HYDRO VISIONS

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Groundwater Resources Association of California

Summer 2008

"Site Closure Strategies" The 20th Symposium in GRA's Series on Groundwater Contaminants

BY RULA DEEB, ELIE HADDAD AND JENNIFER NYMAN

The 20th Symposium in GRA's Series on Groundwater Contaminants was held on February 20 and 21, 2008, at the Hilton Hotel in Concord, California. For the first time in this series, a symposium was dedicated to the important topic of site closure. In an overwhelming response, the symposium attracted over 165 participants and showcased several nationwide speakers from industry, regulatory agencies and other stakeholders. The symposium was co-sponsored by CH2M Hill, Locus Technologies and Thermal Remediation Services, and was co-chaired by **Dr. Rula Deeb** of Malcolm Pirnie, Inc. and **Mr. Elie Haddad** of Locus Technologies. The symposium was organized into six sequential sessions. **Ms. Barbara Cook** of the DTSC was the keynote speaker during the dinner that was held after the conclusion of Day 1 of the symposium. A poster session with many interesting entries was also held on the evening of February 20. During breaks, attendants had a chance to network and explore services and ideas provided by vendors and displayed in exhibits.

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

Session 1: Regulatory Framework

The opening session of the conference included four presentations by members of the regulating community. **Mr. Thomas Cota** of California's Department of Toxic Substances Control (DTSC) spoke about remediation with site closure in mind. After providing an overview of how the establishment of remedial objectives plays a role in site closure requirements, Mr. Cota offered additional thoughts about planning for site closure. Mr. Cota concluded that early planning is critical and that remedial alternatives should be evaluated with the end in mind.

Ms. Alana Lee of EPA Region IX presented a paper on the closure of NPL sites using Technical Impracticability (TI) Waivers. Ms. Lee focused on EPA policy on site closure and provided examples of sites which have attained groundwater MCLs, sites which have optimized their remedy and are in the process of meeting their cleanup goals, and finally, sites which cannot meet MCLs and are awaiting TI decisions. The Intel Santa Clara 3 site was discussed in detail as a candidate for a TI Waiver. Ms. Lee concluded with key messages on technical impracticability and applicable EPA guidance.

INSIDE

Mr. Alec Naugle, a geologist at the San Francisco Regional Water Quality Control Board, gave a presentation titled "Recommended Closure Criteria for Low-Threat Solvent and Other Non-Fuel Cases." Mr. Naugle discussed the development of a reference document being developed by the Water Board to aid regulatory decisions on closing chlorinated solvent and other non-fuel cases. Mr. Naugle elaborated on how this document is expected to improve the efficiency and consistency with which low-threat cases are investigated, remediated and closed.

In the last presentation of this session, **Ms. Deana Crumbling** of EPA's Office of Solid Waste and Emergency Response discussed how the Triad framework can

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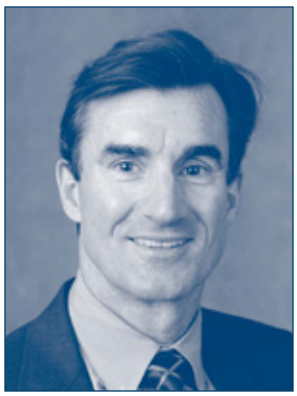

President's Message

BY JAMES STRANDBERG

Technical Leadership And Legislative Activity

Over the years, GRA has become well-recognized within California's water resources industry for organizing and delivering high quality educational events focusing on all aspects of groundwater management and protection. The dominantly technical events focus on issues important to the membership and others interested in California's groundwater resources. GRA strives to provide nonpartisan forums with equal representation by interested scientific, public and governmental constituencies in the groundwater industry.

GRA's events are offered through three series – Contaminants, Water Resources, and, more recently, Tools and Technologies. The lead article in this HydroVisions, written by the co-chairs of the recent Site Closures Symposium, the 20th in the Contaminant Series, highlights another successful event – a useful summary for those able to attend and, importantly, substantive information for those members unable to attend. GRA, through the leadership of its Events Committee and nearly complete reliance on talented and tireless volunteers, has achieved a central theme of its mission by providing education on not only the technical aspects of the event topic, but also the relevant regulatory, policy, and legal aspects as well.

Another equally important component of GRA's mission is technical leadership in the policy arena of Sacramento's Legislature. GRA is achieving its mission of becoming a recognized leader in helping to shape policy for the management and protection of the state's groundwater resources. Through the effective work of our legislative advocates, lead by Chris Frahm and Paul Bauer of Brownstein Hyatt Farber Schreck LLP, GRA is being called upon at an increasing frequency by legislative staff and Legislators themselves for not only technical information, but advice as well.

A critical component of GRA's ability to steadily increase its reputation and value as a strong technical resource has been the establishment and consistent offering of the annual Legislative Symposium and Lobby Day at the Capital. An article in this HydroVisions provides a thorough summary of the recent event held on April 23, 2008. This event, typically attended by senior professionals and water policy leaders, has enabled GRA to emerge as a recognized authority on California's groundwater resources, thereby fulfilling a central theme of our mission.

This year's event was extremely successful and included presentations by Legislators in the Senate and Assembly, both Democrat and Republican, with interests and passion for California's groundwater resources. These leaders addressed the major issues facing our state and the pending legislation designed to address these concerns. Issues raised during the morning session, the lunch presentation by Senator Machado, and the afternoon meetings with Legislators and their staff and consultants in the Capital included the need to balance the welfare of

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

Upcoming Events

Principles of Groundwater Flow & Transport Modeling

SEPTEMBER 22-24, 2008
REDWOOD CITY, CA

CO-SPONSORED BY THE UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION GROUNDWATER HYDROLOGY PROGRAM

LIMITED SPACE AVAILABLE!
TO REGISTER - HTTP://WWW.GRAC.ORG/MODREG.HTM

This course introduces the conceptual principles and practical aspects of groundwater modeling in an intuitive yet comprehensive manner. The course objective is to demystify the use of groundwater models by providing solid understanding of the principles, methods, assumptions, and limitations of groundwater models, as well as hands-on experience with the planning, preparation, execution, presentation, and review of a modeling project. At the end of the course, participants should be able to understand and actively engage in planning, supervision, and/or review of groundwater modeling projects.

Course Topics (partial list)

- principles and concepts of groundwater modeling
- data collection and preparation
- model grid design
- boundary conditions
- modeling multiple aquifer systems
- sensitivity analysis, model calibration and verification
- contaminant transport modeling
- capture zone analysis

Course instructors include Graham E. Fogg, Ph.D., Thomas Harter, Ph.D., and Peter Schwartzman, M.S. For more information, contact Mary Megarry at GRA, mmegarry@nossaman.com or 916-446-3626, or visit www.grac.org.

CALL FOR ABSTRACTS

(deadline for submitting an abstract is August 10, 2008)

Groundwater Resources Association of California Presents the 21st Symposium in its *Series on Groundwater Contaminants* "Emerging Contaminants 2008"

NOVEMBER 19-20, 2008, SAN JOSE, CA

SPONSOR EXHIBITOR OPPORTUNITIES - HTTP://WWW.GRAC.ORG/SE.DOC

GRA is pleased to announce the Call for Abstracts for its upcoming symposium on Emerging Contaminants. Emerging chemical contaminants present numerous technical and institutional challenges to society and to environmental and public health professionals. Increasingly sensitive analytical techniques have detected the presence of previously unregulated chemicals in actual or potential sources of drinking water. In some cases, the impacts of these chemicals to human health and the environment are uncertain. Many of the emerging chemicals remain unregulated, but the number of regulated contaminants will continue to grow slowly over the next several decades.

GRA's one and a half day event will profile the latest developments in detection, risk assessment, remediation and regulation of emerging contaminants in groundwater. Experts from academia, regulatory agencies, consulting, industry, and the legal arena will participate in moderated speaker sessions, poster sessions, and roundtable panel discussions. Symposium sessions will cover a variety of topics, including the following:

- Overview of emerging contaminant classes, and physical and chemical properties of key contaminants
- Occurrence and sources of emerging contaminants in water
- Regulation of emerging contaminants in the United States and Europe
- Environmental fate and transport of emerging contaminants
- Analytical techniques for quantifying emerging contaminants in environmental samples
- Modeling tools
- Natural attenuation of emerging contaminants
- Human health effects from exposure to emerging contaminants
- Environmental and human risk assessment and management
- Innovative and cost-effective remediation and treatment technologies
- Green chemistry and preventing the emergence of new contaminants

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Save the Dates

Climate Change and Groundwater

AUGUST 12-13, 2008
SACRAMENTO, CA

On August 12 and 13, 2008, GRA will convene its first conference on evaluating the impacts of climate change on groundwater resources management. The Conference, which will take place in Sacramento, will be organized along three primary tracks: 1) technical aspects of the effects of climate change on groundwater availability, recharge, timing and water supply and demand; 2) legal and policy issues; and 3) what is a groundwater manager/agency to do? Climate change already is being touched upon in CEQA studies and will likely be necessary as a component of the next round of Urban Water Supply Plans and/or groundwater management studies. This Conference will bring together a combination of invited experts and abstract-solicited speakers to talk about the newest developments and strategies for dealing with the technical, legal and political ramifications of climate change associated with management of groundwater resources. This Conference will provide critical information for groundwater professionals, water agency technical staff and managers, water and planning attorneys, significant groundwater users, agricultural interests and City, County and State agencies.

Upcoming Events

Vadose Zone Hydrology, Contamination, and Modeling

JUNE 9 – 11, 2008
UCLA EXTENSION BUILDING – LOS ANGELES, CA

CO-SPONSORED BY THE UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION GROUNDWATER HYDROLOGY PROGRAM

TO REGISTER - HTTP://WWW.GRAC.ORG/VADOSEREG.HTM

Course Description

The objective of the Course is to introduce participants to principles of vadose zone flow and transport, including gas and multiphase transport phenomena (VOCs); to discuss field characterization and monitoring techniques appropriate for model data collection; to introduce common modeling techniques and their limitations; and to provide hands-on experience with several commonly used one- and multi-dimensional computer models for vadose flow, transport, and multiphase flow. The Course is designed for scientific and technical staff working with consulting firms and regulatory agencies that are involved in the design, review and implementation of point source and nonpoint source contamination studies, recharge projects, and site assessment and remediation of vadose zone contaminants (e.g., soil vapor extraction, steam venting). Participants should be familiar with PC Windows and are assumed to have some college training in groundwater hydrology, engineering, or soil and water science. Experience with computer modeling, however, is not a prerequisite. The course will be taught by Thomas Harter, Ph.D., (University of California, Davis), Jan Hopmans, Ph.D., (University of California, Davis), and Kent Udell, Ph.D. (University of California, Berkeley). Early enrollment is encouraged, as the Course is limited to 32 registrants.

Course Topics

- principles and concepts of vadose zone flow and transport
- VOC transport and multiphase flow in the vadose zone
- hydraulic characterization of the vadose zone
- vadose zone monitoring
- numerical methods in vadose zone modeling
- overview of modeling software
- hands-on software training
- case-studies and illustration of water / solute / VOC / multiphase flow in the vadose zones

GRA wants to hear from you!

In early June, GRA members will receive an email delivering GRA's 2008 Membership Survey. We'd like to know what you like or don't like about GRA, including events, Branch meetings, *HydroVisions*, and other GRA activities. We want to ensure that GRA is meeting your expectations as a beneficial, high quality, professional groundwater association for California. We look forward to your candid responses to help map out the future of GRA.

CALL FOR POSTER PRESENTATIONS

Symposium on "Applications of Optimization Techniques to Groundwater Projects"

OCTOBER 15-16, 2008
SACRAMENTO, CA

Hydrogeologists and groundwater engineers are increasingly applying optimization methods to help address complex groundwater management problems. GRA is sponsoring this event to provide an open forum to facilitate dialog among groundwater professionals about experiences with optimization methods and potential opportunities for new applications. The event will include a half-day short course on October 15th, and a one-day symposium on October 16th. For the short course, the methodologies employed in optimization analyses will be addressed theoretically and illustrated with example applications. The symposium will feature invited speakers from consulting, government, and academia, and will present case studies on a range of groundwater optimization applications, focusing on benefits derived at the project level. In addition, a poster session will be held on October 15th. The poster session will provide an excellent forum for the authors to present their work in an informal and interactive setting.

Posters are being solicited in areas including, but not limited to, optimization of pump-and-treat remediation design, wellfield management, conjunctive use planning, integrated regional water

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Upcoming Events

Groundwater Resources Association 17th Annual Conference & Meeting "GROUNDWATER: Challenges to Meeting Our Future Needs"

SEPTEMBER 24-26, 2008

COSTA MESA, CA
TO REGISTER: HTTP://WWW.GRAC.ORG/AMREG.DOC

"The Nation behaves well if it treats the natural resources as assets which it must turn over to the next generation increased and not impaired in value."

---Theodore Roosevelt, 1910

The Groundwater Resources Association of California (GRA) invites you to join us for our 17th Annual Conference and Meeting "GROUNDWATER: Challenges to Meeting Our Future Needs."

GRA has partnered with stakeholders from all segments of the profession and industry to develop an annual conference that covers technical, regulatory, legal, and policy issues affecting groundwater and facilitates networking and the exchange of the latest research and information. Conference speakers will be featured in a plenary assembly and also in concurrent sessions that include the following issues and topics:

- ***Groundwater Challenges:*** water quantity and quality issues, national groundwater availability, emerging contaminants, water issues in the west, sustainable groundwater management strategies, climate change
- ***Surface Water/Groundwater Interactions:*** conjunctive management, ecosystem considerations, groundwater banking and transfers, groundwater quality influenced by natural and artificial recharge, surface water/groundwater modeling
- ***Groundwater Storage:*** challenges/benefits and reducing risks/uncertainties, enhancing water supply availability
- ***Watershed Water Quality Management:*** salt balance methods, salinity management, water and agricultural-chemical transport
- ***Delta Issues:*** shift in pressure to groundwater basins; ecologic issues; legislation
- ***Collegiate Groundwater Colloquium:*** GRA seeks to increase participation by university and college faculty and students in its programming. This new Colloquium will provide an opportunity for students to showcase their research and its application to groundwater challenges in California or elsewhere in the

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Technical Corner

Wells and Words

BY DAVID W. ABBOTT, P.G., C.HG.
TODD ENGINEERS

How is a reliable and recommended well yield determined for a production well?

In early April 2008, the GRA Education Committee received this technical question from a UC Fresno graduate student, and forwarded the question to me. Determining the yield for a specific production well is an exercise that requires experience and information about aquifer properties and performance, well hydraulics and dynamics, operational constraints of the well, well design, well performance, and groundwater chemistry. Each of these elements must be considered for each individual production well – no two production wells are the same.

Recommended well yields depend upon the mechanical engineering properties and composition of the construction materials, physical constraints and characteristics of the well design (diameter of well casing, screened intervals, screen opening or aperture size, water levels, specified screen entrance velocities, and well efficiency), and the properties of the aquifer (hydraulic conductivity, aquifer thickness, aquifer materials, aquifer composition and grading, unconfined/confined aquifer storativity, and hydraulic boundaries). However, the only information you really need are the casing diameter, non-pumping or static water level (SWL), the top of the well screen, and the specific capacity (SC). The measured or actual SC of a pumping well incorporates the well efficiency and many of the other hydraulic and aquifer parameters listed above. The actual SC can be compared to the theoretical SC (which is determined from aquifer properties) to estimate the well efficiency. Well efficiencies of newly constructed wells typically range between 60 and 90 percent and decrease with age.

As a practical matter, the pumping water level (PWL) should remain above the perforated or screened intervals to prevent adverse chemical reactions from occurring in the well. These chemical reactions are enhanced by the exposed portions of the well screen and the addition of oxygen from turbulent groundwater flow cascading into the well casing. Such chemical reactions can clog the well screen, increasing entrance velocities through the well screen, or enlarging the perforations allowing sand to enter the well. Sand production will seriously and prematurely abrade and wear pump impellers, thereby reducing pump efficiency, and will clog distribution facilities. Cascading water also will reduce the life span of the well and the well pump. Therefore, the usable and available drawdown is the linear distance between the SWL and the top of the well screen or perforations. This strategy prevents the PWL from dropping below the top of the well screen. The pump should be installed at the top of the well screen or perforations in most cases.

The actual SC is multiplied by the available drawdown to estimate the well yield. However, since natural, seasonal, and other unanticipated changes to water levels (e.g., interference from nearby - sometimes unknown - production wells, decreasing well efficiency through time, and interception of aquifer boundaries) occur it is recommended only using two-thirds (a safety factor) of the available drawdown in alluvial materials; or using one-half of the available drawdown in fractured rock aquifers. It is also recommended that the drawdown in a well be less than 100 feet to reduce risks of structural collapse of the well casing and promoting chemical reactions, both of which result from increased hydraulic pressure differences between the inside of the casing (PWL) and outside of the casing. Production wells and screens can be designed, at greater cost, to withstand larger drawdowns utilizing thicker wall casing or stronger and chemically more resistant casing materials.

The following rules of thumb can be used to estimate a safe and reliable long-term well yield:

1. For alluvium and unconsolidated aquifers, use two-thirds of the available drawdown or 100 feet, whichever is less;
2. For fractured rock aquifers, use one-half of the available drawdown or 50 feet, whichever is less.

Once historical records are available for the production well, the reliable well yield could be adjusted up or down based on historical performance records and well design parameters.

The casing diameter restricts the size (i.e., outside diameter) of the pump column and bowls that can be installed in the well, and therefore restricts the yield. For example, given standard pump designs, the optimum well diameter must be at least 8 inches to yield between 75 and 175 gpm (gallons per minute); at least 10 inches to yield between 150 and 350 gpm; and at least 20 inches to yield between 1,200 and 3,000 gpm. It would be difficult to find an off-the-shelf 500 gpm pump that would fit into an 8-inch diameter well casing. The following is an example of estimating the recommended yield of a production well.

An 8-inch diameter well was drilled to 250 feet in an unconfined alluvial aquifer and screened between 150 and 250 feet with 0.100-inch aperture (100 slot) stainless steel standard construction continuous wirewrap screen. This 100 slot screen can produce about 54 gpm per foot of screen or 5,400 gpm

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GRA's Annual Legislative Symposium and Lobby Day

GRA's Annual Legislative Symposium and Lobby Day was held in Sacramento on April 23rd. We had outstanding attendance and a dynamite lineup of speakers to discuss this year's topic, *Groundwater: The Hidden Link in California's Water Supply, Focusing on the Role and Importance of Recycled Water*. We would like to recognize and thank this year's title sponsor, the Metropolitan Water District of Southern California (MWD), and our luncheon and dinner sponsors, Roscoe Moss Company and CH2MHill, respectively.

Senator Alex Padilla and Tim Brick, MWD Board Chairman, kicked off the morning program with a presentation on SB 1391 (Padilla), sponsored by MWD. The Porter-Cologne Water Quality Control Act establishes a statewide goal to recycle a total of 1,000,000 acre-feet of water per year by 2010. SB 1391 would require the State Water Resources Control Board to prepare a plan to assist California in achieving that goal, consistent with state and federal water quality laws. GRA is in support of SB 1391 and will be working with the sponsor and author's office on proposed amendments.

Assembly Member Jared Huffman focused his comments on water recycling and conservation, noting that desalination must also be a part of California's long-term water supply solution. Resources Secretary Mike Chrisman spoke about the Administration's efforts to develop a water bond. Leah Walker, Chief of the Drinking Water Technical Programs for the California Department of Public Health (CDPH), spoke about the role of the CDPH in California water recycling projects. Senator Dave Cogdill, the newly elected Senate Republican Leader, reported on the status of water bond negotiations with his Democratic counterpart, Senator Mike Machado. While much of the debate has been about surface storage, Senator Cogdill assured GRA that groundwater needs must also be addressed in the water bond. Assembly Budget Committee Chairman John Laird was informative and entertaining as he spoke about his efforts to pass legislation addressing water conservation and water softeners.

Our keynote luncheon speaker was Senator Mike Machado, a California water veteran. He spoke about the challenges of crafting a water bond that will address the needs of all of the stakeholders and legislators from all parts of California. In the afternoon, we walked over to the Capitol and met with Assembly Members Lieu, Hernandez and Salas and Assembly Water Committee consultant Alf Brandt. In the afternoon, our guests enjoyed a reception in the Capitol which was co-hosted by GRA, ACWA and Water Replenishment District of Southern California.

California Legislative Corner

Senate Bills

SB1391 (Padilla), noted above, began as an aggressive measure to allow the California Department of Public Health to set statewide standards for the use of recycled water for groundwater recharge in lieu of the current distributed regulatory scheme under nine regional water quality control boards. The bill has been controversial and was amended to allow the State Water Resources Control Board (SWRCB) and interested stakeholders an opportunity to develop a solution that will have broad acceptance. This process is expected to continue over the course of the summer and hopefully will result in consistent standards for the safe use of recycled water for groundwater recharge. *GRA is in support of SB 1391 (Padilla).*

Assembly Bills

AB 2691 (Eng), sponsored by GRA, requires the Department of Water Resources (DWR) to update Bulletin 118 every 5 years with information gathered on a voluntary basis from local agencies. This information will better inform policy makers as they make decisions regarding groundwater. AB 2691 passed from the Assembly Water, Parks and Wildlife Committee with testimony in support by GRA. The bill is now pending further action in the Assembly Appropriations Committee. Since there would be a cost associated with the bill in its current form, GRA is working with the DWR on language and an approach that will allow the bill to move out of Appropriations. *GRA is the sponsor and in support of AB 2691 (Eng).*

AB 1654 (Huffman) would repeal the Integrated Regional Water Management Act of 2002 and enact the Integrated Regional Water Management Planning Act. This bill is modeled on AB 1489, introduced in 2007 by the same author. GRA sought and obtained amendments to the bill in an earlier version. Due to procedural issues, it is unlikely this bill will pass out of the Senate. *GRA has taken a Watch position on AB 1654 (Huffman).*

AB 2046 (Jones) excludes contaminated groundwater from water supply assessments in city and county development determinations and urban water management plans. GRA believes that this bill removes an incentive for developers to clean up groundwater and thus appears counter productive to the author's intent of encouraging groundwater cleanup. *GRA is opposed to AB 2046 (Jones).*

AB 2270 (Laird) would require increased reporting requirements re-

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Fulbright Award at Afeka College of Engineering, Tel Aviv, Israel

BY JAMES A. JACOBS,
HYDROGEOLOGIST
ENVIRONMENTAL BIO-SYSTEMS, INC.

It was a great honor to be selected by the Council of International Exchange of Scholars (CIES) for a Fulbright Specialists Grant. The Fulbright Senior Specialists Grant at Afeka College of Engineering in Tel Aviv, Israel was used to provide specialized training to Israeli environmental professionals. I invited other California-based experts in geology, chemistry, engineering, toxicology and other disciplines resulting in an integrated workshop titled "Remediation of Contaminated Soils and Groundwater: The California Experience." The workshop focused on regulatory perspectives, risk assessment and remedial technologies. The workshop was also made possible by corporate sponsorship and logistical assistance provided by RPC of Israel, Ami Adini & Associates and Amphibio.

Israel faces water shortages that are more severe than in California, and consequently, the Israelis have pioneered various water treatment technologies. During my first week in Israel, I had a private tour by Nellie Tal at one of the modern water treatment plants operated by Mekorot Water Company, Ltd. This water utility provides 90% of Israel's drinking water and 70% of all the water supply in the country. Technical experts come from around the world to Mekorot's facilities to learn water treatment and conservation methods from the Israelis.

The workshop occurred during the second week of the trip. I gave more than a dozen lectures, which covered topics such as the environmental history of the United States and California, brownfields experiences in the United States, and Phase I Environmental Assessment. I also discussed soil, vapor and groundwater sampling methods. After describing the fundamentals of sampling, soil and groundwater remediation methods were discussed, including in-situ chemical oxidation, enhanced bioremediation, metals stabilization and two-phase extraction methods. One topic that seemed to be of great interest in the workshop was the determination of risk and exposure levels for soil, vapor and groundwater. The participants also wanted to know how to determine what level of remediation should be required to obtain case closure. In addition, passive vapor sampling methods were described in detail and a lively discussion followed on how to use the results and the limitations of these types of data.

The other American lecturers included Ravi Arulanantham, Ph.D., a Principal Toxicologist with Geomatrix Consultants in Oakland, California. He was formerly the Chief Toxicologist with the State of California, and he gave lectures on risk assessment, as well as the risked based corrective action method (RBCA), which he helped design. Chin Man W. Mok, Ph.D., P.E., P.G., G.E., Principal Engineer and Hydrogeologist at Geomatrix Consultants in Oakland, California, provided insight into the fate and transport of chemicals in the environment. Ami Adini, born in Israel, but now living in Los Angeles, California is the Principal Engineer at Ami Adini & Associates and Rejuvenate Performance Company (RPC), an Israeli environmental consulting firm. Ami gave lectures on rapid site closure methods and remediation funding sources in California. Several Israeli regulators also gave lectures on specific challenges or case studies for the class to discuss.

(L to R) Jim Jacobs, Ami Adini, Ravi Arulanantham, Amit Tal and Chin Man Mok in Jerusalem overlooking the old city and the Dome of the Rock.

The workshop provided an introduction to the topics discussed. It was attended by about 50 Israeli professionals, who were equally divided between Israeli regulatory and water agencies, environmental consultants, potentially responsible parties and landowners. Given the significant interest by the participants, the lectures themselves were more like technical conversations with numerous discussions and questions interspersed throughout the duration of the talks. These interactions provided valuable insights into the needs of the Israeli regulators to develop realistic and meaningful cleanup levels that are attainable and designed to evaluate exposure pathways to protect human health and the environment. Since California has been performing risk assessments and has had environmental regulations for over thirty years, the lecturers provided first-hand experience to the Israeli participants on what has worked and what has failed in California.

I thank the generosity of the American lecturers, Ravi Arulanantham, Chin Man Mok and Ami Adini to provide the time to participate with me in the environmental workshop. I also thank

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The Federal Corner

BY JOHN UNGVARSKY

Federal Legislative/Regulatory Corner

Carbon Sequestration Workshops

Presentations and summaries from December 2007 and February 2008 workshops discussing Management of Underground Injection of Carbon Dioxide for Geologic Sequestration Under the Safe Drinking Water Act are available online. Each workshop was attended by over 200 stakeholders representing a broad range of interests including government, industry, public interest groups, and the general public. For more information, see: http://www.epa.gov/safewater/uic/wells_sequestration.html.

USGS Study of Pharmaceuticals and Organics

The US Geological Survey's Toxic Substances Hydrology Program recently published in the journal Science of the Total Environment an article, "A national reconnaissance for pharmaceuticals and other organic wastewater contaminants in the United States," summarizing analyses of water collected from untreated sources of drinking water including 49 surface-water and 25 ground-water sites in 25 states and Puerto Rico.

The link to the article is: http://dx.doi.org/10.1016/j.scitotenv.2008.02.021.

Your Water, Your Decision

The Source Water Collaborative (SWC) has launched a campaign, "Your Water, Your Decision," to help local decision-makers protect sources of drinking water, understand the costs involved, and consider ways to pay for it. The SWC, a group of 16 national organizations and three federal agencies, including EPA, was formed to further the goal of protecting sources of drinking water. Materials can be found at: http://www.ProtectDrinkingWater.org

Internet-Based Training

The Interstate Technology & Regulatory Council (ITRC) provides groundwater-related training courses via the Internet to reach regulators, consultants, and other members of the environmental community. The courses create a unique forum for the exchange of technical and regulatory information that reflects the consensus opinion of ITRC members from states and federal environmental agencies, the private sector, and citizen stakeholders. For more information, see: http://www.itrcweb.org/ibt.asp

Revised Guidance for Monitoring Applicable to Ground Water Rule

EPA has revised the guidance for source water monitoring methods applicable to the Ground Water Rule. The objective of the guidance is to provide ground water systems, states, tribes, and other primacy agencies a brief review of the source water monitoring provisions. Since the primacy agencies may select one of three fecal indicators (e.g., E. coli, enterococci, coliphage) that the system would be required to test for in the ground water source sample, the source water monitoring methods guidance manual provides criteria to assist primacy agencies in determining which fecal indicator is most appropriate to test for in the geographic region of that agency. For more information, see: http://www.epa.gov/safewater/disinfection/gwr/pdfs/guide_gwr_source_water_monitoring.pdf.

New Model for Simulation of Ground-Water and Surface-Water Interaction

USGS has released GSFLOW – a new ground-water and surface-water flow model. The model is based on the USGS Precipitation-Runoff Modeling System (PRMS) and Modular Ground-Water Flow Model (MODFLOW-2005). GSFLOW was developed to simulate ground-water/surface-water interaction in single or multiple watersheds. For more information, see: http://water.usgs.gov/nrp/gwsoftware/gsflow/gsflow.html. Additional USGS ground water software is available at http://water.usgs.gov/software/lists/ground_water/.

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 oversees source water protection efforts in CA, HI, and NV. For information on any of the above topics, please contact John at 415-972-3963 or ungvarsky.john@epa.gov.

Chemist's Corner

Septic Tanks on Drugs

BY BART SIMMONS

Prescription and over-the-counter drugs are now known to present significant problems for wastewater treatment plants. A more direct problem for groundwater is release of drugs from septic tanks. Septic tanks are recognized sources of viral and bacterial contamination, and now there is accumulating data for them as a source of contamination from drugs and drug metabolites.

A recent article (*Environ. Sci. Technol.*, 42(8), 2805-2811) demonstrated the movement of ibuprofen, naproxen, and other drugs from septic systems in Canada.

The drug-related contaminants which have been measured near septic systems include caffeine, estrogens, ibuprofen, salicylic acid (metabolite of aspirin), other non-steroidal anti-inflammatory drugs – fenoprofen, naproxen (an NSAID found in Aleve), diclofenac, ketoprofen, and indomethacin – plus triclosan (an antibacterial and antifungal drug), and drugs used to control lipid levels (gemfibrozil, bezafibrate, and fenofibrate). Of these compounds, ibuprofen, gemfibrozil and naproxen were found in the Canadian study at the highest concentrations and at the greatest distance, particularly in anoxic areas.

Septic systems, or on-site treatment systems, are the major source of contaminated water discharged to the subsurface in the U.S. About 25% of U.S. households depend on septic tanks for wastewater treatment and disposal. The siting, design, construction, operation, and maintenance of the systems have been based primarily on treatment of pathogens, and may be inadequate for drugs or other compounds. Some drugs are subject to photolysis, which would be more effective in wastewater treatment plants than in septic tanks. Thus, some compounds may be more persistent in the sub-surface environment. The results of the Canadian study and another study suggest that removal of drugs is more effective in oxic areas of plumes.

By one estimate, there are 17 million septic systems in the U.S. alone. These systems have been primarily designed to remove pathogens; even well-designed and well-maintained systems may be discharging drugs and drug metabolites into groundwater. Research done to date suggests that septic systems with significant oxic regions are more effective at metabolizing drugs.

The relative impact of discharges from septic tanks is not clear. However, there are clear indications that improperly constructed or compromised septic systems can cause an increase in gastrointestinal illness, and these systems are also likely to be poor treatment systems for drugs and drug metabolites.

Bart Simmons can be reached at bartonps@aol.com

Alliance Corner

WASH-in-Schools Program Launched

In March, NGWA participated in the launching of a new three-pronged program attacking disease and death among children in developing counties called WASH-in-Schools.

The program is headed up by Water Advocates, the first U.S.-based organization dedicated solely to increasing American support for worldwide access to safe, affordable and sustainable supplies of drinking water and adequate sanitation. WASH-in-Schools focuses on Africa, Asia and Latin America. The program launch took place at the National Geographic Society's Grosvenor Auditor in Washington, D.C.

NGWA, which is invested in helping people in developing countries have safe drinking water, attended the launching to learn more about the initiative. The National Ground Water Educational and Research Foundation (NGWREF) in February awarded three grants to help provide safe drinking water in developing countries:

- A $5,000 grant to West Side Church in Richland, Washington, to install a well at a school in Geisha, Malawi.
- A $5,000 grant to the Ann Campana Judge Foundation for potable water projects in Guatemala, Panama, Honduras, Nicaragua, or El Salvador.
- A $6,000 grant to the Tarahumarra Children's Hospital Fund for constructing water wells in villages served by the hospital, located near Creel in the Sierra Madre Mountains of Mexico's Copper Canyon region.

Established in 1994, the NGWREF is operated by NGWA as a 501(c)(3) public foundation and is focused on conducting educational, research, and other charitable activities related to a broader public understanding of ground water.

There are three components to the WASH-in-Schools program:

- First is providing a safe drinking-water source. Collecting water over long distances regularly keeps children, especially girls, out of classrooms. The water that they retrieve is often unsafe and exposes them to harmful water-related diseases.
- Second is to provide adequate sanitation. This is key for reducing disease and keeping children in school, especially adolescent girls who often face privacy and safety issues due to poor sanitation facilities.
- Third is hygiene education. This includes teaching children the importance of hand washing in reducing the transmission of diarrheal diseases.

Speakers at the program launching noted that globally more than one billion people do not have access to safe drinking water and an estimated 2.6 billion do not have proper sanitation. Former UNICEF Executive Director Carol Bellamy said each day 4,500 children die around the world of diarrheal illnesses.

"I'm constantly asked, 'What's the solution?' There is no single solution, no silver bullet," said Dr. Peter Gleick, president and co-founder of the Pacific Institute. "But, one chewable, one digestible piece of the problem that we could solve is (water, sanitation and hygiene education) in schools."

You can learn more about the WASH-in-Schools program by going to the Water Advocates Web site at www.wateradvocates.org.

2008 Contributors to GRA — Thank You

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GRA Extends Sincere Appreciation to its Co-Chairs and Sponsors for its February 2008 *Site Closure Strategies* Symposium

Co-Chairs
Rula Deeb, Malcolm Pirnie, Inc.
Elie Haddad, Locus Technologies

Co-Sponsors
CH2M HILL
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Luncheon
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Organizational Corner

Organizational Corner

GRA Requests Nominations for the 2008 "Lifetime Achievement" and "Kevin Neese Awards"

The purpose of the GRA Awards Program is to recognize noteworthy projects and unique individual contributions related to the understanding, protection and management of groundwater. The objectives of the annual Awards Program are:

1. To provide recognition to individuals who have demonstrated leadership and continuous dedication in the field of groundwater;
2. To provide recognition for unique contributions to the field of groundwater in 2007-2008.

All nominations for the Lifetime Achievement and Kevin Neese Awards must be received by Stephanie Hastings at admin@grac.org no later than Friday, June 13, 2008.

Nominations should be completed using the nomination forms available on the GRA's website at http://www.grac.org/awards.asp. Nominations should: not exceed one page, identify the award for which the nomination is made, and include justification for the award based on the criteria listed.

The GRA Awards will be presented to the recipients selected by the GRA's Board of Directors during GRA's Annual Meeting in Costa Mesa, September 24-26, 2008.

Awards

Lifetime Achievement: presented to individuals for their exemplary contributions to the groundwater industry, and contributions that have been in the spirit of GRA's mission and organization objectives. Individuals that receive the Lifetime Achievement Award have dedicated their lives to the groundwater industry and have been pioneers in their field of expertise.

Previous Lifetime Achievement Award recipients include:

2007 - Dr. Herman Bouwer
2006 - Glenn Brown
2005 - Dr. Luna P. Leopold
2004 - Dr. John Bredehoeft
2003 - Rita Schmidt Sudman
2002 - Tom Dibblee
2001 - Carl Hauge
2000 - Joseph H. Birman
1999 - David Keith Todd
1998 - Eugene E. Luhdorff, Jr.

Kevin J. Neese: recognizes significant accomplishment by a person or entity within the most recent 12-month period that fosters the understanding, development, protection or management of groundwater.

Previous Kevin J. Neese Award recipients include:

2007 – University of California Cooperative Extension (UCCE) Groundwater Hydrology Program in recognition of its efforts to engage scientists, regulators, farm advisors, dairy industry representative, and dairy farmers to better understand the effects of dairy operations on water quality.

2006 – Senator Sheila Kuehl for her work to improve the production and availability of information about the state of our groundwater resources, with which reasonable and sensible groundwater management may be developed

2004 – California Department of Water Resources for publication in 2003 of its updated Bulletin 118: "California's Groundwater"

2002 – Glenn County Water Advisory Committee for formulating a significant groundwater management ordinance that was adopted by the Glenn County Board of Supervisors

2001 – American River Basin Cooperating Agencies and Sacramento Groundwater Authority Partnership for fostering the understanding and development of a cooperative approach to regional planning, protection and management of groundwater

2000 – Board of Directors of the Chino Basin Watermaster for delivering a remarkable OBMP that created a consensus-based approach for making water supplies in the Chino Basin more reliable and cost effective

1999 – Governor Gray Davis for his work and leadership in addressing MTBE

GRA Extends Sincere Appreciation to its Chair, Sponsors and Legislative Advocates for its 2008 Legislative Symposium and Lobby Day

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Tim Parker,
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help agencies meet site closure goals. Ms. Crumbling gave an overview of the Triad approach, what it is not, and elements of Triad systematic planning. Ms. Crumbling concluded that EPA's Triad initiative will have met its goals when "adaptive uncertainty management is the routine expectation of the cleanup business model" and "the business model readily adopts newly proven best practices into routine practice."

Session 2: Alternative Approaches to Site Closure

Mr. Brian Lewis from DTSC moderated this session. The first presentation of the session was given by **Byron Gee, Tom Long** and **Sophie Froelich** of Nossaman Guthner Knox and Elliot, LLP. The trio of speakers focused on the role of insurance policies and insurance coverage in successful brownfield development efforts. Insurance mechanisms discussed included cost cap policies, finite risk and liabilities policies.

Mr. Stephen Koenigsberg of WSP Environmental Strategies gave a presentation titled "Advanced Diagnostic Tools and Applications to Site Design, Management and Accelerated Closure." Mr. Koenigsberg discussed recent shifts in the regulatory landscape and remediation technologies, gave an overview of diagnostic tools, then provided detailed applications of diagnostic tools in site design, management and closure strategies. Diagnostic tools discussed by Mr. Koenigsberg included molecular biological tools (e.g., DNA probes, lipid analyses), specialized chemical analyses (e.g., stable isotope probing) and advanced geophysical tools (e.g., real time data collection/imaging, remote sensing). He concluded that diagnostic tools can be used to optimize site design and management, and that the information generated using these tools can be used to petition for a reduction in active remediation and can lead to accelerated site closure.

Mr. Evan van Hook, Honeywell's Corporate Vice President, gave a presentation on sustainable development and brownfields. Mr. van Hook elaborated on linking brownfields development to broader policies supporting sustainable development. Specifically, he discussed three ways of how brownfield policies and projects could be enhanced to further sustainability goals.

Mr. James Bruen, a partner in the San Francisco office of Farella Braun + Martell LLP, spoke about overcoming obstacles to site closure. Mr. Bruen discussed investigating and remediating contamination amidst environmental litigation, the risks and benefits of voluntary cleanups, certificates of completion, no further action letters, agreed and implied reopeners, and natural resource damages. Mr. Bruen concluded with guidelines for the environmental professional such as aligning client and agency expectations, identifying and confirming steps to action agency and obtaining agency signoffs in "bite size pieces."

Dinner Keynote Presentation

The evening keynote presentation was given by **Ms. Barbara Cook**, Acting Division Chief for the Statewide Cleanup Program of the California Environmental Protection Agency Department of Toxic Substances Control (DTSC). The presentation, titled "One Cleanup Program," described the planned consolidation within DTSC of the Site Mitigation and Brownfields Program and the Hazardous Waste Program. Ms. Cook described the similarities of the two Programs, which include their methodology for cleanup and similar groups of technical experts, as well as their differences, which include applicable regulation and types of chemicals addressed. The consolidation became effective in April 2008.

Keynote Speaker Barbara Cook from DTSC

Ms. Cook also discussed goals set by DTSC Director Maureen Gorsen and actions underway to meet these goals. Ms. Gorsen's challenge to DTSC to increase transparency has resulted in enhancements to DTSC's publicly accessible information repository EnviroStor. Additional efforts are underway to make EnviroStor more complete. Other goals of DTSC are to improve efficiency and reduce the timeframe to remedy implementation. Toward these ends, DTSC has formed task forces to address decreasing timeframes for regulatory review of documents, providing generic outlines for key documents, encouraging scoping meetings

at the beginning of the cleanup process, encouraging the inclusion of contingency plans in workplans (particularly for site characterization) and providing presumptive technologies for remedies. Electronic commenting on documents, a practice currently in use in the Berkeley Field Office and slated for state-wide expansion, is anticipated to assist in decreasing review times.

Session 3: Technical Impracticability

Day 2 of the conference started with a session on technical impracticability. **Mr. Frederick Stanin** of Malcolm Pirnie opened the session by revisiting the National Contingency Plan as the basis for site exit strategies. He examined key words in the NCP language, such as "EPA expects to return usable ground waters to their beneficial uses wherever practicable, within a timeframe that is reasonable given the particular circumstances of the site." He concluded that most TI waivers have been performance based, and that TI has been addressed formally (such as formal TI waivers or containment zones) by adaptive management or by negotiated settlements in which stakeholders agree that enough is enough.

Dr. Sarah Grossi of Earthtech gave a presentation titled "Application of a TI Waiver/ Containment Zone (CZ) at the South Air Force Research Laboratory (South AFRL), Edwards AFB, CA." The selected remedy for the site included a TI waiver for a 16.5 square mile by 500-feet deep CZ, in which long-term monitoring is used to confirm that concentrations above MCLs do not migrate beyond the containment zone. In addition to monitoring, the selected remedy included remedy by natural processes, performance of technical and economic feasibility analyses, and institution of active remedies that could be triggered by the projected arrival of COCs within 10 years in sentinel wells outside the CZ.

Ms. Mary Stallard of Northgate Environmental Management, Inc. gave a presentation on a TI evaluation and alternative remediation strategy for a CERCLA Superfund site. The evaluation discussed an updated conceptual site model, evaluation of source removal adequacy based on multiple lines of evidence, an assessment of the effectiveness of the existing pump-and-treat remedy, and cleanup time projections based on regression analyses from monitoring wells. Based on the preliminary results of these evaluations, a waiver of the MCL cleanup standards will likely be proposed. In addition, an alternative cleanup strategy is being developed that will focus on engineered containment for potential DNAPL areas and natural attenuation in dissolved plume areas.

Session 4: Site Closure Strategies Case Studies – 1

Mr. Terry Feng of CH2M Hill presented a case study titled "Expedited Site Characterization and Remediation to Facilitate the Redevelopment of a Complex Brownfield Site." The project was a success as a result of the expedited and concurrent implementation of four interrelated project elements including (1) multi-step remedial investigation using the TRIAD process, (2) a reverse risk management approach to derive site-specific unit risk values for chemicals of concern thus allowing real-time calculations of location-specific risks and risk-based cleanup goals, (3) soil removal actions, and (4) final risk assessment using post-confirmation samples (after soil excavation) to verify acceptable risk levels.

Dr. Thomas Fogwell of Weiss Associates gave a presentation titled "Optimization Strategy for Central Plateau Closure at the Hanford Site." The Hanford Site is a former weapons production complex managed by the U.S. Department of Energy. Remediating the site and protecting the Columbia River, which flows through the property, from radioactive and hazardous contaminants are priorities of the cleanup effort. The presentation summarized a plan to transfer the site to a closure state where most structures are gone, contamination is either removed or significantly immobilized, and long-term stewardship has been initiated.

Mr. Michael Dodson of Thermal Remediation Services and **Ms. Nova Clite** of TN & Associates, Inc. gave a presentation on a case study illustrating how a complex site, the Pemaco Superfund Site, can be expedited through the Superfund process. Four approaches were implemented at the site including (1) Triad in decision making, (2) a flexible record of decision, (3) a combined lifecycle remedy, and (4) web-based tools for project team collaboration. Remedial technologies implemented include electrical resistance heating and heat-enhanced bioremediation in the DNALP source area, bioremediation, dual-phase extraction, pump-and-treat and monitored natural attenuation for other contaminated zones. The flexibility written in the ROD allowed using combined remedies and lifecycle approaches to optimize cleanup without the need for time-consuming administrative changes to the ROD.

Continued on page 16

"Site Closure Strategies" — The 20th Symposium in GRA's Series on Groundwater Contaminants — Continued from Page 15

Mr. Kenneth Goldstein of Malcolm Pirnie, Inc. gave a presentation titled "Regulatory Exit Strategy for a Fractured Shale Bedrock Site Dominated by VOC Matrix Diffusion." The site is at the Watervliet Arsenal in New York. Based on data collected, it is estimated that more than 99 percent of the VOC mass is present in the rock matrix. It was determined that mass-based metrics (reduction of source mass and/or reduction in flux) may be the only viable measures by which eventual site closure could be achieved. In-situ oxidation was used at the site. Measurements of mass-discharge along property boundary and integrated mass flux measurements were conducted to evaluate the treatment efficacy.

Session 5: Site Closure Strategies Case Studies — 2

Mr. Elie Haddad started Session 5 with a presentation on a stepwise closure process at a site involving a drinking water aquifer. Starting in 1982, active remediation was closed in steps. First, groundwater extraction in deep formations was suspended in 1988. Second, all off-site wells were shut down in 1991. An SVE system was installed and operated between 1989 and 1990 in the on-site area. A slurry wall installed in 1986 isolated the on-site contamination and was instrumental in the 1998 containment zone application that allowed the suspension of all active remedies and subsequent redevelopment of the site into a shopping center.

Mr. Robert Cipolletti of CH2M Hill gave a presentation titled "Using Site Strategic Planning to Manage Risk throughout the Closure Process." This presentation focused on an approach and an example case where well-developed site-strategic planning allowed for pro-active management of risks (business, human health and environmental risks) while achieving regulatory compliance over the lifecycle of the project. By developing goals, objectives, and metrics early in the process and revisiting them as conditions changed, more focus was placed on achieving objectives rather than on the next phase of work.

Mr. Dennis Parfit of the State Water Resources Control Board presented a perspective on the State Water Board's Underground Storage Tank Site Closure Policy. The talk included a discussion of the Health and Safety Code Section 25296.10 (corrective action shall ensure protection of human health, safety and the environment), Water Code Section 13000, and Resolution 92-40. He recommended consideration of characteristics of the waste, the hydrogeology of the site, the location of public supply wells, and the future potential uses of the groundwater. He concluded with a quote from T.S. Eliot that "half the harm that is done in this world is due to people who want to feel important [...] they justify it because they are absorbed in the endless struggle to think well of themselves."

Ms. Nova Clite of TN & Associates gave a presentation titled "Using the Triad Approach to Get a Failed Remediation Site Back on Track." The site in question is at the Oxnard Airport in California. The Triad approach included the following elements: (1)

systematic planning during meetings of stakeholders, (2) development of a conceptual site model that provided information on site history and determined data gaps, and (3) site characterization using Membrane Interphase Probe (MIP) with real-time data reporting. In addition, a pilot study of high-vacuum dual-phase extraction as an alternative remedy was conducted. Other studies were performed to collect data and construct 2D and 3D models and cross-sections that were used to update the CSM. The refined CSM provided stakeholders with the tools for confident project planning, prioritization and decision making.

From left to right, panelists Lenny Seigle (CPEO), Greg Taylor (Raytheon), Dr. Marvin Unger (SERDP/ESTCP), Alana Lee (EPA Region IX), Stephen Hill (SFRWQCB), and moderator Elie Haddad (Locus)

Session 6: Panel Discussion – The Treacherous Road to Site Closure

Mr. Elie Haddad of Locus Technologies moderated this panel that included **Mr. Stephen Hill** of the RWQCB (Oakland, CA), **Ms. Alana Lee** of EPA's Region IX (San Francisco, CA), **Mr. Lenny Siegle** of the Center of Public Environmental Oversight (Mountain View, CA), **Mr. Greg Taylor** of Raytheon Company (Long Beach, CA), and **Dr. Marvin Unger** of SERDP and ESTCP (Arlington, VA). This group that spans variable stakeholders from regulatory agencies, industry, government and non-government organizations presented their perspective on site closure. Even with some regulatory and non-regulatory tools for closure, some were doubtful if a site will ever be completely "closed." Some of the treacherous obstacles present themselves at the site itself, such as low-permeability formations, low cleanup standards of chemicals and physical access. Several panelists mentioned that an effort to remove mass to the extent practicable should be made, but that there comes a time when no available technology would be able to achieve cleanup standards. In answering a question regarding reopening of "closed" sites, some of the panelists discussed vapor intrusion as a recent reopener of closed sites, others talked about changes in toxicity evaluations of chemicals, and others explained how some emerging chemical contaminants (e.g., 1,4-dioxane) are potential reopeners.

This panel provided a closing summary of earlier discussions and perspectives for the two-day conference, reminding attendees of challenges facing site closure.

About the Authors

Dr. Rula A. Deeb is a Senior Associate and Technology and Applied Research Leader at Malcolm Pirnie, Inc. in Emeryville, CA. Dr. Deeb's work focuses on alternative site closure strategies at complex sites, and the environmental fate and transport of emerging contaminants. She has co-chaired various GRA conferences in the past.

Mr. Elie Haddad is a Vice President with Locus Technologies based in Mountain View, California. Mr. Haddad has extensive background in site strategies, remedial investigations and designs, and vapor intrusion. He has co-chaired various GRA conferences in the past.

Dr. Jennifer Nyman is an environmental engineer in the Emeryville office of Malcolm Pirnie, Inc., specializing in the characterization and remediation of groundwater and sediment and associated cost estimation. She is an expert on the geochemistry and microbial reduction of uranium in groundwater.

President's Message – Continued from Page 2

the delta with water reliability for southern California; increasing groundwater storage statewide, but especially in depleted aquifers in southern California; increasing groundwater recharge with treated wastewater to foster local sustainability; reduction of imported water with benefits of reduced electricity use (20% of the electricity used in California involves the movement of water across the state); and balancing treated wastewater recharge with concerns for water quality through the potential introduction of contaminants, including salts and disinfection byproducts.

A direct benefit of GRA's visibility and reputation in Sacramento occurred when Assembly Member Eng approached GRA about sponsoring a groundwater bill. The result has been the development of AB 2691, which would require the Department of Water Resources to prepare 5-year updates to Bulletin 118 (California's Groundwater). GRA has also authored "support" letters for two other bills currently moving through committees as well as providing advice on a potential water bond.

GRA is proud of its accomplishments in providing education and technical leadership and serving as an advocate for the science-based management and protection of California's groundwater resources. In the near future, we will be sending a survey designed by the Membership Committee to the membership to assess the organization's activities. The Committee will compile feedback from the survey in advance of the Board of Directors Annual Strategic Planning meeting to be held in August. Survey results will also be provided in the next HydroVisions. I urge all members to actively engage in, and support GRA by completing the survey and providing GRA's leadership with your feedback and suggestions. While we believe we are well on our way to fulfilling our mission, California's groundwater industry is complex, and our members represent a broad array of constituencies that we want to fully understand. On behalf of my fellow Officers, Directors, and Membership Committee members, thank you in advance for completing the survey and providing us with your valuable opinions on our activities.

CALL FOR POSTER PRESENTATIONS: Symposium on Applications of Optimization Techniques to Groundwater Projects – Continued from Page 5

resources management planning, groundwater management for quantity and quality, seawater intrusion management and mitigation, water supply sufficiency and reliability analysis, and water transfer valuation.

For other questions on the Symposium, please contact Rob Gailey (rob@rmgailey.com, 415-407-8407) or Chin Man Mok (cmmok@geomatrix.com, 510-663-4290).

Wells and Words – Continued from Page 6

with an entrance velocity of 0.1 feet per second. The SWL was 75 feet and the SC was 13 gpm per foot of drawdown for a single test. Transmissivity is about 19,500 gpd/ft [13 gpm/ft of drawdown x 1,500] while hydraulic conductivity is about 111 gpd/ft2 [19,500 gpd/ft / (250 feet – 75 feet)]. The well is assumed to be 100 percent efficient. No aquifer boundaries were encountered in the 48-hour pumping test.

Calculations would suggest that this well could yield 975 gpm [(150 feet – 75 feet) x 13 gpm/ft of dd]; but wait - using only two-thirds of the available drawdown would yield 650 gpm. Furthermore, a pump that fits within an 8-inch diameter casing can only practically yield between 75 and 175 gpm. The suggested pumping rate of the well is less than 200 gpm even though the aquifer could probably yield 975 gpm with a properly designed 14-inch diameter well. Note that this 8-inch diameter well was over-designed with 100 feet of screen and a 100 slot aperture; only 10 feet of screen would be needed to transmit 540 gpm efficiently. This short length of screen would have plenty of transmitting capacity for an 8-inch diameter well.

CALL FOR ABSTRACTS: Groundwater Resources Association of California Presents the 21st Symposium in its Series on Groundwater Contaminants Emerging Contaminants 2008 – Continued from Page 3

Emerging contaminants to be covered include, but are not limited, to the following:

- Nanomaterials
- Pesticides/herbicides (e.g., 1,2,3-TCP)
- Pharmaceuticals, including antibiotics
- Phthalates
- Personal care products (e.g., polycyclic musks)
- Disinfection byproducts (e.g., NDMA)
- Industrial additives and byproducts (e.g., 1,4-dioxane, 1,2,3-TCP)
- Flame/fire retardants (e.g., PBDEs)
- Fluorinated compounds (e.g., PFOS)

GRA welcomes submittals of abstracts for papers and poster presentations on the topics outlined above. The deadline for submitting an abstract is August 10, 2008. Please feel free to contact the symposium co-chairs, Tom Mohr (408-265-2600) or Jennifer Nyman (510-735-3012) if you would like to discuss your topic for this symposium before submitting an abstract.

Student Paper Competition

A competition with cash scholarship prizes will be held for posters presented by students at the Symposium. Interested students should submit an abstract per the guidelines below.

Guidelines for submitting an abstract for a Paper or Poster Presentation are as follows:

- Word 9.0 documents are preferred.
- Please identify if you are submitting an abstract for a paper or poster presentation.
- Abstracts must be one page in length or less, and should be titled and include all contributing authors' names and affiliations.
- Please identify the name of the person who will be presenting the paper or poster, and add biographical sketches of the authors as a second page. The biosketches should be 50 words or less in paragraph form, and full mailing and e-mail addresses should be included in addition to other contact information (phone and fax numbers).
- Authors are required to indicate the topic for which the abstract is being submitted.
- Margins should be 1-inch top, bottom, and right side and 1¼-inch left margin. The text should be single-spaced, 10-point size, Arial font, with no pagination, footers and headers. Paragraphs should be justified.
- Major headings should be 12-point bold; minor headings should be 10-point italicized but not bolded. There should be one blank line above and below all headings, except above major headings which should have two blank lines.
- Graphics should not be used in abstracts.

By virtue of submitting an abstract, the submitter(s) grants GRA the right to publish any accepted abstract or the right to decline any abstract. You can submit your abstract by e-mail to Mary Megarry (mmegarry@nossaman.com; 916-446-3626) **no later than August 10, 2008**. The organizing committee made up of GRA members will review abstracts and make the final selections.

Sponsors and Exhibitors

If you are interested in exhibiting your organization's services or products, or being an event sponsor, please contact Mary Megarry (mmegarry@nossaman.com; 916-446-3626). GRA welcomes co-sponsors as well as lunch, break, reception and student paper competition sponsors.

Sponsor Exhibitor Information Packet - http://www.grac.org/se.doc

Fulbright Award at Afeka College of Engineering, Tel Aviv, Israel – Continued from Page 8

the corporate sponsors and Afeka College of Engineering for making the workshop a success. I thank the Council for International Exchange of Scholars (CIES) for the Fulbright grant that allowed the Israeli workshop to be possible. The U.S. Department of State, Bureau of Educational and Cultural Affairs funds the Fulbright program and CIES is a division of the Institute of International Education. The Fulbright Program is an important part of American educational exchange and is used to help build and maintain U.S. international relations throughout the world. The goal of the Fulbright Program is to promote mutual understanding and respect between the United States and other nations. Unfortunately, Congressional funding for the Fulbright Program has been drastically cut over the past several years. Readers interested in the continuation of international exchanges can notify their representatives in Congress that the CIES program is an important part of building and maintaining U.S. international relations and should be funded generously.

James A. Jacobs, Environmental Bio-Systems, Inc., 707 View Point Road, Mill Valley, CA 94941; Tel: 415-381-5195; Fax: 415-381-5816; Email: jimjacobs@ebsinfo.com

GRA's Annual Legislative Symposium and Lobby Day – Continued from Page 7

garding recycled water by the DWR, and allow any local agency that operates a sewer system to control residential salinity inputs after a finding by the SWRCB that residential salinity control would help meet water quality standards. Residential salinity discharges to sewer systems are one of the most significant impediments to expanding recycled water. Current law allows local agencies to regulate water softeners; however, it requires an extensive, costly process. This bill has strong support in the water industry and is opposed by the water softener industry. *GRA is in support of AB 2270 (Laird).*

Groundwater Resources Association 17th Annual Conference & Meeting GROUNDWATER: Challenges to Meeting Our Future Needs – Continued from Page 5

world. Please e-mail Jean Moran, GRA Education Committee Chair, at moran10@llnl.gov for more information.

- ***Recycled Water for Recharge:*** evolution of recycled water regulations, monitoring wastewater constituents through Soil Aquifer Treatment and Direct Injection (e.g., pharmaceuticals, PCPs, TOC, BDOC, other indicators and surrogates) assessing potential risk to receptors, etc.
- ***Coastal Groundwater Supply and Quality Issues:*** seawater intrusion; coastal groundwater discharge; brine water discharge estuarine environments; assessing supplies and optimizing groundwater management approaches in coastal environments
- ***Groundwater Protection and Remediation Success Stories***: examples of groundwater cleanup success stories, wellhead treatment, desalination, contaminant containment and removal technologies
- ***Demonstrating Groundwater Supply Sufficiency and/or Reliability:*** deciphering SB 610/221/UWMPs/IRWMPs
- ***Emerging Technologies on the Horizon***

Luncheon Keynote: On September 25, Robert Glennon, Morris K. Udall Professor of Law & Public Policy at the University of Arizona and author of the book "Water Follies: Groundwater Pumping and the Fate of America's Fresh Waters" (Island Press, 2002), will provide a compelling talk titled "Tales of Bottled Water and French Fries: The Environmental Consequences of Groundwater Pumping." You'll hear a striking collection of stories that bring home the actual and potential consequences of our growing national thirst.

Field Trip: An optional field trip on September 24 includes a tour of the world's largest indirect potable reuse facility, Orange County Water District's new Groundwater Replenishment System, as well as OCWD's artificial recharge facilities in Anaheim.

Short Course: The one-day course, Introduction to Practical Statistics, is being offered on September 24 and instructed by Dennis Helsel, Phd. Dr. Helsel is the lead author of the popular textbook "Statistical Methods in Water Resources" (USGS, 2002) and of "Nondetects And Data Analysis" (Wiley, 2005) as well as many technical articles.

The short course will emphasize basic principles of data analysis, including when to transform data and why, how to handle outliers, what hypothesis tests are good for, and how to build a good regression equation. Advantages of newer nonparametric and permutation tests for scientific applications will be highlighted. Common pitfalls of traditional methods will be discussed. Attending this course will clear up misconceptions, point to further resources, and get you heading in the right direction.

Cooperating Organizations: California Groundwater Association, International Association of Hydrogeologists, Water Education Foundation, Sustainability of Semi-Arid Hydrology and Riparian Areas

Sponsors and Exhibitors: GRA is pleased to invite participants to sponsor Conference functions or to exhibit at the Conference, including during the President's Reception. Please contact Mary Megarry at mmegarry@nossaman.com or 916-446-3626 for more information; for Sponsorship & Exhibitor Opportunities see http://www.grac.org/se.pdf.

Please reserve the Conference dates and join us to hear the latest scientific, management, legal, and policy advances for sustaining our groundwater resources. For more information, contact Kathy Snelson at (916) 446-3626 or executive_director@grac.org.

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Sacramento Branch Highlights

BY JOHN W. AYRES,
BRANCH SECRETARY

The Sacramento Branch hosted a January meeting that featured Steven Phillips of the United States Geological Survey (USGS). Mr. Phillips provided an overview of new tools for MODFLOW, including example applications of the tools in the San Joaquin Valley. The new tools allow direct simulation of irrigated agriculture, vertical flow through wells, and other processes that result in improved simulations of real-world conditions. Tools included parameter estimation techniques that make use of multiple realizations of sediment distribution, and GSFLOW, a just-released hybrid between MODFLOW and PRMS, which provides a coupled simulation of groundwater and surface-water flow. Additionally, Mr. Phillips discussed several applications, including a new model of the entire Central Valley, to be published in 2008. The valley-wide model utilized one square mile cells, over 8500 well logs, over 20,000 water level observations and streamflow from 43 inflows and 66 diversions.

The February meeting was the 4th annual regulatory update featuring Antonia Vorster of the Central Valley Regional Water Quality Control Board (CVRWQCB), and Brian Lewis of the Department of Toxic Substances Control (DTSC). Antonia Vorster is program manager of the Groundwater Cleanup Program for the Central Valley Region and has over 30 years experience. Brian Lewis is Chief of the Geological Services Unit, Northern California DTSC. During the meeting, both speakers discussed trends in groundwater cleanup enforcement. The CVRWQCB has achieved 10 site closures per year, has approximately 100 sites in active remediation, and has been able to support local redevelopment agencies in grant applications for brownfield redevelopment. Ms. Vorster identified a number of challenges facing the board including: brownfield cleanups, increasing efficiency in achieving affective and timely cleanup, identifying responsible parties, and pursuing funding for sites without viable responsible parties.

The Sacramento Branch held a March meeting at Sacramento State that drew 39 student attendees. The meeting featured a presentation on groundwater quality impacts and groundwater monitoring on dairies, by Dr. Thomas Harter of UC Davis. Dr. Harter's presentation focused on the results of his work in the San Joaquin Valley, where there are over 1600 dairies and 1.5 million cows that provide 20% of the nation's milk supply. Monitoring of groundwater recharge quality beneath dairies in areas with large water-table fluctuations requires a different approach than the typical twenty-foot well screen at the water level encountered during drilling. Rather, multiple short-screened wells over an appropriate depth range are far more effective. Downgradient from dairy source areas, there are reasonable ways to estimate the appropriate depth of wells intended to monitor dairy-impacted groundwater below the water table.

In April, the Sacramento Branch hosted a presentation by Andrea L. Foster entitled "Towards an Understanding of the Risk Presented by Arsenic-Rich mine waste: X-ray Absorption Spectroscopy Case Studies." There are millions of tons of arsenic-rich mine wastes at mine sites throughout California, 67% of which are on public land. Inorganic forms of arsenic (arsenate As5+ and arsenite As3+) are a health concern, and are known to cause cancer when ingested in dissolved form. Since other species of arsenic are not as much of a health concern, knowing the speciation of the arsenic present in mine wastes is as important as knowing its concentration. Dr. Foster discussed x-ray absorption spectroscopy as a tool for the identification of the chemical species of arsenic at several mine sites in California.

San Francisco Branch Highlights

BY BILL MOTZER, PRESIDENT;
DAVID ABBOTT, TREASURER; &
JOHN KARACHEWSKI, SECRETARY

The October 2007 meeting was held at the Biltmore Hotel hosted by Mark Wheeler, SF Branch South Bay Coordinator; 46 members and nonmembers attended.

Thomas K.G. Mohr with the Santa Clara Valley Water District (SCVWD) and GRA Board Past President gave an excellent talk on old dry cleaners and their risk to groundwater resources. Tom and the SCVWD recently completed a "Study of Potential for Groundwater Contamination from Past Dry Cleaner Operations in Santa Clara County." This study assessed the number, ages, and duration of past dry cleaning operations, and extent to which solvent use, regulation, and machinery could be combined to increase or reduce the possibility of past dry cleaner solvent releases. A ranking tool was used establishing a relative threat index, combining factors such as potential source strength, apparent groundwater sensitivity, the distance from a dry cleaner to the nearest production well, directional differences from groundwater gradients, and a potential well vulnerability factor from production well construction data. Relative threat ranks were generated with the adaptation of a SiteRank algorithm to prioritize the many unique features of past dry cleaner locations and their potential to release chlorinated or hydrocarbon solvents. Occurrence of tetrachloroethene (PCE) in Santa Clara County groundwater subbasins was profiled, as were improvements in dry cleaner machinery, operator practices, regulations, and enforcement.

For the November 2007 meeting at Spenger's in Berkeley, 44 members and nonmembers heard drilling expert and Johnson Screens representative, Edd Schofield, explore the relationship between drilling technologies in the groundwater and oil/gas industries. Edd was the 2007 McEllhiney Distinguished Lecturer sponsored by the NGWA and National Groundwater Research and Education Foundation. Edd provided a vigorous and informative presentation on the brief history of both the water well and oil/gas industry. Initially, the oil industry relied on the tools and methods found in the water well industry. Over 100 years later the groundwater industry is adapting to the more sophisticated methods developed for the oil/gas industry. The oil/gas industry has developed innovative and sophisticated methods which include: directional drilling, rig activity screens, virtual reality training, rig safety protocols, handling of casing with robotics, advances in drilling fluids and solids controls, drill stem testing, filter packs composed of uniform ceramic beads, and expandable sand control liners. In the oil industry, well efficiency is supreme and likewise should be an objective of all water well drilling projects. Edd concluded with this piece of advice "Be willing to look over the fence."

The January 2008 dinner meeting at Spenger's was highlighted by the San Francisco Bay Region RWQCB annual regulatory update, attended by 115 members, nonmembers, and students. Our speakers were Stephen Hill, Toxics Cleanup Division Chief, Michael Rochette, Water Planner, and Elizabeth Allen, Toxicologist with the Toxics Cleanup Division. Stephen began with a 2007 legislation update: SB 1001 was introduced by Don Perata because it was felt that the RWQCBs were not enforcing and restoring impaired water bodies. The bill was to provide RWQCBs consistency across regions. It was vetoed by the Governor who stated that it would be too expensive. Stephen also discussed the Municipal Regional Permit (MuRP) process to regulate urban runoff. Site cleanup implications for MuRP are that it will require stormwater agencies to identify toxic "hot spots" and will trigger RI/cleanup work at those hot spots. Michael discussed RWQCB planning activities including the DWR's California Water Plan and GAMA Program update. The SWRCB Strategic Plan was updated in 2007 with the focus on planning for the next five years. DWR's 2009 Water Plan will also focus on snow pack and sea-level (bay) changes. Elizabeth discussed the use of screening levels. There are three types: (1) Risk-based (RBSLs), (2) Statutory, and (3) Nuisance/General Quality. Screening goals are intended to provide environmental protection without knowledge of specific site conditions. Examples of

RBSLs used in California include: (1) U.S. EPA Region 9 PRGs (final update - 2004) (see www.epa.gov/region09/waste/ sfund/ prg/index.html) (2) OEHHA CHHSLs (www.calepa.ca.gov/Brownfields/documents/2005/ NumberReport.pdf), and (3) SF Bay RWQCB ESLs (www.waterboards.ca.gov/sanfranciscobay/esl.htm).

February 2008 dinner meeting, the San Francisco Branch South Bay venue met at the Biltmore Hotel in Santa Clara hosted by our South Bay Coordinator Mark Wheeler. Dr Carol Kendall of the U.S. Geological Survey presented: Isotope Tracers of Nitrate Sources in Agricultural Basins. Dr Kendall provided the audience with a brief introduction to isotope fundamentals, and then discussed how several new isotope tools can provide critical information about nutrient and associated organic matter sources. Finally, she showed some examples of the usefulness of these new multi-tracer approaches for quantifying nitrate derived from different land uses in the San Joaquin Valley. Nitrate sources often have distinctive isotope "fingerprints" that can provide a better understanding of a system than just chemical data.

For the March 2008 meeting, 27 members and nonmembers met at our North Bay Venue in Berkeley, California. Julian (J.C.) Isham from the Shaw Group provided presentations on "Reclamation of the Jamestown Mine" and "Issues before the State Mining and Geology Board." Mr. Isham focused on reclamation of this former open pit gold mine and its impacts to surface and groundwater. When mining operations ceased in 1994, the Sonora Mining Corporation (SMC) transferred the property to Tuolumne County, which envisioned redevelopment of this area for new businesses, parks, and a reservoir. In December 2001, the California Attorney General filed a complaint against the SMC for violating a Cleanup and Abatement Order and Waste Discharge Requirements. This case was settled, and in July 2006 Shaw Environmental Liability Solutions, L.L.C. (SELS) was awarded the Jamestown Mine Reclamation Project. This project included dewatering of the tailings management facility (TMF) 50-acre pond, transfer of >300-million gallons of water to the Harvard Pit, and capping and closure of the 130-acre TMF with on-site clay. SELS also conducted a site investigation to determine groundwater impacts and evaluated water treatment technologies for remediating groundwater impacted by arsenic and salts. SELS has assumed environmental responsibility for the site 'O&M' for 10 years.

Mr. Isham also provided an overview and current issues before the State Mining and Geology Board. The Board administers the State Mining and Reclamation Act, the Alquist-Priolo Earthquake Fault Zoning Act (A-P Act), the Seismic Hazards Mapping Act, and the California Geological Survey's seismic and landslide hazard programs. All of these programs are vital to the safety of California citizens. For example, the Board is reviewing the A-P Act to determine if advances in understanding of California's earthquake hazards may require modifications to the current regulations. Mr. Isham also discussed the importance of aggregate use in the building and construction industries and the impending shortages and price increases for this underappreciated resource.

For the April 2008 meeting, Mr. Brian Lewis, Chief of the Geological Services Unit of the DTSC, provided his third annual regulatory update to 50 members and nonmembers. In March 2008, the DTSC and LA RWQCB organized a collaborative Soil Gas Advisory Forum (search "Soil Gas Forum" on the DTSC web site). Mr. Lewis also summarized public input for revising the "Vapor Intrusion and Mitigation Guidance" and "Vapor Intrusion Guidance" documents, which received over 370 comments (most of the feedback sought clarification on sampling depths and bio-attenuation of petroleum vapors). Mr. Lewis also stressed regulatory concern about vapor intrusion into buildings and the need for either active or passive remediation systems, in addition to liners. EnviroStor is being updated to improve area searches and to provide reports for public review. Mr. Lewis envisioned that electronic deliverables and reviews will be required to streamline remediation processes and to improve the long-term success rates for completing corrective actions and clean up of contaminated sites. Recently, DTSC has reorganized the "Site Mitigation and Brownfields Program" and "Hazardous Waste Program" into a "One Cleanup Program," supported by geologists, engineers, and toxicologists. Mr. Lewis further indicated that EPA Method 5035 for TOC analysis is required for risk-based site closures. Last year, the EPA increased the hexavalent chromium analytical holding time from 24 hours to 28 days. Effective 10/18/07, the new California MCL for perchlorate was established at 6 ppb. Mr. Lewis provided an example of a successful TRIAD approach, and DTSC is sponsoring a 3-day Remediation Technology Symposium and webcast in mid-May. Mr. Lewis concluded his presentation with a vision of DTSC working to restore communities and to address issues such as the green chemistry initiative, pharmaceutical waste, treated wood waste, brownfields redevelopment, and the recent high-profile news story about high concentrations of lead in children's jewelry.

San Joaquin Valley Branch Highlights

BY BILL PIPES,
BRANCH PRESIDENT

Our May meeting will feature geologist Dr. Roland Brady from California State University at Fresno. He will be speaking on "Watershed Restoration for Fish and People: Rural and Urban Opportunities."

Our meetings are dinner meetings and are held the third Thursday of the month. Meeting notices are mailed out each month and email reminders are sent frequently. We also post notices of all our meetings on the GRA website (www.grac.org). If you would like to be on our mailing/emailing list, please contact Lisa Massie at (559) 264-2535 or lmassie@geomatrix.com.

Southern California Branch Highlights

BY GENIECE HIGGINS,
BRANCH SECRETARY

February 2008 Meeting: Regulatory Update

On February 21, 2008, the Southern California Branch held its bi-monthly meeting at the Wyndham Hotel in Costa Mesa, CA. The meeting was a joint event with the Professional Environmental Marketing Association and generated an impressive turnout of 70 attendees. The meeting began with an introduction to the 2008 GRA Southern California Branch officers: Emily Vavricka, President; William Sedlak, Vice-President; Peter Murphy, Treasurer; Geniece Higgins, Secretary; and Technical Advisors Paul Parmentier, Sheila Rogan, and Toby Moore. Emily followed with an announcement of the 2008 GRA scholarship awards, presented to Cal State Fullerton students, Peggy Barthel and Dale Dailey. Peggy is a Masters of Science candidate studying the source of a spring that houses the endangered Mohave Tui Chub at Zzyzx Desert Studies Center in San Bernardino County, California, and Dale is a fourth year student studying the El Mirage Lake area of San Bernardino County California, where he is looking at the impacts of an extensive clay unit to local groundwater recharge.

The regulatory update portion of the meeting included presentations from the Santa Ana Regional Water Quality Control Board (Steve Mayville), Los Angeles RWQCB (Adnan Siddiqui), Department of Toxic Substances Control (Dave Murchison), and Orange County Health Care Agency (Geniece Higgins). Highlights of discussion topics are presented below:

SARWQCB: Hot Topics:

- Salt management (OCWD's groundwater replenishment program, proposed state policy on water recycling and 2004 basin plan amendment)
- Use of recycled water
- Perchlorate
- TMDLs for nutrients, pathogens, and pesticides
- Problems associated with septic systems

LARWQCB

- Discussion of Key State Board Resolutions (Anti-degradation Policy [68-16], Sources of Drinking Water Policy [88-63], and Policies & Procedures [92-49])
- Outline of site clean up program - oversight for Investigation and Cleanup of Sites not overseen by UST and WIP, Cost Recovery Program; AGT Program; and DOD Program
- Overview of site cleanup program requirements: Site Investigation, Cleanup, and Closure Process

DTSC

- Unified Cleanup Program: to cover both RCRA and CERCLA cleanups
- Improved Performance /Quicker Decisions/Teamed approach to site management
- Increased enforcement
- More consumer protection actions (i.e. lead in jewelry, toxic packaging…)
- Hiring

OCHCA

- Reorganization of case managers from distribution by responsible party to distribution by cities
- Review of delays in the site closure process (missing Geotracker uploads, "old" groundwater monitoring data, submerged wells, lack of full scan VOC analysis)
- Addition of new geologist and two staff members to program
- Updated and/or guidance documents for quarterly monitoring, O&M, and closure reporting requirements
- Requirement of abandonment of all wells prior to issuance of closure letter

Plans for future Southern California Branch meetings tentatively include: presentations on the Pasadena NASA/JPL VOC-Perchlorate Plume, Dana Point Desalinization Project, a Remediation Technologies Field Seminar in June, two Saturday summer Field Trips in conjunction with UCI Extension class, a September Dinner Meeting in conjunction with the GRA Meeting, and an October talk regarding the Sweetwater Groundwater Basin in San Diego.

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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 Course *Vadose Zone Hydrology, Contamination & Modeling*	**June 9-11, 2008** Los Angeles, CA
GRA Symposium *Climate Change: Implications for California Groundwater Management*	**August 12-13, 2008** Sacramento, CA
GRA Board & Planning Meeting	**August 16-17, 2008** Santa Barbara, CA
GRA Course *Principles of Groundwater Flow & Transport Modeling*	**September 22-24, 2008** Redwood City, CA
GRA Workshop *Introduction to Practical Statistics*	**September 24, 2008** Costa Mesa, CA
GRA 17th Annual Meeting & Conference	**September 24-26, 2008** Costa Mesa, CA
GRA Course & Symposium *Applications of Optimization Techniques to Groundwater Projects*	**October 15-16, 2008** Sacramento, CA
GRA Symposium *Emerging Contaminants*	**November 19-20, 2008** San Jose, CA

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