

# HYDRO VISIONS

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WINTER 2011

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## California's Water Future Goes Underground

### 28th Biennial Groundwater Conference & 20th Groundwater Resources Association Annual Meeting

Compiled by Vicki Kretsinger, Thomas Harter and Tim Parker, Conference Co-Chairs, with contributions by Roy Herndon, Brian Lewis, Jean Moran, Vera Nelson, Chris Petersen, Steve Phillips, Sarah Raker, Bob Niblack, and Rob Swartz

The 28th Biennial Groundwater Conference and 20th Annual GRA Annual Meeting was held in Sacramento on October 5-6, 2011. The theme of the conference was “*California's Groundwater Future Goes Underground*,” and it included many fine presentations on how groundwater resources can be maintained and enhanced to help make up the water needs of the state and the nation. Groundwater plays an ever-increasing critical role in meeting California's water needs, given population pressures, climate uncertainty, and unavoidable conflicts between urban, agricultural, and ecosystem uses. To meet these challenges, there is an increasing need for facilitation of information exchange, education, and capacity building across and among diverse stakeholders, including policy makers, regulatory and planning agencies, NGOs, water users, consulting practitioners, water managers, researchers, educators, and the public.

The effects of California's economic climate have challenged traditions in many ways, including the University of California's closure of its Water Resources Center, which previously administered the Biennial Groundwater Conference. GRA accepted the role of administering the joint conference and is pleased that the long-time organizing entities, including the California Department of Water Resources, Water Educa-

tion Foundation, US Geological Survey, and the California Department of Toxic Substances Control continue to support this very important conference. GRA's gratitude is also extended to the University of California, which continued in a new role as a key financial supporter and organizing entity.

Although many talks focused on California's groundwater picture, many of the talks were also applicable to any groundwater basin. A summary of the conference topics follows.

#### Conference Opening and Plenary Session on the Present and Future Groundwater Outlook (Vicki Kretsinger)



Vicki Kretsinger, Conference Co-chair, opens the conference.

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capacities since 2004. She served as my Vice President and Chair of the Finance Committee for the past 2 years—a challenging time indeed for the finances of non-profit groups! Sarah's efforts have given GRA's Board of Directors and Officers a new appreciation for the financial side of the organization and have enabled us to weather recent economic storms. Thank you, Sarah.

**Ted Johnson** will serve as Sarah's VP. Ted is the Chief Geologist for the Water Replenishment District of Southern California and he has served on the GRA Board of Directors since 2007. He played very important roles this last 2 years as GRA's Secretary and Chair

been as supportive of GRA in committing their time and resources than Bob, and Roscoe Moss. Bob, with help from his son, **R. T. Van Valer**, brings his many years of corporate finance experience to GRA, and will help the organization manage its finances accurately and keep us in the black. Thank you, Bob, R. T., and Roscoe Moss.

Working with this team will be GRA's Executive Director, **Kathy Snelson**, of Nossaman LLP. Kathy has served in this role since 2000 and is an indispensable member of the GRA management team. Sarah and the other officers will find, like I did during my term, that Kathy handles with grace and aplomb a myriad of day-to-day details that keep GRA functioning smoothly. Her continued wise counsel and steady hand will be invaluable to Sarah and her team in managing the organization. Thank you, Kathy, and Nossaman, for doing so much for GRA and being a great partner the last two years!

GRA's success during the last 20 years stems from the talent and hard work of many volunteers from all parts of the water community and throughout California. As President, I was blessed to be able to witness firsthand their efforts and to avail myself of their intellect and creativity. I would like to thank everyone that contributed so much during my term, but only have room in this column to thank a few. If I miss someone, believe me, it's an act of mistaken omission, and not by commission. Many thanks go to **Vicki Kretsinger**, the heart and soul of GRA. Vicki was a founding Board member 20 years ago and is a past President of GRA. She continues to serve on the Board, and is Chair of the Affiliates Committee. Vicki co-chaired our very successful Biennial event this year and is the brains and inspiration behind GRA's Contemporary Groundwater Issues Council and the David Keith Todd Lecture Series.

*Continued on the following page...*

## Thank You!

By William Pipes

**T**his will be my last column as President of GRA. The last two years has gone by very fast – too fast! This is a very exciting time for those working in the water supply industry in California and the West, especially for those of us involved with groundwater and in organizations like GRA that make a real difference in how Californians view and understand groundwater. I am honored, and want to thank you, the members, for allowing me to serve as GRA's President.

I would like to use this last column to introduce you to the 2012 officers of GRA, and to thank those that have made my term as President so enjoyable. As approved by the GRA Board of Directors at their November 5, 2011 meeting, **Sarah Raker** will be the new President. Sarah is a consulting geologist with AMEC Environment & Infrastructure, Inc., and has a lot of GRA experience, having served on the Board of Directors and in many other

of our Events Committee. Not only did Ted lead the Events Committee in developing GRA programs that were timely, relevant and informative, he also took the lead in starting our popular "GRA-Cast" series of web-based seminars. Serving as GRA Secretary for the next term will be **Brad Herrema**. Brad is a very fine attorney with Brownstein Farber Hyatt Shreck LLP practicing in water law and has served on the GRA Board of Directors since 2010. Brad has provided an invaluable service to GRA as Chair of the Bylaws Committee where he has helped guide us through the labyrinth of non-profit corporate law and other legal aspects of running a 501(c)6 organization. Thank you, Ted and Brad.

Completing Sarah's team will be **Bob Van Valer**, serving as Treasurer. Bob is the President of Roscoe Moss Company and he previously served on the GRA Board of Directors for many years. No person or organization has

## Thank You! – Continued

I would like to thank **Brian Lewis**, the “Dean” of GRA and also a founding Board member and past President, for his hard work on events and guidance on GRA business matters large and small. Thanks to **Tim Parker**, past GRA President and current Board member, for his energy and passion in leading GRA’s legislative efforts and organizing our annual Legislative Day in Sacramento. And thanks for all the work Tim does on events.

Thank you, **David Abbott**, for your contributions on the Board, your work on the Awards Committee, your contributions to *HydroVisions*, and your longtime service to GRA’s San Francisco Branch. **Jim Strandberg**, my immediate predecessor as President, has been a valuable source of advice for me and a steady hand on the Board – thank you, Jim.

Many thanks go to **Thomas Harter**, a GRA Board member with incredible stamina and creativity, particularly where applied as Chair of the Education Committee. Thomas assisted Vicki with the David Keith Todd Lecture Series and the Council and has been a major contributor to many of GRA’s events. Thank you **Roy Herndon**, Board member and Chair of the Communications Committee, for your service and wise counsel.

Thanks to **Steve Phillips** for doing such a great job as editor of *HydroVisions*. Steve shepherded *HydroVisions* into the electronic world, serves on the Board, and has been a steady fixture in the GRA Sacramento Branch. **Jean Moran** has been a Board member since 2006 and has provided valuable service in that role and as a champion of GRA’s educational efforts. Jean has been our liaison with colleges and universities and was the founder of the Collegiate Groundwater Colloquium. Thank you, Jean. And thank you **David Von Aspern**, the first editor of *HydroVisions*, for your contributions as past GRA Treasurer (helping us to understand all things

*Quickbooks*), and your significant role in making the GRA Sacramento Branch the success it is today.

I would like to thank two new Board members: **Emily Vavricka** and **Chris Peterson**. Both are already making their mark on the Board. Emily also is the President of GRA’s Southern California Branch and she will be the new Chair of the Membership Committee next year. Chris will be taking over as Chair of the very important Events Committee. Thank you for serving, Emily and Chris.

One does not have to serve on GRA’s Board to make an impactful contribution to the organization. I would like to thank **Rula Deeb** and **Elie Haddad** for their recent contributions to GRA’s events. Rula has been the force behind our Emerging Contaminants events. Elie served as Ted’s co-chair of the Events Committee. Thank you, Rula and Elie. And thank you, **Tom Mohr**, longtime Board member and a past GRA President. For me, Tom is the conscience of GRA – a source of thoughtful advice and clear thinking that I found invaluable during my term. Tom also is the inspiration and organizer behind many successful GRA events.

Many thanks to **Chris Frahm** and **Duncan McFetridge** of Brownstein Far-


ber Hyatt Shreck LLP, GRA’s legislative advocates, for assisting Tim with making GRA so influential and successful in the State Capitol.

If you have been to one of our many events or to our website (which probably is everyone reading this!) you know the work of two individuals whom I would like to thank for their hard work and dedication. **Mary Megarry** works with Kathy Snelson and handles many of the details of our events, including registration, putting the handout materials together, taking care of the A/V, and the many important day-of-the-event tasks. **Kevin Blatt** is our webmaster extraordinaire, database administrator, and all-around IT guy. Kevin handles everything online from event registration to membership renewals to website maintenance. Thank you, Mary and Kevin.

And thank you for being a reader of *HydroVisions*, a GRA member, and a supporter of the organization. We are truly making a difference in the world of California water.




William Pipes, GRA President



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## California's Water Future Goes Underground – Continued from page 1

Conference attendees were welcomed on October 5th by Vicki Kretsinger, Conference co-chair, followed by a “Happy Birthday tribute” to GRA on the occasion of GRA’s 20th anniversary by GRA President Bill Pipes. Hearty thank yous were extended to the sponsors, cooperating agencies, conference committee, and exhibitors. This year the Conference Planning Committee also received input from GRA’s newly formed Contemporary Groundwater Issues Council, a group of recognized water resources leaders, which complement the roles of GRA’s Board of Directors and Committees by providing external input on key ongoing or future groundwater-related issues, challenges, and opportunities.

In keeping with the conference theme, three invited Plenary session speakers, John Laird, Secretary of the Natural Resources Agency; Steve Arakawa, Manager of the Bay Delta Initiatives Program of the Metropolitan Water District (MWD); and Ken Belitz, Chief of the U.S. Geological Survey (USGS) component of the Groundwater Ambient Monitoring and Assessment (GAMA) Program provided presentations on the types of challenges we face to meet future water needs and the role groundwater plays.

**John Laird** kicked off the Plenary session with the intriguing note that 40 years ago his thesis topic focused on the history of water development in California. A significant shift in California’s way of thinking about the use and management of its water resources occurred about 20 years ago—more attention is being paid to groundwater storage and remediation of underground supplies. Treatment is being recognized as more economical than some other water supply strategies.

In 2009, the bipartisan compromise passed by the CA State Legislature took center stage. The compromise provided statutory authority to proceed with the Bay Delta Conservation Plan, with co-equal goals of water supply reliability

### GRA thanks Dr. Prem Saint and Dr. John Bredehoeft for being its inaugural Southern and Northern California David Keith Todd Lecturers in 2011, respectively.



*Dr. Prem Saint (left) and Dr. John Bredehoeft, GRA David Keith Todd Lecturers for 2011.*

and ecosystem restoration through the use of sound science. Importantly, attention was paid to groundwater monitoring: SBx7-6 established the CA Statewide Groundwater Elevation Monitoring Program, and NASA satellite technology shows potential for statewide monitoring to provide more information about the status of our water resources. Mr. Laird emphasized the statewide importance of the co-equal goals. Water planning processes tend to focus on one of the goals, but he stressed that you “can’t have the goal you like without meeting the other goal.” Over time, Mr. Laird sees the need for less reliance on

the Delta through the implementation of other water supply strategies.

He relayed Governor Brown’s administration’s philosophy of making policy decisions based on sound science, including open public meetings and the use of stakeholder groups to comprehensively address the issues. Mr. Laird is responding to the Governor’s platform, which called for groundwater programs as a priority. He underscored the importance of using science to help deal with our statewide water issues, and of moving the decision making away from the courts.

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## California's Water Future Goes Underground – Continued

**Steve Arakawa** described the challenges that MWD has faced in addressing drought conditions and the related increased integration of groundwater resources into MWD's overall water supply. Main sources of MWD's supply include imported water from the Colorado River and the Delta; these sources are facing unprecedented challenges because of dry conditions and restrictions imposed on Delta exports. Groundwater is managed as a vital part of MWD's water resources strategy. During the 1980s, the focus was on extracting and replenishing groundwater with cyclic storage programs. During the early 1990s, key programs addressed water quality and treatment requirements. MWD incentivized at least 21 projects to increase its available water supply. Conjunctive use operations significantly increased in the early 1990s, and over the next 15 years contributed to groundwater storage. In the late 1990s to early 2000s, funding bolstered efforts to continually update programs and enhance system operations. Today, MWD faces continually changing conditions. MWD supports partnerships in the Delta and urgently encourages the setting of a new course and provision of temporary and permanent fixes for the Delta that balance ecosystem needs with those for a functional water system. Frequent cutbacks in MWD's allocations have prompted newer mechanisms to take advantage of supplies and use of storage accounts. MWD is coordinating with others to assess opportunities to rehabilitate facilities, use recycled water, and treat additional water to meet growing demands. He described their key strategy as one of adaptation to always maintain a diversified supply.

**Ken Belitz** began his presentation with an overview on the three components of the GAMA program, including the Domestic Well Project, Special Studies Project, and the Priority Basin Project (PBP). Since 2004, the GAMA PBP has been conducting a comprehensive assessment of groundwater quality in priority basins that collectively account for over

90% of groundwater use and over 90% of the number of contaminant sources in CA. GAMA-PBP primarily focuses on aquifers providing groundwater for public supply. Between May 2004 and December 2010, the USGS sampled about 2,200 wells in 111 priority basins, about 50 low-use basins, and several areas outside of basins.

GAMA-PBP evaluates groundwater quality in terms of the proportion of the aquifer resource that has chemical concentrations exceeding health-based benchmarks, some of which are regulatory (e.g., maximum contaminant levels). From a statewide perspective, naturally-occurring trace elements are more prevalent at concentrations above benchmarks than any other constituent; trace elements are high in about 15 to 20% of the resource at the depth zone tapped by public supply wells. In contrast, nitrate typically exceeds benchmarks in about 5 to 10% of the resource. Organic compounds, such as solvents, gasoline-related compounds, and pesticides, are generally present at high concentrations in only a small proportion of the resource (<1%). Important questions that remain to be answered by future program efforts include: "What proportion of California's shallow groundwater resource has high concentrations of natural and anthropogenic constituents? What is the fate of constituents currently present at high concentrations, particularly legacy contaminants present at shallow depths?"

### Groundwater Remediation: 20 Year Retrospective & Future Approaches (Sarah Raker)

This session included representatives from two Southern California groundwater basins that have been impacted from a legacy of industrial operations over the past several decades. The speakers discussed how investigations and negotiations with stakeholders have been completed over the past 20 years to clean-up and provide potable

drinking water to the region. **Ken Manning** from the San Gabriel Basin Water Quality Authority, **Milad Taghavi** of the Los Angeles Department of Water and Power, **Stephen Hill** of the Regional Water Quality Control Board, and **Stewart Black** of the Department of Toxic Substances Control provided their perspectives on, and recent developments in, how contaminated sites have been managed (e.g., a shift from cleanup goals based solely on groundwater protection to goals based on potential exposure pathways) and the use of environmental indicators to help assess exposure reduction as sites achieve cleanup. The session also included a presentation from **Elisabeth Hawley** of ARCADIS Malcolm Pirnie on how groundwater at complex sites can be managed with alternative approaches to site closure (e.g., technical impracticability and use of monitored natural attenuation).

### Regional Groundwater Monitoring: Implementation (Rob Swartz)

This session included four informative presentations on implementing water level and water quality monitoring programs at the regional and statewide level. **Mary Scruggs** of the Department of Water Resources opened the session with a history and status update of the CA Statewide Groundwater Elevation Monitoring (CASGEM) Program. **Marcus Trotta** of the Sonoma County Water Agency provided an overview of his agency's efforts to implement a regional groundwater elevation monitoring program and the tools developed to manage and analyze the data. The focus then shifted to water quality; **Till Angermann** of Luhdorff and Scalmanini Consulting Engineers describing efforts to develop a representative groundwater quality monitoring program for California's dairies. Finally, **Miranda Fram** of the USGS presented results of pharmaceutical and perchlorate monitoring as part of the GAMA Program.

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## California's Water Future Goes Underground – Continued

### Groundwater Modeling: Latest Approaches (Steve Phillips)

The first three speakers in this session integrated Global Climate Model (GCM) results into their models, and the latter two discussed the evolution of models. **Rich Niswonger**, USGS, developed GSFLOW, an integrated groundwater-surface water flow model, to better estimate the hydrologic effects of climate change. An application near Lake Tahoe showed that earlier (warming-induced) peak groundwater discharge to streams leaves shallow aquifers drained, reducing baseflow during dry summers. **Randy Hanson**, USGS, co-developer of the Central Valley Hydrologic Model (CVHM), used that model in conjunction with GCM results to assess potential changes in conjunctively used water resources and related effects. Model results suggested a shift to a groundwater-dominated agricultural supply, which in turn caused increased streamflow infiltration, reduced availability of surface water for riparian habitat, increased land subsidence, and reduced flows to the Delta. **Francisco Munoz-Arriola**, a researcher at Scripps/UC San Diego, linked the CVHM to an upper-watershed model and incorporated GCM results to explore the effects of streamflow regulations on groundwater-surface water interactions during drought and non-drought climatic conditions. **Tony Morgan**, United Water Conservation District, discussed an extensive, ongoing update of a mid-90s model of groundwater flow in Ventura County. The revisions are based on hundreds of well logs, geophysical data, and continuous water-level data, all of which are revealing a complex hydrostratigraphy; incorporation of this complexity will allow for improved simulation of the region. **Adam Siade**, USGS, presented an extensive update of previous groundwater modeling in the Antelope Valley, including the addition of unsaturated flow, explicit simulation of agricultural processes, and updated

subsidence capabilities. The model is being used, in part, to estimate natural recharge; a Monte Carlo type method suggests that natural recharge is considerably lower than recently determined during basin adjudication.

### Day 1 Luncheon Program

The first day's luncheon program included presentation of Legislative Leadership Awards to **Senator Fran Pavley** and **Assembly Member Jared Huffman**, who were honored for their outstanding contributions promoting sound groundwater policy in California. Senator Pavley is Chair of the Senate Natural Resource and Water Committee and Assembly Member Huffman is Chair of the Assembly Water, Parks and Wildlife Committee, the two key water committees at the state capitol. GRA has found both of these legislators and their committees to be a pleasure to work with and exceptional at disseminating scientific and technical information in support of groundwater policy development. Dennis O'Connor, Chief Consultant to the California Senate Committee on Natural Resources and Water, accepted the award on behalf of Senator Pavley. Tina Leahy, Water Policy Consultant for the Assembly Water, Parks and Wildlife Committee, received the award on behalf of Assembly Member Huffman.

Duncan McFetridge of Brownstein, Hyatt, Farber and Schreck provided a whirlwind update on GRA's very active year at the Capitol, which involved tracking more than 20 bills. GRA focused on three bills this year, including:

- **AB 359 (Huffman)**, which adds notification and mapping requirements relating to recharge areas (signed by Governor Brown);
- **AB 1152 (Chesbro)**, which made technical amendments to groundwater monitoring implementation; and
- **SB 263 (Pavley)**, which as originally drafted would provide public access to well logs. The bill was amended

and passed by the Legislature but vetoed by Governor Brown (see the California Legislative Corner in this issue for more information).

### Nitrate in Groundwater: Current Status & Future Implications (Thomas Harter)

The opening speaker for the session was **Karen Burow** of the USGS, who showed that nationally, nitrate concentrations exceeded the EPA nitrate-nitrogen MCL of 10 mg/L in 9% of 5,101 wells sampled as part of the National Water Quality Assessment Program during 1991-2003. In the eastern San Joaquin Valley, median shallow nitrate-nitrogen concentrations have increased by 0.6 mg/L per decade during the last 60 years with the growing use of synthetic fertilizer and increasing animal herd size. Burow emphasized the need for long-term, consistent monitoring of nitrate concentrations in groundwater, improved accounting of nitrate sources, and data on aquifer redox conditions and groundwater age; these are needed for effective groundwater quality management. **Rob Gailey** of The Source Group provided an overview of factors that affect nitrate concentrations in water supply wells, focusing on well design and construction. Careful profiling prior to designing the well, or placement of packers, are important tools to address such issues. Characterizing local hydrogeologic conditions, specifically the flow and chemical contribution from various strata, is important for properly designing a well that minimizes nitrate contamination. **Thomas Harter** of the University of California at Davis (UCD) summarized ongoing work by a large UCD team that is preparing material for the SWRCB and a Report to the Legislature on Groundwater Nitrate. The report will address key questions related to groundwater nitrate; Tulare Lake Basin and Salinas Valley are the targeted pilot project areas. This work includes nitrate source characterization, groundwater quality assessment, drink-

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## California's Water Future Goes Underground – Continued

ing water treatment options, alternative supply options, especially for disadvantaged communities, cost analyses, and a survey of funding options and policy solutions. **Pamela Creedon**, Executive Officer of the Central Valley Regional Water Quality Control Board, gave a fresh look at her Board's regulatory approach to control or abate the impact of nitrate on groundwater. Within the Central Valley region, nearly half the population relies on groundwater as a source of drinking water; the region is also home to most of California's irrigated agriculture (77%) and dairy herd (86%), which are significant nitrate sources. The Central Valley board recently adopted the Dairy Program and is currently revising its Irrigated Lands Regulatory Program to also include groundwater protection and monitoring. Both programs address nonpoint source pollution of groundwater from farming activities. The Central Valley region is further engaged in broader efforts to update the basin plan to include salinity and nitrate management in surface water and groundwater from all sources. Statewide, the SWRCB is implementing its recycled water policy, developing updated regulations for on-site wastewater treatment (septic systems), and is developing a groundwater strategic plan.

### Groundwater Recharge Approaches & Issues

(Chris Petersen)

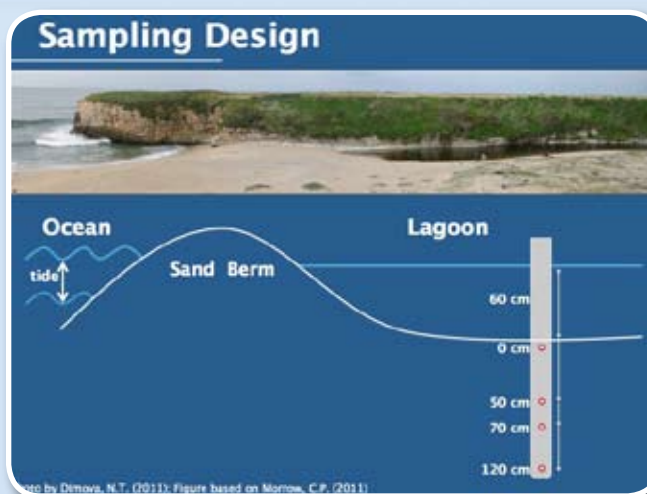
The first presentation was given by **Tom Morris** of ASR Systems who described an innovative method of well development for dual purpose (injection and extraction) wells. The method involves injection and extraction at rates at least 20% greater than maximum design operation rates to ensure filter pack stability during normal well operation. Case studies demonstrate injection specific capacity increases of 15 to 155%. **Allen Christensen** of the USGS presented findings

of a recharge study along Amargosa Creek near Palmdale, in Antelope Valley. Utilizing exploratory drilling and logging, gravity, seismic and resistivity surveys, a detailed hydrogeologic conceptual model was developed and incorporated into a groundwater flow model used to better estimate artificial recharge rates under multiple planning scenarios. **Andrew Fisher**, professor at UC Santa Cruz, discussed findings from ongoing research at the Harkin's Slough Project, a groundwater recharge facility constructed and operated by the Pajaro Valley Water Management Agency in Watsonville. They developed a comprehensive monitoring program to measure recharge rates, depth to groundwater and changes in water chemistry during recharge. A key finding of their work is the reduction in nitrate concentration (30-60%) during infiltration realized by controlling recharge rates and groundwater levels below the pond. **Marty Sponberg** of AMEC Geomatrix, Inc. described six projects involving the use of innovative methods to capture and infiltrate stormwater without degrading groundwater quality. Information gained from these projects demonstrates no evidence of statistically significant groundwater degradation resulting from stormwater infiltration at these project sites.

### Collegiate Groundwater Colloquium (Jean Moran)

Five students presented their research findings during the fourth annual Collegiate Groundwater Colloquium. The Collegiate Colloquium offers an opportunity for practicing groundwater professionals to hear about students' recent research, and gives students an opportunity to present their work to an interested audience and to network with practitioners. Submissions are solicited from undergraduate and graduate students through their faculty advisors and can be on any topic related to groundwater transport, occurrence, contamination, or management. This year, five graduate students from four of California's public universities gave lively presentations on a range of topics.

**Priya Ganguli**, a doctoral candidate at UC Santa Cruz, described the results of a detailed investigation of the speciation and dynamics of mercury in submarine groundwater discharge at a Central California coastal lagoon. Monomethylmercury (MMHg), which is a bioaccumulative neurotoxin, shows enhanced production in lagoon waters (figure 1). Spatial and temporal variations are being explored using a sampling network that includes a depth profile, and samples of seawater, lagoon water, and groundwater.



*Figure 1. Photo of Younger Lagoon (above) and schematic showing sampling locations for MMHg collected in filtered and unfiltered water samples. (Photo by Dimova (2011); Figure after Morrow (2011))*

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## California's Water Future Goes Underground – Continued

**Marianne Holtz**, a graduate student in the Master's program at California State University East Bay, showed the results of a chemical and isotopic investigation of the source of nitrate in a drinking water well in the Eastside sub-basin of the Salinas Valley Groundwater Basin. The well was sampled repeatedly in 2010, and showed significant variation in the nitrate concentration but little change in the isotopic signature of nitrate. Synthetic fertilizer, drawn into the well capture zone during seasonal pumping, was identified as the most likely nitrate source.

**Jingjing Wang**, a doctoral candidate in the Program of Environmental and Natural Resource Economics and Policy at UC Riverside, presented a farm-level model that seeks to evaluate cost-effective policies for reducing leaching of nitrogen from both crop and animal areas of dairies (figure 3). The model is designed to maximize net profit subject to equations of motion, mass balance constraints and pollution control policies. The effects of various nutrient management plans are simulated and optimal economic and en-



Figure 2. Former drinking water well at the San Jerardo Cooperative, with strawberry fields in the background.

vironmental performance is predicted for different manure management and irrigations systems.

**Tess Russo**, a PhD candidate at UC Santa Cruz, discussed a wide-ranging analysis of the suitability of an area of the Pajaro Valley Groundwater Basin for managed aquifer recharge (MAR). She described a GIS analysis that uses property weighting of surface and sub-

surface data, field percolation tests that show relatively small-scale variability (figure 4), and a regional MODFLOW model that will be used to test the effects of MAR on long term overdraft and seawater intrusion.

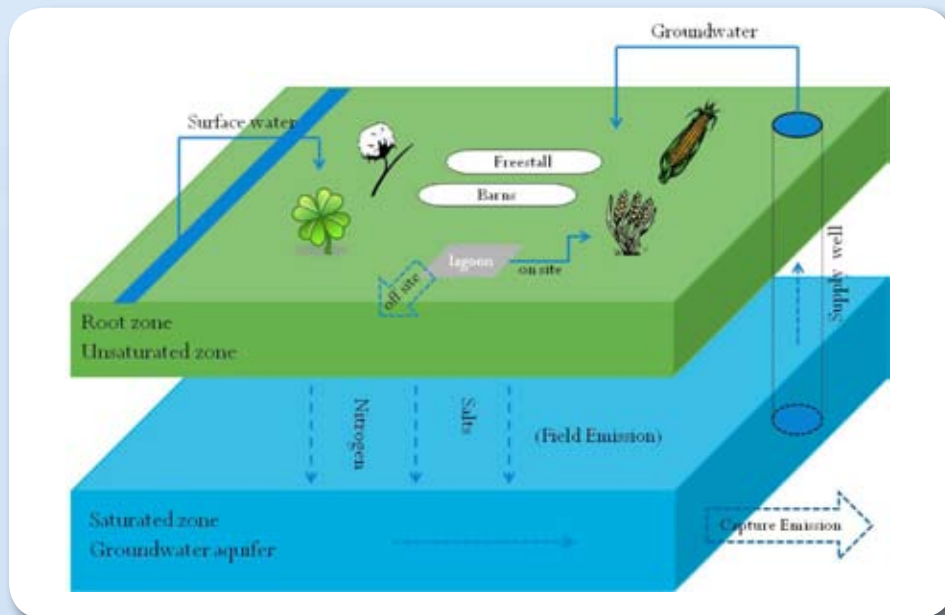


Figure 3. Best management practices and cost-effective policies for reducing nitrogen emissions from dairies depend on the mass fluxes shown in this schematic farm model.

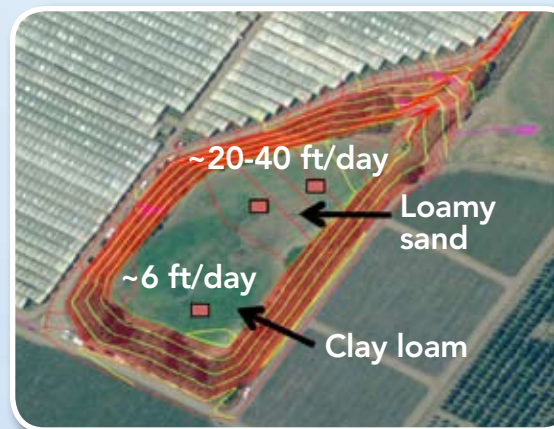


Figure 4. Squares show locations of field percolation tests in an area of the Pajaro Valley Groundwater Basin, showing local variability in infiltration rates. (Survey image from USDA-NRCS, 2010)

**Bronwyn Green** of UC Santa Cruz discussed market solutions of conjunctive surface water-groundwater management in an agricultural area of the East Snake River Plain, Idaho. She presented the case for use of mitigation banking in areas where demand out-

*Continued on the following page...*

## California's Water Future Goes Underground – Continued

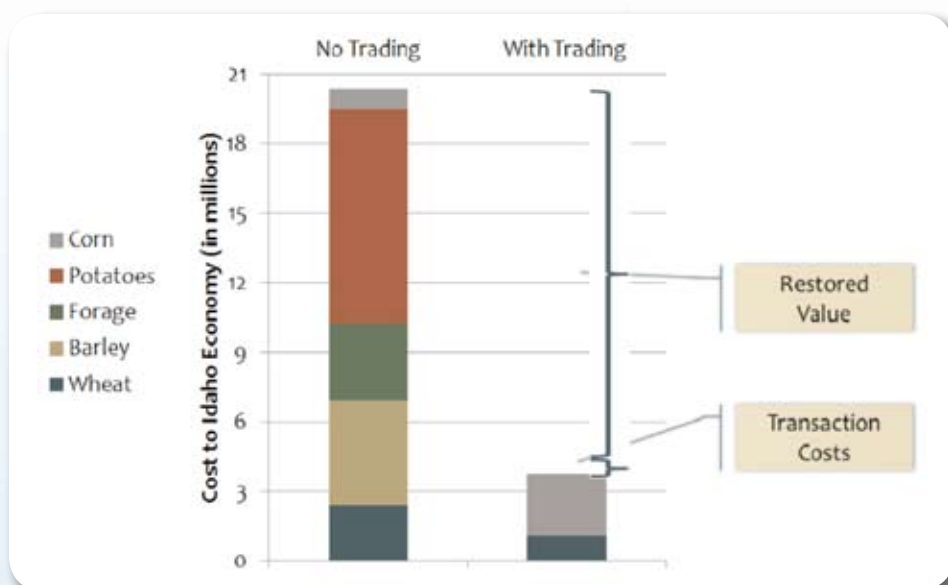


Figure 5. Chart shows the predicted reduction in economic impacts of water supply cutoffs through mitigation trading.

strips supply, and where the connection between groundwater withdrawals and surface water flows is recognized. Pre-approved mitigation credits would be applied for recharge or in-stream flow, thus reducing the economic impacts of water cutoffs to farmers (figure 5).

### Exhibits and Poster Session

Bill Pipes made a toast to GRA's 20th Anniversary to kick off the evening reception on October 5th. Lively networking occurred as attendees mingled between posters, exhibits, and hors d'oeuvres stations.

### Prem Saint – GRA 2011 Southern California David Keith Todd Lecturer

Day 2 of the conference was kicked off by retired California State University Fullerton Professor and GRA's Southern California David Keith Todd Lecturer Prem Saint. Dr. Saint provided a fascinating historical and global view of groundwater from his personal observations. He showed photographs of animal-powered bucket chains to draw water from dug wells, known as *saqqias*, and elaborate stepped wells, known as *bouris*, that were constructed over 100 feet deep to provide people a "stairway" to the water table. These images illustrated the range of primitive to complex efforts used in other parts of the world to obtain precious water. Dr. Saint also summarized the evolution of man's curiosity and scientific understanding of the hydrologic cycle from ancient times to the present.



William Pipes, GRA President, makes a toast at the evening reception.



Continued on the following page...



## California's Water Future Goes Underground – Continued

### Managing, Organizing & Visualizing Data (Brian Lewis)

Sean Maguire and Mike Maley of Kennedy/Jenks Consultants, on behalf of the Sacramento Groundwater Authority (SGA), studied the vulnerability of groundwater supply infrastructure to water quality degradation, based on a spatial analysis of existing and potential contamination threats. A GIS-based risk assessment mapped many factors that could influence groundwater quality over the next 25 years. The results provided guidance to the 14 SGA member agencies on the economic and environmental risks associated with contamination threats. The development of water resources management tools to support future planning activities is ongoing. Jim Hunt, professor at UC Berkeley, discussed the Russian River watershed, where groundwater data limited in spatial and temporal coverage limited the ability to assess frost protection events and to test watershed modeling assumptions. An additional example addressed the opposite case: vast amounts of data were collected at the DOE Savannah River Site, but data utilization was limited by the lack of tools for data access. Joe LeClaire of Wildermuth Environmental described the need for a robust, secure, scalable, watershed-scale, centralized data management system for water resources data. He then presented HydroDaVE(tm), a free, web-enabled and map-based water resources data management software. HydroDaVE includes the ability to quickly display the areal distribution of water quality, develop Piper diagrams, link to other external databases and display and export data from these databases (e.g., the SWRCB's GeoTracker).

### Remote Sensing Technologies & Applications (Bob Niblack)

Attendees were treated to examples of how remote sensing was applied to regional groundwater studies to estimate changes in groundwater levels,

determine land use and its effect on groundwater pumping, and estimate changes to groundwater in storage. Tom Farr of the Radar Sciences Group at NASA's Jet Propulsion Laboratory discussed the use of interferometric synthetic aperture radar (InSAR) to observe land surface deformation associated with changes in groundwater levels in several regions. InSAR can provide estimates of groundwater-level change over broad regions where well data may be sparse. An upcoming satellite launch will further improve the interpretation of groundwater-associated land surface deformation. David Jordan from INTERA described how LANDSAT imagery was used to develop estimates of irrigated acreage for use in groundwater modeling of the Lower Rio Grande Region in New Mexico. The demonstrated method of creating a land use dataset for a hydrologic model is transferable to other regions. Ty Brandt and Mi-

chelle Newcomer of the NASA Ames DEVELOP team described the team's work to estimate groundwater storage change in the Central Valley. Data from the Gravity Recovery and Climate Experiment (GRACE) satellite was used in conjunction with other data sources to derive the estimate. Session attendees learned of the potential, and limitations of this application of satellite technology for developing regional water budgets. Together, these presentations showed that space-based technology will play an integral part in the future of water resource management planning.

### Local Groundwater Management Successes & Insights (Roy Herndon)

Brian Lockwood discussed the Pajaro Valley Water Management Agency's efforts to halt seawater intru-

*Continued on the following page...*

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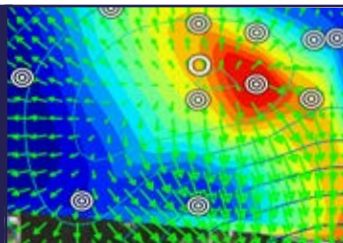
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## California's Water Future Goes Underground – Continued

sion. Conversion of irrigation supply from groundwater to recycled water has reduced pumping near the coast, while implementation of recharge via injection wells and infiltration basins has increased groundwater elevations. These projects have reduced seawater intrusion, but additional programs are needed to solve the basin's seawater intrusion and overdraft problems. **Rob Swartz** described the Sacramento Groundwater Authority's framework for sustainable pumping in the North Area Basin. Historically, this basin suffered from long-term groundwater level declines and projected increased pumping. Water demands have recently declined, leading to reduced groundwater pumping and groundwater level recovery. However, a framework was still needed to develop sustainable target pumping amounts for the basin. By focusing on portions of the basin most in need of pumping reductions, SGA developed an equitable voluntary program whereby basin pumpers can meet agreed-upon pumping goals and also gain exchangeable credits for pumping below these goals. **Bryan Bondy** presented activities by the Fox Canyon Groundwater Management Agency, which comprises several groundwater basins and subbasins. Varying hydrogeology, water quality, infrastructure and governance, and salts management (TMDLs) drive the need for basin-specific management programs. While some subbasins have been rebounding from historical overdraft conditions, others continue to show groundwater level declines. Surface inflows of effluent from upstream sewage treatment plants offer a source of recharge water; however, the long-term reliability of these inflows is subject to upstream recycling and reuse of these flows.

### Climate Change/Enhancing Groundwater Reserves (Vera Nelson)

**Jason Gurdak** of San Francisco State University, focused on climate variability and the affects of different climate

cycles on groundwater storage within some of the principal aquifers in the U.S., including the Central Valley and Basin and Range aquifers. He discussed the significance of the impacts of climate variability on groundwater storage within these aquifers and their importance in groundwater management planning. **Ruth Langridge** and **Bruce Daniels** of UC Santa Cruz focused on the legal hurdles and mechanisms by which groundwater reserves can be established for drought protection. These talks included discussion of the target volume of such groundwater reserves and the legal and policy reforms that could encourage the development of drought reserves in California.

### Day 2 Luncheon and Awards Program

On October 6th, awards were presented during the lunch program to recognize the significant contributions of

Joseph Scalmanini, president of Luhdorff and Scalmanini, Consulting Engineers, and the Sacramento County Environmental Management Department.

Mr. Scalmanini received GRA's Lifetime Achievement Award for his contributions at the forefront of California groundwater issues for more than 40 years. He has worked in most of the groundwater basins in California and has served the courts on technical issues in a number of groundwater basins, including acting as basin engineer and technical advisor, among other roles. Over the length of his career, Mr. Scalmanini has been actively involved in many of the major technical and policy debates concerning groundwater and legal classification of groundwater. Kevin O'Brien of Downey Brand LLP and Chris Sanders of Ellison, Schneider and Harris LLP presented the award to Mr. Scalmanini (see also the Award citation, page 26).

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## California's Water Future Goes Underground – Continued

The Sacramento County Environmental Management Department received GRA's Kevin J. Neese Award for its *Abandoned Well Program*. The Program identifies and properly closes abandoned, unused water wells. Such wells may be conduits for groundwater contamination, and many older hand-dug wells and open casings pose a physical falling-in hazard. It is the property owner's responsibility to properly close abandoned wells. The County's outreach efforts have increased the public awareness of the presence and potential liabilities of abandoned wells. This awareness has resulted in substantial savings to prospective property buyers, especially in cases of foreclosed and/or bank-owned properties where the buyers and sellers may be unaware of the existence of abandoned wells. Val Siebel, Director of the Sacramento County Environmental Management Department, accepted the award on behalf of the Department.

### John Bredehoeft – GRA 2011 Northern California David Keith Todd Lecturer

Following the Day 2 luncheon, John Bredehoeft of the Hydrodynamics Group gave a provocative talk on "Patterns of Water Use in the West: The Cowboy Water Crisis." He described irrigation as the largest human consumer of water in the west. In all of the nine western states examined, groundwater withdrawals for irrigation exceed 60 percent of the total groundwater use. In eight of the states, the withdrawals for irrigation exceed 70 percent. In six states, irrigation withdrawals exceed 80 percent. Agricultural commodities are grown with irrigation in the West that could be grown in states with adequate rainfall. Cattle are the agricultural commodity that is ubiquitous across the West. In spite of institutional impediments, water transfers are being made from agriculture to other uses. He emphasized that there are areas with obvious water resource problems in the



*From left to right, Tim Parker, moderator, and panel members Paul Massera, Abdul Khan, Dennis O'Connor, Tim Quinn, and Gina Bartlett.*

West; however, the amount of water currently used for irrigation leaves a certain slack in the water supply that calls into question the immediacy of a crisis, if it exists, as suggested by others.

### Statewide Planning Underground: Raising the Bar on Groundwater Management (Tim Parker)

Over the past several years, surface water has been in shorter supply and difficult to convey, especially due to Delta regulatory constraints. Within the current environmental and regulatory framework and state budget, only limited additional surface water reservoirs are possible, placing a much greater emphasis on groundwater storage as the means for increased water supply reliability. To increase groundwater storage, better information is needed on many of our groundwater basins, including groundwater level trends and quality, aquifer matrix mineralogy, storage capacity and potential for water quality degradation. Increasing groundwater storage requires adequate groundwater management to assure a safe, reliable supply; success in some basins will require raising the bar on groundwater management. **Tim**

**Parker** of Parker Groundwater provided a short rendition of CA's water geography and history: most precipitation falls in the north; most water demand is in the south; the demand is in the spring and summer; and precipitation occurs in late fall and winter. To meet this geographic and temporal imbalance in demand and supply, federal, state and local governments have built reservoirs and conveyance to store and move water from north to south to meet demands and help alleviate groundwater overdraft. With recent cutbacks on Colorado River supplies and reductions in Delta conveyance, the picture is gloomy.

**Paul Massera**, DWR lead on the California Water Plan Update 2013, discussed the expansion of groundwater's role in the plan. A new Groundwater Caucus has been established, and new elements of the plan are being created, including: integration of CA's groundwater data; summary narratives on groundwater conditions, institutional frameworks, and management activities; site-specific examples of groundwater conditions and management activities; quantification of change in groundwater storage; case studies showing detailed groundwater

*Continued on the following page...*

## California's Water Future Goes Underground – Continued

budgets that demonstrate the benefits of groundwater data; and inventory and description of the potential for conjunctive management of groundwater and other supplies.

**Abdul Khan** of DWR discussed a new issue paper being developed on annual change in storage and groundwater overdraft in CA. DWR defines annual change in groundwater storage as the estimated change in the volume of groundwater during a single year resulting from inflows to and outflows from the groundwater system. DWR defines groundwater overdraft as the condition in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years, during which the water supply conditions approximate average conditions. The annual overdraft in CA has been estimated at 1 to 2.2 million acre feet in the DWR 118 and 160 bulletin series, and from 1.4 to 2.5 MAF based on USGS and DWR models and NASA-GRACE estimates. The DWR is developing a GIS-based tool to estimate change in storage in unconfined/semi-confined aquifers using spring-to-spring water-level data and applying available aquifer storage coefficients and aquifer delineations.

**Gina Bartlett**, Center for Collaborative Policy, discussed engaging stakeholders in groundwater management. The stages of collaboration include (1) assessing issues and concerns, (2) defining stakeholder roles in decision-making, (3) learning about groundwater issues and stakeholder interests together, (4) developing a groundwater management plan that includes negotiated basin management objectives, and (5) program implementation with collaborative input. Core elements of success were cited using the Sonoma Valley GMP as an example; these include defining rules of the game, having a credible technical consultant, and that lead agencies and other stakeholders develop the plan together.

**Dennis O'Connor**, Principal Consultant to the State Senate Natural Resources and Water Committee, discussed this Legislative process and how there appear to be problem areas in the state where groundwater management collaboration and consensus needs improvement. The Central Basin in Los Angeles was used as an example of an area where conflict is preventing the local agencies from progressing in achieving sustainability in groundwater management. Collaboration and cooperation are essential if local management is going to work; without these, other legislative approaches may be needed to address problem groundwater areas.

**Tim Quinn**, Executive Director of the Association of California Water Agencies, discussed the ACWA frame-

work for sustainability of groundwater management in CA. Its purpose is to highlight the many successful locally-driven innovative groundwater management programs, and to provide a policy foundation and recommendations for expanding successful efforts. Foundational themes of the ACWA groundwater framework include sustainability as a key policy goal of local management; that the local level is the appropriate place to provide sustainable management; and that sustainable management can only occur as part of a comprehensive approach that includes Delta conveyance improvements, additional surface water and groundwater storage, and investment in local resources development. An implementation plan is forthcoming. 💧

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## Dates & Details

### GRA EVENTS & KEY DATES

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

**GRA Board Meeting**  
Feb. 4, 2012 | Davis, CA

**GRA Emerging Contaminants Symposium**  
Feb. 7-8, 2012 | Concord, CA

**GRA Introduction to Groundwater & Watershed Hydrology Course**  
Feb. 28-29, 2012 | Davis, CA

**GRA Legislative Symposium & Lobby Day**  
Apr. 25, 2012 | Sacramento, CA

**GRA 21st Annual Meeting & Conference**  
Fall, 2012 | Northern CA

## SAVE THE DATE

# Compounds of Emerging Concern in Groundwater

FEBRUARY 7-8, 2012, CONCORD, CA

GRA has a long history of successful symposia on groundwater contaminants, and is pleased to announce this upcoming symposium on compounds of emerging concern in groundwater. This two-day event in Northern California will focus on key groundwater contaminants including hexavalent chromium, 1,2,3-TCP, 1,4-dioxane, perfluorinated compounds, nanomaterials and more. The symposium will feature presentations on the technical and institutional challenges posed by the presence of these compounds in the environment. Background information including history of use, sources in the environments, nationwide occurrence, analytical methods, environmental fate and transport, and technologies for removal from soil and groundwater will be presented for compounds of emerging concern. Case studies focusing on demonstrated cleanup successes and failures will also be presented. Finally, standard of care issues and federal and state drinking water standards will be discussed.

Experts from academia, regulatory agencies, consulting, industry and the legal arena will participate in speaker and posters sessions that will be held in conjunction with the Symposium. Confirmed invited speakers include the following:

- **Dr. Sam Brock**, Air Force Center for Engineering and the Environment (Perfluorinated compounds)
- **Professor Arturo Keller**, UCSB (nanomaterials)
- **Dr. Nicole Blute**, ARCADIS (chromium)
- **Leah Walker**, CA Department of Health Services (chromium)
- **Professor Shaily Mahendra**, University of California, Los Angeles (1,4-dioxane)
- **Dr. Jeffrey Wong**, California Environmental Protection Agency, Department of Toxic Substances Control (nanomaterials)
- **Dr. Andy Eaton**, MWH (chromium)
- **Dr. Bruce Macler**, US EPA Region 9 (regulatory perspective on compounds of emerging concern)
- **Tom Mohr**, Santa Clara Valley Water District (1,4-dioxane)
- **Dr. Jody Shoemaker**, US EPA's National Exposure Research Laboratory (analytical challenges associated with compounds of emerging concern)

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## GRA SPONSORED EVENT

# 2012 North American Environmental Field Conference & Exposition

FEBRUARY 7-10, 2012 – SAN DIEGO, CALIFORNIA

The Nielsen Environmental Field School is pleased to announce the 2012 North American Environmental Field Conference & Exposition, scheduled for February 7-10 at the Marriott Courtyard at Liberty Station in San Diego, CA. The complete schedule of presentations for the Conference is posted on the event web site at [www.envirofieldconference.com](http://www.envirofieldconference.com).

The Conference is presented by The Nielsen Environmental Field School, and sponsored by the American Institute of Hydrology, the American Institute of Professional Geologists, ASTM International, the Groundwater Resources Association of California, The University of South Florida Water Institute, Princeton Groundwater, and CRC Press/Taylor & Francis Publishers. Past events have attracted more than 2700 environmental professionals from around the world. Representatives from 19 different countries attended the 2011 Conference in San Diego, CA.

The Conference features a unique combination of presentations focused on the theme of the meeting, "Advances and Innovations in Environmental Site Characterization, Sampling, Monitoring and Remediation Technology," including:

- More than 60 hours of interactive indoor workshops at each location, discussing cutting-edge field-based environmental technology presented by the world's leading experts in their fields;
- More than 24 hours of hands-on, interactive outdoor workshops and equipment demonstrations at each location, featuring the latest environmental field methods and equipment;

- An educational Exposition featuring 40 indoor and outdoor exhibits of state-of-the-science environmental equipment and services at each location; and
- An active social calendar so Conference attendees can chat with the experts and make new friends.

Major subject areas covered by Conference presentations include: innovative and cost-effective environmental site characterization practices; the latest technology in vapor intrusion investigation and remediation; new developments in environmental sampling and field sample analysis; and advances in soil and ground-water remediation methods and technology.

**GRA members receive a special discount on registration and pay only \$750 (\$100 discount) through January 13, 2012.**

Detailed information on the Conference, including event schedules, event exhibitors and sponsors, and event registration and hotel accommodations can be found at the event web site or by e-mailing The Nielsen Environmental Field School at [info@envirofieldschool.com](mailto:info@envirofieldschool.com). 💧

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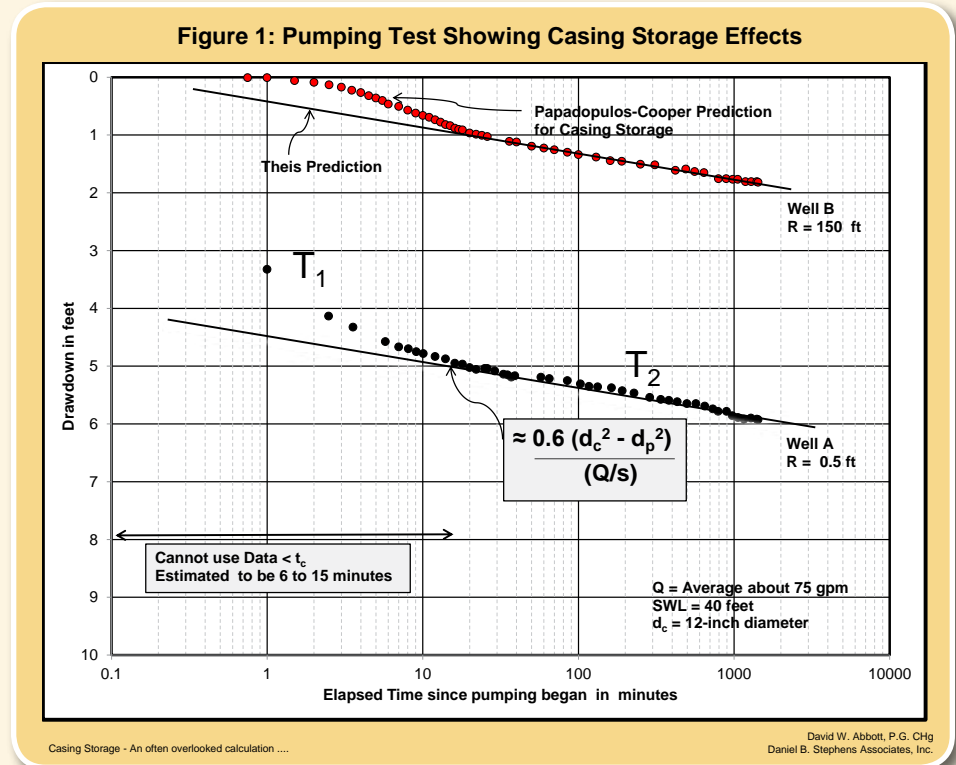
# Wells and Words

By David W. Abbott P.G., C.Hg., Senior Hydrogeologist, Daniel B. Stephens & Associates, Inc.

## Casing Storage – An often overlooked calculation that helps to interpret time-drawdown data from pumping tests

Recognition of casing storage, which affects the interpretation of early time-drawdown (t-dd) and time-recovery data, is essential for proper interpretation of pumping tests conducted on large-diameter wells and/or low-yield aquifers. The Theis and modified non-equilibrium well equations assume that the water removed from storage is discharged instantaneously with the decline in head and that the diameter of the well is relatively small<sup>1</sup>. If the diameter of the well is large, a portion of the water is pumped from casing storage and a portion from the aquifer, hence violating these assumptions. It is difficult, if not impossible, to establish the actual contribution of water from casing and aquifer. The response from a pumping test in a relatively large-diameter well and low transmissivity (T-value) will diverge from the expected drawdown response predicted by the Theis or modified non-equilibrium formulae. This deviation begins when the pump is first turned on (or off) and occurs until the t-dd curves coincide, at time  $t_c$ ;  $t_c$  depends on the volume of water stored in the well and the filter pack<sup>2</sup>, aquifer parameters, and well efficiency.

Incorrect evaluation of early t-dd data affected by casing storage can result in significant underestimation of the T-value, by a factor of four, and inaccurate recharge boundary interpretations of the remaining t-dd data. In 1967, a short and succinct paper by Papadopoulos and Cooper<sup>3</sup> addressed casing storage in large-diameter wells relative to aquifer permeability.



In 1978, Schafer<sup>4</sup> provided an easy method, accompanied by a clear explanation, for recognizing the effects and compensating for casing storage while analyzing a pumping test. Subsequent editions of *Groundwater and Wells*<sup>5</sup> summarize the influence of casing storage effects. The  $t_c$  is the time after pumping started (or stopped) where casing storage is estimated to have been depleted; the trend of the t-dd curve would then coincide with that predicted using the Theis non-equilibrium formula. The following two equations can be used to estimate  $t_c$ :

$$\text{time} = t_c = \left( \frac{375 \times (r_c^2 - r_p^2)}{T - \text{value}} \right) \text{days} = \left( \frac{0.6 \times (d_c^2 - d_p^2)}{\left( \frac{Q}{s} \right) @ t_c} \right) \text{minutes}$$

where  $r_c$  and  $r_p$  are the radius (feet) of the well casing and pump column, respectively; T-value is in gallons per day per foot (gpd/ft);  $t_c$  is in days (in first equa-

tion);  $d_c$  and  $d_p$  are the diameter (inches) of the well casing and pump column, respectively; and  $Q/s$  is the specific capacity (SC) in gallons per minute per foot of drawdown at time  $t_c$  (in minutes). If the T-value is known, then the first equation can be used; the second equation can be used if the SC at  $t_c$  is known. Note that the SC will converge rapidly within two or three iterations of the evaluation to a stable  $t_c$  (i.e., calculate  $t_c$  at the SC of  $t_1$ , yielding  $t_2$ ; determine the SC at  $t_2$  and re-calculate to determine  $t_c$  at  $t_2$ , yielding  $t_3$ ; continue until a stable value is reached).

Review of the equations indicates that low denominator values (low T-value or low SC) and/or large

diameters will result in large  $t_c$ ; this can affect the interpretation of early t-dd data at times less than  $t_c$ . All pumping

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## Wells and Words – Continued

test data from the pumping well (and, incidentally, observation wells) should be ignored in the interpretation prior to  $t_c$ . Storativity calculations using observation wells are also affected by casing storage and should not be done.

**Figure 1** shows a classic response affected by casing storage. The pumping test was conducted in the mid-1980s and had been re-evaluated in 2011 for a client. The first evaluation concluded that the steep initial slope ( $T_1$ ) represented the aquifer T-value and the second slope ( $T_2$ ) was a recharge boundary that occurred from the discharge of water from the pumping well to a nearby stream – a common mistake. Evaluation of  $t_c$  suggests that much of the drawdown data prior to 15 minutes were affected by casing storage.  $T_2$  represented a value of about 40,000 gpd/ft, or four times greater than the original estimate,  $T_1$ . This re-evaluation and correct interpretation

of the pumping test data reduced project costs because a repeat pumping test was not needed to clarify aquifer parameters. Note in Figure 1 that the observation well located 150 feet from the pumping well revealed the same casing storage effect. In general,  $T_2$  is equal to about four times  $T_1$  and is also affected by the well efficiency.

The  $t_c$  calculations and formulae are simple and easy to memorize. Time-drawdown data for all pumping tests should be routinely evaluated for casing storage, especially for aquifers that have low yields, low specific capacities, or small T-values and/or relatively large-diameter casing. Note that David C. Schafer, a long-time friend and colleague, has contributed to GRA courses as an instructor on low-yield aquifers, explaining casing storage in more detail (June 1992 and April 2004). 💧

<sup>1</sup> Kruseman, G.P. and N.A. de Ridder, 1991, *Analysis and Evaluation of Pumping Test Data* (2nd edition), International Institute for Land Reclamation and Development, Wageningen, the Netherlands, p. 56 and p. 175 to 179.

<sup>2</sup> Sterrett, Robert J. (editor), 2007, *Groundwater and Wells* (3rd edition), Johnson Screens, New Brighton, Minnesota, p. 227 to 231; also see Appendix 6.Q for original Schafer (1978) paper.

<sup>3</sup> Papadopoulos, I.S. and H.H. Cooper Jr., 1967, Drawdown in a Well of Large Diameter, *Water Resources Research*, First Quarter, Vol. 3, No. 1, p. 241 to 244.

<sup>4</sup> Schafer, David C., 1978, Casing Storage Can Affect Pumping Test Data, *The Johnson Drillers Journal*, January-February edition, p. 1 to 5 and p. 10 to 11.

<sup>5</sup> Driscoll, Fletcher G. (editor), 1986, *Groundwater and Wells* (2nd edition), Johnson Division, St. Paul, Minnesota, p. 232 to 235.



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## Legislative Update

By Tim Parker, GRA Legislative Committee Chairman,  
Chris Frahm and Duncan McFetridge, GRA Legislative Advocates

This was another very busy year for GRA in the Capitol, including sponsorship of two groundwater bills passed by the Legislature and signed into law by Governor Brown. The Legislative Committee and its advocates tracked more than 20 bills on water and groundwater management issues.

GRA also conducted another highly successful Legislative Symposium and Lobby Day in the Capitol: *Back to the Future of California Groundwater – Improving Management of the State’s Groundwater Resources*. This year’s presenters included the Speaker of the Assembly, the Secretary of Resources, the Chair of the Senate water committee and many other key members of the Legislature and Administration. The Legislative Symposium provides a unique opportunity for GRA members to hear from and talk directly to the legislators and policymakers at the forefront of California groundwater law and policy. With last year’s event sold out, we recommend that you hold the date for next year’s event:

Legislative Symposium  
and Lobby Day  
APRIL 25, 2012

### GRA Sponsored and Supported Legislation

- **AB 359 (Huffman)** – GRA sponsored AB 359, requiring the mapping of groundwater recharge areas and greater coordination with local planning agencies. Following a relatively smooth sail through the Legislature, Governor Brown signed AB 359 into law on October 8, 2011. GRA members will recall that an earlier version of the bill,

also authored by Assemblymember Huffman, was vetoed by Governor Schwarzenegger last year.

- **AB 1152 (Chesbro/Cook)** – GRA co-sponsored AB 1152, correcting deficiencies in the groundwater monitoring legislation passed as part of the 2009 water bill package. The bill allows an “alternative monitoring” process for specified types of groundwater basins, including those where (1) groundwater elevations are unaffected by current or planned land use activities, or naturally occurring total dissolved solids within the groundwater preclude the use of that water; (2) the basin is underlying land that is wholly owned or controlled, individually or collectively, by state, tribal, or federal authorities, and groundwater monitoring information is not available; or (3) the basin is underlying an area where geographic or geologic features make monitoring impracticable, including, but not limited to, a basin or sub-basin that is inaccessible to well-drilling equipment. Having been instrumental in the passage of the 2009 groundwater monitoring legislation, a number of stakeholders asked for GRA’s help and sponsorship of this legislation. Governor Brown signed AB 1152 into law on September 9, 2011.
- **SB 263 (Pavley)** – Strongly supported by GRA in its initial form, SB 263 would have made well logs public information, as it is in other western states. Senator Pavley and her staff are extremely appreciative of GRA for the technical and political assistance provided to her staff on the bill. GRA’s Legislative Committee Chairman, Tim Parker, and board member and GRA past-President Jim Strandberg, testified in committee in sup-

port of the bill and helped move the bill through the legislature. Very late in the process, SB 263 was amended on the Assembly Floor to delete the requirement for public disclosure and instead make well logs available to specified groups and individuals only. As amended, the bill also prohibited certain disclosures and made a knowing violation a misdemeanor crime subject to up to \$25,000 per day of each violation, imprisonment in a county jail for not more than one year, or both. GRA did not support these amendments.

Governor Brown vetoed SB 263 as passed by the Legislature, stating “The original intent of this bill recognized that wise management and use of groundwater supply requires public disclosure of well logs. Unfortunately, as amended, this bill now unduly restricts the use of these reports and imposes severe criminal penalties for disclosure. California is the only western state that does not provide ready access to well reports. That should be changed. I am directing the Department of Water Resources to work with the author to ensure responsible public access to well logs.”

GRA has recently met with Senator Pavley and her staff. We believe Senator Pavley will remain dedicated to passing the earlier version of SB 263 – so stay tuned.

### Legislative Awards

GRA presented Legislative Leadership awards at its Annual Meeting honoring **Senator Pavley** and **Assemblymember Huffman** for their outstanding contributions promoting sound groundwater policy in California. As many of our members are aware, Senator Pavley Chairs the

*Continued on the following page...*

## Legislative Update – *Continued*

Senate Natural Resource and Water Committee, and Assemblymember Huffman Chairs the Assembly Water, Parks and Wildlife Committee. GRA has a strong working relationship with each of these key water committees and is frequently called upon to provide scientific and technical information in support of groundwater policy development.

### Gubernatorial Veto Facts

- Brown considered the lowest number of bills (870) of any Governor since the California Constitution was changed to disallow the pocket veto in 1966 (Proposition 1A)
- Brown vetoed a higher percentage in 2011 (14.4 percent) than any of his prior years as Governor
- Brown's veto percentage is only slightly above the average since 1967 (13.8 percent)
- Deukmejian and Schwarzenegger still hold the record for the most bills vetoed in a year, 436 (1990) and 414 (2008), respectively.

### Looking Ahead

As noted in previous issues, 2012 is shaping up to be a big year for water policy. The Governor and Legislature are facing enormous pressure to rework and limit the size of the water bond. In addition, historically challenging issues, including Delta Conveyance and related water financing proposals, will be before the Governor and the Legislature starting in January. GRA will be at the table as these important issues are deliberated. 💧

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## The Federal Corner

By Kelly Manheimer, U.S. EPA

### FY 2013 SERDP Solicitations Released

The Department of Defense's Strategic Environmental Research and Development Program (SERDP) is seeking environmental research and development proposals for funding beginning in Fiscal Year (FY) 2013 in response to the Core and SERDP Exploratory Development (SEED) solicitations. Projects will be selected through a competitive process. Details for both Federal and non-Federal submissions are available on the web site under Funding Opportunities at [www.serdp-estcp.org/Funding-Opportunities/SERDP-Solicitations](http://www.serdp-estcp.org/Funding-Opportunities/SERDP-Solicitations).

### New EPA Publication

EPA has published *A Primer on Using Biological Assessment to Support Water Quality Management*. This technical document serves as a primer on the role of biological assessments in a variety of water quality management program applications including reporting on the condition of aquatic biota, developing biological criteria, and assessing environmental results of management actions. The primer provides information on new technical tools and approaches for developing strong biological assessment programs and examples of application of biological assessment information by states and tribes. Here's the link to the [publication](#).

### EPA Announces Schedule to Develop Natural Gas Wastewater Standards

The EPA has announced a schedule to develop standards for wastewater discharges produced by natural gas extraction from underground coalbed and shale formations. No comprehensive set of national standards exists at

this time for the disposal of wastewater discharged from natural gas extraction activities, and over the coming months, EPA will begin the process of developing a proposed standard with the input of stakeholders – including industry and public health groups. The announcement is in line with the priorities identified in the president's Blueprint for a Secure Energy Future, and is consistent with the Secretary of Energy Advisory Board recommendations on steps to support the safe development of natural gas resources. For more information: <http://water.epa.gov/lawsregs/lawsguidance/cwa/304m/>

### EPA Proposes to Collect Information about Concentrated Animal Feeding Operations

On October 14, EPA proposed that concentrated animal feeding operations (CAFOs) submit a specific set of basic operational information so the Agency can more effectively carry out its CAFO permitting programs on a national level and ensure that CAFOs are implementing practices to protect water quality and human health. The proposal, which is part of a settlement agreement reached with the Natural Resources Defense Council, Waterkeeper Alliance, and the Sierra Club, will be open for public comment for 60 days after publication in the Federal Register. The National Pollutant Discharge Elimination System (NPDES) requires that CAFOs obtain a permit from EPA or authorized states before discharging any pollutants from their operations into a water of the United States. EPA's proposal does not change which CAFOs need permits under NPDES. For more information: <http://cfpub.epa.gov/npdes/afo/aforule.cfm>

### EPA is providing Training Webinars for the Water Sector on the Climate Resilience Evaluation and Awareness Tool

The Climate Resilience Evaluation and Awareness Tool (CREAT) supports water sector utilities in conducting climate related risk assessments, evaluating adaptation options, and understanding climate threats. EPA is currently delivering a nine-webinar series of training materials for CREAT that will continue through November 15 including: CREAT 101, an introduction to the tool; CREAT 201, an overview of setup steps and climate science information within the tool; and CREAT 202, an overview of the analysis and reporting functions within the tool. These training webinars provide water sector utilities with a detailed understanding of how climate change may impact utility facilities and operations, encouraging wider adoption of climate related risk assessments and adaptation plans. To register for the webinars online, visit: <https://www.thetestportal.com/CREAT>. You can also download the tool on the Climate Ready Water Utilities (CRWU) web page at: <http://water.epa.gov/infrastructure/watersecurity/climate/>

### New Mercury Report

The Biodiversity Research Institute along with the Great Lakes Commission and U of WI-Lacrosse today released a report summarizing a major research effort: Great Lakes Mercury Connections: *The Extent and Effects of Mercury Pollution in the Great Lakes Region*. This report comes out of a binational scientific synthesis effort funded through OAR's GLAD Program. The purpose of the synthesis project was to compile a wide variety

*Continued on the following page...*

## The Federal Corner – Continued

of mercury data for the Great Lakes region and to address key questions concerning mercury contamination, the bioaccumulation of methylmercury in food webs, and the resulting exposures and risks. The report, a summary, and a press release are available at <http://www.briloon.org/mercuryconnections/GreatLakes>

### New EPA Summary of Fish Advisories Across the U.S. in 2010

The EPA has published a fact sheet summarizing the National Listing of Fish Advisories for 2010. As in previous years, states continued to increase their monitoring and assessment activities related to contaminants in noncommercial fish. EPA believes the increase in monitoring—rather than changes in contaminant levels—is the main reason for the continued upward trend in the amount of U.S. waters placed under advisory. See [http://water.epa.gov/scitech/swguidance/fishshellfish/fishadvisories/advisories\\_index.cfm](http://water.epa.gov/scitech/swguidance/fishshellfish/fishadvisories/advisories_index.cfm).

### Northern California Coast Groundwater Quality Study Data Released

Groundwater quality was tested in Napa, Lake, Mendocino, Glenn, Humboldt, and Del Norte Counties. In total, 239 natural and man-made compounds and 12 field groundwater-quality indicators were measured.

The study was conducted by the USGS from June to November 2009, as part of the California State Water Resources Control Board (SWRCB) Groundwater Ambient Monitoring and Assessment (GAMA) Program. See “[Groundwater-Quality Data in the Northern Coast Ranges Study Unit, 2009: Results from the California GAMA Program.](#)”

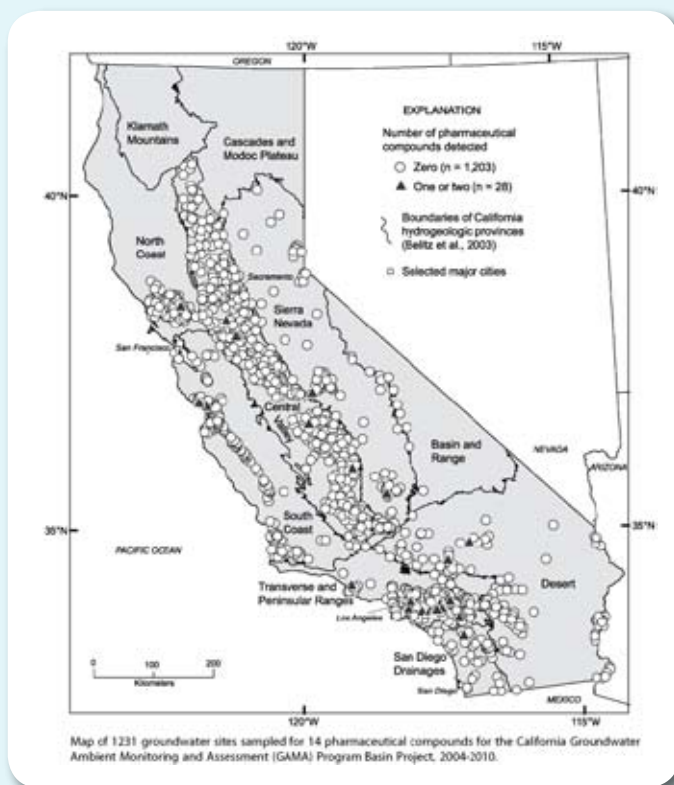
### Pharmaceutical Compounds Found at Low Levels in Some California Aquifers

USGS scientists detected low concentrations of pharmaceutical compounds in groundwater samples



from 2.3 percent of tested aquifers used for drinking water in California. Pharmaceuticals were detected more frequently in urban areas according to results reported in “[Occurrence and concentrations of pharmaceutical compounds in groundwater used for public drinking-water supply in California.](#)” The most frequently detected pharmaceutical was carbamazepine (a prescription medication used mainly as a mood stabilizer or anti-seizure medication). Other compounds detected were the analgesics acetaminophen and codeine, the antibiotics sulfamethoxazole and trimethoprim, and caffeine, plus a metabolite of caffeine, p-xanthine. This study is one of several statewide synthesis studies that use data from the SWRCB’s GAMA Program’s Priority Basin Project, conducted by the USGS.

*Kelly Manheimer is an Environmental Engineer at the U.S. Environmental Protection Agency, Region 9. She works in the Superfund Division and oversees cleanup activities at several Superfund sites in CA. For information on any of the above topics, please contact Kelly at 415-972-3290 or [manheimer.kelly@epa.gov](mailto:manheimer.kelly@epa.gov).*





# Is Organic Food Good for Goundwater?

By Bart Simmons

The popularity of organic food is soaring. Not only stores like Whole Foods, but also major supermarket chains offer organic food, at least as an alternative to conventionally-farmed food. Comparing the environmental impacts of organic food versus conventionally-farmed food is complex, and requires the use of life-cycle assessment (LCA). Remarkably few studies have made this comparison; however, the published studies do provide some perspective.

Organic food production uses no synthetic pesticides, and the detectable residues of pesticides in organic produce (about 10%) are less than in conventional food (about 40%). Past pesticide applications have contaminated groundwater, e.g., aldicarb in groundwater near potato fields in Long Island, plus dibromoethane and 1, 2 dibromochloropropane in California groundwater. However, current pesticide regulation has greatly reduced the risk posed by persistent and mobile pesticides.

The Manchester Business School published a study for the UK Department for Environment Food and Rural Affairs (Defra) which examined the environmental effects of organic and conventionally-farmed food production and post-retail activities. Their main findings included the following: compared with conventional farming, organic farming generally requires more land, less pesticide use, has greater global warming potential (GWP), tended to have more water and eutrophication effects, but less energy input. For example, conventional milk production has an eutrophication potential (EP) of 6.3 g  $\text{PO}_4^{3-}$  equiv. per liter of milk, whereas organic milk production has an EP of 10.3 g  $\text{PO}_4^{3-}$  equiv. per liter of milk. An LCA of lamb production found similar results: 200 g  $\text{PO}_4^{3-}$  equiv. per pound of meat versus 594 g for organic lamb.

Organic food production produces more nitrate leaching and emissions of nitrous oxide to the atmosphere, so both GWP and eutrophication are higher than those for conventional food.

A major factor is the type of fertilizer used. Organic farming does not use synthetically produced ammonium nitrate, urea, or chemically processed phosphorus and potassium. Organic farming uses phosphorus and most potassium as directly extracted minerals, whereas phosphate is commonly used as triple or single super-phosphate in the non-organic sector because of the better availability of the nutrients in these forms. Nitrogen is by far the biggest difference, however, with organic nitrogen being derived by nitrogen fixation with crops like clover grass or other legumes. Cover crops are used much more in the organic sector

between cash crops with a major aim of reducing nitrogen losses. However, because of the greater use of land and the need for rotation crops, organic food has greater nitrate impacts.

Not only nitrate leaching, but also nitrous oxide emissions are greater for organic farming because of the lower yield and the need for cover crops between cash crops.

Organic food is certainly popular, but the environmental benefits have not been demonstrated. It appears that organic food production has detrimental effects on groundwater, as well as other potential environmental effects. Finding truly sustainable technologies will require a thorough examination of the data, and not just perceptions of what is greener.

Bart Simmons can be reached at [bartonps@aol.com](mailto:bartonps@aol.com).



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## Indian Wells Valley

By Elizabeth Babcock, Historical Society of the Upper Mojave Desert

The glimpses of early 20th-century life found in the Joseph Barlow Lippincott collection of the Water Resources Collections and Archives have a special significance to residents of the Indian Wells Valley, a desert land encompassing the communities of Ridgecrest, China Lake, and Inyokern and located along the eastern scarp of the Sierra Nevada about 150 miles north of Los Angeles.

The history of our valley may be viewed as having three major segments. For thousands of years, nomadic tribes moved through here, hunting antelope, harvesting piñon nuts, and creating petroglyphs (today preserved on the military reservation at China Lake as North America's largest collection of Native American rock art).

The second segment had a dramatic beginning as construction workers for the Los Angeles Aqueduct erected temporary cities here and brought in workers, many of whom ended up staying on as ranchers and miners.

The third segment began even more dramatically in late 1943 when thousands of workers arrived here almost overnight to establish a Navy rocket research, development, and testing program. More sophisticated versions of that work are still going on today at the massive Naval Air Weapons Station, China Lake.

It is the start of that second segment that Lippincott and his crew documented so beautifully. We in the Historical Society of the Upper Mojave



*The image "Horses with Packs of Supplies" was taken from the Joseph Barlow Lippincott collection courtesy of the Water Resources Collections and Archives at the University of California, Riverside.*

Desert are proud to say that our newly revised publication, *Indian Wells Valley Stage and Freight Stops 1874-1906*, will include 16 photographs from the Lippincott collection, including several of the Coyote Holes Stage Station, home of Freeman Raymond, our valley's first homesteader, who in 1894 received 160 acres of land near what would turn out to be the aqueduct's route through the Sierran foothills.

The 1994 edition of *Stage and Freight Stops* was illustrated only using photographs taken in 1905-06 by stagecoach driver Everett D. Grose as he traveled along the stagecoach route through our

valley. Although we treasure these photographs, their technical quality is poor. Before we discovered the Lippincott collection, we had resigned ourselves to being able to offer only obscure views of this important part of our history.

The current version of *Indian Wells Valley Stage and Freight Stops 1874-1906* is still in preparation, but we expect to have it available within the next several weeks. To learn more about getting a copy, please send me an e-mail at [lizbab@iwvisp.com](mailto:lizbab@iwvisp.com), visit the Historical Society website at [www.hsumd.org](http://www.hsumd.org), or call the Society at 760-375-8456. 💧



## Core Succeeds – UST Fund Gets Extra \$180 Million for Two More Years

On October 8, 2011, Governor Brown signed a bill that will support more UST cleanups across California. AB291 adds \$90M to the UST Cleanup Fund (Fund) in both 2012 and 2013. AB291 is the only bill in 2011 to have met the required 2/3rds vote of the California Legislature for bills that collect fees. In a rare display of bipartisan effort, this bill and related legislation (AB358) were supported by both Democrats and Republicans.

In this time of recession and political angst, the story of AB291 is a lesson in how “good government” legislation can help fix environmental problems in California. The California legislature enacted the Barry Keene UST Act in 1989. This Act, funded by a fee on gasoline sales, provides \$1 million of financial assurance for operators of fuel USTs, and up to \$1.5 million for investigation and cleanup of releases of petroleum fuels. Responsible parties/claimants hire environmental consultants to do cleanups and make reimbursement requests to the Fund for cleanup costs. From 1989 to 2009, the Fund paid out over \$1 billion for cleanups.

By 2004, the Fund found reimbursement requests for UST cleanups were exceeding the collected fees. By 2009 the Fund could no longer meet the reimbursement demand, and suspended over 1,000 class “C” claims. To provide more funds and help reinstate the suspended claims, the California Independent Oil Marketers Association (CIOMA) helped pass legislation, AB1188, which increased the gasoline fee by 0.6 cent for two years (2010 and 2011).

With the extra fee scheduled to cease December 31, 2011, CORE Environmental Foundation, Inc.—a nonprofit 501(c)(3) corporation representing environmental consultants, property/UST owners, regulators and environmental vendors—anticipated another financial crisis and started working on a solution. In 2009 the State Water Board appointed a CORE representative to the UST Cleanup Fund Advisory Group, which met monthly in Sacramento. In 2011, CORE Environmental Reform, Inc., a nonprofit 501(c)(5) corporation, asked Assemblyman Bob Wieckowski (D-Fremont), Chair of the Assembly Environmental Safety and Toxics Committee, to sponsor AB291 to extend the 0.6 cent fee increase two more years, to December 31, 2013.

The major oil companies, through the Western States Petroleum Association (WSPA), opposed AB291. CIOMA members also would not support extending the gasoline fee. CIOMA acknowledged the benefit of additional money for the Fund, but was concerned that extending the fee increase would reduce the pressure for regulatory change, such as passage of the Low Threat UST Closure Policy under consideration by the State Water Board.

CORE continued to lead on UST Fund solvency with AB291, so it began meeting with legislators and representatives of CIOMA, WSPA, and the California Association of Environmental Health Administrators (CAEHA). CORE representatives testified at hearings in the Assembly and the Senate. CIOMA eventually supported AB291 when it was “double-joined” with its bill (AB358) that

streamlined regulatory authority and policies for case closure. WSPA also withdrew its opposition. The Assembly and the Senate passed AB291 by over 80%. Senator Joe Simitian, Chair of the Senate Environmental Quality Committee, said at the Committee’s hearing on AB291: “It is refreshing to see a bill this year that has bipartisan support, and you are to be commended for it.”

CORE is currently working on additional UST Program and Cleanup Fund legislation. A hearing was scheduled for November 30, 2011, and CORE is looking for success stories where money from the UST Cleanup Fund helped avoid blighted property or helped small businesses stay in business. If you have such a success story, please contact CORE.

CORE’s website is [www.coreenvironmental.org](http://www.coreenvironmental.org). CORE will continue to support reforms of the UST Cleanup Fund and the UST Cleanup Program, and finding solutions to the PCE dry cleaner problem. CORE’s success depends on volunteers, donations, and members; please contact CORE if you can contribute. 💧

# Presentation of Groundwater Resources Association 2011 Lifetime Achievement Award to Joseph C. Scalmanini

On October 6, 2011, Joseph C. Scalmanini, P.E. was presented with the Groundwater Resources Association of California's Lifetime Achievement Award. GRA's Lifetime Achievement Award is presented to individuals for their exemplary contributions to the groundwater industry and for contributions that have been in the spirit of GRA's mission and organization objectives, including the management, protection and improvement of groundwater. These individuals are pioneers in their field of expertise. In recognizing these attributes and more, the award presented to Mr. Scalmanini read:

*"In Recognition of Extraordinary Contributions to Groundwater Development and Management, and for his Unparalleled Abilities in Solving Complex Water Problems Facing California."*

Mr. Scalmanini was nominated by a very diverse group of 29 signatories to a letter transmitting the application package. Following news of the nomination, countless others corresponded with the key organizers of the nomination (Rob Donlan and Chris Sanders of Ellison, Schneider and Harris LLP) to indicate they too supported his nomination. He has been at the forefront of California groundwater issues for more than 40 years, and his body of work epitomizes GRA's mission and organization objectives of professional development, policy formulation and education regarding California's groundwater resources. Throughout his career, Mr. Scalmanini has conducted himself with the highest ethical character and civility.



*Joseph C. Scalmanini, third from left, shares his GRA 2011 Lifetime Award with (left to right), Kevin O'Brien, son John Scalmanini, daughter Jenna Scalmanini, wife Mary Hendrickson and Chris Sanders. Unable to attend is daughter Annie Scalmanini.*

He has been and continues to be one of the most sought after groundwater experts in California because of his comprehensive understanding of groundwater and hydrogeology, and his unparalleled ability to assist others to understand these complex issues. His work has involved the majority of the groundwater basins in the State, and he has served the courts in a number of groundwater basins, including acting as basin engineer and technical advisor, among other roles.

Since 1974, Mr. Scalmanini has taught groundwater education for practitioners, attorneys and water management personnel, primarily through the University Extension courses of the University of California at Davis. For the past twelve years, he

has co-taught a course on Groundwater Law and Hydrology with Kevin O'Brien, attorney with Downey Brand LLP, the most recent of which was conducted in November 2011. He also has educated many of the water attorneys and groundwater engineers in the state on the intricacies of groundwater hydrology and hydrogeology. Over the length of his career, he has been actively involved in many of the major technical and policy debates concerning groundwater and legal classification of groundwater.

Mr. O'Brien and Mr. Sanders presented the award to Mr. Scalmanini. Following are highlights of their remarks.

*Continued on the following page...*



## Presentation of GRA 2011 Lifetime Achievement Award to Joseph C. Scalmanini – *Continued*

### Kevin O'Brien – Highlights

"Over the years Joe has served as my lead expert witness for several major groundwater lawsuits. He is unique in his ability to explain complex technical issues in a manner that judges and juries can understand. I am convinced that if Joe had not pursued a career as a consulting engineer he would have taught engineering at a leading university. He is a great teacher. One veteran trial lawyer from a major San Francisco law firm described Joe as the 'best expert witness he had ever seen on the witness stand.'

Although Joe and I have enjoyed our work together in the litigation context, I know that he is most proud of the projects he has been instrumental in implementing that have solved real problems and helped real people. First on this list is the Salinas Valley Water Project. Joe was instrumental in the early conceptualization of this project which is now being implemented by the Monterey County Water Resources Agency. This project, once fully implemented, will address the critical issue of sea water intrusion into the Salinas Valley Groundwater Basin.

Finally, a few comments on Joe the man. Over the years Joe and I would often speak to each other by phone late in the day during our commutes. While we would sometimes discuss work, as often as not these conversations would focus on children, family and life in general. For although Joe Scalmanini is a great engineer he is first and foremost a great human being and his family is the centerpiece of his life."

### Chris Sanders – Highlights

"I'd like to talk about the 'education' aspect of Joe's career. I'd be willing to bet that there are very few people in this audience that have not been directly or indirectly affected by Joe's teachings. Joe has a unique ability to take a complex subject matter and make it understandable. His informal education or 'schoolings,' however, are where his real forte lies.

I have been involved in California groundwater for almost 25 years but in almost every conversation I have with Joe I learn something new. As a result, quite frequently I hear 'that's not quite right' or even 'you're wrong.' However, that's not a bad thing, because it is always followed up with an understandable explanation of why I am wrong. Occasionally I hear 'you're right' - always followed up with 'but for the wrong reasons.' And, that's okay too, since I know that I am going to learn something new with the upcoming explanation. Fortunately, I am not the only one that has heard this.

I am also fortunate that I have not been an opposing counsel to Joe in any proceeding since Joe looks at these as opportunities to 'educate' opposing counsel. While it may be urban legend that Joe once took a full four hours to answer a single question from an opposing counsel during a deposition, I have been witness to an answer of more than an hour to an opposing counsel's question who obviously Joe thought needed an education.

For as much as I am a fan of Joe's groundwater tutelage, it may be his education of 'life' that stands out even more. Anybody that has spoken at length with Joe knows that while his profession is important, nothing is more important than family. Joe is accompanied today by his incredible family."

For the above reasons and many others, Mr. O'Brien and Mr. Sanders, along with a long list of other nominators and supporters of his nomination, described why Mr. Scalmanini is very deserving of GRA's 2011 Lifetime Achievement Award. Attendees echoed their agreement with a resounding standing ovation as Mr. Scalmanini went to the stage to make his acceptance speech.

Attendees listened with rapt attention and uncommon quietness filled the banquet room as Mr. Scalmanini gave his heartfelt thanks and great appreciation for being the recipient of the GRA 2011 Lifetime Achievement Award. His full citation is posted at [http://www.grac.org/Acceptance\\_Speech\\_JCS.pdf](http://www.grac.org/Acceptance_Speech_JCS.pdf). Attendees gave another warm, very enthusiastic standing ovation when he finished his speech.

Joseph C. Scalmanini shared the occasion of the receipt of the Lifetime Achievement Award with his family, including his wife Mary Hendrickson, son John Scalmanini, and older daughter Jenna Scalmanini. His younger daughter Annie Scalmanini was unable to attend, but later shared time with him watching the video of his speech captured by John and Jenna. 💧

## GRA Recognizes the Sacramento County Environmental Management Department for its Abandoned Well Program with the 2011 Kevin J. Neese Award

The Sacramento County Environmental Management Department was selected for its Abandoned Well Program. The Program identifies and properly closes abandoned, unused water wells. Such wells may be conduits for groundwater contamination; many older hand-dug wells and open casings pose a physical falling-in hazard. It is the property owner's responsibility to properly close abandoned wells. Properly sealing abandoned wells protects groundwater quality and mitigates safety hazards. Also, because of the County's outreach efforts, the public has become more aware of the presence and potential



liabilities of abandoned wells. This awareness has resulted in substantial savings to prospective property buyers, especially in cases of foreclosed and/or bank-owned properties where the buyers and sellers may be unaware of the existence of abandoned wells. Val Siebel, Director of the Sacramento County Environmental Management Department, accepted the award on behalf of the Department. 💧

*Val Siebel, right, accepts the 2011 Kevin J. Neese Award from GRA president William Pipes on behalf of the Sacramento County Environmental Management Department.*

## GRA 2011 Legislative Leadership Awards Presented to Senator Fran Pavley and Assembly Member Jared Huffman

Senator Pavley and Assembly Member Huffman were honored for their outstanding contributions promoting sound groundwater policy in California. Senator Pavley is Chair of the Senate Natural Resource and Water Committee and Assembly Member Huffman is Chair of the Assembly Water, Parks and Wildlife Committee, the two key water committees at the state capitol. GRA has found

both of these legislators and their committees exceptional to work with and to disseminate scientific and technical information in support of groundwater policy development.

Dennis O'Connor, Chief Consultant to the California Senate Committee on Natural Resources and Water, accepted the award on behalf of Senator Pavley.

Tina Leahy, Water Policy Consultant for the Assembly Water, Parks and Wildlife Committee, received the award on behalf of Assembly Member Huffman. 💧

*Dennis O'Connor, center, accepts the GRA 2011 Legislative Leadership Award from GRA president William Pipes, left, and GRA Legislative Committee chair Tim Parker, right, on behalf of CA Senator Fran Pavley.*



*Tina Leahy, center, accepts the GRA 2011 Legislative Leadership Award from GRA president William Pipes, left, and GRA Legislative Committee chair Tim Parker, right, on behalf of CA Assembly Member Jared Huffman.*

## David K. Todd Distinguished Lecturers for 2012

GRA proudly announces the speakers for the second year of its David Keith Todd Distinguished Lecture Series. **Dr. John A. Cherry** (northern California) and **Dr. William Alley** (southern California) have enthusiastically accepted the 2012 David Keith Todd Lectureship. The objective of this program, initiated in 2011, is to foster interest and excellence in applied groundwater science and technology through GRA-sponsored lectures at California universities and at local and statewide GRA events. This objective furthers a key GRA objective, which is to develop scientific educational programs that promote the understanding and implementation of groundwater assessment, protection, and management.

GRA held Dr. David Keith Todd in the highest esteem for his enormous contributions to groundwater science and technology and awarded him GRA's Lifetime Achievement Award. We pay tribute to his legacy as a groundwater science and education leader by naming the series in his honor. Lecturers for this series go through a nomination and evaluation process that ensures qualified individuals are selected to represent GRA and David Keith Todd's legacy.

Dr. Cherry will generally give presentations in northern California, and Dr. Alley will generally give presentations in southern California. Each lecturer will provide a minimum of five lectures, including lectures at two GRA Branch Meetings and two academic institutions along with a "wrap-up" lecture at GRA's Annual Conference and Meeting held in the fall. Lecture Series funding comes from sponsors, voluntary support from the lecturer's institution, organization or firm, and support from the universities hosting the lecturer. Universities that are interested in hosting a lecture should contact Dr. Thomas Harter ([ThHarter@ucdavis.edu](mailto:ThHarter@ucdavis.edu)) no later than December 31, 2011. Look for the Lecture Series schedule to be posted on GRA's website and Facebook page.



**John A. Cherry, Ph.D.**, is Director of the University Consortium for Field-Focused Groundwater Contamination Research and Adjunct Professor, University of Guelph. Dr. Cherry holds geological engineering degrees from the University of Saskatchewan and the University of California, Berkeley and a Ph.D. in hydrogeology

*Dr. John Cherry receiving GRA's Lifetime Achievement Award in 2010*

from the University of Illinois. He joined the faculty at the University of Waterloo in 1971 where his research focused on field studies of the migration and fate of contaminants in groundwater and groundwater remediation. He retired from the University of Waterloo in 2006 and was granted the title Distinguished Professor Emeritus in 2007. He co-authored the textbook "Ground Water" with R.A. Freeze (1979) and co-edited and co-authored several chapters in the book "Dense Chlorinated Solvents and Other DNAPLs in Groundwater" (1996). In addition to research concerning subsurface contaminant behavior, he has participated in development of several technologies for groundwater monitoring and remediation and co-holds several patents. He is a Fellow of the Royal Society of Canada and has received awards for groundwater contamination research from scientific and engineering societies in Canada, the United States and the U.K. He held the Research Chair in Contaminant Hydrogeology at the University of Waterloo (1996-2006). Dr. Cherry received GRA's 2010 Lifetime Achievement Award.



*Dr. William (Bill) Alley*

**William M. Alley, Ph.D.**, has served as Chief of the Office of Groundwater for the U.S. Geological Survey (USGS). Dr. Alley has published over 80 scientific publications, including the text *Regional Ground-Water Quality*. He has served on national and international committees for UNESCO and the National Research Council, as a Director for the National Ground Water Association (NGWA) Scientists and Engineers Division, on the U.S. National Committee of the International Association of Hydrogeologists, and as Associate Editor for *Ground Water* and the *Hydrogeology Journal*. Dr. Alley is a recipient of the NGWA John Hem Award, the USGS Shoemaker Award for Lifetime Achievement in Communication, the Department of Interior Distinguished Service Award, the Meritorious Presidential Rank Award, and the Groundwater Foundation E. Benjamin Nelson Government Service Award. He received a B.S. in Geological Engineering from the Colorado School of Mines, an M.S. in Hydrogeology from Stanford University, and a Ph.D. from the Johns Hopkins University. 💧



# GRA Welcomes the Following New Members

AUGUST 26 – NOVEMBER 22, 2011

Athorp, Eric  
Barkouki, Tammer  
Bartlett, Doug  
Beeler, Katherine  
Brandt, William  
Brownsberger, Rae  
Burt, Cynthia

Cablay, Alfred  
Christensen, Wes  
Connelly, Pete  
Cramer, Linda  
de Sieyes, Nick  
DeGross, Shane  
Eads, Lunde  
Fiack, Duran

Fong, Bryan  
Hastings, Nicole  
Hodny, Jay  
Jansen, John  
Kean, Mary  
Lamb, Beth  
LeBouef, Michael  
Matthew, Andrew  
McManus, Dan  
Mullaugh, Nathan  
Mulligan, James  
Newcomb, Nicholas  
Osterling, Eric  
Paradis, Charles  
Power, Matt  
Salinas, Jenny  
Schwartzbart, David

Kings River Conservation District  
Geosyntec  
Clear Creek Associates  
TechLaw, Inc.  
CSUMB  
Haley & Aldrich  
California State University,  
East Bay  
Alpha Enterprises  
University of California, Davis  
TechLaw, Inc.  
Cramer Environmental  
University of California, Davis  
Richard Brady & Associates  
Brown and Caldwell  
University of California,  
Santa Cruz  
Conestoga-Rovers & Associates  
Versar, Inc.  
W.L. Gore & Associates, Inc.  
Cardno ENTRIX  
Sustainable Silicon Valley  
NCRWQCB  
Instrumentation Northwest Inc.  
Conestoga Rovers & Associates  
Department of Water Resources  
Geosyntec Consultants  
City of Roseville  
University of California, Davis  
Kings River Conservation District  
University of California, Davis  
Cardno  
San Jose State University

Shadley Martin,  
Anjanette  
Simon, Edward  
Stroud, Matthew  
Tannehill, Sean  
Wiedmer, Arthur  
Wrigley, Michael

Western Canal Water District  
California American Water  
University of Arizona  
Vironex, Inc.  
University of California, Berkeley  
RWQCB #2/SFSU

## GRA Extends Sincere Appreciation to the Co-Chairs and Sponsors for the October 2011 28th Biennial Groundwater Conference and GRA 20th Annual Meeting, *California's Water Future Goes Underground*

### CO-CHAIRS

Vicki Kretsinger, Luhdorff & Scalmanini  
Consulting Engineers  
Dr. Thomas Harter, University of California, Davis  
Tim Parker, Parker Groundwater

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## GRA Extends Sincere Appreciation to the Chair and Co-Sponsor for the November 2011 *Advanced Tools Workshop for In-Situ Remediation*

### CHAIR

Tom Mohr, Santa Clara Valley Water District

### CO-SPONSOR

VN Productions

## Continue GRA's Success Into Its 21st Year By Renewing Your Membership!

It's time to renew your GRA membership for 2012. 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 [dbadmin@grac.org](mailto:dbadmin@grac.org). To save time and effort, GRA recommends that you renew online as the process is secure and seamless. It will also help GRA to keep related expenses to a minimum.

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

## 2011 Contributors to GRA – Thank You

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Brian Lewis  
Bruce Lewis  
Tim Parker  
Steven Phillips  
Brian Wagner

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Jeriann Alexander  
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Tanya Atwater  
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Richard Booth  
William Brandt  
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Gary Clossin  
Crawford Consulting, Inc.  
Daniel B. Stephens & Associates, Inc.  
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David Dunbar  
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Lunde Eads  
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Geoff Fiedler  
Ryan Fong  
Alvin Franks  
Rodney Fricke  
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Peter Mesard  
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Greg Middleton  
Jean Moran  
Jeff Mosher  
Don Motsko  
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Aaron O'Brien  
Glenn Ozima  
PES Environmental, Inc.  
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Robert Pexton  
Bryan Pilkington

Lisa Porta  
Matt Power  
Eric Reichard  
Zi Zi Searles  
William Sedlak  
Pawan Sharma  
Jay Shaw  
Marc Silva  
Linda Spencer  
Phyllis Stanin  
Michele Staples  
John Strandberg  
Matthew Stroud  
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Anthony Zampielo  
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Charles Paradis  
Tom Peltier  
Thomas Regan  
Tim Rumbolz  
Jenny Salinas  
Michael Sekigahama  
Nick de Sieyes  
John Speargas

## GRA 2012 Officers Elected

The GRA Board of Directors elected the following officers for 2012: Sarah Raker, President; Ted Johnson, Vice President; Brad Herrema, Secretary; Bob Van Valer, Treasurer. Congratulations to all of you for being elected. 💧

### Sacramento

By Tom Ballard,  
Branch Secretary



August's speaker was Mr. Ronald Reed who presented *The Pitfalls and Triumphs of Developing Groundwater Resources in Tanzania, Africa*. Mr. Reed is a Chico-based attorney who for the past seven years has worked with a number of villages in Tanzania assisting in the development of their groundwater resource. He discussed the pitfalls and triumphs of developing groundwater resources in an impoverished nation. With the assistance of friends and associates residing in Chico, California, Mr. Reed designed and built 12 trailer-mounted well drilling rigs and shipped them to Tanzania. He further provided guidance and assistance with young Tanzanian men and women by training them to become well drillers and eventually creating a self-sustaining business funded by the individual villages for both initial well installation and long-term well maintenance. Since July 2008, the eight young women and 15 young men have successfully drilled 95 wells in 13 villages. Mr. Reed discussed the difficulties of drilling in areas without any roads, drilling in rock with relatively low-torque rigs, breaking drill pipe and the challenges of obtaining replacement parts and drill pipe, and, finally, the great satisfaction in seeing a village get clean water. Several short videos showed the drilling operations and the people who benefited from the new, clean water resource.

The September 2011 meeting featured Ms. Dawn Zemo of Zemo & Associates who presented a *Preliminary Evaluation of Polar Non-Hydrocarbons in Groundwater Resulting from Biodegradation of Petroleum Hydrocarbons*. Polar non-hydrocarbon compounds (primarily alcohols and organic acids, with possible phenols, aldehydes, and ketones) are known metabolic byproducts of petroleum biodegradation. These compounds are structurally different from the precursor hydrocarbons, and therefore have different chemical/toxicity properties than the hydrocarbons. The presence of these polar by-products in groundwater at petroleum release sites can be a technical issue and has (for some) become a regulatory policy issue, because they are included within the extractable total petroleum hydrocarbons EPA Method 8015B analysis, unless using a silica gel cleanup (SGC) on the sample extract. "TPH" water quality objectives (WQOs), which are either health-based or taste and odor-based, are based on the properties of the dissolved petroleum hydrocarbons, not on the properties of the polar compounds. Therefore, SGC has been recommended as a best practice to separate the hydrocarbons from the polar compounds to allow appropriate comparison of EPA Method 8015B TPH results to hydrocarbon-based WQOs.

Ms. Zemo also provided initial results from an ongoing research study in which groundwater samples collected at multiple petroleum release sites are analyzed using two different specialty analytical methods to assess the specific polar that are actually found in groundwater due to biodegradation. So far, it appears that the polar compounds pose relatively low risk to human health, aquatic receptors, and groundwater resources.

The Sacramento Branch thanks Advance Field Systems, Inc., the September Scholastic Sponsor. 💧

### San Francisco

By Abigail McNally  
Branch Vice President

In September, the San Francisco Branch was well represented at the Biennial Groundwater Conference/Annual GRA Meeting, and also held a joint meeting with the ASCE-Environmental & Water Resources Institute. Matthew Heberger, a researcher at the nonprofit Pacific Institute in Oakland presented *Managing Groundwater as if the Environment Mattered: Policy and Management Reform in Western States*. In western states, where most surface water has long been fully appropriated, growing populations have turned increasingly to groundwater. The unfortunate side effects include decreased streamflows, conflicts with surface water rights, and harm to fish and wildlife. Groundwater overdraft has emerged as a national problem; states have begun the process of reforming outdated laws and policies—some more ambitiously than others—with mixed results. Oregon, New Mexico, and Texas have taken steps to limit groundwater pumping while avoiding undue harm to regional economies. Mr. Heberger also examined the role of endangered species protections, environmental organizations, and water trusts in triggering these changes, and explored how states used tools such as basin closures, groundwater rights, mitigation credits, and water markets to promote sustainable water use. The Branch thanks RSI Drilling, the scholastic sponsor.

In October, Tom Christopherson of the Nebraska Department of Health and Human Services, and the NGWA 2011 McElhiney Lecturer, presented *The Nebraska Grout Task Force Research: Unexpected Results-New Solutions*. It started with a demonstration well at the University of Nebraska, Lincoln that was meant to be a "super well," constructed with clear PVC casing to observe the sanitary seal from the inside out. After several months,

*Continued on the following page...*



### San Francisco – Continued

the sanitary seal was clearly behaving in a way that no one had anticipated, and the Task Force was born. Over the course of 6 years the research involved observation and testing on 80+ wells installed in varying geologic conditions. Each test well was constructed with clear PVC for visual observation and a dye reservoir in the surface vault for a quantitative evaluation of the sealing ability of different grout mixes. The results astounded academics and industry professionals alike; none of the grout mixes performed quite the way experts anticipated, especially in the unsaturated zone. Although the study raised more questions than it answered, it is likely to have a profound impact on the groundwater industry. Mr. Christoperson indicated that further research is planned, and the state of Nebraska and grout manufacturers have implemented immediate changes in light of the preliminary results. The report is available for \$30 at <http://nebraskamaps.unl.edu/productcart/pc/home.asp>. The Branch thanks Kiff analytical, the scholastic sponsor.

In November, Dr. Andrew Fisher, Professor of Earth and Planetary Sciences at UC Santa Cruz, presented *Variability in Infiltration Rates, Soil Properties and Changes to Water Quality During Managed Aquifer Recharge*. As a percentage of total water use, the Central Coast is a region more heavily dependent on groundwater than almost any other in the state; thus, Managed Aquifer Recharge (MAR) could play a crucial role in future water management. Through advanced instrumentation, Dr. Fisher's group was able to analyze infiltration rates, location, timing and controls on denitrification in a MAR scenario. The results indicate that the managed recharge process is highly variable in both space and time. They are currently seeking funding and opportunities to evaluate if the mechanisms observed were unique to the research site or more universal to MAR in general. The Branch thanks WDC Exploration & Wells, the scholastic sponsor. 💧

### Southern California

By Paul Parmentier,  
Branch Secretary

On August 17, 2011, Ms. Dawn A. Zemo, PG, CEG and principal hydrogeologist of Zemo & Associates discussed the composition and types hydrocarbons and non-hydrocarbons in groundwater due to the biodegradation of petroleum products. Non-hydrocarbon compounds (primarily alcohols and organic acids, with possible phenols, aldehydes, and ketones) are formed as metabolic byproducts of petroleum biodegradation. These compounds are structurally different from the precursor hydrocarbons, and therefore have different chemical/toxicity properties. However, analysis for total petroleum hydrocarbons using EPA Method 8015B (TPHd/mo, DRO/ORO) does not differentiate between hydrocarbons and the biodegradation byproducts; these byproducts are reported as TPH unless a silica gel cleanup is used on the sample prior to analysis.

TPH data must be carefully evaluated when interpreting the effects of intrinsic or enhanced bioremediation because without silica gel cleanup the data may include biodegradation compounds in the extractable total petroleum hydrocarbon result. This can cause underestimation of the degree of biodegradation and make comparisons to water quality objectives (WQOs) inappropriate. TPH WQOs (either health-based or taste and odor-based) are based on the properties of the dissolved petroleum hydrocarbons, not on the properties of the polar biodegradation compounds. Therefore, the use of a silica gel cleanup is recommended as a best practice to separate hydrocarbons from the polar compounds such that technically appropriate comparisons can be made between the EPA Method 8015B TPH results and hydrocarbon-based WQOs. Polar compounds also appear to naturally attenuate to CO<sub>2</sub>



and water by sequential oxidation-reduction reactions. Available data indicate that the vast majority of classes of polar compounds expected to be present in groundwater at biodegrading petroleum release sites are of low toxicity to humans.

The GRA Southern California Branch would like to thank Regenesys for sponsoring the June meeting by contributing to the Southern California Branch's scholarship fund. 💧

**NOTE:** The State Water Resources Control Board posted the draft Low-Threat Underground Storage Tank (UST) Closure Policy in August. GRA submitted a comment letter on the technical merits of the proposed policy and associated CEQA document on November 8, 2011. The comment letter was written by a group of GRA volunteers coordinated by GRA's Technical Committee. The closure policy is likely to change based on public comment and peer review. The next step in the CEQA process will be a supplemental environmental document produced by the State Board. The Technical Committee expects to provide review of the next form of the policy and the supplemental environmental document.

[http://www.grac.org/Comments\\_Low-Threat\\_UST\\_Closure\\_Policy.pdf](http://www.grac.org/Comments_Low-Threat_UST_Closure_Policy.pdf)



### Fortynine Palms Oasis

Charred fan palms at Fortynine Palms Oasis grow along a fault zone, which cuts Cretaceous granitic rocks and allows groundwater springs to discharge at the surface. Because life teems around the springs, the interplay between fault geology and biology is especially apparent in this desert landscape, as noted by D.D. Trent and Richard W. Hazlett. Fan palms suck up water using a dense network of pencil-wide rootlets that may extend as far as 20 feet from the trunk. But water, in the form of flash floods, is also the most common cause of death for desert fan palms living in narrow canyons. Stands of native California fan palms are found at five locations in Joshua Tree National Park, and the oases at Twentynine Palms and Fortynine Palms mark their northern extent.

For additional information about Joshua Tree National Park refer to <http://www.nps.gov/jotr/index.htm>

*Photograph by John Karachewski, PhD (DTSC)*  
[www.geoscapeshotography.com](http://www.geoscapeshotography.com)