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Soil Confirmation and Perimeter Air Monitoring Plan

University of California, Berkeley
Richmond Field Station, Richmond, California

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Prepared for:
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ACRONYMS

bgs	Below ground surface
CFR	Coder of Federal Regulation
COPC	Chemical of Potential Concern
cyds	Cubic yards
DTSC	Department of Toxic Substances Control
EH&S	Environment, Health & Safety
EPA	U.S. Environmental Protection Agency
FPL	Forest Products Laboratory
HI	Hazard index
IDW	Investigation derived waste
LDR	Land disposal restriction
mg/kg	Milligrams per kilogram
mg/m ³	Milligrams per cubic meter
µg/ m ³	Micrograms per cubic meter
µm	Micrometer
mph	Miles per hour
OEHHA	Office of Environmental Health Hazard
PCB	Polychlorinated biphenyl
PDR	Personal data ram
PRG	Preliminary remediation goal
RCRA	Resource Conservation and Recovery Act
REL	Reference exposure level
RFS	Richmond Field Station
SOP	Standard operating procedure
STLC	Soluble threshold limit concentration
SVOC	Semivolatile organic compound
TCLP	Toxicity Characteristic Leaching Procedure
TCRA	Time-Critical Removal Action
UC Berkeley	University of California, Berkeley
UHC	Underlying hazardous constituents
UTS	Universal treatment standards

VOC Volatile organic compound

WET Waste Extraction Test

1.0 INTRODUCTION

The University of California, Berkeley (UC Berkeley) Office of Environment, Health and Safety (EH&S) has prepared this soil confirmation and perimeter air monitoring plan (the “Plan” in accordance with the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC), Site Investigation and Remediation Order, Docket No. ISE-RAO 06/07-004, dated September 15, 2006. This Plan outlines the soil confirmation sampling protocols for conducting the Time Critical Removal Action (TCRA) for the elevated concentrations of arsenic at the former Forest Products Laboratory (FPL), Wood Treatment Laboratory (referred to as “the former laboratory” or “the Site”, of the Richmond Field Station (RFS) in Richmond, California (see Figure 1). The TCRA is described in the “Final Memorandum for a Time-Critical Removal Action at the Former Forest Products Laboratory Wood Treatment Laboratory” (Tetra Tech, EM Inc., 2007).

The soil confirmation sampling will be performed during the TCRA to confirm the limits of the excavation and from the excavated soil to characterize the soil for waste disposal. The air monitoring procedures were developed to protect RFS workers and off-site community from exposure to chemicals of potential concern (COPCs) and to evaluate adequacy of dust control methods being applied by the contractor selected to implement the TCRA.

Soil confirmation sampling activities will be performed in accordance with Tetra Tech EM Inc.’s Health and Safety Plan Addendum for the RFS, dated October 31, 2006.

2.0 CONFIRMATION SOIL SAMPLING

For purposes of this Plan, confirmation soil sampling is defined to mean soil sampling conducted at the extent of the excavation to verify that soil remedial goals identified in the TCRA are achieved. Confirmation soil sampling is anticipated to be conducted on excavation sidewalls and at the bottom of the excavation.

Soil confirmation samples are planned to be collected from the following discrete locations but will be subject to change depending on the configuration of the final excavation: (1) at two locations in the bottom of Excavation Area I [excavation depth to 3.5 feet below ground surface (bgs)] in areas where the highest concentrations of arsenic have been identified, (2) at four locations in the bottom of Excavation Area II (excavation depth to 2 feet bgs) in areas where the highest concentrations of arsenic have been identified, (3) along the mid-point of each excavation sidewall (where the excavation sidewall lengths exceed 40 lineal feet, samples will be collected at a spacing of approximately every 40 linear feet along the length of the excavation sidewalls), and (4) where excavation sidewalls are greater than or equal to four feet high, floor confirmation samples will also be collected every 40 linear feet where the sidewalls and floor of the excavation meet.

Sidewall samples will be collected at the approximate mid-point of the depth of the excavation sidewall; therefore, the sidewall sample elevations will vary depending on the depth of excavation at each sample location.

2.1 Confirmation Soil Sampling Procedures

For excavation areas that are less than four feet deep, the soil surface will be scraped a few inches using a decontaminated trowel or spoon. Discrete confirmation soil samples will be analyzed for metals and semi-volatile organic compounds (SVOC) and will be collected from the sidewalls and bottom of the excavation by either (a) driving a brass or stainless steel liner into the sidewall or bottom or (b) scraping the soil with a decontaminated trowel or spoon into a glass jar. For excavations that extend deeper than four feet, sidewall and bottom soil samples will be collected from a backhoe bucket after the bucket had scraped a clean surface on the area to be sampled. The sample collection procedure will be the same as described above, but will be obtained from the backhoe bucket. Soil sample jars will be labeled and placed in zip-closure plastic bags in a chilled ice chest for transport to the analytical laboratory under chain-of-custody procedures.

Sample confirmation sample collection locations will be clearly marked (e.g. placing wooden stake) and surveyed by a licensed surveyor after sample collection. The surveyor will use prismless survey techniques that will allow the sample locations to be surveyed without entering the excavation.

2.2 Decontamination Procedures

Minimal quantities of investigation-derived waste (IDW) will be generated. All IDW will be placed in the roll-off bins with the excavated soil. Disposable scoops will be used whenever possible. Thorough decontamination and cleaning procedures will be followed during sampling activities to prevent contamination of confirmation samples and the cross contamination between sample locations if dedicated sampling equipment is used. Any dedicated sample equipment that is used will be decontaminated before each use by washing with nonphosphate detergents such as Liquinox or Alconox and deionized water solution. A double tap-water rinse and single deionized-water rinse will follow the detergent wash. Decontaminated dedicated sampling equipment will be allowed to air dry and placed on and wrapped with clean aluminum foil.

Equipment rinsate blanks will be collected from all decontaminated dedicated sample equipment at a frequency of one per day to confirm that sampling equipment was properly decontaminated. After sampling equipment has been decontaminated and air dried, equipment rinsate blanks will be obtained by flushing the surface of the sampling equipment with organic-free reagent-grade water, or its equivalent. Analyses to be completed on the equipment rinsate blanks will be the same as for the analyses identified in Section 2.3 below.

2.3 Confirmation Soil Sample Analysis

Confirmation soil samples will be submitted to a state-certified analytical laboratory for analysis in accordance with U.S. Environmental Protection Agency (EPA) analytical methods. The soil samples will be analyzed using the following methods:

Analysis	U.S. EPA Method
Metals	6010B
Mercury	7471A
SVOCs	8270C

The laboratory reporting limits for these analyses are provided in Appendix A. All analytical results for soil confirmation samples will be reported on a dry-weight basis.

Confirmation soil sampling results will be tabulated and transmitted with a figure showing sampling locations to DTSC to allow for review of confirmation sampling results. The excavation area will be backfilled with clean soil following verbal approval by DTSC.

2.4 Soil Confirmation Sampling Evaluation

Confirmation sampling results will be evaluated to verify soil remedial objectives have been achieved in the designated excavation areas. Completion of excavation will be evaluated on the basis of removing all soils with concentrations of arsenic greater than the not to exceed project-specific remediation goal of 16 milligrams per kilogram (mg/kg). Individual arsenic soil sample results will be compared directly to the project-specific remediation goal. If a chemical concentration in a single soil sample exceeds the applicable remediation goal, additional excavation will be performed in that area.

2.5 Import Fill Material

UC Berkeley will consult with DTSC and follow DTSC’s fact sheet “Information Advisory, Clean Imported Fill Material”, dated 2001, to identify a suitable source of clean backfill that is approved by DTSC.

2.6 Waste Characterization

Waste characterization soil sampling for the TCRA excavation area will include samples collected during site characterization activities prior to the TCRA activities and from samples collected from excavated soil that will be placed in roll-off bins. Based on the current estimate of soil that will be excavated under the TCRA, it is expected that one, four-point composite sample will be collected from the excavated soil and submitted for chemical analysis for waste soil characterization purposes. Landfills typically require one, four-point composite sample per 750 cyds of soil.

As outlined in the TCRA, the surface concrete and asphalt removed during excavation activities will be segregated from the excavated soil and placed on and covered with visquene or similar material. Asphalt pavement will also be removed by the Contractor in areas surrounding the excavation so that a new building that will be constructed as part of the new RFS corporation yard. Asphalt that is removed from areas outside of the excavation footprint will be segregated separately from the asphalt and concrete that is removed from within the excavation footprint. Each of the segregated asphalt and concrete stockpiles will be sampled by collecting a 15-point increment composite sample and submitted for chemical analysis for waste debris characterization purposes.

Waste characterization samples will be submitted to a state-certified analytical laboratory for analysis in accordance with EPA analytical methods. The waste characterization samples will be analyzed using the following methods:

Analysis	U.S. EPA Method
Metals	6010B
Mercury	7471A
SVOCs	8270C

Any metal or SVOC concentrations exceeding 10 times the soluble threshold limit concentration (STLC) criterion will be subjected to the Waste Extraction Test (WET) with the leachate being analyzed for that metal or SVOC. Soil samples with soluble concentrations exceeding the STLC will be classified as a non- Resource Conservation and Recovery Act (-RCRA) hazardous waste for disposal purposes and transported to an appropriately permitted landfill facility.

Any metal or SVOC concentrations exceeding 20 times the RCRA regulatory criterion will be subjected to the Toxicity Characteristic Leaching Procedure (TCLP) with the leachate being analyzed for that metal or SVOC. Soil samples with soluble concentrations exceeding the RCRA regulatory level will be classified as RCRA hazardous waste for disposal purposes and transported to an appropriately permitted landfill facility. The remaining soil will be classified as Class II non-hazardous.

According to 40 Code of Federal Regulations (CFR) Section 268.48, characteristic hazardous waste must meet Land Disposal Restriction (LDR) treatment standards before being eligible for land disposal. Underlying hazardous constituents (UHC) must also be treated in order to meet contaminant specific levels. These levels are referred to as the universal treatment standards (UTSs) and are listed in 40 CFR Section 268.48. If soil is classified as a characteristic RCRA hazardous waste, other contaminants found in the soil must meet the UTSs prior to disposal. If sample results from waste characterization indicate that the waste is a RCRA characteristic hazardous waste, the waste will be analyzed for other potential UHCs that have been detected at the site. The analytical results for the potential UHCs will be compared to their respective UTSs to determine if treatment is required prior to land disposal.

The Contractor will be responsible for coordinating and determining all necessary and required additional waste characterization requirements with the selected disposal facility and for performing any and all additional landfill-required waste characterization to allow off-site disposal in accordance with the prices provided in the Contractor's bid.

3.0 SOIL CONFIRMATION SAMPLE LABELING AND CHAIN-OF-CUSTODY

This section describes standard operating procedures for sample chain-of-custody. The purpose of these procedures is to assure that the integrity of the soil samples are maintained during their collection, transportation, and storage prior to analysis. Each sample will be labeled and properly sealed immediately after collection. Sample tracking documents will be prepared so that chain-of-custody records can be maintained and sample disposition can be controlled. Forms and labels will be filled out with waterproof ink. Sample identification documents will include a daily field activity log, a sample label, and chain-of-custody records. Such records will be prepared during each sampling activity.

Each sample label will include the following information:

- Client and project number,
- Sample location,
- Unique field identification number or sample identification number (e.g WTA-CONF-1, etc.),
- Date and time sample collected,
- Name or initials of sample collector, and
- Analyses requested.

Each chain-of-custody record will include the following information:

- Client and project number,
- Site name,
- Name or initials of sample collector,
- Field identification number or sample identification number for each sample,
- Laboratory sample number for each sample,
- Date and time sample collected for each sample,
- Preservative used (if any) for each sample,
- Sample matrix of each sample,
- Type of sample container used for each sample,
- Any filtering performed or requested, if applicable,
- Analyses requested for each sample,
- Name of the destination laboratory,
- Signatures of all persons involved in possession of the samples; that is, "relinquished by" and "received by",
- Dates and times of transfers of sample possession, and

- Any remarks by either sample collector or laboratory.

Samples will always be accompanied by a chain-of-custody record. When transferring samples to the analytical laboratory, the individuals relinquishing and the individuals receiving the samples will sign, date, and note the time on the chain-of-custody record. A separate chain-of-custody record will accompany each transfer of samples. The method of shipment and courier name will be entered on the chain-of-custody records.

4.0 PERIMETER AIR MONITORING

During implementation of the TCRA, there is the possibility that minor amounts of dust will be released into the air during excavation activities. Dust emissions will be minimized by spraying water onto the excavation area to eliminate visible dust and excavated soil will be placed and stored in covered roll-off bins to minimize wind-borne dust.

Air monitoring will be performed at the fenced perimeter of the construction site to verify that dust control measures are adequate. The Contractor will be issued a verbal notification (and documented in daily field reports) to stop work if air monitoring shows that perimeter action levels for dust are exceeded.

Real-time air monitoring of total dust will be performed using real-time aerosol monitors [MIE Personal Data Rams (PDR)] with data loggers to provide immediate information for the total dust levels present. The lower detection limit for the operating range of the PDR is 0.001 milligrams per cubic meters (mg/m^3). The particle size maximum range of response for the PDR is 0.1 to 10 micro meters (μm). The PDRs will be checked approximately every hour during the work day by an on-site UC Berkeley representative to verify equipment operation and compliance with the target action levels. Data will be downloaded into a computer daily and will be posted on the RFS Environmental Website (<http://rfs.berkeley.edu>) within two working days.

The PDRs will be positioned along the excavation fence line at locations most likely to be in the direction of off-site dust migration from the excavation depending on the wind direction on the day and time of work. Two PDRs will be placed at a height of five feet on fences in the downwind direction to monitor for dust being generated in the excavation and one PDR will be placed upwind of the excavation to measure ambient dust concentrations.

Wind speed and direction will be continuously monitored using a portable calibrated wind sock. Wind speed will also be measured every hour using a hand-held anemometer and the readings recorded in the daily field notes. The Contractor will be notified verbally (and documented in the daily field notes) to stop work if the sustained wind speed exceeds 15 miles per hour (mph) (sustained for 15 minutes).

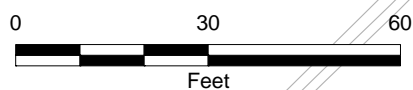
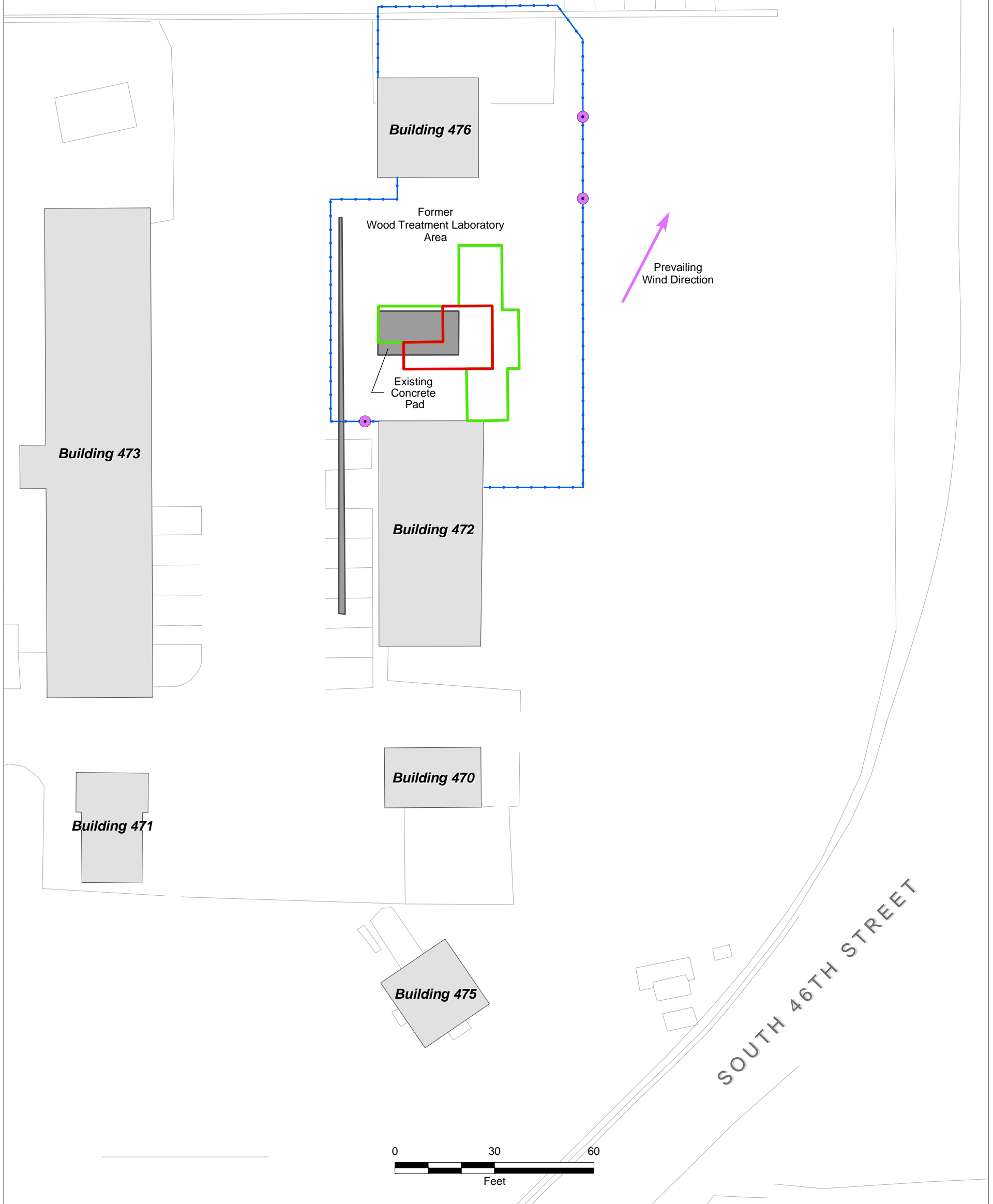
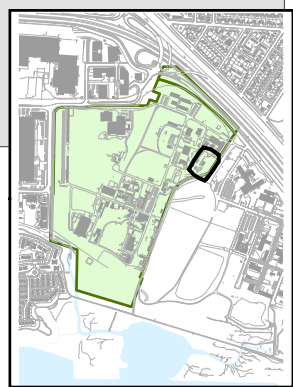
UC Berkeley has calculated an action level of $0.025 \text{ mg}/\text{m}^3$ dust concentration as measured by the PDRs along the fence lines outside of the excavation area. This action level is protective of the most sensitive receptors including children, elderly, and the ill. This fence-line action level was established using the following criteria:

- Chemicals detected in soils during previous investigations were reviewed to determine those that are present in soils at concentrations exceeding residential preliminary remediation goals (PRG) and could be potentially associated with an adverse health risk if released into the air as dust. Based on this review, arsenic was the only analyte that is present at concentrations exceeding the PRGs.
- A hypothetical worst-case dust concentration that an individual located outside of the excavation area could be exposed was calculated by assuming all dust released from the excavation contained the maximum concentration of arsenic found during investigations, 1,300 mg/kg. A majority of the soil in the proposed excavation area contains arsenic at much lower concentrations with an overall average concentration of approximately 170 mg/kg. The dust concentration at which the hazard index (HI) equals 1 to an exposed individual relative to the California Office of Environmental Health Hazard Assessment (OEHHA) noncancer chronic reference exposure level (REL) for arsenic of 0.03 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) equals $0.025 \text{ mg}/\text{m}^3$ (OEHHA 2000). Exposures with an HI less than 1 are considered to be not significant. Note: the chronic RELs are concentrations or doses at or below which adverse health effects are not likely to occur. They are designed to protect the individuals who live or work in the vicinity of emissions of these substances. Chronic RELs are intended to protect individuals with low susceptibility for chemical injury as well as identifiable sensitive subpopulations (high-risk individuals) from adverse health effects (OEHHA 2000).

5.0 REFERENCES

OEHHA 2000. "Air Toxics Hot Spots Program Risk Assessment Guidelines, Part III, Technical Support Document for the Determination of Noncancer Chronic Reference Exposure Levels." February.

Tetra Tech, EM Inc. 2007. "Final Memorandum for a Time-Critical Removal Action at the Former Forest Products Laboratory Wood Treatment Laboratory." August 24.



- Buildings
 - Construction Fence Lines
 - Site Features
- Proposed Excavation Areas
- Area I (Excavation depth 3.5 feet)
 - Area II Excavation depth 2.0 feet)

- Perimeter air monitoring location. Actual monitor locations will be based on the wind direction. Two monitors will be sited downwind of the excavation and one monitor sited upwind of the excavation

**Richmond Field Station
University of California at Berkeley**

**FIGURE 1
VICINITY MAP SHOWING
TCRA BOUNDARIES AND
CONSTRUCTION FENCE LINES**

APPENDIX A

Laboratory Reporting Limits for Curtis and Tompkins Analytical Laboratory

CA Title 22 Metals (EPA Method 6010B/7400)

CAS #	Element	Symbol	Reporting Limit	
			(ug/L)	(mg/kg)
7440-36-0	Antimony	Sb	10	3
7440-38-2	Arsenic	As	5	0.25
7440-39-3	Barium	Ba	5	0.5
7440-41-7	Beryllium	Be	2	0.1
7440-43-9	Cadmium	Cd	5	0.25
7440-47-3	Chromium	Cr	5	0.5
7440-48-4	Cobalt	Co	5	1
7440-50-8	Copper	Cu	5	0.5
7439-92-1	Lead	Pb	3	0.15
7439-97-6	Mercury	Hg	0.2	0.02
7439-98-7	Molybdenum	Mo	5	1
7440-02-0	Nickel	Ni	5	1
7782-49-2	Selenium	Se	10	0.25
7440-22-4	Silver	Ag	5	0.25
7440-28-0	Thallium	Tl	10	0.25
7440-62-2	Vanadium	V	5	0.5
7440-66-6	Zinc	Zn	20	1

Semivolatile Organics (EPA 8270)

CAS #	Compound	Water RL (ug/L)	Soil RL ug/Kg
83-32-9	Acenaphthene	10	67
208-96-8	Acenaphthylene	10	67
120-12-7	Anthracene	10	67
103-33-3	Azobenzene	10	330
56-55-3	Benzo(a)anthracene	10	67
50-32-8	Benzo(a)pyrene	10	67
205-99-2	Benzo(b)fluoranthene	10	67
207-08-9	Benzo(k)fluoranthene	10	67
191-24-2	Benzo(g,h,i)perylene	10	67
65-85-0	Benzoic acid	50	1,700
100-51-6	Benzyl alcohol	10	330
111-91-1	bis(2-Chloroethoxy)methane	10	330
111-44-4	bis(2-Chloroethyl)ether	10	330
108-60-1	bis(2-Chloroisopropyl)ether	10	330
117-81-7	bis(2-Ethylhexyl)phthalate	10	330
101-55-3	4-Bromophenyl-phenylether	10	330
85-68-7	Butylbenzylphthalate	10	330
106-47-8	4-Chloroaniline	10	330
59-50-7	4-Chloro-3-methylphenol	10	330
91-58-7	2-Chloronaphthalene	10	330
95-57-8	2-Chlorophenol	10	330
7005-72-3	4-Chlorophenyl-phenylether	10	330
218-01-9	Chrysene	10	67
53-70-3	Dibenz(a,h)anthracene	10	67
132-64-9	Dibenzofuran	10	330
95-50-1	1,2-Dichlorobenzene	10	330
541-73-1	1,3-Dichlorobenzene	10	330
106-46-7	1,4-Dichlorobenzene	10	330
91-94-1	3,3'-Dichlorobenzidine	20	670
120-83-2	2,4-Dichlorophenol	10	330
84-66-2	Diethylphthalate	10	330
105-67-9	2,4-Dimethylphenol	10	330
131-11-3	Dimethylphthalate	10	330
84-74-2	Di-n-butylphthalate	10	330
534-52-1	4,6-Dinitro-2-methylphenol	20	670
51-28-5	2,4-Dinitrophenol	20	670
121-14-2	2,4-Dinitrotoluene	10	330
606-20-2	2,6-Dinitrotoluene	10	330
117-84-0	Di-n-octylphthalate	10	330
206-44-0	Fluoranthene	10	67
86-73-7	Fluorene	10	67
118-74-1	Hexachlorobenzene	10	330
87-68-3	Hexachlorobutadiene	10	330
77-47-4	Hexachlorocyclopentadiene	20	670
67-72-1	Hexachloroethane	10	330
193-39-5	Indeno(1,2,3-cd)pyrene	10	67
78-59-1	Isophorone	10	330
91-57-6	2-Methylnaphthalene	10	67
95-48-7	2-Methylphenol	10	330
1319-77-3	4-Methylphenol (coelutes w/ 3-)	10	330
88-74-4	2-Nitroaniline	20	670
99-09-2	3-Nitroaniline	20	670
100-01-6	4-Nitroaniline	20	670
88-75-5	2-Nitrophenol	20	670
100-02-7	4-Nitrophenol	20	670

CAS #	Compound	Water RL (ug/L)	Soil RL ug/Kg
621-64-7	N-Nitroso-di-n-propylamine	10	330
62-75-9	N-Nitrosodimethylamine	10	330
86-30-6	N-Nitrosodiphenylamine	10	330
91-20-3	Naphthalene	10	67
98-95-3	Nitrobenzene	10	330
87-86-5	Pentachlorophenol	20	670
85-01-8	Phenanthrene	10	67
108-95-2	Phenol	10	330
129-00-0	Pyrene	10	67
120-82-1	1,2,4-Trichlorobenzene	10	330
95-95-4	2,4,5-Trichlorophenol	10	330
88-06-2	2,4,6-Trichlorophenol	10	330