

**Comments on the UCD Final 2007 Annual Water Monitoring Report
LEHR/SCDS Environmental Restoration Program, University of California, Davis
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Presented herein are comments on the UCD LEHR Superfund site 2007 Annual Water Monitoring Report issued in April 2008. Many of these comments also are applicable to the "First Half 2007 Semi-Annual Water Monitoring Report" issued by UCD in November 2007.

Overall, this UCD Annual Water Monitoring Report has many of the same technical problems found in reports of past years' annual water monitoring reports. It again fails to point out and discuss significant violations of water quality standards in stormwater runoff from the LEHR site.

Executive Summary

Page ES-2 paragraph 5, states "*In addition to chloroform, twelve other VOCs were reported at low concentrations in the chloroform source area.*" An issue that should be reviewed is whether the VOCs found in the LEHR site groundwater are derived from chloroform or represent UCD past dumping of waste VOCs other than chloroform at the LEHR Superfund site. The organochlorine VOCs have well-defined transformation pathways under aerobic and anaerobic conditions. Are any of the other 12 VOCs from sources other than chloroform? Such studies could help reveal the conditions that exist in the groundwaters from the source to the sampling location.

Page ES-2 paragraph 6 states, "*As requested in the RWQCB's August 22, 2007 letter, UC Davis will be implementing stormwater best management practices (BMP), to reduce the discharge of sediment from the Site into South Fork of Putah Creek.*" The primary purpose of the stormwater runoff BMPs is to eliminate the violation of the CTR criterion for mercury in stormwater runoff from the LEHR superfund site.

Page 4-2 section 4.2.2 Vertical Groundwater Gradients, presents information on the estimated vertical groundwater gradients for the LEHR site. On May 14, 2008 the CA DTSC and the US EPA held a Remediation Technology Symposium (agenda available at http://www.dtsc.ca.gov/HazardousWaste/upload/Remediation_Technology_Symposium_Agenda.pdf). At that symposium M. Einarson made a presentation entitled, "Site Characterization and Monitoring in the New Millenium," which was devoted to problems with conventional groundwater monitoring approaches at hazardous chemical sites (slides available at http://www.dtsc.ca.gov/hazardouswaste/upload/einarson_remsymp_presentation.pdf). As has been discussed by DSCSOC repeatedly over the years in its comments to the RPMs, the approach that has been, and continues to be, used at the LEHR site is a conventional

approach that could have a number of the problems of the type discussed by M. Einarson in his presentation, including inadequate characterization of the pollution of LEHR site groundwater by the various waste management units at LEHR. Several of these problems were also discussed by US EPA representatives at the recent DATA GAPS meeting. Of particular concern is the potential for vertical transfer of water and associated pollutants within monitoring wells that are screened in two aquifers or that are not effectively sealed between the aquifers, such as wells screened in HS-1 and HS-2, and in HS-2 and HS-4. There is need to examine the potential for inter-aquifer transfer of water and pollutants in the monitoring wells between the aquifers at the LEHR site.

As I pointed out at the DATA GAPS meeting, it is fairly well-known that the conventional approach for sealing wells with bentonite may not be effective in the short-term, or in the long-term in hard-water systems such as exists at the LEHR site because of cation exchange reactions between sodium bentonite and calcium ions that lead to shrinking and cracking of the seals. Those issues have been reviewed in the following, that include references to the work of others on the topic:

Lee, G. F. and Jones-Lee, A., "Groundwater Quality Protection Issues," Report of G. Fred Lee & Associates, El Macero, CA, February (2007).
<http://www.members.aol.com/annelhome/GWProtectionIssues.pdf>

Lee, G. F., and Jones-Lee, A., "Groundwater Quality Protection Issues," Presented in part at CA/NV AWWA Fall Conference, Sacramento, CA, PowerPoint Slides, G. Fred Lee & Associates, El Macero, CA, October (2007).
<http://www.members.aol.com/annejlee/GWProtectionIssues-sli.pdf>

In his presentation, Einarson also discussed the limited lateral spread of plumes in groundwater from a source of pollutants. It is well-established that UCD did not deposit the same types of wastes in all areas of each waste management unit. As discussed in DSCSOC comments to the LEHR site RPMs (available on the DSCSOC website, <http://members.aol.com/dscsoc/dscsoc.htm>) on the inadequacy of the current groundwater monitoring program at the LEHR Superfund site, releases from limited areas of a waste management unit could produce plumes of limited width that could be missed by the current monitoring well array. There is need to better characterize the actual lateral spread of plumes of pollutants that could be generated by limited areas of waste deposition in the various waste management units at LEHR. This is especially important if there is need to characterize the releases from various parts of a waste management unit, near the unit.

At the recent DATA GAPS meeting, DSCSOC suggested that a high priority for defining data gaps in groundwater monitoring at the LEHR site should be an evaluation of whether pollutants that could be derived from any waste management unit at LEHR could trespass onto adjacent properties without being detected by the current monitoring well array. Such an evaluation will require an understanding of the expected lateral spread of initially-limited source-area plumes. Of particular concern are the off-site groundwaters

just to the east of Landfill 3. As I recall, several years ago DSCSOC raised this issue; UCD consultants were to install additional monitoring wells to the east of Landfill 3 that would have a high probability of detecting releases of pollutants from any part of Landfill 3. Based on the presentation at the recent DATA GAPS meeting however, there was only one well identified as being east of Landfill 3 (but is actually northeast of Landfill 3). Either there were more wells located in this area that were not identified at the meeting, or UCD never installed the additional monitoring wells east of Landfill 3 that I understood were to be installed. This issue needs further review.

Page 4-3 section 4-4 IRA Treatment System Monitoring Results states that TOC was found in concentrations of 1 to several mg/L in groundwater near the IRA unit. Such concentrations are high for groundwaters and indicate that there is significant pollution of groundwaters by uncharacterized organic compounds that could be a threat to groundwater quality but that are not being adequately considered at the LEHR site. Further TOC at these levels can have a significant impact on the transport of other pollutants in the LEHR groundwaters. There is need to better-define the extent of TOC pollution of groundwaters from each waste management unit to understand the potential sphere of influence of TOC from the waste management units on groundwater quality. As part of this effort, the background TOC concentrations in groundwater at the LEHR site should be determined. This type of information could help fill the data gaps in understanding the aquatic chemistry of LEHR site groundwaters.

Page 4-5 section 4.6 Stormwater and Surface Water Monitoring, presents a summary of the stormwater runoff water quality data collected during 2007. The mercury concentration was reported to be 0.225 ug/L (225 ng/L). That concentration is more than 4 times the CTR criterion for mercury of 50 ng/L and is in violation of the UCD NPDES stormwater runoff permit for discharges of mercury to Putah Creek, since Putah Creek is a Clean Water Act Section 303(d)-limited waterbody for mercury. That concentration is also about 40-times the concentration expected to bioaccumulate in fish to excessive levels and cause the fish to be a health threat to some of those who eat the fish.

Examination of Appendix F shows a continuing problem with the analytical methods for mercury. Both the method for mercury analysis and the method for “low level” mercury analysis have the same CRDL of 200 ng/L. As discussed in previous comments, a 200 ng/L CRDL is a grossly inadequate lower detection limit for mercury since concentration of total recoverable mercury above about 5 ng/L can bioaccumulate to excessive levels in edible fish. It is unclear whether the reporting of the low-level mercury CRDL as 200 ng/L is correct, or whether that represents another example of sloppy reporting of analytical methods used in the LEHR site investigation.

Also of concern is the reporting of total chromium in stormwater runoff at 45 and nearly 70 µg/L. Again, UCD failed to discuss these values as being of potential concern with respect to the potential impact of LEHR site stormwater runoff on Putah Creek water quality. These concentrations indicate not only that the groundwaters at the LEHR site are polluted by chromium, but also that the surface soils of the LEHR site contain elevated chromium.

Another chronic problem in the UCD annual water monitoring report is the inconsistent approach to reporting nitrate concentrations. At some locations the concentrations are reported as “nitrate” without any indication of whether it is being reported “as N” or “as NO₃.”

The UCD 2007 annual water monitoring report is like previous annual monitoring reports in its failure to discuss a number of existing water quality issues of concern such as the very high mercury and elevated chromium in the stormwater runoff from the LEHR site.

In previous discussions among RPMs and PRPs regarding the approach that should be used to evaluate the potential human health threats of residual pollutants in the LEHR site surface soils, the question has been raised of whether it is appropriate to use “residential” land use in making this evaluation. I wish to point out in this regard that in its Thursday, May 8, 2008 edition the Davis Enterprise carried the headline, “UCD opens first day care in 20 years.” This opens the question of whether a future UCD administration may seek to open a day care center on the “South Campus,” at the LEHR site. Certainly it is appropriate to use clean-up objectives for surface and near-surface soils that would be protective of children.