



#### Assignment

Vice President/COO

#### Education

*Ph.D., Soil Science, University of California, Riverside, July 1985*

*B.A. Chemistry with a Specialization in Earth Sciences (minor in Economics), University of California, San Diego, June 1980*

## Joseph P. LeClaire, PhD Vice President / COO

#### Summary

Dr. LeClaire has 24 years of professional experience in water resources and hazardous waste engineering. His experience includes project management and administration, office management, and business development. Dr. LeClaire has substantial experience in water resources studies and projects, especially in groundwater chemistry. His technical expertise is in the area of equilibrium chemistry and mobility of trace metals and organics in the unsaturated zones of soils and in groundwater.

He has managed several projects that utilized relational database management systems (RDBMS) and Geographical Information Systems (GIS) as effective management and analytical tools in support of scientific, engineering, and management decisions. Dr. LeClaire received a B.A. in Chemistry with a Specialization in Earth Sciences from the University of California at San Diego in 1980, and a Ph.D. in Soil Science from the University of California at Riverside in 1985. He is a member of the National Ground Water Association, American Water Resources Association, and Groundwater Resources Association of California. Dr. LeClaire is a Vice President,

Chief Operating Officer, and Principal Scientist with WEI, He is the project manager and provides technical expertise on several projects, which include:

#### Selected Project Experience

##### **Wildermuth Environmental, Inc. – 1998 to Current**

*Lysimeter Studies in Support of Maximum Benefit Showing for the Basin Plan, Chino Basin Watermaster/Inland Empire Utilities Agency*

**Project Manager:** Dr. LeClaire is the project manager for this study in which several sets of lysimeters were installed in recharge basins in Chino Basin. Dr. LeClaire worked extensively with IEUA, the Regional Water Quality Control Board, and the Department of Health Services to obtain a permit for recharging recycled water in recharge basins in Chino Basin. WEI proposed the used of lysimeters to measure compliance with permit requirements for nitrogen and total organic carbon reduction during soil-aquifer treatment. The use of lysimeters was approved by DHS and the Regional Board and the lysimeters are showing significant reduction in both nitrogen and TOC. This innovative technology was used for the first time in this application on this project.



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### Wastewater Discharge Ponds, City of Redlands

**Project Manager:** Dr. LeClaire was the project manager for a study to determine the nitrogen loss beneath the City of Redlands wastewater discharge ponds. He installed 9 clusters of 4 lysimeters at depths ranging from 2.5 to 25 feet below ground surface at 3 of the eight ponds. Data show that the nitrogen loss is between 50 to 70 percent.

### Nitrogen / Total Dissolved Solids (N/TDS) Task Force, Santa Ana Watershed Project Authority

**Project Manager:** Dr. LeClaire was the project manager for this study that set revised water quality objectives for groundwater basins throughout the Santa Ana Watershed. The project team developed revised subbasin boundaries based on a reassessment of hydrogeology and water quality to create management zones for more effective stewardship of the health of these systems. We developed sophisticated statistical techniques to set objectives for TIN and TDS based on historical data. We have also studied the impact of reclaimed water projects on groundwater and surface water quality and have developed first-order nitrogen loss coefficients. In this task, we have

developed an understanding of recharge operations at the Hidden Valley Wetlands Enhancement Project (City of Riverside), Rapid Infiltration-Extraction (RIX) Regional Tertiary Treatment System (Cities of San Bernardino and Colton), and Anaheim Lake (Orange County Water District).

### Water Quality Monitoring Programs, Chino Basin Watermaster

**Project Manager:** Dr. LeClaire has developed monitoring programs for groundwater and surface water (recharge basin) quality. He is in the process of implementing a Hydraulic Control Monitoring Program in the southern portion of Chino Basin and along the Santa Ana River that will help to define gaining and losing reaches of the river and allow Watermaster to estimate inflows to and outflows from Chino Basin. These monitoring programs collectively provide a holistic picture of the health of the basin from a water quality perspective.

### Rapid Infiltration/Extraction Hydraulic Studies, City of San Bernardino

**Project Scientist:** The rapid infiltration and extraction RIX treatment process uses native soil to provide in situ tertiary filtration of secondary effluent from the Cities of San Bernardino and Colton. In this process, secondary effluent

(herein referred to as "RIX influent") is discharged to a series of earthen basins located along the Santa Ana River. As the RIX influent percolates through the unsaturated zone to the groundwater table, certain biological, chemical, and physical processes take place, which reduce the dissolved organic matter, suspended solids, and nitrogen within the percolating influent.

Onsite wells extract groundwater at a rate higher than the rate of influent flow to the facility to ensure substantial containment of the RIX influent percolated at the facility. The extracted groundwater is then disinfected with ultraviolet (UV) radiation, and is discharged to the Santa Ana River.

Dr. LeClaire developed a methodology water character index (WCI) to analyze RIX influent and effluent migration and the mixing of RIX influent and native groundwater in the pumped groundwater. WCI was used along with hydrogeological and hydraulic analyses to show substantial containment of RIX discharge.

### Groundwater Contamination Superfund Site, Confidential Client

**Project Manager:** Dr. LeClaire was the project manager for a study to determine the potential source or sources of a groundwater plume containing volatile organic chemicals (VOCs), primarily

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trichloroethene (TCE) and tetrachloroethene (PCE).

He is exploring the use of chemical fingerprinting techniques, including stable isotopes, to distinguish the source(s) of the contaminant plume. He is working with the solute transport modeling team in developing realistic ranges of distribution coefficients for the site contaminants based on chemical properties.

### Composted Materials Salt Study, Inland Empire Utilities Agency

**Project Manager:** Dr. LeClaire conducted a study to determine the amount and types of leachable salt associated with commercially available compost material as well as the salt associated with compost produced by IEUA's co-composting facility.

### Report of Waste Discharge for Fluoride Treatment System, Twenty-Nine Palms Water District

**Project Manager:** Dr. LeClaire helped to develop a Report of Waste Discharge (ROWD) for the TPWD for a fluoride treatment system. TPWD will use halophyte plants as a means of brine disposal from the treatment system that removes naturally-occurring fluoride from groundwater. This system has significantly increased the water

supply for TPWD without importing water.

### Oversight of TPH/MTBE Plume, Yucaipa Valley Water District

**Project Manager:** He is currently providing technical oversight and serves as a liaison between YVWD and the Regional Water Quality Control Board for a significant release of petroleum products, including MTBE from an ARCO service station.

### Water Quality Monitoring Program, Santa Margarita Water District, City of San Juan Capistrano, & Ranch Mission Viejo

**Project Manager:** Dr. LeClaire developed water quality monitoring programs for Trabuco Creek for these entities. The goal of the three studies was to determine the percentages of native water and urban runoff of imported water at various points along Trabuco Creek.

### Diba Consulting Software Engineers, Mission Viejo, California – 1996 to 1998

**Business Development Manager:** Dr. LeClaire was the business development manager for Diba Consulting Software Engineers (DCSE). He was responsible for the development of annual marketing plans, client contact and development, and proposal preparation. Dr. LeClaire was

instrumental in obtaining four new major clients for DCSE, effectively doubling the firm's client base. In addition, he assisted in office administration and managed project control functions for firm-wide projects. In addition, he was project manager for several key projects, including: Database Management System and GIS.

### Database Management System & GIS for the Southwest Riverside County Multi-Species Reserve, Metropolitan Water District of Southern California

**Project Manager:** Dr. LeClaire was the project manager for the design and implementation of a comprehensive database and GIS for the Southwest Riverside County Multi-Species Reserve. The database and GIS incorporates biological, archaeological, meteorological data from approximately 23 independent researchers. Data access is through a World-Wide Web and an ArcView interface.

### Design / Implementation of a Comprehensive Database, California Urban Water Agencies

**Project Manager:** Dr. LeClaire was the project manager for the design and implementation of a comprehensive database for the San Francisco/San Joaquin Bay-Delta region. DCSE worked with the California Urban Water Agencies (CUWA) to create the framework for an integrated database management system that brought together chemical, hydrody-



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namic, and biological data currently in existence in a multitude of agencies throughout the San Francisco Bay-Delta region. The goal was to allow accurate, timely analysis of monitoring program data, and to support multi-species ecosystem management planning. This project represented the largest coordinated environmental DBMS/GIS attempted in the San Francisco/San Joaquin Bay-Delta region.

### [Groundwater Susceptibility Study, Monterey County Water Resources Agency,](#)

**Project Manager:** Dr. LeClaire managed a groundwater susceptibility study for Monterey County Water Resources Agency (MCWRA) that consisted of a loose coupling of GIS and a simulation model. DCSE developed a RDBMS/GIS as a pre-processor to a mechanistic root-zone model, GLEAMS. Several sets of data including soil, antecedent land use, climatic data, and ranch/parcel boundaries were collected, spatially-referenced, and integrated through the DBMS/GIS. The model predicted fluxes of nitrate and pesticides that may impact groundwater and these predictions were post-processed and displayed using GIS. Information from this study is being used to guide MCWRA's future monitoring

programs and to help determine Best Management Practices (BMP) for growers in the county.

### **Montgomery Watson, Walnut Creek and Irvine, California – 1987 to 1996**

Dr. LeClaire was a Section Leader, project manager, and project scientist for Montgomery Watson. As Section Leader, he was responsible for all administrative aspects of a team of 8 to 10 employees, including career management, billability/resource leveling, scheduling, and performance reviews. In his career at Montgomery Watson, Dr. LeClaire developed a comprehensive project management skill set in addition to his technical expertise. A few representative projects are listed below:

#### [Installation Restoration Program \(under the Navy CLEAN Contract\), Moffett Federal Airfield](#)

**Installation Manager:** Dr. LeClaire was the Installation Manager at Moffett Federal Airfield from 1990 to 1996. Total fees for this project exceeded \$12 million. Responsibilities include project scoping, cost and schedule control, contract negotiations, technical oversight, and attendance at public meetings. Engineering Evaluations/Cost Analyses (EE/CAs)

and removal actions were used as interim remedial actions to expedite cleanup. Dr. LeClaire also worked closely with a technology developer (a Fortune 500 company) to demonstrate an innovative groundwater treatment technology onsite, which met with favorable regulatory agency approval. A site-wide ecological assessment was conducted to address agency and public concerns about the wetlands at Moffett Federal Airfield.

A large-scale, comprehensive database and GIS was developed, utilizing chemical and hydrogeological data from other potentially-responsible parties (PRPs), National Aeronautics and Space Administration (NASA), and the Navy. Dr. LeClaire worked closely with the Navy and the regulatory agencies in Long Term Strategic Planning meetings; this coordination helped to accelerate the Federal Facilities Agreement (FFA) schedule and facilitate base transfer to NASA.

He also coordinated with the Silicon Valley Toxics Coalition (SVTC) on behalf of the Navy to understand and address community concerns. The SVTC has praised the Navy for their responsiveness during quarterly Restoration Advisory Board (RAB) meetings. He has made presentations at several biannual public meetings, including a meeting chaired by Congresswoman Eshoo. Dr. LeClaire has worked with the

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Navy and Navy counsel in pre-litigation meetings with other PRPs.

### [San Fernando Valley Remedial Investigation, Los Angeles Department of Water & Power](#)

**Project Scientist:** Dr. LeClaire was a project scientist involved in the remedial investigation of contaminated groundwater at four National Priorities List (NPL) sites in San Fernando Valley. The project includes the siting and installation of vertical profile borings and cluster wells; the implementation of a GIS; and a regional groundwater flow model.

The HST3D was used for site-specific contaminant transport modeling. The project also included an Operable Unit Feasibility Study (OUFS) for the remediation of groundwater contaminated with TCE and PCE. The OUFS evaluated various extraction, treatment, disposal, and monitoring options to mitigate the contamination, while preserving the groundwater for potable supply in the San Fernando Valley.

### [Remedial Investigations at Various Installations, US Army Corps of Engineers:](#)

**Project Scientist:** Project scientist on several remedial investigations throughout the southwest United States for the United States Army Corps of Engineers. The fate and transport of trace contaminants,

including metals and organic chemicals, was estimated using assessment-level models. The results of these models were used in the preliminary risk assessments and to guide recommendations for further remedial activities.

### [Groundwater Investigation of Inactive Steel Manufacturing Facility, Kaiser Steel](#)

**Project Engineer:** Dr. LeClaire was a Project Engineer responsible for a major groundwater investigation of an inactive steel manufacturing facility in Chino Basin. Dr. LeClaire supervised the investigation and conducted monitoring well installations, groundwater sampling, data interpretation, analysis of the fate of contaminants and report preparation.

### [Camp Dresser & McKee, Inc. – 1985 to 1987](#)

Dr. LeClaire served as a project scientist for Camp Dresser & McKee Inc. A few representative projects are listed below:

### [Chino Basin Groundwater Storage Basin Environmental Impact Report, Metropolitan Water District of Southern California](#)

**Assistant Project Manager:** Assistant project manager for a study to determine the environmental impact of storing up to one million acre-feet of State Water Project (SWP)

water in Chino Basin in a recharge project. The operation of the Storage Program would raise the water table between 50 and 100 feet.

The project team assembled data on antecedent land use and cultural practices, as well as hydrologic and soil data in order to evaluate the possible degradation of water quality caused by the interception of vertically moving chemical compounds. An extensive field program for the collection of groundwater samples was also undertaken, giving the most comprehensive assessment of water quality in Chino Basin.

### [Anaheim Lakes Recharge Basins, Orange County Water District](#)

**Project Scientist:** Project scientist for a study in which various geochemical, physical, and biological mechanisms were considered as potential inhibitors of infiltration in artificial recharge basins. The study also examined operational alternatives to improve percolation rates.

### [Part B Hazardous Waste Permit, Shell Oil](#)

**Project Scientist: Dr. LeClaire** Project scientist for a land treatment demonstration for the disposal of oil refinery waste in Anacortes, Washington. The pilot study was in compliance with procedures for securing a Part B Hazardous Waste permit. Examined field and theoretical data to determine the



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mobility of trace metals, volatile organic compounds, and base/neutral/acid extractable organic compounds.

### REM II/Acid Mine Drainage, US Environmental Protection Agency

**Project Scientist:** Project scientist on a study to characterize and assess the environmental hazard of acid mine drainage in the Rocky Mountains west of Denver, Colorado (EPA REM II site). Stream gauging using flumes and Marsh-McBirney probes enabled the team to assess the quantity of flow from numerous adits that were ultimately tributary to Clear Creek. Samples were collected for inorganic and organic analyses; field samples were measured for pH, Eh, dissolved oxygen, and Fe(III)/Fe(II). The chemical data were input into a model that coupled a geochemical speciation model based on equilibrium thermodynamics with a stream flow code.

### University of California, Riverside

**Research scientist** for a study that examined the sorption of copper and cadmium by arid-zone soils at low solution concentrations of those metals to simulate realistic environmental scenarios. The sorption isotherm was characterized by an S-curve that is defined by an initial slope that increases with

soil solution metal concentration, rather than the typical van Bemmelen-Freundlich or Langmuir type isotherms. It was hypothesized that the complexation of the metal ions by naturally occurring organic ligands increases the solubility of the ions, and is responsible for the S-curve. This hypothesis is supported by further experiments in which the isotherm behavior was controlled by the removal of soluble organic matter from the soils and by the addition of fulvic acid.

Research assistant on a study to examine the movement of trace metals, e.g., copper, cadmium, zinc, nickel and lead in near surface soils when the metals were introduced to agricultural soils by the application of sewage (both liquid and sludge). The research group used infrared spectrophotometry (IR) and electron spin resonance (esr) techniques to characterize the role that organic ligands had in binding and transporting trace metals in unsaturated-zone flow. Plant tissue from barley and sorghum grown on the experimental plots were analyzed in an attempt to correlate activities of predicted species of metals in the soil environment to concentrations which were absorbed by the plant root system.

University of California, San Diego, Deep Sea Drilling Project, Scripps Institution of Oceanography

### **Assistant Museum Scientist:**

Conducted and directed scientific sampling and curation of deep sea and sediment cores. Curatorial representative onboard the Glomar Challenger scientific drilling vessel for six weeks off the coast of Morocco.

**Research assistant** on a study examining carbon and carbonate stratigraphy of sediment cores taken by hydraulic piston coring technique on the Guaymas Slope in the Gulf of California. Laminated and homogeneous zones in the diatomaceous oozes were correlated with stratigraphy and paleoclimatology, using known oxygen isotope data.

### **Publications / Presentations**

LeClaire, J. P., "Lysimeters assess regulatory compliance with recycled water recharge." *Water & Wastewater International*, 2005, Vol. 20, Issue 8:15-16. November 2005.

Ozbilgin, M. M., J. L. Goodell, J. P. LeClaire, and M. C. Kavanaugh, "The Use of Existing Water Supply Wells to Evaluate the Hydrogeologic and Transport Characteristics of Alluvial Aquifers." In Gammage, R. B., B. A. Berven (Editors), *Hazardous Waste Site Investigations: Toward Better Decisions*. CRC Press. 1992.

Amin, H., M. M. Ozbilgin, J. P. LeClaire, and M. C. Kavanaugh, "Groundwater Remediation: Risks

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and Alternatives," 62nd Annual Conference. Water Environment and Technology. 3:74-78. 1991.

LeClaire, J. P., "Sorption of Copper and Cadmium onto Soils: Influence of Organic Matter." A dissertation submitted in partial satisfaction of the requirements for the degree of Doctor of Philosophy in Soil Science, Riverside, California. August 1985.

Sposito, G., J. P. LeClaire, C. S. LeVesque and N. Senesi, "Methodologies to Predict the Mobility and Availability of Hazardous Metals in Sludge-Amended Soils." California Water Resources Center, University of California, Davis, Contribution No. 189. 1984.

LeClaire, J. P., A. C. Chang, C. S. LeVesque, and G. Sposito, "Trace Metal Chemistry in Arid-Zone Field Soils Amended with Sewage Sludge: IV. Correlations between Zinc uptake and Extracted Soil Zinc Fractions." Soil Science Society of America Journal 48:509-513. 1984.

J. P. LeClaire, A. C. Chang, Sposito, G., and C. S. LeVesque, "Trace Metal Chemistry in Arid-Zone Field Soils Amended with Sewage Sludge: III, Effect of Time on the Extraction of Trace Metals." Soil Science Society of America Journal 47:898-902. 1983.

LeClaire, J. P. and K. R. Kelts, "Calcium Carbonate and Organic Carbon Stratigraphy of Late Quaternary Laminated and Homogeneous Diatom Oozes from the Guaymas Slope, HPC Site 480, Gulf of California," Curry, J. R., D. G. Moore et al. Init. Repts. DSDP 64: Washington (U.S. Govt. Printing Office). 1982.

#### Selected Symposia

Wildermuth, M. J., J. P. LeClaire, A. E. Malone, R. Atwater, and J. A. Schlange, "Working Within the California Regulatory Process to Change Water Quality Objectives to Promote Large-Scale Use of Recycled Water." 2006.

LeClaire, J. P., A. Diba, G. Chan, and K. Nobriga, "Relational Database Access Across the Internet/Intranet for Water Resources." Information Management & Technology Conference, American Water Works Association. Reno, Nevada. April 5-8, 1998.

J. P. LeClaire, and A. Diba, "GIS-Based Pipeline Alternative Alignment Analysis Using PIPEplan," J. Oravitz, ESRI User's Conference, San Diego, California. June 1997.

Yuan, W. B., J. P. LeClaire, A. Diba, and M. Zidar, "Mapping Groundwater Vulnerability through Loose Coupling of GLEAMS and GIS." 89th Annual Meeting American Society of Agronomy/Crop Science Society of America/Soil Science Society of America, Anaheim, California. October 27, 1997.

LeClaire, J., A. Diba, and J. Oravitz, "World-Wide Web Based RDBMS Access." Orange County Chapter of URISA, Brea, California. February 1997.

LeClaire, J., A. Diba, and J. Oravitz, "The San Francisco/San Joaquin Bay-Delta Database: Data Management and Retrieval Using GIS and Web Interfaces." Third Annual California GIS Conference, Innovative Applications of State-of-the-Art Technology Section, Biltmore Hotel, Los Angeles, California. February 1997.

Yuan, W., J. LeClaire, A. Diba, M. Inada, and M. Zidar, "Mapping Groundwater Vulnerability to Nitrate and Pesticide Contamination in the Salinas Valley, Monterey, California." ASCE North American Water and Environment Conference, Anaheim, California. June 1996.

Amin, H., M. M. Ozbilgin, J. P. LeClaire, and M. C. Kavanaugh, "Alternatives and Risks for Remediation of Groundwater Contaminated with Volatile Organics at a Major Superfund Site." 62nd Annual Conference. Water Pollution Control Federation. San Francisco, California. October 1989.

#### Affiliations / Organizations

American Water Resources Association  
Groundwater Resources Association of California  
National Ground Water Association  
Sigma Xi - The Scientific Research Society of North America  
Soil Science Society of America

