Department of Toxic Substances Control

Matthew Rodriquez
Secretary for
Environmental Protection

Deborah O. Raphael, Director
700 Heinz Avenue
Berkeley, California 94710-2721

Edmund G. Brown Jr.
Governor

October 5, 2011

Mr. Greg Haet
EH&S Associate Director, Environmental Protection
317 University Hall, No 1150
Berkeley, California 94720

Dear Mr. Haet:

The Department of Toxic Substances Control (DTSC) received the *Final Phase II Field Sampling Plan (SAP), University of California, Berkeley, Richmond Field Station, Richmond, California*. The SAP, dated September 12, 2011, was prepared by Tetra Tech EM Inc., on behalf of the University of California. The Plan includes soil sampling at locations where transformers potentially containing PCBs were historically located and at the Facilities Maintenance Corporation Yard where chemicals and equipment were stored. DTSC has reviewed and approves the Plan with the following modification: Step 5, development of the decision rules is modified to use a PCB (Total) soil screening level of 0.1 mg/kg for mammals based on validation studies conducted at Vandenberg Air Force Base. Enclosed is the reference for derivation of this screening level provided by DTSC's Human and Ecological Risk Office, Ecological Risk Assessment Section.

If you have any questions regarding this letter, please contact Lynn Nakashima at (510) 540-3839 or email at lnakashi@dtsc.ca.gov.

Sincerely,

Lynn Nakashima, Project Manager
Senior Hazardous Substances Scientist
Brownfields and Environmental
Restoration Program
Berkeley Office - Cleanup Operations

Mark Vest, P.G.
Senior Engineering Geologist
Brownfields and Environmental
Restoration Program
Sacramento Office - Geologic Services

Enclosure

cc: Karl Hans
University of California, Berkeley
Environmental Health & Safety
317 University Hall, No 1150
Berkeley, California 94720

Jason Brodersen
Tetra Tech EM Inc.
1999 Harrison Street, Suite 500
Oakland, CA 94612

J. Michael Eichelberger, Ph.D.
Department of Toxic Substances Control
Human and Ecological Risk Office
8800 Cal Center Drive
Sacramento, CA 95826

Kimi Klein, Ph.D.
Department of Toxic Substances Control
Human and Ecological Risk Office
700 Heinz Avenue
Berkeley, CA 94710

Matt Rodriguea
Secretary for
Environmental Protection

Department of Toxic Substances Control

Deborah Raphael, Director
8800 Cal Center Drive
Sacramento, California 95826-3200

Edmund G Brown,
Governor

MEMORANDUM

TO: Lynn Nakashima
Site Mitigation and Brownfields Reuse Program
Department of Toxic Substances Control
700 Heinz Avenue, Suite 200
Berkeley, CA 90630

FROM: J. Michael Eichelberger, Ph.D.
Staff Toxicologist
Ecological Risk Assessment Section (ERAS)
Human and Ecological Risk Office (HERO)
Department of Toxic Substances Control
8800 Cal Center Drive
Sacramento, CA 95826

DATE: September 19, 2011

SUBJECT: FINAL PHASE II FIELD SAMPLING PLAN UNIVERSITY OF CALIFORNIA, BERKELEY RICHMOND FIELD STATION, RICHMOND, CALIFORNIA

PCA: Site Code:

BACKGROUND

The University of California Richmond Field Station is located on former industrial land and consists of 96-acres of uplands and 13-acres of tidal marsh and marsh edge habitat. Industrial use of the uplands, particularly for the manufacture of blasting caps containing mercury fulminate, has been documented as early as the 1870's and continued until 1950 when the University of California purchased the property for use as a research facility. Documented releases of chemicals of potential ecological concern (COPECs) including metals, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs) have been reported. An ecological risk evaluation of the uplands and West Stege Marsh were completed in 2001. Several remedial measures have been implemented since 2002, and include, but are not limited to, treatment and transport to the adjacent Zeneca property of mercury contaminated soils, installation of a biologically active permeable barrier and excavation and removal of contaminated sediments from a portion of West Stege Marsh, and

backfilling with clean fill to restore California clapper rail (*Rallus longirostris obsoletus*) habitat. The site includes upland habitats including rare costal prairie, and wetlands consisting of saltwater marsh. This memorandum is in response to the DTSC project manager request for review of the Final Phase II Field Sampling to determine if ERAS comments to the draft version were adequately addressed and incorporated into the final report.

DOCUMENT REVIEWED

ERAS reviewed "Final Field Sampling Workplan, University of California, Berkeley Richmond Field Station, Richmond, California" prepared by Tetra Tech Em Inc. (Oakland, California) and dated September 12, 2011. ERAS received the report for review via an Envirostor work request dated September 13, 2011.

SCOPE OF REVIEW

The report was reviewed for scientific content related to ecological risk assessment. Grammatical or typographical errors that do not affect the interpretation of the text have not been noted.

GENERAL COMMENTS

In general ERAS believes the concerns expressed in its August 4, 2011 memorandum to the Draft Field Sampling workplan have been addressed. ERAS does however have one specific comment and recommendation; please see Specific Comment 2 below.

SPECIFIC COMMENTS

1. Page 1, Section 1.1, Physical Setting, third paragraph of section. The inclusion of additional text in this section of the revised report, adequately address ERAS' comment.

2. Pages 10 and 11, Data Quality Objectives,

   Step 4: Define the Boundaries of the Study.

   ERAS concurs that additional expansion of the sampling area will be required pending the results of sampling from proposed scope of work. ERAS remains concerned that potential PCBs under the asphalt pad shown in Inset 7 of Figure 5 will not be detected if present. If PCBs are found in soils in the area please indicate if this will trigger sampling under the asphalt parking lot. Sample location B12803 is shown just inside the edge of the asphalt parking lot. Please confirm that this is the actual sample location.

   Step 6: Specify Performance or Acceptance Criteria. The report attempts to address the ERAS comment that a PCB screening level needs to be included in

the report in Step 5: Develop the Decision Rules. The report indicates that the Oak Ridge National Laboratory plant screening benchmark will be provided.

This is inadequate. The most toxic PCBs are co-planar congeners that bind as ligands to the aryl hydrocarbon receptor (AHR). To ERAS' knowledge there are no known plant AHR homolog receptors. Any expression of toxicity in plants to PCBs is likely from non-coplanar PCBs that do not bind to AHR. Toxicity in plants is far less than in animals. The mammalian AHR receptor contains a ligand binding domain that binds co-planar PCBs. When PCBs are bound to AHR the complex acts as a transcription factor that causes altered gene expression and toxicity that is thought to have arisen from a non-chordate lineage (Karchner et al, 2006). Please use a PCB (Total) soil screening level of 0.1 mg/kg for mammals based on validation studies conducted at Vandenberg Air Force Base. Please see Table 1 as reference for derivation of this screening level.

CONCLUSIONS

The report is largely complete. The plant PCB screening level is not adequate; please use the screening level of 0.1 mg/kg for total PCBS.

REFERENCES

Aulerich, R.J., and R.K. Ringer. 1977. Current status of PCB toxicity to mink, and effects on their reproduction. Arch Environ Contam Toxicol. 6:279-292.

Karchner, S.I., B.R. Evans, D.G. Franks, R.R. Merson, and J.M. Lapseritis. 2006. Unexpected diversity of aryl hydrocarbon receptors in non-mammalian vertebrates: insights from comparative genomics. J. Exp Zool A Comp Exp Biol. 305(9): 693-706.

Nagy, K.A. 2001. Food requirements of wild animals: predicitive equations for free-living mammals, reptiles, and birds. Nutrition Abstracts and Reviews. Series B 71, 21R-31R.

Reviewed by: Brian Faulkner, Ph.D.
Staff Toxicologist, ERAS

cc: Jim Polisini, Ph.D.
Senior Toxicologist, ERAS

Table 1. Derivation of HERD proposed Total PCB (as Aroclor) soil screening concentration of 0.1 mg/kg in soil for Vandenberg Air Force Base.

Chemical of Potential Ecological Concern	Incidental Soil Ingestion EPC[1] (mg/kg)	Tissue Uptake EPC[2] (mg/kg)	Source of Invertebrate Tissue Bioaccumulation Factor[3]	Regression Equation or Bioaccumulation Factor	Invertebrate Tissue Concentration (mg/kg)[4]	Food Ingestion Rate[5] (kg/kg BW/day)	Soil Ingestion Rate[5]	Fraction of Invertebrate in Ingested Food[5]	Dose Via Food Ingestion[6] (mg/kg BW/day)	Dose Via Soil Ingestion[7] (mg/kg BW/day)	Total Dose[8] (mg/kg BW/day)	Site Presence Index[10]	Toxicity Reference Value[11] (mg/kg BW/day)	Toxicity Endpoint	NOAEL Hazard Quotient[12]	Toxicity Reference Value[13] (mg/kg BW/day)	Toxicity Endpoint	LOAEL Hazard Quotient[14]
Total PCB (Aroclor)	0.1	0.1	VAFB Validation Study	ln(Tissue) = 1.4824 + [ln(Soil) * 0.7947]	7.06E-01	0.203	0.037	1	0.143	0.001	0.144	1	0.14	Reproduction	1.0	1.40	Reproduction	0.1

All concentrations, proportions, and doses are expressed on a dry weight basis.
BW = body wt. HI Congeners = hazard index or sum of individual hazard quotients for each congener.
Yellow highlights indicate NOAEL hazard quotients above 1 and LOAEL hazard quotients at or above 1.

1. Exposure point concentration (EPC) selected for soils potentially incidentially ingested by burrowing animals (most protective soil depth interval between surface to 5 ft below ground surface).
2. Selected, and most protective, soil EPC reported for the 0 - 1 ft, 0 - 2 ft, or 0 - 5 ft depth interval and used to estimate plant or invertebrate uptake.
3. Provided in Appendix H.6 of the Final Site 31 Cluster Remedial Investigation Report (September 2006).
4. Estimated, dry weight normalized concentration in invertebrate tissue.
5. Food Ingestion Rate estimated by method of Nagy (2001): Predicting food requirements of wild mammals (dry matter intake per day). Insectivores: Y = a(grams body mass)b, where a = 0.373, body wt. = 5 g (body wt. from Table 6.3-1a, Final Site 31 Remedial Investigation, September 2006), and b = 0.622. Soil ingestion rate = 3.7% of total food mass ingested (as cited in Table 6.3-1a, Final Site 31 Remedial Investigation, September 2006).
6. Dose Via Food Ingestion = (Invertebrate Tissue Concentration*Food Ingestion Rate*Fraction of Invertebrate in Diet).
7. Dose Via Soil Ingestion = (Soil Ingestion EPC*Food Ingestion Rate*Soil Ingestion Rate).
8. Total Dose = Dose Via Food Ingestion + Dose Via Soil Ingestion.
9. N/A
10. Site Presence Index = the fraction of time spent foraging at the site.
11. Unadjusted Chronic No Observable Adverse Effect Level (NOAEL) Toxicity Reference Value for PCBs . Aulerich and Ringer 1977 study, See Appendix J, Final Site 31 Remedial Investigation Report, September 2006.
12. NOAEL Hazard Quotient = (Total Dose * Site Presence Index)/Unadjusted Chronic NOAEL Toxicity Reference Value.
13. Unadjusted Chronic Lowest Adverse Effect Level (LOAEL) Toxicity Reference Value for PCBs. See Appendix J, Final Site 31 Remedial Investigation Report, September 2006.
14. LOAEL Hazard Quotient = (Total Dose * Site Presence Index)/Unadjusted LOAEL (Adverse Effect) Toxicity Reference Value.