Comments on
"Environmental Impact Report
Puente Hills Waste Management Facilities"

Submitted by

G. Fred Lee, Ph.D. and Anne Jones-Lee, Ph.D.

President Vice-President

G. Fred Lee & Associates

El Macero, CA

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INTRODUCTION

Marlene A. Fox, Esq. requested that the authors (Drs. G. Fred Lee and Anne Jones-Lee) conduct a review of the technical adequacy of the June 1992 Draft Environmental Impact Report (draft EIR) and November 1992 Final Environmental Impact Report for the County Sanitation Districts of Los Angeles County ("Districts"') proposed expansion of the Puente Hills Waste Management Facilities. Pursuant to that request, the authors reviewed the following materials:

- *Puente Hills Waste Management Facilities Draft and Final Environmental Impact Reports*, Prepared by Solid Waste Management Department, County Sanitation Districts of Los Angeles County, June 1992, November 1992;

- *Puente Hills Waste Management Facilities Draft and Final Environmental Impact Report Technical Appendices*, Prepared by Solid Waste Management Department, County Sanitation Districts of Los Angeles County, June 1992 and November 1992;

- *Geohydrologic Review of the June 1992 Draft EIR, Puente Hills Waste Management Facilities*, Prepared by Geoscience Support Services Inc., September 30, 1992;

- Transcripts for Public Hearing organized by the County Sanitation Districts
  Tuesday, August 4, 1992, St. John Vianney Church, Hacienda Heights, CA
  Wednesday, August 5, 1992, Downey High School Cafeteria, Downey, CA
  Thursday, August 6, 1992, St. John Vianney Church, Hacienda Heights, CA
  Monday, September 14, 1992, Los Altos High School Gymnasium, Hacienda Heights, CA

- Puente Hills Waste Management Facilities Project, November 5, 1992 Letter from C. Carry to the Board of Directors, County Sanitation District No. 2 of Los Angeles County, and the accompanying:
  Resolution of the Board of Directors County Sanitation District No. 2 of Los Angeles County Certifying Final Environmental Impact Report for Puente Hills Waste Management Facilities Making Written Findings Adopting Reporting or Monitoring Program and Making Its Statement

of Overriding Considerations;

- *Mitigation Monitoring Plan*, dated November 5, 1992

- *Analysis and Comments on Draft EIR for Puente Hills Landfill Expansion and Material Recovery Facility*, Submitted by M. Fox to G. Chan, County Sanitation Districts of Los Angeles County, September 14, 1992;

- Correspondence and Reports/Papers that have relevance to the potential environmental impact of the Districts' proposed expansion of the Puente Hills Landfill.

QUALIFICATIONS TO UNDERTAKE REVIEW

The authors have had many years of experience in evaluating the real and potential impacts of existing and proposed municipal and industrial landfills for hazardous and "non-hazardous" wastes, and landfill expansions, on beneficial uses of surface and groundwaters. Dr. Lee has worked on this topic since the 1960's, at various locations in the US and in other countries. In the early 1980's, he served as an advisor to the State of California Water Resources Control Board staff on the development of "Subchapter 15" regulations governing the disposal of municipal and industrial solid wastes on land; those regulations have subsequently been designated as "Chapter 15." Chapter 15 regulations govern the water quality protection aspects of the Districts' proposed expansion of the Puente Hills Landfill.

As summarized in materials presented in the Appendix to these comments, the senior author has a Bachelor degree in environmental health sciences from San Jose State College, a Master of Science in Public Health degree with emphasis in water quality and aquatic chemistry from the University of North Carolina School of Public Health, and a Ph.D. degree in environmental engineering and environmental sciences with emphasis in aquatic chemistry from Harvard University. He taught and conducted university graduate-level research for 30 years; he conducted more than $5 million in research devoted to various aspects of water supply water quality, water and wastewater treatment, water pollution control, and solid and hazardous waste management. One of his major areas of specific research over the past 20 years has been the ability of various types of landfill liners to prevent the migration of landfill leachate through them to lead to groundwater pollution. He has published more than 550 professional papers and reports on his research; a number of those papers and reports have been specifically devoted to landfills and groundwater quality protection issues.

Dr. Jones-Lee earned a Bachelor of Science degree in biology from Southern Methodist University, and Masters and Ph.D. degrees in environmental sciences from the University of Texas at Dallas, focusing on water quality issues. For 11 years she taught and conducted university graduate-level research. Drs. Lee and Jones-Lee have worked as a team on research, public service, and private consulting since the mid-1970's.

Since 1989, Drs. Lee and Jones-Lee have been full-time consultants through their firm, G. Fred Lee & Associates, of which Dr. Lee is president and Dr. Jones-Lee is vice-president, located in El Macero, CA (near Sacramento). A major part of their efforts over the past three years has been evaluating the potential impacts of municipal solid waste landfills in Southern California on groundwater quality, on behalf of various water utilities and districts. It has included in-depth reviews of the San Gabriel Basin Azusa Landfill situation. In addition, they have considerable expertise and experience in reviewing existing and proposed municipal solid waste landfills in Southern California canyons.

Drs. Lee and Jones-Lee have experience with issues associated with large landfills. While they held university positions at the New Jersey Institute of Technology, they were involved in issues of the Fresh Kills Landfill on Staten Island on New Jersey coastal water and beach quality. The Fresh Kills Landfill is said to be the largest in the US; the existing Puente Hills Landfill is said to be the second-largest. These two landfills have very similar problems of now significantly adversely affecting adjacent and nearby property-owners/users.

The authors' work on landfills and groundwater quality protection issues was recognized in 1986 by the American Water Works Association, Water Resources Division. That division selected a paper they published, devoted to problems with the approaches being used for the protection of groundwater quality from landfill leachate, as the "Best Paper" published in the Journal of the American Water Works Association during 1984.

Drs. Lee and Jones-Lee have organized and presented a series of one-day short-courses on landfills and groundwater quality protection issues. In those courses Lee discusses a variety of topics that are pertinent to technical review of the Districts' proposed expansion of the Puente Hills Landfill. He has presented this short-course at the National Ground Water Association's Outdoor Action Conference annually for the past three years in Las Vegas, NV; twice for University Extension of the University of California, Davis; at the National Ground Water Association conference in San Francisco; for the California Integrated Waste Management Board staff in Sacramento; at University Extension of the University of California, Los Angeles in October 1992; and at the American Water Resources Association conference in Reno, NV in November 1992. Presentation of this short-course is currently scheduled for University Extension of the University of California, Santa Barbara on November 13, 1992; for University Extension of the University of California, Berkeley on November 19, 1992; for the National Ground Water Association in Orlando, FL in December 1992; and for the American Society of Civil Engineers in New York City and in Atlanta, GA in January 1993.

In connection with the development and presentation of these short-courses, the authors have prepared in-depth discussion papers of various issues including comprehensive literature reviews pertinent to municipal landfills and groundwater quality protection issues. A number of the key reports and papers that they developed on this topic are appended to these comments on the technical adequacy of the EIR for the proposed Puente Hills Landfill expansion. Further, they are under contract with Van Nostrand Reinhold to develop a book covering their expertise and experience on

landfills and groundwater quality protection issues. Many of the appendices for these comments on the EIR for the Puente Hills Landfill expansion will be chapters in that book, scheduled for publication in 1993.

Drs. Lee and Jones-Lee have worked on a wide variety of small and large municipal solid waste landfill issues, including work on behalf of residents of the state of New Jersey on the impacts of New York City's Fresh Kills Landfill on Staten Island, NY on coastal water quality and beach quality. Fresh Kills Landfill is the largest landfill in the US. Over the past two years Drs. Lee and Jones-Lee have been involved in the review of EIR's for 12 different landfills in the state of California. Their recent activities have also included work in landfills and groundwater quality protection issues and regulations in the state of Michigan. They have also been active in these issues in Wisconsin, Illinois, Indiana, Texas, Colorado, Missouri, New York, New Jersey, and in several other countries.

Dr. Lee has focused a considerable part of his 37-yr professional career on domestic water supply water quality issues. He has been recognized for his expertise in that topic area by serving as Chairman of the American Water Works Association's Quality Control in Reservoirs Committee. He is currently a member of the American Water Works Association's California-Nevada Section's Source Water Quality Committee. Last year Drs. Lee and Jones were asked by the University of California Water Resources Center and the California Urban Water Agencies to conduct a review on the feasibility of controlling water quality (of both surface and groundwater) at the source. They presented a paper on this topic at the April 1991 conference organized by those groups; a condensed version of their paper appeared in the proceedings of that conference. Further, on behalf of the California-Nevada Source Water Quality Committee, Drs. Lee and Jones conducted a review of and presented a paper on the impact of the current drought on domestic water supply water quality, at the fall meeting of the Section. That paper included consideration of groundwater quality issues. Dr. Lee has worked on the topic of groundwater pollution by municipal landfill leachate and the impact of landfill leachate contamination on domestic water supply water quality since the mid-1960's.

On November 6, 1992, Dr. Lee conducted a site visit to the Puente Hills Landfill in which he observed current dumping operations and the areas that stands to be potentially impacted by the proposed expansion of that landfill.

Additional information on the authors' qualifications in this area is provided in the Appendix.

OVERALL COMMENTS

According to the State's Guidelines for EIR's (Section 15151) for CEQA,

"An EIR should be prepared with a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of proposed projects need not be exhaustive, but the sufficiency of an EIR is to be

reviewed in the light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among experts. The courts have looked not for perfection but for adequacy, completeness, and a good faith effort at full disclosure."

The authors have found that the EIR for the proposed expansion of the Puente Hills Landfills is significantly deficient in informing the public and decision-makers about the long-term environmental and public health consequences of the proposed activity. The EIR

- is highly superficial in its consideration and evaluation of potential impacts;
- contains significant technical errors;
- contains numerous misleading and otherwise inappropriate statements; and
- provides an unreliable and incomplete assessment of the ability of the proposed liners, leachate collection and removal system, cover, groundwater collection system, groundwater barrier system, and groundwater monitoring system to enable compliance with Chapter 15 requirements for Class III landfills to prevent impairment of groundwater quality for as long as the wastes represent a threat.

It is the finding of the authors that the EIR should not be certified as adequate, since it does not conform to the requirements for reasonably feasible evaluation of environmental effects and *"adequacy, completeness, and a good faith effort at full disclosure."*

A number of members of the public who testified at the various public hearings on the draft EIR prepared by the Districts for the proposed expansion of the Puente Hills Landfill have expressed technically valid questions and issues that identify significant deficiencies in the document regarding the potential water quality and public health threats posed by hazardous and otherwise deleterious chemicals associated with the proposed expansion. Those issues should have been, but were not, addressed in the EIR. At this time, the public has not been provided the opportunity to become reliably informed about the potential for the proposed landfill expansion to adversely affect public health and welfare, and the environment.

The review of the potential adverse impacts of a proposed landfill or landfill expansion should consider the impacts of the landfill on adjacent and nearby property-owners/users during the active life (when wastes are deposited in the landfill) and after closure of the landfill (after the landfill no longer accepts wastes). Typically, landfills of the type proposed for the Puente Hills Landfill expansion can have significant adverse impacts on adjacent and nearby property-owners/users during the active life of the landfill. After the landfill is closed, the impacts are primarily associated with long-term contaminant migration in air and water, to adjacent and nearby properties. A review of the documents in support of the proposed Puente Hills Landfill expansion clearly shows that that site is inappropriate for a landfill because of its close proximity to existing residential, commercial, and

public areas including educational facilities, and the hydraulic connection that exists between the landfill area and significant groundwater resources in the San Gabriel Valley Basin. The existing landfill should not be used for deposition of wastes beyond the current permit period ending November 1993. There is no question that a landfill such as that proposed for the Puente Hills Landfill expansion, located in a highly urban area, will have significant adverse impacts on adjacent property-owners/users and deny them the right to appropriate use and enjoyment of their properties during the active life of the landfill. Further, the sphere of influence of the landfill's adverse effect will widen with time as groundwater becomes contaminated by landfill leachate.

During the senior author's site visit on November 6, 1992, he observed the types of problems that commonly occur with municipal landfills. There were significant odors emanating from the landfill to adjacent properties. This confirmed repeated statements made by the public as reported in transcripts of the public hearings on the draft EIR for the landfill, about the odor problems caused by the existing landfill. As discussed below in these comments, while the EIR claimed that problems with odors would not be significant with the proposed landfill expansion owing to the continuation of the current approaches for odor control, the reliability of such claims can be judged by the problems that exist with the operation of the existing landfill. The manner in which the Districts are operating the existing landfill is such that adjacent property-owners/users are, in fact, significantly adversely affected.

The Districts tout their providing waste "disposal" at a cost that is one of the lowest in the US. However, those low fees result in an operation that causes significant adverse impacts to adjacent property-owners/users during the active life, and will result in significant adverse impacts on the groundwater resources in the future. Thus, the "low" fees are augmented by the price paid by adjacent property-owners/users in lost and diminished use and enjoyment of their property, and by the public when future generations have to pay to try to stop the spread of chemical contaminants in the groundwater, to attempt to "remediate" contaminated groundwater and aquifer areas, and to replace the lost water resources. These additional costs would increase with the permitting of the proposed landfill expansion. The attempt to short-cut proper waste management with the proposal for the Puente Hills Landfill expansion perpetuates the myth that the "tipping fees" represent the long-term true costs of waste "storage" by the lined, "dry tomb" landfilling approach (A "dry tomb" landfill is one in which an attempt is made to entomb and store untreated wastes in plastic sheeting and/or compacted soil/clay liners and covers.) The reality is that when garbage disposal is provided at costs "cheaper-than-real," the remaining costs are paid by adjacent property-owners/users in the loss and impairment of the use and enjoyment of their property and by future generations in lost and diminished groundwater resources and in costs for remediation.

In his November 5, 1992 letter to the Board of Directors of the County Sanitation District No. 2 of Los Angeles County, Mr. Carry threatened a substantial increase in garbage disposal cost if the Landfill expansion is not approved. Under no circumstance should the health and welfare of people be adversely impacted for the sake of allowing a the residents of Los Angeles County to enjoy garbage disposal at cheaper-than-real costs.

A landfill owner/operator, whether public or private, should not have the right to adversely

affect the quality of adjacent properties, groundwaters, or air. The proposed expansion of the Puente Hills Landfill will adversely affect adjacent property-owners/users during the active life, and the water resources of the area. The EIR is a Districts "in-house" document and does not reliably address these issues. It should therefore be judged to not be in compliance with the requirements of CEQA.

The groundwater resources of California, especially those of the San Gabriel Basin that stand to be polluted by the expansion of the Puente Hills Landfill, are extremely important to future generation's water resources. The situations that have been allowed to occur in the past under Chapter 15 in which landfills have been constructed at geologically unsuitable sites with liners that only postpone groundwater pollution cannot be allowed to occur in the future. Governor Wilson's task force on developing a new water policy for the state has recently predicted that in the year 2010 the state will be about 6 million acre feet/year short in water resources. Surface and groundwaters not now being used for water supply purposes will have to be used in the future to meet the needs of the State. Therefore the people served by the Districts cannot continue to receive garbage disposal at costs cheaper-than-real at the expense of future generations' water resources. A properly developed EIR should have discussed these issues as part of considering the long-term consequences of the proposed landfill expansion, instead of misleading the public and decision-makers to believe that there future problems associated with the landfill expansion would be unlikely. It is clear that there will be significant problems of groundwater quality in the vicinity of the landfill expansion.

SPECIFIC COMMENTS ON EIR EXECUTIVE SUMMARY

The focal point of this review of the EIR will be the statements made in the Executive Summary. This is appropriate since in general decision-makers and members of the public do not have the technical expertise, experience, or time to conduct an in-depth review of the body of the EIR or the technical appendices. Further, it is understood by the authors that the Districts have provided some of the Districts' members with only the Executive Summary. Thus the information in the Executive Summary needs to be sufficient to provide a reliable and complete disclosure of information on the potential for the proposed landfill expansion to adversely affect public health and the environment, including adjacent properties. Finally, the additional information presented in the body of the EIR and technical appendices do not substantively address the issues raised and deficiencies noted based on the Executive Summary.

The section headings and page notations presented herein follow those of the draft EIR.

PROJECT DESCRIPTION

Purpose and Objectives of the Project

A section is provided on page 1-7 of the purpose and objectives of the proposed project. The second bulleted item in that section stated,

"To provide environmentally sound, publicly owned disposal capacity within Los Angeles County to avoid a disposal capacity shortfall in both the near-term and long-term."

A reader who is not knowledgeable in the technical aspects and implications of the proposed project would be led by the quoted statement to believe that the proposed project would be environmentally sound. However, as discussed below, it is clear that the proposed project is not environmentally sound and will cause significant adverse impacts on adjacent property and on water resources of the area.

Operations Description

Overview

In the first paragraph on page 1-8 it was stated,

"The landfill and the materials recovery and rail loading facility would accept only nonhazardous solid wastes and inert wastes, as defined in Title 23, Chapter 15, California Code of Regulations (CCR), which include all putrescible and non-putrescible solid and semi-solid, (sic) wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, manure, animal solids, dewatered sewage sludge, and other solid and semi-solid waste, provided that such wastes do not contain wastes that must be managed as hazardous wastes, or wastes that contain soluble pollutants in concentrations which exceed applicable water quality objectives, or could cause degradation of waters of the state."

It is clear by that quoted statement that the decision-makers and the public are being led to believe that no hazardous materials will be deposited in the landfill expansion.

As discussed in the authors' paper, *"Groundwater Pollution by Municipal Landfills: Leachate Composition, Detection, and Water Quality Significance,"* a copy of which is presented in the Appendix to these comments, the waste classification system currently used at the federal and State levels is designed to minimize the amount of what are classified to be "hazardous wastes" that must be managed. The classification of a waste as "non-hazardous" does not mean that the material contains no hazardous or deleterious components or that leachate from the material could not

adversely affect the use of a groundwater or aquifer for domestic water supply or other purposes. The waste classification system only addresses major sources of "hazardous wastes" and does not address the large amounts of wastes that arise from the use of various materials in homes and commercial/industrial establishments that contain the same chemicals that cause "hazardous wastes" to be classified as such but at concentrations or amounts that are arbitrarily described as being "non-hazardous." There are several aspects of this situation that need to be considered for the proposed Puente Hills Landfill expansion.

First, one of the US EPA's determiners of the classification of a soil, solid, or waste was originally the Extraction Procedure Toxicity Test which has been revised to the TCLP test used today. Processing a material through that procedure yields an assessment of the amount of measured chemicals that leach from the material under the conditions of the procedure. If the amounts of the measured chemicals that leach from the material under those conditions is greater than 100-times the drinking water standard, the material is classified as "hazardous." Thus the US EPA will allow the classification of a waste as "non-hazardous" if it leaches highly hazardous chemicals in concentrations less than 100 times the drinking water standard; a waste that leaches certain hazardous chemicals in concentrations 99.9-times the drinking water standard could be legally deposited as a "non-hazardous waste" in the Puente Hills Landfill expansion.

As discussed in the appendices to these comments, the factor of 100 applied in the classification of wastes was not based on any finding that that amount of hazardous chemical does not cause a threat. Rather, it was an arbitrary factor assigned by the US EPA to minimize the amount of waste that has to be managed as "hazardous waste." Further, there are not drinking water standards for all leachate-associated chemicals that could be hazardous.

Second, a material that is not categorized as "hazardous waste" can be placed into a municipal solid waste landfill. In fact, very large amounts of hazardous chemicals that cause "hazardous waste" to be classified as "hazardous" are commonly present in municipal solid waste. Typical suburban street-sweepings, acceptable for disposal in Class III municipal solid waste landfills, contain lead and a number of other contaminants in amounts that could be of great significance to groundwater quality. Vacuum cleaner dust, paint chips, residuals from common household and garden products all contain components that would be hazardous or deleterious to groundwater and aquifer quality. Clearly certain demolition and construction wastes, discarded home and industrial appliances, and other materials indicated in the draft EIR as anticipated for placement in the proposed landfill expansion contain components that could, when transported in leachate, be hazardous or otherwise deleterious to groundwater and aquifer quality.

Municipal solid waste landfills can legally contain large amounts of highly hazardous chemicals, even though the landfill accepts none of what are classified as "hazardous wastes." Thus, the statement quoted above from the draft EIR for the proposed Puente Hills Landfill expansion cannot be interpreted to mean that there will be no hazardous or otherwise deleterious chemicals or materials placed in the landfill. Municipal solid waste leachate contains lead and many other contaminants well-above drinking water standards, and thus represents a threat to domestic water supplies, especially under geological conditions found at the Puente Hills Landfill expansion site.

In addition, there is a wide variety of unidentified and uncharacterized organic chemicals present in municipal solid waste leachate that can be highly hazardous to public health or otherwise deleterious to groundwater quality. These so-called "non-conventional pollutants" constitute most of the organics in municipal solid waste landfill leachate and not quantified except in a general aggregate way. The work being conducted today on the composition of landfill leachate reveals that the programs employed to monitor leachate and groundwater for the presence of hazardous and otherwise deleterious chemical components do not begin to measure all of the hazardous chemicals in leachate. For example, Gintautas *et al*. (1992) recently found that a common household herbicide is present in landfill leachate in potentially significant amounts. Prior to their work, landfill leachate had not been evaluated for the presence of that contaminant. With increasing attention being given to the composition and potential impacts of municipal solid waste landfill leachate, the presence of other such previously unrecognized contaminants will undoubtedly be found in municipal landfill leachate.

The authors' paper cited above summarizes the literature on this topic and discusses the implications of the manner in which the US EPA and the state of California classify wastes for disposal. Even with inspection of waste loads for disposal and collection of household "hazard wastes" as is being done today, municipal solid waste will always contain large amounts of highly hazardous chemicals. Even if all the potentially "hazardous" chemicals could be eliminated from wastes disposed in municipal solid waste landfills, the municipal landfill leachate would still contain conventional pollutants that could destroy the use of contaminated areas of the aquifer, such as that in the San Gabriel Basin, for domestic water supply purposes, or impair the quality sufficiently so as to cause substantially greater expenditures for treatment. It is well-known today that very small amounts of municipal landfill leachate can render very large amounts of groundwater, and the associated areas of the aquifer, unsuitable for domestic water supply purposes.

Materials Recovery and Rail Loading Facility Operations

In paragraph 3 on page 1-9 it was stated with regard to eliminating hazardous materials from the waste-stream entering the landfill,

> *"In the manual process, the waste initially would be screened to recover* ***any incidental*** *hazardous materials and then conveyed up to eight sorting lines, each line accommodating employees to sort for specified materials."* (emphasis added)

The language selected for that statement and emphasized in the citation, is grossly misleading in its implication that hazardous materials would not be expected on other than an "incidental" basis, and that the screening process proposed would prevent even the "incidental" introduction of hazardous materials into the landfill. The common, legal, and indeed unpreventable introduction of hazardous materials into a municipal solid waste landfill was noted above and is discussed in the Appendix to these comments. The language presented at this location demonstrates a pro-applicant distortion in the draft EIR that defies the CEQA requirement to provide for reasonably feasible evaluation of

environmental effects and *"adequacy, completeness, and a good faith effort at full disclosure."* In fact, as written that statement provides misinformation to the public and decision-makers on the hazardous materials/chemicals that would be reasonably expected to enter the proposed landfill expansion. There is no question that municipal solid waste will always contain substantial amounts of hazardous and otherwise deleterious materials. The fact is that there is no way to control the waste-stream to eliminate the placement of materials that are hazardous or otherwise deleterious to groundwater quality, in a municipal solid waste landfill.

Environmental Control Features of the Project

Throughout this section, significant misstatements and overstatements are made of the capabilities of the so-called environmental control features to provide protection of groundwater quality from the wastes that would be buried at the Puente Hills Landfill expansion. As with other sections of the draft EIR, the language selected in this section demonstrates the pro-project advocacy stance of the document instead of a disinterested, technically reliable review of the information and capabilities of the features incorporated.

(Section Paragraphs 1 and 2)

The first two paragraphs of this section, on page 1-10 and continuing on page 1-11, outlined the features of the proposed landfill expansion that are relied upon by the applicant to provide the protection of groundwater quality that is required by Chapter 15, i.e., that Class III waste management units that are placed be developed in a manner so as to prevent adverse impact on groundwaters of the State for as long as the wastes represent a threat, i.e., forever. Those paragraphs stated,

> *"During the operation of the Puente Hills Waste Management Facilities project, various environmental control features would be employed, which would allow for the safe operation of both the landfill and the materials recovery and rail loading facility to ensure public health and safety. The integrity of the system would be maintained through proper design and operation, including ongoing monitoring of effectiveness. Each of the environmental control features is discussed below. All of the features proposed for the landfill are proven techniques that have been employed in the existing landfill operation.*
>
> *A multi-phase groundwater protection system would be constructed and would include a composite (both clay and synthetic) liner, subsurface barriers, and extraction and monitoring wells, all of which would be installed prior to any refuse placement in the eastern canyons. The first phase of protection would be the continued operational practice of maintaining a minimum solids-to-liquid ratio in the refuse, which greatly reduces the potential for any liquid to form and potentially migrate from the waste. The second phase of protection would be the liner which would underlie the refuse fill. Any liquid traveling within the fill would be collected and conveyed to extraction pipes above the liner. Although the liner would serve as a barrier to liquid, and the*

use of a composite liner exceeds regulatory requirements, in the unlikely event that any liquid would pass beyond the liner, it would be collected in the underdrain piping and similarly conveyed for extraction. In the next phase of protection, continuity between onsite perched water and offsite alluvium waters would be severed by the subsurface barrier, a cement and clay wall, which is installed underground and keyed into bedrock. Any water collected behind the barrier would be extracted from wells located upstream from the barrier. Lastly, to ensure that no contamination has passed beyond the barriers, monitoring wells would be located downstream of the barriers and sampled regularly."

The quoted section is another example of the pro-applicant distortion in the draft EIR that defies the CEQA requirement to provide for reasonably feasible evaluation of environmental effects and *"adequacy, completeness, and a good faith effort at full disclosure."* Because of the paramount importance of the groundwater quality protection provisions for meeting the requirements of Chapter 15, and because of the gross distortion of the ability of the features proposed to provide reliable protection of groundwater quality, the technical reliability of the statements made is examined in greater detail below.

Each statement in the first quoted paragraph is fraught with misleading overstatements of the public health and groundwater quality protection provided by the proposed facility.

The first sentence of the quoted section,

*"During the operation of the Puente Hills Waste Management Facilities project, various environmental control features would be employed, which would allow for the **safe operation** of both the landfill and the materials recovery and rail loading facility to **ensure** public health and safety."* (emphasis added)

claimed that the so-called environmental control features *"would allow for the safe operation"* of the landfill and associated facilities during their *"operation"* to *"ensure public health and safety."* As discussed below and contrary to those claims, the proposed landfill expansion would place public health at risk owing to landfill leachate-contamination of groundwater that is suitable for domestic water supply. The focus on the alleged "safety" provided during the "operation" evades the issues of the long-term protection of groundwater quality. Since the materials that render landfill leachate of public health and water quality concern will be present in the landfill forever, adequate measures for prevention of groundwater pollution will have to be provided indefinitely - forever, long after the period of "operation" of the facility. That issue was not adequately addressed in the draft EIR.

With regard to the second statement made in the first paragraph quoted above,

"The integrity of the system would be maintained through proper design and operation, including ongoing monitoring of effectiveness."

even if the design integrity of the waste containment systems could be ensured *ad infinitum*, groundwater quality protection would not be ensured. This is because of the inability of the containment features to prevent all leachate migration even shortly after installation, owing to design decisions for example with regard to the permeability of clay liner material, as well as to the holes that are present in flexible membrane liners. The reality is, however, that design integrity cannot be

maintained *ad infinitum* in defiance of the Second Law of Thermodynamics. The system components will deteriorate over time which will allow increasing migration of leachate. Since the containment features of "dry tomb" landfills such as the proposed Puente Hills Landfill expansion lie beneath hundreds of feet of garbage, they are not available for routine and detailed inspection, much less repair, without exhumation of the wastes. At best, the "dry tomb" landfill approach postpones pollution; it cannot prevent it.

The claimed *"monitoring of effectiveness"* of the integrity of the system does not prevent breaches of the system; at best, it alerts the vigilant monitor, after the fact, to the failure of the system. Once the *"monitoring of effectiveness"* reveals diminution or loss of "effectiveness," it is too late to prevent pollution. Finally, the *"ongoing monitoring"* would have to be continued forever; this was not adequately discussed or provided for in the draft EIR. Examination of the current state of the civil works infrastructure in the US for roads, bridges, water lines, sewers, etc. - many of which structures are readily accessible to inspection - illustrates the societal commitment, and society's ability, to maintain structures. In the case of landfills, however, inspection of the liners is not possible; the only way that liner failure is found is by finding groundwater pollution. Similar kinds of problems exist for landfill covers.

The last statement made in the first paragraph discussing the so-called environmental control features of the project was,

*"**All** of the features proposed for the landfill are **proven techniques** that have been employed in the existing landfill operation."* (emphasis added)

The implication of that statement is that the features proposed for the Puente Hills Landfill expansion have been proven by the existing Puente Hills Landfill to provide appropriate protection of public health and environmental quality for as long as the wastes represent a threat as required by Chapter 15. There has been no evidence offered to support that claim. Clearly, this has **NOT** been "proven" by the existing landfill operation. In fact, the recent technical literature is replete with discussion of the inadequacies of the approach proposed. Examples of this are noted below.

The second paragraph of this section delineates the components of the so-called "Multi-phase groundwater protection system;" the system is introduced by the statement,

"A multi-phase groundwater protection system would be constructed and would include a composite (both clay and synthetic) liner, subsurface barriers, and extraction and monitoring wells, all of which would be installed prior to any refuse placement in the eastern canyons."

Each of those phases merits comment since none, either alone or as part of the system, can provide groundwater quality protection for as long as the wastes represent a threat.

- First Phase -

"The first phase of protection would be the continued operational practice of maintaining a minimum solids-to-liquid ratio in the refuse, which greatly reduces the potential for any liquid to form and potentially migrate from the waste."

While it is desirable to minimize the amount of liquid placed in the landfill during the active life, the entrance of moisture with the deposited wastes is not the primary concern for moisture entrance into a landfill that can generate leachate to pollute groundwater. Of greater significance is the moisture that enters through the cover after closure of the landfill. The details of the cover envisioned for the proposed landfill expansion were not provided in the draft EIR. However, Schroeder (1990) of the US Army Corps of Engineers and a US EPA-invited lecturer on the passage of moisture through landfill covers, stated at the US EPA landfill cover design seminar held in Oakland, CA, that a cover consisting of a one-foot layer of compacted soil having a permeability of $1x10^{-6}$ cm/sec as the low permeability layer (i.e., a conventional nominal landfill cover design allowed by some Regional Boards in California) would be "largely ineffective" in preventing entrance of moisture into a landfill. As discussed in the Appended paper entitled, *"Municipal Solid Waste Management: Long-Term Public Health and Environmental Protection,"* there are many phenomena that can cause significant breaches in a low-permeability layer of a cover, among them animal burrowing, roots of vegetation, desiccation-cracking, differential settling of the wastes, and the expected permeation owing to the "design permeability" of the layer. All of those phenomena can lead to the entrance of significant amounts of moisture into a landfill, that could generate leachate to pollute groundwater.

Perhaps even more significant than the inherent inability of conventional covers to prevent transport of moisture *ad infinitum* is the issue of cover maintenance. That issue was not addressed adequately in the draft EIR. It is not realistic to expect that even an appropriate cover will be adequately maintained and replaced as needed *ad infinitum* within the funding levels typically available for such purposes.

The key moisture retardation component of the cover for a landfill such as the proposed Puente Hills Landfill expansion, a "low-impermeable" layer, would be buried under vegetation, and top soil and likely a drainage layer; its location would make the "low-impermeable" layer inaccessible to inspection. An inspector walking across the surface of the landfill cover could conclude from visual inspection of the surface that the cover is functioning adequately when in actuality, the low-permeability layer could readily have desiccation cracks in it, cracks from differential settling, or other breaches that would allow entrance of far greater moisture into the landfill than theoretically predicted or seen by visual surface inspection.

Desiccation-cracking will occur in a compacted soil layer in a landfill cover during months of little or no precipitation. As discussed by Daniel (1990), since desiccation-cracks do not heal to original design/construction permeability upon wetting, shortly after landfill closure the cover will likely have a much higher permeability than the design specification, and thereby allow significant leachate generation during times of infiltration of precipitation. Similarly, it is also widely recognized that small amounts of differential settling of solid waste that normally occurs in landfills can cause cracks to develop in a compacted soil layer in the cover (Daniel, 1990). The problems for keeping moisture from the landfill caused by those cracks and the inability to detect their presence are the same as those for desiccation cracks (See Lee and Jones, 1991b in the Appendix to these comments).

It is likely that the cover for the proposed Puente Hills Landfill expansion would have to incorporate a low-permeability soil layer and a flexible geomembrane. The Subtitle D regulations promulgated by the US EPA in October 1991 require such a cover and will be applicable to the Puente Hills Landfill expansion. The problems discussed above for low-permeability clay layers in covers will be experienced in the Puente Hills Landfill expansion. Further, the problems with the development of cracks and holes, and the deterioration of flexible membrane liners discussed below will be experience in the geomembranes that would be used in such a cover. Therefore, even meeting the new US EPA requirements for landfill covers will only temporarily retard the entrance of moisture into the landfill.

In a section devoted to "long-term considerations: problem areas and unknowns" for landfill liners, the US EPA (1989) concluded,

"The performance of a capped and closed waste facility is critically important. If a breach should occur many years after closure, there is a high likelihood that maintenance forces would be unavailable. In that event, surface water could enter the facility with largely unknown consequences. Thus the design stage must be carefully thought out with long-term considerations in mind."

Another aspect of this issue that needs consideration is the fact that it may be reasonably expected that the liner and leachate collection and removal system (discussed further below) could be expected to function during the few tens of years of the active life of the proposed landfill expansion. That system may well remove much of the leachate that would be generated during the active life developed from precipitation onto the landfill as well as moisture added with the wastes. However, collection of leachate in the system may well present a false sense of security that the "system" is functioning as intended. As discussed further below, that system, subject to deterioration over time, may not be functioning adequately as greater amounts of moisture are introduced through the landfill cover with time after closure. The liner and leachate collection and removal system cannot be reasonably expected to function forever; the failure to detect leachate in the leachate collection and removal system would not evidence the lack of leachate production but rather the failure of the collection system and/or liner. However, the materials in the waste that are of concern to groundwater quality do not diminish over time in the landfill; their only means of escape is through leachate.

Thus, whatever actions are taken during the active life of the landfill to minimize introduction of moisture into the landfill do not address the problems of long-term, post-closure leachate generation in the landfill that would lead to groundwater pollution.

- Second Phase -

"The second phase of protection would be the liner [a composite liner composed of a flexible membrane liner and compacted clay] *which would underlie the refuse fill. **Any** liquid traveling within the fill would be collected and conveyed to extraction pipes*

*above the liner. Although the liner would serve as a barrier to liquid, and the use of a composite liner exceeds regulatory requirements, in the **unlikely event** that **any** liquid would pass beyond the liner, it would be collected in the underdrain piping and similarly conveyed for extraction."* (emphasis added)

The technical issues of liner integrity are addressed in detail in papers presented in the Appendix to these comments. While described elsewhere in the draft EIR as "state-of-the-art," the liner system proposed for the Puente Hills Landfill expansion is without question not "state-of-the-art" even for "dry tomb" landfills. Contrary to the claim made in the quoted statement, the composite liner **does not** "exceed regulatory requirements." The "regulatory requirement" of Chapter 15 is that the engineered system be sufficient to prevent adverse impacts on groundwater quality for as long as the waste represents a threat, which is effectively forever. The minimum design guidance specifications presented in Chapter 15 are not presumed by that regulation to necessarily be sufficient to meet that performance requirement. It is grossly misleading for the draft EIR to claim that the passage of liquid beyond the liner would be an "unlikely event" for the reasons discussed below.

One of the issues that should have been addressed in the draft EIR, which is well-known in the technical landfill literature, is the potentially limited durability of the flexible membrane liner (FML) (geomembrane-plastic sheeting). A review of the technical literature on the durability of the liner system components that are proposed for the Puente Hills Landfill expansion shows that both the geosynthetic (i.e., polymer-based) and geologic (i.e., soil-based) components of the liner system are subject to failure. In 1988, the US EPA Hazardous Waste Engineering Research Laboratory (HWERL) convened an ad hoc technical committee to review the "Service in Landfills of Flexible Membrane Liners and Other Synthetic Polymeric Materials of Construction." A primary conclusion of that committee regarding durability and functioning of geomembrane liners, as reported by Haxo and Haxo (1988), was

"The polymers that were discussed and first-grade compounds based on these polymers should maintain their integrity in landfill environments for considerable lengths of time, probably in terms of 100's of years. Nevertheless, when these polymers or compounds are used in products such as FMLs, drainage nets, geotextiles, and pipe, they are subject to mechanical and combined mechanical and chemical stresses which may cause deterioration of some of the important properties of these polymeric products in shorter times."

In addition, Haxo and Haxo reported on *"areas of concern that may affect the service life of components of liner systems and the functioning of the liner system as originally designed."* Those "areas of concern" included:

"The combined mechanical and chemical stresses under which the liner system functions may cause cracking and breaking of the components due to environmental stress-cracking or possibly to mechanical fatigue under long service."

* * *

"Seams of FMLs continue to be an area of concern, as none of the test methods truly assess

the effects of long-term exposure in landfills."

* * *

"Clogging of drainage and detection systems continues to present a problem. The clogging can be by biological clogging due to growth or sedimentation or through precipitation of dissolved constituents."

Mitchell and Jaber (1990) stated,

"In waste containment applications, however, conditions do not remain the same. The permeation of a compacted clay liner by chemicals of many types is inevitable, since no compacted clay or any other type of liner material is either totally impervious or immune to chemical interactions of various types. In addition, most clay liner systems are subjected to distortional stresses that may cause differential movement. If these movements lead to formation of open cracks, then the liquid retention ability of the system will be lost."

Therefore, Mitchell and Jaber (1990) recognized that soil-clay liners may be subjected to chemical and mechanical stresses within a landfill that diminish their ability to serve as effective liners.

The US EPA (1989) stated with regard to problems with clay liners in landfills,

"While clays do not experience degradation or stress cracking [compared with FML's], *they can have problems with moisture content and clods. High concentrations of organic solvents, and severe volume changes and desiccation also cause concern at specific sites."*

Based on the Second Law of Chemical Thermodynamics, plastic sheeting can be expected to deteriorate over time and fail to function as an effective liner for landfills to prevent leachate from migrating through it. In its proposed Subtitle D regulations governing municipal solid waste landfills, the US EPA (1988a) stated,

"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."

In addition, the US EPA (1988b) stated with reference to lined municipal solid waste landfills,

"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."

Koerner *et al.* (1990) stated:

"Perhaps the most frequently asked question regarding geomembranes (or any other types of

geosynthetic material) is, 'how long will they last?' The answer to this question is illusive (in spite of a relatively large data base on polymer degradation) mainly because of the buried nature of geomembranes. Soil burial greatly diminishes, and even eliminates many of the degradation processes and synergistic effects which have been most widely investigated by the polymer industry for exposed plastics. However, different degradation processes coming from chemical interactions and extremely long time frames may be involved via exposure to liquids like leachate for systems intended to last for many decades or even hundreds of years. Thus the lifetimes of buried geomembranes can be significantly different than exposed plastics, but a quantitative method to predict 'how long' is still not available."

* * *

"While accelerated test methods are attractive to assess the various phenomena, these procedures may significantly misrepresent the actual long-term performance of geomembranes."

In a subsequent paper Koerner *et al.* (1991) stated with regard to long-term durability of geomembranes:

"Several phenomena can accelerate the individual degradation mechanisms, but quantifying these synergistic effects is complicated, the database is weak."

* * *

"We know what geomembranes can do but still haven't learned exactly how long they will last."

One of the primary concerns with the long-term durability of HDPE liners is stress-cracking. Shortly after plastic sheeting constructed of HDPE began to be used as liners for waste ponds, problems with large cracks' appearing in the plastic sheeting were found to occur after liners had been installed; visual inspection of the liners in the ponds revealed that large cracks had developed in the HDPE, typically near seams. Those cracks have been characterized as "stress-cracks" or "brittle fractures." Examination of the literature on that topic indicates the potential importance of the stress-cracking failure mechanism in the long-term stability of liners for municipal solid waste landfills. For example, Peggs and Carlson (1990) discussed the stress-cracking (brittle fracture) of HDPE and stated,

"The common concept of polyethylene [of which HDPE is one type] *in geomembrane form is that of a compliant ductile material that yields at 12% elongation but will actually break only after reaching 800% or more elongation. That is so, but over extended periods of time polyethylene will also fail by brittle cracking at essentially zero elongation.*

Within two years of installation, brittle cracks have developed in geomembrane liners exposed on the side slopes of liquid impoundments. Such cracking has occurred at stresses well below the yield stress of the material."

Peggs and Carlson (1990) also discussed the experience with stress-cracking with polyethylene (PE) pipe, including HDPE pipe. They reported that at the time the pipes were first installed, it was thought that they would readily provide 50 years of service. However, according to Peggs and Carlson (1990),

"After as little as two years, it was found [3] that a large amount of the installed pipe was cracking in a brittle manner, necessitating extensive replacement programs." They also stated, *"Stress cracking is a fundamental characteristic of PE and, as previously mentioned, occurs to different degrees in different resins."* and concluded, ***"Brittle fracture, including the various forms of stress cracking, fatigue, and slow crack growth, occurs in PE geomembrane. This fact must be recognized, acknowledged, and investigated further."***

Halse *et al.* (1990) stated,

"The surface temperature of the FML's can be reduced significantly by using some type of cover materials, thereby ***reducing*** *the stress cracking potential of the FML's."* (emphasis added). They went on to state, *"Minimizing the surface temperature and direct sunlight exposure will* ***probably extend*** *the performance of these materials."* (emphasis added).

At two different conferences-seminars, Koerner has discussed the stress-cracking phenomenon and indicated to the audiences that he cannot be certain that stress-cracking will not occur in landfill liners.

In a recent review of stress-cracking in geomembrane liners for landfills, Waters (1992) stated with reference to a statement made by another investigator that he had not seen stress-cracking in the field,

"His statement lends credence to the claim that this concern is largely overstated. Yet the phenomenon is well-documented and can only be slowed, not eliminated."

Stress-cracking is an example of the kind of problems that can occur with liners. The long-term properties and stability of HDPE FML's are poorly understood. The literature clearly does not support the position that flexible membrane liners of the type being used today and those proposed for the Puente Hills Landfill expansion will prevent leachate migration through them for as long as the wastes represent a threat to groundwater quality.

Therefore, the implications of the draft EIR that the liner system will be a significant barrier to leachate-pollution of groundwater for as long as the wastes represent a threat is not in keeping with the literature. There is no indication in the literature, nor would it be expected to be found, that HDPE liners in landfills would function perfectly forever, i.e., for as long as the wastes represent a threat, as an impermeable barrier to leachate transport.

Bonaparte and Gross (1990) stated,

"Liquid flows have been observed from the leakage detection layers of many double-lined landfills and surface impoundment facilities."

They went on to conclude,

"Based on the data in this study, an action leakage rate of 50 lphd [liters per hectare per day] *is too restrictive and presents a performance standard that, if promulgated by USEPA, frequently will not be met by facilities that were constructed to present standards with rigorous third-party CQA programs. An action leakage rate of 200 lphd appears to be reasonable for landfills that have been constructed using rigorous third-party CQA programs."*

Bonaparte and Gross found that double liners in landfills constructed with rigorous quality assurance and quality control for liner construction, leak at a rate of about 200 liters/hectare/day shortly after placement in service; that leakage rate is about 7,800 gallons per acre of landfill liner per year. This means that annually thousands of gallons of leachate can pass through an acre of a landfill's double-liner. For the area that will be covered by the Puente Hills Landfill expansion, that leakage rate has the potential to pollute large amounts of groundwater.

The liner "action leakage rate" referred to by Bonaparte and Gross is the rate of liner leakage that is considered to represent "failure" of the liner system. As Bonaparte and Gross indicated, the US EPA has proposed a "threshold" "action leakage rate" of 50 liters/hectare/day. **Bonaparte and Gross found that even new landfills with the best of liner construction cannot be expected to meet that performance standard and recommended that it be quadrupled in order that landfills can be in "compliance" with the US EPA regulations.**

The findings of Bonaparte and Gross (1990) on this issue are in accord with those reported in 1989 by the US EPA. In a discussion of the requirements for hazardous waste landfill liner design, construction, and closure, the US EPA (1989) stated,

"EPA realizes that even with a good construction quality assurance plan, flexible membrane liners (FMLs) will allow some liquid transmission either through water vapor permeation of an intact FML, or through small pinholes or tears in a slightly flawed FML. Leakage rates resulting from these mechanisms can range from less than 1 to 300 gallons per acre per day (gal/acre/day)."

The key to achieving a composite liner is the ability of the contractor to achieve intimate contact between the flexible membrane liner (FML) and the underlying soil layer throughout the lined area. In theory, such liners minimize leakage better than either component alone or both components not in intimate contact. However, it is recognized that it is difficult, if not impossible, to keep leakage rates as low as those estimated based on the attainment of a true composite liner, under field conditions. In areas in which intimate contact between the FML and compacted soil is not

achieved, the liners act separately, not as a composite; the components of a composite liner acting alone or separately are capable of transporting leachate at high rates. In describing "Leakage through a composite liner" Giroud and Bonaparte (1989) stated,

"A composite liner is comprised of a geomembrane upper component and a low-permeability soil layer lower component. Therefore, leakage migrates first through the geomembrane component and, then, through the soil component." "...there are two mechanisms by which leakage can migrate through a geomembrane: permeation through the geomembrane (i.e. flow through a geomembrane that has no defects); and flow through geomembrane defects such as holes or pinholes."

With regard to the achievement of intimate contact between the FML and the compacted soil layer component, Giroud and Bonaparte (1989) stated,

"There may be no space between the geomembrane component and the soil component of a composite liner if the geomembrane is sprayed directly onto the low-permeability soil layer. This technique is not very often used, and, in the more usual case of a geomembrane manufactured in a plant, there will be some space between the geomembrane component and the soil component of a composite liner in almost all applications because: the geomembrane has wrinkles (note that geomembrane wrinkles may exist even under very high pressures as shown by Stone [14]); there are clods or irregularities at the underlying soil surface; and/or even if the underlying soil surface is apparently smooth, the geomembrane bridges small spaces between soil particles."

Later in the document they stated with reference to composite liners,

"In fact, geomembranes are never in close contact with the soil (with the possible exception of geomembranes sprayed directly onto the soil) because of small soil surface irregularities that are bridged by the geomembrane."

Giroud and Bonaparte (1989) concluded,

"In spite of their limitations, the tests show that composite liners are significantly more effective than either low-permeability soil liners or geomembrane liners. However, the test results also indicate that composite liners as they are usually built (i.e. by unrolling a geomembrane on a layer of low-permeability soil) do not perform as well as an ideal composite liner, which would be made of a geomembrane in perfect contact with a low-permeability soil (i.e. a geomembrane sprayed on the soil)."

Exhibit 3-21 in the body of the draft EIR is a photograph of the Canyon 9 liner, which is supposed to be a composite liner. That photograph reveals that the FML is not in intimate contact with the underlying compacted clay over much of the illustrated area; there are many wrinkles, folds, and buckles in the FML which prevent the attainment of a true "composite liner" and the associated

enhanced leachate-migration-retardation characteristics. Therefore, leachate migration through that liner system will be at much higher rates than expected for a new, truly composite liner. The composite liner of the type proposed for the Puente Hills Landfill expansion will not prevent leachate migration for as long as the wastes pose a threat to water quality. It is evident that composite liners leak when placed into service at sufficient rates to violate Chapter 15 requirements, and that over time the composite liner that is proposed for the Puente Hills Landfill expansion will deteriorate in its ability to retard leachate migration through it.

In October 1991, the US EPA (1991a) promulgated the regulations governing the disposal of wastes in municipal landfills. Those regulations required that composite liners be used to line municipal solid waste landfills. The US EPA acknowledged that its minimum requirements (a composite liner) will not prevent groundwater pollution. However, RCRA does not require the same degree of groundwater quality protection as required in California by Chapter 15. Chapter 15 is explicit in requiring that there be no impairment of uses of groundwater for as long as the wastes represent a threat. A single-composite liner of the type proposed for the Puente Hills Landfill expansion will not comply with Chapter 15 requirements.

As discussed by Lee and Jones (1991b) (See Appendix), some states such as New York and New Jersey recognized several years ago that single-composite liners are not adequate for groundwater quality protection. Those states adopted double-composite lining requirements. Contrary to the claim repeatedly made in the draft EIR for the Puente Hills Landfill expansion that its proposed single-composite liner was "state-of-the-art," Daniel and Koerner (1991) indicated that the current state-of-the-art design of landfill liners incorporates a double-composite liner. However, even double-composite-lined systems constructed and operated as is typically done today will ultimately fail to prevent groundwater pollution by landfill leachate.

Another issue that has not been addressed in the draft EIR is the permeation of organics through HDPE flexible membrane liners. It has been known for some time that certain organic chemicals such as organic solvents, many of which are known or suspected carcinogens, can pass through intact (no holes) HDPE liners used for solid waste landfills. While it is sometimes asserted that organic permeation through HDPE liners only occurs from concentrated solutions of organics, recent research results from the University of Wisconsin (Sakti *et al.* 1991, 1992) provide confirmation that low molecular weight solvents in dilute aqueous solutions will readily pass through intact HDPE liners. From their study of the permeation of m-xylene, toluene, trichloroethylene (TCE), and methylene chloride from dilute aqueous solutions through HDPE geomembrane liner material, Sakti *et al.* (1991) reported,

> *"These chemicals penetrated through 0.76, 1.52, and 2.54 mm HDPE geomembranes in about one, four, and thirteen days, respectively."*

2.54-mm HDPE is equivalent to 100-mil HDPE liner material. The HDPE liner material proposed for the Puente Hills Landfill expansion is only 80-mil. Sakti *et al.* also found that stretching a geomembrane by 5% (such as could readily occur in liner installation) increased the rate of permeation. Sakti *et al.* (1991) concluded that a geomembrane would have to be on the order of 7.3

cm (about 3 inches) thick to prevent organic permeation for a period of 25 years. After that period of time, those organics would pass even that thickness of liner. It is evident that organic permeation through intact HDPE liners is of concern since the organic solvents of concern can be readily purchased in hardware stores and are commonly used by the public for cleaning purposes. As discussed by Lee and Jones (1991b), small amounts of these solvents can pollute large amounts of groundwater. For example, TCE can be purchased at hardware stores and a partially full container of TCE could be expected to be discarded in household trash and pass into a landfill without being detected by a trash inspection program. Eventually the can will rust out and the TCE remaining in the can at the time of disposal could pass through the liner, even one without any holes, and pollute millions of gallons of groundwater with concentrations of carcinogens above those allowed by the Department of Health Services for drinking water.

The language of the draft EIR indicates that **all** leachate would be collected by the liner/leachate collection and removal system. It is well-known, however, that that is not the case. Leachate collection and removal systems do not collect all leachate; they collect only part of the leachate even while they are functioning. The functioning of a leachate collection and removal system depends on the integrity of the flexible membrane liner (geomembrane - plastic sheeting) to prevent leachate from passing through the lower liner of compacted soil into the groundwater system. Bonaparte and Gross (1990) found that leakage through holes in a landfill membrane liner would be expected to occur at a rate of at least 20 gal/acre/day shortly after the landfill is placed in service.

A leachate collection and removal system of the type proposed for the Puente Hills Landfill expansion theoretically operates as follows. Leachate generated in the waste passes down through the sand (or geocomposite) until it reaches the liner; it then flows along the top of the liner to a sump where it can be removed. It is sometimes asserted that, due to the capabilities of the leachate collection system, there is little potential for the buildup of a sustained leachate head on the liner. As discussed below, there will be locations within the proposed landfill where a sustained leachate head (ponding of leachate) can develop and therefore leaks through the holes that exist in the FML shortly after the landfill is placed in service will occur at a greater rate than if the sustained head were not present. Landfill proponents also assert that if there is no sustained leachate head, there is no potential for leakage. Such an assertion is not technically correct. A sustained head is not a prerequisite for leakage. Leaks will occur even without buildup of sustained head. It is not necessary that there be any head of leachate to drive it through the liner, although the rate of leakage will be affected by head. Leakage through holes in the liner can occur by unsaturated contaminant transport for which there is no measurable head of leachate, in the normal sense.

Further, an important factor that is now becoming widely recognized is that the porous layers in leachate collection and removal systems used for municipal landfills tend to become clogged or blocked by biological growths, thereby leading to ponding of leachate behind clogged areas; such ponding contributes to greater rates of leachate transport through holes in the liners.

The US EPA (1989) stated with regard to problems with clogging of leachate collection and removal systems,

"Clogging is the primary cause of concern for the long-term performance of leachate collection and removal systems. Particulate clogging can occur in a number of locations. First, the sand filter itself can clog the drainage gravel. Second, the solid material within the leachate can clog the drainage gravel or geonet. Third, and most likely, the solid suspended material within the leachate can clog the sand filter or geotextile filter."

The US EPA (1989) also stated,

"Biological clogging can arise from many sources including slime and sheath formation, biomass formation, ochering, sulfide deposition, and carbonate deposition." "Sand filters and geotextile filters are most likely to clog, with gravel, geonets, and geocomposites next in order from most to least likely."

Koerner and Koerner (1990) presented the results of a study of biological growth-induced clogging of geotextile filters used in municipal solid waste landfill leachate collection and removal systems. They indicated that municipal landfill leachate is particularly prone to cause biological growth-induced clogging of leachate collection and removal systems because of the warm temperatures and abundant food sources for microorganisms.

Thus, the leachate collection and removal systems, including the type designed for the proposed Puente Hills Landfill expansion, can leak from the time of construction and will deteriorate over time, becoming increasingly less efficient in collecting leachate. Further, biological growths within the porous layer of the leachate collection and removal system will clog the system leading to ponding on the liner, increasing the rate of leakage in those areas.

Examination of the performance characteristics of the geomembrane liner and composite liner proposed for the Puente Hills Landfill expansion leads to the undebatable conclusion that such a liner will not contain/isolate the wastes from the waters of the state so that they do not cause degradation-use impairment of those waters. Such liners will not prevent leachate migration. Further, over the period of time that the wastes represent a threat to groundwater quality, their integrity and performance will degrade. Therefore, contrary to claims made in the draft EIR, the proposed Puente Hills Landfill expansion does not conform to the requirements set forth in Chapter 15. The draft EIR significantly misleads the decision-makers and the public regarding the ability of the proposed landfill expansion to protect the waters of the State in the short-term and the long-term.

- Third Phase -

"In the next phase of protection, continuity between onsite perched water and offsite alluvium waters would be severed by the subsurface barrier, a cement and clay wall, which is installed underground and keyed into bedrock. Any water collected behind the barrier would be extracted from wells located upstream from the barrier."

Subsurface barriers of this type cannot be considered to be 100% effective in preventing leachate-contaminated groundwater from migrating from the landfill site to the aquifer system hydraulically connected to the area beneath the landfill. Based on the characteristics of the transport of groundwater in fractured rock systems, such as that which underlies the Puente Hills Landfill, it is unreliable and misleading for the draft EIR to claim that the so-called subsurface barrier would prevent groundwater contamination in the San Gabriel Valley Basin. Such barriers can be effective in controlling the near-soil-surface transport of leachate-contaminated groundwater as long as the integrity of the barrier is maintained and **all** leachate-contaminated groundwater that accumulates behind the barrier is removed. It would be indeed rare that such conditions could be achieved even when the barrier is new; it is strongly contrary to best professional judgement to assert that the barrier system will function perfectly for as long as the wastes represent a threat, i.e., forever.

A variety of conditions are widely recognized to cause such a barrier to be ineffective in "severing" the continuity between onsite perched water and offsite alluvium waters. Such conditions include cracks or areas of higher permeability in the barrier that exist at the time of construction as well as those which develop over time, and ineffective functioning of the water extraction system that would preclude the reliable capture of all contaminated waters so that none passes around the barrier. Municipal landfill leachate-contaminated groundwaters are known to contribute to sever clogging problems of extraction wells, rendering wells ineffective in extracting contaminated groundwater. Further, the zones of capture of even well-functioning extraction wells, especially those in fractured bedrock systems, are difficult if not impossible to define and manage. Thus, even if the barrier system were to function effectively at the time of installation, it is highly inappropriately to assert that that barrier system could be expected to function perfectly forever. In addition, it is unlikely that the barrier would intercept all potentially significant fractures that could serve as transport pathways for leachate-contaminated groundwater. It must therefore be concluded, contrary to the statements and claims made in the draft EIR, that the barrier system would not prevent leachate-contamination of groundwater in the San Gabriel Valley Basin by the proposed Puente Hills Landfill expansion.

The Geoscience Support Services September 1992 report (which is part of the record for review of the draft EIR on the proposed Puente Hills Landfill expansion) reviewed the issues of the potential for migration of landfill leachate-leakage through the liners and through the substratum to region's groundwaters which are important sources of domestic water supply. It was the conclusion of that report based on previous studies conducted by those who have investigated the area on behalf of the Districts, that there is a significant potential for groundwater pollution associated with the proposed expansion of the landfill. This is the opposite of what has been claimed by the Districts in the draft EIR and in verbal testimony at the public hearings.

Municipal landfills represent a tremendous threat to the groundwater resources of the San Gabriel Basin. Not only does landfill leachate destroy the use of the affected groundwater for domestic water supply purpose, but it also destroys the use of the affected part of the aquifer for conjunctive-use storage of surface waters collected during wet periods. It is becoming widely recognized that every possible effort should be made to protect groundwater and aquifer quality from pollution by landfill leachate.

- Fourth Phase -

"Lastly, to ensure that no contamination has passed beyond the barriers, monitoring wells would be located downstream of the barriers and sampled regularly."

The fallacy of this claim is self-evident: groundwater monitoring cannot *"ensure that no contamination has passed beyond the barriers"* since by the time leachate contamination of the groundwater is detected by groundwater monitoring, the contamination would have already passed beyond the so-called "barriers." As quoted below, Article 5 of Chapter 15 requires that there is to be no pollution of groundwaters of the State at the point of compliance which is the downgradient edge of the landfilled waste, and that leachate-pollution of groundwater at the point of compliance be detected at the earliest possible time. By the time the groundwater monitoring system detects leachate, damage has already occurred in violation of the requirements of Chapter 15.

Decision-makers, professionals, and members of the public who are not familiar with the current state of information on the ability of groundwater monitoring programs at lined landfills to detect leachate-pollution of groundwater at the point of compliance at the earliest possible time before widespread contamination of groundwater has occurred, are led to believe by the draft EIR that the groundwater monitoring program proposed and/or that can be readily developed will reliably detect groundwater pollution, which can then be mitigated to below levels of significance. This would lead a reader to conclude that the proposed landfill does not represent a threat to the groundwater resources in the area of the landfill. However, as discussed in a paper entitled, *"Ground Water Quality Monitoring at Landfills: It's Time to Stop Deceiving Ourselves and the Public,"* (Lee and Jones, 1992a) (See Appendix) the groundwater monitoring programs of the type typically proposed for lined landfills have a low probability of detecting groundwater pollution before widespread pollution has occurred. Monitoring programs that are typically, or that can be readily, developed for a landfill such as the proposed Puente Hills Landfill expansion and site will not detect groundwater pollution before significant groundwater pollution occurs.

An important factor to consider in the evaluation of the ability of lined landfills to provide protection of groundwater quality is the ability to monitor for leakage before widespread groundwater contamination occurs from landfill leachate. Article 5 of 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, a sufficient number of monitoring wells is to be located so that they

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

Section 2550.5, Article 5, of Chapter 15 states with regard to monitoring points and the point of compliance,

"(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. For each waste management unit, the regional board shall specify monitoring points at the point of compliance and additional monitoring points at locations determined pursuant to Section 2550.7 of this article at which the water quality protection standard under Section 2550.2 of this article applies and at which monitoring shall be conducted."

The typical groundwater monitoring program being used today for lined landfills, such as that proposed for the Puente Hills Landfill expansion, involves the placement of a few wells up-groundwater gradient and several wells down-groundwater gradient spaced hundreds of feet apart at the point of compliance for the landfill monitoring program. It is becoming widely recognized that such a monitoring program has a low probability of detecting leakage through a landfill liner at the "earliest possible" time as required by Chapter 15, Article 5.

The basic problem is that the typical groundwater monitoring program described above was designed for monitoring groundwater associated with unlined landfills from which leakage would occur over a considerable part of the bottom of the landfill. Under those conditions, the plume of leachate-contaminated groundwater would generally move downgradient as a wide front across the landfill; therefore, close well-spacing was not critical. However, as discussed by Lee and Jones (1992a) lined landfills will initially leak from holes, imperfections, or areas of high permeability in the liners. It has been established (Cherry, 1990) that the lateral spread of a leachate-contaminated groundwater plume is very limited. Smyth (1991) reported that the results of a study of the lateral dispersion of leachate plumes showed that a 0.6 m (2-ft) wide source of contaminant spread laterally to about 2 m (6 ft) after travelling 65 meters in a homogeneous sand aquifer system. Thus the leakage from point sources such as holes in landfill liners will move downgradient as "fingers" of leachate rather than in fan-shaped plumes. This means that the wells used for monitoring lined landfills must be close enough together to detect fingers of leachate, if the monitoring program is to comply with Article 5, Chapter 15 requirements of detecting leachate at the earliest possible time.

The typical monitoring wells used today involve a four- to eight-inch diameter borehole. Normally those wells are purged by removing three to five borehole volumes prior to sampling at quarterly or so intervals. This means that the zones of capture for such monitoring wells are on the order of a foot about each well. Therefore, monitoring wells that are spaced hundreds of feet apart downgradient of a lined landfill at the edge of the landfill have a very low probability of detecting the fingers of leachate produced by leaks in the liner system. This is especially true in fractured bedrock systems such as that which occurs under the Puente Hills Landfill. Those fingers of leachate could travel long distances before groundwater pollution is detected.

Parsons and Davis (1992) have discussed the issues of spacing of monitoring wells and the associated zones of capture for waste management units. The monitoring-well-spacing should be such that the monitoring wells have a high probability of detecting leachate-contaminated groundwater at the point of compliance. The fractured bedrock characteristic of the Puente Hills Landfill expansion area makes the monitoring of leachate-pollution of groundwater even more difficult thereby enhancing the probability that leachate-pollution of groundwater will occur beyond the point of compliance.

Therefore, the basic technical premise set forth in the draft EIR - that the monitoring program would provide the last avenue to *"ensure that no contamination has passed beyond the barriers"* - is fundamentally flawed. The decision-makers and the public who rely on the integrity of the draft EIR are being highly misled about the abilities of the groundwater monitoring program to detect leakage at the earliest possible time as required by Article 5 of Chapter 15.

Another key issue that should be discussed in an EIR for a proposed landfill or landfill expansion but was not addressed in the draft EIR for the Puente Hills Landfill expansion is the consequence of the pollution of groundwater by municipal landfill leachate. Some presume that the consequence is simply the need to "clean-up" the groundwater; indeed such a presumption is fueled by the Chapter 15 regulatory requirements for "corrective action" when the containment systems fail to prevent leachate-contamination of groundwater. Such is not the case, however.

The fact of the matter is that there is no way to "clean-up" groundwater contaminated with municipal landfill leachate to render it safe and reliable for domestic water supply purposes. Moreover, there is no way to restore the contaminated parts of the aquifer so that it could be reliable for use for domestic water supply or certain purposes. As discussed above, landfill leachate contains tens of thousands of "conventional pollutants," "non-conventional pollutants" and "Priority Pollutants." While treatment processes are available to reduce the concentrations of certain of those contaminants to levels accepted in drinking water, they are not reliable for reducing the concentrations of all potentially present chemicals to levels below which they could cause adverse impacts to people. Only a small portion of the chemicals present in landfill leachate are quantified in monitoring programs or have analytical procedures for their reliable quantification. Furthermore, the "safe" levels or levels that represent "accepted" cancer risks for most of the chemicals in municipal landfill leachate have not been established; other contaminants are of human health concern at very low levels, some below analytical detection limits. Therefore, there would be no way to determine the sufficiency of treatment even if all chemicals were to be identified and quantified. Prudent public health practice would thus dictate that any contamination of a water by municipal landfill leachate would render that water unsuitable for domestic water supply purposes.

In addition to not being able to reliably "clean-up" leachate-contaminated groundwater, it is not possible to restore a leachate-contaminated aquifer to a character that would allow it to again be a reliable source of groundwater or a reliable aquifer for conjunctive-use storage of wet-weather surface water. Many landfill leachate-derived contaminants that become associated with aquifer solids do not readily disassociated from the solids or only slowly leach from the solids. These issues

are discussed by Lee and Jones (1991c,d,e).

In his review of superfund and groundwater remediation, Rowe (1991) stated,

"The commentary by Curtis Travis and Carolyn Doty on groundwater remediation at Superfund sites (ES&T, October 1990, p. 1464) emphasizes a proverb that is worth repeating: Don't pollute groundwater resources because contaminant plumes have no quick fix. This was underscored 10 years ago when earth scientists at the U.S. Geological Survey stated that, '...deterioration in [groundwater] quality constitutes a permanent loss of water resources because treatment of the water or rehabilitation of the aquifers is presently generally impractical' and 'solutions rest largely in changing [land- and water-management practices] to take into account the susceptibility of the groundwater resources to degradation' (1). Thanks in part to the U.S. Geological Survey, the above proverb comes as no big surprise."

As part of developing the regulatory impact analysis for the Subtitle D regulations governing landfilling of municipal solid wastes (regulations released on October 9, 1991 (US EPA, 1991a)), the US EPA concluded that the contamination of an aquifer by municipal solid waste landfill leachate destroys the contaminated part of the aquifer as a domestic water supply source and requires that a new water supply source be substituted (US EPA, 1988c). The US EPA's updated regulatory impact analysis for municipal solid waste landfill regulations also accepted the fact that once contaminated by municipal landfill leachate, the affected groundwater and aquifer area will have to be abandoned as a water supply and new wells constructed (US EPA, 1991b).

Today, large amounts of money are being spent at "superfund" and other sites in attempts to "clean-up" chemically contaminated groundwaters. The focus of clean-up programs at those sites is the so-called "hazardous" chemicals as defined under RCRA and CERCLA, which are typically the volatile organic chemicals (VOC's) such as trichloroethylene and its transformation product, vinyl chloride. While several years ago it was assumed by some that it would be relatively easy to clean-up VOC-contaminated groundwater, as discussed by Rowe (1991) it is recognized today that the ability to clean-up even VOC-contaminated groundwater is in question. Recently the National Ground Water Association held an international conference entitled, "Aquifer Restoration: Pump-and-Treat and the Alternatives" (Las Vegas, NV, October 1992). A key conclusion from that conference was that while a few years ago it was thought that there was a possibly of being able to clean-up VOC-contaminated groundwater within a few tens of years by pump-and-treat technology, it is now clear that at many sites it would require hundreds to a thousand or more years of groundwater pumping to possibly clean-up a VOC-contaminated aquifer.

Therefore, it must be concluded that a real consequence of landfill leachate-pollution of groundwater is the loss of a groundwater resource and the contaminated portion of the aquifer for domestic and certain other uses. The water and resource would have to be replaced and restitution made to those affected by the lost resource. The failure of the draft EIR for the proposed Puente Hills Landfill expansion to address this issue is a significant deficiency that should cause its rejection.

(Section Paragraph 3)

Paragraph 2 on page 1-11 mentioned issues of surface water management. As discussed in a subsequent section of these comments, there are significant questions about the ability of the Districts to manage surface and groundwater pollution downgradient of the landfill that can be caused by stormwater runoff from the landfill. In the experience of the authors, who have worked on stormwater quality issues since the 1960's, components of the waste-management activities that would be carried out at the proposed landfill expansion will pollute surface and groundwater on adjacent and nearby properties. This issue is discussed further below.

(Section Paragraph 4)

Paragraph 3 on page 1-11 discussed landfill gas and provisions proposed for controlling problems with landfill gas migration from the proposed Puente Hills Landfill expansion. Several aspects of that discussion need to be addressed as it also provides unreliable and distorted assurances of protection.

The first statement made was,

"Landfill gas, produced in the natural decomposition process of refuse, contains trace organics that have the potential to cause odor if not controlled."

There are several aspects of that statement that warrant comment. First, the quoted statement, along with the rest of that discussion of landfill gas, leaves the distinct impression that the only concern about migration of landfill gas is odor. This is certainly not the case. One of the key concerns about landfill gas migration is the potential for explosions in areas where the gas may be trapped, such as in basements or other confined structures into which it could migrate. With the presence of homes, schools, and other buildings in close proximity to the proposed landfill expansion, this issue should have been addressed. Another potentially significant concern about the migration of landfill gas is the ability of the components of the gas to contribute to groundwater pollution. It is also well-known that landfill gas especially in confined areas can be toxic and thus a significant public health threat to owners/users of adjacent and nearby properties.

Second, the quoted statement reflects a lack of understanding regarding the production of landfill gas in a lined, dry tomb landfill and its significance for long-term monitoring and gas management. As discussed by Lee and Jones-Lee (1992b) (See Appendix), the idea of a "30-year" post-closure period evolved from estimates of the rate of fermentation ("stabilization") of fermentable organics in "sanitary landfills" in which no specific provisions were made to retard the input of moisture. Since developing the 30-yr post-closure maintenance concept, the US EPA and many states have adopted and/or are proposing to try to create "dry tomb" landfills for municipal solid waste. The objective for such landfills is to keep the waste in the landfill dry to prevent the formation of leachate. "Dry tomb" landfills include low-permeability caps to reduce the entrance of moisture into the landfill from the atmosphere; siting requirements provide that the wastes are to be placed above the water table. The rate and extent to which stabilization of fermentable wastes occurs in a landfill is directly related to the moisture available. Thus, to the extent that "dry tomb" landfills can meet design objectives to keep the wastes dry, they also reduce the rate and extent to which fermentation takes place in the landfill. Significant "stabilization" would not be expected to occur in a dry tomb landfill until its cap and/or groundwater barrier fail and allow moisture into the landfill. Thus, the 20- to 50-yr "stabilization" period characteristic of unlined "sanitary" landfills has no relevance for modern-day "dry tomb" landfills.

Further, contrary to what some presume, the "stabilization" of fermentable organics in a landfill does nothing to convert many of the chemical components of the wastes to forms that do not represent threats to groundwater quality. For example, fermentation does not reduce the threats to groundwater quality posed by Priority Pollutants, conventional pollutants, or non-conventional

pollutants that are in and derived from the buried wastes. These constituents will be a threat to groundwater quality for as long as wastes and/or their residues are present in the landfill.

The second statement made in paragraph 3 on page 1-11 was,

"The previously described liner would control migration of landfill gas to underlying soils, and a collection system consisting of gas recovery wells, trenches, pipelines, and gas flares would be used to control migration through the surface."

The existing landfill has already caused problems of lateral migration of landfill gas that has been detrimental to adjacent property-owners/users. Similar problems can readily be caused by the proposed landfill expansion.

(Paragraph 5)

The fifth paragraph of this section (which is paragraph 2 on page 1-12) stated,

"Odors potentially produced at the materials recovery and rail loading facility would be controlled through a ventilation system using filters to remove any odors. Storage periods for refuse on the enclosed tipping floor would not exceed 96 hours per regulatory requirements, thus minimizing potential offsite odors."

First, it is highly misleading to make claims that a process will *"remove **any** odors."* The clear implication of the quoted statement was that there would be **no** odors emanating from the facility. The modifier "any" is used liberally in this manner in the draft EIR; such use commonly overstates the degree of assurance that can be reliably provided. Such use is justification for skepticism about the objectivity of the discussion of the issues provided.

Second, the second sentence creates the illusion that there may not be offsite odors; this cannot be realistically expected from the proposed operation and 4-day waste storage on tipping floors. Further the senior noted significant offsite odors on SR-60 during his recent site visit. In addition, the transcripts of the hearings contain testimony of numerous citizens about the odor problems caused by the existing landfill. There can be no legitimate question about the proposed landfill expansion's causing significant offsite odors to the detriment of adjacent and nearby property-owners/users. This problem is exacerbated by the inadequate amount of land buffer between the landfill and adjacent properties, and contributes to the unsuitability of the site for a landfill expansion.

Third, greater protection should be provided for adjacent and nearby property-owners/users than "minimizing" offsite odors. There should be no offensive odors trespassing onto adjacent or nearby properties; adequate pro-active measures should be required rather than reliance on the presumption that meeting "regulatory requirements" will to provide adequate odor control. An adjacent or nearby property-owner/user should not be forced to endure offensive odors and to make complaint about them. As stated elsewhere in these comments, a landfill owner/operator, public or

private, should not have the right to adversely affect the use and enjoyment of adjacent or nearby properties by their owners/users.

(Section Paragraph 6)

Paragraph 6 of this section (which is paragraph 3 on page 1-12) stated,

"Since it is important that only nonhazardous waste be received at the site, an extensive load checking program would be continued at the landfill and would be implemented at the materials recovery and rail loading facility."

It highly unreliable and grossly misleading to give the impression that only materials that cannot adversely affect groundwater quality would be accepted at the landfill. As discussed previously in these comments, the prevention of entrance of hazardous waste into the facility is virtually impossible. Further, even if the accepted wastes were all classified as "non-hazardous," the proposed landfill expansion would, in fact, be accepting, legally, large amounts of hazardous and otherwise deleterious materials that would, when transported to groundwater, render the groundwater unsuitable for domestic water supply purposes.

(Section Paragraph 12)

Section paragraph 12, the fourth paragraph on page 1-13, discussed the control of vectors; it was stated,

"Vectors such as seagulls, flies, and rodents would be controlled as is currently done, by limiting the working face area, the use of daily cover, vegetation of completed areas, the prevention of ponding, and the use of wires suspended over the disposal area."

During his recent site visit, the senior author observed hundreds of seagulls flying over the active area of the landfill. It is highly misleading and unreliable for the draft EIR to indicate that the current approach to control of seagulls is adequate to protect the use and enjoyment of adjacent and nearby properties. There is every reason to believe that the seagull problem, for one, will be manifested over adjacent and nearby properties which, according to the proposed plan, would be only about 1000 ft from the landfill expansion.

Closure and Post-Closure Plans

In the first paragraph on page 1-14, the statement was made,

"Post-closure monitoring and maintenance would continue as long as necessary, probably for 30 to 50 years. Closure and post-closure activities would be fully funded by the monies currently being set aside for the present operating area and by that set aside during the expansion operating period for the same purposes."

The first quoted sentence reflects a serious lack of understanding of the requirements of Chapter 15. Chapter 15 requires that monitoring, maintenance, and provision for corrective action ("remediation") continue for as long as the wastes represent a threat to groundwater quality. As discussed in the Appendices and as noted earlier in these comments, a municipal solid waste landfill represents a threat to groundwater quality for as long as the hazardous and deleterious components of municipal solid waste remain buried at the site. There are no forces acting on the wastes in a dry tomb landfill of the type proposed for the Puente Hills Landfill expansion, that would eliminate such components other than the leaching of waste components once sufficient moisture enters the landfill. Therefore, the buried wastes represent a threat to groundwater quality effectively forever. The suggestion in the quoted statement that the applicant and author of the draft EIR expect that monitoring and maintenance could be discontinued after "30 to 50 years" indicates a lack of understanding not only of the requirements of Chapter 15, but also a lack of understanding of the nature and behavior of chemical contaminants in municipal solid waste landfills. Such lack of understanding should provide adequate technical grounds for rejection of the draft EIR since the post-closure maintenance and activities are key to continued postponement of groundwater pollution by the landfill.

It is unclear why the presumption was made in the draft EIR that funds currently being set aside for the closure and post-closure of the present operating area would be available for closure and post-closure activities at the landfill expansion. The draft EIR provided no specific information on the magnitude of the funds that would be set aside during the active life of the landfill expansion for post-closure activities.

The Appendix to these comments includes a paper entitled, *"Municipal Landfill Post-Closure Care Funding: The '30-Year Post-Closure Care' Myth,"* developed by the authors to discuss the presumption of the sufficiency of a 30-year post-closure care period. It also discusses the widespread recognition that current funding provisions for post-closure care of "dry tomb" landfills is significantly deficient compared to what will ultimately be needed to provide protection of groundwater quality. A good example of the underestimation of post-closure care funding needs was provided by the Azusa Landfill in the San Gabriel Basin. It has been estimated that in the past 10 years, that 80-acre "non-hazardous waste" landfill has polluted more than $100,000,000 in groundwater rendering it unusable for domestic purposes. In addition to providing funds for cover maintenance, groundwater monitoring, etc. *ad infinitum*, post-closure care funding provisions must be sufficient to address the inevitable groundwater pollution. The fact is that very large amounts of money, not currently being planned for, will be needed to halt the inevitable groundwater pollution once it is detected; to remediate the contaminated groundwater to the extent possible; to replace and provide restitution for the lost groundwater resources, since once contaminated by municipal landfill leachate groundwater and the associated aquifer cannot be used as a reliable source of domestic water.

From the description of the Districts' perception of post-closure care activities and duration presented in the draft EIR, the authors conclude that the Districts has not made adequate provision for post-closure care funding for the existing landfill, much less the proposed landfill expansion. Since

the draft EIR does not properly discuss these issue, it must be judged significantly deficient and rejected for failure to meet CEQA requirements.

SUMMARY OF POTENTIAL SIGNIFICANT IMPACTS, MITIGATION MEASURES, AND UNAVOIDABLE SIGNIFICANT IMPACTS

In the discussion of potential significant impacts, mitigation measures, and unavoidable significant impacts on page 1-14, it was stated,

"A summary of potential adverse impacts, proposed mitigation measures that would eliminate or reduce the potential impacts, and any unavoidable significant impacts remaining after mitigation is shown in Table 1-4."

A review of the material presented in Table 1-4, however, shows that the statement quoted above is grossly inaccurate. These deficiencies are discussed in comments on Sections 7 and 8 - "Summary of Unavoidable Adverse Impacts" and "Inventory of Mitigation Measures" presented subsequently.

SPECIFIC COMMENTS ON DRAFT EIR
SECTION 3 - PROJECT DESCRIPTION

PURPOSE AND OBJECTIVES OF THE PROJECT

The second bulleted item in the section describing the purpose and objectives of the project on page 3-2 stated,

"Provide environmentally sound, publicly owned disposal capacity within Los Angeles County to avoid a disposal capacity shortfall in both the near-term and long-term."

Contrary to that statement of purpose, the proposed expansion of the Puente Hills Landfill is not "environmentally sound." At best the provisions made will only postpone groundwater pollution; they will not prevent it. While the Districts' approach may provide for long-term solid waste storage capacity, the environmental and public health protection components of their approach is exceedingly short-sighted in order to achieve garbage "disposal" for costs cheaper-than-real at the expense of the economic and public health welfare of adjacent and nearby property-owners/users and at the expense of the groundwater resources of the region.

OPERATIONS DESCRIPTION

Overview

The first paragraph on page 3-6 repeated a grossly misleading statement made in the Executive Summary,

"The landfill ... would accept only non-hazardous waste and inert wastes ..."

As discussed at length in comments presented above, that quoted statement is highly misleading, and contrary to its implication, does not mean that hazardous materials or chemicals would not be disposed of, legally, in the expanded landfill. An understanding of the nature of materials included in the categories listed as acceptable for disposal makes it clear that significant amounts of hazardous chemicals would be disposed of, legally, in the proposed landfill.

ENVIRONMENTAL CONTROL FEATURES

In the first paragraph on page 3-20 the following statements were made,

"These measures are intended to allow for safe operating procedures and protection of public health at both the proposed landfill expansion site and the proposed materials recovery and rail loading facility."

* * *

"The site would be designed and operated to eliminate the potential for impacts -- extensive state-of-the-art control features would be incorporated, including back-up/secondary containment as an added protection measure."

Those quoted statements could lead someone not knowledgeable in the topic areas pertinent to the approach proposed by the Districts to believe that the Districts' proposed expansion of the Puente Hills Landfill would provide for true, long-term protection of public health and the environment. Such a belief is not justified. The Districts' approach is little better than the minimum necessary just to get by in their perceived view of the permitting process. Those who are knowledgeable in this topic area know that what the Districts are proposing and claiming to be state-of-the-art "control features" and to provide groundwater quality protection the liner systems, are not protective. They are, in fact, less protective the systems mandated by the US EPA on October 9, 1991, i.e., nine months before the draft EIR was released, as the national minimum for landfills of this type. This issue is discussed further below. As mentioned above, the state-of-the-art landfill liners today, as discussed by Daniel and Koerner (1991), is a double-composite liner system, not the single-composite liner that the Districts propose to use. This is another example of the highly misleading and inaccurate information that the Districts provided decision-makers and the public on the proposed expansion of the Puente Hills Landfill.

Groundwater Protection

The first paragraph on page 3-21 stated,

"The composite liner system would prevent the potential migration of liquid from the refuse

(leachate) and the migration of landfill gas into the soil layers beneath the fill. The composite liner system would consist of (from bottom to top) a subdrain, a clay liner, a synthetic liner, a leachate collection and removal system, a geotextile filter, and a protective soil layer."

As discussed elsewhere in these comments, the proposed composite liner system will not prevent the migration of liquid (leachate-garbage juice) from the refuse, or the migration of landfill gas into the soil layers beneath the fill. The facts are that

•shortly after the landfill is placed into operation, there will be some leakage of leachate through the liner. Further, landfill gas will be able to penetrate through the liner at that time.

•the waste present in the proposed landfill would be a threat to groundwater quality forever. The landfill liner system chosen by the Districts will not prevent leachate migration through it forever.

•the ability of the proposed landfill liner system to prevent leachate and gas from migrating through it will deteriorate over time; the liner system will eventually become an ineffective barrier to leachate and gas migration.

There is no question that ultimately, potentially significant migration of leachate and gas will occur from the landfill expansion. The gas will be a significant threat to adjacent and nearby property owners/users, and the leachate will be a threat to the quality of the groundwater resources in the area.

The first paragraph on page 3-21 continued,

"Installing both a clay liner and a synthetic liner would exceed the Regional Water Quality Control Board (RWQCB) requirements for the proposed site."

Problems with composite liners in providing protection of groundwater quality were discussed elsewhere in these comments. Further, based on its actions last June, the Regional Water Quality Control Board has concluded that even double-composite liner systems will ultimately leak; as a result, the RWQCB banned the siting of landfills in sand and gravel pits in the LA Basin. The draft EIR claim regarding what the RWQCB would require for the proposed Puente Hills Landfill expansion is out-of-date. Chapter 15, Article 4, Section 2540(c) mandates that

"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."

The Regional and State Boards are now beginning to realize that the plastic sheeting and compacted soil liners of the type that the Districts proposed for use at the Puente Hills Landfill expansion cannot comply with the requirement of Chapter 15 to prevent impairment of groundwater quality for as long as the wastes represent a threat, i.e., forever. Obviously those liner components and the system as a

whole will not function perfectly forever. Since the liner system will be buried under hundreds of feet of garbage, it cannot be inspected and repaired when it fails to prevent large amounts of leachate migration through it. It is therefore obvious that the Districts' statements in the draft EIR about being able to prevent leachate and gas migration through the liner system are not accurate.

SPECIFIC COMMENTS ON DRAFT EIR
SECTION 4 - EXISTING CONDITIONS, PROJECT AND CUMULATIVE IMPACTS, MITIGATION MEASURES, AND LEVEL OF SIGNIFICANCE AFTER MITIGATION

AESTHETICS/VISUAL RESOURCES

In the section entitled, "Onsite Aesthetics," on page 4.1-1, it was stated,

"The existing Puente Hills Landfill is a Class III, 'cut and fill' landfill ... "

According to Chapter 15, the site selected for a Class III landfills is to be suitable to prevent the impairment of use of groundwater. If the proposed site does not meet that siting requirement, the owner/operator may try to use containment system to engineer protection of groundwater quality. As stated in Chapter 15, the engineered alternative containment system must meet the performance standard of not causing impairment of use of groundwater required of natural geological strata.

In the early 1980's, those involved in developing Chapter 15 thought that it may be possible to engineer containment systems (e.g., including combined plastic sheeting and clay layers) that would provide protection equivalent to natural geologic strata. It is now well-known, however, that none of the materials that are used today including compacted soil-clay and plastic sheeting, will provide for unequivocal protection of groundwater quality from landfill leachate for as long as the wastes represent a threat. It is therefore clear that the engineered alternatives discussed in Chapter 15 are badly out-of-date and will not ensure compliance with the overriding performance standard set forth in Chapter 15 of preventing impairment of use of groundwater from waste leachate.

If California is to maintain its ability to regulate landfills, Chapter 15 will have to be revised to comply with the new federal requirements promulgated on October 9, 1991 for Subtitle D (municipal solid waste) landfills. When those revisions are made, there will be an opportunity to address the significant deficiencies that exist in the language of Chapter 15 regarding engineered containment systems. The people of California will have to decide at that time whether they will allow continued construction of landfills, such as the proposed landfill expansion, that are virtually certain to pollute groundwater resources at some time in the future (owing to the insufficiency of the containment systems and society's approach to long-term maintenance) in order to enjoy their short-term rewards of garbage disposal for costs cheaper-than-real. As discussed elsewhere, the additional costs will be paid, if not by today's garbage generators, then by future generations in lost or diminished water resources for the region, diminished use and value of adjacent and nearby properties, public health and welfare impairment, and financial resources. If the state chooses not to maintain its ability to regulate landfills, then the US EPA will impose much stricter standards for landfilling of municipal

solid wastes than those set forth in the draft EIR.

Groundwater resources, including the groundwater itself and the aquifers that can be used for conjunctive-use storage, are of great importance for the state of California for its residents, industries, and economic maintenance and development. If this resource is to be available to future generations, today's society will have to start paying the full cost to properly manage the municipal solid wastes it generates; this will mean that cheaper-than-real garbage "disposal" will no longer be able to be practiced and that more costly management approaches that will, in fact, protect groundwater quality will have to be practiced.

Page 4.1-3 discussed the proximity of the proposed landfill expansion to adjacent properties. The authors were astonished that any public agency such as the Districts would propose to site a landfill operation in the immediate vicinity of existing residences and schools. It is the authors' opinion that such was a callous and irresponsible choice on the part of the landfill applicant, made without due regard for the health and welfare of adjacent and nearby property owners/users. Familiarity with the nature and character of today's "modern" lined, "dry tomb" municipal solid waste landfills (that should be had by an entity charged with the development and advocacy of a landfill) should obviate even the passing consideration of such a site. Without question, the use and enjoyment of owners/users of adjacent and nearby properties will be adversely affected by the Districts' proposed Puente Hills Landfill expansion. In proposing the expansion, the Districts are opting to perpetuate the myth that municipal solid waste can be "disposed" at cheaper-than-real costs for the waste generators; the reality is that such is done at the expense of public health and welfare of area residents and the groundwater resources of the region. Having examined the impacts of municipal solid waste landfills for the past 20 years, the authors believe that area residents are fully justified in opposing the siting of the proposed Puente Hills Landfill expansion, and are not simply "NIMBY's," since there is no question that the proposed landfill expansion would be adverse to their health and welfare.

In order to properly address concerns of adjacent and nearby property-owners/users, the landfill applicant's property must incorporate an adequate land buffer about the fill area so that the obnoxious and deleterious impacts associated with the operation of the landfill can be controlled during the active life of the landfill. A landfill applicant does not have the right to rely on "buffers" that may be afforded by others' properties.

GEOLOGY AND SEISMICITY

Pages 4.3-2 to 4.3-6 presented a discussion of the geologic setting for the existing Puente Hills Landfill and the proposed landfill expansion. From the information presented it may be concluded that the site is highly unsuitable for a lined, "dry tomb" landfill of the type proposed. The geology of the region is extremely complex and contains a wide variety of relatively high-permeability layers. There is also significant fracturing of the geological strata so that there could readily be transport of leachate that would pass through the liner into the underlying geologic strata.

The high-permeability layers and fractures, and the high groundwater table also render the Puente Hills site virtually impossible to reliably monitor for leachate migration in the underlying geological strata. These characteristics, coupled with the high probability of seismic activity in the vicinity of the landfill as discussed on pages 4.3-7 and 4.3-8, should cause this site to be considered unsuitable for a landfill.

HYDROGEOLOGY

Section 4.4 presented a discussion of those hydrogeologic characteristics of the site that the authors of the draft EIR chose to bring to the attention of the public. The commenters' (Lee and Jones-Lee) have had many years of experience reviewing proposed landfill applications, experience that has included the review of more than a dozen draft or final EIR's for landfills in California in the past 2 years. The discussion of the hydrogeology and groundwater pollution issues presented in the draft EIR for the Puente Hills Landfill expansion is the most inadequate the authors have encountered in such documents. It is not unusual for EIR's prepared by landfill applicants or on their behalf to not comply with CEQA requirements to provide full disclosure of issues of the potential for groundwater pollution from the proposed or expanded landfill. However, EIR's generally provide sufficient data so that a reviewer knowledgeable in the topic can review the information provided and make his/her own judgement as to whether there is sufficient justification for the claim that the proposed landfill liner-containment system will protect groundwater quality for as long as the wastes represent a threat as required by Chapter 15. The Districts' draft EIR for the Puente Hills Landfill expansion, however, does not provide the information that should have been provided to allow decision-makers and the public to assess the reliability of the claims and statements made in the draft EIR that the so-called containment system will protect groundwater quality in accord with Chapter 15 requirements.

The entire section on "hydrogeology" abounds with vague comparative terms such as "low permeability," "higher permeability," "more water quality," etc. The meaning and implication of such terms and phrases are subjective; they do not have uniform or consensus meaning. A scientist or engineer working on such topics would be expected to report the actual values that led him/her to use the subjective descriptive terms of "poor" or "good," etc. regarding the significance of a particular numeric value. Since the Districts themselves were responsible for their own draft EIR, the document's authors should have gone to significant lengths to provide the objective information in order to quell concerns about their drawing self-serving conclusions about the acceptability of the proposed project. Instead, inaccurate, unreliable, and highly misleading statements and claims were made to the benefit of the applicant and the detriment of public health and groundwater resource protection. The draft EIR should be rejected as being grossly inadequate because of these inadequacies; the Districts should require those who would continue to try to site a landfill expansion in the proposed area to start over and provide reliable information to the public on the groundwater pollution issue.

The discussion of regional hydrogeology on pages 4.4-1 to 4.4-3 pointed out that the existing landfill and proposed landfill expansion area is hydraulically connected to the San Gabriel Valley Basin where surface water runoff and groundwater and could transport contaminants from the landfill

to the groundwaters of the basin. It further points out that the San Gabriel Valley Basin is already significantly contaminated due to a variety of hazardous chemicals. The authors are highly familiar with the groundwater of the San Gabriel Basin through their work on the impacts of the Azusa Landfill on groundwater quality in the Basin. The San Gabriel Basin provides the water resources for about one million people of that region and is extremely vulnerable to pollution.

When the authors first read that section they found that it was highly superficial compared to what is normally presented in such a section of an EIR. They assumed, however, that the detailed information to support and document the various assertions made therein about the limited potential for groundwater pollution would be provided in the technical appendices for the draft EIR. While all of the other sections of the draft EIR that are covered in the main document have technical appendices, the one most crucial section, i.e., the one pertinent to groundwater pollution, has no technical appendix. This is a very significant omission and appears to be part of an overall philosophy of the draft EIR to not provide the public and decision-makers with information needed to review the draft EIR in an appropriate manner.

The first sentence in the section, "Site Hydrogeology" on page 4.4-3 stated,

"The proposed project site is underlain by bedrock of low permeability siltstone and interlayered, clayey, silty sandstones of marine origin."

No information was provided in the draft EIR to indicate what level of permeability was considered to be "low permeability." Ordinarily in a draft EIR, the existing permeability of each of the formations that could receive leachate is described. Such information in needed to allow the public and decision-makers to make a reliable judgement regarding the nature and implications of the permeability of the formations.

The second sentence in the "Site Hydrogeology" section on page 4.4-3 stated,

"These formations are considered to be nonwater-bearing by the Department of Water Resources (DWR 1966) because they do not contain groundwater in sufficient volumes to be extracted for municipal or industrial use."

A citation to the document referenced in that statement, DWR (1966) was not included in the listed references. Therefore, it cannot be determined whether or not the quoted statement accurately reflects what was stated by DWR. Nonetheless, even if the quoted statement is accurate, it is very misleading to use such a statement to infer that leachate from the existing Puente Hills landfill or the proposed landfill expansion would not pollute groundwaters of significance in the San Gabriel Valley Basin. It is very important to understand that just because a particular geologic strata does not contain sufficient groundwater to be classified as an aquifer that will yield sufficient water to be used for domestic or other purposes does not mean that that particular geologic strata cannot transport contaminants in sufficient concentrations to pollute an aquifer that is or could be used for domestic purposes.

As discussed elsewhere in these comments, municipal landfill leachate of the type that could be generated in the proposed landfill expansion has a tremendous potential to pollute groundwater. Very small amounts of leachate can pollute large amounts of groundwater rendering them unusable for domestic purposes. Further, leachate-contamination not only renders the water unusable, it also contaminates the aquifer so that that contaminated part of the aquifer could never again be considered safe for use since it cannot be reliably cleaned up by technologies available today.

The first paragraph of the "Site Hydrogeology" section on page 4.4-3 also noted the fractures in the rock of the region. Those fractures provide avenues for transport of leachate between geologic strata to the highly permeable San Gabriel Basin aquifer system.

The fourth sentence of the first paragraph of the "Site Hydrogeology" section on page 4.4-3 stated,

"The low permeabilities of silts and clays at depth support the probability that any water contained in these rocks is probably bound within the rocks rather than groundwater."

There is no technical support for that quoted statement and it is likely not to be technically valid.

The second paragraph on page 4.4-4 stated,

"The weathered bedrock in the proposed site area transmits relatively small amounts of canyon water at very slow rates, predominantly through discontinuous features, such as upper weathered horizons, joints and fractures, and permeable but limited sandy lenses."

A review of that quoted statement would lead one knowledgeable in the potential for groundwater pollution to conclude that the geology of this area is such that there is a significant potential for groundwater pollution to occur from leakage of leachate through the liner system that will occur from the existing landfill and the proposed landfill expansion. In the Geoscience Support Services, Inc. report dated September 30, 1992 which has been submitted into the record of the comments on the draft EIR, a critical evaluation was provided of the reliability of the hydrogeological information presented in the draft EIR and in the supporting documents that the draft EIR claimed supported the statements made about the hydrogeology of the site. The Geoscience Support Services report found that the draft EIR did not reliably describe the potential for groundwater pollution by landfill leachate. The authors concur with the findings of Geoscience in this regard and find that the geological setting renders the proposed site for the Puente Hills Landfill expansion highly unsuitable for a landfill.

It was stated in the third paragraph on page 4.4-5 regarding the site hydrogeology,

"Onsite canyon water is uniformly poor in quality primarily due to the contact with naturally occurring mineral salts and organics inherent to marine formations of the region. Sediments at the proposed site contain various mineral salts of calcium, magnesium,

and sodium that elevate the dissolved solids levels and produce a water that is characteristically 'hard.' Organic residues from marine detritus also contribute to the elevated dissolved solids concentrations and are responsible for elevated chemical oxygen demand (COD) and oil and grease levels of the water."

No data were provided in the draft EIR, however, to support those statements.

Under the heading, "Landfill Operations" on page 4.4-6, the steps that the Districts propose to take to minimize liquid formation within the landfill during the active life of the landfill were presented. As discussed at length in a previous section of these comments, as well as the Appendix to these comments, it is well-known that the primary issue of concern is not the occurrence of groundwater pollution during the active life of the landfill. The real issue is the ability to control the entrance of moisture into the landfill after it has been closed, i.e., covered, for as long as the wastes represent a threat. As discussed in the Appendix to these comments, while it may be possible to conceptually develop a landfill cover that would, in theory, prevent moisture from entering the landfill *ad infinitum*, in practice there is significant opportunity and modes of entrance of moisture through the cover of a landfill.

Page 4.4-6 presented the discussion of the "Groundwater Protection System" proposed for the landfill expansion. The first paragraph of that section stated,

"As previously discussed, the existing groundwater onsite is limited, and of poor water quality, and there is limited natural hydraulic connection between onsite and offsite groundwaters."

The quoted statement was made without technical substantiation or documentation, and represents the view that the applicant wishes to portray to the public on these issues. Without documentation, that quoted statement cannot be accepted as reliable; in fact, review of the issues by others such as Geoscience has shown the statement to be highly misleading. Those familiar with the characteristics of municipal landfill leachate, the geologic and hydrogeologic setting for the Puente Hills Landfill and its proposed expansion, and the vulnerability of the San Gabriel Valley Basin aquifer system would conclude just the opposite, namely that the existing and proposed expansion of the Puente Hills Landfill represents a significant potential for groundwater pollution in the San Gabriel Basin.

The fourth paragraph on page 4.4-6 stated,

"The CCR [California Code of Regulations] allows for the construction of a Class III landfill over earthen materials within a permeability less than or equal to $1x10^{-6}$ *cm/sec, such as in the Main Canyon area."*

That quoted statement is not an accurate representation of what is required by Chapter 15. Quoted below are selected relevant sections of Chapter 15 that provide an awareness of the intent and requirements of the regulations.

Article 1, Section 2510 (a): *"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]

Article 3, Section 2530(a): *"Waste management units shall be classified according to their ability to contain wastes. Containment shall be determined by geology, hydrology, topography, climatology, **and other factors relating to the ability of the waste management unit to protect water quality**."* [emphasis added]

Article 4, Section 2540(f): *"The integrity of containment structures shall be maintained."*

Table 4.1 Construction Standards for Waste Management Units - Footnote Designation on "Clay Liner" Requirements in Table: *"All Permeabilities Specified in This Table Are **Maximum Allowable Permeabilities**."* [emphasis added]

Article 5, Section 2550(a): *"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**."* [emphasis added]

Article 5, Section 2550(d): *"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**."* [emphasis added]

Article 8, Section 2580(a): *"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**."* [emphasis added]

Article 8, Section 2581(c): *"Throughout the post-closure maintenance period, the discharger shall:*

(1)maintain the structural integrity and effectiveness of all containment structures, and maintain the final cover as necessary to correct the effects of settlement or other adverse factors;

(2)continue to operate the leachate collection and removal system as long as leachate is generated and detected;

(3)maintain monitoring systems and monitor the ground water, surface water, and the unsaturated zone in accordance with applicable requirements of Article 5 of this subchapter;

(4)prevent erosion and related damage of the final cover due to drainage; and

(5) protect and maintain surveyed monuments."

Article 3, Section 2533(a): *"Class III landfills shall be located where site characteristics provide adequate separation between nonhazardous solid waste and waters of the state."*

Article 3, Section 2533(b)(1): *"New Class III and existing Class II-2 landfills shall be sited where soil characteristics, distance from waste to ground water, and other factors* ***will ensure no impairment of beneficial uses of surface water or of ground water beneath or adjacent to the landfill****."* [emphasis added]

Article 3, Section 2533(b)(2): *"Where consideration of the factors in subsection (b)(1) of this section indicates that site characteristics alone do not ensure protection of the quality of ground water or surface water, Class III landfills shall be required to have a single clay liner with permeability of* $1x10^{-6}$ *cm/sec* ***or less****."* [emphasis added]

Article 4, Section 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."* [emphasis added]

It is quite evident that **prevention** of groundwater pollution is an overriding requirement of Chapter 15 for all Class III landfills.

As discussed elsewhere in these comments and their Appendix, the composite liner system proposed in Section 4.4 of the draft EIR will not prevent groundwater pollution. Leachate will penetrate through that liner in small amounts if good-quality construction is maintained, at the time of construction. Over time the liner system will deteriorate in quality allowing increasing amounts of leachate to pass through it. Even a perfectly constructed liner system will not function perfectly forever; the wastes, however, will be a threat forever. This type of liner system is fundamentally flawed approach for trying to engineer a landfill at a geologically unsuitable site. At best, such a system would postpone groundwater pollution; it will not prevent it.

The first paragraph on page 4.4-7 stated,

"Areas to be landfilled would either meet regulatory requirements or be underlain by a composite liner."

One of the problems with the draft EIR, released in June 1992, is that it does not reflect the mandatory requirements set forth by the US EPA nine months earlier in October 1991, for municipal landfills. The federal requirements will have to be met by the landfill expansion. Thus, the Districts' staff has not only inappropriately interpreted the requirements of the existing Chapter 15, but also not considered the applicable federal requirements.

The second paragraph on page 4.4-7 stated,

"After excavation of the proposed fill area, and prior to installation of a clay liner, a subdrain system would be installed. The purpose of the subdrain portion of the liner system is

to prevent hydrostatic stress on the liner due to rising subsurface, to serve as a collection and monitoring system and to provide a 5-foot separation between maximum anticipated subsurface water and refuse. The subdrain performs these functions by collecting and removing subsurface shallow waters from under the liner system."

The quoted passage is a misrepresentation of the requirements of Chapter 15. The passage attests to the recognized problem of a high watertable and lack of the 5-ft separation between the wastes and groundwaters required by Chapter 15; these characteristics render the site unsuitable for the proposed landfill expansion.

As discussed in their review of landfills and groundwater quality protection issues, the authors of these comments noted that one of the significant problems with siting landfills in canyons is such areas typically have high groundwater tables. While the draft EIR did not discuss the issue of high watertable in an appropriate, straight-forward way, the facts are that there is shallow groundwater in the Puente Hills site system that surfaces in springs, and because of this high groundwater table in the canyons, construction of the liner system on the canyon floor will not meet the Chapter 15 requirement for a 5-foot separation between the bottom of the wastes and the groundwater table.

In an apparent attempt to circumvent that requirement and evade the issue of the unsuitability of the proposed site for municipal landfill, the Districts are proposing to construct an underdrain system that it purported would function to collect all groundwater so that no time would groundwater rise to a sufficient extent to damage the liner and/or to enter the waste to cause leachate formation. Use of groundwater diversion structures, drains, etc. to try to separate the wastes from the groundwaters is not reliable for several reasons. First, those systems would have to function perfectly for as long as the wastes represent a threat, i.e., forever. Since they would be buried beneath the liner system and hundreds of feet of garbage, they would not be available for inspection, repair, or replacement when they fail or significantly deteriorate. Such systems are well-known to be prone to plugging and would be subject to damage by seismic activity. Second, it is clear that such systems, however well-designed and constructed, would not provide reliable separation, *ad infinitum*, of the wastes from the groundwaters. If all parts of the system do not function perfectly forever, failure will occur and groundwaters could readily damage the liner and enter the landfill, providing an additional source of moisture for leachate generation and mode for leachate leakage. When this occurs there is no opportunity to correct the failure.

The fourth paragraph on page 4.4-7 noted the use of on-site repetto siltstone (clay) for the clay liner. No information was provided, however, on the characteristics of that material or its ability to provide the permeability that will be required. The reference in that paragraph to a required minimum permeability of $1x10^{-6}$ cm/sec is badly out-of-date. The October 9, 1991 US EPA requirements specify a minimum permeability of 10^{-7} cm/sec; the $1x10^{-6}$ cm/sec permeability discussed in Chapter 15 will not be allowed in the future. That issue should have been discussed in the draft EIR since the clay will have to conform to the lower-permeability requirement in order to meet the minimum federal requirements.

The fifth paragraph on page 4.4-7 discussed the use of a high density polyethylene (HDPE) liner. As discussed in the Appendix to these comments, it is well-known and documented in the literature that HDPE liners have a significant number of problems in providing long-term stability. As is well-documented in the literature and acknowledged by the US EPA that HDPE liners will not last forever to prevent passage of all leachate. While a properly installed, high-quality HDPE liner may be expected to delay the leakage of leachate from a municipal solid waste landfill for a few tens of years, it would not satisfy the requirements set forth in Chapter 15 of protecting groundwater quality for as long as the wastes represent a threat. In order to meet that requirement, the HDPE liner would have to function perfectly forever. It obviously cannot do that.

While such liners have been approved in the past by regional boards, it is highly questionable whether such approvals will be granted in the future. Future approval would be inconsistent with recent rulings, for example by the LA Regional Water Quality Control Board that concluded that even double-composite-lined systems will leak and cannot protect groundwaters from pollution by landfill leachate in those situations where the area beneath the landfill is hydraulically connected to groundwater aquifer systems of importance for use as public water supplies. In July 1991, the State Water Resources Control Board ruled (in connection with the expansion of the Azusa Landfill system) that even the proposed double composite liner, which would provide a higher degree of protection than that proposed by the Districts for the Puente Hills Landfill expansion, not protect groundwater quality from landfill leachate-pollution.

In the first paragraph on page 4.4-8 a statement was made that the proposed HDPE liner would be installed in accord with requirements approved by the regional water quality control board. At numerous locations throughout the draft EIR mention was made of meeting regional water quality control board requirements. Such language suggests an attempt to artificially inflate the credibility of the document; it should go without saying that the neither the Districts nor others would claim that they could construct a landfill that does not meet the minimal requirements. By repeatedly stating they are going to meet the requirements that would obviously have to be met, the authors of the draft EIR are misleading the decision-makers and the public into believing that regulatory requirements for protection of public health and the environment are always adequate, never out-of-date, and not subject to being superseded when new information is developed. During his 30-yr career, the senior author has frequently been involved in helping to develop and review regulatory requirements in connection with water pollution control and domestic water supply water quality management. For example, he served as an invited peer reviewer for the National Academies of Scientist and Engineers Blue Book of water quality criteria of 1972.

Page 4.4-13 presented a discussion, under the heading, "Project Impacts," of what the District staff and management consider to be a significant adverse impacts. It was stated,

"Specific to the hydrogeologic and water quality aspects of a proposed project, Appendix G of CEQA states that a project will normally have a significant effect if it will: · substantially degrade water quality · contaminate public water supply · substantially degrade or deplete groundwater resources."

The draft EIR claimed in subsequent discussion that the proposed landfill expansion would not have a significant adverse impact because it would not cause any of those problems. That assessment of the "project impacts" is self-serving and does not reflect the technical information available. There is no question that the proposed project will have a very high probability, in fact a virtual certainty, of substantially degrading water quality, contaminating a public water supply, and substantially degrading and depleting groundwater resources in the San Gabriel Valley Basin. The technical foundation for these comments has been discussed in other sections of these comments.

Presented on page 4.4-14 was a summary statement of the two so-called "approaches to mitigate potential threats to groundwater systems, including measures to minimize the potential for the formation of leachate, and measures that provide barriers between potential contaminants and the existing subsurface waters." These were,

"1.Landfill operation and control systems would be implemented to reduce the potential for leachate formation. ...

2.Groundwater protection systems which would consist of a composite liner system, a subsurface barrier and extraction well system, and a groundwater monitoring system, as well as gas collection and monitoring systems would be constructed and maintained to provide barriers to migration of onsite subsurface waters and protect subsurface water quality."

The technical deficiencies in claims made in the quoted numbered items have been discussed elsewhere in these comments in the discussion of overall mitigation of impacts as well in comments on those claims made in the Executive Summary. It is clear that the protection that the applicant claims would be provided, cannot be achieved with the approaches proposed. Best professional judgement for this situation would lead to the conclusion that the so-called liner and barrier system will not prevent groundwater pollution by landfill leachate in this setting.

Page 4.4-14 also presented a statement of the claimed "level of significance after mitigation," which was,

"Hydrologic impacts can be mitigated to a level that is less than significant."

That claim is unreliable. The facts are that there is a very high probability, in fact virtual certainty that the landfill expansion as proposed would cause groundwater pollution that would destroy part of the groundwater resources of the San Gabriel Basin and would cause the part of the aquifer contaminated by leachate to be unusable for domestic purposes in the future.

SURFACE WATER DRAINAGE

On page 4.5-8 under the heading, "Final Cover," second paragraph, it was stated,

"To verify the integrity of the final cover and maintain minimum grades, a program of routine observation of maintenance would be instituted by the Sanitation Districts for at least 30 years after closure of the site. All drainage structures, such as downdrains, bench crossings, and desiltation basins, also would be routinely inspected and maintained to ensure that no ponding of stormwater on the landfill surface or erosion of the protective cover occurs around those facilities."

That quoted statement reflects a lack of understanding of the realities of landfill processes and the proposed "environmental control systems" and their implications for post-closure care for the proposed landfill. The language selected regarding providing post-closure care for "at least 30 years" is highly misleading as it suggests the magnitude of duration over which the applicant anticipates providing such care. Further, the language indicates that there would be some point at which a definitive and final determination of the "integrity of the final cover." Contrary to the statement quoted, and as discussed in other sections of these comments, the "integrity of the final cover" would have to be maintained *ad infinitum* - as long as the wastes remained buried there. The waste in the landfill will be a threat to groundwater quality forever. There will be need for post-closure maintenance of the cover and other structures forever.

At no place in the draft EIR was there a discussion of post-closure operations for the proposed landfill expansion. Appendix C presented a listing of topics that have to be covered in the closure and post-closure plan. That was simply a listing from the regulations and provided no information on the approach that would be followed by the Districts to comply with the regulations. The information provided in the draft EIR indicated that its authors had little understanding of the true magnitude post-closure care, or period over which post-closure care would have to be provided. Focusing on 30 years of cover maintenance was simply restating the regulations as the minimum. Anyone familiar with "dry tomb" landfills and their evolution recognizes that the minimum specification of a 30-year period was the result of a mistaken understanding brought forth by the US EPA in the mid-1970's as part of implementing the original RCRA. As discussed in other sections of these comments and the Appendix, the US EPA presumed that post-closure care would only be needed while gas production was occurring in a landfill; for a classical sanitary landfill that did not have significant barriers to moisture penetration into the landfill, gas production typically occurred for 30 years or so after closure of the landfill.

What was not appreciated at that time was that that time period has no relevance to gas production in a lined, "dry tomb" landfill. With the development of the "dry tomb" approach - in which there is an attempt to isolate the waste between low-permeability liners and covers to substantially reduce the input of moisture to the system while the cover is maintained - the waste in the landfill will not produce any significant gas until inadequate maintenance of the cover occurs. This could be 20 years, 50 years, 100 years or hundreds of years after closure of the landfill. Meanwhile, throughout that period, post-closure care is going to have to be maintained. There is no doubt that post-closure care will be needed *ad infinitum*, i.e., forever, for the existing as well as the expanded landfill if it should be permitted. Furthermore, even after the cessation of gas production, the wastes in the landfill will represent a threat to groundwater quality; hazardous and otherwise

deleterious materials will not have disappeared during fermentation of the fermentable organics. Thus, post-closure care has, in fact, to be provided after cessation of gas production.

A decision-maker or member of the public could conclude from the numbered items quoted above that the Districts' attempt to "verify the integrity" of the cover mentioned in this section would be effective in preventing significant moisture from entering the landfill. The fact is, however, that the key to the cover "integrity" is the low-permeability layer located under a top soil layer designed to support vegetation and under a drainage layer to drain moisture that added from natural precipitation and/or from irrigation to the vegetative layer to support the plant growth. Typically those upper layers, which are at least 2 ft and frequently 4 ft or more thick, are not the low-permeability layer critical to keeping moisture out of the landfill. The low-permeability layer would be located below those upper layers where it is not accessible to routine inspection. It is well-known that in climates such as the current Southern California climate, desiccation cracking of the low-permeability layer routinely occurs which leads to cracks in the layer that will allow rapid transport of moisture through the layer into the refuse. Walking over the surface of a landfill performing visual inspections as described in this section will not detect desiccation cracks in the cover.

It should be noted that EIR's for landfills routinely discuss the characteristics of the proposed cover. The discussion of closure in the draft EIR for the Puente Hills Landfill expansion was significantly deficient in that no information was provided on what would be done with respect to the construction of a cover for the landfill. Based on approaches taken for other aspects of the proposed landfill expansion, it would have to be assumed that the minimum cover needed to just get by the regulations would be prescribed. If that approach is followed, there is a significant likelihood that the cover will be inadequate to prevent entrance of significant moisture in the landfill. If the Districts plan to do more than the minimum necessary just to get by, they should have described the approach in the draft EIR. Failure to do so, in light of the approach taken on other issues, is an indication that the Districts will not provide adequate cover and associated maintenance to prevent significant migration of moisture into the landfill leading to leachate formation. It therefore must be concluded that the so-called verification of the integrity of the final cover is simply a statement without foundation that cannot be properly carried out in a meaningful way by the District.

The Districts seems to pride themselves on how cheap they can make garbage "disposal" for the residents of the LA region that dispose of their waste at District-managed facilities. The cheap garbage disposal being practiced by the District is at the expense of adjacent and nearby residents and property owners and the groundwater resources in the vicinity of the landfill.

Page 4.5-9 discussed surface water quality monitoring. As discussed elsewhere in these comments, the proposed water quality monitoring for surface water could readily prove to be inadequate to protect surface and groundwater resources downgradient from the landfill.

The concluding statement with regard to surface water quality on page 4.5-12 under the heading, "Levels of Significance after Mitigation," was,

"There would be no significant impacts on surface water management or quality resulting

from the proposed Puente Hills Waste Management Facilities project."

That is almost certainly a gross overstatement of the ability of the project to prevent surface water pollution from occurring from landfill-derived contaminants associated with stormwater runoff. To claim that there would be "no significant impacts" reflects either naivete on the part of the document authors or a self-serving approach to mislead the public and decision-makers into believing that a landfill of this type, located on top of a mountain, could be operated and maintained in such a way as to have no significant impacts no surface water quality and adjacent properties receiving stormwater runoff. This is an impossibility.

Another of the significant deficiencies in the draft EIR is the discussion of how leachate would be managed. Typically landfill owner/operators discuss leachate management issues as part of the EIR. In many EIR's statements are made by the owner/operators that they will use the leachate on-site to control dust, etc., i.e., spread over the surface of the soil during the active life of the landfill. Such an approach can readily lead to contamination of surface soils that in turn will pollute surface water runoff from the landfill where the precipitation on the areas of the landfill which have received leachate runs off from the landfill property to adjacent properties.

AIR QUALITY

On page 4.8-23, under the heading, "Landfill Gas," it was stated,

"The maximum rate of landfill gas generation in sanitary landfills occurs soon after the solid waste is buried and then decreases with time. Low levels of landfill gas production typically continue to occur for a period of time after landfill closure."

As discussed elsewhere in these comments and in the Appendix, the description provided is for the classical sanitary landfill, not a "dry tomb" landfill of the type that is proposed for the landfill expansion area. As discussed elsewhere in these comments, the "dry tomb" landfill will produce gas for a while during the active life. Once the cover is in place, it should be an effective barrier to the entrance of moisture into the landfill for a period of time. Landfill gas production should significantly diminish after placement of the cover, and may go to zero, and remain low as long as the waste is kept dry - as intended by the placement of the cover and groundwater barrier systems in the proposed landfill. However, after time, when the maintenance of the cover becomes inadequate, or, in the case of the Puente Hills landfill, when groundwaters enter the waste from under the landfill, the landfill gas production will resume. The pattern of landfill gas production discussed in the draft EIR and presented in Exhibit 4.8-12 does not apply to the Puente Hills Landfill expansion. The authors of the EIR do not understand how lined, "dry tomb" landfills and their associated covers behave relative to the classical sanitary landfills.

Page 4.8-25 discussed the proposed monitoring for landfill gas migration, and specified,

"The monitoring probes are typically installed every 1,000 feet along the perimeter of the

landfill, although closer spacing and additional probes would be considered, as necessary, to protect the safety of surrounding land uses."

There is no doubt that landfill gas migration could occur between the probes and never be detected by them. Placement of probes at 1000-ft intervals is inadequate for monitoring gas migration from the proposed landfill. The approach that is being used by the Districts to establish the monitoring program reflects a lack of understanding of how gas migration will occur through liner systems. The system described could be applicable to an unlined landfill where gas migration would occur essentially everywhere out through the sides of the landfill. In a lined landfill, gas migration will occur through holes, cracks or imperfections in the liner system, along the path of high permeability layers and fractures in the substrata. This can lead to a very narrow path of migration that would not likely be detected by monitoring probes placed 1000 foot apart.

Page 4.8-28 discussed the impact of landfill gas combustion. It is well-known that the flare systems of the type described do not result in complete combustion of potentially hazardous chemicals.

The mitigation measures for landfill gas were discussed on page 4.8-31. The inadequacies of those measures for protecting public health and the environment were discussed elsewhere in these comments.

Page 4.8-32 discussed odors from the landfill. As discussed under mitigation there are significant odor problems associated with the existing landfill and there is no doubt that such problems would continue after the proposed expansion of the landfill occurs, should it be permitted. It is clear that there were significant odors at the landfill property at the time of the senior authors' site visit there on November 6. In addition, there was frequent reference in the hearing transcripts to odor problems experienced by nearby residents owing to the existing landfill operations. The so-called mitigation of odors discussed on page 4.8-33 is a grossly superficial and inadequate discussion of these issues; those deficiencies have been addressed in another section of these comments.

PUBLIC HEALTH AND SAFETY

Page 4.11-1 discussed landfill gas issues. There it was asserted that the landfill liner, monitoring system, etc. will prevent gas migration to adjacent properties. It was also stated,

"Engineering safeguards would be supplemented by maintenance of a minimum distance of 1,000 feet between refuse fill and surrounding land uses."

The technical deficiencies in the proposed approach to manage the landfill gas have been discussed in other sections of these comments. With regard to the quoted statement, landfill gas is known to migrate laterally well-over 1000 feet. Landfill gas is also known to represent a significant threat to public health and present a hazard of explosions in properties located distances farther than

1,000 ft. As discussed elsewhere in these comments, the systems proposed will not prevent gas migration from the refuse to adjacent and nearby properties, which include residences and schools.

Page 4.11-2 presented a paragraph devoted to "water quality protection." The statement was made therein,

"Engineered containment and control systems consisting of composite liners, subsurface barriers, monitoring and extraction wells, and detention/desiltation basins would be installed for the proposed project, protecting both groundwater and surface water quality."

That quoted statement is unreliable and grossly misleading. As discussed elsewhere in this statement, those systems will not provide for reliable groundwater quality protection and will not prevent surface water transport of contaminants from the landfill property to adjacent properties.

The discussion under the heading of "hazardous waste" on page 4.11-2 misleads the public and decision-makers to believe that no hazardous and otherwise deleterious chemicals would be disposed of at the site. As discussed elsewhere in these comments, and in the Appendix, there is no question that disposal of hazardous and otherwise deleterious chemicals would occur, legally, at the landfill expansion and that those chemicals could endanger public health and the environment through leachate and air migration from the facility. No amount of load checking (household hazardous waste collection program) there can prevent such an occurrence.

SPECIFIC COMMENTS ON DRAFT EIR
SECTION 7 - SUMMARY OF UNAVOIDABLE ADVERSE IMPACTS

On page 7-1, the Districts listed *"aesthetic/visual character," "biological resources," "transportation,"* and *"air quality"* as the *"effects [that] would, after mitigation, remain significant unavoidable adverse impacts of the project."* Water quality impacts are not listed. This omission is a significant deficiency in the draft EIR. Those knowledgeable in the issues of dry tomb landfilling of municipal solid waste of the type that is occurring at the existing Puente Hills Landfill and would continue with the proposed expansion, know that such landfills will inevitably and unavoidably impair groundwater quality. In order to prevent groundwater quality impairment, the cover, groundwater diversion system, liner system, monitoring systems, and vigilant maintenance would have to function perfectly to **prevent** entrance of **any** moisture into the landfill and the exit of **any** leachate from the landfill forever; not only can this not be ensured, it cannot be reasonably expected. No one familiar with the properties of such landfill systems in a geologically and hydrogeologically complex site such as the Puente Hills site, would ever claim that groundwater pollution would not occur at the proposed landfill expansion. Because the Districts have failed to properly consider and report on the groundwater quality issues that will arise at the proposed site, and have thus mislead the public and decision-makers on the significance of these issues, the draft EIR should be rejected as inadequate.

SPECIFIC COMMENTS ON DRAFT EIR
SECTION 8 - INVENTORY OF MITIGATION MEASURES

Section 8 purports to present an inventory of mitigation measures. The adequacy of consideration of potential problem areas that could develop under plausible worst-case scenarios, and the proposed mitigation approaches considered for those problems are keys to the Districts' ability to provide protection of public health and environmental quality from influences of the proposed landfill expansion. However, the authors found that the section on "Inventory of Mitigation Measures" presented inaccurate, unreliable, and misleading information to the public and decision-makers concerning the definition and ability to mitigate the environmental and public health problems expected to be caused by the proposed landfill expansion. Specific examples of such inappropriate information are presented below; the technical issues have been discussed in other sections of these comments and in the materials appended to these comments.

AESTHETIC/VISUAL RESOURCES

On page 8-1, numbered item 7 under the heading, "Aesthetic/Visual Resources" stated,

"Fugitive litter would be removed from areas adjacent to the landfill and along all access roads."

Owners/operators of landfills typically do not effectively control fugitive litter; the problem of fugitive litter is one of the legitimate reasons that adjacent property owners/users vigorously oppose landfill sitings or continued operations. During his November 6, 1992 site visit, the senior author observed significant amounts of fugitive litter along the roadway associated with the existing landfill. A number of individuals from the landfill site area presented testimony at the public hearings regarding the problems routinely encountered with fugitive litter. It is very clear that the Districts are not properly controlling fugitive litter from the existing landfill at this time; there is no reason to believe that the management of this problem would be significantly better at the landfill expansion proposed.

GEOLOGY AND SEISMICITY

The discussion of mitigation measures for "Geology and Seismicity," on page 8-4, presents unreliable information on the adequacy of the consideration given to the potential for earthquakes to adversely affect the "proposed environmental control system." From the independent review of this issue conducted by Leighton & Associates, Inc. (whose September 14, 1992 report is part of the record for the review of the draft EIR), the authors are convinced that the Districts either have not conducted the necessary in-depth studies on the very important issues of the stability of the proposed landfill system to withstand the seismic activity that could occur in the vicinity of the landfill, and/or they have not reliably reported on the results of studies, in the draft EIR.

Numbered item 4 in that section stated,

"Design of the proposed environmental control system would accommodate the anticipated effects of the peak ground acceleration for the site. Immediate inspection of all environmental controls system at the site would be a planned response to an earthquake in the Southern California area."

The quoted statement misleads a decision-maker or member of the public to believe that the Districts will be able to identify and rectify any and all impacts on the landfill "environmental control system" components. It is clear, however, that such a conclusion cannot be supported. The key to the groundwater quality protection system for the landfill is the liner, leachate collection and removal system, shallow groundwater diversion structures, and cement/bentonite "barrier" walls, all of which will be buried under as much as 400 feet of garbage. Those structures would have to function perfectly, forever, in order to maintain the postponement of groundwater pollution by landfill leachate that will be generated by the proposed landfill expansion. All of those structures would be subject to seismic damage that could significantly impair or destroy their ability to function. Contrary to the claims made in the quoted statement, those structures - located under hundreds of feet of garbage - are not available for inspection following an earthquake. Further, if the seismic activity caused failure of one or more of the components (which is highly probable at some time in the future) and if the failure were detected by some means (which would be virtually impossible until widespread groundwater pollution has occurred), it would be impossible to repair the facility without removing hundreds of feet of garbage.

The language in this item is another example of the unreliable, and highly misleading statements and claims made in the draft EIR. The pro-applicant distortion demonstrated in this, and other sections of the draft EIR, defies the CEQA requirement to provide for reasonably feasible evaluation of environmental effects and *"adequacy, completeness, and a good faith effort at full disclosure."* The draft EIR should have presented plausible worst-case scenarios for seismic activity and discussed how damage to containment structures and facilities buried beneath hundreds of feet of garbage would realistically be determined and remedied by the Districts. Furthermore, the anticipated consequences of the failures in terms of groundwater pollution and massive disturbance of the buried wastes that would be involved in waste exhumation, and the costs of evaluation, remediation, and restitution for such an occurrence, for as long as the wastes represent a threat (i.e., forever), should have been discussed. It is not surprising that the Districts did not address these issues in the draft EIR however, since it would render a landfill of the type proposed for the Puente Hills Landfill expansion cost-prohibitive.

HYDROGEOLOGY

The two numbered items in the description of mitigation measures pertaining to hydrogeology stated,

"1.Landfill operation and control systems would be implemented to reduce the potential for leachate formation. These include a load checking program, landfill gas condensate collection, limitation of liquids disposal, interception of surface water run-on, and the use of cover to control infiltration.

2.Groundwater protection systems which would consist of a composite liner system, a subsurface barrier and extraction well system, and a groundwater monitoring system, as well as gas collection and monitoring systems would be constructed and maintained to provide barriers to migration of onsite subsurface waters and protect subsurface water quality."

As discussed elsewhere in these comments, in developing the draft EIR the Districts have ignored most important sources of moisture that can, and inevitably will, lead to leachate formation that will pollute groundwater. Those sources are the long-term entrance of moisture through the cover after landfill closure, and groundwater that would enter after failure of the groundwater diversion system. When placed in contact with moisture, wastes that are anticipated to be received at the landfill expansion will generate a leachate that will be a significant threat to groundwater quality.

Contrary to the numbered item 1 quoted above, it is not sufficient to *"reduce the potential for leachate formation."* To meet the requirements of Chapter 15, there can be no escape of leachate from the Puente Hills Landfill expansion to impair the use of groundwater at any time. As was discussed earlier in these comments, however, the containment liner, leachate collection and removal systems, and extraction wells will not prevent leakage of leachate from the landfill for as long as the wastes represent a threat. Furthermore, because of the extremely complex hydrogeology of the groundwater aquifer systems into which the leachate from the proposed Puente Hills Landfill expansion would enter, it is highly unlikely that the groundwater monitoring system would detect leachate before it had caused widespread pollution of the groundwater. Thus, to prevent groundwater pollution, it would be necessary to prevent the generation of leachate. In order to prevent the formation of leachate in the landfill, the cover and groundwater diversion systems must function to prevent entrance of moisture into the landfill *ad infinitum*. Capabilities of those systems to retard entrance of moisture into the landfill will diminish over time due to a variety of inherent characteristics and deteriorative processes noted earlier. Key components of the system, including the liner and leachate collection and removal system, would be beneath hundreds of feet of wastes and hence unavailable for routine detailed inspection or repair; even the barrier systems in the cover would be buried beneath vegetation and topsoil and hence unavailable for routine detailed inspection. Therefore it is clear that the statements and claims made in the Districts' draft EIR about the ability of the proposed cover, liner, and barrier systems to protect groundwater quality are unreliable and grossly misleading. It would only be a matter of time until groundwater pollution occurred.

Approximately one million people rely on the water resources of the San Gabriel Valley Basin for water supply. There can be no legitimate question about the fact that the proposed landfill expansion would irreparably damage the quality of the groundwater and aquifer in areas of the San Gabriel Valley. The draft EIR provides unreliable and highly misleading information on the hydrogeological issues.

SURFACE WATER DRAINAGE

The authors have been involved in work on issues of stormwater drainage and its impacts on surface water quality since the 1960's. In the section that addressed mitigation measures for surface water drainage (pages 8-4 and 8-5), a series of statements was presented about how various desiltation/detention basins would be used to address pollution of surface water. Numbered item 7 in that section stated,

"A monitoring system for sampling and evaluating the water quality of stormwater runoff from the proposed project would be implemented."

Runoff monitoring programs of the type being developed today, and likely in the foreseeable future, are not adequate to detect potentially significant concentrations of contaminants in surface water runoff from landfill operations that could be adverse to surface and groundwater downgradient from the landfill.

Recently the US EPA and the California Water Resources Control Board significantly reduced their proposed requirements for monitoring of stormwater runoff, from those thought a year ago to be necessary, primarily to reduce the cost of monitoring. From the authors' experience, and from the modest potential significance of chemical contaminants in stormwater runoff from most urban and many industrial areas, such reductions in monitoring requirements would not be expected to significantly adversely affect receiving water quality. However, the situation for stormwater runoff from municipal solid waste landfills is quite different from that of urban stormwater runoff. Very extensive runoff monitoring should be required of landfills well-beyond that required for municipal and most industrial areas.

Materials received at municipal solid waste landfills contain many tens of thousands of different chemicals that could be detrimental to public health and the environment when introduced into surface or groundwater; at best, today's routine monitoring programs include measurement of only a few hundred of those chemicals. Therefore, the stormwater runoff monitoring programs adopted for most urban and industrial areas are inadequate for municipal solid waste landfill areas. The quoted item 7 cannot be considered to be a sufficient "mitigation" measure for addressing issues of contaminants from stormwater runoff from the proposed Puente Hills Landfill expansion, and to ensure that such runoff would not adversely affect downgradient surface and groundwater.

An issue of concern not adequately addressed by the draft EIR is the infiltration of landfill-contaminated surface waters into the aquifer system in the San Gabriel Valley Basin. The authors will be presenting a paper on this issue at the American Water Resources Association annual conference that will be held in Tucson, AZ in August 1993. Their paper will focus on the need for much greater protection of groundwater from surface-water-associated contaminants, such as from landfills and wastewater discharges.

Numbered item 6 in the discussion of proposed mitigation measures for surface water drainage stated,

"Long-term maintenance plans to ensure continuous functioning of all the permanent drainage facilities would continue to be implemented."

The draft EIR does not make clear the duration of maintenance that the Districts consider to be "long-term." Other sections of the draft EIR suggest that the Districts' envision only 30 to 50 years of post-closure care. The existing landfill as well as the proposed landfill expansion will be a threat to groundwater quality for as long as the wastes remain buried there. The somewhat casual statement quoted above does not reflect the profound and perpetual obligation, not to mention funding, required to *"ensure continuous functioning of all the permanent drainage facilities."* As discussed in previous sections of these comments, the containment and other systems proposed for the landfill would have to be maintained *ad infinitum* and replaced as necessary.

As discussed in the Appendices to these comments, one of the major problems with canyon landfills is the potential for surface waters from adjacent, higher land to run onto the landfill, increasing the amount of moisture available to penetrate through the cover to generate leachate in the landfill. Landfill applicants typically propose to construct a structure to divert surfacewater run-on. While such an approach can be effective, there is a significant and perpetual cost associated with maintaining such diversion structures. The Districts will have to be maintaining those structures for as long as the wastes remain buried at the site.

If the Districts intend to maintain diversion structures at the Puente Hills Landfill expansion for only 30 to 50 years as suggested in the draft EIR, the post-closure care costs for the landfill have been grossly underestimated. The public and decision-makers should be reliably informed of all of the costs and to understand that the proposed expansion of the Puente Hills Landfill carries with it far-greater costs than the draft EIR presented.

AIR QUALITY - Odors

Page 8-8 presented proposed mitigation measures for odors at the proposed Puente Hills Landfill expansion. Numbered item 1 in that section stated,

"Potential odors in the operating area of the landfill would be controlled by rejection of extremely odorous loads and by application of daily cover."

The nonchalant language of the quoted section would indicate that its author had never been at a sanitary landfill during its operation. There is no skirting the fact that despite efforts made, municipal solid waste sanitary landfills cause odors. This is one reason that those attempting to develop more appropriate methods for landfilling of municipal solid waste advocate a land buffer about the filling area to separate the landfill from adjacent properties by at least a mile, or even several miles for canyon situations where winds blow over the waste fill area and down the canyon. An adequate buffer zone provides for dilution of the inescapable odors that are produced at every sanitary landfill.

During his site visit on November 6, the senior author was not surprised to find that the areas near the landfill, including areas of SR 60, were highly odorous. The transcripts of the four hearings held by the Districts contain numerous reference and complaints by citizens about the odor problems associated with the existing landfill. These problems are real, and are expected. The claim that the *"potential odors"* associated with the proposed landfill expansion, which in some cases will be as close as 1000 ft from residences and schools, will be *"controlled"* by *"rejection of extremely odorous loads"* and *"application of daily cover"* is naive at best, and grossly misleading to decision-makers and the public. If these approaches could, in fact, control odors, there would not be the odor problems associated with the existing Puente Hills Landfill or indeed with other sanitary landfills.

It is fundamental that one property owner/user does not have the right to adversely impact the use and enjoyment of anothers' property. Landfill owner/operators do not have the right to allow the emanation of offensive odors to adjacent and nearby properties; those making decisions that allow landfills to be sited need to make very clear the requirement that at no time during the active life or during post-closure care will odors from the operation permeate the air of adjacent and nearby properties. Penalties and recompense for causing offsite odors should be significant and carry the responsibility of the landfill owner/operator to alter the activities sufficiently to prevent recurrence of the problem; repeated violation should be cause for forced closure of the landfill. Without such an approach in force, those who own or use adjacent and nearby properties are justified in vigorous opposition to landfill siting and expansion. The common practice over the years for landfill owner/operators to allow offsite odors has led to justifiable NIMBY syndromes across the country. Few individuals who have had experience with offsite landfill odors would accept a landfilling operation upwind of their residence.

The draft EIR does not acknowledge the existence of an offsite odor problem with the existing Puente Hills Landfill. The Districts' attitude as expressed in its approach to odor "mitigation" appears to be that offsite landfill odors are acceptable to the detriment of the owners/users of adjacent and nearby properties. This indicates little or no regard for the health and welfare impacts of landfill odors on adjacent and nearby property-owners/users.

The obvious fallacy of the claim of the draft EIR that odor control would be provided is another example of why the draft EIR should be rejected as an unreliable presentation and discussion of the issues.

PUBLIC HEALTH AND SAFETY

Numbered item 1 in the mitigation measures for public health and safety on page 8-10 stated,

"Landfill gas collection and monitoring systems presently in place at the landfill would be continued and expanded into the eastern expansion area."

As discussed previously in these comments, the landfill liner system that is currently in place and that

is proposed for the landfill expansion will not control migration of landfill gas. First, gas can penetrate through an intact liner. Second, at the time of placement into service, the liner will have holes and imperfections in it through which gas can migrate. Third, the geology of the area is extremely complex, with various fractured geologic strata; this makes the reliable interception of and monitoring for landfill gas virtually impossible. Further, there are reported problems with landfill gas migration from the existing landfill. Therefore there can be little doubt that landfill gas migration from the proposed landfill expansion would occur and that that gas will threaten the health and welfare of the owners/users of adjacent and nearby properties which include residences and schools. The proposed approach for "mitigation" of landfill gas migration is superficial and grossly inadequate.

As discussed elsewhere in these comments, the Districts have significantly misjudged the period of time over which landfill gas will be developed at the proposed landfill expansion. Gas formation is directly dependent on moisture. If the wastes placed in the landfill are sufficiently dry (less than about 20% moisture), the fermentable organics will not undergo substantial fermentation and substantial gas would not be formed. However, the organics would remain, and will decompose with gas formation once sufficient moisture enters the landfill. Thus the period over which landfill gas generation in the proposed landfill expansion could be of concern will be significantly, but inversely, dependent on how effective the cover and groundwater diversion structures are in keeping moisture out of the landfill. The more effective the systems are in keeping moisture out of the landfill, the greater the period over which the potential for generation of landfill gas will exist. Meanwhile, the liner system is deteriorating, as is the gas collection system. While no one can predict the time at which significant gas production would begin at a lined, dry tomb landfill such as the proposed Puente Hills Landfill expansion, ultimately at some time in the future sufficient moisture will enter the landfill to cause significant gas production; by that time the "mitigation" provisions - liner and gas collection and monitoring systems - will likely have deteriorated rendering them less effective or ineffective for addressing the problem.

The draft EIR is unreliable in addressing proper "mitigation measures" for public health and safety associated with landfill gas problems.

Numbered item 3 in the health and safety mitigation measures stated,

"Seagull control would occur through the use of overhead lines at the landfill and totally enclosing the proposed materials recovery and rail loading facility."

In their many years of work on landfills, the authors have not seen a landfill at which seagulls were not a nuisance. As discussed elsewhere in these comments, the senior author observed hundreds of seagulls in the vicinity of the operating landfill during his site visit. While during that visit the observed seagulls were over landfill property, there can be little doubt that as the landfill expansion moves to within 1000 ft or so of adjacent properties the seagull populations will expand into those areas as well. The owners/users of those residential areas, schools, and other properties will be adversely affected. It is clear that the current measures for seagull control that the Districts claim to be practicing are not effective and that the provisions for "mitigation" of that problem for the

proposed landfill expansion are inadequate.

COMMENTS ON HEARING TRANSCRIPTS

The unreliable and misleading information and assurance regarding the environmental and public health protection provisions of the proposed landfill expansion, provided in the draft EIR, were perpetuated and amplified by the Districts' staff at the public hearings. While the issues have been discussed in comments on the draft EIR and in the Appendices, examples of the inappropriate, unreliable, and misleading information provided at the public hearings are provided below.

August 4, 1992 Hearing
Hacienda Heights, CA

As recorded on page 10 of the transcript for the August 4, 1992 hearing, Ms. Chan, who was introduced as "Supervising Engineer for the Planning Section Solid Waste Management Department" of the Sanitation Districts, stated,

> *"Environmental Protection is paramount to the proposed project. The water quality protection features at the site incorporate several levels of state-of-the-art protection, including ongoing programs for inspection to prevent receipt of hazardous materials, both clay and synthetic liners underlying the fill[,] sub-surface barriers, and groundwater monitoring wells surrounding the site.*
>
> *"The environmental control measures that we are proposing are the same measures that have been proven at the existing operation, and that includes the landfill gas collection system such as shown here. Currently the gas is either flared or used to generate electricity and will soon be used to produce a clean-burning fuel. Continuous monitoring as shown in the photo on the right ensures that system operates effectively."*

Contrary to Ms. Chan's claim, the proposed system is not *"state-of-the-art."* The technical deficiencies in the proposed plan that render the proposed landfill expansion unable to provide protection of groundwater quality for as long as the wastes represent a threat were discussed in previous sections of these comments and in detail in the Appendix. Even those systems which are, in fact, "state-of-the-art" for lined, dry tomb landfills, are not capable of preventing groundwater pollution; at best they postpone it.

Ms. Chan's claim that programs for inspection will *"prevent receipt of hazardous materials"* is also unreliable and highly misleading. This issue was discussed in previous sections of these comments and in the Appendix. As discussed there, even with the exclusion of wastes classified as "hazardous wastes" from the waste-stream accepted at the proposed landfill, the waste-stream will contain substantial amounts of materials that are hazardous and otherwise deleterious if introduced

via leachate into groundwater. The issue is not one of there being illegal or illicit contributions of those materials to the waste stream. The fact is that wastes deemed acceptable for disposal at Class III landfills such as the Puente Hills Landfill expansion, and indeed identified in the draft EIR as being acceptable at the proposed landfill expansion, contain myriad chemicals - conventional, non-conventional, and priority pollutants - which if introduced into groundwater via leachate would render the groundwater and associated aquifer permanently unsuitable for domestic water supply. This situation cannot be addressed by waste stream modification.

Ms. Chan stated that the proposed approach for gas management of landfill gas at the landfill extension would be the, *"same measures that have been proven at the existing operation"*. The fact is that the current landfill gas management approaches at the existing facility have proven themselves to be inadequate as evidenced by problems with gas migration from the facility. Ms. Chan's statements in this regard are highly misleading.

August 5, 1992
Downey, CA

As recorded on page 11 of the transcript for the August 5, 1992 hearing, Ms. Dodge, who was introduced as "a staff person from the Sanitation Districts," repeated the same claims, essentially verbatim, made in the previous day's hearing by Ms. Chan.

Response to Public Questions and Comments

In the authors' review of the hearing transcripts, they were greatly surprised by the unusual manner in which the Districts staff addressed the public concerns. The Districts staff who were responsible for development of the draft EIR explicitly made themselves unavailable to respond to questions on the record. It was stated in the transcripts (e.g., August 5 hearing transcript, pages 5 and 6) that members of the Sanitation Districts' staff were available outside the hearing room to answer questions, and that those staff would also be available "after the hearing" to answer questions. The significance of this arrangement is that neither the questions asked of the staff nor the staff responses were on the record. If questions were taken "after the hearing," there could be no excuse for closing the hearing prior to responding to such questions. The validity and appropriateness of that arrangement was challenged during the August 5 hearing as not meeting the requirements of CEQA for public participation. In the view of the authors, the deliberate actions to keep the public's questions and staff responses off the record can serve no purpose other than the self-interest of the Districts staff in minimizing the record of concern and criticism of the proposed landfill expansion. The staff members who respond to the questions are also not on record to be held accountable for the responses provided, either by the party to whom they responded, or to the public at large and members of the technical community who may review the record.

In all of the senior author's years of work on public issues and involving public hearings, he has never seen such an inappropriate approach taken to "public participation." As discussed in other

sections of these comments, the staff made statements and claims in the draft EIR and in verbal testimony at the hearings about "ensuring" protection, preventing entrance of "any" "hazardous materials," the "state-of-the-art" nature of the proposed expansion, etc. that are blatant, self-serving statements and claims that cannot be substantiated or demonstrated with the technical information that is available. If the staff were convinced of the reliability of the claims and statements made, there would be good reason to keep discussion of them "on the record" to provide documentation of assurance of their validity. It is obvious, however, that the level of protection claimed cannot be provided by the proposal. The unwillingness of the staff to respond on the record, indeed the staff's steps to preclude responding on the record, indicates to these commenters that the staff refuses to be held accountable for the claims and representations provided in the draft EIR.

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Submitted by

G. Fred Lee, Ph.D. and **Anne Jones-Lee, Ph.D.**
President Vice-President
G. Fred Lee & Associates
El Macero, CA

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Appendix