HYDRO VISIONS

Volume 8, No. 2 | Groundwater Resources Association of California | Summer 1999

Land Subsidence — An Often Overlooked Consequence of Our Water-Use Practices

Subsidence Monitoring and Management Considerations

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Much of the information in this article was derived from: Land Subsidence Case Histories and Current Research: Proceedings of the Dr. Joseph F. Poland Symposium on Land Subsidence, 1998, in Borchers, J. W., ed., Association of Engineering Geologists Special Publication No. 8, 576 p.

Land Subsidence in the United States, 1999, Galloway, Devin, Jones, D. R., Ingebritsen, S. E., eds., U. S. Geological Survey Circular 1182, 174 p.

I. Subsidence Monitoring and Management Considerations

THIS SECTION BY BORCHERS, GALLOWAY, AND PHIPPS.

Subsidence

Aquifer-system compaction caused by groundwater pumping is responsible for most of the subsidence in the Nation.

Land subsidence occurs worldwide and is especially prominent in the United States, particularly in California. The principal causes of its occurrence in California are deep-seated compaction of unconsolidated sediments caused by the following three processes: (1) extraction of subsurface fluids, water, oil, and gas; (2) oxidation of organic soils that results when Histosols are drained; and (3) hydro-

Continued on page 4

The approximate location of maximum subsidence in the United States attributed to groundwater pumping was identified by the research efforts of U.S. Geological Survey hydrologist Joseph Poland (pictured). Signs on pole show approximate altitude of land surface in 1925, 1955, and 1977. The pole is near benchmark S661 in the San Joaquin Valley southwest of Mendota, California.

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

INSIDE

Some Thoughts on Ownership Transition

By Nigel A. Renton, Past President
Dealey, Renton, and Associates.

Recently, a number of our clients attended a seminar in our offices on the topic of "Planning a Successful, Smooth, Internal Ownership Transfer." Naturally enough, some of the focus of this seminar was on the issues of professional liability and how to insure against them. In this article, I should like to dig a little deeper into the issue. It has been said that successful professionals often spend most of their working lives building up a practice, until they reach the age of 55 or thereabouts. From that point, they are concerned with how to dispose of their practice or business, while maintaining to the extent feasible the standard of living to which they have become accustomed.

There are no simple answers to this question. My sister-in-law and her husband, both successful attorneys, built up a significant practice in Long Beach, with perhaps ten attorneys in the firm. During the lucrative

Continued on page 3

PRESIDENT'S MESSAGE

BY BRIAN LEWIS

I have fresh news to share based on our August 7th, Board meeting. The San Francisco Branch is honoring Thomas Iwamura on September 8th for his contributions to groundwater in California (see separate article, pg. 9). Tom is retiring from the Santa Clara Valley Water District after more than 40 years of working on California Groundwater issues. The Sacramento and Southern California Branches are planning field trips for September and November (Penn Mine and San Gabriel Basin Superfund Project Respectively.) Our web page will have more information as the trips are planned. Our Legislative Committee recommended to the Board and the Board approved supporting AB 980 (Conjunctive Use Grants) and SB 989 (MTBE, Underground Storage Tanks, Well logs). Our Executive Director, Harrison Phipps has written an article on pg 15 highlighting these bills.

The Board also established the Kevin Neese Memorial Award in honor of Kevin's service to GRA and the Groundwater Industry. This award will be given annually to recognize an individual, group, or organization that has had a significant impact on California's Groundwater management, protection, or education. In addition the Board voted to select David Keith Todd as the recipient for the 1999 Lifetime Achievement Award. Both the Kevin Neese Memorial Award and Lifetime achievement award will be given at GRA's Annual meeting September 20-21 in San Diego (see pg 12 for info on the meeting.)

GRA is starting to work on their 2000 Annual Meeting, which is planned to be a joint meeting with the Association of Engineering Geologists (their National Meeting) in San Jose in the Fall of 2000. David Abbott (Todd Engineers, Emeryville) and Martin Steinpress (Montgomery Watson, San Francisco) are working with Dennis Maslonkowski on the technical portion of the meeting.

In May and June, GRA sponsored a successful short course on Groundwater Modelling. The course was held at California State University Sacramento and Fullerton. The course evaluations were very favorable. One evaluation stated, "The course was excellent and quite a bargain compared to other courses."

GRA is appreciative to Thomas Harter, Ph.d., and Graham Fogg, Ph.d., as the instructors and Peter Schwartzman, as the computer Guru. USEPA sent an evaluator to the Sacramento Class because USEPA Headquarters is thinking of taking this course on the road nationally to their ten regional offices.

I am impressed with our Branches and the high quality of talks they coordinate on a monthly or bimonthly basis. I could go on with more accomplishments of our Association, but I do not want to compete with the content of this informative newsletter. I hope you are taking time out for yourselves in your hectic schedules. Hope to see you at our Annual Meeting in San Diego. Until again.....

Don't miss out on the 1999 GRA Annual Meeting.

See page 12 for details.

HydroVisions is the official publication of the Groundwater Resources Association of California (GRA). GRA's mailing address is P.O. Box 1446, Sacramento, CA 95812. Any questions or comments concerning the contents of this publication should be directed to the newsletter editor. The editor may also be reached by e-mail:

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Ownership Transition

Continued from page 1

years of their practice, they set aside sufficient savings for their own retirement needs, and when they thought it was close to the time to retire, they simply arranged for their associates to go elsewhere, and gradually phased out their practice over several years. As a result, they realized nothing from the sale of the practice, nor could they arrange with a successor partnership to continue malpractice coverage. I always thought there were better ways to manage this, but they were thoughtful people, and if they chose to do it that way, it was not my job to try to "straighten them out."

Because the second half of my business life was concerned with working with consulting engineers, geologists, and architects, the problems of providing continuity for the benefit of their clients, obtaining value for the business, and retiring at the right time, have long been of interest to me. At the outset, I can state categorically that there is no one perfect solution.

It is very natural for those who have been successful individuals or "the boss" for many years to wish to continue charting their own destiny until they are ready to give up. I have known structural engineers to continue working part-time until within a short time of their deaths, some having stayed in harness past the age of 90. In these days it is commonplace for people to continue working past the age of 70.

Unless a professional firm concentrates on a very limited field, such as forensic work, it is usual to have a number of key associates in a successful engineering firm. This becomes especially critical when the firm has a number of jobs in different locations, and where the "boss" likes to take an occasional vacation. In response to an RFP, it is usually necessary to give suitable assurances to the potential client that not everything depends upon the continuous health and availability of one key person.

But how do you keep your key associates if they can see no future for ownership or management? Time and time again I have seen situations where no provision has been made for succession, and the key people simply leave, go elsewhere, or start their own practices.

Conventional wisdom holds that the most important people with whom to discuss proposed retirement are your accountant and your attorney. My suggestion is to cast a wider net, starting with any family members, including spouse, as well as siblings and children active in the firm. What are your aspirations for the rest of your life? What are their expectations for the future? In my own situation, one son had no interest in the business, and several years ago completed a doctorate in Germanic Languages. The other son did join our insurance brokerage firm, and within a few years obtained his professional insurance designation (CPCU). However, he had no taste for managing a business, and for many years has concentrated his energies on our computer system. (This was an important factor in my decision to form an Employee Stock Ownership Trust, which enabled me to obtain deferral of Capital Gains Tax.)

If you have one or more partners, or fellow stockholders, you may already have a "buy & sell" agreement in place. If not, now would be a good time to develop one. If you are a sole proprietor or a sole stockholder, you clearly need to talk to your close associates. Are they interested in ownership of the business? If not, are there some "friendly competitors" who might be interested in acquiring the firm? Then, talk to your insurance broker: how can your potential liability for future claims arising from past work best be handled? Can a successor entity provide you with the protection you need, or will you need to continue to pay for a separate "retirement" or run-off policy?

Whatever your own particular solution may be, be mindful of your own needs. Can you hardly wait to move to Florida and play at least 18 holes a day at your favorite golf course? Or would you like to be able to continue to work part-time, without the responsibility? If the terms for payment to you of your interest are affected by future results, you will generally receive more from a slow phase-out, so that you can ensure that your clients remain loyal to the firm, and can continue to talk to you about concerns and problems.

Above all, whether you are 40, 50, 60, or even older, now is the best time to be planning for the future. Even if you change your plans somewhat in future years, you will be in a better position to ensure a smooth transaction if you have a plan in place.

I have known Nigel for over thirty years. His firm has steadily grown during this time from half a dozen to over sixty employees. The firm successfully transferred to a new management team and continues to grow. Editor.

Land Subsidence
Continued from page 1

compaction the near-surface compaction of moisture-deficient sediments caused by wetting. For each of these causes, groundwater use can play a role, directly or indirectly, that links our balanced use of land and water resources. Aquifer-system compaction, related to groundwater pumping and extensive water-level declines, is responsible for most of the subsidence in the state and has been observed for decades in the Santa Clara, San Joaquin, Sacramento, and Antelope Valleys, and elsewhere. Groundwater pumping for agriculture in the San Joaquin Valley caused one of the single largest man-made alterations of the land surface on record. By 1970, the maximum subsidence near Mendota was more than 28 feet (see photo pg 1), and subsidence in excess of 1 foot affected more than 5,200 square miles of irrigable land, nearly one-half of the entire valley. Since the late 1800s, when levees were built in the Sacramento San Joaquin Delta and the rich organic soils of the protected islands were cleared, drained, and farmed, much of the delta islands have subsided to 10-25 feet below sea level. In arid and semiarid regions of the state, subsidence is caused by compaction of moisture-deficient sediments, such as debris flow deposits and arid region soils, when they are wetted by irrigation water or rising water tables. Hydrocompaction has substantially damaged surface infrastructure in many developing areas of California.

Aquifer-system compaction is often an unrecognized, and sometimes overlooked, consequence of groundwater development in alluvial basins. The reduction of fluid pressure in the pores and cracks of aquifer systems, especially unconsolidated sediments, is inevitably accompanied by some deformation of the aquifer system. Compression occurs when the weight of overlying materials is increasingly supported by the clay, silt, sand, and gravel that form the skeleton of the aquifer system. Increased inter-granular stress (*or effective stress*) on the aquifer system skeleton causes some compression of the skeleton and, if the stresses are large enough, some rearrangement of mineral grains and compaction of the skeleton. The result is expressed as land subsidence at the surface.

Aquifer-system deformation can be fully reversible (*elastic*) or largely permanent (*inelastic*). Elastic deformation occurs when sediments compress as pore pressure decreases, and expand equally as pore pressure increases. The consequent subsidence and rebound of the land surface commonly occur seasonally, coincident with cyclic groundwater discharge and recharge. The magnitudes of elastic subsidence and rebound are equivalent and typically small, ranging from about 2×10^{-6} to 8×10^{-6} feet of subsidence (or rebound) per foot of aquifer-system thickness per foot of head change. For example, 0.25 feet of reversible subsidence would result from a hydraulic head decline of 100 feet in a 500-foot-thick aquifer system with an average elastic compressibility (specific storage value of 5×10^{-6} per foot)[a].

Permanent compaction results only when the sediments are compressed beyond their previous maximum stress (*preconsolidation stress*). The preconsolidation stress—the effective stress threshold at which inelastic compaction begins—generally is exceeded when groundwater levels decline past historical low levels. In these stress ranges, the materials compress inelastically, and the compaction and consequent land subsidence are largely permanent and irreversible, despite any subsequent water-level recovery. Because clay (particularly montmorillinite) and diatomaceous deposits (materials that contain a high percentage of the siliceous skeletal remains, or frustules, of phytoplankton) are often highly compressible and subject to rearrangement of the grains, depressurization results in more compaction and subsidence than depressurization of less compressible, coarser-grained deposits. The inelastic compressibility typically ranges from 20 to more than 100 times larger than elastic compressibility. For example, in comparison to the earlier example for elastic subsidence, 20 feet of compaction and permanent land subsidence would ultimately result from 100 feet of hydraulic head decline beyond the preconsolidation stress in an aquifer system containing an aggregate 500-foot thickness of fine-grained, clay-rich sediments with a typical inelastic compressibility (specific storage value of 4×10^{-4} per foot)[b].

The temporal relation between variations in hydraulic head (we use the terms, "head," "pore pressure," and "water level" interchangeably) and aquifer-system compaction is complex. Because clay and other fine-grained sediments typically have low hydraulic conductivity (permeability), changes in hydraulic head are transmitted slowly through these materials when they form aquitards; how slowly depends largely on their thickness. While heads in thin aquitards (1 to 3 feet) equilibrate relatively quickly to a head decline in adjacent aquifers, pore pressures in the middle of thick aquitards may take years, decades, or longer to equilibrate. The delayed drainage of groundwater from the middle of thick aquitards causes *residual compaction* that may continue long after water levels have stabilized in the aquifers. The unequal distribution of hydraulic head in a thick aquitard leads to a complex vertical distribution of preconsolidation stress within the aquitard, which is also in disequilibrium with the preconsolidation stresses in the adjacent aquifers. It is likely that unequal distribution of preconsolidation stress in aquitards accounts for the re-initiation of inelastic compaction in some areas of the Central Valley of California where previously recovered groundwater levels in permeable parts of the aquifer have since declined, though not below historical low levels.

(a) (100 ft x 500 ft x 5 x 10-6 ft-1 = 0.25 ft)

(b) (100 ft x 500 ft x 4 x 10-4 ft-1 = 20 ft)

Monitoring Land Subsidence

Some old and new detection and monitoring methods are being used.

Historically, land subsidence caused by aquifer-system compaction has been monitored using repeat, spirit-level surveys on transects through subsiding areas and sometimes borehole extensometers to measure compaction at a single location. The subsidence that is calculated from repeat surveys of land surface altitude is a measure of the total subsidence from all causative processes; subsidence caused by aquifer-system compaction cannot be discriminated from such surveys. Borehole extensometers accurately measure compaction between land surface and the bottom of the borehole—often 800—1,000 feet or more below land surface. When paired with data from carefully constructed piezometers, and high-quality borehole information describing aquifer-system sediments, measurements of aquifer-system compaction can be used to determine the hydraulic and mechanical properties of the aquifer system; but, borehole extensometers are expensive installations.

Determining the magnitude and areal extent of subsidence can be a costly and time-consuming effort with conventional spirit-leveling techniques. For regional-scale problems, surveying using Global Positioning System (GPS) satellites is often utilized. Results can be obtained rapidly and they are easily referenced to a common stable datum. Typically,

GPS surveying yields a vertical accuracy of about plus or minus 1 inch. Several efforts are underway in California to establish networks to monitor the magnitude and extent of subsidence using GPS surveying. A 110-station network in the Sacramento—San Joaquin Delta stretches from Tracy to Davis along both sides of the Sacramento and San Joaquin rivers. The project is a collaborative effort between a group of state, federal, and local agencies. Benchmarks, more accurately termed "geodetic stations," in the delta network are spaced, on average, about 4 miles apart. Plans call for the entire network to be re-observed every three years. A similar effort has begun in Yolo County.

A new method of measuring the displacement of the earth's surface using space-based radar has been developed during the past few years. Recently, Interferometric Synthetic Aperture Radar (InSAR) has been used to measure the magnitude and areal extent of land subsidence in parts of Arizona, California, Nevada, and New Mexico. It has also been used to measure the small (about 1 to 2 inches) seasonal elastic deformation of the land surface that is caused by groundwater pumping in the Santa Clara Valley, California. InSAR holds great promise for cost-effective, detailed monitoring of land subsidence at regional scales and at well-field scales. InSAR is especially suited to urban land-use in arid and semiarid environments. Currently, InSARs use in agricultural areas is limited because of changes in the reflective properties of the land surface caused by tilling, irrigation, and crop growth. An explosion of research on InSAR applications to monitor land subsidence and aquifer-system compaction is underway.

Managing Land Subsidence

Land subsidence, water-management concerns, and land-use decisions are linked.

Compaction permanently reduces the storage capacity of the aquifer system by an amount roughly equivalent to the volumetric lowering of the land surface. In this process, groundwater yielded from the permanent compaction of aquitards (*water of compaction*) is essentially mined at the expense of incurring land subsidence. This water of compaction could be viewed as a valuable nonrenewable resource that, when used, will cause subsidence. For example, the water derived from the compaction of the aquifer systems in the San Joaquin and Santa Clara valleys during the 1950s and 1960s was an investment in the agricultural and urban development of these regions. Water resources management plans, if they include production of water of compaction, might optimize this production so that the value of the water of compaction or the benefits of its use is maximized. The cost of subsidence—reduction of aquifer-system storage capacity; impairment or damage to canals, wells, and other infrastructure; increased flooding susceptibility; and environmental degradation—has not been calculated consistently or quantified reliably in California. Quantification of these costs will lead to more reliable cost-benefit analyses for new groundwater development projects or water transfers in California.

The substantial delay between the stress applied to the aquifer by pumping, and the response of thick aquitards to equilibrate to those stresses, means that in many alluvial basins, a significant part of the ultimate subsidence that will occur may lag sustained drawdowns in the aquifers by decades or longer. Because of the limited 20-year planning horizon typically used in the California Environmental Quality Act process, realistic assessments of land subsidence caused by groundwater-development projects may not be accomplished in many basins. A longer-term view may be required to account for the residual compaction that may occur. A conservative assessment can be made by assuming that clayey aquitards will equilibrate completely with expected declines in hydraulic head in coarser-grained parts of the aquifer.

Managers base their water resources decisions on scientific information that describes the complexly interconnected atmospheric, surface, and subsurface waters. These managers, however, must work within the confines of water policy and legal codes that often treat subsurface (groundwater) and surface waters as distinctly separate entities. On one hand, surface water is held in public trust: stream flow is measured continuously at gaging stations on every major river and many streams, and the data are generally available to resources managers and to the public. On the other hand, groundwater is essentially the property of the overlying landowner and he or she is entitled to extract a correlative share as long as the water is put to a beneficial use. Because quantitative information on groundwater extractions generally is unavailable, water managers are sometimes hampered by a scarcity of information on which to base decisions. Although groundwater and surface water derive from precipitation and are intimately related components of the same hydrologic system, legally and often politically, they are treated as disparate entities. Optimal management of water resources takes into consideration all aspects of the hydrologic cycle—a task that is not encouraged by some parts of the water code and some current water policy.

II. Legal Considerations

Interestingly, legal implications of land subsidence are not founded in the water code.

Anne Thomas, Best, Best & Krieger, Riverside, Calif.

What are some of the legal implications? Property damage attributed to subsidence costs governments and individuals hundreds of millions of dollars every year. In California, as cities expand onto subsidence-prone areas, more damage to homes and infrastructure is occurring. Two legal frameworks exist through which counties and local agencies can investigate and mitigate subsidence—the Geologic Hazard Abatement District and the Subsidence Report Zone. Although formation of these zones and districts provides an avenue to address and mitigate subsidence in the interest of public health and safety, they are opposed by many people, agencies, and businesses on the grounds that they increase the time and cost of projects and could reduce property values. Groundwater management plans in subsidence-prone areas may include provisions for monitoring subsidence.

Who is legally responsible for damage that may be attributed to subsidence? Where one person causes subsidence by extracting subterranean water, oil, minerals, or other substances from under the land of another, thus removing the subjacent support, he is absolutely liable for the damage caused without regard to negligence. (See *Marin Municipal Water District v. Northwestern Pacific R.R. Co.* (1967) 253 Cal.App.2d 83, 91-96; Restatement (Second) of Torts § 818 [1977 Main Vol.]). A public agency's liability is governed by the law of inverse condemnation. Generally, a public agency is strictly liable for physical damage it causes to private property under the California Constitution, article 1, section 19, which states that private property may not be taken or damaged for public use without just compensation. Two narrowly con-

Continued on page 8

People on the Move

Rebecca L. Silva, REA, has been promoted to Project Environmental Scientist at Geocon Environmental Consultants, Inc. (Geocon), a professional environmental and geotechnical engineering firm. She is responsible for managing environmental site assessments, risk-based closure studies and groundwater monitoring programs. Ms. Silva has 7 years environmental experience with Geocon and is a graduate of University of California at Davis with a degree in Soil and Water Science.

Letter to the Editor

To: editor@grac.org

Subject: Hydrovisions

As a female professional member of GRA I take exception to the title of the *PBMS: not a Hormonal Disease*, by Bart Simmons, article in the latest Hydrovisions.

What were you guys thinking when you let this title get past editing??????

Kim A. Schwab

The author and editor apologize for the title of the article. It was meant to be a glib title. We will try to be more sensitive in the future.

Editor

Job Announcement

TechLaw's San Francisco office is seeking mid-level or project manager level hydrogeologists, engineers or toxicologists. The work involves providing technical support for the EPA, reviewing RI/FS, EE/CA and Removal Action reports and work plans related to Federal Facilities undergoing investigation and cleanup under CERCLA. The selected individual(s) will be responsible for managing/performing the document reviews for several facilities, and will act as the primary contact for the EPA project manager for those facilities. Interested individuals should submit a cover letter expressing their interest and a resume to JRR@techlawinc.com.

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GRA operations are funded through membership dues and donations made by members and their affiliated companies. We would like to recognize those that have contributed to GRA's future in 1999:

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Thank You

Are the Data Legally Defensible

by Bart Simmons

As the federal and state governments try to move toward a performance-based measurement system (PBMS), a major question has been asked: Will the data be legally defensible? What does determine whether data are legally defensible?

The Courts Have Their Own Rules

The standards used by the courts are quite different than the standards used in the environmental testing community. In addition, the rules on the acceptability of scientific evidence are different in federal courts than in some state courts.

Federal Rules for Scientific Data:

The federal rules for admissibility of scientific evidence changed in 1993 when the U.S. Supreme Court issued an opinion in the case of *Daubert v. Merrell Dow Pharmaceuticals*. Although the case involved allegations that a drug, Bendectin, caused birth deformities, the ruling had a broad application because it abandoned an earlier standard, based on *Frye v. United States*. In its 1993 Daubert ruling, the court established a more flexible and liberal test of admissibility of scientific evidence. The Supreme Court received a considerable number of briefs from scientific organizations, and this is reflected in their opinion.

> "...under the Rules the trial judge must ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable (*Daubert v. Merrell Dow Pharmaceuticals,* 4827)"

Readers who are interested in a thorough examination of the Daubert ruling may want to look at Foster and Huber's book, *Judging Science*. The question of what constitutes reliable scientific evidence is still subject to debate, but the impact of the Court's ruling was to give the judge considerable flexibility in deciding that question in a particular case. The Court did give judges some factors to consider:

1) whether the underlying theory or technique can (and has been) tested,

2) whether it has been subjected to peer review and publication,

3) the known or potential rate of error, and

4) if it is generally accepted in the scientific community.

Engineers are held to the same rules:

The U.S. Supreme Court recently expanded the Daubert principles to testimony based on technical and other specialized knowledge (*Kumho Tire v. Carmichael*). The court agreed that a district court had properly prevented the testimony of a tire expert whose methods were unacceptable to the judge.

California Rules Are Different Than Than Federal Rules

Unlike the federal courts, California courts still maintain a standard based on "general acceptance" in the relevant scientific community (*People v. Kelly*, 1976). The three "prongs" of this standard are:

1) The scientific test's reliability must be established by its general acceptance in the relevant scientific community;

2) The testifying witness must be properly qualified; and

3) The proponent of the evidence must demonstrate that the correct scientific procedures were used.

None of these rules would pose a significant barrier to environmental test methods, with the possible exception of a "black box," which may operate using principles that have not been accepted in the scientific community.

Case Histories

People v. Hale, 1994: The first line of this California Appellate Court ruling reads:

> "SW-846 is not the name of some new gasoline additive marketed by an oil company. It is the title of a manual compiled by the United States Protection Agency (EPA) dealing with the collection and testing of hazardous waste."

The case involved illegal dumping of 1,1,1- Trichloroethane into waste dumpsters. The appeal focused on major deviations from SW-846: no sampling plan was used, the lab had used Method 8015 (using a flame-ionization detector) instead of the accepted methods 8010 or 8240; the samples were frozen instead of cooling to 4ºC.; and the 14-day holding time was exceeded. The court held that the deviations were harmless.

> "We discern no per se rule which does automatically precludes the introduction of evidence of disposal of hazardous waste just because the gathering of the sample does not follow every jot and tittle of the EPA manual."

People v. K&L Plating, 1997: Although this is not a case published by an appellate court, this case involved the use of field methods. This was a manslaughter case, in which a worker died after rescuing another worker who was cleaning out sludge in a waste treatment tank. The prosecution used results from a Draeger tube testing of head space in a jar of sludge and a hydrogen cyanide monitor as evidence that hazardous levels of hydrogen cyanide were emitted from the waste. The defense challenged the reliability of all of the data. Review of validation of the Draeger tube showed that a lower estimate of HCN concentration could be calculated even though the tube changed color on one stroke instead of the required ten strokes. The HCN monitor, the prosecution argued, used an accepted principle and provided an expert witness to support the data. The defendant plead guilty. *People v. Sangani* 1994: This case involved illegal disposal of hazardous waste into a sewer system. The defendant was

Continued on page 8

Chemist's Corner

Land Subsidence
Continued from page 5

strued exceptions to this rule are when there is a genuine, narrowly defined emergency requiring the proper exercise of the emergency police power, and when the public agency by law has a right to inflict damage. The most recent expression of this rule is in the case of *Los Osos Valley Associates v. City of San Luis Obispo* (1994) 30 Cal.App.4th 1670, where the court held the City of San Luis Obispo liable for subsidence caused to a shopping center by the City's groundwater extraction program, rejecting the City's affirmative defense that the pumping was part of an emergency response to continuing drought conditions.

Liability for subsidence as between the owner of the subterranean land or minerals and the surface owner is the same for private parties as it is for public agencies, but the cause of action is damage to real property or nuisance, rather than inverse condemnation. The owner of the surface has the absolute right to subjacent support and the subterranean extractor is strictly liable for removal of such support regardless of negligence. Civil Code Section 832, which purports to modify the rule for coterminous surface owners who excavate surface lands without negligence, has been held by the *Marin Municipal Water District v. Northwestern RR Co.*, supra, court to apply only to adjacent surface owners, and only to lateral support.

The cause of action of the surface owner arises when the land subsides, not when the extraction is made, and the person who removes the subjacent support remains strictly liable for damages caused by subsidence even though the damages do not occur until after he has transferred his subsurface rights to another party. (*Platts v. Sacramento Northern Railway* (1988) 205 Cal.App.3d 1025.) Furthermore, each separate subsidence creates a new cause of action with a new statute of limitation. (*Bellman v. County of Contra Costa* (1960) 54 Cal. 2d 363, 369.) Therefore, subsidence occurring many years or even decades after extraction is actionable against the extractors, though the surface owner may have difficulty after so many years in proving the early extraction was the proximate cause of the eventual subsidence.

CHEMIST'S CORNER
Continued from page 7

convicted, but appealed, in part, because the lab which did the analysis was not certified. The Appellate Court found that even if the Hazardous Waste Control Law required the use of a certified lab, the data would be admissible.

> "Failure to follow precise regulatory or statutory requirements for laboratory tests generally does not render the test results inadmissible, provided the foundational requirements for establishing the reliability of the tests are met. The necessary foundational requirements are:

(1) the testing apparatus is in proper working order;

(2) the test was properly administered; and

(3) the operator was competent and qualified. (*People v. Sangani*, p. 1276)"

People v. Adams: In what has been described as an explanation of the general rule of evidence in California, the court found:

Where a statute ...does not specifically provide that evidence shall be excluded for failure to comply with said statute...such evidence is not inadmissible. Statutory compliance or noncompliance goes to the weight of the evidence (*People v. Adams*, 567)."

The courts have their own rules for what is legally defensible, and they should be kept in mind as we reform the test methods used for environmental measurement.

Bart Simmons is Chief of the Hazardous Materials Laboratory in the Department of Toxic Substances Control. He can be reached at bsimmons@dtsc.ca.gov or (510) 540-3003.

References

Foster, K.R.£, and P.W. Huber, 1997. *Judging Science: Scientific Knowledge and the Federal Courts*: MIT Press.

Kumho Tire v. Carmichael, 526 U.S., No. 97-1709, 1999.

People v. Adams, 59 Cal.App£. 3d at 567 (1976).

People v. Hale, 29 Cal.App£. 4th 730 (1994).

People v. Kelley, 17Cal£.3d 14 (1976).

People v. Sangani, 94 C.D.O.S. 1273 (1994).

U.S. EPA Office of Solid Waste, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.*

CALFED Plan Out For Review

By HARRISON PHIPPS, Executive Director

The CALFED Draft Programmatic Environmental Statement - Environmental Impact Report was released in June 1999. CALFED is a group of 15 state and federal agencies with management and regulatory authority in the Sacramento/San Joaquin Bay Delta. The purpose of the program is to develop a long-term plan to restore ecosystem health and improve water management of the Bay-Delta system. The objective of this collaborative planning process is to identify comprehensive solutions to the problems of ecosystem quality, water supply reliability, water quality, and Delta levee and channel stability. Deadline for comments is September 23, 1999.

The Bay-Delta is the largest estuary on the West Coast. It consists of a maze of tributaries, sloughs and islands and is haven for more than 750 plant and animal species. The Delta is critical to California's economy, as it supplies drinking water for over two-thirds of all Californians and irrigation water for over 7 million acres of the most productive agricultural land in the world.

Proposed strategies to mitigate the program's impacts on groundwater include:

- Creating additional groundwater and surface water storage facilities
- Importing water from other basins
- Increasing recharge
- Redistributing groundwater withdrawals
- Purchasing water rights from willing sellers
- Regulating groundwater withdrawals to avoid overdraft
- Increasing water conservation and recycling
- Increasing well and septic tank regulations

Continued on page 16

San Francisco Chapter Announces a Special Meeting Honoring the Career of Tom Iwamura

After working for more for than 40 years in the groundwater industry, Tom Iwamura has elected to retire from the Santa Clara Valley Water District. Tom's many contributions to the groundwater sciences are well known to Bay Area groundwater practitioners. The San Francisco Chapter of Groundwater Resource Association is hosting a special meeting to honor Tom's lengthy and distinguished career. Tom will give a presentation that reflects on his career and shares his perspective about the future of the groundwater industry in California. Introductory remarks will be made by Seena Hoose.

Tom graduated from UC Berkeley with a B.A. in geological sciences in 1957. That year, he began working for the Department of Water Resources in Sacramento as an engineering geologist. He practiced in both engineering geology and groundwater, conducting groundwater studies in the northeast portion of California. In 1963, he transferred to the Fresno office of the Department of Water Resources where he continued a dual career in both engineering geology and groundwater. There, his groundwater studies focused on the San Joaquin Valley, including the Tulare Basin. In 1970, Tom joined the Santa Clara Valley Water District where he worked on many groundwater basin management issues, including groundwater recharge, land subsidence, and salt water intrusion. With the recognition of contaminant impacts to groundwater in the early 1980's, Tom became involved in environmental issues affecting Santa Clara Valley groundwater resources.

Please join us in honoring Tom Iwamura at this very special meeting. It will be held at the Victory Theatre in San Jose, September 8th, 1999. Appetizers and no-host bar begin at 6:00. The elegant buffet supper is $20. Please call Linda Spencer at (510) 622-2420 for a reservation.

NEW MEMBERS

Welcome!

New members that have joined GRA since April 1, 1999

FIRST	LAST	COMPANY	BRANCH
Jan	Alfson	Twining Laboratories, Inc.	SAC
Linda	Barnes	TriHydro Corporation	OS
Jennifer	Beatty	LFR Levine Fricke	SFB
Taylor	Bennett	LFR Levine Fricke	SFB
Aaron	Bierman	Weber Hayes & Associates	SFB
Paula	Bolio	CH2M Hill	SFB
James	Borchers	U.S. Geological Survey	SAC
Mark	Bowland	NewFields, Inc.	SAC
Don	Bradshaw	LFR Levine Fricke	SFB
Kim	Brandt	LFR Levine Fricke	SFB
Elizabeth	Brode	DTSC	SAC
Glenn	Browning	Luhdorff & Scalmanini C.E.	SAC
Richard	Burzinski	Earth Tech	SFB
Angel	Cardoza, Jr.	The Reynolds Group	SC
Jim	Carolan	Geomatrix Consultants, Inc.	SFB
Larry	Carr	Montgomery Watson	SAC
Robert	Churchill	Citrus Heights Water District	SAC
Richard	Coffman	Tait Environmental Mngt., Inc.	SC
Eric	Cole	Luhdorff & Scalmanini C.E.	SAC
Matt	Colwell	Western Canal Water District	SAC
Sophia	Drugan	LFR Levine Fricke	SFB
Elizabeth	Elliott	UC Davis – Hydrologic Sciences	SAC
Hicham	Eltal	Merced Irrigation District	SAC
Scott	Engstrom	Montgomery Watson	SFB
Josh	Feinberg	Montgomery Watson	SFB
S. Thomas	Freeman	URS Greiner Woodward Clyde	SC
Dan	Gallagher	DTSC	SAC
Susan	Gallardo	Geomatrix Consultants, Inc.	SFB
Tom	Gavigan	Geomatrix Consultants, Inc.	SFB
Lucas	Goldstein	LRF Levine Fricke	SFB
Helge	Gonnerman	Geomatrix Consultants, Inc.	SFB
Melissa	Gossel	IT Corporation	SFB
Robert	Grant	USGS Student Member	SAC
Douglas	Headrick	San Bernardino Valley Water Cons. Dist.	SC
Amy	Hester	Geocon Env. Consultants, Inc.	SAC
Winston	Hickox	Cal-EPA, Office of the Secretary	SAC
Mike	Hurd	Pacific Env. Group Inc./IT Group	SFB
Kathleen	Isaacson	LFR Levine Fricke	SFB
Brenda	Jahns Southwick	California Farm Bureau Federation	SAC
Roger	Johnson	Camp Dresser & McKee, Inc.	SAC
Lange	Jorstad	Geomatrix Consultants, Inc.	SFB
Nancy	Katyl	RWQCB, SFB Region	SFB
Adam	Klein	TechLaw, Inc.	SFB
Dave	Kremer	Montgomery Watson	SAC
Frank	Kresse	Consulting Geologist	SFB
Lorraine	Larsen-Hallock	DTSC	SAC
Michael	Marsden	LFR Levine Fricke	SFB
John	Marsolais	Black & Veatch Special Projects Corp.	SC
Nancy	Matsumoto	Water Replenishment District of So. Calif.	SC
Tom	McCloskey	Lowney Associates	SFB
Lucia	McGovern	Central Basin/West Basin M.W.D.	SC
Dan	McManus	Calif. Dept. of Water Resources	SAC
Kent	McMillan	AGRA Earth & Environmental	SC
Jeff	Melby	LFR Levine Fricke	SFB
Eugene	Michael	E.D. Michael, Consulting Geologist	SC
Phillip	Morris	GRA Member	SAC
Penny	Nakashima	DTSC	SC
Mark	Newton	Calif. Legislature Analyst's Office	SAC
Chuck	Pardini	LFR Levine Fricke	SFB
Jennifer	Patterson	Geomatrix Consultants, Inc.	SFB
Mehmet	Pehlivan	Tait Environmental Mngt., Inc.	SC
Sarah	Raker	LFR Levine Fricke	SFB

Continued on page 11

GRA Board Appoints Scott S. Slater to Vacant Position

The GRA Board appointed Scott Slater to the board position held by Kevin Neese.

Mr. Slater is a shareholder with the law firm of Hatch and Parent with offices in Santa Barbara, San Diego and South Lake Tahoe. He currently serves as special counsel to many cities, investor-owned water utilities, special districts and businesses throughout California.

His experience includes transactional counseling and negotiation, transfers, groundwater management, litigation and adjudication. He has served as an expert witness on water law and attorney standard of care. A member of the adjunct law faculty at Pepperdine University and advanced studies faculty at University of California Santa Barbara, he is a frequent lecturer and published author on matters related to California water law including the two volume treatise entitled *California Water Law and Policy* first published in 1995.

In the Spring of 1997 he served as a visiting Professor at the University of Western Australia; provided comparative law analyses to the Coalition of Australian Governments and consulted with the water law reform effort in Western Australia. In January of 1999 he lectured extensively in China on the western legal framework for water law.

He is an honors graduate from the University of Redlands where he received a Bachelor of Arts Degree in Political Philosophy and Geology. After graduating from college, he attended the University of Pacific, McGeorge School of Law, graduating with distinction, Order of the Coif.

Nominees Sought for Officers and Board Members

The GRA Board of Directors is accepting nominees for the position of President, Vice-President, Secretary, and Treasurer for the 2000 calendar year. Officers are expected to make the time commitment necessary to fulfill their duties as well as attend quarterly Board meetings. Some travel costs to attend Board meetings are reimbursed. At the August Board meeting, Tim Parker was nominated for President, Tony Ward was nominated for Vice President, and David Von Aspern was nominated for Treasurer. Additional nominations are being accepted until the vote for officers at the November Board meeting scheduled for November 6, 1999 at Wallace-Kuhl Associates in West Sacramento, California.

Board of Directors

Four positions are subject to election on the Board of Directors. Every year three board positions are up for election. In addition, the position vacated by Kevin Neese is subject to election. Scott Slater is currently filing the position. Board members are expected to make the time commitment necessary to fulfill their duties as well as attend quarterly Board meetings. Some travel costs to attend Board meetings are reimbursed. If there is a quorum at the Annual Meeting, the election may be held at the Annual Meeting September 22 during the business meeting.

All nominations may be made by contacting GRA executive director, Harrison Phipps at (530) 758-3656 or email execdir@grac.org.

The next HydroVisions due date for articles is October 1, 1999. We welcome your articles and photos. Articles may be e-mailed to:

editor@grac.org

NEW MEMBERS, continued

Welcome!

New members that have joined GRA since April 1, 1999

FIRST	LAST	COMPANY	BRANCH
Erdmann	Rogge	GRA Student Member	SFB
James	Rohrer	DTSC, Region 1	SAC
Keith	Romstad	Environmental Resolutions, Inc.	SFB
Charles	Rose	Citrus Heights Water District	SAC
Tom	Runyon	Global Drilling Supply, LLC	SC
Jennifer	Sanders	LFR Levine Fricke	SFB
Britt	Sanford	AGRA Earth & Environmental	SC
Cindy	Schreier	PRIMA Environmental	SAC
Brian	Sears	Geomatrix Consultants, Inc.	SFB
Herb	Simmons	Provost & Pritchard Engineering Group	SAC
Travis	Skadberg	GRA Member	SC
Dominique	Sorel	Geomatrix Consultants, Inc.	SFB
Daniel	Stephens	Daniel B. Stephens & Associates, Inc.	OS
Walter	Swain	U.S. Geological Survey	SAC
Travis	Taylor	FAST-TEK Engineering Support Services	SFB
Dean	Thomas	Montgomery Watson	SAC
Jeanette	Thomas	Stockton East Water District	SAC
Brian	Thompson	Geomatrix Consultants, Inc.	SFB
John	Townsel	Citrus Heights Water District	SAC
Ted	Trimble	Western Canal Water District	SAC
Lara	Urizar	Geocon Env. Consultants, Inc.	SAC
Chris	Voci	LFR Levine Fricke	SFB
Leah	Walker	CA DHS, Drinking Water Program	SFB
Christopher	White	MFG, Inc.	SFB
Penny	Wilson	Tetra Tech EM, Inc.	SFB
Janet	Yantis	Pacific Env. Group Inc./IT Group	SFB
Mike	Yeraka	Diablo Water District	SFB

San Francisco Branch Announcements

By CLIFTON DAVENPORT, President

The SF-GRA is hosting its first-ever meeting in San Jose to honor Tom Iwamura, a long-time practitioner in geohydrology and recently retired from the Santa Clara Val-ley Water District. For many years now, Tom has been the reference for stratigraphic questions on surbsurface geo-hydrologic relationships in general and the stratigraphy of the South Bay in particular. Tom has given a lot of time and energy into assisting the SCVWD, other agencies and private parties to resolve groundwater contamination problems. The meeting is currently scheduled for September 8, 1999 at the old Victory Theater in San Jose, California.

We are presently putting together a litigation workshop for October and expect to have presentations by attorneys, consultants and RPs regarding litigation support and expert witnessing. The meeting time and place is to be determined.

Our November meeting will either be with Walt McNab of the Lawrence Livermore National Laboratory regarding their research on the natural attenuation of clorinated volatile organic compounds or Brian Herridge of Resolution Resources, Inc. regarding his acoustical phase-shifting technology used to locate DNAPLs at depth.

We are attempting to establish student chapters at several of the colleges and universities in the area. In turn for sponsoring memberships and/or research, we will have student nights in which students will make presentations on the findings of their research. Board members will be making presentations to the groundwater sections at the various colleges later on this year.

GRA'S 1999 ANNUAL MEETING

22ND BIENNIAL GROUNDWATER CONFERENCE

"INTERCONNECTED WATER SUPPLY IN CALIFORNIA"

DATES & LOCATION

SEPTEMBER 20-21, 1999

HYATT ISLANDIA HOTEL

SAN DIEGO

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University of California State Water Resources Water Resources CenterControl Board

California Department of Water Education

Water Resources Foundation

Groundwater Resources Association of California

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You may register via e-mail with:
jlwoled@ucdavis.edu

NO REGISTRATION CONFIRMATIONS WILL BE SENT. NO REFUNDS AFTER SEPTEMBER 10, 1999.

TOPICS OF DISCUSSION

Statewide Economic Engineering Water Model for California
Water Marketing Opportunities
Successful Management of Ground Water Basins in Southern California Dealing with Conjunctive Use
Physical Considerations in Artificial Recharge
Aquifer Storage Feasibility, San Diego Formation
USGS National Water Quality Assessment Program
Activities in the Santa Ana Basin, California
Regional Water Management Plan
Ground Water Considerations in the CALFED Bay-Delta Process
Water Banking in Semitropic Water Storage District
Water Transfers from the Sacramento Valley
Recharge of Recycled Water and Assessing Source
Water Quality
Ground Water Replenishment Using Recycled
Water -WRD Experience
East Valley Water Recycling Project, Ground Water
Recharge San Fernando Valley
Water Resources Center Archives
Recharge, Spreading, Injection
Economics of Conjunctive Management
Urban Water Use Efficiency
Shared Water Resources Between San Diego-Tijuana
Commission and Susanne Michel, University of California, San Diego
Successful Public Relation Strategies for Aquifer
Storage and Recovery and Recycled Water Projects
San Gabriel Valley Water Reclamation Program
Ground Water Recharge and Public Perception Issues
OCWD and OCSD Ground Water Replenishment
System Enhancements to Meet Future Needs
Poster Session, Vendor Exhibits
Water Resources Center Archives Presentation
Video Presentation "Conjunctive Use: A Comprehensive Approach to Water Planning"
Recharging Ground Water in Southern California
A 6-County Regional Recycling Program
Water Recycling in the San Joaquin Valley
3-D Visualization of Ground Water Flow from Industrial Property Towards
Canada's Newest Heritage River
Electronic Site Summary for a Former Military Manufacturing Facility
Source Water Assessment & Protection
Update on the Federal Ground Water Rule
Integration of Multiple Data Sets to Generate
Plume Maps and Animations at Lawrence
MSVMS-2000: Fully Integrated Surface Water/Ground Water Modeling System with 3- D
Visualization and Animation Capabilities
Groundwater Resources Association Annual Meeting
Ground Water Quality Issues in the San Diego Region
Ground Water Quality Challenges in the Agricultural and Dairy Regions
Short- and Long-Term Impacts of MTBE on California Ground Water Quality and on Cleanup Strategy
Video Presentation "Ground Water Quality: Managing the Resource"
Ground Water Challenges in the 21st Century

F. Marshall Eaton 1924-1998

F. Marshall Eaton passed away October 6, 1998 at age 74, ending a career in the water well industry that lasted 60 years. Mr. Eaton eventually owned Eaton Drilling Co., Inc. of Woodland, CA, a business started by his father in 1928. In their young years, all four sons of F.H. and Georgia Eaton worked with their father drilling wells. Marshall had the longest involvement in the family business; his brother, Edmond "Pep" Eaton, died in 1992. In the 1940s, while still working with the family operations, Marshall and Eugene Luhdorff, Sr. were partners in a firm called Peerless Drilling Company. The partnership operated one drilling rig purchased from the Krautzer family who drilled wells in Yolo County for many years prior to 1940. The partnership between Marshall Eaton and Eugene Luhdorff, Sr. lasted until 1948, however, their friendship lasted throughout their lifetimes.

Always an innovator, the rigs and support equipment operated by Marshall were things that played a major roll in design and fabrication. Much of the design work was done in his head, and the blue prints were chalk marks on the shop floor. In the early 1940s, he designed and built the first portable mud shaker which replaced hand dug trenches and screens that were dumped by hand. He always strived to make things as simple and practical as possible; in the 1960s, he came up with an idea to eliminate the need to use a second engine or transfer box. He made a double-ended drive shaft that was about as simple as anything could be.

Much of the equipment built in the 1940s and 1950s has been reworked a number of times and is still in daily use. He would always have an interesting story that went along with where he found various components and how he would, more often than not, have that eventful first trip home.

In the mid-1960s, Marshall had his first involvement with reverse circulation drilling. He eventually operated four reverse circulation rigs, including two large direct mud rotary rigs that he converted for reverse circulation drilling. Until the last few months of his life, Marshall was a key component in the daily operations of the company. He flew airplanes from the 1940s until very recently, and he used his flying abilities to be almost everywhere at once.

Marshall had an ability to recall well depths and possible quantities of water that a person could expect to find in many areas of Northern California. In the late 1940s, 1950s, and well into the 1960s, he drilled many wells in Suprise Valley in Modoc County. In the early 1950s, he drilled many wells near Bums, Oregon and near Casa Grande, Arizona. In the late 1970s, he developed relationships in the Salinas area of Monterey County, and he completed many wells in that area every year since that time. Of course, he drilled an untold number of wells around the Woodland base of operations.

Marshall would always be as helpful as he could be with his knowledge and experience. He recognized early on that a water well had the potential to exchange water between different water bearing zones. He would often recommend to customers that a well be sealed between zones if there was a potential for harm to occur to the ground-water system if mixing of waters between zones was allowed.

In the mid- I970s, Marshall purchased electric logging equipment to more accurately log the wells drilled by the company. He always emphasized the need to retain well drilling records and be able to retrieve them if they were needed by his customers.

Marshall had an ability to use things learned in other enterprises and apply them where appropriate. With his brother "Pep," he farmed rice, alfalfa, and other crops. They leveled land, developed ranches in the 1950s, and built a number of commercial buildings.

Marshall is survived by his wife of 56 years, Esther; daughters: Judith Tisher and Elizabeth Eaton; sons: John Eaton and Tom Eaton; seven grandchildren and three great grandchildren.

1998 Statement of Activity - Unaudited

Changes in Unrestricted Net Assets

Revenues

Program Fees		$ 75,389
Membership Dues		28,540
Contributions		1,655
Other Income:		
Interest	1,499	
Special Activity — Lapel Pins	194	
Advertising	150	
Reimbursed Expenses	41	
Total Other Income		1,884
Total Unrestricted Revenues		$107,468

Expenses

Program Expense (Seminars)	$ 46,785
Printing and Reproduction	21,226
Executive Director	10,800
Postage and Delivery	3,060
Misc. Contract Labor	2,599
Insurance	2,063
Association Promotion and Devel.	1,963
Dues and Subscriptions	1,590
Travel	1,166
Professional Fees	555
Office Supplies	252
Bank Fees	183
Donations	100
License and Permits	20
Other Expense:	
Special Activity — Lapel Pins	80
Total Expenses	$ 92,442
Increase in Unrestricted Net Assets	$ 15,026

Changes in Permanently Restricted Net Assets

Grants Received	$ 18,431
Grant Labor and Admin.	33,871
Decrease in Permanently Restricted Net Assets	($ 15,440)
Decrease in Net Assets	**($ 414)**
BEGINNING NET ASSETS (CASH)	$ 60,356*
ENDING NET ASSETS (CASH)	$ 59,942*

As you can see from the financial statement, GRA had a net increase in unrestricted assets of $15,026. This is the same as saying that we had income from operations totaling $15,026. After the net decrease in permanently restricted assets, (grants) totaling $15,440, the overall decrease in net assets was ($414). The overall decrease was the result of timing differences in grant receipts and disbursements. GRA disbursed current year and prior year grant funds, which exceeded the current year grant allotment. Got it???

*GRA's Net Assets includes funds from all the Branches.

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Waterstone Environmental
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Vice-President: Linda Spencer
S.F. Bay Regional Water Quality Control Board
(510) 622-2420

Secretary: Jim Ulrick
Ulrick & Associates
(510) 848-3721

Treasurer: David Abbott
David Keith Todd Consulting Engineers
(510) 595-2120

Membership Chair: Mary Kean
(510) 865-9949

Member At Large: Jim Jacobs
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Legislative Corner

BY HARRISON PHIPPS
Executive Director

A number of Bills in the California Legislature are being tracked by GRA (see Spring 1999 HydroVisions.) We are actively involved with the following bills. Information on pending legislation can be obtained from the California Legislative web page www.leginfo.ca.gov. Click on "Bill Information," and enter a bill number or key search words or a bill's author.

AB 303 (Thomson) *Groundwater Study*– Existing law authorizes specified local agencies to adopt and implement groundwater management plans pursuant to specified provisions. This bill would declare that additional study of groundwater resources is necessary to better understand how to effectively manage groundwater to ensure the safe production, quality, and proper storage of groundwater in the state.

AB 980 (Ducheny) *Conjunctive Use*– Would authorize the Department of Water Resources to provide grants to local public agencies for feasibility studies, conjunctive use facilities, local pilot projects, and other facilities that are integral to the implementation of a conjunctive use plan or project and for the acquisition of land for conjunctive use projects. The bill also would authorize the department to provide grants to local public agencies for their share of the cost of construction of conjunctive use facilities that provide multipurpose benefits of significant statewide interest.

SB 390 (Alpert) & SB 989 (Sher) *Waste Discharge Permits and Well Reports*– 1.Would require operators of underground storage tanks to install an environmental monitoring system at facilities located in; 1) A groundwater area designated as vulnerable in a regional board's water quality control plan; 2) the delineated 10-year time of travel area around a public water supply well for which a drinking water source assessment has been completed; 3) a one-half mile radius around a drinking water supply well when a vulnerable area has not been defined for the well in (1) or (2).

2. This bill would prohibit the state board from adopting any regulation that requires the addition of any oxygenate to motor vehicle fuel unless the regulation is subject to a multimedia evaluation conducted by the California Environmental Policy Council.

3. The bill would authorize the Secretary for Environmental Protection, in consultation with the state board, the State Water Resources Control Board, and regional water quality control boards, to phase out the use of MTBE on a regional basis on a date before January 1, 2002, if the secretary determines that the phase out will not adversely affect the price or supply of gasoline in the region in which the phase out will occur. Makes it a misdemeanor to sell gasoline containing MTBE or any other ether-based oxygenate on or after January 1, 2002.

4. Existing law requires well completion reports be filed with the Department of Water Resources within 30 days after well construction or alteration is completed. Under existing law, those reports may not be made available to the public, except to a person who obtains a written authorization from the owner of the well. This bill would also allow a person performing an environmental cleanup study under order from a regulatory agency to obtain a report.

CALFED Plan
Continued from page 9

- Monitoring and testing wells and aquifers
- Developing groundwater management plans

The program is developing guiding principles for conjunctive use programs to assure that local concerns and potential impacts are fully addressed prior to implementing a conjunctive use program. The CALFED Groundwater Outreach Program has identified stakeholder concerns regarding potential negative impacts from conjunctive use programs. These impacts fall into the following categories:

- Reduced well yields
- Subsidence
- Water quality degradation
- Increased pumping costs
- Costs for lowering pumps or deepening wells
- Changes in streamflow
- Overdrafted basins
- Loss of water rights
- Wetland impacts

For a copy of the EIS/EIR, contact Rick Breitenbach, CALFED Bay-Delta Program, 1416 9th Street, Suite 1155, Sacramento, CA 95814 or call (800)900-3587.

DATES & DETAILS

1999 Board of Directors' Meeting Date

All Members Welcomed

September 20-21 — **GRA's Annual Meeting**
Biennial Groundwater
Monday-Tuesday
Conference
San Diego, CA

November 6, 1999 . . Saturday — Wallace-Kuhl
West Sacramento, CA

WEB

Check Out Our Web Site
http://www.grac.org

GRA Offers Lapel Pins

Actual Size (Gold Color)

If you would like to buy a lapel pin, attend your nearest branch meeting or order a pin now. Pins cost $7.00 at a branch meeting or $8.00 through the mail. Send your checks to: GRA, P.O. Box 1446, Sacramento, CA 95812

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Groundwater Resources Association of California

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Please check if your address is correct. If you see an error, please contact: David Von Aspern at **(916) 372-1434** . You may also send e-mail to **admin@grac.org**. We are trying to ensure our records are updated. You may now update your address electronically on our web page: http:/**www.grac.org**.

Thank you for your help.