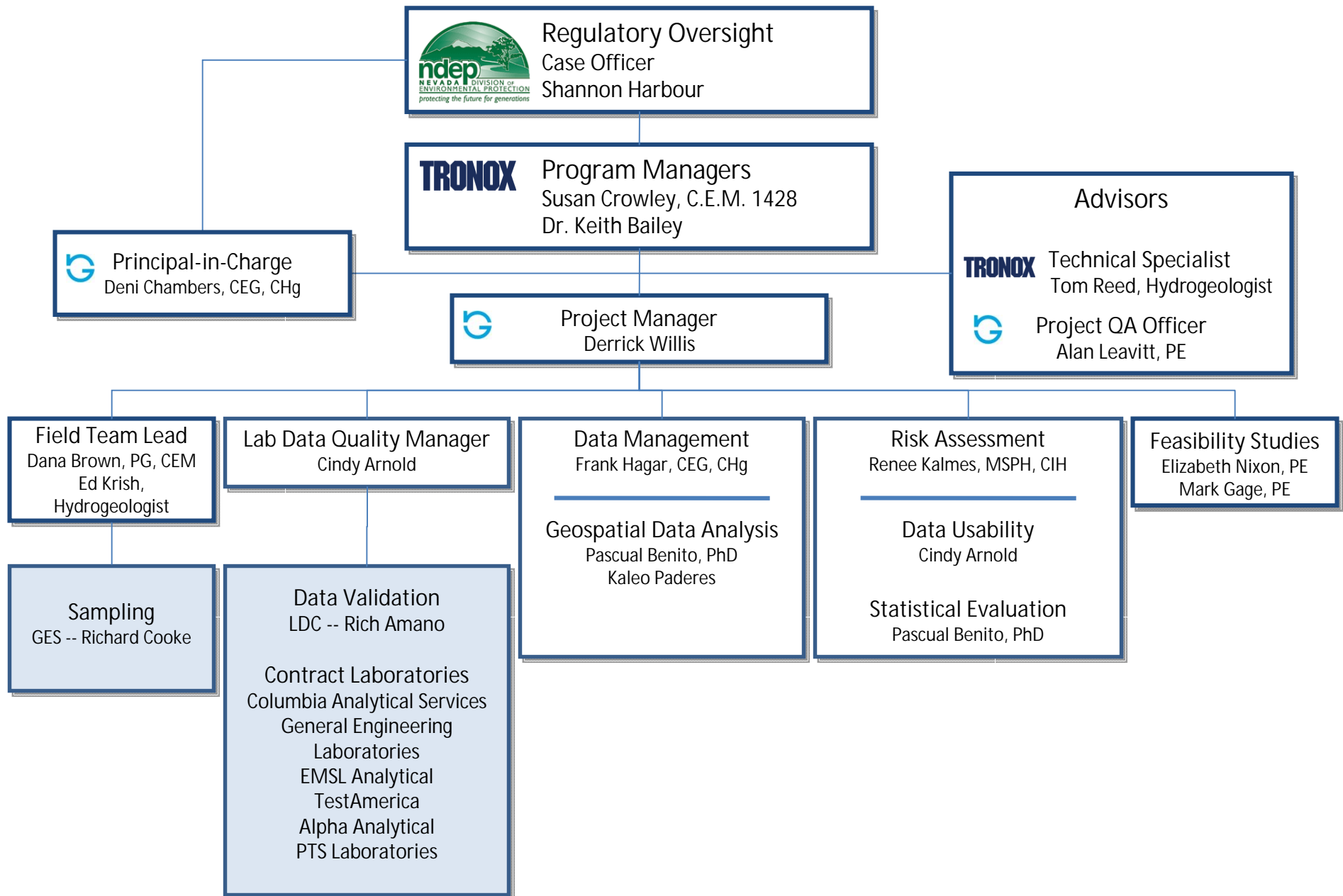
Contact List for Tronox Henderson Phase B Sampling - May 2009

<u>Name</u>	<u>Organization</u>	<u>Function</u>	<u>E-Mail</u>	<u>Phone</u>	<u>Cell Phone</u>	<u>Address</u>
Keith Bailey	Environmental Answers LLC	Tronox Project Manager	<a href="mailto:okbailey@flash.net">okbailey@flash.net</a>	405-216-9213	402-246-6818	Environmental Answers 3229 Persimmon Creek Dr Edmond, OK 73013
Susan Crowley	Crowley Environmental LLC	Tronox Project Manager	<a href="mailto:smcrowley@cox.net">smcrowley@cox.net</a> <a href="mailto:susan.crowley@tronox.com">susan.crowley@tronox.com</a>	702-592-7727	702-592-7727	Crowley Environmental 366 Esquina Dr Henderson, NV 89014
Tom Reed	Tronox LLC	Tronox Hydrogeologist	<a href="mailto:tom.reed@tronox.com">tom.reed@tronox.com</a>	405-775-5602	405-613-1809	Tronox LLC 3301 NW 150th Oklahoma City, OK 73134
Roy Widmann	Tronox LLC	Tronox Hydrogeologist	<a href="mailto:roy.widmann@tronox.com">roy.widmann@tronox.com</a>	405-775-5674		Tronox LLC 3301 NW 150th Oklahoma City, OK 73134
Deni Chambers	Northgate Environmental	Primary Contractor	<a href="mailto:deni.chambers@ngem.com">deni.chambers@ngem.com</a>	510-839-0688 x201	510-381-2322	Northgate Environmental 300 Frank H. Ogawa Plaza, Suite 510 Oakland, CA 94612
Alan Leavitt	Northgate Environmental	NG QA Support	<a href="mailto:alan.leavitt@ngem.com">alan.leavitt@ngem.com</a>	510-839-0688 x203	510-381-2334	Northgate Environmental 300 Frank H. Ogawa Plaza, Suite 510 Oakland, CA 94612
Derrick Willis	Northgate Environmental	NG Project Manager	<a href="mailto:derrick.willis@ngem.com">derrick.willis@ngem.com</a>	949-260-9293 x116	949-375-7004	Northgate Environmental 1100 Quail Street, Suite 102 Newport Beach, CA 92660
Cindy Arnold	Northgate Environmental	NG Analytical Support	<a href="mailto:cindy.arnold@ngem.com">cindy.arnold@ngem.com</a>	407-859-3939	407-716-5543	Northgate Environmental 2501 Geigel Avenue Orlando, FL 32806
Frank Hager	Northgate Environmental	NG Database Support	<a href="mailto:frank.hager@ngem.com">frank.hager@ngem.com</a>	949-498-7056	949-689-9987	Northgate Environmental 1100 Quail Street, Suite 102 Newport Beach, CA 92660
Dana Brown	Northgate Environmental	NG Field Support	<a href="mailto:dana.brown@ngem.com">dana.brown@ngem.com</a>	949-260-9293 x107	949-230-0643	Northgate Environmental 1100 Quail Street, Suite 102 Newport Beach, CA 92660
Kyle Hansen	Geotechnical Environmental Services (GES)	Sample Collection Contractor	<a href="mailto:kyle.hansen@gesnevada.com">kyle.hansen@gesnevada.com</a>	702-365-1001		GES 7150 Placid Street Las Vegas, NV 89119
Richard Cooke	GES	Sample Collection Contractor	<a href="mailto:richard.cooke@gesnevada.com">richard.cooke@gesnevada.com</a>	702-365-1001		GES 7150 Placid Street Las Vegas, NV 89119
Victoria Hansen	GES	Sample Collection Contractor	<a href="mailto:victoria.hansen@gesnevada.com">victoria.hansen@gesnevada.com</a>	702-365-1001		GES 7150 Placid Street Las Vegas, NV 89119
Rich Amano	Laboratory Data Corporation	Data Validation	<a href="mailto:ramano@lab-data.com">ramano@lab-data.com</a>	760-634-0437		LDC 7750 El Camino Real, Ste 2L Carlsbad, CA 92009

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<u>Name</u>	<u>Organization</u>	<u>Function</u>	<u>E-Mail</u>	<u>Phone</u>	<u>Cell Phone</u>	<u>Address</u>
Janice Jaeger	Columbia Analytical Services (Rochester)	Primary Lab	<a href="mailto:jjaege@caslab.com">jjaege@caslab.com</a>	585-288-5380		CAS 1 Mustard Street, Suite 250 Rochester, NY 14609
Ed Wallace	Columbia Analytical Services (Kelso)	Primary Lab	<a href="mailto:ewallace@caslab.com">ewallace@caslab.com</a>	360-577-7222	None	CAS 1317 South Thirteenth Avenue Kelso, WA 98626
Jane Freemeyer	Columbia Analytical Services (Houston)	Primary Lab	<a href="mailto:jfreemv@caslab.com">jfreemv@caslab.com</a>	713-266-1599		CAS 19408 Park Row, Suite 320 Houton, TX 77084
Stephen Siegel	EMSL	Asbestos Analyses	<a href="mailto:ssiegel@EMSL.com">ssiegel@EMSL.com</a>	800-220-3765x1209	856-296-5329	EMSL Analytical Inc. 107 Haddon Avenue Westmont, NJ 08108
Daniel Kocher	EMSL	Asbestos Analyses	<a href="mailto:dkocher@EMSL.com">dkocher@EMSL.com</a>	888-455-3675	408-206-4255	EMSL Analytical Inc. 2235 Ponderosa Avenue Suite 230 San Leandro, 94577
Edith Kent	GEL Laboratories, LLC (GEL)	Radiochemistry Analysis	<a href="mailto:emk@gel.com">emk@gel.com</a>	843-769-7385		GEL Laboratories, LLC 2040 Savage Road Charleston, SC 29407
Mike Phillips	Test America (Denver)	Organophos Pesticide Analyses	<a href="mailto:michael.phillips@testamericainc.com">michael.phillips@testamericainc.com</a>	303-736-0157		Test America 4955 Yarrow Street Arvada, CO 80002
Karen Kuoppala	Test America (Denver)	Organophos Pesticide Analyses	<a href="mailto:karen.kuoppala@testamericainc.com">karen.kuoppala@testamericainc.com</a>	303-736-0184	303-489-1203	Test America 4955 Yarrow Street Arvada, CO 80002
Latricia Endrosa	Alpha Analytical (Sparks, NV)	Organic Acid Analyses	<a href="mailto:ledrosa@alpha-analytical.com">ledrosa@alpha-analytical.com</a>	800-283-1183		Alpha-Analytical 255 Glendale Ave, Suite 21 Sparks, NV 89431
Michael Brady	PTS (Santa Fe Springs, CA)	Geotechnical Analyses	<a href="mailto:mbrady@ptslabs.com">mbrady@ptslabs.com</a>	562-347-2502		PTS Laboratories 8100 Secura Way Santa Fe Springs, CA 90670
Julie Diebenow	AIU Holdings	Insrance Consultant	<a href="mailto:julie.diebenow@aiq.com">julie.diebenow@aiq.com</a>	714-436-3916	714-785-9229	AIG Consulatant - Cost Cap Monitoring One MacArthur Place, Fifth Floor South Coast Metro, CA 92707

# Tronox Henderson Project Management Organization Chart



# PROJECT STAFF ROLE DESCRIPTIONS



NDEP provides regulatory oversight for the investigative and remedial activities at the site, and provides direction on NDEP policy and environmental objectives. All field activities and reports are supervised by a State of Nevada Certified Environmental Manager (CEM).

## TRONOX

Susan Crowley, CEM  
Keith Bailey, PhD  
Program Managers

Ms. Crowley and Dr. Bailey are primarily responsible for project direction and decisions concerning technical issues and strategies, budget, and schedule. They serve as primary points of contact for regulatory and environmental issues pertinent to the Site.

Ed Krish, Hydrogeologist  
Field Team Lead - Hydrogeology

Tom Reed, Hydrogeologist  
Technical Specialist - Hydrogeology

Mr. Reed supports Ms. Crowley as necessary.

Deni Chambers, CEG, CHg  
Principal-in-Charge

Ms. Chambers works closely with Tronox, NDEP, and Northgate's project manager on overall project strategy. To facilitate communication and coordination of assignments, Ms. Chambers is Northgate's point of contact for Tronox and NDEP. She works directly with Northgate's Project Manager, Project QA Officer and other team members, as necessary to facilitate a technical approach and deliverables that meet regulatory requirements and project objectives. Ms. Chambers assures that appropriate resources are available to meet project requirements. She updates Tronox regularly on the project status, including completed, ongoing, and proposed activities. If the scope of work increases or the level of effort is greater than anticipated due to unforeseen circumstances, Ms. Chambers will review the situation with the Project Manager and Tronox immediately to confirm the appropriate course of action.

As a certified hydrogeologist with 20 years of experience, Ms. Chambers works with a variety of private and public-sector clients to evaluate and manage environmental liabilities. Ms. Chambers previously oversaw remedial activities at the BMI complex on behalf of the buyer, including participation in meetings with NDEP. As the Principal-in-Charge on large complex remediation projects, including Superfund Sites, Brownfields Redevelopment and Open Space restoration sites, Ms. Chambers has formulated strategies to achieve remedial goals that meet future land use requirements. She is a specialist in assessing the requirements, feasibility, operation, and performance of remedial programs, ranging from monitored natural attenuation to innovative remediation technologies. Ms. Chambers' skill as a liaison between regulatory agencies, clients, and other involved parties has been instrumental in achieving project goals.

Derrick Willis  
Project Manager

Mr. Willis serves as the focus for coordination of all field and laboratory task activities, communication, reports, and technical reviews, and other support functions, and facilitating site activities with the technical requirements of the project. He is responsible for technical, financial, and scheduling matters.

Mr. Willis works closely with the Principal-in-Charge, QA Officer, and Project Risk Assessor on the overall project strategy to ensure completion of all tasks within the project schedule. Mr. Willis manages Northgate's technical team and all subconsultants, including Exponent, Verdant, and other selected subcontractors, and will coordinate subcontractor procurement if necessary. He works closely with the Field Team Leader and Laboratory Data Quality Manager to ensure high quality field and laboratory data are obtained. He works directly with the Principal-in-Charge and project team to ensure that the technical approach and deliverables meet regulatory requirements and project objectives. Mr. Willis reviews and tracks invoices for compliance with established task-specific cost estimates. He works with the Project QA Officer and Principal-in-Charge as appropriate to ensure project objectives are met and adhere to Northgate's corporate QA/QC program. If the scope of work increases or the level of effort is greater than anticipated due to unforeseen circumstances, Mr. Willis will review budget status with Ms. Chambers and Tronox immediately to confirm the appropriate course of action.

Mr. Willis has more than 19 years of professional experience providing direct oversight and management of a wide variety of environmental engineering projects. He manages team efforts for remedial investigations, feasibility studies, environmental assessments, evaluation of remedial alternatives, and implementation of remedial measures. Mr. Willis' background includes management of due diligence activities and peer review of remediation documents (on behalf of buyer) for a 2,200-acre parcel of land that is part of the BMI complex.

Alan Leavitt, PE  
Project QA Officer

Mr. Leavitt serves as Project Quality Assurance (QA) Officer, working to address and integrate data quality considerations and Northgate's corporate quality assurance/quality control (QA/QC) program into all aspects of the project, from planning to completion. These measures assist in avoiding costly errors and collection of superfluous data.

Mr. Leavitt ensures that QA audits of the various phases of the project, as well as data validation/data assessment are conducted in accordance with the Quality Assurance Project Plan (QAPP). Mr. Leavitt reports on the adequacy, status, and effectiveness of the QA program to the Project Manager. He works with the Principal-in-Charge and the Project Manager to ensure that project objectives are met, and is available to provide strategic input on technical and project management issues, as needed.

Mr. Leavitt is a professional engineer with 22 years of experience in the environmental field, including water and wastewater engineering, hazardous materials and waste management, regulatory compliance and permitting, site cleanup, and litigation support. He has designed and implemented numerous site investigations, feasibility studies, cleanup plans, and economic analyses involving water quality, water treatment, and reuse options. He has applied innovative technologies at a number of sites in California and Nevada, including in situ chemical treatment with permanganate; stabilization of wastes to reduce metals leachability; and treatment of groundwater with fluidized bed carbon reactors. Mr. Leavitt integrates his technical expertise with an in-depth understanding of environmental regulations, gained through his previous employment with the U.S. Environmental Protection Agency (EPA), California Department of Toxic Substances Control (DTSC), and California Department of Health Services (DHS).

Dana Brown, PG, CEM  
Field Team Lead

Mr. Brown has overall responsibility for completion of all field activities in accordance with the Field Sampling and Analysis Plan (FSAP) and the Quality Assurance Project Plan (QAPP), and is the communication link between project management and the field team. He will coordinate activities at the site, assign duties to field team members, mobilize and demobilize the field team and subcontractors to and from the site, direct activities of subcontractors, and resolve any logistical problems that could potentially hinder field activities.

He will implement field quality control including issuance and tracking of measurement and test equipment; proper labeling, handling, storage, shipping, and chain-of-custody procedures used at the time of sampling; and control and collection of all field documentation.

Dana Brown is a Professional Geologist and Certified Environmental Manager with 19 years of professional experience. He has been responsible for geologic and hydrologic site characterization studies, remedial alternative feasibility studies, and remedial systems implementation. His project experience includes work at the BMI Henderson Site as well as a groundwater characterization project under oversight of NDEP in Reno, Nevada. Mr Brown has attained key user status with the AutoCAD, GINT, and SURFER software packages. His computer modeling abilities include proficiency with groundwater fate-and-transport modeling using GMS, Modflow, MT3D, and other aquifer testing systems; surface water hydrology using RMS and WMS to model watershed systems and determine 100-year floodplain boundaries and flood depths. He has extensive field experience in all common types of environmental drilling and monitoring well installation, surface water characterization, and soil vapor studies, having participated in site remediation involving excavation, groundwater pump and treat, soil vapor extraction, insitu chemical oxidation, dual-phase extraction, and biostimulation through oxygen sparge.

Cindy Arnold  
Laboratory Data Quality Manager & Data Usability Lead

Ms. Arnold will manage data validation contractors and contract laboratories to ensure high quality laboratory data is obtained. She will be responsible for ensuring implementation and adherence to the laboratory QA manual and all corporate policies and procedures within the laboratory; approving the standard operating procedures (SOPs); maintaining adequate staffing documented on organization charts; and implementing internal/external audit findings corrective actions.

Ms. Arnold has over 20 years of experience in environmental chemistry both in the laboratory setting and as an environmental consultant. She has worked on numerous remedial investigations and feasibility studies, performing baseline risk assessments, ecological assessments, and community relations planning. She has served as a Quality Assurance Officer for a wide variety of state and federal programs across a national network of offices, in addition to serving on special technical teams for both the public and private sector. Ms. Arnold has performed data validation for organic analysis, high resolution analysis of PCB congeners and dioxin/furans, radiochemistry, inorganic analysis and classical wet chemistry. She has experience with air and industrial hygiene sampling and analysis. Ms. Arnold has also served as a litigation support chemist in the statistical impact analysis of environmental data.

Frank Hagar, CEG, CHg  
Data Management Lead

Mr. Hagar oversees data management operations including data recording, validation, transformation, transmittal, reduction, analysis, tracking, security, storage, and retrieval. The data management task includes creating reports, generating bottle orders, COC tracking and verification, Electronic Data Deliverable (EDD) management and logistics, and GIS and data analysis support. In addition, the task includes providing NDEP the analytical data for the Site in the specified format.

Mr. Hagar has 30 years of progressive experience in hydrogeologic consulting for the environmental, mining, and agricultural water supply industries. He specializes in the integration of technology for organization, analysis, interpretation and presentation of site information and geo-characteristics that enable clients to efficiently conduct and maintain business or to create new business depending on the nature of the assignment. He has participated in all aspects of environmental data management including of optimized relational database management software, performance needs analysis and enterprise system construction and application of many diverse data management products to environmental projects. His depth of experience and knowledge of technical and regulatory issues ensures that his clients receive innovative and cost effective solutions for their projects. He has provided expert witness and testimony services for numerous clients throughout the United States.

Pascual Benito, PhD  
Geospatial Data Analysis & Statistical Evaluation

Dr. Benito performs statistical evaluations and spatial/temporal visualizations of monitoring data. He performs plume delineation and capture zone analysis in support of remediation efforts. He manages deployment of the web-based environmental information management system (EIMS) that allows project data including water quality, water levels, and GIS map layers, as well as project communications and documents to be shared between project stakeholders.

Dr. Benito has 14 years of experience in support of environmental hydrogeological site investigations and working in research and development in areas including subsurface fluid flow and contaminant transport modeling, groundwater/surface water interactions, environmental data visualization, and web-based environmental information management. Dr. Benito is an expert in groundwater flow and contaminant plume modeling using MODFLOW, PMWIN PRO, and GMS. He has carried out large-scale modeling investigations to assess the risks posed from multiple plumes from industrial facilities; river and stream modeling using HEC-RAS; and groundwater pumping test analysis using Aquifer and AQTESOLV. He has experience in data management with Microsoft Access and SQL database systems, and has managed the development and deployment of web-accessible environmental information systems for use in multi-stakeholder projects so that environmental information is easily and securely reported, transferred, and disseminated between project stakeholders. He also has extensive experience using Excel, Surfer, Python, and ArcGIS, and is an expert in MATLAB programming for data analysis and visualization.



Elizabeth Nixon, PE  
Feasibility Study Lead

Ms. Nixon will serve as technical lead for conducting feasibility studies (FS) for the project. She will be responsible for designing feasibility studies that fulfill NDEP policy and environmental objectives, and that identify remediation alternatives that are technically feasible and cost-effective.

Ms. Nixon has 20 years of professional experience in managing and implementing complex remedial investigations (RIs), FSs, remediation design and construction projects, as well as site management plans for both public and industrial clients. Ms. Nixon specializes in long-term strategic development for legacy sites, facilitating exit strategies and site reuse. Her work on RI/FS and remediation projects has included removal, treatment, and disposal of contaminated materials; design, construction, and operation of soil vapor and groundwater extraction systems and treatment plants; containment options including vertical slurry cutoff walls and surface capping; removal of underground storage tanks and remediation of associated soil and groundwater; exposure pathway and risk analysis for residual chemicals that remain in the subsurface; and, technical impracticability studies. Ms. Nixon has prepared feasibility studies for soil and groundwater contaminated with volatile organic compounds, heavy metals, perchlorate, pesticides, and petroleum hydrocarbons.

Mark Gage, PE  
Feasibility Studies

Mr. Gage specializes in process engineering to support feasibility studies. He will work closely with the Feasibility Study Lead to provide input on FS design and alternatives.

Mr. Gage has more than 28 years of experience in chemical, environmental, and process engineering. His work has included process and plant design, construction, operations and maintenance, process control and instrumentation, materials science and computer applications. He has managed multi-million dollar projects involving cross-country and urban pipelines, municipal supply wells, water treatment systems, and municipal distribution systems.

Dara Donnelly  
Project Assistant

Ms. Donnelly serves as an assistant providing general support to the project team. Her primary responsibility is invoice review and tracking. In addition, she is responsible for hard copy and electronic file management, budget review, QA report production, presentation and report coordination, and assisting with compilation of monthly status reports. Working closely with the Project Manager and Principal-in-Charge, she assists in facilitating internal communications and coordination.

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Renee Kalmes, MSPH, CIH  
Risk Assessment Lead

Ms. Kalmes will oversee all activities related to the preparation of the human health risk assessment and development of risk-based cleanup recommendations for the project. In this role, she will coordinate with the Principal in Charge and Project Manager to ensure project and scheduling goals are met. She will participate in meeting with NDEP risk assessors to ensure the risk assessment is prepared following appropriate regulatory guidance and best scientific principles.

Ms. Kalmes has over 25 years of experience in managing and conducting human health risk assessments. She has performed risk assessment for more than 150 sites, including comprehensive risk assessments at former landfills and industrial facilities. She is familiar with chemicals of potential concern and exposure pathways at the BMI Henderson site through her oversight of previous investigation activities, performed on behalf of Centex Homes. She has evaluated potential exposure to metals, pesticides, volatile organic chemicals and petroleum products in soil, groundwater and air and developed cleanup levels and other risk management recommendations. Ms. Kalmes has evaluated soil vapor intrusion issues through use of soil vapor modeling and air monitoring tools. For these projects, she has communicated risk results to a variety of stakeholders, including neighborhood, worker and community groups.

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Kaleo Paderes  
Geospatial Data Analysis

Mr. Paderes will support data validation and integration of the relational database, setting up reporting queries, GIS Services, GeoSpatial Mapping/Analysis and supporting data validation of EDDs to EQUIS. He will work closely with the Data Management Lead on EQUIS database coordination for GIS mapping, analysis, and figures. He will oversee direct EDD data validation support, reporting, and coordination.

Mr. Paderes has 15 years of applied experience in resource/data management and GIS for large complex multi-stakeholder remediation projects. He is a recognized industry expert in geospatial technologies and has trained and mentored staff in the use of EQUIS and ArcGIS. He has utilized GIS and EQUIS to develop client standards for quarterly monitoring, mapping, reporting, and analysis for environmental information systems. He is also active in developing site conceptual models and conducting groundwater fate and transport (including free phase) modeling.

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## **DENI CHAMBERS, C.Hg., C.E.G.**

PRINCIPAL HYDROGEOLOGIST

As a certified hydrogeologist with 20 years of experience, Ms. Chambers works with a variety of private and public-sector clients to evaluate and manage environmental liabilities. Ms. Chambers previously oversaw remedial activities at the BMI complex on behalf of the buyer, including participation in meetings with NDEP. As the Principal-in-Charge on large complex remediation projects, including Superfund Sites, Brownfields Redevelopment and Open Space restoration sites, Ms. Chambers has formulated strategies to achieve remedial goals that meet future land use requirements. She is a specialist in assessing the requirements, feasibility, operation, and performance of remedial programs, ranging from monitored natural attenuation to innovative remediation technologies. Ms. Chambers' skill as a liaison between regulatory agencies, clients, and other involved parties has been instrumental in achieving project goals.

### **REPRESENTATIVE EXPERIENCE**

#### ***Sustainable Redevelopment***

- *BMI Henderson Project, Henderson, Nevada*—Performed pre-purchase due diligence for a 2200-acre parcel – the largest Brownfields site in the United States. Involvement included meetings with NDEP, where Northgate management gained their respect and confidence. This property served as a disposal facility for wastes generated by the world's largest magnesium production plant during World War II. The property was later used as a disposal site for other manufacturing activities, resulting in a mixed-waste stream of heavy metals, radionuclides, pesticides, chlorinated solvents, perchlorates, and other chemicals. In order for the cleanup project to meet residential standards, an estimated 2 million cubic yards of soil will be removed from the parcel. Remediation efforts are complex due to the presence of existing nearby residential developments and the Las Vegas Wash, which flows into Lake Mead, a major source of water for the Southwest. Following remediation, construction of the development will occur, including parks, schools, trails, housing, and a business district. The Site is the largest Brownfields project in Nevada. The City of Henderson anticipates that the project will revitalize the downtown area and provide housing for those employed in Henderson and Las Vegas.
- *Confidential Superfund Site, Schlumberger Oilfield Services, Mountain View, California*—Principal-in-Charge for a groundwater remediation program at a redeveloped commercial/light industrial site in Mountain View. Involves the cleanup of chlorinated solvents from at least eight RPs commingled with petroleum hydrocarbons and solvents from an adjacent Department of Defense CERCLA site. Services include assessment and optimization of remedial systems and aquifer restoration; application of sustainability principles and life-cycle analyses to CERCLA FS assessments and remedy selection; technical impracticability evaluation; ensuring compliance with consent decree, federal and state orders and multiple waste water discharge and air permits; coordination, review, and assessment of multi-RP technical exchanges; reporting, meeting presentations, and negotiations involving regulators, property owners, RPs, and the general public.
- *San Jose MarketCenter, San Jose, California*—Performed due diligence, researching complex Site history that extended back into the 1800's. Managed soil and groundwater investigations to characterize current environmental conditions. Evaluated options and associated costs for remediation of soil impacted with arsenic on a portion of the site to be dedicated to the city for open space, and for excavating and treating soil impacted with hydrocarbons and metals elsewhere on the site. Prior to development, Northgate prepared a Risk Management Plan to address residual petroleum hydrocarbons in soil in order to protect construction workers, future

retail workers, and the public. Northgate provided environmental monitoring and geotechnical engineering services during construction.

- *Tourtlot Cleanup Project, Benicia, California*—Oversaw Northgate's chemical cleanup of this 220-acre portion of the former Benicia Arsenal. In 2004, Northgate secured the first-ever approval by the Department of Toxic Substances Control (DTSC) for unrestricted residential use of a former munitions and explosives site. This project required close coordination with the DTSC, the Regional Water Quality Control Board, the United States Army Corps of Engineers, the California Department of Fish and Game, and the City of Benicia. Supervised preparation of project documents and field execution. Northgate's multi-disciplinary approach on the Tourtlot Cleanup Project is widely recognized as the model for future projects requiring the cleanup of munitions and explosives of concern.
- *Redevelopment of Electronics Manufacturing Site as a Medical Facility, San Carlos, California*—Oversaw real estate transfer services, including a remedial action plan, prospective purchaser agreement, and environmental insurance policies to manage liabilities and facilitate redevelopment of this 18-acre site in San Carlos, California. The site had been used for research and manufacturing of electronic components since the mid-1950s. These activities resulted in the release of chemicals to soil and groundwater at the site, including volatile organic compounds and metals. Northgate developed a comprehensive plan designed to achieve unrestricted future use of the site, consistent with Palo Alto Medical Foundation's plans to build a medical facility at this location. Remediation of the soil and groundwater will include excavation, treatment and disposal, as well as enhanced bioremediation.
- *Former Braito Landfill Site, Benicia, California*—Conducted due diligence and supervised review of numerous documents. Supervised hydrogeologic investigations for a remedial investigation/feasibility study (RI/FS) on a 70-acre development at a former landfill site. Designed, managed, and interpreted monitoring and testing of landfill gas, waste material, and leachate to provide parameters for treatability and feasibility studies and health risk assessment. Provided technical advice for remediation technologies, including in-situ stabilization and excavation of the waste material, design of leachate control system, and design of soil-gas extraction and treatment system.

### **Facility Closures**

- *Kaiser Facility Closure, Pleasanton, California*—With oversight from the RWQCB and Cal-EPA Department of Toxic Substances Control, Northgate obtained closure for this Kaiser facility in Pleasanton. Northgate prepared and implemented RI/FS for rezoned industrial to residential site in Pleasanton, California. Collected data for risk assessment to establish cleanup goals to enable residential development of the property. Supervised all hydrogeologic and contaminant migration investigations for PCB- and PCE-affected site.
- *Chemical Manufacturing Facility, West Pittsburg, California*—Supervised closure of wastewater treatment tanks, including soil and groundwater investigations, at a chemical manufacturing facility in West Pittsburg, California. Used risk-based analyses to develop cleanup goals for residual chemicals in soil and groundwater.
- *Hazardous Waste Storage Facility, Stockton, California*—Prepared and implemented closure plans for a hazardous waste storage facility in Stockton. Used risk-based analyses to develop cleanup goals for residual chemicals in soil and groundwater.
- *VOC Remediation, Electronics Manufacturing Facility*—Designed and implemented closure plan to remediate soil containing volatile organic compounds (VOCs) at an electronics manufacturing facility. Plan included excavation, onsite aeration, and backfilling chemical-affected soils.

### **Program Management Superfund Sites**

- *Siemens/Intersil Federal Superfund Site, Cupertino, California*—Project director for aquifer characterization and groundwater investigation/remediation at a Federal Superfund site. Prepared and implemented RI/FS work plan and negotiated final cleanup order with the Regional Water Quality Control Board (RWQCB) and U.S. Environmental Protection Agency (U.S. EPA). Designed and implemented groundwater extraction and soil-vapor extraction systems and supervised all hydrogeologic and geologic investigations. Monitored operation, performance, and compliance of remedial systems. Conducted water reuse study and implemented onsite water reuse of the treated effluent. Evaluated potential to reinject the treated effluent in an effort to reduce long-term project costs by waiving the Santa Clara Valley Water District pump fees. Assessed indoor air issues based on changes in TCE action levels. Successfully negotiated property transfer for the Client.
- *Siemens/Micrel State Superfund Site, Sunnyvale, California*—Project director for a multiple-party regional soil and groundwater RI/FS remediation project at a state Superfund site in Sunnyvale. Supervised hydrogeologic investigations and remediation activities. Successful cross-allocation negotiations with multiple RPs. Further negotiations with the RWQCB reduced cleanup area and established realistic cleanup goals. Implemented pilot study of aggressive remediation technology to expedite cleanup activities at the site.
- *Middlefield-Ellis Whisman (MEW) Superfund Site, Schlumberger Oilfield Services, Mountain View, California*—Principal-in-Charge for a groundwater remediation program at a redeveloped commercial/light industrial site in Mountain View. Involves the cleanup of chlorinated solvents from at least eight RPs commingled with petroleum hydrocarbons and solvents from an adjacent Department of Defense CERCLA site (Moffett Field). Services include assessment and optimization of remedial systems and aquifer restoration; application of sustainability principles and life-cycle analyses to CERCLA FS assessments and remedy selection; technical impracticability evaluation; ensuring compliance with consent decree, federal and state orders and multiple waste water discharge and air permits; coordination, review, and assessment of multi-RP technical exchanges; reporting, meeting presentations, and negotiations involving regulators, property owners, RPs, and the general public.

### **Water Resources**

- *Montezuma Dredge Sediment Disposal Project, Suisun Marsh, Solano County, California* — Supervised hydrogeologic investigation to evaluate water-bearing zones underlying project area. Designed, conducted, and interpreted hydraulic tests to assess characteristics of the underlying water-bearing zones to provide parameters for a 2,000-gallon-per-minute groundwater supply system for the project.
- *Chesapeake Bay Dredge Disposal Project, Chesapeake Bay, Maryland* — Performed technical analyses of proposed open-water dredge disposal site in Chesapeake Bay. Analyses included assessment of potential water quality and benthic impacts, sediment chemical characteristics, and critique of U.S. Army Corps of Engineers' sediment transport model.
- *Benicia, California, Benicia Arsenal Wetlands Remediation Project* — Characterized sediments for heavy metals and organic contaminants in a sensitive wetlands habitat. Managed team to conduct investigations, biological assessments, risk evaluations, dredging activities and disposal of chemical and ordnance impacted sediments from 100-acre watershed.
- *Yosemite Wetlands Restoration Project, San Francisco, California* — Managed contaminant evaluation and remediation of a 34-acre site restoration planning effort, including development of a significant wetland habitat restoration on park property adjoining the Yosemite Channel. The

Yosemite Canal project area, historically part of the tidal marshes and mudflats of San Francisco Bay, was filled in the 1950s and 1960s to provide space for industrial and residential development, and the remnant channel is all that remains from the original tidal marsh. Restoration design constraints include impacted sediments in the adjoining Yosemite Canal and South Basin. Management of project includes meetings and coordination with the Navy and the City of San Francisco to characterize the sediments in these waterways, including sampling, source identification, and sediment transport. Ms. Chambers also directed a team performing soil, sediment, and groundwater investigations to assess the distribution and mobility of contaminants. A screening-level ecological risk evaluation was completed to assess the potential toxicity of contaminated fill and sediments to aquatic receptors in the project area. Information gathered during these investigations was used to modify the restoration design to mitigate the potential exposures of ecological and human receptors to chemicals of concern.

- *Hard Rock Mine, Confidential Location, Northern California*—Principal-in-Charge for the hydrogeologic assessment, geological mapping, natural resources planning, geological logging, and data interpretation using 3D visualization and modeling packages for the proposed expansion of a rock quarry. The extent of the expansion will be several times the site's current area and depth, creating a series of planning challenges subject to environmental constraints. The site overlies a complex fractured rock aquifer along a river and between three large fault zones. The regulatory agency and the public are concerned about potential negative impacts from quarry expansion and dewatering activities to the quality and availability of water resources from groundwater and surface water flows. Naturally occurring levels of salts, metals, and other chemicals in groundwater beneath the site are above pollution standards depending on their source area. Northgate's role in this project is to characterize the fractured rock aquifer and to evaluate proposed mining grading plans for their potential environmental impacts.
- *Kottinger Creek Sediment Characterization, Pleasanton, California* — Assessed impacts to sediments in creek due to adjacent nonpoint source discharges, including sediment characterization, risk evaluation and impact assessment.
- *Water Reuse Study for Electronics Manufacturing Site, Silicon Valley, California* — Conducted water reuse study and water recharge study of treated effluent from a large-scale groundwater remediation projects in Cupertino, California. Assessed impact of NPDES discharges to upper reaches of Calabazas Creek from several ongoing remediation systems. Implemented onsite water reuse of the treated effluent, as well as aquifer recharge via surface water discharge. Approximately 500 million gallons of water have been reclaimed since implementation, including landscape irrigation, recharge, and facility reuse. Evaluated aquifer reinjection of treated effluent in an effort to recharge underlying aquifers and reduce long-term project costs by waiving the Santa Clara Valley Water District pump fees.
- *Cogeneration Facility Water Reuse Study, Modesto, California* — Evaluated treatment requirements and options for water reuse and reinjection of scrubber blowdown water from a cogeneration facility.
- Surveyed, mapped, and performed tests on numerous watersheds in the San Francisco and Antioch areas in California.

## **EDUCATION**

M.S., Civil Engineering, University of California, Berkeley, 1988  
B.A., Geology, University of California, Berkeley, 1985

## PROFESSIONAL HISTORY

Northgate Environmental Management, Inc., CEO, Principal, 1999–present

LFR Levine-Fricke (international co), National Technical Forum Leader, 1988–1999  
University of California, Berkeley, Research Assistant & Teaching Assistant, 1985–1988

## REGISTRATIONS

Professional Geologist: California, No. 5845  
Certified Hydrogeologist: California, No 610  
Certified Engineering Geologist: California, No. 2149  
Water Conservation Practitioner, Level 1: American Water Works Association, No. 00121

## AFFILIATIONS

National Groundwater Association (NGWA)  
Groundwater Resources Association (GRA)  
American Water Works Association (AWWA)  
Water Reuse Association

## PUBLICATIONS

- Chambers, J.D., Smith, L.M., Nixon, E., and Rieke, A., *Balancing Cleanup and Sustainability at a CERCLA Superfund Site*, poster presentation at Battelle's Sixth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, California; May 19-22, 2008.
- Chambers, J.D., Nixon, E., and Shan, C., *A New Model for Transient Soil Vapor Intrusion*, abstract submitted to Battelle's Sixth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, California; May 19-22, 2008.
- Chambers, J.D., Nixon, E., Shan, C., *Approaches for High-Tier Assessments on Vapor Intrusion*, abstract submitted to Battelle's Sixth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, California; May 19-22, 2008.
- Chambers, J.D., Laduzinsky, D., and Walti, C., *Impacts of AAI on Property Transactions*, Presented at Environmental Law Conference at Yosemite, October 19-22, 2006.
- Marvin, B.K., Chambers, J.D., Leavitt, A., and Schreier, C.G., *Chemical and Engineering Challenges to In Situ Permanganate Remediation*, in CSA Aerospace and High Technology Database, September 2006.
- Chambers, J.D., Leavitt, A.L., and Splitter, T., *Deep Soil Mixing to Stabilize Tannery Wastes at Braito Landfill*, poster presented at the Battelle's Fifth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, May, 2006.
- Chambers, J.D., Goldie, S., Bird, J., and Splitter, T., *Tourtlot Cleanup Project: Benicia, California*, poster presented at the Battelle's Fifth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, May, 2006.
- Chambers, J.D., Bennett, T.H., Hill, B., Martin, B., and Josselyn, M., *Yosemite Slough Restoration Project: Wetland Design for an Urban Watershed*, poster presented at the Battelle's Fifth

International Conference on Remediation of Chlorinated and Recalcitrant Compounds, May, 2006.

Chambers, J.D., Erskine, J.A., and Leavitt, A.L., *San Jose MarketCenter: Risk Management for Brownfields Redevelopment*, presented at the Battelle's Fifth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, May, 2006.

Chambers, J.D., Leavitt, A.L., and Splitter, T., *In Situ Treatment of Tannery Wastes at the Braitto Landfill*, presented at the 16th Annual AEHS Conference on Soils, Sediment, and Water, March, 2006.

Splitter, T., Chambers, J., and Leavitt, A., *In Situ Treatment of Tannery Wastes at the Braitto Landfill*, Presented at 16th Annual AEHS Conference on Soils, Sediments and Water, March 15, 2006.

Marvin, B. K. and Chambers, J. D., A. L. Leavitt, C.G. Schreier, *Chemical and Engineering Challenges to In Situ Permanganate Remediation*, accepted at Remediation of Chlorinated and Recalcitrant Compounds, 3rd International Conference, Monterey, California, May 2002.

Chambers, J. D. and B. K. Marvin, C.G. Schreier, A. L. Leavitt. *Chemical and Engineering Challenges to the Application of In Situ Permanganate Remediation*, presented at The First International Conference on Oxidation Reduction Technologies. Niagara Falls, Ontario, Canada. 2001; and Poster Presentation at the Ground Water Resource Association 3<sup>rd</sup> Symposium on Arsenic Remediation.

Chambers, Jane, Alan Leavitt, Caryl Walti, and Cindy Schreier, *In-Situ Destruction of Chlorinated Solvents with KMnO<sub>4</sub> Oxidizes Chromium*, accepted at Remediation of Chlorinated and Recalcitrant Compounds, 2<sup>nd</sup> International Conference, Monterey, California, May 2000.

Chambers, Jane D. and Alan Leavitt, *Groundwater Cleanup in the San Francisco Bay Area-Creating Opportunities For Water Reuse*, accepted at NGWA National Conference in Nashville, Tennessee, December 2000.

Chambers, Jane D., Alan Leavitt, Jeff Melby, Caryl Walti, and Cindy G. Schreier, *Formation and Attenuation of Hexavalent Chromium During In-situ Permanganate Treatment of Chlorinated Hydrocarbons*, accepted at NGWA Focus Conference in San Francisco, California, February 2000.

Chambers, Jane D. and Alan Leavitt, *Creating Opportunities For Water Reuse – Integrating Water Reuse with Groundwater Cleanup*, accepted at NGWA Focus Conference in San Francisco, California, February 2000.

Chambers, Deni and Alan Leavitt, *Combining Groundwater Cleanup with Water Reclamation*, presented at AWWA Water Resources Conference, Norfolk, Virginia, October 29, 1999.

Chambers, Deni, Alan Leavitt, and Jeff Hennier, *Combining Groundwater Cleanup and Water Reuse*, presented at Water Reuse Association of California Symposium XIII, Oakland, California, September 18, 1998.

Leavitt, Alan and Deni Chambers, *Balancing Risks to Optimize Groundwater Remediation*, presented at AEHS West Coast Conference, Contaminated Soils and Groundwater, Oxnard, California, March 10, 1998.



Chambers, Jane D. and Jeff H. Hennier, *Soil-Gas Extraction Test and Analysis Techniques for Use in Design of Vapor Extraction Systems*, presented at AGWSE/API Conference on Petroleum Hydrocarbons and Organic Chemicals in Groundwater in Houston, Texas, 1991.

Hennier, Jeff and Jane D. Chambers, *Design of Vapor Extraction and Monitoring Wells and Vapor Pressure Testing in Heterogeneous Alluvial Sediments*, presented at the ASTM Symposium on Vadose-Zone and Aquifer Testing, 1990.

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## DERRICK WILLIS

PRINCIPAL

Mr. Willis has more than 19 years of professional experience providing direct oversight and management of a wide variety of environmental engineering projects. He manages team efforts for remedial investigations, feasibility studies, environmental assessments, evaluation of remedial alternatives, and implementation of remedial measures. Mr. Willis' background includes management of due diligence activities and peer review of remediation documents (on behalf of buyer) for a 2,200-acre parcel of land that is part of the BMI complex.

### REPRESENTATIVE EXPERIENCE

#### *Environmental Due Diligence and Regulatory Compliance*

- *BMI Henderson Project, Henderson, Nevada*—Managed Phase I ESA and peer reviewed remediation documents (on behalf of buyer) for a 2,200-acre parcel of land that was part of the Black Mountain Industrial complex, a former disposal facility for wastes generated by the world's largest magnesium production plant during World War II. The property was later used as a disposal site for other manufacturing activities, resulting in a mixed-waste stream of heavy metals, radionuclides, pesticides, chlorinated solvents, perchlorates, and other chemicals. In order for the cleanup project to meet residential standards, an estimated 2 million cubic yards of soil will need to be remediated at the site.
- *RREEF, Multiple Sites, Southern California, California*— Mr. Willis serves as client director for RREEF on multiple projects including acquisition studies (which includes Phase I ESAs and mold, asbestos and indoor air quality surveys), tenant audit programs, soil remediation, groundwater investigation and remediation, third party oversight, agency negotiation, and mold and asbestos abatement programs. Sites have included shopping centers, drycleaners, office buildings, chemical manufacturers, printed circuit manufacturers, aerospace manufacturers, food processing facilities, automotive repair facilities, printers, and precious metal recovery facilities.
- *Opus Corporation, Multiple Sites, Southern California*— Mr. Willis has directed over 50 acquisition-related due diligence investigations for Opus Corporation (Opus). Scope of work has included Phase I ESAs, soil and groundwater investigations, risk evaluations, agency negotiation, and aiding Opus in evaluating and quantifying the potential risk associated with recognized environmental concerns. Sites have included former automotive and chemical manufacturers, strip malls, shopping centers, and cattle/dairy farms.
- *Various Clients, Various Locations, Southern California*— Project manager for more than 200 due diligence evaluations that included Phase 1 environmental assessments (ESAs), and Phase II assessments (where warranted) for industrial facilities including aerospace, furniture and paper manufacturing factories; automotive and industrial manufacturers, utility companies, vehicle and equipment maintenance facilities; as well as landfills, drycleaners and shopping centers, and agricultural land. The objective of the due diligence evaluations was to evaluate and quantify potential liabilities associated with the acquisition and development of the properties. Contaminants of concern typically included volatile organic compounds, petroleum hydrocarbons, pesticides, metals, and PCBs.
- *PacTrust, Multiple Sites, Southern California* – Mr. Willis conducted environmental audits for PacTrust's portfolio of 14 industrial properties in southern California. The purpose of the audit program was to review and evaluate chemical use and industrial processes employed at each facility and evaluate whether there was any potential risk to the property owner from site operations. Sites included manufactures of aerospace products, printed circuit boards,

processed foods, automotive fueling systems, industrial and residential lighting, window products, and respiratory protective equipment.

### ***Site Investigation and Remediation***

- *Playa Capital Corporation, Playa Vista Development Project, Los Angeles, California*— Mr. Willis served as program manager for the Playa Vista project, one of the largest and most visible brownfield development projects in the country. At 1,100 acres, it is the largest underway in Los Angeles County. His primary responsibility included environmental program management (including scoping, developing, scheduling, and tracking environmental activities for the development project), risk management (including developing and negotiating with agencies for appropriate cleanup criteria), remedial strategy/management (including development and implementation of pilot tests and oversight of investigation and remediation activities), agency/RP/buyer negotiations, consultant and contractor selection/oversight, coordination with Playa's infrastructure group on the development/implementation of integrated remedial approach where appropriate, litigation support, data management, and transactional support with respect to the sale of remediated parcels.
- *Lockheed Martin Former International Light Metals Facility, Torrance, California*— Served as project manager and principal investigator for a 67-acre aerospace facility where client objective was expedited redevelopment. The project included facility demolition, preparation and implementation of a Resource Conservation and Recovery Act (RCRA) closure plan for 11 permitted RCRA units, negotiations with the Department of Toxic Substance Control (DTSC), preparation of a RCRA Facility Assessment (RFA) (210 features identified that required intrusive investigation), implementation of a RCRA Facility Investigation (RFI) for soil, preparation of a health-based risk assessment, and implementation of soil remediation. Site closure for soil was granted only three years after project initiation, in contrast to the normal six to eight year process, and has been used as an example by head DTSC officials as an example of industry and the regulatory community working together to achieve expedited site closures for property redevelopment purposes. Mr. Willis also developed strategy for groundwater investigation and remediation and negotiated the corrective action consent agreement (CACA) with DTSC.
- *Project Manager, Confidential Client, Buena Park, CA*— Served as project manager for multi-media remediation project at a commercial development in Buena Park, California. The site was a former food processing facility that was redeveloped into commercial offices and warehouse space. Evaluated the environmental liability for a Real Estate Investment Trust (REIT) that subsequently purchased the property, and managed remediation program in conjunction with site redevelopment.
- *Project Manager, Brownfield Redevelopment, Torrance, California*— Served as project manager and for site redevelopment project for a PacTrust. Evaluated environmental liabilities associated with a 12-acre parcel that was part of a butadiene plant (Del Amo Superfund Site) left undeveloped as a brownfield, and formulated a strategy to expedite regulatory closure and redevelopment. A comprehensive investigation was completed on the parcel, and the report submitted to the Environmental Protection Agency (EPA) for review. Successfully negotiated with EPA to conduct a non-Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) closure program. Conducted soil remediation program under EPA oversight in conjunction with site construction activities.
- *Project Manager, Investigation and Remediation Program, Safety Kleen, Vancouver, British Columbia, Canada*— Managed remediation of former solvent recycler transfer stations in British Columbia and Alberta, Canada. Sites involved characterization and remediation of soil and perched groundwater zones. Assessed feasibility of vapor extraction for cleanup of vadose zone contamination, and designed and installed a dewatering system for perched water in former tank

cavities and surficial saturated zone for Vancouver transfer station. Achieved regulatory site closure two years faster than previous consultant's estimate.

- *Cupples Manufacturing, Investigation and Remediation Program, La Mirada, California*— Project manager for soil/groundwater characterization and remediation program at a truck maintenance facility in La Mirada, California. Conducted an underground storage tank and clarifier removal program in conjunction with site characterization activities. Implemented remediation of soil and groundwater impacted with petroleum hydrocarbons. Negotiated and received closure from Regional Water Quality Control Board (RWQCB).
- *Alberta Environment, Abandoned Wood Treatment Sites, Various Locations, Alberta, Canada*— Project manager for the Wood Preserving Sites Characterization Program for Alberta Environment. Performed site characterization of four former wood preservation sites in Alberta, Canada. The sites had been used for many years for treating wood poles and railroad ties with a pentachlorophenol/diesel mixture. Soil and/or groundwater were impacted at the sites. Soil borings and groundwater monitoring wells were installed, and laboratory analysis of soil and groundwater was performed, to help determine the lateral and vertical migration of dissolved-phase hydrocarbons in the groundwater and dense nonaqueous phase liquids (DNAPLs) through glacial tills and several non-confining layers. Detailed drilling and sampling plans were necessary to ensure correct evaluation of vertical DNAPL migration. Aquifer tests were performed and receptor data were collected in order to formulate a quantitative assessment of both health-based and environmental risk.
- *Texaco Refining and Marketing Inc., Investigation and Remediation Programs, Various Locations, Southern California*— Responsible for remediation programs at several petroleum retail outlets for Texaco in the southern California area. Projects included soil and groundwater investigation programs, underground storage tank (UST) removals, remedial design (including design and implementation of vapor extraction and aquifer tests), implementation of remedial program, and operation and maintenance of remediation systems. This included designing, specifying, permitting, and installing of all equipment (including piping, downhole pumps, off-gas treatment, and water treatment).
- *Groundwater Contamination Investigation and Analysis, Technisol, Raymond, Alberta, Canada*— Conducted a groundwater investigation program at a solvent recycling facility located in southern Alberta, Canada. The program was implemented to determine the lateral and vertical extent of several species of chlorinated volatile organic compounds present in the confined aquifer beneath the facility. Aquifer testing was performed to estimate migration rates and to provide preliminary data for remedial action. Successfully negotiated with Alberta Environment (lead regulatory agency) for monitored natural attenuation approach.
- *Pier A Railyard, Port of Los Angeles, Los Angeles, California*— Managed a soil and groundwater investigation a program at a Port of Los Angeles rail transfer yard. The objective of the project was to characterize previously identified polynuclear aromatic compounds, volatile organic compounds, and petroleum hydrocarbons in the soil and groundwater, and identify any regulated building materials in the site structures in order to facilitate an expedited redevelopment program. The project was finished ahead of schedule and under budget.
- *Soil and Groundwater Remediation, Texaco, Various Locations, Southern California*— Conducted vapor extraction tests, performed data analysis, and generated recommendations for an industrial manufacturing facility to determine the viability of using vapor extraction for remediating chlorinated solvents, primarily tetrachloroethene (PCE), present in the soil beneath the facility. Each test was designed to assess air flowrates and vacuums, vertical interference and crossflow, radii of influence, potential for water upwelling, and effectiveness of vapor extraction in both vadose and capillary zones. Extracted vapors were collected to determine

volatile organic compound concentrations. Data were used to determine well spacing and slotting intervals, optimum flowrate/vacuum combinations, extraction blower sizing, and vapor treatment equipment.

- *Texaco, Various Locations, Southern California*— Responsible for preparation of South Coast Air Quality Management District (SCAQMD) permitting, installation, operation and maintenance of thermal and catalytic oxidizers/vapor extraction systems for the remediation of soil (containing petroleum hydrocarbons) beneath operating service stations.

## **EDUCATION**

B.S., Geology, University of Alberta, Alberta, 1988

## **PROFESSIONAL HISTORY**

Northgate Environmental Management, Principal, 2006 to date

LFR Levine Fricke, Principal Hydrogeologist, 2002 – 2006

Integrated Environmental Services, Director of Operations/Senior Program Manager, 1999 – 2002

ARCADIS Geraghty & Miller, Inc. Senior Hydrogeologist, 1993 – 1999

Environmental Design Corporation, Vice President, 1992

Environmental Science & Engineering, Inc., Staff Geologist, 1991

Terracon Geotechnique, Ltd., Geologist, 1989 – 1991

Contract Positions, Various Locations, Geologist, 1988

## **REGISTRATIONS**

Registered Geologist: Alberta, Canada No. 48113

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**ALAN LEAVITT, P.E., R.E.A.****PRINCIPAL ENGINEER**

Mr. Leavitt is a professional engineer with 22 years of experience in the environmental field, including water and wastewater engineering, hazardous materials and waste management, regulatory compliance and permitting, site cleanup, and litigation support. He has designed and implemented numerous site investigations, feasibility studies, cleanup plans, and economic analyses involving water quality, water treatment, and reuse options. He has applied innovative technologies at a number of sites in California and Nevada, including in situ chemical treatment with permanganate; stabilization of wastes to reduce metals leachability; and treatment of groundwater with fluidized bed carbon reactors. Mr. Leavitt integrates his technical expertise with an in-depth understanding of environmental regulations, gained through his previous employment with the U.S. Environmental Protection Agency (EPA), California Department of Toxic Substances Control (DTSC), and California Department of Health Services (DHS).

**REPRESENTATIVE EXPERIENCE*****Site Investigation & Remediation***

- *BMI Henderson Project, Henderson, Nevada*—Performed pre-purchase due diligence for a 2200-acre parcel – the largest Brownfields site in the United States. This property served as a disposal facility for wastes generated by the world’s largest magnesium production plant during World War II. The property was later used as a disposal site for other manufacturing activities, resulting in a mixed-waste stream of heavy metals, radionuclides, pesticides, chlorinated solvents, perchlorates, and other chemicals. In order for the cleanup project to meet residential standards, an estimated 2 million cubic yards of soil will be removed from the parcel. Remediation efforts are complex due to the presence of existing nearby residential developments and the Las Vegas Wash, which flows into Lake Mead, a major source of water for the Southwest. Following remediation, construction of the development will occur, including parks, schools, trails, housing, and a business district. The Site is the largest Brownfields project in Nevada. The City of Henderson anticipates that the project will revitalize the downtown area and provide housing for those employed in Henderson and Las Vegas.
- *Former Electrical Equipment Manufacturing Site, San Mateo County, California*—Director for Brownfields redevelopment project at former RCRA-permitted manufacturing facility. Prepared remedial action plan to clean up soil and groundwater to unrestricted reuse standard to allow future development of a hospital at this site. Services included oversight of the former owner’s closure of hazardous materials facilities, including plating facilities and a RCRA-permitted wastewater treatment plant. Established limited liability company to purchase and remediate the property. Procured cleanup cost cap and pollution legal liability insurance policy. Initial phase of work included abatement of asbestos and lead-based paint and demolition of 300,000 square feet of buildings. Remedial actions include treatment of soil containing chlorinated VOCs and excavation/disposal of soil containing metals.
- *Former Flour Mill Site, Vallejo, California*—Represented buyer on Environmental Due Diligence activities at a 41-acre industrial property. Performed Phase I and II environmental site assessments, remedial cost estimations, and oversight of cleanup activities performed by the seller. Principal contaminants included petroleum hydrocarbons and polynuclear aromatic hydrocarbons. Mr. Leavitt advised the buyer on potential environmental liabilities, and prepared a Soil Management Plan for future development of the property.

- *United Heckathorn Site, Richmond, California*—Project Director for a former pesticide processing site in Richmond, California. Completed remedial investigation/ feasibility studies (RI/FS) and managed removal action to excavate and dispose of 10,000 cubic yards of sediment containing DDT and other organochlorine pesticides along the San Francisco Bay. Designed and constructed innovative sediment curtain to confine suspended sediments within excavation area. Developed cost-effective cleanup goals to protect workers, nearby residents, and aquatic organisms. Negotiated agency approvals from USEPA, U.S. Army Corps of Engineers, BCDC, DTSC, Regional Water Quality Control Board (RWQCB), and other regulatory agencies.
- *Alviso Ring Levee Operable Unit of South Bay Asbestos Area Superfund Site, Santa Clara, California*—Project Director providing oversight in the preparation and implementation of remedial design to remove 2-mile-long flood control levee located adjacent to residential community and San Francisco Bay wetlands. Worked with regulatory agencies to develop appropriate plans to control dust near residences and minimize the effect of construction on wetlands.
- *Former Braito Landfill, Solano County, California*—Project Engineer for former landfill site in Benicia. Provided oversight for design and implementation of remedial action plan, including landfill gas extraction and treatment, stabilization of buried wastes, and excavation and offsite disposal of approximately 80,000 tons of soil and waste. The cleanup plan included stringent measures to control dust, odor, noise, and traffic, given the site location in a residential neighborhood.
- *Former Chemical Manufacturing Site, Santa Clara, California*—Project Director in managing multi-disciplinary team to complete RI/FS, risk assessment, interim cleanup actions, treatability studies, remedial design, and construction for soil-vapor and groundwater remedial systems. Groundwater treatment system unit processes included air stripping, fluidized bed liquid-phase carbon adsorption, and catalytic scale control.
- *Former Electronics Manufacturing Site, Sunnyvale, California*—Project Engineer responsible for design, operation and maintenance of groundwater extraction and treatment system. Developed plans and specifications for in-situ chemical oxidation treatment system using potassium permanganate. Implemented aggressive source remediation to reduce pump and treat requirements for Site.
- *Chromium Disposal Site, Mendocino County, California*—Project Director for this disposal site. Prepared corrective action plan for soil and groundwater, including realistic and cost-effective cleanup goals. Also prepared and implemented remedial design for excavation and treatment of 2,000 cubic yards of contaminated soil. Provided oversight for laboratory treatability studies for soil and groundwater to meet cleanup goals and discharge requirements.

### **Regulatory Permitting and Negotiations**

- Negotiated with USEPA to classify 100,000 cubic yards of contaminated sediments as non-RCRA hazardous waste, saving client over \$1 million in disposal costs.
- Prepared RCRA Part B applications, including storage facility designs, for two Bay Area chemical distribution and recycling facilities.
- Negotiated with California DTSC and CalTrans to manage 40,000 cubic yards of asbestos-containing soil as non-hazardous waste, allowing client to recycle material as deep fill at nearby highway construction site.
- Obtained variance for hazardous waste transfer station to increase onsite storage from 96 hours to 10 days, allowing facility to manage operations more cost effectively.

### ***Facility Closure***

- Prepared and implemented closure plans for hazardous waste storage facilities in Pittsburg, Richmond, Milpitas, and Stockton, California. Used risk-based analyses to develop cleanup goals for residual chemicals in soil and groundwater.
- Developed closure plan for Class II wastewater ponds at cogeneration facilities in Stanislaus and Colusa Counties, California.
- Designed and implemented a closure plan to remediate soil containing VOCs for an electronics manufacturing facility in Sunnyvale, California. Closure Plan included excavation, onsite aeration, and backfilling of chemical-affected soils.

### ***Water Quality / Sediment / Biological Assessments***

- *Temescal Creek and San Francisco Bay* — Managed team to assess potential migration of arsenic from soil to groundwater and surface water at former pigments manufacturing facility. Scope included a water quality and sediment investigation to evaluate arsenic concentrations in a storm drainage system, Temescal Creek, and San Francisco Bay. Evaluated various treatment options, including treatability studies and cost analyses to remove arsenic from water.
- *Throughout California and Hawaii* — Reviewed permit applications from municipal wastewater treatment plants in California and Hawaii requesting variances from secondary wastewater treatment standards. Assessed chemical and physical characteristics of waste water discharges, sediments, and receiving water quality, and biological effects predicted to occur from the discharge.
- Represented U.S. EPA in Section 7 consultations with U.S. Fish and Wildlife Service and other agencies to develop biological opinions on potential impacts of waste water discharges on southern sea otters and critical habitat in California.
- *Chesapeake Bay, Maryland* — Performed technical analyses of a proposed open-water dredge disposal site in Chesapeake Bay. Analyses included assessment of potential water quality and benthic impacts, sediment chemical characteristics, and critique of U.S. Army Corps of Engineers sediment transport model.
- *Former Pesticide Processing Site, Northern California* — Project director responsible for completing regional investigation of sediment quality, and managing dredging and disposal of 10,000 cubic yards of contaminated sediment along a shipping terminal. Developed health protective cleanup goals based on ecological and human health risk assessments. Negotiated agency approvals from U.S. EPA, U.S. Army Corps of Engineers, RWQCB, and DTSC.
- *Abandoned Asbestos Mill, Central Coast Range, California* — Evaluated potential migration of asbestos and heavy metals from an abandoned asbestos mill. Project included regional watershed analyses, including surface water quality and sediment erosion analysis of the Arroyo Pasajero alluvial fan to evaluate regional impacts from various point sources and non-point sources in the watershed basin.
- *Former Chemical Manufacturing Site, Guadalupe River, Santa Clara, California* — Project director responsible for assessment of impacts on the Guadalupe River, including groundwater-surface water interactions, sediment quality, and potential risks to aquatic organisms. Managed a multi-disciplinary team to complete a remedial investigation/feasibility study, risk assessment, treatability studies, remedial design, and construction for a remedial system for contaminated groundwater.



### ***Expert Witness / Litigation Support***

- Represented printing facility in Central California in negotiating consent decree with USEPA regarding alleged violations of RCRA and Clean Water Act. Evaluated waste management practices and compliance monitoring procedures. Developed recommendations to improve environmental management program, and identified mitigating factors to lower facility's fine.
- Provided expert witness testimony on behalf of plaintiff regarding fate and transport of organic compounds associated with chlorinated pesticide formulation facility in Richmond, California.
- Provided expert witness testimony for defendant in litigation regarding alleged placement and removal of contaminated soil from plaintiff's property in Santa Clara County, California.
- Provided litigation support for a case involving alleged contamination of a residential property with asbestos from a nearby construction site. Designed and implemented a soil testing program that demonstrated no significant impacts to plaintiff's property, which lead to a favorable settlement.
- Provided expert witness testimony for plaintiff in cost recovery litigation for a San Francisco Bay Area property. Services included case development and trial testimony regarding former occupants' contamination of land, and costs to remediate site for residential development. Jury decided in favor of the plaintiff.
- Represented property owner in litigation regarding right to take property, and recovery of remediation costs for Brownfields site in Emeryville, California.
- Testified on behalf of potentially responsible party regarding disposal of chromium waste at a municipal landfill in Mendocino County, California.
- Represented national chemical company in San Francisco Bay Area to negotiate settlement with state Attorney General Office regarding alleged violations of California Hazardous Waste Control Law. Identified mitigating factors to successfully reduce stipulated penalties.

### **EDUCATION**

M.S., Environmental Engineering, Cornell University, Ithaca, New York, 1984

B.A., Biology, University of Missouri, Columbia, Missouri, 1978

### **PROFESSIONAL HISTORY**

Northgate Environmental Management, Inc., Principal Engineer, 1999–present

LFR Levine-Fricke, Principal Engineer and Technical Services Group Manager, 1987–1999

California Department of Health Services-DTSC, Environmental Engineer, 1985–1987

U.S. EPA, Region IX, Environmental Engineer, 1983–1985

### **REGISTRATIONS**

Professional Civil Engineer: California, No. 049319

Registered Environmental Assessor: California, No. 00184

Engineering /Hazardous Materials Contractor: California, No 788400

Water Conservation Practitioner, Level 1: American Water Works Association, No. 00122

## PUBLICATIONS AND PRESENTATIONS

- Splitter, T., Chambers, J., and Leavitt, A., *In Situ Treatment of Tannery Wastes at the Braito Landfill*, Presented at 16th Annual AEHS Conference on Soils, Sediments and Water, March 15, 2006.
- Erskine, J., Chambers, J., and Leavitt, A., *San Jose MarketCenter: Risk Management for Brownfields Redevelopment*, Proceedings of Battelle's Fifth International Conference for Remediation of Chlorinated and Recalcitrant Compounds, May 22-25, 2006.
- Leavitt, A., Chambers, J.D., and Splitter, T., *Deep Soil Mixing to Stabilize Tannery Wastes at Braito Landfill*, Poster Presentation and Proceedings for Battelle's Fifth International Conference for Remediation of Chlorinated and Recalcitrant Compounds, May 22-25, 2006.
- Marvin, B.K., Chambers, J.D., Leavitt, A., and Schreier, C.G., *Chemical and Engineering Challenges to In Situ Permanganate Remediation*, in CSA Aerospace and High Technology Database, September 2006.
- Marvin, B.K., Chambers, J.D., Leavitt, A., and Schreier, C.G., *Chemical and Engineering Challenges to In Situ Permanganate Remediation*, accepted at Remediation of Chlorinated and Recalcitrant Compounds, Third International Conference, Monterey, California, May 2002.
- Chambers, J.D., Marvin, B.K., Schreier, C.G., and Leavitt, A., *Chemical and Engineering Challenges to the Application of In Situ Permanganate Remediation*, presented at The First International Conference on Oxidation Reduction Technologies. Niagara Falls, Ontario, Canada. 2001; and Poster Presentation at the Ground Water Resource Association Third Symposium on Arsenic Remediation.
- Chambers, J.D., and Leavitt, A., *Groundwater Cleanup in the San Francisco Bay Area- Creating Opportunities for Water Reuse*, accepted at National Ground Water Association National Conference in Nashville, Tennessee, December 2000.
- Chambers, J.D., Leavitt, A., Melby, J., and Walti, W., *In-situ Formation and Attenuation of Hexavalent Chromium with Permanganate*, accepted at Remediation of Chlorinated and Recalcitrant Compounds, Battelle Second International Conference, Monterey, California, May 2000.
- Chambers, J.D., Leavitt, A., Melby, J., Walti, W., and Schreier, C.G., *Formation and Attenuation of Hexavalent Chromium During In-situ Permanganate Treatment of Chlorinated Hydrocarbons*, accepted at National Ground Water Association Focus Conference in San Francisco, California, February 2000.
- Chambers, J.D. and Leavitt. *Creating Opportunities for Water Reuse—Integrating Water Reuse with Groundwater Cleanup*, accepted at National Ground Water Association Focus Conference in San Francisco, California, February 2000.
- Chambers, J.D. and Leavitt, A., *Combining Groundwater Cleanup with Water Reclamation*, presented at American Water Works Association Water Resources Conference, Norfolk, Virginia, October 29, 1999.
- Chambers, J.D., Leavitt, A., and Hennier, J.H., *Combining Groundwater Cleanup and Water Reuse*, presented at Water Reuse Association of California Symposium XIII, Oakland, California, September 18, 1998.

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**FRANK HAGAR, C.E.G., C.Hg.**

ASSOCIATE

Mr. Hagar has 30 years of progressive experience in hydrogeologic consulting for the environmental, mining, and agricultural water supply industries. He specializes in the integration of technology for organization, analysis, interpretation and presentation of site information and geo-characteristics that enable clients to efficiently conduct and maintain business or to create new business depending on the nature of the assignment. His depth of experience and knowledge of technical and regulatory issues ensures that his clients receive innovative and cost effective solutions for their projects. He has provided expert witness and testimony services for numerous clients throughout the United States.

**REPRESENTATIVE EXPERIENCE*****Environmental Characterization and Remediation***

- Project Manager for phased RCRA Facility Investigation for a secondary lead smelter located in Vernon, California. Project includes preparation of work plans for phased RFI, direction of associated field activities, interpretation and presentation of results including reporting. Project also includes design, construction, installation and operation and maintenance of soil vapor extraction system for Interim Corrective Measure program.
- Constructed flow and hydrocarbon contaminant model for a risk assessment for no action alternative at crude oil spill. Model included two-phase flow in both the saturated and unsaturated zone. San Luis Obispo Tank Farm, San Luis Obispo, California.
- Designed groundwater extraction system using flow modeling to establish a capture zone analysis. In addition, performed aquifer test design and analysis for model input. Pacific Coast Pipeline (PCPL) Superfund Site, Fillmore, California.
- Using visualization and estimation software, prepared detailed description and depiction of hydrocarbon contamination beneath the tank farm site. Unocal-Avila Tank Farm, Avila Beach, California.
- Prepared a site investigation report for petroleum product tank storage farm. Project included recommendations for implementation of a Remedial Action Plan to clean up a hydrocarbon-contaminated volume of soil. ARCO Pipeline Co./Texas City Refinery, Texas City, Texas.
- Conducted site evaluation for service station demolition and subsequent sale of property. Identified contaminated areas and recommended soil remediation program including vapor extraction. Unocal-site evaluation, Solana Beach, California.
- Task leader for investigation of several service stations rebuilds. Contract included conducting site investigations to identify groundwater and soil contamination. Provided both technical and management services for several underground storage tank removals including cleanup and disposal of contaminated soil and groundwater. Activities were limited to pump and treat and

excavate and disposal. Mobil Oil Corporation, Marketing Division, Northern Los Angeles District, California.

- Managed project for phased evaluation of environmental impacts of a potentially responsible party (PRP) in a Superfund action. Project included agency and client interaction, work plan development and implementation, and management of budgets and schedules, as well as onsite direction of activities. Confidential client RI/FS for solvent reprocessing facility, Southern California.
- Provided soil and ground water sampling per San Bernardino County's requirements for several old gasoline service station sites where either site demolition or station rebuilds were being performed by the client. Bear Valley Paving, various sites, San Bernardino County, California.
- Remediation of smudge oil contaminated site. Conducted evaluation of extent and severity of smudge oil contamination on property being developed for tract homes sales. Recommended and implemented a combined excavation and bioremediation technique for cleanup to mandated standards. Homestead Land Development Co., Riverside County, California.
- Environmental Restoration and Protection Plans, U.S. Forest Service, Denver, Colorado. Participated as a Forest Service ID Team member for development of watershed and hydrologic portions of Environmental Restoration and Protection Plans (ERPPs). Project included oil field drilling, transfer station siting, pipeline and transportation route evaluation. Exxon La Barge Project, La Barge, Wyoming.
- Site investigation and clean up of waste oil and solvent spills beneath several auto dealerships. Plymouth Land Management Co., Corona, California.
- Evaluation of in-situ venting efficiencies and optimum well spacing for extraction of various hydrocarbons. Various clients - City of Lead, South Dakota.
- Site investigation, characterization, and clean up of gasoline and waste oil spills beneath several service stations. Regulatory negotiation, vapor extraction system (VES) and groundwater monitoring plan development, data collection and submission, and closure document preparation. Texaco Refining and Marketing, Inc., various locations.
- Project Leader for preparation of a multi-lingual public participation plan for a site being remediated under California Environmental Protection Agency; Department of Toxic Substances Control direction. Texaco Refining and Marketing, Inc., Santa Fe Springs, California.
- Prepared VLEACH and gas flow modeling analysis in support of installation of a deep vapor recovery system. Texaco Refining and Marketing, Inc., Fullerton, California.
- Developed, implemented and managed program for the location of 13 buried sumps associated with historic drilling activities at the Aliso Canyon oil field. Project consisted of an integrated remote sensing program using photography and geophysical techniques to supplement subsurface data collection. A trigger-activated sampling program was devised to minimize costs while establishing subsurface hydrocarbon contamination extent within a risk management program consistent with the Gas Company's program. Southern California Gas Company, Aliso Canyon Site, California.
- Developed and implemented an air monitoring program for use during pipeline cleaning operations. Program was designed to minimize odors and annoyance factors for nearby residents. Southern California Gas Company, Marina Del Rey, California.
- Prepared ground water hydrology and surface water hydrology portions of landfill cap design and closure plan. Landfill contaminated with benzene, toluene, ethylbenzene, and xylenes (BTEX), dense, non-aqueous phase liquid (DNAPL) and metals. San Diego County Superior Court, Sesi Property.
- Directed sampling and monitoring program for DNAPL contaminated landfill site.

- Prepared an implemented supplemental site characterization plan in response to a regulatory imposed Cleanup and Abatement Order. Negotiated with regulatory agency on client's behalf to minimize long-term expenditure at site. Granite Construction Company, Indio, California.
- Directed installation, operation and monitoring for a VES system at a pipeline take-off station. Prepared closure documentation and request. Obtained closure without verification drilling. Calnev Pipeline Company, Barstow, California.
- Prepared Risk-Based Corrective Action (RBCA) analysis for subsurface DNAPL contamination and developed statistical sampling program for verification of clean up levels within the subsurface beneath a number of buildings either destroyed or damaged by fire. Commerce, California.
- Vapor intrusion modeling using Johnson and Ettinger and other applicable models. Various locations in California.

### ***Groundwater Fate and Transport Modeling***

- Preparation of UIC permit application, NRC license application and state required permits for in-situ uranium mining project. Data management, visualization and display and preparation of public interest presentations included. Data management performed using EQulS 5 Enterprise and Professional. Included in the EQulS activities was development of a SEDD 2A EDD import utility, web based, password controlled laboratory interaction and web based reporting for client and regulators.
- Fate and transport modeling for coal-bed methane water disposal in Wyoming. Prepared a pond management plan to minimize impact to shallow ground water to allow disposal of generated water from coal bed methane operations.
- Constructed fate and transport model including biodegradation and co metabolic degradation rates for a demonstration of natural attenuation processes at a benzene and chlorinated contaminated site.
- Prepared capture zone analyses for numerous service stations in the Los Angeles basin, Orange County and San Diego County.
- SESOIL and AT123D application and project construction for two sites for establishment of soil screening levels for remedial activities at California Environmental Protection Agency/ Department of Toxic Substances Control (Cal EPA/DTSC) managed sites.
- Prepared a fate and transport model to evaluate potential impacts to a deep, high capacity water supply well in the city of Carpentaria, California from an Methyl Tertiary Butyl Ether (MTBE), benzene plume excursion from a nearby service station. Project included regulatory interaction and review and cooperatively interacting with the water district designated consultant to evaluate current as well as planned water production scenarios. Reevaluated aquifer test data to establish aquifer properties for parameter estimation.
- Constructed and applied multi-dimensional, numerical model for northern San Juan Basin project for oil production company. Purpose of model was to evaluate recharge and predict aquifer drawdown due to long-term dewatering. Modeling included two-phase methane/water predictions.
- Performed numerical modeling of vapor transport for Oil landfill. Developed flow model and capture zone analysis for pump and treat system for light, non-aqueous phase liquid (LNAPL) recovery.

- Task Manager for database construction and management and three-dimensional ground water flow modeling for hydrology portions of Environmental Impact Statement (EIS). Project involved client and public interaction for evaluation of cumulative hydrologic impacts due to extensive mining in area.
- Numerical modeling for mine pit dewatering and subsequent fill-up.
- Developed numerical flow model of Ivanpah Valley, California, for evaluation of impacts of mining on regional aquifer system. Results incorporated into third party EIS for mine.
- Developed analytical well field models for water withdrawals at three gold properties in Nevada.
- Constructed numerical ground water flow model for Superfund site and developed capture zone analysis for pump and treat system. Provided aquifer test and long-term water level monitoring service and data analysis.
- Developed numerical model for hydrocarbon recovery at a crude oil pipeline spill.
- Performed capture zone analysis for response to EIS for landfill development. Evaluated effectiveness of monitoring plan based on results. Confidential client, California.
- Developed three-dimensional geologic and ground water flow model for third party EIS at Rosebud Mine near Colstrip, Montana. Model included long-term evaluation of the cumulative hydrologic impacts of mining on the regional aquifer system. Extensive analysis of impacts on alluvial water quality. Montana Department of State Lands, Helena, Montana.
- Developed three-dimensional flow model for Flying J Refinery near Williston, North Dakota.
- Developed cross sectional variably saturated contaminant model for mine waste disposal site. Battle Mountain Gold Company, Houston, Texas.
- Applied a two-dimensional numerical flow model (MODFLOW) to the evaluation of proposed well pumping effects on existing wells and the adjacent river. Presented extensive expert witness testimony regarding the results. South Adams County Water and Sanitation District, Commerce City, Colorado.
- Utilized two-dimensional numerical flow models for predicting recharge well effects and evaluating well field development scenarios. Applied two-dimensional analytical contaminant transport model to evaluating the fate of inorganic chemicals migrating through the ground water system. Denver Southeast Suburban Water and Sanitation District, Parker, Colorado.
- Applied two-dimensional flow models (MODFLOW) to evaluating deep well pumping effects on surface streams, and presented expert witness testimony at regulation-forming hearings. City of Colorado Springs, Colorado Springs, Colorado.
- Applied ARC-Info GIS for development of a Habitat Conservation Plan for the California giant garter snake and the Swainson's hawk. Integrated land ownership, land use, soil type agricultural information, transportation corridors, and existing habitat information to develop alternate habitat locations and associated costs.
- Applied image processing techniques to develop methodology for correlation of vegetative stress with regional water level declines. Initially, a pilot project was performed to develop technique. Follow up project included full temporal analysis of eastern San Luis Valley. U.S. Bureau of Land Management, San Luis Valley, Colorado.
- Prepared flow model calculations for dewatering of landfill face during construction of toe buttress. Model addressed seasonal influence and was used for construction scheduling. San Diego County Superior Court, Sesi Property.

- Prepared VLEACH model for analysis of infiltration of gasoline. Subsequently constructed a gas flow model to show impact of operation of a multi-zone vapor extraction system. Texaco Refining and Marketing, Inc., Fullerton, California.
- Constructed a three-dimensional gas flow model to show operational impact of vapor extraction system. Using a variety of models and calculation techniques, documented system performance that eventually led to site closure. Calnev Pipeline Company, Barstow, California.

### ***Expert Testimony***

- Designated expert for Sacramento County District Attorney Action for protection of ground water from petroleum hydrocarbon contaminants. Assigned tasks include preparation of risk analyses using fate and transport studies combined with geospatial analysis of water resource production.
- Designated expert for fracture system fate and transport, consumptive and beneficial use and hydrogeochemistry of ground water in a liability case involving rainfall, runoff and modification of surface runoff regime.
- Fate and transport modeling for class action and fate and transport in the Santa Susana Mountains of Southern California. Assignments included review of historical records, current environmental conditions, surface and subsurface flow as well as prediction of travel times and points of impact for chlorinated hydrocarbon contaminated ground water.
- Designated expert for ARCO in arbitration with City of Garden Grove, EXXON-Mobil and a sewer construction contractor for due-diligence investigation for sewer installation in contaminated intersection. Assignment involved design of dewatering and treatment system based on fate and transport of hydrocarbon contaminated groundwater to allow installation of a below water table major sewer line.
- Project manager and designated independent reviewer of adequacy of site characterization and remedial activities for Underground Storage Tanks belonging to two major oil companies in a settlement with the Orange County, California District Attorney office.

### **EDUCATION**

B.Sc., Geological Engineering, Colorado School of Mines, 1977

Geol. Eng. (Professional Geologic Engineer degree), Colorado School of Mines, 1978

### **PROFESSIONAL HISTORY**

Northgate Environmental Management, Inc., Associate, 2008 to date

VP of Operations, Managing Hydrogeologist, E2 Environmental, Inc. Irvine, California, 2005 to 2008

Manager, Technical Applications Group, England Geosystem, Inc. Irvine, California, 1997 to 2005

Principal Hydrogeologist, ENV America Incorporated, Irvine, California, 1995 to 1997

President, Envirottools Ltd., San Clemente, California, 1991 to 1997

Division Manager, Knight Piésold and Co., Irvine, California, 1990 to 1992

Branch Manager/Hydrologist, Western Technologies, Inc., Newport Beach, California, 1989 to 1990

Associate, Western Technologies Inc., Denver, Colorado, 1988 to 1989

Owner/Sr. Hydrologist, Green Canyon Geosciences, Bakersfield, California, 1985 to 1988

Vice President, MINESoft Ltd., Lakewood, Colorado, 1985

Engineering Geologist/Hydrogeologist, Fox and Associates, Lakewood, Colorado, 1983 to 1985

Project Hydrologist, Ertec Rocky Mountain, Inc., Golden, Colorado, 1980 to 1983

Staff Engineer, Zorich-Erker Engineering, Denver, Colorado, 1978 to 1980

## **REGISTRATIONS**

Certified Professional Geologist No. 5979, California

Certified Engineering Geologist, No. 1943, California

Certified Hydrogeologist No. 430, California

## **PUBLICATIONS**

Robinson, G.M.L. and Frank J. Hagar, "Geostatistical Databases for Hazardous Waste Estimation,"  
Pollution Engineering, G.M.L., 1987

Frank J. Hagar, "Conventional Geostatistics in Mine Waste Monitoring and Management,"  
Groundwater Monitoring Review, NWWA, G.M.L., 1988

Frank J. Hagar, "Mine Waste Database Management," Groundwater Monitoring Review, NWWA,  
1988

Frank J. Hagar, "Computerized Analysis of Ground Water Data," Colorado Computer Oriented  
Geologic Society Short Course, 1988



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**CINDY ARNOLD**  
SENIOR CHEMIST

Ms. Arnold has over 20 years of experience in environmental chemistry both in the laboratory setting and as an environmental consultant. She has worked on numerous remedial investigations and feasibility studies, performing baseline risk assessments, ecological assessments, and community relations planning. She has served as a Quality Assurance Officer for a wide variety of state and federal programs across a national network of offices, in addition to serving on special technical teams for both the public and private sector. Ms. Arnold has performed data validation for organic analysis, high resolution analysis of PCB congeners and dioxin/furans, radiochemistry, inorganic analysis and classical wet chemistry. She has experience with air and industrial hygiene sampling and analysis. Ms. Arnold has also served as a litigation support chemist in the statistical impact analysis of environmental data.

## REPRESENTATIVE EXPERIENCE

### *Site Investigation and Remediation*

- *BMI Henderson Project, Henderson, Nevada*—Performed pre-purchase due diligence for a 2200-acre parcel – the largest Brownfields site in the United States. Involvement included participation in meetings with NDEP, where Northgate gained their respect and confidence. This property served as a disposal facility for wastes generated by the world’s largest magnesium production plant during World War II. The property was later used as a disposal site for other manufacturing activities, resulting in a mixed-waste stream of heavy metals, radionuclides, pesticides, chlorinated solvents, perchlorates, and other chemicals. In order for the cleanup project to meet residential standards, an estimated 2 million cubic yards of soil will be removed from the parcel. Remediation efforts are complex due to the presence of existing nearby residential developments and the Las Vegas Wash, which flows into Lake Mead, a major source of water for the Southwest. Following remediation, construction of the development will occur, including parks, schools, trails, housing, and a business district. The Site is the largest Brownfields project in Nevada. The City of Henderson anticipates that the project will revitalize the downtown area and provide housing for those employed in Henderson and Las Vegas.
- *Luke Air Force Base, Phoenix, AZ* – Ms. Arnold served as the Quality Assurance Officer (QAO) during the data fraud investigation and Remedial Investigation resampling at Luke AFB. She worked directly with USEPA Region IX, USACE Omaha District and Arizona DEQ to resolve the impact of data fraud on 23 NPL sites CERCLA protocol.
- *Remedial Investigation, Former Pesticide Manufacturing Facility, Lakeland, FL* – Ms. Arnold served as Quality Assurance Officer during the RI for a former pesticide manufacturing facility listed on the NPL in Lakeland, Florida. CERCLA process experience included remedial investigation planning and implementation. Site issues included offsite exposure issues including groundwater, surface water, sediment, and soils. Contaminants include pesticides, metals, and several inorganic analytes such as nitrates, sulfate, and ammonia.
- ◆ *Remedial Investigations and Baseline Risk Assessments, Homestead AFB, FL, USACE Omaha* - Served as the Quality Assurance Officer for Homestead AFB, an installation listed on the NPL. CERCLA process experience included remedial investigations, baseline risk assessments, ecological assessments, and community relations planning. Twenty-five sites were identified and designated as separate operable units: nineteen sites were CERCLA-based investigations, five sites were state petroleum contamination-based investigations, and one site was a RCRA

closure investigation. All of the investigations included groundwater, surface water, sediment, and soils evaluations. Contaminants include pesticides, metals, waste oils, and jet fuel.

- ◆ *Sloss Industries, Alabama* - Project chemist for preparation and implementation of RCRA RFI Work Plan for a southeastern manufacturer of chemicals, industry grade coke, and mineral fiber. The facility has 39 identified Solid Waste Management Units (SWMUs) requiring a RFI and a CMS. Proximity and similarity of several SWMUs requiring a RFI and a CMS permitted grouping of SWMUs into four areas and development of a staged approach of implementing the RFI over a five-year period.
- *Ford Motor Company Corporate Consortium* – Ms. Arnold was the corporate representative at the consortium who acted as a consultant to Ford Motor Company in developing standard protocol for environmental sampling, analysis, database management, retrieval, access security and storage for all Ford Motor Company consultants to utilize.
- *Uranium Mill Tailings Remedial Action (UMTRA), Albuquerque, NM* – Ms. Arnold developed and implemented the statistical analysis of historical data for the DOE Uranium Mill Tailings Remedial Action (UMTRA) project. Successfully trained staff to update the database for all 24 UMTRA sites for radiological, organic, and inorganic data prior to monitoring and disposal/containment.
- *RCRA Corrective Measures, Chemical Manufacturing Facility, Central Alabama* - Project Manager for an agricultural chemical manufacturer and managed RCRA-related compliance issues at the facility, including evaluation of the current Detection Monitoring Program for the regulated units, evaluation and redesign of the corrective action systems for the SWMUs. Also managed stormwater-permitting activities at the site. Prepared RCRA Part B Modification Groundwater Monitoring Program based on site-wide approach to corrective action at the SWMU areas and an ACL evaluation of the constituents of concern at the facility.

### **Laboratory Experience**

- *USEPA Contract Laboratory Services* - Ms. Arnold performed both quantitative and statistical analyses in support of federal programs for the USEPA under the Contract Laboratory Program (CLP), Routine Analytical Services (RAS) and Special Analytical Services (SAS) in support of environmental studies, treatability projects, bioassays, ecological risk assessments, industrial hygiene and government contracts.
- *NASA's Space Shuttle Program* – As the primary contractor for NASA, Ms. Arnold provided quantitative support to NASA's space shuttle program performing routine industrial hygiene analysis and pre-launch analysis of drinking water, vehicle assembly building worker safety program and environmental post launch analyses.
- *Florida Institute of Phosphate Research (FIPR)* – Ms. Arnold served as a chemist providing radiological testing services for ecological and vegetative impact studies throughout the state of Florida.

### **EDUCATION AND TRAINING**

Bachelor of Science, Chemistry, Florida Atlantic University

Finnigan/MAT GC/MS and MS Interpretation Training Courses

Finnigan/MAT ITD Training Course

40 Hour HAZWOPER

### **Resume**

FL and AZ DEQ Field Sampling Course – Soil and Groundwater

Access Database Management Course IRPIMS Database Management Course

ISO 9001 Project Management Training

Building Envelope Seminar: Mechanics of Moisture, Dr. Joe Lstiburek

Dr. Chin Yang and Dr. Li lecture series

- Fungal identification, ecology and species succession
- Fungal life cycles for water damage species
- Timelines for fungal growth in water damage circumstances
- Legal cases and consultant preparation
- Comparison of sampling techniques and the interpretation of clearance samples

Guidelines for the Assessment of Microbiological Contamination in Indoor Environments 2004

Asbestos Awareness, Conestoga Rovers 2005

Health & Safety, Conducting an Accident Investigation, USF Education & Research Center 2006

## **PROFESSIONAL HISTORY**

Northgate Environmental Management Inc., Senior Chemist, 2008 - present

Independent Contractor, 2007– 2008

HSA Engineers & Scientist, Senior Scientist/Manager, 2003 –2007

ARCADIS, Senior Project Scientist, 1992 –2003

Post, Buckley, Schuh and Jernigan, Laboratory Division 1985 - 1992

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**RENEE KALMES, M.S.P.H., C.I.H.**  
ASSOCIATE RISK ASSESSOR

Ms. Kalmes has managed and overseen human health risk assessments for more than 150 sites, including comprehensive risk assessments at former landfills and industrial facilities. She is familiar with chemicals of potential concern and exposure pathways at the BMI Henderson site through her oversight of previous investigation activities, performed on behalf of Centex Homes. She has evaluated potential exposure to metals, pesticides, volatile organic chemicals and petroleum products in soil, groundwater and air and developed cleanup levels and other risk management recommendations. Ms. Kalmes has evaluated soil vapor intrusion issues through use of soil vapor modeling and air monitoring tools. For these projects, she has communicated risk results to a variety of stakeholders, including neighborhood, worker and community groups.

## REPRESENTATIVE EXPERIENCE

- *BMI Henderson Project, Henderson, Nevada*— Ms. Kalmes reviewed and provided oversight of risk-based remediation goals development for constituents of potential concern (COPCs) at the 2,200-acre BMI waste-pond redevelopment site. COPCs consisted of heavy metals, radionuclides, pesticides, chlorinated solvents, perchlorates, and other chemicals.
- *Middlefield-Ellis-Whisman (MEW) Superfund Site, Mountain View, California* – Ms. Kalmes is providing ongoing support for this EPA site addressing trichloroethylene and other chlorinated solvents in groundwater and indoor air within an office park. Evaluated factors that most influence settings where indoor air concentrations are elevated over target risk-based concentrations. Background concentrations were incorporated into the evaluation of no risk.
- *Tourtlot Remediation Project, Benicia, California* – Ms. Kalmes managed several area-wide and site-wide risk assessments following remediation efforts to ensure that residual levels were protective of human health and ecological impacts. Ecological screening assessments were also conducted.
- *Former Braito Landfill, Benicia, California* – Ms. Kalmes conducted a risk assessment for this 60-acre closed sanitary landfill in Solano County. The Preliminary Endangerment Assessment evaluated soil, soil-gas, and groundwater data. Data were used to evaluate potential runoff to assess conditions in the lands adjoining the area. Developed site-specific clean-up levels for various metals, including arsenic.
- *FMC, Stanislaus County, California* – Ms. Kalmes develop a risk-based remedial investigation of this 43-acre site for proposed use as a business park. Conducted assessments of construction worker, service worker, and commercial worker exposure scenarios. Developed site-specific cleanup levels for arsenic, barium, and polycyclic aromatic hydrocarbons that were accepted by the Department of Toxic Substances Control and the Regional Water Quality Control Board.
- *Sutter Creek Gold Mines, Amador City, California* – Ms. Kalmes managed risk assessment and Preliminary Endangerment Assessment of three former gold mines in northern California. Contaminants consisted primarily of metals in soils. Evaluated future residential, construction worker, commercial worker, and recreational site user scenarios. Ecological receptors were also evaluated.
- Prepared over 100 exposure and risk assessment for various properties, including former landfills, industrial, residential, recreational and agricultural properties and schools. Evaluated potential exposure to metals, pesticides, volatile organic chemicals and petroleum products in

soil, groundwater and air and developed clean-up levels and other risk management recommendations. Evaluated soil vapor intrusion issues through use of soil vapor modeling and air monitoring tools. Communicated risk results to a variety of stakeholders, including neighborhood, worker and community groups.

- Managed numerous assessments of contaminated property for future residential, commercial and school developments while working closely with regulatory agencies to obtain approval of health-based strategies. Key issues for these sites included soil gas vapor migration, particulate emissions and groundwater transport and fate modeling. Developed health based cleanup levels for scenarios such as residential, commercial, construction and trespassers. Has successfully worked on sites involving chemicals such as TCE, PCE, 1,1,1,-TCA, EDB, PAHs, arsenic, lead, barium and mercury.
- Conducted numerous exposure assessment analyses for use in cohort and case-control health studies including petrochemical, aircraft, chemical, and agricultural industries. Designed and managed air sampling program to obtain 8-hour, peak and short-term levels for various job classifications to be used in epidemiological studies. Performed exposure reconstruction studies to evaluate chemicals such as benzene, silica, formaldehyde, lead and asbestos.
- Provided reviews of health literature, air sampling methods, and worker exposure data for silica, beryllium and asbestos and their associated products. Conducted air sampling for numerous compounds such as volatiles, oil mists, pesticides and particulates. Audited and reviewed health and safety compliance programs for petrochemical, agricultural, laboratory and chemical manufacturing facilities, including review of labeling, MSDSs, training manuals, safe chemical handling procedures, ventilation, and employee training and chemical inventory procedures.
- Conducted Proposition 65 evaluation on various consumer products assessing potential exposure to children and adults to metals including lead, cadmium and arsenic. Developed sampling protocol to evaluate metals in products. In addition, evaluated potential exposure associated with dermal contact and incidental ingestion associated with hand-to-mouth activities.
- Managed over 20 air risk assessments associated with the California Hot Spots Program (AB-2588) for aerospace, hospitals, chemical, and manufacturing facilities including evaluation of hexavalent chromium, benzene and propylene oxide. Ms. Kalmes has also performed analyses of large hydrogen sulfide air monitoring datasets to evaluate potential sources and trends within a state.

## **EDUCATION**

M.S., Air and Industrial Hygiene, University of North Carolina, 1983

B.S., Environmental Science, Purdue University, 1981

## **REGISTRATIONS**

Certified Industrial Hygienist

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**DANA R. BROWN, P.G., R.E.A., C.E.M.**  
SENIOR GEOLOGIST

Dana Brown is a Professional Geologist and Certified Environmental Manager with 19 years of professional experience. He has been responsible for geologic and hydrologic site characterization studies, remedial alternative feasibility studies, and remedial systems implementation. His project experience includes work at the BMI Henderson Site as well as a groundwater characterization project under oversight of NDEP in Reno, Nevada. Mr Brown has attained key user status with the AutoCAD, GINT, and SURFER software packages. His computer modeling abilities include proficiency with groundwater fate-and-transport modeling using GMS, Modflow, MT3D, and other aquifer testing systems; surface water hydrology using RMS and WMS to model watershed systems and determine 100-year floodplain boundaries and flood depths. He has extensive field experience in all common types of environmental drilling and monitoring well installation, surface water characterization, and soil vapor studies, having participated in site remediation involving excavation, groundwater pump and treat, soil vapor extraction, insitu chemical oxidation, dual-phase extraction, and biostimulation through oxygen sparge.

## REPRESENTATIVE EXPERIENCE

### *Due Diligence*

- *BMI Henderson Project, Henderson, Nevada* – Conducted a Phase I ESA (on behalf of buyer) for a 2,200-acres parcel of land that was part of the Black Mountain Industrial complex, a former disposal facility for wastes generated by the world's largest magnesium production plant during World War II. The property was later used as a disposal site for other manufacturing activities, resulting in a mixed-waste stream of heavy metals, radionuclides, pesticides, chlorinated solvents, perchlorates, and other chemicals. Developed confirmation sampling work plans and peer reviewed remediation documents on behalf of buyer.
- *Watson Land Company, Judith Young Trust, Opus West Corporation* – Performed Phase I Environmental Site Assessments at various locations in Southern California. Performed evaluations of site and vicinity listings on federal, state, and local environmental databases; conducted file reviews at state and local agencies; conducted site visits to determine Recognized Environmental Conditions for site and vicinity; reviewed historical documents and interviewed relevant individuals to determine current and historical uses of the site and vicinity; provided findings of the Phase I investigations in written reports.

### *Site Investigation and Remediation*

- *Initial Site Investigation Study, City of Lodi Area of Contamination, City of Lodi and Resolution Law Group, P.C., Lodi, CA* — Responsible for performance of site characterization including installation of 465 grab-groundwater sampling points and 20 monitoring wells. Managed bid and contract processes, and supervised field activities of subcontractors providing drilling, monitoring well installation, drive point sampling, analytical services, utility locations, surveying, paving, traffic control, waste disposal, and site restoration services. Performed all permitting, site access agreement negotiations, scheduling, and management of investigation derived residuals including waste profile development and disposal.
- *Multiple Contaminant Characterization, Lawrence Livermore National Laboratories, United States Department of Energy, Environmental Restoration Division, Livermore, CA* —

Responsible for collection of soil, surface water, and groundwater samples; monitoring well installation; soil vapor surveys; and installation of soil borings for multiple contaminant characterization at a CERCLA facility with former military and ongoing DOE operations. Supervised drilling and sampling using wireline punch core (94mm) mud rotary methods, hollow stem auger, Geoprobe, and cone-penetrometer methods. All work performed within security clearance zones of the Main Laboratory and Site 300 areas, and in compliance with relevant USEPA Superfund site protocols.

- *Litigation Defense & Legal Support Services, Chico Central Plume, Noret, Inc.; Resolution Law Group, P.C.; and Stoel Rives, LLP, Chico, CA* — Performed drilling and well installation, geophysical characterization, aquifer testing, and contaminant fate & transport analysis for a solvent plume in downtown Chico, CA. Participated in the legal defense of clients downgradient of the release, and also site investigations for responsible parties that contributed to the plume by preparing expert witness declarations and reviewing the activities of consultants employed by the PRPs. Oversaw field work performed by consultants for the PRPs on properties that were named as potential contributors to the plume, and participated in the legal defense of those entities. Also supervised aquifer properties testing of the deep and intermediate zone aquifer systems for remedial investigation feasibility studies and Corrective Action Plan development.
- *Downtown Reno Groundwater Characterization, Nevada Division of Environmental Protection Reno, NV* — Worked with the State of Nevada to develop a Workplan for field activities that included shallow and intermediate zone monitoring well installation, soil and groundwater sampling, and aquifer characterization studies to create a hydrological model of the contaminant fate and transport within the heavily developed section of downtown Reno. Managed bids and contracts for sub-contractors, supervised all field work to drill and install the wells, develop and sample, perform aquifer testing, and then prepare a combined Site Characterization Report and Corrective Action Plan.

### **Mining Industry**

- *Mine Waste & Site Hydrology Characterization, Leviathan Mine, Regional Water Quality Control Board, Lahontan Region, Markleeville, CA* — Performed investigations to characterize mine wastes for interactions with rainfall and runoff, created an inventory of site springs and seeps, developed a sampling program for portal discharge and pit water, and documented the site surface water balance. Supervised site drilling and sampling activities for installation of 17 monitoring wells in decomposed volcanic terrain using the Rotosonic method. Developed and sampled the groundwater monitoring wells, and performed aquifer testing to facilitate groundwater modeling. Developed and implemented programs for sampling of surface waters, springs, seeps, and stream gauging to characterize surface water hydrology.
- *Baseline Site Hydrology Evaluation and Leachate Release Remediation, Erdenet Mine, Armada Gold Corporation, Erdenet, Mongolia* — Performed baseline studies to characterize surface and groundwater chemistry, surface and groundwater hydrology, and air quality prior to startup of an SX/EW extraction facility at a copper mine in north-central Mongolia. Performed diamond core and rotary drilling of granitic bedrock to characterize release of low-pH leachate released from the onsite storage ponds. Performed contaminant fate and transport evaluation and created monitoring network to safeguard surface water supplies from impacted springs and seeps.
- *Underground Workings and Above-Ground Processing Facilities Site Cleanup and Heap Leach Closure, Darwin Mine, Blue Range Mining Company, Darwin, CA*—Performed Phase I and II Environmental Site Assessments, hazardous materials inventories, and characterization for all portions of an inactive lead-zinc mine located in Inyo County, CA. The facility included underground workings and above-ground mill buildings with intact processing equipment, tailings impoundment, and heap leach facility. Managed the removal and remediation of hazardous materials including storage tanks, transformers, asbestos, lead-based products, and assay

laboratory wastes. Performed site and heap materials characterization and reporting to develop closure documentation for inactive heap leach facility. Performed open portal and shaft identification combined with patented claims verification in rugged 920 acre site to develop recommendations for access restrictions and/or closures for the adjacent claims.

- *Tailings Disposal Evaluation, Mill Facility Cleanup and Site Remediation, Heath and Shoemaker Mine Sites, The Hillman Company, Lewistown, MT*—Performed Phase I and II Environmental Site Assessments for the surface and underground portions of inactive gypsum mines located in Central Montana. Evaluated the potential for tailings disposal within the mine to impact regional aquifer systems and groundwater quality. Supervised the cleanup of petroleum impacted soils, above-ground storage tanks, spent chemicals, mineral processing and laboratory wastes.

## **EDUCATION**

B.S., Geology: California State University, Long Beach, 1984

## **PROFESSIONAL HISTORY**

Northgate Environmental Management, Inc., Senior Geologist, 2006 to date

E2C Remediation, Bakersfield, CA, Senior Geologist 2005-2006

Hanover, Inc., Chico, CA, Senior Geologist 2001-2005

Henshaw Associates, Dublin, CA, Senior Project Manager 2000-2001

WESTEC/SRK, Reno, NV, Project Manager, 1990-1999

Weiss Associates, Emeryville, CA, Staff Geologist 1989-1990

## **REGISTRATIONS**

California Registered Professional Geologist, #7188

Nevada State Certified Environmental Manager, #1528

California Registered Environmental Assessor-I, #06396

RWQCB/EPA Course: Application of Risk Assessment for Environmental Decision Making



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**PASCUAL BENITO, PH.D****SENIOR STAFF ENGINEER**

Dr. Benito has 14 years of experience supporting environmental consulting projects and working in research and development related to numerical modeling using MODFLOW, PMWIN PRO, and GMS; river & stream modeling using HEC-RAS; pumping test analysis using Aquifer and AQTESOLV. He is experienced using Surfer, Excel, ArcGIS, expert in MATLAB programming, and computer graphics and data visualization, and writing numerical modeling codes in MATLAB, Fortran, and Python. Dr. Benito has also worked extensively in research and development in areas including: subsurface fluid flow and contaminant transport modeling, hydrogeologic site characterization and environmental remediation, ground water/surface water interactions, chaos and fractal geometry in Earth systems, data visualization, Web-based GIS, and science and engineering curriculum development.

**REPRESENTATIVE EXPERIENCE**

- Developed 3-D regional groundwater flow and transport model for Northern San Joaquin River Basin as part of an investigation into the impact of the food processing industry on salinity in the Central Valley.
- Pore-network modeling of immiscible displacement fronts (e.g. NAPL/water, gas/water, etc...) using invasion percolation method. Lattice-Boltzmann numerical modeling to measure absolute and relative permeabilities of digitized rock samples.
- Analysis of production data from Chevron Lost Hills Diatomite oil reservoir, and development of cross-well tests that can be carried out during production operation. Developed analytic solutions for pressure transients arising from sinusoidal well testing for use in analysis of water flood production data.
- Analysis of cross-well air-injection tests in variably saturated, fractured basalt flows, Analysis included steady-state and transient injection test analysis and spatial data visualization of hydrogeologic data.
- Yucca Mountain Project: Lab measurement of hydrogeologic rock properties from core samples: gravimetric water content, saturation, porosity, bulk density, grain density.
- Responsibilities included: monitoring hydrogeologic field experiments and data collection; geophysical gravity surveying, statistical analysis of fracture data, laboratory analysis of tracer test samples using ion-exchange chromatography, geologic mapping; and creation of publication quality figures and visual aids for presentations.
- Worked as part of a research team investigating fluid flow in fractured bed-rock aquifers: analyzed geophysical well logs and developed sub-surface fracture database; monitoring hydrologic field experiments; water sample analyses using ICP spectrometer and fluorophotometer; petrographic analysis of rock samples; computer data entry and analysis; prepared graphs and figures for presentations and professional publications.
- Hydrogeologic and environmental data collection, GIS mapping, numerical groundwater modeling (<http://hgp-inc.net>), systems and web-based GIS + data analysis tools (<http://h2o2u.us>).
- Hydrogeologic characterization and aquifer test analysis in support of expert witness testimony in environmental litigation cases.

## **EDUCATION**

Ph.D., Major: Hydrogeology, Minors: Geophysics, River Restoration & Ecology, U.C. Berkeley,  
Department of Civil & Environmental Engineering, 2008

M.S., Hydrogeology, U.C. Berkeley, Dept. of Civil & Environmental Engineering, 2001

B.A. cum laude, Geology, Amherst College, 1994

Summer Course in Geologic Field Methods, Univ. of Pennsylvania-YBRA, 1993

## **PROFESSIONAL HISTORY**

Northgate Environmental Management, Inc., Senior Staff Engineer, 2009–present

HGP, Inc./WebH<sub>2</sub>O, Research and Development Engineer, 2006–2009

U.C. Berkeley Department of Civil & Environmental Engineering, Graduate Student  
Researcher, 2006–present

Berkeley and Berkeley Unified School Districts Applied Design Engineering Project Teams  
(ADEPT), U.C. ADEPT Fellow, 2005–2006

U.C. Berkeley Department of Civil & Environmental Engineering, Graduate Student  
Instructor for Groundwater and Seepage Course, 2003–2004

Lawrence Berkeley National Laboratory Earth Science Division, Graduate Student  
Researcher, 2002; 1997–1999

U.C. Berkeley Department of Civil & Environmental Engineering, Graduate Student  
Instructor for Introduction to Computer Programming for Scientists and Engineers,  
2000–2002

U.C. Berkeley Department of Civil & Environmental Engineering, Graduate Student  
Instructor for Introduction to Environmental Engineering, 1999

Lawrence Berkeley National Laboratory Earth Science Division, Research Technician,  
1995–1996

Lawrence Berkeley National Laboratory, Student Research Assistant, 1993–1994

Amherst College Department of Geology, Teaching Assistant, 1992–1993

## **FELLOWSHIPS AND ACADEMIC AWARDS**

U.C. Berkeley -NSF ADEPT (Applied Design Engineering Project Teams) Fellowship, 2005-2006

Graduate Teaching Assistantship, U.C. Berkeley, Jan. 1999, 2000, 2001, 2002, Aug 2000,  
2003, & 2004

Jane Lewis Fellowship, U.C. Berkeley, Spring 1999, 2002-2003

U.C. Graduate Opportunity Program Fellowship, 1996-96, 1997-98

Richard M. Foose Scholarship Award, Amherst Dept. Geology, 1993

American Geological Institute Minority Geoscience Scholarship, 1992-3, 1996-97

National Hispanic Scholarship Fund Scholar, 1993

Amherst Alumni Association David Winslow Award Recipient, 1993-94

## **AFFILIATIONS**

American Geophysical Union (AGU)  
Groundwater Resources Assoc. (GRA)  
Engineers for a Sustainable World (ESW)  
Society of Petroleum Engineers (SPE)

## **PUBLICATIONS**

- Miller, G.R., Y. Rubin, K. Ulrich Mayer, and P. H. Benito, Modeling Vadose Zone Processes During Land Application of Food-processing Wastewater in California's Central Valley , Journal of Environmental Quality (In Press).
- P. Benito, T. Patzek, (2007), Pore-Network Model Investigation of Stability & Scaling of Immiscible Displacement Fronts with Buoyancy Forces, Eos Trans. AGU, 88(52), Fall Meet. Suppl., Abstract H44D-07
- Rubin, Y, P. Benito, G. Miller, J. McLaughlin, Z. Hou, S. Hermanowicz, and U. Mayer, U, (2007), Modeling Land Application of Food-Processing Wastewater in the Central Valley, California, Eos Trans. AGU, 88(52), Fall Meet.
- Suppl., Abstract H54D-01 Rubin, Y., P. Benito, G. Miller, J. McLaughlin, Z. Hou, S. Hermanowicz, U. Mayer, and D. Silin, Hilmar Supplemental Environmental Project, Submitted to the California Regional Water Quality Control Board Central Valley Region In Compliance with Order No. R5-2006-0025, November 16, 2007 (online at <http://hgp-inc.net> )
- Bessinger, B., Cook, N.G.W., Benito, P., Myer, L., Nakagawa, S., Nihei, K. and Suarez-Rivera, R., 2002. The role of compressive stresses in jointing on Vancouver Island, British Columbia. Journal of Structural Geology, LBNL-51104.
- Stoller, S., and P. Benito, Pilot project proposal for San Anselmo Creek floodplain re-establishment: hydraulic modeling report. (Term project for Landscape Architecture 227, Prof. G. Mathias Kondolf, University of California, Berkeley, Fall 2000. On file In UCB Water Resources Center Archive: MS 96/2 87)
- Benito, P.H., P. Cook, B. Faybishenko, B. Freifeld, and C. Doughty, Crosswell air-injection packer tests for the assessment of pneumatic connectivity in fractured, unsaturated basalt, Rock Mechanics for Industry, Proceedings of the 37th U.S. Rock Mechanics Symposium, Vol. 2. Amadei, Kranz, Scott & Smeallie (Eds), A.A. Balkema, 1999.
- Benito, P.H, P. Cook, B. Faybishenko, B. Freifeld, and C. Doughty, Analog Site for Fractured Rock Characterization: Box Canyon Pneumatic Connectivity Study Preliminary Data Analysis. Report LBNL-42359, Lawrence Berkeley National Laboratory, Berkeley, CA, 1998.
- P. H. Benito, P. J. Cook, C. Doughty, B. Faybishenko, B. Freifeld, K. Karasaki, (1997), Cross-Borehole Air-Injection Interference Tests in Fractured Unsaturated Basalt, Eos Trans. AGU, Fall Meet. Suppl., Abstract H21B-03

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**ELIZABETH A. NIXON, P.E.**

ASSOCIATE

Ms. Nixon has 20 years of professional experience in managing and implementing complex remedial investigations (RI), feasibility studies (FS), remediation design and construction projects, as well as site management plans for both public and industrial clients. Ms. Nixon specializes in long-term strategic development for legacy sites, facilitating exit strategies and site reuse. Her work on RI/FS and remediation projects has included removal, treatment, and disposal of contaminated materials; design, construction, and operation of soil vapor and groundwater extraction systems and treatment plants; containment options including vertical slurry cutoff walls and surface capping; and underground fuel tanks and remediation of associated soil and groundwater.

**REPRESENTATIVE EXPERIENCE*****Due Diligence and Litigation Support***

- *BMI Henderson Project, Henderson, Nevada*—Performed pre-purchase due diligence for a 2200-acre parcel – the largest Brownfields site in the United States. This property served as a disposal facility for wastes generated by the world’s largest magnesium production plant during World War II. The property was later used as a disposal site for other manufacturing activities, resulting in a mixed-waste stream of heavy metals, radionuclides, pesticides, chlorinated solvents, perchlorates, and other chemicals. In order for the cleanup project to meet residential standards, an estimated 2 million cubic yards of soil will be removed from the parcel. Remediation efforts are complex due to the presence of existing nearby residential developments and the Las Vegas Wash, which flows into Lake Mead, a major source of water for the Southwest. Following remediation, construction of the development will occur, including parks, schools, trails, housing, and a business district. The Site is the largest Brownfields project in Nevada. The City of Henderson anticipates that the project will revitalize the downtown area and provide housing for those employed in Henderson and Las Vegas.
- *Environmental Due Diligence for \$600 Million Timber Industry Property Transfer, Northern California*—Assisted the buyers of more than 500,000 acres of timberlands and 20 wood processing facilities in Humboldt and Mendocino Counties with environmental due diligence associated with the property transfer. Ms. Nixon identified up to \$50 Million worth of residual environmental liabilities at the properties, including introduction to the subsurface of petroleum hydrocarbons, metals, wood treatment chemicals, dioxin, solvents, and herbicides, as well as environmental facility compliance associated with processes, storm-water discharge, underground storage tanks, asbestos, and lead-based paint. Ms. Nixon quantified potential costs associated with the liabilities, and the probabilities of these costs being incurred. This analysis formed the basis for the sale agreement, where the seller retained financial responsibility for future environmental liabilities at the properties.
- *Environmental Due Diligence for \$250 Million Commercial Property Transfer, Alameda, California*—Assisted the potential buyer of a 200+-acre commercial property with its environmental due-diligence. The property historically had been used for shipbuilding, and had been redeveloped for commercial purposes in the 1980s. Residual subsurface chemicals included petroleum hydrocarbons and lead. Ms. Nixon previously had performed significant environmental work at the property on behalf of the owners, and therefore was familiar with site conditions and the potential for future liabilities under new ownership. Ms. Nixon quantified the costs of these potential liabilities on behalf of the buyer, which were used as part of the property transfer price negotiations.

- *Former Fuel-Fired Steam Power Generation Plant, California*—Team Member of three independent neutral experts retained by a large electric utility company and a port agency to resolve a dispute over remediation of petroleum-affected soil and groundwater at a former power generation plant. Ms. Nixon developed a cleanup plan and reasonable cost estimate to remediate the site that was based on risk-management for proposed redevelopment for mixed-use, including commercial, marina, retail and public shoreline access. Ms. Nixon evaluated site conditions, assessed potential risks to future users, and developed an in-place management plan consisting of shoreline protection, capping, sealing off former wastewater discharge tunnels, and a small quantity of soil excavation where separate-phase product was seeping into the adjacent waterway. She provided technical rationale against the port agency's original remediation plan to encircle the property with a slurry cut-off wall, based on the limited potential of high-boiling petroleum hydrocarbons to dissolve and migrate in groundwater toward the adjacent waterway. The two parties successfully settled using the reasonable cost estimates developed by Ms. Nixon.

### ***Remedial Investigation/Feasibility Study and Remediation Projects***

- *Former Industrial Site, Newark, California*—Evaluated remediation alternatives and developed a remediation plan that incorporated treatment and on-site containment of more than 6000 cubic yards of soil and waste slag for this project. Ms. Nixon developed the statistical characterization of contaminants in the soil and slag that enabled the waste to be classified as a non-RCRA material. The final remediation accounted for the proposed property development for residential use and incorporated the potential health risks at the site.
- *Confidential Superfund Site, Mountain View, California*—Retained by the Responsible Party to develop an exit strategy for this large and complex chlorinated solvent site. This 20-year old federal superfund site is under a 1990 ROD prescribing pump and treat indefinitely to restore groundwater to MCLs. As Program Manager for this site, Ms. Nixon worked with multiple stakeholders, including six RPs, legal representatives, EPA, RWQCB and SCVWD to develop alternative remedial action objectives and approaches that will move the site toward closure. She provides technical support to community relations activities conducted by the EPA. Specific challenges include DNAPL in a complex hydrogeologic setting, and the potential for vapor intrusion into commercial and residential areas over the 1.5 mile long plume. Ms. Nixon oversaw the performance of multiple consultants and contractors performing remediation and monitoring work at the site.
- *Whittaker Hollister Site, California*—As Project Director, Ms. Nixon oversaw remediation and investigation efforts on behalf of the responsible party. The site contained perchlorate and VOCs in soil and groundwater, resulting from former use as an explosives research facility. The RP's insurance policy required a third-party over-sight consultant to oversee work being performed by two other consultants. Ms. Nixon reviewed technical work including pilot tests, remediation system performance, monitoring, and reporting. She lead efforts in developing comprehensive long-term strategies that would result in site closure. She oversaw a decision-analysis process to assist the RP and insurance company make informed decisions on remediation alternatives based on long-term liability tolerances.
- *Former Wood Treatment Superfund Sites, Selma and Turlock, California*—Project Manager for two Federal Superfund projects, which, under U.S. EPA oversight, focused on the remediation of PCP and arsenic-affected soil and the treatment of chromium-affected groundwater. Led multidisciplinary team in planning and executing a field sampling effort; analyzing data to identify areas requiring remediation; reviewing and revising drawings and specifications for the construction of a groundwater treatment plant; and developing the associated subcontract packages. Completed Feasibility Studies to develop a range of solutions for soil remediation, the associated Proposed Plans, public Fact Sheets, and (for one of the projects) the first Five-Year

Review of the project. Assisted the EPA in preparing associated Proposed Plans and public Fact Sheets; and provided technical support for EPA community relations.

- *Phoenix-Goodyear Airport North Superfund Site, Arizona*—Directed remediation and investigation efforts on behalf of the responsible party for this project. DNAPL released at the site through the use of dry wells in the 1960s through 1980s caused a 3-mile long plume of TCE to travel in 100-foot deep groundwater beneath property that was being redeveloped from agricultural to commercial and residential uses. Recently, perchlorate was discovered in the groundwater. Chemicals in the upper aquifer were viewed as a potential risk to a lower aquifer, which supplies the local community with drinking water. Ms. Nixon became the technical consultant in 2001, when the responsible party changed consultants. Under her direction, the following improvements were made or are planned:
  - Overhauled existing treatment plants to improve safety and reliability of the two aging plants.
  - Worked with the local municipal wastewater treatment plant to accept discharge water and treat for perchlorate through existing denitrification process, rather than expanding on-site treatment plants.
  - Designed and installed new drinking water supply well in deep aquifer for privately operated water supplier adjacent to the site.
  - Performed significant hydrogeological analysis to evaluate potential transport mechanisms between the upper and lower aquifers, including aquifer testing, developing both conceptual and numerical groundwater flow models, and performing an extensive study of possible vertical conduits over the plume area.
  - Streamlined the groundwater monitoring program.
  - Installed two deep monitoring wells to be used as sentinel points for City water supplies.
  - Developed strategy to implement in-situ biodegradation of DNAPL, dissolved-phase VOCs, and perchlorate.

On behalf of the responsible party, Ms. Nixon is responsible for project strategy and interfacing with the U.S. EPA, the Arizona Department of Environmental Quality, and local City and property owner representatives on this high-profile site. She organizes and presents technical information at interagency meetings, community advisory group meetings, and other technical meetings, and manages the team of technical staff performing the remediation/investigation activities.

- *Former Television Manufacturing Facility, Asia*—Directed this high-profile, complex soil and groundwater remediation project. As the first environmental project of its kind in this Asian country, the project was challenging from technical and regulatory perspectives, requiring a wide range of environmental consulting services. DNAPL had been released into subsurface soil and groundwater to depths as great as 75 feet beneath the 26-acre former television manufacturing facility. Chemicals have migrated off site a distance of more than one mile and have reached a number of water-supply wells used by nearby residences. To fulfill governmental requirements and at the request of the client, Ms. Nixon directed the preparation of a RI/FS and conceptual remediation plan (CRP), which focused on the technical impracticability (TI) of DNAPL source removal, and the suitability of the site to be granted a TI waiver. The CRP consisted of a risk-based management plan for the off-site plume; a demonstration groundwater pump and treat system to show that pump and treat would be ineffective in meeting groundwater quality goals; and, limited source removal through soil excavation and vapor extraction.

Once the governmental agency approved the CRP, Ms. Nixon directed the preparation of detailed designs for the remedial components. The remediation systems were constructed and operated by local contractors. Data obtained from the remediation was used to support the TI waiver and risk-based management strategy.

As a condition of the government's approval of the TI waiver, the client was asked to assemble an international team of experts on DNAPL to evaluate the practicability of site cleanup and to develop an effective long-term groundwater management strategy that would be protective of the surrounding population. Ms. Nixon acted as the overall coordinator for the team's efforts. For this phase of the project, the team of experts provided the following analyses and services:

- Developed a conceptual model for the site, including regional and local hydrogeologic conditions, chemical distribution, and historical site use.
- Performed quantitative groundwater flow and chemical transport modeling for PCE, TCE and breakdown products.
- Analyzed natural attenuation and biodegradation processes occurring within the plume.
- Established that DNAPL was widespread in the saturated zone.
- Established the impracticability of groundwater extraction for removing DNAPL, considering chemical rebound, diffusion, and chemical transport issues.
- Evaluated emerging technologies for DNAPL source cleanup.
- Identified long-term management mechanisms for on- and off-site groundwater use.
- Performed toxicology and health risk evaluation.
- Compiled Brownfields examples in the U.S.

Conclusions drawn from the analyses supported the TI waiver and the adoption of natural attenuation and risk-based management as an appropriate remedial strategy that would be protective of human health. The analyses also effectively demonstrated that use of a long-term pump and treat system would not achieve groundwater quality goals. These conclusions and recommendations were presented by the client and technical team to the governmental agency, and is currently undergoing final review and consideration.

- *Site Closure at Gasoline Product Site, Santa Clara, California*—A gasoline UST, which the City of Santa Clara used from the 1950s until it was removed in 1988, had leaked a significant amount of gasoline into subsurface materials. Groundwater monitoring data indicated that the shallow aquifer contained both light non-aqueous phase liquid (LNAPL) and dissolved-phase constituents, with concentrations of benzene up to 20,000 ppb, and that the intermediate-depth aquifer contained relatively lower concentrations of dissolved-phase constituents. The existing consultant had developed remedial alternatives, including air sparging, vapor extraction, and pump and treat, with associated costs in excess of \$1,000,000. The consultant also had been implementing a quarterly groundwater sampling program for 5 years, that utilized 18 wells on this 1-acre site. Ms. Nixon used available analytical and hydrogeologic data to evaluate the utility of the remedial alternatives and the need for continued quarterly monitoring. She concluded that: air sparging would be ineffective due to soil heterogeneity and low-permeability vadose-zone soils; vapor extraction was not feasible because rising groundwater had submerged nearly all of the affected materials; pump and treat would not be capable of removing the LNAPL and therefore would not significantly improve groundwater quality over the long-term; and regulatory requirements could be met with an annual monitoring program consisting of 5 of the existing 18 wells.

Ms. Nixon developed a risk-based management plan that was better suited to site conditions and designed a supplemental site investigation to demonstrating that gasoline constituents were not migrating off-site or to the lower aquifer, and that natural degradation processes were effectively containing the contaminants to the site. Additionally, she evaluated whether potential human receptors would be at risk, and determined that under the existing site use, there were no at-risk receptors. Therefore, the risk-based management plan included a limited natural attenuation verification monitoring program; a property notification and disclosure process; and safety, regulatory and disposal procedures to be implemented during future construction, development,

or disturbance of subsurface materials at the property. The plan was accepted by the overseeing regulatory agency as the most appropriate, protective, and cost-effective remedial alternative for the site. Acceptance of the plan saved the client nearly \$1,000,000.

- *Former Shipyard, Alameda, California*—As the Project Manager, Ms. Nixon was responsible for all environmental aspects in the redevelopment of a 240-acre former ship building/ industrial property for commercial and residential use. Project work included: remediating petroleum- and lead-affected soil; treatability studies; removing USTs; capping lead-affected soil, designing, installing and monitoring a network of groundwater wells; characterizing petroleum hydrocarbon distribution in the subsurface beneath a 10-acre parcel adjacent to SF Bay; analyzing shoreline slope stability and grading plans for 10,000 cubic yard soil storage area; and characterizing dredge spoils beneath a proposed development for petroleum, metals, VOCs, and PCBs. Ms. Nixon worked closely with the client and County regulators to apply the RWQCB, San Francisco Region, Guidance for Low-risk Soil and Groundwater Case Closure. Ms. Nixon demonstrated that there was no significant risk to human health and the environment at parcels containing petroleum hydrocarbons and lead. Regulatory case closure was granted for all property parcels affected by petroleum hydrocarbons and lead, and appropriate risk-based management plans were adopted and approved by Alameda County and RWQCB to allow commercial development over the affected soil.
- *Goodwill Property Redevelopment, San Francisco, California*—Assisted the charity-based Goodwill organization with two properties where shallow fill contained elevated concentrations of lead, typical of “south of market” fill materials. One vacant property owned by Goodwill was being sold to the San Francisco Redevelopment Agency for development as low-cost multi-unit housing. Ms. Nixon negotiated a risk-management plan with the San Francisco Department of Public Health, which permitted property development over the lead-contaminated material, provided that the surface was covered by buildings, paved parking areas and landscaping, and that institutional controls were adopted that specified safety measures in the event of future disturbance/contact with the soil. The second property was being redeveloped by Goodwill as their new San Francisco headquarters and new retail store. Ms. Nixon assisted Goodwill and their architects with designing the new structures so that lead-containing soil could be managed on-site, and costly off-haul and disposal could be avoided. This was accomplished by relocating lead-containing soil at the property, while off-hauling clean soil to reach the cut/fill balance. In this way, costs to redevelop that property were substantially reduced.
- *Former Semiconductor Processing Facility, Sunnyvale, California*—Managed all aspects of a \$2 million remediation project that involved a feasibility study; designing and installing a 30-foot-deep, 700-foot-long cut-off slurry wall; designing and installing a groundwater extraction and treatment system to dewater a shallow aquifer; and designing and installing a vapor extraction and treatment system to remove VOCs from the dewatered aquifer. This project strategy enabled the client to separate the limited on-site problem from a regional plume, and to achieve on-site cleanup levels to allow regulatory closure. Ms. Nixon helped negotiate a status of no further action with the regulatory agency after only two years of treatment system operation.
- *Former Consumer Goods Manufacturing Facility, Ontario, California*—Developed a conceptual remedial design for soil at this 12-acre facility. Remedial design included site characterization and health-risk assessment for surface and shallow soil containing heavy metals, VOCs and petroleum hydrocarbons. Ms. Nixon developed a remedial strategy utilizing a regrading and capping alternative that was consistent with the planned future development of the site as a transit station. The remediation plan was approved by the DTSC and deemed protective of public health.



- *Site Investigation and Interim Remediation Planning for Former Smelting Facility, Selby, California*—Responsible for site characterization and remedial investigation of heavy metals in waste slag and offshore sediments on this 660 acre California Superfund Site. Ms. Nixon developed interim remedial measures to address metals-contaminated materials, which included off-shore dredging to onsite settling ponds; regrading and encapsulating slag onsite; and a passive interception trench to neutralize acidic groundwater. The remedial plan was approved by the Regional Water Quality Control Board, State Department of Toxic Substance Control, and State Department of Fish and Game.

### ***Environmental Restoration Projects***

- *Sears Point Restoration Project, Sonoma County, California*—Ms. Nixon served as Project Manager for the environmental investigation and remediation planning of a shooting range contaminated with lead and PAHs. The seven-acre property was purchased by Sonoma Land Trust as part of a 2300-acre environmental restoration project. The shooting range was situated in an area designated for tidal wetlands restoration as part of the Sears Point Restoration Project. Ms. Nixon used an integrated approach to define the problem, assess ecological risks, and work with the restoration design team to understand the dynamics of the proposed tidal wetlands. An innovative Corrective Action Plan was approved by the RWQCB that allowed the beneficial re-use of the contaminated material as fill for the core of perimeter flood control levees. Ms. Nixon worked collaboratively with the site owner, the RWQCB and other stakeholders to develop a practical approach to cleaning up the site that is protective of the proposed wetland without incurring costly remediation.
- *Rio Salado River Restoration, Phoenix, Arizona*—The Los Angeles District of the U.S. Army Corps of Engineers and the City of Phoenix are planning a \$90 Million river restoration project along the Salt River in an industrial part of downtown Phoenix. As a part of a technical team, Ms. Nixon evaluated the feasibility of supplying up to 12 million gallons per day of water from a shallow aquifer to support the 50-year life of the restoration. She also assisted the team with evaluating issues relating to the degraded water quality of the aquifer, potential discharge criteria, possible treatment requirements, and siting/design of the future production wells to optimize water supply and quality. Ms. Nixon also assisted the team with evaluating impacts of future pumping on numerous nearby contaminant plumes that are present in the shallow aquifer.
- *Tidal Wetland Restoration, East Palo Alto, California*. Coordinated the restoration planning of a 150-acre former salt pond to tidal wetlands. The project was completed as mitigation for seasonal wetlands that were destroyed due to environmental remediation. The restoration will enhance habitat for two endangered species, the California clapper rail and the salt marsh harvest mouse. Ms. Nixon worked closely with project biologists and hydrologists to prepare and submit applications for a Corps of Engineers Section 404 Individual permit, a RWQCB Section 401 Water Quality Certification, a Bay Conservation and Development Commission permit, and a U.S. Fish and Wildlife Service Section 7 Consultation, all of which were required for the restoration. She was also responsible for the geotechnical design of the restoration, Contractor selection and oversight, and implementing the 10-year post-construction monitoring plan. The restoration involves breaching a ring levee to allow tidal inundation; constructing earthen berms along historical sloughs to re-establish flow and develop third-order channels suitable to support clapper rail habitat; cutting off flow in the ring levee borrow ditch to prevent the ditch from dominating hydraulic processes; and raising the marsh plain to support tidal wetland vegetation and habitat.

### ***Management of Government Contracts***

- Ms. Nixon was Program Manager for indefinite delivery/indefinite quantity (ID/IQ) contracts for the Army Corps of Engineers, Sacramento District, with contract values totaling \$2.5 Million. Ms.

Nixon's responsibilities included: negotiating contract terms; developing work scopes and costs for over 25 individual projects; coordinating project work; overseeing all aspects of work activities; and working with Corps Technical Managers and military base personnel on regulatory issues. Ms. Nixon received a Letter of Commendation from the Sacramento District for her work, and received a performance evaluation with recommendations for future contracts.

## **EDUCATION**

M.S., Civil Engineering, University of California, Berkeley, 1986

B.A., Geological Science, University of California, Santa Barbara, California, 1983

B.A., Environmental Studies, University of California, Santa Barbara, California, 1983

## **PROFESSIONAL HISTORY**

Northgate Environmental Management, Inc., Associate, 2005–present

Geomatrix Consultants, Inc., Senior Consultant, 1991–2005

Levine-Fricke Consultants, Senior Project Consultant, 1987–1991

SOHIO Petroleum, Assistant Geologist, 1987–1991

U.S. Geological Survey, Geologist 1983–1984

## **REGISTRATIONS**

Professional Civil Engineer: California, No. C53511

Environmental Engineer: Arizona, No. 39048

## **PUBLICATIONS**

Nixon, E., Chambers, J.D., Smith, L.M., and Rieke, A., *Balancing Cleanup and Sustainability at a CERCLA Superfund Site*, abstract submitted to Battelle's Sixth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, California; May 19-22, 2008.

Nixon, E., Chambers, J.D., and Shan, C., *A New Model for Transient Soil Vapor Intrusion*, abstract submitted to Battelle's Sixth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, California; May 19-22, 2008.

Nixon, E., Chambers, J.D., and Shan, C., *Approaches for High-Tier Assessments on Vapor Intrusion*, abstract submitted to Battelle's Sixth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, California; May 19-22, 2008.

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**MARK GAGE, P.E.**

ASSOCIATE

Mr. Gage has more than 28 years of experience in chemical, environmental, and process engineering. His work has included process and plant design, construction, operations and maintenance, process control and instrumentation, materials science and computer applications. He has managed multi-million dollar projects involving cross-country and urban pipelines, municipal supply wells, water treatment systems, and municipal distribution systems. Representative project experience includes:

**REPRESENTATIVE EXPERIENCE**

- *Former Manufacturing Facility, Ontario, California:* Project manager of a \$25 million groundwater remediation and manufacturing site redevelopment project. Groundwater and soils contained hexavalent chromium and chlorinated VOCs. Responsible for planning, budgeting, scheduling, cost estimating, and regulatory and community relations. Primary interface for review and permitting of project plans by city, county, and state agencies. Evaluated alternatives for reuse of approximately 2,500 acre-feet/year of treated groundwater in cooperation with the city, county, and Chino Basin water management agencies. Prepared life-cycle cost analyses of project alternatives, defined and implemented the groundwater remediation program from initial process design through the first five years of operations and maintenance. Led the design, construction, and operations of a 3 Mgal/day water treatment system. Facilities included two 1,000 gal/min extraction wells, four miles of underground urban pipelines, carbon filtration and ion exchange treatment processes, and cooperative use of recharge basins.
- *Former Manufacturing Facility, Phoenix, Arizona:* Principal in Charge of a large, multi-faceted groundwater remediation Superfund project under US EPA Region 9, including a team of approximately 30 project professionals and 3 project managers. City and private water supply wells had been impacted by VOCs and perchlorate. Groundwater was hydraulically contained and treated through a combination of pump and treat and in-situ remedies and an innovative system to remove perchlorate via the local waste water treatment system. Domestic and public supply wells were installed and integrated into the municipal supply system. Primary client and regulatory contact and lead for the engineering design and operations teams. Design and construction efforts included the complete overhaul of a 1,000 gpm LGAC facility, the design and installation of new domestic water tankage and supply lines for a private water supply system, and improvement and optimization of a 300 gpm treatment system at the source area. In addition, worked with city engineers and technicians to modify the operations of a 3 million gallon per day waste water treatment plant to improve its effectiveness in destroying perchlorate. Conducted a 90 day pilot test under the supervision of the EPA to demonstrate the waste water treatment plant's destruction of perchlorate from groundwater.
- *Delta Coves Development, Bethel Island, California.* Prepared preliminary designs and obtained detailed vendor quotations for reverse osmosis treatment of 1 Mgal/day of water to be generated while dewatering the site. Groundwater at the site was impacted with arsenic, iron, manganese, and chlorides above proposed surface water discharge criteria. The system included retention ponds for temporary storage and blending of water from the 300 acre site, oxidation/filtration to pre-treat the water prior to multi-stage reverse osmosis treatment, and discharge of the water to the adjacent Sacramento Delta. Budgetary vendor quotations for treatment equipment and 18 months of operations ranged from \$9 to \$14 million.
- *Treatment System Design, former solvent recycling facility, Santa Fe Springs, California:* Responsible for design, permitting and construction of treatment systems for soil vapor and groundwater. Prepared engineering and economic evaluations of treatment system alternatives,

and developed remedial strategy. Designed and oversaw an SVE extraction and treatment system using an innovative system that treated, recondensed, and reclaimed pure solvents recovered from soil vapor. Designed a 50 gpm groundwater treatment system with air strippers and thermal oxidation of air stream from polishing stripper. Primary interface with the city, county, and state agencies for engineering review and permitting of the facilities. Delivered design package to client for construction and operation of groundwater treatment system.

- *Confidential Superfund Site, Mountain View, California.* Prepared analyses of remedial alternatives and an alternative cleanup strategy for a Site that has incurred over \$100 million in soil and groundwater investigation and remediation costs.
- *Chemical and Environmental Engineering:* Performed engineering and economic feasibility studies of slurry pipeline systems for the long distance transport of coal, phosphate, copper, iron, and gold. Developed process design and P&IDs for pipeline, pumping, tankage and water return/reuse facilities. Prepared environmental impact reports (EIR) for proposed projects. Field engineer during construction and startup of underground cross-country pipelines.
- *Materials and Manufacturing Engineering:* Designed and conducted research and development for the use and manufacturing of advanced materials in aerospace and rocket propulsion applications. Projects included investigations into the causes of fouling in copper alloy cooling channels for combustion chambers, the manufacturing and life extension of lightweight carbon-carbon materials for nozzles, the development and testing of advanced plating and coating processes for the protection of metallic and composite parts, and troubleshooting all phases of aerospace manufacturing and assembly, from construction of raw alloy and composite materials, through machining, cleaning, and assembly of components, to inspection and testing of subassemblies and complete flight-ready engines.

## **PROFESSIONAL HISTORY**

Northgate Environmental Management, Inc., Associate, 2005–present

Geomatrix Consultants, Inc., Project Engineer to Principal Chemical Process Engineer, Vice President and Board of Directors, 1993-2004

Aerojet Propulsion, Sacramento, Sr. Project Engineer to Engineering Manager, 1986-1993

Bechtel, San Francisco, Project Engineer to Sr. System Analyst, 1980-1986

Aerojet Energy Conversion Company, Sacramento, Test Engineer, 1979-1980

## **EDUCATION**

University of Michigan: B.S., Chemical Engineering, 1979

California State University, Hayward: B.S., Computer Science, 1986

## **REGISTRATION**

Professional (Chemical) Engineer: California, No. 3965, 1981

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## **KALEO PADERES**

### **GIS SERVICES MANAGER**

Mr. Paderes has 15 years of applied experience in resource/data management and GIS for large complex multi-stakeholder remediation projects. He is a recognized industry expert in geospatial technologies and has trained and mentored staff in the use of EQUIS and ArcGIS. He has utilized GIS and EQUIS to develop client standards for quarterly monitoring, mapping, reporting, and analysis for environmental information systems. He is also active in developing site conceptual models and conducting groundwater fate and transport (including free phase) modeling.

### **REPRESENTATIVE EXPERIENCE**

- GeoSpatial Solutions Group Leader for Wyle, Mr. Paderes provided technical direction, management and product expansion with the implementation of EQUIS for ArcGIS in collaboration with EQUIS Geology and Chemistry. He was the architect in documenting best practices for an Environmental Data Management System and effectively piloted EQUIS through a consultant's offices across its southwest business unit. He was also responsible for outlining the GPS data collection standards and streamlined graphics, analysis, and 3-D simulations for the WYLE project. Additionally, he standardized the quarterly monitoring, mapping, reporting and analysis via GIS and EQUIS across other key client projects for environmental information systems.
- Provided technical direction, marketing, and product expansion for the planning work by managing the EIR/EIS analysis, GPS data collection, graphics, analysis, and 3-D simulations for the Tejon Ranch project in Tejon Ranch, California. Responsible for planning team management and direction in the early stages of this project, which included data collection from a variety of sources including the client, engineers, manual drawings, and United States Geological Survey (USGS). Was involved in the CEQA project management and technical marketing of the suitability plan analysis and grading analysis for the site. The Tejon Ranch project has progressed through data analysis and 3-D terrain mapping over 7 years and is now in the planning phase.
- Director for the overall GIS database and Information Management Architect for the GIS land database system, and 3-D visualization & modeling. Highly effective coordination and marketing of the EIS and EIR support for the Newhall Ranch project in Los Angeles County, California. He has been involved in a wide variety of EIR tasks for the Newhall Ranch Land Company and continues to provide his expertise. His team provided land use analysis/alternatives, biological mapping, and vegetation impact analysis for the Specific Plan submittal and jurisdictional delineation analysis for the EIS submittal (CEQA/NEPA), in which project received an NAEP award of excellence during his tenure, management, and direction.
- Project Team leader for the 36,000 acre Yokohl Ranch project in Tulare County, California. Managed the organization, maintenance, and operations of the geodatabase. Due to the large size of the project and extensive geodatabase of complex information, provided consultation to initiate the interface transfer of GIS constraints files for accountability and efficiency, which provided a return on investment for the client in excess of \$100,000 of data processing time. The information has been developed and modified in 3-D to clearly illustrate the unique geography of a topographically challenging site and showing the site benefits and features in a very user friendly manner.

- Project Team Leader for the San Gabriel and Lower Los Angeles Rivers and Mountain Conservancy in Los Angeles County, California, with detailed analysis using the GIS data collected. A demographic analysis for the project included a summary of results for year 2000 estimated population, age, and ethnicity percentages within each community. The interpretation of demographic data and mapping allowed the team to develop innovative data assessing techniques other than those applied to land management.
- Team Leader and Project Manager for the Los Angeles Significant Ecological Area (SEA) Study Update Project in Los Angeles County, California. The project involved cross departmental coordination in updating the existing SEAs created in 1976. The project required preparing field plots for biologist surveys, digitizing results, data conversion, database management, preparing multiple plots for the final reports, and providing analytical support for the team, in which Mr. Paderes played a vital role in ensuring data accuracy and efficiency, and that schedules and budgets were met.
- Senior Project Manager in supervising and updating the Irvine Company's GIS database, aerial imagery, and Tentative Tract Map data. The company's database was in its early stages allowing proposal early on GIS data standards, naming conventions, file management procedures, and organizational systems. This project included editing of the parcel library, road networks, infrastructure, and general plan information using ArcInfo and AutoCAD Map, which is currently being used today.
- As the Senior Team Leader managed and developed the desktop GIS projects for the Raytheon Company's Fullerton and Canoga Park sites. The GIS was used to prepare a strategy to attain regulatory closure for environmental issues at site and meeting project objectives. Mr. Paderes developed an Environmental Data Management System (EDMS) for the Raytheon Company Website in Newport Beach, CA. used to communicate site conditions to the State of California Department of Toxic Substances Control. Mr. Paderes managed all aspects of the GIS Data Architecture, and Design and conducted training and tutorials for the Raytheon Project Management staff.

## EDUCATION

Bachelor of Arts, Geography (GIS/Urban Planning Focus), University of Hawaii

## CERTIFICATIONS AND WORKSHOPS

Image Analyst  
3D Analyst  
Network Analyst  
Business Analyst  
ArcObjects Programming  
KETIV CAD Training  
AutoCAD LandDesktop  
AutoCAD Map Essentials  
Civil 3D 2007  
CEQA/NEPA

Conflict Resolution  
Coaching & Team Building  
People Management/Mentoring  
Project Management  
Marketing Strategy Approaches  
GIS Enterprise Management  
Managing a GIS  
GPS Workshop  
Spatial Analyst  
ArcSDE Administration

## **PROFESSIONAL HISTORY**

Verdant Solutions, Inc., GIS Services Manager, 2009 – present  
Environ (Environmental Services), GeoSpatial Solutions Group Leader, August 2008 – December 2008  
Impact Sciences (Environmental Services, Director of GIS/Visual Arts, August 2007 – August 2008  
FORMA Companies (Architecture & Planning), Director of FORMA Systems, 2003 – July 2007  
LFR – Levine Fricke Recon (Environmental Services), GIS Services Manager, 2001 –2003  
IESI – Integrated Environmental Services, Inc. (Environmental Technology & Services), Senior Project  
GIS Analyst/Team Lead, 1999 – 2001  
Northrup Grumman TASC (Defense & Space), Senior GIS Programmer Analyst, 1997 – 1999  
ESRI (Computer Software), Software Analyst, Technical Support, 1995 – 1997  
Imperial Software Systems (IT and Services), Account Manager, March 1995 – October 1995  
State of Hawaii Department of Business, Economic Development & Tourism (Government  
Administration), GIS Support Analyst, March 1993 – February 1995

## **PROFESSIONAL ASSOCIATIONS**

American Planning Association  
Association of American Geographers  
National Association of Environmental Professionals  
Urban Land Institute  
Geospatial Information Technology Association

