

# HYDRO VISIONS

Volume 13, No. 1

GROUNDWATER RESOURCES ASSOCIATION  
OF CALIFORNIA

Spring 2004

## GRA's 1,4-Dioxane Conference Profiles National Challenge of Emerging and Unregulated Contaminants

BY TOM MOHR

GRA's Ninth Symposium in the Series on Groundwater Contaminants focused on 1,4-dioxane and Other Solvent Stabilizer Compounds in the Environment. The December 10th Symposium, held at the San Jose Doubletree Hotel, attracted more than 100 participants from ten states. The event was held in cooperation with the International Association of Hydrogeologists, and was sponsored by Applied Process Technology Inc. We present here an abbreviated synopsis of some of the presentations. The complete text can be found at the GRA website, [www.grac.org](http://www.grac.org).

The author and symposium chair, Tom Mohr, presented his research on the occurrence of solvent stabilizers in chlorinated degreasing and dry cleaning

solvents. His research was supported in part by his employer, the Santa Clara Valley Water District, and is the subject of an upcoming book by CRC Press. Solvent stabilizers are chemicals added to chlorinated solvents such as trichloroethylene (TCE), methyl chloroform (TCA), and perchloroethylene (PCE). These additives serve to inhibit reactions that otherwise lead to the deterioration and ultimate breakdown of the solvent, diminishing or preventing the proper solvent performance in the intended industrial application. During vapor degreasing, solvents must perform under extreme conditions associated with boiling and condensation, and contact with metal salts, water, light, and acids. Solvent stabilizers are added to serve as anti-oxidants, acid inhibitors, and metal stabilizers. For example, 1,4-dioxane is commonly added to TCA at 2 to 3% volume to prevent reaction with aluminum salts. Without 1,4-dioxane or other inhibitors, TCA will undergo an autocatalytic reaction leading to the rapid production of acid, which causes further splitting of more acid. The end product of this rapid reaction can be phosgene gas, with potentially fatal consequences to equipment operators, and a black tarry

*"Identification of solvent stabilizer compounds may also be useful in forensic investigations for deconvoluting commingled plumes."*

*The Groundwater Resources Association of California is dedicated to resource management that protects and improves groundwater through education and technical leadership.*

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mass which spots the parts being cleaned and leaves a problematic residue on the degreasing equipment.

Over the course of five decades, industrial chemists empirically arrived at a wide variety of chemical additives to prevent these reactions and avoid the expensive shut down of industrial production lines necessitated by solvent breakdown. The number of solvent stabilizers identified in industry literature number in the hundreds, though solvent stabilizer "packages" for individual solvents usually included only a few stabilizers. PCE is the most stable among the main chlorinated solvents, and therefore requires the least stabilization. TCE also required solvent stabilizers at less

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# President's Message

BY TOM JOHNSON

## A Proper Foundation

It has been more than 12 years since December 14, 1991, when the Officers of the Technical Branch of the California Groundwater Association made a very difficult and important decision. Those present at that meeting included Vicki Kretsinger, Gene Luhdorff, Paul Dorey, David Abbott, Tony Ward, Brian Lewis, Anthony Saracino and several others who all agreed, with some regret, that it was time to build a new organization. That new organization, they felt, must provide representation and opportunity for anyone involved in groundwater resource protection, management and planning in California. Groundwater scientists and engineers, policy makers, drilling contractors, consultants, educators, water suppliers, regulatory agency representatives; all would be welcome in this new organization and all would have a voice in its programs and future. On January 1, 1992, less than three weeks after that December meeting, the Groundwater Resources Association of California was officially started, with articles and bylaws in place. GRA had begun with President Vicki Kretsinger and Vice President Anthony Saracino.

As they prepared for the official kick-off meeting for GRA on March 11, 1992, I am sure that each person who attended that December meeting must have wondered how many other California groundwater professionals shared their vision for such an organization. Those must have been exciting and daunting times. It was particularly reassuring then, when more than 160 members had joined GRA by March 11, and 90 persons attended that first GRA meeting in Sacramento. The keynote speaker at that meeting, Doug Wheeler, Secretary of the California Resources Agency, strongly emphasized the need for long-term planning to meet California's water needs and that a crucial action period was at hand. It did not take

long to answer the question whether that December decision was the right one. In its first year, more than 600 persons joined GRA. This amazingly showed the need for an association that provided a home and representation for all groundwater professionals in California.

Fortunately, Vicki, Gene, Paul, Anthony, Brian, David and the others at that December meeting had established a proper foundation for the organization. First, GRA would be inclusive and volunteer-based; anyone involved with groundwater was welcome to participate in the organization. And second, GRA's mission would be to provide unequalled education and technical leadership to protect and improve groundwater resources.

In 2004, GRA now has almost 1,000 members, representing all aspects of the groundwater community. There are now five very successful GRA Branches, each representing membership and groundwater issues specific to their geographic areas, with outstanding leadership and technical programs. GRA also has excellent support and guidance from Executive Director Kathy Snelson and her staff. Under the exceptional leadership of President Jim Carter, GRA found new and exciting ways to serve the needs of its membership during the past two years.

This year, Tom Mohr, Seminar Committee Chair and Vice President of GRA, will lead a new and exciting series of programs, including a first-ever "Dry Cleaners Symposium" on April 7 in Sacramento. A "Model Calibration and Uncertainty Analysis Workshop Using PEST" will be held in Santa Ana, April 19-21, and GRA will hold the "2004 California Perchlorate Update Symposium" in Glendale on August 4. Plans are also underway for GRA's 13th Annual Meeting, to be held September 23-24, in Sonoma,

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**HYDROVISIONS** is the official publication of the Groundwater Resources Association of California (GRA). GRA's mailing address is 915 L Street, Suite 1000, Sacramento, CA 95814. Any questions or comments concerning this publication should be directed to the newsletter editor at [editor@grac.org](mailto:editor@grac.org) or faxed to (916) 442-0382.

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## Seminars and Calls for Papers

BY TOM MOHR, SEMINAR CHAIR

The Groundwater Resources Association is planning another full program of events for 2004. The 10th Symposium in the Series on Groundwater Contaminants, **Investigation and Remediation of Dry Cleaner Release Sites**, will be held April 7, 2004 at the Radisson Hotel, Sacramento. The Symposium will focus upon investigation and remediation techniques, featuring speakers and posters in the following topic areas:

- ◆ Source Investigation and Characterization Techniques
- ◆ Health Risk from PCE Ingestion and Inhalation
- ◆ Remedial Strategies for Dry Cleaner Sites
- ◆ Legal Strategies for Managing Liability from Dry Cleaner Release Sites
- ◆ Assessing and Managing Water Supply Impacts from Dry Cleaner Release Sites
- ◆ Roundtable Policy Discussion addressing questions such as, “Is there a need to further restrict PCE usage?”, “Are dry cleaner releases a thing of the past?”, and others

GRA is now accepting abstracts for speakers and poster presentations for the above topic areas through March 4, 2004. Please see the website for guidelines (<http://www.grac.org>).

GRA is co-sponsoring a three-day workshop “**Model Calibration and Predictive Uncertainty Analysis Using PEST**” on April 19-21, 2004 at the Santa Ana Offices of CH2M Hill. The principal instructor is Dr. John Doherty, author of PEST; he will be assisted by Matt Tonkin of SS Papadopoulos &

## Upcoming Events

Associates, Inc. The workshop will provide attendees an understanding of how the PEST code was developed to apply parameter estimation theory, and will incorporate extensive demonstrations and “hands-on” computer lab exercises from a variety of environmental disciplines, including applications of PEST to groundwater/surface water modeling. This class was offered in 2003 and received highly favorable ratings from participants. Register online at <http://www.grac.org>.

Two 8-hour classes on **Low Yield Aquifer Testing** to review basic hydraulic analysis and interpretation from pumping tests are being planned by GRA for April. One class will be held in Walnut Creek on April 26, and the second in Glendale on April 27. The course will feature lectures by three leading practitioners, David Schaefer (independent consultant, Minnesota), Peter Leffler (Fugro West), and Bill Gustafson (Luhdorff Scalmanini) on pumping test analysis, capture zone modeling in low yield aquifers, and low yield well pumps. Full venue and registration details will be available soon online.

May is the time for GRA’s annual **Lobby Day**, usually held in the third week. In May 2003, fifty GRA members trekked to Sacramento for the 2nd Annual Legislative Symposium and Lobby Day. GRA members participated in discussions with legislators and their staff, communicating the importance and complexities of groundwater issues. GRA organizes a legislative staff briefing on groundwater issues for legislative staff each year to improve legislator’s knowledge of the importance of groundwater. See GRA’s web site for details for the 2004 event – a great opportunity to participate directly in government!

An introductory three day course on **Groundwater Modeling** will be instructed by Dr. Graham Fogg and Dr. Thomas Harter, both of UC Davis’ Hydrologic Sciences Group. The course will be held April 21-23 in Sacramento. This hands-on course is a mainstay of GRA’s professional educational series. It has been taught five times and has always been received with high acclaim by students. See the web site for full details.

GRA’s plans include its 11th groundwater symposium, on August 4, 2004 in Glendale. **Perchlorate in Groundwater 2004** promises to bring the latest technical and policy developments on the perchlorate scene, and will feature a larger selection of talks than were offered in the very successful July 2003 event in Sacramento. GRA is now accepting abstracts for papers and posters on perchlorate in groundwater in the following topic areas:

- ◆ Perchlorate Characteristics, Analysis, and Forensics
- ◆ Toxicology of Perchlorate in Plants and Foods
- ◆ Remediation Case Histories and Costs of Treatment
- ◆ Legislation, Regulatory Affairs, and Legal Issues

Be sure to see the call for papers for this event on the web site. Inquiries for this event should be directed to Bill Metzger, [bmetzer@toddengineers.com](mailto:bmetzer@toddengineers.com), who will chair the event.

GRA’s premier event for 2004 will be the **13th Annual GRA Meeting and Conference**, and this year’s theme is “Aquifer Protection, Restoration, Replenishment and Treated Water Reuse.” The conference is set in the Sonoma wine country on September 23-24, 2004 (with a GRA golf event and

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# New Crop Water Requirement Estimation Tools

BY MORTEZA ORANG  
CALIFORNIA DEPARTMENT  
OF WATER RESOURCES

## Consumptive Use Program (CUP)

A user-friendly Excel application program (CUP) was developed to help water agencies, engineers, consultants, educators, and growers obtain an estimate of crop water requirements for irrigation scheduling. The program computes reference evapotranspiration (ET<sub>o</sub>) from monthly means of solar radiation, maximum and minimum temperature, dew point temperature, and wind speed using the daily Penman-Monteith equation. The program helps users to determine improved crop coefficient (K<sub>c</sub>) values for estimating crop evapotranspiration (ET<sub>c</sub>). Rather than using only linear estimates of the K<sub>c</sub> values for various growth stages, CUP accounts for differences in soil evaporation to refine the early season K<sub>c</sub> values. The application outputs a wide range of tables and charts that are useful for irrigation planning. CUP's input and output data are in English or metric unit. Visit our website for more information, publications, and to order a free compact disc on CUP: <http://www.waterplan.water.ca.gov/landwateruse/wateruse/Ag/wuagricultural.htm>.

## Simulation of Evapotranspiration of Applied Water (SIMETAW)

The SIMETAW program was developed through a joint effort between the California Department of Water Resources and the University of California, Davis to help water planners, researchers, engineers, consultants, and water agencies estimate

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# Technical Corner

## Framework for a Ground-Water Quality Monitoring and Assessment Program for California

BY KENNETH BELITZ, NEIL M. DUBROVSKY, KAREN BUROW,  
BRYANT JURGENS, AND TYLER JOHNSON

**U.S. GEOLOGICAL SURVEY , Water Resources Investigation  
Report 03-4166, Sacramento, California 2003**

*Prepared in cooperation with  
CALIFORNIA STATE WATER RESOURCES CONTROL BOARD*

The State of California uses more ground water than any other State in the Nation. With a population of over 30 million people, an agricultural economy based on intensive irrigation, large urban industrial areas, and naturally elevated concentrations of some trace elements, there is a wide range of contaminant sources that have the potential to contaminate ground water and limit its beneficial uses. In response to the many and different potential sources of ground-water contamination, the State of California has evolved an extensive set of rules and programs to protect ground-water quality, and agencies to implement the rules and programs. These programs have in common a focus on compliance with regulations governing chemical use and (or) ground-water quality. Although appropriate for, and successful at, their specific missions, these programs do not at present provide a comprehensive view of ground-water quality in the State of California.

In October 2001, The California Assembly passed a bill, AB 599, establishing the Ground-Water-Quality Monitoring Act of 2001." The goal of AB 599 is to improve Statewide comprehensive ground-water

monitoring and increase availability of information about ground-water quality to the public. AB 599 requires the State Water Resources Control Board (SWRCB), in collaboration with an interagency task force (ITF) and a public advisory committee (PAC), to develop a plan for a comprehensive ground-water monitoring program. AB 599 specifies that the comprehensive program should be capable of assessing each ground-water basin in the State through direct and other statistically reliable sampling approaches, and that the program should integrate existing monitoring programs and design new program elements, as necessary. AB 599 also stresses the importance of prioritizing ground-water basins that provide drinking water.

The United States Geological Survey (USGS), in cooperation with the SWRCB, and in coordination with the ITF and PAC, has developed a framework for a comprehensive ground-water-quality monitoring and assessment program for California. The proposed framework relies extensively on previous work conducted by the USGS through its National Water-Quality Assessment (NAWQA) program. In particular, the NAWQA program defines three types of ground-

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# Colorado River Quantification Settlement Agreement

BY SCOTT SLATER, J.D.,  
HATCH AND PARENT

On October 15, 2003 an era of contentious in-fighting among long-warring California water interests came to an end. In place of escalating political rhetoric and legal wrangling, California finally delivered on its promise to the federal government and the other Colorado River Basin States to live within its basic apportionment of Colorado River Water.

More than 9 months after the federal government reduced California's deliveries in accordance with federal guidelines designed to go into effect should California fail to make good on its earlier promises, extraordinary leadership from former Governor Davis and his staff, as well as grueling negotiations among Colorado River Basin States presided over by Assistant Secretary Bennett Raley, led to the execution of the Quantification Settlement Agreement (QSA). The QSA and the literally dozens of related agreements provide an integrated, albeit complex, roadmap for efficient management of Colorado River Resources for a minimum of 35 years. Some components of the underlying program will last in excess of 110 years.

The Colorado River remains the most important water supply to Southern California, and successful management of this supply is of great significance to all of California but especially the Imperial Irrigation District (IID), the Coachella Valley Water District (CVWD), the Metropolitan Water District of Southern California (MWD) and the

## Technical Corner

San Diego County Water Authority (SDCWA). These agencies looked to the Colorado River as their life-blood, and the future of the Southern California economy depends on the Colorado River remaining a reliable water supply.

Prospects that California might not pull a deal together threatened to strain a great number of relationships. Some of the more obvious were linked to the acknowledged fact that much of urban Southern California relies upon two major export projects to meet its needs: the Colorado River and the State Water Project (SWP). If the Colorado River was not going to be available, greater attention was likely to be focused on the SWP.

Unfortunately, the SWP tends to be an irregular performer from year to year. And if Colorado River water were not going to be available in the expected historical quantities, stress would be placed upon all other supplies to meet long-term needs in many portions of the State. Consequently, water interests watching the progress of the QSA negotiations began to stake out territory that would become vital in the event of protracted delays or even failure.

Second, environmental interests were growing weary over the State/Federal indecision regarding the fate of the Salton Sea. For much of the early negotiating and authorization period the Salton Sea was thought to travel an independent but parallel path. The absence of an acknowledged process for determining how or at what level the Salton Sea would be restored led to an increased tendency to want to squeeze, if not strangle, the deal.

Third, California's excuses for non-performance and its good will with other Colorado River Basin States and the Federal Government were wearing thin. The State of Nevada in particular, had in part, bet its short-term future and its sharing in surplus Colorado River water upon California's ability to

meet its targets as outlined in the Federal Interim Surplus Guidelines. Given the enormous consequences to California for non-performance and the pressure of the Federal Government to be open to this approach, the position seemed eminently reasonable. However, when the California agencies failed to meet the December 31, 2002 deadline for completing the QSA, with each passing month Nevada became increasingly skeptical and concerned.

The initiation of litigation between the Secretary of the Interior and IID further raised the stakes by threatening to unveil some State-Federal conflicts regarding the appropriate Law of the River. Thus, it was with great relief to all involved, directly and indirectly, that California was able to execute all the underlying documents and deliver "peace on the river."

Here is why:

- It provides California with the "soft-landing" and the availability of Special Surplus Criteria amounting to millions of acre-feet of water.
- It provides economic incentives for IID to engage in voluntary conservation measures of its choosing to produce water for transfer to SDCWA, CVWD and MWD.
- It includes the quantification of agricultural water entitlements on the Colorado River, providing a basis for efficient river management and a basis for future conservation and trading.
- It continues and extends the IID/MWD conservation agreement for approximately 110,000 acre-feet of water.
- It authorizes the transfer of 200,000 acre-feet of water per year from IID conservation to SDCWA for a minimum of 35 years.

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# AB599 Groundwater Quality Monitoring Act of 2001 – Status

BY TIM PARKER, RG, GRA  
DIRECTOR AND LEGISLATIVE CHAIR

It's been a long road, going on three years since GRA testified on behalf of AB599, and a year and a half since the first legislative hearing was conducted. GRA has assisted in planning and conducting the hearings, participated in nearly all the hearings, and provided technical resources and assistance as requested. We believe we have met the GRA mission and goals on this effort.

Assembly Bill AB599, signed by the governor in October 2001, required the State Water Resources Control Board to establish an interagency task force (ITF), and convene a public advisory committee (PAC) to work together to develop a comprehensive statewide groundwater monitoring program. Under the law, the monitoring program is to integrate existing programs and design new programs as necessary in order to provide assessments of all state groundwater basins. The law also required that SWRCB, the ITF, and the PAC identify measures that would increase coordination among state and federal agencies that collect groundwater data. On or before March 1, 2003, the state board, in consultation with the ITF was required to submit a report to the Governor and the Legislature, that describes the comprehensive groundwater monitoring, identifies funding, and makes recommendations for increasing coordination among state and federal agencies.

The report was submitted at the end of March 2003, signed by Governor Davis in November 2003, and made available to the public by Cal EPA in January 2004. The report is available at [www.swrcb.ca.gov](http://www.swrcb.ca.gov).

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## California Legislative Corner

### UPDATE ON PROPOSITION 50: WHERE'S THE MONEY?


At a recent Proposition 50 hearing held by State Senator Michael Machado (D - District 5), some disappointing information was provided. It seems that the Proposition 50 funds may largely remain inaccessible until 2005. These funds, as well as Proposition 40 funds, were frozen by the Department of Finance at the end of last year. Exemptions are required to be filed by individual departments for the use of any of these funds, but it is unclear when the funds may become more fully available.

Last fall, California voters passed Proposition 50, the Clean Water and Coastal Protection Bond of 2002. As a first for the organization, the GRA membership was surveyed via email on whether to support Proposition 50 as a group, and a vast majority of those responding indicated support of the bond measure. In these challenging budget times, it was hoped that Proposition 50 would help to keep water and groundwater resources programs, local assistance, grant and loan programs going.

Senator Machado, Chair of the Senate Committee on Agriculture and Water Resources, assumed the legislative lead on developing implementation language for Proposition 50. Legislation was enacted which provided direction to our government agencies on the actions and steps to take to carry out the proposition and issue the bond funds.

At the recent hearing, the California Department of Health Services, State Water Resources Control Board, and Department of Water Resources were asked for an update on progress in implementing Proposition 50 under the requirements of the legislation. DHS indicated its compliance with the law based on its current progress. Neither SWRCB or DWR had made sufficient progress to be in compliance with the law.

The summary Proposition 50 budget is provided below – more information is available at the GRA website at [www.grac.org](http://www.grac.org).

1. WATER QUALITY	\$955 million
A. Water Security	\$50 million
B. Safe Drinking Water	\$435 million
C. Clean Water and Water Quality	\$370 million
D. Contaminant and Salt Removal Technologies	\$100 million
2. CALFED BAY-DELTA PROGRAM	\$825 million
3. REGIONAL PROJECTS:	\$710 million
A. Integrated Regional Water Management	\$640 million
B. Colorado River	\$70 million
4. COASTAL PROTECTION	\$950 million
<b>TOTAL</b>	<b>\$3.44 billion</b> 

# Legislative Committee Activities

BY TIM PARKER, RG, GRA  
DIRECTOR AND LEGISLATIVE CHAIR

The Legislative Committee has been revitalized to include a wider representation of stakeholders, including regulators, contaminant experts, agricultural landowners, businesses, water industry, and legislative advocates. GRA is dedicated to resource management that protects and improves groundwater through education, advocacy and technical leadership. Our approach is to build our legislative advocacy program to represent the interests of our members before the state legislature and regulatory agencies. Through our legislative advocates, Chris Frahm and Jennifer Carbuccia of Hatch & Parent, member concerns on critical issues may be communicated directly to the decision-makers in the state Capitol. We want to play an active role in educating elected representatives about the importance of groundwater supply and quality issues.

The Legislative Committee meets in person two times per year; and monthly by telephone conference or more frequently if necessary. Groundwater and selected water related bills are reviewed by GRA's Legislative Advocates and brought to the Legislative Committee for discussion and suggestions regarding which bills to support, monitor (neutrality), or oppose based on Legislative Guidelines; and which bills to take to the GRA board for deliberation (significant and/or controversial issues or outside Legislative Guidelines). Legislative Guidelines have been adopted and may be amended by the GRA Board – available on the GRA webpage at [www.grac.org](http://www.grac.org).

GRA plans to Host the “Legislative Symposium and Capitol Lobby Day”

# California Legislative Corner

(scheduled for May 19, 2004) to assist in educating our membership on legislative priorities and give them an opportunity for direct contact with key legislators effecting groundwater policy in California. We will also continue to participate in the legislative process as a technical expert and provide support where appropriate based on legislative guidelines and other issues presented to the board of directors and/or legislative committee. Listed below are the committee membership, 2004 planned activities, and key legislative dates.

Several key pieces of legislation which the committee is currently monitoring include:

- ◆ AB 1020 (Laird) – Public Water Systems: Civil Actions: Contaminants; .
- ◆ AB 1546 (Simitian) – Local Governments: Vehicle Fee for Stormwater;
- ◆ SB 1089 (Johnson): State Water Pollution Control Revolving Fund;
- ◆ SB 1089 (Brulte) Water Security: Clean Drinking Water: Management; and
- ◆ SB 1155 (Machado): Sacramento-San Joaquin Delta.
- ◆ Groundwater Extraction reporting bill: Ventura, possibly Los Angeles and Riverside

Additional key issues the committee is following include :

- ◆ Prop 50 and 40 funding allocations
- ◆ AB 599 Process
- ◆ Perchlorate– Request for Action or Delay to DHS/OEHHA
- ◆ Discussion of an Action Level Notification Bill.

The new governor has made a number of key water resource related appointments through early February 2004:

## California Environmental Protection Agency

- ◆ Terry Tamminen as Secretary
- ◆ James Branham as Undersecretary
- ◆ Maureen Gorsen, Deputy Secretary, Law enforcement and Counsel

## State Water Resources Control Board

- ◆ Peter S. Silva to the SWRCB
- ◆ Arthur Baggett, Jr., as Chairman of the Board

## California Resources Agency

- ◆ Michael Chrisman as Secretary of Resources
- ◆ Karen Scarborough as Undersecretary
- ◆ Sandra S. Ikuta as Deputy Secretary and General Counsel
- ◆ Melinda Tracy Terry as Deputy Secretary of Legislation

## Department of Fish and Game

- ◆ Loris “Ryan” Broddrick as Director

A complete list of committee members, 2004 planned activities, and key legislative dates, and biographies for the governor's water resource related appointments can be found elsewhere in this issue or in their entirety on the GRA website under Resources/Legislative and Regulatory Updates.

More information on these bills and issues are provided in this HydroVisions or on the GRA website at [www.grac.org](http://www.grac.org).

## Committee Members

**Bob Bowcock**  
Integrated Resource Management  
Category: Agriculture/ Landowner

**Terry Foreman**  
CH2Mhill  
Category: Water Resources

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# CCGO Highlights

BY JANE H. GILL, RG (CA AND NC);  
CCGO EXECUTIVE DIRECTOR

## Geology Board Loses Eight Permanent Employees in Three Years

The California Board of Geology and Geophysicists ‘lost’ its Staff Services Analyst position in November, which reduces the overall staffing for the Board to three permanent employees. In the course of three years the Board has gone from 11 authorized positions to just three.

This announcement from Paul Sweeney, Executive Director of the BGG, is alarming. The Board’s Mission is to enhance the quality, significance and availability of geological and geophysical services to the people of the State of California, and because of the significant loss of funding because of what appear to be blind budget cuts, the Board’s vision of a “state in which qualified, regulated geologists and geophysicists function optimally in a competitive environment in making their contributions to the public health, safety and welfare” has been seriously impaired. Please make your feelings about this situation known to BGG EO Paul Sweeney at Paul\_Sweeney@dca.ca.gov

## CCGO Planning for 5th Annual 8-hour Legislative “Drive-In” March 30

Plans are well underway for the 5th (yes the FIFTH!) annual CCGO Sacramento Legislative Drive-in on Wednesday, March 30. This is an annual event in which delegates from the CCGO Organizational and Business Membership meet with California Legislators and their staff, bringing up points of concern to our membership and the public. The themes this year are seismic safety, geologists’ registration, groundwater resources, and science

# California Regulatory Corner

education. CCGO also supports legislation to protect the environment, increased diversity in the sciences, and the wise use of natural resources.

Meetings are already scheduled with staff members of the new Governor, Arnold Schwarzenegger. CCGO Delegates will spend the entire day in Sacramento, meeting in the morning with the CGS and BGG, enjoying a short lunch at the Capitol, and reserving the afternoon for the Governor’s Staff and members of the Assembly and Senate. CCGO delegates Jim Jacobs, Anne Cavazos (CCGO Treasurer), Rick Blake (CCGO President), and Tim Parker (GRA Representative) are among the CCGO Delegates. For more information, please contact the CCGO Executive Director at [janehgill@aol.com](mailto:janehgill@aol.com).

## CCGO May General Meeting and Fundraisers to Feature Geophysics Pioneer Dr. Tanya Atwater

The CCGO Board met on February 9 to discuss the upcoming CCGO Fundraisers and General Meeting in May (date TBA). The Fundraiser in Northern California will be held in conjunction with the Association of Engineering Geologists, and will feature Dr. Tanya Atwater, a pioneer in plate tectonics theory. Dr. Atwater graduated from Scripps Institution of Oceanography in 1972, in an era when women were not as welcome on geoscience expeditions. She nevertheless participated in the very first research trip to study a seafloor-spreading center, which resulted in her first publication, the lead article in *Science*, a well-regarded journal.

Dr. Atwater went on to lead the first all-woman cruise, *Aphrodite*, in 1968, and was one of the first female scientists to contribute to the theory of plate tectonics. For current information on the Fundraiser, check our website, [www.CCGO.org](http://www.CCGO.org).

## CCGO connects the experts with teachers to benefit middle school students

Sequoia Middle School teacher Allen Sauté was organizing a walking field trip for his students and found that he knew little of the geology of Point Mugu State Park. However, he saw our website, [www.CCGO.org](http://www.CCGO.org), contacted us, and after a flurry of emails, was put in touch with Dr. Eugene Fritsche, Professor Emeritus of CSU Northridge and Scott Moors, Principal Geologist of Bing Yen & Associates. Scott Simmons, of Gorian and Associates, and president of the Coast Geological Society, helped with the search for geology trip leaders.

The geologists, plus Butch Brown, a geological consultant, and Leni Field, a part-time instructor at CSUN, several teachers, and parent volunteers helped guide 97 Middle School students on an all day field trip to Point Mugu State Park in December. The trip was a huge success, and the students are still talking about the outing. Thank you CCGO for being there!

CCGO Highlights is now a stand-alone electronic Newsletter, which may be found at [www.CCGO.org](http://www.CCGO.org). 💧



# Current Happenings at the Federal Government

BY JOHN UNGVARSKY

## Senior Management Changes at EPA

In early November, former Utah Governor Mike Leavitt was sworn in as the EPA Administrator. In his first speech he stressed the importance of the collaborative process and EPA's role as a convener. In late December, Ben Grumbles became Acting Assistant Administrator for the Office of Water. Grumbles had served as the Deputy Assistant Administrator under former Assistant Administrator G. Tracy Mehan III, who resigned in December and has been appointed as the Environmental Stewardship Counselor for the G8 Summit to be held in June in Sea Island and Savannah, Ga.

## Response Protocol Toolbox

EPA is making available the interim final Response Protocol Toolbox: Planning for and Responding to Contamination Threats to Drinking Water Systems. The Response Protocol Toolbox is designed to help the water sector effectively and appropriately respond to intentional contamination threats and incidents. It was produced by EPA, building on the experience and expertise of several drinking water utilities and, in particular, the Metropolitan Water District of Southern California. The Response Protocol Toolbox will be of value to drinking water utilities, laboratories, emergency responders, state drinking water programs, technical assistance providers, and public health and law enforcement officials. For more information, go to <http://www.epa.gov/safe-water/security/index.html#emergency>.

# Federal Legislative Corner

## Strategic Planning: A Handbook for Small Water Systems

EPA's Drinking Water Utilities Team recently published "Strategic Planning: A Handbook for Small Water Systems – One of the Simple Tools for Effective Performance (STEP) Guide Series." This new document is designed to help small drinking water systems with strategic planning and meeting public expectations and regulatory requirements while maintaining organizational and financial stability. For more information, go to <http://www.epa.gov/safewater/smallsys/ssinfo.htm> or contact Andrew Bielanski at (202) 564-3824.

## Arsenic Test Kits Verified

EPA's Environmental Technology Verification Advanced Monitoring Systems Center, in cooperation with Battelle, has verified the performance of five portable analyzers for arsenic in water. The verification reports and statements are available on the ETV Web Site at <http://www.epa.gov/etv/verifications/vcenter1-21.html>.

## Online Perchlorate Resources

EPA's Technology Innovation Program has compiled some of the most relevant information on cleaning up perchlorate-contaminated groundwater. <http://www.clu-in.org/contaminantfocus/default.focus/sec/perchlorate/cat/Overview/>. Perchlorate Questions and Answers, a clarification of the January 2003 Status of EPA's Interim Assessment Guidance for Perchlorate, can be found at [http://www.epa.gov/swerffrr/documents/perchlorate\\_qa.htm](http://www.epa.gov/swerffrr/documents/perchlorate_qa.htm).

## Water On Tap: What You Need To Know

Where does your drinking water come from? How do you know if your drinking water is safe? How can you

protect it? What can you do if there is a problem with your drinking water? To help answer these and other questions, EPA has prepared "Water on Tap: What You Need To Know." For more information on obtaining a copy, go to: <http://www.epa.gov/safewater/wot/index.html>.

## National Drinking Water Week

EPA, States, and the water industry will observe National Drinking Water Week from May 2-8, 2004. National Drinking Water Week will include a kick-off of the 30th Anniversary of the Safe Drinking Water Act, which was signed on Dec. 16, 1974.

## Subscribe to WaterNews

WaterNews is a weekly on-line publication that announces publications, policies, and activities of the U.S. Environmental Protection Agency's Office of Water. To subscribe to the WaterNews listserv, send an email message to [lyris@lists.epa.gov](mailto:lyris@lists.epa.gov) and leave the subject line blank. In the body of the message write: Subscribe WaterNews firstname lastname.

*John Ungvarsky is an Environmental Scientist at the U.S. Environmental Protection Agency, Region 9. He works in the Water Division's Ground Water Office, and his responsibilities include Animal Feeding Operations Coordinator and Source Water Protection, with an emphasis on ground water issues. For information on any of the above topics, please contact John at 415-972-3963 or [ungvarsky.john@epa.gov](mailto:ungvarsky.john@epa.gov).*

# USGS Water Science for Schools

BY HOWARD PERLMAN,  
USGS HYDROLOGIST AND  
WEB SITE DESIGNER

The U.S. Geological Survey's Water Science for Schools website is devoted to explaining the many complexities and facts about water in terms that everyone can understand. The site is available for students aged 9 to 90 and for anyone who wants to find out more about the many aspects of water, from what it is to how we use it.

The URL for Water Science for Schools is <http://water.usgs.gov/droplet/>. The site offers information on the many aspects of water, along with pictures, data, maps, charts, and an interactive center. The website is used worldwide: people from over 120 countries are among the routine users. In fact, about 10 percent of all users are from outside of the United States. In a cooperative effort with EPA, the site is currently being translated into Spanish (to be available by summer 2004). Also, a diagram of the water cycle (the most popular topic on the site) is available in over 30 languages.

On Water Science for Schools you can find out how much water it takes to grow a head of lettuce or to "grow a hamburger." Answers to all types of questions about water are available. A picture gallery offers dozens of pictures along with explanatory text. Maps, charts, diagrams, and data tables explain how and for what purposes water is used in the United States.

One of the most popular areas is the "Activity Center", which is comprised of (1) water questionnaires, (2) opinion surveys, and (3) challenge questions. Users fill in forms with their opinions and answers and are shown a real-time data table of how all users have

# Educational Corner

responded to the same survey. Tables are shown by state and country. Using this method, people can see how others in different states and countries view the subject matter or have different opinions than they have. Teachers can use the results as a basis for discussions on why people in different parts of the U.S. and the world might think differently about water than they do. ♠

# San Francisco Branch Scholarship Program

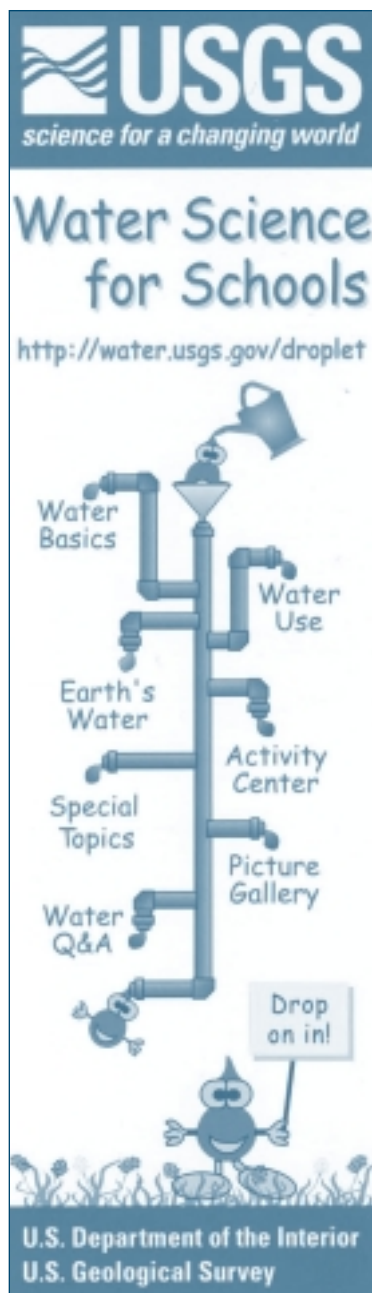
BY JIM CARTER, GRA DIRECTOR

The San Francisco Branch (SF Branch) of the Groundwater Resources Association (GRA) initiated a new Scholarship Program during 2003. The scholarship program is part of an overall outreach plan to maintain relationships with major Bay Area universities. In addition to the scholarship program, the SF Branch has hosted many faculty members as speakers at branch meetings and offers discounts for students who attend branch meetings.

The goal of the scholarship program is to provide students of geology, hydrogeology, engineering, earth science, or a related groundwater resource field with financial assistance for the purchase of necessary academic resources such as books or computer software. One annual scholarship is offered to each of five different Bay Area universities: California State University, Hayward; San Francisco State University; San Jose State University; Stanford University; and University of California, Berkeley. Each scholarship is for an amount of \$300, with \$250 provided by the SF Branch and \$50 provided by the State Board of GRA.

Each University has full discretion to choose the student recipient based on a combination of factors such as financial need, academic standing, and enthusiasm for the practice. The SF Branch has identified a faculty liaison at each University, who assists the Branch

*Continued on the facing page*



# Educational Corner

## Education Corner – Ask a Scientist

in implementing the program. After a student has been selected by University faculty, the student must attend a Branch meeting to receive the scholarship and say a few words about how the scholarship will be used.

To date, scholarships have been awarded to students from three universities. Sean Gehlke from San Jose State University accepted a scholarship at the September 29, 2003 meeting in San Jose. Christy Swindling from Stanford University received her scholarship at the October 28, 2003 branch meeting in San Jose. Peter Gorman from San Francisco State University was presented with a scholarship at the January 21, 2004 branch meeting in Oakland. Congratulations to each of the recipients!

As a result of the efforts and success of the program, the Board of Directors approved to match up to \$250 per branch (or a total of \$1250 statewide) for scholarships provided at the Branch level. An outline of the program, how it will be administered and what Colleges or Universities are being targeted needs to be submitted to the Jim Carter, GRA Past President, for consideration.

Many thanks go to J.C. Isham, Branch Vice President, who also is serving as the Scholarship Chairperson. J.C. took the lead in formalizing the program, identifying faculty liaisons, and implementing the program. Good work J.C.! 💧

Dear Sir or Madam,

As a concerned potential home buyer considering the Santa Monica area could you please advise me of the safety of their water supply after the terrible contamination of MTBE? We have a 3 year old girl who attends preschool in Santa Monica already so are doubly concerned for her health as well as my husband's & my own. I realize Santa Monica supplements a great deal of their drinking supply through the greater Los Angeles drinking supply but would appreciate your opinion on this matter.

Sincerely,  
Kimberly Klaskin

Dear Ms. Klastin

GRA understands your concerns and is happy to help you research the City of Santa Monica water supply situation. Upon the discovery of MTBE in several groundwater supply wells in 1996, the impacted wells were immediately shut down, and the City's reliance on imported surface water from the Metropolitan Water District of Southern California increased. The MTBE problem was featured on "60 Minutes" in January 2000 (<http://www.santa-monica.org/cm/news/releases/archive/2000/epwm20000120.htm>) and the City reached a legal settlement with two oil companies for compensation in July 2002 (<http://www.santa-monica.org/cm/news/releases/archive/2002/epwm20020718.htm>). The City has recently installed a groundwater treatment system to restore its ability to pump some of the impacted wells.

The California Department of Health Services is responsible for ensuring that water purveyors such as the City of Santa Monica Water meet all state and federal drinking water standards. Water purveyors are required to provide an annual report to consumers on the water quality. The City's most recent report at <http://epwm.santa-monica.org/epwm/watquality/2001report/waterweb/reshtm.htm> indicates that MTBE is not present at detectable levels.

GRA has held a series of symposiums on groundwater contaminants that bring together regulatory agency personnel, consultants, responsible parties, property owners and developers to focus on the occurrence, sources, analysis, toxicology, regulation, and remediation of a number of existing and emerging contaminants. MTBE was the focus of GRA's October 2002 symposium in San Jose ([www.grac.org/mtbesymposium/html](http://www.grac.org/mtbesymposium/html)). To prevent future contamination of municipal water supplies, GRA has lobbied for the phase-out of MTBE from gasoline supplies in California ([www.grac.org/mtbenewsrelease/html](http://www.grac.org/mtbenewsrelease/html)). We hope that this information is helpful in addressing your concerns.

Sincerely,  
Martin G. Steinpress  
GRA Director and  
HydroVisions Committee Chair

# Mobile Labs: The Lab is Moving into the Field

BY BART SIMMONS

The demand for shorter test turnaround times and the desire for dynamic field plans have moved testing from the traditional fixed lab to mobile labs and field testing. Shorter turnaround times are almost always desired. The quicker data is available, the quicker it can be used for decision-making.

## Dynamic sampling plans

In addition, there is a movement toward dynamic field plans. The Interstate Technology Regulatory Council, ITRC, and many federal and some state agencies have supported the use of the “Triad Approach,” which depends on mobile labs and field measurements to provide quick feedback for modifications of the field sampling plan during field work.

## Mobile Lab Test Methods

Mobile lab methods range from qualitative tests to the same quantitative EPA methods used in fixed labs. Results from mobile labs can be legally defensible for admissibility, provided they meet the appropriate state or federal legal standards. The federal standards basically allow any data from any method which the judge considers to be relevant and reliable. The California standard depends on whether the technique is generally accepted in the scientific community. For example, soil gas monitoring is an accepted technique for measuring contaminants from groundwater and soils because it uses gas chromatography (GC) or gas chromatography – mass spectrometry (GC-MS), which are well accepted techniques. However, some of the

methods used in mobile labs have not been published by EPA or other organizations. Thus, the testing for volatile organics might be done by “Modified EPA 8260.” This is a misleading title, since 8260 was written for analysis of water and solid samples, not air.

## Data Quality

The EPA Data Quality Objective (DQO) Process produces DQOs which are appropriate to the problem at hand, and the use of testing in mobile labs can optimize the plan (the final step -Step 7 - of the DQO process). By allowing the cost-effective collection of more data, mobile labs can reduce both the false positive and false negative errors in the DQO process.

## Accreditation

Mobile labs pose a particular problem for accreditation programs. The National Environmental Laboratory Accreditation Conference (NELAC) was created to establish a uniform national lab standard, but mobile labs posed a problem: some states wanted to accredit each mobile unit, some didn't. The NELAC compromise was to allow the Accrediting Authority (state program approved by the National Environmental Lab Accreditation Program [NELAP]) to decide whether to accredit individual mobile labs. California laws and regulations require that each mobile lab have accreditation. Fitting mobile labs into the Fields of Testing that were designed for fixed labs has posed a problem which requires some flexibility to accommodate mobile labs which may be re-configured between projects.

## Homeland Security

A key element in preparation and response to potential acts of terrorism is the use of mobile labs for quicker

response. Civil Support Teams (CSTs) have been created in National Guards to respond to incidents when requested. The CSTs are designed for airlifting by military aircraft when necessary. They are designed to respond quickly and provide on-site testing, including the use of field test kits and field portable Gas Chromatography – Mass Spectrometry (GC-MS) to identify chemical agents.

## Moving on

The Homeland Security Program has funded the national laboratories to develop improved field measurement technology. As these technologies are transferred to the public and private labs, a new generation of technologies will further shift testing into the field. This will provide opportunities for environmental professionals, and continue to pose a challenge to traditional accreditation and data validation programs, which are based on a model of fixed lab testing.

*Barton Simmons is Chief of the Hazardous Materials Laboratory in the Department of Toxic Substances Control (DTSC). This article includes the opinions of the author, and do not necessarily represent the views of the Department of Toxic Substances Control (DTSC) or the California Environmental Protection Agency (Cal-EPA). Mention of any products or services does not constitute endorsement by DTSC or Cal-EPA. ♠*

# Chemist's Corner

# Tanzanian Water Minister Seeks to Build Ties with National Ground Water Association

BY CLIFF TREYENS, NGWA

Tanzania may be half a world away, but it shares a common concern about the availability of water over the next two decades, says the Tanzanian water minister who wants help from the National Ground Water Association. "Tanzania, like the rest of the world, will be faced with a water crisis situation by 2025 if nothing is done to properly manage the available water resources," said Edward Lowassa, Minister of Water and Livestock Development, in an address during the NGWA annual meeting December 10 in Orlando, Florida. "There is a great need for governments, professional associations, non-governmental organizations, partners and funding agencies to cooperate and together set up strategies for alleviating this looming and alarming eventuality," Lowassa said. "There are many areas in which my country would benefit by cooperating with your association. I will very much encourage my experts to join this noble association when I go back home.


Tanzania includes 945,000 square kilometers (587,196 square miles) on the east coast of Africa just below the equator. It has three of the largest lakes on the continent (Victoria, Nyasa and



Tanganyika). It also forms the upper catchment of three of Africa's important river basins – the Nile, which drains into the Mediterranean Sea; the Congo, which drains into the Atlantic Ocean; and the Zambezi, which drains into the Indian Ocean. The country is nevertheless relatively dry, and more than half of Tanzania averages less than 800 mm (31 inches) of rainfall a year. Currently, about 100,000 shallow water wells and some 10,000 deep wells have been drilled in Tanzania.

While the country's population currently stands at 34.7 million (80 percent of which lives in rural areas), that number is expected to climb to 59.8 million by 2025. "Such a growth in population will have a negative impact on water supply if proper water resources development, utilization and management strategies are not instituted well in advance," Lowassa warned. Among the types of assistance that would benefit his country are the sharing of expertise, and the development

of hydrogeological maps and a ground water resources atlas for Tanzania. "Being a developing country, Tanzania wishes to train her experts in ground water resources. This will strengthen our human capacity in some specialized fields such as assessment and evaluation of ground water resources, ground water modeling, database management, decision support systems, etc.," he said. "As partners, we can learn a lot from each other's experience.

For more information, contact: Cliff Treyens, 800-551-7379, ctreyens@ngwa.org. 

## Alliance Corner

### IAH News

BY LENNY KONIKOW,  
PRESIDENT, USNC OF IAH

The International Association of Hydrogeologists (IAH) held two successful and successive conferences during September 2003 in Europe. The first was the IAH International Conference on Groundwater in Fractured Rocks, held in Prague, Czech Republic. It was followed the next week by the IAH International Conference on Groundwater in Geological Engineering, which was convened in Bled, Slovenia. The coordination between these two meetings allowed many people to attend both. The IAH council and General Assembly met during the Bled Conference.

At its meeting, the IAH Council agreed to the formation of a new Commission on Groundwater and Climate Change. That groundwater is a critical part of the hydrologic cycle has been long recognized in the hydrogeologic community (for as long as there have been hydrogeologists), but generally is ignored by most scientists and managers involved in assessing causes and/or effects of climate change. For more information, including a downloadable bibliography, go to the Commission's web site at: <http://www.silsoe.cranfield.ac.uk/iwe/projects/iahgroup/>

The Council also decided that the special 50th anniversary IAH Congress will be held in China. More information on this 2006 IAH Congress will be posted on the IAH Web site in the future.

*Continued on page 21*

## 2004 CONTRIBUTORS TO GRA – THANK YOU!

### FOUNDER

(\$1,000 and up)

Hatch & Parent

Roscoe Moss Company

Bob Van Valer

### PATRON - (\$500 - \$999)

DrawingBoard Studios

### CORPORATE - (\$250 - \$499)

David Abbott

LFR Levine Fricke

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Consulting Engineers

### CHARTER SPONSOR - (\$100 - \$249)

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Jim Standberg

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David Procyk

Charles Sorensen

Eric Strahan

Carol Williams

ZymaX envirotechnology, inc.

### SUPPORTER - (\$5-\$24)

Frank Yeamans

# Organizational Corner

## Perchlorate Survey Results

BY TIM PARKER, GRA DIRECTOR

GRA conducted a poll on the issue of possibly opposing or supporting the proposed delay of the development of a California public health goal (PHG) for perchlorate until a National Academy of Sciences (NAS) panel review of the US EPA perchlorate health goal is completed, scheduled for later this year. A total of 185 GRA members (or nearly 1/5 of the membership) weighed-in on the issue. The results are as follows:

◆ Oppose the delay of the perchlorate PHG – 72

◆ Support the delay of the perchlorate PHG until the NAS review is completed – 78

◆ Neither support or oppose delay – GRA should monitor - 35

As can be seen from the results of the poll, the GRA membership is pretty well divided on the issue, and consequently GRA will not be taking a position.

For more detailed information on this topic, including weblinks to scientific reports and NAS, and commentary of the membership on the issue, visit the GRA website at [www.grac.org](http://www.grac.org).

## State Agency is Offering Examination

The State of California, Department of Toxic Substances Control (DTSC), is offering an exam for the Engineering Geologist series. DTSC uses engineering geologists to work on groundwater investigations and the remediation of hazardous waste sites. Geologists are also used to evaluate the suitability of the location of hazardous waste sites based on the geologic hazards. Engineering geologists can be used as either project managers or as in-house technical consultants. The final filing date is March 19, 2004. The exam

bulletin was released on February 20, 2004, and will have more information regarding the scope of the exam.

You may download the exam bulletin from: <http://jobs.spb.ca.gov/openxrd.cfm?exc=4TW01> and a State application from [www.spb.ca.gov](http://www.spb.ca.gov). To learn more about DTSC, please visit their web page at [www.dtsc.ca.gov](http://www.dtsc.ca.gov). If you have any questions, please contact Mary Ellen Lucero, Exam Coordinator, at (916) 322-8669 or via email at [mlucero@dtsc.ca.gov](mailto:mlucero@dtsc.ca.gov).

# Organizational Corner

## David Von Aspern Honored by GRA Board of Directors

GRA Extends Sincere  
Appreciation to its Symposium  
Chair, Cooperator and  
Sponsors for its 2003  
Contaminant Series Symposium,  
"1,4 Dioxane and Other Solvent  
Stabilizer Compounds in the  
Environment"

Symposium Chair

Tom Mohr,  
Santa Clara Valley Water District

Cooperator

International Association  
of Hydrogeologists

Co-Sponsor

Applied Process Technology, Inc.

Refreshment Sponsor

Chemical Risk Sciences  
International

## 2004 DIRECTOR ELECTION RESULTS

The election for GRA's 2004 Board of Directors has been officially completed. Board incumbents David Abbott, Martin Steinpress, Jim Strandberg and Bob Van Valer were re-elected. Stephanie Hastings and Sarah Raker were elected as new members of the Board. All Directors elected in 2004 will serve three-year terms ending in 2006.

GRA extends its sincere appreciation and best wishes to Paul Dorey and Scott Slater who retired from the GRA Board of Directors at the end of 2003. 💧

On December 10, 2003, the GRA Board of Directors recognized David Von Aspern for his seven years of service to GRA as its treasurer. David has been the longest serving treasurer for the State organization. At the Branch level, David has been the treasurer for the Sacramento Branch since its founding in 1992. The plaque awarded to David reads: *Groundwater Resources Association of California recognizes David Von Aspern for his dedication and service to GRA and the GRA Board of Directors as Treasurer and Assistant Treasurer, December 2003*



David Von Aspern, left, receives from Brian Lewis an award on behalf of the Board of Directors for his long tenure and service as GRA Treasurer and Assistant Treasurer.

When past GRA treasurer and past GRA president Brian Lewis presented David with the award on behalf of the Board, he stated "The first year's annual budget was \$30,000. Today, GRA's budget is over \$300,000. The treasurer's activities now involve reconciling credit card receipts as well as check deposits. The task of treasurer has significantly increased over the last 13 years. David has tirelessly, and with little complaint, made hundreds of deposits over the years. It seems David actually enjoys the detailed work necessary for the treasurer's job. Because of term limits, David is out of office for the State organization. David, though, is still the treasurer for the Sacramento Branch. He will greet you at a Sacramento Branch meeting wearing his green visor, eager to write

you a receipt for your payment. On behalf of the GRA Board and membership, please join me in thanking David for his years of service." 💧

### Mark Your Calendar!

- 💧 **GRA Symposium, April 7, 2004** – Sacramento, CA  
*Investigation & Remediation of Dry Cleaner Sites*
- 💧 **GRA Workshop, April 21-23, 2004** – Sacramento, CA  
*Groundwater Modeling*
- 💧 **GRA Seminar, April 26, 2004** – Walnut Creek, CA & **April 27, 2004** – Glendale, CA  
*Low Yield Aquifer Testing*
- 💧 **GRA Symposium, August 4, 2004** – Glendale, CA  
*Perchlorate in Groundwater 2004*
- 💧 **GRA 12th Groundwater Symposium October 18-19, 2004** – Fresno, CA  
*Arsenic in Groundwater 2004*

More information on the GRA website.

# Organizational Corner

## GRA Welcomes the Following New Members

NOVEMBER 6, 2003 THROUGH JANUARY 23, 2004

Adkins, Brian	Bishop Tribal Council
Aghajanian, Ara	ZymaX envirotechnology, inc.
Amendola, Janelle	ATC Associates Inc.
Barrientos, Henry	URS Corporation
Berry, Thomas	Cambria Environmental Technology, Inc.
Brown, Norm	
Cort, Todd	Cameron-Cole
Daniels, Bruce	Soquel Creek Water District
Drake, Nettie	MFG, Inc.
Dunbar, David	Dunbar & Associates
Ferguson, Sasha	Earth Tech, Inc.
Garcia, Andrew	MACTEC Engineering & Consulting
Goldman, Dennis	Tetra Tech FW, Inc.
Hagstrom, Earl	Sedgwick, Detert, Moran & Arnold LLP
Harbaugh, Dwight	Stanford Linear Accelerator Center
Healy, Bob	URS Corporation
Jamieson, Gordon	Tetra Tech FW, Inc.
Jeffrey, David	
Kaetzel, Rhonda	Exponent
Kang, James	URS Corporation
Lee, Jan	East Bay Municipal Utility District
Maier, Gary	MWH Americas, Inc.
Marie Mitani, Mina	Geosyntec Consultants
McCarty, James	Baseline Environmental Consulting
Mcilvanie IV, C. Lee	
Murphy, John	North State Labs
Richesin, Dean	Delta Environmental Consultants, Inc.
Sampath, Rangarajan	Alameda County Water District
Sharp, Tannis	Komex International Ltd.
Sullivan, Patrick	Komex H2O Science, Inc.
Taylor, Matthew	Wallace-Kuhl & Associates, Inc.
Thie, Francis	Blaine Tech Services, Inc.
Turnbull, Bob	Roscoe Moss Manufacturing Company
Vedantham, Susie	URS Corporation
Watamaniuk, Sheila	Magellan Environmental, Inc.
Williams, Carol	Main San Gabriel Basin Watermaster
Young, Douglas	Alameda County Water District

### Renew Your 2004 Membership Online - It's Quick and Easy

If you haven't renewed your GRA membership for 2004, it's time to renew! You can renew online via GRA's Web site, [www.grac.org](http://www.grac.org), or you can request a hard copy dues renewal invoice from Kevin Blatt at [grac@inreach.com](mailto:grac@inreach.com). To save time and effort, GRA recommends that you renew online as the process is secure and seamless. It will also minimize GRA's expenses.

GRA ended 2003 with over 935 members. The goal of having 1,000 members by the end of 2004 is attainable. To make this happen, please renew your membership and recruit one new member to GRA. Recruiting a new member is a way to introduce your colleagues to a highly credible, innovative organization that provides many benefits for only \$75.

Thank you for your interest and continued participation in protecting and improving California's groundwater resources.

## Revised USGS Series

The increased emphasis on an interdisciplinary approach to research has led the U.S. Geological Survey to revise its scientific publication series. The series resulting from this change are designed to accommodate a broad range of research topics in biology, geology, geography, and hydrology. The resulting series are Circular, Data Series, Fact Sheet, General Information Product, Professional Paper, Open-File Report, Scientific Investigations Map, Scientific Investigations Report, and Techniques and Methods.

The following titles will be discontinued and absorbed into the revised series: Biological Science Report; Bulletin; Digital Data Series; Geologic Investigations Series (I-maps); Hydrologic Investigations Atlas (HA-maps); Information and Technology Report; Miscellaneous Field Studies Map (MF-maps); Techniques of Water Resources Investigations (TWRI); Topographic Instructions; and Water Resources Investigations (WRI).

A Fact Sheet will be published soon on the revisions. Send your questions about the changes to Nancy Blair, Chief Librarian, U.S. Geological Survey Library, at [nblair@usgs.gov](mailto:nblair@usgs.gov).



than 1% by volume, while TCA was commonly formulated with between 2 and 8% stabilizers by volume.

While 1,4-dioxane was commonly added to TCA at between 2 to 3% by volume, boiling point differences led to the concentration of dioxane in the vapor degreaser still bottoms (solvent reservoir at the base of the vapor degreaser). Additions of fresh solvent to replenish those stabilizers that were depleted due to boil-off or water traps led to iterative concentration of 1,4-dioxane in the still bottoms. Consequently, the starting concentration of 1,4-dioxane in the solvent wastes that were most commonly disposed of in a manner that led to solvent contamination of soil and groundwater were probably well above 3%, and potentially as high as 15 to 25%. When solvent wastes are sent to solvent recycling facilities for distillation, still more concentration of 1,4-dioxane may occur, with the result that some of the highest concentrations of 1,4-dioxane in groundwater are associated with solvent recycling plants.

1,4-dioxane has attracted the greatest interest among the many solvent stabilizers commonly added to chlorinated solvents because of its classification as a probable human carcinogen. Due to its

infinite solubility, resistance to biodegradation under ambient conditions, low Henry's Law constant, and low affinity for soil organic matter, 1,4-dioxane is extremely mobile, moving far ahead of the VOC plumes in which it is found.

Identification of solvent stabilizer compounds may also be useful in forensic investigations for deconvoluting commingled plumes. Stabilizers and other wastes associated with degreasing may also alter the properties of DNAPL, potentially affecting DNAPL subsurface behavior. For example, the common practice of adding detergents to PCE in dry cleaning operations may provide enough surfactant to increase the bulk solubility of the

solvent. Addition of DDT to PCE for combined dry cleaning and moth protection would increase the toxicity of releases from dry cleaners where this practice was used.

Because 1,4-dioxane is among the most mobile and persistent organic compounds released at solvent release sites, attention to this compound is warranted. The severity of impacts from 1,4-dioxane is open to debate due to uncertainties regarding the toxicological studies used to derive the cancer slope factor. Until such issues are resolved, 1,4-dioxane can certainly create problems for remedial project managers and water utility operators alike.

Vince Christian of the San Francisco Bay Regional Water Quality Control Board presented his work on a survey of sites at which 1,4-dioxane has been detected in the San Francisco Bay Area. SFBRWQCB first identified 1,4-dioxane as a significant issue at a San Jose solvent recycling facility in 1998. After discovering 1,4-dioxane in groundwater at more than 250,000 ppb, SFBRWQCB requested testing for 1,4-dioxane at 15 sites, primarily electronics manufacturing plants comprising some of Silicon Valley's leading semiconductor manufacturers.

The survey confirmed that 1,4-dioxane is present at the majority of TCA release sites. Only three of the fifteen sites showed 1,4-dioxane present above 50 ppb. One site was another solvent recycling facility, the second facility used TCA for contact cleaning and vapor degreasing. Mr. Christian highlighted his agency's interim policy for establishing cleanup levels for 1,4-dioxane contamination of soil and groundwater. The groundwater Environmental Screening Level (ESL) for current or potential drinking water sources is the provisional Action Level established by California's Department of Health Services, 3 ppb. For non-drinking water sources, the ESL is 50 ppm. For soil above drinking water sources, the 1,4-dioxane ESL is 1.8 ug/kg, and above non-drinking water source

waters, 30 mg/kg. For full details on the derivation and application of SFBRWQCB's ESLs, see <http://www.swrcb.ca.gov/rwqcb2/esl.htm>.

A detailed case history of the Pall-Gelman Sciences site in Washtenaw County Michigan was presented by Farsad Fotouhi of Pall Corporation and Jim Brode of Fishbeck Thompson Carr and Huber Inc. Large quantities of 1,4-dioxane were released from a holding pond and through a waste injection well at the Gelman Sciences plant beginning in the 1960's. 1,4-dioxane was used as a solvent for cellulose acetate, a component of micro-porous filters familiar to groundwater professionals as Gelman groundwater sampling filters. Fotouhi and Brode profiled the fascinating history of this site, where they pioneered analytical and remedial solutions to deal with this challenging contaminant. Because 1,4-dioxane is not easily removed by air stripping or carbon adsorption, and relatively immune to biodegradation, Pall initially developed ultraviolet light solutions for this contaminant.

The complex glacial geology of the Pall site has led to multiple plumes advancing in multiple directions. While the physical and chemical challenges faced by Pall were formidable, a group of 'recalcitrant stakeholders' further added to the challenge, forcing Pall to drill the country's longest horizontal well (4,345 feet) beneath a neighborhood whose residents would not accommodate Pall's remedial work. Pall Corporation currently spends about \$5 million annually for operating its remediation systems to remove 1,4-dioxane from area groundwater. The Pall site continues to be a testing grounds for innovative remedial solutions for 1,4-dioxane.

Ms. Dellilah Sabba of the Stanford Linear Accelerator Center (SLAC) profiled several occurrences of 1,4-dioxane at the SLAC site in Menlo Park, California. Ms. Sabba noted that 1,4-dioxane occurrence at the SLAC site is closely associated with TCA and its abiotic degradation product, 1,1-DCE. In some locations, 1,4-dioxane was found with 1,1-DCE where no TCA was detected. 1,4-dioxane was found in

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*"1,4-dioxane can certainly create problems for remedial project managers and water utility operators alike."*

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*Continued on page 18*

groundwater at a maximum concentration of 7,300 ppb. The existing remedial solution, granular activated carbon, was found to remove 1,4-dioxane, in spite of expectations to the contrary, based on 1,4-dioxane's low KOC value. Low influent concentrations, very low flow rates, and possible biodegradation of 1,4-dioxane on carbon surfaces may explain this unexpected but encouraging result.

Dr. Julie Stickney of Arcadis G&M Inc's Portland Maine office presented her paper entitled "An Updated Evaluation of the Carcinogenic Potential of 1,4-dioxane". Dr. Stickney and six colleagues collaborated to complete a comprehensive review and critique of the toxicological literature and the basis for the cancer slope factor now in use for 1,4-dioxane. Experimental data show that 1,4-dioxane via the oral route targets the liver and nasal cavity in rats. The relevancy of nasal cavity tumors to human exposure is questionable, since rats supplied with water from bottle tubes were observed to ingest water directly into their nasal passages, a route not replicated in most humans. Damage to the liver was only observed at very high doses, exceeding the rat's capacity to expel 1,4-dioxane. A strongly non-linear dose response was observed for 1,4-dioxane, wherein exceptionally high dosages were required to produce an adverse response. 1,4-dioxane has been described as a weak genotoxin producing negative results in most test systems. An increase in hepatocyte cell proliferation was reported and 1,4-dioxane was shown to act as a tumor promoter in rat liver and mouse skin carcinogenicity assays.

Two studies applying physiologically based pharmacokinetic (PBPK) modeling suggests that the current cancer slope factor used by EPA significantly overestimates the potential cancer risk, and Dr. Stickney concludes that a formal reevaluation of the carcinogenic potency of 1,4-dioxane is warranted to account for available information on the pharmacokinetics and

mode of action. To facilitate the proposed reevaluation, Arcadis G&M is convening a Risk Management Consortium workshop in Washington D.C. to address toxicology and risk assessment issues for 1,4-dioxane on February 11th, 2004. The Consortium is sponsored by the Synthetic Organic Chemical Manufacturers Association (SOCMA).

Tim Shangraw of EMSI (Arvada, Colorado), presented his work on fixed film biological processes for 1,4-dioxane removal from groundwater at the Lowry Landfill Superfund Site near Denver, Colorado. Mr. Shangraw's team evaluated numerous remedial technologies for 1,4-dioxane removal, including UV-oxidation, activated carbon, and advanced

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*"...a formal reevaluation of the carcinogenic potency of 1,4-dioxane is warranted..."*

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oxidation processes. High UV-absorbance by other compounds in groundwater (particularly bromide) rendered UV-ox ineffective for 1,4-dioxane removal, such that virtually all of the UV light in the first centimeter was absorbed by the unusually high bromide levels at the Lowry site (1,000 – 1,500 mg/L). Activated carbon was also deemed infeasible. The fixed film bioreactor solution was bench tested and found to achieve 95% dioxane removal. A pilot test of the fixed film bioreactor using Kaldnes media at elevated groundwater temperatures (15° to 25°C) was successful at flow rates of 0.4 to 0.7 gpm and influent concentrations of 8 to 12 ppm 1,4-dioxane. Shangraw's team is now deploying a full-scale, fixed film moving bed biological treatment system to reduce 1,4-dioxane from site groundwater. Fortunately, the contaminant tetrahydrofuran is also present in site groundwater at 20 to 30 mg/L. Tetrahydrofuran has been identified as a critical requirement of biodegradation of 1,4-dioxane in other studies (Zenker et al, 2000). Shangraw's team confirmed that the microbial community studied requires tetrahydrofuran to degrade 1,4-dioxane.

Paul Abrams, M.D., J.D. of Global BioSciences Inc. (North Attleborough, Massachusetts) presented his firm's work on 1,4-dioxane degradation using Butane

Biostimulation. A groundwater sample containing 1,4-dioxane was incubated under a butane-air mixture for four weeks at 10°C. Butane consumption and 1,4-dioxane rates were evaluated, and 1,4-dioxane concentrations as high as 7.7 mg/L were degraded to sub-ppb concentrations within 48 hours. Previous studies estimate that the aqueous aerobic half-life of 1,4-dioxane is between 672 and 4320 hours. Dr. Abrams pointed out that bacteria grown on butane rapidly produce the required enzymes, and butane is highly soluble, allowing it to be administered over a larger subsurface area. Dr. Abrams' firm has developed butane delivery systems that pass rigid fire protection requirements using submarine technology for explosion-proof control panels. Data from several chlorinated solvent release sites was presented, illustrating rapid degradation rates for these contaminants. A field study of butane biostimulation for in situ remediation of 1,4-dioxane has not yet been conducted, though the presenter was optimistic that butane biostimulation will be effective.

Mr. Marco Odah of Accelerated Remediation Technologies (Kansas City) presented the In-Well Air Stripping concept for 1,4-dioxane removal using subsurface circulation. Mr. Odah acknowledged that 1,4-dioxane has a very low Henry's Law Constant ( $4.88 \times 10^{-6}$  atm.m<sup>3</sup>/mole), leading to only ~30% removal by conventional air stripping. The recirculation feature of the in-well air stripping approach, may iteratively reduce 1,4-dioxane concentrations to target compliance concentrations with enough effort. Mr. Odah estimated that recirculating 1,4-dioxane contaminated groundwater could achieve a 99.9% reduction in 12 passes. The technology has not yet been field-tested for 1,4-dioxane sites, but has been successful for remediation of MtBE and chlorinated solvents.

Dr. Fred Payne presented a paper prepared with Dr. Suthan Suthersan, Barry Molnaa, and Scott Davis of Arcadis G&M's Michigan and Richmond, California offices on Developing In Situ Reactive Zone Strategies for 1,4-dioxane. Dr. Payne described a concept for the source mass distribution of hydrophilic

compounds like 1,4-dioxane (fully miscible in water) that suggests such compounds may provide a very persistent source zone. In a dual porosity framework divided into 'static' pore space and 'migratory' pore space, high concentrations of hydrophilic compounds may invade the static spaces, and diffuse back out after the center of mass has left the migratory spaces. This leads to long tailing of contaminant concentration curves over time, with a significant amount of the overall contaminant mass in the aquifer residing in the static pore space. Consequently, many volumes of pore flushing would be required to address a 1,4-dioxane release using pump and treat technology. Dr. Payne therefore proposes in situ reactive zones as a conceivable solution for 1,4-dioxane releases (the concept has not yet been tested for 1,4-dioxane sites). Two potential in situ reactive technologies are suggested, one using redox manipulation for biodegradation, the second using ozone sparging. Research to date has documented aerobic degradation of 1,4-dioxane. Dr. Payne suggests anaerobic degradation may also be possible, and trials of these approaches are underway in the eastern U.S. and Midwest.

Dr. Reid Bowman of Applied Process Technology (San Francisco) presented his paper, "Ozone-Peroxide Advanced Oxidation Water Treatment of 1,4-dioxane and Chlorinated Solvents". Dr. Bowman profiled several successful applications of line pressure advanced oxidation process, packaged as the HiPox™ system, for removal of 1,4-dioxane from groundwater. The HiPox™ system utilizes a static mixer to prolong contact time with injected hydrogen peroxide and ozone. The oxidants are typically added at a ratio of 0.7 moles peroxide per mole ozone. Multiple mixer/reactors in series enable sufficient reaction with hydroxide radicals to chemically break down the 1,4-dioxane molecule. Dr. Bowman notes that hydroxyl radicals are the second strongest oxidant known to man (fluoride is strongest). Remedial Feasibility using this particular brand of advanced oxidation is confirmed through pilot testing using a mobile unit to obtain design data for scale up. The

mobile pilot testing unit has flow capacity of 3 to 10 gpm. HiPox™ can be used alone or in tandem with conventional pump and treat technologies to optimize efficiencies of each technology and minimize costs of feedstock chemicals. In a 1,000 gpm full scale application with 4.6 ppb influent, the system consistently reduces concentrations to below 1 ppb. This technology is also effective for removal of chlorinated solvents, MtBE, and other contaminants. Dr. Bowman has developed a computer process model that has been shown to accurately predict system performance.

Neil Blandford of D.B. Stephens & Associates (Albuquerque, New Mexico) and his colleague Dr. Nicole Sweetland presented a paper, "Rethinking Traditional Approaches to Hydraulic Capture in Preparation for the Next Series of Emerging Chemicals of Concern in Groundwater". Mr. Blandford focused on the issue of reinjection of treated groundwater, from which some contaminants that eluded detection by conventional analyses may not have been removed. The recent improvements in analytical technology have allowed better detection of 1,4-dioxane and perchlorate, both of which were only detectable at elevated concentrations prior to 1997. Consequently, these contaminants have been unwittingly reinjected at several sites, and in some instances, distributed to drinking water consumers in water utility distribution systems. Blandford proposes a new paradigm for hydraulic capture to account for the possible future discovery of additional contaminants requiring remediation. Traditional hydraulic containment systems feature minimal disturbance of source areas and use injection to enhance hydraulic containment, but may lead to greater future risk if reinjected water is not fully recaptured by extraction systems. The alternative approach seeks to contain all water extracted and treated. This approach requires more intensive

monitoring and may result in source area disturbance, but reduces the overall risk over the long term by ensuring that contaminants not currently identified or removed by treatment systems are not redistributed.

The symposium closed with a lively and thought-provoking talk by Brian Haughton, an environmental lawyer and a partner at Barg Coffin Lewis & Trapp, LLP in San Francisco. Mr. Haughton compared the issue of 1,4-dioxane at solvent release sites to the steroids scandal involving baseball great Barry Bonds (analytical advances permitted identification of a new variety of steroids not previously detected in routine testing for performance enhancing drugs). Emerging contaminants can be characterized as emergent due to new knowledge, new toxicology, new analytical capabilities, and new understanding of the significance of chemicals in the environment. How should society react to emerging contaminants? Mr. Haughton framed society's choice as being of two aphorisms: "better safe than sorry", and, "measure twice, cut once". In the first case, we should immediately cease all use of the chemical, test everywhere on the property without regard to cost and clean like hell, and eliminate all evidence of human impact on the environment. In the

second case, take no action until there is unanimity and certainty that the subject chemical indisputably causes cancer, and even then don't ban the chemical, and there's no need to test until there's evidence that the dose from exposure to the chemical

at the site is in fact lethal. Where between these two extremes should our actions lie? Do RPs care only about costs? Do regulators care only about the environment? As actors on the contamination stage, we stand together in a pond full of alligators. We each tend to respond most to the nearest alligator. Together, we have a common interest in reducing the alligator population!

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*"...a new paradigm for hydraulic capture to account for the possible future discovery of additional contaminants..."*

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*Continued on page 20*

## GRA's 1,4-Dioxane Conference Profiles National Challenge of Emerging and Unregulated Contaminants – Continued from Page 19

Mr. Haughton called attention to our duty to deal with unintended consequences, including those that are directly negative, such as MtBE in gasoline and groundwater, and PDBEs in kids' pajamas. We also have a duty to attend to the indirect unintended consequences, as we live in a world of limited resources. Water purveyors and RPs alike have limited budgets. Haughton profiled a series of water quality regulation requirements, and contrasted these with the cost benefit analysis approach. Haughton noted that Governor Schwarzenegger's second Executive Order calls upon each state agency to track down all conceivable underground regulation and conduct cost benefit analysis. The Governor's goal is to prohibit enforcement of underground regulation, requiring instead that formal rule-making with Notice and Comment be completed first. As an example of underground regulation, Haughton pointed to advisory drinking water Action Levels promulgated by DHS – these look like, walk like, and talk like rules – they are rules. The challenge with the Rule Making process is that attorneys tend to hammer every problem that looks like a nail.

The Groundwater Resources Association extends its appreciation to the speakers, the symposium sponsor, Applied Process Technologies, the exhibitors, and the attendees for making this event successful.

*Tom Mohr is GRA's Vice President and Seminar Chair, and the author of the Solvent Stabilizers White Paper. Mohr is a hydrogeologist with the Santa Clara Valley Water District. He organized the 1,4-dioxane symposium calling on contacts from his continuing research on 1,4-dioxane and other solvent stabilizers. tmohr@valleywater.org. ♣*

## President's Message – Continued from Page 2

which will focus on "Aquifer Protection, Replenishment and Treated Water Reuse", a topic even more crucial today 12 years after Doug Wheeler stressed the need for groundwater planning in that March 1992 meeting.

GRA also has an exceptional program in 2004 to monitor and advocate legislative activities related to groundwater under the direction of Tim Parker, Legislative Committee Chair. Tim and GRA's legislative advocates, Chris Frahm and Jenny Carbuca from Hatch & Parent, closely monitor legislative activities related to groundwater, and are responsible for coordinating GRA's Lobby Day in May, an exceptional opportunity for GRA members to personally discuss groundwater issues with lawmakers and legislative staff at the state capitol.

Also in 2004, GRA will be publishing the exciting and completely revised Second Edition of the "California Groundwater Management" manual. Orders for this publication, which is scheduled for release in May 2004, can be placed on the GRA Web site ([www.grac.org](http://www.grac.org)).

None of this would be possible, however, without the proper foundation that was laid by those in that auspicious December 1991 meeting. However, the continuing success of GRA and its

Branches has resulted from the continuing commitment of its dedicated volunteers, leaders, contractors and staff. Nothing illustrates this better than the fact that five former GRA Presidents serve on the GRA Board of Directors.

GRA is well positioned to address groundwater issues in 2004. We have an outstanding Board of Directors, including newly elected members Sarah Raker and Stephanie Hastings. Congratulations are also due to newly elected GRA officers: Vice President Tom Mohr, Treasurer Robert Van Valer and Secretary Jim Strandberg. In the coming months, I will be working to revitalize GRA's committee process, and will be seeking volunteers with strong interest in helping build the foundation for GRA in the next decade. More to come on that in future columns.

The true measure of success or relevance of GRA, however, is told by its members, meeting attendees and stakeholders. As a result, we need to hear from you regarding your needs and interests. How can GRA better serve you and groundwater-related issues? I look forward to meeting with as many members as possible in that regard, and I encourage you to contact me by email at [tom.johnson@lfr.com](mailto:tom.johnson@lfr.com) or by phone at (510) 596-9511. ♣



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# Perchlorate in Groundwater – the Debate for a Cleanup Level Continues

BY TIM PARKER, RG, GRA DIRECTOR AND LEGISLATIVE CHAIR

For decades, scientific evidence has been available documenting that perchlorate affects the functioning of the thyroid. Perchlorate had been used therapeutically for the treatment of various forms of thyrotoxicosis (including Graves disease), since the 1960's. More recent scientific studies suggest that there may be adverse impacts at even very low doses, and that pregnant women and fetuses may be at high risk to exposure. The question that remains in debate, surrounded by uncertainty, is what is the level of no adverse health effect on sensitive populations, and what is the groundwater concentration equivalent?

Perchlorate concentrations in excess of the state's action-reporting level of 4 parts per billion have been detected in at least 335 drinking water sources in 10 California counties. The Colorado River, a major source of irrigation water and drinking water supply for southern California, contains levels of perchlorate in most instances in excess of the state's action level. This same perchlorate-

containing Colorado water is being used to recharge some of southern California's groundwater basins. Cleanup of perchlorate in groundwater is going to be a very long-term and costly challenge. California does not currently have regulations in place to prevent future additional contamination from perchlorate transportation, use and disposal.

SB 822 (Sher), enacted with overwhelming bipartisan support in 2002, required that Office of Environmental Health & Hazard Assessment (OEHHA) finalize a perchlorate public health goal (PHG) by December 31, 2003, and that the California Department of Health Services finalize a drinking water maximum contaminant level (MCL) by December 31, 2004. Finalization of the PHG for perchlorate was delayed by litigation and a subsequent peer review requirement, which has recently been completed.

The most recent debate revolves around the US EPA approach for a health-based level for perchlorate and a National Academy of Sciences (NAS) study

being undertaken. There is evidence to suggest that the US EPA approach was flawed, which prompted the NAS effort. The results of the NAS review are due out in a report by Fall or Winter 2004. The debate is whether OEHHA should now move forward with the finalization of the PHG for perchlorate, or wait until the NAS review is completed. Many interested parties have contacted the Governor's office, the Legislature, and Cal EPA to express their concern about moving forward with the PHG prior to having the NAS results, and have requested a delay of the finalization of the PHG for perchlorate. Other interested parties have voiced opposition to more delay of the PHG for perchlorate. Many of these interested parties participated recently at a hearing of the Senate Select Committee on Perchlorate, Chaired by Senator Nell Soto.

For more information on this ongoing debate, please visit the GRA website at [www.grac.org](http://www.grac.org).

## IAH News – Continued from Page 13

At the IAH General Assembly, the IAH President's Award was presented to Prof. Arie Issar of the Water Resources Center, Jacob Blaustein Institute for Desert Research, Israel. He is recognized for his work in arid and semi-arid lands, contributions to the understanding of fossil groundwater, and management of water resources in the Middle East taking into account future climate change.

The International Groundwater Resources Assessment Center (IGRAC) became operational during 2003 and is located in The Netherlands. Its activities

are aimed at benefiting the entire international groundwater community with services on a free-of-charge basis. IGRAC recently released a preliminary global inventory report on existing guidelines and protocols for groundwater assessment and monitoring. The report can be downloaded from the IGRAC web site at: [www.igrac.nl](http://www.igrac.nl). Readers are asked to inform them of additional guidelines or protocols that IGRAC may not have been aware of.

## MARK YOUR CALENDAR



### GRA's 13th Annual Meeting and Conference

*Aquifer Protection, Restoration, Replenishment and Treated Water Reuse*

**September 23-24, 2004  
Sonoma, CA**



Watch for program details including a special field trip and golf tournament!

## Seminars and Calls for Papers –

Continued from Page 3

wine tasting field trip on September 22nd!). This event has consistently proven to best represent the dynamic cross-section of California's groundwater issues of greatest interest to GRA's members. The meeting will feature sessions on the following areas (subject to change as the planning process progresses):

- Alternatives for Groundwater Management – Watershed or Basin Approaches
- Tools and Technologies for Groundwater Assessment and Management
- Groundwater Resource and Quality Management
- Strategies for Managing Groundwater Contamination – Point and Non-Point Sources
- Challenges of a Finite Resource - Groundwater Use and Water Reuse
- Groundwater Legislative, Regulatory, and Policy Issues

See GRA's web site for full conference details and instructions for submitting abstracts.

GRA will hold its 12th Symposium in the Series on Groundwater Contaminants, revisiting the topic of **Arsenic in Groundwater 2004**, scheduled for October 18-19, 2004 in Fresno. Details will be posted on the web site in the near future. In the interim, contact Bill Pipes, Director and Arsenic Symposium Chair, [wpipes@geomatrix.com](mailto:wpipes@geomatrix.com).

Be sure to include GRA's events in your professional development plans. GRA offers the most affordable training on contemporary groundwater issues, and California's best professional networking opportunities.

*Tom Mohr is GRA's Vice President and a hydrogeologist with the Santa Clara Valley Water District.*

## New Crop Water Requirement Estimation Tools – Continued from Page 4

long-term irrigation water requirements for use in water demand planning. SIMETAW simulates many years of daily weather data from monthly climate data to estimate reference evapotranspiration (ET<sub>o</sub>) and crop evapotranspiration (ET<sub>c</sub>). In addition, simulated daily rainfall, soil water holding characteristics, effective rooting depths, and ET<sub>c</sub> are used to determine effective rainfall and to generate hypothetical irrigation schedules to estimate the seasonal and annual evapotranspiration of applied water (ET<sub>aw</sub>). The simulation

program allows one to investigate how climate change might affect the water demand. All of the ET<sub>aw</sub> calculations are done on a daily basis, so the estimation of effective rainfall and, hence, ET<sub>aw</sub> is greatly improved over earlier methods. Visit our website for more information, publications, and to request a free compact disc on the SIMETAW program: <http://www.waterplan.water.ca.gov/landwateruse/wateruse/Ag/simetaw.htm>.

## Framework for a Ground-Water Quality Monitoring and Assessment Program for California – Continued from Page 4

water assessment: (1) status, the assessment of the current quality of the ground-water resource; (2) trends, the detection of changes in water quality, and (3) understanding, assessing the human and natural factors that affect ground-water quality.

A Statewide, comprehensive ground-water quality-monitoring and assessment program is most efficiently accomplished by applying uniform and consistent study-design and data-collection protocols to the entire State. At the same time, a

comprehensive program should be relevant at a variety of scales, and therefore needs to retain flexibility to address regional and local issues. Consequently, many of the program components include a predominant element that will be consistently applied in all basins, and a secondary element that may be applied in specific basins where local conditions warrant attention. The link to the complete document is at <http://water.usgs.gov/pubs/wri/wri034166/>.

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For additional information, visit GRA's Web site at [www.grac.org](http://www.grac.org) or contact Kathy Snelson, GRA Executive Director, at [executive\\_director@grac.org](mailto:executive_director@grac.org) or 916-446-3626.

## AB599 Groundwater Quality Monitoring Act of 2001 – Continued from Page 6

Presented in the report are the following main elements:

- Background on groundwater monitoring and groundwater in California.
- Goals for the comprehensive groundwater monitoring program.
- Summary of existing groundwater monitoring and assessment programs in California.
- Interagency coordination for groundwater monitoring programs.
- Data management needs for a comprehensive groundwater monitoring program.
- Basin prioritization approach and basin assessment methodology.
- Findings & recommendations for the AB 599 process and comprehensive groundwater monitoring program.

The technical framework for the statewide comprehensive monitoring program was prepared by the U.S. Geological Survey: Framework for a Ground-Water Quality Monitoring and Assessment Program for California, Water-Resources Investigations Report 03-4166. The document is included as an appendix to the AB 599 Report is available online at [www.usgs.gov/](http://www.usgs.gov/), and is summarized on page 4.

Several hearings have been conducted in conjunction with AB 599 by the Assembly Select Committee on Groundwater Quality and Quantity, chaired by Assembly Member Carol Liu. These hearings were conducted to provide information on California groundwater quality, quantity, management and law to Legislators and staff. These hearings included the following:

- **Groundwater 101**, held October 2, 2002 at the Rancho Cucamonga Water District in Ranch Cucamonga - presentations background for AB 599 and progress, introduction to California's groundwater, future challenges, and examples of current local approaches and technologies provided by SWRCB, DWR, Chino Basin Watermaster, Water Replenishment District of Southern California (WRD), and GRA.

- **Life Cycle of a Contaminant – Tracing a Contaminant Through the Environment to Our Drinking Water Supplies**, held July 10, 2003 at the Capitol – presentations on current groundwater contaminant issues, nitrate, MtBE, perchlorate, drinking water standards, and emerging contaminants provided by the U.S. Geological Survey, U.S. EPA, California Department of Health Services, Brown and Caldwell, and GRA.

- **Groundwater Management and Law**, held December 18, 2003 at California State University Stanislaus, Stockton - presentations on groundwater law and management institutions with a broad range of examples provided by Semi Tropic Water Storage District, Stockton East Water District, Tehama County Flood Control and Water Conservation District, Sacramento Groundwater Authority, WRD, Central and West Basin Water Districts, Southern California Water Company, DWR, and GRA.

One or two more hearings are planned this year by the Select Committee on Groundwater Quality and Quantity to discuss the results of the AB 599 report,

findings and recommendations, and possible legislation. The outcomes of the Select Committee Hearings and AB599 Report recommendations will be reviewed by the State Legislature and considered during the next legislative session. It should be very interesting to see what comes of these processes, and what recommendations result in legislation. In a time of significant budget shortfalls, legislation that requires any funding will be challenging to pass.

Whatever the result of the hearings and subsequent actions, California should look forward to some great potential benefits in the coming years. We have the technical support of the USGS through implementation of the statewide comprehensive groundwater monitoring program starting this year, along with some other possible opportunities to leverage state and federal resources to better characterize groundwater in our state. Considering the current fiscal and political situation, it is astonishing we have this much going forward. •

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## Colorado River Quantification Settlement Agreement – Continued from Page 5

- It authorizes the lining of the All-American and Coachella Canals and the transfer of up to approximately 77,7000 acre-feet of water per year to SDCWA for 110 years.
- It provides water in perpetuity for the San Luis Rey Indian Tribes.
- It provides water from the lining of the Canals to the San Luis Rey Settlement Parties.
- It assures that the restoration of the Salton Sea will move forward.
- It provides up to 1.6 million acre-feet of water to be made available by IID for sale to DWR and then to MWD to raise money for restoration of the Salton Sea.
- It is true that a number of lawsuits have been filed, predominantly to challenge the adequacy of the environmental

documentation and issues internal to IID and its landowners. However, given the magnitude of the transaction, the litigation was hardly unexpected. All parties to the QSA are hopeful that the litigation can be managed and that this historic Colorado River management plan will remain intact.

*Scott Slater is a partner with the law firm of Hatch and Parent and has more than 20 years professional experience in the areas of water rights, water quality and related laws. He is the author of California Water Law and Policy published by Mathew-Bender and former Board Member of the Groundwater Resources Association. He represented the San Diego County Water Authority in the Quantification Settlement Agreement negotiations.* •

## Legislative Committee Activities – Continued from Page 7

### Jim Jacobs

Environmental Bio-Systems  
Category: Contaminant Expert

### Tim Parker, Chairman

Department of Water Resources  
Category: Government

### Bob Van Valer

Roscoe Moss Manufacturing  
Category: Business/Industry

### Carol Williams

Central Basin Water Association  
Category: Water Industry

### Frank Yeamans

Category: At Large

### Legislative Advocates:

#### Chris Frahm

Hatch & Parent

#### Jennifer Carbuccia

Hatch & Parent

### 2004 Planned Activities

- Continue to track and disseminate information on groundwater-related bills and activities, and provide recommended courses of action.
- Implement and annually review/modify as appropriate Legislative Guidelines.
- Continue to develop and enhance relationships with and educate legislators and key staff on the role of GRA and our ability to provide technical resources and support on groundwater issues.
- Continue to participate in selected stakeholder processes involving groundwater issues – AB 599 (Groundwater Monitoring Act of 2001), and Prop 50.
- Continue to participate in the legislative process as a technical expert and provide support where appropriate based on legislative guidelines and other issues presented to the board of directors and/or legislative committee.
- Host GRA “Legislative Symposium and Capitol Lobby Day” to continue to educate our membership on legislative priorities and give them an opportunity

for direct contact with key legislators effecting groundwater policy in California – scheduled for May 19, 2004.

- Work with selected legislators to further develop sponsor/conduct associated activities related to California Groundwater Awareness Week.
- Initiate process and as necessary refine methods for membership comments and suggestions and action on key legislation as it develops.
- Continue to work opportunistically on possible legislative activities:
- Work on helping develop, without sponsoring, groundwater related legislation
- NGWA fly-in representation on scientists’ effort
- Actively pursue funding sources to support and expand GRA’s legislative advocacy plan.

### 2004 Key Legislative Session Dates

**January 1** – 2003 Statutes take effect.

**January 5** – Legislature reconvenes from Interim Recess.

**January 10** – Budget must be submitted by Governor.

**January 23** – Last day for any committee to hear and report to the floor bills introduced in their house in 2003 (two years bills die).

**February 20** – Last day for bills to be introduced.

**April 1** – Spring Recess begins upon adjournment.

**April 12** – Legislature reconvenes from Spring Recess.

**May 28** – Last day for bills to be passed out of the house of origin.

**June 1** – Committee meetings may resume.

**June 15** – Budget bill must be passed by midnight.

**July 2** – Summer Recess begins upon adjournment, provided Budget Bill.

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## Sacramento Branch Highlights

BY STEVE PHILLIPS

The speaker for the October 2004 Branch meeting, Joseph Stagner, Director of Utility Services for UC Davis, was unable to attend but was to discuss the Multi-Stage In-Well Aerator (MIA) as a simple technology for the removal of volatile organic compounds from groundwater using in-well aeration. The MIA removes VOCs from groundwater using aeration within the well casing by placing an arrangement of concentric pipes in the well and using the annular spaces between the pipes as aeration columns. Results achievable with the MIA at any site will depend upon the same variables considered for other air stripping processes, including the volatility and concentration of VOCs targeted for removal, water temperature, well pumping rates, and air flow applied.

In November 2003, John Izbicki of the US Geological Survey discussed the use of new methods for sampling groundwater in production wells to better understand the variability of chemistry and hydraulic properties in the aquifer system. Traditional methods of collecting data involve the use of vertical-axis current meters and wire-line samplers that can't enter most production wells under pumping conditions. Injection of an easily measured tracer into a well at different depths using small-diameter high-pressure hose can be used to construct velocity logs using the tracer-pulse method. The same equipment can be used to collect depth-dependent water-quality data from a well.

The December 2003 meeting was our annual joint holiday meeting with the Association of Engineering Geologists. We were heartily entertained by Dick Hilton, professor of geology at Sierra College, who discussed dinosaurs and other Mesozoic reptiles of California. Many people are not aware that there have been many

discoveries of dinosaurs, pterosaurs, ichthyosaurs, mosasaurs, plesiosaurs and other sea going reptiles made in California. Many of these finds come from Northern California, and even the Sierras! The presentation highlighted Hilton's new book on these exciting discoveries as well as the ordinary people and scientists who brought them to light. Photographs chronicled a century of discovery, and the artwork of Ken Kirkland fleshed out the meat on the bones of these ancient reptiles and made them live. 🐾

## San Joaquin Valley Branch Highlights

BY BILL PIPES  
BRANCH PRESIDENT

The highlight of the Branch winter quarter, and our final meeting of 2003 was our field trip to Fresno-Clovis metropolitan area water resources facilities. With the help of a grant by the Fresno Metropolitan Flood Control District, a chartered bus took us to six sites in the area where we discovered the day to day details of how these facilities are run. We met early in the day on a crisp fall morning in the Fresno Bee parking lot. The turnout was larger than normal, and the field trip was enjoyed by all who attended.

The first stop on the tour was the City of Fresno Water Operations Center. After an introduction by Martin McIntyre, the director of the Fresno Public Works Department, Garth Gaddy gave us an outline of the supply systems operations and a demonstration of the SCADA remote control system that regulates the city water supply. From there we traveled to Well 70 near the airport to tour the pumping station and groundwater remediation system in place. Bruce Myers explained how the system works and showed how effective it has been to this point. Next we went to the construction site of the new City of Clovis Surface Water Treatment facility where we saw how the filtration takes place and received a detailed description of plant operations. Leaving this facility was perhaps an incident our bus driver might want to forget, though a chance for all of us to see that 'life happens,' as he got high-centered on a dirt berm and had to be pulled out. Life, indeed, happens.

The next leg was a trip to Basin CO2 where we heard a description of the functions of the stormwater basin/groundwater recharge facility there. Lunch was at Oso de Oro Park in Fresno, which was one of 15 finalists for the Innovations in American Government Award and deemed a pioneering advance

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in accessible, multi-use recreational space. Extra-wide gates, doorways and ramps to all areas make this park accessible to wheelchairs as well as others with disabilities. The wildlife seemed to enjoy the park just as much as the children in the play area. From there the next destination was stormwater basin EK. This basin has been outfitted with state-of-the-art equipment at sampling stations to assess the incoming and outgoing stormwater quality and the water quality changes that occur within the basin.

The last stop on the tour was the Fresno-Clovis Regional Waste Water Treatment Facility. We were met there by Janelle Parker from the Waste Water Management Division. We toured the pump house, the control room, and saw a panoramic view of the facility from the pump house roof. If someone asks you what you like in your tea cup, be very specific! The agriculture in the distance was quite a sight; however, the scent of the facility was not much like orange blossoms.

The success of this field trip was the result of hard work and dedication. Thanks go to many people for making it such a success: Bruce Myers, Dave Pomaville and Brent Sunamoto from the Fresno Metropolitan Flood Control District, Martin McIntyre, Garth Gaddy, Black & Veatch personnel, the forklift operator that pulled the bus out, Janelle Parker and the staff at the Waste Water Treatment Facility, The Fresno Bee for letting us use their parking lot as a staging area, and many more. Look for more enjoyable events in the upcoming year.

Please call Pam at 559-264-2535 for more information about future meetings or visit the GRA website at [www.grac.org](http://www.grac.org). ♣

## Southern California Branch Highlights

BY DARRELL THOMPSON,  
BRANCH PRESIDENT

The Southern California Branch held its bi-monthly meeting on December 10, 2003 in Fountain Valley at Mile Square Golf Course and Banquet Facility. Mr. Robert Holub, Division Chief with the California Regional Water Quality Control Board - Santa Ana Region, presented the status of perchlorate contamination in the Rialto-Colton Groundwater Basin. Mr. Holub addressed the impacts that past

discharges of perchlorate in the Rialto area have had on local groundwater resources, their on-going efforts to identify responsible parties, summarized recent soil and groundwater investigations and treatment efforts, and possible future actions for the investigation and clean up of the affected area. The meeting was a tremendous success with over 40 people in attendance. Suggestions to work a round of golf in before the next meeting at Mile Square will be taken into serious consideration!

Branch officer elections were held with assistance from GRA President, Jim Carter. Darrell Thompson of Shaw Environmental was elected president, and Peter Murphy of Kennedy Jenks was elected vice president. Bob Ruscitto will remain treasurer until a replacement is found. ♣



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# Dates & Details

## GRA MEETINGS AND KEY DATES

(Please visit [www.grac.org](http://www.grac.org) for detailed information, updates, and registration unless noted)

GRA Symposium <i>Investigation &amp; Remediation of Dry Cleaner Sites</i>	April 7, 2004 Sacramento, CA	GRA Symposium <i>Perchlorate in Groundwater 2004</i>	August 4, 2004 Glendale, CA
GRA Board of Directors Meeting	April 17, 2004 Sacramento, CA	GRA Board of Directors Meeting	August 7, 2004 Pt. Richmond, CA
GRA Sponsored Course <i>Model Calibration &amp; Uncertainty Analysis Using PEST</i>	April 19-21, 2004 Santa Ana, CA	GRA 13th Annual Meeting and Conference <i>Aquifer Protection, Restoration, Replenishment and Treated Water Reuse</i>	September 23-24, 2004 Sonoma, CA
GRA Workshop <i>Groundwater Modeling</i>	April 21-23, 2004 Sacramento, CA	GRA 12th Groundwater Symposium <i>Arsenic in Groundwater 2004</i>	October 18-19, 2004 Fresno, CA
GRA Seminar <i>Low Yield Aquifer Testing</i>	April 26, 2004 Walnut Creek, CA April 27, 2004 Glendale, CA	GRA Board of Directors Meeting	November 6, 2004 Irvine, CA
GRA Lobby Day	May 2004 Sacramento, CA		



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