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John Caffrey, Chairman  
State Water Res Control Board  
PO Box 100  
Sacramento, CA 95801

Dear Chairman Caffrey:

I am contacting you and the other Board members in connection with the pending review of an appeal of the LA Regional Water Quality Control Board's permitting of the expansion of the Puente Hills Landfill. It is my understanding that Order No. 93-070 (Puente Hills Landfill Expansion) issued by the California Regional Water Quality Control Board, Los Angeles Region, State Board File No. A-884, will be reviewed in a State Board workshop that is scheduled for February 7 and 8, 1996. Several years ago, I was highly involved in the review of that proposed landfill expansion and at that time indicated that I was opposed to that expansion since ultimately it would lead to groundwater pollution in the San Gabriel Basin.

I also found at that time, as I have found with the Azusa Landfill in the San Gabriel Basin, that the LA Regional Water Quality Control Board's staff have failed to properly interpret the groundwater quality data that have been developed at the landfill and have allowed the LA County Sanitation Districts to use inappropriate procedures for evaluating whether the existing landfill is polluting groundwaters. As you know, I pointed out in 1989 in testimony before the State Board that the Azusa Landfill was polluting groundwaters at a high rate. My analysis of the situation was based on the quarterly monitoring data that BFI had submitted to the LA Regional Board. Last year the US EPA examining the same data declared that site to be part of the San Gabriel Basin Superfund site based on the pollution of the groundwaters by leachate derived from the Azusa Landfill. The LA Regional Water Quality Control Board staff chose to ignore year after year obvious pollution of groundwaters by that landfill. It is my assessment that it is only a matter of time before the same situation develops at the Puente Hills Landfill.

Last year I learned that an attorney representing a private developer had without my knowledge submitted some of my comments from several years ago into the record for the current review of Order No. 93-070. I contacted the Board at that time to indicate that since I had had no contact on this matter for several years, I could not be certain that the comments that I made on the draft Order No. 93-070 were applicable to the final Order. While I have had no further contact on this matter now for a couple of years, I have recently become aware of the State Board staff's review of the LA Regional Water Quality Control Board's Order, "Technical Evaluation: Petition Regarding Puente Hills" memorandum from H. Schueller to C. Wilson dated September 15, 1995, where they independently have come to the same conclusions that I did a couple of years ago that that landfill is now polluting groundwaters and then, since these waters are hydraulically connected to the San

Gabriel Basin, it is only a matter of time until significant groundwater pollution occurs by the existing as well as the expanded Puente Hills Landfill.

While the LA Regional Water Quality Control Board and the LA County Sanitation Districts are attempting to stop the spread of leachate from the Puente Hills Landfill to the San Gabriel Basin through the use of slurry walls, it is obvious that such an approach will not work to prevent the transport of leachate under the slurry wall. Several years ago I prepared detailed comments on the inability of slurry walls of the type being used to prevent the leachate generated in the Puente Hills Landfill from migrating into the San Gabriel Basin. I do not know if these comments are part of the record that is being reviewed by the Board in connection with review of this petition. If they are not, they should be since they point to the fundamentally flawed approach that is being used by the LA County Sanitation Districts and the LA Regional Water Quality Control Board in trying to stop the pollution of the San Gabriel Basin by Puente Hills Landfill derived leachate.

As I indicated in my comments, slurry walls have a significant finite permeability. Further, they develop cracks at the water table. In addition, even if a slurry wall was a true barrier, the use of slurry walls in this Puente Hills Landfill situation in which there is a fractured bedrock system underlying the slurry walls means that leachate can readily pass through the fractured rock under the slurry wall and not be intercepted by it.

When I was involved with the Puente Hills Landfill matter several years ago, I found that the LA County Sanitation Districts' Puente Hills Landfill management staff consistently provided unreliable information on that landfill to the public. This past fall, as part of the work that I have been doing in Ontario, Canada I assisted a Public Liaison Committee for the Kirkland Lake, Ontario area evaluate the potential to pollute the groundwater resources of the region by a large landfill that would be located in a former iron ore mine that would take Metropolitan Toronto's garbage for 20 to 40 years. The consultants from Metropolitan Toronto contacted other large landfill owners for information. Senior staff in the LA County Sanitation Districts responded to inquiry by this consultant on potential problems associated with large landfills that the Puente Hills Landfill does not generate leachate.

This is more of the same propaganda and unreliable information that has been put forth by the LA County Sanitation Districts on the ability of the existing Puente Hills Landfill as well as the proposed Puente Hills Landfill expansion to pollute groundwaters by landfill leachate. It is obvious that the Puente Hills Landfill should and, in fact, does generate leachate. If there were not leachate generation at the landfill, why did the LA Regional Water Quality Control Board require that the LA County Sanitation Districts install a slurry wall to try to stop the migration of leachate down the canyon into the San Gabriel Basin? Further, this matter was reviewed again a couple of years ago by the LA Regional Water Quality Control Board where they ordered the LA County Sanitation Districts to install a second slurry wall downgradient of the first slurry wall that had failed.

The approach that the LA Regional Water Quality Control Board has adopted - allowed for groundwater monitoring at the Puente Hills Landfill is fundamentally flawed. There is a very high probability that leachate polluted groundwaters will pass by the monitoring wells and never be

detected by them. This arises from the fact that finger plumes of leachate arising from initial leakage through the flexible membrane liner that is to be used under the expanded part of the landfill will not be detected by the monitoring wells which have zones of capture of about one foot on each side. Further, the fact that the Puente Hills Landfill is located on a fractured bedrock system means that leachate can enter the fractures and not be detected by the monitoring wells. In summary, there is no reliable way to monitor the expanded part of the Puente Hills Landfill as designed that will have a high probability of detecting leachate pollution of the groundwater system that exists under the landfill that is hydraulically connected to the San Gabriel Basin aquifer system before widespread pollution occurs.

This situation is similar to the situation that occurred several years ago in the WRCB review of the Keller Canyon Landfill in an appeal of the San Francisco Regional Water Quality Control Board's issuance of waste discharge requirements for that landfill. The State Board staff's review of this matter showed, based on their written comments, that the landfill as proposed would not conform to Chapter 15 requirements of preventing the migration of leachate through the liner system into the underlying aquifer system. The staff also found that the water quality monitoring program that had been established for that landfill would not conform to Article 5 of Chapter 15 of having a high probability of detecting leachate at the point of compliance for groundwater monitoring before widespread groundwater pollution occurred. The Board over the recommendations of its staff denied the appeal and therefore approved the landfill and remanded the WDR's back to the Regional Board for improving the groundwater monitoring approach.

I was involved as an advisor to the City of Pittsburgh in helping them evaluate the potential threat that that landfill represented to the City's groundwater resources. I also found that the San Francisco Regional Water Quality Control Board's groundwater monitoring approach was significantly deficient and would not conform to Chapter 15, Article 5 requirements. I recommended at the San Francisco Regional Water Quality Control Board hearing on this matter that the landfill applicant - BFI be required to demonstrate the reliability of the groundwater monitoring system, i.e. would it have at least a 95% probability of detecting leachate-polluted groundwater at the point of compliance before leachate passes the point of compliance? In the system developed by the San Francisco Regional Water Quality Control Board - BFI, the groundwater monitoring wells were typical groundwater monitoring wells with zones of capture of about one foot on each side of the well. These wells were spaced hundreds of feet apart. It is obvious that the system was fundamentally flawed.

Following the State Board's remand of the groundwater monitoring system for the Keller Canyon Landfill back to the Regional Board I contacted the Regional Board some months later about obtaining information on what had been worked out between BFI and the Regional Board staff on the monitoring program. I have contacted the Regional Board Executive Officer (Ritchie) several times on this; I did not get a response. It became clear to me that the San Francisco Regional Water Quality Control Board did not want the public pointing out again the deficiencies of their revised groundwater monitoring system.

I also contacted the State Board staff about this matter and I was informed that the State Board staff who had independent of me found that the original Regional Board's monitoring program was deficient also was not made aware of the changes in the Regional Board's - BFI's groundwater monitoring program that were developed in response to the State Board's remand of the monitoring program back to the Regional Board. I raise this issue because it represents a very significant problem with the way in which the State Board handles such matters.

This situation represents a significant deficiency in the current regulatory approach that is used in the appeal process. Basically, it means that the public is not entitled to actively participate at the regional board level in addressing the adequacy of the results in a remand of an Order. The current approach allows the regional board staff and the waste discharger to reach an agreement without having the public and/or the State Board involved in the process. Why is there any reason to believe that the reliability of the monitoring program will address the deficiencies significantly better than the one that was submitted to the State Board as part of the appeal process? The Regional Board staff have already approved the deficient program. What will likely happen is that there will be some token improvement and yet the public's interests will not be protected.

In situations such as the Keller Canyon and the Puente Hills Landfills where there is fractured rock hydraulically connected to and underlying the landfill there is no way to properly monitor these systems with a high degree of reliability using vertical monitoring wells at the point of compliance. Haitjema, an internationally known groundwater hydrologist at the University of Indiana, in a 1991 paper on monitoring landfills located above 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."*

Several years ago Dr. John Cherry at the University of Waterloo discussed the inability to reliably monitor landfill leachate pollution of groundwaters using vertical monitoring wells spaced hundreds of feet apart in homogeneous, isotropic sand systems (Cherry, 1990). This past year Dr. Jones-Lee and I published a review of that situation. A copy of this review is enclosed. The combination of finger plumes of leachate with fractured rock means that the Puente Hills Landfill will pollute high-value groundwaters with landfill leachate. There is no question about this situation; the only question is when this will occur. Chapter 15 requirements mandate that the containment - monitoring system must protect groundwater from impaired use for as long as the wastes represent a threat. The wastes in the Puente Hills Landfill expansion will be a threat, effectively, forever. Therefore, eventually the wastes placed in the Puente Hills Landfill expansion will generate leachate that will pollute the San Gabriel Basin groundwater system.

The deficiencies in the groundwater monitoring system being allowed by regional boards have been pointed out to the State Board by the State Board staff. Thus far, the State Board members have failed to address this issue. This is a very significant error on the part of the State Board in that it allows what are obviously inadequate monitoring systems to be developed for new or expanded landfills that are permitted under Chapter 15 and now the Landfilling Policy requirements.

The state of Michigan recognized this problem and adopted a different approach as part of their Rule 641 which requires that a landfill applicant construct a double composite liner in which the lower composite liner is the leak detection system for the Subtitle D single composite liner. This approach has a good chance of detecting when the Subtitle D landfill liner fails. Again, the issue is not will Subtitle D landfill liners fail; they will all fail in time, i.e. fail to prevent leachate from passing through them and polluting the groundwater resources hydraulically connected to the landfill for as long as the wastes in the landfill will be a threat. The key to the reliability of the double composite lined landfill monitoring system will be the requirement to take action to stop further leachate generation when leachate is detected in the leachate detection system between the two composite liners. As discussed in the enclosed papers, this can be done through the installation of leak detectible landfill covers.

Enclosed is a recently published invited paper on the problems with today's Subtitle C and Subtitle D landfills providing groundwater quality protection for as long as the wastes in the landfill represent a threat. I am also enclosed several other papers that provide additional information on these issues. They should be made part of the administrative record for this appeal.

I strongly urge that the Board adopt a policy associated with the remand of an issue back to a regional board where the subsequent review process is a public process in which the results of the further efforts, such as the development of a water quality monitoring program, are presented to the Board in a formal presentation with appropriate public notice and availability of information on the issue.

While I do not know the basis of the petition and therefore the comprehensiveness of the Board's review of the appropriateness of expanding the Puente Hills Landfill, I do know from the work that I did several years ago that that landfill should never have been constructed. It is located in a pre-existing residential area. The landfill expansion is located in very close proximity to a school. The past landfill has significantly adversely impacted the health, welfare and interests of those in these residential areas. The expanded landfill will clearly make this situation worse. There have been and will continue to be significant odor problems.

The LA County Sanitation Districts have admitted in their own self-certified EIR that those living in the areas next to the landfill will have an increased exposure to cancer due to landfill gas - VOC emissions. There is a severe bird problem associated with the landfill. Basically, the Puente Hills Landfill should be shut down and a third-party independent panel should be appointed to guide the State and Regional Board on how best to stop the pollution of the San Gabriel Basin by landfill-derived leachate from the wastes already present in that landfill. If this is not done and this landfill is allowed to continue to accept wastes, then the State Board's decision on this matter will be

looked on by future generations as a serious error where the Board members chose to ignore the already documented problems and obvious future problems with that landfill.

While I will not attend the February 7, 1996 workshop because of a previous commitment, if Board members or others have questions on my comments, please contact me.

Sincerely yours,

G. Fred Lee, PhD, DEE

Copy to: SWRCB Board Members  
W. Pettit  
C. Wilson

GFL:oh  
Enclosures

## References

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

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