YIM, OKUN & WATSON
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
3745 WHITEHEAD STREET, SUITE 101
MATHER FIELD
SACRAMENTO, CALIFORNIA 95655
TELEPHONE (916) 443-6500
TELEFAX (916) 443-8156

RANDALL A. YIM
LORI T. OKUN
KELLY F. WATSON

OF COUNSEL TO
PARKER, MILLIKEN, CLARK, O'HARA & SAMUELIAN
A PROFESSIONAL CORPORATION

June 14, 1995

VIA FACSIMILE (916) 227-4349

SB 1764 Advisory Committee
c/o James George Giannopoulos
UST Program Manager
SWRCB/White Papers
2014 T Street, Suite 130
Sacramento, California 95814

Re: Purpose of Resource Protection Standards; Need for Tiered Decision Making

Dear Members of the SB 1764 Advisory Committee:

I am currently a member of the UST Technical Advisory Committee, and an environmental attorney in private practice specializing in toxic and hazardous materials issues and military base reuse. I am a member of the California Military Base Reuse Task Force, and former chair of the Sacramento Environmental Commission.

At your Advisory Committee meeting of May 19, 1995, a question was raised regarding the differences between laws and regulations applicable to hazardous materials management and groundwater cleanups. This question framed the issue about why we should have both risk-based and resource protection based cleanup standards. The answer to this question has significant implications for the work of this Committee.

Purpose of Resource Protection Standards

Most toxic regulations are designed to reduce risks from a single use source, for example, risks from using a solvent or other chemical. In contrast, water quality regulations recognize that water is not a single user or single use resource. Unlike the typical "product," water is used over and over again by many different users. Each use degrades the water quality to some extent. The anti-degradation policies, and water resource protection statutes and regulations in general, endorse the legislative policy decision that it is not fair to allow any single user to degrade water to the extent it prevents later beneficial uses. This would allow a single user to shift significant costs to subsequent users and thus avoid costs directly attributed to its use.

Water quality regulation is also a function of each particular region's special characteristics. Water quality statutes and regulations are enforced through a "basin plan," which matches federal and state clean water standards to a particular locality. Each basis plan sets the range of beneficial uses, and factors into the process multiple users and multiple uses. The basin plan then sets cleanup standards for resource protection to protect the entire range of uses and users, specifically recognizing the multiple use characteristics of water.

Resource protection standards thus serve the interest of all of the various "constituencies" represented by the Water Board. The Water Board's constituency is not just business, but all users, many of whom are businesses also. Relaxation of cleanup standards, or use of only risk-based standards, may benefit some businesses at the expense of water districts and other water purveyors who must "pay for" the avoided cost of less stringent cleanup standards in the form of additional water treatment costs or less available water supplies. As a matter of policy, already established by our Legislature, a single user cannot automatically degrade water quality to the drinking water standard or MCL, and shift additional costs to subsequent users.

Need for Tiered Decision Making

Recognition of the important role played by resource protection standards suggests that a "tiered" decision making process be endorsed, which initially sets high goals for environmental protection, but recognizes both technical and fiscal limitations. Guidelines as to how to move from one tier to another and incorporate technical and fiscal considerations should be addressed by this Committee. This tiered approach could serve both goals of assuring uniformity in process but flexibility in result. Tiering allows many different approaches to be employed, including both resource protection and risk-based cleanup standards. The key is definition of the various tiers, and a uniform decision making process to move between tiers.

An example of such a tiered decision making framework has been discussed in draft form in Alameda County and is enclosed for your information.

SB 1764 requires that "any regulations governing cleanup standards and required corrective actions adopted pursuant to this article shall insure the protection of human health and safety and the environment." This charge expressly recognizes both risk based and resource protection cleanup standards, and requires this Committee to fashion an approach which respects both of these cleanup approaches.

Thank you for this opportunity to comment on these important issues. Please feel free to contact me if you have any questions regarding my comments.

Very truly yours,

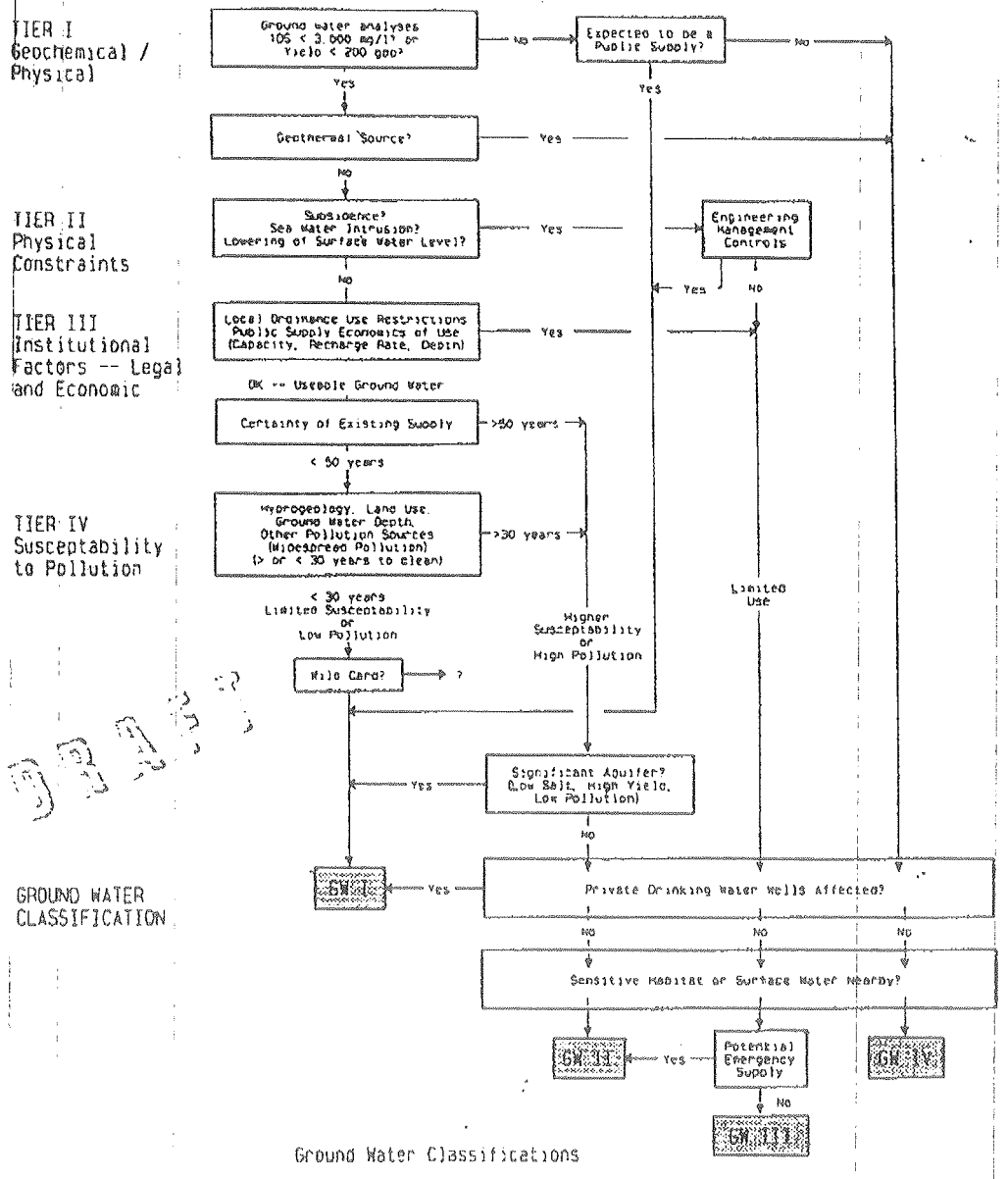
RANDALL A. YIM

RAY:csd

Enclosures

cc: James Cornelius

Tiered Evaluation of Ground Water Basins or Sub Basins To Establish Cleanup Goals for Municipal / Domestic Beneficial Use



Ground Water Classifications

GW I — Currently used or high probability of use -- meets water quality objectives of Basin Plan

GW II — Limited probability of use -- source removal, plume containment, cleanup levels _____

GW III — Low probability of use -- source removal, plume containment, cleanup levels _____

GW IV — Non-drinking water -- source removal.

Notes: For all sites, must meet requirements of higher class if probable pollutant migration to higher class ground waters, and must evaluate impacts on surface water and sensitive habitat

Revised R2 Ground Water Committee 3/1/95

Groundwater Beneficial Use Category

	I	II	III	IV
Groundwater Cleanup (Easily Biodegradable)	MCL	10-100xMCL	soil source removal	soil source removal
Case Closure Status	close	No further active remediation necessary. Implement NAZ risk management controls		close

	I	II	III	IV
Groundwater cleanup (Persistent Chemicals)	MCL	1-10xMCL	100xMCL	source removal, monitoring
Case Closure Status	close	No further active remediation necessary. Implement NAZ risk management controls		close

- Must be land use (health and ecological receptors) protective
- Stable Plume
- Source removal = floating product + any soil residue
- Soil residue = leachate < groundwater category or current plume concentration
- NFA to case closure = either cleanup to MCL or pay into a regional mitigation fund
- Mitigation fund = insurance for the future

Blank Page

THE USE OF LEACHABILITY, FRACTIONATION, AND CHROMATOGRAMS IN TOTAL PETROLEUM HYDROCARBON (TPH) ANALYSIS

Jon B. Marshack, D. Env., Senior Environmental Specialist
Gordon Lee Boggs, Underground Tank Program Coordinator
Central Valley Regional Water Quality Control Board

Issue—

Many have criticized Total Petroleum Hydrocarbon (TPH) analyses of soil samples as having little bearing on the ability of the soil to pose health or environmental threats and that other organic substances, such as sewage and food wastes, can give false positive TPH results. These critics have proposed abandoning aggregate analytical methods (e.g., TPH) in favor of analysis only for specific chemical species (e.g., benzene, toluene, ethylbenzene and xylenes [BTEX]).

However, due to the differential mobility and degradability of individual petroleum hydrocarbon species in the subsurface environment, analysis for a few individual hydrocarbon chemicals is not sufficient to permit delineation of the entire suite of hydrocarbon contaminants that have the ability to migrate through the subsurface and impair beneficial uses of underlying ground water. For example, measuring the highly mobile BTEX constituents alone would bias site investigations toward assessment of the leading edge of plumes, ignoring the water quality threat posed by hydrocarbons of lesser but still significant mobility and water quality threat which lie closer to the source of the hydrocarbon release.

Proposed Solution—

The problem with TPH measurement is with methods (e.g., infrared analysis for total oil & grease—Method 418.1) that do not differentiate between compounds or ranges of compounds. Measuring the amounts of potentially mobile petroleum hydrocarbons is far more valuable than measuring total TPH concentrations without differentiation. With careful analytical method selection and interpretation, analyses for volatile and leachable TPH fractions can provide valuable information on the aggregate of petroleum hydrocarbon contaminants present in soils that have the potential to migrate to underlying ground water and cause pollution. Individual petroleum hydrocarbon species have widely differing mobility in the subsurface environment.

Mobile petroleum hydrocarbons may be differentiated from those with insignificant mobility by selecting analytical methods that are focused on volatile and leachable hydrocarbons. Volatile hydrocarbons in soil samples may be assessed with purge and trap gas chromatography plus flame ionization detection. Soil gas sampling and analysis may also be used to measure volatile hydrocarbons in-situ. Leachable hydrocarbons in soil samples may be assessed using leachability tests (e.g., the Waste Extraction Test with deionized water as the extractant) followed by chromatographic analysis of the resulting extract (e.g., solvent extraction gas chromatography with flame ionization detection).

Our experience shows that, by paying careful attention to chromatographic patterns, most analytical labs are able to differentiate between petroleum hydrocarbons and hydrocarbons originating from non-petroleum sources.

Discussion—

Without differentiating mobile from non-mobile hydrocarbons, TPH analysis provides little information regarding the threat posed by petroleum hydrocarbons in contaminated soils. Volatile hydrocarbons, as are found in gasoline, can migrate through soils in both vapor and dissolved phases. Some hydrocarbons within the diesel range (i.e., generally those with 10 to 25 carbons) can have significant subsurface mobility in the dissolved phase. Both gasoline and diesel hydrocarbons may be differentiated from other hydrocarbons using chromatographic analysis (e.g., purge and trap or solvent extraction, respectively, followed by gas chromatography with flame ionization detection). Heavier hydrocarbons (e.g., asphaltics and polynuclear aromatics) do not have significant mobility in soils and are, therefore, generally irrelevant to a determination of ground water quality threat. These heavier hydrocarbons may be removed from consideration by specifying an upper carbon chain length limit for the gas chromatographic analysis.

For hydrocarbons with limited volatility, only a fraction of the total soil concentrations are available to leach toward ground water. Leachability tests, such as the California Waste Extraction Test (WET) and the federal Toxicity Characteristic Leaching Procedure (TCLP), are designed to selectively determine the mobile fraction. Both the WET and TCLP are normally run with an organic acid buffer extraction solution, designed to assess the ability of acidic landfill leachate to mobilize metallic pollutants. When using these tests to assess the mobility of low-volatility petroleum hydrocarbon pollutants in soil samples, deionized water provides a more realistic extractant, because the mobility of these organics is relatively insensitive to differing pH conditions and the organic acid in the usual buffer solutions can interfere with analysis of the resulting extract.

Chromatographic patterns can provide additional information about the nature of organic materials. Sewage, food wastes, vegetable matter and other non-petroleum organics have specific chromatographic spectra which can be differentiated from petroleum hydrocarbon fuels by careful review of these patterns. It is, therefore, important to request that copies of the chromatograms be provided along with concentration data from the analytical laboratory.

JM

Blank Page

Opinion that UST releases are a relatively minor concern and resource protection-based cleanup standards is over-valued and improper waste of societies monies.

White Paper
SB 1764 Advisory Committee

"Misinformation Regarding Resource Protection"

Kevin L. Graves, PE
Associate Water Resources Control Engineer
RWQCB-San Francisco Bay

6/13/95

Problem:
There has been considerable discourse lately regarding the subject of ground water resource protection. When interpreted in a vacuum, much of the dialog would lead one to conclude that petroleum USTs are the most important water quality problem facing Regional Boards today. In reality, resource protection is very large issue but petroleum UST cleanups have a relatively small impact on water resources in California as a whole. This misconception leads regulatory agencies to misallocate societies' monies towards a relatively minor concern.

Solution:
Recommend to the State Board the following items:

1) that the petroleum UST cleanup program be reevaluated alongside other programs as to threat to the environment and human health.

2) that monetary and regulatory resources be spent on cleanups based on the reasonable threat that a site poses to human health and the environment considering all demands being made and to be made on the environment surrounding the site.

3) that beneficial uses of groundwater be reevaluated based on reasonable and probable projected use, not potential use as is the current practice. This should include differentiating between shallow and deep groundwater.

4) that the concepts of the ASTM RBCA process be adopted into regulations as a means to obtain consistent regulation and protection of societies' resources in California.

Resource Protection:
When considering the issue of resource protection, it is instructive to remember that shallow groundwater is not as pristine or untouched as we might like to think. Human waste (septic tanks, leaking sewer lines), animal waste (dairies, chicken farms, feed lots, etc.), legal pesticide application, industrial and commercial chemicals (TCE, PCE, etc), acid mine drainage (dissolved metals), irrigation return waters (pesticides, salts), and others all are currently impacting the shallow groundwater in California.

Spending a million dollars per gas station will not guarantee protection of water resources in the larger sense. For a groundwater body to be protected to a particular level, it needs to be protected from all sources of pollution to that same level. Unfortunately, petroleum UST's have readily available funding sources and therefore get the most attention. They are not,

however, the largest threat to groundwater resources. Petroleum naturally biodegrades in the environment with groundwater plumes stabilizing near the source. The other contaminants mentioned above (nitrates, TCE, PCE, metals, salts, etc.) do not attenuate appreciably and are a much greater threat to deeper groundwater resources.

Protecting human health and water resources in most cases requires much less than a million dollars per site. The rest of the cost of cleanup buys "equity restoration". Owners want a clean site because it is worth more in the real estate market - they have no reason to voluntarily stop cleaning up if the fund is paying for it. Equity restoration is not mandated by the Water Code or any State Board Resolution.

Resource Management

Often when we discuss resource protection, we fail to address resource management. Pump and treat systems which extract large quantities of water and then dump this water into a storm drain are a travesty. If water is indeed as precious as we claim, it should be treated when it is used, or reinjected, rather than treating it and throwing it away in the name of "resource protection". It is ironic that many areas that are overdrafting their aquifers by continued pumping in excess of recharge are required to pump low level contamination, treat the water, and then throw it away in order to "protect the aquifer".

In these days of belt tightening and fiscal responsibility, it is incumbent upon government officials to be realistic and pragmatic so as not to waste societies' resources. We should be working on the types of pollution that pose the greatest threats and doing so in the most efficient manner with a minimum impact on the public. The people of the State entrust regulatory agencies with their tax dollars and expect to get the best bang for the buck.

We must also understand that the term "resource" includes more than just water. Landfill space, regulator's time, RP's time, cleanup fund money, air quality, land use, enjoyment of property, and other tangible and intangible things are resources that are worth protecting. Cleaning up hydrocarbons beneath every gas station to background levels at the unreasonable expense of other resources is not good public policy. The Water Code and State Board Resolution 68-16 require us to act reasonably and in the best interest of the people of the State. Let us not forget that responsibility.

Hydrogeology:

There are several disagreements about petroleum fate and transport that cause the petroleum cleanup debate to be more contentious than is necessary. Creation of more pragmatic policies has been hampered in the past by a lack of complete understanding of these issues. I would encourage an open dialog about these matters. If we expose these issues to the light of day, I'm sure that a consensus could be reached and we could move on to more product debates.

Vertical Gradients: It is assumed by some regulatory agencies that although plumes may appear to stabilize in the horizontal dimension, they continue to migrate in the vertical dimension. This claim has never been substantiated by data although it is repeatedly stated as a fact. The data that would support or deny the claim has indeed never been collected by the very agencies who believe it is a problem and have the legal authority to require the data be submitted.

Most people who are knowledgeable in the field agree that there are some cases in which vertical flow can be a problem, but the cases are few and far between and the conceptual scenarios are very specific. We should be clear about when to spent the public's money pursuing vertical gradients and when not to. Regulating every site as if vertical gradients and flow are a significant problem is extremely overconservative.

"It is only a matter of time": As more and more data is collected and reviewed by many different parties with a stake in the issue, it is becoming clear that petroleum plumes are limited in extent. Once the source is removed, naturally occurring attenuating factors keep the plume from expanding out into the aquifer and spreading the contamination to new areas. This is not true of other types of pollutants such as nitrates, solvents and metals.

The theory that it is only a matter of time before each benzene plume reaches a well is not born out by the data. Very few wells have been documented to have been impacted by petroleum releases and those that have are shallow and close to the source. If groundwater were a fully mixed system, like a big bathtub or tank, then this idea would have more credence. The subsurface, in fact, is not homogeneous at all. As contaminants move through the subsurface, they interact with the soil and biota along the way. These interactions cause plumes to stay localized around their sources, shrinking in size after source removal, even after a long time.

Intrinsic Bioremediation: The literature abounds with studies documenting the affects, causes, and how to characterize natural bioremediation at petroleum sites. We should not be asking about the classes of sites where it <u>does</u> occur, but rather where it <u>does not</u> occur. Clean sands, saline environments, and arctic conditions may be places that activity is reduced - but the odds are very high that it is happening right now at every corner gas station in the State. Any policy we consider regarding petroleum cleanups must recognize the beneficial aspects of natural biogradation. It's happening, and it's responsible for much of the actual remediation taking place, whether regulators choose to recognize it or not.

Blank Page

Call for Site-Specific, Risk Based Cleanup Standards

(15)

Advisory Committee, California State Senate Bill 1764
WHITE PAPER:

INTEGRATING RESOURCE PROTECTIVE STANDARDS AND RISK-BASED STANDARDS INTO CALIFORNIA'S LUFT CLEANUP PROGRAM

Ravi Arulanantham and Stephen I. Morse
Toxics Cleanup Division, San Francisco Bay RWQCB
June 12, 1995

ISSUE

The LUFT cleanup program is a large problem with its own complexities. Although we need a series of reforms in all aspects of the LUFT cleanup program, this paper, more than anything else, focuses on a policy issue that is fundamental to the overall efficiency of the program. The existing policy framework in California that guides this LUFT cleanup program does not allow us to readily derive cleanup or remediation/management goals that are protective of both land use and water quality issues based on site-specific conditions, circumstances and risks. Therefore, we are unable to ensure that the cost of overall remediation efforts is truly relevant to the protection of public health, water quality and other natural resources. Simply stated, we are not working smart; we are wasting public wealth.

Therefore, the issue is; what changes or modifications can be made to the existing policy framework that will allow us to be smarter with the money we spend on the LUFT cleanup program and still protect water quality, public health, and the environment.

RECOMMENDATIONS

In California's LUFT cleanup program there is a place for resource protective corrective action and there is a place for risk-based corrective action. We need a predictable decision-making process in which combinations of these two actions are available to suit individual and/or regional situations of each RWQCB.

To provide this flexibility, the State Water Resource Control Board (SWRCB) should develop a framework complete with guidelines that allows for a tiered approach starting from a resource protective action to different tiers of risk-based actions. The following procedures must be included in this framework.

1. The SWRCB should recommend that, within this framework, RWQCBs classify all water bearing zones, based on groundwater use and sensitivity and not just based on Res. 88-63 criteria alone. This will result in different tiers of realistic beneficial use designations.

2. The SWRCB should recommend that, within this framework, RWQCB's assign realistic water quality objectives to these different tiers of beneficial use designations. The resulting tiers of beneficial use designations and water quality objectives shall then be the basis to choose the appropriate level of corrective actions: resource protective standards for the most sensitive tiers and risk-based standards for the lower tiers.

3. The SWRCB should recommend that the new beneficial use designations and water quality objectives be incorporated into the decision-making process described in ASTM-RBCA, ES 38-94. The streamlined ASTM approach will provide region-wide and state-wide consistency in site cleanup standards.

DISCUSSION

The State Board's anti-degradation policy (Res. 68-16) is indeed a good policy for the Golden State. However, over the years a good policy has been misinterpreted and inappropriately implemented. The result is a program that is inconsistent, unpredictable, inflexible and quite costly to our entire society. The policy also intended that cleanup programs should result in "maximum benefit to the people of the state" and "will not unreasonably affect the beneficial uses". Where we went overboard was, in trying to implement it, (along with Res. 88-63) entirely as a resource protective method in almost all situations where the present and future usable resource value, which we were trying to protect and reclaim, clearly did not equal all the effort (eg., cost, time etc.) expended on it by society. In the last ten years of our experience, we have learned that these exclusively resource protective actions have not resulted, in the majority of cases, in maximum benefit to the people of the state.

In the world of LUFT cleanup, for example, some cases are soil-only impacted where threat to water may or may not exist, some cases are soil and water impacted with different degrees of magnitude, some cases have floating product, and some cases have plumes that continue to migrate. In the current state wide LUFT program there are no consistent methodologies that result in uniform cleanup standards that can apply to these myriad scenarios. Most of the time this cleanup decision-making process includes a backward mode estimation, where we first determine a protection standard (realistic or unrealistic) for the groundwater conditions and then estimate the soil standards taking into account land use issues as well. If we set an unrealistic standard for water quality, then in a domino effect, the entire cleanup effort at the site becomes unreasonable. Therefore, what we need in the new LUFT program is reasonableness at every site.

In the current LUFT cleanup program, the resource protective standards are often interpreted to mean, after contamination has occurred and been discovered, the attempt to clean up the contamination to either the background levels or non-detect levels (regardless of the actual risk or threat the contamination may pose to public health, groundwater quality, environment, or the cost to achieve it). In a looser definition, the federal/state MCLs are also used as resource protective standards as an alternative to background or non-detect levels.

The primary reason for the current and widespread application of resource protective standards is the assumption that almost all groundwater (shallow as well as deep) resources in the state have a potential for beneficial use(s) immediately or in the future. In addition, we make the mistake in our Basin Plan that municipal/domestic drinking water is the first beneficial use choice for almost all waters. This has given us no flexibility and leads us to a decision-making process that results in cost-ineffective cleanup in most situations.

However, for aquifers with existing usages, this logic of resource protective standards are reasonable and should be the starting point of discussion. Technical feasibility, economic constraints and risk

management controls must also be considered and should be incorporated only later in the process.

The difficulty, however, lies in all the other shallow and deep water bearing zones that are not in use. What is reasonable in these cases and what methodology and standards should we apply? To be reasonable, first of all, we should not automatically assign unrealistic beneficial use designations to these waters even if it meets Res. 88-63 criteria. Instead, we need one or more methodologies to evaluate and classify the regional and sub- regional groundwater (even the shallow zones) based on groundwater use and sensitivity. In other words we rank or tier the different water bearing zones according to their usefulness and resource value (not just based on Res. 88-63). The result of this will be different tiers of realistic beneficial use designations. Therefore, we can direct our limited fiscal resources toward protecting the most useful and valuable groundwater resources and assure that we don't spend the same level of effort on the ones with little usefulness and value. In a following paper, we also suggest that using cost-benefit analysis may be an appropriate measure to quantify the usefulness and resource value of any groundwater.

Once the different tiers of beneficial use designations are completed, what cleanup standards (or objectives) shall be applied to these different tiers? This is where the risk-based standards become useful in defining a balance between the level of risk reduction, cost of the efforts and the resulting public benefit. In fact, the different tiers of beneficial use designations represent an important component of the site specific risk to water quality. The specifics of this exercise of assigning realistic groundwater quality objectives to each respective tier is best done by each RWQCB that is familiar with the peculiarities of its region, and the assumptions that went into the methodology to classify the entire groundwater resources. As mentioned earlier in the discussion, this use of realistic water use designations will result in cost-effective cleanup actions as well as reasonable protection of water quality at sites where water is not yet in use.

Risk-based standards are also based on protection of health, water quality, and other environmental resources; however, these standards are derived based on site specific conditions and risk as opposed to resource protective standards. when implemented, risk-based standards achieve the same effects as the use of resource protective standards but of course at a much better cost savings to the society. A very good example of a risk-based decision-making process is the ASTM - Risk Based Corrective Action (RBCA) Applied at Petroleum Release Sites (ES 38-94). The ASTM-RBCA document integrates site investigation, risk assessment, and risk management components and provides a uniform process to choose cleanup standards and corrective actions for sites.

The ASTM-RBCA is also a document organized in a three-tiered approach to corrective action involving increasingly detailed levels of data collection and analysis. The Tier 1 offers non-site-specific (therefore, very conservative assumptions) screening levels, which can be also used as site cleanup goals if one chooses to. If the actual site conditions and circumstances are different, then one moves to establish site-specific cleanup goals in Tier 2 and even more detailed site-specific analysis in Tier 3. Therefore, this document offers the flexibility to operate at three tiers (translating into three level of efforts) at a site.

The ASTM-RBCA document however, does not come with the different tiers of beneficial use designations and water quality objectives. Therefore, the RWQCB's have to incorporate these water quality objectives into the ASTM document. Once this is done, within each tier of beneficial use designation we will have the additional flexibility resulting from the use of the risk-based process outlined in ASTM-RBCA.

To accomplish all of this, the SWRCB must establish a framework with detailed guidelines to RWQCB's that will result in realistic beneficial use designations and appropriate water quality objectives .

For further information or questions, please call Ravi Arulanantham at (510)286-1331 or Stephen Morse at (510)286-0304

concur,

Steven R. Ritchie,
Executive Officer