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July 5, 2000

Steven Butler, Chairman
Central Valley Regional Water Quality Control Board
3443 Routier Road, Suite A
Sacramento, CA 95827-3003

Dear Chairman Butler and Members of the Board:

Please find attached my comments on the Tentative Revised Waste Discharge Requirements for University of California, Davis, UC Davis Class III Landfill, Yolo County (UCD landfill no. 5).

As you may recall, in 1996 I provided detailed comments to the CVRWQCB on why the staff's proposed WDRs for closing UCD landfill no. 4 and the development of UCD landfill no. 5 should not be approved by the Board. The primary thrust of my comments was that the proposed approach for closure of landfill no. 4 would not prevent further groundwater pollution by this landfill. Also, the proposed design and monitoring of landfill no. 5 would not prevent groundwater pollution by this landfill.

When the CVRWQCB approved the staff's WDRs, as an individual interested in groundwater quality protection, on September 9, 1996, I filed an appeal to the State Water Resources Control Board of these WDRs requesting that the State Board review this matter. Subsequently, I learned that the CVRWQCB staff and Board actions in support of what were obviously deficient WDRs in complying with Chapter 15's requirements, were based on an SWRCB "Position," announced to the public for the first time on March 19, 1997, by H. Schueller of the Clean Water Programs, that minimum Subtitle D and Chapter 15 prescriptive landfill liner and cover requirements met the performance standards required by Chapter 15 of protecting groundwaters from pollution by landfill leachate for as long as the wastes in the landfill are a threat. Since this position (policy) was adopted without public review, I asked the State Board in a supplement, dated March 27, 1997, to my petition to conduct a public review of this position.

I provided detailed discussions of why the WDRs and this position were well known to be significantly deficient in complying with Chapter 15 (now, Title 27) requirements for protection of groundwaters from pollution by landfill leachate. A copy of the original petition and the supplement are appended to these comments.

On April 17, 2000, the SWRCB Office of Counsel, notified me that the 270-day period in which the State Board must review petitions had lapsed and the Board, by lack of action, denied the petition. A copy of the April 17 notice is appended to these comments.

On June 2, 2000, I received a Notice of Tentative Revised WDRs for the UCD campus landfill. This notice requested comments concerning the tentative order for revised WDRs. Attached are my comments.

I find that the revised draft WDRs for UCD's proposed landfill no. 5 are still obviously significantly deficient in complying with Chapter 15/Title 27 requirements of protecting groundwaters from pollution by landfill leachate for as long as the waste in the landfill will be a threat. A single composite liner of the type that UCD proposes to use will fail to prevent leachate from passing through it during the time that the waste in the landfill will be a threat. Changing the two feet of compacted clay in this composite liner to a geocomposite clay liner (GCL) will not change this situation. In fact, as discussed in the enclosed comments, the GCL could readily shorten the time in which groundwater pollution will occur.

I am submitting these comments as part of an ongoing effort to try to get the State and Regional Boards in California to begin to develop municipal solid waste and industrial solid waste landfills that will have a high degree of certainty of protecting groundwaters from pollution by landfill leachate for as long as the waste in the landfill will be a threat. I have no personal interest in the UCD landfill other than that of a taxpayer whose children will experience the loss of groundwater resources and will have to pay for the cleanup of the polluted groundwaters that will arise out of the construction of landfill no. 5 as proposed in the June 2, 2000, draft WDRs.

As discussed herein, a small additional initial investment in a double composite liner, rather than the single composite liner now proposed, will save future generations many tens of millions of dollars in not having to cleanup the polluted groundwaters arising from the ultimate failure of the single composite liner. It should be noted that there are ten states in the US that would not allow UCD's proposed landfill no. 5 design because of the ultimate failure of the single composite liner to prevent large amounts of leachate from passing through it while the wastes in the landfill are still a threat.

An important aspect of this situation is that requiring a double composite liner as part of the development of landfill no. 5, where the lower composite liner is a leak detection system for the upper liner, will not impose a significant financial burden on UCD. The UCD L. Vanderhoef administration, and specifically, L. Vanderhoef, should adopt this approach on their own initiative as part of providing leadership in the state in environmental protection. However, thus far, L. Vanderhoef and his administration have approached issues of this type as a recalcitrant polluter, doing the least possible to just get by current CVRWQCB staff and Board approaches for interpretation of current regulations.

The April 17, 2000, SWRCB Notice letter, where the State Board has refused to review the obviously significant deficient "Position" on the equivalency of a single composite liner and the typically approved associated groundwater monitoring system to Title 27's requirements for groundwater quality protection, means that the State Board is relying on the Regional Boards to require additional measures to protect the groundwater resources within the Boards' jurisdiction from pollution by landfill leachate. The importance of groundwater resources to the future within the Central Valley mandates that the CVRWQCB not continue to accept the obviously flawed equivalency

between a single composite liner and Title 27's requirements for protecting groundwater quality from pollution by landfill leachate for as long as the wastes in the landfill will be a threat. It is my understanding that the CVRWQCB has the right/obligation to establish WDRs for proposed landfills, as well as landfill closures, that will comply with Title 27 requirements. The CVRWQCB is not restricted from independent assessment of the ability of a proposed liner system and groundwater monitoring system to protect groundwater resources from pollution by landfill leachate. In fact, it is obligated to conduct this review.

I urge, in the name of protection of future generations' groundwater resources within California, that the CVRWQCB work with UCD and the public in developing WDRs for UCD's proposed landfill no. 5 and the closure of landfill no. 4 to provide for true groundwater quality protection for as long as the wastes in the landfills will be a threat.

If there are questions on these comments or the attached materials, please contact me.

G. Fred Lee, PhD, DEE

GFL:ds
Encl.

cc: Governor G. Davis
Members, CVRWQCB
Members, SWRCB
S. Rosenbaum
S. Ritchie, CALFED
Bill Jennings, DeltaKeeper
Gary Carlton
James Pedri
Loren Harlow
James Kuykendall
California Groundwater Resources Association
Tom To, Yolo County Dept. of Health
Alvin Franks
Jim Parsons
Gil Torres
L. Vanderhoef

Comments on Tentative Revised Waste Discharge Requirements for the University of California Davis (UCD) Class III Landfill, Yolo County, Dated June 2, 2000

Submitted by
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July 5, 2000

Presented herein are my comments on the Tentative Revised Waste Discharge Requirements for the proposed UCD Class III landfill (UCD landfill no. 5).

In 1994, I provided detailed comments to the Central Valley Regional Water Quality Control Board (CVRWQCB) on the fundamentally flawed nature of the University of California, Davis' (UCD's) proposed landfill no. 5. I pointed out in those comments that that landfill as proposed would, at best, only postpone when groundwater pollution occurs. UCD, by adopting a minimum US EPA Subtitle D landfill design (also minimum Chapter 15, now Title 27, landfill liner design) would create yet another landfill that would be polluting groundwaters of the area.

UCD has been practicing landfilling of campus waste for many years. It has developed four landfills on the UCD campus, all of which are now polluting groundwaters, and two of which have created chloroform plumes that extend over a mile from the landfill. It has been the UCD administration's approach for landfilling of campus waste that the University would practice the minimum design, operation, closure and post-closure care needed to just get by the CVRWQCB's then-current approach for regulating the landfilling of municipal solid waste. This cheaper-than-real-cost garbage disposal has led to severe groundwater pollution, which is now costing the taxpayers of California many tens of millions of dollars in polluted groundwater clean-up.

While the current UCD administration claims that past administrations were not at fault for adopting this approach since the approach was approved by the Regional Board, the facts are that it has been known since the 1950s that the construction of a landfill of the type that UCD has constructed, which will superficially meet minimum regulatory requirements then (and, for that matter, now) in a geological setting such as that which exists at UCD, will lead to groundwater pollution. Research done at the University of California, Berkeley, demonstrated in the 1950s that this situation would likely occur. This research served as background information to the American Society of Civil Engineers (ASCE)1959 Sanitary Landfill manual. That manual discussed the need to carefully site landfills to avoid groundwater pollution. The UCD's administrations, including the L. Vanderhoef administration, have chosen to ignore good engineering practice and environmental and groundwater quality protection in order to achieve cheaper-than-real-cost garbage disposal at the expense of future generations' groundwater resources and quality.

In 1994, when I found that the CVRWQCB adopted waste discharge requirements which were obviously fundamentally flawed in complying with then Chapter 15's requirements of protecting groundwaters from pollution by landfill leachate for as long as the waste in the landfill would be a threat, I appealed, without support, the Regional Board's actions to the State Board. A copy of this appeal is appended to these comments. The State Board accepted receipt of the appeal, but chose to not act on it until recently, when I was informed on April 17, 2000 that the 270-day period within which the Board must act, had passed (actually, it was about 4 years) and the Board has chosen not to act on this appeal. As I understand the situation, this now enables me to take action to have this matter reviewed by the courts.

My original review and appeal, as well as this action have all been unsponsored. They are being conducted in the name of trying to establish a more technically valid approach for protecting groundwater quality from pollution by municipal and industrial landfill leachate than has been occurring in California.

In discussing this matter with the Regional Board staff, I learned that the staff understood the fundamental deficiencies in the proposed design of the UCD landfill in providing groundwater quality protection from pollution by landfill leachate for as long as the wastes represent a threat. I subsequently learned that the reason the Regional Board staff supported this approach, even though they knew that it would not comply with Chapter 15 requirements of protecting groundwater from pollution for as long as the wastes are a threat, was that H Schueller then head of the Clean Water Program had issued a policy statement that stated that it was the State Board's position that constructing a minimum US EPA Subtitle D landfill with a single composite liner and monitoring wells spaced hundreds or more feet apart along the downgradient edge of the landfill would be considered as complying with Chapter 15's requirements of protecting groundwaters from pollution by landfill leachate for as long as the wastes are a threat. The wastes in municipal landfills, including the UCD landfill, will be a threat, effectively, forever; therefore, the minimum US EPA Subtitle D liner, consisting of a thin plastic sheeting and a couple of feet of clay, must protect groundwaters from pollution by landfill leachate forever. Obviously, this cannot be done.

When I learned of this behind-the-scenes policy that had been adopted, without public review, by the SWRCB, I amended my petition to include review of that policy. A copy of my amended petition is appended to these comments.

The proposed UCD landfill no. 5 is to be located near UCD landfill no.4. Landfill no. 4 has already polluted groundwaters for over a mile downgradient from the landfill by a chloroform plume associated with UCD's mismanagement of its campus chloroform wastes, which were dumped into pits at that landfill. A similar plume exists at UCD landfill no.2, at the UCD LEHR national superfund site.

Another fundamentally flawed aspect of UCD's proposed landfill no. 5 is the grossly inadequate groundwater monitoring system that is proposed to be used, compared to that needed to comply with either US EPA Subtitle D or Chapter 15 (now Title 27) requirements. These issues are discussed in the attached materials. Without question, ultimately, the single composite liner that UCD proposes to use for its

proposed landfill no. 5 will ultimately develop finger plumes of leachate that will pass between the monitoring wells that UCD proposes to use at the point of compliance for groundwater monitoring. This will mean that off-site groundwater pollution will occur from the proposed landfill no. 5, which will require remediation of the polluted groundwaters.

With respect to the specific proposal to substitute a geocomposite clay liner (GLC) for the two feet of compacted clay , it should be understood that neither the two feet of clay nor the GLC will prevent pollution of groundwaters. In fact, the GLC will likely allow more rapid pollution. Because of its very thin character, there are structural stability problems with the GLC that can lead to failure that would not occur with the two feet of clay. Further, diffusion through the GLC can occur at a much higher rate than through the two feet of clay. While the GLC is claimed to have a lower advective permeability, this claim is misleading because the rate of transport of pollutants through the GLC will be controlled by diffusion, not advection. Also the GLC has a much smaller capacity for ion exchange shrink/swell and therefore will be more subject to cracking as calcium substitutes for sodium in the clay.

Recommended Approach

In the fall of 1999 the US EPA issued a request for comments on the changes that should be made in Subtitle D landfill regulations. In January 2000 Dr. Anne Jones-Lee and I submitted the attached comments on changes that should be made in Subtitle D regulations. I recommend that the CVRWQCB rescind the current WDRs for the UCD proposed landfill and substitute the recommendations that Dr. Jones-Lee and I submitted to the US EPA on the changes in Subtitle D regulations. These changes should be required for the proposed UCD landfill no.5. The most important of the changes in UCD landfill no. 5 design include a double composite liner with the lower composite liner serving as leak detection for the upper composite liner.

This approach is now required by 10 states in the US; it is recognized as the approach that should be used for minimum design for Subtitle D (Title 27) landfills located where the geological strata do not provide for natural protection of the groundwater resources. This approach also greatly reduces the unreliability of the groundwater monitoring systems that are based on vertical monitoring wells spaced hundreds of feet apart at the point of compliance. This approach can be readily implemented and should be required of UCD and, for that matter, all landfills located within the Central Valley. While the initial cost of this approach is about twice that of a single composite liner, which typically represents an increase in cost of about a few cents per person per day for those who deposit waste in the landfill, it will save the taxpayers of California millions of dollars in groundwater clean-up.

Another change that should be made in the WDR's is concerned with the closure of UCD landfill no. 4. UCD landfill no. 4 should be closed with a leak detectable cover that will be operated and maintained forever. This approach will shut off the moisture supply that is leading to further leachate generation and groundwater pollution.

Adoption of these recommended approaches will enable UCD to close landfill no. 4 to stop further pollution of groundwater. It will also allow UCD to develop landfill 5 so that it will be more protective of groundwater quality.

While the past CVRWQCB and the current SWRCB have not been willing to take the action needed to develop landfills in California that are protective of groundwater resources from pollution by landfill leachate for as long as the wastes are a threat as required by Title 27, the current CVRWQCB should take the lead for the state and require that landfills developed in the Central Valley will in fact protect groundwater resources for as long as the wastes are a threat.

If there are questions on these comments please contact me. Thank you for taking time to review this matter.

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January 30, 2000

via email
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Criteria For Municipal Solid Waste Landfills (Section 610 Review)
Submitted to Docket Number F-1999-MLFN-FFFFF

RCRA Docket Information Center
Office of Solid Waste (5305G)
US EPA (EPA HQ)
401 M St, SW
Washington DC202460

Dr. Anne Jones-Lee and I wish to provide comments pertinent to the Agency's current review of the continued need for Subtitle D regulations. We focus our comments on the adequacy of Subtitle D regulations as they have been implemented at the state and local levels to provide protection of public health, groundwater resources and the environment from Subtitle D landfilled wastes for as long as the wastes in a Subtitle D landfill remain a threat. This is a topic that we have been concerned with since Subtitle D was first proposed in 1988. We have published extensively on the fundamentally flawed approach that the US EPA adopted in 1991 with the promulgation of Subtitle D regulations. These comments summarize many of the issues addressed in our publications.

The basis for our concern and comments stems from my more than 30 years of work on the impact .of landfilled municipal solid wastes (MSW) on public health, groundwater resources and the environment. For 20 of these years I was involved in graduate level teaching and research at several major US universities on various aspects of water quality and solid and hazardous waste management. The research included evaluation of the ability of landfill liners of the type used in Subtitle D landfills to prevent MSW leachate from polluting groundwaters for as long as the wastes are a threat. A summary of my professional expertise and experience pertinent to these comments is appended.

Subtitle D Landfill Containment and Monitoring Systems Are a Flawed Technological Approach for Protection of Groundwater Quality

In 1997 we were invited to present a review paper on the problems of Subtitle D landfills at an Air and Waste Management Association (AWMA) conference session devoted to landfilling of MSW. That paper was presented at the national meeting in June 1997 and published in the conference proceedings. A copy of that paper is appended to these comments. Also, in July 1998 we presented a review paper at the US EPA national Water Quality Monitoring conference devoted to the problems of reliably monitoring liner leakage of leachate from MSW Subtitle D landfills before widespread offside pollution of groundwater occurs.

These papers summarize the current state of knowledge on the ability of minimum Subtitle D MSW landfills to protect groundwater from pollution by landfill leachate for as long as the waste are a threat. A summary of the key deficiencies in the current Subtitle D regulations is presented below. Also we present recommendations on changes that should be made in Subtitle D regulations.

- MSW in a Subtitle D landfill will be a threat to public health, groundwater resources and the environment effectively forever. THE US EPA SHOULD REVISE SUBTITLE D REGULATIONS TO CLEARLY RECOGNIZE THE *AD INFINITUM* THREAT OF MSW IN A SUBTITLE D LANDFILL AND, AS DISCUSSED HEREIN, RELIABLY PREPARE TO MANAGE THIS THREAT TO PUBLIC HEALTH, GROUNDWATER QUALITY AND THE ENVIRONMENT FOR AS LONG AS THE LANDFILLED WASTES ARE A THREAT..

- A single composite liner will not protect groundwater quality from pollution by landfill leachate. SUBTITLE D SHOULD BE REVISED SO THAT ALL MSW LANDFILLS SITED AT LOCATIONS WHERE THERE ARE GROUNDWATERS HYDRAULICALLY CONNECTED TO THE BASE OF THE LANDFILL THAT COULD AT ANY TIME IN THE FUTURE BE USED FOR DOMESTIC WATER SUPPLY WILL BE PROTECTED FROM LANDFILL LEACHATE FOR AS LONG AS THE WASTES ARE A THREAT..

- Minimum Subtitle D landfill leachate leakage through the liner cannot be reliably monitored by the approach allowed in implementing Subtitle D regulations involving vertical monitoring wells located hundreds of feet apart at the point of compliance for groundwater monitoring. The current typical Subtitle D landfill groundwater monitoring system is cosmetic and is unreliable as a means of providing offsite groundwater quality protection. SUBTITLE D SHOULD BE REVISED TO REQUIRE THAT A DOUBLE COMPOSITE LINER SYSTEM IS USED. THE LOWER COMPOSITE LINER IN THE DOUBLE COMPOSITE LINED MSW LANDFILL IS TO BE USED AS A LEAK DETECTION SYSTEM FOR THE EVENTUAL FAILURE OF THE UPPER SUBTITLE D COMPOSITE LINER TO PREVENT LEACHATE FROM PASSING THROUGH THE LINER THAT COULD POLLUTE GROUNDWATER.

- The current Subtitle D regulations do not require the long term funding that will be needed to provide the monitoring, maintenance and eventual remediation of leachate polluted groundwater over the period of time that the wastes in the landfill will be a threat. SUBTITLE D SHOULD BE

REVISED SO THAT THE SUBTITLE D LANDFILL OWNER IS REQUIRED TO DEVELOP A DEDICATED TRUST FUND OF SUFFICIENT MAGNITUDE TO ADDRESS ALL PLAUSIBLE WORST CASE LANDFILL CONTAINMENT SYSTEM FAILURE SCENARIOS FOR AS LONG AS THE WASTES IN THE LANDFILL WILL BE A THREAT. FOR PLANNING PURPOSES THIS PERIOD SHOULD BE CONSIDERED TO BE INFINITE. THIS TRUST FUND CAN BE GENERATED FROM DISPOSAL FEES.

- Current Subtitle D landfill covers will not prevent moisture from entering the landfill wastes that generates leachate that will cause groundwater pollution during the time that the wastes will be a threat. The eventual failure of the plastic sheeting layer in the cover cannot be detected by the current landfill cover inspection approach. SUBTITLE D SHOULD BE REVISED SO THAT A LEAK DETECTABLE COVER IS INSTALLED AND RELIABLY OPERATED FOR AS LONG AS THE WASTES IN THE LANDFILL ARE THREAT. THIS WILL REQUIRE THAT ASSURED FUNDING BE DEVELOPED DURING THE ACTIVE LIFE OF THE LANDFILL.

- Subtitle D regulations fail to reliably protect public health, safety and the environment from the adverse impacts of landfill gas generated in a Subtitle D landfill for as long as the wastes are a threat to generate gas emissions. SUBTITLE D SHOULD BE REVISED TO RECOGNIZE THAT SUBTITLE D LANDFILLS WILL HAVE THE POTENTIAL TO GENERATE AND RELEASE TO THE ENVIRONMENT LANDFILL GAS AND OTHER VOLATILE CONSTITUENTS FOR MUCH LONGER THAN THE CURRENT 30 YEAR MINIMUM ASSURED FUNDED POSTCLOSURE CARE PERIOD. THE REVISED REGULATIONS SHOULD PROVIDE FOR MANAGEMENT OF ALL GAS RELEASES FOR AS THE LANDFILL IS A THREAT TO RELEASE GASES/VOLATILE CONSTITUENTS TO THE ENVIRONMENT.

- Contrary to US EPA's statement in the 1991 Subtitle D regulation, this regulation fails to address the justified NIMBY opposition to Subtitle D landfills developed without adequate buffer lands to dissipate the emissions of waste derived components and other impacts of MSW landfills to the those who live and/or use properties within the sphere of influence of the landfill. This area of influence often extends for several miles from the landfill. SUBTITLE D REGULATIONS SHOULD BE REVISED SO THAT THE HEALTH, ENVIRONMENT, WATER AND AIR RESOURCES AND THE INTERESTS OF THOSE WHO ARE POTENTIALLY IMPACTED BY THE LANDFILL ARE FULLY PROTECTED FOR AS LONG AS THE WASTES IN THE LANDFILL ARE A THREAT.
-

Adoption of this recommended approach for revising Subtitle D will be a major step toward beginning to manage MSW in a technically valid cost effective manner to protect groundwater, public health and the environment. This approach will put an end to the highly unreliable information the current US EPA administration has been providing the US public about the "safety" of minimum Subtitle D landfills. With

high quality construction of the liner and cover systems, this safety applies for a short period of time compared to the time that the wastes in the landfill will be a threat. While this recommended approach will initially cost the MSW generators (public residential, commercial and industrial) more to manage the MSW, the true long term costs of managing landfilled MSW will be less since the "superfund" costs associated with the remediation of the leachate polluted groundwater will be less likely to occur.

Another important impact of adopting these recommended revisions of Subtitle D is that they will cause the true cost of MSW landfilling to become more comparable to practicing the 3Rs. At this time MSW reuse, reduction and recycling (3Rs) is experiencing problems in obtaining public support due to the higher costs compared to the costs of minimum Subtitle D landfill tipping fees. Currently the Agency claims to promote MSW reduction, reuse and recycling yet allows MSW landfilling at costs less than the real costs to those who generate the wastes. The Agency's current approach for landfilling is strongly contrary to the practice of the 3Rs and passes most of the costs of landfilling of MSW to future generations in terms of threats to their health, loss of groundwater resources and having to pay the "Superfund" costs for polluted groundwater resources, and other long term impacts of Subtitle D landfills. Attached is preprint of a paper that I will be presenting at the AWMA June 2000 national conference session devoted to MSW 3Rs that discuss these issues.

The current US EPA efforts to promote landfill leachate recycle should be properly evaluated in terms of the potential to cause increased and more severe groundwater pollution. Attached is a paper that I will present at the AWMA national conference in June 2000 that discusses problems with leachate recycle in minimum Subtitle D landfills. Also discussed are recommended approaches for promoting wet cell MSW landfilling.

Background to these comments and recommendations are provide in the appended papers. Further additional information is presented in papers and reports available from our web site, www.gfredlee.com.

We strongly recommend that the US EPA not continue its current approaches of weakening Subtitle D as occurred with the adoption of less assured long term funding of postclosure monitoring and maintenance. Instead, the US EPA should significantly strengthen Subtitle D so that it provides true protection of public health, groundwater resources and the environment for as long as the wastes in the landfill are a threat.

If anyone attempts to claim that our assessment of deficiencies in Subtitle D landfills is technically incorrect, please have him/her provide written documentation on the technical bases for the claim(s) so that they can be independently peer-reviewed by experts in the field.

Please contact me if there are comments or questions on these comments.

G. Fred Lee, PhD, PE, DEE
Anne Jones-Lee, PhD

Qualifications to Undertake This Review

My (Dr G. Fred Lee) work on municipal landfill impact matters began in the mid-1950s while I was an undergraduate student in environmental health sciences at San Jose State College in San Jose, California. My course and field work involved review of municipal solid waste landfill impacts on public health and the environment.

I obtained a Master of Science in Public Health degree from the University of North Carolina, Chapel Hill in 1957. The focus of my masters degree work was on water quality evaluation and management with respect to public health and environmental protection from chemical constituents and pathogenic organisms.

I obtained a PhD degree specializing in environmental engineering from Harvard University in 1960. As part of this degree work I obtained further formal education in the fate, effects and significance and the development of control programs for chemical constituents in surface and groundwater systems. An area of specialization during my PhD work was aquatic chemistry.

For a 30-year period, I held university graduate-level teaching and research positions in departments of civil and environmental engineering at several major United States universities, including the University of Wisconsin-Madison, University of Texas at Dallas and Colorado State University. During this period I taught graduate-level environmental engineering courses in water and wastewater analysis, water and wastewater treatment plant design, surface and groundwater quality evaluation and management, and solid and hazardous waste management. I have published over 850 professional papers and reports on my research results and professional experience. My research included, beginning in the 1970s, the first work done on the impacts of organics on clay liners for landfills and waste lagoons.

In the 1980s, I conducted a comprehensive review of the properties of HDPE liners of the type being used today for lining municipal solid waste and hazardous waste landfills with respect to their compatibility with landfill leachate and their expected performance in containing waste-derived constituents for as long as the waste will be a threat.

My work on the impacts of municipal solid waste landfills began in the 1960s where, while directing the Water Chemistry Program in the Department of Civil and Environmental Engineering at the University of Wisconsin-Madison, I became involved in the review of the impacts of municipal solid waste landfills on groundwater quality. In the 1970s, while I was Director of the Center for Environmental Studies at the University of Texas at Dallas, I was involved in the review of a number of municipal solid waste landfill situations, focusing on the impacts of releases from the landfill on public health and the environment.

In the 1980s while I held the positions of Director of the Site Assessment and Remediation Division of a multi-university consortium hazardous waste research center and a Distinguished Professorship of Civil and Environmental Engineering at the New Jersey Institute of Technology, I was involved in numerous

situations concerning the impact of landfilling of municipal solid waste on public health and the environment. I have served as an advisor to the states of California, Michigan, New Jersey and Texas on solid waste regulations and management.

In the early 1980s while holding a professorship in Civil and Environmental Engineering at Colorado State University, I served as an advisor to the town of Brush, Colorado on the potential impacts of a proposed hazardous waste landfill on the groundwater resources of interest to the community. Based on this work, I published a paper in the Journal of the American Water Works Association discussing the ultimate failure of the liner systems proposed for that landfill in preventing groundwater pollution by landfill leachate. In 1984 this paper was judged by the Water Resources Division of the American Water Works Association as the best paper published in the journal for that year.

In 1989, I retired after 30 years of graduate-level university teaching and research and expanded the part-time consulting that I had been doing with governmental agencies, industry and community and environmental groups into a full-time activity. A principal area of my work since then has been assisting water utilities, municipalities, industry, community and environmental groups, agricultural interests and others in evaluating the potential public health and environmental impacts of proposed or existing hazardous, as well as municipal solid waste landfills. I have been involved in the review of approximately 50 different landfills in various parts of the United States and in other countries.

Dr Anne Jones-Lee obtained a bachelors degree in biology form Southern Methodist University and a PhD degree in Environmental Sciences from the University of Texas at Dallas in 1978. For 11 years she taught and conducted university graduate level environmental engineering and environmental sciences courses and conducted research on various aspects of water quality management. She and Dr. G. Fred Lee have worked together as a team since the mid 1970s.

Dr. Anne Jones-Lee and Dr. G. Fred Lee have published extensively on the issues that should be considered in developing new or expanded municipal solid waste and hazardous waste landfills in order to protect the health, groundwater resources, environment and interests of those within the sphere of influence of the landfill. Our over 40 professional papers and reports on landfilling issues provide guidance not only on the problems of today's minimum US EPA Subtitle D landfills, but also how landfilling of non-recyclable wastes can and should take place to protect public health, groundwater resources, the environment, and the interests of those within the sphere of influence of a landfill. I make many of my publications available as downloadable files from my web site (www.gfredlee.com).

In the early 1990s, I was appointed to a California Environmental Protection Agency's Comparative Risk Project Human Health Subcommittee that reviewed the public health hazards of chemicals in California's air and water. In connection with this activity, Dr. Jones-Lee and I developed a report, "Impact of Municipal and Industrial Non-Hazardous Waste Landfills on Public Health and the Environment: An Overview" (Lee and Jones-Lee, 1994a), that served as a basis for the human health advisory panel to assess public health impacts of municipal landfills.

In addition to teaching and serving as a consultant in environmental engineering for over 39 years, I am a registered professional engineer in the state of Texas and a Diplomate in the American Academy of Environmental Engineers (AAEE). The latter recognizes my leadership roles in the environmental engineering field. I have served as the chief examiner for the AAEE in north-central California and New Jersey, where I have been responsible for administering examinations for professional engineers with extensive experience and expertise in various aspects of environmental engineering, including solid and hazardous waste management.

My work on landfill impacts has included developing and presenting several two-day short-courses devoted to landfills and groundwater quality protection issues. These courses have been presented through the American Society of Civil Engineers, the American Water Resources Association, the National Ground Water Association in several United States cities, including New York, Atlanta, Seattle and Chicago, and the University of California Extension Programs at several of the UC campuses, as well as through other groups. I have been and continue to be an American Chemical Society tour speaker, where I am invited to lecture on landfills and groundwater quality protection issues, as well as domestic water supply water quality issues throughout the US.

SUMMARY BIOGRAPHICAL INFORMATION

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EDUCATION

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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, 1986-1988

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

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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
- State Stormwater Quality Task Force Activities
- Impact of Hazardous Chemicals -- Superfund, LEHR Superfund Site Reports
- Contaminated Sediment -- Aquafund, BPTCP
- Domestic Water Supply Water Quality
- Excessive Fertilization/Eutrophication
- Reuse of Reclaimed Wastewaters
- Watershed Based Water Quality Management Programs:
  Sacramento River Watershed Program,
  Delta -- CALFED Program, and
  Upper Newport Bay Watershed Program
  San Joaquin River Watershed DO and OP Pesticide TMDL Programs

Stormwater Runoff Water Quality Science/Engineering Newsletter

Municipal Solid Waste Landfills and Groundwater Quality Protection Issues Publications

Drs. G. Fred Lee and Anne Jones-Lee have prepared several papers and reports on various aspects of municipal solid waste (MSW) management and hazardous waste management by landfilling, groundwater quality protection issues, as well as other issues of concern to those within a sphere of influence of a landfill. These materials provide an overview of the key problems associated with landfilling of MSW and hazardous waste utilizing lined "dry tomb" landfills and suggest alternative approaches for MSW management that will not lead to groundwater pollution by landfill leachate and protect the health and interests of those within the sphere of influence of a landfill. Copies of many of these papers and reports are available as downloadable files from Drs. G. Fred Lee's and Anne Jones-Lee's web page (www.gfredlee.com). Copies of these papers and reports listed below as well as a complete list of their publications on this and related topics are available upon request.

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Assessing the Potential of Minimum Subtitle D Lined Landfills to Pollute: Alternative Landfilling Approaches[1]

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June, 1998

Abstract

The US EPA Subtitle D regulations specify as a minimum, MSW landfills be lined with a single composite liner which is part of a leachate collection and removal system. Upon reaching the landfill capacity, a low-permeability cover is installed. A groundwater monitoring system is used to detect liner failure during the 30-year mandated post-closure care period. The waste in a minimum Subtitle D "dry tomb" landfill will be a threat to pollute groundwaters by leachate, effectively forever. The landfill liner and cover have a finite period of time when they can be expected to function effectively to keep moisture out of the landfill that generates leachate and to collect leachate formed within the landfill. The groundwater monitoring systems typically used with monitoring wells having zones of capture of about one foot on each side, spaced hundreds of feet apart, have low probabilities of detecting landfill liner failure that leads to groundwater pollution before off-site pollution occurs. The 30 years of mandated post-closure care is an infinitesimally small part of the time that the waste in a minimum Subtitle D "dry tomb" landfill will be a threat to generate leachate that can pollute groundwater. Fundamentally, the minimum Subtitle D MSW landfill is a technologically flawed approach that, at best, only postpones when groundwater pollution occurs for those landfills sited at geologically unsuitable sites, i.e. those without natural groundwater quality protection. The US EPA Subtitle D regulations also fail to address the justifiable NIMBY associated with active life releases (odors, dust, blowing paper, etc.) from the landfill to the surrounding area. This paper discusses the deficiencies in minimum Subtitle D landfilling of MSW and provides guidance on alternative landfilling approaches that can protect public health, groundwater resources, environment and the interests of those within the sphere of influence of the landfill.

The complete paper is available from www.gfredlee.com.

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1. Lee, G.F. and Jones-Lee, A., "Assessing the Potential of Minimum Subtitle D Lined Landfills to Pollute: Alternative Landfilling Approaches," Proc. Air and Waste Management Assoc. 91st Annual Meeting, San Diego, CA, available on CD ROM as paper 98-WA71.04(A46), 40pp, June (1998). Also available at http://www.gfredlee.com.

Deficiencies in Subtitle D Landfill Liner Failure and Groundwater Pollution Monitoring[1]

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Abstract

The US EPA (1991) MSW Subtitle D landfill regulations require a groundwater monitoring system based on vertical monitoring wells located at a point of compliance for monitoring that is no more than 150 meters from the down groundwater gradient edge of the landfill. The regulations specify that a detection monitoring program be implemented which has a high reliability of determining when leachate-polluted groundwaters reach the point of compliance. A critical review of the implementation of the Subtitle D landfill liner failure detection approach using the typical current groundwater monitoring approach shows that minimum Subtitle D landfills are being permitted with monitoring wells spaced one hundred to one thousand feet apart. The 1990 work of Dr. J. Cherry showed that plastic sheeting lined landfills such as a minimum Subtitle D landfill, will initially produce narrow plumes of groundwater pollution that arise through leachate leakage through the plastic sheeting liner that could readily pass by the typical point of compliance groundwater monitoring well array without being detected by the monitoring wells. This paper reviews the deficiencies in the Subtitle D groundwater monitoring approach in detecting groundwater pollution associated with the inevitable liner failure before widespread, off-site pollution occurs. Also presented is information on alternative monitoring approaches that have a high reliability of detecting liner failure before significant groundwater pollution occurs. The recommended monitoring system involves the use of a double composite liner with a leak detection system between the two liners where the lower composite liner functions as a pan lysimeter for the upper composite liner.

The complete paper is available from www.gfredlee.com.

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[1]. Presented at US EPA national Water Quality Monitoring Conference Reno, NV July (1998)

Petition

To the State Water Resources Control Board

to Review
California Regional Water Quality Control Board
Waste Discharge Requirements
for University of California, Davis
Class III Landfill
Yolo County
Order 96-228
Adopted on August 9, 1996

Submitted by

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September 9, 1996

On August 9, 1996, the Central Valley Regional Water Quality Control Board (CVRWQCB) adopted Waste Discharge Requirements (WDR's) for the University of California, Davis "west" landfill WMU-1 closure and the development of an expanded but non-contiguous "west" landfill in the same region (WMU-2). Prior to that time the petitioner, Dr. G. Fred Lee, had submitted several sets of detailed written comments on the inability of the CVRWQCB staff's proposed closure of WMU-1 and the development of WMU-2 to conform to WRCB's Title 23, California Code of Regulations (23 CCR), Division 3, Chapter 15 (hereafter Chapter 15) as well as the state Landfilling Policy adopted in June 1993. A copy of these comments is appended to this Petition. Order No. 96-228, adopted by the CVRWQCB on August 9, 1996, covering the closure of WMU-1 and the development of WMU-2, will not conform to State Water Resources Control Board (State Board or WRCB) Chapter 15 requirements of protecting groundwaters from pollution (impaired use) by landfill leachate for as long as the wastes in the existing landfill (WMU-1) and in the proposed landfill (WMU-2) will be a threat.

Requested Action

It is requested that the State Board conduct a technical review of the adequacy of Order No. 96-228 to protect the groundwater resources in the vicinity of landfill WMU-1 from further pollution by landfill leachate and from landfill leachate that will be developed in the proposed new landfill WMU-2 for as long as the wastes in the landfill will be a threat. As part of this review, the WRCB should provide guidance to

the CVRWQCB on how, in light of current understanding of the ability of today's landfill containment systems and groundwater monitoring systems, the closure of WMU-1 and the development of WMU-2 can be achieved to protect groundwaters from pollution by landfill leachate for as long as the wastes in the landfill will be a threat. It is requested that the State Board remand Order No. 96-228 back to the Regional Board with specific instructions that this Board should comply with the full requirements set forth in Chapter 15 and in today's Landfilling Policy of protecting groundwaters from pollution by landfill leachate for as long as the wastes in the landfill will be a threat.

Background Information

The University of California, Davis has a long history of constructing campus landfills that cause highly significant groundwater pollution. At this time, UCD has four such campus landfills. Three of these (landfills 1, 2, and 3) are located at the LEHR site. This is a national superfund site because of the groundwater pollution that has occurred at UCD's campus landfills. Landfill 2 has a chloroform plume of groundwater pollution that extends over a mile under adjacent properties. It is known that there are other groundwater pollution plumes associated with hazardous and radioactive wastes that have been placed in UCD campus landfills at the LEHR site. The full extent of the pollution from landfill 2, as well as other LEHR site landfills and waste disposal areas, is not known.

In 1966 UCD closed landfill 3 at the LEHR site and began to operate, what it calls now, the campus landfill (the "west" campus landfill, landfill 4, WMU-1). That landfill has received campus wastes, which include materials typically representative of municipal solid wastes, hazardous wastes, and, according to the former dump-tender for landfill 4, radioactive waste from the LEHR site. As with the LEHR site landfills, large amounts of chloroform were dumped as wastes by UCD at landfill 4. This has caused a chloroform and other VOC groundwater pollution plume that extends for some unknown distance beyond a mile to the northeast of the landfill. There are also other groundwater pollution plumes that are characterized as municipal solid waste leachate associated with the "west" landfill.

Closure of WMU-1

Under threat of a proposed Cease and Desist Order, drafted by the Central Valley Regional Water Quality Control Board staff, which was scheduled to be reviewed by the Board on August 9, 1996, the UCD L. Vanderhoef administration, without public review, signed a Stipulated Agreement with the Yolo County Department of Public Health that calls for termination of waste receipt at WMU-1 and the closure of this landfill in a five year period by November 1, 2001 (see Order No. 96-228, page 9). To the public, this period of time appears to have been selected to enable the UCD L. Vanderhoef administration to develop the fifth campus landfill (WMU-2).

The petitioner finds that since WMU-1 has been polluting and continues to pollute groundwaters with landfill leachate, the five year period of time that the Central Valley Regional

Water Quality Control Board and Yolo County Department of Public Health allowed the UCD L. Vanderhoef administration to terminate accepting campus wastes at WMU-1, is an excessive period of time of continued groundwater pollution by this landfill before its closure.

The petitioner requests that the State Board remand Order No. 96-228 back to CVRWQCB for reconsideration of the period of time that WMU-1 shall remain active and be allowed to continue to pollute groundwaters by landfill leachate.

As discussed in the attachments, including the August 5, 1996 and especially the September 1, 1996 letters to Tom To, Director Yolo County Environmental Health, there are several aspects of the Stipulated Agreement and Order No. 96-228 of concern to the petitioner and to the public on the continued operation of WMU-1. These include the following:

- WMU-1 has been and is currently polluting groundwater with landfill leachate.

- Continued acceptance of wastes at this landfill will increase the total amount of groundwater pollution that will occur under the current closure provisions adopted by the CVRWQCB on August 9, 1996. The taxpayers of California who must fund the remediation of the UCD L. Vanderhoef administration's continued pollution of groundwater by WMU-1 should be entitled to closure of WMU-1 as soon as possible.

- Yolo County Department of Public Works operates a municipal solid-waste landfill that could accept UCD campus wastes immediately.

- While the UCD L. Vanderhoef administration claims that five more years of groundwater pollution by WMU-1 is needed for economic reasons before it can be closed, the economic analysis conducted by the UCD L. Vanderhoef administration is fundamentally flawed in that it fails to consider the true cost of landfilling in WMU-1. The UCD L. Vanderhoef administration has chosen to ignore in its economic analysis the cost of groundwater pollution and the associated remediation of the polluted groundwaters.

- The primary justification for continued operation of WMU-1 for a five year period is that this period of time would be needed for the UCD L. Vanderhoef administration to develop and place in operation UCD campus landfill 5 (WMU-2). However, as discussed herein, the UCD L. Vanderhoef administration's economic analysis, which purports to show that it is cheaper for this administration to continue to operate campus landfills rather than disposing of its campus wastes in the Yolo County landfill, is unreliable. Dr. L. Wegge, Professor of Economics Emeritus, has conducted a review of the reliability of the UCD L. Vanderhoef administration's analysis which attempts to justify continued landfilling of wastes (see July 27, 1996 letter from the petitioner to Karl Longley) in which Dr. Wegge has found that UCD's economic analysis of near-term economics is flawed. Further, as the petitioner has pointed out in his comments on the UCD L.

Vanderhoef administration's self-certified draft and FEIRs, the UCD L. Vanderhoef administration's economic analysis totally ignores the long-term costs associated with remediation of groundwater pollution that will occur if WMU-2 is constructed as allowed in the CVRWQCB's August 9, 1996 Order No. 96-228.

A proper economic analysis will show that it is cheaper for the University of California, Davis and the taxpayers of California to terminate, as soon as possible, i.e. within no more than a two year period, the operations of WMU-1. Further, a proper economic analysis would show that it is improper for the UCD L. Vanderhoef administration to burden the taxpayers of the state with the large costs that will accrue associated with the eventual pollution of groundwaters by the proposed WMU-2.

It is requested that the State Board take the necessary action to cause the CVRWQCB to issue a revised Order that will allow WMU-1 to continue to accept wastes only until June 30, 1998. By that date, the UCD L. Vanderhoef administration must make arrangements to, and implement, management of campus solid wastes at the Yolo County landfill.

Closure of WMU-1

Order No. 96-228 states on page 8, item 19, under the section "Landfill Closure Specifications"

"At closure, WMU-1 shall receive a final cover consisting, at a minimum, of a two-foot think foundation layer which may contain waste materials, overlain by a one-foot thick clay liner that has an hydraulic conductivity of no more than 1 x 10^{-6} cm/sec, and finally by a one-foot thick vegetative soil layer, or an engineered equivalent final cover approved by the Board pursuant to Sections 2510(b) and (c) of Chapter 15."

On January 18, 1996, the petitioner provided Chairman Longley with a detailed discussion of the inadequacies of the proposed approach for closing WMU-1 (see pages 5-8 of the January 18, 1996 correspondence). The petitioner specifically quoted from a CVRWQCB December 1, 1995 memorandum, authored by Mr. Morris of the Regional Board staff, which states,

"The discharge shall neither cause nor contribute to the contamination, degradation, or pollution of ground water via the release of waste constituents in either liquid or gaseous phase."

"The discharge shall not cause any increase in the concentration of waste constituents in soil-pore gas, soil-poor liquid, soil, or other geologic materials outside of the new waste management units if such waste constituents could migrate to waters of the State--in either the liquid or the gaseous phase—and cause a condition of contamination, pollution, degradation, or nuisance."

Chapter 15, Article 8, Section 2580(a) states,

"Classified waste management units shall be closed according to an approved closure and post-closure maintenance plan which provides for continued compliance with the applicable standards for waste containment and precipitation and drainage controls in Article 4 of this subchapter, and the monitoring program requirements in Article 5 of this subchapter, throughout the closure and post-closure maintenance period. The post-closure maintenance period shall extend as long as the wastes pose a threat to water quality."

The wastes in WMU-1 will be a threat to groundwater quality effectively forever. Therefore, UCD must close WMU-1 in such a way as to prevent further and continued pollution of groundwaters, including, in accord with Porter-Cologne "threat," the unsaturated (vadose) zone under the landfill forever. It is obvious upon examination of the CVRWQCB Order No. 96-228, item 19 under landfill closure specifications quoted above, that a two-foot foundation layer overlain by a one-foot thick clay layer with a hydraulic conductivity of less than 1×10^{-6} cm/sec that is covered with a one-foot thick vegetative soil layer as specified in Order No. 96-228 cannot conform to the prevention of further groundwater pollution by WMU-1 for as long as the waste in this landfill will be a threat. At best, the prescribed cover will only slow down for a short period of time the generation of leachate in the landfill that will lead to further groundwater pollution. Therefore, Order No. 96-228 will lead to a violation of Chapter 15 requirements in the closure of WMU-1.

Basically the CVRWQCB staff and Board are perpetuating the highly inappropriate approach that was adopted in the mid-1980s for closing landfills by allowing landfill owners to construct the minimum landfill cover requirements irrespective of the suitability of the site for a landfill. The University of California, Davis "west" landfill location has been demonstrated to be a highly unsuitable site for a landfill. The site does not provide natural protection of the groundwater resources underlying the landfill from pollution by landfill leachate. This is well demonstrated by the fact that there is large groundwater pollution plume associated with WMU-1. Therefore, in order to stop further groundwater pollution by landfill leachate in accord with the explicit requirements set forth by Mr. Morris and Chapter 15, it will be necessary to construct a landfill cover on landfill WMU-1 that is far more effective in preventing moisture that enters the landfill cover from precipitation than can be achieved with one foot of clay with a permeability less than 1×10^{-6} cm/sec at the time of construction. The petitioner's January 18, 1996 letter to Chairman Longley provides additional information on why the landfill cover specified in Order No. 96-228 cannot comply with regulatory requirements.

One of the key issues that has been discussed in previous correspondence (see petitioner's August 8, 1996 letter to Karl Longley) is the ability of the University of California, Davis to comply with the monitoring requirements set forth in the Order of detecting dessication cracks that occur in the low permeability layer of the cover within a short time after installation. While the CVRWQCB staff have stated that UCD must be able to do this, they have not responded to the petitioner's request of how, in fact, this can be done. As discussed above, the low permeability layer of compacted clay is buried under a

topsoil layer. This overlying layer will not necessarily show dessication cracks. If it does experience such cracks, the cracks will not necessarily be at the same location as the cracks that will occur in the low permeability layer. As the petitioner has discussed, this situation represents an impossible requirement since it cannot, in fact, be implemented under the cover design set forth in the Order.

In the past, as discussed in the petitioner's previous correspondence on this matter, and at the time the current practice for closing landfills was adopted in the mid-1980s, it was assumed a landfill owner could not develop a landfill cover that could, in fact, prevent moisture from entering the landfill and generating leachate that leads to groundwater pollution for as long as the wastes in the landfill represented a threat. By the late 1980s, it was becoming well known by professionals in the field that landfill covers of the type specified in Order No. 96-228 would not prevent appreciable moisture from entering a landfill generating leachate that, at a geologically unsuitable site such as the UCD "west" landfill location, would lead to groundwater pollution. As discussed in the enclosed correspondence, (see in particular the January 18, 1996 letter to Karl Longley from the petitioner) this problem has become so well recognized today among professionals in the landfill design and water pollution control field that the American Society of Civil Engineers held a national conference in San Diego, California in the fall of 1995 to discuss this problem. Several of those, such as Dr. David Daniel of the University of Texas, Austin and the petitioner, presented invited papers at this conference addressing this issue. Dr. Daniel, again, pointed out as he had in 1990, in the US EPA seminar lectures he gave around the country on landfill closure issues, including in San Francisco, that today's landfill covers will not prevent moisture from entering the landfill which generates leachate that can lead to groundwater pollution.

In the petitioner's January 18, 1996 letter to Karl Longley, which responded to correspondence from the Regional Board's staff to UCD, concerning closure of WMU-1, the petitioner provided additional references to the literature on this topic as well as discussed again the findings of the state of Wisconsin in their studies of the late 1980s on the deficiencies in compacted soil layers of the type that are prescribed for the closure of WMU-1 in Order No. 96-228 to prevent moisture from entering the landfill for as long as the waste represents a threat and could generate leachate and cause further groundwater pollution.

There is no question about the fact that if WMU-1 is closed as prescribed in Order No. 96-228 it is likely that within the first summer after closure, significant dessication cracks will occur in the low permeability layer that cannot be discerned from the surface. These cracks will allow moisture that penetrates through the top soil layer to enter the landfill and generate leachate. While this problem is well understood by Regional Board and State Board staff and other professionals in the field, no one is willing to change the approach. This approach has been allowed to be used for closing landfills for those landfills cited at a geologically unsuitable site, i.e. does not have natural protection of the groundwater resources hydraulicly connected to the landfill. It has been known for many years that closing landfills with one foot of compacted soil with a permeability of less than 1×10^{-6} cm/sec will not develop a closure that for any significant period of time complies with the Chapter 15 requirements, as well as those prescribed by Mr. Morris in his letter to the University of California, Davis quoted above, of protecting groundwaters from further pollution by landfill leachate. In the past, the Regional Board's staff and Board, to the extent that

they were informed by their staff of the deficiencies in the landfill closure approaches that have been approved since the late 1980s, apparently took the attitude that there was little else that could be done, and besides Chapter 15 specifies the one foot of less than 1 x 10^{-6} cm/sec as the minimum landfill cover closure low permeability layer design. Regional Board staff have informed the petitioner that so long as the State Board does nothing to correct this minimum design requirement, they will continue to recommend to their Boards what they know to be an inadequate landfill closure approach in terms of complying with the Chapter 15 requirements of protecting groundwaters from pollution by landfill leachate for as long as the wastes in the landfill will be a threat. Basically, the Regional Board's staff are passing the buck on this issue to the State Board. The State Board and its staff, however, claim that in accord with Chapter 15 requirements, it is the responsibility of the Regional Boards to ensure that an adequately designed low permeability layer is, in fact, designed, constructed, and maintained to prevent further groundwater pollution by landfill leachate for as long as the waste in the landfill will be a threat.

The situation today is significantly different than it was just a couple of years ago with respect to developing landfill covers that will, in fact, comply with Chapter 15 requirements of preventing further groundwater pollution by waste-derived constituents. As discussed in the petitioner's previous correspondence with the Board, there are now several companies that manufacture leak detectable covers for landfills. These systems can be installed and operated at a reasonable cost and, thereby, enable the landfill owner to comply with Chapter 15 requirements of preventing further leachate pollution of groundwaters by an existing landfill.

The petitioner requests that the State Water Resources Control Board take the necessary action to cause the Central Valley Regional Water Quality Control Board to amend Order No. 96-228 to require that the University of California, Davis develop a landfill cover low permeability layer that will be designed, constructed, operated, monitored, and maintained for as long as the waste in WMU-1 will be a threat. This cover must comply to the high degree of certainty with Chapter 15 requirements of preventing further groundwater pollution by WMU-1 waste-derived constituents. It should be understood for the purpose of planning, that the period of time that this low permeability layer must function as prescribed should be considered infinite and, therefore, will require effective monitoring and maintenance.

These proposed amended Order requirements can be readily implemented through the incorporation of one of several leak detectible covers that are commercially available today.

Development of WMU-2

Page 4, item 28 of Order No. 96-228 states,

"The Discharger proposes to construct WMU-2 with a composite liner system that meets the prescriptive requirements of federal Subtitle D regulations of landfill liners. The liner will consist of two feet of compacted soil having a maximum hydraulic conductivity of 1 x 10^{-7}

cm/sec covered by a 60-mil high density polyethylene geomembrane. A blanket type leachate collection and recovery system (LCRS) overlying the composite liner will be covered by a one foot thick operations layer. The LCRS will consist of a one foot layer of gravel on the base of the WMU and a geosynthetic net on sideslopes."

Page 4, item 32 of Order No. 96-228 states,

"*This Order implements (1) the Water Quality Control Plan for the Sacramento River and San Joaquin River Basin Third Edition; (2) the prescriptive standards and performance goals of Chapter 15, Division 3, Title 23 of the California Code of Regulations, effective 27 November 1984, and subsequent revisions; (3) the prescriptive standards and performance criteria of Part 258, Title 40 of the Code of Federal Regulations (Subtitle D of the Resource Conservation and Recovery Act); and (4) State Water Resources Control Board Resolution No. 93-62, Policy for Regulation of Discharges of Municipal Solid Waste, Adopted 17 June 1993."*

As discussed herein, a critical review of the regulatory requirements as set forth in the Central Valley Regional Water Quality Control Board Basin Plan shows that the Water Quality Objectives For Groundwaters, Chemical Constituents requires that,

"Ground waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses."

There is no question that Order No. 96-228 provisions covering the design of WMU-2 with a single composite liner of the minimum Subtitle D type quoted above cannot comply with the CVRWQCB Basin Plan requirements quoted above in preventing groundwater pollution by chemical constituents derived from WMU-2 that adversely affect beneficial uses of the groundwater.

Chapter 15, Article 4, Section 2540(c) states,

"Class III landfills shall have containment structures which are capable of preventing degradation of waters of the state as a result of waste discharges to the landfills if site characteristics are inadequate."

Chapter 15, Article 5, Section 2550(a) states,

"The siting, design, construction, and operation standards contained elsewhere in this subchapter and in Title 22 of this code are intended to prevent adverse impacts on water quality."

Chapter 15, Article 5, Section 2550(d) states,

"The regulations under this article apply during the active life of the waste management unit (including the closure period). After closure of the waste management unit, the regulations in this article apply during the post-closure maintenance period unless all waste, waste residues, contaminated containment system components, and contaminated geologic materials have been removed or decontaminated at closure."

Article 1, Section 2510(a) states,

"Requirements in this subchapter are minimum standards for proper management of each waste category. Regional boards may impose more stringent requirements to accommodate regional and site-specific conditions." [emphasis added]

As quoted above, the Chapter 15 performance standard to which WMU-2 must conform is the prevention of impaired use of groundwaters from waste-derived constituents for as long as the wastes in the landfill represent a threat. It is important to note that this performance standard is far more strict than that of the US EPA's RCRA Subtitle D requirements. The US EPA, as part of adopting Subtitle D minimum single composite liner, stated in the Federal Register covering the proposed regulations (August 30, 1988),

"First, even the best liner and leachate collection system will ultimately fail due to natural deterioration, and recent improvements in MSWLF (municipal solid waste landfill) containment technologies suggest that releases may be delayed by many decades at some landfills."

The US EPA Criteria for Municipal Solid Waste Landfills (July 1988) stated,

"Once the unit is closed, the bottom layer of the landfill will deteriorate over time and, consequently, will not prevent leachate transport out of the unit."

US EPA, "Solid Waste Disposal Facility Criteria; Proposed Rule," Federal Register 53(168):33314-33422, 40 CFR Parts 257 and 258, US EPA, Washington, D.C., August 30, (1988).

US EPA, "Criteria for Municipal Solid Waste Landfills," US EPA Washington D.C., July (1988).

The petitioner has provided, as an addendum to this Petition, several of Dr. Jones-Lee's and the petitioners reports which review the ability of a Subtitle D single composite liner to prevent leachate from passing through the liner and causing groundwater pollution for as long as the waste in a Subtitle D landfill of the type that UCD proposes to construct as WMU-2 will be a threat. These papers and reports provide references to the literature covering the publications of others on this topic as well. A review of the current literature pertinent to the US EPA's 1988 statements on the eventual failure of Subtitle D liners quoted above shows they are applicable to today's Subtitle D landfills.

There is no doubt Order No. 96-228 statements on page 4, items 28 and 32 are not reliable. A minimum Subtitle D liner system as proposed for WMU-2 cannot comply with either the Basin Plan requirements for groundwater quality protection or the groundwater protection performance requirements of Chapter 15. Even Mr. J. Stagner of the University of California, Davis, who is responsible for UCD's landfilling operations, admitted at a public meeting held in May 1996 that UCD's proposed WMU-2 will cause groundwater pollution. Order No. 96-228 must, based on this issue alone, be remanded back to the Central Valley Regional Water Quality Control Board to resolve the highly significant inconsistency between items 28 and 32 on page 4 of the Order.

It is recommended that the WRCB remand Order No. 96-228 back to the CVRWQCB to require that if the UCD L. Vanderhoef administration proceeds with developing WMU-2, this landfill be designed, constructed, operated, closed, and provided with post-closure care (monitoring and maintenance) so there is a high probability that the waste constituents in this landfill will not pollute-impair the groundwater resources in the vicinity of the landfill for as long as the wastes in the landfill are a threat.

In the accompanying attachment "Recommended Design, Operation, Closure and Post-Closure Approaches for Municipal Solid Waste and Hazardous Waste Landfills," the petitioner has discussed how such a landfill could be developed. The minimum requirements for WMU-2 should be those set forth in this report. Failure of the State and Regional Boards to adopt this approach will ultimately lead to yet another landfill in California that is polluting the groundwater resources of the state.

Closure of WMU-2

Order No. 96-228 does not provide any information on the proposed approach for closure of WMU-2 other than a general statement that it shall conform to the requirements set forth in Chapter 15. This can be interpreted to mean that since the proposed design of WMU-2 involves the use of a minimum Subtitle D liner, a plastic sheeting layer shall be incorporated into the landfill cover. As discussed in previous correspondence and is well known in the literature, a minimum Subtitle D landfill closure cover that incorporates a single plastic sheeting layer will not prevent moisture from entering the landfill and generating leachate that can cause groundwater pollution. As with the compacted clay layer that UCD proposes for closing WMU-1, the plastic sheeting layer will be buried below covered materials and, therefore, is not available for visual inspection. As with the liner materials, the plastic sheeting layer in a landfill cover will deteriorate, likely at a greater rate than the liner, ultimately becoming ineffective in preventing moisture that penetrates the top soil layer of the cover from entering the wastes and generating leachate.

It is recommended that the WRCB remand Order No. 96-228 back to the CVRWQCB to require that, as a minimum, this Order specify the closure of WMU-2 shall be done in such a way as to provide a high degree of reliability in preventing moisture from entering the landfill that

generates leachate that could lead to groundwater pollution for as long as the wastes in the landfill represent a threat.

The UCD L. Vanderhoef administration should know now that minimum Subtitle D landfill closure approaches will not be allowed at WMU-2. WMU-2 could, based on current technology, be closed with a leak detectible cover system of the type described above for WMU-1.

Groundwater Monitoring

Order No. 96-228 requires on page 2, second paragraph, under the section "Required Monitoring Programs,"

> *"For any given monitored medium, a sufficient number of samples shall be taken from all Monitoring Points and Background Monitoring Points to satisfy the data analysis requirements for a given Reporting Period, and shall be taken in a manner that ensures sample independence to the greatest extent feasible."*

Article 5, Chapter 15, Section 2550.1 requires,

> *"detection monitoring...to provide the best assurance of the detection of subsequent releases from the waste management unit."*

Further, Chapter 15 requires that a sufficient number of monitoring wells be located so that they,

> *"...provide for the best assurance of the earliest possible detection of a release from a waste management unit."*

Article 5, Chapter 15, Section 2550.5 states,

> *"(a) For each waste management unit, the regional board shall specify in the waste discharge requirements the point of compliance at which the water quality protection standard of Section 2550.2 of this article applies. The point of compliance is a vertical surface located at the hydraulically downgradient limit of the waste management unit that extends through the uppermost aquifer underlying the unit."*

Examination of Order 96-228, Attachment B shows that the UCD L. Vanderhoef administration has proposed, and the CVRWQCB has accepted, one upgradient (MW-8) and three downgradient (MW-6, MW-12, and MW-13) at the point of compliance, groundwater monitoring wells for WMU-2. The three downgrading monitoring wells are spaced approximately 300 to 400 feet apart. The sampling of these wells in accord with conventional requirements will result in extraction of water from the aquifer at a maximum distance of about one foot from each well, i.e. the zone of each capture has a radius of about

one foot. Therefore, for the wells that are spaced 300 feet apart at the point of compliance, there is 298 feet at this point through which leachate that will leak through the liner system could pass without being detected by the monitoring wells.

Cherry (1990) (see enclosed) has discussed the leakage of leachate through flexible membrane-lined landfills of the WMU-2 type. He points out that the initial leakage will occur at tears, rips, and points of deterioration in the plastic sheeting layer. These leaks will produce finger plumes of leachate of a few feet wide at the point of compliance for groundwater monitoring. It is obvious that the groundwater monitoring approach proposed by UCD and accepted by Central Valley Regional Water Quality Control Board, as set forth in Order NO. 96-228, is fundamentally flawed. Obviously, it cannot conform to Chapter 15 requirements or Subtitle D requirements of detecting leachate-polluted groundwaters arising from leakage through the Subtitle D liner before widespread groundwater pollution occurs.

The highly significant deficiencies in the proposed groundwater monitoring approach have been previously brought to the attention of the CVRWQCB and its staff on several occasions (see the January 18, 1996 letter from the petitioner to Karl Longley as one example). The staff and the Board have chosen to ignore this situation and have proceeded with accepting an obviously flawed groundwater monitoring approach that, at best, can be described as cosmetic. It is important to note that over almost two years ago, the petitioner, in connection with the review of the UCD L. Vanderhoef administration's then Draft EIR, pointed out that the groundwater monitoring approach proposed for WMU-2, as well as other aspects of the proposed approach for development of WMU-2, would not be protective of the groundwater resources in the vicinity of that landfill. The UCD L. Vanderhoef administration, in response to the petitioner's comments made on the Draft EIR, claimed that since the Central Valley Regional Water Quality Control Board would approve the groundwater monitoring program, it must be an adequate program to satisfy Chapter 15 requirements.

Once again, it is the deficiencies in which the way the Central Valley Regional Water Quality Control Board's staff have been and continue to implement Chapter 15 requirements that are allowing the development of landfills in the Central Valley Region that will obviously not prevent groundwater pollution for as long as the waste in the landfill will be a threat as a result of leakage through the Subtitle D liner. Further, this leakage will not be detected at the point of compliance for groundwater monitoring by a groundwater monitoring program of the type specified in Order No. 96-228 before wide-spread pollution of groundwaters has occurred.

It is recommended that the WRCB remand Order No. 96-228 back to CVRWQCB with instructions that the Regional Board must develop a groundwater monitoring program for WMU-2 that will, in fact, provide, in accord with Chapter 15 requirements, "...for the best assurance of the earliest possible detection of a release from a waste management unit."

In the petitioner's previous correspondence to the Board and as discussed herein, it is possible to readily develop a groundwater monitoring program that will have a high probability of detecting leachate leakage through the Subtitle D liner when it occurs in a sufficient amount to potentially pollute the groundwaters under the landfill. The approach recommended is the one that has been adopted in the state of Michigan under that state's Rule 641. The approach that should be used at WMU-2 is to require, as a number of other states now require, a double composite liner be constructed at WMU-2. The lower composite liner is separated from the upper composite liner by a leak detection layer of the type typically used in RCRA Subtitle C landfills. When leachate is detected in the leak detection layer in sufficient quantities to potentially pollute groundwaters underlying the landfill, if the lower composite liner were not present, the landfill owner/operator must stop this leakage or remove the waste from the landfill (landfill mining). Landfill mining is becoming recognized as an effective tool in preventing groundwater pollution by landfill wastes. If the UCD L. Vanderhoef administration wishes to proceed with the development of WMU-2, a groundwater monitoring system of this type must be required. Failure to do so will result in WMU-2 being in violation of Chapter 15 groundwater monitoring requirements.

A review of other aspects of the surface and groundwater monitoring requirements set forth in Order No. 96-228 shows that an inadequate frequency of monitoring and parameters for monitoring is specified in this Order. These issues can be addressed when this Order is remanded back to the Central Valley Regional Water Quality Control Board.

In summary, as documented herein, the Central Valley Regional Water Quality Control Board's Order No. 96-228 does not require that UCD construct WMU-2 in such a manner as to conform to Chapter 15 and to the WRCB Landfilling Policy. If this landfill is allowed to be constructed as proposed, it will cause groundwater pollution. The natural strata at the location of WMU-2 has been demonstrated, based on the situation at nearby WMU-1, to be unsuitable for a landfill of this type. While, as discussed herein, a landfill could be developed at the WMU-2 site that would be protective, it will have to be of significantly different design than that specified in Order No. 96-228.

Need for Timely Action by State Board

Order No. 96-228 sets forth the general aspects of the minimum design and other requirements for WMU-1 closure and for the development of WMU-2. While the details of the design of WMU-1 closure and WMU-2 development will be submitted by UCD to the Central Valley Regional Water Quality Control Board at some time in the future, the way that this Order is implemented by the Regional Board mandates that the public petition the State Board at this time on the deficiencies in the Order in order to have the State Board review these deficiencies. The public does not have a mandated opportunity to review the details of the design of the landfill cover for WMU-1 or the liner, leachate collection and removal system, groundwater monitoring system, and proposed approach for closing WMU-2. The review of the details of the design, etc. is done by the Regional Board's staff without Board and public review.

The public has substantial reason to question, based on previous correspondence discussed by the petitioner and Order No. 96-228, whether the Regional Board's staff will, in fact, require the University of California, Davis to meet current regulatory requirements for protection of surface and groundwaters. As discussed herein, the Regional Board's staff have chosen to interpret Chapter 15 and Subtitle D minimum design standards as equivalent to Chapter 15's groundwater protection performance standard. This approach is contrary to the State Water Resources Control Board's statement at the June 1993 hearing where the State Board adopted the current Landfilling Policy which incorporated Subtitle D minimum design standards into Chapter 15 requirements, where Chapter 15's minimum design standards were less protective than Subtitle D requirements. At this hearing, in response to a question the petitioner raised with the Board, the Board members explicitly stated that Chapter 15's groundwater protection standard must be achieved by the new Landfilling Policy. Further, they stated that the minimum design standards set forth in the new Landfilling Policy should not be interpreted to be equivalent to the groundwater protection requirements set forth in Chapter 15.

Favorable action on this Petition will be the first step in correcting a significant error that has been made by the Regional Water Quality Control Boards in implementing Chapter 15. As a result of having served as an advisor to the State Board's staff in the early 1980s in the development of Chapter 15, the petitioner is well aware of the intent of this regulation. It clearly was not that of the approach used by the Regional Boards in its implementation of allowing the construction of new landfills and the closure of existing landfills in such a way as to only postpone for a relatively short period of time, compared to the time the wastes in the landfill will be a threat, the pollution of groundwaters by the wastes.

At this time, the Regional Board's staff claim, in an attempt to justify their obvious technically invalid approach for developing orders for landfill closure and development of new landfills, it is the responsibility of the State Board to correct Chapter 15 so the Regional Boards cannot use the minimum design containment component standards for landfills where such standards are inadequate for groundwater quality protection. Further, Regional Board staff have informed the petitioner that because of political and other pressures, they must require the same design for landfill closure and new landfill development for all landfills in their region. Obviously, such claims are strongly contrary to the intent of Chapter 15, which was to require landfill developers select more appropriate sites for landfills, i.e. those that provide natural protection. Chapter 15 explicitly states that an unsuitable site for a landfill can be used provided that an engineered alternative containment system design, construction, operation, closure and post-closure care is provided which will perform in accord with the Chapter 15 groundwater protection standard of no impaired use of groundwaters by waste-derived constituents for as long as the wastes represent a threat. While in the past there was limited understanding of the deficiencies in how Chapter 15 was being implemented at the Regional Board level, today these deficiencies are well known. It is time for the State Board to take action on this matter to either correct the deficiencies on how the Regional Boards are implementing Chapter 15 or to amend Chapter 15 so it is clear that the landfilling of waste in this state, as well as the closure of existing landfills, will not be done in such a way to protect the groundwater resources in the state from pollution by landfill leachate.

If the State and Regional Boards are unwilling to require that all future closures of landfills and the development of new landfills comply with a high degree of certainty with Chapter 15 requirements, then the WRCB should immediately take action to amend Chapter 15 so the groundwater protection standard of protecting groundwaters from pollution-impaired use from landfill leachate set forth in this regulation are no longer part of the regulation. It is time for the State Water Resources Control Board, the Regional Water Quality Control Boards, and the state of California to stop living a lie about the protection being provided for groundwater resources by the approaches being used in the design, construction, closure, and post-closure care of municipal solid waste landfills. The public should be reliably informed about the protection being provided by the State Water Resources Control Board and by the Regional Water Quality Control Boards in their implementation of the regulations governing the landfilling of municipal solid wastes as well as the closure of existing landfills. With few exceptions, all of the Chapter 15 as well as Subtitle D landfills will eventually pollute groundwaters by landfill leachate in violation of Chapter 15 requirements. In some cases, these violations will generate leachate plumes that extend well over a mile down groundwater gradient from the landfill.

Today the state of California is practicing a defacto "zone of attenuation" landfilling approach in which landfill leachate is allowed to pollute groundwaters at distances of up to a mile or more from the landfill. Often these leachate plumes extend under adjacent property owners lands. The least that should be done, if the Regional and State Boards are unwilling to implement the technology available today in the design, construction, operation, closure, and post-closure care of municipal solid waste landfills to comply with Chapter 15 requirements of protection of groundwater quality from impairment by landfill leachate, is for the Water Resources Control Board to amend Chapter 15 to eliminate the overall groundwater protection performance standard set forth in it and require that landfill owners acquire sufficient buffer lands so that the leachate plumes generated by today's landfills will occur under landfill owner property lands.

Inadequacies of Order to Conform to Legal Requirements

Order No. 96-228 governing the closure of UCD "west" landfill, WMU-1, and the development of a new "west" landfill, WMU-2, will lead to violations of the groundwater protection requirements set forth in Title 23, Division 3, Chapter 15. As discussed herein, various sections of this regulation explicitly require that the landfill containment system components achieve the same degree of groundwater quality protection as that achieved by a landfill sited where the natural strata protect the groundwaters from impaired use for as long as the wastes in the landfill will be a threat. Today's understanding of the behavior of municipal solid wastes in a Subtitle D "dry tomb" landfill as well as the understanding of the behavior of the various components of the landfill containment system (cover, liners, leachate collection and removal system, etc.) and an understanding of the reliability of the groundwater monitoring systems based on vertical monitoring wells spaced hundreds of feet apart clearly and unequivocally leads to the conclusion that the development of WMU-2 as proposed by the University of California, Davis L. Vanderhoef administration and the closure of WMU-1 as proposed in Order No. 96-228 will, in time, cause violations of Chapter 15 requirements of protecting groundwaters from impaired use for as long as the wastes represent a threat.

These specific issues have been discussed in detail in this Petition. Specific citation of sections of Chapter 15 that are pertinent to this Order are provided herein.

Interested Parties

There are a large number of individuals who are interested in the proper closure of the UCD "west" landfill, WMU-1, and the proposed development of WMU-2. Appended to this Petition are two petitions that have been signed by members of the public who have expressed an interest in this matter. It can be concluded that those listed on these public petitions represent part of the public who are highly concerned about the inadequacies of UCD's solid waste management activities.

In addition to those specifically concerned with the UCD "west" landfill matters, there is also a large number of people who are concerned with Putah Creek water quality issues. Putah Creek water quality is intimately tied to UCD's mismanagement of its campus solid wastes in landfills that do not protect the groundwaters from impaired use, since at least thus far the UCD L. Vanderhoef administration's approach to remediation of the "west" landfill leachate-polluted groundwaters is to discharge these groundwaters after minimal treatment to Putah Creek. Therefore, it is appropriate to conclude that the public members of the "interested parties" listed in the Petition filed by the petitioner on the technical deficiencies in Order No. 96-227 also have an interest in the Petition on Order No. 96-228.

The CVRWQCB has indicated through its mailing of the "Notice" of the "Adopted New Waste Discharge Requirements" as set forth in Order No. 96-228 of August 16, 1996, that the following agencies and/or individuals are interested in this Order:

Ms. Betsy Jennings, State Water Resources Control Board, OCC, Sacramento
Ms. Liz Haven, State Water Resources Control Board, DCWP, Sacramento
Ms. Beatrice Poroli, California Integrated Waste Management Board, Sacramento
Office of Drinking Water, Department of Health Services, Sacramento
Environmental Mgmt. Branch, Department of Health Services, Sacramento
Department of Fish and Game, Rancho Cordova
Mr. Craig Walker, Yolo County Department of Environmental Health, Woodland
Yolo County Planning Department, Woodland
Mr. Eric Vanderbuilt, Sacramento County Public Works, Sacramento
Mr. Wayne Pickus, Camp Presser & McKee, Inc., Walnut Creek
Mr. Stephen Chen, City of Stockton, Stockton
Solano County Environmental Health Department
Solano County Planning Department
Mr. Wesley Wooden, Davis
Ms. Jeane-Marie Olmo-Resendiz, Davis
Mr. Chris Horsley, Davis
Mr. Mark Bonetti, Davis

Ms. Julie Roth, Davis
Mr. [sic] *G. Fred Lee, El Macero*

Addresses for these agencies and individuals are available from the CVRWQCB.

In addition, the following individuals have attended CVRWQCB meetings on UCD landfill matters. Some of these may be duplicate of some of those who have signed the enclosed petitions.

Richard Winger
Dos Pinos Ranch
37884 Russell Boulevard
Davis, CA 95616

Yvonne Le Maitre
23090 Myrtle Lane
Woodland, CA 95695
Represents T. S. Glide Estate

Molly Webster
26880 Cassidy Lane
Davis, CA 95616

George Crum
19 Priscilla Court
Winters, CA 95694

Hearing

The petitioner requests that, if necessary, a hearing be held to discuss these issues. While the petitioner believes that adequate evidence has been presented to enable the State Board to act on this matter in affirmation of the Petition, if the State Board concludes otherwise, then a hearing is requested for full public review of the issues.

The petitioner requests that, if necessary, a hearing be held to discuss these issues. While the petitioner believes that adequate evidence has been presented to enable the State Board to act on this matter in affirmation of the Petition, if the State Board concludes otherwise, then a hearing is requested for full public review of the issues.

Notice of Appeal

A copy of this Petition has been provided to the Central Valley Regional Water Quality Control Board and Chancellor L Vanderhoef of the University of California, Davis.

A copy of the request that was made by the petitioner to the Regional Board is enclosed.

Overall Conclusions and Recommendations

The location where the UCD L. Vanderhoef administration has proposed to construct a new minimum Subtitle D landfill (WMU-2) is a geologically unsuitable site for such a landfill. It has been found that the substrata under that proposed landfill, which is the same as that under WMU-1, will allow waste-derived constituents in landfill leachate to pass through the vadose zone into the saturated groundwaters under the site. The minimum Subtitle D single composite liner will, at best, only postpone when leachate generated in the landfill will pass through the landfill containment system into the underlying groundwater system. The groundwater monitoring requirements set forth in Order No. 96-228 are highly ineffective in complying with the Chapter 15 requirements of detecting leachate-polluted groundwaters at the point of compliance before widespread pollution occurs beyond this point. Basically, the construction of WMU-2 as proposed and allowed by Order No. 96-228 will result in a landfill that will violate Chapter 15 requirements for protection of groundwater quality from impaired use by waste-derived constituents for as long as the wastes in the landfill represent a threat.

Requiring that the UCD L. Vanderhoef administration comply with Chapter 15 requirements in developing WMU-2 in accord with providing a high degree of certainty that the groundwaters in the vicinity of this landfill will be protected from impaired use by waste-derived constituents will not represent a significant economic hardship to the University of California, Davis. Alternative waste disposal facilities are readily available to UCD at the Yolo County landfill. The use of these facilities will result in a significant economic savings to the taxpayers of California since future generations will not have to pay for the high costs of remediating WMU-2 leachate-caused groundwater pollution.

It is time for the State Water Resources Control Board to start to correct the errors that are being made at the Regional Board level throughout the state where Regional Boards such as the Central Valley Regional Water Quality Control Board are adopting landfill closure and landfill development orders that obviously cannot conform to Chapter 15 and the WRCB Landfilling Policy requirements of protecting groundwaters from impaired use by landfill-derived waste components for as long as the wastes in the landfill will be a threat. In the mid-1980s, when the current landfill development and landfill closure approaches were adopted by the Regional Boards, there was limited understanding in the deficiencies of these approaches in complying with Chapter 15 requirements. In the past half dozen years sufficient new information has developed on the ability of compacted clay and/or plastic sheeting-lined and/or covered landfills to prevent groundwater pollution by landfill leachate for as long as the wastes in the landfill represent a threat, so that today the State Board and the Regional Boards have an obligation to the public, and especially to future generations, to implement this new information into an updated landfill closure and development implementation approach that will, in fact, comply with Chapter 15 requirements. As

discussed herein, the technology is available today to develop landfills in California that will be protective of the state's highly valuable groundwater resources. While the initial cost of developing such landfills is a few cents per day per person more for those who contribute waste to a landfill than the current minimum Subtitle D landfilling approach, the true cost of this approach is far cheaper when proper consideration is given to the fact that ultimately today's Subtitle D landfills and those that are closed with minimum Chapter 15 landfill cover requirements will pollute groundwaters necessitating expensive groundwater remediation.

The petitioner would be happy to answer questions on any aspects of this matter. He strongly, in the name of future generations' groundwater resources, recommends that the State Water Resources Control Board take the necessary action to correct the highly significant errors being made in implementing Chapter 15 by the Regional Water Quality Control Boards. This process can be initiated through the State Board acting favorably on this Petition.

List of Correspondence Pertinent to Petition

Letter to Karl Longley, Chairman, regarding G. Vaughn December 1, 1995 letter to UCD on closure of UCD west landfill, WMU-1, and the development of WMU-2, from G. Fred Lee, dated January 18, 1996.

Letter to Karl Longley, Chairman, responding to T. Pinkos' letter of February 22, 1996 regarding UCD landfill matters, from G. Fred Lee, dated May 19, 1996.

Letter to Karl Longley, Chairman, regarding Notice for comment on the Board's Draft Cease and Desist Order No. 94-226 for the continued operation of the UCD "west" landfill, from G. Fred Lee, dated July 27, 1996.

Letter to Karl Longley, Chairman, regarding staff reports covering the UCD landfill matters that are to be reviewed by the CVRWQCB on August 9, 1996, from G. Fred Lee, dated August 3, 1996.

Letter to Tom To, Director, regarding UCD Stipulated Agreement of July 10, 1996, from G. Fred Lee, dated August 5, 1996.

Letter to Karl Longley, Chairman, responding to Mr. Pinkos' August 5, 1996 letter on UCD landfill matters, from G. Fred Lee, dated August 8, 1996.

Letter to Karl Longley, Chairman, regarding a complaint on the inappropriate approach followed by the Board in the admission of reports into the record for the August 9, 1996 hearing, from G. Fred Lee, dated August 18, 1996.

Letter to Tom To, Director, regarding UCD Stipulated Agreement covering the closure of WMU-1, from G. Fred Lee, dated September 1, 1996.

Lists of Professional Paper and Report Enclosures

List of Municipal Solid Waste Landfills and Groundwater Quality Protection Issue Papers Developed by Drs. G. Fred Lee and Anne Jones-Lee

Jones-Lee, A. and Lee, G.F., "Groundwater Pollution by Municipal Landfills: Leachate Composition, Detection and Water Quality Significance," Proc. Sardinia '93 IV International Landfill Symposium, Sardinia, Italy, pp. 1093-1103, October (1993).

Lee, G.F. and Jones-Lee, A., "A Groundwater Protection Strategy for Lined Landfills," Environmental Science & Technology, 28:584-5 (1994).

Cherry, J.A., "Groundwater Monitoring: Some Deficiencies and Opportunities," Hazardous Waste Site Investigations; Towards Better Decisions, Lewis Publishers, Proc. 10th ORNL Life Sciences Symposium, Gatlinburg, TN (1990).

Parsons, A.M., and Davis, P.A., "A Proposed Strategy for Assessing Compliance with the RCRA Ground Water Monitoring Regulations," Current Practices in Ground Water and Vadose Zone Investigations, ASTM STP 1118, David M. Nielsen and Martin N. Sara, Eds., American Society for Testing and Materials, Philadelphia, PA (1992).

Lee, G.F. and Jones-Lee, A., "Detection of the Failure of Landfill Liner Systems," Report of G. Fred Lee & Associates, El Macero, CA, April (1996).

Lee, G.F. and Jones-Lee, A., "Landfilling of Solid & Hazardous Waste: Facing Long-Term Liability," IN: Proc. 1994 Federal Environmental Restoration III & Waste Minimization II Conference, Hazardous Materials Control Resources Institute, Rockville, MD, pp. 1610-1618, April (1994).

Lee, G.F. and Jones-Lee, A., "Dry Tomb Landfills," MSW Management, 6(1):82-89 (1996).

Lee, G.F. and Jones-Lee, A., "Landfill Leachate Management: Overview of Issues," MSW Management 6:18-23 (1996).

Lee, G.F. and Jones-Lee, A., "Overview of Landfill Post Closure Issues," Presented at American Society of Civil Engineers Convention session devoted to "Landfill Closures - Environmental Protection and Land Recovery," San Diego, CA, October (1995).

Lee, G.F. and Jones-Lee, A., "Geosynthetic Liner Systems for Municipal Solid Waste Landfills: An Inadequate Technology for Protection of Groundwater Quality?" Waste Management & Research, 11(4):354-360 (1993).

Lee, G.F. and Jones-Lee, A., "Evaluation of the Potential for a Proposed or Existing Landfill to Pollute Groundwaters," Report of G. Fred Lee & Associates, El Macero, CA, 18 pp, July (1996).

Lee, G.F. and Jones, R.A., "Municipal Solid Waste Management in Lined, `Dry Tomb' Landfills: A Technologically Flawed Approach for Protection of Groundwater Quality," Report of G. Fred Lee & Associates, El Macero, CA, 68 pp, March (1992).

Lee, G.F. and Jones-Lee, A., "Recommended Design, Operation, Closure and Post-Closure Approaches for Municipal Solid Waste and Hazardous Waste Landfills," Report of G. Fred Lee & Associates, El Macero, CA, 14 pp, August (1995).

Lee, G.F. and Jones-Lee, A., "Cost of Groundwater Quality Protection in MSW Landfilling," Report of G. Fred Lee & Associates, El Macero, CA, 8 pp, August (1993).

Lee, G.F. and Jones-Lee, A., "Impact of Municipal and Industrial Non-Hazardous Waste Landfills on Public Health and the Environment: An Overview," Report to State of California Environmental Protection Agency Comparative Risk Project, Berkeley, CA, 45 pp, May (1994).

Lee, G.F. and Sheehan, B., "MSW Recycling Protects Groundwaters: Reply to Recycling May be Our Most Wasteful Activity," Letter submitted to the Editor of the Sacramento Bee, July 16 (1996).

Lee, G.F. and Jones-Lee, A., "Three R's Managed Garbage Protects Groundwater Quality," Report of G. Fred Lee & Associates, El Macero, CA, 9 pp, July (1996).

Lee, G.F. and Jones-Lee, A., "Practical Environmental Ethics: Is There an Obligation to Tell the Whole Truth?," Civil Engineering Forum, p.6, October (1995).

Summary Biographical Data, G. Fred Lee, PhD, PE, DEE

Lee, G.F. and Jones-Lee, A., "Water Quality Evaluation and Management Solid and Hazardous Waste Landfills," Web Page: http://members.aol.com/gfredlee/gfl/htm

Lee, G.F. and Jones-Lee, A., Recent Publications of G. Fred Lee and Anne Jones-Lee

Lee, G.F. and Jones-Lee, A., "Lectures and Shortcourses"

Lee, G.F. and Jones-Lee, A., Summary of Experience & Activities

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Wegge, L., UCD Professor of Economics emeritus, "Financial Feasibility Study of the Campus Landfill, UCD 9 October 1992 Comments," July 9, 1996.

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March 28, 1997

John Caffrey, Chairman
State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812

Supplement to Petition A-1042
Order 96-228

Dear Chairman Caffrey:

Recently, several significant events have occurred that are pertinent to the petition I filed last September on the technical deficiencies in the Central Valley Regional Water Quality Control Board's (CVRWQCB) Order 96-228 devoted to the WDRs covering the University of California-Davis's (UCD) development of another campus landfill that will ultimately pollute groundwaters. As discussed below, there is ample justification for amending my Petition A-1042 covering Order 96-228. The primary justification for amending this petition is a March 19, 1997 memorandum from H. Schueller which brings out for the first time that the State Water Resources Control Board has adopted a "position" with respect to the ability of minimum Subtitle D landfills to protect groundwaters from impaired use by waste-derived constituents for as long as the waste in the landfill will be a threat.

Mr. Schueller states in his memorandum that:

"The performance standards are:

- *For Class II landfills [§2540 (a)], 'Class II waste management units shall be designed and constructed to prevent migration of wastes from the waste management units to adjacent geologic materials, ground water, or surface water, during disposal operations, closure, and the post-closure maintenance period'; and*
- *For Class III landfills [§2540 (c)], 'Class III landfills shall have containment structures which are capable of preventing degradation of waters of the state as a result of waste discharges to the landfills if site characteristics are inadequate.'*

It is our position that a properly-installed single composite liner meets both performance standards, whereas a clay liner does not. It is important to note that these performance standards address the entire containment system for the landfill, not just the liner. The final cover also provides an important measure of protection over the lifetime of the landfill."

While Mr. Schueller did not define who *"our"* was or is, from his memo it appears that the WRCB has practiced rule-making on groundwater quality protection provided by a minimum Subtitle D landfill without public review, which is contrary to the public's interest and is leading to a highly inappropriate approach in the way in which the Regional Water Quality Control Boards are implementing Chapter 15 and Subtitle D requirements. Further, the "position" that Schueller described that has been adopted by the WRCB was at the time that it was adopted (during or post 1993) with the Board's incorporation of US EPA Subtitle D requirements and Chapter 15 requirements into the Board's current Landfilling Policy, not in accord to what was well known at the time of adoption of this position on the ability of a single composite liner and a minimum Subtitle D landfill cover as typically constructed and maintained and the groundwater monitoring systems that are allowed to be developed by Regional Water Quality Control Boards as part of issuing WDRs for new or expanded landfills to protect groundwaters from impaired use for as long as the waste in a MSW landfill will be a threat. It is highly inappropriate and contrary to the public's interest for the WRCB, without public rule-making, to allow its staff, H. Schueller et. al., to adopt this position since it was at the time of adoption and is now technically invalid.

While it is unclear whether H. Schueller understands the obvious technical deficiencies with a minimum Subtitle D landfill that he states in his March 19, 1997 memo, which sets forth the "position" that the WRCB has adopted on the protective nature of a Subtitle D landfill of the type being implemented today by Regional Water Quality Control Boards, members of the Clean Water Program Staff have for years understood these problems. In fact, as I testified at the CVRWQCB's February 28, 1997 hearing, former members of his staff (Gil Torres) have testified and produced documents concerned with specific landfill reviews (Azusa Landfill and Keller Canyon Landfill) that have been brought to the attention of the State Board that a single composite liner does not comply with Chapter 15's performance standards of protecting groundwater quality from impaired use for as long as the waste in the landfill will be a threat. Further, other members of the Clean Water Program staff who understand and will discuss landfill liner and cover properties and the unreliability of the current groundwater monitoring systems of the types being allowed by Regional Water Quality Control Boards in WDRs for minimum Subtitle D landfills have indicated to me, on a number of occasions, that a minimum Subtitle D landfill as it is being implemented by Regional Boards would not, in their opinion, prevent groundwater pollution by landfill leachate for as long as the waste in the landfill would be a threat.

Further, with respect to the Keller Canyon Landfill review that took place several years ago, the State Board staff documents clearly delineate that a single composite liner does not comply with Class II requirements of *". . .prevent(ing) migration of wastes from the waste management units to adjacent geologic materials."* It was in connection with the Keller Canyon Landfill review by the State Board that the State Board "management" decided to overrule the staff's position on this issue and inform the Board that a single composite liner in the Keller Canyon Landfill setting would conform to Chapter 15's Class II landfill liner requirements, even though it was obvious, as discussed by the State Board staff, that this was not a factual statement about the expected performance of a single composite liner. It appears that that may have been the situation where the Board adopted the position that Schueller referred to in his March 19,

1997 memorandum for Class II landfills. However, to my knowledge, the issue of whether a minimum Subtitle D landfill will conform to Chapter 15 groundwater protection performance standards of protecting groundwaters from impaired use for as long as the waste will be a threat has not been addressed by the WRCB, except in the case of the Azusa Landfill where the State Board concluded that BFI should not be permitted to expand that landfill with a single composite liner because of the inability of a single composite liner to protect the groundwaters in the San Gabriel Basin from landfill leachate pollution for as long as the waste in the Azusa Landfill will be a threat.

The ability of a minimum Subtitle D landfill of the type that is being permitted by Regional Boards across the state today to conform to Chapter 15's groundwater quality protection performance standard is the key issue that was raised in the Petition I filed to the State Water Quality Control Board on September 9, 1996 governing the waste discharge requirements for the University of California-Davis proposed expansion of its campus landfill. On August 9, 1996 the Central Valley Regional Water Quality Control Board adopted Order 96-228, allowing the development of a new campus landfill adjacent to an existing campus landfill that had produced a groundwater pollution plume of over one mile in length due to chloroform and other VOC's. This CVRWQCB Order allows UCD to construct a minimum Subtitle D landfill at a site where it is obvious that the natural strata underlying the location of the landfill will not prevent groundwater pollution by waste-derived constituents.

H. Schueller's March 19, 1997 memo has direct bearing on the adequacy of the State Board's review of this Petition. As it stands now, the focus of the Petition must be on the reliability of the "position" that was adopted by the State Board without rule-making that asserts that a minimum Subtitle D landfill such as that proposed by UCD for its fifth campus landfill covered by CVRWQCB Order 96-228 will prevent groundwater pollution by waste-derived constituents for as long as the waste in the landfill will be a threat. The UCD campus landfill situation is one where UCD administrations have been constructing campus landfills for managing the campus's solid wastes for over 50 years. While the past administrations and the current L. Vanderhoef administration assert that it is "cheaper" for UCD to continue to manage its campus solid wastes by constructing on-campus landfills, this economic evaluation has been found to be fundamentally flawed since it only considers the initial cost of landfilling and ignores the massive costs that the people of California are having to pay for cleaning up the polluted groundwaters that arise from UCD's campus landfills.

UCD now has four campus landfills, all of which are currently polluting groundwaters. The UCD Vanderhoef administration claims that it is cheaper to construct a fifth campus landfill, which even its own staff admitted to the public will also pollute groundwaters, rather than take the campus waste to the Yolo County landfill, which has the capacity to immediately accept these wastes. Three of UCD's former landfills are part of the UCD-DOE LEHR national Superfund site located on the UCD campus. It is important to note that it was not the DOE-sponsored activities that have led to the massive groundwater pollution by UCD's campus landfills. This pollution arises from the mismanagement of campus wastes by UCD. The fourth campus landfill is under clean-up orders because of the over one mile long plume of polluted groundwaters that it has created. It, too, should be part of the national LEHR Superfund site;

however, for political reasons the regulatory agencies are unwilling to act on the public's request to have this site declared as part of the LEHR Superfund site.

It is clear that preventing UCD from continuing to construct campus landfills is in the best interest of the state of California since the ultimate cost to the state taxpayers of managing UCD's campus wastes by landfilling at the Yolo County Landfill is far less than the cost that the taxpayers will have to pay when they spend the tens of millions of dollars that will be needed for cleaning up the groundwater pollution that will occur at the UCD proposed fifth campus landfill. Therefore, the review of the Petition covering the significant technical deficiencies in Order 96-228 can and should focus on the technical issues of whether a minimum Subtitle D landfill system will protect groundwaters from impaired use for as long as the waste in the landfill will be a threat.

Mr. Schueller did not indicate in his March 19, 1997 memorandum whether he understands and acknowledges that the municipal solid waste in a minimum Subtitle D "dry tomb" landfill that it permitted under Order 96-228 will be a threat to pollute groundwaters effectively forever. Therefore, Mr. Schueller, in his March 19, 1997 memorandum is either stating that the WRCB has, within the past few years since adopting his stated "position", critically reviewed the professional literature on the expected performance of minimum Subtitle D landfill containment and monitoring systems in preventing pollution of groundwaters from waste-derived constituents impairing their use over the effective infinite period of time the waste in such a landfill will be a threat, or the State Board adopted his stated "position" without reviewing what is well known in the literature on the inability of the minimum Subtitle D landfill liner, cover, and groundwater monitoring systems to prevent groundwater pollution by waste-derived constituents for as long as the waste in the landfill will be a threat. In either case, the Board's action with respect to adopting this position is highly inappropriate.

It is now clear that as long as Mr. Schueller's stated WRCB "position" stands, that there is no way that the public who are concerned about the quality of future generations' groundwater resources in the state can receive a fair review of the adequacy of WDRs issued by Regional Boards for proposed landfills or landfill expansions to incorporate what has been readily know for a number of years in the professional literature about the inability of a minimum Subtitle D landfill liner and cover system and groundwater monitoring system as typically implemented by Regional Boards for Subtitle D landfills to protect groundwaters of interest to the public and future generations from impaired use by MSW leachate for as long as the waste in the landfill will be a threat.

For a period of about a year in 1994-1995, I was involved in a review of the operations of Placer County's Western Regional Sanitary Landfill (WRSL). The client for whom I worked subsequently sold the property that is being significantly adversely impacted by the WRSL. I have not been involved with the new owners in review of the CVRWQCB's proposed WDRs for the proposed expansion of the WRSL. I did, however, on my own initiative, as part of my concern about more reliable groundwater quality protection than is being practiced in California by Regional Water Quality Control Boards in the permitting of landfills, submit comments to the CVRWQCB on the significant deficiencies in the staff's proposed

WDRs for the continued operation of the WRSL. Since, based on past experience, the CVRWQCB conducts its hearings for some issues, which the Board Chairman or certain Board members want to see approved, in a manner that the public finds is strongly contrary to enabling the public to express their concerns on issues, I attempted to ask the CVRWQCB staff at the February 28, 1997 Board hearing on the staff's proposed waste discharge requirements for the continued operation of the Placer County Western Regional Sanitary Landfill about the appropriateness of the review conducted by the staff in determining whether the proposed WDRs complied with Chapter 15's requirements of protecting groundwaters from impaired use for as long as the wastes represent a threat.

The questions focused on the appropriateness of the CVRWQCB's approach for developing the WDRs for the WRSL relative to the WRCB's regulatory requirements. It is this situation that led Mr. Pinkos to ask Mr. Schueller for information on the State Board's position on the protective nature of a minimum Subtitle D landfill single composite liner cover and groundwater monitoring systems to comply with Chapter 15's requirements of protecting the groundwater from impaired use where it is understood that the waste in such landfills will be a threat effectively forever. As I testified at the February 28, 1997 CVRWQCB hearing, in the past it has been the State Board's position as evidenced by testimony at hearings, memos, and personal discussions that a single composite liner would not comply with Chapter 15's requirements of protecting groundwater quality from impaired use at a geologically unsuitable sites where natural protection of groundwater resources was not available. It appears now from Mr. Schueller's memorandum in response to Mr. Pinkos's request, that the State Board has, since 1993, reversed its position on this matter without proper rule-making. Further, this reversal of its position is not in accord with what is known in the professional literature about the ability of a minimum Subtitle D landfill containment system and groundwater monitoring systems as being implemented by Regional Boards today to protect groundwaters from impaired use for as long as wastes in the landfill remain a threat.

Mr. Pinkos, through his request, has opened the door to a more comprehensive review of issues than would have been possible without Mr. Schueller announcing for the first time to my knowledge that *"our"*, presumably the Board, either directly or through delegated authority, had adopted a "position" that a minimum Subtitle D landfill could be sited anywhere in California and be protective of groundwater resources in accord with Chapter 15 requirements of no expected impaired use for as long as the waste in the landfill will be a threat. This represents a significant change in Board policy from what was adopted by the Board in connection with the Board's position on the expansion of the Azusa Landfill in the early 1990's.

It is important in reviewing this matter to incorporate the Porter-Cologne requirements for addressing a threat of pollution, in which,

> *"'Threaten,' for purposes of this section, means a condition creating a substantial probability of harm, when the probability and potential extent of harm make it reasonably necessary to take immediate action to prevent, reduce, mitigate damages to persons, property, or natural resources."*

Clearly, the permitting of a minimum Subtitle D landfill at a geologically unsuitable site such as the UCD West Landfill site, or the WRSL site, where it is obvious that the proposed WDRs will not be protective in accord with Chapter 15 requirements of preventing impaired use of groundwaters for as long as the waste in the landfill will be a threat would be in violation of Porter-Cologne "threaten" requirements.

Rather than filing another petition with the State Board to address these issues, such as could be filed on the significant technical deficiencies in the CVRWQCB's WRSL expansion, I have decided that the best way to address the issues that have arisen because of H. Schueller's March 19, 1997 stated State Board "position" on the protective nature of minimum Subtitle D landfills, would be to amend the Petition filed with the State Board on the CVRWQCB's inadequate WDRs set forth in Order 96-228 to ask the State Board to specifically address in a full public arena the appropriateness of the position that H. Schueller indicates was adopted by the Board that a minimum Subtitle D landfill has a high probability of protecting groundwaters from impaired use, i.e. does not threaten groundwaters, for as long as waste in the landfill remains a threat.

This amendment to my Petition includes asking the State Board members and their staff to review the questions that were originally developed for the WRSL's WDRs in the context of basically the same issues associated with the UCD's West Landfill site under Order 96-228. While I am not filing a petition on the significant technical deficiencies in the CVRWQCB's WDRs adopted for the expansion of the WRSL, I have included the questions that are pertinent to the WRSL situation in the set of questions since addressing these questions will demonstrate a pattern that has been adopted by the CVRWQCB's staff and Board in failing to conduct a proper analysis of site conditions in developing WDRs for landfills. With few exceptions, the same issues apply to the WDRs governing both landfills. Both landfills are proposed to be developed at geologically unsuitable sites, where natural protection has been demonstrated to not exist. Therefore, the basic question that the State Board must address is whether a minimum Subtitle D liner system, the minimum Subtitle D cover system, and the groundwater monitoring systems that the CVRWQCB has allowed for the UCD West Landfill development can be expected to have a high degree of reliability of containing waste-derived constituents effectively forever, i.e. that the construction of the UCD West Landfill as proposed under Order 96-228 has a low probability of threatening groundwater quality, impairing its use forever.

Please find enclosed a recent report that I have developed: "Deficiencies in US EPA Subtitle D Landfills in Protecting Groundwater Quality For As Long as MSW is a Threat." This report summarizes many of the key issues that need to be addressed in connection with evaluating whether a minimum Subtitle D landfill will protect groundwaters from impaired use for as long as the wastes in the landfill represent a threat. I ask that this report and the enclosed questions become part of the administrative record for this amended Petition and be reviewed by the State Board as part of addressing the issues raised in the Petition. These materials, coupled with the papers and reports that are part of the administrative record associated with my appeal of CVRWQCB Order 96-228 serve as a technical basis to the literature which demonstrates that since the early 1990s, it has been well understood by professionals in the landfilling field

that a minimum Subtitle D landfill containment system and groundwater monitoring system as typically implemented by Regional Boards cannot comply with Chapter 15's groundwater quality protection standards. Further, as discussed herein, the Regional Boards have been adopting WDRs for landfills that obviously cannot comply with Subtitle D requirements. While it may be possible after appropriate rule-making for the State Board to adopt Mr. Schueller's stated "position" which is contrary to the literature, such adoption must be done in a full public process where the public has the opportunity to review and inform the Board of the appropriateness of such a position.

I request as part of my Petition on the significant technical deficiencies of Order 96-228 that the Board conduct this review. If the Board concludes after proper public rule-making that it is in the best interest of the state of California to adopt a "position" on the ability of a minimum Subtitle D landfill containment system and groundwater monitoring system as implemented by Regional Boards to protect future generations' groundwaters from pollution by landfill leachate even though such a position is contrary to the professional literature pertinent to this topic, then the public will have had an appropriate opportunity to have reviewed this position as it should have had before it was adopted by the State Board without proper rule-making. Adopting that position is a clear indication that this Board wishes to continue to practice cheaper than real cost garbage disposal in minimum Subtitle D landfills at the expense of future generations' groundwater resources, as well as their health, welfare and interests.

Thank you for consideration of this matter. Please contact me if you have any questions about it.

Sincerely yours,

G. Fred Lee, PhD, DEE

Copy to: Governor P. Wilson
Members, SWRCB
Ed Schnabel, Chairman CVRWQCB
W. Pettit
J. Bennett
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April 17, 2000

CERTIFIED MAIL

Mr. G. Fred Lee
G.Fred Lee & Associates
27298 El Macero Drive
El Macero, CA 956 18-

Dear Mr. Lee:

PETITION OF G. FRED LEE (WDR ORDERS 96-227 AND 96-228 FOR THE UNIVERSITY OF CALIFORNIA AT DAVIS CAMPUS LANDFILL GROUND WATER CLEANUP SYSTEM)CENTRAL VALLEY REGION: DISMISSAL SWRCB/OCC FILE A-1042

The State Water Resources Control Board's regulations on review of water quality petitions provide, in relevant part:

If formal disposition of the petition is not made by the state board within 270 days of the written notification provided for in Section *2050.5,* the petition is deemed denied." (Title 23, California Code of Regulations, Section 2052(d).)

I am writing to inform you that this 270-day time period has elapsed in this matter.

If you have any questions about this matter, please contact Jorge A. Leon, Senior Staff Counsel, in the State Water Resources Control Board's Office of Chief Counsel, at (916) 657-2428.

Sincerely,

Craig M. Wilson
Assistant Chief Counsel

cc: Mr. Gary M. Canton Executive Officer
Central Valley Regional Water Quality
Control Board

3443 Routier Road
Sacramento, CA 95 827-3003