CENTRAL VALLEY SALINITY COALITION PROPOSAL

SALT AND NITRATE SOURCES WORK PLAN AND PILOT IMPLEMENTATION STUDY

APRIL 20, 2009
April 20, 2009

Mr. Daniel B. Cozad
Central Valley Salinity Coalition
360 Lakeside Avenue
Redlands, California 92373

Subject: Request for Proposal for Salt and Nitrate Sources Work Plan and Pilot Implementation Study

Dear Mr. Cozad:

Brown and Caldwell (BC) has tailored an experienced and qualified team to conduct a thorough and responsive Salt and Nitrate Sources Work Plan and Pilot Implementation Study for the Central Valley Salinity Coalition (CVSC). Our team of multi-disciplined scientists and engineers is uniquely qualified, having performed a wide variety of water quality and engineering studies on salt and nutrient loading throughout the Central Valley. BC will provide an experienced facilitator and leverage our past technical experience managing difficult salinity and nitrate issues to rapidly achieve consensus from the stakeholders including the Central Valley Regional Water Quality Control Board (Water Board) to provide project deliverables on schedule.

Project manager, Jeff Bold, PhD, CPSS and senior staff Ron Crites, PE; Rob Beggs, PhD, PE; Martin Steinpress, PG, CHG; and Ane Deister have worked for industry, municipalities, and water purveyors throughout the Central Valley with a combined experience of more than 100 years. Recent work with the Water Board includes the food processing industry (California League of Food Processors), municipal wastewater treatment plants (Sacramento), and irrigation districts (Yolo County). This experience provides our team with an outstanding ability to manage the nuances of technical detail, work with industry, work with the Water Board, and communicate with the public through our timely and cost-effective work products.

BC has assembled a diverse team for both the current Phase 1 scope as well as potential future CVSC needs in Phase 2 and beyond. Our experienced facilitator, Ane Deister, will communicate key issues and identify and resolve key concerns raised by the CVSC regarding this project’s major deliverables. Our team has the data management systems and expertise to efficiently compile, manage, analyze, and present the large volumes of water quality and other data that will be integral to a successful project.

We have included Hydrometrics, LLC and Wolfgang Shmid, PhD on our team to ensure we collect the appropriate data to support future basin models and to conduct fate and
transport analyses in future work. We have drawn on our experience with salt and nitrate issues in the Central Valley to recommend three potential sites for pilot studies and we look forward to discussing these areas with the CVSC Technical Advisory Committee. Finally, BC has successfully collaborated in the past with the University of California, the United States Geologic Survey, and the Department of Water Resources (DWR) and we anticipate coordinating with them for peer review of deliverables on this project if desired by the CVSC.

As requested, we are submitting this proposal and comments to the service agreement as a single PDF file electronically and five hard copies on recycled paper. We are excited at the prospect of working with you on this challenging project. Please contact Jeff Bold at 530.204.5210 or jbold@brwnca1d.com if you have questions or would like to discuss this proposal.

Sincerely,

BROWN AND CALDWELL

Dave Zuber, PG (#5933)  Jeff Bold, PhD, CPSS (#24689)
Vice President  Project Manager
Proposal Authorization

I certify I am authorized to submit a binding proposal on behalf of my company, Brown and Caldwell, and this proposal conforms to required specifications unless otherwise noted.

Brown and Caldwell
Dave Zuber, PG
Vice President

April 17, 2009
dzuber@brwncald.com
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DESCRIPTION OF BUSINESS

BC will serve as the prime consultant on the Salt and Nitrates Sources Work Plan and Pilot Implementation Study. The BC team members live and work in the Central Valley and this project will be managed out of our Davis office with administrative and technical support from our Rancho Cordova and Walnut Creek offices.

Figure 3.1. Map of BC's Walnut Creek, Davis, and Rancho Cordova offices.
BC is a full-service environmental engineering and consulting firm that provides a comprehensive suite of services including designs and studies focused towards providing water supply, wastewater treatment, water quality evaluations, and analysis of soil, air, surface water, and groundwater in the Central Valley. Our practice in northern California (Davis, Rancho Cordova, and Walnut Creek) was established more than 60 years ago and includes local experts that develop proven solutions to match each client’s organizational culture and needs. We have more than 60 full-time professionals in our Rancho Cordova and Davis offices who routinely provide water resource related design and siting studies for utilities, municipalities, and private industry. Our wastewater clients stretch from Tulare County to the Modesto area to Butte County. Some of our water supply clients include Placer County Water Agency, San Juan Water District, Citrus Heights Water Agency, Olivehurst Irrigation District, City of woodland, City of Davis, El Dorado Irrigation District and the City of Modesto.

Our Wastewater Design group has worked with large municipalities and major design projects for Sacramento Regional County Sanitation District, City of Fresno, and the City of Modesto. In addition to working for cities, large municipalities, and irrigation districts, BC has an active practice working with the private sector agricultural and industrial clients of varying sizes. A partial list includes the California League of Food Processors, Hilmar Cheese, Del Monte Foods, J.G. Boswell, Pacific Coast Producers, SK Foods, several Central Valley wineries, University of California (UC) at Davis, and Yokohl Ranch in Tulare County. Through this work we have compiled salinity studies Reports of Waste Discharge, Anti-Degradation Analyses, and Soil and Groundwater Investigations.

**Technical Qualifications and Licenses**

The proposed key project team members include three Professional Engineers and two Professional Geologists registered in California along with one Certified Professional Soil Scientist (CPSS) (national certification). The BC team can draw on assistance from 97 Registered Engineers between our Davis, Rancho Cordova, and Walnut Creek offices.
SECTION 5

BC EXPERIENCE

This section highlights the BC’s experience in evaluating salt sources (CASS, Sacramento County, Butte County, UC Davis), compiling and managing databases (Yolo WRID, HBWS, Del Monte Kingsburg), reaching consensus with stakeholder groups (CLFP, San Joaquin River Restoration, AOWA & CASA), and leading studies. These projects are located throughout the Central Valley of California and provide proof that BC brings technical excellence and experience forming relationships and resolving complex issues with the public, regulatory agencies, and with industry.

Manual of Good Practice for Land Application of Food Processing/Rinse Water

California League of Food Processors (CLFP), Sacramento, California

BC managed the development of a manual of good practice for land application of food processing/rinse water for the CLFP in 2007. A key component of the manual’s development was the collaboration with staff from the State and Regional Water Boards. Subcommittees of technical and regulatory staff discussed, defined, and drew conclusions on the areas of contention between industry and regulators that included small systems waivers, safe and protective biochemical oxygen demand (BOD) loading rates, point of compliance with groundwater quality limits, and soil monitoring.

BC Rob Beggs and Ron Crites provided guidelines for designing and monitoring land application systems and in particular emphasized salt loadings, nitrogen loadings, and crop uptake of both salts and nutrients. Characterization of salts in process water was concluded to be best represented by the fixed dissolved solids (FDS) rather than total dissolved solids (TDS) or electrical conductivity (EC).

BC prepared examples of planning and design of two types of food processing facilities — small fresh vegetable washing plant with low risk to groundwater from land application and large fruit canning facility with higher loading rates that required specialized engineering analysis of loading rates for BOD, nitrogen, and salts.

Client Benefits:
- Salt management
- Groundwater protection
- Streamlined regulations

Key Personnel: Jeff Bold, Ron Crites, Rob Beggs

Water Resources Information Database (WRID)

Yolo County, California

The Yolo County WRID contains water level and quality data from wells throughout Yolo County that are monitored by various entities, including the cities of Davis and Woodland, UC Davis, the Yolo County Flood Control and Water Conservation District, and several other data cooperators. BC, led by Dr. Rob Beggs, performed an evaluation of data structure and quality, reorganized the database into a true relational structure, eliminated redundant data, and corrected coordinates and other reference data errors. BC then developed a Web-based data interface for easy data access and entry. The Web interface displays well construction details, generates reports and isocountour plots and incorporates data export features. The database and data were also modified to be consistent with DWR Water Data Library standards for easy data exchange. BC performed outreach and training with local groundwater data cooperators, and is currently enhancing database interface features and providing annual database maintenance services.

Client Benefits:
- Consistency, accuracy, and access to data for resource planning
- Uniform criteria for evaluating groundwater level

Key Personnel: Rob Beggs, Jennifer Chen
Cheese Processing Wastewater Conveyance and Land Application Alternative Evaluation

Hilmar Cheese Company, Hilmar, California

In 2004, BC performed a Report of Waste Discharge for flow and land expansion for land application of 2.0 mgd of cheese processing wastewater for Hilmar Cheese Company. BC also calculated a nitrogen balance and BOD loading estimate based on oxygen diffusion, performed an analysis of the tile drain influence on the land treatment system, and developed a laboratory data Quality Assurance Program.

BC prepared a Site Assessment Work Plan in compliance with a Cleanup and Abatement Order issued by the Water Board to address potential impacts resulting from the discharge of wastewaters to open fields at the Site Plant referred to as the primary land application area. The overall goal of the Site Assessment is to provide the data necessary to develop an appropriate remedy, or set of remedies, for groundwater impacts identified to have resulted from the HCC wastewater discharges to the primary land application area.

In 2007, BC conducted an evaluation of the feasibility of secondary land application approximately five miles west of the Site. This evaluation was part of an amended report of Waste Disposal (AROWD). For this task, BC identified naturally saline/alkali soil and conducted a preliminary groundwater quality assessment which suggested that groundwater in these secondary lands was more saline than the process water as long as the process water could be conveyed. Process water application to the naturally saline secondary lands (and groundwater) provided a potentially sustainable source of irrigation water for moderate salt tolerant crops and would not degrade groundwater. This option was not selected but will be considered further if other options such as deep well injection prove to be infeasible or uneconomical.

Central Arizona Salinity Study (CASS)

Bureau of Reclamation and Sub-Regional Operating Group (SROG), Phoenix Region, Arizona

Initiated in 2001 to examine the importation of salts into central Arizona, CASS began through a cooperative partnership between the Bureau of Reclamation and SROG, which is represented by the cities of Glendale, Mesa, Phoenix, Scottsdale, and Tempe and is expanding to several other cities. BC managed the project and coordinated in the identification of the extent of salinity problems. It was originally scoped as a two phase, four year project, but continues today as a community forum focusing on educating the public on salinity issues, identifying new concentrate management ideas, and exploring ways to control salinity in wastewater treatment plants.

Currently, more than 1.75 million tons of dissolved salts are imported into central Arizona’s via the Salt, Verde and Colorado Rivers. Prior to construction of the Salt River Project (SRP) in the early 1900’s, the Salt and Verde Rivers exported salts through central Arizona to the Colorado River into the Sea of Cortez, however after the SRP was created, salts began accumulating. Upon completion of the Central Arizona Project (CAP) aqueduct system in the mid 1980’s another source of high salinity water, Colorado River water, was brought into Arizona.

Fertilizers, water softeners, industrial water treatment, and other human activities added more salts to the system, increasing the total dissolved solids (TDS) concentration in wastewater effluent from 300 to 500 milligrams per liter (mg/L) greater than the TDS concentration of the potable water supply. As municipal wastewater is treated, effluent is either discharged to surface water and used for agricultural/landscape irrigation or artificially recharged, significantly increasing groundwater salinity.

Phase I of CASS quantified that since 1985, the Phoenix metropolitan area has been accumulating about 1.1 million tons annually. Phase I modeling

Client Benefits:

- Provided additional options for wastewater disposal
- Identified an innovative approach toward salt management

Key Personnel: Jeff Bold, Ron Crites, Rob Beggs, Karen Cole
identified that an increase in TDS of 100 mg/L led to approximately a $30 million annual increase in salinity impacts, primarily within the Phoenix metropolitan area. Although these costs are large, they have not yet significantly affected the economic development of the area. It is anticipated that costs related to salinity issues will increase because of the salt build-up associated with imported surface waters and the additional salt loading due to population growth.

The focus of CASS Phase II was to evaluate potential approaches to managing salinity in central Arizona. Four subcommittees were formed to exam salinity issues in detail. Those subject areas were:

1. **Planning.** Examine consequences of taking no action in managing salinity and where would it be most economical to apply salinity management strategies.

2. **Brackish Water.** Examine how to develop brackish groundwater available in the Phoenix metropolitan area as a viable water resource.

3. **Salinity Control at the Wastewater Treatment Plants.** Examine how to prevent the anticipated increase in salinity concentration in the future because of high TDS source waters and increased influent TDS streams from residential and commercial water softener usage, industrial processes, increased quantities of concentrated salts from cooling towers, and increased concentrate from membrane treatment facilities.

4. **Concentrate Management.** Examine which concentrate management alternatives work best for Arizona considering the cost of concentrate management can be about 50 percent of a major desalination facility.

CASS Phase II concluded that more work is required to manage salinity, and eventually, the availability of water resource for specific uses may be limited by salinity. Improvements in both desalination and concentrate management technologies are required for large-scale use of desalination and to allow full utilization of the impaired water resources in Arizona.

### Biosolids Management

**Sacramento Regional County Sanitation District (SRCSD), Elk Grove, California**

Since the early 1970s, BC has provided biosolids management services for the SRCSD including comprehensive site characterization, sludge management studies, operational troubleshooting, EIRs, pilot studies, facility plans, detailed design, and construction management. BC was instrumental in developing the innovative and cost-effective solids treatment and disposal system in use today.

This solids treatment system includes on-site 185-acre dedicated disposal of nearly 20,000 dry tons of sludge per year. Jeff Bold conducted numerous studies on the soil and groundwater characteristics. We have conducted salt and nutrient mass balances content of biosolids and conducted fate and transport studies through the vadose zone and into groundwater.

BC completed the Solids Master Plan for the SRCSD as part of the overall Wastewater Treatment Plant Management Program. BC evaluated existing solids handling and disposal facilities and assessed alternative biosolids treatment, disposal, and beneficial use options. This plan is currently guiding the development of biosolids beneficial use options to agricul-

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**Client Benefits:**
- Coordinated a complex analysis of multi-source salt import and export
- Coordinated multiple parties with differing issues regarding salt accumulation
- Assigned an economic value to salt accumulation

**Key Personnel:** Laura Chavez

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**Client Benefits:**
- Quantified the loading rate of salts and nutrients in biosolids applied to DLD soil
- Quantified the assimilative capacity of DLD soils for salt nutrient and metal loading
- Assessed the impact on groundwater from biosolids loading to unlined DLDs
- Provided the technical data needed for planning, construction of lined DLDs

**Key Personnel:** Jeff Bold, Ron Crites
tural land to minimize future biosolids disposal to the dedicated land disposal acreage.

BC is involved with follow-up work in all of these elements of the Biosolids Management Program including tasks focused on salinity management:

- Implemented a 1-acre synthetic-lined DLD facility to test high-rate biosolids application rates while avoiding impact to groundwater.
- Completed the design of several HDPE-lined DLD sites (45 acres each) for long-term land treatment and disposal of biosolids. This system is the first like it in the world.
- Currently assisting in conducting a Pilot Study using an Anaerobic Digester to convert grease, fat, oils, and food processing waste into energy.

Recycled Water Irrigation

Honolulu Board of Water Supply (HBWS), Hawaii

Irrigation is the preferred reuse method under study on Oahu due to current and past water recycling projects utilizing reclaimed water on golf courses and agricultural land. The HBWS took a cautious approach toward allowing recycled water use over potable water aquifers because of concerns over degrading or contaminating the underlying, high-quality groundwater. HBWS had concerns regarding the migration of constituents including pesticides, endocrine disruptors, and other trace organics. As a result, HBWS developed a project to investigate potential impacts of irrigation with recycled water in Central Oahu and determine the level of protection of water quality that exists when recycled water is used for crop or turf irrigation.

The project was initiated with a literature review and research plan in December 2000. The next task completed was a detailed water quality characterization of recycled water and alternative irrigation water sources. A golf course site was studied concurrently with the water characterization work. An 18 month field study was completed in which the percolate water quality from eight plots irrigated with recycled water was compared to the percolate from four plots irrigated with groundwater. For the organic and nutrient constituents studied, the percolates were statistically equal. Soil-water and groundwater contaminant models were developed and used to assess potential long-term impacts to groundwater.

The Sacramento office conducted the database management for the water quality testing of the applied groundwater, recycled water, and percolate water from the 12 groups of lysimeters, under the direction of Karen Cole.

Client Benefits:
- Quantified the non-degradation of groundwater
- Groundwater resource conservation and beneficial reuse of recycled water

Key Personnel: Ron Crites, Rob Beggs, Martin Steinpress, Karen Cole

Technology Review

City of Dixon, California

Ron Crites led the BC team that analyzed options for wastewater treatment and reuse using aerated ponds and infiltration basins for a flow of 2.0 mgd. The issues for the City of Dixon include minimizing salinity in the treated effluent, identifying alternative methods of reducing total dissolved solids in the water supply, completing antidegradation analysis of groundwater, and best practicable treatment and control. A public presentation was made to the City Council and the interested public.
Salinity sources for the city’s discharge to land were identified as their (1) water supply 41%, (2) water softeners, 24%, (3) industry and commerce 1%, (4) evapoconcentration in their ponds, 17%, and, (5) municipal/residential contribution, 17%. Alternatives explored included (1) improved water supply by adding surface water sources, (2) wellhead treatment for hardness reduction, (3) point-of-use softening, (4) banning of self-regenerating water softening, and (5) alternative wastewater treatment methods.

**Chico Urban Area (CUA) Groundwater Nitrate Study**

**Butte County, California**

Working in tandem with stakeholders, Dr. Jeff Bold completed a Butte County Groundwater Nitrate Study Work Plan, conducted field work installing 20 monitoring wells, conducted sampling, and published the Butte County Groundwater Nitrate Study. The Work Plan required evaluation of well logs and water quality data for over 100 existing wells and called for semi-annual sampling of 20 additional wells for a total of 40 wells in the CUA. The Work Plan and sampling activities were conducted to support the most technically defensible groundwater database. BC worked with UC Davis faculty to conduct a comprehensive analysis of N15/N14 isotopic ratios of all 40 wells to evaluate nitrate sources.

**Nitrate Source Investigation.** Dr. Bold conducted a Nitrate Source Technical Memorandum (TM) that attempted to evaluate historic nitrogen loading and potential residual affects in vadose zone and groundwater. To support the TM, BC staff conducted the installation of vadose zone lysimeters, completed a soil boring program, and conducted depth discrete soil nutrient and salt analyses. Results derived from the work conducted by the BC team have been utilized to support Butte County’s efforts to build consensus with the public and regulatory agencies.

**Process Design Manual**

**U.S. Environmental Protection Agency (EPA)**

BC was retained by the EPA to prepare a new version of the design manual for Land Treatment of Wastewater. New text was added on mechanical move sprinkler systems and drip irrigation systems. New design examples were added, including calculation of oxygen diffusion into soils.

In related work, Ron Crites and Rob Beggs also recently served as principal authors for chapters on small and natural wastewater treatment systems for Water Environment Federation Manuals of Practice:

- Natural Systems for Wastewater Treatment (Manual of Practice FD-16; 3rd Edition)
- Design of Municipal Wastewater Treatment Plants (Manual of Practice 8, Chapter 19 – Natural Systems (including soil absorption systems)

**Client Benefits:**
- Quantified salt sources
- Assisted in the planning process for salt management and salt reduction
- Public meetings facilitated understanding of the issues

**Key Personnel:** Ron Crites, Rob Beggs, Jennifer Chen

**Client Benefits:**
- Obtained the technical basis for design of land application systems

**Key Personnel:** Ron Crites, Rob Beggs

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**Client Benefits:**
- A technically sound groundwater database underlying a large urban area
- Source investigation that resolved source of nitrates in groundwater
- Technical support in public meetings to describe nitrate sources and sinks

**Key Personnel:** Jeff Bold
Groundwater Data for Kingsburg Plan #25 Land Application Facility
Del Monte, Kingsburg, California

In 2000, BC compiled and analyzed 15 years of groundwater quality and elevation data for Del Monte Kingsburg land application facility covering the years 1986 through 2000. The purpose of this compilation was to respond to a Water Board request to evaluate facility groundwater monitoring data and assess if the facility caused groundwater degradation. Since the facility began operation in 1986, groundwater was monitored on a quarterly schedule for 18 different parameters including EC, pH, TKN, nitrate, ammonia, COD, iron, manganese, phosphorus, chloride, boron, sulfate. Once data were verified and checked, BC conducted a statistical analysis on the data set that included basic summary statistics, trend analysis, and calculating background concentration limits. BC also conducted an evaluation of subsurface geology and hydrogeology based on site monitoring well logs and a well survey using water well logs from the surrounding area. The results of the analysis included developing an understanding of subsurface stratigraphy, identifying chemical parameters that had statistically significant increasing and decreasing trends.

This report satisfied the Water Board and the land application operation continued. Subsequent to the initial report, BC maintained the database and assisted with yearly reporting requirements including review of analytical data and producing figures and tables for reports.

In November 2006, the Water Board issued a notice of violation (NOV) citing the land application facility caused degradation in groundwater quality for iron and manganese. Dr. Jeff Bold assisted Del Monte by preparing a comprehensive response to all of the issues identified in the NOV. This included:

- A second groundwater constituent concentration trend analysis from 2000 to 2006. This trend analysis showed that determining the direction of groundwater flow was difficult, given the facility is located on the Kings River, for more comprehensive hydrogeologic investigation that recommended a modification to the existing well network.

These reports, work plans, and studies satisfied the Water Board that groundwater quality, although elevated above background for some parameters, was improving by implementing improvements in plant operations.

Client Benefits:
- Obtained technical data focusing ways to improve land application processes

Key Personnel: Jeff Bold, Ron Crites, Karen Cole

San Joaquin River Restoration,
Friant Water Users Authority, Natural Resources Defense Council (NRDC), USBR and Other State and Federal Agencies

The San Joaquin River Restoration Project is defined in a Federal court sanctioned settlement agreement reached in 2006 between Friant Water Users Authority, NRDC, USBR and a host of other State and Federal agencies. This agreement was reached after 18 years of legal action. The Federal court established and appointed our proposed Lead Facilitator, Ane Deister, an independent Restoration Administrator to provide an objective annual report to the court along with periodic technical reports and recommendations to the Secretary of Interior regarding its implementation. The two program goals were to restore the salmon fishery and maintain water supplies while ensuring Friant and USBR could continue to provide flood protection services. The Restoration Administrator assisted the implementing agencies and program management team by overseeing the work of the Technical Advisory Committee and making technical recommendations and guid-
Ms. Deister brought resources together and provided input to the development of the draft fisheries management plan. She worked with the TAC to review, comment, and make recommendations regarding numerous Technical Memoranda providing the basis for PEIS/PEIR and Draft Alternative Planning documents, met with ‘third parties’ and land owners to understand their views and interests, and gathered input for program documents.

**Alternative Recycled Water Policy Draft**

**Association of California Water Agencies (ACWA) and California Association of Sanitation Agencies (CASA)**

When the California State Water Resources Control Board’s (SWRCB) draft update to the recycled water policy in 2008 was met with a negative response by major stakeholders SWRCB invited alternative drafts. Ane Diester of BC was hired by ACWA and CASA to facilitate the development of an alternate draft. Participants included members of ACWA and CASA, utility representatives, environmental representatives, and State Board members and senior staff. Ane identified the key issues, developed agreement on difficult provisions, and provided alternative approaches for the group’s consideration. One of the key issues discussed and debated was salt management throughout the region.

### Client Benefits:
- Achieved resolution and developed solutions acceptable to three key stakeholder agencies that were at odds over this issue for 18 years
- Coordinated with additional Federal and State agencies and a group of more than 20 environmental entities and more than 20 water agencies

### Key Personnel:
Ane Deister

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**Key Personnel:**

- Ane Deister
BC TEAM
ORGANIZATIONAL CHART

BC commits a team of technical experts led by project manager, Jeff Bold, PhD, CPSS, an expert in salinity and nutrient studies in the Central Valley. The technical team is composed of seasoned professionals who have recent experience directly relevant to their assignments.

Team members’ responsibilities are shown on the organizational chart and summarized in the brief biographies in Section 7. Full resumes may be found in Appendix A.

We also have contacted key persons with the USGS and US Soil Salinity Lab to discuss peer review activities. Due to the vital importance of keeping peer reviewers truly independent, we recommend that peer reviewers be contracted separately.
SECTION 7

BC TEAM OVERVIEW

The Salt and Nitrate Sources Work Plan and Pilot Implementation Study represents an exciting and challenging opportunity for the CVSC and BC team members alike. Jeff Bold will effectively manage our team of highly qualified and very motivated team members by fostering clear, continuous communication.

A key to the success and efficiency of our work on this project will be a series of productive meetings where agendas will be developed in advance and followed, all stakeholders’ input will be valued, and decisions will be clearly documented.

Below is a complete list of personnel including subcontractors that will be dedicated to this project.

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<tr>
<th>Name</th>
<th>Title</th>
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<tbody>
<tr>
<td>Jeff Bold, PhD, CPSS</td>
<td>Project Manager</td>
<td>BC</td>
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<td>Ron Crites, PE</td>
<td>Technical Leader</td>
<td>BC</td>
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<tr>
<td>Ane Deister</td>
<td>Lead Facilitator</td>
<td>BC</td>
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<td>Paul Selsky, PE</td>
<td>Regional Planner</td>
<td>BC</td>
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<tr>
<td>Martin Steinpress, PG, CHG</td>
<td>Geologist/Hydrogeologist Leader</td>
<td>BC</td>
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<tr>
<td>Rob Beggs, PhD, PE</td>
<td>Sources Identification/Vadose Modeler</td>
<td>BC</td>
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<tr>
<td>Brent Cain</td>
<td>GIS Analyst/Lead Modeler</td>
<td>BC</td>
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<tr>
<td>Allan Scott</td>
<td>Information Technology Manager</td>
<td>BC</td>
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<td>Laura Chavez</td>
<td>Salinity Expert</td>
<td>BC</td>
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<tr>
<td>Jennifer Chen, EIT</td>
<td>Project Engineer</td>
<td>BC</td>
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<tr>
<td>Karen Cole</td>
<td>Database Analyst</td>
<td>BC</td>
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<tr>
<td>Chris Bautista</td>
<td>GIS Analyst</td>
<td>BC</td>
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<tr>
<td>Jacqueline Bates</td>
<td>Project Assistant</td>
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<tr>
<td>Lance Hershman</td>
<td>Project Engineer</td>
<td>BC</td>
</tr>
<tr>
<td>Greg Menna</td>
<td>Project Scientist/Geologist</td>
<td>BC</td>
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<tr>
<td>Suzanne Kocsis</td>
<td>Project Data Manager</td>
<td>BC</td>
</tr>
<tr>
<td>Angela Brush</td>
<td>Project Geologist</td>
<td>BC</td>
</tr>
<tr>
<td>Diego Colorado</td>
<td>Project Engineer</td>
<td>BC</td>
</tr>
<tr>
<td>Derrik Williams, PG, CHG</td>
<td>Groundwater Resources Management</td>
<td>Hydrometrics, LLC</td>
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<tr>
<td>Tana Cameron, PE</td>
<td>Groundwater Management</td>
<td>Hydrometrics, LLC</td>
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<tr>
<td>Wolfgang Schmid, PhD</td>
<td>Groundwater Modeling</td>
<td>University of Arizona</td>
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We have assembled a team of experts for the Salt and Nitrate Sources Work Plan and Pilot Implementation Study. Our team has worked together on previous projects and are distinguished by their professionalism, attention to detail, and commitment to complete assignments. In the interest of providing the CVSC with a well-rounded team, we are pleased to have Hydrometrics, LLC and Wolfgang Schmid join the team as subcontractors.

Team members’ responsibilities and experience are summarized in the brief biographies below.

**Jeff Bold, PhD, CPSS**  
**Role:** Project Manager  
**Title:** Managing Scientist

Jeff Bold will be our Project manager for this effort. Dr. Bold will serve as the single point of contact for the BC team and be responsible for coordinating and tracking project activities, schedules and budgets. He will take the lead in ensuring the CVSC receives regular updates and are consulted to set meeting agendas, action items, and schedules. Dr. Bold assumed a similar role as project manager for salt and nutrient loading studies of septic effluent in Butte County, biosolids loading in Sacramento County, and Solid Waste in for UC Davis in Yolo County.

Dr. Bold is a Certified Professional Soil Scientist (CPSS), whose expertise is in soil and water chemistry with doctoral and post-doctoral research in the toxicity and mobility of heavy metals in unsaturated vadose zone soils. Following academic pursuits at University of California, Davis (Plant and Soil Sciences) and University of Minnesota (Forest Resources), Dr. Bold has more than 25 years experience in postdoctoral geochemistry, soil and water remediation, toxicology, and statistics. Currently Dr. Bold serves agricultural, industrial, mining, municipal and agricultural clients focusing on reuse of treated water, managing organic residues to protect soil, and aquifer quality. Dr. Bold has managed large remediation construction projects and continues to represent private industrial clients in negotiations on state and federal Superfund (CERCLA, RCRA) sites within and outside California.

**Ron Crites, PE**  
**Role:** Technical Leader  
**Title:** Chief Engineer

As technical leader, Ron Crites will supply his knowledge of data sources and stakeholders to the project and provide technical oversight of the project approach and deliverables. Mr. Crites is the Natural Systems Service Leader for BC. Mr. Crites has 40 years of wastewater treatment experience with water reuse and land treatment of municipal and industrial wastewaters. He is the author of three textbooks including Natural Systems for Waste Management and Treatment, Small and Decentralized Wastewater Management Systems, and Land Treatment of Municipal and Industrial Wastes. He is active on the Land Discharge Committee and Chairman of the Recycled Water Committee of the Central Valley Clean Water Association. He was the Technical Leader on the Honolulu Board of Water Supply Recycled Water Irrigation Study and he was the project manager for the California League of Food Processors Manual of Good Practice for Land Application.

**Ane Deister**  
**Role:** Lead Facilitator  
**Title:** Vice President

Ane Deister’s role on this project will be to facilitate the critical initial meetings between the CV Salinity Committee members and stakeholders early in the work plan process. She will also facilitate review and comment meetings for the work plan and pilot study reports. Ms. Deister has over 30 years of experience in the water resources management business with over 20 years in executive leadership appointments. She was hired on five separate projects to provide change management, leadership development and organizational improvements for public regulated...
water and wastewater utilities, and two private sector firms. She has significant technical experience in the engineering, operations, administration, drought preparedness, sustainability, conservation, watershed management, and river restoration fields. Ms. Deister has also served in leadership positions nationally and is frequently sought after to provide training and professional presentations on succession planning, leadership development, and utility, Human Resource, change, and organizational management.

Paul Selsky, PE  
**Role:** Regional Planner  
**Title:** Vice President

Paul Selsky, manager of the Sacramento/Davis water resources group, an elected member of the Board of Directors of the Carmichael Water District, and 29 year veteran of the water industry, will serve as Regional Planner on the CVSC's project. He provides water supply and treatment planning and design to western water agencies with a regional and policy-level focus. He has directed or written numerous water master plans involving water needs assessment and has prepared capital improvement programs for U.S. and international clients. He serves on policy making committees for the American Water Works Association and the Sacramento Regional Water Authority.

Martin Steinpress, PG, CHG  
**Role:** Geologist/Hydrogeologist Leader  
**Title:** National Service Leader, Groundwater Resources

As the BC Team lead hydrogeologist, Martin Steinpress will be responsible for technical coordination of hydrogeologic aspects of the study and will direct our key subcontractors Hydrometrics and Dr. Wolfgang Schmid. Mr. Steinpress has 31 years of applied experience in geology and hydrogeology. He has worked in the environmental and groundwater industry for 19 years and has managed many large groundwater resources and water supply projects. He is the National Groundwater Resources Services Leader and a technical expert in hydrogeology with extensive experience in analyzing and solving complex groundwater problems. He has provided project management and technical expertise on groundwater investigations, remedial actions, water supply, and recharge projects. His water resources planning background includes creating cooperative partnerships among water agencies to facilitate the development of regional conjunctive water management projects. He has worked in all major aquifer types (alluvial basins, volcanic, carbonate and bedrock terrains). He also has extensive experience in applying database, GIS, modeling and web-based tools to water resources and other environmental challenges. Mr. Steinpress is also a lecturer at California State University East Bay teaching the geology department's senior-level hydrogeology lecture and lab course and various other geology classes.

Rob Beggs, PhD, PE  
**Role:** Sources Identification/Vadose Modeler  
**Title:** Managing Engineer

Rob Beggs will be responsible for managing the acquisition of data from various sources and using his expertise in vadose zone modeling to evaluate parameters that will be used in the basin templates. Dr. Beggs provided similar database services for Yolo County and Pacific Coast Producers, where he developed database and Web-based data sharing applications for land application and groundwater monitoring sites. Dr. Beggs has 25 years of experience in environmental engineering, soil-water systems, and water resource management. His particular areas of expertise include engineering and project management for natural wastewater treatment systems, water reclamation, groundwater quality, agricultural irrigation, water resources planning, and food processing wastewater systems. As part of his wastewater regulatory reporting and studies, he has performed numerous source investigation and control evaluations for salts and nitrates and is a modeling expert. He has substantial expertise in soil-water transport processes and soil-water and groundwater quality monitoring.
Jennifer Chen, EIT
Role: Project Engineer
Title: Staff Engineer

Jennifer Chen will be assisting senior team members in executing various tasks for this project including hands-on review of data spreadsheets and reports from various sources. Ms. Chen is a chemical engineer with experience in wastewater treatment, drinking water treatment piloting, economic evaluations, hydraulic modeling, land application processes, and erosion control seed material. Ms. Chen is familiar with environmental compliance issues and waste discharge requirements. She presented at the 2007 American Water Works Association, Water Quality Technology Conference on pretreatment with pre-ozone and alum upstream of microfiltration membranes from her work on a drinking water treatment plant pilot study.

Laura Chavez
Role: Salinity Expert
Title: Water Resource Analyst

Laura Chavez’s role will be to provide the BC team, CV Salinity committee, and stakeholders insights from similar work in Arizona. This will be especially important for early phases of the project where experience from the CASS project can be incorporated into the work plan.

Karen Cole
Role: Database Manager
Title: Computer Services Manager

Karen Cole will be responsible for successfully completing the data transfer from existing sources into the project database. This process typically includes data scrubbing, data formatting and some programming to ensure the resulting database is useful for later project phases. Ms. Cole is an experienced programmer in SQL Server, Access, Visual Basic, Visual FoxPro, Delphi, Oracle, SQL and UNIX. She has proven expertise in database design, development and management. She has extensive reporting experience from multiple platforms and in multiple formats, including CalTrans, ERPIMS and GeoTracker.
Derrick Williams, PG, CHG and Tana Cameron, PE
Hydrometrics, LLC
Groundwater Resources Management and Groundwater Modeling

Derrick Williams and Tana Cameron of Hydrometrics will work closely with Martin and Brent to provide flow modeling and fate and transport modeling support. Hydrometrics, LLC is an Oakland, California based firm providing water resources consulting to both public agencies and private companies. HydroMetrics, LLC’s staff of premier scientists and engineers provides their clients specialized expertise in developing, protecting, and managing groundwater and surface water resources. Both as individuals and as part of a growing company, the staff of HydroMetrics, LLC has developed a reputation for providing perceptive, quality analyses that yield practical solutions to water resource problems. Hydrometrics provides both groundwater flow modeling and fate transport modeling services to address water resources challenges.

Wolfgang Shmid, PhD
Groundwater Modeling

Wolfgang Schmid, a modeling expert, will ensure that our team has collected the soil and water data necessary for future basin modeling studies. Dr. Schmid worked with the USGS to develop the code for the FARM model which integrates surface water, irrigation, and precipitation into the MODFLOW code used for basin models developed by the USGS.
In this section, we outline our understanding of the project and our approach to specific tasks. BC’s previous work on similar projects gives us a thorough understanding of the challenges facing the CVSC’s project and the perspective necessary to create a successful approach.

**BC’s Approach**

The major challenge of this project will be to rapidly achieve stakeholder consensus on a technically sound work plan and to develop pilot study results that provide the framework for future studies. Our approach to meeting this challenge will be to focus on the key issues listed below, resulting in project success.

**Maximize productivity and consensus building using meetings with the CVSC.** We will set up well organized, focused meetings with a proven facilitator and well respected technical leader, Ane Deister to assist our project team. The meetings will be viewed as opportunities for consensus building.

**Choose representative study basins that will allow the best results to be achieved in a timely manner.** We will study basins representative of the Central Valley that have excellent data availability and where we have direct experience studying salinity and nitrate issues.

**Meet the schedule by establishing a sense of urgency.** Given the tight project schedule, a sense of urgency needs to be established among all stakeholders and technical leaders in order to maximize productivity. We are proposing three main project meetings. By limiting the amount of meetings, stakeholders will understand the necessity of compromise and the importance of their input at each meeting. We will also provide project status e-mails to major stakeholders twice a month to heighten awareness of project progress and direction.

**Establish data standards for high quality, consistency, and usability.** Without high data quality standards, the follow-up studies could be impaired. We will extend our proven data quality control systems to this project. These systems are consistent with other public data systems. We have developed an easy to use web-based data interface system accessible by stakeholders and the public for finding and exporting data. We will obtain and store the necessary data in a format readily available for future modeling efforts.

**Establish data priorities for future studies.** There are large numbers of potential salt and nitrogen sources that could be addressed in future studies. One of the high value results of this study will be to establish data priorities that can be examples for studies of additional basins. We will accomplish this by incorporating a sensitivity analysis of data inputs and by including historical trend analyses in our overall sensitivity analysis for each basin.

**Produce graphics for widespread publication.** Communication through high quality graphics will be key to public outreach efforts. The BC team has television production capabilities to communicate technical findings to the CVSC, the Water Board, various workshops, and ultimately the public. We will produce graphics suitable for incorporation into news publications and PowerPoint presentations so the significance of the work can be easily understood by a wide spectrum of the public and interested parties.

**Detailed Scope of Work**

The detailed scope of work to accomplish the project objectives is provided below.

**Task 1 – Pilot Work Plan**

The purpose of Task 1 is to complete a Draft Pilot Work Plan that articulates how and where data will be collected and stored to satisfy the objective of defining significant salt and nutrient sources in selected Central Valley basins as stated in the RFP. The BC Project Manager will initiate the scope of work by meeting with the CVSC Executive Director to coordinate meeting schedules and develop deliver-
able dates. We propose three basins for the Pilot Work Plan (illustrated in Figure 9.1):

- Yolo Basin
- Turlock Basin
- Tulare Lake Basin

These candidate sites were selected for a number of reasons. First, we wanted to select one basin in each of the Department of Water Resources (DWR) Central Valley hydrologic regions. Secondly, these three basin include the typical diversity of hydrologic characteristics, agricultural, and urban land use. The BC team also recommends these sites because we know sufficient quality data are available and we have completed detailed source salt loading, water balances, vadose zone fate and transport assessments, and groundwater evaluations in each of these basins.

In addition to compiling our own data sources in these areas, the BC team has worked with and contacted the following entities to prepare for collaborations on this project:

- USGS (Steve Phillips, Randy Hanson)
- California State University, Fresno (John Suen)
- USDA Salinity Laboratory (Don Suarez)

Many of these experts are already on the Central Valley Salinity Technical Advisory Committee (TAC) and could not provide peer review of this approach because of conflict of interest. Also, these public organizations cannot subcontract with private contractors. The CVSC must contact these and other individuals directly if they desire a peer review. The CVSC has requested that the contractor will team with USGS or other entities in order to access data.

We are pleased to have Wolfgang Schmid, PhD of the University of Arizona on our team, who has developed the FARM process model code under USGS grants. The BC team will work with these and other entities at the Water Board and DWR to assess data availability in these areas.

**Meeting #1 - Kickoff and Site Selection**

The BC team (Project Manager, Technical Leader, and Lead Facilitator) proposes to meet with CVSC to confirm the three proposed sites and their boundaries since the selection of these locations are critical to the success to the Phase 1 activities. Our team will prepare a brief 10-20 minute presentation to initiate discussion. By obtaining concurrence on these sites, we anticipate expediting the overall schedule.

**Draft Pilot Work Plan Methodology**

The BC team will begin by defining and quantifying salt and nutrient sources (including nitrate) of signifi-
consider domestic, agricultural, and industrial users as classified by the North American Industrial Classification System (NAICS). These typically include water quantity and quality measurements of:

- Imported surface water used by domestic agricultural and industrial consumers (including disinfection treatment)
- Wastewater from consumers discharged directly to wastewater treatment plants (WWTPs) or septic systems
- Groundwater supply wells for domestic, agricultural, and industrial users
- Salt and nutrients estimates applied to crop land as irrigation water
- Land application of treated water by WWTPs, confined animal feeding operations (CAFOs) and other industrial users permitted by WDRs
- Landscape irrigation estimates used by domestic users and urban parks

We will also consider soils, salts, and solids applied to the surface and stored in the vadose zone.

**Identifying and Validating Salt and Nutrient Sources**

The Draft Pilot Work Plan will describe how we will identify and validate salt and nutrient sources through published information sources. We will consider domestic, agricultural, and industrial users as classified by the North American Industrial Classification System (NAICS). These typically include water quantity and quality measurements of:

- Imported surface water used by domestic agricultural and industrial consumers (including disinfection treatment)
- Wastewater from consumers discharged directly to wastewater treatment plants (WWTPs) or septic systems
- Groundwater supply wells for domestic, agricultural, and industrial users
- Salt and nutrients estimates applied to crop land as irrigation water
- Land application of treated water by WWTPs, confined animal feeding operations (CAFOs) and other industrial users permitted by WDRs
- Landscape irrigation estimates used by domestic users and urban parks

We will also consider soils, salts, and solids applied to the surface and stored in the vadose zone.

**Figure 9.2. Idealized Central Valley water/salt balance**
Identifying and Evaluating Constituents of Interest

The primary constituents of interest are inorganic salts and nitrogen compounds. Simple inorganic salt measures such as total dissolved solids (TDS) and fixed dissolved solids (FDS) to characterize sources with specific inorganic constituents provide valuable information. The breakdown of inorganic salt ions affects mobility of salt in soil and groundwater, eventually affecting the quality of the soil and water. For example, in a typical FDS analysis, calcium (often applied as a soil amendment) is not differentiated from boron or sodium (which have toxic affects on plants) and are not desirable in potable water. Potassium, magnesium, chloride, sulfate, barium, carbonate, and bicarbonate are also salt constituents of interest.

Many salts are also nutrients; nitrate, phosphates, sulfate, calcium, magnesium, and potassium are a few examples of inorganic salts that are also nutrients. Nitrogen is a special case because it is the most widely used plant nutrient and animal feed and exists in both amino acid, protein, and more recalcitrant forms in soil. To fully address all forms of nitrogen sources, total nitrogen in soil, solid wastes, and agricultural residues (including organic and inorganic forms of nitrogen [ammonium and nitrate]) will be considered nutrient constituents of interest.

Compiling Soil and Water: Physical and Chemical Characteristics

The physical characteristics of the soil and aquifer materials determine the fate and transport; rate of import, export, storage capacity of salts; infiltration; and recharge characteristics of the salts and nutrients. The BC team has conducted detailed hydrogeologic investigations for the proposed areas and can provide the necessary physical soil and aquifer characteristics (e.g. grain size distribution, hydraulic conductivity, infiltration rate) in selected locations. We propose to correlate these physical characteristics as much as possible through soil and geological surveys, utilizing DWR well driller’s logs, as available.

Data Management Plan

The draft Pilot Work Plan will include a data management plan. This plan will include the key elements identified by the CVSC’s data priorities and will provide database protocols for metadata (documentation describing how the data is organized) storage, access, and archiving processes. Depending on data user needs, the BC team proposes to establish a secure web-based database for several of our customers. The BC team is well versed in compiling diverse engineering and environmental data in a number of database programs (i.e. Microsoft Access™, SQL Server™) for data visualization using tables, graphs, spreadsheets (e.g. Microsoft Excel™) and GIS (i.e. ESRI ArcGIS™). These tools provide a secure and flexible way to manage and access data for future use. The BC team will work with CVSC to understand their priorities and provide database protocols, metadata (documentation describing how the data is organized) storage, access, and archiving. Depending on data-user needs, the BC team will establish a secure web-based database as we have for several of our clients.

Meeting #2 - Draft Work Plan Review

The BC team will deliver our Draft Pilot Work Plan to the CVSC for review within one month of award and will address written comments. We propose a meeting to discuss and resolve comments with CVSC one week after preparing the Draft Work Plan. Attended by our Project Manager, Senior Technical Team, and Lead Facilitator, we will verbally address comments and discuss key issues so that all stakeholders are heard and their concerns addressed.

We anticipate the main issues to be resolved in this meeting will include:

- Concurrence of the constituents of interest
- Definition of “significant” salt sources
- Methods of correlation of salt constituents
- Use of historical data

In the interest of completing the Phase 1 scope in a timely manner, only one revision to the Draft Pilot Work Plan is proposed. Based on the comments received, the BC team will finalize the Pilot Work Plan and submit five hard copies of the final plan to CVSC following the second meeting.
Task 2 – Pilot Salt and Nutrient Studies and Reports

The BC team has managed a variety of water supply and wastewater treatment studies and related hydrologic investigations requiring quantitative modeling and fate and transport analyses to support anti-degradation analyses of groundwater. In Task 2, the BC team will implement the approved Pilot Work Plan and begin by compiling data for the approved locations. We will begin by transferring data from our internal databases; supplementing these data with public databases (STORET[USEPA], National Water Quality Assessment [NAWQA], Groundwater Ambient Monitoring and Assessment [GAMA; USGS], and the California Data Exchange Center [CDEC; DWR]); and finally from hardcopy documents maintained by the Central Valley Water Board. Land use data will be obtained from the DWR land use surveys.

These data will be evaluated over the period of 1985 to the present and will include drought periods in the 1980s as well as wetter than normal periods in the late 1990s. This duration is consistent with the findings presented by Water Board staff (Cismowski et al., 2006) in their report, “Salinity in the Central Valley.”

As described in the Pilot Work Plan and consistent with the CVSC preferences, the data will be transferred to a public database with a uniform location identification code that identifies the basin, data type, and surveyed location. These source, soil, and water data will be classified by solid and liquid media.

We anticipate that relatively few existing monitoring points (wells, surface water monitoring points) will have the complete list of constituents of interest available. Therefore, correlations between TDS, FDS, and EC and specific constituents will be evaluated. Data that is correlated rather than measured directly will be qualified.

The presentation of these data is primarily a detailed salinity mass balance as shown in the schematic Figure 9.2. The mass balance within each basin will include:

- **Inputs into the basin**
  - USBR/CVP and other surface water conveyance facilities entering the basin
  - Surface water flows
  - Groundwater flows into the basin
  - Storm water run-on
  - Nutrient and soil amendments applied to landscaped and crops acreages (using typical fertilization rates)
  - Confined animal facilities including animal type and herd size (imported feed, salts)
  - Domestic wastewater treatment influent
  - Domestic septic effluent
  - Industrial salts and nutrients raw materials imported into the basin
  - Industrial wastewater treatment influent
  - Food processing solid and liquid application
  - Unregulated industrial spills and leaks of wastewater

- **Current and historical trends for salt and nutrient storage within the basin**
  - Vadose zone soil
  - Groundwater
  - Surface water
  - Solid waste landfills

- **Exports outside of the basin**
  - USBR/CVP and other surface water conveyance facilities leaving the basin
  - Surface water outflow
  - Groundwater outflows
  - Storm water run-off
  - Wastewater effluent discharged to surface water
  - Crops exported from the basin
  - Processed foods exported from the basin
  - Industrial products exported from the basin

Care will be taken to ensure that salt and nutrient sources are not double-counted when developing the mass balance. Future salt and nitrate sources will also be identified where suitable data are available. Available transport parameter data will also be identified in the course of data gathering and compiled for use in future studies.

The Draft Pilot Salt and Nutrient Report (Draft Report) will be prepared to provide graphic and...
The BC team will summarize the Draft Report in a presentation to the CVSC in mid-September, 2009. To maintain the schedule, we request written comments on the Draft Report be submitted to the BC team four weeks after the Draft Report is distributed.

The overall objective of the Draft Report will be to provide comprehensive, accurate access to the data that allows stakeholders to use the data for additional analysis to support generating salt and nutrient management plans. The presentation of these data will utilize GIS tools to enhance visualization and communication of the data for the CVSC and eventually the public. Simplified summarization of the data will not replace reliability and accuracy of the database.

The BC team will finalize the Final Pilot Salt and Nutrient Report and submit five hard copies of the Final Report to CVSC on October 31, 2009.

Meeting #3 - Draft Pilot Study Report Review

One week after comments are received, we propose to discuss and resolve comments with the CVSC. Our Project Manager, Senior Technical Team, and Lead Facilitator will address comments and work through key issues.

Following Meeting #3, the BC team will finalize the Final Pilot Salt and Nutrient Report and submit five hard copies of the Final Report to CVSC on October 31, 2009.

Tabular presentations of these data. The salt and nutrient sources will be classified by media including surface water, streams and rivers, groundwater, wastewater (municipal and food processing land application), solids (fertilizers), and soils.
SECTION 10

PROJECT SCHEDULE

This section presents BC’s project schedule, outlined in Table 10.1. We recognize the importance of staying on schedule in order to complete Phase 1 within the CVSC’s progress expectations. Our team is committed to the CVSC’s project and will complete the project as specified in the CVSC’s Request for Proposal, allowing Phase 2 to begin by October 31, 2009.

Table 10.1. Proposed Phase 1 Project Schedule

<table>
<thead>
<tr>
<th>Item</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
</tr>
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<tbody>
<tr>
<td>1. Contract Negotiations Complete</td>
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<tr>
<td>Task 1</td>
<td></td>
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<tr>
<td>2. Kickoff Meeting—BC Team, Executive Director</td>
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<tr>
<td>3. Prepare, Conclude Meeting 1</td>
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<tr>
<td>4. Prepare, Submit Draft Work Plan</td>
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<td></td>
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<tr>
<td>5. CVSC Review Draft Work Plan, Submit Comments</td>
<td></td>
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<td>6. Prepare, Conclude Meeting 2</td>
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<td>7. Prepare, Submit Final Work Plan</td>
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<tr>
<td>8. CVSC Approve Work Plan</td>
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<tr>
<td>Task 2</td>
<td></td>
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<td>9. Compile Data—Task 2</td>
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<tr>
<td>10. Prepare, Submit Draft Report</td>
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<tr>
<td>11. CVSC Review Draft Report, Submit Comments</td>
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<td>12. Prepare, Conclude Meeting 3</td>
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<td>13. Prepare, Submit Final Report</td>
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</table>
BC will perform the Phase 1 Scope of Work on a time-and-materials basis for an estimated fee of $210,000. Cost for Task 1 is $60,000 and costs for Task 2 is $150,000 including all meetings workplans, reports, and project management described in Section 9 and shown on the schedule presented in Section 10. This cost will not be exceeded without written authorization from the CVSC. Table 11.1 provides a task-specific breakdown of charges that we estimate for this project.

<table>
<thead>
<tr>
<th>Task Activity</th>
<th>Labor</th>
<th>Expenses</th>
<th>Subcontractors</th>
<th>Total</th>
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<td>Task 1 Pilot Work Plan Meetings</td>
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<td>$500</td>
<td>$0</td>
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<tr>
<td>Project Management</td>
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<td>Work Plan Preparation</td>
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<td>$10,500</td>
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<td><strong>Task 1 Subtotal</strong></td>
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<td><strong>$1,500</strong></td>
<td><strong>$10,500</strong></td>
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<td>Task 2 Pilot Salt and Nutrient Studies and Report Meetings</td>
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<td>Project Management</td>
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<td>Data Compilation</td>
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<td><strong>Task 2 Subtotal</strong></td>
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<td><strong>$9,500</strong></td>
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<td><strong>Grand Total</strong></td>
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<td><strong>$11,000</strong></td>
<td><strong>$31,000</strong></td>
<td><strong>$210,000</strong></td>
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</table>
The costs summarized in Table 11.1 are based on the BC labor hours shown in Table 11.2. The expenses for this project are calculated by applying Associated Project Costs (APCs) for phone, fax, copies, and computers, billed at a rate of $8 per labor hour. Other direct charges (ODCs) and subcontractors will be billed at cost plus a 10 percent service charge.

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Labor Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jeff Bold, PhD, CPSS</td>
<td>Project Manager</td>
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<tr>
<td>Ron Crites, PE</td>
<td>Technical Leader</td>
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<tr>
<td>Ane Deister</td>
<td>Lead Facilitator</td>
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<tr>
<td>Paul Selsky, PE</td>
<td>Regional Planner</td>
<td>16</td>
</tr>
<tr>
<td>Martin Steinpress, PG, ChG</td>
<td>Geologist/Hydrogeologist Leader</td>
<td>64</td>
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<tr>
<td>Rob Beggs, PhD, PE</td>
<td>Sources Identification/Vadose Modeler</td>
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<tr>
<td>Brent Cain</td>
<td>GIS Analyst/Lead Modeler</td>
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<tr>
<td>Allan Scott</td>
<td>Information Technology Manager</td>
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<tr>
<td>Jennifer Chen, EIT</td>
<td>Project Engineer</td>
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<tr>
<td>Jacqueline Bates</td>
<td>Project Assistant</td>
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<tr>
<td>Laura Chavez</td>
<td>Salinity Expert</td>
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<td>Karen Cole</td>
<td>Database Analyst</td>
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<tr>
<td>Chris Bautista</td>
<td>GIS Analyst</td>
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<tr>
<td>Derrik Williams, PG, ChG</td>
<td>Groundwater Resources Management</td>
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<td>Tana Cameron, PE</td>
<td>Groundwater Management</td>
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<tr>
<td>Wolfgang Schmid, PhD</td>
<td>Groundwater Modeling</td>
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<tr>
<td>Various</td>
<td>Project Engineers, Scientists, Data Manager</td>
<td>304</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>1182</strong></td>
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**SECTION 12**

**HOURLY RATES**

BC labor will be billed according to the proposed labor rates shown in Table 12.1 where we identify our key team members (subcontractor fees are listed in Table 12.2). These rates will be in effect until December 31, 2009. Associated Project Costs (APCs) for phone, fax, copies, and computers will be billed at a charge of $8 per labor hour. Other direct charges (ODCs) and subcontractors will be billed at cost plus a 10 percent service charge.

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<th>Table 12.1. Hourly Billing Rates</th>
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<td>Jeff Bold, PhD, CPSS</td>
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<td>Ron Crites, PE</td>
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<td>Ane Deister</td>
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<td>Paul Selsky, PE</td>
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<td>Martin Steinpress, PG</td>
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<th>Table 12.2. Subcontractor Fees</th>
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<tr>
<td>Name</td>
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<td>Hydrometrics, LLC</td>
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<td>Wolfgang Shmid, PhD</td>
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RESUMES

Jeff Bold, PhD, CPSS
Ron Crites, PE
Ane Deister
Paul Selsky, PE
Martin Steinpress, PG, ChG
Rob Beggs, PhD, PE
Allan Scott
Brent Cain
Wolfgang Schmid, PhD
Jennifer Chen, EIT
Karen Cole
Chris Bautista
Derrik Williams, PG, ChG
Experience Summary
Dr. Bold is a Certified Professional Soil Scientist (CPSS), whose expertise is in soil and water chemistry with both doctoral and post-doctoral research in the toxicity and mobility of heavy metals in unsaturated vadose zone soils. Following academic pursuits at University of California, Davis (Pant and Soil Sciences) and University of Minnesota (Forest Resources) Dr Bold has over 20 years experience in postdoctoral geochemistry, soil and water remediation, toxicology, and statistics. Currently Dr. Bold serves agricultural, industrial, mining, municipal and agricultural clients focusing on reuse of treated water and organic residue. Dr. Bold also leads remedial investigations, feasibility studies and risk assessments for hazardous waste sites. Dr. Bold has managed large remediation construction projects and continues to represented private industrial clients in negotiations on state and federal Superfund (CERCLA, RCRA) sites. Dr. Bold’s uses his extensive experience designing in-situ chemical oxidation and reduction in groundwater, modeling metals fate and transport, phyto- and bioremediation to manage and participate in a wide variety of projects in mine reclamation, industrial, municipal and agricultural waste management.

Municipal Waste Management
Chico Area Groundwater Study, Butte County, California
Project Manager 1996-2002. Investigated the source of nitrates in groundwater in the Chico Urban Area required by the RWQCB to evaluate potential impacts of domestic septic systems on soils and groundwater. This project required a hydrologic and geochemical investigation of surface water, groundwater and the vadose zone focusing on sources, transformations and forms of nitrogen in soil and water throughout the 25-square mile Chico Urban Area with over 20,000 domestic septic systems currently in operation.

- Provided the scientific basis to allow the public to differentiate septic system impacts from past agricultural practices;
- Conducted a detailed evaluation of over 100 groundwater wells to identify the 20 best existing monitoring wells supplemented with installation of 20 additional groundwater monitoring wells;
- Working with Dr Graham Fogg and Dr Dennis Rolston, UC Davis, this study included isotopic analysis $^{15}$N/$^{14}$N ratios in groundwater samples to determine the source of nitrate;
- This study was conducted throughout a 25 square mile urban area with complex hydrogeologic conditions with a history of agriculture and septic impacts required a detailed investigation of nitrogen sources;
- The study concluded that septic effluent impacted groundwater and proposed limits to septic tank density along with a plan to reduce nitrogen loading by a combination of sewering and an innovative septic tank retrofit program.
Waste Load Assimilative Capacity Study, Sacramento Regional County Sanitation District (SRCSD), Sacramento, California
Project Manager 1990-1994. Completed a Waste Load Assimilative Capacity Study required by the RWQCB to evaluate the chemical and hydraulic loading of biosolids to this unlined 185-acre dedicated land disposal (DLD) facility in 1991. Operating since the 1970’s the DLD’s were used to degrade biosolids, but this facility impacted groundwater with nitrate and lowered the surface soil pH from neutral to pH 4.5, causing concern that metals were migrating downward from the surface soil used to degrade biosolids residues from Sacramento’s main wastewater treatment plant from the 1970’s to 1990. Designed metals adsorption, biodegradation studies conducted in cooperation with UC Davis faculty. Directed the vadose zone modeling (HELP, FEMWATER) that detailed the fate and transport assessment of a wide variety of organic and inorganic constituents (salts, nutrients, metals) in biosolids. This study demonstrated that the soils at this facility had surplus attenuation capacity for metals, pesticides, and organic materials for an additional 15 to 25 years of biosolids loading.

Vadose Zone Monitoring Program, SRCSD, Sacramento, California
Technical Lead. 1994-1996 Designed, installed and operated a Vadose Zone Monitoring Program to comply with Waste Discharge Requirements. This program utilized 33 custom built lysimeter/tensiometers installed at five, ten, and 15 feet bgs to assess migration of salts and metals in the vadose zone. Installed, operated and developed the Monitoring Reports required by the RWQCB.

Agricultural Waste Management
Response to Water Board Notice of Violation, Del Monte Foods, Inc., Kingsburg, California
Project Manager 2006-2007. Managed Del Monte’s response to a NOV issued by the Water Board in November 2006. This required the integration of several technical disciplines into a technical comprehensive response that addressed the Water Board’s contention that Del Monte was degrading groundwater quality through their application of treated process water from their Kingsburg Plant onto the 80-acre land treatment facility (farmed with oats, wheat and sudangrass). This project required coordination with Del Monte’s technical and legal staff, in addition to the land treatment facility property owner (the City of Kingsburg, also named in the NOV). Several separate tasks were required as part of the NOV response, including:

- Reevaluation of the conceptual hydrogeologic model of the 80-acre land application facility, adjacent to the Kings River;
- Statistical trend analyses of quarterly groundwater data collected from 2000 through 2007 for iron, manganese, sodium, potassium, TDS, EC, chloride and nitrate concentrations over time;
- Groundwater Monitoring Work Plan to improve the plant groundwater monitoring system by installing additional wells in the upper portion of...
the aquifer and proposed to use staff gauges to monitor surface water/groundwater interactions;

■ A Biochemical Oxygen Demand (BOD) Evaluation focused on the adequacy of the current hydraulic and BOD loading. This study concluded that although not currently overloading, superior treatment could be achieved by converting to sprinkler irrigation of process water;

■ A BOD Pilot Study Work Plan. As part of their plant upgrades Del Monte had decided to change to a sprinkler irrigation system. This Pilot Study would collect the soil, soil pore water and soil gas data to assess any potential impact from their land treatment facility;

■ Waste Area Investigation Work Plan. Adjacent to the 80 acre land treatment facility, the land owner (City of Kingsburg) had allowed application of cottonseed oil residue to a small (0.2 acres) from a nearby farming operation that had not degraded after several years.

**Physical Investigation for Land Application of Process Water, Hilmar Cheese, Hilmar, California**  
Task Manager 2006-2007. Designed and conducted field investigations to evaluate the feasibility of rapid infiltration of process water. Land application of process water requires studies to demonstrate that soils have the hydraulic loading capacity and the groundwater quality characteristics to meet requirements that process water not degrade existing groundwater.

■ Reviewed soil types in the Hilmar area, developed a map of infiltration rates in the area;

■ Designed a field investigation program that provided infiltration testing, an evaluation of groundwater quality, and a hydrologic evaluation of groundwater gradient.

**Vadose Zone Study for Land Application of Process Water, Gallo Winery, Madera, California**  
Project Manager 2006-2007. Developed a vadose zone monitoring program to monitor any potential impacts from this 60-acre land application facility. This program was required by the Water Board as part of completing a Waste Discharge Requirements for this facility.

■ Developed a vadose zone monitoring program to demonstrate that process water constituents (soluble organic carbon, ammonium, nitrate, other salts) were being sufficiently attenuated in the vadose zone.

**Presidio Landscape and Irrigation Management Program, National Parks Service, San Francisco**  
Project Manager 1994-1995. The Presidio, a historic US Army base, is being converted into an urban park under the care of the Nation Park Service. Dr. Bold prepared a Landscape and Irrigation Management Plan used by the USPS as a design handbook for landscape staff, and planners to use in design and maintenance projects throughout the facility. Design emphasis was on reducing lawn and turfgrass areas, substituting native species with lower water requirements.
This Landscape and Irrigation Management Plan proposed the use of reclaimed water from a municipal wastewater treatment plant, increasing the water use efficiency of the existing landscape by utilizing drought-tolerant species while minimizing changes to the historic characteristics of the Presidio.

**Dairy Waste Emissions Evaluation, Merced County, California**  
**Project Manager, Technical Lead 2002-2003.** Collected/compiled data, performed regulatory analysis, public health evaluation, and assessed engineering options to reduce air and groundwater pollution. Conducted research on air emissions, conducted air modeling of ammonia, to predict health effects of dairy emissions leading to PM10, PM2.5, methane and ammonia emissions from dairies. Evaluated engineering evaluations and cost analysis to reduce dairy emissions. Compiled groundwater data on nitrate, ammonium, total nitrate, phosphate, and TDS associated with dairy ponds, corrals, crop fields. Evaluated engineering alternatives to reduce groundwater impacts. Produced a feasibility analysis that ranked data adequacy, health impacts, costs and effectiveness of reducing groundwater impacts by alternative pond design, implementation of CNMP, etc.

**Site Remediation – CERCLA/RCRA**

**Beazer East, Inc., Multiple Sites**  
**Project Manager, 1992-present.** Soil and Water Remediation expert. Managed public, agency negotiations. Sites located in California, Florida, South Carolina, Alabama and Colorado. Managed large complex construction projects including landfills containing hazardous wastes.

**LEHR/SCDS Superfund Site Restoration, Davis, California**  
**Project Manager 1999-2005.** This CERCLA site is a former landfill where municipal, laboratory chemicals and low level radionuclides were disposed. Primary author - UC Davis Remedial Investigation Report.

**RCRA Landfarms, Chevron Products Company, Richmond, California**  
**Technical Director, Soil Chemist/Bioremediation Specialist 1989-2000.** Directed biodegradation studies, RCRA Facilities Investigation, and Closure Plan using an innovative phytoremediation design for this large 29-acre land treatment facility that received petroleum sludges for approximately ten years.

**Memberships**

- American Society of Agronomy
- Groundwater Resources Association

**Publications**

Experience Summary
Ron Crites, Brown and Caldwell’s Natural Systems Service Leader, has conducted numerous evaluations and designs of natural systems and water reuse. He has managed a wide variety of projects including facility plans for wastewater treatment and biosolids management, constructed wetlands for pond upgrades, a recycled water assessment of groundwater impacts from emerging pollutants, and a pilot groundwater recharge program. He is the author of four textbooks. He is the chairman of the CVCWA Recycled Water Committee.

He also has extensive experience in reuse and disposal of numerous types of industrial wastes, including projects for vegetable and fruit processing, winery, brewery, meat processing, and chemical wastewater. His expertise is in studies, designs, monitoring, and operations advice for pretreatment, land application, and reuse.

Assignment
Technical Lead

Education
Engineer's Degree, Sanitary Engineering, Stanford University, 1970
M.S., Sanitary Engineering, Stanford University, 1968
B.S., Civil Engineering, California State University, Chico, 1967

Registration
Professional Civil Engineer 21532, California, 1972
Professional Engineer 13506, Oregon, 1987
Professional Engineer 7795, Hawaii, 1993

Experience
40 years
Joined Firm
1997

Relevant Expertise
- Land treatment and reuse
- Groundwater impacts from reuse
- Alternative wastewater and sludge treatment technologies
- Land application analysis
- Regional Water Quality Control Board permitting
- Industrial wastewater processing
- Contributed to manuals of practice on constructed wetlands, natural systems, nutrient control, and land treatment

Food Processing

Manual of Good Practice for Land Application of Food Processing/Rinse Water, California League of Food Processors, Sacramento, California

Project Manager. Ron managed the development of a manual of good practice for land application of food processing/rinse water in 2007. The process of preparing the manual involved collaboration with State Water Board and Regional Water Board staff to reach agreement on technical and regulatory guidance. He provided guidelines for design, salt and nutrient management, and monitoring of land application systems. He presented the new manual to food processors and regulators in a workshop.

Campbell Soup Dixon RWD, Campbell Soup Supply Company, Dixon, California

Project Manager. Ron managed the report of waste discharge to add a vegetable processing line to the tomato processing operation. The RWD expanded the land application area from 555 acres to 606 acres and the operating season from 90 to 140 days. Tailwater control over the surface irrigation system was improved to minimize storm runoff in the fall.

Hilmar SEP Stakeholders
Technical Reviewer. Ron attended all the workshops and provided review comments to the University of California scientists who prepared the Hilmar Supplemental Environmental Project analysis and report.

Evaluation of Modesto’s Land Application Ranch, Manufacturer’s Council of the Central Valley (MCCV), Modesto, California

Project Manager. Ron managed an analysis of the existing loading rates, soil conditions, and groundwater conditions for the 2,530-acre City of Modesto land application system. The system is used during the peak canning season for direct land application of 20 mgd of food processing flow from the largest five industrial dischargers in the City of Modesto. Optimization opportunities for the system were proposed including conversion to sprinkler irrigation from surface irrigation.
**Del Monte NOV, Del Monte, Kingsburg, California**

**Technical Leader.** The Regional Water Board issued a notice of violation to the Kingsburg land application site for groundwater degradation. Ron directed a revised monitoring well network and proposed a BOD loading rate study designed to evaluate sprinkler application at different BOD loading rates. A network of lysimeters was proposed along with oxygen monitoring over a two year period.

**Relocation of Land Application Facilities, Colusa County Canning Company, Williams, California.**

**Project Manager.** A report of waste discharge was prepared for the treatment of 4.0 mgd of tomato canning wastewater on over 800 acres of land. A monitoring well installation plan was prepared, accepted by Regional Board staff, and implemented. A revised monitoring and reporting program was developed that covered monitoring of the quality of the effluent, soil, and groundwater. A cropping and irrigation management plan was also prepared. New Waste Discharge Requirements were received and implemented in 2006.

**Site Remediation and Closure Plan, Harter Packing Company, Yuba City, California.**

**Project Manager.** An evaluation of alternatives was conducted to determine the appropriate and cost-effective approach to closure of a land application site. The recommended approach included a combination of source control, capping, phytoremediation and groundwater attenuation. No offsite wells were required and one new upgradient well was recommended and implemented.

**Groundwater Quality Data Evaluation, Del Monte Foods, Woodland, California**

**Project Officer.** Ron produced groundwater quality evaluation report required by the Regional Water Quality Control Board (RWQCB) to assess possible impact from Del Monte land application, and to assist the RWQCB in writing waste discharge requirements (WDRs) for the next tenant of the land (currently owned by the City).

**Audit of Land Application System Operation and Monitoring, Frito-Lay Inc., Bakersfield, California**

**Project Manager.** Ron prepared and audit of the 17 year old sprinkler irrigation system used to treat potato and corn chip processing wastewater. The center-pivot system and the existing wastewater, soil, lysimeter, and groundwater monitoring system were evaluated.

**BOD Loading Rate Research, SK Foods, Lemoore, California**

**Project Officer.** Ron planned and evaluated a loading rate study comparing irrigation water with applied tomato process/rinse water. Percolate quality from suction lysimeters were compared for FDS and general minerals.
Salt Impact Evaluation, Manufacturer's Council of Central Valley, Modesto, California

Project Manager. Ron managed the evaluation of the impact of fixed dissolved solids from five food processors on the land application of process/rinse water at the City of Modesto’s 2,500-acre site.

Land Treatment and Reuse

Land Treatment Technology Update, U.S. Environmental Protection Agency

Project Manager. Ron is the principal author of a process technology update issued in 2006, including slow rate, soil aquifer treatment and overland flow land treatment. Additional subjects included phytoremediation, phosphorus retention, biochemical oxygen demand loading rates, and nitrogen removal with organic nitrogen applications.

Recycled Water Irrigation, Honolulu Board of Water Supply, Oahu, Hawaii

Technical Director. Ron prepared literature review, research plan, and field investigation for using recycled water for irrigation above a potable aquifer in central Oahu. He conducted public outreach and field demonstration studies. The field study involved lysimeters to sample vadose zone water beneath 12 field plots irrigated either with recycled water or control water. The study concluded that the soil will remove the organic constituents in recycled water to the level where they are statistically equal to the control groundwater.

Reclamation Study, County of Sacramento, California

Project Manager. Ron was responsible for the investigation of the potential for reuse of 150 mgd of tertiary effluent from the Sacramento Regional County Sanitation District. Reuse options included agricultural and urban landscape irrigation, industrial reuse, groundwater recharge, and wetlands applications.

Technology Review, City of Dixon, California

Project Manager. Ron led a team that analyzed options for wastewater treatment and reuse using aerated ponds and infiltration basins for a flow of 2.0 mgd. The issues for the City of Dixon include minimizing salinity in the treated effluent, alternative methods of reducing total dissolved solids in the water supply, antidegradation analysis of groundwater, and best practicable treatment and control. A public presentation was made to the City Council and the interested public.

Wineries

Wine Stillage Guideline Update, Wine Institute, San Francisco, California

Project Manager. Ron revised guidelines for the land application of winery stillage wastewater. He documented current practices, including hydraulic and BOD loading rates, nitrogen removal through denitrification and crop uptake, and pH attenuation. He summarized impacts on groundwater.
quality and made recommendations to reduce impacts, collect more detailed data on groundwater and soil, and isolate high TDS sidestreams for treatment or reuse.

**Stillage Study, Wine Institute, San Joaquin Valley, California**  
*Project Manager.* Ron prepared guidelines for land application of winery stillage. He developed a monitoring program for the San Joaquin Valley to determine effects on soils and groundwater of land application of winery stillage wastewater and prepared a state-of-the-art report on design and operation of stillage land application systems. The guidelines were adopted as part of the Basin Plan by the Fresno Regional Board.

**Manuals of Practice**
- Nutrient Control, WEF
- Natural Systems for Wastewater Treatment, WEF
- Land Treatment of Municipal Wastewater, EPA
- Constructed Wetlands and Aquatic Plant Systems for Municipal Wastewater Treatment, EPA

**Memberships**
- Central Valley Clean Water Association
- American Society of Agronomy
- American Water Works Association
- California Water Environment Association
- International Association of Water Quality
- Water Environment Federation
- WateReuse Association

**Publications/Presentations**
A separate list of publications is available.
Experience Summary
Ane Deister has over 30 years of experience in the water resources management business with over 20 years in executive leadership appointments. She was hired on five separate instances to provide change management, leadership development and organizational improvements for public regulated water and wastewater utilities, and two private sector firms. She has broad experience in facilitation and mediation services applied to specific projects, conflicts, challenges, and as part of her management practice. She has significant technical experience in the engineering, operations, administration, drought preparedness, sustainability, recycled water, conservation, watershed management, and river restoration fields. Ane has also served in leadership positions nationally and is frequently sought to provide training and professional presentations on a variety of water related topics.

Recycled Water Agencies
Lead Facilitator. Ane was hired by representatives of the Association of California Water Agencies (ACWA) and California Association of Sanitation Agencies (CASA) to facilitate development of a draft recycled water policy for consideration by the State Water Resources Control Board. Participants included members of ACWA and CASA, utility representatives, environmental representatives, and State Board members and senior staff. Ane identified the key issues, developed agreement on difficult provisions, and provided alternative approaches for the group’s consideration.

San Joaquin River Restoration Project
Restoration Administrator. Selected by the defendant and plaintiff of the San Joaquin River Restoration Program (SJRRP) Settlement Agreement Parties, and appointed by federal judge Lawrence Karlton as independent Restoration Administrator (RA) for the SJRRP in January 2008, Ane provided leadership and oversight to the appointed Technical Advisory Committee (TAC) comprised of settling parties, consultants, state agency implementers, federal agency liaisons, and program management team members. Through production of the master calendar and duties and responsibilities documents for the TAC, Ane is familiar with detailed complex actions and requirements of the SJRRP Settling Agreement implementation. She was responsible for completed technical documents and recommendations to the Secretary of Interior on management of Fall Run and Spring Run Chinook Salmon, monitoring and study objectives for the 2009 Interim Flow Program and the 2007 and 2008 annual program reports. Successfully worked with program implementers and consultants to frame issues and develop interim flow monitoring recommendations; and applications to ‘real time’ flow decision-making and implementation of the overall program restoration flows. Brought together resources and provided input to the development of the draft fisheries management plan. Worked with the TAC to review, comment and make recommendations regarding numerous Technical Memoranda providing the basis for PEIS/PEIR and Draft Alternative Planning documents. Met with ‘third parties’ and land owners to understand their views and interests, and input for program documents.
El Dorado Irrigation District
General Manager. Ane was hired by a 5 member elected board in 2001 to serve as CEO of a multipurpose utility providing water, wastewater, recycled water, hydroelectric and recreation services in a 222 square mile area north and east of Sacramento. In 2002, Ane was confirmed by the California Legislature as a Commissioner with the California Water Commission, which oversees and establishes the water, energy and other governing rules and regulations for the California Department of Water Resources. Also in 2002, she was appointed to the Governor’s Recycled Water Task Force by Tom Hannigan, Director of the Department of Water Resources. In 2003, Ane was elected as National Chairman for the American Water Works Association (AWWA) Conservation Division and to the AWWA Technical Education Council. Currently, she serves on the Board of Trustees of the AWWA Water Resource Sustainability Division.

Metropolitan Water District of Southern California
Executive Assistant to the General Manager / Associate Vice President. Ane provided the successful mediation of a legally charged conflict involving the Los Angeles and San Gabriel Rivers watershed flood prevention programs; conservation program funding and implementation criteria to develop consensus between member agencies and the district; issues between the district and member agencies related to funding and program criteria associated with local resource management funding programs; and various drought impact conflicts.

Las Virgenes Municipal Water District
Director Resource Conservation / Operations / Engineering. Ane provided leadership to three different departments in the district involved in resource management, capital projects and operations and maintenance. In addition she also provided state and federal legislative advocacy, public and community outreach, and conflict resolution of significant issues within the Malibu Creek watershed. Ane developed and implemented in-the-field computer assisted water use assessments including rate impacts. She conducted successful 2-way dialog and consensus-based resolutions regarding Title 22 recycled water effluent disposal, regulatory permit requirements, seasonal storage project proposals, groundwater conjunctive use programs, recreation and environmental protection issues, and conflicts. She also established and mediated the Malibu Creek Watershed program and performed conflict resolution and consensus building services surrounding the district’s recycled water seasonal storage project.

Executive Level Appointments
In addition to those listed above, Ane served in an executive level position as Special Assistant Executive Director at the South Florida Water Management District. She served as CEO of 2 multi-agency Regional Planning Councils in Florida; and created the Water Resource Center at Florida State University. She was appointed to the California Water Commission and served as Assistant Secretary for Resources by California governors, both confirmed by the California Senate, and to the President’s National Drought Policy Commission.
Experience Summary
Paul Selsky, manager of the Sacramento/Davis water resources group, an elected member of the Board of Directors of the Carmichael Water District, and 29 year veteran of the water industry, provides water supply and treatment planning and design to western water agencies with a regional and policy-level focus. He has directed or written numerous water master plans involving water needs assessment and has prepared capital improvement programs for U.S. and international clients. He serves on policy making committees for the American Water Works Association and the Sacramento Regional Water Authority.

Water Master Planning and Studies

Drinking Water Supply Program, Turlock Irrigation District, Turlock, California

Project Manager. The project commenced in the late 80s with a series of studies that examined the feasibility of a regional water supply system utilizing Tuolumne River water. Several reports were prepared through 1992 that evaluated current water supply conditions, alternatives, and provided a recommended project. The project was revisited in 1995 and 2003 with additional studies that developed a smaller project. In late 2005, the cities of Turlock, Ceres, Hughson, Keyes, and Modesto decided to particpate in the regional system. The project will consist of a 42 mgd surface water treatment plant and approximately 12 miles of pipelines. A project definition study that will define project description details is currently being prepared. The project is scheduled for completion of construction by 2011.

Water Conservation Master Plan, Cities of Roseville, Sacramento, and Folsom, San Juan Water District, Sacramento Suburban Water District, and Placer County Water Agency, California

Project Officer. A water conservation technical analysis was prepared for a group of the large water purveyors in the Sacramento region. The water purveyors needed the technical analysis to help provide guidance for possible revisions to water conservation commitments made to the Sacramento Water Forum. An economic benefit-cost analysis was performed using both the California Urban Water Conservation Council Best Management Practices (BMPs) and each purveyor’s specific water conservation agreement. The analysis was conducted using computer model developed by Maddaus Water Management. Presentations were made to clients, Water Forum staff, and stakeholders.

Drought Analysis of the Western Slope of El Dorado County, El Dorado County Water Agency and El Dorado Irrigation District, California, Shingle Springs, California, 2004-2006

Project Officer. Mr. Selsky helped develop strategy and approach to the project, presented at client meetings, conducted a technical review, and helped develop the project scope. The source of water for the western slope of El Dorado County is primarily surface water from the American River watershed. Drought planning and preparation is vital for El Dorado County
because of the increased risk of water shortages due to a combination of limits on water supplies from water demand growth and drought. The drought analysis consisted of obtaining public input, defining drought mitigation actions, and developing a drought management strategy. A strategic visioning computer model was developed to simulate virtual droughts and mitigation measures.

**Integrated Water Resources Plan, Placer County Water Agency, Auburn, California, 2004-2006**

**Project Manager.** To develop a clear understanding of future water demands and how they would be supplied, Placer County Water Agency (PCWA) contracted with Brown and Caldwell to prepare an Integrated Water Resources Plan (IWRP). The study area focuses on west Placer County, one of the fastest growing areas in California. Cities in the study area include Roseville, Loomis, Lincoln, Rocklin, and Auburn. The projected demographics and land use from the respective general plans provided the basis for developing future build-out of water demand projections under several growth scenarios. The preliminary results for the demand projections show that the existing surface water supplies combined with recycled water and groundwater supply, and additional water conservation efforts, will provide adequate supply to meet future demand at buildout. The project represents the first time PCWA used an integrated, regional planning approach and coordinated ultimate total demand with the various general plans within the service area.

**Water Supply Study, City of Folsom, California, 2005**

**Project Officer.** Paul oversaw the evaluation of water supply needs and the potential to use recycled water. He participated in discussions with Sacramento Regional County Sanitation District and the City’s team of consultants.

**Rice Ranch Water Facilities Evaluation, Rice Ranch Ventures, Santa Maria, California, 2004-2005**

**Project Officer.** Paul oversaw the team that evaluated the water system needs for a proposed 750 unit development on 626 acres. He represented the developer in discussions with the water utility regarding the extent of needed water system improvements.


**Project Manager.** Paul worked with Natomas Central Mutual Water Company and other partners to develop the conceptual layout and costs for a water system to serve new development. The potential extent and type of new development was defined, demand projections prepared, and facilities identified and sized.
**Experience Summary**

Mr. Steinpress has 31 years of applied experience in geology and hydrogeology. He has worked in the environmental and groundwater industry for 19 years and has managed many large groundwater resources and water supply projects. He is the national groundwater resources services leader and a technical expert in hydrogeology with extensive experience in analyzing and solving complex groundwater problems. He has provided project management and technical expertise on groundwater investigations, remedial actions, water supply, and recharge projects. Martin has supervised many large field programs that have included geophysical investigations, soil boring and well drilling, aquifer pumping tests, percolation tests and groundwater recharge pilot testing. His water resources planning background includes creating cooperative partnerships among water agencies to facilitate the development of regional conjunctive water management projects. His project work has included the West, Rocky Mountains, Pacific Northwest, Florida, and Southwest, as well as Hawaii and Guam. He has worked in all major aquifer types (alluvial basins, volcanic, carbonate and bedrock terrains). He also has extensive experience in applying database, GIS, modeling and web-based tools to water resources and other environmental challenges. Martin is also a lecturer at California State University East Bay teaching the geology department's senior-level hydrogeology lecture and lab course and various other geology classes.

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**Groundwater Resources Development and Management**

**Water System Master Plan Update, Sacramento Suburban Water District, Sacramento, California**

**Project Hydrogeologist.** Martin led the groundwater supply assessment for the water resource management plan component of the Master Plan Update, which also included an infrastructure analysis and developing a capital improvement program. The groundwater assessment included the characterization of the resource and a re-evaluation of the basin yield and district pumping targets for the North and South systems. Martin also evaluated the threat to the District supply from regional contaminant plumes, including VOC plumes from the former McClellan Air Force Base, Mather Air Force Base, Aerojet’s Rancho Cordova Facilities, and the Roseville Union Pacific Railyard. He developed a matrix of potential mitigation measures for each of the major plumes. The plan also included a conjunctive use strategy that recommended water supply alternatives such as dry year exports from the District. (2009)

**Groundwater Flow Model, Indian Wells Valley Water District, California**

**Senior Technical Advisor.** Martin applied his extensive experience in the IWV to serve as the senior technical advisor to a consortium of groundwater users in the Indian Wells Valley basin who are collaborating on a basin-scale assessment of the effect of current pumping practices on groundwater supplies. Martin’s role in this short- and long-term planning effort included assisting in the evaluation, refinement, updating and maintenance of the original USGS MODFLOW model of the basin. He played a key role in the hydrogeologic data compilation and development of a hydrogeologic
A conceptual model. A detailed water budget was developed for the basin that includes all major pumping and detailed estimates of precipitation and recharge, including potential leakage from the Rose Valley basin to the north. Martin is assisting in the locating of new wells, identifying future water quality concerns, prediction of long-term water resource shortfalls and needs, and analysis of alternative basin operation scenarios. (2008)

**Well System Condition Assessment, City of Woodland, California**

*Project Hydrogeologist.* Martin led the development of a Technical Memorandum (TM) that assessed the condition of the 20 city wells used to meet water demand. The TM included an asset management plan that addressed well rehabilitation and replacement needs, and a well facility inventory report that incorporated well details and the results of several field visits. Information and a schedule were provided to ensure that the wells are rehabilitated and replaced when needed. Well rating factors included the well’s age, casing thickness, screen type, existing damage, specific capacity, system location, cost to pump, water quality and likelihood of failure. (2008)

**Groundwater Substitution Transfer Project, San Juan Water District, California**

*Project Hydrogeologist.* Martin led the preparation of a well information report and monitoring/mitigation plan on behalf of the San Juan Family of water agencies, who have agreed to water cutbacks through the Water Forum Agreement during dry years. As a result, they will take less water during these years and allow it flow down the American River for ecosystem and recreational uses. However, once the water has achieved its beneficial use, it will be transferred to San Diego County Water Authority through the State Water Project and Central Valley Project. To accomplish this, BC prepared the documentation as required by the California Department of Water Resources and U.S. Bureau of Reclamation, which included establishing the well supply source as a reliable alternative to the surface water they are selling and establishing a monitoring program to assess impacts of the transfer on local and regional groundwater resources. (2009)

**Preliminary Study of Lower Colorado River Storage and Water Management Alternatives United States Bureau of Reclamation (USBOR), Lower Colorado Region**

*Project Hydrogeologist.* On behalf of USBOR, Martin provided technical assistance on a preliminary study to evaluate storage and water management alternatives on the Lower Colorado River (below Parker Dam). The storage study considered the need for, and benefits of, having regulating storage, including quantifying the storage capacity needed to replace the loss of regulating storage due to a reduced cross-sectional area and canal volume that may result from the relining of the All-American and Coachella Canals. This study also evaluated the feasibility of conveying additional Colorado River water via the All-American Canal for use by Mexico for groundwater recharge operations. (2007)
Experience Summary
Robert Beggs has 25 years of experience in environmental engineering, soil-water systems, and water resource management. His particular areas of expertise include engineering and project management for natural wastewater treatment systems, water reclamation, groundwater quality, agricultural irrigation, water resource planning, and food processing wastewater systems. He has substantial expertise in soil-water transport processes and soil-water and groundwater quality monitoring. Dr. Beggs also has experience in database development and Web-based data sharing applications for land application and groundwater monitoring sites.

Assignment
Sources/Vadose Modeling

Education
PhD, Biological Systems Engineering, University of California, Davis, 2005 (dissertation research on vadose zone nitrogen transport)
MS, Agricultural Engineering, Utah State University, 1981
BS, Mechanical Engineering, University of California, Davis, 1977
BS, Agricultural Engineering, University of California, Davis, 1977

Registration
Professional Civil Engineer 46503, California, 1991
Professional Agricultural Engineer 470, California, 1986
Irrigation Association Certified Level III Designer for Sprinkler Irrigation Systems and Drip Irrigation Systems, 1985

Experience
25 years

Joined Firm
2002

Relevant Expertise
- Groundwater resources and monitoring
- Vadose zone monitoring and modeling
- Natural wastewater treatment systems
- Wastewater reclamation and reuse
- Agricultural irrigation
- Food processing wastewater systems
- Regional Water Quality Control Board permitting and reporting

Manual of Good Practice, California League of Food Processors, Sacramento, California
Co-Author. Led technical groups comprising industry, regulatory, and design stakeholders in achieving consensus on key design, operation, and monitoring approaches for land application of food processing wastewater. Prepared new sections and edited previous sections for new CLFP Manual of Good Practice for Land Application of Food Process/Rinse Water. Presented final manual material to stakeholders in a workshop forum.

Wastewater Reuse Facilities Regulatory Assistance and Evaluation of Groundwater Impacts, Pacific Coast Producers, Woodland, California
Project Manager. Performed numerous studies and prepared regulatory reports over 7 years for 750 acre wastewater reuse site for upgraded tomato cannery. These reports have addressed the fate and transport of salinity, BOD, and nitrogen in land applied wastewater and waste solids. Methods utilized have included tracer tests, tritium isotope dating of groundwater, and other groundwater characterization methods. Developed a Web-based groundwater database in conjunction with the City of Woodland to encompass all relevant groundwater monitoring wells in the area.

Design Manual, Environmental Protection Agency, Cincinnati, Ohio
Co-Author. Authored sections and reviewed drafts of other sections for new EPA Design Manual for Land Treatment of Municipal and Industrial Wastewater.

Reclaimed Water Pollutant Transport Modeling, Honolulu Board of Water Supply, Honolulu, Hawaii
Project Engineer. Developed Hydrus model for vadose zone transport of potential pollutants from irrigation with reclaimed water. Calibrated model to pilot study data. Nitrate and pharmaceutical impacts were found to not be significant, while long term chloride and TDS impact were found to be potentially significant.
Cheese Processing Wastewater Conveyance and Land Application Alternatives Evaluation, Hilmar Cheese Company, Hilmar, California

Project Manager. Evaluated alternatives for 5 miles of pipeline conveyance and land application of 2 mgd of cheese processing wastewater. The project included evaluation of salinity and nitrate impacts on soils and groundwater and anti-degradation policy compliance.

Evaluation of Groundwater Impacts and Pond Operation Alternatives, City of Woodland, California

Project Manager. In response to requests from the Regional Water Quality Control Board, evaluated groundwater quality impacts from wastewater and biosolids ponds. Performed in-situ percolation rate studies, installed new monitoring wells, evaluated alternatives for salinity reduction in ponds, and evaluated biosolids treatment alternatives.

Water Resources Information Database, Yolo County, California

Project Manager. Updated structure, eliminated errors, and made the database consistent with the DWR Water Data Library for this water level and water quality database containing approximately 2000 wells in Yolo County. Also directed the development of a Web-based interface for data cooperators. Led information and training meetings with stakeholders and data cooperators.

Groundwater Management Plan, City of Davis and U.C. Davis, California

Project Manager. Coordinated preparation of groundwater management plan conforming to California Department of Water Resources guidelines. Plan development included extensive stakeholder participation and integration of results from numerous previous studies. Qualitative and quantitative basin management objectives and a monitoring program were developed to protect groundwater resources.

Phase I and II Deep Aquifer Studies, City of Davis and U.C. Davis, California

Project Manager. Performed geological investigation, multiple aquifer drawdown and recovery tests, isotope analysis, and related investigations to determine the water supply capacity, characteristics, and extents of the deep aquifer zone near Davis. The deep aquifer zone was evaluated as a higher quality water supply to replace a portion of production from lower quality intermediate zone wells.

Coordinated Groundwater Data Analysis and Planning, Solano Water Authority, Vacaville, California

Project Engineer. Led the merging of existing groundwater databases for a group of five adjacent water districts and agencies. Project consisted of computerized base mapping development, compilation and reorganization of existing data, evaluation of existing data quality, and linking of databases to base mapping. Recommendations were developed for future municipal well construction and well spacing to prevent quality and drawdown problems.
Experience Summary

Mr. Brent Cain has over 10 years of experience in hydrology with an emphasis on groundwater flow modeling, hydrogeologic litigation support groundwater resource investigations, aquifer testing, contaminant/solute fate and transport, well installation, groundwater-surface water interactions, GIS applications, and field and modeling project management. Mr. Cain has overseen the development of multiple basin scale hydrologic studies, as well as numerous environmental assessments. Specialties include the conceptualization of complex hydrogeologic systems and the application of innovative approaches to address water supply, legal, and permitting issues. Mr. Cain developed the diagnostic method of hydrogeologic modeling as well as GIS integration for Brown and Caldwell. Both of these advancements have been successfully applied in numerous permitting, water rights, and environmental projects.

Assignment
GIS / Lead Modeler

Education
Masters Coursework and Candidate for Ph.D., Hydrology and Water Resources, University of Arizona
B.S., Geology, Furman University, South Carolina, 1994

Experience
10 years

Joined Firm
2000

Alamosa Well Diagnostic Model, City of Chandler, Arizona

Lead Modeler. Developed three-dimensional, conceptual and numerical groundwater flow and transport model to address migration of industrial effluent that is being recharged. Migration and potential impacts to proposed municipal production well locations was also investigated. Present-day and predictive particle tracking as well as dispersive transport simulations were performed. Model results were compared to California water quality standards for recharge of reclaimed water, and proper well placement was determined to reduce risks to the local water supply system.

Lindsay Road Diagnostic Model, City of Chandler, Arizona

Lead Modeler. Developed a three-dimensional, conceptual and numerical groundwater flow model to address the impact of municipal well pumping in a confined, multi-aquifer system. Coupled groundwater model with the use of advanced, analytical well solutions to assess hydraulic properties of local and regional confining units. Aquifer testing and modeling methodology and submittal has been approved by the Arizona Department of Water Resources (ADWR).

Fennemore Craig, Groundwater-Surface Water Interaction Technical Support, Nebraska

Lead Modeler. Completed an extensive technical review of existing analytical methods used to estimate the impact of groundwater pumping on streamflow depletion. Work was completed as part of concerns regarding the ramifications of proposed regulations to determine the impact of municipal pumping on in-stream flow water rights. Results of work were submitted by client as an affidavit to the State of Nebraska, Department of Natural Resources.

Assured Water Supply Certification, Town of Oro Valley Water Utility, Arizona

Lead Modeler. Developed conceptual and numerical groundwater flow model to address assured water supply certification, expansion of well field, and regional groundwater pumping issues. This analysis has been subsequently approved by the Arizona Department of Water Resources (ADWR).
Groundwater Action Plan, Town of Oro Valley Water Utility, Arizona

**Lead Modeler.** Refined conceptual and numerical groundwater flow model to address well field expansion, siting of new wells, drought sensitivity, pumping interferences, and current status of aquifer reserves and hydraulic properties.

Oro Valley Sub-basin Drought Sensitivity Study and Well Field Assessment, Town of Oro Valley Water Utility, Arizona

**Lead Modeler.** Ongoing project. Refining conceptual and numerical groundwater flow model to address effects of extended drought conditions, magnitude of basin recharge, siting of future well locations, and impact of well field pumping using analytical well solutions.

Garnet Ranch, Ltd., Tubac, Arizona, Assured Water Supply Groundwater/Surface Water Flow Model

**Lead Modeler.** Studied, conceptualized, and modeled the impacts of groundwater pumping on a coupled groundwater / surface water flow system. Pumping impacts for a future well field located adjacent to an effluent dominated river reach were estimated for a 100-year period.

Hydrologic Modeling of Reclaimed Water, City of Bisbee, Arizona

**Lead Modeler.** Developed numerical model to simulate flow, infiltration, and evaporation of reclaimed water discharged into an ephemeral, desert wash. Integrated field and literature derived data into the conceptual model of the study area using GIS.

Arizona Department of Environmental Quality, City of Willcox Site Remediation

**Lead Modeler.** Conducted regional hydrology study, developed conceptual and numerical groundwater model for basin and sites, and interpreted multi-phase flow conditions.

Arizona Department of Environmental Quality, Rock Springs Site Remediation

**Staff Hydrologist/Lead Modeler.** Designed and conducted aquifer tests and developed numerical groundwater and mass transport model to simulate remedial options.

Ranch 160 LLC, Assured Water Supply Certification

**Lead Modeler.** Developed conceptual and numerical groundwater flow model to address assured water supply certification for a proposed housing development near Florence Junction, Arizona. The groundwater model and accompanying analyses have been subsequently approved by the Arizona Department of Water Resources (ADWR).

Salt River Project, Engineering feasibility study for the discharge of industrial effluent

**Staff Hydrologist.** Conducted a regulatory review and assessed the feasibility of discharging effluent to a local waterway. Simulated water quality and mixing for the receiving waters.
Experience Summary
Allan Scott is an information technology project manager, programmer, and analyst with 18 years of experience. His experience includes performing analyses and assessments of information management systems and developing strategy and planning documents for gap analysis and system improvement. In addition, Mr. Scott has performed a wide range of system development and data management functions, including migration of legacy systems to client/server architecture; design, development, and implementation of new data systems; technical management of information systems; and business management of a corporate service center.

Assignment
Information Manager

Education
M.S., Geological Sciences, University of Nevada, Las Vegas, 1988
B.S., Geoscience, State University of New York at Buffalo, 1984

Training
Mastering Distributed Application Design and Development using Microsoft Visual Studio (Course #1298), January 2000
Systems Analysis and Design, UC Davis Extension, August 1999
Introduction to Networking Technologies, UC Davis Extension, June 1998
ORACLE Advanced SQL & PL/SQL Training, June 1998
ORACLE Systems Modeling Techniques and Designer 2000, November 1997
Software Lifecycle Development - JAD Approach, June 1997
Delphi 2.0, October 1996
Oracle 7.0, March 1993
Introduction to Arc/Info, May 1988

Experience
19 years

Joined Firm
2000

Relevant Expertise
- System development
- Data management
- Systems deployment
- User-interface development
- System security

Implementation and Integration of a Computerized Maintenance Management System (CMMS) for Plant Services, City of Sacramento Utilities Department, Sacramento, California
Project Manager and Information Technology Technical Lead. Mr Scott is currently managing and providing technical leadership to implement Maintenance Connection’s CMMS software for the Plant Services Division for the City of Sacramento. This system will support preventative maintenance, work order processing, warehousing, mobile dispatch, training and certification, and capital improvement planning work processes in order to integrate asset management and maintenance management best practices into the Division. This solution will integrate with the City’s SCADA system and GIS, and use mobile systems so field staff have access to the system at remote sites. Mr. Scott is providing project management and technical leadership to define the integration architecture and implement the software solution.

Groundwater Resources Plan, United States Agency for International Development (USAID), Honduras, Central America
Task Leader. Managed development of a water resource data management system and training program as part of a comprehensive hydrogeologic study to assess the available water supply in five cities affected by Hurricane Mitch. The results of these studies will be used to determine if groundwater resources can adequately meet current and future municipal demands and to develop a comprehensive water resource plan for each municipality. Developed a bilingual, comprehensive data management and decision support system using a Microsoft Access database and ESRI ArcView Geographic Information System; designed a project collaboration web site to facilitate team communication, store and retrieve project documents, manage schedules, and provide project tracking utilities; developed bilingual user documentation and training program to train municipalities in the use of the system; and conducted training sessions for system users.

Monitoring and Facility Inspection Data Management Needs Assessment, Pierce County Water Programs, Pierce County, Washington
Task Manager. Performed a needs assessment to define the business processes and technical requirements for implementation of an
environmental management system to manage the County’s Stormwater Inspection and Water Quality Monitoring Programs. The needs assessment included conducting facilitated workshops to document existing workflows, brainstorming to identify new workflows, definition of specific business requirements and evaluation of existing and third-party systems to potentially meet the County’s needs. The results were compiled into a Needs Assessment Report that included the business requirements, recommendations for implementation, an implementation plan, and general costs.

**Stormwater GIS Needs Assessment and Development, San Diego Unified Port District, San Diego, California**

Lead Facilitator, Systems Analyst, and Development Lead. Systems Analyst Task Leader for development of a needs analysis for the Environmental Services Division at the Port to determine the best use of GIS for stormwater compliance management. The needs analysis process defined the Departments enterprise business needs and is being used as a road map for phased development on an enterprise environmental management system. Facilitated the needs analysis workshops and developed the needs assessment report. Specified the system design and lead the development team during building and implementation of the application.

**Compliance Database Development, Southern California Water Company, Sacramento, California**

Project Manager/System Designer. Designed and managed the development of a web-based compliance management system used to track regulatory requirements to closure. The system is a multi-user application based on Microsoft SQL Server and Microsoft Active Server Page, and it utilizes the SCWC e-mail system to proactively notify responsible staff of new requirements or impending deadlines. The system also tracks compliance metrics for management reporting and uses SCWC’s domain-based NT security to manage system access and update privileges.

**Environmental Data Management System, U.S. Army Corps of Engineers, Sacramento District, Benicia, California**

Task Manager/System Designer. Designed and managed the initial phase of development of the web-based environmental data management system (EDMS) to support data validation, analysis, and reporting for the Benicia Arsenal Project. Responsible for the development of the data model, requirements, and design documents. Initial system capabilities include automated data loading of electronic data deliverables of lab analyses, data navigation and update screens, and production of data verification reports. This system is used to support ongoing environmental investigations at the Benicia Arsenal and is designed to meet U.S. Department of Defense data requirements (IRPIMS).
Experience Summary
Jennifer Chen is a chemical engineer with experience in wastewater treatment, drinking water treatment piloting, economic evaluations, hydraulic modeling, land application processes, and erosion control seed material. Ms. Chen is familiar with environmental compliance issues and waste discharge requirements. She presented at the 2007 American Water Works Association, Water Quality Technology Conference on pretreatment with pre-ozone and alum upstream of microfiltration membranes from her work on a drinking water treatment plant pilot study.

Food Processing

Regulatory Monitoring and Salt Audit, SK Foods, Lemoore, California

Staff Engineer. Jennifer completed an annual salt study for the tomato processor in 2003 to proactively address one of the Central Valley’s most pressing environmental issues. In 2003, Jennifer also began providing wastewater monitoring and compliance support for their 900-acre, 2.5-mgd land treatment system. In 2005, Jennifer reviewed historical groundwater data to evaluate the possible effects of tomato process water application on the underlying groundwater. An annual review was conducted in 2006 to evaluate the ongoing effects of the tomato processing operations. The monitoring and reporting program expanded in 2007 in response to SK Foods’ increased land application operations to a new 2600-acre site and increased discharge limit of 4.5 mgd.

Permitting Reports, Culinary Farms, Dixon, California

Engineer. Jennifer completed a Report of Waste Discharge (ROWD) in 2005 to request new Waste Discharge Requirements (WDRs) from the Regional Water Quality Control Board. The ROWD described the Culinary Farms tomato processing and land application operations, and included loading calculations and recommendations for the onsite monitoring program. Culinary Farms generated 0.005 mgd of process water during the processing season and applied it to a 1.2-acre field. An Operations and Management Plan containing guidelines for operation of the land application area was also completed.

Report of Waste Discharge, Confidential Client, California

Engineer. Jennifer completed a Report of Waste Discharge (ROWD) in 2007 to request new Waste Discharge Requirements (WDRs) from the Regional Water Quality Control Board. The ROWD described the fresh corn processing and land application operations, discussed proposed site capital improvements, and included salt and organic loading calculations and recommendations for the onsite monitoring program. The processor operates a 0.03 mgd, 16-acre treatment system throughout the year.

CEQA Initial Study, Confidential Client, California

Engineer. Jennifer completed an initial study to provide the necessary California Environmental Quality Act (CEQA) documentation to support
the land application of corn process water. The initial study addressed the potential environmental impacts from operation of the 16 acre, 0.03 mgd land application system and from construction of a new storage pond and other site improvements.

Wastewater

Salt Reduction and Source Control, University of California, Davis, California

Staff Engineer. Jennifer completed a 2004 salt audit of the UCD campus to determine sources of significant salt loads to the wastewater treatment plant. She explored source control options, evaluated alternate water softening systems, and compared salt disposal methods. Jennifer also performed a cost analysis to assess feasibility of the options.

Water

Water Treatment Plant Pilot Study, Turlock Irrigation District, California

Engineer. Jennifer was the engineer-operator for the 0.2 mgd drinking water treatment pilot plant constructed and operated for the Turlock Irrigation District (TID) from 2006 to 2007. Her onsite responsibilities included sample collection, conducting laboratory analyses, daily maintenance of the treatment units, and coordination with vendors and project team members. The goal of the pilot study was to determine the optimal process train for treating raw surface water from the Tuolumne River to the TID and regulatory drinking water standards. The treatment alternatives consisted of dissolved air flotation, ballasted flocculation, or flocculation in conjunction with plate settling for pretreatment and three microfiltration/ultrafiltration (MF/UF) membrane systems for secondary treatment. Ozonation was evaluated both downstream of the membranes for disinfection and upstream of the flocculator for pretreatment with alum coagulation. Because pre-ozonation ahead of membrane filtration is not well studied in the drinking water industry, the pilot evaluation allowed evaluation of the coagulating effects of ozone, its effects on removal of constituents such as iron, manganese, and organic carbon, and the resulting impacts to membrane performance.

Water Supply Selenium Evaluation, City of Davis, Davis, California

Engineer. In 2007, Jennifer evaluated the City’s drinking water system to optimize the operational order of the City’s groundwater production wells, with the goal of minimizing the overall selenium concentration in the drinking water. This was a source control measure to minimize the selenium input to the wastewater treatment plant to meet discharge limits. Operational scenarios for 2010, 2013, and 2015 were developed using the City’s projected water supply and demands. The planned facility maintenance projects were evaluated and the future conditions were simulated with the City’s hydraulic model. Based on the model results and a review of the City’s distribution grid, capital improvements were also recommended to improve system water distribution and pressures.
Experience Summary
Laura Chavez has 11 years of experience in water resources management. Ms. Chavez has extensive knowledge in water rights, regulatory compliance and permitting issues, especially related to assured water supply and recharge regulations, water conservation, and the coordination of regional planning coalitions.

Central Arizona Salinity Study (CASS), City of Phoenix, Arizona
Technical Support. Ms. Chavez provides continuous support for the monthly meetings of CASS. Ms. Chavez has also assisted in researching desalination methods, defining costs of brine concentrate disposal methods, developing a model to predict the increases in salinity from different source waters and compiling and writing sections of the technical papers produced from the project.

Special Planning Area 3 Water Reclamation Facility, City of Surprise, Arizona
Permitting and Project Management. Assisted in the evaluation of alternatives for managing water reclamation facility Class A effluent generated by a new 1 mgd regional treatment plant which would employ a state-of-the-art membrane bioreactor (MBR) secondary treatment process. The effluent management planning was part of a larger facility plan and facility preliminary design which required planning of effluent management facilities to fit into a long-term build-out plan for the ultimate 31 mgd facility. Integral with the effluent management planning effort Ms. Chavez’s was responsible for compiling information and preparing documentation to support permitting for the project. Among others, key permits included Arizona’s Aquifer Protection Permit (APP) and the Underground Storage Facility (USF) permits. Integral with the permit documentation and application are coordination with regulatory departments at both the Arizona Department of Environmental Quality (ADEQ) and the Arizona Department of Water Resources (ADWR). Project management responsibilities also included assisting with financial management, scheduling, report editing, and other miscellaneous management support functions.

Water Wells and Treatment Program, City of Goodyear, Arizona
Technical Support. Provided support in permitting of drinking water program for the City of Goodyear. The project consisted of the assessment of existing agricultural wells for conversion to potable wells, the construction of new wells and improvements to a reverse osmosis treatment facility.

Arizona-American Water Company (AAWC), Phoenix, Arizona
Technical Support. Provided annual reporting services for water production and consumption for five different service areas within Arizona. Annual reporting to the Central Arizona Groundwater Replenishment District in accordance with State of Arizona Assured Water Supply rules for
12,000 homes was also required. Task included using GIS and access database to analyze water usage for each lot.

**Adaman Groundwater Modeling, City of Goodyear, Arizona**

Technical Support. Compiled water demand data for water provider and adjacent area in support of groundwater sustainability modeling that was used to determine whether pumping of additional groundwater supplies would negatively impact the Adaman service area by drawing down the water table to a point where groundwater wells were unusable or creating subsidence issues. Role in project included writing and editing of technical document, specifically addressing regulatory requirements for pumping of groundwater.

**Confidential Client, Gila Bend, Arizona**

Technical Support/Project Management. Managed hydrogeologic study for a confidential client in the Phoenix, Arizona area. This included coordinating water quality sampling field events, gathering historic water use data and providing direction in regulatory requirements of drilling and using new water resources.

**West Valley CAP Subcontractors (WESTCAPS), City of Goodyear, Arizona**

Technical Support. WESTCAPS is a planning group comprised of West Salt River Valley Central Arizona Project (CAP) water users. Ms. Chavez provides continuous support for the WESTCAPS Technical and General Committee meetings. Responsibilities include scheduling meetings, membership billing, recording, and maintaining the meeting minutes, assisting with the development of scope of work and producing project status reports.

**Hassayampa Sub-Basin Hydrologic Study and Computer Model, Town of Buckeye, Arizona**

Technical Support. Ms. Chavez assists in the development of planning assumptions that will be used as inputs for a hydrologic model being done for Assured Water Supply purposes. This task includes reviewing water demand data, researching potential effluent availability, reviewing recharge project data, and groundwater right information throughout the study area.

**Effluent Master Plan, San Manuel, Arizona**

Developed effluent master plan for a proposed development in rural Arizona. Plan included evaluating need for National Pollutant Discharge Elimination Systems permit, potential for artificial recharge and identifying non-potable reuse opportunities.
Experience Summary
Karen Cole is an experienced programmer in SQL Server, Access, Visual Basic, Visual FoxPro, Delphi, Oracle, SQL and UNIX. She has proven expertise in database design, development and management. She has extensive reporting experience from multiple platforms and in multiple formats, including CalTrans, ERPIMS and GeoTracker.

Hilmar Cheese Company, Hilmar, California

Shell Corporation, Carson, California
Data Manager. Supervising management of project analytical data in SQL Server database.

SK Foods, Colusa County Canning, California

Yerington Mine Site, Yerington, Nevada

Systems Developer. Supervised migration of historical data set to SQL Server database. Designed weather data reporting calculations and tables. Assisted in design and development of automated weather data validation routines.

CalTrans District 12, State Route 73, California

Systems Developer. Designed export process to CalTrans required format from SQL Server database. Received client commendation on quality of data submission for 2004-2005 season.

CalTrans District 10, Caples Lake Maintenance Station, Amador County, California
Data Manager. Created and submitted GeoTracker files in compliance with California SWRCB requirements.
CalTrans District 10, Peddler Hill Maintenance Station, Amador County, California
Data Manager. Created and submitted GeoTracker files in compliance with California SWRCB requirements.

Rancho San Francisco, Newhall, California
Data Manager. Supervising management of project analytical data in SQL Server database. Reporting data summaries for client updates. Tracking sampling and analyses percent completion using project database.

Systems Developer. Designed reports in Microsoft Reporting Services for SQL Server database. Assisted in design and development of website tracking of project progress.

UC Davis - LEHR, Davis, California
Data Manager. Supervising management of project analytical data in SQL Server database. Reporting data summaries for client deliverables.

Systems Developer. Designed reports in Microsoft Reporting Services for SQL Server database. Assisted in design and development of website improvements for client access to data.

Benicia Arsenal, U.S. Army Corps of Engineers, Sacramento District, Benicia, California


Sealy, Inc., South Gate, California
Data Manager. Created and submitted GeoTracker files in compliance with California SWRCB requirements.

T & T Trucking, Lodi, California
Data Manager. Creating and submitting GeoTracker files in compliance with California SWRCB requirements.

General Dynamics, San Diego, California
Data Manager. Managed existing and newly acquired data in MS Access. Created and submitted GeoTracker files in compliance with California SWRCB requirements. Following data migration to SQL Server database, managed existing and newly acquired data in SQL Server.

Systems Developer. Migrated entire data set to SQL Server database. Web interface was expanded to include data query screens and project-specific user authorization proxy process.

Fallbrook, San Diego, California
Data Manager. Created and submitted GeoTracker files in compliance with California SWRCB requirements.
Derrik Williams, P.G., C. Hg.  
Hydrogeologist

OVERVIEW

Mr. Williams has been a practicing hydrogeologist in California since 1987. He is a California Professional Geologist and Certified Hydrogeologist with extensive experience managing, reviewing, and assisting on water supply, groundwater recharge, and wastewater disposal projects. Mr. Williams is accomplished in analytical hydrogeology, with extensive application of groundwater flow and transport models. He has expertise in aquifer test analyses and is experienced in all aspects of groundwater management.

REPRESENTATIVE EXPERIENCE

Groundwater Modeling/Analytical Hydrogeology

Los Osos Basin Groundwater Assessment and Groundwater Model. Developed a water and nitrate balance of the basin, accounting for all known water recharge and nitrate sources. Incorporated the water and nitrate balance into a numerical groundwater model, used to predict future groundwater conditions. The model showed that the proposed sewer system significantly lowers nitrate levels in the shallow aquifer. Nitrate already migrating towards municipal wells, however, will continue to impact these wells for decades into the future.

San Benito County Water Agency Model. Investigated groundwater impacts from changing wastewater quality in San Benito County, California. Helped estimate and model groundwater impacts and changing salt loads near the wastewater treatment ponds and at anticipated reclaimed water application sites.

Salinas Valley Reclaimed Water Injection and Recovery Program Modeling. Employed a series of groundwater flow and contaminant transport models to study the effects of injecting reclaimed water into salt-water intruded aquifers beneath Salinas Valley, California. Used a local, variable density, contaminant transport model and a three-dimensional flow and transport model to demonstrate the impact of the injected reclaimed water on nearby water supply wells.

San Fernando Valley Vadose Zone Modeling. Oversaw vadose zone transport modeling of volatile organic compounds in the San Fernando Valley, under
contract to the EPA. Used a three-dimensional vadose zone model that simulated advective and diffusive transport in the soil moisture, and density driven transport in the soil vapor.

Sand City Saline Groundwater Intake and Disposal System Modeling and Design. Developed a two-phase flow model of a feedwater extraction and brine injection beneath the beach in Sand City for a planned desalination plant. Used the groundwater model to develop a unique arrangement of feedwater wells and horizontal brine disposal wells that reduced environmental impacts on the National Marine Sanctuary.

Marina Coast Water District Desalination Brine Disposal Modeling. Developed a coupled density-dependent flow and transport model to help estimate and visualize the impacts from injecting brine from a small desalination plant beneath the sea floor. The model results suggested that the example brine discharge system created a subsurface brine mound that rose to the sea-floor surface, and entered the ocean at effectively full brine concentration. To obtain all the potential advantages of sea-floor injection, the injection system needed to inject brine over a larger area, at a lower injection rate.

Santa Clara Valley Water District Regional Groundwater Model. Developed the groundwater flow model of the Northern Santa Clara Valley under a joint contract between the City of San Jose and the Santa Clara Valley Water District. The model is presently used by the SCVWD for future water planning.

EDUCATION

University of Arizona, Tucson, AZ
Masters of Science in Hydrology, June 1987.
Thesis: Geostatistical Analysis and Inverse Modeling of the Upper Santa Cruz Basin, Arizona

University of California, Davis, Davis, CA
Bachelor of Science - Geology. December, 1982.

REGISTRATIONS

Registered Geologist, California, #6449
Certified Hydrogeologist, California, #35
Cover Letter

Dr. Wolfgang Schmid, Research Hydrologist
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Tucson, 13 April 2009

Curriculum Vitae

of

Dr. Wolfgang Schmid

To Whom It May Concern:

I am currently employed as Research Hydrologist at the Department of Hydrology and Water Resources (HWR) at the University of Arizona, Tucson, AZ, USA. I have been the principal investigator of grants awarded by the United States Geological Survey (USGS), the California Department of Water Resources, the New Mexico State University, and the Elephant Butte Irrigation District, Las Cruces, NM, to develop and apply a hydrologic model called ‘The Farm Process’ for the USGS’s groundwater modeling software MODFLOW (MF2K-FMP; http://water.usgs.gov/nrp/gwsoftware/mf2k-fmp/mf2kfmp.html).¹

Under my guidance, hydrologic models using MF2K-FMP have been built in California by USGS research teams (entire Central Valley, Monterey Bay, Eastern San Joaquin Valley), and along the Rio Grande in New Mexico. The main objectives are the hindcast and forecast of irrigation demand and the accordingly necessary surface-water and groundwater supply. These models do not only couple surface-water and groundwater systems but also allow the simulation of the response of these systems to changing conditions that can alter the demand or supply of water (e.g., climate changes, droughts, land-use changes, sea level rise, salt water intrusion, economic changes, changes in water rights). Benefits of linking hydrologic models with models that simulate such changing conditions (e.g., climate models) include (a) the simulation of hydrologic responses of water supply systems to changing conditions, (b) the development of adaptation strategies, (c) the evaluation of probabilities of water supply sufficiency, and (d) determination of changing economic losses or profits.

My research interests, as described in the “Statement of Research Interests,” are current research goals, but do not necessarily constitute an agenda for a potential future employment. Scientific tools to pursue these interests include, but certainly are not limited to, MF2K-FMP. I am also interested in other modeling techniques that can simulate and manage the conjunctive use of surface water and groundwater, land-atmosphere interactions, and water supply & demand for agricultural, urban, or ecological settings.

¹ MF2K-FMP integrates irrigation water demand, surface-water and groundwater supply, and excess irrigation return flows. General applications of MF2K-FMP are sustainable water resources management, water rights simulations, drought management, impact of climate change/variability scenarios on irrigation water supply systems and optimization or adaptation schemes under these scenarios.
I have published a comprehensive scientific methods report on MF2K-FMP as well as journal and conference proceedings papers. As a result of my close collaboration with the United States Geological Survey, reports and proceedings papers with USGS co-authors prevailed over journal publications. However, all such USGS reports and proceedings papers were peer reviewed before being published. In addition, I have promoted my research in domestic and international conferences. For the USGS, I have taught MF2K-FMP in US-wide Advanced Groundwater Modeling Classes in San Diego, California, in 2006, and in Denver, Colorado, in 2008.

During my time at the Department of HWR at the University of Arizona (PhD degree: 2000-2004; Post Doc: 2004-2005; Research Hydrologist since 2005), I have been able to gather additional experience in the field of sustainable water resources management and to extend my long-term experience from a Consultant Hydrogeologist to a Research Hydrologist. The German companies GTZ (Gesellschaft für Technische Zusammenarbeit GmbH) and Dornier-Consulting (subsidiary of EADS Deutschland GmbH) contracted me for two years (1998, 1999) to lead a branch office of the Groundwater Assessment Project in Abu Dhabi, United Arab Emirates (staff: around 15). The technical objective was to carry out a groundwater well field development and to determine the storage capacity of the aquifer by means of a groundwater model. As consultant in Germany from 1994 until 1997, my main tasks consisted of contaminant hydrogeology, groundwater exploration, and water supply.

Sincerely,

Wolfgang Schmid, PhD

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2 e.g., American Geophysical Union Fall Conference 2004, San Francisco, California; MODFLOW and MORE Conferences 2006 and 2008 at the International Groundwater Modeling Center, Golden, Colorado; Conference for Computational Methods in Water Resources, 2008, San Francisco; HydroPredict2008 in Prague, Czech Republic; Co-convener of a session on the “Sustainability of Groundwater in Highly Stressed Aquifers” for the IAHS Scientific Assembly in 2009, Hyderabad, India.
PERSONAL DATA

Name: Wolfgang Schmid  Address: 2689 W. Avenida Azahar
Marital status: Married  City: Tucson, Arizona
Date of birth: 29 February 1964  Postal code: 85745
Place of birth: Wangen/Allgäu  Country: United States of America
Nationality: Germany
Private: 1-520-622-7583  Work: 1-520-621-1083
Mobile: 1-520-668-0891  Email: w_schmid@hwr.arizona.edu

HIGHER EDUCATION

Degree earned: Ph.D. in Hydrology  Obtained in: 08/2004
Department: Hydrology and Water Resources  Advisor: Prof. Dr. T. Maddock, III
Major subjects: Management of Groundwater and Surface-water Supply
GPA: 4.0 on a scale from 4 – 1*  * failing margin
From - To: 01/2000 - 08/2004
School/University: University of Arizona, Tucson, Arizona, United States of America

Degree earned: M.S. in Geology (German Diploma)  Obtained in: 07/1994
Department: Geology (Institut für Geologie und Paläontologie)  Advisor: Prof. Dr. G. Einsele
Major subjects: Hydrogeology, Engineering Geology
GPA: 3.6 on a scale from 4 – 1*  * failing margin
From - To: 10/1987 - 07/1994
School/University: University of Tübingen, Germany

Degree earned: M.S. in Geography (German Diploma)  Obtained in: 07/1994
Department: Geography (Geographisches Institut)  Advisor: Prof. Dr. C. Hannß
Major subjects: Soil Science, Geo-ecology, Environmental Planning
GPA: 3.55 on a scale from 4 – 1*  * failing margin
From - To: 10/1985 - 07/1994
School/University: University of Tübingen, Germany

EXPERTISE

Fields of Expertise
- Hydrologic modeling & Conjunctive management of groundwater and surface-water use;
- Groundwater exploration and water supply;
- Geotechnical assessment of site suitability for solid waste disposals.

Practical Experience
- Geophysical borehole logging / Seismic and Geoelectric Surveys;
- Well construction / Hydraulic testing / Tracer tests;
- Streamflow gages & measurements / Weather stations;
- Groundwater quality & age; Hydrochemistry & Isotope Methods (e.g. $^2$H/$^{18}$O, $^3$H, $^{14}$C, $^{85}$Kr).

Computer Skills
- Groundwater Modeling (Ground-Water Flow & Transport Processes of MODFLOW-2000 and MODFLOW-2005, Model Calibration and Parameter Estimation by UCODE);
- Surface-water Routing (Streamflow Routing Package of MODFLOW, Runoff by KINEROS);
- Modeling of the Unsaturated Zone (HYDRUS2D, MODFLOW’s Unsat. Zone Flow Package);
- Pumping Test Analysis (AQTESOLV, AQUITEST, STEPMASTER, etc.);
- Irrigation Scheduling (AZSCHED) & Irrigation Management (FARM Process);
- Geographical Information Systems (ARCINFO, ARCVIEW, ARCGIS, ARCHYDRO);

Language Skills
- German (fluent – native), English (fluent), Spanish (intermediate).
## PROFESSIONAL EXPERIENCE


<table>
<thead>
<tr>
<th>Fields</th>
<th>Description of Projects</th>
<th>From</th>
<th>To</th>
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<tbody>
<tr>
<td><strong>Hydrologic Modeling &amp; Conjunctive Management of Surface-water and Groundwater Supply</strong>&lt;br&gt;Determination of Irrigation Demand and Conjunctively Managed Surface-water and Groundwater Supply (by the FARM Process for MODFLOW)&lt;br&gt;• Promotion of the FARM Process software in conferences and instruction of hydrologists in a nation-wide Advanced Groundwater Modeling Class.&lt;br&gt;• Development and constant update of Farm Process software for the joint use with the USGS’s Groundwater Modeling Program MODFLOW;&lt;br&gt;• Publication of report that provides documentation and a user-guide for the FARM Process software;&lt;br&gt;• Graphics-User-Interface (Windows version) of the FARM Process;&lt;br&gt;• Application to Groundwater Model in New Mexico to simulate historic agricultural pumpage (as required by Rio Grande Stream Adjudication);&lt;br&gt;• Application to four models in California constructed by the USGS for the entire Central Valley, the Pajaro Valley (Monterey Bay), the Modesto area south of Sacramento, and the Antelope Valley north of Los Angeles.</td>
<td>2000</td>
<td>now</td>
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<td><strong>Groundwater Exploration and Water Supply</strong>&lt;br&gt;Groundwater Well Field Development Program (Abu Dhabi, UAE)&lt;br&gt;• Well siting by geoelectric survey (Schlumberger array);&lt;br&gt;• Supervision of drillings (Reverse Rotary method);&lt;br&gt;• Pumping test program (Production tests, Aquifer tests);&lt;br&gt;• Logging of flow and electrical conductivity;&lt;br&gt;• Hydrochemistry (Major Ions and Isotopes);&lt;br&gt;• Groundwater flow model.&lt;br&gt;(Research on the maximum possible discharge for each well, of total storage, and of suitability of produced groundwater for irrigation purposes).</td>
<td>1998</td>
<td>1999</td>
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<tr>
<td><strong>Solid Waste Disposal Planning</strong>&lt;br&gt;Remediation of CO₂-wells of a Health-Spa for Balneological Use&lt;br&gt;Well hydraulics, hydrochemical &amp; microbiologic groundwater quality.</td>
<td>1994</td>
<td>1997</td>
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1 United States Geological Survey.
2 Funded by the New Mexico State University, Las Cruces, New Mexico, and by the Interstate Stream Commission of the Office of the State Engineer, New Mexico.
3 Consortium: DaimlerChrysler Aerospace (DASA), Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ).
4 Local consulting firms (EGNER Geoanalytik, Tübingen; IHB, Tübingen; and BGT, Stuttgart; all in Germany).
BC has reviewed the Central Valley Salinity Coalition Agreement for Services by Independent Consultant and generally finds the terms and conditions to be acceptable. If awarded this project, we wish to discuss the following proposed contract revisions or clarifications with the Coalition. In any event, we are confident that we can arrive at mutually acceptable contract terms promptly and without delay.

**Article III COMPENSATION**

3.05: We request inclusion of the following to clarify the process for resolving any questions or contested portions of the Consultant’s invoices:

If CVSC has reason to question or contest any portion of Consultant’s invoices, amounts questioned or contested shall be identified and notice given to Consultant within 15 days of the date of the invoice. Any portion of any invoice not contested shall be deemed to be accepted and approved for payment and shall be paid to Consultant in accordance with the above schedule. CVSC agrees to cooperate with Consultant in a mutual effort to resolve promptly any contested portions of the Consultant’s invoices.

**Article IV CONSULTANT OBLIGATIONS**

4.03: We request several minor revisions to clarify that: a) contractual liability is a coverage part to the Commercial General Liability policy and will not be evidenced on either Auto Liability or Professional Liability; b) waiver of subrogation shall be evidenced on all liability policies except for Professional Liability; c) a primary insurance endorsement will be evidenced for the Commercial General and Auto Liability policies; and d) a 30 day written notice will be provided in the event of policy cancellation or non-renewal (but our insurers will not provide notice in the event of material changes to coverages; however, BC can agree to provide notice to CVSC in this unlikely event).

4.04: We wish to propose several revisions to this indemnity paragraph which incorporate a comparative negligence standard with respect to the Consultant’s obligation. (Specific revisions can be provided upon request.) We also request inclusion of the following sentence at the end of this paragraph: “Regardless of any other term of this Agreement, in no event shall either party be responsible to the other for any incidental, consequential or indirect damages.”

**Article V CVSC OBLIGATIONS**

5.01: We request inclusion of the following sentence at the end of Paragraph 5.01a: “Consultant shall not independently verify the validity, completeness or accuracy of such CVSC furnished information unless otherwise expressly engaged to do so in writing.”

**Article VI ADDITIONAL SERVICES, CHANGES AND DELETIONS**

6.04: On line 3, we request insertion of “, and Consultant” before the words, “shall only be compensated…”. (We want there to be mutual agreement between CVSC and Consultant on the change in compensation based on a change in the scope of services.)

**Article VIII CONSULTANT STATUS**

8.01: We request two minor edits to Paragraph 8.02: a) On the first line delete “specifically” and b) on the fifth line after the word “services” insert “in the same locale at the time such services are rendered”.

**Article IX AUDIT AND OWNERSHIP OF DOCUMENTS**

9.01: On the fourth line, before the words “the sole property” insert, “upon payment to Consultant”. (Ownership should transfer to CVSC upon payment to Consultant for services rendered.)