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September 24, 2007

Ms. Tracy Barreau, REHS
Environmental Health Investigations Branch
California Department of Public Health
850 Marina Bay Parkway, P-3
Richmond, CA 94804

SENT VIA E-MAIL AND US MAIL

RE: Draft RFS Public Health Assessment – UC Comments

Dear Ms. Barreau:

The University of California, Berkeley (UC Berkeley) has reviewed the Draft Public Health Assessment (Draft PHA) prepared by the Department of Public Health (DPH) for UC Berkeley's Richmond Field Station (RFS). As a professor in the UC Berkeley School of Public Health and as Vice Provost, I submit UC Berkeley's comments on the Draft PHA in this letter.

We appreciate the opportunity to provide comments on the Draft PHA. We support the health assessment process and believe this work is of utmost importance. The health and safety of University students, faculty, staff, visitors and the surrounding community is our highest priority as we clean up contaminants left by historic industrial uses on and near the RFS. We also appreciate the effort made by DPH staff in collecting data from multiple sources and reaching out to provide a resource to the RFS community.

We are providing these comments to you in order to strengthen this important work by making it more accurate. We are also providing some recommendations that we believe will make the document more accessible and meaningful for both the general public and technically-knowledgeable readers.

In providing these comments, we want to stress that many of the corrections we are providing—and many of the uncertainties that DPH believes still exist— could have been resolved had DPH staff

communicated its preliminary findings to University staff prior to issuance of the draft document. In some cases, collection of a few additional environmental samples would likely have resolved the uncertainties. Similarly, data on exposure durations and information about actual RFS conditions were readily available, and could have been incorporated into this Draft PHA.

Because the Draft PHA did not use the most current and accurate information, risks in many cases are grossly overstated or misrepresented, which has unfortunately caused undue alarm. As a result, some in the RFS community (which includes employees, visitors, students, and contractors) now believe that the RFS is unsafe. In fact, one longtime contract group unfortunately quit working at RFS because of the damage caused by the misleading information contained in the draft PHA.

We would appreciate more open communication with University technical staff while DPH staff work on future health assessments. This request applies to both the finalization of the Draft PHA and to the health assessment being prepared for the adjacent former Zeneca property. If DPH staff conclude that there are undetermined health risks to the RFS community due to lack of data on the effects of historic activities at the former Zeneca site, we would appreciate the opportunity to participate in resolving those areas of undetermined risk through additional environmental assessment before a draft report is issued. Such communication will facilitate the incorporation of exposure assumptions that are conservative but realistic.

We found the Draft PHA to be generally disorganized and misleading due to selective presentation of conclusions and recommendations, unrealistic exposure scenarios and the use of terminology that biases interpretation toward risks that may not exist. Some examples (and recommended changes) are presented below, with detailed comments and recommendations contained in the sections that follow. We request that our comments be incorporated into the Final PHA, and would be happy to work with DPH to provide whatever additional information DPH needs to ensure that the Final PHA is a meaningful, relevant, and scientifically-valid document. The comments are numbered sequentially to facilitate discussion on recommended changes.

General Comments

The University has spent nearly \$20 million to investigate and remove legacy pollutants at the RFS since 1999. More than 60,000 cubic yards of wastes were removed from the RFS during three phases of work from 2002 through 2004. These actions have led to a significantly improved environment for human and ecological residents of the RFS and for the neighboring City of Richmond community.

The Draft PHA bases its findings on upland soil conditions on two remaining areas of soil affected by legacy pollutants. One of these, a small area near the former Forest Products Laboratory, will be remediated in early October 2007. The other area, the former California Cap Company mercury fulminate manufacturing plant, is also slated for cleanup. Both areas are access-restricted, with fences and warning signs. Both areas are off-limits to anyone at the RFS, including facility maintenance staff that might otherwise dig in these soils.

1. Confusion between past, current, and future health risks. The Draft PHA unfortunately merges findings for past, current and future exposures to RFS maintenance workers who regularly work in soil. This leads to confusing and sometimes inaccurate conclusions regarding current

potential exposure risk compared with historic exposures. We recommend that the document clearly separate the analyses of past exposure from the assessment of current and future exposure potential. The University's removal of significant pollutant source areas and the University's implementation of exposure control measures (such as training facilities maintenance workers on potential soil contaminants) has significantly reduced any potential risk posed by current conditions. We are confident that the current actual risk is far lower than the risk presented in the Draft PHA.

2. Biased summary of risks. Key points regarding safe conditions are not highlighted in the summary. The Draft PHA (page 45) and the two page summary of the Draft PHA completed by CCDHS for the September 5, 2007 meeting at the RFS, explicitly concluded that it is safe to walk on the grounds of the RFS and on the Bay Trail. However, this fundamentally important point was omitted from the Summary and Conclusion section of the Draft PHA. Instead, that section of the Draft PHA described the RFS as an inadequately characterized area containing a number of "indeterminate health risks," suggesting that the RFS may be a dangerous place and creating a climate of fear. The fact that it is safe to walk on the RFS and Bay Trail should be included as a principal finding in the Summary and Conclusion of the Final PHA.

3. Misleading language. The repeated statement of the presence of "indeterminate health risks" is biased toward the assumption of an actual risk being present that has not been ruled out by sampling. An alternative description should be used instead, such as, "there is insufficient data to determine whether any health risk exists." This might help prevent further unwarranted alarm and unnecessary anxiety among some in the RFS community. We ask that vague and misleading language such as this be eliminated in Final PHA.

4. Selective analysis of existing mitigations. The Draft PHA correctly cites the restriction of access to the marsh as a control which prevents exposure to an "indeterminate health risk" (to adults and children in the Stege Marsh). However, the Draft PHA ignores an even more restrictive barrier to access in two upland soils areas. The Final PHA should cite the access restrictions of fencing in the uplands as an appropriate measure to control exposure and incorporate this control into the exposure assessments.

5. Report is disorganized. The Draft PHA scatters conclusions and recommendations throughout the report. In one instance, a recommendation is made (page 23, sampling for arsenic in indoor air) that does not appear in the recommendations section. The Final PHA should include a section that summarizes all of the conclusions and recommendations by exposure pathway and that references the source pages in the document.

6. Unrealistic exposure durations. The Draft PHA contains assumptions about exposure durations that are extremely unrealistic (and in at least one case, impossible). We recommend the use of realistic exposure durations in the Final PHA.

7. Incorrect or incomplete data used. As an example, the Draft PHA suggests that indoor air at B478 (the former Forest Products Laboratory) could be affected by soil gas migration from contaminated groundwater from the Zeneca site, yet recent soil gas analyses along 46th St. and groundwater sampling in the vicinity do not indicate that such a problem exists. DTSC has reviewed the recent soil-gas data as presented in Zeneca's Lot 1 Remedial Investigation Report (dated July 27, 2007) and has verbally indicated to UC Berkeley staff that although VOCs are present in groundwater in this area, VOCs are not migrating upward and there is no increased health risk for the vapor intrusion pathway.

8. Broad scientific and technical imprecision. There are numerous examples in the Draft PHA where a broad generalization is used to suggest an actual health effect, without any evidence of a link between the effect and exposure. An example is the discussion on formaldehyde detected in one indoor air sample in an unoccupied room in one building (B163). The text in the Draft PHA can be interpreted to imply that formaldehyde was potentially linked to a broader concern of eye irritation at RFS. In fact, there appears to be no documentation that links the effect with any exposure in the area where the sample was taken.

9. Inappropriate application of maximum concentrations to assess risk. The Draft PHA bases its assessment of current and future risk on exposure to maximum concentrations of contaminants. This is an invalid approach because many of the types of exposures described in the draft PHA are not physically possible to achieve.

10. Presentation of irrelevant health effects information. The Draft PHA contains approximately fourteen pages of detailed descriptions of potential health effects of various chemicals. However, the Draft PHA concludes that levels of chemicals detected at the RFS are *not* expected to have caused such noncancer health concerns (except possibly for upper respiratory tract and eye discomfort in one instance). Detailed discussion of the *potential* health risks of chemicals tends to mislead many into believing risks of those diseases are posed at the RFS, when the evidence does not actually support such a conclusion. Therefore, we recommend that the generic discussion of health risks of chemicals be moved to an appendix in the Final PHA (similar to Appendix D, Toxicological Summaries).

11. Inappropriate process. Finally, although it is not described as such, the Draft PHA is primarily a screening-level assessment, with the purpose of separating pathways, receptors and chemicals that are not a concern from those that warrant further evaluation. After a screening-level assessment is completed, immediate response actions are generally not recommended (unless an imminent threat to public health exists). Instead, if unacceptable risks or hazards are noted at the screening level (i.e., the analysis cannot demonstrate compliance with screening-level exit criteria), then the logical next step, according to the tiered processes in USEPA and state guidance, is to refine the risk and hazard estimates by an increasingly site-specific evaluation, using more refined estimates of site-specific exposure. While the Draft PHA frequently notes that actual exposures for all receptors may be far lower than assumed, it still recommends exposure control and mitigation actions (most of which are already in place), rather than recommending that the exposure assumptions be refined further.

The Final PHA should clarify that this is a screening level risk assessment and should recommend that exposure estimates be refined and more realistic estimates of risks and hazards be generated in order to determine whether response actions such as mitigation or exposure controls are necessary.

Specific Comments– Exposure Assessment

12. Many of the exposure assumptions are not simply conservative; they are invalid, because they are physically impossible to achieve. For example, the Draft PHA states that RFS maintenance workers are subject to an increased *current and future* health risk and assumes that workers are exposed to the highest concentrations of contaminants during all digging, but does not take into account that the two areas where the highest concentrations are located are fenced off and are not accessible to workers. Moreover, even if the areas were not fenced, material containing the highest concentrations of

contaminants is not co-located, making simultaneous exposure to peak levels of each contaminant impossible. This same type of assumption was used for restoration workers and for children and adults playing in the marsh.

13. The assumed exposure frequency in the Draft PHA for RFS workers digging in soil is listed as 100 days per year, for two hours per day, up to 7 years or 23 years, although no source or justification is provided. Default exposure frequencies and exposure durations for excavation and utility workers are typically far lower. More importantly, the actual exposure frequencies and durations at the RFS are far lower. For example, actual data for the most recent year indicates that two workers dug in soil for only 31 and 34 hours each over the most recent year (and this digging was performed by trained workers instructed on how to identify and respond to cinders and other contaminated soils.) The risk assessments for current and future exposures should be recalculated based on more realistic exposure times.

14. Even for a screening-level evaluation, many of the exposure factor values are unrealistically conservative, and no source citations, rationale or justification are provided for the selected values, as noted below. (Although citations of numbered references from the reference list are provided, the specific source and justification for each assumption cannot be readily understood.)

15. The Western Stege Marsh recreational pathways turned out to be driver pathways, but at the same time the Draft PHA says access “should continue to be restricted”. The real issue is whether to call this a complete pathway at all. Even if it were considered a complete pathway, it is one with rare occurrence and short duration (the classic “trespasser” type of scenario).

16. In Table 1, adults and children who may come into contact with marsh sediments and surface water are presented as key receptors. However, the text says that reports of such activities are “anecdotal” without any citations. We have not observed or received reports of any adults or children playing in the marsh (on weekdays or weekends) in recent years. If such recreational exposure exists at all, it most likely occurs only on the edges of the marsh. Therefore, a more realistic exposure point concentration (EPC) would be based upon the chemical concentrations found at the edge of the marsh, extending out to a depth that would be “wadable” by children, teenagers or adults.

17. Maximum concentrations were used to represent post-remediation conditions in the marsh (page 14, Table 5, page 15, Table 6) and in upland soils for both pre-remediation and post-remediation conditions (page 17, Table 9), as a “worst-case” scenario. However, this approach conflicts with longstanding and the most current standards of practice for risk assessment (for example, USEPA guidance). While comparison of maximum concentrations to screening values is commonly done in early assessment stages, EPCs for estimation of site-specific risks and hazards are typically based on the lower of the maximum or the 95% Upper Confidence Limit (UCL) on the mean (USEPA 1989), as long as the sample size is large enough for calculation of a UCL. In the most recent guidance (USEPA 2007 a, b), USEPA explicitly recommends that the 95% UCL on the mean be used instead of the maximum (based on a review of sample size, data distribution and detection frequency).

18. No source citation is provided for the assumed rate of incidental ingestion of surface water from the marsh (50 ml/hr). This may be based upon USEPA’s default rate for recreational exposure, where 50 ml/hr is assumed to be the incidental water ingestion rate for swimmers (USEPA 1989). If so, this assumption would result in a gross overestimation of incidental ingestion of surface water by waders in a

tidal marsh. Several recently issued guidance documents (ODEQ 2000) and large human health risk assessments have *eliminated* the route of incidental ingestion of water when considering non-swimming recreational or occupational exposures to surface water and sediment (LWG 2007, Exponent 2000).

19. The dermal absorption factor (referenced as AF in the PHA) provides an estimate of the desorption of a chemical from soil and subsequent absorption across the skin and into the bloodstream (USEPA 1989b). It is a chemical-specific value based on evaluation of available biological data and the physical/chemical characteristics of the chemical.

The sources and accuracy of the values cited in the PHA for dermal absorption factors from sediment are not clear. For some inorganic chemicals (copper, mercury, zinc), the PHA appears to use default AF values without providing a rationale. However, this is contrary to the current practice. USEPA (2004), which is the most current guidance for evaluation of the dermal exposure pathway, recommends that AFs for inorganic chemicals should be used only if chemical-specific data are available and has withdrawn the previous default value of 0.01 for inorganics. Therefore, the AFs for copper, mercury and zinc should be zero since there are no chemical-specific values available for these metals.

20. The analysis of indoor air quality data in the Draft PHA is incomplete and misleading. The Draft PHA states (page 24) that five volatile organic contaminants “exceed cancer comparison values,” but provides no information on how concentrations of these contaminants at RFS compare with indoor air in typical office buildings. EPA Indoor Environments Division’s technical data (USEPA 1995) indicates that concentrations at RFS are on the *low* end of the spectrum of concentrations found in typical office buildings. Rather than providing perspective and context, the Draft PHA leads one to think that contaminant levels in indoor air at RFS are unusual and dangerous.

21. The Draft PHA states that additional analysis is needed to “evaluate the potential for VOCs to be affecting indoor air in buildings in these areas,” referring to buildings on the northeast side of RFS. However, the Draft PHA provides no technical basis for this conclusion. Soil gas and groundwater samples collected in the past year in the vicinity of B478 do not indicate that VOCs pose a health risk to occupants of B478.

Specific Comments – Risk Characterization

22. It is difficult to interpret the results of the initial screening comparisons. A large number of screening values are used in the initial screening exercise (e.g., CREGs, CMEGs, PRGs, CHHSLs). The Draft PHA provides neither a hierarchy of selection nor any discussion of which screening values may be the most appropriate to use. For example, in Table 2, the “Comparison/Screening Value[s]” for arsenic span more than three orders of magnitude, from a “0.07 [ppm] Residential CHHSL” to a “200 [ppm] Chronic EMEG (adult)”; without further justification, these screening values cannot all be applicable. No context or explanation as to the magnitude and frequency of exceedances, nor are the implications of the exceedances discussed (for example, what would be the importance of 1 exceedance out of 100 results?).

23. The risk characterization text for non-cancer effects undermines the implications of the hazard quotient (HQ) and hazard index (HI) values presented in the tables. For example, the estimated HI for child/teen playing in the Marsh is 3.1 (Table 6). The text discussion (on page 14) points out that

additivity of the chemicals included in this HI is not warranted, i.e., “current toxicity information indicates that different parts of the body are affected by the lowest dose of each of the chemicals”. The typical next step would be to separate HQs by target organ and evaluate whether the HI for any target organ exceeds 1.0. However, this step was not performed, leaving the impression that non-cancer adverse effects exceed the recommended threshold levels.

24. Cancer risk calculations are not shown and tables of estimated cancer risks are not presented. It is not possible to evaluate whether the cancer estimates are accurately calculated and which chemicals and exposure routes (e.g., ingestion, dermal contact) are the risk drivers.

25. Although risk and hazard estimates were developed separately for pre-remediation and post-remediation periods in the Marsh, the summary text combines these periods as past/current/future exposure into a single, misleading conclusion. This implies the potential for unacceptable risks to have occurred during a long interval of undisturbed high exposure. In reality, EPCs varied by area, by site and receptor activity, and by spatial and vertical distribution patterns for the chemicals.

26. The Draft PHA recommends additional soil characterization at the RFS, but provides little basis for this recommendation. For example, the Draft PHA states (page 3) that “Chemicals used in research activities at RFS, as well as known contaminants from historic uses of RFS and Zeneca... should be analyzed.” However, hundreds of samples already have been taken at RFS. This information, combined with assessment of historic uses, has formed the basis for the clean-up UC Berkeley has performed at RFS to date. The Draft PHA doesn’t provide sufficient justification for additional characterization of soils at RFS. Other than the Forest Products Lab area already identified based on a historic use assessment, if DPH has information that there have been spills from RFS research labs that could have contaminated soils at RFS, that information should be provided to University technical staff as soon as possible.

Specific Comments – Miscellaneous

27. The Draft PHA states (page 26) that UC Berkeley “...objected to the transfer [from RWQCB to DTSC oversight]...” Aside from being factually untrue (note that UC never spoke or corresponded with the California Environmental Protection Agency to try to influence this decision), this information is not relevant to assessment of public health risk.

28. Many of the actions recommended (page 48) in the Draft PHA were completed by the University prior to the issuance of the Draft PHA, or are currently in progress. Examples of actions completed include recommendations numbers 6 (Forest Products Lab assessment), 7 (maps) and 9 (worker training). Other recommendations are already in progress or are items on which UC Berkeley is currently working with DTSC. We ask that completed items be removed from the list of recommendations in the Final PHA.

29. In the Final PHA, the risk assessment conclusions and findings should be presented more clearly with uncertainties identified in the context of additional evaluation needs and data gaps. An uncertainty section should be added that describes the sources of uncertainty and discusses the level of confidence in the risk assessment. Sources of uncertainty that are inherent to the risk assessment process should be identified, as well as sources of uncertainty or assumptions that may benefit from additional evaluation.

Recommendations to increase the level of confidence or reduce the level of uncertainty in the risk assessment should also be included.

We appreciate the opportunity to provide comments on the Draft PHA. We believe that an accurate Final PHA, with the recommendations we have proposed, can serve as tool for ensuring the ongoing safety of RFS workers and the public. If you have any questions on the comments we have provided, please contact me (ckosh@berkeley.edu) or EH&S Director Mark Freiberg (freiberg@berkeley.edu).

Sincerely,



Catherine P. Koshland, Ph.D.

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