Final

Phase II
Field Sampling Plan

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

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Prepared for
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Appendix

A RESPONSE TO COMMENTS

Attachment

1 PHOTOGRAPH LOG

ACRONYMS AND ABBREVIATIONS

AST	Aboveground storage tank
Bay Trail	East Bay Regional Parks District's Bay Trail
bgs	Below ground surface
CCR	Current Conditions Report
CHHSL	California Human Health Screening Level
COPC	Chemical of potential concern
CSM	Conceptual site model
DQO	Data quality objectives
DTSC	Department of Toxic Substances Control
EERC	Earthquake Engineering Research Center
EPA	U.S. Environmental Protection Agency
FSP	Field Sampling Plan
FSW	Field Sampling Workplan
HSP	Health and Safety Plan
IDW	Investigation-derived waste
MS/MSD	Matrix spike/matrix spike duplicate
Order	DTSC Site Investigation and Remediation Order No. IS/E-RAO 06/07-004
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PID	Photoionization detector
ppm	Parts per million
QAPP	Quality Assurance Project Plan
QC	Quality control
RI/FS	Remedial Investigation/Feasibility Study
RFS	Richmond Field Station
RSL	Regional Screening Level
SVOC	Semivolatile organic compound
Tetra Tech	Tetra Tech EM Inc.
TPH	Total petroleum hydrocarbons
TPH-e	Total extractable petroleum hydrocarbons
TPH-p	Total purgeable petroleum hydrocarbons
TSCA	Toxic Substances Control Act
UC	University of California
VOC	Volatile organic compound

1.0 PROJECT DESCRIPTION

The University of California (UC), Berkeley, prepared this Field Sampling Plan (FSP) in response to the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC), Site Investigation and Remediation Order No. IS/E-RAO 06/07-004 (Order). In response to the Order, UC Berkeley prepared a Current Conditions Report (CCR) (Tetra Tech EM Inc. [Tetra Tech] 2008). The final CCR, dated November 21, 2008, provided a comprehensive summary of current conditions at the Richmond Field Station (RFS) in accordance with the DTSC Order, including the 96 acres of upland and 13 acres of tidal marsh and transition habitat. This FSP implements Phase II of the sampling strategy proposed in the RFS Field Sampling Workplan (FSW), dated June 2, 2010.

1.1 PHYSICAL SETTING

The RFS is located at 1301 South 46th Street, Richmond, California, along the southeastern shoreline of the City of Richmond on the San Francisco Bay and northwest of Point Isabel (see Figure 1). It consists of upland areas developed for academic teaching and research activities, an upland remnant coastal terrace prairie, a tidal salt marsh, and a transition zone between the upland areas and marsh. Between the late 1800s and 1948, several companies, including the California Cap Company, manufactured explosives at the RFS. In 1950, The UC Regents purchased the property from the California Cap Company. UC Berkeley initially used the RFS for research for the College of Engineering; later, it was also used by other campus departments.

The RFS is described in terms of types of habitat because future uses and potential receptors vary by the type of habitat available. Three habitat type areas have been identified at RFS: (1) the Upland Area, (2) the Transition Area, and (3) the Western Stege Marsh (see Figure 2).

The Upland Area consists of 96 acres of land bounded by Meade Street to the north, South 46th Street to the east, the Transition Area to the south, and Meeker Slough and Regatta Boulevard to the west. The Transition Area occupies approximately 5.5 acres and is bounded to the north by the Upland Area at the location of a buried, former seawall that is believed to have been the edge of the historic mudflats, and to the south by Western Stege Marsh at the 5-foot elevation upper extent of the marsh (National Geodetic Vertical Datum 29). The Transition Area is believed to consist entirely of artificial fill placed on historic mudflats. Western Stege Marsh occupies approximately 7.5 acres and is bounded by the Transition Area to the north, the RFS connector trail to the East Bay Regional Park District Trail (Bay Trail) and Eastern Stege Marsh to the east, the Bay Trail to the south, and Meeker Slough and Marina Bay housing development to the west (see Figure 2). The proposed Phase II sampling locations are all located in the Upland Area.

The RFS consists of a number of distinct and varied habitats resulting from both natural and manmade activities. The Upland Area consists of numerous research facilities, with their associated out-buildings surrounded by landscaped trees and plants. The eastern and central portions of the Upland Area are largely developed and few natural ecological conditions exist. The western portion of the Upland Area contains one of the largest and best-preserved remaining areas of native coastal grasslands once prevalent throughout the San Francisco Bay Area, referred to as the Coastal Terrace Prairie (see Figure 2). The Transition Area and small patches to the southwest of the EPA Laboratory consist of mainly coastal scrub and mixed ruderal scrub. Most of the coastal scrub habitat in the Transition Area is disturbed and intermixed with non-native invasive grasses and forbes. The southern portion of the RFS is the least developed and consists of a low salt marsh, middle salt marsh, high salt marsh, and tidal wetlands. The plants observed in this area include both native and non-native species and attract a variety of special-status species birds such as the California clapper rail (Rallus longirostris obsoletus). No sampling will occur in the three main areas of ecological interest: the Coastal Terrace Prairie, Transition Area, and Western Stege Marsh.

1.2 INVESTIGATION PURPOSE

Section 5.3.1 of the Order required preparation of a FSW to conduct site investigations in order to address data gaps identified in the CCR that warrant additional characterization or evaluation at the RFS. The FSW, dated June 2, 2010, outlined five phases of planned field investigations to address these data gaps. The FSW was intended as a site-wide document to cover all phases of the investigation and included a site-wide project background, objectives, conceptual site model (CSM), schedule for investigating the RFS, a Quality Assurance Project Plan (QAPP), and a facility-wide Health and Safety Plan (HSP).

The FSW was also intended as the FSP for Phase I, a site-wide groundwater investigation. The Phase I FSW field effort consisted of the installation and sampling of 51 piezometers throughout the RFS (see Figure 3). Data collected from the installed and developed piezometers included chemical groundwater samples, geology, and depth to water measurements, and was used to develop a hydrogeologic model of the site, and improve the understanding of overall site-wide groundwater quality.

An evaluation of the results from the Phase I groundwater sampling data did not identify immediate or potential threats to human health or the environment; however, continued seasonal monitoring is required prior to any final site conclusions are determined.

As a follow-up to the Phase I investigation, several data gaps identified in the CCR were identified as the scope of Phase II. Consistent with the phased approach for the site-wide investigation laid out in the FSW, this FSP outlines the sampling strategy for Phase II, which includes the investigation of current and former transformer locations, the Corporation Yard along the eastern property boundary, and above ground storage tanks (AST). This sampling plan includes site-specific background and history, purpose for sampling, data quality objectives (DQO), sample locations, site-screening level methodology, and chemicals of potential concern (COPC) for the Phase II investigation.

Site-specific sampling strategies for remaining soil and utility data gaps outlined in the CCR and FSW will be included in subsequent phase FSPs. The proposed scopes for upcoming phases will be based on updated sampling information from Phase I and II.

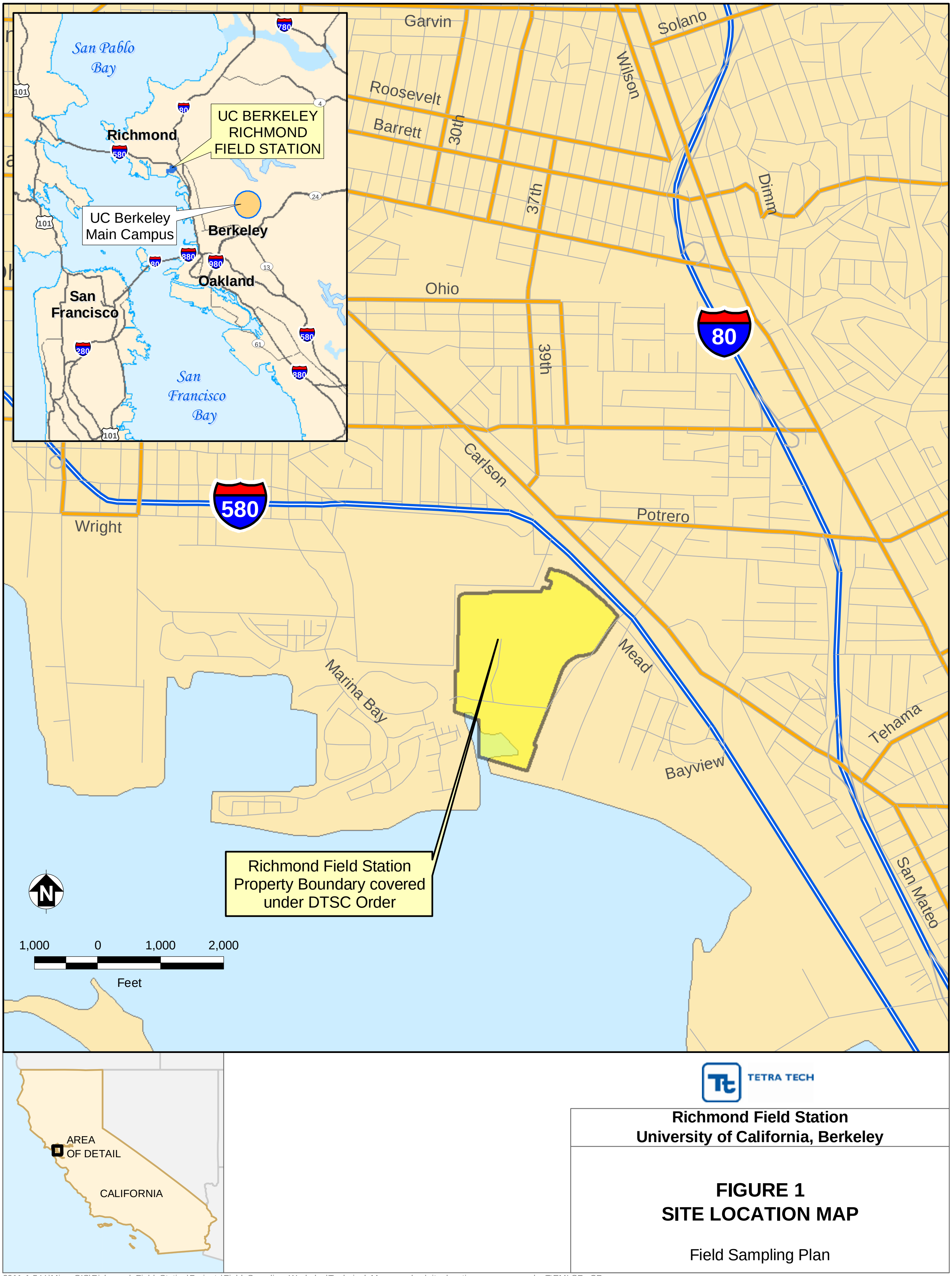

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FIGURE 1
SITE LOCATION MAP

Field Sampling Plan

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Bay Trail
Meeker Slough
Western Stege Marsh
Transition Area (Including Bulb)
Upland

Property Boundary
Approximate Property Boundary

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FIGURE 2
SITE MAP

Field Sampling Plan

Notes:

EBRPD	East Bay Regional Parks District
EERC	Earthquake Engineering Reseach Center
EPA	Environmental Protection Agency
NRLF	Northern Regional Library Facility
RFS	Richmond Field Station

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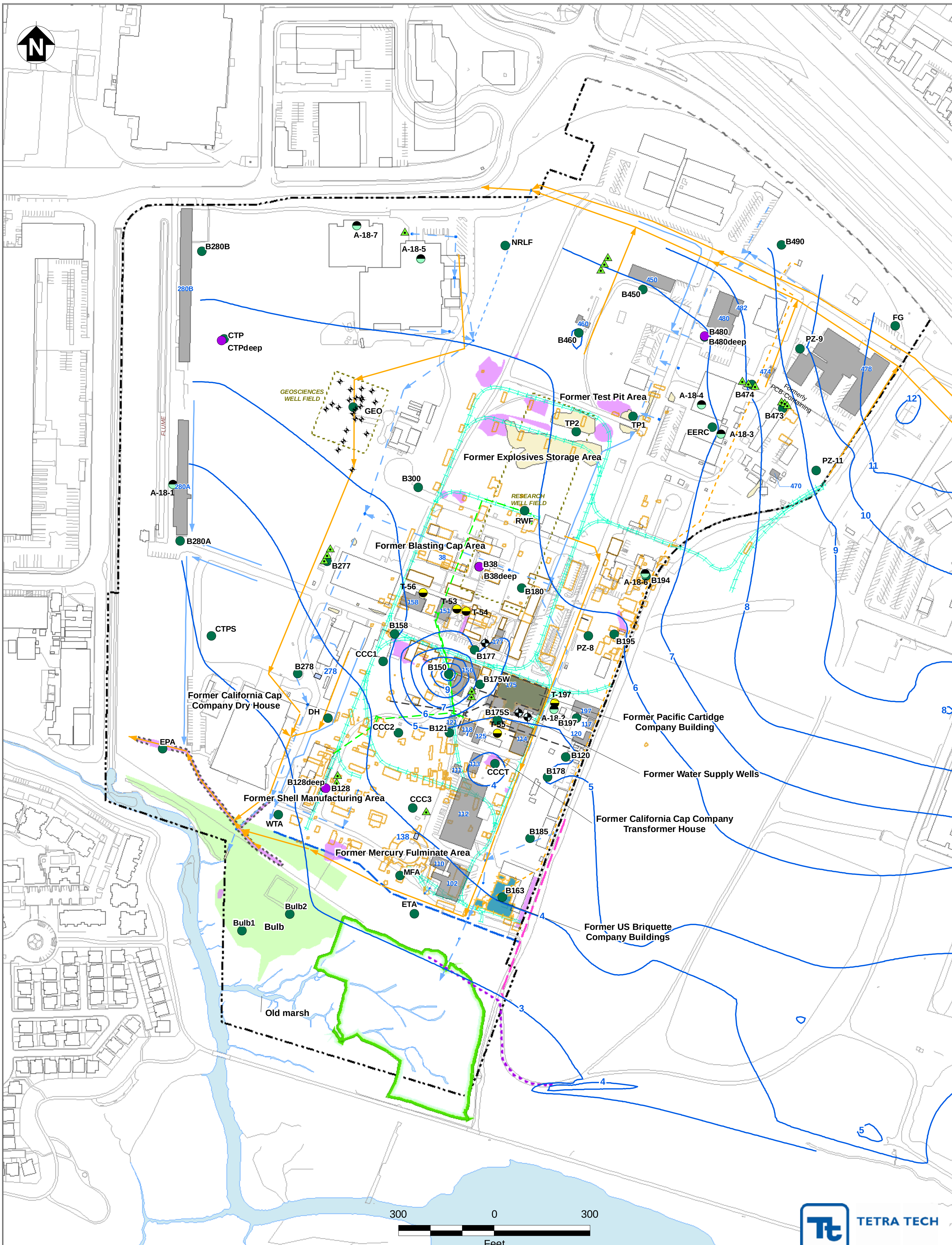

Data Gaps Indentified in the Current Conditions Report

- Existing Buildings Identified as Data Gaps
- Removed Buildings Identified as Data Gaps
- Former California Cap Company Facilities/Buildings
- Former Pacific Cartridge Company Buildings
- Former U.S. Briquette Company Building
- Remediated Areas
- Known Pyrite Cinders Area
- Suspected Pyrite Cinders Area
- Western Transition Area
- Remediated Marsh
- Well Field Boundary

- Former California Cap Company Tramway

Former California Cap Company Utilities:

- Fuel Line
- Hydraulic Line

Sanitary Sewer Lines:

- Existing Sewer Line
- Abandoned Sewer Line

Storm Drain Lines:

- Open Swale
- Underground Culvert
- Underground Culvert, Abandoned (Grouted at Manholes)

- BAPB Wall
- Former Seawall (Approximate)
- Slurry Wall
- Former Underground Storage Tank (UST)
- Aboveground Storage Tank (AST)
- Open Well (Not in Use)
- Geoscience Well
- Transformer Location

Site Features

- Property Boundary
- Approximate Property Boundary
- Road Perimeter or other Landscape Feature
- Surface Water
- Groundwater Elevation Contour (in feet) Nov 2010
- Existing Piezometer Location (shallow)
- Existing Piezometer Location (deep)

Richmond Field Station
University of California, Berkeley

FIGURE3
DATA GAPS MAP

Field Sampling Plan

Notes:
Some locations are approximate.

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2.0 SUMMARY OF SITE HISTORY AND PREVIOUS INVESTIGATIONS

Section 2 presents a summary of previous investigations performed at RFS in the areas included in Phase II. Site-wide sampling results of previous investigations, documented through November 21, 2008, are presented in detail in the CCR (Tetra Tech 2008). The data gaps addressed in this Phase II FSP include transformer locations and the California Cap Company transformer house; the Corporation Yard, including Buildings 117, 120, and 197; and ASTs.

2.1 PCB-CONTAINING TRANSFORMERS

Electrical power distribution equipment currently present on the RFS contains only non-polychlorinated biphenyl (PCB)-containing dielectric fluids. Previously, PCB-containing transformers have been present on the RFS property; these transformers were either replaced or retrofitted in the late 1980s and early 1990s. There is documentation of the retrofits with the RFS Facilities Department and additional information about the removal and retrofits, as well as general knowledge about the transformers and other PCB-containing electrical equipment, was gathered during interviews with current and former employees of the RFS.

RFS transformers are either pole mounted, placed together on elevated platforms, or pad-mounted. Most of the retrofits and routine maintenance operations occurred at the former transformer locations and created the potential for spills at the transformer locations. While there are no records of PCB leaks or spills during either of these activities, shallow soil samples will be collected in the areas where the former PCB-containing transformers were located and/or retrofitted to confirm or deny if releases have occurred. From interviews with RFS employees, one event which may have resulted in a release did occur. At the elevated platform east of Building 128, lightning struck a transformer which had PCB-containing dielectric fluid at the time (UC Berkeley 2006b).

In addition to the RFS transformer locations, a 'transformer house' was identified on Sanborn maps during the time when the California Cap Company operated on the property. No sampling has been performed in this area and it is unknown what equipment was in the building; therefore, it is included in the Phase II FSP.

Groundwater samples were collected in the vicinity of, and downgradient of, many of the historic transformer locations as part of the Phase I site-wide groundwater investigation. Piezometer locations were chosen to assess if historic transformers had any impacts on shallow groundwater. All PCB results collected as part of the Phase I investigation came back as non-detect.

2.2 CORPORATION YARD

The Corporation Yard is located in the southeast portion of the RFS near Building 120 and is used for RFS facilities maintenance. RFS staff have historically used this area for material storage, including seismic engineering test specimens; large concrete bins of sand, gravel, and other construction materials; and large maintenance equipment including tractors, lawn mowers, lift equipment, and the facility trash compactor.

Many current and historical research facilities that used or stored hazardous chemicals at RFS were identified as data gaps in the CCR. Although there have been spills reported in the vicinity of Building 120, limited or no soil sampling has occurred in these areas. Buildings 117 and 197 have no records of spills, but were historically and are currently used for chemical storage. From the 1960s to the early 1980s, an incinerator was located near Building 120 which was used to burn office trash. The incinerator was dismantled and sold to a scrap dealer at which point Building 120 was converted to a storage building. The areas around Buildings 120 and 197 were also identified in a 1989 inspection as areas where unlabeled drums were stacked and should be sampled (Ensco Environmental Services, Inc. 1989). Sampling points around these buildings have been proposed to assess whether historic activities affected the soil in this area.

Twelve borings are proposed with varying sampling depths above the groundwater table (see Section 3.3.2). During the Phase I groundwater sampling, four piezometers were installed in the Corporation Yard. Volatile organic compounds (VOC) were detected in the shallow groundwater (Tetra Tech 2011); therefore, soil samples will be collected to help identify or deny if there is a source of VOC contamination to groundwater.

2.3 ASTs

Three ASTs are used to hold fluids for teaching and research laboratories (see Figure 3). Tank A-18-1, installed in 1996 and located on the west side of Building 280A, is a 1,500-gallon double walled SuperVaultTM tank that used to contain diesel fuel, but is currently empty. Tank A-18-3, installed in 1969 and located at Building 421, is a 2,000-gallon single-walled steel tank that contains hydraulic fluid used to operate equipment in the Earthquake Engineering Research Center (EERC). Tank A-18-4, installed in 1965 and located at Building 484, consists of two linked tanks containing a maximum of 1,000 gallons of hydraulic fluid used to operate equipment in the Structural Test Laboratory (Tetra Tech 2008).

Four ASTs are used to store fuels for RFS facilities' operations (see Figure 3). Tank A-18-2, installed in 1997 in the Corporation Yard, is a 1,500-gallon double-walled SuperVaultTM tank that stores gasoline for fueling RFS maintenance vehicles. The three remaining tanks contain diesel fuel used to power emergency generators and a fire suppression water pump. Tank A-18-5, installed in 1982, is a 120-gallon single-walled steel tank located at Building 400 and supplies fuel to the fire suppression system pressure booster engine. Tank A-18-6, installed in 2004 in Building 400, is a 110-gallon double walled steel belly tank attached to a diesel powered emergency electrical generator. Tank A-18-7, installed in 2005, is a 110-gallon double-walled steel belly tank attached to a diesel powered emergency electrical generator for Building 194 (Tetra Tech 2008).

The ASTs are all in good condition and there have been no reports of releases from the ASTs; however, no site-specific sampling data are available for the vicinity of the tanks to confirm or deny whether releases have occurred there. During a site walk conducted with DTSC staff on May 12, 2011, it was confirmed that there is no staining or evidence of a spill at the AST locations (see Attachment 1). Phase I piezometer locations were placed downgradient of AST locations to assess whether any AST could have had an impact on shallow groundwater. The Phase I sampling results for total petroleum hydrocarbons (TPH) in groundwater throughout RFS ranged from non-detect to 77 micrograms per liter (μg/L) (Tetra Tech 2010). As a result, no soil sampling is proposed at these ASTs and they are recommended for elimination as data gaps pending completion of Phase I seasonal groundwater monitoring.

Visibly-stained surface soil along a hydraulic fluid pipeline has been identified at the above ground portion of piping at the EERC associated with Tank A-18-3. Phase II will include collecting surface and subsurface soil samples in the area of the stained soil in the vicinity of the pipeline to assess if the underlying soil has been adversely affected.

3.0 PHASE II SAMPLING DESIGN

This section discusses the purpose of the transformer, Corporation Yard, and AST investigations; DQOs; and sampling process design.

3.1 PURPOSE OF INVESTIGATION

Results from Phase II sampling will allow UC Berkeley to recognize areas where historic activities may have adversely impacted soil conditions at the RFS. Based on a review of the data gaps described in Section 2 and a May 12, 2011 site walk with DTSC staff, sampling locations have been specified at strategic locations to determine potential impacts to surface soil from previous site activities.

Areas where transformers were historically located could have PCB contamination in the shallow soil due to spills when transformer oil was either maintained or removed. The sampling plan addresses the concerns of a potential direct release to soil. Although there is no documentation of spills and some oil-filled transformers were not documented as PCB-containing, all areas where an oil-filled transformer was located will be sampled.

The Corporation Yard has been used by the RFS Facilities Maintenance Department for chemical and equipment storage. In the 1989 Ensco Environmental Services, Inc. report, there is documentation of drums stacked near Building 120. This sampling plan addresses concerns of a potential direct release to soil which could have migrated to groundwater.

The on-site ASTs are in good condition and there is no documentation of spills associated with the ASTs. A photographic log included as Attachment 1 depicts the current status of each AST. The ASTs are not proposed for sampling. The area of stained soil beneath the hydraulic fluid line at EERC will be sampled to characterize the area.

3.2 DATA QUALITY OBJECTIVES

DQOs are intended to help ensure collection of data appropriate for support of defensible decisions. The DQO process is a seven-step iterative approach to prepare plans for environmental data collection activities. It is a systematic approach for defining the criteria that a data collection design should satisfy, including when, where, and how to collect samples or measurements; determining tolerable decision error rates; and identifying the number of samples or measurements that should be collected (EPA 2006). The seven steps for DQO development are defined in the QAPP (Tetra Tech 2010). The DQOs for the Phase II FSP are outlined below.

Step 1: State the Problem.

- No site-specific soil sampling data are available for historic transformer locations, the Corporation Yard, and current ASTs at the site; all of which have been identified as data gaps in need of additional characterization to assess whether historic activities have impacted soil conditions at the RFS.
- Additional characterization is needed to improve understanding of soil quality for specific locations of known or possible contamination, such as the Building 128

transformer location, the area surrounding Building 120, and the soil beneath the hydraulic fluid pipeline at the EERC.

- If contaminants are present in soil, exposure to human and ecological receptors is possible.

Step 2: Identify the Goals of the Study

- Characterize soil conditions at the historic transformer locations, Corporation Yard, and EERC AST piping.
- Determine if metals, PCBs, VOCs, semivolatile organic compounds (SVOC), polycyclic aromatic hydrocarbons (PAH), pesticides, or other contaminants are present within the study area(s) in quantities or concentrations that would require inclusion of the area into the remedial investigation/feasibility study (RI/FS), evaluation of remedial action, or require an immediate response.

Step 3: Identify Information Inputs

- Information provided within historical documents including the CCR and FSW.
- Interviews of current and former employees.
- Previously conducted sampling locations and concentrations.
- Findings and observations identified during the May 12, 2011 site reconnaissance with DTSC.

Step 4: Define the Boundaries of the Study

- The Phase II FSP study area includes locations of historically oil-filled transformers, the Corporation Yard, and the EERC courtyard where the hydraulic fluid pipelines are located. Specific sampling locations are included on Figure 4 and Figure 5.
- For the historic transformer locations, the soil from 0-2 feet below ground surface (bgs) will be investigated since PCBs are readily sorbed to soil and are most likely to stay in the shallow horizon from a surface spill. Vertical or horizontal expansion of the study area may be necessary if elevated concentrations of PCBs are detected in the shallow soil sampling.
- For the Corporation Yard, all soil above the groundwater table is of interest; soil samples will be collected at 2-foot intervals down to the elevation where groundwater is encountered. Vertical or horizontal expansion of the study area may be necessary if elevated concentrations of contamination are detected in the shallow soil sampling.
- For the hydraulic fluid pipeline at the EERC, soil from 0-2 feet bgs will be sampled to assess potential contamination in stained soil. Vertical expansion of the study area may be necessary if elevated concentrations of contamination are detected in the shallow soil sampling.
- No temporal boundaries are imposed upon this investigation.

Step 5: Develop the Decision Rules

- The data provided by this investigation will be reviewed by UC Berkeley and DTSC and screened against applicable screening levels, including the California Human Health Screening Levels (CHHSL), U.S. Environmental Protection Agency Regional Screening

Levels (RSL), and the Oak Ridge National Laboratory plant screening benchmark and EPA Toxic Substances Control Act (TSCA) specifically for PCBs.

- If an area is recommended for further investigation, one or several of the following may occur: further data evaluation or data gap sampling (by expansion of the lateral or vertical boundary of the study area to subsurface or surface soils), inclusion in the RI/FS, or immediate consideration for remedial or response action.

Step 6: Specify Performance or Acceptance Criteria

- The specific screening levels for each constituent will be established after data have been received and reviewed by UC Berkeley and DTSC. The screening levels will be developed through evaluation of several sets of values, including but not limited to, CHHSLs, RSLs, and TSCA values. For metal constituents, concentrations expected from background considerations will be evaluated.

Step 7: Optimize Design for Obtaining Data

- Soil sampling locations are based on best available current and historic information presented in the CCR, in addition to the site reconnaissance conducted with DTSC on May 12, 2011 (see Figures 4 and 5).
- Following receipt and review of the laboratory results from this soil investigation, any additional sampling, if deemed necessary, will proceed following discussion with UC Berkeley and DTSC.

3.3 SAMPLING PROCESS DESIGN

The sampling strategy for Phase II consists of discrete sampling locations located around former transformers to assess the PCB transformer data gap, sampling 12 locations within the Corporation Yard at varying depths to assess possible impacts from historic site activities, and two locations in the vicinity of the EERC to assess the stained soil beneath the hydraulic pipelines.

3.3.1 PCB Containing Transformers

Discrete sampling locations were identified at historic transformer locations during the site walk with DTSC on May 12, 2011. Locations were chosen based on current conditions and the former placement of the transformers (historically some were elevated while others were located on a slab on grade). Based on the configuration and number of transformers, between two and six sampling locations were identified at each transformer site. Sampling locations include the current transformer on a slab-on-grade near the Northern Regional Library Facility (see Inset 1 of Figure 5); the elevated platform located northeast of Building 450 (see Inset 2 of Figure 5); the location of formerly pole-mounted transformers southeast of Building 474 (see Inset 3 of Figure 5); the elevated platform southeast of Building 277 which historically held transformers (see Inset 5 of Figure 5); the pad-mounted transformers northwest of Building 473 in the fenced high voltage area (see Inset 6 of Figure 5); the elevated platform east of Building 128 which historically held transformers (see Inset 7 of Figure 5); the pad-mounted transformers and other fenced electrical equipment southwest of Building 150 (see Inset 8 of Figure 5); the location of the former California Cap Company transformer house (see Inset 9 of Figure 5); and the location of the formerly pole-mounted, currently pad-supported, transformers east of Building 112 (see Inset 10 of Figure 5).

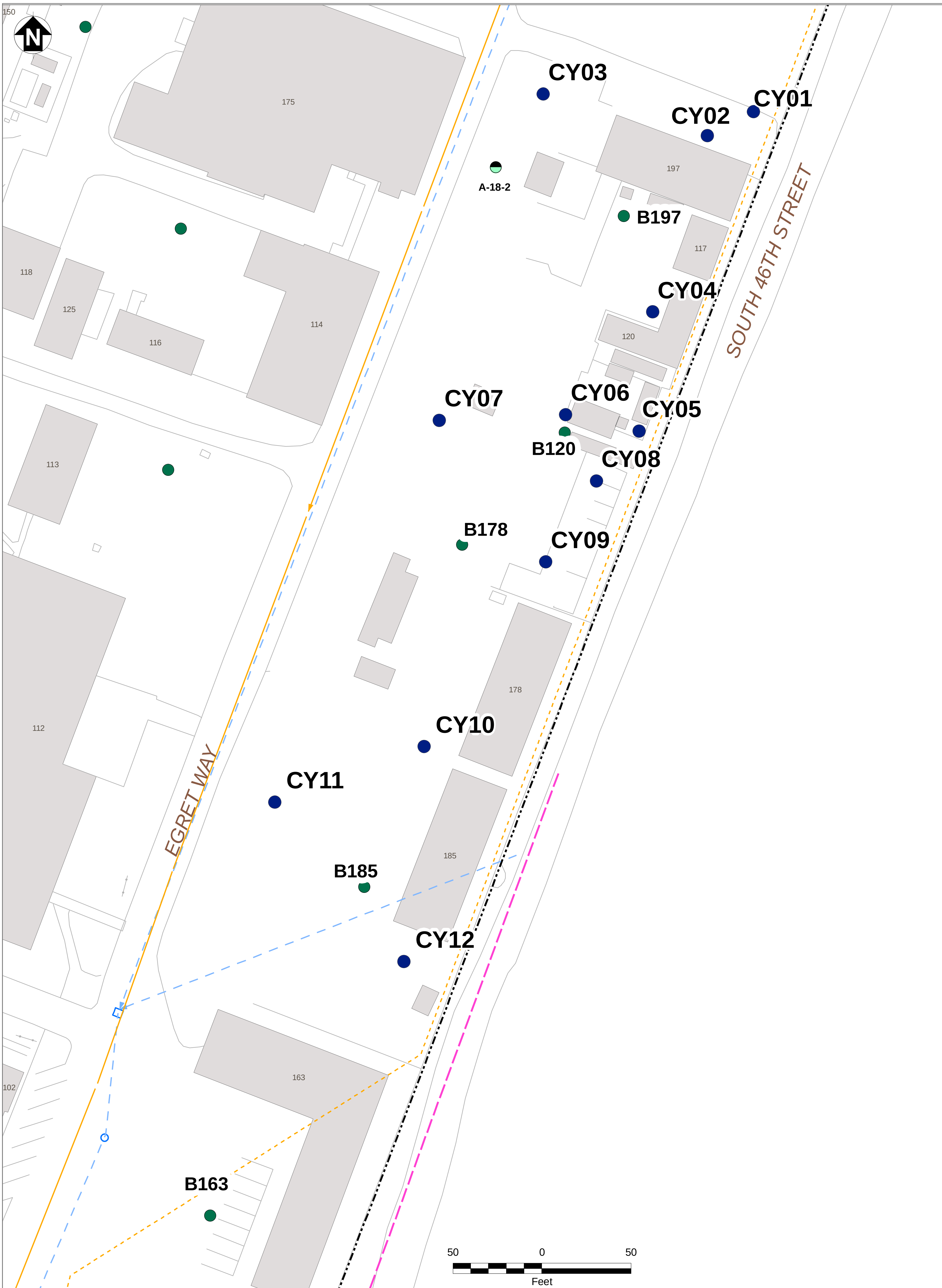
At each sampling location, a hand auger will be used to collect soil for two samples; one between 0 and 0.5 feet bgs and one sample between 1.5 and 2 feet bgs. All soil samples collected to assess the transformer data gap will be submitted for analysis of PCBs as aroclors. If visual analysis of soil reveals stained or oily soils, samples will be collected and analyzed for total extractable petroleum hydrocarbons (TPH-e) and total purgeable petroleum hydrocarbons (TPH-p). Because little is known about the California Cap Company transformer house, the six samples that will be collected in this area will also be analyzed for metals, pesticides, SVOCs, TPH-e, TPH-p, PAHs, and VOCs.

3.3.2 Corporation Yard

Twelve discrete sampling locations were identified in the Corporation Yard during a site walk with DTSC staff on May 12, 2011. Locations were chosen to give broad coverage of the area but were also focused around Buildings 117, 120, and 197, see Figure 4. A majority of the Corporation Yard ground surface is covered in compacted gravel approximately 1 to 1.5 feet thick. The gravel will be removed at each proposed sampling location using a backhoe or backhoe-mounted auger, after which sampling will be conducted with a hand auger. At each of the 12 locations, samples will be collected between 0 and 0.5 feet below the gravel, 2-2.5 feet below gravel, 4- 4.5 feet below gravel, and 6-6.5 feet below gravel. Before sampling begins, water level measurements will be recorded at the four recently installed piezometer locations in the Corporation Yard to obtain a general sense of the anticipated depth to groundwater. The soil sampling for this investigation is targeted in the vadose zone soil above the groundwater table. The 6-6.5 foot below gravel sample may not be collected if groundwater accumulates in the soil boring or it is judged to be below the groundwater table based on the depth to groundwater measurements in the four nearby piezometers. All soil samples collected as part of the Corporation Yard characterization will be analyzed for metals, pesticides, PCBs, SVOCs, TPH-e, TPH-p, PAHs, and VOCs. Additionally, at locations CY04, CY05, and CY06 the shallow soil sample (0-0.5 feet below gravel) will be analyzed for dioxins to assess whether the former incinerator at Building 120 impacted the surrounding area. The field sampling crew will have a photo ionization detector (PID) on hand and will take readings of the cuttings from the hand auger before soil sampling begins. An additional soil sample will be collected from any depth with a PID reading higher than 50 parts per million (ppm).

3.3.3 ASTs

During the site walk with the DTSC staff on May 12, 2011, all current ASTs were visually inspected. No additional sampling is proposed for any of the AST locations. One area of stained soil was noted below the hydraulic fluid pipeline at the EERC near Building 420. In this area, two locations will be sampled between 0 and 0.5 feet bgs and between 1.5 and 2 feet bgs (see Inset 4 of Figure 5). These samples will be submitted for analysis of SVOCs, TPH-e, TPH-p, and PAHs.



Existing Buildings
Asphalt/Concrete Pads
Surface Water
Marsh Boundary
Property Boundary
Approximate Property Boundary
Roads and Other Landscape Features
Fenceline
Biologically Active Permeable Barrier Wall
Former Seawall (Approximate)
Slurry Wall

Storm Drain Lines:
Open Swale
Underground Culvert
Underground Culvert, Abandoned (Grouted at Manholes)

Sanitary Sewer Lines:
Existing Sewer Line
Removed Sewer Line
Abandoned Sewer Line

Aboveground Storage Tank (AST)
Existing Piezometer Location
Proposed Soil Sampling Location

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FIGURE 4
CORPORATION YARD
PROPOSED SAMPLING LOCATIONS

Field Sampling Plan

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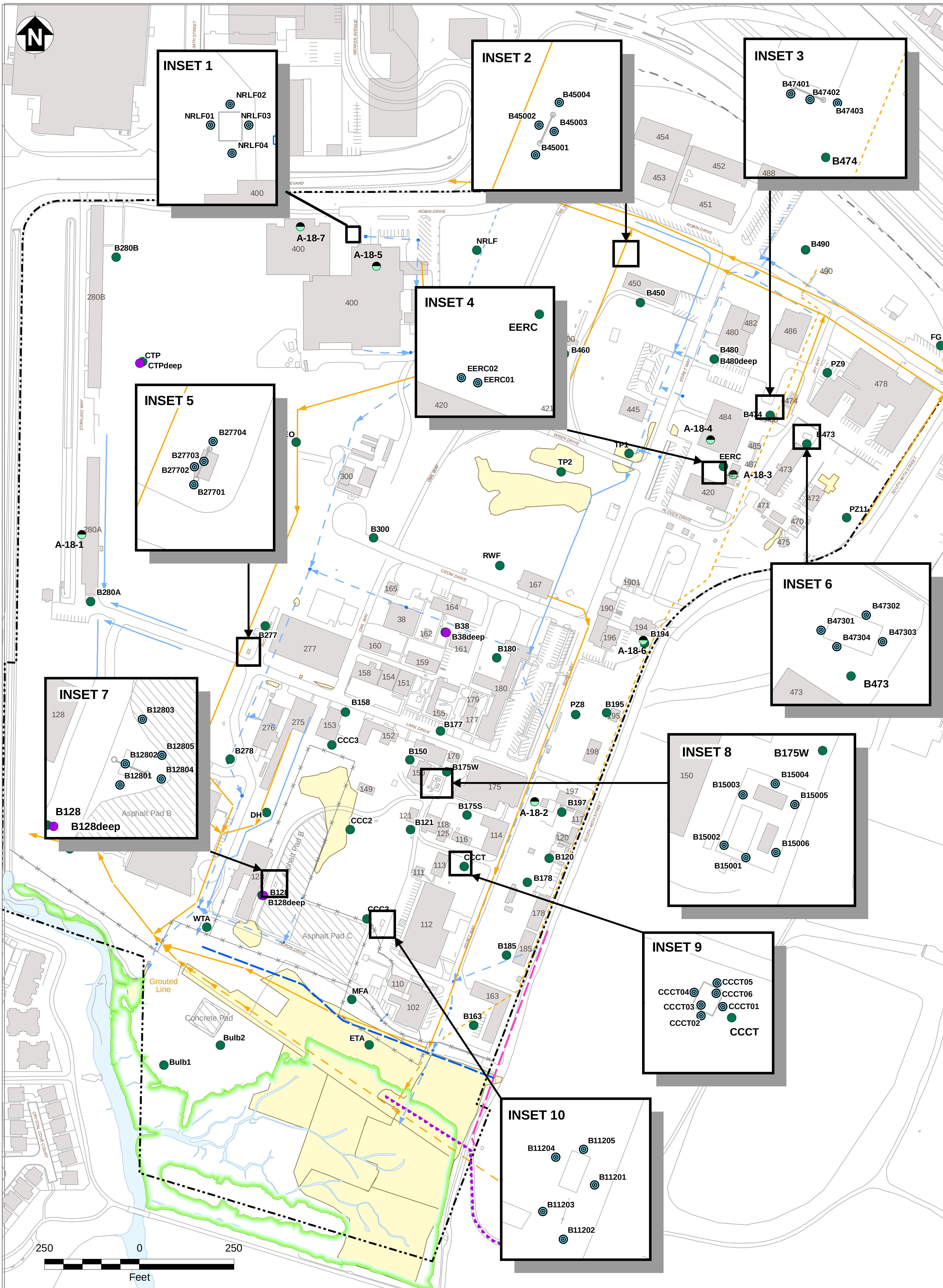

Existing Buildings	Former Seawall (Approximate)
Asphalt/Concrete Pads	Slurry Wall
Remediated Areas	Storm Drain Lines:
Surface Water	Open Swale
Marsh Boundary	Underground Culvert
Property Boundary	Underground Culvert, Abandoned (Grouted at Manholes)
Approximate Property Boundary	Sanitary Sewer Lines:
Roads and Other Landscape Features	Existing Sewer Line
Fenceline	Removed Sewer Line
Biologically Active Permeable Barrier Wall	Abandoned Sewer Line
Existing Piezometer Location (shallow)	Aboveground Storage Tank (AST)
Existing Piezometer Location (deep)	Proposed Sampling Locations

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FIGURE 5
FORMER PCB TRANSFORMER AND AST PROPOSED SAMPLING LOCATIONS

Field Sampling Plan

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Table 1 – Sample Registry

		Analysis	TPH-P (EPA Method 8015B modified)	VOCs (EPA Method 8260B)	TPH-E (EPA Method 8015B modified)	SVOCs (EPA Method 8270C)	Metals (EPA Method 6020A/7400 series)	PAH (EPA Method 8270-SIM)	PCB (EPA Method 8082)	Pesticides (EPA Method 8081A)	Dioxinx and Furans (EPA Method 8290)	
		Holding Time	14 Days	14 Days	14 Days	7/40 days	Metals – 6 Months (except Mercury – 28 Days)	7/40 days	7/40 days	7/40 days	30/45 days	SAMPLE CONTAINERS
Point Location ID	Sample ID	Depth (feet bgs)										
Transformer Samples												
B11201	PCB21	0-0.5							X			1 8oz Glass Jar
B11201	PCB22	1.5-2.0							X			1 8oz Glass Jar
B11202	PCB23	0-0.5							X			1 8oz Glass Jar
B11202	PCB24	1.5-2.0							X			1 8oz Glass Jar
B11203	PCB25	0-0.5							X			1 8oz Glass Jar
B11203	PCB26	1.5-2.0							X			1 8oz Glass Jar
B11204	PCB27	0-0.5							X			1 8oz Glass Jar
B11204	PCB28	1.5-2.0							X			1 8oz Glass Jar
B11205	PCB29	0-0.5							X			1 8oz Glass Jar
B11205	PCB30	1.5-2.0							X			1 8oz Glass Jar
B12801	PCB31	0-0.5							X			1 8oz Glass Jar
B12801	PCB32	1.5-2.0							X			1 8oz Glass Jar
B12802	PCB33	0-0.5							X			1 8oz Glass Jar
B12802	PCB34	1.5-2.0							X			1 8oz Glass Jar
B12803	PCB35	0-0.5							X			1 8oz Glass Jar
B12803	PCB36	1.5-2.0							X			1 8oz Glass Jar
B12804	PCB37	0-0.5							X			1 8oz Glass Jar
B12804	PCB38	1.5-2.0							X			1 8oz Glass Jar
B12805	PCB39	0-0.5							X			1 8oz Glass Jar
B12805	PCB40	1.5-2.0							X			1 8oz Glass Jar
CCCT01	PCB41	0-0.5	X	X	X	X	X	X	X			3 8oz Glass Jar, 6 encore samples
CCCT01	PCB42	1.5-2.0	X	X	X	X	X	X	X			3 8oz Glass Jar, 6 encore samples
CCCT02	PCB43	0-0.5	X	X	X	X	X	X	X			3 8oz Glass Jar, 6 encore samples
CCCT02	PCB44	1.5-2.0	X	X	X	X	X	X	X			3 8oz Glass Jar, 6 encore samples
CCCT03	PCB45	0-0.5	X	X	X	X	X	X	X			3 8oz Glass Jar, 6 encore samples
CCCT03	PCB46	1.5-2.0	X	X	X	X	X	X	X			3 8oz Glass Jar, 6 encore samples
CCCT04	PCB47	0-0.5	X	X	X	X	X	X	X			3 8oz Glass Jar, 6 encore samples
CCCT04	PCB48	1.5-2.0	X	X	X	X	X	X	X			3 8oz Glass Jar, 6 encore samples
CCCT05	PCB49	0-0.5	X	X	X	X	X	X	X			3 8oz Glass Jar, 6 encore samples
CCCT05	PCB50	1.5-2.0	X	X	X	X	X	X	X			3 8oz Glass Jar, 6 encore samples
CCCT06	PCB51	0-0.5	X	X	X	X	X	X	X			3 8oz Glass Jar, 6 encore samples
CCCT06	PCB52	1.5-2.0	X	X	X	X	X	X	X			3 8oz Glass Jar, 6 encore samples
B15001	PCB53	0-0.5							X			1 8oz Glass Jar
B15001	PCB54	1.5-2.0							X			1 8oz Glass Jar

Table 1 – Sample Registry

Point Location ID	Sample ID	Depth (feet bgs)	TPH-P (EPA Method 8015B modified)	VOCs (EPA Method 8260B)	TPH-E (EPA Method 8015B modified)	SVOCs (EPA Method 8270C)	Metals (EPA Method 6020A/7400 series)	PAH (EPA Method 8270-SIM)	PCB (EPA Method 8082)	Pesticides (EPA Method 8081A)	Dioxinx and Furans (EPA Method 8290)	SAMPLE CONTAINERS
		Analysis / Holding Time	14 Days	14 Days	14 Days	7/40 days	Metals – 6 Months (except Mercury – 28 Days)	7/40 days	7/40 days	7/40 days	30/45 days	
Transformer Samples												
B15002	PCB55	0-0.5							X			1 8oz Glass Jar
B15002	PCB56	1.5-2.0							X			1 8oz Glass Jar
B15003	PCB57	0-0.5							X			1 8oz Glass Jar
B15003	PCB58	1.5-2.0							X			1 8oz Glass Jar
B15004	PCB59	0-0.5							X			1 8oz Glass Jar
B15004	PCB60	1.5-2.0							X			1 8oz Glass Jar
B15005	PCB61	0-0.5							X			1 8oz Glass Jar
B15005	PCB62	1.5-2.0							X			1 8oz Glass Jar
B15006	PCB63	0-0.5							X			1 8oz Glass Jar
B15006	PCB64	1.5-2.0							X			1 8oz Glass Jar
B27701	PCB65	0-0.5							X			1 8oz Glass Jar
B27701	PCB66	1.5-2.0							X			1 8oz Glass Jar
B27702	PCB67	0-0.5							X			1 8oz Glass Jar
B27702	PCB68	1.5-2.0							X			1 8oz Glass Jar
B27703	PCB69	0-0.5							X			1 8oz Glass Jar
B27703	PCB70	1.5-2.0							X			1 8oz Glass Jar
B27704	PCB71	0-0.5							X			1 8oz Glass Jar
B27704	PCB72	1.5-2.0							X			1 8oz Glass Jar
B45001	PCB73	0-0.5							X			1 8oz Glass Jar
B45001	PCB74	1.5-2.0							X			1 8oz Glass Jar
B45002	PCB75	0-0.5							X			1 8oz Glass Jar
B45002	PCB76	1.5-2.0							X			1 8oz Glass Jar
B45003	PCB77	0-0.5							X			1 8oz Glass Jar
B45003	PCB78	1.5-2.0							X			1 8oz Glass Jar
B45004	PCB79	0-0.5							X			1 8oz Glass Jar
B45004	PCB80	1.5-2.0							X			1 8oz Glass Jar
B47401	PCB81	0-0.5							X			1 8oz Glass Jar
B47401	PCB82	1.5-2.0							X			1 8oz Glass Jar
B47402	PCB83	0-0.5							X			1 8oz Glass Jar
B47402	PCB84	1.5-2.0							X			1 8oz Glass Jar
B47403	PCB85	0-0.5							X			1 8oz Glass Jar
B47403	PCB86	1.5-2.0							X			1 8oz Glass Jar
B47301	PCB87	0-0.5							X			1 8oz Glass Jar
B47301	PCB88	1.5-2.0							X			1 8oz Glass Jar

Table 1 – Sample Registry

		Analysis	TPH-P (EPA Method 8015B modified)	VOCs (EPA Method 8260B)	TPH-E (EPA Method 8015B modified)	SVOCs (EPA Method 8270C)	Metals (EPA Method 6020A/7400 series)	PAH (EPA Method 8270-SIM)	PCB (EPA Method 8082)	Pesticides (EPA Method 8081A)	Dioxinx and Furans (EPA Method 8290)	
		Holding Time	14 Days	14 Days	14 Days	7/40 days	Metals – 6 Months (except Mercury – 28 Days)	7/40 days	7/40 days	7/40 days	30/45 days	SAMPLE CONTAINERS
Point Location ID	Sample ID	Depth (feet bgs)										
Transformer Samples												
B47302	PCB89	0-0.5							X			1 8oz Glass Jar
B47302	PCB90	1.5-2.0							X			1 8oz Glass Jar
B47303	PCB91	0-0.5							X			1 8oz Glass Jar
B47303	PCB92	1.5-2.0							X			1 8oz Glass Jar
B47304	PCB93	0-0.5							X			1 8oz Glass Jar
B47304	PCB94	1.5-2.0							X			1 8oz Glass Jar
NRLF01	PCB95	0-0.5							X			1 8oz Glass Jar
NRLF01	PCB96	1.5-2.0							X			1 8oz Glass Jar
NRLF02	PCB97	0-0.5							X			1 8oz Glass Jar
NRLF02	PCB98	1.5-2.0							X			1 8oz Glass Jar
NRLF03	PCB99	0-0.5							X			1 8oz Glass Jar
NRLF03	PCB100	1.5-2.0							X			1 8oz Glass Jar
NRLF04	PCB101	0-0.5							X			1 8oz Glass Jar
NRLF04	PCB102	1.5-2.0							X			1 8oz Glass Jar
Corporation Yard Samples												
CY01	CY0101	0-0.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY01	CY0102	2.0-2.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY01	CY0103	4.0-4.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY01	CY0104	6.0-6.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY02	CY0201	0-0.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY02	CY0202	2.0-2.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY02	CY0203	4.0-4.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY02	CY0204	6.0-6.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY03	CY0301	0-0.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY03	CY0302	2.0-2.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY03	CY0303	4.0-4.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY03	CY0304	6.0-6.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY04	CY0401	0-0.5	X	X	X	X	X	X	X	X	X	3 8oz Glass Jar, 6 encore samples
CY04	CY0402	2.0-2.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY04	CY0403	4.0-4.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY04	CY0404	6.0-6.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY05	CY0501	0-0.5	X	X	X	X	X	X	X	X	X	3 8oz Glass Jar, 6 encore samples
CY05	CY0502	2.0-2.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY05	CY0503	4.0-4.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY05	CY0504	6.0-6.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples

Table 1 – Sample Registry

Point Location ID	Sample ID	Depth (feet bgs)	TPH-P (EPA Method 8015B modified)	VOCs (EPA Method 8260B)	TPH-E (EPA Method 8015B modified)	SVOCs (EPA Method 8270C)	Metals (EPA Method 6020A/7400 series)	PAH (EPA Method 8270-SIM)	PCB (EPA Method 8082)	Pesticides (EPA Method 8081A)	Dioxinx and Furans (EPA Method 8290)	SAMPLE CONTAINERS
		Holding Time	14 Days	14 Days	14 Days	7/40 days	Metals – 6 Months (except Mercury – 28 Days)	7/40 days	7/40 days	7/40 days	30/45 days	
							Corporation Yard Samples					
CY06	CY0601	0-0.5	X	X	X	X	X	X	X	X	X	3 8oz Glass Jar, 6 encore samples
CY06	CY0602	2.0-2.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY06	CY0603	4.0-4.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY06	CY0604	6.0-6.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY07	CY0701	0-0.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY07	CY0702	2.0-2.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY07	CY0703	4.0-4.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY07	CY0704	6.0-6.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY08	CY0801	0-0.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY08	CY0802	2.0-2.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY08	CY0803	4.0-4.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY08	CY0804	6.0-6.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY09	CY0901	0-0.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY09	CY0902	2.0-2.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY09	CY0903	4.0-4.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY09	CY0904	6.0-6.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY10	CY1001	0-0.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY10	CY1002	2.0-2.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY10	CY1003	4.0-4.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY10	CY1004	6.0-6.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY11	CY1101	0-0.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY11	CY1102	2.0-2.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY11	CY1103	4.0-4.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY11	CY1104	6.0-6.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY12	CY1201	0-0.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY12	CY1202	2.0-2.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY12	CY1203	4.0-4.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
CY12	CY1204	6.0-6.5	X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
							AST Samples					
EERC01	EERC0101	0-0.5	X		X	X		X				2 8oz Glass Jar, 3 encore samples
EERC01	EERC0102	1.5-2.0	X		X	X		X				2 8oz Glass Jar, 3 encore samples
EERC02	EERC0202	0-0.5	X		X	X		X				2 8oz Glass Jar, 3 encore samples
EERC02	EERC0202	1.5-2.0	X		X	X		X				2 8oz Glass Jar, 3 encore samples

Table 1 – Sample Registry

QC SAMPLES													
		Analysis		TPH-P (EPA Method 8015B modified)	VOCs (EPA Method 8260B)	TPH-E (EPA Method 8015B modified)	SVOCs (EPA Method 8270C)	Metals (EPA Method 6020A/7400 series)	PAH (EPA Method 8270-SIM)	PCB (EPA Method 8082)	Pesticides (EPA Method 8081A)	Dioxinx and Furans (EPA Method 8290)	
		Holding Time		14 Days	14 Days	14 Days	7/40 days	Metals – 6 Months (except Mercury – 28 Days)	7/40 days	7/40 days	7/40 days	30/45 days	SAMPLE CONTAINERS
Point Location ID		Sample ID	Depth (feet bgs)										
Water IDW		RFSWIDW01 - XX	1 per drum of IDW water	will be based on disposal criteria									
Soil IDW		RFSSIDW01 - XX	1 per drum of IDW soil	will be based on disposal criteria									
MS/MSD*	2 Locations	Same as original sample		X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
MS/MSD*	3 Locations	Same as original sample								X			1 8oz Glass Jar
Field Replicate	5 Locations	Add "D" to end of original sample ID		X	X	X	X	X	X	X	X		3 8oz Glass Jar, 6 encore samples
Field Replicate	6 Locactions	Add "D" to end of original sample ID								X			1 8oz Glass Jar
Trip Blank		RFSCYTB01 - XX	1 per shipping container containing volatile samples	X	X								6 encore samples
Equipment Rinsate		RFSCYER01 - XX	1 per day per type of non-disposable sampling equipment	X	X	X	X	X	X	X	X		
Source Water Blank		RFSGWSW01 - XX	1 per source of decontamination water	X	X	X	X	X	X	X	X		
Temperature Blank		RFSGWTemp01 - XX	1 per shipping container										

Notes:

Holding Times	Listed time is to preservation/extraction by the lab.
*MS/MSD	Use the same sample number and triple the number of containers (bottles) per sample.
Preservation	All samples must be put on ice in coolers after collection and shipped to the lab maintaining a temperature of 4°C ± 2°C.

bgs	Below ground surface	PCB	Polychlorinated biphenyl
EPA	U.S. Environmental Protection Agency	QC	Quality control
ID	Identification	SVOC	Semivolatile organic compound
IDW	Investigation derived waste	TPH-E	Total petroleum hydrocarbons - extractable
MS/MSD	Matrix spike/matrix spike duplicate	TPH-P	Total petroleum hydrocarbons - purgeable
PAH	Polycyclic aromatic hydrocarbon	VOC	Volatile organic compound

3.3.4 Sampling Methods

All soil samples will be collected from a decontaminated hand auger. Standard information for planning and conducting field sampling for Phase II, such as such as field equipment calibration and maintenance, sample collection methodology, sample packaging and documentation, is outlined in the QAPP (Tetra Tech 2010).

All locations in the Corporation Yard will be screened using a PID. If VOCs are detected by the PID at concentrations exceeding 50 ppm, the location and depth will be flagged for the collection of an additional soil sample. Table 2 provides specific sampling and analysis information to assist the field crew during field activities, including sample identification numbers for the various sampling locations and a summary of the test methods to be performed on each sample. The procedures for decontamination and management of investigation-derived waste (IDW) from sampling activities are provided in the QAPP (Tetra Tech 2010) and will be utilized by the field crew during sampling activities. .

3.3.5 Analytical Methods and Quality Control

The soil samples will be submitted for analysis using the analytical methods shown on Table 2. Samples for chemical analysis will be submitted to Curtis and Tomkins, Ltd, a State-certified analytical laboratory. Additional descriptions of the analytical methods, including the selection of analytical laboratories and project analytical requirements, can be found in the QAPP, as outlined below.

To assess the quality of field data, field quality control (QC) samples will be collected and analyzed as listed in Table 2. Laboratory QC samples will also be analyzed in accordance with referenced analytical method protocols to ensure laboratory procedures are conducted properly and the quality of the data is known. Testing, inspection, and maintenance procedures for field equipment are also critical for accurate data collection. Procedures for these QC practices are explained in the QAPP.

Table 2 – QAPP Reference Locations

Preparation for Field Activities	**Reference Section in QAPP**
Utility Clearance	Section 4.12
Health and Safety Plan (HSP)	See Appendix B, HSP
Analytical Methods	Section 7.2
Analytical Laboratory Selection	Section 7.4
Analytical Requirements	Section 7.3 and Table A-13
Field Sampling	
Chain-of-Custody Requirements	Section 5.4
Hand Auger	Section 4.1.1.1
VOC Encore Sampling	Section 4.1.2.1
Management of Investigation-Derived Waste	Section 4.11
Decontamination	Section 4.10
Field Quality Control Samples	
Equipment Rinsate Samples	Section 4.9 and 3.2.2
Source Water Blank	Section 4.9 and 3.2.2
Temperature Blanks	Section 4.9 and 3.2.2
Trip Blanks	Section 4.9 and 3.2.2
Laboratory Quality Control Samples	
Method Blanks	Section 3.2.2
Matrix Spike and Matrix Spike Duplicates (MS/MSD)	Section 3.2.2
Laboratory Control Samples	Section 3.2.2
Surrogate Standards	Section 3.2.2
Field Equipment Testing, Inspection and Maintenance	
Calibration of Field Equipment	Section 6.1
Maintenance of Field Equipment	Section 11.1

4.0 PROJECT ROLES AND RESPONSIBILITIES

This section presents key staff and responsibilities. Additional project organization information pertaining to sampling and laboratory quality is presented in the QAPP (Tetra Tech 2010).

Table 3 – Richmond Field Station Roles and Responsibilities

Name and Affiliation	Roles	Responsibilities
Greg Haet (UC Berkeley Office of Environment, Health & Safety)	Project Coordinator	Directs environmental health and safety compliance of the project. Receives notices, comments, approvals, and related communications from DTSC and forwards them to Respondents' representatives. Reports to and interacts with the DTSC for all Order tasks and/or public outreach.
Kate Bolton (UC Berkeley Capital Projects)	Project Manager	Manages contracts, schedules, and budgets. Authorizes work to proceed.
Karl Hans (UC Berkeley Office of Environment, Health & Safety)	Project Scientist/ On-Site EH&S Coordinator	UC on-site environmental health and safety project coordinator at the Richmond Field Station. Assists in managing the project and in reporting to and interacting with the DTSC and Respondents. Reviews all submittals and notifications to DTSC and other agencies for quality and completeness.
Jason Brodersen, P.G. (Tetra Tech EM Inc.)	Project Consultant/Project Geologist	Provides direction and supervision of hazardous waste site cleanup work. Provides expert advice on environmental management during investigation and remediation phases of the project. Primary author and coordinator of completion Order required reports and other technical deliverables.
Gene Barry, P.E. (4LEAF, Inc.)	Project On-Site Coordinator	Performs construction management and oversight duties during various construction phases of the project and other on-site activities. Assists the project consultant and project coordinators in managing project information and data and completion of project deliverables.
Anthony Garvin (UC Office of the General Counsel)	Respondent Representatives	Provide input to and receive input from Project Coordinator regarding project management, task completion, and DTSC interaction.
Brian Spiller (Zeneca)		
John Edgcomb (Edgcomb Law Group- Zeneca/Bayer CropScience)		
Bill Marsh (Edgcomb Law Group- Zeneca/Bayer CropScience)		

5.0 REFERENCES

Ensco Environmental Services, Inc. 1989. "Environmental Assessment of University of California Richmond Field Station." Richmond, California. August.

Tetra Tech EM Inc. (Tetra Tech). 2008. Current Conditions Report, University of California, Berkeley, Richmond Field Station, Richmond, California. November 21.

Tetra Tech. 2010. Phase I Groundwater Field Sampling Workplan, University of California, Berkeley, Richmond Field Station, Richmond, California. June 2.

Tetra Tech. 2011. Phase I Final Groundwater Sampling Results, Technical Memorandum, University of California, Berkeley, Richmond Field Station, Richmond, California. May 11.

U.S. Environmental Protection Agency (EPA). 2006. "Guidance on Systematic Planning Using the Data Quality Objectives Process." EPA/240/B-06/001. February.

University of California, Berkeley (UC Berkeley). 2006b. Interview regarding Richmond Field Station (RFS) Operational History. Between Scott Shackleton, Karl Hans, Larry Bell, and Greg Haet, UC Berkeley; and Julia Vetromile and Leslie Lundgren, Tetra Tech EM Inc. November 14.

APPENDIX A

RESPONSE TO COMMENTS

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

August 11, 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) has reviewed the document entitled *Phase II Field Sampling Plan, University of California, Berkeley, Richmond Field Station, Richmond, California* (Sampling Plan). The July 1, 2011 Sampling Plan was prepared by Tetra Tech EM Inc. for the University of California (UC).

The Sampling Plan describes work to be performed as part of the second phase of investigation as outlined in the Field Sampling Workplan, dated June 2, 2010. The investigative work to be conducted includes soil sampling in areas where PCB-containing transformers were, or may have been, located and in the Corporation Yard where various maintenance activities occurred. Above ground storage tanks were evaluated; however, no soil sampling is necessary based on the information provided to DTSC.

DTSC has completed its evaluation of the Sampling Plan and has the following comments that need to be addressed:

1. Table of Contents: Section 3.0 is identified as "Phase I Groundwater Sampling Design." Please correct the error.

2. The Sampling Plan should include summary information on the three ecological units of interest (the coastal prairie, transition area, and remaining unremediated marsh) to help support the decision that no further sampling in these areas is needed in this phase of work.

3. Page 6, Section 2.1 PCB-Containing Transformers:
    a. During the May 12, 2011 site walk, it was observed that transformers located east of building 150 were enclosed with a fence and berm. At that time a request was made to inquire why a berm had been constructed around the transformers. Please include any information discovered about the reason for construction of the berms.
    b. The current status of the transformer located north of the Northern Regional Library Facility (NRLF) is that it does not contain PCBs. Please identify when this transformer was installed and whether it replaced an older transformer that may have contained PCBs. If the current transformer is a replacement, soil samples will be needed.

4. Page 7, ASTs:
    a. Please state what caused the discoloration on the floor of the room containing tank A-18-5 in the NRLF that was observed during the May site walk.
    b. Please state whether the tank located at A-18-2 (Corporation Yard east of B197) is a replacement for an older tank.

5. Page 10, Section 3.2, Data Quality Objectives, Step 1: The last bullet item in this section states that, "If contaminants are present in shallow soil, exposure to human and ecological receptors is possible." While shallow soil may pose a risk to receptors, deeper soils may also represent a risk to receptors. Therefore, please delete the reference to shallow soils.

6. Page 11, Section 3.3.1, PCB Containing Transformers: If soil samples are observed to be stained or contain an oily substance, the samples should also be analyzed for petroleum hydrocarbons.

7. Page 18, Section 3.3.4, Sampling Methods: This section states that soil samples will be collected from a hand auger. Please indicate what steps will be taken to minimize volatilization of contaminants while augering.

8. Figure 5: To provide greater clarity, the blow-up boxes in Figure 5 should be further identified to provide pictorially the rationale for sampling in each of the areas. In addition, the correlation between the sample locations identified in the figure and the text in Section 3.3 (Sampling Process Design) needs to be explained more fully. For example, the blow-up boxes in Figure 5 could be numbered and the numbers referred to in Section 3.3.

In addition, please find enclosed comments provided by DTSC's Human and Ecological Risk Office, Ecological Risk Assessment Section.

Please submit a response to all comments and a revised work plan to this office within 30 days of the date of this letter.

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: Kimi Klein, Ph.D.
Human and Ecological Risk Office
Department of Toxic Substances Control
700 Heinz Avenue
Berkeley, CA 949710

J. Michael Eichelberger, Ph.D.
Human and Ecological Risk Office
8800 Cal Center Drive
Sacramento, CA 95826

Matthew Rodriquez
Secretary for
Environmental Protection

Department of Toxic Substances Control

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

Edmund Gerald Brown Jr.
Governor

MEMORANDUM

TO: Lynn Nakashima
Senior Hazardous Substances Scientist
Site Mitigation and Brownfields Reuse Program
700 Heinz Avenue, Suite 200
Berkeley, CA 90630

FROM: J. Michael Eichelberger, Ph.D.
Staff Toxicologist
Human and Ecological Risk Office (HERO)
Ecological Risk Assessment Section (ERAS)

DATE: August 4, 2011

SUBJECT: UNIVERSITY OF CALIFORNIA, BERKELEY, RICHMOND FIELD STATION PHASE II FIELD SAMPLING PLAN DTSC SITE INVESTIGATION AND REMEDIATION ORDER I/SE-RAO 07/07/-004 SECTION 5.16

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. The current report submitted for DTSC/HERO/ERAS review is a Phase II Field Sampling Plan that proposes additional sampling to address data gaps associated with PCB-containing transformer locations, above ground storage tanks (ASTs) and the Corporation Yard. Some of the transformer locations are within what ERAS would consider habitat areas. DTSC/HERO/ERAS staff participated in a site walk with University of California staff, and their consultants on May 12, 2011 to review specific proposed sampling areas.

Document Reviewed

ERAS reviewed "University of California, Berkeley, Richmond Field Station Phase II Field Sampling Plan DTSC Site Investigation and Remediation Order I/SE-RAO 07/07-004 Section 5.16". The report was prepared by Tetra Tech EM Inc. (Oakland, California), is dated July 1, 2011 and is hereafter referred to as the report. ERAS received the report via an Envirostor request dated July 14, 2011 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.

ERAS General Comments

ERAS believes the report is generally sufficient for the proposed scope of work in regards to collection of data in support of investigations of potential hazard to ecological receptors in the areas defined within the portion of the UC Richmond Field Station as 'Upland Area'. ERAS has two specific comments it would like to see addressed.

Specific Comments

1. Page 1, section 1.1, Physical Setting, third paragraph of section. For clarification, is the 96 acres of upland habitat exclusive of land developed with roads, parking lots and buildings? Figure 2 shows the stream race in the western portion of the area designated as Upland Area, There are also structures associated with the "NLRF' and other unidentified structures in the northern portion and, of course, there is the main building complex and associated parking lots and roads in the eastern portion. The report states that all proposed samples of the '*The proposed Phase II sampling locations are all located in the Upland area'*.

2. Pages 10 and 11, Data Quality Objectives,

   Step 4: Define the Boundaries of the Study. For the historic transformer locations, the soil from 0-2 feet below ground surface (bgs) will be investigated since PCBs are readily sorbed to soil and are most likely to stay in the shallow horizon from a surface spill. ERAS generally agrees with this statement, except if the surface soil position has changed since the time of the spill, for example if the site was graded at some point after the spill. A case in point is the transformer location east of Building 128 where the tower mounted transformers were struck by lightning. The parking lot immediately adjacent to the transformer tower was apparently not yet constructed at the time of the lighting strike. It is possible that ejection of PCB-containing dielectric fluid coupled with wind could have spread PCBs to soil under the now graded parking lot. The location of potentially released PCBs at this transformer location could have changed not only in lateral extent but also in soil depth from the location and depth of their original deposition.

   Step 6: Specify Performance or Acceptance Criteria. Many of the sample locations are located in areas that are not habitat and will not be habitat in the future. However, some sample locations like B27701-B27704 and sample locations EERC01 and EERC02 could be within habitat areas. Therefore, in addition to the listed human health soil screening Levels (CHHSLs, RSLs and TSCA values) Step 6 should also include ecological soil screening levels.

Conclusions

ERAS generally believes the proposed sampling is adequate for the scope of work proposed as it pertains to evaluation of potential hazards to ecological receptors in the Upland Area in the specific locations where releases may have occurred. Please address the specific comments discussed above.

Reviewed by: James M. Polisini, Ph.D.
Senior Toxicologist, ERAS

Cc: Kimiko Klein, Ph.D.
HERO, emeritus

Response to Comments
Department of Toxic Substances Control, August 11, 2011

UC Berkeley Ref. No.	Page/ Sect No.	DTSC Comment	UC Berkeley Response
1		Table of Contents: Section 3.0 is identified as "Phase I Groundwater Sampling Design." Please correct the error.	The Table of Contents has been updated with the heading "Phase II Sampling Design".
2	Page 1, Section 1.1	The Sampling Plan should include summary information on the three ecological units of interest (the coastal prairie, transition area, and remaining unremediated marsh) to help support the decision that no further sampling in these areas is needed in this phase of work.	Text has been amended to state, "The RFS consists of a number of distinct and varied habitats resulting from both natural and manmade activities. The Upland Area consists of numerous research facilities, with their associated out-buildings surrounded by landscaped trees and plants. The eastern and central portions of the Upland Area are largely developed and few natural ecological conditions exist. The western portion of the Upland Area contains one of the largest and best-preserved remaining areas of native coastal grasslands once prevalent throughout the San Francisco Bay Area, referred to as the Coastal Terrace Prairie (see Figure 2). The Transition Area and small patches to the southwest of the EPA Laboratory consist of mainly coastal scrub and mixed ruderal scrub. Most of the coastal scrub habitat in the Transition Area is disturbed and intermixed with non-native invasive grasses and forbes. The southern portion of the RFS is the least developed and consists of a low salt marsh, middle salt marsh, high salt marsh, and tidal wetlands. The plants observed in this area include both native and non-native species and attract a variety of special-status species birds such as the California clapper rail (Rallus longirostris obsoletus). No sampling will occur in the three main areas of ecological interest: the Coastal Terrace Prairie, Transition Area, and Western Stege Marsh." Given the broad scope of activities necessary to address the data gaps identified in the 2008 Current Conditions Report, the Field Sampling Workplan field investigations are being conducted in five temporal phases (Phases I though V), as approved by DTSC at a meeting on December 19, 2008. Phase I of the investigations consisted of a site-wide groundwater sampling investigation. As a follow-up to the Phase I investigation, several data gaps identified in the CCR were identified as the scope of Phase II, including the investigation of current and former transformer locations, the Corporation Yard along the eastern property boundary, and above ground storage tanks (AST). This approach was agreed upon by UC and DTSC during working meetings. The Corporation Yard is not in an ecological area and no transformers or ASTs are located in the three ecological units of interest; therefore, no sampling will occur in these areas during this phase of work. Data gaps in these areas will be investigated during Phases III through V of the FSW.

UC Berkeley Ref. No.	Page/ Sect No.	DTSC Comment	UC Berkeley Response
3	Page 11, Section 3.3.1 and Figure 5	Page 6, Section 2.1 PCB-Containing Transformers: a. During the May 12, 2011 site walk, it was observed that transformers located east of building 150 were enclosed with a fence and berm. At that time a request was made to inquire why a berm had been constructed around the transformers. Please include any information discovered about the reason for construction of the berms. b. The current status of the transformer located north of the Northern Regional Library Facility (NRLF) is that it does not contain PCBs. Please identify when this transformer was installed and whether it replaced an older transformer that may have contained PCBs. If the current transformer is a replacement, soil samples will be needed.	a. According to RFS Facilities personnel the berm was constructed as part of the pad for the transformer, although the reason for the construction of the berm is unknown. b. The transformer located north of the NRLF was installed around 1980, and is oil-containing. It is unknown whether the original oil was PCB-containing; therefore, this location will be sampled.
4		Page 7, ASTs: a. Please state what caused the discoloration on the floor of the room containing tank A-18-5 in the NRLF that was observed during the May site walk. b. Please state whether the tank located at A-18-2 (Corporation Yard east of B197) is a replacement for an older tank.	a. The discoloration on the floor was caused by water when the batteries in the room were accidentally over-filled. b. AST A-18-2, located in the Corporation Yard replaced a UST, T-57, which was closed in 1997 under supervision of the Contra Costa County Environmental Health Department. The tank closure report is included in Appendix I of the 2007 Current Conditions Report.
5	Page 10, Section 3.2	Page 10, Section 3.2, Data Quality Objectives, Step 1: The last bullet item in this section states that, "If contaminants are present in shallow soil, exposure to human and ecological receptors is possible." While shallow soil may pose a risk to receptors, deeper soils may also represent a risk to receptors. Therefore, please delete the reference to shallow soils.	Text has been revised to state, "If contaminants are present in soil, exposure to human and ecological receptors is possible."
6	Page 12, Section 3.3.1	Page 11, Section 3.3.1, PCB Containing Transformers: If soil samples are observed to be stained or contain an oily substance, the samples should also be analyzed for petroleum hydrocarbons.	Text has been revised to state, "All soil samples collected to assess the transformer data gap will be submitted for analysis of PCBs as aroclors. If visual analysis of soil reveals stained or oily soils, samples will be collected and analyzed for total extractable petroleum hydrocarbons (TPH-e) and total purgeable petroleum hydrocarbons (TPH-p)."
7		Page 18, Section 3.3.4, Sampling Methods: This section states that soil samples will be collected from a hand auger. Please indicate what steps will be taken to minimize volatilization of contaminants while augering.	The sampling team will follow the hand auger sample collection SOP in the FSW QAPP. All VOC samples will be collected first, and the field team will work to minimize soil disturbance.
8	Page 11, Section 3.3.1 and Figure 5	Figure 5: To provide greater clarity, the blow-up boxes in Figure 5 should be further identified to provide pictorially the rationale for sampling in each of the areas. In addition, the correlation between the sample locations identified in the figure and the text in Section 3.3 (Sampling Process Design) needs to be explained more fully. For example, the blow-up boxes in Figure 5 could be numbered and the numbers referred to in Section 3.3.	Figure 5 has been amended to include numbered insets and the text in Section 3.3 has been updated to contain references to the figure.

Response to Comments
Department of Toxic Substances Control, August 11, 2011

UC Berkeley Ref. No.	Page/ Sect No.	DTSC Comment	UC Berkeley Response
9		Page 1, section 1.1, Physical Setting, third paragraph of section. For clarification, is the 96 acres of upland habitat exclusive of land developed with roads, parking lots and buildings? Figure 2 shows the stream race in the western portion of the area designated as Upland Area, There are also structures associated with the "NLRF' and other unidentified structures in the northern portion and, of course, there is the main building complex and associated parking lots and roads in the eastern portion. The report states that all proposed samples of the 'The proposed Phase /I sampling locations are all located in the Upland Area'.	Yes, the 96 acres designated as the Upland Area includes all of the land shaded in yellow on Figure 2, including land developed with roads, parking lots, and buildings.
10	Page 11, Section 3.2	Pages 10 and 11, Data Quality Objectives, Step 4: Define the Boundaries of the Study. For the historic transformer locations, the soil from 0-2 feet below ground surface (bgs) will be investigated since PCBs are readily sorbed to soil and are most likely to stay in the shallow horizon from a surface spill. ERAS generally agrees with this statement, except if the surface soil position has changed since the time of the spill, for example if the site was graded at some point after the spill. A case in point is the transformer location east of Building 128 where the tower mounted transformers were struck by lightning. The parking lot immediately adjacent to the transformer tower was apparently not yet constructed at the time of the lighting strike. It is possible that ejection of PCB-containing dielectric fluid coupled with wind could have spread PCBs to soil under the now graded parking lot. The location of potentially released PCBs at this transformer location could have changed not only in lateral extent but also in soil depth from the location and depth of their original deposition. Step 6: Specify Performance or Acceptance Criteria. Many of the sample locations are located in areas that are not habitat and will not be habitat in the future However, some sample locations like B27701-B27704 and sample locations EERC01 and EERC02 could be within habitat areas. Therefore, in addition to the listed human health soil screening Levels (CHHSLs, RSLs and TSCA values) Step 6 should also include ecological soil screening levels.	In most transformer locations, the historic grade and current grade appear to be the same. The potential for soil disturbance and subsequent PCB redistribution was discussed with DTSC during the May 12, 2011 site walk when sampling locations were selected. In the case of the Building 128 transformer, the soil directly under, and directly adjacent to the transformer platform do not appear to have been disturbed. Sampling locations were placed near the platform, as well as close to the more recently constructed asphalt pad. These locations provide adequate coverage for the area. Additionally, the DQOs state that if elevated concentrations of PCBs are detected, expansion of the study boundaries may be necessary. Some of the proposed sampling locations are located in areas which will require abbreviated or full ecological risk assessments, as identified in the 'Ecological Strategy for Upland Habitat' submitted to DTSC on June 26, 2009. Therefore the ORNL plant screening benchmark was added to the list of soil screening levels.

ATTACHMENT 1

PHOTOGRAPHIC LOG

ATTACHMENT 1
PHOTOGRAPHIC LOG OF AST SITES
UC BERKELEY, RICHMOND FIELD STATION

Tank A-18-1 (Diesel) - Bldg 280A

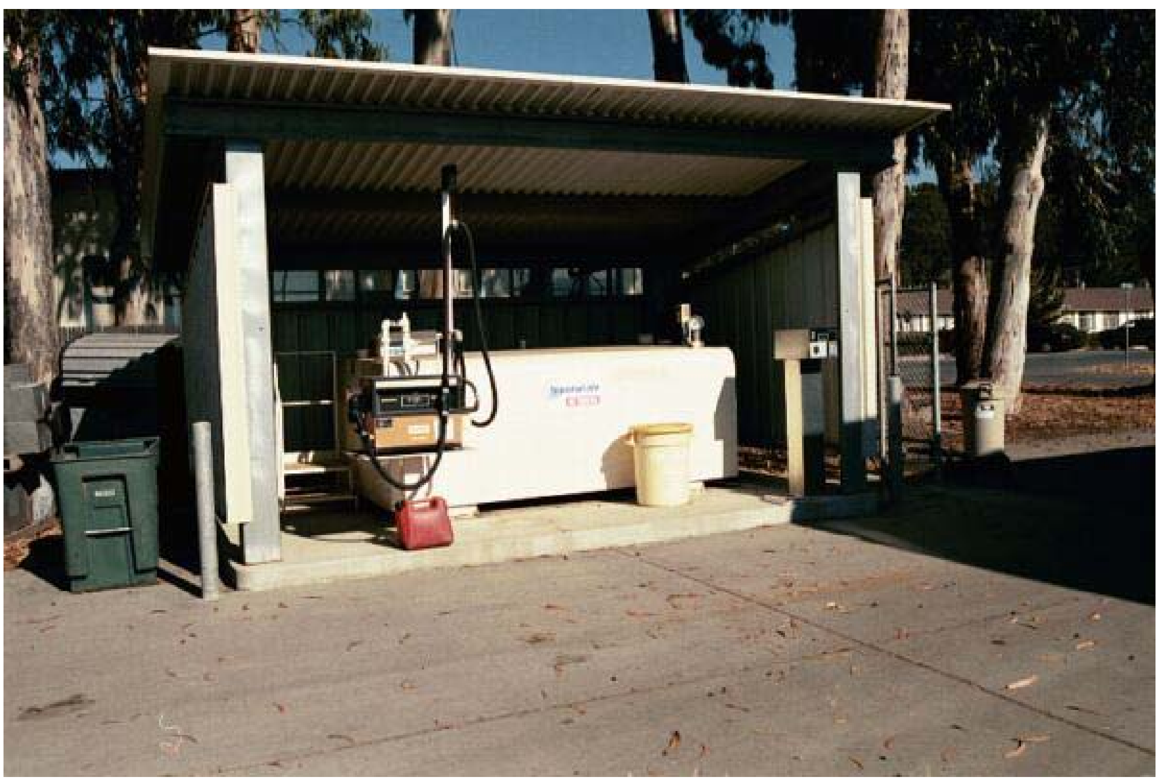
Tank A-18-1 (Diesel) - Bldg 280A

ATTACHMENT 1
PHOTOGRAPHIC LOG OF AST SITES
UC BERKELEY, RICHMOND FIELD STATION

Tank A-18-1 (Diesel) – Bldg 280A

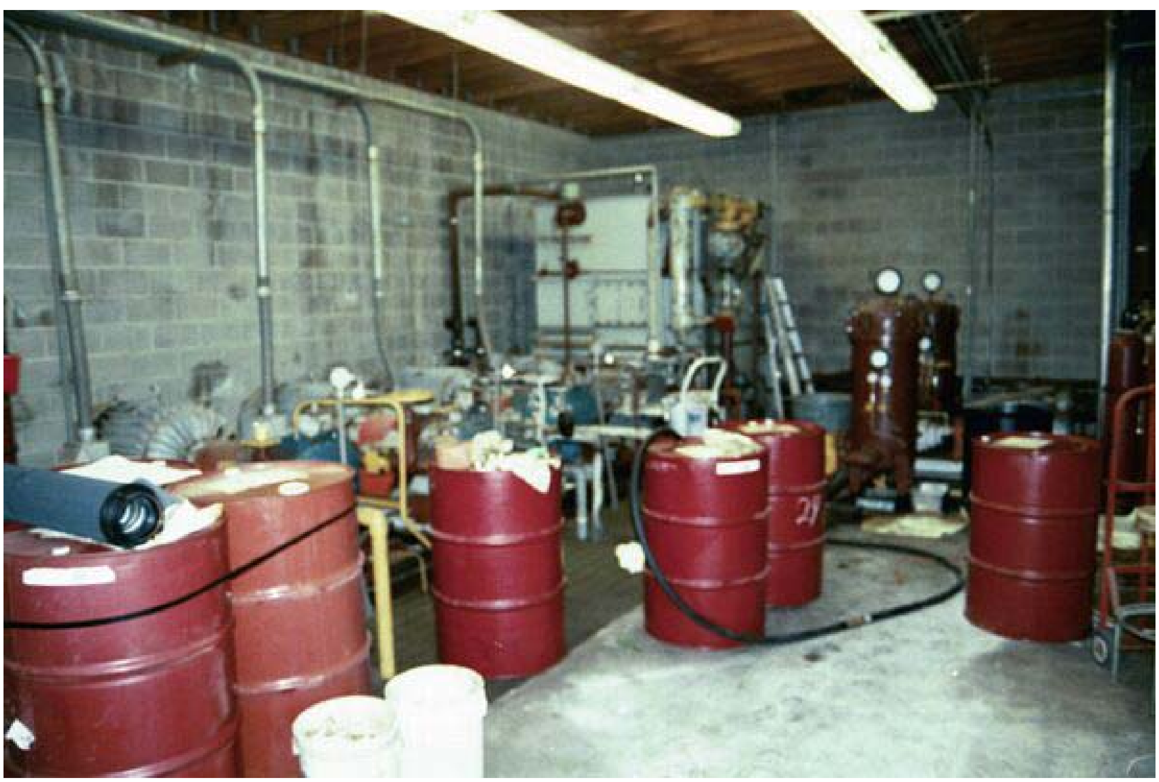
ATTACHMENT 1
PHOTOGRAPHIC LOG OF AST SITES
UC BERKELEY, RICHMOND FIELD STATION

Tank A-18-2 (RFS) (Diesel) - Adjacent to Bldgs 120 and 197


Tank A-18-2 (RFS) (Diesel) - Adjacent to Bldgs 120 and 197

ATTACHMENT 1
PHOTOGRAPHIC LOG OF AST SITES
UC BERKELEY, RICHMOND FIELD STATION

Tank A-18-3 / DSA-4 (Hydraulic Oil) - Bldg 421



Tank A-18-3 / DSA-4 (Hydraulic Oil) - Bldg 421

ATTACHMENT 1
PHOTOGRAPHIC LOG OF AST SITES
UC BERKELEY, RICHMOND FIELD STATION

Tank A-18-4 (Hydraulic Oil) - Bldg 497

Tank A-18-4 (Hydraulic Oil) - Bldg 497

Tank A-18-5 (Diesel) - Bldg 400

Tanks A-18-5 – Bldg 400

Tanks A-18-5 – Bldg 400

ATTACHMENT 1
PHOTOGRAPHIC LOG OF AST SITES
UC BERKELEY, RICHMOND FIELD STATION

Tanks A-18-5 – Bldg 400

ATTACHMENT 1
PHOTOGRAPHIC LOG OF AST SITES
UC BERKELEY, RICHMOND FIELD STATION

Tank A-18-7 – Bldg 400

Tank A-18-6 – Outside Bldg 194

Tank A-18-6 – Outside Bldg 194