

Comments on Response to Comments Provided by UCD on the 2002 Annual Water Monitoring Report

Submitted By G. Fred Lee, DSCSOC TAG Advisor
October 24, 2003

Presented below are my comments on the responses to comments that UCD provided to the RPMs at the last LEHR Superfund site RPM meeting. I have included the original comment item as provided by UCD and their response, as well as my comment on their response.

Page 2, number 5, devoted to Vertical Groundwater Gradients:

Reviewer: Patti Collins, Remedial Project Manager, EPA			
5	Section 4.4.2, Page 4-6	Vertical Groundwater Gradients: The text states that because the water level differences were greater between HSU-1 and HSU-2, “the hydrological connection between HSU-2 and HSU-4 is poor to virtually non-existent,” but this conclusion cannot be supported by the difference in water levels. While Table 12 appears to indicate that there are few times when there is a downward gradient from HSU-2 to HSU-4, only two well pairs were used for this analysis. Two well pairs are not sufficient to conclude decisively that there is no connection between the two units. Please delete the quoted statement.	Disagree. The statement that the hydrological connection is poor to non-existent in this section is based on the response to pumping between the two HSU’s and not the difference in water levels. The text has been modified to clarify this point as follows: “Figure 7 shows that changes in water levels during the pumping season were distinctly greater between HSU-2 and HSU-4 than between HSU-1 and HSU-2. This distinct difference in response to pumping between the two HSU’s combined with the stratigraphic interpretation presented in Section 2.3, supports the conclusion that the hydrological connection between HSU-2 and HSU-4 is poor to virtually non-existent. Additional analysis of this connection will be presented in the FS.”

With respect to UCD’s statement,

“This distinct difference in response to pumping between the two HSU’s, combined with the stratigraphic interpretation presented in Section 2.3, supports the conclusion that the hydrological connection between HSU-2 and HSU-4 is poor to virtually nonexistent,”

I have been involved repeatedly over the years in situations where landfill owners, applicants or others claim that a clay layer represents an impermeable layer, which prevents the pollution of lower aquifers by upper aquifer pollutants. Yet, when proper evaluation is made, it is found that the age of the water in the lower aquifer is essentially the same as that in the upper aquifer. It is inappropriate to claim that the lack of rapid hydrological connection between two aquifers, which would show up in water level differences under pumping, means that there is no transport between the two aquifers. There can readily be transport. It is just that the rate is sufficiently slow so that the hydraulic head issues do not show up in the conventional approach for assessment. I agree with the US EPA's assessment of this situation.

Page 15, number 2:

Reviewer: G. Fred Lee, PhD, DEE, G. Fred Lee & Associates			
2	Page 0-2, third and fourth paragraphs.	These paragraphs mention the six constituents of concern. As discussed previously, TOC should be a constituent of concern, as a surrogate for unknown or uncharacterized pollutants in the UCD waste disposed of at the UCD LEHR Superfund site. This same problem of failing to include the concept of a much broader list of constituents of concern than the list of six mentioned occurs at several other locations in this report.	Disagree. The list of COCs was developed in conjunction with the RPMs.

UCD's statement that it disagrees with DSCSOC's finding that the constituents of concern that are listed in UCD's reports are all of the constituents of concern that should be considered at the LEHR site does not represent a technically valid approach for Superfund site investigation. DSCSOC has repeatedly pointed out that, under the conditions where there are many tens of thousands of chemicals that have been used at UCD, which have been buried in pits or landfills at the LEHR site, it is unlikely that there are only six of these chemicals that are adverse to public health and/or the environment. This is especially true when some of the monitoring wells near waste management units show significantly elevated TOC. This is another of the chronic problems with the way in which the LEHR site is investigated by UCD. As discussed in the past, UCD should discuss the deficiencies in the approaches that have been used to define constituents of concern at the LEHR site and acknowledge that there could readily be unidentified constituents in the soils, stormwater runoff and groundwater that could be a threat to public health and the environment.

Page 15, number 3:

Reviewer: G. Fred Lee, PhD, DEE, G. Fred Lee & Associates			
3		On page 0-3, in the section 0.2.2 Surface Water and Stormwater Monitoring, the statement is made on concentrations found relative to the CRDL. There has been a chronic problem at the LEHR Superfund site with UCD and DOE using contract laboratories that do not have adequate analytical detection limits for parameters of concern. Any time reference is made to the CRDL, a discussion should also be given as to whether the CRDL is adequate to	Disagree. The CRDLs are consistent with the QAPP which was reviewed and

		detect constituents at critical concentrations. The issue is not whether the concentrations are above or below the CRDL. The issue is whether they are above water quality criteria/standards applicable to these waters.	approved by the RPMs.
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UCD’s statement that it disagrees with DSCSOC in requiring that the analytical detection limits for the measured constituents be sufficient to detect the constituents at concentrations that are potentially adverse to public health and the environment is contrary to appropriate Superfund site investigation. UCD claims that, because the US EPA has approved these methods, this is satisfactory. It is not satisfactory to DSCSOC and the public’s general interest. Using analytical methods that do not have adequate detection limits is a waste of public funds and contrary to adequate science. This is another of the chronic problems that have plagued the LEHR site investigation by UCD. The significance of this problem was recently demonstrated in the review of the draft risk assessment documents, in which, time after time, there was an inadequate database to make decisions on risk. If the approach that DSCSOC had recommended in the mid-1990s, with respect to properly monitoring waters at the LEHR site had been used, many of the significant problems with the risk assessment would not have occurred.

Page 16, number 4:

Reviewer: G. Fred Lee, PhD, DEE, G. Fred Lee & Associates			
4	General	One of the key parameters in the stormwater runoff from the LEHR site is mercury. No mention is made of the mercury analyses that were supposed to have been done years ago with the adequate detection limits.	Disagree. Samples collected for analysis of mercury by low-level methods and the reporting of these results are conducted as a special study by separately from the Annual Water Monitoring program.

UCD’s statement that the low-level mercury analyses were conducted in a special study separately from the Annual Water Monitoring program is a surprise. This is the first time DSCSOC has heard that the low-level mercury analyses requested by DSCSOC were of a limited study. This appears to be another of those decisions that were made at meetings called by the US EPA which DSCSOC was not allowed to attend. Again, it is a waste of public funds to measure mercury in stormwater runoff from the LEHR site with analytical methods that cannot detect mercury at concentrations that can bioaccumulate to excessive levels in fish located in Putah Creek. This is another of the chronic problems that exist in the adequacy of the LEHR site investigation by UCD.

Page 16, number 5:

Reviewer: G. Fred Lee, PhD, DEE, G. Fred Lee & Associates			
5	Section 0.4.2, Page 0-5, first paragraph.	<p>The statement is made that, <i>“The primary objective of groundwater monitoring is to assess if unexpected changes to they system occur that warrant additional monitoring. The current monitoring program accomplishes this goal.”</i></p> <p>DSCSOC does not agree that the primary objective of groundwater monitoring is to assess unexpected change. The primary objective should be to characterize the pollution of groundwater by the LEHR site to identify the sources of this pollution. Even though millions of dollars have been spent on groundwater monitoring at the LEHR site, this goal has not yet been accomplished, since the groundwater monitoring system has not been properly developed to measure the releases that have occurred across the various waste management units, as well as the extent of offsite pollution.</p>	<p>Disagree. This change in rationale for the monitoring program was approved by the USEPA and RPMs for the 2001 Annual Water Monitoring Report and was discussed at meetings about that report and the monitoring program. At that time, the group agreed that the monitoring program had matured to the point that the focus should shift from characterization to monitoring of the interim removal action and treatment pilot studies.</p>

UCD’s statement that it disagrees with DSCSOC’s statement on what the purpose of groundwater monitoring should be at the LEHR site is contrary to proper site investigation. UCD states that the US EPA and RPMs approved that the purpose of the groundwater monitoring is to detect unexpected changes, rather than to assess the full extent of pollution of groundwater by waste management practices at the LEHR site. This is another of those decisions that were made at a monitoring meeting which DSCSOC was not allowed to attend. It is another example of the chronic problems that exist in the LEHR site investigation that is conducted by UCD, where the US EPA has now indicated that, even though the full extent of groundwater pollution at the LEHR site and offsite has not yet been defined, the current monitoring program is only designed to detect trends. There is no effort to define the full extent of pollution by UCD’s mismanagement of campus and research wastes. This is a significant deficiency in the current monitoring program.

Page 17, number 9:

Reviewer: G. Fred Lee, PhD, DEE, G. Fred Lee & Associates			
9	Page 5-7, fourth paragraph.	<p>Mention is made that “...<i>the Berryessa system cannot be used when other upstream users are drawing water off the line for irrigation.</i>” This is the first time that I recall hearing of this problem. This is a water rights issue that should have been</p>	<p>Disagree. This issue has been discussed at several RPM meetings, not as a water rights issue, but as an engineering issue. Water is gravity fed and if other campus users are irrigating, there is insufficient</p>

		thoroughly investigated by UCD as part of this problem. This is more of the inadequate planning, design, and operation of the IRA system that has been a chronic problem with it since it was first proposed. These problems do not speak well for a pump-and-treat system of a similar design.	pressure for use in the IRA. Furthermore, the Berryessa system was a test authorized by the RWQCB and the EPA, designed to meet effluent discharge standards for nitrate and TDS.
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UCD now reveals that the problem with the Berryessa water system is that the plumbing on UCD is not adequate to carry the water to the IRA. The adequacy of plumbing and availability of supply should have been determined before the use of Berryessa water for the IRA system was proposed.

Page 18, number 11:

Reviewer: G. Fred Lee, PhD, DEE, G. Fred Lee & Associates			
11	Page 5-9, First paragraph.	Indicates that the groundwaters underlying the LTPS will be monitored. As I have discussed previously, if pollution shows up in the groundwater underlying the LTPS, then there will be a significant problem trying to correct it. What should be done is to initiate a vadose zone early warning monitoring system to detect if pollutants added to the soil or created because of irrigation are moving through the vadose zone to cause groundwater pollution underlying the area.	Agree. UC Davis included baseline and annual vadose zone soil sampling to address this issue. These data will be presented in the 2003 Annual Monitoring Report, one full year of operation of the LTPS.

DSCSOC discusses not “vadose zone soil sampling,” but rather “vadose zone water monitoring.” Soil sampling is not reliable for detecting vadose zone transport, because of the way in which constituents can band in layers in the vadose zone during dry periods. Water monitoring of the vadose zone using appropriately operated vacuum cup lysimeters is necessary to achieve reliable estimates of whether there are pollutants transported from the land-applied wastes to the soil.

Page 18, number 13:

Reviewer: G. Fred Lee, PhD, DEE, G. Fred Lee & Associates			
13	General	As discussed previously by DSCSOC and by Susan Timm, the reliable way to determine if UCD disposal of hazardous chemical at the LEHR site is responsible for elevated concentrations of TDS, chromium and other pollutants is by installing an appropriate number of upgradient waste management unit monitoring wells, just upgradient and just downgradient of the unit. This will likely require several	Disagree. The number and location of wells for characterization has been discussed by the RPMs throughout the RI process.

	<p>wells on each side of the unit. The exact number will be determined based on the variability of the groundwater composition in the area and the potential plumes that could occur just downgradient of the waste management unit. These monitoring wells should be designed to measure the concentrations of pollutants of concern, including TOC, in the uppermost part of the aquifer for HSU-2, and at about mid-depth in HSU-2. This would require nested monitoring wells to detect any plumes generated by waste in a waste management unit that are denser than the groundwater underlying the waste management unit into which the pollutants enter. The multiple well approach is necessary because of the fact that UCD practiced somewhat selective waste disposal in various parts of a waste management unit. As discussed in previous correspondence beginning in 1995, this will lead to plumes of pollutants that are of limited dimension compared to the overall plume generated by the unit. While the overall mean of the plumes may not show elevated chromium at a particular location, specific plumes generated by areas which received chromium would show that chromium has been derived from UCD's past waste disposal practices.</p>	<p>UCD areas are contiguous and many of the Site monitoring wells are useful to evaluate groundwater up- and downgradient of more than one area. UC Davis believes that as a whole, the current groundwater monitoring wells are sufficient to characterize impacts from the Site. Future installation of wells will be driven by the needs of the FS and to monitor the effectiveness of the selected remedies for the Site.</p>
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UCD's statement that it disagrees with DSCSOC's statement that UCD must evaluate for each waste management unit the ability to detect pollution of groundwater near the waste management unit by wastes derived from the unit represents more of the inappropriate approaches for LEHR site investigation. The current monitoring well array is not adequate to determine groundwater pollution by each of the waste management units. There could be and likely is pollution of groundwaters near the waste management unit which are not being detected by existing wells. This is in violation of the CVRWQCB requirements for groundwater quality protection. While UCD claims that it believes that the current monitoring well array is adequate, this is an issue that should be demonstrated, as DSCSOC has repeatedly suggested, in a report that specifically delineates the potential reliability of these wells to comply with CVRWQCB requirements for groundwater quality protection.

Page 19, number 16:

Reviewer: G. Fred Lee, PhD, DEE, G. Fred Lee & Associates			
16	Table 2	<p>Table 2 contains data for acute toxicity. Based on the references provided in this table on page 2 of 2, it appears that the methods used to determine acute toxicity are not the current US EPA recommended approach. The method used should be based on Lewis, P.A.; Klemm, D.J.; Lazarchack, J.M.; Norberg-King, T.; Peltier,</p>	<p>Disagree. Table 2 lists analytical methods not data. The method listed in Table 2 for acute toxicity (EPA/600/4-90-027F) is the correct method listed in the RPMs approved</p>

		W.H. and Heber, M.A., “Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms,” Environmental Monitoring Systems Laboratory, Cincinnati, OH; Environmental Research Laboratory, Duluth, MN; Region 4, Environmental Services Division, Athens, GA; Office of Water, Washington, D.C.; Environmental Monitoring Systems, Cincinnati, OH; Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, OH (1994).	Field Sampling Plan (Dames & Moore, 1998). Also note that the SWRCB General for Stormwater Discharges Associated with Industrial Activities (which covers the Site) requires this method for acute toxicity as well. Any change in the method for acute toxicity would require approval by the RPMs.
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UCD’s statement is another of the situations where UCD continues to use outdated methods for measurement of water characteristics at the LEHR site. To cite a 1998 report issued by the US EPA that has been superseded with updated methodology, is technically invalid and inappropriate. The latest US EPA approved methodology for toxicity testing should be used – not some previous methodology that has been superseded by subsequent work.

Page 20, number 18:

Reviewer: G. Fred Lee, PhD, DEE, G. Fred Lee & Associates			
18	Appendix A, page 5 of 11.	The CRDL for arsenic is listed as 3. It should be decreased to 1. It is likely that arsenic will be regulated at about 2 µg/L. In the same table, chromium has a CRDL of 10. According to US EPA documents, chromium-VI is toxic to zooplankton at a fraction of a microgram per liter. This same table has the CRDL for mercury as 0.2 µg/L. This value should be decreased to about 5 ng/L.	Disagree. The CRDLs are consistent with the USEPA approved QAPP.

This is another of the detection-limit situations where inadequate detection limits are used, with the approval – according to UCD – of the US EPA. This is another example of the wasted-public-funds situations where inadequate detection limits are used to determine if there is a problem with a potential pollutant at the LEHR site.

Page 20, number 20:

Reviewer: G. Fred Lee, PhD, DEE, G. Fred Lee & Associates			
20	Appendix A, page 7 of 11.	Lists TOC at about 1 mg/L in the influent to the treatment unit. This is high for groundwater and could indicate appreciable pollution by	Disagree. TOC was monitored more frequently during previous years and was scaled back when the program was

		organics that are not being considered as constituents of concern at this time. TOC should be analyzed in every sample – not just a few, as has been done.	revised.
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UCD disagrees with respect to the need to use TOC as a surrogate for potential COCs that need to be acknowledged as possibly being present but not yet identified. This is a short-sighted, technically invalid approach that should not be allowed to continue at the LEHR site. TOC should be measured in all samples, since it is the only measure we have now of the potential for uncharacterized organics that are present in the wastes to be present in waters associated with the LEHR site.

Page 21, number 22:

Reviewer: G. Fred Lee, PhD, DEE, G. Fred Lee & Associates			
22	Appendix B, page 1 of 5.	Shows that the DO in these samples (again assuming that the units are mg/L) is quite low. This shows an appreciable oxygen demand in the groundwater. Because of these data, all well samples should have down bore hole DO measurements made. This is a more meaningful data than ORP, which is subject to many interferences. The failure of UCD to make the DO measurements on most of the groundwater samples is a significant deficiency in the 2001 and 2002 monitoring.	Disagree. For the DDC program, DO measurements are collected using a down-hole instrument. A flow-through cell is used for the other program measurements which is also an approved USEPA method (for example see USEPA, 1998, EPA/600/R-98/128).

UCD’s statement that, because US EPA approved a method for DO measurements, this method is satisfactory for the LEHR site investigation, is technically invalid. Those familiar with developing analytical methods know that the selection of the analytical method must be appropriate for the situation. I have been involved in developing and approving analytical methods for Standard Methods for over 40 years. Often there are a variety of methods listed, which will not yield reliable results at each and every site where they could be applied.

Page 21, number 25:

Reviewer: G. Fred Lee, PhD, DEE, G. Fred Lee & Associates			
25	Appendix B, page 2 of 5.	Metals – Stormwater: indicates that mercury was present in a stormwater runoff sample at 0.540 µg/L. This is a violation of the California Toxics Rule, which allows mercury to be present at 0.05	Disagree. As discussed in the 2001 Annual Water Monitoring Report, stormwater samples collected after November 2001 are unfiltered samples which contain suspended sediments. Currently, the RWQCB does not

	<p>µg/L. Why did UCD not discuss this high mercury level in its presentation of the data? This is another example of inappropriate reporting on the part of UCD in its annual report.</p>	<p>apply CTR standards to stormwater runoff from LEHR/SCDS or other industrial sites (see p. 1 Policy for Implementation of Toxics Standards, SWRCB March 2000).</p>
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UCD indicates that, “*Stormwater samples collected after November 2001 are unfiltered samples,*” and then states (on page 22) that, “*Currently, the RWQCB does not apply CTR standards to stormwater runoff from LEHR/SCDS or other industrial sites.*” This is not my understanding of CVRWQCB requirements. If true, then it is a technically invalid approach by the CVRWQCB to regulating mercury in stormwater runoff. Mercury is transported from areas as particulates. It accumulates in downstream sediments where it may convert to methylmercury. Any measurement of mercury based solely on dissolved mercury can grossly underestimate the potential for bioaccumulation of mercury in downstream water fish.

Page 22, number 27:

Reviewer: G. Fred Lee, PhD, DEE, G. Fred Lee & Associates			
27	Appendix B, page 4 of 5.	<p>Pesticides, PCBs – Stormwater: shows that inadequate analytical detection limits are used for various pesticides in stormwater runoff from the LEHR site, as has been discussed since 1995 when DSCSOC first became involved. In light of this situation, the fish in Putah Creek need to be examined for the organochlorines to see if they contain excessive concentrations. If they do, then work needs to be done to determine if these are being contributed to by runoff from the LEHR site. The Lee and Jones-Lee (2002) report discusses in detail the approach that should be followed.</p> <p>Lee, G.F. and Jones-Lee, A., “Organochlorine Pesticide, PCB and Dioxin/Furan Excessive Bioaccumulation Management Guidance,” California Water Institute Report TP 02-06 to the California Water Resources Control Board/Central Valley Regional Water Quality Control Board, 170 pp, California State University Fresno, Fresno, CA, December (2002). http://www.gfredlee.com/OCITMDLRpt12-11-02.pdf</p>	<p>Disagree. The methods and CRDLs used for the Site are as specified in the USEPA approved QAPP.</p>

This is another situation involving inadequate detection limits, which UCD claims the US EPA allows as adequate investigation of the site. This is more of the waste of public funds that is a chronic problem at the LEHR site with respect to inadequate investigation using available, reliable, US EPA approved analytical methods for pollutants.

Overall, UCD's responses to DSCSOC's comments indicate what DSCSOC has been pointing out year after year, since the mid-1990s, that the LEHR site is not being adequately investigated with respect to conducting a monitoring program that wisely uses the funds available in a technically valid, cost-effective manner to characterize the pollution of the waters at the LEHR site.