

HYDRO VISIONS



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GROUNDWATER RESOURCES ASSOCIATION
OF CALIFORNIA

Winter 2004

GRA's 13th Annual Meeting in Sonoma County — Days of Wine and Water

BY TIM PARKER, CO-CHAIR, WITH CONTRIBUTIONS BY MEMBERS
OF THE ANNUAL MEETING COMMITTEE

Oil and water may not mix, but GRA demonstrated that wine and water do at its 13th Annual Meeting in Rohnert Park, Sonoma County, from September 22nd through the 24th, 2004. The theme of the meeting was “Managing Aquifers for Sustainability — Protection, Restoration, Replenishment and Water Reuse.” This meeting provided several “firsts” for GRA, including the first time for:

- Presentations dominantly from abstract submittals
- Public session on local groundwater free and open to the public
- Wine tasting dinner/ scholarship fund-raising event
- Attendance exceeded 300
- Resort-type location not near a major airport

Based on what the 2005 Annual Meeting Planning Committee heard from meeting attendees, reviewing evaluation forms and

post-meeting feedback, the annual meeting was extremely successful in fulfilling GRA's mission of *resource management that protects and improves groundwater through education and technical leadership*. The attendees and committee were very pleased with the technical quality of the presentations; speakers and moderators stayed on queue, the facilities were quite good, and the food superb. The committee would like to again extend thanks to the speakers for taking the time to put together high quality presentations, and extend our

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GRA Sonoma County Water Agency Facilities Field Tour

BY JAY JASPERSE,
SONOMA COUNTY WATER AGENCY

The Sonoma County Water Agency (SCWA) provides wholesale public water supply to approximately 570,000 people in Sonoma and Marin Counties in Northern California. SCWA is responsible for releasing water from the Coyote Valley and Warm Springs Dams in the Russian River Watershed for water supply purposes. SCWA's diversion facilities along the Russian River,

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GRA 2004 Awards

At its Annual Meeting in Rohnert Park, California, GRA presented their Lifetime Achievement Award to Dr. John Bredehoeft for his extraordinary contributions to the science of groundwater. Dr. Bredehoeft presented an exceptional keynote address at the meeting on the subject of groundwater sustainability and the water-budget myth. The Lifetime Achievement Award is presented for exemplary contributions to the groundwater industry.

GRA also presented its Kevin J. Neese Award to the California Department of

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



President's Message

BY TOM JOHNSON

Groundwater — The X Files

Elsewhere in this edition of Hydrovisions is an article about a permanent court injunction recently obtained by the California Board for Geologists and Geophysicists (BGG) against a San Diego man who admitted to being a “water witch” and advising customers where to drill for water (see page 26). A San Diego judge had issued a prior temporary restraining order against the man because of “continuing risk to the public, since only state-licensed professionals can provide such geological and geophysical services to the public.” The BGG subsequently cited him for practicing without a license and fined him \$2,500.

As groundwater scientists and engineers, we tend to ignore dowsters and water witches, assuming that their work is limited to the less-enlightened parts of the country. Surely, such unscientific practices would not be prevalent in California - the metaphysical center of the universe. Feeling somewhat like Agent Mulder, I entered “dowser” into Google and found myself on an Internet odyssey.

The American Society of Dowsters (ASD), based in Vermont, indicates on its website that it is for those who “wish to experience expanded consciousness through the ancient art of dowsing.” The ASD motto is “Indago Felix” – Latin for fruitful search. Dowser is defined by the ASD as “someone who communicates with the Universe through the use of mind, body and tools,” as a “method of increasing a person’s sensitivity to receiving answers to questions that go beyond one’s three dimensional senses.”

A recent ASD article on “The Fruits of Dowsing” by Steve Herbert with reported “degrees in geology and anthropology” defines dowsing as “The search for information by means of a hand-held instrument and faculties beyond the five physical senses,” not unlike some definitions of geophysics. Herbert says that “Typically, dowsters reportedly search for water which comes from the depths of the earth, rising to form domes and extending out laterally in pressure-flowing veins. Such water is much purer, a more steady and reliable supply, and sometimes is found at shallower depths than the static groundwater found in aquifers.” He also indicates that “A dowser may also find ...oil, gas, minerals, ...buried treasure and underground utilities.”

It turns out that the Society now has chapters in 36 states, holds conferences throughout the U.S., and has a 72-page quarterly Journal (compared to Hydrovision’s 28 pages). And, as I was afraid, California leads the nation with 13 chapters; there is even a Valley of the Dowsters Chapter, a Veterans Chapter, and a Digital Dowsters-Cyber Chapter. Most chapters have more than 100 members, and hold monthly meetings with such topics as the “The Effects of Stress on Water Intake and Utilization, and our Dowsing Accuracy,” and “Dowsing and Feng Shui.” The Society holds workshops on Beginning, Intermediate and Advanced dowsing, and is developing a Dowsters’ Certification Program. There is even a “Dowsters Doing Good Deeds” group, which reports that they have recently discovered the reasons for oak tree blight,

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EIMS - Environmental Information Management Systems

**JANUARY 26, 2005
SAN JOSE, CALIFORNIA**

For every dollar spent on environmental management, another \$1.75 is spent on managing related information. Sooner or later, businesses must attack and eliminate the inefficiencies in their practices. Information management is one area that seems ripe for improvement in the environmental field.

In the first of its kind, GRA announces a one-day seminar entitled Environmental Information Management Systems (EIMS) that will focus on tools available in today's market place to deal with data overload, the types of information that are generated during the course of an environmental project, the inefficiencies that arise in the processing and handling of this information, how the Internet offers a solution to these problems, and lastly, why more progress has not been made to date in rooting these inefficiencies out.

In today's environmental industry (specifically in groundwater contaminated sites), most of the clients, regulatory agencies, and consultants use multiple, disconnected systems to store and manage their critical environmental information, much of which is dispersed across multiple silos of information and data stores. In addition, many companies are facing greater scrutiny than ever before as shareholders demand accountability and accurate reporting (Sarbanes-Oxley Act), and environmental liabilities are not exempt from this requirement.

Upcoming Events

This one-day seminar is designed to introduce participants to available environmental information management systems that optimize groundwater-related data storage and usage. The seminar will include presentations of invited speakers from several vendors of environmental information management systems.

Speakers will cover topics regarding EIMS applications to groundwater-related data, including types and features; platforms (web vs. client

server) and their pluses and minuses; component costs and security; systems for managing documents and reports; and other topics.

Exhibitors and Sponsors

If you are interested in securing exhibiting your firm's services or products at this event, please contact GRA at 916-446-3626. We also welcome sponsors for the conference, breaks, and reception. ♡

Save the Date!

AQUIFER RECHARGE – NEXUS OF QUANTITY AND QUALITY

GRA WORKSHOP IN SACRAMENTO, CA

FIELD TRIP MARCH, 2005:

LOCAL PROJECTS AND CONJUNCTIVE USE PROGRAMS

TWO DAY WORKSHOP MARCH, 2005

Currently, California is able to meet most, but not all, of its water demands in most years. Artificial recharge is one of the tools available to achieve more efficient utilization of limited available water supplies as our population continues to increase. Many challenges lie ahead for artificial recharge projects, including adequate understanding of local hydrogeology, groundwater chemistry, aquifer beneficial uses, and developing regulatory policy.

Workshop Program and Field Trip: The workshop will cover many critical factors related to artificial recharge projects, ongoing or planned, through two days of sessions (under consideration and in development). Focus of the workshop will be artificial recharge using ASR, water quality issues and policy

development, aquifer sustainability, underground storage permits and groundwater recharge as a beneficial use. The field trip will cover local projects and conjunctive use programs.

Who should attend: The workshop is intended for regulatory agency personnel, consultants, responsible parties, property owners and developers interested in the latest strategies for understanding and addressing issues and challenges related to artificial recharge. More information may be found on the GRA website closer to the event.

Sponsors/Cooperators (invited) include California Department of Water Resources, U.S. Geological Survey, State Water Resource Control Board, and Association of California Water Agencies. ♡

Editor's note: For a full listing of upcoming events, go to the GRA calendar on the back page and www.grac.org/Upcomingevents.

Something's Fishy in Federal Court: *NRDC v. Patterson*

BY STEPHANIE OSLER HASTINGS
AND ROBERT J. SAPERSTEIN,
HATCH & PARENT

Dams throughout California add over 10 million acre feet of consumptive water annually for use on our farms and in our communities, supplies that otherwise would flow to the ocean. Community perspectives on the environmental impacts of damming our rivers and streams have evolved significantly over the past several decades. Sometimes shoved, other times voluntarily, the water community has made significant steps towards softening the environmental effects of consumptive water uses on riparian systems.

Now comes a dramatic federal court decision that may launch every dam operator into a "protect fish at all cost" mode. (*National Resources Defense Council, et al. v. Patterson, et al.* (2004) 333 F.Supp.2d 906.) In late August, Sacramento federal district court Judge Lawrence Karlton ruled that the Bureau of Reclamation's operation of Friant Dam violates California Fish and Game Code Section 5937 by failing to release sufficient flows from the dam to keep downstream fish populations in good condition.

Section 5937 is elegant in its simplicity. It provides:

The owner of any dam shall allow sufficient water at all times to pass through a fishway, or in the absence of a fishway, allow sufficient water to pass over, around or through the dam, to keep in good condition any fish that may be planted or exist below the dam.

The *NRDC v. Patterson* decision has been published and therefore may be cited as precedent in the state of

California. On its face, the decision is dramatic – a dam owner is responsible for ensuring the viability of a stream system's historic fishery. As such, the decision may have broad implications for all dam owners, and ultimately, all water consumers, in the state.

The Natural Resources Defense Council (NRDC) and other environmental and fishing organizations initiated this litigation in 1988. The original litigation involved a dispute over the renewal of several agricultural entities' Central Valley Project water supply contracts. NRDC sued both federal (the Department of Interior, Bureau of Reclamation) and non-federal (Friant Water Users Authority and other irrigation districts) parties. Since 1988, the litigation has involved several appeals to the United States Supreme Court and has been broadened to include claims regarding Fish and Game Code violations.

The parties to the litigation engaged in extensive settlement efforts, including technical studies necessary to quantify methods of improving fishery resources in and along the San Joaquin River. The negotiations ultimately failed, leading to re-initiation of the litigation and this court decision. Absent an appeal, Judge Karlton will next consider the "remedy" required for the Bureau's compliance with Section 5937. Presumably, this will involve consideration of highly technical issues related to one basic question: how must the Bureau modify Friant Dam operations to comply with Section 5937? Specifically, how much water must be released from the dam to keep fish in good condition?

Judge Karlton's Order represents the first instance in which a court, as opposed to the State Water Resources Control Board, has applied Fish and Game Code section 5937. The only reported court decisions that interpret

Section 5937 do so only in conjunction with Fish and Game Code section 5946. (See *California Trout, Inc. v. State Water Resources Control Bd.* (1989) 207 Cal.App.3d 585, and *California Trout, Inc. v. Superior Court* (1990) 218 Cal.App.3d 187.) Section 5946 makes application of Section 5937 mandatory in Mono and Inyo Counties. The Cal Trout cases did not address, however, the manner in which Section 5937 might be applied in other counties in the state, in the absence of Section 5946, or whether and to what extent competing uses of water would be taken into consideration in those circumstances. Judge Karlton's decision appears to have answered these questions.

The decision concisely and without substantial deliberation concludes that the Bureau's operation of the Friant Dam is subject to Section 5937 and as such that the Bureau may be responsible for restoring "historic" fisheries on the San Joaquin River. The history of the San Joaquin River appears to have had an important influence on the decision. The Court took particular care to note that historically the San Joaquin River supported substantial populations of Chinook salmon, that the Bureau of Reclamation's operation of Friant Dam has caused long stretches of the river to dry up, and that the Bureau has diverted nearly all of the river's flows for consumptive purposes. In the Court's opinion, the destruction of several historic fisheries is directly attributable to reduced river flows downstream of Friant Dam.

Importantly, the Judge's decision does not apply a balancing approach to application of the Section 5937. Although prior State Water Resources Control Board decisions have recognized the importance of competing uses of water in their application of Section 5937, Judge Karlton's interpretation of Section 5937 appears

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Drinking Water Risk Assessments at OEHHA, Cal/EPA

BY ROBERT A. HOWD, PH.D.

The Office of Environmental Health Hazard Assessment (OEHHA) in the California Environmental Protection Agency is continuing work on the California risk assessments in order to develop Public Health Goals (PHGs) for the entire set of chemicals that have Maximum Contaminant Levels in drinking water. OEHHA develops PHGs for all chemicals that have federal MCLs, plus a few other chemicals of significance to California, as mandated under the Safe Drinking Water Act of 1996 (HSC 116365).

On the OEHHA website at www.oehha.ca.gov/water/phg/index.html, the PHG documents are available for 70 chemicals which may be found in drinking water. Also, several drinking water risk assessment projects in progress are described.

On June 4 of this year we posted draft PHG documents for three solvents, and on July 2 we posted draft documents for three radionuclides, and announced a public workshop and the first public comment period. The solvents and proposed PHGs are cis and trans-1,2-dichloroethylene (100 ppb, 60 ppb), 1,1,1-trichloroethane (1,000 ppb), and 1,1,2-trichloroethane (0.2 ppb), and the radionuclides are radium-226 and -228 (0.069 pCi/L, 0.019 pCi/L), strontium-90 (0.35 pCi/L), and tritium (400 pCi/L). The official first comment period for all of these has now ended. The solvents got very little comment, but we received several comments for the radionuclides. The most significant critical comment for the radionuclides was that we should

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Technical Corner

Impacts of Ethanol on Degradation of Other Gasoline Constituents in Groundwater Described at Stanford Seminar

BY BETTINA LONGINO AND GARY FOOTE

On September 30, 2004, Dr. Douglas Mackay, consulting professor in the Department of Civil and Environmental Engineering at Stanford University, presented a thought-provoking seminar on ongoing field experiments to evaluate the impacts of ethanol on degradation of other gasoline constituents in groundwater. The seminar was organized by the Department of Civil and Environmental Engineering at Stanford, and simulcast through a live Web link to Nanyang Technological University in Singapore (NTU) as part of the ongoing Singapore Stanford Partnership (SSP). Co-sponsors for the seminar included GRA, NTU, SSP, Stanford Center for Professional Development, Geomatrix Consultants, and EPA Region 9.

The field experiments discussed are being conducted at an existing fuel release site at Vandenberg Air Force Base in California, where groundwater is impacted by methyl tertiary butyl ether (MTBE). This work is being conducted to address concerns that ethanol, added to gasoline to reduce problems with MTBE contamination, may in some cases create new impacts to groundwater quality by slowing or stalling natural biodegradation, or generating new MTBE degradation products.

In May 2004, Dr. Mackay's team began paired experiments in which benzene, toluene, o-xylene and tracers were released at a controlled and steady

rate into one "lane" of a shallow, well-characterized aquifer, and benzene, toluene, o-xylene, tracers, and ethanol were released into a parallel "lane" in the same aquifer. In his presentation, Dr. Mackay described the extensive pre-experiment characterization and instrumentation work completed at the site to facilitate the detailed investigation of differences in the migration and fate of the species in the two lanes of the experiment. Using data from the dense network of monitoring points, Dr. Mackay showed that some of the introduced contaminants, including benzene, are migrating further in the lane containing ethanol. In addition, other data show compelling evidence that MTBE is being transformed to TBA under the strongly reducing geochemical conditions caused by the addition of the ethanol.

The ongoing experiments at Vandenberg continue to provide first-of-its-kind data regarding potential impacts to groundwater quality of ethanol-blended gasoline released to the subsurface. Dr. Mackay plans to present additional findings at conferences and meetings in 2005.

Bettina Longino and Gary Foote are with Geomatrix Consultants. 💧

California Legislative Corner

Legislative Committee Update

BY CHRIS FRAHM, LEGISLATIVE COMMITTEE CHAIR

With the election finally behind us, the GRA Legislative Committee is getting ready to tackle a new year in Sacramento. While some things will remain the same, we will also find a significantly changed landscape as a result of the ongoing impacts of term limits, including but not limited to committee and leadership changes being made by Senate Pro Tem-elect, Don Perata. In what may signal a significant shift in perspective if not power, water has been removed from the Senate Agriculture and Water Committee – formerly chaired by Mike Machado – and combined with natural resources to form a new committee, the Natural Resources and Water Committee.

The new committee will be chaired by Senator Sheila Kuehl (wildlife has been removed from the committee's purview). Kuehl, a former candidate in the race for Pro Tem, will also succeed termed out Senator Byron Sher as chair of Budget Subcommittee No. 2 on Resources, Environmental Protection, Public Safety and Energy. So, while Machado managed a victory in his record-spending slugfest of a race – perhaps the most competitive in the state – he returns to Sacramento to find his former Committee missing in action. Members of the Assembly who have shown an interest in water issues and who have now moved up to the Senate include Christine Kehoe (D-San Diego) and Alan Lowenthal (D-Long Beach). Perata has shown early confidence in each of the new Senators by appointing Kehoe to chair Local Government and Lowenthal to chair Environmental Quality.

On the Assembly side, posting results that surprised the pundits in both the primary and general election, environmentalist Lori Saldana (D-San Diego) has been elected in the 76th; she brings with her a long resume of involvement with water quality improvement projects in San Diego and its border region. Overall, election results and committee assignments reflect a strong commitment to environmental protection. As for the Governor, he closed out a very successful legislative year without too much controversy or acclaim in the area of water quality and resources (see 2004 Legislative Year in Review posted on GRA's web site at www.grac.org).

The bill that was the subject of GRA's last Legislative Symposium and Lobby Day, AB2528 (Lowenthal), changing action level terminology, was signed into law by the Governor. On the other hand, the Governor's election efforts produced mixed results. While his efforts to increase the number of Republicans in the Legislature fell short

– with Democrats keeping their 48 Assembly seats and 25 Senate seats, his continuing popularity did prove a factor in many of the ballot propositions (Yes on Prop 69 [criminal DNA database funding], No on Propositions 68 [non-tribal gaming] & 70 [tribal gaming Expansion], and No on Proposition 66 [limits "three strikes"])). Budget challenges will certainly continue to dominate the landscape in Sacramento again this year. The LAO has released its report on economic and budget projections for 2004-05 through 2009-10 (available at www.lao.ca.gov) and the partisan storm has already started to build. As the California Performance Review now makes its way through the Little Hoover Commission, it too promises to provide fuel for another interesting year in Sacramento (see separate report on CPR in this issue of Hydrovisions). Stay tuned. And, don't forget to mark your calendars for this year's Legislative Symposium and Lobby Day next May 18, 2005. 💧



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California Regulatory Corner

CCGO Quarterly Highlights

BY JANE GILL-SHALER, CCGO EXECUTIVE DIRECTOR

November 13 CCGO Board Meeting in San Ramon

CCGO's Board of Directors held their quarterly meeting at ENGEO in San Ramon at the office of Jason Preece, representative from AEG-San Francisco Section. For the first time the meeting had conference call, web camera, and conference manager capabilities, thanks to ENGEO, Jason Preece's employer.

In attendance were representatives of AEG San Francisco, AIPG California Section, AWG, and AAPG. Included by conference call or web camera were representatives of AEG Southern California, and AEG Sacramento. New officers elected are:

- ◆ **President - Jason Preece**, of ENGEO, representing the San Francisco Section of Association of Engineering Geologists (AEG) jpreece@engeo.com;
- ◆ **Vice President - Charles Nestle**, of the Los Angeles Department of Public Works, representing the Southern California Section of AEG cnestle@ladpw.org;
- ◆ **Treasurer - Anne Cavazos**, of Cavazos Environmental, representing AWG SF Bay Chapter anne@cavazosenvironmental.com.
- ◆ **Secretary - Rick Blake**, of Lawrence Livermore National Laboratories, representing AAPG blake2@llnl.gov.

Some of the new plans include exploring the possibility of contracting with a professional legislative analyst in conjunction with other geoscience organizations; completing the CCGO

legislative database project, and reviewing current information and opinions of our membership to craft a position on the new CPR. Calendar items for 2005 include the 7th annual Legislative Drive-in (May 2, 2005), the Annual Northern and Southern California fundraiser (May 10 and 12); and the California Science Fairs AIPG and CCGO Joint Geoscience Awards.

Sunset Review Postponed

The Joint Committee on Boards, Commissions and Consumer Protection postponed the sunset review hearings until January 4-6. We will keep you informed on our website, www.ccco.org.

Tilford Field Scholarships Deadline Feb. 1

Application deadline for the 2005 undergraduate and graduate Norman

R. Tilford Field Studies Scholarships is February 1, 2005 (applications must be RECEIVED by this date to be considered). So students, get your applications in right away! Go to the AEG web site at www.aegweb.org (follow the AEG Foundation link to Tilford Fund). If you have questions, please contact Deb Green, Chairman of the Norman R. Tilford Scholarship Committee, at (505) 867-0670 or tilgreen@aol.com.

Jane Gill-Shaler is a registered geologist in CA and NC. She is the Executive Director of the California Council of Geosciences Organizations, and a principal in GEO, an online services company. CCGO's website is www.ccco.org.



Today, industry and the public recognize the crucial need to protect, restore and plan water resources for a sustainable future. LFR Levine-Fricke has experts in groundwater remediation and resource management to help solve your groundwater issues. We provide the following services:

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- Wetlands and ecological restoration

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Federal Legislative/Regulatory Corner

Current Happenings at the Federal Government

BY JOHN UNGVARSKY, EPA REGION 9

Center for Subsurface Modeling Support

The Center for Subsurface Modeling Support (CSMoS) provides public domain ground-water and vadose zone modeling software and services to public agencies and private companies. The primary aims of CSMoS are to provide direct technical support to EPA and State decision makers in subsurface model applications and to manage and support the ground water models and databases resulting from the research at EPA's National Risk Management Research Laboratory. This research encompasses the transport and fate of contaminants in the subsurface, the development of methodologies for protection and restoration of ground water quality, and the evaluation of subsurface remedial technologies. For more information, see: <http://www.epa.gov/ada/csmos.html>.

Assessing Ground Water Vulnerability to Contamination

The USGS recently posted on the web Circular 1224, Assessing Ground Water Vulnerability to Contamination: Providing Scientifically Defensible Information for Decision Makers. The report provides an overview of common approaches used to scientifically determine the vulnerability of ground water resources to contamination, and discusses the strengths and weaknesses of these approaches. The circular may be viewed at <http://water.usgs.gov/pubs/circ/2002/circ1224/>.

Updated Guidelines for Water Reuse

EPA's Office of Water and Office of Research and Development and the U.S. Agency for International Development have developed a 2004 Guidelines for Water Reuse Manual that provides information to help water managers advance water conservation and sustainability efforts at home and abroad. Copies of the manual can be ordered or printed via www.epa.gov/ttnrmrl. For further information contact Robert Bastian at 202-564-0653.

Private Drinking Water Wells Web Site

EPA has created a new web site specifically addressing issues associated with private drinking water wells. The site is full of useful information and topics, including frequently asked questions, human health risks, publications, and related links. For more information, go to: <http://www.epa.gov/safewater/privatewells/index2.html>.

Question and Answer Web Site

A new web site provides answers to over 300 questions related to ground water and drinking water, covering topics such as source water protection, tap water testing, and the Underground Injection Control program. Check it out at <http://safewater.custhelp.com/cgi-bin/safewater.cfg/php/enduser/entry.php>.

Water Security Web Site

Improving the security of our nation's drinking water and wastewater infrastructure has become a top priority since the events of 9/11. Significant actions are underway to assess and reduce vulnerabilities to potential terrorist attacks; to plan for and practice response to emergencies and incidents; and to develop new security technologies to detect and monitor contaminants and prevent security breaches. A new web site provides resources for water utilities, state and local governments, public health officials, emergency responders and planners, and others. For more information, go to <http://cfpub.epa.gov/safewater/watersecurity/index.cfm>.

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

Chemist's Corner

Drugstore Cowboys

BY BART SIMMONS

Like drugstore cowboys, some drugstore chemicals just hang around. Drugs, fragrances, solvents, insect repellents, flame retardants, and cosmetics have been found not only in water bodies, but also in treated drinking water. A recent article in Chemical and Engineering News (Oct 4, 2004, pp 44-5) highlighted the problem; a list of survivors in treated drinking water is on C&EN Online. Pharmaceuticals have been increasingly detected in wastewater, groundwater, and surface water in Europe and the list is certain to increase in the U.S. as studies target these non-conventional pollutants.

A U.S. Geological Survey study found 40 substances in untreated stream water and 18 in treated drinking water, although the drinking water treatment included activated charcoal filtration. The chemicals which hung around included fragrances (AHTN and HHCB, known as polycyclic musks); a cosmetic – triethyl citrate; DEET – the insect repellent; dehydronifedipine – a metabolite of Nifedipine, a blood-pressure drug; caffeine and cotinine, its metabolite; carbamazepine, an anti-convulsant; plus a solvent (perchloroethylene); plasticizers [tri(-butoxyethyl) phosphate]; and flame retardants (tri(2-chloroethyl) phosphate, tri(dichloroisopropyl) phosphate, and tributyl phosphate).

Collectively, these compounds have been called Organic Wastewater

Contaminants (OWCs). In the USGS study, the immediate sources of the OWCs were presumably wastewater treatment plants upstream of intakes for the drinking water treatment plant. Many of these substances have neither federal drinking water standards nor health advisories, although some have European risk assessments. Additionally, the range of OWCs has been measured using some significant variations on typical water monitoring techniques.

An American Chemical Society symposium held in August discussed lessons related to the persistence of pharmaceuticals and other wastewater-related chemicals. First, although a parent compound may disappear after water treatment, a reaction product may take its place. Second, the number of compounds detected to date is probably a small fraction of those present, and the most bioactive compounds may not have been detected. Third, the human and ecological effects of mixtures may be more important than the risk assessment of individual compounds.

The disposal of household pharmaceuticals down the drain is undoubtedly a major source of inputs to wastewater treatment plants, and the traditional practice of flushing drugs down the toilet may need to change. The state of Maine is creating a take-back program so patients have an alternative to disposing of drugs

themselves. As testing techniques improve, more of the drugstore cowboys will be found, and only comprehensive changes in drug use will reduce the pressure on treatment plants.

Editors Note: After 30 years with State of California laboratories, including the last eight years as Chief of the Hazardous Materials Laboratory of the Department of Toxic Substances Control (DTSC), Bart Simmons has left the state to pursue his consulting and expert witness testimony in hazardous waste chemistry and exposure. His work at DTSC included enforcement, lab accreditation, and research related to fate and transport of industrial waste. Bart has a Ph. D. in Environmental Health Sciences from the University of California, Berkeley. After a brief hiatus in the Fall issue of HydroVisions, he continues writing the Chemist's Corner with this issue. If you have suggestions for the Chemist's Corner, please contact Bart at his new email address, bartonps@aol.com. 💧

MARK YOUR CALENDAR



GRA LEGISLATIVE DAY

May 18, 2005

at the Capitol
Sacramento, CA

GIS; A Tool for Determining Long-term Changes in Groundwater Storage A Case Study, Lucerne Valley Groundwater Basin

BY N. NAPOLI AND W. R. LATON,
CALIFORNIA STATE UNIVERSITY,
FULLERTON

Groundwater level change maps are useful in determining areas of greatest changes in storage across basin-wide systems, and Geographical Information Systems (GIS) have been used for a variety of groundwater studies. GIS was used in this study to visually and spatially analyze water level data obtained from the U. S. Geological Survey (USGS) and Department of Water Resources (DWR) in order to obtain long-term groundwater level change maps. Change maps were only constructed for areas of overlapping data from associated time periods, thus limiting the overall coverage. However, based on an assumption of homogeneity, an overall average change of 1.6 feet per year was calculated for the main portion of the Lucerne Valley groundwater basin.

The complete research paper, with tables and figures, is posted on the GRA website, www.grac.org.

Richard Laton and J. Foster are Assistant Professors in the Department of Geological Sciences California State University, Fullerton. N. Napoli is a undergraduate student in the same Department. 💧

Education Corner

GRA Education Committee

BY JIM STRANDBERG, GRA EDUCATION COMMITTEE CHAIR

The 2004 GRA Education Committee met on November 13 to discuss activities and outreach for the near future, including the Awesome Aquifer Events, hosted by The Groundwater Foundation (TGF). These are part of the Regional Science Olympiad (SO), an international program devoted to improving the quality of science education, increasing student interest in science and providing recognition for outstanding achievement in science education by both students and teachers. The three regional events are on March 5, 2005 in Turlock and in Stockton; and on March 12, 2005 in Visalia. The State Finals will be held on April 9, 2005 at CSU, Sacramento. GRA can support TGF by offering coaches or judges.

A GSA member is being solicited as point person with the new University of California at Merced, also, with the proposed goal of establishing a student chapter and/or a scholarship program. GRA may receive some extra support in collaborating with the Metropolitan Water District's \$6M annual educational outreach program. The Committee identified several opportunities to collaborate with selected regional and national professional organizations with similar educational missions, including Water Education Foundation, Groundwater Foundation, International Association of Hydrogeologists, US Geological Survey, and others. We are in the process of developing alternative missions for consideration, reflecting levels of commitment and funding needed.

Other outreach projects under consideration include focused scholarship programs to increase visibility and

interest in GRA; and contests to solicit papers pertaining to a groundwater matter for review and award; and developing presentations for groundwater professionals, educators, and legislators. Previous suggestions of the Education Committee have included developing a second, non-technical web site for the general public, providing funding to the WEF for a tangible product such as a video, having booths at science fairs, and publicizing our positions on the potential impact of the California Performance Review on the state's ability to manage and protect groundwater resources. We also will continue to prepare articles for *HydroVisions*, possibly adding an educational event calendar.

Publishing student papers in *HydroVisions* and on our website certainly fits in with these suggested outreach activities, and we do just that here with two papers by talented students elsewhere in this issue. Both are briefly published here, with links to the complete versions on our website, www.grac.org. They include: research on evidence that the spice Turmeric will reverse the effect of perchlorate on the heart rate of a sand flea; and using GIS in calculating long-term changes in groundwater storage.

The GRA Education Committee consists of Jim Strandberg (Chair), Vicki Kretsinger, Tim Parker, Susan Garcia, and Jim Carter. 💧

Science Fair Perchlorate Effect Reversal Project Wins San Diego Ninth Grader National Recognition

BY ROXANNE HUNKER

Rebecca Chan is currently a ninth grader attending La Costa Canyon High School in San Diego County. Last year, as an eighth grader at The Rhoades School, Rebecca developed a science fair project which attempted to discover whether or not adverse effects of the notorious pollutant sodium perchlorate (an oxidant) could be reversed or minimized by the addition of an antioxidant, turmeric. Turmeric was effective in reversing the harmful effects produced by the perchlorate contaminant. Rebecca's project received much attention, and she earned the prestigious "Second Place Award in Environmental Engineering" at the California State Science Fair. She then entered a national science fair contest, the "Discovery Channel Young Scientist Challenge," and out of approximately 2000 applicants from across the country was selected as one of 40 finalists. In October, Rebecca spent an all-expense-paid week in Washington, D.C. participating in the "Discovery Channel Young Scientist Challenge."

Rebecca's project is summarized in her own words, as follows:

Can Turmeric Reverse the Effects of Perchlorate on Daphnia Heart Rate?

PROJECT SUMMARY

Objectives: The objective of this project was to evaluate whether

perchlorate salts will increase the heart rate of *Daphnia magna* and whether turmeric could reverse this effect.

Results: A dose-dependent increase in heart rate was demonstrated upon exposure of *Daphnia* to perchlorate solutions. In 0.001M perchlorate, the average heart rate (AHR) increased from 215 beats per minute (bpm) in water to 221 at 1 minute; down to 217 after 15 minutes and 215 at 30 minutes. In 0.01M perchlorate the AHR increased from 247 to 274 bpm at 1 minute; 297 at 15 minutes and 289 at 30 minutes. In 0.1M perchlorate the AHR increased from 309 to 383 bpm at 1 minute and 403 at 15 minutes.

Addition of turmeric to *Daphnia* that have already been exposed for 15 minutes to 0.01M perchlorate lowered the AHR from 369 to 331 bpm within 1 minute and continued to decrease it at 114 after 15 minutes. When *Daphnia* were exposed to solution containing both 0.01M perchlorate and turmeric, the AHR was lowered from 381 bpm in 0.01 perchlorate to 269 in the combined solution within 1 minute of exposure. This drop continued to an AHR of 181 bpm after 15 minutes.

Conclusions: The findings of this study fully supported the hypothesis. This study definitively demonstrates the dose-dependent increase in heart rate in *Daphnia magna* upon short-term exposure to perchlorate in water. The results also showed a dramatic reversal of this phenomenon upon addition of turmeric. In the event of an acute exposure to high perchlorate levels due to industrial accidents, turmeric represents a natural, potent, economic, and readily available antidote that can immediately reverse the effect of perchlorate.

For members who may be interested in reading the complete text, the entire science fair report, with tables and appendices, is posted on the GRA website at www.grac.org.

Education Corner

Rebecca's science teacher is Ms. Roxanne Hunker, faculty member at Rhoades School, a private school in San Diego County, CA. Ms Hunker was the recipient of the California State Science Teacher of the year for 2004. Many of her students have received awards at State and National Science Fairs. It is the dedication of individuals like Ms Hunker that assures our youth are prepared to address the scientific challenges that face society. 💧

We Need Your Help for 90 minutes! Hydrogeologists Sought for John Mann Mentors Program

BY KARLON BLYTHE, GSA
OUTREACH PROGRAM OFFICER

Through the John Mann Mentors in Applied Hydrogeology Programs (John Mann Programs), GSA is seeking practicing professionals as mentors for students on a career track in applied hydrogeology. The program goal is to bring together for mentoring purposes students with professionals from either the existing pool of practicing hydrogeologists associated with GSA's Hydrogeology Division Annual Meetings; GSA Sections' Hydrogeology Representatives and other attendees; or other hydrogeology professionals in attendance at GSA's Section Meetings, including non-GSA members. The biggest challenge has been identifying potential hydro-related Mentors who are available to participate in these Mann Programs at GSA's Section

Continued on page 23

New Technical Conference to Explore Crucial Ground Water Issues

BY CLIFF TREYENS, NGWA

The first-ever Ground Water Summit hosted by the Association of Ground Water Scientists and Engineers (AGWSE) will be held April 17-20, 2005 in San Antonio, Texas to explore technical information, new science, and policy related to groundwater. AGWSE is a division of NGWA.

Among the scheduled session subjects are; Ground Water in Developing Countries: Appropriate Technology, Sustainability and Self-Sufficiency; Recycling Remediation Technologies; Ground Water Education; Issues related to pathogens in Ground Water; Arsenic Removal from Ground Water; Emerging Contaminants and Their Impact on America's Water Supply; and the Edwards Aquifer. Workshops include an Eight-Hour OSHA Refresher Course; Practical Guidelines and Best Practices for Managing Ground Water Data; and Optimization Modeling. A complete list of the Summit sessions is at: <http://www.ngwa.org/pdf/e/conf/0504175095sessions.pdf>.

On Monday, April 18 the Summit will feature an address by Texas oilman and entrepreneur T. Boone Pickens, entitled, "The Politics of Oil and Water." Pickens has proposed a controversial plan to sell 200,000 acre feet of water from the Ogallala Aquifer, piping it south to the Dallas-Ft. Worth area and/or San Antonio. (See a related article on page 20 of Fall 2004 Hydrovisions).

Other Summit highlights include professional development courses;

Science and policy panel debate; Darcy forum and lectures; Birdsell Dreiss lectures; networking opportunities; and the student mentoring program. Exhibitors will feature the latest developments in groundwater products, services and information.

Session co-sponsors include the Hydrogeology Division of the Geological Society of America (GSA), the Groundwater Resources Association of California (GRA), the Sustainability of semi-Arid Hydrology & Riparian Areas (SAHRA), and the US National Chapter

Alliance Corner

of the International Association of Hydrogeologists (IAH). Additionally, two field trips will be offered on Sunday, April 17, 2005. Field trip sponsors include the Edwards Aquifer Authority and the San Antonio Water System.

To register, go to <http://info.ngwa.org/servicecenter/Meetings/Index.cfm> or contact NGWA Customer Service at 800-551-7379, ext. 554, or customerservice@ngwa.org. For more information, contact:


Cliff Treyens, 800-551-7379, ext. 554 or ctreyens@ngwa.org. 

GRA Sponsors Groundwater Age-Dating Short Course in Spring 2005

GRA is proud to sponsor a short course titled "Groundwater Age-Dating: Application and Interpretation of Tritium and the Noble Gases for Water Resource Investigations" presented by Lawrence Livermore National Laboratory (LLNL). The short course is being held at the joint Cordilleran Section, Geological Society of America (GSA) and Pacific Section, American Association of Petroleum Geologists (AAPG) Meeting on 29 April - 1 May 2005 at the Fairmont Hotel in San José, California.

Understanding groundwater age, or the time since groundwater entered the saturated zone, can have important implications for managing groundwater resources and determining aquifer vulnerability to contamination. Knowledge of the groundwater age distribution in a basin can be used to delineate groundwater or contaminant flow pathways, identify recharge areas, and provide a measure of hydraulic conductivity. While the presence or absence of tritium in groundwater can mark a component of "modern"

groundwater—recharged in the past few decades—the tritium-helium age dating method allows the dating of a water sample with an analytical uncertainty of one year.

Participants will be guided through all stages of the increasingly popular technique of groundwater age dating, from sampling and analysis to data reduction and modeling the results. Students will see a video showing the sampling method for dissolved gases in groundwater, learn about mass spectrometric methods for measuring Helium isotopes and other gases, calculate groundwater ages using real data from groundwater samples in California, learn how to apply groundwater ages to water resource investigations, and see how groundwater ages can be used to validate and constrain groundwater flow models. Emphasis will be on understanding the meaning of a groundwater age from a well water sample, including limitations in its interpretation, and on proven applications. Details are provided at <http://www.geosociety.org/sectdiv/cord/05cdmtg.htm>. 

National Ground Water Awareness Week: March 13-19, 2005

BY CLIFF TREYENS, NGWA PUBLIC
AWARENESS DIRECTOR


It's been said, "everybody's job is nobody's job." In other words, when everybody assumes that somebody else is going to take the initiative, the end result often is that nobody does. All too often, this is true of ground water education, but the fact is, you can do something about it. Each year in March the National Ground Water Association sponsors National Ground Water Awareness Week. This provides the perfect rallying point for groundwater scientists everywhere to make a collective statement by going into their communities and schools to raise public awareness about groundwater.

The next National Ground Water Awareness Week is scheduled for March 13-19, 2005. That may seem long time off, but with the holiday season upon us, the time to start planning for Awareness Week is now. There are many opportunities to raise local public awareness, and one very effective way is to get involved with your local schools. Do you have a spouse or friends who are teachers? Help them to involve their school or students in Ground Water Awareness Week. You also could contact the science department of your local school or school district. There are loads of ideas at the National Ground Water Association's Web site, www.ngwa.org. Just click on "Educator Resources" on the left side of the page for lesson plans, experiments and fun activities for students from kindergarten through high school. NGWA also can provide classroom posters on the water cycle. Just contact Cliff Treyens at ctreyens@ngwa.org.

Alliance Corner

Schools are not the only place you can have a personal impact on raising public awareness. You're an expert at what you do. That's valuable to a public that knows little or nothing about ground water and wells. If you have any connection with local community groups, business organizations, government, news media, churches, or sports groups, consider sharing what you know at meetings and other gatherings, or through newsletters, bulletin boards, fliers, etc. For consumer-friendly information about ground water and wells, check out NGWA's other Web site, www.wellowner.org. Use it! This is a

great source of information to share with people who know little about ground water, particularly persons who own household water wells.

If you like making presentations, NGWA can provide you with a PowerPoint slide presentation on the future of ground water. Remember, everybody's job is nobody's job. Whatever you do, NGWA encourages you to do something during National Ground Water Awareness Week. For further assistance, contact Cliff Treyens at 800-551-7379, ext. 554, or ctreyens@ngwa.org. 

California Groundwater Association Notes

BY MIKE MORTENSSON, CGA EXECUTIVE DIRECTOR

Meeting Held on Proposed DHS Regulations

As you may recall, CGA and GRA have been working together to make recommendations to DHS on their proposed Waterworks Standard that includes a section regarding aquifer capacity testing in hard rock well areas for public water systems. The current draft includes basic formula approaches of 3 day and 10 day tests with subsequent reduction of capacities by 50-75% for the final approved capacity. CGA expressed concerns that such approaches were not in the best interest of the general public. A CGA-GRA task force was subsequently formed, and proposed an alternative be added to the DHS draft that allows public water systems to utilize the services of a California registered geologist or a California licensed engineer with groundwater hydrology experience to manage and evaluate aquifer and well tests to ascertain well capacity. A

meeting with DHS Director Sandra Shewry, her key staff, CGA task force members, and other stakeholders was held at Assemblyman Tim Leslie's office in October. A subsequent meeting to review DHS data and to attempt resolution of differences is being scheduled. Contact CGA or GRA Director David Abbott if this issue is of concern to you.

CGA Held Regulator Training Workshop on Water Well Destruction

CGA held two workshops in September for regulatory agency personnel on Water Well Destruction. The workshops were the second in a series of training programs that have been funded by US-EPA. The workshops covered State Laws and Standards, CGA's Standard Practice on Water Well Destruction, Destruction Methods, Sealing Materials and Techniques and Inspections. Last year CGA, working

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GRA Extends Sincere
Appreciation to its Co-Chairs and
Sponsors for its 13th Annual Meeting
and Conference, "Managing Aquifers
for Sustainability — Protection,
Restoration, Replenishment
and Water Reuse"

Symposium Co-Chairs

Tim Parker, CA Department
of Water Resources
Eric Reichard, United States
Geological Survey

Co-Sponsors

Malcolm Pirnie, Inc.
Roscoe Moss Company
S.S. Papadopoulos & Associates, Inc.

Luncheon Sponsor

LFR Levine Fricke

Refreshment Sponsor

Brown & Caldwell

GRA Extends Sincere
Appreciation to its Symposium
Co-Chairs and Sponsors for its
2004 *Series on Groundwater
Contaminants Symposium*,
"Arsenic in Groundwater: Impacts
on a Critical Resource"

Symposium Co-Chairs

Bill Pipes, Geomatrix Consultants, Inc.
Sarah Raker, Regional Water Quality
Control Board, SFB Region

Co-Sponsor

Geomatrix Consultants, Inc.

Luncheon Sponsor

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International
QED Environmental Systems, Inc.

Organizational Corner

Renew Your Membership Online - It's Quick and Easy

It's time to renew your GRA membership for 2005. You can renew online via GRA's Web site, www.grac.org, or you can request a hard copy dues renewal invoice from Kevin Blatt at grac@inreach.com. 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.

As GRA approaches 2005 with nearly 1,100 members, the goal of

having 1,250 members by the end of 2005 is attainable. To make this happen, please renew your membership and recruit one new member to GRA. Recruiting a new member is a way to introduce your colleagues to a credible, innovative organization that provides many benefits for only \$85.

Thank you for your interest and continued participation in protecting and improving California's ground-water resources. 💧

2004 CONTRIBUTORS TO GRA - THANK YOU!

FOUNDER - (\$1,000 and up)

Hatch & Parent
Stephanie Hastings
Roscoe Moss Company
Bob Van Valer

PATRON - (\$500 - \$999)

DrawingBoard Studios

CORPORATE - (\$250 - \$499)

David Abbott
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Eric Strahan
William Wigginton
Carol Williams
Ken Williams
ZymaX envirotechnology, inc.

SUPPORTER - (\$5-\$24)

Morley Weitzman
Frank Yeaman

appreciation to the attendees and membership for supporting GRA. Due to space limitations in this issue of HydroVisions, this article has been abbreviated. The complete article is available online at our website, www.grac.org under Publications. A separate article in this issue summarizes the Pre-Meeting Sonoma County Water Agency Facilities Field Tour.

Panel Discussion

GRA's 13th Annual Meeting began with a panel discussion of managing aquifers for sustainability. Topics by the panelists included the journey from safe yield to sustainability; water quality and sustainability in California; Orange County Water District's "12-step program;" the Silicon Valley initiative; and the effect of water transfers on sustainability. Three

common themes wove through each of the panelists' remarks. First, is that we need to do a better job managing groundwater at local, regional, state, and even interstate levels, if we hope to manage our aquifers for sustainability. Second, all of the issues surrounding water resources development must be recognized and included in any long-term water management programs. Finally, whether the chosen term is safe yield or sustainability, hydrologists and the rest of society must understand and consider the political, legal, institutional, economic, and environmental consequences of a project, in addition to the technical aspects.

Groundwater Management Sessions

The first session on groundwater resource management provided some good examples of the tools available for groundwater management in municipalities. Matt Zidar, W.R.I.M.E., discussed how the California Environmental Quality Act (CEQA) forms the basis for consideration of potential groundwater impacts and regulatory compliance in conjunctive use project planning and implementation. Other talks focused on the Chino Basin, where an optimum groundwater management program was developed as a result of a court

order; water supply reliability in the City of Roseville aquifer storage recovery program; and a numerical groundwater flow model developed in the City of Troy, Ohio, for wellhead protection planning.

The second session focused on a wide range of issues, including groundwater recharge, evaluation of collector wells and groundwater management plans. Kevin Kaufmann, Stockton East Water District, described a program in Farmington that annually recharges approximately 35,000 acre-feet of surface water into the Eastern San

Joaquin Basin. Other talks included a method of capturing, storing, and then recharging water via existing flood control channels and catch basins (Richard Chandler, Komex H2O Science, Inc.); an innovative collector well design utilized in Sonoma (Vic Kelson, Wittman

Hydro Planning Associates, Inc.); and a legal perspective on developing groundwater management plans under AB3030 (Edward Casey, Weston, Benshoof, Rochefort, Rubalcava & MacCuish, LLP).

The session *Strategies and Decision Processes for Groundwater Quality Management* included well testing and modification, groundwater management, depth specific sampling, and simulation-optimization as different project approaches for addressing groundwater quality issues. Steven Sagstad, Malcolm Pirnie, Inc., described a project in the City of Peoria, where variable pumping and zonal sampling using dual-inflatable packer assemblies

was used to assess and subsequently seal off high arsenic zones in a public supply well. Other topics in the session included coupling TCE-contaminated groundwater with a drinking water source assessment and protection program; characterization of seawater intrusion in the Salinas Valley (including evidence of density-dependent stratification of seawater); and an interesting

presentation on the application of a simulation-optimization approach employed quite effectively as a tool to address engineering, financial, hydrologic, political and regulatory issues and concerns in a wellhead protection and groundwater contamination remediation project, which resulted in a set of operational rules for seasonal variations in demand.

Three speakers from Lawrence Livermore National Laboratory (LLNL) began the next session, *Long-Term Strategies to Assess and Manage Non-Point Sources and Restore Groundwater Quality*. Steven Carle, Jean Moran and Walt McNab presented ongoing research being conducted by LLNL to better understand nitrate fate and transport, and included new data from a field site where they are evaluating the role of denitrification in shallow nitrate-impacted aquifers. They also presented the results of statistical analyses of a California DHS database and geochemical modeling to demonstrate wide-ranging agricultural impacts to public water supply aquifers throughout California's agricultural areas.

The session on *Quantitative and Predictive Tools* included four papers exploring methods to analyze impacts to groundwater resources, specifically modeling, three-dimensional graphical interpretations, calculating contaminant mass flux, and analysis of specific isotopes to estimate

provenance of recharge. These analytical approaches can greatly improve understanding of the interaction between surface water and groundwater, potential sources of contaminants, and vulnerability of groundwater resources to degradation and depletion. One approach to assessing

potential impact to water supply wells, which may gain more acceptance by regulators (now that MCLs are no longer the clean-up criteria at many sites), included calculating estimates of contaminant mass flux within an aquifer, according to Eric Nichols, LFR Levine-Fricke.

Continued on page 16

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Tools and Technologies

Presentations on *Tools and Technologies for Groundwater Resource Assessment and Protection* highlighted the development of new tools and improved use of existing tools to address complex problems, including the use of heat as a natural tracer, stochastic optimization designed to improve the operation of wellfields, and the use of borehole extensometers and interferometric synthetic aperture radar (InSAR) as part of a program to minimize future land subsidence. Susan Shaw, Tulare County Environmental Health, showed a subset of about 110 GIS coverages containing data being used to evaluate trends and patterns in groundwater contamination in the vicinity of Tulare County. Multiple coverages and dimensional views were used to highlight the analytical capabilities of GIS.

The *Groundwater Contaminants Today and Tomorrow* session included presentations on issues related to emerging contaminants, as well as treatment technologies, processes and alternatives. Among the several interesting presentations, Rula Deeb, Malcolm Pirnie, Inc., discussed the occurrence, chemical characteristics and some of the many challenges posed by the presence in groundwater of emerging contaminants, such as solvent stabilizers, N-nitrosodimethylamine (NDMA), perchlorate, pharmaceuticals and personal care products. Risk management issues, treatment technologies, a new ion exchange resin (AMBERLITE PWA2) with superior selectivity, and streamlined permitting were all touched on in the rest of the session.

Four excellent examples of innovative and successful projects involving reclaimed water were presented in the session on *Challenges of a Finite Resource, Groundwater Use and Reclaimed Water Reuse*. Steve Sagstad, Malcolm Pirnie, presented the results of a two-year pilot study of a leading-edge aquifer recharge facility in the City of Glendale, Arizona. The study, which concerned reclaimed wastewater, indicated that recharge basins were more effective than seepage trenches in getting the water underground; the results justified expansion of the project to full scale in 2005. Other presentations included an approach to augment reclaimed water supply with raw groundwater, and

irrigation of a golf course in Livermore with tertiary treated wastewater incorporating permitted amounts of tritium. Martin Steinpress, Brown and Caldwell, presented the results of a study conducted by the Honolulu Board of Water Supply to assess the fate and transport of constituents in recycled water as they pass through the soil above a potable aquifer.

Hydrogeology of Wetlands, Habitat Protection and Ecosystem Processes provided a good overview of some of the many potential considerations involved in land use change in ecologically sensitive areas. Some of the thought-provoking discussions by several representatives of Balance Hydrologics, Inc. included proposed developments (park, golf course, residential) in wetlands and recharge areas, with design measures to maintain threatened wetlands habitats. California karst landscapes and fractured granitic deep canyon streams present unique water flow characterization challenges, and two talks dealt with the quantification techniques specific to these difficult terrains. This session was followed by an historical account of determining sustainable groundwater, by John Bredehoeft of the HydroDynamics Group.

Panel Discussion - California Performance Review

As part of GRA's ongoing participation in the California Performance Review (CPR) process, the Legislative Committee hosted a panel discussion at the Annual Meeting to brief the membership on CPR and to gather feedback from the membership on the water and groundwater-related recommendations contained in the CPR Report. The panel session was chaired by Chris Frahm, Hatch & Parent, GRA's Legislative Advocate.

Background: Governor Schwarzenegger established the California Performance Review with the mission to conduct a comprehensive examination and assessment of state government, committing to eliminate boards and commissions and end government inefficiencies. After the Report was submitted to the Governor, it was turned over to a 21-person Commission he

appointed, which included business, labor, local government and public policy experts. The Commission completed public hearings on the Report; it is currently under review by the Little Hoover Commission. A complete summary of the Report recommendations affecting issues of concern to GRA may be viewed on the GRA web site at www.grac.org. (Hatch & Parent Memorandum dated August 13, 2004).

GRA Panel and Audience Discussion:

There was a wide variety of comments on the CPR proposals during the panel presentations and the audience participation section which followed. In general, everyone felt that it was a positive development to be asking questions about the efficiency of state government and looking for better ways of doing things. At the same time, there was a lot of concern expressed about some of the specific proposed solutions, in particular, about the possible elimination of the regional

boards. As a result, the Legislative Committee will be featuring this issue at its Annual Legislative Symposium and Lobby Day next May 18, 2005 – so, mark your calendars now! Based on GRA's Legislative Guidelines and feedback from the panel discussion, GRA comments were forwarded to the CPR

Commission by letter dated September 30, 2004. A complete copy of the letter may be found on the GRA web page at www.grac.org. (*BGG Sunset Hearings are January 6, 2005-Editor*).

GRA Hosts Session Open to the Public on Sonoma County Groundwater

Recognizing that the annual meeting theme of "Managing Aquifers for Sustainability — Protection, Restoration, Replenishment and Water Reuse" is a matter of strong public concern in Sonoma County, GRA hosted a special, open, public session to address groundwater issues in Sonoma County. The session included brief presentations by panelists, including representatives from DWR, USGS, Sonoma County, Sonoma County Water Agency, City of Rohnert Park, the legal community and the interested public.

Continued to the right

Coordination and cooperation with other agencies is necessary, as is increased reliance on conjunctive use programs.

GRA Sonoma County Water Agency Facilities Field Tour – Continued from Page 1

Tim Parker, DWR, gave an overview of basic groundwater concepts, and dispelled some of the common misconceptions. Other topics included groundwater law, management methods, and elements for success in groundwater planning and implementation. The session concluded with a lively discussion on what local agencies had planned for groundwater, concerns expressed by the public, and all in agreement that taking the next steps towards groundwater management is the desirable direction to go.

Afterwards, fifty GRA members and guests gathered at the DoubleTree Hotel for a special Wine Tasting, Book Signing and Dinner event, cosponsored by Brown and Caldwell, with winery support from Armida Winery, Beringer, Chateau Souverain, Chateau St. Jean, Etude Wines and Soter Vineyards. The evening started with a lively wine tasting of 6 Pinot Noirs from different regions, with David Howell, (USGS emeritus) and Jonathan Swinchatt. Co-authors and geologists, they have written a book, “Winemaker’s Dance” (UC Press) about the characteristics that soils (and climate) impart to the wines, often referred to as “terroir,” literally, the taste of the soil. Comments about the wines ranged from “fruity, berries, tannic, yummy” to “Superfund!” Tasters then sat down to a delicious dinner, with wines from local family-owned Armida Winery. Between the live auction of the wines, and silent auction of donated items, this event raised \$885 for the GRA Student Scholarship Fund. Many thanks to Ann Spaulding for chairing the event and to Martin Steinpress for Brown and Caldwell’s support.

GRA 13th Annual Meeting Committee members who contributed to this article include: Carl Hauge & Tim Parker (co-chair), California Department of Water Resources; Chris Frahm, Hatch & Parent; Eric Nichols, LFR Levine Fricke; Eric Reichard (co-chair) & Steve Phillips, U.S. Geological Survey; Gary Foote, Geomatrix; Gordon Thrupp, S.S. Papadopoulos & Associates, Inc.; Greg Bartow, San Francisco Public Utilities District; Jean Moran, Lawrence Livermore National Laboratories; Jim Strandberg & Mary Morkin, Malcolm Pirnie; Phyllis Stanin, Todd Engineers; Shawn Chartrand & Barry Hecht, Balance Hydrologics, Inc. 🌱

downstream of the reservoirs, utilize radial collector wells and conventional wells to extract underflow from the Russian River. These facilities are currently capable of producing an average day, peak month capacity of 84 million gallons per day. Water is treated by the alluvial aquifer via natural



Jay Jasperse and Don Seymour of SCWA describe the Agency’s Ramney collector wells.



Lake Sonoma from overlook on the SCWA Field Trip.

filtration processes, disinfected, and conveyed through the SCWA’s transmission system to eight prime contractors and several other customers. Because three species of Russian River salmonids have been listed as threatened under the federal Endangered Species Act, fishery and water supply issues are directly related. In addition, SCWA is involved in several research studies evaluating surface water/groundwater interactions, riverbed conductance, and natural filtration processes.

The tour started at Rohnert Park Meeting Hotel and took a bus trip through the Dry Creek Valley to a scenic overlook of Lake Sonoma and Warm Springs Dam, which provides water supply and flood control benefits. The first stop was at the Riverfront Park Site, a former terrace gravel pit site recently purchased by the Sonoma County Water Agency and the Sonoma County Open Space District.

These agencies intend to utilize the site to provide multiple benefits including water supply and recreation.

This next stop included a visit to SCWA’s Mirabel water supply facilities, which include radial collector wells, an inflatable dam, and infiltration ponds. Research programs and studies regarding water supply and fisheries issues were described, including the reliability of natural filtration processes to produce high quality drinking water and the passage of juvenile and adult salmon and steelhead. Last on the itinerary was the Wohler Area, the site of two of SCWA’s oldest collector wells, and newest collector well (currently under construction). The collector well was constructed using innovative techniques to drill two large 18-inch diameter intake laterals at the bottom of a 110 foot deep caisson. The laterals were installed to more efficiently withdraw groundwater from the aquifer and to compensate for locating the collector well farther away from the river than previous collector wells to minimize impacts to fish habitat.

Jay Jasperse, tour leader, and Don Seymour, assistant tour leader, are with SCWA. 🌱



Dr. John Bredehoeft, recipient of GRA's Lifetime Achievement Award, and Tom Johnson, GRA President.



Carl Hauge, representing California Department of Water Resources, recipient of GRA's Kevin J. Neese Award, and Tom Johnson, GRA President.

Water Resources for publication in 2003 of its updated Bulletin 118: "California's Groundwater." The Kevin J. Neese Award recognizes significant accomplishments by a person or entity within the most recent 12-month period that fosters the understanding, development, protection and management of groundwater. The award was presented to Carl Hauge, Chief Hydrogeologist representing the Department of Water Resources. 💧

and the source of mood-altering vibrations being sent out by government scientists (of course) using satellites, television and the internet. The Society is so organized now that they have a mission statement, regional vice presidents, a five-year marketing plan, and membership drives — strangely parallel to GRA's activities.

These would all be just humorous entertainment for us as groundwater professionals, however, if it weren't also an indicator of the unfortunate state of earth science and groundwater education in our schools. The ASD reports that its primary initiative for 2005 is to increase student education and training activities, from elementary schools through universities. For example, a Montessori school in Dallas recently sent 72 students on an ASD field trip for an entire day learning how to dowse. Dowzers are also currently teaching classes at three junior colleges in the Dallas area. When was the last time you heard of an all-day groundwater (or earth science, for that matter) student field trip in California?

The state of earth science (and groundwater) education in the schools hasn't changed much in the past 50 years. When I attended high school in the 1960s, college-bound students were not permitted to take earth science. The University of California still does not consider earth science as a qualifying high school laboratory science course; only chemistry, biology and physics are considered "real sciences." Is it any wonder that our

children and the public know so little about the earth and its environment, from earthquake hazards to pollution prevention to groundwater supply and protection? GRA and other organizations hold countless conferences on groundwater and the chemical du jour; however, how often do we reach out to educate the general public and school children?

It will take time, but we can all participate in efforts to increase awareness of the need for earth science and groundwater education in public forums, schools and the legislature. Contact your legislators and community leaders to let them know that earth science, environmental and groundwater education is important for California and your local communities. Get involved with schools; talk to classes about groundwater and the earth, organize field trips, and look at your kids' science curriculum.

GRA will be reaching out to the public and our legislators, with increased education and training activities, including our May 2005 Legislative Symposium and Lobby Day. We encourage you to attend this event to personally tell your legislators how important this issue is. As the saying goes, the "truth" may be "out there," but it is up to each of us to help others see it.

I welcome your feedback and I look forward to seeing you at GRA events. I also welcome you to contact me by email at tom.johnson@lfr.com or by phone at (510) 596-9511. 💧

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Thomas W. Dibblee, Jr., 1911-2004

The legendary Thomas Wilson Dibblee, Jr. died peacefully in his sleep on November 18 at the age of 93. This is a man who has made such profound contributions to the people of California that his worth cannot be measured. His elegantly accurate geologic maps have served as the basis for an overwhelming amount of earth science work. A testimonial to the high regard in which he is held by his colleagues was the formation of the nonprofit Thomas Wilson Dibblee, Jr. Geological Foundation (now the Dibblee Geology Center,) which undertook the task of publishing Tom's

many geologic maps, thus preserving them for their scientific and educational value. Tom remained intimately involved with the map-making process through his 93rd birthday in October 2004. His remarkable memory was invaluable in the editing process, and he readied about 75 quadrangles this last year for final production.

Two years ago Joe Birman presented the GRA Lifetime Achievement Award for 2002 to Tom Dibblee. Joe recounted his remarks at that time. "For most of a century Thomas Dibblee re-fit the

geological pieces and told us the fantastic stories of our California — stories that guide so many of us along our own geological journeys. Tom, you are always there, and so we take you for granted. Taking you for granted is our ultimate compliment to you. I hope you always knew that." Contributions in memory of Tom may be sent to the Santa Barbara Museum of Natural History Thomas W. Dibblee, Jr. Geology Center, 2559 Puesta del Sol Road, Santa Barbara, CA 93105. 💧

Something's Fishy in Federal Court: *NRDC v. Patterson* – Continued from Page 4

unequivocal – the statute mandates compliance without exception. The Court does suggest however, by way of a footnote, that the "remedy" (i.e., dam re-operation) may take into account competing uses of the stream system. The decision expressly recognizes the fact that farmers in the central valley have relied on the flows made available by the Central Valley Project for more than 50 years. The great majority of the decision is devoted to dispensing with the defendants' procedural claims which, at this point in the proceedings, Judge Karlton has dismissed as inapplicable.

Given that the remedies phase of the case is anticipated to be lengthy and expensive, the Friant defendants have requested the Court's permission to appeal immediately the narrow set of legal issues resolved by the decision, without awaiting resolution of the remedy phase. The Friant defendants' appeal, if certified, will raise both procedural issues as well as the central question – whether Judge Karlton correctly construed Section 5937.

Although the question of how much water might have to be released from Friant Dam to bring the Bureau of Reclamation into compliance with Section 5937 is not addressed by the decision and is left to the remedies phase, the possible implications of Judge Karlton's ruling are obvious and profound; it potentially

impacts the operation of every dam in the state. There are over 1200 dams within the jurisdiction of the State's Division of Safety of Dams. Moreover, given Judge Karlton's interpretation, both state and federal water projects are likely not immune from application of the statute. Further, to the extent that some number of the state's dams are operated either for direct groundwater recharge, or so that surface and related groundwater supplies are conjunctively managed, his decision impacts groundwater basin management as well. In an average year, groundwater supplies 30 to 50 percent of California's urban and agricultural water demands. Similarly, in the absence of surface water supplies compromised by operation of Section 5937, increased groundwater pumping, and all of the potentially adverse impacts associated with that increased

pumping (overdraft, subsidence, seawater intrusion, etc.), can be expected.

Given the importance of these implications, and in anticipation of the possibility that an interlocutory appeal of Judge Karlton Order will be made, Hatch & Parent has formed a broad coalition of parties interested in filing a "friends of the court" brief in support of the Friant appeal. For more information, please call Stephanie or Robert at (805) 963-7000 or email them at: shastings@hatchparent.com or rsaperstein@hatchparent.com.

Robert J. Saperstein is a partner with the law firm of Hatch & Parent. He is the firm's Water Practice Group Leader. Stephanie Osler Hastings is an attorney in Hatch & Parent's Water Practice Group. She also serves on the GRA Board of Directors. 💧



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Drinking Water Risk Assessments at OEHHA, Cal/EPA – Continued from Page 5

consider other methods of extrapolating risk at low radiation doses, which we will be addressing. These six documents are also currently submitted for peer review by University of California scientists. When this is completed and any necessary revisions are made to the draft documents, we will repost them for a second public comment period, before finalizing the risk assessments. Further comments are welcome.

Risk assessments are well underway for development of PHGs for about 14 other chemicals, comprising the rest of the chemicals with MCLs, plus nitrosodimethylamine (NDMA). The next of these documents ready for public review is for PCBs (polychlorinated biphenyls), which was posted on the OEHHA website on November 5 (<http://www.oehha.ca.gov/>).

On July 23, 2004, we announced the initiation of risk assessments for several more chemicals. Bromate, chlorite, and haloacetic acids have new federal MCLs, so a California MCL and a PHG were required. These assessments are currently in progress. Also, reviews of several chemicals for which a PHG had already been developed were announced. The chemicals considered to have the greatest priority for new reviews were the metals cadmium, copper, mercury, and thallium; the pesticides glyphosate, lindane, methoxychlor, and oxamyl; the solvent trichloroethylene; and the wood preservative pentachlorophenol. Summaries on each of these (as well as the original PHG documents) are available on the OEHHA website. The updated review

of thallium has already been completed. We concluded that no significant new information is available that requires changes to the original document. This was summarized in a memorandum that will be posted to our website shortly.

If you are interested in receiving notice of new postings on the OEHHA website and other news, you can sign up at www.oehha.ca.gov (click on OEHHA E-mail Notification List).

Bob Howd is Chief of the Water Toxicology Unit in OEHHA, which develops the California PHGs. Any opinions expressed in this article are those of the author and not necessarily those of OEHHA or the California EPA. ♣



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Notes – Continued from Page 13

with CEHA and CCDEH, conducted two sessions on Water Well Construction. Planning is underway to conduct sessions on Annular Seal Installation in 2005.

Opportunities for Public Awareness on Water

CGA has long been a co-sponsor of the California Water Awareness Campaign (CWAC). We've initiated a "Right at Home" campaign to help the public conserve water and become more aware of where their water comes from. This year Spanish versions of campaign materials were created and we joined with Flex Your Power to promote water and energy efficiency. The campaign has developed educational materials featuring groundwater that GRA members might find valuable in your projects. We encourage you to look into the possibility of joining the campaign in 2005. Contact CGA for more info or go to CWAC's website at www.wateraware.org. Perhaps CGA and GRA can work with NGWA on special public awareness items during National Groundwater Awareness Week (March 13-19, 2005). ♣

Call for Abstracts

**SUBSURFACE VAPOR INTRUSION
TO INDOOR AIR – AN UPDATE
MAY 2005 - SAN JOSE, CA**

GRA welcomes submittals of abstracts for papers and poster presentations for this upcoming symposium. Topics to include 1) case studies, 2) mitigation measures, 3) risk assessments, 4) toxicity of TCE, 5) modeling advances, 6) field methods for assessing vapor intrusion pathways, and 7) lessons learned. The deadline for submitting an abstract for a Paper or a Poster Presentation is January 28, 2005. Please feel free to contact Elie Haddad (650-960-1640) or Jim Strandberg (510-735-3020) if you would like to discuss your topic before submitting your abstract.

Guidelines for submitting an abstract for a Paper Presentation – <http://www.grac.org/papers.jtml>. 💧

Decision Delayed on Aquifer Water Storage Project in Tracy

Central Valley Regional Water Quality Control Board (RWQCB) members have delayed a decision to permit the initial permits for a controversial water storage project in the city of Tracy. The project involves using the groundwater aquifer beneath the downtown area as a storage bank to reserve water from plentiful years and withdraw them during lean ones.

The controversy arises from the plans of the city of Tracy's engineering department, which has indicated that they would use an existing well as a common point of water insertion into, and withdrawal of water from, the aquifer. Members of the Central

Valley RWQCB indicated their concerns regarding the possibility that water injected into the aquifer may not have all contaminants removed to permissible levels, including pesticides, various carcinogens, and by-products of water-purifying compounds.

The officials of the city of Tracy are working with the RWQCB staff to craft terms of a permit that would facilitate the water storage project. More information may be found from an article in the San Joaquin Record at <http://www.recordnet.com/daily/news/articles/091004-gn-4.php>. 💧

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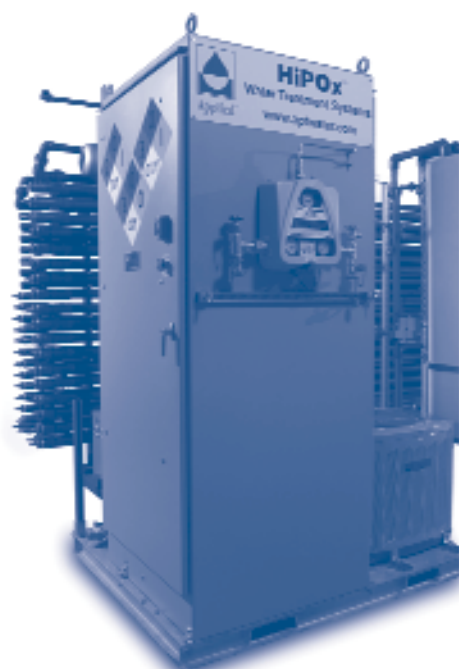
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International Opportunities for Groundwater Professionals

BY BARNEY P. POPKIN, RG AND REA

For the last year or so, I have worked and traveled in over a dozen countries throughout the world, experiencing first-hand opportunities for international water-resources projects. My assignments have included: developing jobs for Egyptians in the water sector; evaluating and recommending projects to use hydrologic data for flood and drought management in India; and establishing carbon-sequestering mangrove forests in Sonora, Mexico. The editor of HydroVisions asked me to share my perspective on how the groundwater professional can obtain such opportunities overseas and in developing countries. There are several ways to obtain these interesting and educational assignments, including:

- ◆ Join a for-profit firm that does international water resources work, and lobby within for assignments. Examples are AMEC, ARD, Bechtel, Bearing Point, CDM, Checchi, Chemonics, CH2M Hill, Development Alternatives, DevTech, Fluor, IRG, Louis Berger, Metcalf & Eddy, MWH, PA Consulting, Parsons, and Tetra Tech.
- ◆ Find a niche with a non-profit or educational organization that provides people for international water resources work, or has a Water Resources Research Center. Examples are the University of Arizona in Tucson, UC Davis, University of Nebraska in Lincoln, University of Nevada in Reno, and University of New Mexico in Albuquerque.
- ◆ Take an assignment as an intern or Personal Services Contractor with an international agency, or an assignment with a firm providing you as a consultant to a project. International agencies include the African, Asian, Inter-American and European Development Banks; Food and Agricultural Organization, Global Environment Facility, Millennium Challenge Corporation, U.S. Agency for International Development, U.S. Department of Agriculture, U.S. Environmental Protection Agency, and U.S. Geological Survey.
- ◆ Search online sources for leads, such as www.developmentex.com, www.fedbizopps.gov, www.fedgrants.gov, www.internationaljobs.org, etc...
- ◆ Attend workshops, conferences, training opportunities; network with people who are active in international water resources projects.

- ◆ Check out web pages of firms and organizations that hire groundwater and other water-resources specialists for overseas work, including for-profit, not-for-profit, and voluntary organizations. Word-of-mouth is still best; you love to get those referrals from friends, colleagues, and clients.

It helps to keep abreast of current trends, like privatization, irrigation efficiencies, water-demand management, remote sensing, GIS and GPS, conjunctive water use, integrated water resources management, community-based management, groundwater recharge and banking, watershed harvesting, trans-national issues, and linkages between water quality and health.

You should keep in mind first the needs of the organizations you are contacting, and position yourself to accommodate them if you can. It's easier to find more general assignments than very narrow ones. There are usually more project, contract, and administrative positions than finite-element contaminant groundwater flow opportunities, more for engineers than geologists, more for economists than engineers. Experience, education, language and people skills, writing and presentation abilities, computer friendliness, flexibility, patience, and availability.

Email me at bppopkin@yahoo.com for a complete description of my recent assignments, some of which are posted at www.grac.org along with some fantastic photographs!

Barney P. Popkin, RG, REA, is an environmental specialist who has spent the last year or so working with USAID and other government agencies overseas. He is currently on assignment as an Environmental Protection Specialist for USAID's Bureau for Asia and the Near East's Technical Services Environmental Team, as well as their Afghanistan and Iraq Teams, based in Washington, DC. ◆

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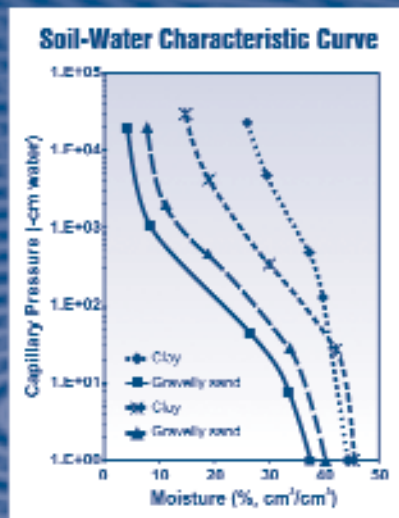


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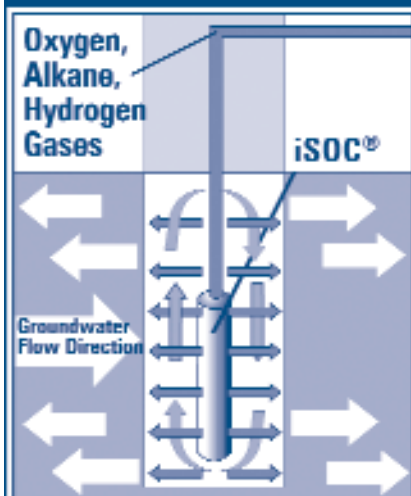
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Hydrogeologists Sought for
John Mann Mentors Program –

Continued from Page 11

Meetings. The program is an informal refreshment arrangement in the late afternoon. If you plan to attend a 2005 GSA Section Meeting and would be willing to serve as a Mann Mentor, please contact Karlton Blythe, kblythe@geosociety.org. This year's GSA Cordilleran Section meeting will be in San Jose April 29-May 1, 2005, at the Fairmont Hotel in San Jose. Please check your schedules and see if you might be able to join us for snacks, beverages, and great conversation! 💧

GRA Welcomes the Following New Members

AUGUST 28, 2004 - NOVEMBER 12, 2004

Arnold, Debbie	Delta Environmental	Murphy, Ralph	Geologic Associates
Aviles, Cathleen		Oberoi, Varinder	EFI Global Inc.
Badger, Timothy	Aquatic Treatment Systems	O'Connor, Matt	O'Connor Environmental, Inc.
Bamford, John-David	The Conservtech Group	Pawlak, Leslie	San Francisco State University
Baron, Richard	Foley, Baron & Metzger	Petersen, Chris	MWH Americas, Inc.
Berryhill, Kevin	Boyle Engineering	Pettis, Nichol	LFR Levine Fricke
Bond, Steve	SBAI	Porras, Gustavo	Balance Hydrologics, Inc.
Booth, Dana	Sacramento County Environmental Management Dept.	Purcell, Rus	Kennedy/Jenks Consultants, Inc.
	ECO:LOGIC Engineering	Ramsay, Dan	Miller Brooks Environmental, Inc.
Butler, Thomas	Balance Hydrologics, Inc.	Reason, Michael	Geologic Associates
Chartrand, Shawn	The Boeing Company	Reddy, Sanjay	Damon S. Williams Associates
Chung, David	Golder Associates	Reynolds, Ed	The Reynolds Group
Cochrane, David	EIP Associates, Inc.	Riddiough, Eric	Golder Associates
Cook, Sabrina	MECx, LLC	Rosenkranz, Thomas	McCampbell Analytical
Cronk, Gary	Geomatrix Consultants	Rothman, Jennifer	LFR Levine Fricke
Deutsch, Paul	MARRS Services, Inc.	Shipley, Jay	LFR Levine Fricke
Dhruve, Meera	Folger Levin & Khan	Shipman, Dorinda	Treadwell & Rollo, Inc.
Dollbaum, Margaret	Treadwell & Rollo	Thomasberg, Kathleen	Monterey County Water Resources Agency
Durkin, Jim	Ecologychem	Umbarger, Kathryn	Bechtel Nevada
Fischer, Steve	Cal State University Fullerton	Ungvarsky, John	U.S. Environmental Protection Agency
Foster, John	Bechtel National Inc.	Vandenburg, Thomas	Dongell Lawrence Finney LLP
Garcia, Julio	Washington Mutual Bank	Vargas, Al	California Dept. of Food & Agriculture
Gerace-Coles, Andee	Wactor & Wick LLP	Vedagiri, Usha	CH2M Hill
Gilb, Robin		Vlassopoulos, Dimitri	S.S. Papadopoulos & Associates
Gonzales, James	Kennedy/Jenks Consultants	Wallick, Ed	AEI Consultants
Graydon, Jim	Golder Associates	Warner, Jim	ERM
Ha, Amy	CDM	White, Chris	Balance Hydrologics, Inc.
Harley, Brendan	Groundwater & Environmental Services, Inc.	Will, Robert	Schlumberger Water Services
Hellmann, Gretchen	Condor Earth Technologies, Inc.	Williams, Ken	Boart Longyear Co.
	The Source Group, Inc.	Willis, Derrick	LFR Levine Fricke
	CDM	Zarrabian, Sohrab	SpectraSensors
Hoagland, Robert	TRC Solutions, Inc.		
Horton, Paul	City of Rohnert Park		
Hossain, Paul	MWH		
James, William	QED Environmental		
Jenkins, Darrin			
Joseph, Trevor	Lang Exploratory Drilling		
Judy, Tom	Geologic Associates		
Systems	Salt River Project/		
Lamb, Jason	Groundwater Division		
Lass, Gary	McQuaid, Bedford &		
Lluria, Mario	Van Zanelt		
	Aquifer Solutions, Inc.		
Lucke, Justin	Golder Associates		
	Glenfos		
Marvin, Bruce	GeoSyntec/SiREM		
Mathias, Maureen	Schlumberger Water		
McCollum, Steve	Services		
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Sacramento Branch Highlights

BY STEVE PHILLIPS
BRANCH SECRETARY

In our August meeting, James Gusek discussed passive treatment of mine drainage using constructed wetlands. James is a Senior Project Manager with Golder Associates, Inc. where he specializes in mine closure, including land reclamation and design of passive treatment systems. Since 1987, this work has included over three dozen international projects, presentation of many short courses, and co-authorship of two books on the subject. Passive treatment of mine drainage using constructed wetlands has been employed on coal (over 600 systems to date) and metal mine sites since about 1985. The naturally-occurring biogeochemical mechanisms found in passive treatment systems are capable of remediating a wide variety of flows and water chemistry in a diverse range of climates. Gusek's presentation included examples of functioning systems, details of the phased design process, key treatment issues, and the economics of passive treatment systems.

Our guest speaker in October was Dr. Jay Lund, who presented the CALVIN economic-engineering optimization model of California's water supply system. (Jay and one of his graduate students recently were featured in the media regarding the use of CALVIN in exploring the potential effects of restoring Hetch Hetchy Valley). Jay is a Professor of Civil and Environmental Engineering at UC Davis, and recently has been involved in the combined economic and engineering examination of California's water supply system. Jay is also on the Advisory Committee for the California Water Plan Update, a past Editor-in-Chief of the Journal of Water Resources Planning and Management, and a past Convener of the California Water and Environment Modeling Forum. The CALVIN model is

used to explore integration of groundwater management with the many other water management options in the state's vast, complex water supply system. As water demands press more tightly against water supplies, especially in Southern California, integration of water management and analysis will become increasingly valuable, but is likely to remain controversial. 💧

San Francisco Bay Branch Highlights

BY MARY MORKIN
BRANCH PRESIDENT

The San Francisco Bay Branch has continued to be very active in fall of 2004, enjoying three excellent talks. On August 18, 2004, Dr. Kenneth Ehman presented his work on groundwater flow and recharge in the Livermore – Amador Groundwater Basin. In cooperation with the Zone 7 Water Agency, he conducted a sequence stratigraphy pilot study on the west side of the Main Basin including the chain-of-lakes area. Particular interest was on the Lake I area, which is considered a significant basin recharge area. The objective of the investigation was to evaluate the hydrostratigraphy and aquifer architecture in the Lake I Area to assess the effectiveness of the groundwater recharge into deeper groundwater aquifers that are

used for municipal supply by Zone 7. Sequence stratigraphy was used as a method for delineating reservoir geometry and continuity by linking depositional processes that formed the aquifers and aquitards.

On October 20, 2004, Dr. Bradley Esser, from the Lawrence Livermore National Laboratory (LLNL), presented a research project that was funded by LLNL entitled "Nitrate Biogeochemistry and Reactive Transport in California Groundwater." Leading this research, Dr. Esser assembled a team of scientists who integrated isotope hydrology, groundwater flow and transport modeling, and molecular biology to develop new approaches to characterizing nitrate source, transport and fate in groundwater basins. The project is coordinating closely with water districts, the State Water Resources Control Board, the dairy industry, and the University of California.

For our last talk of the year (November 17, 2004), the San Francisco Bay Branch was very proud to host John Cherry from the University of Waterloo. Dr. Cherry spoke on "Contaminant Migration in Clayey Aquitards," in which he examined the relative effectiveness of various aquitards in protection from contamination migration, based on their hydrogeologic characteristics and the nature of the contaminants. The presentation examined contaminant migration in non-indurated, flat-lying, clayey aquitards by reviewing studies conducted in 20 different aquitards in Canada, USA, and Mexico. The talk was presented too late for this newsletter; look

for a more complete summary in the 2005 Spring issue of HydroVisions. 💧

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For additional information, visit GRR's Web site at www.grac.org or contact Kathy Snelson, GRR Executive Director, at executive_director@grac.org or 916-446-3626.

Southern California Branch Highlights

BY DARRELL THOMPSON
BRANCH PRESIDENT

Thomas F. Vandenburg and Dongell Lawrence Finney, LLP, collaborated on this month's branch meeting presentation, "Trends in Perc-Related Groundwater Litigation in California" on November 9th. The dinner meeting, held at the Radisson Hotel in Newport Beach, preceded the 14th symposium in GRA's Series on Groundwater Contaminants.

The presentation focused upon the challenges facing municipalities involved in contamination claims and how recent case law developments will effect perc-related groundwater litigation in California. High

profile cases are currently being litigated in Lodi, Modesto, Chico, and several other locations. In the City of Lodi action the City's attempts to prosecute its claims based upon its local "MERLO" statute have not succeeded. In the City of Modesto action the California Court of Appeal, First District has recently issued an important opinion allowing certain municipal entities to sue those manufacturers and distributors of dry cleaning equipment and supplies who "took affirmative steps directed toward the improper discharge of solvent waste" for clean-up of resulting groundwater contamination. In addition, private plaintiffs are bringing actions for personal injuries against municipalities for their exposure to perchloroethylene-contaminated groundwater. These cases raise new questions concerning the boundaries of municipal liability for contamination allegedly caused by third party discharges to sewer systems.

The meeting was well attended and we extend our appreciation and thanks to Mary Megarry and Kathy Snelson for

assisting with the meeting hall arrangements. The next meeting of the Southern California Branch is scheduled for January 2005. We hope to see you there. 💧

Corrections

On pages 26 and 27 of the Fall 2004 issue of Hydrovisions, Southern California Branch President Darrell Thompson's name and phone number were incorrect. His correct phone number is (949) 660-7532.

On page 27, the correct spelling of San Francisco Bay Branch Technical Advisory Member is Bettina Longino.

Hydrovisions regrets any inconvenience these errors may have caused.

"Witch" Way to Water?

The Board for Geologists and Geophysicists (BGG) has won a permanent injunction against a San Diego county man Anthony Jamarillo, who describes himself as a "water witch." The man has been under a temporary restraining order since Nov. 19, 2003, when a San Diego County Superior Court Judge found that consumers could be at risk if Mr. Jamarillo continued illegally advising consumers in Southern California on where to drill for water. In California, only state-licensed professionals can provide geological and geophysical services to consumers. The court issued a permanent injunction on July 9.

The BGG, which is part of the California Department of Consumer Affairs, monitors geological and geophysical services to the people of the State of California through licensing and enforcement. This article was excerpted from a press release on the BGG website, at http://www.geology.ca.gov/hot_topics/index.html. 💧

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Dates & Details

GRA MEETINGS AND KEY DATES

(Please visit www.grac.org for detailed information, updates, and registration unless noted)

GRA Board of Directors Strategic Planning Meeting	January 15-16, 2005 Santa Barbara, CA	GRA Symposium <i>Subsurface Vapor Intrusion to Indoor Air – An Update</i>	May 2005 Northern California
GRA Symposium <i>EIMS - Environmental Information Management Systems</i>	January 26, 2005 San Jose, CA	GRA Symposium <i>Overdraft and Safe Yield</i>	September 2005 Newport Beach, CA
GRA Symposium <i>Artificial Recharge</i>	March 2005 Sacramento, CA	GRA 14th Annual Meeting	October 25-26, 2005 Sacramento, CA
GRA Board of Directors Meeting	April 30, 2005 Emeryville, CA	GRA Symposium <i>DNAPL Source Zone Characterization and Remediation</i>	December 1, 2005 San Francisco, CA
GRA Annual Legislative Symposium	May 18, 2005 Sacramento, CA		



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