GRA's Fifth Annual Meeting

Multi-Disciplinary Solutions To California Groundwater Issues

In Cooperation With

California Department of Water Resources
Cal/EPA - Department of Toxic Substances Control and State Water Resources Control Board
Water Education Foundation
Association of California Water Agencies

The objectives for GRA's Fifth Annual Meeting are to bring together a variety of professionals working on groundwater problems and solutions to present new ideas, exchange information, and develop new directions for groundwater development, management, and protection. To this end, special concurrent symposia, including both groundwater resource and environmental contamination sessions, will address topics relevant to the meeting theme. Presentations will provide forums on the Safe Drinking Water Act, Superfund, Reclaimed Water, Seawater Intrusion, Groundwater Cleanup and Performance Goals, Insitu Remediation Techniques, Groundwater Protection and Cleanup Policy, Groundwater Management Programs, a short course in Risk-Based Corrective Action, and more. This year's meeting reflects the increasing need for collaboration of professionals with expertise in a variety of disciplines to:

- better understand complex whole-earth system processes and identify research needs
- enhance data management, analysis and modeling techniques
- develop innovative solutions to existing water quality problems
- address institutional and policy issues constraining comprehensive management of the state's water resources; and
- pursue science-based approaches to sustaining water resources.

The 1996 program will highlight the necessity to integrate research across traditional disciplines to effectively incorporate groundwater science into policy and legal decisions that accomplish a whole-ecosystem approach to management of California's water resources. Each day at noon, we have scheduled keynote speakers to stimulate your lunch time discussions. On Thursday, Dr. Joseph Birman, President of GSI and former Geology Chair of Occidental College, will be discussing groundwater data and multi-disciplinary approaches to develop solutions to groundwater issues. Our Friday keynote speaker will be a representative from NASA that will provide a more futuristic approach to evaluating water issues on other planets.

DAY 1: Thursday, October 10, 1996
7:00 - 8:00 am Registration
8:00 - 8:30 am Welcome to GRA's Fifth Annual Meeting: Multi-Disciplinary Solutions to California Groundwater Issues, Introduction of Officers and Conference Concurrent Sessions, Schedule and Layout of Conference

Groundwater Resources Sessions
SESSION 1: IMPLICATIONS OF THE SAFE DRINKING WATER ACT ON THE GROUNDWATER INDUSTRY
8:30 - 9:00 am Invited Speaker Overview of the Safe Drinking Water Act
9:00 - 9:30 am Bruce A. Macler, United States Environmental Protection Agency (U.S. EPA) Status of the Groundwater Disinfection Rule - the Crystal Ball is Beginning to Clear....
9:30 - 10:00 am Dr. Lee Shull, Foster Wheeler Environmental Corporation, Arsenic, Threshold Carcinogen, Implications to Drinking Water Standard
10:00 - 10:30 am BREAK

SESSION 2: SUPERFUND ISSUES FACED BY THE GROUNDWATER INDUSTRY
10:30 - 11:00 am John Allen, Esq., Graham & James, Superfund: An Overview from the Private Sector and Prospects for Reform

11:00 - 11:30 am Jim Goodrich, San Gabriel Valley Water District, Finding Consensus in the Largest Superfund Site (San Gabriel Valley)
11:30 - 12:00 pm Jon Bishop, California Regional Water Quality Control Board, Los Angeles Region, San Gabriel Superfund - A Regulator's Perspective
12:00 - 1:30 pm LUNCH GRA ANNUAL MEETING KEYNOTE SPEAKER: Dr. Joseph Birman, President, GSI/w (Geothermal Surveys Inc.), Avoid Developing Multi-disciplinary Solutions to California Groundwater Issues and Quit Re-evaluating the Existing Date... or... Don't Keep Looking, You May Not Like What You Find.

SESSION 3: RECLAIMED WATER ISSUES
1:30 - 2:00 pm Steve Kasower, California Department of Water Resources, Economic Issues Associated with Reclaimed Water
2:00 - 2:30 pm Earle Hartling, Los Angeles County Sanitation District, Answers to Real and Perceived Concerns Regarding Groundwater Replenishment with Reclaimed Water
2:30 - 3:00 pm Steve Bachman, Integrated Water Technologies, Constructed Wetlands - Using Reclaimed Water
3:00 - 3:30 pm BREAK
3:30 - 4:00 pm Ken Thompson, Irvine Ranch Water District, Overcoming Environmental and Political Challenges in a New Reclamation Project (Newport Bay)
4:00 - 4:30 pm David Ebersold, Montgomery-Watson, Evaluation of Direct Injection of Reclaimed Water in a Potable Water Aquifer in the Alamitos Gap Seawater Intrusion Barrier
4:30 - 5:00 pm Tim Silvich, Orange County Water District,Use of Tracer Isotopes as a Method to Age Date Groundwater and Determine Flow Paths at the Talbert Seawater Intrusion Barrier
5:30 - 7:30 pm EXHIBITOR SPONSORED SOCIAL

DAY 2: Friday, October 11, 1996
7:30 - 8:30 am Registration
Groundwater Resources Sessions
SESSION 1: KEY ISSUES FOR GROUNDWATER MANAGEMENT PLAN IMPLEMENTATION
8:30 - 9:00 am Carl J. Hauge, California Department of Water Resources, Groundwater Management in California
9:00 - 9:30 am Judy Bloom, U.S. Environmental Protection Agency, Well Head Protection Programs -- the Federal Perspective
9:30 - 10:00 am Lisa Anderson, Metropolitan Water District of Southern California Containment Zones (SWRCB Policy #92-49) -- How Do You Manage a Groundwater Basin?
10:00 - 10:30 am BREAK
10:30 - 11:00 am Steve Yaeger, Cal Fed Bay-Delta Program, Groundwater Management Strategies in the Cal Fed Bay-Delta Alternatives
11:00 - 11:30 am Linda Spencer, California Regional Water Quality Control Board, San Francisco Bay Region, A New Framework for Designating Groundwater Beneficial Use in the San Francisco Bay Area
11:30 - 12:00 pm William Mills, Orange County Water District, Groundwater Management with Native Water, Imported Water, Recycled Water and Seawater Intrusion
12:00 - 1:30 pm LUNCH KEYNOTE SPEAKER, Representative from National Aeronautics and Space Administration (NASA), Europa! Water Discovered! Interplanetary Water Resources Evaluations for the Next Millennium...Are You Ready?

SESSION 2: SURFACE WATER AND GROUNDWATER INTERFACE ISSUES...THE FINE LINE
1:30 - 2:00 pm Mark Williamson, East Bay Municipal Utility District, Technical Issues Associated with the Interface of Surface Water and Groundwater
2:00 - 2:30 pm Anne Thomas, Esq., Best, Best & Krieger, Surface Water and Groundwater Interface Issues - Legal Implications
2:30 - 3:00 pm David Abbott, Todd Engineers, Case Study Accentuating the Issues Associated with the Surface Water and Groundwater Interface
3:00 - 3:15 pm BREAK

3:15 - 5:00 pm PANEL DISCUSSION -- GROUNDWATER MANAGEMENT: WHAT IS THE BEST WAY? MODERATOR: Carl Hauge, California Department of Water Resources PANELISTS: Jan Goldsmith, Esq., Kronick, Moskovitz, Tiedemann & Girard, City/County Ordinances....Are They Self Defeating? Dan Keppen, Tehama County Flood Control & Water Conservation District, An Ordinance Example and AB 3030 Application John Peterson, San Diego County, Grappling with Groundwater Availability and Land Use Fred Gientke, General Manager, United Water Conservation District, Management by Adjudication, AB 3030, Groundwater Management Agency and Conservation District
5:00 pm ANNUAL MEETING ADJOURNED

DAY 1: Thursday, October 10, 1996
Environmental Sessions
SESSION 1: RE-EXAMINING GROUNDWATER CLEANUP AND PERFORMANCE GOALS
8:30 - 9:00 am Tim Parker, Law Companies, Industry Trends for Groundwater Cleanup: Where Have We Come From and Where are We Going?
9:00 - 9:30 am Roy Herndon, Orange County Water District, An Update of Groundwater Contamination in Orange County - Chlorinated Compounds, Including MTBE
9:30 - 10:00 am Eliana M. Makhlouf, Montgomery Watson, Fuel Product Action Level Development Report (FPALDA): An Innovative Approach to Cost-Effective, Risk-Based Cleanup at Fuel Sites, Presidio of San Francisco
10:00 - 10:30 am BREAK

SESSION 2: IN-SITU REMEDIATION TECHNIQUES
10:30 - 11:15 am Dong Li, Unocal ERS, Intrinsic Bioremediation: Case Study
11:15 - 12:00 am Don Marcus, Emcon Insitu Remediation Using Reactive Permeable Barriers
12:00 - 1:30 pm LUNCH
ANNUAL MEETING KEYNOTE SPEAKER: Dr. Joseph Birman, President, GSI/w (Geothermal Surveys Inc.), Avoid Developing Multi-disciplinary Solutions to California Groundwater Issues and Quit Re-evaluating the Existing Date... or... Don't Keep Looking, You May Not Like What You Find.
1:30 - 2:00 pm Parviz Montazer, Multimedia Environmental Technology, Soil Vapor Extraction and Air Sparging Modeling Results
2:00 - 2:30 pm Dr. Paul D. Lundegard, Unocal ERS, Air Sparging - A New Perspective on Performance and Design
2:30 - 3:00 pm BREAK
3:00 - 5:00 pm PANEL DISCUSSION - THE CHANGING LANDSCAPE OF GROUNDWATER PROTECTION AND CLEANUP POLICY (RISK-BASED APPROACHES, SB 1764 ADVISORY COMMITTEE FINDINGS, LLNL STUDY FINDINGS, AND CONTAINMENT ZONE POLICY EXAMINED) MODERATOR: Steven H. Goldberg, Esq., Downey, Brand, Seymour & Rohwer Legal Implications of Risk-Based Approaches PANELISTS: Ijaz Jamall, President, Risk-Based Decisions, Inc. and former Toxicologist with DTSC Matt Small, U.S. Environmental Protection Agency Dr. Lorne G. Everett, Geraghty & Miller, Research Laboratory at the University of Santa Barbara
5:30 - 7:30 pm EXHIBITOR SPONSORED SOCIAL

DAY 2: Friday, October 11, 1996
8:00 - 8:30 am Registration
ALL DAY SHORT COURSE: ASTM RISK-BASED CORRECTIVE ACTION (RBCA) FRAMEWORK TRAINING SESSION

INSTRUCTOR: Dr. E. Essi Esmaili, Foster Wheeler Environmental Corporation, ASTM Certified Instructor

All Day Course. Class participants will be provided with a formal copy of ASTM-Training Manual and Standard Guide (E 1739-95). Course fee is to compensate ASTM for Copyright. This course is ordinarily a two-day course that is being condensed to a one-day course.

Participants will leave with a familiarity of RBCA, an understanding of how Risk-Based Screening Levels are developed, a foundation to the equations used in RBCA, the knowledge of how to apply RBCA, and much more. Dr. Esmaili is a dynamic instructor who has the ability to convert the most complex equation to its simple components so that the equation is understandable to his audience.

8:00 - 8:15 am Introduction to RBCA
8:15 - 8:45 am Case Studies
8:45 - 9:45 am Toxicity Assessment
9:45 - 10:00 am BREAK
10:00 - 11:30 pm Exposure Assessment/Risk Characterization/Estimation of Cleanup Goals
11:30 - 12:00 pm Fate and Transport
12:00 - 1:30 pm LUNCH KEYNOTE SPEAKER (NASA)
1:30 - 3:15 pm Fate and Transport
3:15 - 3:30 pm BREAK
3:30 - 5:30 pm RBCA Framework END OF RBCA TRAINING COURSE

Special Acknowledgment

GRA would like to thank all our speakers who have made time in their busy schedules to make their presentations. In particular, we would like to thank Carl Hauge of the California Department of Water Resources for his invaluable assistance in locating and confirming speakers for the various sessions and Dr. E. Essi Esmaili of Foster Wheeler Environmental Services for donating his services in providing the RBCA training. Lastly, we would like to thank you for taking the time to attend this annual meeting.

GRA's Fifth Annual Meeting
Multi-Disciplinary Solutions to California Groundwater Issues
October 10 and 11, 1996
Wyndham Garden Hotel, Orange County Airport, 3350 Avenue of the Arts, Costa Mesa, California 92626
REGISTRATION FORM

Fill in completely, please type or print clearly.
Registrant_____
Spouse/Companion (only if attending)_____
Title_____
Company or Organization_____
Mailing Address_____
City_____State_____Zip Code_____
Telephone_____Fax_____

___Academia ___Business ___Government ___GRA Member ___Non Member ___Send Membership Information

REGISTRATION FEES
October 10 and 11, 1996 (Meeting Sessions, Luncheons, and Social)
GRA Member:
___Early Registration: (per person $165 (postmarked by Oct. 3, 1996)
___Registration at Door: (per person) $200
___RBCA Short Course: Additional* $50
Non Member:
___Early Registration: (per person) $200 (postmarked by Oct. 3, 1996)
___Registration at Door: (per person) $250
___RBCA Short Course: Additional* $50
One Day Registration and Individual Event Tickets
___GRA Member Daily Rate (Meeting Sessions and Luncheon): $125

___GRA Member RBCA Short Course (Manual and Luncheon): $175*
___Non Member Daily Rate (Meeting Sessions and Luncheon): $150
___Non Member RBCA Short Course (Manual and Luncheon): $200*
___Luncheon Only: (per person) $25
___Social Only: (per person) $30
TOTAL AMOUNT ENCLOSED: $_____

*ASTM requires a $50/person copyright fee for course manual.
Make checks payable to:
Groundwater Resources Association
Send payment to:
GRA Annual Meeting, P.O. Box 1057 Yorba Linda, CA 92686

HOTEL RESERVATIONS
Directly contact the Wyndham Garden Hotel on 3350 Avenue of the Arts, Costa Mesa, CA 92626 at 714/751-0129. Special Room Rates for GRA Annual Meeting Attendees (need to specify) are as follows:
Single: $71.00 per night
Double: $81.00 per night.

Additional Questions on Annual Meeting: Contact either Susan Garcia or Mark Cutler at Foster Wheeler Environmental at 714/444-5500 or via fax at 714/444-5560. Exhibitors please contact Jim Carter at SPL Labs 714/447-6868

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Branch Activities

San Francisco Branch

The San Francisco Bay branch had an extra meeting in February (normally we have a meeting every other month, beginning with January). This was also a joint meeting with the AIPG -- Northern California Section. Our February speaker was William Knight, Executive Director of the American Institute of Professional Geologists (AIPG). Mr. Knight discussed domestic and international job opportunities for geoscientists, national trends in registration, and university programs. Of particular interest was his observation that geologists may need to become more generalists. Geologists have a reputation for saying "That's not my job," Mr. Knight claimed, when asked to perform a task seemingly peripheral to the field of geology. Engineers, on the other hand, have a reputation for doing anything. This has, according to Mr. Knight, made engineers more desirable employees.

For our March meeting, Dr. Martin Reinhard from the Department of Civil Engineering at Stanford University spoke on in-situ anaerobic biotransformation of BTEX. His recent research investigated the in-situ anaerobic biotransformation of BTEX under intrinsic and enhanced nitrate-reducing, sulfate-reducing and methanogenic conditions at a gasoline contaminated site in Southern California.

In May, Dr. Douglas Mackay of the University of Waterloo spoke on "Zen and the Art of Groundwater Remediation." After more than two decades of concerted efforts to remediate contaminated aquifers, consensus is building that the approaches commonly applied to date cannot be expected to achieve the intended objectives. The two basic problems are 1) pumping-based approaches attempt to move contaminants to points of treatment or remediation, both of which are confounded by heterogeneity of the subsurface and rate limitations of transport processes, and 2) the typical objectives have been impossible to meet within a manageable time frame. Dr. Mackay's talk described the range of passive approaches currently under investigation at the University of Waterloo, including funnel-and-gate systems and the use of rows of unpumped well screens. His talk also reviewed results from field trials of semi-passive remediation using 1) zero-valent iron, and 2) a solid oxygen-releasing compound. The talk finished by highlighting how the nature of semi-passive remediation requires some refinement in our thinking about cleanup objectives.

For our July meeting, we were honored to host Dr. Jacob Bear for a joint meeting with the Northern California Section of the AIPG. Dr. Bear is a professor at the Technion - Israel Institute of Technology, Haifa, Israel, and visiting scientist to Weiss Associates in Emeryville. Dr. Bear discussed the role of groundwater flow and transport models in the decision-making process and the types of information to consider when developing a model for site characterization.

The next San Francisco Bay branch meeting will be held on Thursday, September 12 and will feature Dr. Jon Marshak of the Central Valley Regional Water Quality Control Board. Dr. Marshak will speak on the selection of water quality standards and beneficial uses, the limitations of conventional risk assessment, and current developments in site assessment and cleanup from a water quality perspective.

Future Meetings:

October 16, 1996

> Dr. James Bruya "Petroleum Hydrocarbon Fingerprinting Techniques" (workshop and dinner meeting, 3:00 - 8:30 pm). The meeting and workshop will be hosted by the San Mateo County Health, County Office Building, Room 101, 590 Hamilton St., Redwood City.

November 18, 1996

> Dr. John Cherry, University of Waterloo Meeting location: Hs Lordship, Berkeley Marina.

January 8, 1997

> Regulatory update by the San Francisco Bay Regional Water Quality Control Board. Meeting location: Hs Lordship, Berkeley Marina.

For reservations and to confirm dates and locations, contact David Abbott at (510) 595-2120.

Central Coast Branch

The Central Coast Branch held its May meeting jointly with the Coast Geological Society and the Association for Women Geoscientists in Ventura. Dr. Tanya Atwater of the UCSB Marine Sciences Institute spoke on "A Billion Years of Plate Tectonics in the Western United States." It was a fantastic lecture and the house was packed! Her lecture and slide show described the three general plate tectonic eras of the West: rifted/passive continental margin, convergent margin, and transform margin. Dr. Atwater's mother had passed away that morning and she personalized her lecture with anecdotes about her mother and her mother's influence in her career. The Central Coast Branch, the Coast Geological Society, and the Association of Women Geoscientists gave Dr. Atwater a new variety of bougainvilleas in memory of her mother, who was a botanist.

Scott Slater, an attorney with Hatch and Parent, spoke at our July meeting. His talk was titled "Water Law and Land Use - Recent Developments." This meeting, held in Santa Barbara, was a success and informative. Our thanks to Pace Analytical Laboratories for sponsoring this meeting.

Southern California Branch

On January 17, 1996, the Southern California Branch was pleased to have Dr. Essi Esmaili give a presentation on the ASTM Rick-Based Corrective Action (RBCA). Dr. Esmaili is the Manager of Southern California Operations for Foster Wheeler Environmental Corporation. Essi's presentation was very timely given the Lawrence Livermore's report recommending the use of RBCA to evaluate the need for remediation. The talk was a general overview of the use of RBCA and its potential applicability for sites impacted with petroleum and volatile organic compounds (VOCs). Essi also discussed issues associated with implementing a RBCA program within the existing regulatory framework.

The March 20, 1996, dinner meeting included a presentation by Donald Marcus, MS, RG, Emcon & Associates. Mr. Marcus discussed the emerging development and use of reactive permeable barriers for in-situ remediation. The remediation technology is being promoted by U.S. EPA sponsored Remedial Technologies Development Forum-Permial Barriers Work Group, of which Don is a member. The presentation discussed various new technologies for the mitigation of impacted groundwater. Some of the technologies discussed included: redox manipulation using sodium dithionate; colloidal iron injection; adsorption of COCs by surfactant-coated zeolotites; reactive iron foam; aboveground treatment of groundwater in an iron filled reaction trench; and reactive sand-fracking. Don also presented a case study of the application of this technology at the Sunnyvale Reactive Permeable Barrier funnel and gate site.

The Southern California Branch was honored to have Mr. Ken Williams of the Santa Ana Regional Water Quality Board give a presentation for our May 22, 1996, meeting. Mr. Williams is the Chief of Pollutant Investigation for the Santa Ana Region, and his presentation was titled "General Overview and Preliminary Evaluation of MTBE Data." Mr. Williams presented background information on the use of MTBE in reformulated gasoline (RFG) and its chemical, uses, fate, transport and remediation. Additionally, Ken presented the first quarter of groundwater data with MTBE concentrations. A copy of Mr. William's presentation is available through Jim Carter of the Southern California Branch. We would like to thank Water Development Corporation, Centrum Analytical and Norcal for sponsoring our 600-piece mailers for our past meetings this year.

Future Meeting:

On September 25, 1996, the Southern California Branch of GRA will co-host a meeting to be held with the Los Angeles Regional Water Quality Control Board (LARWQCB). The meeting will be hosted by GRA,

PEMA, and the Hazwaste Association. The LARWQCB will present an update to their Site Assessment and Cleanup Guidebook. This meeting will be held from 8:00 AM to Noon, with workshops presented on the Lawrence Livermore report. The workshops will be given by Dr. Lorne Everett, one of the co-authors of the paper. A copy of the Guidebook will be provided for all attendees, so mark your calendar for this exciting meeting!

Sacramento Branch

The Sacramento Branch has continued to provide monthly functions for its members. In June, GRA and The Association of Women Geoscientists cohosted a presentation on "How to Give a Successful Presentation," by Wayne Pearce, President of Phase Three Environmental Management. The presentation began with a humorous display of how not to give presentations, followed by a detailed analysis of how we can deliver our message most effectively. Wayne has summarized his observations on the art of giving presentations that succeed in the universal goal of impressing our audiences in a brief paper, which may be obtained by calling him at (916) 933-5912.

The July Meeting, sponsored by LAW Engineering and Environmental Services, featured a summary of the ASTM Risk Based Corrective Action (RBCA), presented by Dr. Ijaz Jamall, President of Risk-Based Decisions, Inc., and Dr. Ravi Arulanantham, Staff Toxicologist with the RWQCB-SF Bay Region. Jamall and Arulanantham are both certified ASTM instructors for RBCA, who rounded out the presentation with several interesting examples of sites to which RBCA has been successfully applied. Thanks to Tim Parker for organizing the event.

The Professional Environmental Marketing Association and GRA-Sacramento Branch cohosted a luncheon held August 13 at Sacramento's Beverly Garland Hotel, featuring a presentation by Christine Bailey of the State Water Resources Control Board on Containment Zones. Ms. Bailey informed the audience that dischargers applying for Containment Zone status ("CZ") for their sites must reimburse the RWQCB for all staff time used evaluating CZ applications. The RWQCB would issue a cleanup and abatement order identifying the site as having the CZ designation. Included in the order would be a public notification and comment period and a requirement that the written application and supporting documentation be available to the public for review. The Technical Impracticability Waivers issued by the U.S. EPA or Cal-EPA DTSC may be deemed equivalent to a CZ designation if certain substantive requirements of the CZ policy are met. The proposed amendment to SWRCB Policy 92-49 allowing for the CZ designation was to be heard by the SWRCB on August 15, however action was postponed on the Containment Zone Policy due to comments submitted outside of the record. Log on to http://www.swrcb.ca.gov for information on the next hearing date.

The August 22 meeting featured a presentation on the re-release of Department of Water Resources Bulletin 118, "California's Ground Water." Carl Hauge, Chief Hydrogeologist with the DWR, gave the presentation. A summary of the talk will be in the next HYDROVISIONS. Member input to branch activities is welcome. Officers meet on the last Wednesday of each month at the Tower Cafe on Broadway, Sacramento. Call first to confirm meeting locations.

Sacramento Branch September Meeting Announcement -
Hear an Overview of a New Technical Protocol for Monitoring
Intrinsic Remediation of Fuel Hydrocarbon Plumes

The next Sacramento Branch meeting will be 6:00 to 9:00 PM September 19th at the Royal Hong King Lum Restaurant, 419 J Street, Sacramento. Gerald Church of Transglobal Environmental Geochemistry (TEG) will provide a brief overview of the biogeochemical processes involved with natural biodegradation of fuel hydrocarbons in groundwater, indicator parameters for biodegradation of fuel hydrocarbons, and TEG's technical protocol for monitoring intrinsic remediation of fuel hydrocarbon plumes. For further information regarding the evening program and reservations, please contact Carolyn Hitchcock at Law Engineering & Environmental Services at (916) 649-2424.

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The Butte County Initiatives: Groundwater Management At a Crossroads?

by David R.E. Aladjem

Voters in Butte County this November will vote on two initiatives that may have a lasting impact on the way in which California manages its groundwater resources. Both initiatives seek to regulate groundwater use and extraction within the County while limiting (or prohibiting) the export of water from the County. One ordinance is sponsored by the Valley Protection Water Alliance (VPWA); the other is sponsored by the Butte County Farm Bureau. The initiatives are quite different, however, in two key respects: in their approach to groundwater management and in their acceptance of the A.B. 3030 process. Depending on the results of this election, other counties may move towards greater or lesser regulation of groundwater resources, regulation that, to a greater or lesser degree, reflects and accepts the A.B. 3030 process.

Background

The present groundwater initiatives are a direct result of the measures adopted by water districts and counties arising from the 1987-92 and 1994 drought. The event that is widely credited with sparking the competing groundwater ordinances — the sale of 115,000 acre-feet to the State Drought Water Bank in 1994 — might not have actually led to any action without a recent decision by the California Court of Appeal.

In *Baldwin v. County of Tehama*, landowners challenged a Tehama County ordinance that limited groundwater extractions and conveyance out of that county. The landowners were planning to pump groundwater from wells located in Tehama County, introduce the water into the Tehama-Colusa Canal, and then deliver an equivalent amount of water to lands that they owned in Glenn and Colusa Counties. The Court of Appeal threw out the challenge and upheld the Tehama County ordinance. The court found that the California Constitution grants the police power (i.e., the general power to act to protect the health, safety, and welfare of residents) to counties. Because regulating the use and export of groundwater falls within the general scope of the police power, the court declared that the landowners were required to show that the Legislature had intended to preempt regulation of groundwater by localities. Even after examining A.B. 3030, the court found that the Legislature had not intended to preempt county regulation of groundwater; the court, accordingly, upheld the Tehama County ordinance. Since the Baldwin decision in late 1994, a number of counties throughout California have begun the process of developing ordinances to regulate the use of groundwater. These ordinances have generally stepped gingerly around the key issue left unresolved by that decision: the relationship (if any) between a county ordinance and a groundwater management plan adopted under A.B. 3030.

The Competing Groundwater Ordinances

The first initiative circulated for signature in Butte County was sponsored by the VPWA. The ordinance begins with recitals stating that the extraction of groundwater in Butte County has caused excessive drawdown of the groundwater table. The initiative creates a Butte County Water Department, headed up by a certified hydrologist. The first task of the new Water Department will be to prepare a Water Management Plan. (The initiative is largely silent about the relationship between this water management plan and any plans adopted under A.B. 3030; the Plan must incorporate groundwater conservation standards contained in an A.B. 3030 plan but the incorporation of other provisions of an A.B. 3030 plan are not discussed). The Water Management Plan must include both “surface and groundwater . . . to the extent that they are interchangeable in terms of their use.” The Plan must also be consistent with a number of groundwater extraction standards, including:

1. “The paramount protection of Butte County’s citizens, environment, and economy”;
2. Maintaining the groundwater table at a depth that supports natural vegetation, wildlife, natural springs, and that does not cause excessive costs to groundwater users;
3. Satisfying — to the extent feasible — agricultural water needs;

4. Reducing subsidence from groundwater extraction; and
5. "Consideration of the needs and practices of all water users in the state."

Under the initiative, all wells in Butte County producing over 50 acre-feet will be required to obtain an annual permit to extract groundwater. The permit application will require the extractor to describe the depth and extraction rate of each well, the period of use, any adverse environmental effects from the extraction, any change in the use of surface water, the beneficial use of the groundwater and the end use of the extractor, and the alternatives available to the extractor. Permits will be required to be processed in an expeditious manner and must be consistent with the county's groundwater management plan. Permittees will also be required to report groundwater levels, groundwater extractions, and the use of groundwater pumped to the County on a monthly basis.

The competing initiative — which is sponsored by the Butte County Farm Bureau — adopts a much less regulatory approach. The initiative only requires a permit for groundwater that is exported from Butte County, save where the water is used on an adjacent parcel and the use is consistent with historical practice. The initiative also requires a permit when groundwater substitutes for surface water that is then transferred outside Butte County. Unlike the VPWA initiative, the Farm Bureau initiative does not establish a new department to process groundwater permits. Instead, that function is given to the Butte County Health Department. The information required on the application includes the amount of surface water available to the land, the source of surface water to be transferred, the surface water right, the spacing from adjacent wells, a groundwater hydrology report identifying adverse impacts on other wells, and a mitigation and monitoring program for impacts on third-party wells. Permits are to be granted if the extraction will not cause overdraft, cause or increase salt-water intrusion, cause subsidence, injure other overlying groundwater users without compensation, or exceed the safe yield of the basin or subbasins. These permits will have a three-year term.

The Farm Bureau initiative directly addresses the relationship between a county groundwater ordinance enacted under the county's police power and a groundwater management plan adopted under A.B. 3030. The initiative states that if an applicant will be pumping from lands located within the boundaries of an entity that has adopted an A.B. 3030 plan, the Health Department must consider the plan prior to issuing a permit to extract groundwater. Nonetheless, the initiative also states that it is not its intent to limit the exercise of authority under A.B. 3030. Conclusion Comparing the two initiatives shows that their respective proponents take very different views towards the regulation of groundwater resources. The proponents of the VPWA initiative view groundwater resources through the broad lenses of the public trust and reasonable and beneficial use doctrines and have crafted a detailed regulatory scheme to ensure that no part of these resources can be put to unpermitted use. In exercising this type of broad regulatory authority, though, the VPWA initiative — almost by necessity — leaves little room for regulation under A.B. 3030. By contrast, the Farm Bureau's initiative —while recognizing the importance of groundwater resources in an agricultural county — limits itself to the regulation of groundwater that is proposed for export or that is used to support exports of surface water. In keeping with this more limited scope for regulation, the Farm Bureau initiative states explicitly that it will not limit the regulatory authority of agencies exercising power under A.B. 3030. It will be interesting to see which view of groundwater regulation the voters of Butte County choose. It will be even more interesting to see whether the Butte County ordinance becomes a model for counties around California.

Mr. Aladjem practices with the firm of Downey, Brand, Seymour & Rohwer in Sacramento. He regularly represents public agencies, mutual water companies, farming corporations, and individual farmers in a wide variety of water-related matters.

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CHEMIST'S CORNER

Is TPH Dead?

by Bart Simmons, Ph.D.

The measurement of total petroleum hydrocarbons (TPH) has been a key measure of site assessment and corrective action at leaking underground fuel tank (LUFT) sites as well as other sites with suspected petroleum contamination. In the past, TPH has been measured by freon-113 extraction followed by infrared spectrophotometry (EPA Method 418) or by gas chromatography with flame ionization detection (Modified EPA Method 8015). For the relatively volatile fraction of gasoline, or TPH-gasoline (TPH-G), samples are analyzed with purge-and-trap GC-FID. This fraction is more accurately called volatile petroleum hydrocarbons (VPH), since the results may or may not include gasoline contamination. For the semi-volatile fraction, e.g., diesel contamination, samples are extracted, usually with methylene chloride, and analyzed by GC-FID (TPH-D); this is similarly more accurately called extractable petroleum hydrocarbons (EPH). The TPH results in water and soil have been used in California and elsewhere to assess contamination and to monitor cleanups.

The advent of Risk-Based Corrective Action (RBCA) may end, or severely limit, the use of TPH for LUFT site assessment. The American Society for Testing and Materials (ASTM) has adopted a standard for the use of RBCA at petroleum sites. The RBCA standard has a tiered approach to site assessment and corrective action. Tier one includes examples of Risk-Based Screening Levels (RBSLs) which are used in the first tier of corrective action.

The RBSL examples include contamination with benzene, ethyl benzene, toluene, xylenes, naphthalenes, and benzo[a]pyrene. The use of TPH measurement in risk assessment is discouraged because ". . . the general measure of TPH provides insufficient information about the individual chemical(s) of concern present (RBCA, p. 9)." The use of RBCA criteria may encourage the use of field tests for aromatics, e.g., the immunoassays which are sensitive to benzene and substituted aromatics. The implementation of the RBCA model has resulted in leaving much higher levels or residual contamination of some petroleum fuels. In fact, TPH may still be used in an RBCA system to ensure that soils saturated with fuels are removed even though other RBCA criteria are not exceeded.

The California SB1764 Committee, in the review of the California LUFT program, received many comments about the limited use of TPH. Complaints about TPH were that the measurement was not risk-based and also could include naturally-occurring organics. Many sites have extractable petroleum hydrocarbons which is arguably due to naturally-occurring organics and not due to the release of petroleum products.

The TPH Criteria Working Group is a national group with diverse representation from industry, the Department of Defense, U.S. Environmental Protection Agency, and state governments. Their approach has been to develop a new scheme of TPH measurements which are risk based and could be used in a RBCA structure. It includes the measurement of individual components plus the fractionation of extractable petroleum hydrocarbons, e.g., with alumina, into aliphatic and aromatic fractions. The fractions are then analyzed by GC-FID and the fraction corresponding to specific carbon ranges are reported. The carbon range results would be compared with the corresponding risk-based criteria.

The movement toward risk-based corrective action will eliminate much of the need for TPH measurements. However, the use of risk-based TPH measurements may resurrect TPH from the dead with a reincarnated mission.

Bart Simmons is the Acting Chief, Hazardous Material Laboratory, Department of Toxic Substances Control, Berkeley, CA.

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The Containment Zone Policy

by Tim Parker

The Containment Zone Policy, proposed Amendment of Resolution No. 92-49, Policies and Procedures for Investigation and Cleanup and Abatement of Discharge Under Water Code Section 13304, was the subject of the August 13th GRA Sacramento Branch luncheon meeting. The meeting was jointly sponsored by the Professional Environmental Marketing Association (PEMA). The proposed Containment Zone (CZ) Policy would establish policy and procedures for the Regional Water Quality Control Boards (RWQCBs) to establish portions of groundwater bearing units where water quality objectives cannot be reasonably achieved for technical or economic unfeasibility, termed Containment Zones (CZ). The presentation was provided by Christine Bailey, Senior Environmental Specialist with the State Water Resources Control Board (SWRCB), Division of Clean Water Programs. Margie Youngs, Associate Engineering Geologist also with the SWRCB, assisted Ms. Bailey in a lively question and answer period that followed.

The RWQCBs set the goals for groundwater cleanups to meet water quality objectives of the groundwater basins. The past ten to fifteen years of groundwater restoration effort suggest that the water quality objectives are not generally attainable or economically feasible at California's polluted sites with current technologies. The RWQCBs went to the SWRCB in December 1994 to initiate a process to provide some statewide consistency in dealing with sites where water quality objectives are determined to be non-attainable (formerly "non-attainment zone"). The proposed CZ Policy is the result of the effort initiated in December 1994. For a CZ to be designated under the proposed policy, the discharger would submit an application to the RWQCB. The application would include the following information: site background; site history; site hydrogeologic characterization; evaluation of all wells in the area with potential to be affected by the CZ; description of discharge, and the nature and extent of pollution; demonstration that achieving water quality objectives is unreasonable; completed and planned source removal actions and pollutant mass reduction; proposed CZ boundaries; evaluation of potential impacts to water quality, human health and environment; statement by the discharger that the site is not located within a critical recharge area; maps, cross sections, and figures that show the location of the CZ and contaminant boundaries and land use restrictions; and a management plan for review and approval. The management plan would address the following: source removal; pollutant mass removal from groundwater; description of engineering controls necessary to minimize further impacts from the pollutant source, and prevent water quality impacts and risks to human health and the environment; mitigation measures, schedule and reporting requirements; detailed monitoring plan; detailed monitoring data evaluation methodology; detailed description of protocols to follow if the data indicates that water quality objectives have been exceeded outside the CZ due the pollution within the CZ; report frequency and content of reports; well maintenance, replacement and decommissioning procedures; protocol for management plan modification; file and database maintenance requirements.

As indicated above, for a CZ to be designated the discharger would be required to develop and implement a management plan to assess, cleanup, abate, manage, monitor, and mitigate significant human health and environmental impacts to the satisfaction of the RWQCB. Dischargers would have to monitor according to the approved management plan. Pollution would have to be contained such that water quality objectives are not exceeded outside the CZ. The CZ size would be limited such that it may not cause substantial decline in overall yield, storage, or transport capacity of a groundwater basin. There would be a ban on CZs in critical recharge areas, and where inconsistent with local groundwater management plans. With limited exceptions, a CZ would only be designated with written agreement of owners of property overlying a CZ.

The application would be reviewed by RWQCB with reimbursement for review, and if approved, the CZ designation would be under a cleanup and abatement order. There is a public participation element of the proposed approval process which includes a notification and comment period, and availability of written materials for public review. Various health and water agencies would be notified of RWQCB consideration of a CZ designation, and would meet as a technical advisory committee at the request of any of the agencies.

Under the proposed policy, once a CZ is designated, the RWQCB would not require any further reduction of pollutants levels (within the CZ). However, the CZ designation would be revoked if the conditions of the management plan are not fully implemented, or water quality objectives are violated beyond the CZ. Subsequent to water quality objectives being met within the CZ, the CZ designation would be rescinded by RWQCB. Technical Impracticability Waivers by the U.S. EPA or the Cal EPA Department of Toxic Substances Control would be deemed equivalent if certain substantive requirements of the CZ policy were met (monitoring, mitigation, public participation).

The final hearing on the proposed policy was the July 3, 1996, SWRCB meeting where the Board stipulated a final comment period to 5:00 pm July 15, 1996. Board staff were to address comments, and prepare the final draft policy for a vote by the Board at the August 15, 1996 SWRCB meeting. If the proposed policy does not pass the Board vote, it could either get shelved indefinitely or go back to the drawing board for re-vamping. If the proposed policy passes the Board vote, the policy would go to the State Office of Administrative Law for a 30 day review, and if approved, on to the office of the Secretary of State for signature (another 30 days).

The Board tabled the vote on the CZ Policy at the August 15th SWRCB meeting. The vote was tabled as a result of the Board receiving additional comments on the proposed CZ Policy in a recent letter from the Chairs of the RWQCB. It is unclear when the Board received the letter, but it was past the final comment period date of July 15, and recently enough that the Board had not yet had time to review the letter. The Board agreed to review the letter and determine if the comments are substantive. If the Board determines the comments are substantive, and agrees to address/incorporate the comments, it seems likely that the public review period will have to be re-opened. This probably means another three to six months in the process. Of course, the Board could elect to ignore the twelfth hour comments from the RWQCBs and vote. It will be interesting to see what happens next!

Tim Parker, CEG, CH, is a Project Manager for Law Engineering and Environmental Services in Sacramento.

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Risk-Based Corrective Action: A Practical Approach To Site Evaluation And Remediation

by Ijaz S. Jamall, Ph.D., DABT Risk-Based Decisions, Inc.

Introduction

For most of the last decade since its introduction by the U.S. EPA in the late 1980s, risk assessments have been largely limited to the status of regulatory compliance tools for evaluating the need for cleanup at federal and state superfund sites. The U.S. EPA guidance placed risk assessment as a component of the chemical characterization of hazardous waste sites known as the Remedial Investigation.

Over the past few years, there has been a growing recognition that hazardous waste sites are not being cleaned up as quickly or as cost effectively as was expected when Superfund and Resource Conservation and Recovery Act (RCRA) were first enacted. In particular, the practical application of "worst-case" analyses has resulted in the lack of distinction between sites that pose a serious threat to human health or the environment and sites that do not present significant risks. The original intent of the Superfund law, which was that sites were to be cleaned up to the extent that residual contamination was protective of human health, appears to have gotten blurred in practice.

There is increasing recognition within government and industry that the cleanup of hundreds of thousands of hazardous waste sites across the country to pristine background conditions is not scientifically defensible or economically feasible. The recession of the past few years has impressed this upon the general public who typically want to know, "Will this site impact my health or my children's health?" A question that can only be answered through the risk assessment process.

The Evolution of Risk-Based Analysis

The move towards more pragmatic site evaluation and cleanup is gaining impetus with the re-emphasis of risk-based approaches. In 1994, the American Society for Testing and Materials (ASTM) issued its Emergency Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites (ASTM, ES 38-94, July 1994) commonly referred to as RBCA. This has been revised and updated by the Standard Guide for Risk-Based Corrective Action at Petroleum Release Sites, ES 1739-95 (ASTM, 1995). Also in 1995, the U.S. EPA issued its Use of Risk-Based Decision-Making in UST Corrective Action Programs, OSWER Directive 9610.17 (U.S. EPA, 1995). Several states (e.g., Texas, Ohio, Illinois, Massachusetts, Georgia, and Michigan among others) have adopted some version of the risk-based approach, at least for petroleum contamination resulting from leaking underground storage tanks (USTs).

What is Risk-Based Correction Action?

The basic premise to the ASTM's RBCA process is to ensure that all characterization, evaluation and remediation efforts are targeted towards answering the question, *"Do contaminants at the site pose a potential health risk, above levels of regulatory concern, to current or future occupants of the site?"*

The RBCA process consists of three tiers. The ASTM Standard defines a Tier I evaluation as:
"A risk-based analysis to develop non-site-specific values for direct and indirect exposure pathways utilizing conservative exposure factors and fate and transport for potential pathways and for various property use categories (for example, residential, commercial, and industrial uses). Values established under Tier I will apply to all sites that fall into a particular category."

Essentially, the Tier 1 risk-based screening levels (RBSLs) assume human exposure to contaminants at the source and, therefore, are very conservative values. If the maximum concentrations detected at a petroleum contaminated site are below the Tier 1 RBSLs, then that site is considered to pose no significant health risks and the RBCA process would recommend a no further action. If, however, the maximum concentrations exceed the Tier 1 RBSLs, then the site fails the Tier 1 evaluation and there are two possible options: (a) cleanup to Tier 1 RBSLs or (b) proceed with a Tier 2 evaluation.

The Tier 2 evaluation uses site-specific data both in terms of contaminant concentrations in soils and groundwater and in terms of pathways of human exposure. Once these data are available, the site-specific target levels (SSTLs) are calculated and the average, or upper bound estimate of average, concentrations are compared to the SSTLs. Again, one is faced with the option of cleaning up the site to the Tier 2 SSTLs or collecting more data and performing a Tier 3 evaluation.

A Tier 3 evaluation involves a more sophisticated evaluation of human exposure and perhaps even a Monte Carlo simulation. In the vast majority of petroleum hydrocarbon contaminated sites, a Tier 2 analysis would suffice to determine both the need for remediation and the levels to which any such remediation should be conducted.

The data needs and the level of effort and sophistication of the user increases in progressing from Tier 1 through Tier 3. Naturally, costs also escalate. Therefore, before proceeding to a higher tier, the user should consider the costs of the data needs for that tier of analysis, the costs of the analysis, the time costs and the greater time for regulatory review and approval against the costs of cleaning up the risk-based levels that correspond to the particular tier. Thus, the value of the RBCA approach is the cost savings obtained from a more focused investigation at each stage of the process with an explicit emphasis on protection of human health and the environment. It is important to note that the ASTM RBCA process maintains the same level of protection of human health through each tier of evaluation. This level of protection can be customized based on state policies. While the ASTM RBCA approach does not address the quantification of risks to ecological species, it does lay out a rational process to address such impacts qualitatively. In addition, the RBCA process lends itself to alterations of state-specific regulatory requirements and policies without losing the technical underpinnings of the risk-based approach.

The ASTM RBCA Standard addresses sites contaminated with fuel hydrocarbons. However, there is nothing inherent in the RBCA approach that would preclude its application to a wide range of hazardous environmental problems. In fact, sites contaminated with chlorinated solvents and other compounds would benefit from the application of the same philosophical approach, albeit with different technical considerations.

Case Studies: RBCA in Practice

Case Study #1: At a former industrial site, located in a semi-rural area about 1,500 feet upgradient of a slough that emptied into a river. The soils and shallow groundwater were contaminated with gasoline from a former UST that had leaked, the ASTM RBCA approach was used to obtain a no further action determination from the appropriate regulatory agency. The shallow groundwater (3 to 7 feet bgs) averaged about 8,500 ppb benzene (8.5 ppm), and had similar concentrations of the noncarcinogenic gasoline constituents, toluene, ethylbenzene and xylenes. The shallow groundwater was not used as a source for drinking water and a thick clay aquitard precluded significant downward migration of hydrocarbons to any useable aquifer. Five years of quarterly monitoring data indicated plume stability. And, thus, the primary pathway of human exposure was to benzene, toluene, ethylbenzene and xylene (BTEX) vapors in indoor and outdoor air. Contaminant fate and transport modeling was used to demonstrate that BTEX constituents would not adversely impact aquatic organisms in the river.

Case Study #2: At another UST site, the RBCA approach was used to demonstrate that BTEX levels in groundwater were not at concentrations that might present a risk to human health, and groundwater was not migrating offsite. The evaluation revealed that residual concentrations of benzene (45 ppm) located some 30 feet below ground surface could present risks to workers inhaling benzene vapors in indoor air at levels above regulatory thresholds. In this case, the RBCA process focused the investigation to a potential problem which identified the appropriate scope of remediation. Following this remediation and verification sampling, a no further action determination was obtained.

Ijaz S. Jamall, Ph.D., DABT, is a President of Risk-Based Decisions, Inc., in Sacramento

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Exam Announcement

The Department of Toxic Substances Control is offering an open exam for the Hazardous Substances Engineering Geologist series. The final filing date will be in October, 1996. The filing period will extend 3 to 4 weeks. For a copy of the exam bulletin and an application, contract Dolores W. Powell, 10151 Croydon Way, Suite 3, Sacramento, CA 95827 (916) 255-3673. The engineering geologist at all levels applies scientific and engineering geology methods and principles in the performance of assigned tasks, that include: evaluating geologic data, reports, and professional papers; appraising hydrologic, geologic and geochemical data to characterize the occurrence and migration of contaminants; preparing technical reports and memoranda, public presentations on scientific investigations and findings; and do other related work. Salary range is $2868-4702 per month plus benefits and is commensurate with education and experience.

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GRA Seminar
Rapid Site Characterization

McClellan Air Force Base, Sacramento
November 20, 1996

GRA, in cooperation with Cal-EPA's Department of Toxic Substances Control, McClellan Air Force Base Environmental Management Directorate, and the University Consortium Solvents-in-Groundwater Research Program, University of Waterloo, Ontario, Canada, will sponsor a day seminar of lectures and field demonstrations (weather and logistics permitting). The seminar will cover the need for improved site characterization; the process of rapid site characterization; Quality Assurance/Quality Control; and some of the technologies that are readily available to sample the vadose zone, soil and groundwater. Field demonstrations and a mobile lab are pending.

GRA is honored to have John Cherry, Ph.D., Chairman of the University Consortium Solvents-in-Groundwater Research Program, as the keynote speaker.

Seminar flyers and enrollment forms will be mailed in September.

Enrollment is limited. For more information, contact Brian Lewis at (916) 323-3632 or E-Mail: BLewis@hw1.cahwnet.gov

If you are a vendor that provides rapid site characterization equipment and would like to be a part of the seminar, contact Brian Lewis.

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PRESIDENT'S MESSAGE

by Susan Garcia

I recently received the July-August, 1996 newsletter for the Association of Ground Water Scientists and Engineers (AGWSE), a division of the National Ground Water Association (NGWA). Since many of our members are NGWA members, the comments of Dr. John Bredehoeft may be of interest. His letter pertains to the proposed NGWA bylaws change to provide equal representation by AGWSE on the NGWA Board of Directors. Apparently, AGWSE is currently limited to two Board of Director positions out of sixteen total positions.AGWSE has 16,328 members out of a total of 20,100 NGWA members, but yet their representation on the Board of Directors does not reflect this.AGWSE members should have equal representation on the Board of Directors, because they represent 80% of the total membership.

AGWSE would like the governing bylaws at NGWA to be changed to permit AGWSE an equal share in the governance of NGWA, one that reflects the number of AGWSE members. Dr. Bredehoeft indicates that, "...a vote not to change the bylaws is a statement that the scientific community is unwelcome with NGWA -- maintaining the status quo is unsatisfactory." If the NGWA bylaws are not revised, Dr. Bredehoeft intends to resign, and withdraw his moral and financial support to NGWA. He also will encourage his colleagues to do the same. He specifically states that, "life is too short to spend it where one is unwelcomed."

My initial reaction is to agree with Dr. Bredehoeft, and I boldly presume that a significant percentage of the 16,000 AGWSE members will follow in due time. However, I cannot help but feel saddened that an organization that has served the common interest of the water industry will no longer exist. How many individuals, such as Dr. Bredehoeft, have dedicated a portion of their lives to making NGWA the world renowned organization that it is, namely through its Ground Water publication. Will these individuals be motivated and driven to start all over with a new organization?

What are your thoughts? I encourage those AGWSE members among us to write a letter to NGWA and let them know how you feel. Please send your comments to: Dr. John Bredehoeft, AGWSE, 2600 Ground Water Way, Columbus, Ohio, 43219 or email them to h20@h20-ngwa.org. Comments need to be submitted before December 1996.

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GRA's Recent Cosponsored Events

GRA cosponsored a workshop at the Association of California Water Agencies' (ACWA) conference held in May. The workshop was entitled ***Ground Water Management: Who's Carrying the Ball?*** and featured over a dozen speakers on topics ranging from aquifer protection to groundwater management. Anthony Saracino represented GRA and gave a presentation on Wellhead Protection Programs. The workshop also featured a talk by Carl Hauge of DWR on the status of groundwater management programs, and luncheon presentations by Bob Barles of the U.S. EPA and John Brown from the State Water Resources Control Board. The workshop included over 200 participants and was one of ACWA's most highly attended programs.

Anthony Saracino is GRA's representative on ACWA's Groundwater Committee and Groundwater Quality Subcommittee. The Groundwater Quality Committee is currently evaluating a number of issues that should be of interest to GRA members, including:

- the role of regulatory boards and agencies in managing groundwater
- the impact of watershed management plans on groundwater
- groundwater recharged with recycled water
- tracking of abandoned wells.

Anthony will be representing GRA at the ACWA conference in December. If you would like to provide input regarding these issues, or if you have any questions, please contact him at (916) 688-5807.

GRA also was a cosponsor of the Bay-Delta Institutional Issues Assembly, coordinated by the California Assembly Process, POWER, and the Water Education Foundation. The Assembly was held July 24-26 in Sacramento and was attended by over 100 persons involved in Bay-Delta issues. Anthony Saracino represented GRA and served on the planning committee. The Assembly consisted of four breakout sessions that were led by trained facilitators. Discussions in each session were recorded and summarized in a draft assembly statement. The draft statement was reviewed and modified the following day by the entire group in a parliamentary-like session led by Dr. Lance deHaven Smith from the University of Florida. To obtain a copy of the final Assembly Statement, contact the Water Education Foundation at (916) 444-6240.

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Municipal Solid Waste Recycling Protects Groundwater: Reply to "Recycling is Garbage"

In his June 30, 1996 article entitled "Recycling Is Garbage" published in the *New York Times Magazine* and also published in part in the July 14, 1996 Sacramento Bee Forum, John Tierney, writer for the magazine, asserted that, *"the simplest and cheapest option is usually to bury garbage in an environmentally safe landfill."* Tierney also asserted, *"Today's landfills for municipal trash are filled mostly with innocuous materials like paper, yard waste and construction debris."*

The assumption that new, lined landfills are environmentally safe is, in fact, erroneous. In one important aspect, groundwater pollution monitoring, they are even worse than the unlined "sanitary" landfills that preceded them, since they cannot be reliably monitored to detect groundwater pollution before widespread pollution occurs. Today's municipal solid waste (MSW) leachate, even with extensive waste diversion, contains a large number of hazardous and deleterious chemicals that can render groundwater unusable for domestic water supply purposes.

"Dry tomb" landfills of the type being developed today attempt to isolate wastes using plastic sheeting and compacted soil-clay layers (liners) to keep the wastes dry and to collect any leachate (garbage juice) generated within the landfill. The major "improvement" over classical sanitary landfills offered by U.S. EPA Subtitle D landfills of the type used is postponement of groundwater pollution by a few years to decades, or possibly a hundred years or so. But this "improved" landfilling approach gives the public a false sense of safety that something permanent is being done in managing the solid wastes, when it is not.

It is widely acknowledged that such liners deteriorate over time and ultimately fail to prevent moisture, which generates leachate, from entering the landfill. Keeping garbage dry will require maintenance and periodic replacement of the cap in perpetuity, not just for the 30 year period arbitrarily set by federal law. What is being accomplished by today's landfills is the transference of the economic, public health, and other burdens associated with landfill-caused groundwater pollution to future generations. It also postpones the pressure on society and regulatory agencies to develop and implement MSW management approaches that provide truly long-term protection of public health, groundwater resources and environmental quality.

State of California Water Resources Control Board regulations (Title 23, Chapter 15) have, since 1984, required that the landfilling of municipal solid wastes be conducted in landfills that will protect groundwaters from impaired use for as long as the waste in the landfill will be a threat. The waste in today's dry tomb landfills will be a threat effectively forever. Unfortunately, even though California has some of the most protective regulations for landfilling in the U.S., the Regional Water Quality Control Boards have been implementing these regulations in such a way as to allow the construction of landfills that only postpone groundwater pollution. There is an urgent need to get the Regional Water Quality Control Boards to implement Chapter 15 regulations so that groundwater pollution will be prevented for as long as the waste in landfills remains a threat.

Today's landfilling regulations evolved from a technology that was developed in the early 1980s. They are badly out of date. RCRA, the national solid waste management legislation, urgently needs to be updated to develop landfills that will protect groundwater from all impairment from landfilled wastes for as long as the wastes in the landfill represent a threat. Landfilling is the cheapest option for managing our discarded resources/waste only if the costs of perpetual maintenance and the associated groundwater pollution—future superfund sites—are ignored. This is a subsidy that is being extracted from future generations. Contrary to the statements made by Tierney, recycling protects groundwater quality by reducing the need for new landfills and the inevitable groundwater pollution associated with them.

Signed: G. Fred Lee, Ph.D., P.E., D.E.E.
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El Macero, CA

Bill Sheehan, Ph.D
Sierra Club National Waste Committee
Athens, GA

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