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October 31, 2003

Via email

Julie Roth, Executive Director
DSCSOC

Comments on Draft ATSDR Public Health Assessment for Laboratory for Energy-Related Health Research [a/k/a Old Campus Landfill (U.S. Department of Energy)]
Davis, Solano County, California
Dated July 11, 2003

On behalf of the Davis South Campus Superfund Oversight Committee (DSCSOC), I have been asked to conduct a technical review of the draft ATSDR Public Health Assessment for the University of California, Davis (UCD)/Department of Energy (DOE) LEHR Superfund site located on the UCD campus. I have been involved at this site since mid-1995 as the Technical Assistance Grant (TAG) advisor to DSCSOC. Attached is a summary of my background and expertise pertinent to making these comments.

With respect to the UCD/DOE LEHR Superfund site, over the years I have provided detailed comments on the deficiencies in the LEHR Superfund site investigation and remediation. My comments have included recommended approaches for addressing these deficiencies. These comments are available from the DSCSOC website, http://members.aol.com/dscsoc/dscsoc.htm.

My overall assessment of the draft ATSDR Public Health Assessment for the LEHR site is that ATSDR has, in general, properly assessed the public health issues associated with this site. There are, however, some significant deficiencies that still need to be addressed. These deficiencies occur primarily because ATSDR staff have relied almost exclusively on the PRPs' (UCD and DOE consultants) reports as being adequate to describe the situation at the LEHR site. ATSDR has not adequately incorporated the detailed information that DSCSOC has provided on the significant deficiencies in the DOE and UCD reports, in properly characterizing the adequacy of site investigation and proposed remediation. This had led to a number of errors in the ATSDR report.

Several years ago, K. Setian, the US EPA lead RPM, requested that DSCSOC prepare a list of the problem areas that have been found in LEHR site investigations. Recently this list has been updated and is attached to these comments. As indicated, the background on each of the items listed is well documented in DSCSOC's comments on UCD and DOE LEHR site reports.

At no time has the US EPA or other RPMs indicated that any of DSCSOC's comments on site investigation deficiencies are inappropriate.

While, according to Wayne Henry at the ATSDR Public Meeting on October 30, the draft ATSDR Public Health Assessment report was made available to the LEHR site RPMs and PRPs for their review and comment well in advance of making it available to DSCSOC, if ATSDR had made it available to DSCSOC at the same time that it was made available to the RPMs and PRPs, DSCSOC could have pointed out the significant errors that were in the original draft, thereby potentially avoiding having them occur in the draft that was made public.

As indicated in the attached summary of my qualifications, I have extensive formal training in public health and have been active in this field for over 40 years. One of the principles of public health practice that is not being adequately/reliably addressed in the LEHR site investigation thus far is that of erring on the side of public health protection in situations when there is inadequate information to define the public health risks associated with a situation. This is known today as the "precautionary principle." The ATSDR draft report is deficient in not adequately following this approach. The issue of greatest concern is the failure to adequately present and discuss the deficiencies that have taken place thus far in the LEHR site investigation with respect to defining the potential range of constituents of concern that are a threat to public health and the environment.

UCD's research activities have resulted in deposition of a wide variety of hazardous and deleterious chemicals in shallow pits at the LEHR site. Today there are in excess of 85,000 chemicals in commerce, with 1,000 new chemicals added per year. While the number of chemicals that could have reached the LEHR site in UCD's waste is somewhat less than that number, there still may be tens of thousands of chemicals that could be present in LEHR site wastes that were deposited in shallow, unlined pits, as part of campus waste disposal. Further, monitoring of groundwater and surface waters at the LEHR site has shown that there is appreciable total organic carbon content in these waters, which could readily contain uncharacterized hazardous or deleterious chemicals.

Specific Comments

On page 1, under Summary, last paragraph, the current wording could lead to the conclusion that DSCSOC was not involved until April 2000. In the discussion about 1995, the following should be added:

> It was at that time that DSCSOC informed ATSDR representatives that one of the primary deficiencies in the LEHR Superfund site investigation was the failure to determine if the fish in Putah Creek contained excessive concentrations of constituents that could be a threat to human health.

On page 3, under item 1, this statement needs to be reworded to make it clear that the so-called "metal" mentioned refers specifically to chromium. Some private shallow-water wells in the vicinity of the LEHR site at times contain excessive chromium. Some of the private domestic water supply wells in the vicinity of LEHR, at times, are a threat to the health of those who use the water for domestic consumption purposes.

The statement that neither nitrate nor chromium in these wells appears to have been derived from the LEHR site is appropriate. The nitrate in these wells is derived primarily from agricultural use of fertilizers that are polluting the groundwaters in this area. The chromium is derived from naturally occurring chromium in the aquifer system. A statement needs to be added that this situation needs to be understood, in that this does not mean that there has not been more pollution of the groundwaters at the LEHR site by nitrate and chromium from UCD wastes. It appears that this pollution has occurred; however, it has not affected domestic water supply wells.

Page 4, second paragraph, second sentence states that,

> *"Because creek water is not used as a drinking water source, exposure is likely limited to dermal contact, which may be frequent for some individuals (e.g., anglers and swimmers), or incidental ingestion (i.e., accidental ingestion when swimming in Putah Creek)."*

It is important to note that, since Putah Creek recharges to groundwater, pollutants in the creek can pollute groundwaters that could be used for domestic purposes.

On page 4, under paragraph III Consumption of Fish from Putah Creek, ATSDR has failed to reliably report on the two different datasets on mercury in fish that were collected. The first, in 1997, showed that, when Putah Creek was at low flow and there was no upstream flow, the University of California, Davis, wastewater treatment plant was a source of mercury and conditions that promoted mercury bioaccumulation in fish. Since radioactive mercury was found in fish, there is no doubt that UCD's wastewaters are a contributor to the mercury problem. Further, recently Putah Creek, Lower, has been listed as a Clean Water Act 303(d) impaired waterbody because of excessive mercury bioaccumulation. It is now known, through other studies, that any source of mercury, such as stormwater runoff from the LEHR site, is a potential contributor to excessive mercury in fish.

On the bottom of page 4, the report states, *"As such, ATSDR categorizes the on-site groundwater pathway as posing no public health hazard for past, current, and potential future exposures."* ATSDR has neglected to discuss an important public health issue – namely, the significant unknowns associated with chemical constituents that were not analyzed for at the LEHR site. Only a few of the many thousands of chemicals that are present in UCD wastes have been analyzed for at the LEHR site. There could readily be hazardous chemicals in the soils, stormwater runoff and groundwater that have not been identified as a public health threat. These issues should be discussed in the final report.

The discussion on groundwater contamination, which begins on page 19 and continues through page 26, gives somewhat of an incorrect impression with respect to the pollution of the lower aquifers, particularly HSU-4. This write-up needs to be expanded to include the situation where an agricultural well was developed through HSU-2 into HSU-4. This well served as a conduit for pollutants in HSU-2 to enter HSU-4. This has led to the development of a substantial

plume of polluted groundwaters in HSU-4. These issues should be discussed in this ATSDR write-up.

Another issue that should be discussed, associated with groundwater pollution near the LEHR site, is the fact that the University of California, Davis, discharge of its campus wastewaters to Putah Creek has led to pollution of the groundwaters underlying the creek by VOCs. At this time, there are no known problems with this pollution; however, it has not been adequately investigated to see whether there is a potential problem in the future with VOC-polluted groundwaters due to inadequate treatment of the campus wastewaters.

The discussion of the contamination of the soil, from page 27 through page 35, does not mention the fact that mercury has been found in the soils at LEHR at concentrations above background for the area. Further, these concentrations are sufficient so that mercury has been found to be present in stormwater runoff from the LEHR site and thereby contributes to the excessive mercury that is present in Putah Creek fish. ATSDR's statement that the mercury in Putah Creek fish does not appear to have come from LEHR is not technically valid. The LEHR site has been contributing mercury to Putah Creek, and some of the mercury in the fish is likely from LEHR.

Page 36 mentions wastewater releases. There is no discussion, however, about the fact that some of the stormwater runoff from the LEHR site is still, at times, discharged to the campus sewerage system and, therefore, is part of the wastewater releases from the treatment plant.

Pages 37 and 38 are devoted to stormwater runoff issues. ATSDR has failed to discuss the documented fact that the stormwater runoff monitoring has been and continues to be significantly deficient, compared to a monitoring program that would properly assess the potential for LEHR site constituents to lead to public health and environmental problems in Putah Creek. This situation reflects a significant deficiency in how ATSDR approached the development of this draft report. It appears that the Agency has relied almost exclusively on DOE and UCD reports for information, without considering the repeated comments made by DSCSOC on the deficiencies in many of these reports. This problem is particularly severe with respect to stormwater runoff issues.

On page 40, in the second paragraph (and elsewhere), ATSDR has used the term "EPA." Since there is a California EPA, whenever EPA is mentioned it should be designated, "US EPA."

Page 41 states, in the last paragraph, that it is unlikely that workers at the LEHR site could come in contact with stormwater runoff, because much of the captured stormwater runoff flows underground or in drainage ditches. This statement is incorrect since there is stormwater runoff from the LEHR site that is on the surface, and, therefore, people could have been exposed.

Beginning on page 46 is a discussion of the uptake of LEHR pollutants in various types of biota. While there is mention of a "Fruitless Mulberry tree" not having measurable radioactivity, no mention is made of the tree that was cut down on the LEHR site, which had greatly elevated concentrations of tritium. Throughout the period that DSCSOC has been

involved, it has been trying to get the RPMs and PRPs for the LEHR site to conduct a comprehensive study of the uptake of pollutants from the LEHR site into vegetation. Thus far, the PRPs have refused to do these studies, and the RPMs have not required that they be done, even though there is direct evidence that uptake of tritium did, in fact, occur into one tree where measurements were made.

On the bottom of page 48, mention should be made that the Central Valley Regional Water Quality Control Board, in 2002, recommended that Lower Putah Creek be placed on the Clean Water Act 303(d) list of impaired waterbodies because of excessive mercury bioaccumulation in fish. In July 2003 the US EPA approved this recommendation. As a result, Lower Putah Creek is now an impaired waterbody because of excessive mercury in fish. This will require that mercury from all sources, including stormwater runoff from LEHR, be controlled to prevent further bioaccumulation.

Page 49, devoted to fish monitoring data, fails to mention the significant differences between the two years of monitoring. The first monitoring period, 1996-1997, was during a low flow period for Putah Creek, when there was no upstream discharge of water to Putah Creek in the vicinity of the LEHR site during the summer. The only waters near that site during the time of fish sampling were waters derived from the UCD campus domestic wastewater treatment plant. The subsequent sampling, in 1998, was during a period of elevated Putah Creek flow. The results of the sampling from the two different hydrologic situations showed that there could be local sources of mercury or conditions that lead to mercury methylation in Putah Creek near LEHR and the wastewater treatment plant discharge.

The ATSDR report discussing fish monitoring data also fails to discuss the fact that the US EPA failed to properly analyze fish taken from Putah Creek during both sampling events for organochlorine pesticides and PCBs. Since chlordane has been found at measurable concentrations in stormwater runoff from the LEHR site and would be expected to be present in many of the stormwater runoff samples at concentrations that could lead to excessive bioaccumulation, LEHR could readily be contributing to an excessive chlordane situation in Putah Creek fish. DSCSOC was never able to get UCD/DOE, as the PRPs for the LEHR site, to properly conduct organochlorine pesticide and PCB tissue analyses for fish taken from the vicinity of the LEHR site. This is a significant information gap that still exists, which is part of the potential human health threat that has not been adequately addressed thus far.

On page 51, the first paragraph mentions that the irradiator consisted of a cobalt-60 source mounted on the roof of a concrete building located in the southeast corner of the LEHR site. It is my understanding that the irradiator was located close to the center of the LEHR site.

An issue of concern is that there are ponds and wetland areas at the terminus of Putah Creek that have not been properly sampled with respect to human health and ecological effects, which receive Putah Creek discharges during most of the year, except during high flow periods when the discharges occur to Yolo Bypass. These areas could be contributing to a public health and environmental hazard.

Page 62, second paragraph (under "*Chloroform concentrations in Putah Creek…*"), the statement that the chloroform from the wastewater treatment plant is not likely leading to groundwater pollution is not in accord with the data that were collected, which showed that groundwaters taken near Putah Creek, which could be influenced by the Creek's recharge of domestic wastewaters from the campus, showed elevated concentrations, compared to away from that location.

Page 62, last paragraph states that,

> *"Data collected for the CERCLA program must meet specific standards for quality assurance and control measures for chain-of-custody procedures, laboratory procedures (including detections* [sic] *limits), and data reporting. This standard process provides ATSDR with assurance that the data are reliable and therefore adequate for our goal of assessing environmental exposures and making decisions protective of human health."*

It is clear that those in ATSDR who wrote that statement have either ignored or do not understand the significant problems that have existed at the LEHR site in properly conducting studies of stormwater runoff from the LEHR site, with respect to the potential for excessive bioaccumulation of LEHR-site-derived chemicals in Putah Creek fish and other edible aquatic life. These issues are discussed in detail in DSCSOC's comments on their website.

The quality of the data generated from the studies conducted under CERCLA, with respect to detection limits, is very much dependent on the remediation program managers (RPMs) requiring that adequate analytical methods be used. The public health and environmental literature is replete with problems of this type. As documented by DSCSOC's comments (see http://members.aol.com/dscsoc/dscsoc.htm), there is a chronic problem with inadequate detection limits being used for monitoring certain parameters at the LEHR site. It was only after repeated efforts by DSCSOC that the RPMs finally required that UCD improve the analytical methods for mercury. Even there, the improved method was only used for a short period, and UCD has been allowed to revert back to an inadequate analytical method to detect mercury in stormwater runoff from LEHR at concentrations that could bioaccumulate in Putah Creek fish.

On the bottom of page 64, the ATSDR draft report states,

> *"Data collected from these investigations have served to sufficiently define the current extent of groundwater contamination plumes and type and amount of contamination in Putah Creek."*

While ATSDR states that the definition of the current extent of groundwater contamination plumes is adequate for their purposes, the full extent of groundwater pollution by LEHR is still not known. This issue has been repeatedly discussed in DSCSOC's comments on UCD reports.

The bottom of page 65 to top of page 66 fails to address the issue of limiting the constituents of concern to only a few of the many thousands of chemicals that have been deposited in this waste material at the LEHR site.

In the last two paragraphs on page 66, ATSDR has gone outside of its area of expertise when it comments that the NPDES permit issued by the CVRWQCB will be protective of aquatic life and other resources of Putah Creek from discharges by the UCD wastewater treatment plant and other sources. Those familiar with how NPDES permits are developed know that they are often significantly deficient with respect to properly protecting public health and the environment.

Page 68, paragraph number 2 states that mercury is not believed to be related to the LEHR site. This, again, is a mistake made by ATSDR which reflects a lack of review of the data that have been collected over the past year or so, which shows that mercury in soils and in stormwater runoff from LEHR is at sufficient concentrations to lead to excessive bioaccumulation of mercury in fish.

On page 70, ATSDR should have included, in item 4 under recommendations, properly assessing whether the fish in Putah Creek contain excessive organochlorine pesticides and PCBs, and whether the LEHR site is a contributor to these excessive concentrations.

During the ATSDR Public Meeting on October 30, a member of the ATSDR staff, in response to a question about ATSDR's "comparison values" versus the US EPA drinking water maximum contaminant levels (MCLs), stated that the two were similar with respect to risk-based approaches. While that is true for some drinking water MCLs, it is not true for two of the most important constituents of concern at the LEHR site: arsenic and chloroform. The US EPA drinking water MCLs for arsenic and chloroform are not human health risk-based values, but have built into them economic and other factors, which have caused the values to be much higher than a true risk-based value for prevention of cancer in those who drink the water.

If there are questions on these comments, please contact me.

G. Fred Lee, PhD, MSPH, $PE_{(TX)}$, DEE

DSCSOC's Areas of Concern with Respect to the Adequacy of LEHR Site Investigation

October 30, 2003

The Davis South Campus Superfund Oversight Committee (DSCSOC) is the US EPA supported Technical Assistance Grant (TAG) representative of the public for the University of California, Davis (UCD)/Department of Energy (DOE) LEHR Superfund site. The issues raised by DSCSOC in its comments on UCD and DOE LEHR Superfund site documents that have not been adequately addressed include, but are not limited to, the following:

- Problems in properly defining Constituents of Concern
  There are likely other constituents in LEHR site soils, wastes, stormwater runoff and groundwaters that are not being considered as part of the LEHR site investigation.
- Inadequate stormwater runoff monitoring
  There have been chronic problems with the quality of the stormwater runoff water quality monitoring that has been conducted at the LEHR site. Of particular concern is inadequate analytical method detection limits for key potential pollutants.
- Inadequate evaluation of the impacts of pollutants in LEHR stormwater runoff on Putah Creek water quality
  The inadequate stormwater runoff monitoring program and studies on Putah Creek have not adequately determined the problems that stormwater runoff from the LEHR site has caused or contributed to in Putah Creek.
- Failure to address translocation of pollutants from the subsurface soil to the surface via vegetation
  The LEHR site studies have failed to investigate the potential for terrestrial plants to extract pollutants from the soil through the roots into the stems, leaves and flowers (translocation), and thereby lead to surface soil and stormwater runoff pollution. This is known to occur at the LEHR site, where a tree that was removed was found to be high in radioactive hydrogen (tritium).
- Inadequate definition of the role of each LEHR waste management unit in impacting groundwater quality
  The groundwater monitoring well array does not adequately characterize the pollution of groundwaters downgradient from each LEHR site waste management unit. Pollution beyond that reported can be occurring and not be detected.

- Failure to require that DO and TOC measurements be made in all groundwater monitoring

  Dissolved oxygen is an important parameter influencing the behavior of pollutants in groundwaters. DO should be measured in every groundwater sample. Total organic carbon should be measured in all groundwater samples since it is an indicator of the presence of the vast arena of uncharacterized potential pollutants in LEHR site wastes that can pollute groundwaters.
- Failure to define the full extent of offsite groundwater pollution by the LEHR site

  While offsite groundwater pollution has been known since the mid-1990s, the full extent of this pollution has still not been adequately defined.
- Inadequate treatment and operation of the IRA groundwater demonstration project

  From the beginning, the UCD IRA demonstration project has been plagued by inadequate design, operation, maintenance and monitoring.
- Failure to adequately consider potential impacts of IRA land disposal of partially treated polluted groundwater on groundwater and terrestrial life

  UCD is attempting to dispose of VOC-stripped polluted groundwaters by land disposal, using surface irrigation. This approach can readily lead to soil and groundwater pollution. The current IRA land disposal project is not being adequately monitored for potential long-term problems.
- Unreliable statements made by UCD and DOE contractors in their draft reports

  There has been a chronic problem with the quality of the draft reports prepared on the LEHR site investigation.
- Failure to correct errors in annual monitoring reports

  Another chronic problem with LEHR site reports is that the contractors have not been required to correct the errors that have been pointed out in the reports.

It is DSCSOC's position that these issues will need to be adequately addressed before the public/DSCSOC can support that the LEHR Superfund site has been adequately investigated and remediated. Further information on these issues is available from the DSCSOC website, http://members.aol.com/dscsoc/dscsoc.htm, or by contacting Julie Roth, Executive Director of DSCSOC, at JRoth916@aol.com, or Dr. G. Fred Lee, DSCSOC TAG advisor, at gfredlee@aol.com.

G. Fred Lee's Qualifications to Comment on the Deficiencies in the ATSDR Draft LEHR Superfund Site Public Health Assessment

My background to making these comments includes a bachelors degree in environmental health sciences from San Jose State College in 1955, a Master of Science in Public Health degree from the University of North Carolina School of Public Health in 1957, and a PhD degree in environmental engineering from Harvard University in 1960. For 30 years I taught and conducted research in environmental engineering and environmental sciences at several major US universities. During this time I conducted in excess of $5 million in research and published over 500 papers and reports. Also during this time, I was a part-time consultant to governmental agencies and industry on water quality and solid and hazardous waste management issues.

My public consulting activities have included being asked by the US Public Health Service to chair a committee to determine the appropriateness of developing drinking water standards for PCBs. Further, I was an invited peer reviewer for the National Academies of Science and Engineering Blue Book of Water Quality Criteria, published by the US EPA in 1973.

Since 1989 I have been a full-time consultant on water supply water quality, water and wastewater treatment, water pollution control, and solid and hazardous waste management. I work with my wife, Dr. Anne Jones-Lee. Together we have a two-person specialty consulting firm. We are active in publishing the results of our activities. Our recent papers and reports are on our website, www.gfredlee.com. Throughout my over 43-year professional career I have been involved in evaluating the water quality and public health impacts of chemical constituents and pathogens in water and wastes.

Additional information on my qualifications is available from my website, www.gfredlee.com, the first page of which is attached.

SUMMARY BIOGRAPHICAL INFORMATION

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EDUCATION

Ph.D. Environmental Engineering & Environmental Science, Harvard University, Cambridge, Mass. 1960

M.S.P.H. Environmental Science-Environmental Chemistry, School of Public Health, University of North Carolina, Chapel Hill, NC 1957

B.A. Environmental Health Science, San Jose State University 1955

ACADEMIC AND PROFESSIONAL EXPERIENCE

Current Position:

Consultant, President, G. Fred Lee and Associates

Previous Positions:

Distinguished Professor, Civil and Environmental Engineering, New Jersey Institute of Technology, Newark, NJ, 1984-89

Senior Consulting Engineer, EBASCO-Envirosphere, Lyndhurst, NJ (part-time), 1988-89

Coordinator, Estuarine and Marine Water Quality Management Program, NJ Marine Sciences Consortium Sea Grant Program, 1986

Director, Site Assessment and Remedial Action Division, Industry, Cooperative Center for Research in Hazardous and Toxic Substances, New Jersey Institute of Technology et al., Newark, NJ, 1984-1987

Professor, Department of Civil and Environmental Engineering, Texas Tech University, 1982-1984

Professor, Environmental Engineering, Colorado State University, 1978-1982

Professor, Environmental Engineering & Sciences; Director, Center of Environmental Studies, University of Texas at Dallas, 1973-1978

Professor of Water Chemistry, Department of Civil & Environmental Engineering, University of Wisconsin-Madison, 1961-1973

Registered Professional Engineer, State of Texas, Registration No. 39906

PUBLICATIONS AND AREAS OF ACTIVITY

Published over 850 professional papers, chapters in books, professional reports, and similar materials. The topics covered include:

Studies on sources, significance, fate and the development of control programs for chemicals in aquatic and terrestrial systems.
Analytical methods for chemical contaminants in fresh and marine waters.
Landfills and groundwater quality protection issues.
Impact of landfills on public health and environment.
Environmental impact and management of various types of wastewater discharges including municipal, mining, electric generating stations, domestic and industrial wastes, paper and steel mill, refinery wastewaters, etc.

Stormwater runoff water quality evaluation and BMP development for urban areas and highways

Eutrophication causes and control, groundwater quality impact of land disposal of municipal and industrial wastes, environmental impact of dredging and dredged material disposal, water quality modeling, hazard assessment for new and existing chemicals, water quality and sediment criteria and standards, water supply water quality, assessment of actual environmental impact of chemical contaminants on water quality.

LECTURES

Presented over 750 lectures at professional society meetings, universities, and to professional and public groups.

GRANTS AND AWARDS

Principal investigator for over six million dollars of contract and grant research in the water quality and solid and hazardous waste management field.

GRADUATE WORK CONDUCTED UNDER SUPERVISION OF G. FRED LEE

Over 90 M.S. theses and Ph.D. dissertations have been completed under the supervision of Dr. Lee.

ADVISORY ACTIVITIES

Consultant to numerous international, national and regional governmental agencies, community and environmental groups and industries.

Surface and Groundwater Quality Evaluation and Management
and
Municipal Solid & Industrial Hazardous Waste Landfills

http://www.gfredlee.com

Dr. G. Fred Lee and Dr. Anne Jones-Lee have prepared professional papers and reports on the various areas in which they are active in research and consulting including domestic water supply water quality, water and wastewater treatment, water pollution control, and the evaluation and management of the impacts of solid and hazardous wastes. Publications are available in the following areas:

- Landfills and Groundwater Quality Protection
- Water Quality Evaluation and Management for Wastewater Discharges
    - Stormwater Runoff, Ambient Waters and Pesticide Water Quality Management Issues, TMDL Development, Water Quality Criteria/Standards Development and Implementation
- Impact of Hazardous Chemicals -- Superfund
    - LEHR Superfund Site Reports to DSCSOC
    - Lava Cap Mine Superfund Site reports to SYRCL
    - Smith Canal
- Contaminated Sediment -- Aquafund, BPTCP, Sediment Quality Criteria
- Mine Waste Management
- Domestic Water Supply Water Quality
- Excessive Fertilization/Eutrophication, Nutrient Criteria
- Reuse of Reclaimed Wastewaters
- Watershed Based Water Quality Management Programs:
    - Sacramento River Watershed Program
    - Delta -- CALFED Program
    - Upper Newport Bay Watershed Program
    - San Joaquin River Watershed DO and OP Pesticide TMDL Programs