Comments on
Final Environmental Impact Statement/Environmental Impact Report
Eagle Mountain Landfill and Recycling Center Project
Volume 1, Final EIS/EIR

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June 27, 1997

Bob Buster , Chairman
Riverside County Board of Supervisors
PO Box 1527
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Dear Chairman Buster:

Recently, Helen Wagenvoord with the National Parks Conservation Association asked me to review the technical merits of the Kaiser Eagle Mountain Landfill Final EIS/EIR. I am familiar with that landfill having provided detailed reviews of the first EIS/EIR for the proposed landfill project. Upon review of the revised Final EIS/EIR for this proposed landfill, I find that it, too, does not conform to CEQA requirements for full disclosure discussion of potential impacts of the landfill. In fact, Kaiser and the others responsible for developing this EIS/EIR have continued the approach followed in the first EIS/EIR of only providing information in support of the project without discussing what is well-known in the literature about the potential problems with proposed landfills of this type in protecting public health, groundwater resources and the environment from adverse impacts for as long as the wastes in the landfill will be a threat.

I strongly urge that the Board of Supervisors not certify this Final EIS/EIR since it does not conform to CEQA requirements for full disclosure. The development of this landfill as proposed will ultimately cost Riverside County residents large amounts of money in site remediation which far exceed the small amount of host fees which will be generated by support of the landfill. Further, this landfill will be significantly detrimental to the people and wildlife in the region of the landfill due to releases from the landfill during its active life and post-closure care period.

I have enclosed as attachments a number of Dr. Jones-Lee's and my, as well as others', papers and reports that are pertinent to my comments. They should be made part of the record with my comments since they provide back-up materials to the summary statements made in my comments.

While I cannot attend the July 1, 1997 hearing because of a conflict, I am willing to answer questions that you and other members of the Board may have on the enclosed comments. If you wish, this could be done at a mutually agreeable time via conference call.

Sincerely yours,

Fred

G. Fred Lee, PhD, DEE

Copy to: H. Wagenvoord

GFL:oh
Enclosure

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Resubmitted by:

County of Riverside Planning Department
and
United States Department of the Interior
Bureau of Land Management

Dated
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In September 1992 Dr. Anne Jones-Lee and I submitted comments on the "Final EIS/EIR for the Eagle Mountain Landfill Project dated June 1992." We discussed the significant deficiencies in that EIS/EIR in complying with CEQA requirements for full disclosure. Enclosed is a copy of our original comments. In July 1996, the County of Riverside Planning Department and the US Department of the Interior Bureau of Land Management on behalf of Kaiser Eagle Mountain, Inc. submitted a revised draft EIS/EIR for the Kaiser Eagle Mountain Landfill and Recycling Center. In January 1997 the Final EIS/EIR for the Kaiser Eagle Mountain Landfill and Recycling Center Project was released. A review of the revised Final EIS/EIR for the proposed Kaiser Eagle Mountain Landfill shows that the Final EIS/EIR for the proposed project still contains many of the same deficiencies that have been discussed in our previous comments on the earlier version of it as well as the waste discharge requirements that were proposed by the Colorado River Regional Water Quality Control Board.

Appropriate CEQA Review

It is my finding that the Kaiser Eagle Mountain Landfill revised Final EIS/EIR contains significant unreliable, inadequate information on the potential impacts of the proposed Kaiser Eagle Mountain Landfill on public health, the environment, groundwater resources and the interests of those within the sphere of influence of the landfill, including the National Park Service and visitors to the Joshua Tree National Park. The Final EIS/EIR falls far short of the California Environmental Quality Act (CEQA) Section 15151 requirements. This section states,

"An EIR should be prepared with a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of proposed projects need not be exhaustive, but the sufficiency of an EIR is to be reviewed in the light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among experts. The courts have looked not for perfection but for adequacy, completeness, and a good faith effort at full disclosure."

As part of my reviews of EIRs for clients who are concerned about a particular project, such as a landfill, I try to get the project proponent to provide a detailed discussion of a plausible worst-case scenario failure situation where the project proponent discusses:

- Whether project failures could occur at any time in the future that the project will exist - for landfills, for as long as the wastes in the landfill will be a threat - which would result in the release of hazardous or deleterious constituents to the environment. The failure of a landfill containment system would be the inability of the liner system to prevent leachate from passing through it.
- The reliability of the monitoring program to detect the failure before widespread harm is done to public health and/or the environment and the interests of those within the sphere of influence of the project (landfill). The monitoring programs of concern are the groundwater monitoring programs using vertical monitoring wells spaced hundreds of

feet apart where each monitoring well has a zone of capture of about one foot. This is the typical groundwater monitoring system used at today's Subtitle D landfills.

- The remediation approaches that will be taken when failure is detected. Further, information should be provided on how long remediation will be required. For a landfill, how would the groundwaters and the aquifer system be cleaned up so that the aquifer could be used again for domestic water supply?
- The magnitude of the funding under plausible worst-case failure conditions that will be needed to implement the remediation approaches and to compensate those who have been adversely impacted by the project failure.

The source of the funding that could be needed at any time in the future when project failure could occur. How certain is it for public and private projects, such as landfills, that funds will, in fact, be available to remediate the environmental pollution that has occurred when the pollution is detected and how will the project proponent stop further pollution at the time of protection?

- How the proposed project conforms to the regulatory requirements for protection of public health, the environment and the interests of those within the sphere of influence of the project. For landfills, how well does the proposed landfill conform to the California Water Resources Control Board's Chapter 15 requirements of protecting groundwaters from impaired use for as long as the wastes in the landfill will be a threat?

I find that providing this information is in accord with CEQA requirements for full disclosure. It is important to emphasize that the plausible worst-case scenario failure analysis that I advocate is, if properly conducted, the most probable situation that will occur at a particular landfill over the time that the wastes in the landfill will be a threat. Several judges have ruled in favor of my clients in opposition to projects based on the fact that the project proponent did not provide full disclosure of the impacts of the proposed landfill as the result of not providing this type of information. If this information is provided, it demonstrates to the decision-makers, regulatory agencies and others the deficiencies in a particular proposed "dry tomb" Subtitle D landfill and provides a guide to the decision-makers and others on the permitting of a landfill.

The full disclosure requirements for a federal EIS are similar to those for CEQA. Neither an EIR nor an EIS can be judged to be certifiable if the project proponent is allowed, as occurs with the Kaiser Eagle Mountain Landfill EIS/EIR, to only present information that is favorable to the landfill proponent(s). The Final EIS/EIR for the Kaiser Eagle Mountain Landfill presents a self-serving, woefully inadequate discussion of long-term issues that are well-known in the literature concerning the potential impacts of municipal solid waste landfills of the type that Kaiser proposes to construct at the Eagle Mountain site. Basically, this EIS/EIR attempts to portray the image that the design purpose and requirements for the landfill containment system that can be achieved when the landfill is constructed, if high quality construction is used, will be maintained over the effective infinite period of time, certainly no less than many hundreds to a thousand or more years for the Kaiser Eagle Mountain Landfill, that the wastes in the landfill will be a threat to cause groundwater pollution and be adverse to public health, the environment and the

interests of those within the sphere of influence of the landfill. The Kaiser Eagle Mountain Landfill Final EIS/EIR presents a superficial discussion of the literature pertinent to the long-term containment issues that are well-known in the literature. This EIS/EIR totally ignores the well-known eventual failure of the landfill liner system, the landfill cover system, the groundwater monitoring systems and the inadequate funding that is being made available to address these failures over the time that the wastes in the landfill will be a threat. This failure to even discuss, much less reliably present information on these topics, is in direct violation of CEQA Section 15151 quoted above for requiring full disclosure.

Another highly significant, consistent problem that prevails throughout the Kaiser Eagle Mountain Landfill Final EIS/EIR is the repeated reference made in connection with a particular component of the landfill containment or monitoring system that the component meets, or in some instances is purported to exceed, minimum regulatory requirements. It should be obvious to the reviewers that no project would be approved if it did not meet minimum regulatory requirements. It is also well-known by those familiar with how regulatory requirements are developed and implemented that in many cases meeting minimum regulatory requirements, or even exceeding them by a considerable degree, can still be far short of protecting public health, groundwater resources, the environment and those within the sphere of influence of the regulated entity, such as a landfill. This is especially true for meeting Subtitle D regulations governing today's landfills. Subtitle D regulations are known to be badly out-of-date and significantly deficient in protecting public health, groundwater resources, the environment and the interests of those within the sphere of influence of a landfill. The appended papers and reports discuss these issues. An EIS/EIR, such as the Kaiser Eagle Mountain Landfill Final EIS/EIR, that claims that the proposed landfill design, operation, closure and post-closure care will meet minimum regulatory requirements without discussing the adequacy of these requirements is a self-serving document that does not conform to CEQA Section 15151 for full disclosure. Decision-makers, regulatory agencies and the public are entitled to know the adequacy of the regulatory requirements as part of review of the adequacy of an EIS/EIR.

There is an especially important problem in the development of landfills today that should have been discussed in this Final EIS/EIR relating to meeting minimum regulatory requirements for the design of a component of the containment system, such as landfill liner system, and the regulatory requirements setting forth the performance of the component that must be achieved by design, i.e. the containment system performance standards. The typical regulations governing landfills today contain minimum design requirements for various containment system components, such as landfill liners, covers, etc. These regulations, such as the State Water Resources Control Board's Chapter 15, also contain minimum performance requirements for the landfill containment system. In the case of Chapter 15, for a landfill sited at a geologically unsuitable site, such as Kaiser's proposed Eagle Mountain Landfill, the performance of the liner, landfill monitoring, cover systems, etc. must be reasonably expected to meet the Chapter 15 overall groundwater protection performance standard of preventing any impairment of

use of groundwaters associated with the landfill for as long as the wastes in the landfill will be a threat.

The Kaiser Eagle Mountain Landfill Final EIS/EIR makes the incorrect, highly unreliable assumption that meeting minimum design requirements for a containment system component will meet the overall groundwater protection requirements set forth in Chapter 15 of preventing releases of constituents from the landfill for as long as the wastes represent a threat that could impair the use of groundwaters. Chapter 15 regulations do not state that meeting minimum design requirements for a containment system component will achieve the minimum groundwater protection performance standard set forth in the regulations. Chapter 15 specifies that a landfill applicant must evaluate on a site-specific basis whether the proposed design of a landfill containment component will achieve the overall groundwater protection standard set forth in the regulations. Failure to discuss and reliably address these issues is yet another example of the highly significant deficiencies in the Kaiser Eagle Mountain Landfill Final EIS/EIR that should cause this EIS/EIR to be judged non-certifiable due to failure of providing full disclosure on important issues.

As discussed in a subsequent section in these comments, there is a significant problem in California where not only do landfill applicants and their consultants ignore the professional literature on the expected performance of landfill containment system components and monitoring system ability to prevent groundwater pollution for as long as the wastes represent a threat, but for political reasons the State Water Resources Control Board and regional boards have been and continue to ignore the literature on this issue. As discussed herein, with the adoption of Chapter 15 regulations in 1984, the regional water quality control boards assumed that meeting the minimum design liner requirements would be achieve the groundwater protection performance standard set forth in the regulations. It was obvious from the literature that that assumption was technically invalid. The net result is that from 1984 through 1993, when Subtitle D regulations became effective, the regional water quality control boards allowed the construction of landfill liner systems that, while meeting Chapter 15 minimum design requirements, would obviously not meet minimum groundwater protection requirements. These landfills are, as expected, now polluting groundwaters. Exactly the same situation will happen with respect to meeting the minimum, or even beyond the minimum, Subtitle D composite liner requirements. It is well understood that, at best, such a liner system can only postpone for a small period of time compared to the time that the wastes are a threat when groundwater pollution occurs.

The Kaiser Eagle Mountain Landfill Final EIS/EIR is inconsistent with respect to the adequacy of meeting landfill containment component regulatory design requirements. Through most of the EIS/EIR attempts are made to create the image that the current regulatory requirements are adequate for protection and therefore those concerned about this landfill do not need to be worried about the system failing to protect groundwater resources, public health and the environment for as long as the wastes represent a threat. However, examination of the proposed liner design for the landfill shows that Kaiser *et al.* recognize the significant deficiencies in meeting the current minimum Subtitle D

regulatory requirements and have proposed to improve the liner design over minimum requirements through the use of a double composite liner under parts of the landfill. If the regulatory requirements were adequate, then Kaiser *et al.* would be wasting money by constructing a double composite liner. However, it is obvious, as was discussed by the US EPA in 1989 when it promulgated Subtitle D regulations, that a single composite liner is not protective and that a double composite liner also is not protective since the extra composite liner will ultimately also fail to prevent leachate from passing through the liner into the aquifer system associated with the base of the landfill.

This spring it was learned that the State Water Resources Control Board's staff have adopted the "position" that a single composite liner of the type allowed by Subtitle D regulations would be protective of groundwater resources for as long as wastes represent a threat at any location in the state. If a single composite liner were protective under these conditions, then why have eight states adopted a double composite liner as the minimum system allowed? It is clear that the current State Board staff "position" that was stated by Schueller this spring is obviously inadequate to protect groundwaters from impaired use for as long as the wastes in a municipal solid waste landfill represent a threat. This is another example of the inadequacies of the current landfill minimum design regulations.

It is clear that the County of Riverside Planning Department ,the United States Department of the Interior Bureau of Land Management as well as the Mine Reclamation Corporation, Eagle Mountain Reclamation, Inc., and Kaiser Eagle Mountain, Inc. (Kaiser *et al.*) have practiced in development of the Kaiser Eagle Mountain Landfill Final EIS/EIR another example of an inadequately prepared EIS/EIR that caused Dr. Jones-Lee and me to develop our discussion, "Environmental Ethics: The Whole Truth," that was published in *Civil Engineering* "Forum" in 1995. This overview discussion, coupled with our back-up extended discussion entitled "Practical Environmental Ethics: Is There an Obligation to Tell the Whole Truth?" is appended to these comments. They provide a review of the significant problems that exist today in which those who prepare EIS/EIRs for projects such as landfills take an advocacy approach of only presenting materials that support the development of the project. While such an approach may be appropriate in a courtroom in accord with the current advocacy legal system, it is an inappropriate to follow in an EIS/EIR where full disclosure of probable potential impacts must be presented.

An important issue that should be understood by those reviewing the Kaiser Eagle Mountain Landfill Final EIS/EIR and the permitting of this proposed landfill is the situation that is developing where there is already surplus landfilling capacity in southern California with the permitting of the Mesquite Landfill where the owners of this landfill cannot find anyone who will provide a contract for shipping waste to the landfill. There is little need for additional landfill capacity. While the Mesquite Landfill will also ultimately pollute groundwaters, as will the Eagle Mountain Landfill and, if permitted, the Bolo Station Landfill, since the Mesquite Landfill has already been approved it does not make sense to construct one or more mega-landfills. They will compete with each other for the limited solid wastestream that is available for that region. This competition has important ramifications for regulatory agencies, public health and the environment in

that it will almost certainly lead to ever decreasing tipping fees. The decreasing tipping fees will be attempts to cut costs. Certainly, one of the areas for cutting costs is proper monitoring and maintenance of the landfill. This means that, ultimately, if the Kaiser Eagle Mountain Landfill is permitted and starts to operate, it could, especially in light of the unstable financial situation of the landfill backers/Kaiser, become a significant economic burden to the County. While the County may generate a small income at this time associated with the payment for each ton of waste deposited in the landfill, the magnitude of these payments will be trivial compared to the costs that will ultimately have to be borne by County residents when the pollution of groundwaters and other adverse impacts of the landfill become known and are addressed.

Overall, the Kaiser Eagle Mountain Landfill Final EIS/EIR fails to provide full disclosure information on the potential problems associated with the development of the proposed landfill required by CEQA. This EIS/EIR is non-certifiable as a credible CEQA EIR.

Specific Examples of Deficiencies

Specific examples of deficiencies in the most recent Kaiser Eagle Mountain Landfill Final EIS/EIR are presented below.

Page 2-25, Section 2.1.5 "Design," states in the first paragraph,

"The Eagle Mountain Landfill is designed to meet or exceed all applicable federal and state regulations for the design and operation of municipal solid waste landfills, including recent amendments applicable to liner design."

This is a self-serving statement on behalf of Kaiser and other landfill proponents, that is designed to mislead the reviewers into believing that meeting current federal and state regulations will protect public health, the environment, groundwater resources and the interests of those within the sphere of influence of the landfill, including the visitors to the Joshua Tree National Park.

In connection with our 1992 comments on the deficiencies in the Kaiser/BFI Eagle Mountain Landfill Final EIS/EIR, I provided several papers and reports that Dr. Jones-Lee and I developed pertinent to providing back-up information on the significant deficiencies in the proposed project relative to what would be needed to develop a landfill at the proposed site that would be protective of public health, groundwater resources and the environment for as long as the wastes in the landfill will be a threat. Many of these papers and reports provide review discussions of the topic areas covered and present references to the literature developed by others and the authors on the topic area. Since 1992, Dr. Jones-Lee and I have developed additional papers and reports and have published extensively on the significant deficiencies in Subtitle D landfilling of municipal solid waste. These publications include a recently developed review entitled, "Deficiencies in US EPA Subtitle D Landfills in Protecting Groundwater Quality for as Long as MSW is a Threat: Recommended Alternative Approaches." As part of our efforts to develop more appropriate approaches for landfilling of municipal solid waste, Dr.

Jones-Lee and I have developed a set of questions that every landfill applicant and every agency that permits a landfill that is purported to conform to Subtitle D requirements such as the proposed Kaiser Eagle Mountain Landfill should answer entitled, "Questions that Regulatory Agencies, Staff, Boards and Landfill Applicants and Their Consultants Should Answer About a Proposed Subtitle D Landfill or Landfill Expansion." A copy of these comments and questions is appended to these comments. Also appended are a number of back-up papers and reports which provide a technical base for the discussions presented herein.

As discussed in these materials, there is no question that meeting Subtitle D minimum requirements for landfill containment system design will not protect public health, groundwater resources, the environment and the interests of those within the sphere o f influence of the landfill including the staff of and visitors to the Joshua Tree National Park.

Beginning on page 2-26 is the discussion of the "*primary components of the landfill*"that are supposed to function to prevent adverse impacts.

Page 2-26, Section 2.1.5.1 "Composite Liner System," second paragraph, states,"

"The composite liner system for the Eagle Mounting Landfill is a multilayered system designed to contain leachate and landfill gas that might be generated by the disposal of waste at the landfill. This system allows any leachate that is generated to be collected and removed from the landfill by pumping."

That statement is designed to mislead those reviewing this issue into believing that there may not be leachate generated, and that any leachate that is generated for as long as the wastes in the landfill could generate leachate would be collected by the liner system. It is obvious upon examination of the characteristics of the liner system that such a statement is not factual. The wastes in this landfill, should it be constructed, will be a threat to generate leachate that can pollute large amounts of groundwater effectively forever. As discussed in the enclosed materials, municipal solid waste contains a variety of hazardous and deleterious chemicals that will not disappear, i.e. they will be present in the landfill and will be leached upon contact with moisture. Kaiser *et al.*, through their proposed contract with the National Park Service, agrees to manage some potential adverse impacts of the landfill for approximately 100 years after the landfill is closed. The Kaiser Eagle Mountain Landfill, if permitted as proposed, will continue to be a threat for hundreds to well over a thousand or more years. Because of the size of this landfill, ultimately massive groundwater pollution will occur if it is permitted as proposed.

Who is going to pay for the massive costs that will ultimately have to be paid to stop the pollution of groundwaters from the Chuckwalla Basin when the landfill liner system that is proposed by Kaiser ultimately fails to collect the leachate that will be generated in the landfill? This will almost certainly fall back on the County. While, the County may generate a small income now associated with the disposal of wastes in this landfill, this income will be trivial compared to the ultimate amount of funds that will have to be spent

by the County in trying to control, likely unsuccessfully, the further spread of groundwater pollution from the landfill.

The long-term liability associated with inadequate landfilling of municipal solid wastes is discussed in the enclosed papers: " Landfill Post-Closure Care: Can Owners Guarantee the Money Will Be There?", "Landfilling of Solid & Hazardous Waste: Facing Long-Term Liability" and "Financial Assurance-Will the Check Bounce?" As discussed in these papers, the key to addressing this type of issue is the development of a dedicated trust fund derived from disposal fees of sufficient magnitude to provide a funding base that will be available in perpetuity to address all plausible worst-case scenario failures of the landfill including waste removal. There are no provisions in this landfill development plan for the development of a trust fund of this magnitude. Without it, it is almost certain that the County will become the deep pockets that will have to pay for the inappropriate decisions that are made in approving this Kaiser Eagle Mountain Landfill Final EIS/EIR and the permitting of this landfill.

Page 2-26 mentions that the base of the landfill will have a double composite liner system while the side slopes will have a single composite liner. As discussed in previous correspondence on this liner system, a single composite liner of the type that Kaiser proposes to use on the side slopes will obviously ultimately fail to collect leachate due to its deterioration. This failure could occur shortly after development of the landfill or within a few years or tens of years or hundreds of years.

In Dr. Jones-Lee's and my writing on landfill issues we have discussed not only the problems with today's landfills but also, most importantly, how landfilling under Subtitle D regulations can be accomplished and be protective of public health, groundwater resources, the environment and those within the sphere of influence of the landfill. The Kaiser proposed Eagle Mountain Landfill falls far short of complying with the minimum requirements that we have suggested should be followed for full public health and environmental protection. We suggest that a double composite liner system be used with the lower composite liner functioning as a leak detection system for the upper composite liner. Simply installing a double composite liner under the base of the landfill will not provide for groundwater quality protection for as long as the wastes represent a threat. There is no doubt that the single composite liner system proposed for the side slopes and which represents the uppermost liner under the base of the liner will ultimately fail while the wastes in the landfill are still a threat. Anyone who claims otherwise is providing distorted, unreliable information.

As discussed in our papers and reports, such as "A Groundwater Protection Strategy for Lined Landfills," when the uppermost composite liner in a double composite-lined landfill ultimately fails and leachate is detected in the leak detection system between the two liners, there must be funds available at that time to take corrective action to stop leachate generation. If such action is not taken, then it is only a matter of time before the lower composite liner under the base of the landfill also fails to prevent leachate from passing through it. At that time, not only will leachate be passing through the side slope single composite liner but will also be passing through the base of the landfill double

composite liner system. Leachate will be entering the fractured rock system under this proposed landfill and be on its way to cause off-site groundwater pollution.

It might be asked, why did Kaiser not propose to install a double composite liner on the side slopes? The situation is very simple. A double composite liner on a very steep side slope, of the type proposed for this landfill, represents an unstable situation that is almost certainly subject to failure. The configuration of the landfill needs to be changed so a double composite liner can be installed under the entire landfill, not just the lowermost area of the landfill.

On page 2-28, first full paragraph, Kaiser mentions that a geosynthetic-clay liner (GCL) will be used as the clay layer underlying the plastic sheeting liner for both the side slopes and the base of the landfill. The statement is made in this paragraph,

"A GCL is a manufactured, low-permeability material containing a very impermeable bentonite (clay) material approximately 0.25 inch thick, with a hydraulic conductivity of less than about 1 x 10^{-9} cm/s."

This is more of the distorted information that prevails throughout this Kaiser Eagle Mountain Landfill Final EIS/EIR. Those familiar with this topic area, and this is well known in the field, know that the advective permeability of 10^{-9} cm/s is not the determining factor on the passage of leachate through the GCL. Because of the very thin nature of the GCL, it is readily penetrated in a very short time through a diffusion controlled process with an equivalent advective permeability of about 10^{-7} cm/s. It is deliberate distortion of what is known in the literature to only mention the advective permeability of 10^{-9} cm/s when the real passage of leachate through the GCL is at least 100 times higher than that predicted based on the advective permeability.

Another aspect of the GCL that is not discussed and must be discussed in a full disclosure EIS/EIR is that the very thin GCL is subject to mechanical stresses which can readily lead to its destruction and failure to serve as a base for leachate that passes through the plastic sheeting layer overlying it. This will be especially true on the steep side slopes.

Page 2-28, fourth full paragraph, states,

"A comparison of the proposed design and the state and federal landfill liner requirements is presented in Table 2-3 to highlight the liner design features of the proposed landfill that exceed regulatory requirements."

Examination of Table 2-3 shows that, again, the Kaiser Eagle Mountain Landfill Final EIS/EIR has provided unreliable, inadequate and distorted information. With respect to California requirements Table 2-3 states, *"A leachate collection and removal system that conveys to a sump all leachate reaching the liner."* That statement does not indicate that that is only for a limited period of time, as will be the case for the liner system that Kaiser proposes to use in the Eagle Mountain Landfill. California requirements are set forth in Chapter 15. They are explicit in requiring groundwater quality protection from impaired

use for as long as the wastes represent a threat, which in the Kaiser Eagle Mountain Landfill will be, effectively, forever. While it may be possible to construct the proposed liner system so that it will not leak at a significant rate when first constructed, there is no question that ultimately that liner system will fail to collect all leachate and therefore will fail to meet the California Chapter 15 requirements.

With respect to Table 2-3 "Federal Requirement," the single composite liner set forth under these requirements is the minimum requirement. There are eight states or parts of states that have determined that a single composite liner of this type is not adequate to protect groundwater resources from pollution by landfill leachate for as long as the wastes represent a threat. Other state regulatory agency staff also understand this situation but are prohibited from requiring a double composite liner by the state legislature adopting regulations that prohibit the state agencies from requiring more environmental protection than the minimum required by the US EPA.

Table 2-3 under "Proposed Design" states, *"A leachate collection and removal system that is designed to allow rapid removal of leachate to prevent buildup and to convey leachate off the liner."* That statement can only apply to the time shortly after construction if high quality construction is achieved. It will not apply for as long as the wastes in the landfill will be a threat. Ultimately, the integrity of the flexible membrane liner will deteriorate while the wastes are still a threat. Under these conditions, leachate will pass through the liner, through the GCL and into the underlying groundwater system. This is a fact which is not debatable. It will occur.

On page 2-29 in the first paragraph under Table 2-3 is another of the distorted statements concerning the hydraulic conductivity of less than 1×10^{-9} cm/s for the GCL. The statement is misleading since the diffusional transport through the GCL will be 100 times higher than that amount.

Page 2-29, Section 2.1.5.2 "Leachate Collection and Removal System," states,

"Leachate is water that has infiltrated through and come into contact with landfilled waste and, as a result, contains both suspended and dissolved substances and trace amounts of organics from the waste material."

Whoever wrote this is either deliberately attempting to mislead the readers on the characteristics of leachate that will be generated in this landfill or does not understand that there will be substantial amounts of organics present in the leachate that will be generated in this landfill. There will almost certainly be a thousand to several thousand mg/L of organic materials present in the leachate. No one who understands analytical chemistry would ever call that a trace amount. It is one of the bulk properties of leachate.

The next statement in this same paragraph,

"If any leachate is generated, it would be removed from the collection sumps by pumps installed through riser pipes that tie into a dual-containment collection pipe located outside the limits of the landfill containment."

Again, this is more of the distorted information on how the leachate collection system will function. It can, as discussed above, function as described for only a short period of time compared to the period of time that the wastes will be a threat. However, ultimately, the integrity of the plastic sheeting layer will fail to prevent leachate from passing through it. When this occurs, some of the leachate will not be collected. This is common sense. The Kaiser Eagle Mountain Landfill Final EIS/EIR deliberately presents inadequate information on how the leachate collection system will work, implying that it will work perfectly forever. This obviously will not be the case.

Page 2-30, first paragraph, discusses the characteristics of the granular blanket drain (drainage layer) that will overlie the composite liner (upper composite liner for the base of the landfill). There is no discussion presented on the well-known problem associated with drainage layers of this type of biological clogging which tends to cause ponding of leachate on the liner which accelerates the rate at which leachate leakage can occur through the plastic sheeting layer of the liner. A full disclosure EIS/EIR would have discussed this issue as a factor that needs to be considered which will cause this landfill to leak leachate through the liner at a higher rate than predicted based on the description provided.

A substantial part of page 2-30 discusses the leachate collection pipes and sumps. While these systems can function as described, the problem will be that some of the leachate, and eventually substantial parts of the leachate generated in the landfill, will not get to the sumps where it would be removed by pumping. It will have leaked through the liner on the way to the sumps.

Page 2-30, fifth paragraph, states, *"If the leachate is determined to be nonhazardous, it could be returned to the landfill (e.g. used for dust control)."* It is not clear to me that the regulatory agencies will allow leachate to be used for dust control. This is an archaic practice that has been used in the past for disposal of leachate. However, it has been found that such practices result in stormwater runoff pollution of off-site properties. While there is no discussion of the US EPA stormwater runoff management requirements in this Kaiser Eagle Mountain Landfill Final EIS/EIR with respect to the use of leachate as dust control, as there should have been, these requirements will almost certainly preclude the use of leachate for dust control because of the pollution that will occur in stormwater runoff from the site.

On the bottom of page 2-30 and the top of page 2-34 is discussed the landfill gas collection system. The key issue that should have been discussed that are not discussed in this Kaiser Eagle Mountain Landfill Final EIS/EIR is the period of time over which landfill gas production will occur in this landfill. Because of the dry tomb nature of the proposed landfill, the arid climate and the fact that much of the wastes that will be disposed of in the landfill will be present in plastic bags that will interfere with moisture

interacting with the wastes that permits landfill gas generation through bacterial fermentation, landfill gas generation in this landfill will be a slow process which will take place for hundreds of years and possibly, depending on the integrity of the cover as maintained on the landfill, for a thousand or more years. Will Kaiser *et al.* commit the funds necessary to maintain and operate the landfill gas collection system for as long as the wastes in the landfill have the potential to generate landfill gas or will the landfill gas collection system deteriorate because of lack of maintenance which the County will have to pay for in operating the landfill gas system? If this system is not maintained and operated for as long as the wastes represent a threat to produce landfill gas, then there will be hazards to wildlife and potentially public health and safety due to landfill gas migration from the site.

Page 2-37, last paragraph, discusses the characteristics of the proposed landfill cover. This cover, as proposed, represents the minimum Subtitle D landfill cover allowed. Characteristics of this cover are presented on pages 2-38 and 2-39 and in Table 2-4. A review of the information provided in the EIS/EIR on the landfill cover shows that the Kaiser Eagle Mountain Landfill Final EIS/EIR has continued to provide inadequate and unreliable information on the key component of the landfill containment system. There is no question that ultimately the landfill liner system, including the double composite liner, will fail. This is well understood in the landfill field by those who are familiar with the properties of landfill liner materials. It is possible, however, through the development of leak detectable covers on the landfill, to keep the wastes in the dry tomb landfill dry so that no moisture enters the waste which generates leachate. The cover that Kaiser has proposed is not a cover of this type. The Kaiser proposed cover will, over time, deteriorate in its properties. This deterioration of the low permeability layer will not be detected by surface inspection of the landfill. Moisture will enter the landfill during periods of significant rainfall events which will generate leachate and pass through the liner system into the underlying groundwater.

It is important to remember that this process can take place possibly within a few tens of years, certainly within 50 years, 100 years, 1000 years while the wastes in this landfill are still a threat. Kaiser could, as discussed in our papers, install and maintain one of the several leak detectable covers that are on the market today. By the time the cover is needed there will be others available. The leak detectable cover provides the opportunity to know when the cover's low permeability layer has failed and moisture could potentially enter the waste to generate leachate. The basic reason why Kaiser and other landfill owners do not propose to construct and operate such a system is cost. There is additional cost for construction of a leak detectable cover on a landfill compared to those that are proposed. Most importantly, funds would have to be available in perpetuity, i.e. forever, to operate and maintain the leak detectable cover system. No funds are set aside for this purpose in this Kaiser Eagle Mountain Final EIS/EIR. Without such funding available in perpetuity it is only a matter of time until the landfill cover properties deteriorate to the point where the major precipitation events will result in infiltration of moisture into the landfill that leads to the generation of leachate that will, as the liner system deteriorates, eventually pass through the liner system into the associated groundwater system.

Page 2-39 under "Comments" in Table 2-4 fails to provide full disclosure on key issues that decision makers and the public should be informed of with respect to the inability to reliably determine when the cover loses its ability to prevent moisture from entering the landfill and generating leachate. Instead, Table 2-4 discusses how the erosion protection layer is at least twice the required thickness. It does not discuss whether this layer and the associated liner system in the cover will keep the wastes dry for as long as they represent a threat. This is the issue that should have been addressed.

Page 2-41, Section 2.1.5.7, discusses the "Landfill Gas Management System." As discussed above, the landfill gas management system discussed must function reliably for 100s to possibly 1000 or more years. Will Kaiser *et al.* be available to provide the funds necessary to achieve this level of operation? If not, then landfill gas will be generated in this landfill that will be a threat to the environment, terrestrial life and people who would use structures near the landfill.

Page 2-41 also mentions that the landfill gas will be combusted through flaring. No mention is made, however, of the fact that Eden (1993) at an international symposium on landfilling discussed the fact that landfill gas flares of the type that are typically used in landfills produce dioxins. Dioxins are known carcinogens and represent some of the most hazardous chemicals known to man. These dioxins would be a threat to wildlife and to people of the region.

Page 3.0-1, Section 3.0 "Affected Environment,"presents a discussion of the groundwater quality issues. This is essentially the same, if not identical, to that discussed previously. I have provided a discussion of the deficiencies in that previous discussion. There is no question that the proposed Eagle Mountain Landfill will ultimately pollute the Chuckwalla aquifer system, rendering it unusable for domestic and many other purposes. This issue should have been discussed in this Kaiser Eagle Mountain Landfill Final EIS/EIR. Failure to discuss it means that this, like its previous version, results in a non-certifiable EIS/EIR.

Page 4.1-1, Section 4.1.1.1 "Groundwater Quality," discusses the potential for groundwater pollution where it states on page 4.1-2, second paragraph, *"In this EIS/EIR, groundwater is considered contaminated if it is out of compliance with state or federal drinking water standards."* Such an approach is not protective of public health and the environment for the large number of unregulated constituents in domestic solid waste leachate. As discussed by Jones-Lee and Lee (1993) and is well-known in the field, current regulatory approaches for municipal drinking waters fall far short of protecting the public who consumes waters that have been exposed to municipal landfill leachate from hazardous and deleterious constituents. A groundwater that is contaminated by municipal landfill leachate, even though it meets drinking waters standards for all regulated chemicals, can contain highly hazardous and/or deleterious chemicals which prevent its use for domestic and many other purposes. There are over 75,000 chemicals in use in the US today. Only about 100 of these are regulated. Every year new ones are added. Therefore, one of the so-called significance criteria for groundwater quality protection selected by Kaiser in the Final EIS/EIR is not protective of public health and

groundwater quality. This issue should have been discussed in a credible EIS/EIR that conforms to CEQA requirements for full disclosure.

Page 4.1-5, Section 4.1.2.1 "Proposed Action," "Direct Precipitation," states in the first paragraph, *"The results of both approaches, which are briefly summarized below, support the conclusion that essentially no leachate will be generated in the proposed landfill."* This conclusion is based on the use of the US EPA HELP model where reference is given to the work of Geosyntec (1992). Geosyntec has repeatedly provided unreliable information on the potential for leachate generation through the use of the HELP model. The approach that is followed by Geosyntec and, for that matter, others working on behalf of landfill applicants to "prove" that little or no leachate will be generated is to assume that the properties of the landfill cover which can be achieved if construction is in accord with design will apply for as long as the wastes in the landfill will be a threat. The wastes in the Kaiser Eagle Mountain Landfill will be a threat for hundreds to a thousand or more years. The cover for this landfill will not keep the wastes dry throughout the period of time that they are a threat. Therefore, whenever the properties of the cover deteriorate, which they will naturally do, the moisture in the form of precipitation that enters the cover of the landfill will pass through the liner system in the cover into the wastes, generating leachate.

On the bottom of page 4.1-5 is a discussion which makes reference to the Ham (1990) work where it is claimed that no leachate will be generated because of the high evaporation rates and limited precipitation. Unfortunately, Ham did not take time to review the state of California Water Resources Control Board's Solid Waste Assessment Test (SWAT) results. If he had, he would have found that there are many landfills in California that have and continue to generate leachate where the average precipitation rates are on the order of only a few inches per year. While arid climate landfills tend to produce less leachate, they do not produce no leachate. The leachate that is produced represents a significant threat to cause groundwater pollution.

On page 4.1-6, second paragraph, with regard to leachate production, again referring to the work of Ham (1990), this work is contrary to what has actually been observed in California with respect to its various landfills. While leachate production is intermittent, it is not zero. Further, it appears that Ham has ignored unsaturated transport of leachate within the wastes.

Overall, the statement on page 4.1-6, third paragraph, *"These sources support the site-specific determinations, cited above, that essentially no leachate will be produced at the proposed landfill."* is unreliable. There will be leachate produced at this landfill, and this leachate will ultimately, when the liner system fails to collect it, cause groundwater pollution.

Page 4.1-8, first paragraph, last sentence, states, *"In California, the liner systems for Class III landfills must be designed to prevent the degradation of groundwater (Title 23, Chapter 15, §2540C."* While the statement is true with respect to Chapter 15 regulations, the regulations, which have been in effect since 1984, have not been implemented by the

regional water quality control boards to comply with this requirement. This is readily demonstrated by the fact that the author, Dr. G. Fred Lee, was involved in the development of Chapter 15 regulations. At the time these regulations were developed and adopted, the author was strongly supportive of the requirements set forth in them of protecting groundwaters from impaired use for as long as the wastes in the landfill will be a threat. However, the author and others have found that the regional water quality control boards have chosen to **assume** that the minimum design requirements set forth in Chapter 15 of a clay liner one foot thick with the maximum permeability of 10^{-6} cm/sec at the time of construction would be protective of groundwaters from impaired use for as long as the wastes in the landfill would be a threat. It was obvious that this assumed performance of this liner system was highly unreliable based on a simply Darcy's law calculation. Darcy's law describes how rapidly water moves through materials, like an aquifer system, a clay liner, etc.

It was obvious in the 1980s by the way the regional water quality control boards were interpreting Chapter 15 that the liner systems that they were allowing to be used in sites where there was groundwater vulnerable to pollution by landfill leachate would not be protected from pollution by landfill leachate. The Darcy's law calculations showed that the liners being used would delay by a few months, at most, the migration of leachate through the liner. So when Geosyntec-Kaiser state, as they have in the Final EIS/EIR, that Class III landfills must conform to the regulatory requirements of protecting groundwaters from impaired use for as long as the wastes represent a threat, it is clear that that statement has no meaning since it depends on the adequacy and reliability of how it is implemented. The implementation by the regulatory agencies, as it has been practiced thus far in California, has been woefully deficient compared to what is needed. The State Water Resources Control Board's 1995 SWAT report (Mulder and Haven, 1995) states that landfills that were constructed with these Chapter 15 liners were found to be leaking at the same rate and polluting groundwaters to the same degree as those landfills without any liners. This is exactly what would be predicted based on a Darcy's law calculation.

The deficiencies in the implementation of Chapter 15 were recognized by the State Water Resources Control Board staff where Schueller in a December 27, 1990 memo devoted to the "Need for Revisions to Chapter 15" stated, *"It* [issues papers] *concludes that there are few compelling reasons for revision of the regulations at this time, and recommends that the focus of our attention during the next year be on improving the implementation of the existing regulations."*

For Kaiser, CH2M Hill and Geosyntec to not discuss these issues in this Final EIS/EIR, since they are well-known by qualified professionals in the landfilling field, is a clear example of the biased presentation of information that occurs in the Kaiser Eagle Mountain Landfill Final EIS/EIR. Planning departments, boards of supervisors, the public and regulatory agencies are entitled to a more appropriate, reliable presentation of information than has occurred in this EIS/EIR on what is known in the literature pertinent to the expected performance of the proposed Eagle Mountain Landfill waste containment system.

The statement on page 4.1-8, third paragraph, *"The proposed liner system for the landfill exceeds the regulatory requirements for groundwater protection."* is more of the inadequate/highly unreliable information that is presented. While it exceeds the minimum design requirements for a Subtitle D single composite liner, those who understand the expected performance of such liners for as long as the wastes represent a threat know that the minimum requirements are not protective. Therefore, exceeding the minimum requirements without discussing the adequacy of these requirements when they are known to be inadequate is more of the distorted information that the Kaiser Eagle Mountain Landfill Final EIS/EIR has fostered on the Planning Commission, Board of Supervisors, public and regulatory agencies. Basically, in various sections of this EIS/EIR the landfill proponents are following the tactic of stating the regulatory requirements and then stating that the requirements are exceeded by the proposed design for the Kaiser Eagle Mountain Landfill. They are not, however, discussing the fact that meeting the minimum, or even having a system designed beyond minimum, such as the proposed Kaiser Eagle Mountain Landfill in some respects, does not mean that it is going to be protective. This EIS/EIR is a non-credible document in terms of providing CEQA-required full disclosure discussion of issues. Full disclosure requires a discussion of the adequacy of the regulatory requirements. The landfill proponents wish to have everyone believe that the regulatory requirements are well-known to be protective. In fact, just the opposite is the case. Minimum regulatory requirements are often compromises that are developed at the time between cost, political considerations or other factors and environmental protection. This is the case for some minimum Subtitle D landfills. The US EPA in 1988 as part of promulgating the proposed Subtitle D regulations stated,

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

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

"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."

The Agency knew at the time that the liner systems that it was proposing would not protect groundwaters from impaired use for as long as the wastes represent a threat. However, the Agency was being sued by environmental groups who wanted to force the Agency to develop regulations in accord with a Congressional mandate. This resulted in a situation where the Agency promulgated regulations that would obviously not be protective. Since these regulations were first proposed in 1989 and eventually adopted in 1992/1993, considerable new, additional information has been developed which confirms what was beginning to be known in the late 1980s of the unreliability of landfilling of municipal solid wastes following the Subtitle D approach. It is now widely recognized that the minimum Subtitle D regulations, including the additional so-called protective measures proposed by Kaiser *et al.* in permitting this landfill, will do nothing more than postpone the inevitable groundwater pollution by leachate that will be generated in this

landfill, rendering parts of the Chuckwalla Basin aquifer unusable for domestic or other purposes. Further, it is well known that those parts that are contaminated by leachate will never be able to be cleaned up to a point where they can be used for domestic water supply purposes again. These are issues that could have been and should have been discussed in this Final EIS/EIR.

On page 4.1-8, under "Monitoring Requirements," again the landfill proponents in the self-serving Final EIS/EIR have stated the regulatory requirements. They have not discussed, however, the fact that it is well-known by professionals in the field that these regulatory requirements cannot, in fact, be achieved with any degree of reliability for this type of landfill. The groundwater monitoring system discussed with vertical monitoring wells as proposed have a poor probability of detecting when landfill liner leakage eventually occurs and allows leachate that is generated in a landfill to pass through the liner into the underlying groundwater system. While in 1989, the field did not understand the significant deficiencies with the vertical monitoring wells of the type that have been used for unlined landfills in detecting leakage from lined landfills, since 1990 when Dr. John Cherry published his paper,"Groundwater Monitoring: Some Deficiencies and Opportunities," (Cherry, 1990) which discusses the unreliability of monitoring lined landfills, it has been known that the key component of Subtitle D, namely requiring that the list of chemical constituents set forth in Subtitle D regulation concentrations be met at the point of compliance for groundwater monitoring, cannot be achieved with the groundwater monitoring systems of the type that are being used then and today.

The basic problem is discussed in the enclosed papers- namely that the initial leakage through the plastic sheeting-lined landfill will generate finger-like plumes of leachate which can readily pass between the groundwater monitoring wells and not be detected by them. The unreliability of groundwater monitoring is even worse for the Eagle Mountain site because of the fractured rock. Large amounts of leachate could readily leak through the liners and pass through fractures which could be within a few inches of groundwater monitoring wells at the point of compliance for monitoring and not be detected by the wells. Haitjema (1991) in a discussion of trying to monitor landfills in fractured rock systems stated,

"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."

The groundwater monitoring system that Kaiser *et al.* have proposed to use for the Kaiser Eagle Mountain Landfill will obviously not detect the inevitable groundwater pollution by landfill leachate at the point of compliance for groundwater monitoring as required by Subtitle D and Chapter 15 regulations before off-site groundwater pollution occurs .

Page 4.1-9, under "Impacts," states, *"Little or no leachate will be produced because:"*. The first item is arid climate. While limited leachate will be produced, there will be sufficient leachate produced to pollute groundwaters. This is demonstrated by other arid climate landfills which are producing leachate.

The second bulleted item on page 4.1-9 states, *"Leachate that is produced will be prevented from infiltrating into the subsurface because:"*. The first item is the composite liner which meets all regulatory requirements. This is another of the distorted statements that prevails throughout the Kaiser Eagle Mountain Landfill Final EIS/EIR. Composite liners can function to prevent leachate leakage through it for a finite period of time. The wastes in the landfill will be a threat forever. It is only a matter of time until the composite liner no longer functions effectively to prevent leachate from passing through it.

The second item under leachate states, *"Consistent with state and federal requirements, any leachate that is produced will be collected and removed."* Again, this is a distorted statement that can possibly occur when the liner system is new. Over time, the liner system will deteriorate and will be unable to collect the leachate that is produced.

Page 4.1-9, states as the third bulleted item that when leachate passes through the composite liner, the vadose zone monitoring system will detect the presence of leachate before it reaches the bottom layers of the landfill. The vadose zone monitoring system is not a reliable system for detecting leachate migration under all parts of the landfill.

Page 4.1-10, first bulleted item states, *"Should leachate evade detection and collection in the vadose zone monitoring system, groundwater will be monitored immediately downgradient of the landfill to identify potential releases..."* . This is another of the distorted statements in that the groundwater monitoring system that is proposed has a very low probability of detecting pollution before widespread pollution occurs.

As discussed in the introductory materials for these comments on how a CEQA review should be conducted for proposed groundwater monitoring systems, the landfill proponent should be required to conduct a comprehensive evaluation of the expected reliability of the vadose zone and groundwater monitoring systems to detect leachate or leachate-polluted groundwater at their point of sampling. This is a readily achievable task which, if properly conducted, shows that the groundwater monitoring systems that are proposed, including those that are allowed by regulatory agencies, have a low probability of detecting leachate before widespread, off-site groundwater pollution occurs. Not providing information on the reliability of the vadose zone and groundwater monitoring systems in detecting leachate when it first reaches the point of sampling, is another example of the non-certifiability of this Final EIS/EIR because of its failure to conform to CEQA requirements of full disclosure.

Under "Mitigation" on page 4.1-10, the Kaiser Eagle Mountain Landfill Final EIS/EIR continues the presentation of distorted information with respect to meeting or exceeding the minimum landfill requirements. The facts are that the issue is not what are the

requirements, but how are the requirements implemented by the regional water boards. The regional water boards have not been implementing the monitoring requirements as they were originally intended. It is highly inappropriate for the Kaiser Eagle Mountain Landfill Final EIS/EIR to contain statements about Class III landfills in the Pacific Northwest having applicability to the Eagle Mountain Landfill situation. That is basically gobbledy-gook that has no meaning with respect to protecting the groundwaters of the Chuckwalla Basin.

Page 4.1-10, mid-page, starts a landfill liner systems discussion. This is another of the discussions where the Kaiser Eagle Mountain Landfill Final EIS/EIR claims that the landfill liner system that will be used in this landfill will be more protective than that required by the regulations. Yet it asserts in other places that the regulations are protective. Are Kaiser *et al.*simply throwing money away because it is not needed by constructing thicker additional liners, etc. or is it, as is the case, well-known that the existing minimum liner systems are not protective? Kaiser *et al.* are attempting to overcome this by providing additional protection. Additional protection, however, is well-known only to lead to further postponement of groundwater pollution; it will not prevent it. Further, a 60 mil, as the required minimum, or an 80 mil HDPE liner will not change the ultimate situation-namely that both of these HDPE liners will ultimately fail to prevent leachate from passing through it for as long as the wastes represent a threat.

On page 4.1-11, the first paragraph is a self-serving statement on the part of the landfill proponents where it only cites the work of those who have reported on satisfactory, short-term performance of the liner systems. It does not cite the literature on the long-term performance problems. For example, the last sentences states, *"Bonaparte, et al. (1995) presented operational data for 26 working landfill cells containing composite liners incorporating GCLs. Their study concluded that the efficiency of a composite liner system with a GCL may be greater than 99.90 percent."* While the statement could be accurate for the scope of the study, the study however does not address the long-term problems, i.e. for as long as the wastes represent a threat. In fact, as discussed in previous materials submitted on the draft EIR for the original Eagle Mountain Landfill proposal, Bonaparte has great difficulties accurately quoting the literature on long-term performance issues. He has been repeatedly found to only provide discussions of the first part of a particular comment from the literature on performance and leave off the next paragraph in the same literature source which discusses the limitations of the first paragraph on the long-term expected performance.

A similar problem occurs on page 4.1-11 with respect to the second paragraph on liner durability and expected long-term performance. The last sentence states,

"Bonaparte (1995) concluded that the service life of a HDPE membrane used as a component of a liner system in municipal solid waste landfill designed and constructed in compliance with regulatory requirements is expected to exceed the time period in which leachate and gas would be produced in a landfill."

Over the years that I have been involved in landfill matters, I have repeatedly found R. Bonaparte to have little or no understanding of landfill processes as they relate to landfill gas and leachate generation. He has repeatedly made statements about how the liner system will function effectively perfectly, i.e. to prevent groundwater pollution, for long after the landfill will generate gas and produce leachate. A review of his statements, however, shows that he ignores the fact that the inorganic salts, heavy metals and many organics present in municipal solid waste in a "dry tomb" type landfill of the Kaiser *et al.* proposed type for the Eagle Mountain Landfill site can produce leachate that is detrimental to groundwater quality, effectively forever. The liner systems, even a double composite liner, of the type that Kaiser *et al.* propose to use at the Eagle Mountain Landfill have finite periods of time over which they can be expected to function effectively to collect leachate. Anyone who asserts otherwise is either unqualified to comment on the topic or is deliberately distorting the information that is readily available on this issue. The statement in the Final EIS/EIR that the liner will function longer than the landfill is expected to generate leachate is, without question, in error. It ignores what is well-known in the literature on the expected behavior of wastes in a "dry tomb" type landfill and the expected performance of the liner systems of the type that Kaiser *et al.* propose to use at the Eagle Mountain Landfill site. Additional discussion of these issues is provided in the appended papers and reports.

The discussion on pages 4.1-11 and 4.1-12 on the groundwater monitoring systems and landfill liner monitoring systems presents more of the unreliable information on the expected performance of these systems that has been discussed elsewhere in these comments. The bottom-line facts are that the various monitoring systems, such as the vertical monitoring wells, have limited reliability in detecting leachate-polluted groundwaters before widespread, off-site pollution occurs.

The leak detection system between the two composite liners, however, can be a useful monitoring system for the bottom of the landfill where the double composite liner system exists. This system should be operated as a leak detection system where when leakage through the upper composite liner is detected that cannot be stopped, then the wastes in the landfill must be removed, or else it is only a matter of time until leakage through the lower composite liner will occur. Since this problem could happen within 50, 100, 200, 500, 1,000 or more years from now, it is important that Kaiser *et al.* be required as part of the development of tipping fees for this landfill to include funds for developing a dedicated trust fund of sufficient magnitude to remove the wastes from the landfill if Kaiser *et al.* at any time in the infinite future that the wastes will be a threat, cannot stop leachate from being generated and present in the leak detection system between the two liners.

With respect to the side slopes, the landfill must be reconfigured so a double composite liner system can be installed on the side slopes as well. A similar approach must be followed with respect to leakage through the upper composite liner into the side slope areas with respect to the need for waste exhumation if leachate generation cannot be halted.

Page 4.1-13, mid-page, discusses the final cover. As discussed elsewhere, the final cover for this proposed landfill is inadequate to prevent moisture from entering the landfill for as long as the wastes in the landfill will be a threat. This landfill should not be approved unless a leak detectable cover is installed and Kaiser *et al.* commit funding through a dedicated trust that will ensure that this cover will be operated and maintained in perpetuity.

The statement is made on page 4.1-13, last sentence,

"With the implementation of the proven regulatory requirements for landfill containment and the added protection afforded by the mitigation measures described above, groundwater quality would not be affected by leachate releases from the Eagle Mountain Landfill, and therefore, impacts would be reduced to below the level of significance."

This is a highly unreliable, self-serving statement on the part of the landfill proponents that is designed to mislead the Planning Commission, Board of Supervisors and the regulatory agencies into believing this landfill will not be adverse to groundwater quality for as long as the wastes in the landfill will be a threat. The facts are that it is obvious and common sense that the systems that Kaiser *et al.* have chosen which are slightly better in some respects than the minimum, badly out-of-date, inadequate regulatory requirements will, at best, only postpone when groundwater pollution occurs.

Page 4.1-14, second paragraph, discusses groundwater quality degradation from landfill gas. A series of five ways by which landfill gas could become an environmental pollutant are listed in this paragraph. There is a sixth way which is probably the most important of all that is not listed-namely the migration of landfill gas that interacts with percolating water, including vadose zone transported water, will be carried to groundwater. It does not have to, as described in this paragraph, be a dense organic compound which would settle in the aquifer system and become incorporated into the groundwater to become a water pollutant. This issue has been discussed more reliably than it has been presented in the Kaiser Eagle Mountain Landfill Final EIS/EIR by Prosser and Janecheck (1995) who point out that landfill gas contamination of groundwaters is much more common than typically assumed. As discussed by Prosser and Janecheck, the statements in the third full paragraph regarding the mechanism of contamination of groundwater are inadequate to describe the potential for groundwater pollution.

Page 4.1-15 states that Geosyntec (1996) has concluded that the landfill gas that is produced would be prevented from escaping through the bottom and sides of the landfill by the composite liner system. Again, Geosyntec has only considered short-term issues for a perfectly functioning liner. Liners have holes in them; they also develop points of deterioration over time. Landfill gas production will be extremely slow and extend over very long periods of time, well beyond when the landfill liner would be expected to function as an effective barrier. Therefore, contrary to the statement made, there is the potential for migration of landfill gas through the liner system.

Page 4.1-15, second bulleted item, presents an incorrect concept regarding the migration of any gas condensate arising from landfill gas where it is stated,

"For any liquid introduced to the subsurface, a minimum volume is required before the liquid can flow (i.e., the amount required to elevate the moisture content of the unsaturated bedrock above the level [field capacity] where water is held within the fractures by capillary forces and essentially unable to flow freely.)"

This approach ignores the well-known vadose zone transport that occurs for liquids, such as water. The transport of liquids, including contaminants associated with liquids, occurs at less than field capacity through vadose zone transport. This statement is fundamentally in error and fails to reflect what is well-known in the groundwater hydrology field on the transport of constituents in the vadose zone and, for that matter, in wastes.

The third bulleted item on this page is also incorrect in that, as discussed above, the organic vapors do not have to result in a dense landfill gas in order to be transported to the groundwater table.

Page 4.1-15 under mitigation for landfill gas, the misleading statement is made about the reliability of the vadose zone gas monitoring system exceeding regulatory requirements, with the implication that obviously this is protective. Regulatory requirements are not adequate to be protective.

Page 4.1-15, "Significance After Mitigation," the mitigation measures will not prevent groundwater pollution by landfill gas. Therefore, the statement that the mitigation will result in landfill gas impacts being reduced to a level below significance is a self-serving statement that is not factual.

Page 4.1-16 discusses a number of landfill support facility operations and the potential for these operations to result in groundwater pollution. While it is possible to operate the landfill without groundwater pollution from such facilities, it is important to understand the fiscal setting of this landfill. There will be tremendous pressure to reduce operating costs because of the large amount of surplus landfill capacity such as from the already permitted Mesquite Landfill where each of these landfills owners will be cutting corners to try to reduce costs to stay competitive. The net result is that what would ordinarily be no problem with respect to groundwater pollution such as the various facilities listed on pages 4.1-16 and 4.1-17 could readily become problems due to sloppy operations.

Page 4.1-18 discusses the potential for the local town wastewater treatment system to pollute groundwaters. On the bottom of this page is a series of bulleted items that assert that the migration of the wastewaters through the geological strata down to the watertable would result in its purification. Such statements are self-serving and unreliable. There are significant numbers of groundwater pollution situations in arid climates, such as that near the proposed Eagle Mountain Landfill, where groundwater pollution has occurred due to septic tank and other wastewater management systems.

The statement on page 4.1-19 about the town site treatment plant will not cause groundwater pollution is therefore, not necessarily reliable. There will be need for intensive monitoring of the site to be sure that this is not the case.

Page 4.1-21 discusses the information on the impacts of groundwater pollution from the landfill on the Colorado River water quality. Under the first bulleted item, the claim is made that since there will be no groundwater pollution at the site, there can be no transport via groundwater to the Colorado River. This statement is unreliable since there will be groundwater pollution at the site and therefore, since the flow path is from the site to the Colorado River, there is the potential for leachate-polluted groundwaters to be transported from the site to the Colorado River.

With respect to the travel times discussed in the second bulleted item, since this is a fractured bedrock system, the actual travel times that could occur cannot be predicted. There can readily be pathways that would greatly shorten the travel times from those estimated through a fractured bedrock system of the type that exists in the region.

Page 4.1-22, under the Section 4.1.2.3 "Reduced Volume of Onsite Disposal Alternative," the statement is made that there would be no change in the potential impacts associated with the reduced volume of onsite waste disposal. That statement is inaccurate. The potential magnitude of the pollutional impacts is proportional to the total volume of wastes. While a small landfill and large landfill can both pollute, the magnitude of the impacts is proportional to the size of the landfill since the amount of wastes is the driving force for ongoing pollution.

Pages 4.2-2 and 4.2-3 discuss the issue of the types of wastes that will be accepted at the site with particular reference to the acceptance of hazardous waste. The statement in the third full paragraph on page 4.2-3, *"Federal and state regulations control hazardous substances and wastes and prevent their improper disposal."* is inappropriate. While there are regulations for controlling regulated hazardous wastes which prohibit their disposal in municipal landfills, there are unregulated hazardous wastes and large amounts of hazardous substances that are legally disposed of in accord with current regulatory requirements in municipal landfills. Further, the normal homeowners' solid wastestream such as the vacuum cleaner dust that is disposed of in the garbage from a lead painted house would be a hazardous waste if it were generated at an industrial site because of the lead content. However, this situation is not regulated, with the result that lead is one of the constituents in the municipal solid wastestream that at many landfills represents a significant threat to cause groundwater pollution. This would be especially true in fractured rock systems, such as underlying the proposed Kaiser Eagle Mountain Landfill.

Page 4.2-4, first paragraph, presents the results of some County Sanitation Districts of Los Angeles estimates of the amounts of the hazardous fraction of the total wastestream. While there are questions about the reliability of the work that was done by the Sanitation Districts, given the assumption that it is reliable, the amounts found represent a large amount of hazardous substances that will be added to the Kaiser Eagle Mountain Landfill which represents a significant threat for groundwater pollution.

Page 4.2-4, under "Impact,"second paragraph, discusses untreated infectious waste. This discussion ignores the large number of disposable diapers (about 2% of the wastestream) and the associated fecal material that will be disposed of in the landfill. This fecal material will, in many cases, contain pathogenic organisms such as enteroviruses that can be transported in groundwater systems, especially fractured rock groundwater systems.

Page 4.2-5, first paragraph, states under "Waste Stream Sorting Process," *"To help maintain the environmental integrity of the proposed Project, only nonhazardous municipal solid waste will be allowed at the landfill."* That statement ignores the fact that unregulated hazardous waste is allowed under Subtitle D to be deposited in a municipal landfill. The load checking program described in the Final EIS/EIR is inadequate to prevent the introduction of hazardous waste and hazardous substances into the landfill. The discussion of hazardous waste and hazardous chemical management issues in the Final EIS/EIR is self-serving and unreliable. There is no question about the fact that there will be hazardous waste deposited in this landfill and that there will be large amounts of hazardous chemicals which are not classified as hazardous wastes which will be deposited in this landfill in accord with current regulatory requirements.

Page 4.2-7, is more of the Kaiser *et al.* self-serving statements about how they are going to control everything so there will be no hazardous wastes released. Again, this has to be viewed in terms of the economic competition for solid wastestreams that will occur between the large mega-landfills, one of which is already permitted, which will drive disposal fees down and thereby increase the likelihood of mismanagement of wastes associated with the operations of the landfill.

Page 4.2-9 presents a discussion of the impacts on the Joshua Tree National Park. While the statement is made in the Final EIS/EIR that there will be no impacts, in fact, because of the close proximity of the Park to the landfill, there is a potential for adverse impacts due to the landfill itself and the operations associated with the landfill.

Page 4.2-13, Section 4.2.3.1 "Proposed Action" with respect to "Landfill Gas" assumes a landfill gas generation rate. Such assumptions can readily be highly unreliable because of the fact that much of the wastes that will be placed in the landfill will be in plastic bags which will inhibit for periods of time the interaction between moisture that percolates through the wastes and the wastes to enable the bacteria to convert the fermentable waste components into landfill gas.

Page 4.2-15, second paragraph, mentions that the landfill gas will be flared. No mention is made of the hazardous components of the landfill gas or those that are produced in the flare, such as dioxins. Eden (1993) has pointed out that landfill gas flares typically produce dioxins. A properly developed EIS/EIR would have discussed this issue. It should also be pointed out that the US EPA has recently announced that it is considering regulating landfill gas management systems like it regulates others similar sources of the same components. Thus far, the hazardous components of landfill gas and gas flares have not been regulated to the same degree as other sources of the same constituents. The US EPA's proposals, while opposed by the landfilling industry as an additional cost, points to

the importance of Kaiser *et al.* properly discussing these issues and not being allowed to present the superficial, self-serving statements of the type that are made on page 4.2-15.

Page 4.2-16 discusses the potential for landfill gas to adversely impact Joshua Tree National Park. While the statements are made that the control systems that will be developed will prohibit such impacts, it must be remembered that there are no assurances that these control systems will be operated and maintained for as long as the wastes in the landfill have the potential to produce landfill gas. This potential can extend for very long periods of time-hundreds of years-- if the wastes are kept dry as claimed by Kaiser *et al.* However, the potential will still exit a thousand or more years from now as the waste components will not have degraded and if at some time in the infinite future the maintenance of the landfill cover does not prevent moisture from entering the landfill, landfill gas will then be generated. Under these conditions, there is the likelihood that the landfill gas collection and management systems will no longer be functional. Since the Joshua Tree National Park will be there in perpetuity, it is likely that there will be adverse impacts to Joshua Tree National Park at some time in the future due to landfill gas generation at the landfill.

There is also potential for dioxins released from the landfill gas flares and vinyl chloride released from the landfill as part of landfill gas components to be adverse to terrestrial life in the region. Human carcinogens of concern are also carcinogens to terrestrial life, especially those that live on the surface of the soil and feed at the surface. They will be exposed to hazardous conditions due to inadequately controlled releases of hazardous substances in the landfill gas that will escape from the landfill.

Page 5-37 mentions the Rail Cycle-Bolo Station Landfill, the La Paz County Regional Landfill and the Mesquite Regional Landfill. No mention is made, however, of the tremendous surplus landfilling capacity that will be generated with just one of these landfills, such as the already permitted Mesquite Landfill, much less if Eagle Mountain Landfill or the other landfills are permitted and constructed. This can have a dramatic adverse impact on the public health and environmental safety associated with each of these landfills due to the efforts of the landfill owners to try to reduce costs. While it could be naively assumed that the regulatory agencies at the county and state or federal level will ensure that situations of this type do not occur, the facts are that the amount of support being given to federal, state and local regulatory agencies is decreasing, with the result that they are able to provide even less inspection for confirmation with regulatory requirements than has been occurring in the past.

Pages 5-44 to 5-45 discuss the air quality impacts on the Joshua Tree National Park. While the discussion presented mentions that increased visitors will be a source of PM_{10} particle emissions, there is no discussion of the potential of the landfill to be adverse to the park due to PM_{10} particles generated by landfill operations and its presence next to the Park. One of the issues that needs to be considered is the potential for increased dust and PM_{10} particles generated from the landfill during its operation and closure. This can readily result in almost certainly increased PM_{10} particles arising from the construction and operation of the Kaiser Eagle Mountain Landfill. This will represent an additional

hazard to users of the lands in the region, including staff and visitors to the Joshua Tree National Park.

Page 2-57, Section 2.1.9 "Landfill Closure and Postclosure," discusses the general aspects of Kaiser's proposed approach for funding post-closure activities. The statement is made in the second paragraph of this section,

"Postclosure maintenance activities at the Eagle Mountain landfill will be conducted for minimum of 30 years to maintain the integrity of the various engineered systems at the landfill throughout the postclosure period."

In the next paragraph it is stated,

"To ensure sufficient funds are available to perform the necessary closure and postclosure maintenance activities, MRC will provide funding assurances (in the form of a trust fund or other approved financial mechanism), as required by Subtitle D provision implemented by the Regional Water Quality Control Board (RWQCB)."

There are several aspects of this situation that need to be understood. First, the wastes in the proposed Kaiser Eagle Mountain Landfill will, because of the nature of the landfilling, be a threat effectively forever. Therefore, any mention of this minimum 30-year post-closure care period is of concern. Kaiser, Riverside County, the Regional Water Quality Control Board, the State of California and the US EPA should be requiring that assured post-closure funding is available in a dedicated trust of sufficient magnitude to address all plausible worst-case scenario failures in perpetuity, not for just a minimum of 30 years.

Throughout the Kaiser Eagle Mountain Landfill Final EIS/EIR it is repeatedly stated how Kaiser *et al.* plan to go beyond the minimum requirements. However, in the most critical of all requirements, post-closure care funding, Kaiser *et al.* are not proposing to go beyond the minimum requirements. The minimum post-closure care funding required is recognized to be inadequate to address even the 30-year post-closure care needs, especially as it relates to maintenance of the landfill cover low permeability layer. These issues are discussed in the appended papers by Lee and Jones-Lee, "Municipal Landfill Post-Closure Care Funding: The '30-Year Post-Closure Care' Myth," "Deficiencies in US EPA Subtitle D Landfills in Protecting Groundwater Quality for as Long as MSW is a Threat: Recommended Alternative Approaches," "Questions that Regulatory Agencies Staff, Boards and Landfill Applicants and Their Consultants Should Answer About a Proposed Subtitle D Landfill or Landfill Expansion," "Landfill Post-Closure Care: Can Owners Guarantee the Money Will Be There?" "Recommended Design, Operation, Closure and Post-Closure Approaches for Municipal Solid Waste and Hazardous Waste Landfills," and "Overview of Landfill Post Closure Issues."

Page 7-14, Section 7.2.5 "General Response 5," states,

"Several commenters on the EIS/EIR questioned the adequacy of the document's discussion regarding the landfill composite liner system, and the ability of the system to withstand seismic events."

The statement is made,

"The draft EIS/EIR has relied on thorough geologic, seismic, and hydrogeologic site investigations and expert opinion and conclusion, summarized below and referenced in detail in the Draft EIS/EIR, to evaluate the performance and reliability of the composite liner system proposed for the Project."

It should be pointed out that the landfill proponents in developing this Draft EIS/EIR, have been highly selective in their so-called expert opinions and only have presented those that support their self-serving position. They have not presented the substantial literature that shows that the so-called expert opinions that they have selected are not in accord with what is generally known today about the long-term performance of the composite liner to prevent groundwater pollution for as long as the wastes in the landfill will be a threat.

The statement is made on page 7-14, last paragraph, *"The composite liner system is designed to prevent escape of any leachate and/or landfill gas to groundwater."* While that may be design characteristics, the actual materials that are used (high density polyethylene and compacted clay or a geosynthetic [GCL] liner system as a substitute for a clay layer) cannot be expected to perform in accord with design characteristics for as long as the wastes in the landfill will be a threat. This is the issue that should have been discussed. The performance of the liner system can, if it is properly constructed, function adequately for a period of time. However, over time, the characteristics of the liner system will deteriorate, with the result that it will not function properly for as long as the wastes represent a threat to prevent groundwater pollution.

Page 7-15, third full paragraph, states,

"Although the Eagle Mountain site lies east of the zone of historically high seismicity in California, the Draft EIS/EIR evaluated the performance of existing landfills with and without composite liners in the California coastal zones subject to seismic activity, particularly focusing on the 1994 Northridge earthquake. Evaluations of landfills in proximity to the epicenter of the Northridge earthquake (including the Sunshine Canyon Landfill and the Lopez Canyon Landfill) showed no earthquake-induced damage to landfills or structures that resulted in a release of waste or leachate to the environment."

The statement is further made,

"Observations of the two landfills with geosynthetic composite liner systems, Lopez Canyon and Bradley landfills, provided clear evidence that a composite liner system constructed to federal and state Subtitle D standards can withstand strong earthquake-

induced ground shaking without any damage that would result in environmental impact or damage to resources."

This is not an accurate presentation of what is known about what happened at the Lopez Canyon Landfill. The article by Augello *et al.* (1995) has shown that there was "moderate" damage to the Lopez Canyon Landfill due to the Northridge earthquake. There is reason to believe that during the earthquake the liner system, which apparently already had a tear in it, experienced further tearing due to the seismic activity. The Kaiser Eagle Mountain Landfill Final EIS/EIR has distorted the information that is readily available on this situation by claiming that there has been no release of wastes or leachate to the environment. The EIS/EIR should have discussed the damage to the liner system that is discussed in the literature as part of being a credible EIS/EIR. This discussion of the seismic activity in response to the public's inquiry is a non-credible presentation of information. It does not provide full disclosure of the issues of concern to the public.

The statement is made on page 7-16, first full paragraph, *"The landfill final cover will be installed progressively as the landfill is developed, thus providing an additional means to prevent generation of leachate from rainfall."* This cover will only temporarily slow down leachate generation; it will not prevent it. This issue has been discussed elsewhere in these comments, and it is well-known in the literature.

Overall, "General Response 5" is a self-serving, superficial discussion of issues of concern to the public which should cause this Final EIS/EIR to be rejected as non-certifiable based on failure to provide full disclosure of potential impacts.

The statement is made on page 7-16, fourth full paragraph,

"The Draft EIS/EIR also includes a Technical Advisory panel (TAP) report prepared by a panel of experts who independently evaluated the landfill project and the composite liner system, concluding that the primary and secondary composite liner systems represent the state-of-the-art and are safe, reliable, and durable for long-term performance."

Based on this statement, this panel of experts did not address the issue of concern to the public-namely, will this liner system and the groundwater monitoring system have a high probability of preventing groundwater pollution and other adverse impacts of this landfill for as long as the wastes in this landfill represent a threat? Also, it appears that this panel did not address the issue of how long the landfill will be a threat. The panel has provided information in support of Kaiser *et al.*, who are responsible for organizing the panel. It did not operate as a peer review, independent panel of experts to address the issues of concern by including individuals who are familiar with and will discuss in public the deficiencies of Subtitle D landfill liner, cover and groundwater monitoring systems.

One of the items of concern is a letter developed by R. Bonaparte of Geosyntec Consultants to Gary Johnson of the Mine Reclamation Company dated August 30, 1996 regarding the potential for the geosynthetic clay liner to hydrate due to water absorption. This hydration could lead to side slope failure. It has been my experience, having

reviewed considerable amounts of R. Bonaparte's work over the years on behalf of landfill applicants that he provides unreliable information in support of the landfill applicant on critical issues of landfill safety and stability. Before I would accept his assessment of the situation, it should be independently reviewed by experts who do not, as R. Bonaparte does, make a living working for landfill applicants.

One of the materials made available for review is a sheet entitled, "Differences in Project Previously Approved and Project Described in New Applications." Under item 3 discussing the landfill liner, the new application includes the geosynthetic clay liner (GCL) instead of compacted clay. This actually represents a decrease in protection, rather than an increase, due to the fact that GCLs can experience rapid penetration through the liner due to diffusion and have limited structural integrity under stress. It is also subject to cation exchange which can increase the permeability of the clay layer.

Comments on the Agreement between the National Park Service and Mine Reclamation Corporation, Eagle Mountain Reclamation, Inc., and Kaiser Eagle Mountain, Inc.

The National Park Service and the Mine Reclamation Company, Eagle Mountain Reclamation, Inc. and Kaiser Eagle Mountain, Inc. entered into an agreement on December 9, 1996 which recognizes on page two, third paragraph, that the National Park Service believes

"...that the project's location and proximity to the Park may cause unknown or unpredictable impacts or intrusions to the Park's natural resources including, ecosystem function, air quality, wilderness, ground water, and biodiversity; that potential and unknown impacts from the Project are difficult to predict or quantify; and that installation and operation of the proposed landfill could cause adverse changes in the ecosystem; and

"Whereas, NPS believes that the Project, if approved, will place an additional funding burden on NPS to develop new scientific information, to undertake research strategies, and to implement additional resource management efforts to monitor and address possible impacts from the Project into the Park's natural systems;"

The Agreement provides funds that are available for research management to monitor as well as address possible impacts of the landfill on the Park's natural resources through the form of a trust. The magnitude of the trust at full operation shall be $6 million per year. With the terms of this Agreement as stated on page 3, Section 2.2, this Agreement shall continue for the life of the landfill plus 100 years, where the life of the landfill is 117 years. The wastes in this landfill will be a threat forever. Two hundred seventeen years is a small part of the time that the wastes will be a threat. While there likely will be problems before 217 years, there could also be problems after 217 years. At this time, there are no funds available to address these problems for the National Park Service and others in the region. Any agreement of this type should include sufficient funds for

plausible worst-case scenario failure in perpetuity, not just for a limited period of time during which the wastes will be a threat.

With respect to page 4, Section 3 "Obligations of Kaiser/MRC," it states in item 3.2 under "Odor Control," 3.2.1, *"Operate the Project in such a manner as to minimize landfill and arriving waste odors to the extent that Park visitors and employees within the Park will not be subjected to noticeable levels."* This means that there could be odors on National Park Service land. Kaiser *et al.* should be required to operate the landfill so there are no odors arising from the landfill at the Eagle Mountain Landfill property boundary. Similar conditions should exist for other potential airborne pollutants such as NOX, PM_{10} particles, windblown litter, etc.

Page 9, Section 5.3.2, states, *"In the event a breach of any term of this Agreement is alleged, the aggrieved Party may apply to a court of competent jurisdiction for relief."* Such an arrangement could result in years of litigation with questionable outcome for situations that could readily develop during the terms of the Agreement, much less after the Agreement has expired. The conditions of the Agreement should be that a third-party, independent expert panel should be appointed who would review the issues of concern and develop conclusions. If it is found that there have been repeated violations of the releases from the landfill, such as odors at the landfill property line, then Kaiser *et al.* should have to shut down the landfill and remove all wastes. Further, as part of the Agreement, a dedicated trust fund from disposal fees should be developed that will be available in perpetuity to address all adverse impacts of the landfill on the Joshua Tree National Park and others in the region, including exhumation of the wastes and their proper management.

Overall, this Agreement provides little in the way of assurance that the Joshua Tree National Park will be protected for as long as the wastes in the landfill will be a threat. Further, there is no similar provision to protect the interests of other property owners/users that will be impacted by this landfill for as long as the wastes represent a threat. This Agreement appears to be an attempt by Kaiser, *et al.* to lessen the National Park Service's opposition to the proposed landfill. It is unfortunate that a representative of the National Park Service agreed to this. Evidently, Mr. Galvin did not understand the potential impact of this landfill on Joshua Tree National Park and others in the region in signing this Agreement.

References

Augello, A., Matasovic, N., Bray, J., Kavazanjian, Jr., E. and Seed, R., "Evaluation of Solid Waste Landfill Performance During the Northridge Earthquake," In: Earthquake Design and Performance of Solid Waste Landfills, ASCE Geotechnical Special Publication No. 54, American Society of Civil Engineers, New York, pp. 17-50 (1995).

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

Eden, R., "Toxic Emissions from Different Types of LFG Burners," In: Proceedings of Sardinia '93 IV International Landfill Symposium, Sardinia, Italy, pp. 635-636, October (1993).

Haitjema, H.M., "Ground Water Hydraulics Considerations Regarding Landfills," Water Resources Bulletin 27(5):791-796 (1991).

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

Mulder, J.H. and Haven, E.L., "Solid Waste Assessment Test (SWAT) Program Report to the Integrated Waste Management Board," Water Resources Control Board, CA Environmental Protection Agency, 96-1CWP, Sacramento, CA, December (1995).

Prosser, R. and Janecheck, A., "Landfill Gas and Groundwater Contamination, " In: Landfill Closures...Environmental Protection and Land Recovery, Proc. Of American Society of Civil Engineers, Geotechnical Special Publication No. 53, ASCE, New York, pp. 258-271 (1995).

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

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

List of Enclosures

Letter to Russell Kaldenberg, Bureau of Land Management, providing comments on the Final EIS/EIR for the Eagle Mountain Landfill Project dated June 1992 (September 1992).

Letter to Phil Gruenberg, California Regional Water Quality Control Board Colorado River Basin Region 7, on the proposed Tentative Waste Discharge Requirements for the Eagle Mountain Class III Landfill Project (April 1994).

Deficiencies in US EPA Subtitle D Landfills in Protecting Groundwater Quality for as Long as MSW is a Threat: Recommended Alternative Approaches

Questions That Regulatory Agencies Staff, Boards and Landfill Applicants and Their Consultants Should Answer About a Proposed Subtitle D Landfill or Landfill Expansion

Review of Proposed Landfills: Questions that Should Be Answered

Landfill Post-Closure Care: Can Owners Guarantee the Money Will Be There?

Landfilling of Solid & Hazardous Waste: Facing Long-Term Liability

Financial Assurance-Will the Check Bounce?

No Guarantee (of Financial Assurance)

Overview of Landfill Post Closure Issues

Municipal Landfill Post-Closure Care Funding: The "30-Year Post-Closure Care" Myth

Recommended Design, Operation, Closure and Post-Closure Approaches for Municipal Solid Waste and Hazardous Waste Landfills

Groundwater Pollution by Municipal Landfills: Leachate Composition, Detection and Water Quality Significance

Landfill Leachate Management

Dry Tomb Landfills

Addressing Justifiable NIMBY: A Prescription for MSW Management

Impact of Municipal and Industrial Non-Hazardous Waste Landfills on Public Health and the Environment: An Overview

Environmental Impacts of Alternative Approaches for Municipal Solid Waste Management: An Overview

Municipal Solid Waste Management in Lined, "Dry Tomb" Landfills: A Technologically Flawed Approach for Protection of Groundwater Quality

Evaluation of the Potential for a Proposed or Existing Landfill to Pollute Groundwaters

A Groundwater Protection Strategy for Lined Landfills

Detection of the Failure of Landfill Liner Systems

Environmental Ethics: The Whole Truth

Three R's Managed Garbage Protects Groundwater Quality

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

Water Quality and Solid & Hazardous Waste Landfills Evaluation and Management

Recent Publications of G. Fred Lee and Anne Jones-Lee

G. Fred Lee and Anne Jones-Lee Summary of Experience & Activities

Summary Information

Summary of G. Fred Lee's Qualifications to Undertake Review of a Proposed or Existing Municipal Solid Waste or Hazardous Waste Landfill Impacts

Municipal Solid Waste Landfills and Groundwater Quality Protection Issues

Many of the above-listed papers and reports as well as others pertinent to the topic area are available as downloadable files from Dr. G. Fred Lee's and Dr. Anne Jones-Lee's web site (http://members.aol.com/gfredlee/gfl.htm).

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July 10, 1997

Bob Buster, Chairman
Riverside County Board of Supervisors
PO Box 1527
Riverside, CA 92502

Dear Chairman Buster:

Following the July 1, 1997 hearing on the proposed Eagle Mountain Landfill, I was provided a copy of some materials that Kaiser made available to the Board of Supervisors at that hearing. These consisted of a set of summary sheets entitled, "Eagle Mountain Landfill and Recycling Center Ground-Water Protection System, Prepared for Board of Supervisors County of Riverside, July 1997." Based on my review of these materials and my discussions with those present during the July 1, 1997 hearing, I find that Kaiser and its consultants have continued to provide the Board of Supervisors with large amounts of inadequate, highly unreliable and in some cases, to me, appears to be deliberately distorted information on the potential impacts of the proposed Eagle Mountain Landfill.

While I covered most of the issues of concern with respect to the unreliable information provided by Kaiser and its consultants in its EIR/EIS in my June 27, 1997 letter to you and the accompanying comments, "Comments on Final Environmental Impacts Statement/Environmental Impact Report Eagle Mountain Landfill and Recycling Center Project Volume 1 Final EIS/EIR," which is being submitted to the Board by H. Wagenvoord of the National Parks and Conservation Association, I felt that the Board of Supervisors would find useful a condensed summary of the key issues pertinent to

evaluating the reliability of Kaiser's July 1997 submission to the Board. This summary is attached.

I understand that this will also be submitted to the Board as an attachment to my June 27, 1997 letter. If the Board or others have questions about it please contact me.

Sincerely yours,

G. Fred Lee

G. Fred Lee, PhD, DEE

copy to: H. Wagenvoord

GFL:djc
Enclosure

Summary Comments on Kaiser *et al.* Proposed Eagle Mountain Landfill and Recycling Center Ground-Water Protection System

Submitted to the Board of Supervisors County of Riverside July 1997

Comments Prepared by

G. Fred Lee, PhD, DEE
G. Fred Lee & Associates
El Macero, California

July 10, 1997

Kaiser *et al.* and its Consultants Provided the Board of Supervisors with Additional Inadequate, Unreliable and Distorted Information on the Proposed Eagle Mountain Landfill Groundwater Protection Systems Ability to Prevent Groundwater Pollution by Landfill Derived Leachate for as Long as the Wastes in the Landfill Will Be a Threat

Summary of Key Issues Provided Herein

Eagle Mountain Landfill Water Quality Protection Systems

"Most extensive application in State history for a Class 3 landfill"

Size of Application Is Not the Issue of Concern to Board of Supervisors, Even with "7,500 Pages" Information Provided by Kaiser *et al.* and its Consultants Is still Significantly Deficient in Providing a CEQA Full Disclosure Discussion of the Likely Impacts of the Eagle Mountain Landfill on the Groundwater Resources as well as the Interests of Those Who Own or Use Properties Within the Sphere of Influence of the Landfill. (See Discussion of Deficiencies Submitted by Dr. G. Fred Lee.)

"Design was approved by State in May 1994"

Approval by State Regional Water Quality Board was not Based on a Critical, Reliable Evaluation of Potential for the Landfill Containment System (Liners and Cover) and Groundwater Monitoring System to Comply with WRCB's Chapter 15 Groundwater Protection Performance Standard of No Impaired Use of Groundwaters for as Long as the Wastes in Landfill Will Be a Threat - "Approval" Based on Mechanical Compliance with Staff and Board Interpretations of Minimum Subtitle D Requirements - Ignored Literature on Expected Performance of Landfill Proposed Containment System

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Expert Independent Panel Review

"Given the favorable site condition, sophisticated waste containment systems, and elaborate monitoring systems, the Eagle Mountain Landfill could well become one of the world's safest landfills and a model for others to emulate,"

Panel Members Selected to Support Landfill Development

Panel Members Expertise Focuses on Landfill Development, Not Public Health, Groundwater Resource and Environmental Protection

Panel Members Report Not Independently Peer Reviewed by Experts Whose Perspective is Groundwater Quality Protection from Waste Derived Constituents for as Long as the Waste in the Landfill Will Be a Threat

Panel Conclusion Does Not Provide CEQA Full Disclosure of Issues

"Favorable Site Conditions" - Fractured Rock Impossible to Reliably Monitor with Vertical Monitoring Wells of the Type Proposed by Kaiser

"Sophisticated Waste Containment Systems" - Will, at Best, only Postpone Groundwater Pollution. Will Not Prevent it for as Long as Waste in the Landfill Will Be a Threat

"Elaborate Monitoring Systems" - Substantial Areas of Landfill Liner System Will Allow Leachate to Pass Through Them While Waste in Landfill Will Be a Threat and Not Be Detected by Groundwater Monitoring System Proposed by Kaiser

"One of the World's Safest Landfills" - Will Not Comply with WRCB Chapter 15 Requirements of Preventing Groundwater Pollution - Impaired Use for as Long as Waste in Landfill Will Be a Threat - Will Only Postpone When Groundwater Pollution Occurs.

Waste in Landfill Will Be a Threat Forever. Liners and Cover Have Finite Period of Time When They Can Be Expected to Function as Designed - Failure Inevitable

"Model for Others to Emulate" - Far From Being a Model to Emulate. Proposed Eagle Mountain Landfill Will Not Comply With WRCB's Chapter 15 Requirements of Protecting Groundwaters from Impaired Use for as Long as the Wastes Remain a Threat

Eagle Mountain Landfill, as Proposed, Could Not Be Permitted in Several States and Parts of Other Countries Because of Deficiency in Design, Closure and Post-Closure Care Maintenance and Funding

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Eagle Mountain Landfill Discussion of Items

"Climatic Siting Factors - Favorable" - Unreliable Information Provided on Generation of Leachate. Leachate Will Be Generated in Landfill Following Periods of Precipitation Which Will Pollute Groundwaters.

Ham Study of Eagle Mountain Leachate Generation - *"No sustained leachate generation"* and US EPA's Statement *"Little leachate is generated where precipitation does not exceed 25 in. annually"* - Failed to Properly Review State of California Water Resources Control Board Solid Waste Assessment Test (SWAT) Results. Review of SWAT Results Shows that Landfills in Desert Regions Do, at Times, Generate Leachate that Leads to Groundwater Pollution. Over 80% of California's over 2,200 Landfills, Many Located in Arid Areas, Have Been Found to Be Polluting Groundwaters With Leachate Derived Constituents

US EPA's Computer Model for Leachate Generation is Unreliable for Predicting Transport of Moisture Through Landfill Cover That Will Generate Leachate for as Long as Wastes in Landfill Will Be a Threat

"Faulting/Seismicity Siting Factors - Favorable" - Experts in Field of Impact of Seismic Activity on Landfill Containment Systems Indicate that Impact of Seismic Activity on Liner and Other Containment Systems is Poorly Understood. Problems Could Readily Develop in Liner System Such as That Proposed by Kaiser That Are Not Discussed by Kaiser's Consultants in the EIR/EIS

"Seismic Design - Proven" - Is Not Based on Adequate Evaluation of Impact of Seismic Activity on Landfill Containment and Monitoring Systems. Seismic Caused Failures Could Have Occurred at Existing Landfills Which Would Not Have Been Detected by Methods Used

"Ground-Water Siting Factors" - Depth to Groundwater

Distorted Information Provided by Kaiser Consultants on State Regulations Requiring at Least 5 Foot Separation Between Bottom of Landfill and Groundwater - Purpose of Separation is to Keep Groundwater that Could Generate Leachate Out of Landfill - Not Distance Which is Considered Adequate to Prevent Leachate from Polluting Groundwater

Distance - Depth to Groundwater is Only a Time Factor Which at Eagle Mountain Site, Because of Fractured Rock Formation, Could Be Short

"Leachate Containment/Removal Systems - Exceeds Regs" - Kaiser and its Consultants Failed to Discuss Well-Known Fact that Current "Regs" Do Not Adequately and Reliably Address Ability of Leachate Collection System to Remove Leachate from Landfill for as Long as Waste in Landfill Will Be a Threat to Generate Leachate.

Wastes in Proposed Eagle Mountain Landfill Can Potentially Generate Leachate for 1,000s of Years. Flexible Membrane Layer in Liner Has Finite Period of Time Where it Can Be Expected to Function Effectively to Collect Leachate.

Eventually Leachate Collection System Will Fail to Collect Leachate and Groundwater Pollution Will Occur

"Gas Containment/Removal Systems - Exceeds Regs" - Current Regulations Do Not Provide a Well Defined Mechanism by Which Landfill Gas Containment/Removal Systems Will Be Operated and Maintained for as Long as Waste in Eagle Mountain Landfill Has Potential to Generate Landfill Gas

Period of Time Over Which Landfill Gas Generation Will Occur in Eagle Mountain Landfill Will Certainly Be 100s and Possibly 1000 or More Years

Landfill Gas Generation Depends on Moisture Being Available for Bacteria to Convert Fermentable Organics into CO_2 and Methane

"Dry Tomb" Landfilling - Isolation of the Wastes from Moisture - Greatly Extends Time Over Which Landfill Gas Can Be Generated

Garbage Disposed of in Plastic Bags Isolates Wastes from Moisture for Period of Time Necessary for Bag to Disintegrate

No Assured Funding Available to Operate/Maintain Landfill Gas Containment and Removal Systems for as Long as Wastes Represent a Threat - Inevitable Failure of Landfill Gas and Containment System Will Occur For Proposed Eagle Mountain Landfill

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Characteristics of Landfill Cover

Landfill Cover Proposed by Kaiser and that at this Time Would Be Accepted by Regulatory Agencies is Well-Known to, at Best, Prevent Moisture from Entering Landfill After Closure for a Short Period of Time Compared to the Period of Time that this Cover Must Work Perfectly, i.e. forever, if Groundwater Pollution is to Be Prevented by Eagle Mountain Landfill Leachate

- Low Permeability Layer Buried Below a Top Soil and Drainage Layer and Therefore Not Available for Visual Inspection
- Rips, Tears, Points of Deterioration in FML Component of Cover Will Occur Over Time that Will Allow Moisture to Enter Landfill and Generate Leachate
- Kaiser Has Failed to Propose to Use Leak Detectable Cover for this Landfill
- If Landfill is Permitted as Proposed, Should Require that Kaiser Operate and Maintain Leak Detectable Cover in Perpetuity, i.e. as Long as Wastes Represent a Threat, to Maintain "Dry Tomb" Character of Eagle Mountain Landfill

Will Require Dedicated Trust Be Developed to Fund Leak Detectable Cover Operation and Maintenance Forever

"Water Quality Monitoring Systems - Exceeds Regs" - Kaiser and its Consultants Failed to Discuss Well Known Fact that Groundwater Monitoring Systems of the Type Proposed by Kaiser to Detect Leachate Polluted Groundwaters Have Poor Reliability in Detecting this Pollution at Point of Compliance Before Wide-Spread Off-Site Groundwater Pollution Occurs

Monitoring Wells Spaced Hundreds of Feet Apart, Each Well With Zone of Capture (Sampling) of a Few Feet - Leachate Polluted Groundwater Could Pass Between the Monitoring Wells and Not Be Detected by Them

No Evaluation of Groundwater Monitoring Reliability Provided by Kaiser - Would Show Proposed Monitoring System Highly Unreliable

Some States, Such as Michigan, Have Recognized this Problem and Have Established a Double Composite Liner Over Entire Base of Landfill Where Lower Composite Liner is Leak Detection System for Upper Liner

A Double Composite Liner System for Detection of Liner Failure Over the Entire Bottom of the Landfill Should be Required for Eagle Mountain Landfill Where, if Leachate is Found in Leak Detection System Between the Two Liners that Kaiser Cannot Stop from Continuing to Occur, Kaiser Must Exhume (Mine) Wastes From Eagle Mountain Landfill to Prevent Leachate From Polluting Groundwaters Associated with Eventual Failure of Bottom Composite Liner

This Monitoring System Requires that a Dedicated Trust Fund Developed from Disposal Fees Be Available in Perpetuity, i.e. as Long as Wastes in Landfill Represent a Threat, to Exhume the Wastes When Leachate Is Found in the Leak Detection System Between the Two Composite Liners that Cannot Be Stopped from Continuing to Occur

"Construction Methods - Proven" - Caution Must Be Exercised in Accepting that Construction Methods Have Been Adequately "Proven" Since there Are Known Failures at Some Landfills and

Especially Since the Unreliability of Construction Methods Would Not Be Detected With Methods Used in the Short Time that Lined Landfills of this Type Have Been Developed

Overall Assessment - Inadequate and Unreliable Information Provided to Board of Supervisors by Kaiser and its Consultants on the Characteristics of the Site and Landfill Design Relative to that Needed to Comply with the Water Resources Control Board Groundwater Protection Standard of Protecting Groundwaters From Impaired Use for as Long as the Waste in the Landfill Will Be a Threat

- Landfill Containment System (Liners, Cover) Will Eventually Fail While Wastes Are Still a Threat
- Moisture Will Enter Landfill and Generate Leachate While Wastes are Still a Threat. This Leachate Will Pass Through Deteriorated Liner and Pass by the Groundwater Monitoring Wells Without Being Detected
- Groundwaters of Chuckwalla Basin Will Be Polluted by Eagle Mountain Landfill Leachate Rendering them Unusable for Domestic and Other Purposes

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Ground-Water Protection Financial Assurances

Kaiser States - *"No release of environmental significance is reasonably foreseeable"* - This is Deliberate Distortion of What is Well Known in Landfilling Field

Foreseeable Releases of Waste Derived Constituents Will Occur at the Kaiser Eagle Mountain Landfill if Developed as Proposed

Kaiser and its Consultants Failed to Reliably Consider Period of Time that Wastes Will Be a Threat in a "Dry Tomb" Type Landfill Relative to the Period of Time that the Liner and Cover Systems Can Be Expected to Function Effectively as Designed - Groundwater Pollution Is Inevitable

Kaiser's Financial Assurance Hypothetical Scenario #1 Does Not Represent Most Probable *Reasonable Foreseeable Release* for the Proposed Eagle Mountain Landfill

Kaiser Should Have Discussed Situation that Will Occur 50, 100, 200, 500, 1000 Years After Closure While Wastes in Landfill are Still a Threat,

- When Cover System for Landfill Deteriorates and Is Not Maintained, Moisture Enters the Landfill and Generates Leachate,
- Landfill Liner System Has Deteriorated and No Longer Collects Leachate Generated and Therefore Fails to Prevents Leachate from Passing Through the Liner,
- Groundwater Monitoring Wells, if Still Being Operated at that Time, Have Low Probability of Detecting Groundwater Pollution by Leachate Because of Limited Zones of Capture Relative to Well Spacing at Point of Compliance and
- Off-Site Groundwater Pollution is Detected on an Adjacent Property's Production Water Supply Well Which Causes Well to Have to Be Abandoned

Proper Consideration of this Probable Scenario Failure Will Show That Many Tens of Millions to Dollars to Possibly over 100 Million Dollars Will Be Needed to Implement Corrective Action for the Reasonably Foreseeable Release that Will Occur at the Eagle Mountain Landfill

Kaiser and its Consultant's Hypothetical Scenario #1(Leachate) Grossly Underestimates Cost of Corrective Action ($218,000) that Will Be Needed at the Eagle Mountain Landfill to Stop Further Pollution of the Chuckwalla Basin by Landfill Leachate Once it is Discovered

Kaiser Does Not Propose to Provide the Necessary Post-Closure Funds to Address All Plausible Failures that Could Occur at the Eagle Mountain Landfill While the Wastes in this Landfill Will Be a Threat

Who Will Provide These Funds? Future Riverside County Residents? Or Will the Pollution of the Chuckwalla Basin Be Allowed to Continue Because of the High Cost of Stopping Pollution and the Lack of Funds Available for Addressing the Remediation of the Pollution?

Kaiser and its Consultant's Hypothetical Scenario #2(Gas) Grossly Underestimates the Cost of Remediation ($250,000) of a Probable Landfill Gas Release that Will Occur at the Eagle Mountain Landfill for as Long as the Wastes in this Landfill Have the Potential to Generate Landfill Gas

Kaiser Should Have Considered Situation 50, 100, 200, 500 or more Years After Closure When Landfill Will Still Have Waste that, When Contacted By Moisture Entering Through the Deteriorated Cover, Can Stimulate Bacterial Activity that Leads to Landfill Gas Production. This Gas Production Can Lead to Not Only an Air Quality Problem but Also to Groundwater Pollution by VOCs Such as Vinyl Chloride, a Known Human Carcinogen. Again, as With Leachate Pollution of Groundwaters, Large Amounts of Money Will Be Needed to Clean Up Polluted Groundwaters Caused by Inadequate Management of the Type Proposed by Kaiser of Landfill Gas that Will Occur at the Eagle Mountain Landfill

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Kaiser Summary and Conclusions

"Positive climatic, seismic, and ground-water siting factors" Will Not Prevent Inevitable Groundwater Pollution by Landfill Leachate and Possibly by Landfill Gas Generated in Proposed Eagle Mountain Landfill for as Long as Waste in this Landfill Will Be a Threat

"Design meets or exceeds all state and federal regulations" - Is Misleading Unless Kaiser Reliably Discusses Adequacy of These Regulations to Comply With WRCB Chapter 15 Groundwater Protection Standard of Preventing Impaired Use of Groundwaters by Waste Derived Constituents for as Long as the Waste in the Landfill Will Be a Threat. Todays Federal and State Regulations Governing the Landfilling of Municipal Solid Wastes as They are Being Implemented by Regulatory Agencies are Well-Known to Be significantly Out of Date and Inadequate to Protect Public Health, Groundwater Resources, the Environment and the Interests of Those Within the Sphere of Influence of the Landfill for as Long as the Wastes in the Landfill Represent a Threat.

Implementation of Todays Regulations, at Best, Only Postpone When Groundwater Pollution Will Occur by Landfill Leachate

"Significant redundancy incorporated into design" Is a Ploy Used by Landfill Applicants and Their Consultants to Try to Convince Boards of Supervisors, Regulatory Boards and Others that a Particular Landfill Will Be Safe. Critical Examination of Each of the So-Called "Redundant" Components Shows that the Liners, Cover, Leachate Collection and Removal System, Groundwater Monitoring System, Post-Closure Care Maintenance Funding, Etc. Are All Fundamentally Flawed with Respect to Protecting Groundwaters From Pollution by Landfill Leachate for as Long as Wastes Represent a Threat.

While it Would Be Possible to Construct a Safe Landfill at the Eagle Mountain Site with Readily Available Technology, the Cost of Development, Operation, Closure and Post-Closure Care for this Landfill Would Be Such that the Eagle Mountain Landfill Would Not Be Economically Competitive with Other Landfills Already Approved.

Conclusions and Recommendations

Basically, Kaiser Hopes to Gain Approval for Yet Another Landfill Where True Cost of Development and Operation Will Be Passed onto Those Who Own or Use Properties Near the Landfill Including the National Park Service Joshua Tree National Monument in Terms of a Deteriorated Environment During Active Life of the Landfill and During the Post-Closure Care Period as Well as to Future Residents of Riverside County Who Ultimately Will Have to Pay the Enormous Costs of Trying to Control Further Pollution of Groundwaters Associated with the Eagle Mountain Landfill

It Is Strongly Recommended that the Riverside Board of Supervisors Not Approve the Eagle Mountain Landfill as Proposed. They Should Find that the EIR/EIS Fails to Conform to CEQA Requirements for Full Disclosure on the Potential Impacts of this Landfill on Public Health, Groundwater Resources and the Environment for as Long as the Wastes in the Landfill Represent a Threat

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Qualification of Dr. G. Fred Lee to Undertake Review

Bachelors Degree in Environmental Health Sciences from San Jose State College, California - 1955

Masters Degree in Public Health from University of North Carolina - 1957

PhD Degree in Environmental Engineering and Environmental Sciences from Harvard University in 1960

Registered Professional Engineer in State of Texas

Diplomate American Academy of Environmental Engineers

Paper Devoted to the Eventual Failure of Landfill Liners Judged by the Water Resources Division of the American Water Works Association - Best Paper Published in the Journal of the American Water Works Association in 1984

Involved in Landfill Groundwater Quality Issues Since the Mid-1960s

30 Years in University Graduate Level Environmental Engineering Teaching and Research Positions at Several Major US Universities

Conducted Over $5 Million in Research and Published Over 500 Professional Papers and Reports on this Research

Researched Performance of Landfill Liner Systems Beginning in the 1970s

Advisor to Numerous Governmental Agencies, Industry, and Others on Various Water Supply Water Quality, Water and Wastewater Treatment, Water Pollution for Surface and Groundwaters, and the Management of Solid and Hazardous Wastes

Since 1989 has Served as an Advisor to Governmental Agencies Such as Water Utilities and Municipalities and Others in Helping to Evaluate the Potential for an Existing or Proposed Landfill to Cause Pollution of Groundwaters in California, Other States, and Other Countries

Investigated over 50 Landfill situations in the US and Other Countries

This Work Has Included Conducting Reviews of Environmental Impact Reports/Statements and Becoming Familiar with CEQA Requirements

Early - Mid 1980s Advisor to State Water Resources Control Board Staff in Development of Chapter 15 Regulations Governing Landfilling of Municipal Solid Wastes