Comments on
LA County Sanitation District #2 "Rebuttal"

of the testimony presented to
Los Angeles Regional Planning Commission based on
transcript the LA Regional Planning Commission Hearing
held April 8, 1993

Comments by

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INTRODUCTION

On April 8, 1993, the Los Angeles County Regional Planning Commission (Commission) held a hearing on the proposed plan for the Los Angeles County Sanitation Districts' (Districts') proposed expansion of the Puente Hills Landfill. The purpose of that hearing was to allow the Districts to "rebut" the testimony that had been presented at the previous Commission hearings on this matter. As discussed below, the Districts again, as they have repeatedly done in the past, provided highly unreliable information to the Commission on the public health, groundwater resource, and environmental impact of the existing landfill and of the proposed landfill expansion. Unfortunately, the Commission did not provide the public with the opportunity to document the highly unreliable information provided by the Districts to the Commission. This situation is another manifestation of the bias that has been exhibited on behalf of the Districts throughout the Commission's review of the proposed expansion of the Puente Hills Landfill. Specific comments on inappropriate and unreliable information provided by the Districts are presented below.

SPECIFIC COMMENTS

Comments by Grace Chan of the
Los Angeles County Sanitation Districts

Ms Chan is the Districts' staff member responsible for developing the Districts' Environmental Impact Report (EIR) for the proposed landfill expansion. Beginning on transcript page 7, Ms Chan presented a series of summary statements in which she claimed, without documentation, that the Districts' positions on various issues raised by the public in the previous Commission hearings were appropriate. Her comments are similar to the highly self-serving comments that she made on the issues and concerns raised by the public on the significant technical deficiencies in the EIR that she developed.

Page 8, lines 18-20. Ms Chan acknowledged the unstable slopes in the Puente Hills area when she stated in response to public comment, that during a recent rainstorm, part of the hillside did

slide to the freeway. This type of behavior is to be expected in a geological setting of the Puente Hills type.

Page 9, beginning on line 14. In response to the public complaints about not having access to the data that the Districts had in its files on the current Puente Hills operations, Ms Chan stated,

"Not all of this input was able to be used. For example, they requested that ten years of historical groundwater data be included, simply too voluminous and technical to include in an EIR, but we did summarize the data in the report."

This is another example of the kind of distortion that the Districts' staff has presented throughout the review of the EIR and in the Planning Commission hearings; they make it appear that they have been diligent in properly presenting technical information on potential impacts of the proposed Puente Hills Landfill expansion. It was obvious upon review of the limited water quality data that were made available, that the Districts had not been conducting a proper review of the potential impacts of the existing Puente Hills Landfill on the groundwater resources in the vicinity of the landfill. We included comments on this matter in our March 30, 1993 comments to the Commission.

Recently, Stetson Engineers (1993) conducted an independent, in-depth review of the adequacy of the Districts' groundwater monitoring program for the existing Puente Hills Landfill. They reported that the Districts have refused to provide certain data on the groundwater quality protection issues associated with the current Puente Hills Landfill operations that was requested by Stetson Engineers as part of their review of the potential impacts of the existing landfill and proposed expansion of the Puente Hills Landfill on behalf of the Upper San Gabriel Valley Municipal Water District. Stetson Engineers also found that the Districts groundwater monitoring and contaminant control program was grossly deficient compared to the requirements set forth by the Los Angeles Regional Water Quality Control Board as well as those that are needed to properly evaluate and manage the leachate-contaminated groundwaters that are present in the vicinity of the existing Puente Hills Landfill. It now appears that the Districts were aware of the significant deficiencies in their groundwater protection program and were attempting to cover these up by not providing the data that had been requested of them.

While Ms Chan stated in her testimony on April 8 that the groundwater data are *"simply too voluminous and technical to include in the EIR,"* it is clear that she, the person responsible for developing the EIR, knows, or should have known, that there are significant problems with those data, and that that is possibly the reason that they were not included in the EIR.

Over the past two years we have reviewed about a dozen EIR's on various types of projects, most of which were landfills. Every other EIR that we have reviewed has included a complete set of the groundwater monitoring data that were pertinent to the proposed project. It is preposterous for Ms Chan to assert that the data are "too technical" to be included in the Districts' EIR for the proposed Puente Hills Landfill expansion. Some members of the public who have reviewed the EIR have internationally recognized expertise in review of data of this type. For this reason alone, the EIR has to be judged significantly deficient; the Districts should be required to start over in developing an EIR

for the proposed Puente Hills Landfill expansion that properly represents the existing and proposed impacts of the Puente Hills Landfill and landfill expansion.

Page 12, lines 4-7. Ms Chan again tries to give credibility to the studies conducted by the Districts on the impact of the existing and proposed expansion of the Puente Hills Landfill on property values. As indicated in our March 30, 1993 testimony to the Commission in which we provided documented reference to independent studies on the impacts of landfills on property values and, in accord with common sense, municipal solid waste landfills do significantly adversely impact property values of adjacent and nearby property owners. The only exception to this could be in those situations where the landfill owner owns sufficient buffer lands, i.e., on the order of one mile or more, between the edge of the landfilling operations and adjacent properties. All that needs to be done to judge the credibility of Ms Chan's claims on transcript page 12 about the lack of adverse impact of the Puente Hills Landfill on property values is to ask someone if they would purchase property at fair market value in the absence of the landfill, that is adjacent to the existing and proposed landfill expansion.

Page 12, beginning on line 18. Ms Chan superficially addresses some of the comments raised about air quality issues. While Ms Chan took Commission time to discuss the use of "clean fuels" for heavy equipment, she did not discuss one of the most significant, real air quality issues associated with the existing Puente Hills Landfill operations, namely the severe odor problems that are frequently inflicted upon adjacent properties due to the current landfill operations. Further, there can be no doubt that those odor problems will become more severe if the proposed landfill expansion is allowed to occur since there will be even less dilution of the odors as the area between where wastes are being deposited and the residents of the area decreases associated with the proposed landfill expansion.

Comments by S. Maguin of the
Los Angeles County Sanitation Districts

Beginning on transcript page 13, Mr. Maguin presents a series of short, superficial statements in which he attempts to dismiss the public comments on the deficiencies in the Districts' operation of the Puente Hills Landfill and proposed approach for its expansion by claiming they are without technical basis.

On page 16, Mr. Maguin attempts to portray the Districts' interest in wildlife habitat. The true extent of this interest is shown by the Districts' taking of a large number of large oak trees in the proposed expansion and replacing them with so-called "five-gallon" trees. Obviously, a five-gallon oak tree provides very poor wildlife habitat for many years compared to that provided by mature oak trees.

Beginning on transcript page 17, line 22. Mr. Maguin attempts to defend the "dependable" nature of the liner system that is proposed for use by repeatedly stating in a series of statements that the various components of the liners will conform to regulatory requirements and will be inspected.

While the Commission members may not have understood the true significance of those statements, those who understand the significant deficiencies of landfill liner systems of the type that the Districts propose to use in the proposed landfill expansion know that conforming to current regulatory requirements and inspection of the liner at the time of construction would not be expected to, and does not, provide for groundwater quality protection for as long as the wastes in the landfill represent a threat.

With respect to regulatory requirements, it has been recognized for some time that Chapter 15 governing landfill disposal of wastes in the State, which was originally adopted in 1984 by the State Water Resources Control Board, is not being implemented at the Regional Board level in accord with the regulatory requirements set forth in Chapter 15 of providing for groundwater quality protection from use-impairment by landfill leachate-pollution for as long as the wastes in the landfill represent a threat. As documented in the testimony we have presented to the Districts and the Commission, the wastes that have been deposited in the Puente Hills Landfill and those that will be deposited in the proposed landfill expansion will be a threat to groundwater pollution effectively forever. As part of developing the RCRA Subtitle D regulations, the US EPA (1988a) stated in the proposed regulations (August 30, 1988),

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

Also, in the Agency's Criteria for Municipal Solid Waste Landfills (July 1988) the US EPA (1988b) stated,

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

As we have discussed in previous testimony, the issues of the liners go beyond whether they conform to minimum regulatory prescriptive requirements or are properly inspected at the time of construction. The key aspect that has not been addressed is that the wastes will be a threat forever and that the liner materials and design that are used have a limited, finite useful life.

If Mr. Maguin had properly discussed this issues rather than trying to create a smokescreen before the Commission members, he would have pointed out that a simple Darcy's Law calculation shows that the clay liner that Mr. Maguin discusses (on the bottom of transcript page 17, beginning line 22) will, if constructed in accord with design specifications and if inspected and certified to meet those design specifications, be breached by landfill leachate that will be generated in the Puente Hills Landfill in a few years (less than 10 years).

With respect to the so-called synthetic materials (thin plastic sheeting) Mr. Maguin mentions on transcript page 18, line 2, it is well-known that plastic sheeting will not be a barrier for leachate migration through it forever, i.e., for as long as the wastes are a threat. The facts that the material

meets current regulatory prescriptive requirements and is inspected when it is installed will not change the fact that ultimately the leachate-containing properties of the material will deteriorate, causing the liner to diminish and failing in its function as an effective barrier to leachate transport through it.

It is for these reasons that the US EPA in 1988 and again in 1991 acknowledged (see our previous testimony) that its proposed approach for regulating solid wastes only postpones groundwater pollution; it will not prevent it. In light of what is known about the nature, character, and expected performance of landfill liners of the type being approved by regulatory agencies, and about the significance of inspections made at the time of construction, it is certainly inappropriate for such liners to be relied upon at landfills such as the Puente Hills Landfill where the eventual failure of the liner system will result in pollution of highly significant groundwater resources in the San Gabriel Basin. The groundwater aquifer system in that Basin provides water supply for more than one million people; there is no alternative water supply available. Once that water supply is polluted by landfill leachate it is permanently destroyed for use for domestic purposes.

It is important to remember that inspection of the liner at the time of construction will not prevent the ultimate deterioration of the liner system. Further, and most significant, since the liner system will be buried under hundreds of feet of garbage, there is no opportunity to inspect, much less repair, the liner system when it is found to fail to prevent significant leachate passage through it.

Therefore, again as he has done in the past, Mr. Maguin does not address the issues that were raised by the public, including us in our comments on the significant deficiencies in the Districts' proposed design of the Puente Hills Landfill expansion. Mr. Maguin's smokescreen of claiming that the landfill will meet the minimum prescriptive standards set forth by the regulatory agencies for landfill liner design and that it will be inspected at the time of construction, serves only to divert attention away from the substantive technical issues and concerns we raised on the long-term ability of that liner design to protect groundwater quality in accord with the performance standards set forth in Chapter 15 - to prevent use-impairment of the waters of the State for as long as the wastes represent a threat, i.e., for as long as the existing and proposed expanded landfill, if permitted, will exist.

Rather than trying to confuse and misdirect the Commission about the facts in this matter, Mr. Maguin should have provided the Commission with what he believed to be technical information that convincingly and reliably demonstrates that our previous comments, which were based on a critical review of information in the literature, are inappropriate. He should have addressed why the US EPA's comments quoted above, which were also quoted in our previous comments to the Commission, are invalid. Further, he should have provided data that show that the plastic sheeting (so-called synthetic material) and clay liners will prevent groundwater pollution by landfill leachate forever. He did not do this because he knows that this is obviously not the case. Neither he nor other representatives of the Districts in the Districts' EIR review or in the Commission's review of the planning for the landfill expansion, have addressed the issues we have repeatedly raised about the highly significant, very expensive, long-term impacts of the past and current operations as well as those of the proposed expansion, if permitted, on the groundwater resources in the San Gabriel Basin.

Rather than addressing issues that are fundamental to evaluating the potential impacts of the proposed expansion, Mr. Maguin, Ms Chan and others representing the Districts repeat superficial arguments about meeting minimum regulatory liner design requirements and liner inspection at the time of construction. Since they know that they are playing to a sympathetic audience (the Districts' Board of Supervisors for the EIR review and the Los Angeles County Planning Commission), they have been able to get away with never having to address the real and fundamental issues that have been raised in the comments on the EIR and during the Planning Commission review of the proposed landfill expansion.

On transcript page 18, beginning on line 12. Mr. Maguin states,

"One commenter, Dr. Lee, at last week's hearing testified of the opinion that the double liners will leak and cited the work of the leading liner expert, Dr. Rudolph Bonaparte as evidencing his opinion. Yet in correspondence from Dr. Rudolph Bonaparte he stated, and I quote -- and I will present this letter as -- for your consideration and enter it into the record -- `The interpretation of the information in the paper by Lee and Jones Lee is wrong. There is no data or information in the Bonaparte and Gross paper suggesting that there was leakage through any of the double liner systems included in the study.'"

R. Bonaparte frequently testifies on behalf of landfill applicants that he and members of his firm know how to design and construct plastic sheeting base liners so that they will not leak. He also has, on occasion, stated before the Los Angeles Regional Water Quality Control Board and the State Water Resources Control Board that these types of liners will conform to regulatory requirements for the prescriptive design of the liner and will be "protective." However, as we have pointed out in our comments on his testimony on behalf of water utilities and water agencies who are concerned about long-term groundwater quality protection before these Boards, he does not indicate what he means by "protective." He also does not state that such a liner system will be "protective" for as long as the wastes represent a threat.

Bonaparte did indicate in testimony before the State Water Resources Control Board on October 3, 1989 (see transcript of State Board hearing on the Azusa Landfill proposed expansion) that the fact that the plastic sheeting liners will ultimately deteriorate is of no consequence since the wastes in the landfill will decompose at a rate faster than that at which the liner will deteriorate. By such statements, Bonaparte, who is trained as a geotechnical engineer (landfill liner design), shows limited understanding of environmental engineering, aquatic chemistry, and water quality, i.e., those areas covering the processes that take place within landfills and the potential impacts of landfill leachate on groundwater quality. An understanding of those areas clearly shows that his statement to the State Board on this matter is in significant technical error. The wastes in municipal solid waste landfills contain a wide variety of constituents which will never decompose in a lined landfill of the type that was proposed for the Azusa Landfill expansion (about which the statement was made) or that is proposed for the Puente Hills Landfill expansion. Further, the processes that govern the process of the deterioration of plastic sheeting in liners are totally different from the processes the govern the decomposition of wastes for those parts of the municipal solid wastes that are potentially decomposable.

We previously submitted into the record of the Districts' EIR review a copy of a professional paper that we published several years ago, (authored by Lee and Jones) entitled, *"Groundwater Pollution by Municipal Landfills: Leachate Composition, Detection and its Water Quality Significance,"* in the proceedings of a National Groundwater Association's conference in 1991. Recently, we developed an updated version of that paper entitled, *"Groundwater Pollution by Municipal Landfills: Leachate Composition, Detection and Water Quality Significance,"* authored by Jones-Lee and Lee (1993). This paper will be published in the proceedings of an international solid waste management conference that will be held in Italy in October 1993. A copy of that paper is appended to these comments. That paper discusses the current understanding of the characteristics of landfill processes and municipal landfill leachate, and the groundwater pollution potential of MSW landfill leachate.

Further, we previously submitted into the administrative record for the Districts' EIR review (which is part of the Commission's review), a paper by Lee and Jones (1992a) entitled, *"Municipal Landfill Post-Closure Care Funding: The `30-Year Post-Closure Care' Myth."* A condensed version of that paper was accepted for publication in "Solid Waste and Power" in 1993. A copy of the condensed version is appended to these comments. The above-mentioned papers document the unreliability and technical error in statements made by Bonaparte in his attempt to persuade the State Water Resources Control Board about the "protective" nature of plastic sheeting based liners for the groundwater resources in the vicinity of the landfill.

In 1991 and 1992 Bonaparte testified on behalf of Browning Ferris Industries (BFI) in opposition to the Los Angeles Regional Water Quality Control Board's proposal to ban landfills in sand and gravel pits in the Los Angeles Basin. Previously in July 1991, he had testified before the State Water Resources Control Board's re-review of the proposed expansion of the Azusa Landfill. He again played games with words claiming the "protective" nature of plastic sheeting liners but failed to define the extent or duration of the "protection." Significantly, he did not claim that those systems would meet the State's landfill containment system performance standards set forth in Chapter 15 of protecting groundwater quality from use-impairment for as long as the wastes in the landfill represent a threat.

In the review of Bonaparte's testimony before the State and Regional Boards we have found that on several occasions he claimed to be quoting from the technical literature to support his client's (BFI) position. However, examination of the text from which he quoted shows that he provided only partial and selective quotation of the literature material leaving out key parts of the discussion of the issues about long-term liner stability and performance (see testimony of Lee and Jones in the administrative record for the Los Angeles Regional Water Quality Control Board's review of the Board's proposal to ban landfills in sand and gravel pits in the Los Angeles Basin - June 1992). Bonaparte's use of the literature in support of his claims of long-term performance of landfill liners for the protection of beneficial uses of groundwater, have to be carefully scrutinized.

A critical review of the statements cited by Mr. Maguin on transcript page 18, lines 18-20, in which Bonaparte is alleged to state that the interpretation of the information by Jones-Lee and Lee is

"wrong" will show that both Bonaparte and Maguin have provided highly misleading and inaccurate information to the Planning Commission. The facts of the matter are that Bonaparte is now trying to re-interpret the data that he presented in the paper by Bonaparte and Gross in which they discuss liner leakage.

Contrary to the implications of Mr. Maguin's and Bonaparte's comments in this matter, we have never indicated that data were presented by Bonaparte and Gross regarding leakage through a double-liner system included in their study. We have quoted Bonaparte and Gross (1990) directly from their paper. Bonaparte and Gross (1990) stated,

"All of the double-lined landfill cells reviewed in this study that were constructed with geomembrane top liners appear to have exhibited top liner leakage. Based on the available data, the flow rates attributable to top liner leakage at active cells that had geomembrane top liners and CQA programs were frequently less than 200 lphd; the maximum measured flow rates, which were often associated with increased flow from the leachate collection layers shortly after storm events, were typically several times the average flow rates."

* * *

"The double-lined landfills and surface impoundments in this study having a layer of compacted clay as the soil component of a composite top liner almost always exhibited flows due to consolidation water. Measured flow rates attributable to consolidation water were in the range of 20 to 840 lphd."

* * *

"Based on the data in this study, an action leakage rate of 50 lphd 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-part 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. Even at this level, the action leakage rate may be temporarily exceeded at the start of operation of a facility, due to drainage of construction water, and, for facilities with composite top liners, during the active life of the facility, due to drainage of consolidation water."

In Bonaparte's November 20, 1992 letter (to which Mr. Maguin's comment had reference) the focus of Bonaparte's objection to our "interpretation" of his paper co-authored with Gross was that their *"paper addresses flow rate <u>within</u> double-liner systems, which is not the same as the potential for leakage <u>through</u> double-liner systems."* (emphasis his). It is obvious that the point of determination of leachate flow was the leachate detection system, as he pointed out in his comments on our statements. There would be no way to measure the leakage that occurs through the bottom liner; it could be many years before that would be found through the groundwater pollution monitoring systems used.

Maguin and Bonaparte are trying to mislead the reviewers of this statement to believe that if leakage of leachate occurs through the top liner system so that it is detected in a leak detection system,

that the bottom liner will prevent all leakage of leachate through it for as long as the wastes represent a threat. This is obviously not the case. Some of the landfills that Bonaparte and Gross reported leakage data on likely had leakage through the bottom liner as well. However, since there was no leak detection system below the bottom liner, there was no way of knowing that this leakage was occurring.

Bonaparte tries to convey the impression, in his attempt to discuss these issues, that the leakage that was occurring was through an FML and not a composite liner (which is an FML backed by a low-permeability layer of soil). The way that composite liners leak leachate is through holes in the FML. While a composite liner with few holes in it will leak less than an FML alone, it still will leak. On page 4 of Bonaparte's letter, in the second paragraph in Bonaparte's discussion of composite top liner leakage he stated,

"Only a small fraction of the reported flow was categorized as possibly being due to top liner leakage."

Therefore Bonaparte admitted, as he should, that composite liners will also leak leachate through them. On page 6, paragraph two of his letter, Bonaparte commented on our comments on the difficulty of reliably constructing a composite liner. It is well-known in the liner technology field that it is essentially impossible to achieve true composite liner characteristics in a landfill liner. While Bonaparte claimed that he has the ability to develop composite liners which "minimize wrinkles," he did not state that he can achieve true composite liner properties in a landfill liner. It will still have wrinkles. At every wrinkle the FML and the soil layer will act as independent liners which can leak at very high rates, rather than as a composite liner. Further, over time, the FML will deteriorate with ever an increasing number of holes developing in it leading to increasing rates of leakage. In addition, there is a wide variety of mechanisms, such as desiccation cracking, ion exchange cracking, etc., that can cause the soil backing layer of a composite liner to transmit leachate through it at much greater rates than those predicted based on the design permeability.

There is another very important aspect of liner leakage that Maguin and Bonaparte have failed to acknowledge, even though Bonaparte is well-aware of it. This is the permeation of an intact plastic sheeting liner, i.e., no holes, by organic solvents. These issues were discussed in the materials submitted to the Sanitation Districts on the deficiencies in the Districts' EIR. The solvents of concern can be purchased at hardware stores and other firms by the public, used to some extent, and the remainder of the can of solvent discarded in the trash. These materials are, and will continue to be, present in municipal landfills. A fraction of a gallon of these solvents can pollute millions of gallons of groundwater rendering it hazardous to consume because of increased cancer risk. Studies by University of Wisconsin researchers (Sakti *et al*., 1991) reported that the plastic sheeting in landfill liners would have to be three inches thick to prevent these solvents from passing through the liner in 25 years. With the normal-thickness plastic sheeting liner used, passage through this liner material by the solvents occurs within a few days. It is important to emphasize that this phenomenon occurs without any holes in the plastic sheeting.

Bonaparte's letter went on to provide six additional pages of "interpretation" of the paper he

published with Gross. In all his additional "interpretation" Bonaparte did not address the issues we raised. Bonaparte and Gross stated their finding that the upper liners leak, as quoted above. In his letter, Bonaparte also pointed out that upper liners leak. That finding is consistent with the nature of liner systems as we have pointed out. His figures A and B show top liner leakage as one of the three *"... most likely potential sources of liquids within leakage detection layers of double-liner systems located above the ground-water table ..."* While recognizing top liner leakage, he claims that there would not be similar leakage of the lower liner. He is careful, however, not to claim that the lower liner will not leak. He stated,

> *"It is important to recognize that this liquid* [in the leakage detection layer within the double-composite liner] *is contained within the double-liner system, above the bottom liner, and that the liquid collection efficiency of a typical leakage detection layer is very high. The leakage detection layer for a modern double-liner system is designed to allow rapid drainage of liquid to a sump, thereby minimizing the potential for hydraulic head buildup on the bottom liner. With this design, there is little potential for liquid migration into the bottom liner."*

It is significant that Bonaparte failed to point out that leachate collection and removal systems, which are above the top liner are also *"designed to allow rapid drainage of liquid to a sump."* That design, however, does not preclude leakage through the top liner, as shown by the Bonaparte and Gross data, and it will not preclude leakage of leachate out of the leak detection system before it reaches a sump, through the bottom liner.

Therefore while design considerations for a flawless system may indicate "little potential for liquid migration into the bottom liner," the facts are that the systems are subject to clogs and deterioration, and depend on the integrity of the lower FML. Further, those systems, which are relied upon to collect leachate in perpetuity, are located beneath hundreds of feet of garbage and are not available for inspection and repair without waste exhumation. It is therefore obvious that it is only a matter of time until at least some of the leachate that appears in the detection system between two liners will pass through the bottom liner as well. Small amounts of municipal solid waste landfill leachate can pollute large amounts of groundwater, rendering it unusable for domestic water supply. We have discussed in previous testimony and publications the technical basis well-described in the technical literature, for the indisputable conclusion that the lower liner of a double-lined landfill will not be impermeable in perpetuity.

With respect to the proposed Puente Hills Landfill expansion, it is important to note that that would not be a double-lined facility, but rather a single composite lined system. Therefore leaks will occur through the composite liner which will lead to groundwater pollution under the landfill.

It is also important to note that what Bonaparte and Gross have said about leakage rates of liners is not different from what others have independently reported on this topic. 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)."

It is clear to me that Bonaparte and Gross did not understand the significance of their statements about liner leakage rates when they were trying to convince the regulatory agencies and others that the agencies should allow a higher liner leakage rate than what the agency was proposing on the basis that even with good quality construction, such liners will leak at rates above the proposed regulatory values. By asserting that greater leakage rates should be allowed before the liner is considered to have failed, Bonaparte is trying to protect an obviously flawed technology where thin plastic sheeting and a compacted soil layer a couple feet thick are expected to prevent leachate migration through them in perpetuity, i.e., for as long as the wastes represent a threat. Obviously, even if a landfill liner system could be constructed that would not leak at the time the landfill was put in operation, it is only a matter of time until the quality of the liner system deteriorates so that significant leakage through the liner system will occur.

On the bottom of page 5 and the top of page 6 of his letter, Bonaparte objected to our use of the words "liner failure" in describing leakage that he and Gross reported as occurring in a liner system. This is more of the inappropriate approaches used by Bonaparte and some of his colleagues in trying to perpetuate the use of an obviously flawed technology for managing municipal solid waste in "dry tomb" landfills. Ian Peggs, who is recognized as a pioneer in work on landfill liner integrity, stated in a December 14, 1992 memorandum "re: Proposed ASTM Symposium on Geosynthetic Failures: Forensic Analysis Methods and Remediation,"

"It has become apparent that the word 'failure' should not have been used in the title of the Symposium. It limited the number of abstracts submitted."

It has become very clear that those, like Bonaparte, who are proponents of plastic sheeting and compacted soil layers as liners for landfills are trying to dodge the fact that these systems have significant failures within short periods of time after construction. There is no question about the fact that all of these systems will fail to protect groundwater quality for as long as the wastes are a threat (forever).

It is important to understand also that Bonaparte has frequently testified before regulatory boards on behalf of landfill companies. We have found on several occasions that in his quoting from the literature that he claims supports his technical position on matters, Bonaparte has selectively presented those parts of passages or materials that give the appearance of supporting his client's position. Examination of the complete passage or document on those matters, however, has revealed that it does not support his client's position and, in fact, raises serious questions about the ability of the liner systems of the type that Bonaparte asserts will "protect" groundwater quality to provide groundwater quality protection for as long as the wastes represent a threat as required by Chapter 15.

In our testimony on the technical reliability of Bonaparte's statements on behalf of Browning Ferris Industries' (BFI) proposal to construct the Keller Landfill near Pittsburg, PA, before the San Francisco Bay Regional Water Quality Control Board, and in his testimony before the LA Regional Water Quality Control Board, he has provided highly unreliable, incomplete and inaccurate information to the Boards on the views of others in the literature, on the expected performance of the liners of the type being used today (plastic sheeting and compacted soil layers) to prevent pollution of groundwater which impairs its use, by landfill leachate, for as long as the wastes represent a threat, i.e., forever, as required in Chapter 15. In Bonaparte's testimony before various boards he has often cited parts of the writings of Haxo and Haxo (1988) and Mitchell and Jaber (1990). For example he appended to his November 18, 1991 letter to LA Regional Water Quality Control Board, a copy of his declaration to the State Water Resources Control Board dated July 21, 1991 (Bonaparte, 1991b). In that declaration Bonaparte cited and selectively quoted from conclusions of an "Ad Hoc Meeting of the Service in Landfills of Flexible Membrane Liners and Other Synthetic Polymeric Materials of Construction" convened by the US EPA at the US EPA Hazardous Waste Engineering Research Laboratory, reported by Haxo and Haxo (1988). Three major conclusions of the "Ad Hoc Meeting" were presented by Haxo and Haxo (1988). On page 14 of Bonaparte's declaration addendum to his November 18 letter, he quoted two-and-a-half of those conclusions, omitting the major qualifying component of the conclusions. Specifically, he cited the first statement from the third conclusion of Haxo and Haxo (1988),

"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."

He omitted the subsequent and final statement of that conclusion which reads,

"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."

The part of the Haxo and Haxo conclusion that Bonaparte left out of his quotation of conclusions to the State Board and to the LA Regional Board indicates that the ad hoc committee concluded that the long-term stability/integrity of membrane liner materials to function reliably as a liner cannot be demonstrated and therefore is in question.

In addition, Bonaparte did not cite the *"areas of concern that may affect the service life of components of liner systems and the functioning of the liner system as originally designed"* that were expressed by Haxo and Haxo (1988). 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." and

"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." and

"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."

Thus it is clear that while Bonaparte quoted words from the Haxo and Haxo report of the ad hoc meeting held by the US EPA, by his selective citation from the report Bonaparte provided a distorted representation of the content and conclusions of that work.

Another example of Bonaparte's inadequate and unreliable reporting of the literature on the stability of landfill liners occurred in his 1991 statement,

"In addition, I presented an excerpt from a publication by Professor J. K. Mitchell of the University of California, Berkeley [Mitchell and Jaber, 1990] indicating that a clay liner in a stable chemical/physical environment (such as the one at the Keller Canyon Landfill) 'would be expected to function well as a seepage barrier indefinitely'." (Bonaparte, 1991a).

A review of the document cited by Bonaparte (a document published in a conference proceeding that Bonaparte edited) shows that Bonaparte distorted what was presented in the literature. In truth, the statement made by Mitchell and Jaber (1990) in the passage that Bonaparte only partially quoted, clearly and explicitly contradicted Bonaparte's reporting of it. The complete passage from Mitchell and Jaber (1990) is presented below (the portion underlined is that portion cited by Bonaparte; other emphasis was added):

"By their very nature most clay soils are quite stable materials in their natural state, because they are towards the end point of the degradation phase of the weathering and rock-forming cycle. Thus, if a naturally occurring clay soil is compacted to high density, thereby producing a material with very low hydraulic conductivity, and ***if it is maintained within the same ranges of temperature, pressure, and chemical and biological environment****, it* <u>*would be expected to function well as a seepage barrier indefinitely*</u>*.* ***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, contrary to the distorted citation presented by Bonaparte, Mitchell and Jaber (1990) question the reliability of clay liners to function as effective landfill containment systems over long periods of time.

Bonaparte's letter and claims do not reflect an understanding that very small amounts of leakage of municipal landfill leachate through a liner system can pollute very large amounts of groundwater, rendering it unusable for domestic water supply purposes. The US EPA has repeatedly stated what is well-known, that once a domestic water supply well is polluted by municipal landfill leachate, the well has to be abandoned. This point was discussed in both its 1988 and 1991 proposed and finalized RCRA Subtitle D regulations (US EPA 1988a, 1991). It is also well-known that once a groundwater is polluted by municipal landfill leachate, there is no possibility of cleaning up the groundwater or affected portions of the aquifer so that it can ever be used safely again for domestic water supply purposes (see Rowe, 1991). Lee and Jones (1992b) have presented a review of this issue from the literature. The rates of leakage that Bonaparte proposed as acceptable are sufficient in some landfill settings to pollute very large amounts of groundwater, rendering it unusable for domestic water supply purposes.

Those who understand the properties of liner materials of the type being used today in solid waste landfills, which are the same materials that the Sanitation Districts propose to use in the Puente Hills Landfill expansion (plastic sheeting and a compacted soil layer) and who reliably report on their knowledge on this topic, know that the US EPA's 1988 assessment (quoted above) of the ultimate deterioration of the liner material and the failure of these liners to function perfectly forever is correct. It is only a matter of time until liners of this type will allow sufficient leachate passage through them to lead to groundwater pollution below the landfill. In landfill settings such as the Puente Hills Landfill where there are pathways for off-site migration of the leachate-polluted groundwater, it is only a matter of time until the groundwaters of the San Gabriel Basin will be polluted by leachate from the existing landfill, as well as the expanded landfill (if constructed). It is important not to allow the expansion of the Puente Hills Landfill as proposed by the Districts since this will establish new pathways to transport much larger amounts of leachate polluted groundwaters to the basin.

The problem of unreliable reporting on the expected long-term performance of liners has caused a representative of a national professional engineering society ethics committee to request that the we develop a paper on professional ethics related to regulating landfills. From that request, we recently developed a paper entitled, *"Practical Environmental Ethics: Is There an Obligation to Tell the Whole Truth?"* (Lee and Jones-Lee, 1993), a copy of which is appended. It is under peer review and has been submitted for publication in one of the national journals. This paper discusses the half-truths and distortions that are presented by some landfill applicants on the ability of liners of the type being used today to provide groundwater quality protection from leachate pollution for as long as the wastes represent a threat.

On transcript page 19, lines 1-6 Mr. Maguin states that the liner system that will be used in the Puente Hills Landfill expansion has been approved for other Districts' landfills including the Canyon 9 area of the Puente Hills Landfill. First, it is very important to understand that the Los Angeles Regional Water Quality Control Board has not reviewed the proposed liner design for the proposed Puente Hills Landfill expansion. At the February 17, 1993 Commission hearing, the Regional Water Quality Control Board staff explicitly stated that such a review has not taken place. It was, therefore, highly misleading of Mr. Maguin to suggest that what the Los Angeles Regional Quality Control

Board has approved in the past for a landfill liner design would be suitable and approved today by that Board. A review of the actions of that Board will show that in 1989 it approved the liner design for the proposed expansion of the Azusa Landfill, but in June 1992 it concluded that no landfill liner, including a double-composite liner (which can be far more protective than that proposed by the Districts for the Puente Hills Landfill expansion), would be protective of groundwater quality from landfills located in sand and gravel pits in the San Gabriel Basin, such as the Azusa Landfill.

Since 1984 when Chapter 15 was first implemented, Regional Water Quality Control Boards throughout the State have been approving landfills based on prescriptive standards for liner design without adequate attention to whether the landfill design would meet the performance standard of providing protection of groundwater quality protection from use-impairment for as long as the wastes represent a threat. As a State Water Resources Control Board-invited reviewer of the State Water Resources Control Board's then-proposed Subchapter 15 in the early 1980's, I (G. F. Lee) am highly familiar with the intent of those who developed those regulations. It was not the intent of those who developed the regulations at the State Board level to allow landfills to be constructed in the State which meet the minimum prescriptive standards for liner design, but will not meet the landfill containment performance standards set forth in the regulations. Since the Regional Boards can act autonomously in the implementation of the regulations until a particular aspect of the regulations is appealed to the State Board, the State Board has had little opportunity to force the Regional Boards to require more protective landfill liner systems than the minimum prescriptive standards set forth in Chapter 15. However, this situation is now changing. The State Board has notified the Regional Boards that there are significant problems in the implementation of Chapter 15 based on the minimum prescriptive liner design standards. Achieving the minimum performance standard is not equivalent to achieving the performance standards

The State Water Resources Control Board has recently incorporated the US EPA Subtitle D requirements into Chapter 15 as part of developing a new municipal solid waste landfill Policy. A hearing, workshop, and meeting were held in June 1993 on this proposed Policy. At the workshop on June 3, 1993, and again at the meeting on June 17, 1993, the State Board explicitly stated that the implementation of the Policy requires that any landfill liner containment system developed under the Policy will have to meet the Chapter 15 performance standard of the protection of groundwater quality from impaired use for as long as the wastes represent a threat. No longer will minimum prescriptive standards set forth in the Policy be assumed to be equivalent to the landfill containment prescriptive standard. This Policy will likely be adopted by the State Water Resources Control Board on June 17, 1993. Since the Districts' proposed liner system for the proposed Puente Hills Landfill expansion will obviously not prevent groundwater impaired use for as long as the wastes represent a threat to groundwater quality, there are significant questions about whether the proposed expansion of the Puente Hills Landfill expansion can be issued a waste discharge requirement (WDR), i.e. can be permitted. The permitting of the proposed landfill expansion will clearly be a violation of the proposed State Board Policy governing landfilling of wastes in the state. Therefore, Mr. Maguin's statements on page 19 about how the proposed landfill liner design had been approved for installation at other landfills and within Canyon 9 of the Puente Hills Landfill has no relevance to today's situation.

Page 19, beginning on line 7-16. Mr. Maguin states,

"And lastly, the double liner system which is proposed should be viewed as simply two components of a complete liner system, the details of which we presented to you in our opening statement on February 17th. It's a system designed to provide multiple redundancy to the expectations the site will never produce leachate in the first place. The fact being evidenced by the fact that none of the Sanitation Districts (sic) has ever produced leachate over our 35 - year history."

Again, Mr. Maguin has provided misleading and unreliable information. The so-called double liner system is not a double-composite liner of the type adopted in other states, such as New York and New Jersey and proposed in Michigan for municipal solid waste landfills. What Mr. Maguin referred to as a "double liner" is, in fact, a single composite liner, composed of a sheet of thin plastic overlying compacted soil. It is well-known that even with good-quality construction, such a liner, at best, only postpones groundwater pollution. This is why some of the states will not allow this approach to be used within their states for municipal solid waste landfills. Also, at the June 3, 1993 hearing, the State Water Resources Control Board staff stated that a single-composite liner system is far less-protective than the double-composite liner system. While as discussed in the materials that we have developed (that are part of the administrative record) on the Districts' EIR for the Puente Hills Landfill expansion, the US EPA has selected a single-composite liner as the minimum prescriptive standard for landfill liner design permitted under Subtitle D, the US EPA acknowledges that a single-composite liner of the type proposed by the Districts will not be protective of groundwater quality.

A critical review of the liner system shows that contrary to the claim of Maguin quoted above, there is no "redundancy" in the liner design. There are multiple layers in the containment system, only one of which (the plastic sheeting) provides any significant impediment to leachate transport through it. Plastic sheeting used as a municipal solid waste landfill liner will likely contain holes after placement of waste in the landfill. Further, some organic solvents which can be purchased in a hardware store and legally discarded in household trash will pass through intact plastic sheeting, even without holes, in a matter of days. Some such organic solvents are suspected human carcinogens and decompose to vinyl chloride, a known human carcinogen. Half a gallon of these solvents can pollute millions of gallons of groundwater, increasing the cancer risk for those who consume it. Further, even if the plastic sheeting could be constructed and placed into operation without holes, which is highly doubtful, it is only a matter of time until holes develop.

Mr. Maguin's statement of the expectation that the landfill will *"...never produce leachate in the first place."* (quoted above) is highly misleading, and a gross distortion of the facts. From the statement Maguin made, it is appropriate to question what Mr. Maguin means by the term, "leachate"; it is clearly not the definition used by professionals in the landfill field. Those knowledgeable in this topic area know that leachate is "garbage juice" which is produced from any liquids inherent in the wastes as they are deposited in the landfill or developed from precipitation on the surface of the landfill which, in contact with the wastes, dissolves (solubilizes) constituents in the waste. It is a chemical soup of conventional, non-conventional, and hazardous chemicals. The enclosed paper on the composition of municipal solid waste leachate and its impacts discusses the characteristics of

municipal landfill leachate.

The fallacy of Mr. Maguin's assertion that no leachate has been produced at the Puente Hills Landfill in 35 years, is evident by the fact that the Districts have been required by the Los Angeles County Regional Water Quality Control Board to construct to groundwater barriers (slurry walls) at the downstream end of the canyons for the existing Puente Hills Landfill for the purpose of preventing migration of contaminated groundwater from under the existing landfill to adjacent properties and ultimately, to the San Gabriel Basin aquifer system. Further, as has been reported by Stetson Engineers (1993), the Los Angeles Regional Board had required the Districts to place additional groundwater "barriers" downgradient of the existing "barriers" because they have failed to prevent landfill-derived constituents from passing through the original barrier.

It is common sense and fact that leachate is produced in the Puente Hills Landfill every time there is a significant rainfall event. That leachate is a highly concentrated soup of chemicals that has the potential to pollute large amounts of groundwater rendering it unusable for domestic water supply purposes. It is indeed shocking that one of the key managerial officials of the Districts does not even recognize that leachate as normally defined in the field is being produced at the Puente Hills Landfill and that that leachate has been polluting groundwater in the vicinity of the landfill and that it has passed through the groundwater barriers that were developed to prevent its migration.

On the bottom of page 19, beginning with line 21 and continuing to the top of page 20, through line 2, Mr. Maguin again provided highly misleading information to the commissioners. He is trying to give the impression that the pollution of groundwater under the landfill is of no consequence since the water is unusable for domestic purposes. He states, beginning on page 19, line 24, with regard to what his interpretation of groundwater data was,

"First, that the soils in the area have marine origin and, secondly, that the local waters in the area of the landfill are unusable to start with."

While some of the groundwaters under the landfills have elevated concentrations of a number of constituents that would cause them to be considered adverse to domestic water supply water quality, with minor treatment, some of these waters could be readily used for that purpose. The issue of concern raised is not, and Mr. Maguin indicated, whether the waters under the landfill could be used for domestic purposes. The issue that was raised by a number of commenters including us, in comments on the Districts' EIR, and in the presentations made to the Commission, is whether leachate-contaminated groundwater, even if not directly usable for domestic purposes, could pollute the groundwaters of the San Gabriel Basin, rendering them unusable for domestic purposes. There is no question about the fact that even the Districts' own consultants, as discussed in Dr. Dennis Williams' testimony as well as the Stetson Engineers (1993) report, have shown that the groundwaters under the landfill are hydraulically connected to the groundwaters of the San Gabriel Basin aquifer system. Therefore, leachate-contamination of groundwaters beneath the landfill could ultimately result in leachate-contamination of the San Gabriel Basin aquifer system.

Proper review and presentation of the information pertinent to this matter would have pointed

out that municipal solid waste landfill leachate is such a potent source of contaminants so that very small amounts of it can pollute large amounts of groundwater, rendering it unusable for domestic purposes. This issue is discussed in detail in the enclosed papers as well as in the administrative record for the Commission's hearing. This means that far greater dilution of groundwater polluted with landfill leachate has to occur before the concentration of the leachate-derived constituents will meet drinking water standards (MCL's). While the groundwater in the Puente Hills system before landfill construction was polluting groundwaters in the San Gabriel Basin, the San Gabriel Basin aquifer system was able to dilute these pollutants to acceptable levels. However, the construction of the second largest landfill in the United States represents a massive source of pollutants that will pollute the San Gabriel Basin groundwaters beyond the ability of the San Gabriel Basin groundwater system to dilute out the contaminants to acceptable levels based on current MCL's.

Further, as discussed in our testimony and the appendices to it, it is prudent public health policy to assume that any groundwater polluted with municipal landfill leachate is of highly questionable quality, even if all of the MCL's for the constituents that are now regulated were met. As noted, there are 60,000 chemicals used in this country every day, many of which could be present in municipal landfill leachate. Fewer than 200 of these are regulated. The large amounts of non-conventional contaminants in municipal landfill leachate are of great concern and a key reason that the Puente Hills Landfill should not be allowed to expand and that the Districts should be required to begin an immediate program of effective groundwater pollution control which will have to be carried out forever to try to prevent significant irreparable damage to the San Gabriel Basin aquifer system from the wastes that have already been deposited in the Puente Hills Landfill. Mr. Maguin's statement about the groundwaters under the landfill being unusable was misleading in its indication that leachate-pollution of the groundwater beneath the landfill is of no concern. This is clearly not the case.

On transcript page 20, beginning on line 3, Mr. Maguin discussed the heavy metal pollution of groundwaters in the vicinity of the Puente Hills Landfill and tried to claim that the high heavy metal concentrations are due to natural sources. A review of the groundwater data shows, however, that Mr. Maguin's assertions are not in accord with what would be expected based on the data that have been collected by the Districts. Last winter, Stetson Engineers, on behalf of the Upper San Gabriel Basin Watermaster concluded that there were elevated concentrations of heavy metals in groundwaters downgradient of the landfill. Further, the June 1993 Stetson Engineers report confirmed the preliminary findings and concluded that the Districts have not properly investigated the elevated concentrations of contaminants that have been found. Further, the analytical methods that have been used, sample pre-treatment, sampling approaches, duration, etc. have not provided a reliable data base upon which to determine the full extent and degree of groundwater pollution by the existing Puente Hills Landfill. As reported by Stetson Engineers, the Regional Water Quality Control Board has not had adequate funding and staff to properly police the Districts' groundwater quality monitoring and evaluation activities. The Regional Board staff has admitted that because of such limitations it has had to allow the Districts to be self-policing. This means that not only did the Districts generate their own EIR and then certify it, largely ignoring the public comments on the deficiencies in it, but the Districts (whose management does not even recognize that leachate is being generated at the landfill) also have been in the position of policing its own operations with respect to

detecting groundwater pollution by the leachate that is generated at the landfill. This is obviously a highly inappropriate situation that cannot be allowed to continue. The San Gabriel Basin aquifer system is far to valuable to allow the Districts' self-serving staff to continue to mismanage the groundwater monitoring program at the existing landfill.

The Stetson Engineers report discussed the inappropriateness of the approaches used by the Districts and the Regional Board staff in review of the groundwater quality data that the Districts have collected on the existing Puente Hills Landfill. Mr. Maguin stated on transcript page 20, lines 9 and 10

"...the levels of the metals have always been very low."

That statement is not supported by the reporting of Stetson Engineers. Heavy metal levels in the vicinity of the landfill have been found to be above drinking water MCL's. It cannot be ruled out that those metals have been derived from the existing landfill. Because of the poor-quality monitoring program conducted by the Districts and because the Districts have been allowed to be largely self-policing, the causes of the elevated heavy metals is unknown.

On transcript page 20, beginning on line 15, Mr. Maguin stated that the Districts have properly presented information in their EIR on the groundwater quality data. As discussed above with reference to Ms Chan's comments on this point, Mr. Maguin's statement was not factual. Further, as indicated in the Stetson Engineers report, and contrary to the statement made on transcript page 21, lines 6-9, the Districts have withheld data and other information from Stetson Engineers.

On transcript page 21, beginning on line 17, Mr. Maguin attempted to discredit my testimony by trying to raise questions about my serving as an invited reviewer to the State Water Resources Control Board's development of what was then called Subchapter 15. He referenced a memorandum from H. Schueller, Chief Division of Clean Water Programs, State Water Resources Control Board, dated April 23, 1992 that he implies questions my activity in that regard. That memorandum stated in toto,

> *"You have received a letter from Dr. G. Fred Lee, dated March 14, 1992. In both the letter and in one of the enclosed publications, Dr. Lee states that he was involved in the review and development of the 1984 version of Chapter 15. Dr. Lee's involvement was limited in that he was among a group of 19 or 20 individuals <u>who were asked to comment upon the proposed regulations</u>. None of these individuals worked as a team member with State Water Board staff in writing the regulations, although some of their input was used as additional substantiation, regarding a given requirement in the Statement of Reasons.*
>
> *If you have any questions, please telephone Charlene Herbst at (916)739-4196 (CALNET 497-4196)."* (emphasis added)

Thus the Schueller memorandum simply provided additional detail that substantiated that I was, in

fact, among a group of professionals who were asked to comment to the State Board on the development of Chapter 15 regulations. I have never claimed to have been the primary advisor, the sole advisor, or a "team member" with the State Board staff. However, since at the time that this occurred in the early 1980's I was teaching in the University of Texas system and had had no previous contact with the State Board or its staff on these matters and had not lived in California since 1955, the fact that I was asked to be a reviewer of Chapter 15 by the State Board staff demonstrates that my expertise was in fact sought-out in the development of these regulations. Further, while not mentioned by Mr. Schueller, I was, at the request of the State Board staff, present at the final hearing when Chapter 15 was adopted and was prepared to testify on behalf of the Staff's position in support of these regulations should that have been necessary. Also, at the same time, and at the request of the State Board staff, I presented a workshop on groundwater monitoring associated with landfills to State Board and Regional Board staff. Clearly I have made no misstatement regarding my advisory role to the State Board in the development of Chapter 15 regulations, nor did the memorandum from H. Schueller make any claim that I had misrepresented my role in those activities.

Mr. Maguin used that Schueller memorandum as the basis for questioning my critical comments on the geological suitability of the Puente Hills site for a landfill. By his approach Maguin has distorted, and failed to address or refute, the information I presented on this matter. It is obvious to anyone who reviews the Puente Hills site and is concerned with a factual presentation of technical information on the suitability of the Puente Hills site for the second largest landfill in the United States that this site is a highly unsuitable site for a municipal solid waste landfill.

On transcript page 22, beginning on line 9, Mr. Maguin discussed some materials that he claimed show support for the proposed landfill expansion, by the San Gabriel Basin Watermaster. It is important to note that after Mr. Maguin made those statements at the April 8 hearing, Mr. Robinson, a representative of the San Gabriel Basin Watermaster, identified himself as "Director of Upper San Gabriel Valley Municipal Water District" and attempted to enter into the record a letter that showed that Mr. Maguin's statements about the Watermaster's position on the Puente Hills Landfill were inappropriate (see transcript page 40, lines 9-13). Chairman Wulliger told Mr. Robinson that he was out of order and questioned whether he wished to speak in favor or against the application. Mr. Robinson responded on transcript page 40, line 24-25,

"Well, there's either a misinterpretation or a misrepresentation contained in the remarks by Mr. Maguin that I'd like to clear up."

Even with that statement, the chairman of the Commission would not allow Mr. Robinson to enter into the record the documentation to show that Mr. Maguin had inaccurately characterized the Upper San Gabriel Basin Watermaster's views on the expansion of the Puente Hills Landfill. The chairman ruled that it was not possible to introduce any materials from the public at that hearing and therefore only Mr. Maguin's version of this situation would be presented. A review of the facts will show that again Mr. Maguin has provided highly distorted information to the Commission on this issue.

Returning to Mr. Maguin's comments reported on transcript page 22, beginning on line 11, Mr. Maguin quoted from 1989 testimony of the Executive Officer of the Main San Gabriel Basin

Watermaster before the Regional Water Quality Control Board. As indicated above, and as Mr. Robinson attempted to correct for the record, this is not the current Watermaster position. This is shown by the fact that the Watermaster is sufficiently concerned about the Puente Hills Landfill to request that Stetson Engineers do a review of the groundwater monitoring data that exist for the landfill. If the Watermaster were satisfied that the Puente Hills Landfill represented no threat to groundwater resources in the San Gabriel Basin, there would be no need for that review.

On transcript page 28, first paragraph Mr. Maguin discussed the rail haul situation and pointed out in that paragraph that none of the cities joined in the 1990 rail haul joint powers agreement because of high cost. This is to be expected since as long as the cities feel that they can continue to dispose of garbage at near-term costs far less than the real costs, passing on the balance to future generations, they will continue to do so. It is time for the people in the Los Angeles area to begin to pay the true costs for managing their solid waste which include the costs of protecting groundwater quality from use-impairment for as long as the wastes represent a threat and protecting the health and welfare of property owners and users in the area. Continuing and expanding the operation of the Puente Hills Landfill as proposed may allow today's waste generators to have waste "disposal" for less money than would be required if these protections were provided, but the nearby property owners and users, and future generations will be paying the balance, plus the costs of lost water resources. The Districts and all of the cities that are now using the Puente Hills Landfill must start to responsibly plan for managing their solid wastes so that they do not have significant adverse impacts on adjacent and nearby property owners/users or on the groundwater resources of the area at any time in the future.

On transcript page 29, beginning on line 24, Mr. Maguin stated that the proposed project satisfied, by design, many of the elements of the Board of Supervisors' action plan for waste management. For substantiation, he stated on transcript page 30, lines 3-5,

"Secondly it offers substantial environmentally sound in-county capacity."

Contrary to that self-supporting statement made by Mr. Maguin, the proposed continuation of operation of the Puente Hills Landfill is not environmentally sound and is strongly contrary to the best, long-term interests of the people in the San Gabriel Basin.

On transcript page 35, lines 23-24, Charles Carry, Chief Engineer and General Manager for the Los Angeles County Sanitation Districts, applauded his and the Districts' waste management efforts stating,

"We have covered the universe as far as solid waste management goes."

While the Districts and their staff may have been involved in many activities, a review of the facts will show that pertaining to the issue at hand, namely the proposed Puente Hills Landfill expansion, they have not properly planned for cessation of operations at the Puente Hills Landfill. Further, they have inadequately managed the operations that have taken place there and that are taking place at the landfill today. As the Stetson Engineers (1993) report discusses, the Districts have done a very poor

job in groundwater quality protection at the Puente Hills Landfill and have shown little regard for the public health and welfare of adjacent and nearby property owners/users. While superficially the Districts' management may appear to be doing a good job, in fact in the most basic, fundamental issues of landfill management, they are doing a very poor job.

In the first paragraph of transcript page 36, Carry claimed that the Districts are a model for landfills worldwide. That situation will soon change as the sloppiness and inadequacies of the Districts' operations of Puente Hills Landfill become more widely known.

Throughout pages 36 and 37, Mr. Carry made claims about how the Districts pioneered in a number of areas associated with landfill management. While that may be true in some respects in California, it is certainly not true for the rest of the country. California and the Districts have lagged behind many other parts of the country in a number of the programs that Mr. Carey discussed such as household hazardous waste programs, etc. I know from having lived and worked in New Jersey, that New Jersey is far ahead of the Districts in properly addressing the management of municipal solid wastes.

On transcript page 37, on the beginning on line 8, Mr. Carry stressed the Puente Hills tipping fees of $16/ton. As we have commented previously, a landfill cannot be reliably operated on tipping fees of $16/ton at a suitable site, much less at a highly unsuitable site such as the Puente Hills area. These costs are initial costs and do not consider the costs and impacts on nearby property owners and users and the massive long-term costs of trying to control the leachate that will be generated at the Puente Hills Landfill from now on (*ad infinitum*). Future generations will look back on the Puente Hills Landfill operations as being very poorly managed and short-sighted compared to what should have been done in the 1980's and 1990's to provide for true, long-term protection of public health and the environment.

On transcript page 37, beginning on line 18, Carry discussed the fact that this landfill is still the lowest cost landfill anywhere in Los Angeles County and that that is an obvious benefit to the general public. Again this is short-sighted, narrow scope economics; it is strongly contrary to the overall benefits to the people in Los Angeles County and especially those who own or depend on the use of properties in the vicinity of the landfill.

On transcript page 38, beginning on line 12, Carry indicated that if the Puente Hills Landfill were not re-permitted, the costs could be as high as $400 million/year. When those costs are considered, as they should be, as the costs to the residential contributor of waste, they are found to range from on the order of 15 to 30¢/person/day for those who generate the waste. That is certainly a small increased price to pay for having the wastes disposed of at a site that does not represent long-term significant threats to a major groundwater basin. There is no question that the Districts' short-sighted near-term approach to economics is strongly contrary to what will have to be addressed by future generations when they are faced with spending hundreds of millions of dollars to try to clean up the contaminated groundwaters in the San Gabriel Basin because of the Puente Hills Landfill. An example is provided by the current Azusa Landfill. In a 10-year period, that one 80-acre landfill has destroyed more than $200 million in groundwater resources. Future generations

are going to be spending tens of cents/day to try to correct the mistakes made in the operations at the current Puente Hills Landfill. Allowing that landfill to expand and operate for another 10 to 20 years will make the ultimate magnitude of those costs increase even more. It is important to note that individuals in other parts of the country have already been paying far more than this increase for management of solid waste so as to better protect the groundwater resources in their areas.

On transcript page 43, beginning on line 10, Commissioner Ryan, who, coming into the hearings is obviously strongly pro-Puente Hills Landfill expansion, provided an erroneous impression that it should be possible to convert the Puente Hills Landfill into a golf course, a botanic garden, an area with beautiful trees, etc. In responding to Ryan's question and comment, Mr. Maguin indicated that they will be planting trees on the completed landfill. That approach reflects a lack of understanding on the part of Mr. Maguin about the impact of vegetative cover, such as trees, on the ability of the closed landfill to prevent moisture from entering the waste and generating leachate. Those familiar with the closure of "dry tomb" landfills, such as the proposed Puente Hills Landfill expansion, know that the Districts will be into a very expensive cover maintenance program; they will be deliberately trying to prevent the growth of trees and other deep-rooted vegetation on the closed Puente Hills Landfill. The idea as stated by Mr. Maguin (transcript page 44, line 18) that they will be irrigating the landfill area is absurd. Irrigation of the closed landfill area will not be possible because it will increase the potential for leachate generation which will lead to increased groundwater pollution. There is increasing consensus among those who are concerned about long-term impacts of "dry tomb" landfills that it may be necessary to armor the cover of such landfills with rocks in an effort to maintain the maximum protection of groundwater resources from passage of moisture though the cover to generate leachate within the landfill.

On transcript page 44, beginning on line 21, Commissioner Ryan made comments about the Fresh Kills Landfill in New York. I am very familiar with the Fresh Kills Landfill, having worked in the area of the impacts of that landfill on New Jersey coastal water quality when I held a Distinguished Professorship at the New Jersey Institute of Technology until 1989. The Fresh Kills Landfill is reported to be the largest landfill in the United States. It, like the current Puente Hills Landfill, has significant problems related to management of the operations. The regulatory agencies in the New York/New Jersey area, however, have been aggressively addressing these problems for a number of years and are well-ahead of the Districts and the Los Angeles Regional Water Quality Control Board in beginning to develop programs to manage those problems.

On transcript page 46, beginning line 9, in response to a question on traffic problems, Ms Chan reported,

"We have already implemented a measure which has virtually eliminated this problem by allowing trucks to queue on the site."

A review of Ms. Chan's testimony at the EIR hearings as well as before the Commission shows that she is not a reliable witness on the efficacy of Districts' operations. She has presented highly self-serving statements on behalf of the Districts' management that are not in accord with facts for such issues as odor control, litter control, truck traffic, groundwater pollution, etc.

On transcript page 47, beginning on line 3, Commissioner Santiago asked some questions about water quality issues. In response Mr. Maguin stated (transcript page 47, beginning on line 19) that the Districts are proposing state-of-the-art water quality protection for the proposed facility. Having been involved in evaluating of the impacts of municipal landfills on groundwater quality since the mid-1960's in a wide variety of locations in the US and other countries, I can state with authority that the Districts' so-called "state-of-the-art" water quality protection program that Mr. Maguin discussed significantly deficient and not "state-of-the-art" much less a program that will ensure groundwater quality protection for as long as the wastes represent a threat. I am very sure that a proper peer review by independent, disinterested, and knowledgeable professionals in the field would show that the Districts' water quality protection program is extremely inadequate. The Districts staff, based on testimony before the Commission as well at the EIR hearings, do not even recognize the severity of the groundwater protection issues or problems that exist today, much less the *ad infinitum* problems that future Districts' managers will have to face in trying to correct the problems caused by the inappropriate design and operation of the current water quality monitoring program. The Stetson Engineers (1993) report provides a factual representation of the gross deficiencies that exist in the current Districts water quality protection program.

On transcript page 48, beginning on line 9, in response to Commissioner Santiago's question regarding the adequacy of the monitoring program that exists now, Mr. Maguin stated that as the project proceeds through permitting,

"... we will propose to them [Regional Water Quality Control Board] *a specific monitoring system relative to groundwater quality based on geologic studies on the site."*

As discussed in the Stetson Engineers report, this is the approach that has been followed today, where the Regional Board staff has indicated that it does not have the staff or funds necessary to properly monitor the Districts' operations. The Regional Board is allowing the Districts to be self-policing. As the Stetson Engineers (1993) reported, the Districts have not been carrying out the public trust to conduct a proper groundwater monitoring program.

It is very important to note, as is well-documented in my testimony as well as that of Dr. Dennis Williams and in the Stetson Engineers report, that it is virtually impossible to reliably monitor the Puente Hills Landfill area for leachate-pollution of groundwater because of the extreme difficulty in trying to monitor in fractured rock geology. Haitjema (1991) stated in a paper on monitoring of landfills,

"An extreme example of Equation (1) (aquifer heterogeneity) is flow through fractured rock. The design of monitoring well systems in such an environment is a nightmare and usually not more than a blind gamble."

* * *

"Monitoring wells in the regional aquifer are unreliable detectors of local leaks in a landfill."

This is the real situation; it is not as Mr. Maguin represented it.

Beginning on transcript page 51, line 20, Commissioner Clark asserted that based on her experience, the Puente Hills Landfill is the *"best run, best operated"* of all the landfills in Los Angeles County. That impression, however, was fostered by the large amounts of highly unreliable information that had been provided to the Commissioners by Mr. Maguin and other members of the Districts' management on the true groundwater quality problems associated with the Puente Hills Landfill.

Beginning on transcript page 52, Commissioner Clark asked questions about reported cancer cases in Hacienda Heights and whether they could be caused by the current Puente Hills Landfill operation. In response, on transcript page 53, beginning on line 10, Mr. Maguin states he obtained a letter from a "Dr. Paul Pathenek (phonetic)" (correct spelling: Papanek) of the Los Angeles County Health Department. Mr. Maguin quoted from that letter (beginning transcript page 52, line 16).

> *"For many objectively measurable health effects which might be of theoretical interest following exposure, we can roughly estimate how great the incremental risk due to landfill exposures is likely to be. These risks are likely to be very small, well below the threshold for detection in an epidemiologic study."*

Once again Mr. Maguin provided misleading and inaccurate information on the issue. To reliably inform Commissioner Clark and other members of the Commission on this matter, Mr. Maguin would have pointed out that what Papanek was saying was not that landfills do not contribute to cancer incidence, but rather that cancer causes cannot be detected through epidemiological studies unless there is massive cancer occurrence due to a particular cause.

I have an academic background in public health and many years of work on impacts of hazardous chemicals on public health and the environment, including helping to establish drinking water standards for the US Public Health Service for PCB's and other potential carcinogens. I am also serving on the Human Health Committee (with Dr. Papanek) on behalf of the California EPA's Comparative Risk Project; that committee is helping to evaluate the relative risks of various carcinogens and potentially dangerous chemicals. Through my background and experience, I am well-aware of the limitations of the epidemiological approach to detecting an increased rate of cancer due to landfill operations. Epidemiology is not very sensitive to being able to detect the increased rate of cancer. Cancer rate on order of 1/1000 (1 additional cancer in 1000 people exposed) can readily occur from a source/cause without the cause's being identified by epidemiological approaches of the type that Papanek discussed. It is important to note that regulatory agencies such as the California Department of Health Services are required by the legislature to control cancer to a rate of 1 additional cancer in one million people exposed (1/1,000,000). Cancer rates a thousand times the regulatory limit could readily occur in the vicinity of Puente Hills Landfill caused by current landfill emissions and not be detected by the techniques being used. This is especially true when there is a wide variety of possible agents associated with landfill gases that could cause cancer. There is no question about the fact that landfill gas enters adjacent properties; that is well-demonstrated by the highly obnoxious odors that occur in the Hacienda Heights and other adjacent and nearby properties on a fairly frequent basis from the current landfill operations. Landfill-derived odors on adjacent

properties are a clear indication that there could be highly hazardous chemicals present in the air that are not being regulated today. It is important to note as indicated in our testimony, that today regulatory agencies address a maximum of about 200 chemicals out of the 60,000 that are routinely used in the US today, many of which could be present in municipal solid waste.

In January 1993 I attended a Water Environment Federation Specialty Conference in Washington, D.C. in which representatives of the US Public Health Service, CDC "Superfund" group in Atlanta indicated that they are finding increased rates of cancer near Superfund sites, many of which are former landfills. While at this time it is not clear why the increased rates of cancer near Superfund sites/landfills are occurring, there can be little doubt that this problem does exist.

Therefore, the bottom line with respect to the Papanek statement is that epidemiologic studies are not very sensitive in detecting increased cancer associated with landfill operations.

On transcript page 54, line 16-18, Commissioner Russell correctly pointed out the thinness of the key component (plastic sheeting) of the liner system the Districts propose to use. As she suggested, that material is not very substantial; anyone who believes, as the Districts' representatives (Mr. Maguin and others) try to portray, that the thin plastic sheeting that the Districts propose to use to prevent groundwater pollution from the landfill for as long as the wastes in the landfill will be a threat, which will be forever, is either extremely naive or simply ignores what typically happens to plastics after a period of time. The facts are that the thickness of the thin plastic sheeting that would be used in the liner is a small fraction of an inch. There is no possibility that such a thin plastic sheeting will last forever to prevent leachate from migrating through it for as long as the waste represent a threat (forever). There is a wide variety of degradation mechanisms by which the integrity of such plastics deteriorate over time. No one considers plastics of this type to be a reliable, permanent method of protecting groundwater quality from pollution by landfill leachate forever.

On transcript page 58, beginning on line 2, Mr. Maguin discussed the increased costs in the tipping fee for the Puente Hills Landfill to help support rail haul, and states,

"Secondly, the dollars and cents, the -- as the project is proposed, with only about 67-percent increase in the tip fee at Puente Hills, we can achieve this by the ratio of 12,000 tons per day landfill to 4,000 tons per day of much more expensive rail haul capacity. As Mr. Carry said, we're looking at a price of the MRF rail haul of in the fifties dollars per ton compared to the current $16 at the landfill."

Here Mr. Maguin is discussing a potential $40/ton increase as being only about a 67% increase; he is trying to minimize the appearance of the magnitude of the cost increase. The approximately $56/ton that Mr. Maguin indicates would be the new increased rail haul price represents a $40/ton, or about a 13¢/person/day increase in the garbage bills for those who contribute garbage to the Puente Hills Landfill. Previously, Mr. Carry discussed the increased costs associated with the loss of the Puente Hills Landfill and tried to scare the reviewers and public into believing that a 15¢ or so increase is exorbitant. It is clear that Districts staff have two different standards for discussing the same level of expenditure. This double-talk on the part of Mr. Maguin and Carry concerning a 10 to

20¢/person/day increase in the garbage rate - for one approach it is very expensive while for another it is something that each person can readily afford - should be recognized. It can not be both.

On transcript page 61, beginning on line 1, Mr. Maguin discussed the issues of the gas flares; he stated on line 7,

"They're used because the extremely high temperature and controlled residence time in the flare is designed to destroy the trace compounds contained by the gas and to destroy the odor and to comply with very specific requirements of the air quality management district."

Someone not familiar with gas flares might gain the impression that these types of flares eliminate any hazards associated with odors, cancer-producing chemicals, etc. This is not the case. While gas flares will destroy some chemicals and burn the bulk of the gas such as methane, and some of the hazardous chemicals, they certainly are not adequate to completely destroy to non-risk levels of all of the hazardous chemicals that can be present in the gas from the landfill. It is also important to note that while the Districts have been operating gas flares for some time, they have not been able to control the odors emitted from the landfill. As in the testimony that I submitted to the Districts when I visited the facilities last November I personally experienced severe odor problems on adjacent properties. Those problems were directly related to the current landfill operations. My experience in this regard was no different from what those who reside on or otherwise work or use the lands near the current landfill experience routinely.

Beginning on page 61, line 23, Mr. Carry, in responding to questions about property value guarantees, indicated that he cannot be certain that the Districts' Board of Directors will support such an approach. On page 62, Commissioner Clark presented the view that there may be problems in trying to come to an agreeable property value decrease due to landfill operations. It is very important to understand that the people who have and will continue to be adversely affected by the Puente Hills Landfill operation should it be allowed to continue, should be compensated for more than just the minimum necessary to get by some kind of appraisal. Those property owners and users who are under the influence of the existing Puente Hills Landfill have had to endure severely unpleasant conditions due to the inability of the Districts to properly manage current landfill operations and increased health risk. They should receive compensation far above what would be the minimum necessary to just get by, and should receive compensation for the damages that have been done to them and the time they have had to waste in dealing with these issues.

On transcript page 70, beginning on line 13, Commissioner Ryan again expressed his very strong bias in support of the Sanitation Districts when he claimed that the Los Angeles County Sanitation Districts are the

"premiere sanitation district in the world operating here compared to sanitation districts in the rest of the country."

An unbiased review of this matter would show that the Los Angeles County Sanitation Districts' operation of the Puente Hills Landfill has been far from what could be considered a premiere operation; it is one of the worst that I have seen, ranks among the lowest of anywhere in terms of

consideration of long-term public health and environmental impacts of the existing landfill, and shows little regard for the adverse impacts of the existing landfill and public health and welfare of adjacent and nearby property owners/users.

On transcript page 77, beginning on line 5, Commissioner Clark again addressed the issues of fair market value for the impaired use of properties due the inability of the Districts to properly operate the Puente Hills Landfill so that it does not adversely affect adjacent property owners/users. Again, the issue should not be just providing fair market value. The individuals who have been adversely affected should be generously compensated. It is important to note that what is being traded for is the problems that the generators of the garbage throughout the Districts would have if they did not have their garbage picked up and disposed of at less-than-true-cost. Over the past 10 years that the Districts have operated the Puente Hills Landfill, they have done very significant damage to those who work at, live in, or use the properties near the landfill. Those who generate the waste should compensate all of the people. The Districts, Planning Commissioners and others should recognize the invalidity of the belief that the masses of people who generate garbage should be able to have the adverse impacts of its disposal brought to bear on adjacent property owner/users so that the generators can have less-than-real-cost garbage disposal.

On transcript page 90, beginning on line 16, Commission Chairman Wulliger stated,

"There are problems with the EIR. I hope it's not a court that has to resolve these. That's the wrong way. I'm a lawyer and I respect the courts. That's not the place for urban planning. I would hope perhaps we could solve it here, if not the Board of Supervisors' level."

While Commissioner Wulliger did not expand on the significant deficiencies that he has found with the Districts' self-serving EIR, he did acknowledge, as was appropriate, that the Districts' EIR is deficient and therefore should not have been certified the Districts until the issues had been properly addressed so that the Districts' Board of Directors and the Planning Commission have been provided reliable information on the environmental impact of the proposed project upon which to make a decision upon first the certification of the EIR and, second, the appropriateness of the planning process that the Districts have conducted for the proposed Puente Hills Landfill expansion.

While we agree with Commissioner Wulliger that the courts are not an appropriate place to resolve technical problems associated with the Districts' EIR, the way the Districts and the Planning Commission have conducted the review of the EIR, there is no alternative but to take this matter to the courts. The Districts and the Planning Commission could have conducted their hearings in a peer review arena where disinterested experts could have reviewed these issues and presented the Commission and the Board of Directors with information that they could have used to properly evaluate the reliability of the Districts staff's self-serving statements on the lack of environmental impact of the existing operations and proposed landfill expansion.

CONCLUDING REMARKS

Overall, a review of the transcript of the April 8 Commission meeting shows that the Commissioners did not conduct the kind of in-depth review and discussion of issues that should have been conducted on the environmental issues. They simply accepted the Districts' EIR as a credible document and the Districts' staff statements about little or no adverse impacts of the current operations as being the fact. Clearly the record that was available to the Commission shows that there are significant adverse impacts of the existing landfill. These should have been addressed since there is very great likelihood that the impacts will continue, and if not in some respects become worse, if the proposed expansion is allowed to occur.

If the Board members, or others dispute any of the technical information or positions reflected in these comments or in the appended materials, we request that the point(s) of contention be articulated and substantiated in writing for our review and comment in accord with standard professional peer review approaches.

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