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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 9
75 Hawthorne Street
San Francisco, CA 94105-3901

BY EMAIL to all and USPS Mail to Mr. Oatman

April 19, 2003

Brian Oatman
Environmental Health and Safety, TB 30
University of California
Davis, California 95616

Re: LEHR/SCDS Superfund Site

Draft Remedial Investigation Report, LEHR/SCDS Environmental Restoration, January 2003

Dear Mr. Oatman:

Thank you for your submittal of the subject document. EPA's comments are attached. Forclarification it is noted that the risk assessment is a part of the RI. Further, the RI is focused as described in the National Contingency Plan (NCP). Thus, one does not take one approach to the evaluation of data for the RI and another for the risk assessment.

> 40 CFR - CHAPTER I - PART 300 § 300.430 Remedial investigation/feasibility study and selection of remedy. (d) Remedial investigation. (1) The purpose of the remedial investigation (RI) is to collect data necessary to adequately characterize the site for the purpose of developing and evaluating effective remedial alternatives. To characterize the site, the lead agency shall, as appropriate, conduct field investigations, including treatability studies, and conduct a baseline risk assessment. The RI provides information to assess the risks to human health and the environment and to support the development, evaluation, and selection of appropriate response alternatives.

http://www.access.gpo.gov/nara/cfr/cfrhtml_00/Title_40/40cfr300_00.html

Please revise the document to address the comments. Provide a schedule for the response to the comments in anticipation of producing a final document. We will be happy to assist in discussing content and formats for the revised document.

If you have any questions about the above, please call me at (415) 972-3156 or by email at collins.patti@epa.gov.

Yours truly,

Patti Collins
Remedial Project Manager

cc: Steve Ross, DTSC
Susan Timm, RWQCB
Stephen Pay, DHS
Robert Devany, Weiss Associates
Catherine Luu, DOE
Julie Roth, DSCSOC
G. Fred Lee, DSCSOC

GENERAL COMMENTS

1. **Sufficiency of data for the FS:** The feasibility study will need to address the removal of hexavalent chromium, and possibly nitrate, from groundwater, and potentially from soil, at LEHR. Hence, the Remedial Investigation Report (RI Report) must contain sufficient information to support the assessment of the various potential remedial actions that could be implemented at LEHR to address hexavalent chromium and nitrate. The remedial actions likely to be assessed during the feasibility study include biological treatment for denitrification (which may also reduce hexavalent chromium), ion exchange, and enhanced natural attenuation. Please consider whether sufficient data is available to assess the efficacy of ion exchange, biological treatment and enhanced natural attenuation to address the nitrate and hexavalent chromium plumes at LEHR.

   The Air Force, at the former McClellan Air Force Base, is just completing its selection of a hexavalent chromium treatment option for its groundwater extraction system (it seems likely that ion exchange will be selected); the U.S. Department of Energy has been operating an ion exchange system for several years at the Lawrence Livermore National Laboratory Main Site for the purposes of removing hexavalent chromium from groundwater; and the Air Force, at the former Mather Air Force Base, biological treatment is being used to remove nitrate from extracted groundwater prior to reinjecting the treated water into the subsurface. UC Davis may wish to consult with these facilities regarding the removal of nitrate and hexavalent chromium from itsgroundwater.

1. **Coordination of UCD and DOE Work:** Outside reviewerswho are unfamiliar with the site may not know that the Department of Energy (DOE) is conducting a remedial investigation (RI) for the purpose of preparing a feasibility study (FS) for a site that is substantially congruent with the University of California at Davis (UC Davis) site. For example, the Eastern Dog Pens (a DOE site) overlie Landfill Unit 2 (a UC Davis site). For clarity, please revise the RI Report to include a discussion of the DOE sites that are within or adjacent to the UC Davis sites anddiscuss how remedial efforts for the two sites will be coordinated.

1. **Employee Interviews**: There is no indication in the Remedial Investigation Report (RI Report) that any former or current employees of the Laboratory for Energy-RelatedHealth Research (LEHR) were interviewed regarding waste generation and disposal practices at LEHR. Interviews with former or current employees regarding waste generation and disposal practices are a key component of any remedial investigation. Please revise the RI Report to include documentation of interviews with former and current LEHR employees regarding waste generation and disposal practices, including a list of former personnel interviewed and the list of questions asked of former personnel. Transcripts of interviews should be appended to the RI Report or referenced if archived elsewhere.

1. **Role of background calculations:** U.S. EPA uses calculations of estimated background levels of inorganics for purposes of comparison and decision making. Background for inorganics is assumed to be zero. The estimates of background are not used for screening out or eliminating chemicals from further consideration as to risk or origin. Please revise the RI Report to include all detected hazardous substances in all media regardless of the background concentration.

1. **Screening Criteria**: The EPA Region 9 Preliminary Remediation Goals (PRGs) and Soil Screening Levels (SSLs) are to be used as the screening criteria. Please revise to eliminate other criteria and to include these.

http://www.epa.gov/region09/waste/sfund/prg/index.htm

Role of the screening criteria: The data, without screening, is presented in table form in the RI. And further, these data are presented in table form showing the chemicals and concentrations that exceed the screening criteria. The screened data are then presented in figures in the RI. Additionally, the data, without screening, are passed to the next step - the risk assessment.

Land Use Assumptions: An assumption of industrial land use is consistent with the material provided concerning the University's land use plan. A limitation to industrial land use requires an institutional control in perpetuity. This may not be necessary in some locations. To evaluate this, the Residential PRGs are to be used for screening and shown, along with the Industrial PRGs. On the boxes for the figures, the samples exceeding Residential but not exceeding Industrial may be highlighted with color or grayscale tone.

1. **Tables and Figures**: It is not possible, based on the information presented in the RI Report, to determine if nature and extent of contamination in soil have been adequately delineated. Rationale for the use of "selected samples" is unclear. The following explains what is to be included.

Tables are to include all chemicals compared to benchmarks: residential and industrial PRGs and SSLs (and MCLs as applicable), resulting in a list of those chemicals that exceed these benchmarks. The associated figures are to show all exceedences in a format like Figure 3-1. (The term exceedence is used to mean any chemical and its total concentration where that concentration exceeds the benchmark) The exceedences for each media for the entire site would be shown on one figure except for its unmanageable size. This would include exceedences for all samples taken (whether for a facility or background reference.) To simplify the review, individual figures, subdivided from the site-wide figure, would show all sample exceedences with associated depths, whether inside or outside a particular facility such as a landfill or DOE area. A similar approach is needed for water data: presentation of data, comparison and figures.

1. **Carbon 14:** In a number of places, the RI Report indicates that there is no maximum contaminant level (MCL) for carbon 14 (C-14). The U.S. EPA Region IX

preliminary remediation goal (PRG) for C-14 in water is 46 pCi/L (per Steve Dean of U.S. EPA Region IX, 1996). Please use it for C-14 in groundwater.

1. **File Format for CDROM**: While the inclusion of Adobe Acrobat files containing selected monitoring data is appreciated, the files are too cumbersome to be easily used. If UC Davis has this data available in a database, please include this database in the next version of the RI Report.

1. **Permanent Repository**: The RI Report is likely to be the standard reference for site conditions in the future, and thus it is important that it be complete as possible. Hence,please describe the location and management of the Permanent Repository ensuring that documents will not be destroyed as part of typical document destruction schedule. Include the following items in the next version of the RI Report by reference to the Permanent Repository or, either as hard copies or on the CD:

    1. copies of boring and cone penetrometer test (CPT) logs
    2. copies of the aerial photographs reviewed by Dames & Moore in 1995.
    3. copies of as many of the removal action reports as are available in electronic format
    4. all soil gas data

1. **Characterization of landfills**: It appears that UC Davis has attempted to characterize the waste located in the three landfills and the eastern and southern trenches. An attempt to characterizewaste in this manner is problematic because of the extreme heterogeneity of the waste. The RI Report indicates that landfills contained bottles and vials, some of them with radiation warning labels (Page 19), that still contained liquids. There is no indication in the RI Report that any of the contents of these vials or bottles were ever characterized. Please provide the caveat that any characterization results regarding the waste materials to indicate that the results are not expected to be representative of the entire body of waste and that the waste likely contains every compound that might be expected to be present in a chemical or veterinary laboratory.

    The purpose of sampling for such an area is primarily to assess the risk posed by possible contact with the material. The assessment of risk provides information for use in designing the remedy, often including an engineered cover and monitoring. Please clarify whether this characterization is also for the purpose of evaluating the consolidation ofmaterial in fewer landfills.

1. **Scope and effectiveness of DDC**: The RI Report indicates, in several locations, that the density driven convection (DDC) pilot-test showed that DDC had reduced chloroform concentrations in groundwater by several orders of magnitude. While technically true, this statement may mislead the public into believing that hydrostratigraphic unit 1 (HSU-1) has been remediated when it has not. In all places in the RI Report where the DDC pilot study results are discussed, please note that the radius of influence of the DDC well was extremely small and that it will likely require many years of operation of an expanded DDC system to remove most of the chloroform from HSU-1 groundwater.

1. **Gravel:** It appears from the waste material descriptions contained in the text that a substantial amount of gravel was disposed of in the landfills and trenches. If this gravel is, or may be, from the dog pens, please provide characterization results from the Department of Energy (DOE) remedialinvestigations regarding pesticide and radionuclide contamination of this material.

1. **Table Section:** Please either put all of the tables in the Tables Section or put all of thetables in the text immediately after they are first referenced. If all tables are to be in the Tables Section, a duplicate of smaller tables could be placed in the text for ease of reading. It is difficult to read to have them split.

SPECIFIC COMMENTS

1. **Executive Summary, Page x:** Revise as necessary to describe the revised screening criteria and other changes.

1. **Section 1.4.1, Landfill Unit 1, Page 4:** The description of waste depths in the landfill, "typical waste depths range from 3.5 to 6 ft below ground surface" is unclear. Please clarify the RI Report to indicate if this means the top of waste is 3.5 to 6 ft below the ground surface or if it means the waste is located between 3.5 and 6 ft below the ground surface. If the former meaning is correct, please provide total depths of waste.

1. **Section 1.5.4.2, Groundwater Levels, Flow, and Gradients, Pages 8 and 9:** There are no groundwater maps in this document. Please provide maps for HSU-1, HSU-2, and HSU-4 that show the groundwater flow direction, that include potentiometric surface contours, and that demonstrate the change in groundwater flow direction.

1. **Section 2.1, Previous Investigations and Remedial Actions, Page 15:** The RI Report references a soil gas investigation conducted in 1995. While it is understood that the data from this investigation is lost, the summaries and the discussion of the data may still be useful. Please revise the RI Report to include what is known regarding the results of this soil gas investigation.

1. **Section 2.1, Previous Investigations and Remedial Actions, Page 21:** The RI Report indicates:

> Chromium concentrations found in samples collected from HSU-1 wells were sporadic and did not correlate with potential source areas. Chromium concentrations in HSU-2 were consistent with regional levels and were not indicative of Site impacts. Researchusing soil cores from monitoring well boreholes demonstrated that hexavalent chromium could be generated under natural conditions from Site soils, which could explain the anomalous distribution of chromium in HSU-1.

This discussion ignores the fact that UC Davis has detected Cr^{6+} in groundwater samples collected at the site at concentrations 30 times average background levels and that third party consultants (Jones & Stokes) have looked at UC Davis's data and drawn a Cr^{6+} plume flowing out of landfill 2. Table 1 appended to these comments contains data clearly indicating that site operations have degraded groundwater quality in both hydrostratigraphic 1 and 2 with inorganic contaminants. In order to provide a complete picture of the site conditions, please revise the RI Reportto include the following where appropriate,

> There is evidence that a release of significant quantities of the known carcinogen (cancer-causing substance) hexavalent chromium has occurred at the site. It appears that Landfill Unit 2 is the source of hexavalent chromium in site groundwater, though a second major release of hexavalent chromium may have taken place in the vicinity of

monitoring well UCD1-028, where groundwater is currently affected at concentrations up to 3,000 times the California Public Health Goal (PHG) in Drinking Water (Office of Environmental Health HazardAssessment) for hexavalent chromium. It appears that this impacted water is migrating from shallow to deep groundwater as the concentrations of hexavalent chromium in the drinking water aquifer (HSU-2) are now up to 350 times the California PHG in Drinking Water, or four times the average background concentration. UC Davis is extracting the deep groundwater that has been impacted by this known carcinogen, treating it to remove volatile compounds, and then reinjecting this water into the drinking water aquifer up gradient of the location where the release of hexavalent chromium appears to have occurred. The treatment methodology being used to remove the volatile compounds does not remove any of the hexavalent chromium. Hence, it is expected that this cancer-causing compound is impacting groundwater in the drinking water aquifer upgradient of the extraction well.

Place this text into the RI Report immediately following any UC Davis discussion of hexavalent chromium in groundwater that implies or states that the hexavalent chromium detected in site groundwater is unrelated to site activities.

1. **Section 2.1.1.1, Waste and Soil Data Screening Levels, Page 36:** It is unclear why UC Davis used ten times (10 X) the California Title 22 Soluble Threshold Limit Concentration (STLC) criteria to evaluate site contaminant levels. The STLC criteria apply only to non-RCRA toxicity-criteria (equivalent) waste designations. If a constituent causes a waste to be characterized as hazardous, it must be treated to remove that characteristicbefore it can be disposed of in a doubly-lined hazardous waste landfill cell. Any material that is a listed hazardous waste or which has a RCRA characteristic would also be a hazardous waste requiring proper treatment and disposal. Please clarify the purpose of evaluating site environmental media using ten times the STLC level and, if applicable, how listed and RCRA-characteristics were taken into account. Include reference to any protocols approved by the RPMs for such screening. Or delete all reference to use of STLC.

1. **Table 2-6, Background Constituents for Groundwater in HSU-1:** It is unclear how the average can be greater than the maximum detection. The calculated average for eight constituents (antimony, cobalt, diethylphthalate, di-n-butylphthalate, molybdenum, silver, thallium and tritium) exceeds the maximum detection - probably because half the detection limit was used for results where the compound was not detected. Please revise the table to include a footnote explaining how non-detects were handled in the calculation of averages.

1. **Table 2-7, Background Levels for Constituents in Groundwater, HSU-2:** The table indicates that 14 of 109 background groundwater samples had detectable concentrations of chloroform. Of these 14 detections, 13 were in groundwater samples collected from well UCD2-37. It should be apparent that this well is installed in groundwater that has been affected by site operations (probably the

adjacent groundwater injection wells). Please remove all of the data collected from well UCD2-37 from the background groundwater quality calculations.

1. **Table 2-7, Background Levels for Constituents in Groundwater, HSU-2:** The background data set contained in Appendix A for groundwater in HSU-2 (wells UCD2-16, UCD2-17 and UCD2-37) includes 105 chromium detections (eliminating duplicates and only using the hexavalent chromium results when both hexavalent and total chromium concentrations are available for the same sampling event). There were 34 detections of chromium in groundwater samples collected from monitoring well UCD2-16. Of the 37 highest chromium concentrations detected in these three wells, 34 of them were from UCD2-16. The average concentration of chromium detected in groundwater samples from UCD2-16 was 30.8micrograms per liter (ug/L). The average detected chromium concentration in samples collected from the other two background wells were 11.6 ug/L (UCD2-37) and 15.9 ug/L (UCD2-17). It is not clear if groundwater in UCD2-16 has been impacted by anthropogenic sources of chromium, but it is clear that the groundwater flowing past this well is different from the groundwater flowing past the other two proposed background wells. The nitrate and total dissolved solids (TDS) concentrations in groundwater samplescollected from UCD2-16 are 40% and 33% higher than the nitrate and TDS concentrations detected in groundwater samples collected from UCD2-17, whereas the chloride, magnesium and sulfate concentrations are essentially identical (implying the wells are not installed in aquifers with different geochemical signatures). Please remove the UCD2-16 data from the background calculations or show the hexavalent chromium and nitrate concentrations detected in groundwater samples from this well are naturally-occurring. If it can be shown that the nitrate and hexavalent chromium detected in groundwater samples collected from UCD2-16 are naturally-occurring, please also show that well UCD2-16 is an appropriate background well for the HSU2 aquifer downgradient of the landfills as it does not appear that UCD2-16 and UCD2-17 are screened in an aquifer with similar groundwater geochemical signatures. To demonstrate that the nitrate, TDS, and chromium detected in groundwater samples collected from UCD2-16 are naturally-occurring, please present figures (e.g., Piper and Durov Diagrams, Ternary, Stiff, and Radial Diagrams) showing that the geochemical signature of the groundwater samples collected from groundwater monitoring well UCD2-16 is similar to the geochemical signaturesof other groundwater samples collected upgradient of the LEHR facility and similar to the downgradient groundwater geochemical signatures in the areas known to be impacted by releases of chloroform.

1. **Section 3.1, Waste and Soil, Page 35:** UC Davis has used industrial preliminary, remediation goals (IPRGs) to develop screening values for constituents of concern (COCs). See prior comments on screening criteria and revise.

1. **Section 3.1.2.2, Landfill Unit No. 2, Page 41:** The text states that "soil sample results for the Eastern Dog Pens are summarized in the Draft DOE Areas RI Report," but does not specify what these results indicated. Please include a brief summary of the results from this investigation in the RI report.

1. **Section 3.1.2.5, Eastern Trenches, Page 45:** The text in the first complete paragraph on page 45 indicates that Tables 3-1, 3-2, 3-3, and 3-4 contain soil results, but Tables 3-2 and 3-4 are summaries of waste sampling. Please resolve this discrepancy. Also, it appears that Table 3-5 should be included in this list.

1. **Section 3.1.2.6, Southern Trenches, Page 46:** The text does not indicate that dieldrin was also detected above the Screening Levels in soil samples. Please include dieldrin in the list of compounds detected above Screening Levels.

1. **Table 3-1:** Revise as described in prior comments with respect to screening criteria. (Note that the Industrial PRG for arsenic and mercury are incorrect on the present version of Table 3-1.)

http://www.epa.gov/region09/waste/sfund/prg/index.htm

Tables 3-4 and 3-5, Pages 37 and 38: For clarity, please indicate what a blank cell in these tables denotes.

1. **Section 3.2.1, Constituents in Stormwater, Page 47:** The RI Report indicates thatconstituents detected in stormwater that are also present "regionally" are not considered site constituents of concern. Global statements involving "regions" require supporting data. Please support this statement by presenting a table showing the maximum concentration of all constituents ever detected in surface water at the site, the "regional" background concentration of these compounds, the maximum concentration of these compounds detected in surface water upstream of the facility and appropriate health screening values for comparison, e.g., U.S. EPA National Ambient Water Quality Criteria.

1. **Table 3-8, Summary of Constituents Detected in Stormwater Samples, LF-1 and LF-3 in 2000 and 2001:** Cadmium, silver and Radium-226 were not detected in upgradient creek samples, but were detected in stormwater outfall samples. However, in the column headed, "Average Value exceeds STPO Average?" they are all listed as "No". Please revise the table or provide an explanation for this result.

1. **Figures 3-26, 3-27, 3-29:** The scales in these plots are not particularly well suited for displaying the data. Please select a scale that allows for visual determination of temporal trends.

1. **Section 4.2.4, Estimated Constituent Travel Time to Groundwater, Page 58:** The estimate of the travel time for chromium to groundwater, 160 years, is difficult to reconcile with the groundwater monitoring data which indicates that chromium has reached the groundwater at high concentrations. As the numerical model cannot explain reality, apparently the numerical model used is not applicable to this site. Perhaps this is due to one of the potential problems with the model noted in the text (e.g., preferential pathways). Please remove all of the vadose zone transport results from the RI Report.

1. **Section 4.4.1, Nitrate Transport in HSU-1 and HSU-2, Page 61:** UC Davis indicates that conclusions regarding relative permeability of HSU-1 soils were made

based oncontaminant concentration differences between groundwater sampled from HSU-1 and HSU-2 at the same location (horizontal coordinates only). As the groundwater velocity in HSU-2 is 400 times faster than the groundwater velocity in HSU-1, it would seem thatthe groundwater contaminant concentrations in HSU-2 would be more a function of upgradient sources in HSU-2 than sources in HSU-1. Please provide additional details on how contaminant concentrations were used to deduce HSU-1 material properties. (Thiscomment also applies to the Executive Summary, Page xiv)

1. **Section 4.4.3, Chromium Transport in HSU-1 and HSU-2, Page 62:** UC Davis indicates that there does not appear to be a consistent correlation between the groundwater concentrations of chromium in HSU-1 and proximity to waste disposal areas at the site. This interpretation is problematic in that there appears to be a typical bullseye-shaped concentration distribution (emanating from Landfill 2) for hexavalent chromium (Cr^{6+}) in site groundwater - see the Final Environmental Impact Report for the Wastewater Treatment Plant Replacement Project by Jones & Stokes [1997], Figure 7-7 appended to the end of these comments. In addition, the highest Cr^{6+} concentrations detected in downgradient groundwater samples are 25 to 30 times higher than any Cr^{6+} concentrations detected in upgradient groundwater samples. It is true that there could be a separate release of Cr^{6+} near the location of monitoring well UCD1-028, though it is unclear how this would have impacted the groundwater upgradient of UCD1-028 between the monitoring well and the landfill. As the landfill is clearly releasing contaminants to groundwater, as shown by the presence of the chloroform plume, it is very likely that the landfill is also a source of Cr^{6+} and that any Cr^{6+} released into HSU-1 will eventually migrate to HSU-2. Please revise the RI Report to present a less optimistic opinion of the sources of Cr^{6+} in site groundwater or present evidence that negates the evidence presented by Jones & Stokes. (This comment also applies to the Executive Summary, Page xiii)

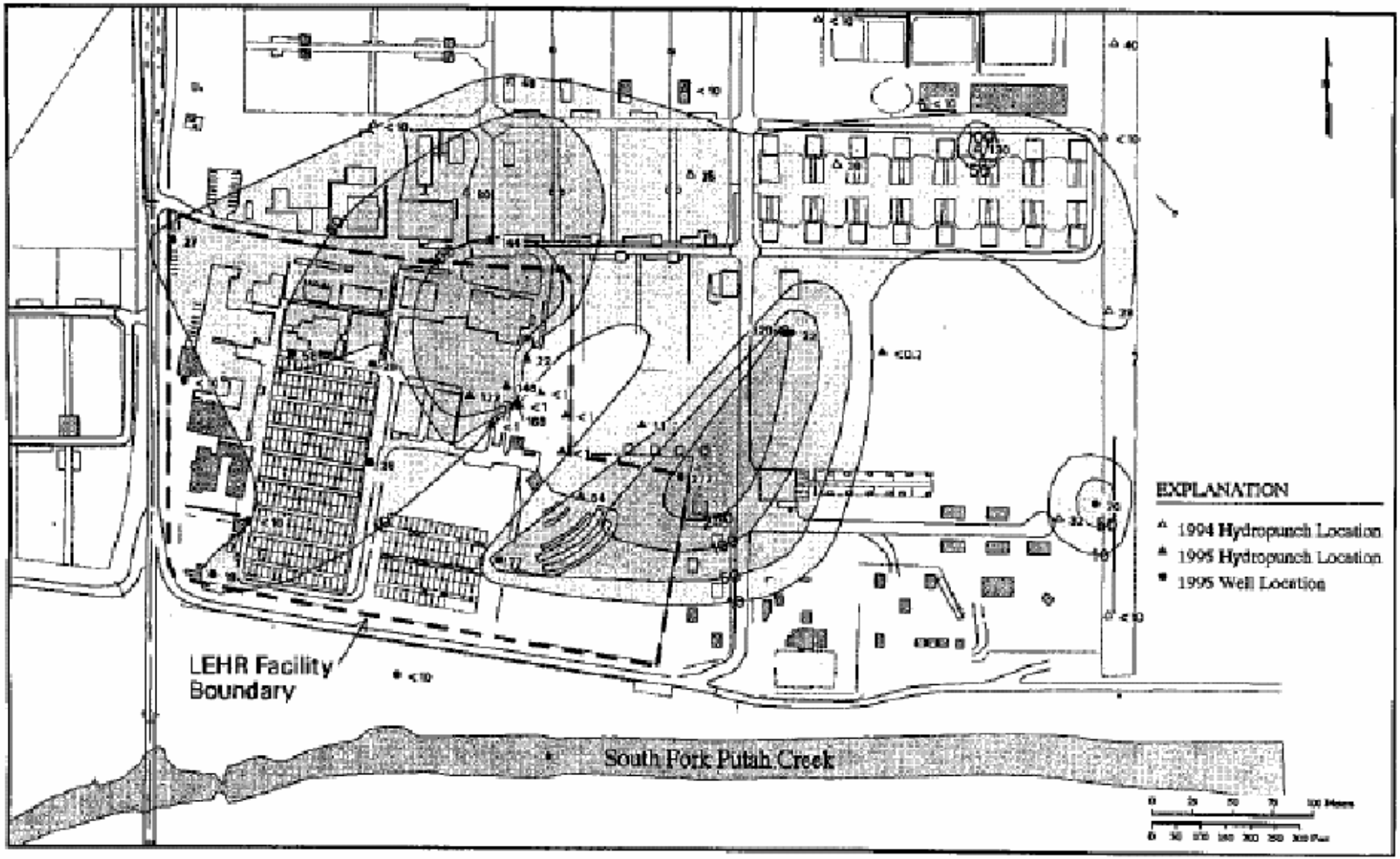
1. **Section 4.4.3.1, Potential Chromium Sources, Page 63:** The RI Report indicates that, "There was no known disposal of hexavalent chromium in any UC Davis Areas." Current UC Davis radioisotope decontamination procedures (http://ehs.ucdavis.edu/hp/shi/radio_sh.html) indicate that laboratory glassware is to be decontaminated with chromic acid. It is unknown how much chromic acid was washed down laboratory sinks into the site septic systems, which did not discharge to the campus waste water treatment plant, or how much chromic acid solution became surplus due to contamination or age and was disposed of in the site landfills. However, there is no reasonable doubt that the laboratories at LEHR (UC Davis and DOE) are a source of hexavalent chromium to the environment at LEHR. Please revise the RI Report to indicate that laboratories at LEHR are a source of hexavalent chromium.

1. **Section 4.4.4.3, HSU-2/HSU-4 Analysis, Page 66:** UC Davis indicates that contaminant transport to HSU-4 is no longer a concern and indicates that contaminant concentrations have fallen in HSU-4 since an old irrigation well was abandoned in 1999. However, as the RI report contains no groundwater data prior to 2000, current HSU-4 groundwater samplesstill contain anthropogenic compounds and there appears to be no background data from HSU-4, this claim is difficult to verify. Please revise the RI Report to include all groundwater monitoring data available for the site.

Please revise the RI Report toinclude plots of contaminant concentrations in HSU-4 versus time to bolster the claim that the chloroform in HSU-4 is naturally-attenuating.

1. **Appendix E:** Please revise the RI Report to use an 80% lower confidence limit on the 95^{th} percentile to estimate the background concentrations of soil and water. Or use the values calculated by DOE for inorganics. The background for inorganics is assumed to be zero.

1. **Appendix E:** Please include units in Table 1, Soil Background Data Values. Also, the table was presented with the last columns truncated due to a printing format error.



Source: Pacific Northwest National Laboratory 1996.

Figure 7-7
Concentration Contour Plot (mg/L) - Hexavalent Chromium in HSU-1: 1995

Table 1
Constituents of Concern in Groundwater Concentrations and Comparison Criteria
South Campus Disposal Site
Laboratories for Energy-Related Health Research
Davis, California

	Effluent Concen-tration[1]	Up / **Down** Gradient HSU1 / HSU2[2]	Federal MCL	Region 9 Tap Water PRG	State MCL	LEHR: Water Board WDRs (incorporated into EPA SOW in AOC to UC)		UC Davis WWTP: Actual Discharge Concentrations /Water Brd NPDES Discharge Limit [4]
						Injection[3]	Irrigation	
Hexavalent Chromium	25 ppb[5]	21 / **534** ppb 19 / **31.7** ppb	100 ppb[6]	110 / 0.16 ppb[7]	50 ppb[6]	32 / 50 ppb	40 ppb	12 ppb / No Limit
Nitrate (as N) (8)	5.94 ppm[9]	6.1 / **48.6** ppm 2.7 / **12.1** ppm	10 ppm[10]	10 ppm	10 ppm[10]	7.7 / 20 ppm	10 ppm	10.4 ppm / No Limit
TDS	478 ppm[11]	489 /**1107** ppm 459 / **557** ppm	500 ppm[12, 13]	None	500 ppm[12, 14]	485 / 500 ppm	None	700 ppm / No Limit

Notes
1. Influent concentrations not actually measured, influent concentrations assumed equal to effluent concentrations
2. Top numbers are HSU1, Lower Numbers (cleaner) are HSU2
3. Average / Daily Maximum
4. Concentrations are highest recorded 1997 - 2000 [URS Greiner, 2002a]. The State does not put a limit on the discharge of TDS, Cr^{6+}, or Nitrate from the UC Davis waster water treatment plant.
5. All chromium concentrations are total chromium assumed to be hexavalent. Only one effluent sample analyzed for chromium in June 2002. Concentrations varied between 22.2 and 26.9 in 2001.
6. Total chromium, assumed to be 100% hexavalent chromium
1. 0.16 ppb is the California Modified PRG, hexavalent chromiumtoxicity is currently a subject of debate. The State issued a public health goal (PHG) of 2.5 ppb for total chromium, but was forced to withdraw it.
2. MCL limit protects infants from "blue baby" syndrom. Nitrate is not usually the limiting factor in algae blooms in fresh water (phosphorus is usually the limiting factor in fresh water). Average June 2002, varies between 4.9 and 7.25 ppm in four samples collected June 2002
3. Limit applies to total of Nitrate and Nitrite
4. Average June 2002, varies between 459 and 557 ppm in the four samples collected June 2002 (subsequently diluted with Berryessa Water prior to injection)
5. Secondary limit, not legally-enforceable
6. The taste and odor threshold National Ambient Water Quality goal is 250 ppm for chlorides and sulfates combined

7. Recommended level; Upper level = 1000 mg/L; Short-term level = 1500 mg/L.May 28, 2003