Linda S. Adams
Secretary for
Environmental Protection

Department of Toxic Substances Control

Maziar Movassaghi
Acting Director
700 Heinz Avenue
Berkeley, California 94710-2721

Arnold Schwarzenegger
Governor

April 15, 2009

Mr. Greg Haet
Associate Director, Environmental Protection
Office of Environment, Health & Safety
University of California, Berkeley
317 University Hall #1150
Berkeley, California 94720-1150

Dear Mr. Haet:

The Department of Toxic Substances Control (DTSC) received the Field Sampling Workplan (FSW), Appendix A: Quality Assurance Project Plan, and Appendix B: Health and Safety Plan for the University of California Richmond Field Station (RFS), Richmond, California. The plans, dated February 27, 2009, were prepared by Tetra Tech EM, Inc. for the University of California. The purpose of the FSW is to describe the general facility-wide strategy and protocols for the field investigations that will fill the identified data gaps and allow characterization of the site. Separate site-specific field sampling plan addenda will be submitted in the future for the various investigation areas that will include background and historical information, specific data quality objectives, sampling locations, analytical methods, etc. DTSC received comments from the Richmond Southeast Shoreline Area Community Advisory Group and has taken their comments into consideration when preparing this letter. DTSC support staff has reviewed the report and their comments are enclosed along with the following comments:

General Comment:

1. The use of Multi-Increment Sampling (MIS) has not been approved by DTSC for site characterization or risk assessment purposes. Therefore, at this time reference to MIS should be removed from all documents and replaced with standard soil sampling methods.

Field Sampling Workplan:

1. Page 12, Section 3.1, Sources, Migration Pathways, and Exposure:
   a. Inhalation of vapors from soil or groundwater sources needs to be added to the text as a potentially complete exposure pathway as identified in Figure 3 (Conceptual Site Model).
   b. The potential for contaminated backfill material in utility corridors should also be identified as a potential source of contamination to soil and groundwater in the Conceptual Site Model as cinder material was previously found to have been used as backfill. Section 4.3.3, Utility Data Gaps should also be revised to include the potential for contaminated backfill in utility lines.
   c. This section states that the former Liquid Gold facility may have been a possible source of contamination to the RFS. Due to the distance of the Liquid Gold facility to the RFS, a brief rationale for this statement should be included. Additional rationale should also be included in the appropriate future site-specific field sampling plan(s).

2. Page 15, Section 3.2, Exposure to Human Receptors: This section should include inhalation of soil vapors from soil as a potential exposure pathway.

3. Page 17, Section 3.3, Exposure to Human Receptors: This section should include that inhalation of vapors from volatilization of contaminated groundwater may also be a potential exposure pathway to persons occupying buildings and to workers that may come in contact with groundwater or work in trenches.

4. Page 19, Section 4.2, Strategy, Prioritization, and Data Evaluation: This section should also include an investigation strategy for the possible presence of soil vapors from a soil and/or groundwater sources.

5. The rationale used to identify the prioritization of the investigation areas, other than habitat areas, should be included.

6. Page 25, Section 4.3.1, Soil Data Gaps: Revisions to this section are needed as the depth of initial sampling is being limited to the upper two feet of soil. For example, in areas where the former California Cap Company operated, known hazardous waste storage areas, and in the Western Transition Area where dumping was known to have occurred, deeper soil sampling is warranted.

7. Page 27, Section 4.3.2, Groundwater Data Gaps, Step 2: Please include as one of the goals of the study a determination whether contaminants are migrating from the RFS to off-site locations.

Appendix A, Quality Assurance Project Plan (QAPP)

The QAPP needs to be revised to include specific standard operating procedures (SOPs) for the investigation methods that are most likely to be used at the site. Anticipated laboratory analytical methods along with a list of chemicals that will be reported, sample size, holding times, preservative, etc. should be included.

1. Page A-14, Section 3.2.1, Sensitivity: The last sentence of this section is unclear and needs to be revised. Please explain what the laboratory detection limit and laboratory method reporting limits are, and why it is acceptable to use the laboratory method reporting limit. Previously, quantitation limits and detection limits were discussed. This comment also applies to Page A-154, Section 7.3, Reporting Limits.

2. Page A-15, Section 3.2.2, Precision and Accuracy:
   a. The default frequency for laboratory blanks and spike blanks should be a minimum of once for every batch of samples, or type of matrix, or 20 samples, whichever is more frequent.
   b. Temperature blanks need to be added to Table A-2 as part of the Field QC requirements, and included in Section 4.9, Field Quality Control Samples.

3. Page A-17, Section 3.2.4, Completeness: The criteria that will be used to establish the degree of completeness needs to be included. A minimum percentage for each type of matrix should be included.

4. Page A-18, Section 4.0, Sampling Procedures: Utility clearances and specific types of permits that are required prior to sampling should be identified in this section. The description should also include lead times required to obtain permits and clearances.

5. Page A-23, Section 4.1.2, Soil Sampling for Volatile Organic Compounds:
   a. DTSC's November 2004 guidance document for implementation of Method 5035 should be reviewed and incorporated into this section and referenced in Section 4.1.29.
   b. This section needs to include a discussion regarding the collection and analysis of high and low concentration VOC samples. Collection of low concentration soil samples in vials that contain methanol is not appropriate for samples analyzed with closed system purge and trap equipment. It should also be noted that the use of methanol as a preservative and extraction solvent introduces a significant dilution factor that will raise the method quantitation level beyond the operating range of the low concentration direct purge and trap. The high concentration method is used for samples with VOC concentrations greater then 200 ug/kg.
   c. This section needs to contain a discussion regarding packaging and transportation of vials used to transport samples. For example, VOAs need to be transported upright in the ice chest.

d. The criteria for acceptance of vials containing methanol needs to be included. Vials containing methanol should be weighed a second time in the field on the day they are to be used. Vials containing methanol that are found to have lost a reduction in weight of greater than 0.05 grams should not be used. Also, vials should not be submitted for analysis if the preservative has spilled or splashed from the vial.
e. Additional tared and preserved vials should be available in the field due to the potential for rejecting vials.
f. It should be specified that the tared weight of each vial is to include the weight of the sample label.
g. If the preservative is added to the vial in the field, the analytical laboratory should be contacted to determine if a magnetic stirring bar needs to be placed in the vial prior to sample collection.

6. Page A-24, Section 4.1.2.2, Sampling Protocol 2: It should be specified in this section that the surrogate, matrix spikes and internal standards are only added to the vials after the sample is added to the vial, and will be done by the analytical laboratory.

7. Page A-25, Section 4.1.2.4, Field Weighing: The field balance needs to be checked at least daily and against an appropriate reference weight. Also, please explain and provide a reference indicating why a weight accuracy of 0.1 grams is acceptable. DTSC's November 2004 guidance for implementation of Method 5035 recommends an accuracy of 0.05 grams and that it is achievable in the field.

8. Page A-26, Section 4.1.2.5, Presence of Carbonates: Please provide the reference demonstrating that a holding time of unpreserved EnCore samples of 7 or 14 days does not result in a loss of VOCs.

9. Page A-67, Section 4.3.2.12.1, Deciding When to Filter: The decision to filter groundwater samples should also include an evaluation of who the receptor is and how that receptor will come into contact with the groundwater. For example if the receptor may come into direct contact with groundwater, filtering may not be recommended.

10. Page A-79, Soil-Gas Sampling: This section should be updated to reflect the current state of practice of soil gas sampling. For example continuous soil gas sampling and post-run tubing methods are no longer accepted due to the recognized difficulty in sealing the space between the drive rod and borehole. The actual zone that is being sampled therefore cannot be determined, and there is a greater potential for ambient air leakage.

11. Page A-85, Table A-5, Summary of Vapor Intrusion Analytical Methods: Because analytical methods have not been certified for soil gas analysis, the laboratory

Standard Operation Procedures will need to be submitted for approval prior to analysis.

12. Page A-109, Section 4.11, Management of IDW: Please add to this section that waste determined to be a hazardous waste must be disposed within 90 days of generation. In addition, personal protective equipment and other waste that is grossly contaminated with a known hazardous substance should not be disposed in the facility trash receptacle. The waste should be stored in a container and disposed at a proper off-site facility to prevent exposure to unauthorized personnel.

If you have any questions regarding this letter, please contact Lynn Nakashima of my staff at (510) 540-3839.

Sincerely,

Barbara J. Cook, P.E.
Performance Manager
Brownfields and Environmental Restoration Program – Berkeley Office

Enclosures

cc: See next page

cc: Mr. Mark Vest
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Secretary for
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Arnold Schwarzenegger
Governor

MEMORANDUM

TO: Lynn Nakashima
Senior Hazardous Substances Scientist
Cleanup Program-Berkeley

FROM: Eric Brocales
Associate Industrial Hygienist
Office of Human Capital and Workplace Innovation (OHCWI)
Health and Safety Branch (HSB)

DATE: April 1, 2009

SUBJECT: University of California, Berkeley, Richmond Field Station
Health and Safety Plan
PCA Code: 11050 Site Number: 201605-00

BACKGROUND

The Cleanup Program-Berkeley requested the HSB to review the Health and Safety Plan (HASP) for the remediation activities at the University of California, Berkeley, Richmond Field Station (Site) in Richmond, California. The Site is located at 1301 South 46th Street, Richmond, CA.

DOCUMENT REVIEWED

The HSB reviewed the HASP for the remediation activities at the Site. The HSB received the plan on March 17, 2009.

GENERAL COMMENTS

The Department of Toxic Substances Control (DTSC) reviewed the HASP for compliance with appropriate State and Federal Health and Safety Regulations. An industrial hygienist from the HSB may perform a field audit in order to confirm the implementation of the provisions and specifications presented in the HASP.

The DTSC is unable to foresee all the health and safety hazards in the work place by the review of the submitted plan. Continuous surveillance of the work-site and

creation of an effective health and safety program by the employer will reduce work place injuries and reduce liability.

In the event that this HASP does not cover a contractor or sub-contractor, they must submit their own HASP to DTSC for review. If the scope of work changes significantly, (an unanticipated chemical, physical, or biological hazard is discovered or introduced to the site), then the new hazard must be addressed in an addendum to this HASP and submitted to DTSC for review.

The final site HASP must be available at all times for on-site personnel to reference. In utilizing the site HASP, field staff must be able to obtain sufficient information to compile an accurate assessment of the site safety issues associated with every job function.

The HSB review of this HASP is not a guarantee that it will be properly and safely implemented. HASP implementation is the employer's responsibility. The acceptance is limited to concurrence that all the required elements of a safety plan are present.

SPECIFIC COMMENTS

HSB's review finds the submitted HASP deficient in providing sufficient information to assess the hazards. The HASP appears to be lacking and/or has incomplete key elements.

1. **KEY PERSONNEL AND RESPONSIBILITIES.** In Section 2.1, PROJECT PERSONNEL, please provide information identifying key personnel who at a minimum, have the responsibility and authority to perform the following functions:

    a. Be present at all times during site operations.
    b. Have the authority to enforce the HASP and stop operations if personnel or community safety and health may be jeopardized.
    c. Evaluate monitoring data to make field decisions regarding safety and health.

2. **WORK PLAN.** In Section 3.3, PLANNED ACTIVITIES, HSB is aware that UCRFS will be submitting separate sampling plans for the Site activities covered in the remedial work plan, however please ensure that each addendum is included in the final HASP, and at a minimum includes a summary description of the project, including but not limited to: the duration of planned activities, personnel requirements, and the extent to which subcontractors will be used. In addition, please provide a summary of the information regarding known or suspected hazardous waste disposal on-site, the waste(s) location, physical state, chemical characteristics, and the range of concentrations found to date by matrix

(soil, water, air).

3. **JOB HAZARD ANALYSIS/SUMMARY.** In Section 8, SITE-SPECIFIC HAZARD EVALUATION, please provide the following details:

    a. The best information available regarding the contaminants and conditions present at the site.
    b. Approximate duration of the operation and each task.

4. **EMPLOYEE TRAINING.** In Section 5.0, TRAINING REQUIREMENTS, the HASP should state that the employee training program is in compliance with CCR 5192(e).

5. **PERSONAL PROTECTION.** In Section 6.0, PERSONAL PROTECTION REQUIREMENTS, The body of the HASP should state that the Personal Protective Equipment program is in accordance with 8 CCR 5192(g).

6. **MEDICAL SURVEILLANCE PROGRAM.** In Section 7.1, HEALTH MONITORING REQUIREMENTS, please verify and state in the body of the HASP that the health monitoring program is in accordance with 8 CCR 5192(f).

7. **AIR SURVEILLANCE.** In Section 8, ENVIRONMENTAL MONITORING AND SAMPLING, please provide additional information regarding:

    a. When air monitoring levels would indicate the expansion(s) of exclusion zone. In addition, provide the rationale for how each action level was derived.
    b. The specific make and model of instrument(s) selected for use.
    c. The relative response factors for the instrument of choice must be incorporated into any action level(s) derived for the site.

8. **SITE CONTROL.** In section 9.0, SITE CONTROL, please verify and state in the body of the HASP that the site control measures are in accordance with CCR 5192(d).

9. **SPILL CONTAINMENT**. A discussion regarding a spill containment plan shall be incorporated as a separate section in the body of the HASP. The spill containment program must meet the requirements of 8 CCR 5192(j).

10. **SANITATION.** Please describe the provisions that will be made to ensure proper sanitation facilities are available for site personnel, including but not limited to:

    a. Adequate washing facilities such as soap, water, towels and where appropriate showers.

b. Toilets and other sanitary facilities in numbers which will reasonably handle the projected number of personnel.
c. Adequate stocks of potable water, provided in sanitary containers.

11. **ILLUMINATION.** Please include a section discussing how minimum illumination shall be provided for site personnel. The plan shall be in accordance with the requirements of 8 CCR 5192(m).

    If all planned field activities are to be conducted during daylight hours and not within any structures at the site, please state as such.

CONCLUSIONS

The HASP must follow and contain the specific content and procedural elements as indicated in the Department of Toxic Substances Control guidance document and be resubmitted for further review. HSB recommends consulting a safety professional to complete the Health and Safety Plan.

In addition, the HASP must comply with 8 CCR, 5192: "Health and Safety for Hazardous Waste Operations and Emergency Response" as well as other appropriate State and Federal Health and Safety Regulations. Please note that in addition to the requirements of this section, the employer is also responsible for the implementation of an Illness and Injury Prevention program, which is required by the 8 CCR, 1509 and 3203.

The HSB is available to discuss the necessary revisions and approach. Thank you for the opportunity to review this document. Should questions arise regarding this review and/or related issues, please contact Eric Brocales at (510) 540-3953.

PEER REVIEW BY: _____

Kathleen Yokota-Wahl
Senior Industrial Hygienist

Linda S. Adams
Secretary for
Environmental Protection

Department of Toxic Substances Control

Maziar Movassaghi
Acting Director
8800 Cal Center Drive
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Arnold Schwarzenegger
Governor

MEMORANDUM

TO: Lynn Nakashima
Site Mitigation and Brownsfields Reuse Program
Geology, Permitting and Corrective Action Branch
Department of Toxic Substances Control (DTSC)
Cypress, CA 90630

FROM: J. Michael Eichelberger, Ph.D.
Staff Toxicologist
Human and Ecological Risk Division (HERD)

DATE: April 14, 2009

SUBJECT: DRAFT FIELD SAMPLING WORKPLAN, UNIVERSITY OF CALIFORNIA, BERKELEY RICHMOND FIELD STATION, RICHMOND, CALIFORNIA

PCA: 11050 SITE CODE: 201605-00

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 habitat. The site includes upland habitats including rare coastal prairie and wetlands consisting of saltwater marsh. This memorandum is in response to the DTSC project manager request for technical review of ecological issues related to the Draft Field Sampling Workplan.

Document Reviewed

HERD reviewed "Draft Field Sampling Workplan, University of California, Berkeley Richmond Field Station, Richmond, California" prepared by Tetra Tech EM Inc. (Oakland, California) and dated February 27, 2009, hereafter referred to as the work plan. HERD received the report in March, 2009 for review.

Scope of the 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

1. HERD does not believe the work plan contains sufficient information to determine if the sampling approach is adequate to assess nature and extent of contamination relative to potential hazards to ecological receptors. Screening levels for ecological receptors are not listed. Since the report represents an overall approach to sampling for all five sampling phases, it should provide all of the information common to all. Screening levels, the references to these screening levels, appropriate chemical analytical methods and associated detection limits below the ecological screening levels should be presented for each of the chemical constituents to be assessed. For ecological risk assessment purposes, sampling and analysis should be conducted to the No Observable Adverse Effect Level, please see Specific Comments 6 and 7 below.

2. HERD is concerned that Multi-incremental Sampling will not adequately support ecological risk assessment needs. It will certainly not be adequate for sediments where individual sample locations represent total exposure to sedentary marine benthic invertebrates. Average concentrations calculated for individual Areas of Concern (AOC), that are larger than the home range of terrestrial species such as the shrew, may not adequately represent actual exposure.

SPECIFIC COMMENTS

1. Page 13, Figure 3, Conceptual Site Model. The Conceptual Site Model is not complete, only a partial list of exposure pathways to ecological receptors is depicted. There is neither graphical representation of contaminant transport to

sediments nor the transfer of sediment contaminants up the food chain. There is some representation of trophic transfer from surface water but it is too small to interpret and is incomplete. Likewise exposure to terrestrial ecological receptors is also only partially represented. There is no representation of potential exposure pathways to invertebrates or food chain pathways from plants and invertebrates to vertebrate receptors. HERD believes for clarity it would be useful to separate the conceptual site models for human health and ecological receptors into separate figures.

2. Page 15, Section 3.2, Adsorption to Sediment. The sentence "*PCBs and pesticides are strongly adsorbed to soil particles and are not readily leached*" is not entirely accurate and needs to be clarified. HERD would agree that PCBs readily adsorb to soil particularly those that are more highly chlorinated, however PCBs can readily migrate down in the soil horizon if organic solvents are present. Also, not all pesticides bind tightly to soil. For example, aldicarb, atrazine and carbaryl are all examples of pesticides that readily leach in soils. The work plan needs to clarify which pesticides it is referring to when stating that they do not leach.

3. Page 15, Section 3.2, Exposure to Ecological Receptors. This section is not well organized and written. The text indicates that grasses, shrubs and trees are not exposed to contaminants through the "*root uptake of soil and sediment.*" There is no uptake of soil and sediment by plants. Soil and sediment are complex media containing many different components. What is accurate to say is that plants can take up contaminants present in soil and sediment. Generally, the majority of the exposure of birds and mammals is through the diet, not through ingestion of soil 'dirt' on plant leaves or through grooming or preening .

4. Page 17, Section 3.3, Exposure to Ecological Receptors. Please see specific comment 3 above.

5. Page 21, Table 1: Site Prioritization and Page 22, Figure 4, Soil Investigation Areas. Figure 4 delineates where Phase I Sampling is to occur but it is not clear where the specific areas within Phase I listed in Table I are located. Table I lists four primary soil sources: 1a) IA1-1 Building 478; 2a) IA1-2 East Meadow; 3a) IA1-3 Corporation Yard; 4a) IA1-4 U.S. Briquette Company, five groundwater source areas: 1b) GW1: Building 478 Area; 2b) GW2 Building 120 Area; 3b) GW3 Property Boundary; 4b) GW4 Biologically Active Permeable Barrier Wall (BAPB); and 5b) GW5 Site-wide Groundwater, and a separate utilities source are identified as UT1 Select Utility Locations. With the exception of the BAPB, none of the primary sources are identifiable in Figure 4. It is also unclear why the BAPB, a structure constructed to impede downgradient movement of site related Chemicals of Potential Ecological Concern (COPECs) to Western Stege Marsh is considered a 'Primary Source.' Neither the 'Approximate Property Boundary' nor the 'Property Boundary' shown in the Figure 4 legend, are identifiable on the figure. The figure should be modified to show the primary sources, secondary

sources and the property boundary as indicated in the legend. HERD notes that Figure A-3 Physical Features Map in Appendix A identifies buildings 478 and 120 but does not identify other features such as the U.S. Briquette Company, East Meadow, Corporation Yard, or utility locations.

6. Page 23, Section 4.2.3, Data Evaluation, Decision I Levels. The report fails to describe Ecological Soil Screening Levels as a Decision I Level. This needs to be rectified in the report. Please provide a reference for soil screening levels. Given that Western Stege Marsh is being remediated and reclaimed to support California clapper rail habitat, the use of Effects Range Median (ER-M) is not warranted. Protection for endangered and threatened species needs to be at the level of the individual. Sampling to the ER-M will not provide sufficient protection to the clapper rail.

7. Page 23, Section 4.2.3, Data Evaluation, Detection II Levels. Please explain how Decision II Levels will be applied to ecological receptors, none are mentioned in the report. HERD fundamentally disagrees with the approach presented in the unnamed table on page 23. For site characterization purposes, sampling needs to be conducted to determine nature and extent to the 'No Effect Level.' This is particularly important for the sediments of Western Stege Marsh. Sampling needs to be conducted with detection limits set to a value lower than the No Effect Screening Level. Since the work plan offers no information regarding how Decision II Levels would apply to ecological receptors, only to human receptors, HERD assumes that, as written, sampling could occur at levels not protective of ecological receptors.

8. Page 25, Section 4.3.1, Soil Data Gaps, Step 4: Define the Boundaries of the studies. HERD does not believe the work plan has provided sufficient documentation to justify limiting initial sampling to the depth of 2 feet. Location of each specific chemical constituent within the soil horizon is, as the report points out, dependent on multiple factors, some related to the soil, others to the chemical itself, and also potential soil disturbance subsequent to the release. The UC Richmond Field Station historically has been used for many purposes and the potential for movement of soils due to site activities and potentially from grading due to past remedial efforts is apparent. HERD believes that sampling should be conducted at multiple depths. For ecological purposes a logical soil sampling strategy would include surface soil to a depth of 6 inches, samples between two and three feet and deep samples at 6 feet.

9. Page 25, Section 4.3.1, Soil Data Gaps, Step 5: Develop Decision Rules. HERD does not believe that if a chemical is detected at concentrations below Decision I Levels that it can be assumed that a release has not occurred as stated in the report. It is appropriate to state that chemicals are below a level that reasonably would be considered to pose a hazard to receptors. The work plan should be revised accordingly.

10. Page 26, Section 4.3.1, Soil Data Gaps, Step 6: The report needs to be more specific about the screening levels, neither soil or sediment screening levels are mentioned. Inorganic background concentrations should be approved by the DTSC Geological Services Unit and should be used as the determinant for establishing inorganic COPECs.

Conclusions

HERD does not believe that Multi-incremental Sampling is necessarily the best method for conducting site investigation at the UC Richmond Field Station. Compositing samples from an AOC do not provide sufficient information to evaluate certain receptors such as benthic invertebrates or species with smaller home ranges than the AOC. HERD disagrees that detected concentrations of a chemical below the screening level indicates that there has not been a release. This reference in the work plan should be deleted. Sampling for site characterization purposes should be to the No Effect Level and all methods with their references and detection limits appropriate to the screening levels should be presented in the work plan. The conceptual site model should be reworked to accurately represent exposure pathways to ecological receptors. The report should be revised to reflect the comments in this memorandum and resubmitted to HERD for review.

Reviewed by: James M. Polisini, Ph.D.
Staff Toxicologist

Cc: David L, Berry, Ph.D.,
Senior Toxicologist

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MEMORANDUM

TO: Lynn Nakashima
Senior Hazardous Substances Scientist
Brownfields and Environmental Restoration Program
Berkeley Office

FROM: Mark Vest, CEG
Senior Engineering Geologist
Geologic Services Unit
Sacramento Office

REVIEWED BY: Kate Burger, PG, PhD
Senior Engineering Geologist
Geologic Services Unit
Sacramento Office

DATE: April 13, 2009

SUBJECT: GSU REVIEW OF FIELD SAMPLING WORKPLAN, UNIVERSITY OF CALIFORNIA, BERKELEY, RICHMOND FIELD STATION, RICHMOND, CALIFORNIA AND FIELD SAMPLING WORKPLAN: APPENDIX A, QUALITY ASSURANCE PROJECT PLAN, UNIVERSITY OF CALIFORNIA, BERKELEY, RICHMOND FIELD STATION, RICHMOND, CALIFORNIA

Project: 201286/11050-00 GRE:0810246/ESTOR:WR20001124

Activity Requested

In response to your request, the Geological Services Unit (GSU) has reviewed the subject documents. The Field Sampling Workplan (FSP) and Appendix A: Quality Assurance Project Plan (QAPP) were prepared by Tetra Tech EM Inc. for the University of California at Berkeley. When approved and finalized, the February 27, 2009 FSW and

QAPP will provide an overall approach for investigating the Richmond Field Station (RFS) for uncontrolled releases of hazardous substances. The following comments and recommendations are provided for your information and use. If you need more information regarding this matter, feel free to contact me at (916) 255-3692 or mvest@dtsc.ca.gov.

General Comments and Recommendations

1. As per requirements in the California Business and Professions Code (Sections 6735 and 7835), the FSP and QAPP should be signed and/or stamped by a California registered civil engineer and/or professional geologist indicating their responsibility for engineering and/or geologic content of the documents.

2. The FSP, QAPP, and pending FSP addenda should present sufficient detail such that sampling teams unfamiliar with the site could perform the same quality field investigation using the FSP and QAPP as references. In particular, the QAPP should be amended to include detailed Standard Operating Procedures (SOPs) for reasonably anticipated site investigation activities.

   The SOPs should present concise, detailed written instructions for planning, conducting, and documenting routine investigation activities. Sampling procedures including personnel qualifications, equipment checklists, step-by-step procedures, and field forms should be included. Additional SOPs may be provided with the FSP addenda, as warranted. The SOPs should be signed by the Tetra Tech Quality Assurance/Quality Control manager, or equivalent.

3. Based on a review of literature on multi-incremental (MI)/decision unit (DU) sampling, it seems that the method can provide good estimates of mean concentrations within sampled grids (DUs) when applied correctly. Also, it is recognized that there are uncertainties associated with sample representativeness and associated decisions based on discrete samples. Because of growing interest in the sampling method, DTSC is participating in a review and assessment of MI/DU sampling that is being performed by the Interstate Technology & Regulatory Council (ITRC)[1]. Unfortunately, the ITRC work is not scheduled to be completed until at least the end of this year. Therefore, DTSC should not accept MI/DU sampling for implementation on the RFS project.

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[1] "ITRC is a state-led coalition working together with industry and stakeholders to achieve regulatory acceptance of environmental technologies. ITRC consists of 50 states, the District of Columbia, multiple federal partners, industry participants, and other stakeholders, cooperating to break down barriers and reduce compliance costs, making it easier to use new technologies, and helping states maximize resources. ITRC brings together a diverse mix of environmental experts and stakeholders from both the public and private sectors to broaden and deepen technical knowledge and streamline the regulation of new environmental technologies."
(http://www.itrcweb.org/aboutITRC.asp)

Specific Comments and Recommendations

4. Page 1 of the FSP contains a typographical error. The order number should be IS/E-RAO 06/07-004.

5. Page 20 of the FSP proposes *"Use of multi-incremental (MI)/decision unit (DU) sampling will be the primary technique to address the soil data gaps. MI/DU sampling has been developed as a sampling technique to greatly increase sample result confidence and identify possible spill areas".*

   Recommendation
   - MI/DU sampling should not be approved by DTSC for implementation on the RFS project. Propose an alternate approach to address the soil data gaps.

6. Page 20 of the FSP proposes *"The requirement for subsurface sampling will be determined following review of near-surface sampling results".* Contaminant releases at depth may not correlate with detectable results in near surface samples. For example, releases from subsurface utilities, under ground tanks, buried wastes, or discharges to dry wells are not likely to be detected in surface soil samples. Even historical discharges to the ground surface of volatile or very soluble compounds may not be detectable in surface soil samples. Grading activities may also prevent detection of historical surface releases.

   Recommendation
   - The proposal to use *"near-surface sample results"* as decision criteria for investigating releases at depth should not be approved. Also, "Near surface results" may not be an appropriate decision criteria for evaluating contaminant mobility and fate in shallow soils. Decision criteria for evaluating releases at depth and contaminant mobility/fate should be based on an appropriate conceptual site model of the potential release(s).

7. Pages 20 to 24 of the FSP propose *"Decision I Levels"* and *"Decision II Levels"* as a way to apply screening levels to detected contamination. According to the FSP, contaminants found at concentrations less than Decision Level I criteria would result in a no further action decision. Contaminant concentrations greater than Decision Level II criteria would result in more investigation, possibly including removal actions. The significance of concentrations detected between the two levels would be evaluated based on a lines-of-evidence methodology. These decision rules are also incorporated into the data quality objectives (DQOs) section of the FSP.

   Recommendations
   - Although the proposal to identify or develop numerical decision criteria within the FSP addenda is acceptable, the criteria should be applied carefully.

- The lines-of-evidence methodology should incorporate the nature of potential contaminant releases that are under investigation and the associated confidence in sampling locations. For example, sampling locations for potential releases from existing storage tanks or waste lines can be more confidently identified than sampling locations for spill areas related to poor housekeeping or other poorly documented historical practices.

- The Level I pass/fail decision criteria should be amended to apply a lines-of-evidence approach. As discussed above, in areas where historical activities and potential releases are not well documented, analytical results from one or two isolated, discrete samples may represent anything from the highest to the lowest concentrations in an area. In such a case, several surrounding samples should be completed to better understand what the discrete sample results represent.

8. Page 23 of the FSP proposes *using "National Drinking Water Maximum Contaminant Levels (MCL)"* as screening criteria.

   Recommendation
   - If MCLs are used as screening criteria, the lower of federal or state MCLs should be used.

9. Page 25 of the FSP proposes DQOs for soil investigation including *"Step 4: Define the boundaries of the Studies - All reasonably accessible surface soils located within the property boundaries of the RFS."*

   Recommendation
   - The boundaries of the study should be expanded if contamination from the RFS is known or thought to have spread off the RFS property. This determination should be based on an appropriate conceptual site model as well as data collected under this FSP.

10. Page 25 of the FSP proposes DQOs for soil investigation including *"Step 5: Develop Decision Rules - If surface soil contaminants are detected at concentrations at or less than Decision I Levels, then the data confirms that there has not been a contaminant release and no further action is required."*

    Recommendation
    - Level I decisions should incorporate a lines-of-evidence approach as recommended above. Detected concentrations from locations that are confidently expected to be within source or release area should be given more weight than concentrations from areas with little documentation or no obvious release mechanisms.

11. Page 25 of the FSP proposes DQOs for soil investigation including *"Step 5: Develop Decision Rules - If surface soil contaminants are detected as concentrations exceeding Decision II Levels, expand the vertical boundary of the study area to subsurface soils."*

    Recommendation
    - The lateral boundaries may also be expanded in such a case.

12. Page 26 of the FSP proposes DQOs for soil investigation including *"Step 6: Specify performance or Acceptance Criteria - Use of MI/DU sampling will maximize the confidence of confirming or denying the presence of unacceptable hazardous concentrations at each site"* and *"Step 7: Optimize Design for Obtaining Data - The DUs will be sampled using MI sampling and the samples will be sent to the laboratory for analysis."*

    Recommendation
    - The use of MI sampling has not been approved by DTSC for use on the RFS project. Alternate DQOs should be proposed.

13. Page 27 of the FSP proposes DQOs for ground water investigation including *"Step 2: Identify the Goals of the Study – What is the prevailing hydraulic gradient of the groundwater at RFS?"*

    Recommendation
    - The study should identify seasonal or other variations in groundwater flow conditions, in addition to the prevailing hydraulic gradient.

14. Page 27 of the FSP proposes DQOs for ground water investigation including *"Step 4: Define the boundaries of the Study – The study area is all groundwater located within the property boundaries of the RFS."*

    Recommendation
    - The boundaries of the study should be expanded if contamination from the RFS is found to have spread off the RFS property, or if the conceptual site model suggests that releases may have extended off-site.

15. Page 28 of the FSP proposes DQOs for ground water investigation including *"Step 5: Develop the Decision Rules."* Ground water quality including contaminant concentrations may vary seasonally. The variations can be significant resulting in decision criteria being exceeded only seasonally.

    Recommendation
    - Decision rules for ground water should be developed in the FSP addenda.

16. Page 27 of the FSP proposes DQOs for ground water investigation including *"Step 7: Optimize Design for Obtaining Data – Groundwater data gaps will be addressed through collection groundwater grab samples. Grab sample results will be evaluated to determine subsequent optimal placement of piezometers, if necessary."*

    Recommendations

    - Simply collecting shallow grab water samples is not recommended. Prior to, or combined with, collecting shallow grab samples, the site hydrostratigraphy should be investigated to depths below initial target grab sample depths. This is needed to understand the hydrostratigraphic context of the grab samples and the overall site hydrogeology.

    - Completing cone penetrometer surveys and, where VOCs may be present, membrane interface probe surveys are recommended. Such an approach will provide for high resolution stratigraphic and contaminant distribution data needed to support site characterization decisions (such as optimal placement of monitoring wells and/or piezometers).

    - Please insure that the piezometers are designed such that they can provide representative ground water samples because ground water quality will need to be monitored over time to evaluate trends.

17. Pages 28 and 29 propose DQOs for utilities including sewers, fuel lines and hydraulic lines. Passive soil gas sampling is proposed to possibly be followed by active soil gas, soil, and/or ground water sampling. The FSP proposes sampling the main lines beginning at the southern (downstream) part of the site and moving towards building areas and laterals based on the main line results.

    Recommendations

    - Samples should be collected at the building areas (where lines leave the buildings) and where laterals connect to main lines even if main line samples do not exceed screening criteria.

    - If release areas are identified based on detected VOCs, follow-up sampling and analysis should include non-VOC constituents. If no VOC release areas are identified, target areas for non VOCs should be identified based on other criteria.

Linda S. Adams
Secretary for
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Department of Toxic Substances Control

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MEMORANDUM

TO: Lynn Nakashima
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FROM: Kimiko Klein, Ph.D.
Staff Toxicologist
Human and Ecological Risk Division (HERD)

DATE: April 14, 2009

SUBJECT: Draft Field Sampling Workplan
UNIVERSITY OF CALIFORNIA, BERKELEY, RICHMOND FIELD STATION
PCA 11050 Site Code: 201605-00

Background

The University of California Richmond Field Station (UCRFS) is located on about 96 acres of former industrial upland and 56 acres of transition area, Western Stege Marsh, and the outboard area south of the bay trail. Industrial use of the uplands, including the manufacture of blasting caps containing mercury fulminate and a briquette company, 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 engineering research facility. A human health and ecological risk evaluation of the uplands and West Stege Marsh were completed in 2001. Several remedial measures have been implemented since 2002, and include the treatment and transport to the adjacent Zeneca property of mercury contaminated soils, installation of a biologically active permeable barrier (PAPB), installation of a slurry wall between the Zeneca property and the USRFS, and excavation and removal of contaminated sediments from a portion of West Stege Marsh, and backfilling with clean fill to restore California clapper rail habitat. The Human and Ecological Risk Division (HERD) has been requested to provide technical support for this site.

Document Reviewed

The HERD reviewed a document entitled "Draft Field Sampling Workplan, University of California, Berkeley, Richmond Field Station, Richmond, California", dated February 27, 2009, and prepared by Tetra Tech EM Inc. for the Office of Environment, Health and Safety, University of California, Berkeley. This document includes two appendices: Appendix A Quality Assurance Project Plan, and Appendix B Health and Safety Plan. The HERD received this document around March 5, 2009.

General Comments

The HERD reviewed the draft workplan and both appendices. The field sampling workplan is an umbrella workplan for all site investigation activities that will take place. Field sampling addenda will be submitted for specific areas. Therefore, no chemical or area-specific approaches and methods are described, except for the stated preference for the use of multi-increment sampling (MIS) as the primary tool for soil characterization.

A. Multi-increment sampling (MIS) strategy. The HERD has not yet reviewed or accepted data using this technique in any health risk assessment. In addition, the Department of Toxic Substances Control (DTSC) has not yet reviewed or approved the use of this technique for soil investigatory activities. However, the DTSC is currently participating in a review of this sampling strategy with the Interstate Technology and Regulatory Council (ITRC). Until significant issues are resolved regarding the appropriate use of the technique and the suitability of using MIS data in health risk evaluations, the HERD believes this sampling strategy should not be employed at this site. Some questions that need to be resolved include how or under what conditions this strategy may be acceptably used to characterize the release into the environment of volatile organic compounds (VOCs) or chemicals known to migrate in soil due to leaching, the appropriate design and use of this strategy for ecological risk evaluation, and how MIS data may be evaluated to obtain a statistically acceptable 95% upper confidence limit on a mean concentration.

B. Appendix A Quality Assurance Project Plan. A large part of this appendix is a compendium of sampling procedures used in environmental site investigations and, thus, presumably represents the complete potential battery of techniques that may be used at any site. This appendix should be revised to include only those methods most likely to be utilized at this site and to remove those methods that are no longer widely used in site investigation or would not apply to this site.

C. Appendix B Health and Safety Plan. The HERD reviewed only the environmental monitoring and sampling and ambient air monitoring sections and assumes that other DTSC staff have reviewed this appendix in depth.

The HERD has the following specific comments.

Specific Comments

1. Page 10 Section 2.2.1 Soil – Western Stege Marsh. Western Stege Marsh has been identified as a soil data gap, so more information will be collected to determine if surface water and sediment concentrations in the marsh pose risks to humans and ecological receptors. A) Please confirm that data to be collected will include the information necessary, such as wind and wave activity and tidal action exchange and recharge, to develop a site-specific fate and transport model for sediments and contaminants in the marsh. B) Please confirm that sampling will take place in the shallow, saturated zone beneath the depth of previous removal activities in the marsh.

2. Page 11 Section 2.2.2 Groundwater – The Biologically Active Permeable Barrier Wall, and Table 1 Site Prioritization. A) Table 1 lists specific groundwater priorities, identified as GW 1 through 8. A figure should be included that shows the approximate locations of these areas. B) Table 1 indicates that the biologically active permeable barrier (BAPB) will be investigated as GW4 in Phase I of the field sampling, but the soil BAPB area will be investigated as IA3-9 in Phase III. Please explain why these two closely associated areas are being investigated as separate units in different time periods.

3. Page 15 Section 3.2 Soil Migration and Exposure – Exposure to Human Receptors. This discussion of human exposure to environmental contaminants is restricted to workers, without consideration of potential human exposure in a residential scenario. Please confirm that a land use covenant will be in place to prohibit use of the site for residential purposes and that the human health risk assessment to be performed will support the use of such a land use convenant.

4. Page 19 Section 4.2 Strategy, Prioritization, and Data Evaluation – Soil Data Gaps. Soil data gaps are proposed to be addressed through multi-incremental sampling. The lack of soil VOC data on this site is a data gap that the HERD believes cannot be filled using multi-incremental sampling techniques. Where VOCs may be present in soil, the HERD recommends soil gas sampling to be performed.

5. Page 20 Section 4.2 Strategy, Prioritization, and Data Evaluation – Groundwater Data Gaps. Please confirm that the approaches to be used to fill the groundwater data gap will include those that will provide information on the groundwater hydrology of the site.

6. Page 21 Table 1 Site Prioritization; and, Page 22 Figure 4 Soil investigation Areas. A) Table 1 lists investigation areas using Arabic numerals, whereas Figure 4 lists

those areas using Roman numerals. For clarity, use one or the other. B) Figure 4 should be revised to include a brief descriptor for each soil investigation area.

7. Page 23 Section 4.2.3 Data Evaluation – Decision I Levels. Chemical concentrations measured in this proposed site investigation will be compared to generic human and ecological screening criteria. In addition, site data will also be compared to background concentrations where applicable. The general approach to be used to determine local background concentrations should be described in this workplan.

8. Page 23 Section 4.2.3 Data Evaluation – Decision II Levels. Chemical concentrations that are greater than their respective Decision I Levels will be compared to Decision II Levels. Decision II Levels are chemical screening concentrations that have been modified with site-specific parameters, such as "Tier II exposure concentrations". Please define Tier II exposure concentrations.

9. Page 23 Section 4.2.3 Data Evaluation. The text states that areas with concentrations less than or equal to Decision I Levels will not be further investigated. The cumulative screening risk and hazard for all detected chemicals should be calculated before no further action is recommended for a particular area.

10. Page 25 Section 4.3.1 Soil Data Gaps – Step 4: Define the Boundaries of the Studies. Vertical expansion of study areas will take place if surface soils from zero to two feet below ground surface (bgs) are contaminated. For risk assessment purposes, it is necessary to have soil data down to ten feet bgs. For ecological receptors, it may be necessary to have soil data below two feet. For VOCs and chemicals known to be mobile in soils, sampling at depths below two feet will be necessary.

11. Page 25 Section 4.3.1 Soil Data Gaps – Step 5: Develop Decision Rules. A) These proposed decision rules do not address the frequency of detection of specific chemicals. In general, if a chemical is detected in less than or equal to five percent of samples, that chemical may be eliminated as a chemical of concern. B) If a known human carcinogen (an A carcinogen) is detected in only one sample, it must be evaluated in a health risk assessment. These rules would apply to those circumstances where multi-increment sampling will not be used.

12. Page 26 Section 4.3.1 Soil Data Gaps – Step 6: Specify Performance or Acceptance Criteria. Screening Levels will be based on background concentrations, unrestricted and commercial land use California Health Hazard Screening Levels (CHHSLs), and other risk-based values. These screening levels should include ecological screening criteria.

13. Appendix B Health and Safety Plan. Page B-71 Section 8.3 Ambient Air Monitoring. This section summarizes the ambient air monitoring that will be performed during site investigation activities. A) The number of air monitoring stations and/or instruments that will usually be present should be included in this summary. B) The method/instruments to be used to determine upwind and downwind locations during a work day should also be described. C) Detection limits and fence line standards should be briefly discussed in this section.

14. Appendix B Health and Safety Plan. Page B-72 Section 8.4.2 Other Chemicals. Engineering controls are proposed to control emissions of metals, polychlorinated biphenyls (PCBs) and pesticides. The text states that no other chemicals have been identified at this site that may require air monitoring. Site investigatory activities in the mercury fulminate area may require air monitoring instruments for mercury vapors, and this should be so stated.

Conclusions

This draft field sampling plan has very little detail with respect to the specific methods and approaches that will be used in the forthcoming site investigation. There are major deficiencies that must be addressed before the HERD can accept this workplan.

If you have further questions on this memorandum, please contact me at Kklein@dtsc.ca.gov or by telephone at 916 255 6643 or 510 540 3762.

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