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OFFICE OF ENVIRONMENT, HEALTH AND SAFETY
317 UNIVERSITY HALL
BERKELEY, CALIFORNIA 94720-1150

August 28, 2018

Sara Ziff
Project Manager
Corrective Action Section
U.S. EPA, Region 9
75 Hawthorne Street (LND-4-1)
San Francisco, CA 94105

Subject: **TSCA PCB Risk-based Disposal Approval Application**
EPA North Meadow
University of California, Berkeley, Richmond Field Station Site
Richmond, California

Dear Ms. Ziff:

Please find attached the application for a risk-based disposal approval for PCB cleanup is being submitted to address a planned soil excavation removal action in the EPA North Meadow at the University of California, Berkeley's Richmond Field Station, located along the City of Richmond Southeast Shoreline. This application replaces the application dated August 15, 2018 and provides additional certification language based on comments received from EPA dated August 23, 2018.

If you have any questions or need further information regarding this submittal, please call me at (ghaet@berkeley.edu, 510-642-4848) or Alicia Bihler (abihler@berkeley.edu, 510-725-2528).

Sincerely,

Greg Haet, P.E.
EH&S Associate Director
Environmental Protection

Enclosure

Cc: Bill Marsh, Edgcomb Law Group (email copy)
Lynn Nakashima, Department of Toxic Substances Control (email copy)

Toxic Substances Control Act (TSCA) Polychlorinated Biphenyls (PCBs) Risk-based Disposal Approval Application
University of California, Berkeley
Richmond Field Station

EPA North Meadow Soil Piles

August 28, 2018

Office of Environment, Health & Safety

Berkeley EH&S

Toxic Substances Control Act (TSCA) Polychlorinated Biphenyls (PCBs)
Risk-based Disposal Approval Application
University of California, Berkeley
Richmond Field Station

EPA North Meadow Soil Piles

1. Executive Summary, Introduction, Certification

This application for a risk-based disposal approval for PCB cleanup is being submitted to address a planned soil excavation removal action of the EPA North Meadow soil piles at the University of California, Berkeley's Richmond Field Station, located along the City of Richmond Southeast Shoreline. This application is based on the EPA May 2017 Facility Approval Streamlining Toolbox (EPA530-F-17-002) Tool 4, TSCA Risk-Based PCB Cleanups Checklist to address the requirements of 40 CFR 761.61(c)(1).

Site Address:

University of California, Berkeley (UC Berkeley), Richmond Field Station (RFS), 1301 S. 46th St., Richmond, CA 94804

Owner and/or operator name and contact information:

Owner and operator:

Owner: The Regents of the University of California
Operator: University of California, Berkeley

Contact:

Greg Haet
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Office of Environment, Health & Safety (EH&S)
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Brief Summary of PCB Impacts (impacted media and maximum PBC levels)

Field sampling investigations conducted in 2014 and 2015 discovered low concentrations of PCBs in the EPA North Meadow soil piles north of B201. The combined impacted area of the two soil piles totals approximately 24,000 square feet with a perimeter of 640 (EPA NW pile) and 690 (EPA NE pile) feet. The soil piles together cover approximately 60% of the meadow. It is estimated that 1,032 cubic yards of soil will need to be removed for off-site disposal. In both excavation areas, PCB concentrations are below the TSCA bulk remediation waste level of 50 mg/kg, but exceed the proposed cleanup level of 1 mg/kg.

PCBs in all of the samples from the EPA North Meadow soil piles were identified as Aroclor 1248, 1254, and 1260. There is no evidence of significant groundwater contamination based on historic (November 2010) groundwater well sampling. No PCBs were detected in a September 2010 groundwater sample collected at the CTPS well located within the proposed excavation area.

Brief Description of proposed cleanup option, cleanup schedule date by which cleanup needs to be completed and reasons for schedule (e.g. redevelopment)

The proposed PCB cleanup option is excavation of two soil piles on EPA North Meadow with PCBs above the 1 mg/kg cleanup level using an excavator, backhoe, or similar excavation equipment, to be determined by the contractor. The University will procure a hazardous materials contractor to excavate and dispose of the soil following approval of this application. Soil will either be placed directly into covered trucks or placed into roll-off bins and/or cubic yard boxes for eventual off-site disposal at licensed disposal facilities approved for the PCB waste stream. It is estimated that the excavation work will take two weeks to complete. If the soil is containerized, the bins will remain on-site for up to a month to receive approval from disposal sites.

Upon approval by EPA and DTSC, it is anticipated that the EPA North Meadow soil removal action can be conducted in Fall 2018. The University would prefer completing this work prior to the rainy season.

Brief discussion of state or local agency or community interests in the project, if applicable.

UC Berkeley has been conducting investigation and cleanup actions at the RFS under oversight of the Department of Toxic Substances Control (DTSC) Site Investigation and Remediation Order regarding soil investigations and removal actions. All sampling activities at the EPA North Meadow have been provided to DTSC for their monthly updates to the Richmond Southeast Shoreline Community Advisory Group. To date, the Community Advisor Group has not expressed any specific comments or concerns regarding investigation or proposed excavation activities related to the EPA North Meadow. Prior to any excavation activities, DTSC will issue a Work Notice to alert the community of the proposed activities. UC Berkeley will also issue a Work Notice to on-site workers at the Richmond Field Station.

Certification

Note the certification follows at the end of the Checklist, after Section 10 (page 28).

2. Site Description

Surrounding land uses

The RFS is bounded to the north by Meade Street and Hoffman Boulevard, east by South 46th St., south by the East Bay Regional Park District (EBRPD) Bay Trail and the San Francisco Bay, and west by Meeker Slough and Regatta Boulevard. See Figure 1 Site Location and Figure 2, Site Map.

Land uses immediately adjacent to the site are industrial, office, and transportation corridors, along with the Marina Bay single- and multi-family residential neighborhood immediately to the southwest.

Land uses to the west of the RFS include Bio-Rad Laboratories, a private research equipment manufacturing company located south of Regatta Boulevard, and the 24 acre UC Berkeley 3200-3300 Regatta property which is the location of campus museums storage, the UC Berkeley Property Surplus facility, and tenants Whole Harvest Baking, Oakland Packaging, and Loomis.

Businesses at the adjacent property to the northwest include the Safeway Bread Plant and otherwise are commercial warehousing and office space.

The adjacent property immediately to the northeast includes railways and the Meade Street and I 580 roadway corridors. Richmond residential neighborhoods and Booker T. Anderson Park are located across I 580, approximately 500 feet from the RFS.

The adjacent property to the east is the location of former Stauffer chemical production operations previously owned by Zeneca and currently owned by Cherokee Simeon Ventures, LLC. The currently vacant Campus Bay Business Park is located on part of this site, but the Richmond Bay Specific Plan, approved by the City of Richmond City Council in December 2016 anticipates property development as mixed-use commercial/residential.

The East Bay Regional Park District's (EBRPD) East Shore Park lies east and south of the RFS extending south and east along the Richmond Southeast Shoreline Area extending to the southern city limits and beyond. The EBRPD Bay Trail dissects UC Berkeley property at the southern boundary of the inboard marsh.

Current and proposed or planned future land uses

The RFS is currently an academic teaching and research facility that houses campus research and teaching programs, a cooperative library facility, and a number of non-University tenants with functions compatible with commercial/institutional land use, including the Federal EPA Region 9 Laboratory, non-profit organizations the Watershed Project and Earth Team, and a number of small private sector start-ups. Proposed future land use as presented the 2014 Berkeley Global Campus Long Range Development Plan anticipates continued similar commercial/institutional land use. The RFS property also include large areas of natural open space consisting of rare remnant Bay edge Coastal Terrace Prairie, ruderal and restored marsh edge transitional habitat, tidal salt marsh, mud flats, and submerged SF Bay land. These areas are identified as Natural Open Space (NOS) within the Long Range Redevelopment Plan and future development is prohibited or very limited; the EPA North Meadow is within the NOS land use designation.

The University owns 195.8 total acres along the Richmond Southeast Shoreline comprised of the portion of the Richmond Field Station covered by the DTSC Order (110.1 acres inboard of the EBRPD Bay Trail), adjacent 3200-3300 Regatta Property (24 acres, almost all hardscape), and the undevelopable tidal marsh, mudflats, and submerged lands outboard of the EBRPD Bay Trail (61.7 acres).

Onsite buildings, including age and use plans for the buildings

The RFS houses 80 buildings with approximately 500,000 square feet of space on the ~96 acre upland portion of the campus. See Figure 3, Richmond Field Station Physical Features. Buildings date from the late 1800s to 2005. Buildings were constructed in the 1800s to 1940s for the California Cap Company, a blasting cap and explosives manufacturer company that was one of the first industrial occupants of the Richmond Southeast Shoreline. The University purchased the property after 1950 and has constructed new buildings and research facilities with the most recent dating to 2005 with the construction of the third phase of the Northern Regional Library Facility. Construction of the fourth phase of the NRLF is scheduled to begin in March 2019. Current buildings use includes laboratory research space, offices, libraries, classrooms, conference rooms, facilities support storage and storage warehouses. There is one small café on site. B201 houses the US EPA Region 9 laboratory which is owned and operated by a third party under a ground lease with the University. Anticipated use for the buildings under the Berkeley Global Campus Long Range Development Plan are the same or similar.

There are no buildings in the EPA North Meadow cleanup site. B201, US EPA Region 9 Laboratory and its parking lot are adjacent to the southern edge of the site. B276 is located across from the site and is currently used as research laboratory space.

Hydrology and depth to groundwater

<u>Surface and Storm Water</u>

The RFS is located at the downstream base of a small watershed (~2,200 acres, 3.3 square miles) of a perennial creek draining from the North Richmond and El Cerrito East Bay Hills, extending to McBryde Avenue near Alvarado Park. The creek watershed is not formally named but is generally referred to as the Meeker Slough watershed, the tidally influenced water channel into which the creek drains. Meeker Slough courses through Western Stege Marsh, the delta of the creek, then to San Francisco Bay at the confluence with Baxter Creek, the adjacent creek watershed to the east of the RFS.

There is no dry season waterway in the upland portion of RFS as the uplands area is currently disconnected from surface water and storm water runoff from the watershed by the storm drain system which drains into Meeker Ditch and Meeker Tidal Creek and then to the marsh. Storm water runoff from most of the RFS flows from north to south by way of sheet flow, open swales, culverts and storm drains. The existing storm drain system consists of two main 24-inch storm drain lines- the Eastern Storm Drain and the Western Storm Drain- spanning the respective eastern and western edges of existing improvements. See Figure 4 RFS Hydrology.

It is believed that the Western Storm Drain was originally a sewer line draining to the San Francisco Bay mudflats that was placed along Syndicate Avenue prior to the establishment of the Richmond Publically Owned Treatment Works (POTW) and construction of the existing City of

Richmond sewer mains traversing the north and south portions of the RFS. After construction of the Richmond POTW, the Western Storm Drain remained connected as an overflow port to the for the City of Richmond sanitary sewer main traversing the northern portion of the RFS before the overflow was closed in 2004. The Western Storm Drain now conveys only runoff from the central and northeastern portions of the RFS, including EPA North Meadow, the NRLF (Building 400), eastern portions of the coastal-terrace prairie, and the asphalt pads to the east of Building 128.The Western Storm Drain discharges to Meeker Slough downstream of the confluence of Meeker Tidal Creek and Meeker Ditch. There are two storm drain inlets located at the EPA North Meadow site.

The Eastern Storm Drain collects runoff from the southeast portion of the RFS (Building 180 and south), including the Corporation Yard and B150 Transformer Cleanup Sites, and discharges in the northeastern corner of Western Stege Marsh, which drains via slough channels to the west into Meeker Slough upstream of the Bay Trail bridge.

The former Zeneca site, now known as Campus Bay, is east of S. 46th Street. In the past, runoff from a portion of the former Zeneca Site drained into the RFS Eastern Storm Drain via an interconnecting storm drain originating on South 46th Street on the east side of RFS Building 185. Following 2002 and 2003 Zeneca site remediation activities, only a small amount of Zeneca site surface runoff now flows into the interconnecting and Eastern Storm Drain.

Groundwater Hydrology

Evaluation of historic research groundwater well installations and site contamination piezometer installations (site-wide 47 shallow and 4 deep, installed in 2010) have revealed three water-bearing zones within 100 feet below ground surface. These are:

- Shallow zone, 1.5 to 20 feet below the surface;
- Intermediate zone, 30 to 74 feet below the surface; and
- Deeper zone, 90 to 100 feet below the surface.

Depth to groundwater as measured within the RFS piezometer network over the past 7 years ranges from 1.5 feet below ground surface (bgs) in the southeastern portion of RFS to 16.5 feet bgs in the northern portion of RFS. Depth to groundwater in the EPA North Meadow is approximately 3 to 5 feet bgs which varies seasonally. The shallow water-bearing zone spans the depth in which artificial fill, Quaternary alluvium, and young Bay sediments are found. Although the sediments are generally coarser in the upper 20 feet, clay content and sufficiently discontinuous permeable lenses slow groundwater flow such that the yield from shallow wells is low. Intermediate zone groundwater appears to flow through a relatively continuous, five-foot-thick sand stratum at a depth of about 30 to 35 feet. Groundwater may be under semi-confined conditions within this zone. The older Bay Mud acts as a confining layer or aquitard. The deeper groundwater zone is below or within the older Bay Mud.

The ground surface elevation slopes from about 30 feet National Geodetic Vertical Datum (NGVD) in the RFS site northeast corner and slopes down to the south and west. To the south, it slopes to about 15 to 20 feet NGVD in the site's central portion, down to about 2 feet along the edge of Meeker Slough.

Groundwater gradients vary somewhat seasonally and locally across the RFS site, probably due to differences in the amount of recharge and local differences in vertical permeability. The general direction of flow is toward the southwest, in the direction of Meeker Slough. In the late fall, groundwater elevations in the shallow zone are about 10 to 11 feet National Geodetic Vertical Datum (15 feet bgs) in the RFS site northeast corner, falling to about 6 feet National Geodetic Vertical Datum (10 feet bgs) in the RFS site central area, and dropping to about just below the ground surface along Meeker Slough. During groundwater monitoring rounds between November and April, groundwater elevations in the site's northeast corner increased about one foot in April wet season relative to November dry season, probably as a result of greater springtime recharge.

Proximity to surface water

As described in the Hydrology and Depth to Groundwater section above, there is no dry season waterway in the RFS upland meadows, including EPA North Meadow, as perennial flow from the watershed is routed around the RFS through the City of Richmond storm drain system. The RFS storm drains and Meeker Slough drain to Western Stege Marsh. RFS property includes approximately 6.5 acres of inboard marsh and 62 acres of outboard area consisting of tidal salt marsh, mudflats, and submerged land. The EPA North Meadow is approximately 450 feet from Western Stege Marsh at its nearest point. There are two inlets to the Western Storm drain which drains to Western Stege Marsh within the EPA North Meadow site.

Western Stege Marsh and Meeker Slough, in the southern portion of the RBC site, include high marsh, low marsh, tidal mudflat, and open water slough. They are all jurisdictional wetlands. The primary hydrologic feature in the area is the approximately 40- to 50-foot wide Meeker Slough. The high marsh is dominated by inland saltgrass and the low marsh is dominated by pacific cordgrass. Inland saltgrass is typically found in temperate grassland with sparse shrub layer. Habitats can be irregularly flooded or permanently saturated with shallow water table in haline or saline water chemistry. Western Stege Marsh is considered a sensitive natural community. The saltmarsh habitat provides high quality wildlife habitat for numerous special-status species including the federally endangered Ridgway's rail known to nest on site, and also functions to reduce erosion and sedimentation.

Storm water runoff and any collection system, and discharges to surface water and other areas

As described in the Groundwater Hydrology section, the RFS storm drain system consists of sheet flow, open swales, culverts and storm drains that discharge to Western Stege Marsh or Meeker Slough through two 24 inch culverts or by overland flow.

The EPA North Meadow cleanup site drains overland to the marsh through the Western Storm Drain. During periods of heavy rainfall the runoff drains overland into two storm drain inlets to the south of the soil piles which connect diagonally to the Western Storm Drain at the southern end of Avocet Way (Figure 5).

Typical weather patterns, climate, and wind rose depicting wind direction and speed

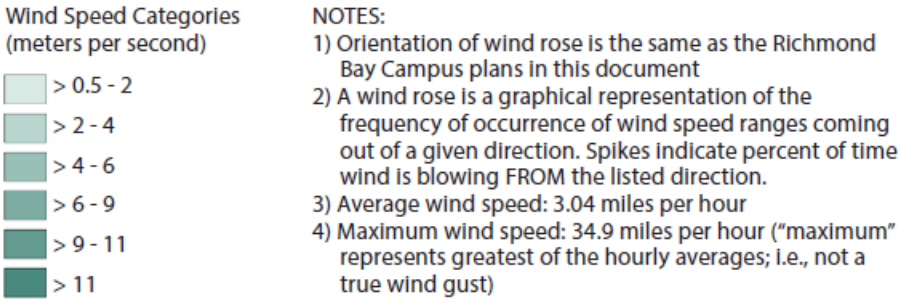
The Richmond South Shoreline Area enjoys a very mild Mediterranean climate year-round. The temperature is slightly warmer than in the coastal areas of San Francisco, the Peninsula, and

Marin County. It is, however, more temperate than areas further inland. The average highs range from 57 to 73°F and the lows between 43 and 56°F year-round. September is, on average, the warmest month and January is, on average, the coldest month. The highest recorded temperature in Richmond was 107°F in September 1971 while the coldest was 24°F in January 1990.

The average annual wind speed is 6 to 9 miles per hour primarily from the direction of the San Francisco Bay. It is generally windier from March through August than in other months and the strongest winds typically occur in June. (See wind rose below.)

The rainy season typically begins in late October and ends in April with some showers in May. Most of the rain occurs during stronger storms in November through March when rainfall is usually three to five inches per month, and the seasonal average for downtown Richmond is 21.81 inches (Richmond City Hall DWR gauge). Most precipitation occurs during January and February. Seasonal wetlands are known to occur throughout the Richmond Field Station site during the rainy season. The area experiences no snowfall but has brief hail storms annually during the coldest months.

The City of Richmond experiences sunshine more than 80% of the day lit hours during seven months out of the year and there are ten months where 60% or more of the day lit hours experience sunshine. December and January are the darkest months with about 45% average brightness. The South Shoreline Area and the ridges of the East Bay hills experience more fog than do the northern areas of Richmond. Morning humidity is 75% to 92% year round. Afternoon humidity ranges from 20-40% May through October (the summer months) and from 40-70% during the winter.



Source: Richmond Bay Campus LRDP May 2014, Climate, page 2.15

Soil types and geological features and characteristic at the site

The RFS is at the distal end of an alluvial plain that slopes to the southwest. The Hayward Fault Zone transects the alluvial plain to the northeast, toward the Berkeley Hills; the fault is not mapped across the RFS. The alluvial plain consists of relatively recent Quaternary age deposits (less than 2 million years old).

The lithology of the alluvial plain is primarily consolidated to unconsolidated clay, silt, sand, and gravel, with organic-rich clay and silt bordering the San Francisco Bay. Total thickness of the deposits ranges from shallow surface deposits, where the alluvium thins against the Berkeley Hills, to a depth of approximately 300 feet. These deposits are underlain by bedrock of the Mesozoic Franciscan Formation. The Franciscan Formation is a complex assemblage of serpentinite, greenstone, greywacke, chert, shale, sandstone, and schist, found on many ridges and mountains of the San Francisco Bay region.

Four major hydrogeologic units were defined for the RFS area as:

- Artificial Fill
- Quaternary Alluvium
- Bay Sediments
- Yerba Buena Mud (Older Bay Mud)

The Artificial Fill at RFS predominantly consists of imported soils, including pyrite cinders that originated from adjacent properties, and on-site soils that were moved and re-deposited in upland area soils as part of construction activities. Most of the artificial fill that was historically and recently imported to the RFS was placed in the Transition Area and in the marsh and upland areas excavated during remedial activities in falls 2002 to 2004. The Transition Area formerly contained a large area of pyrite cinders that was excavated as part of remediation activities by UC Berkeley from 2002 to 2004. Excavated areas were backfilled with clean fill from sources outside of the RFS.

The RFS is a topographically flat area of an alluvial fan reflecting historical conditions. Pyrite cinders have been found in small patches around buildings. Pyrite cinders at RFS are managed according to the DTSC-approved Pyrite Cinder-containing Soils Management Plan. Imported clean upland soil was used for backfill in five areas excavated during Phase 3 of the remediation

project in 2004 and in one area during the 2007 Forest Products Laboratory (FPL) Time Critical Removal Action (TCRA). Two areas of mounded soil, north and west of the EPA laboratory, are believed to be native soils deposited as part of grading activities during construction of the EPA Building 201 Laboratory in the early 1990s. Imported fill has also been used for road base and utility backfill.

The Quaternary Alluvium consists of fine- to coarse-grained sediments. The Bay Sediments consist of fine- to very fine-grained sediments, while the Yerba Buena Mud is a fine-grained unit that behaves as a regionally extensive aquitard.

The EPA NW and NE soil piles we deposited on top of the native coastal terrace prairie soils as part of grading activities during construction of B201. It is likely that the soil originated from excavation of the historic Western Storm Drain which was removed and relocated as part of the construction project.

Sources of PCBs and historic operations

Development of the current location of the RFS for industrial, commercial, and institutional uses dates to the 1870s when the California Cap Company and associated industries began manufacturing explosives on site. The neighboring former Zeneca site was established as a sulfuric acid plant by Stauffer Chemical in 1897. The University of California purchased the California Cap Company in 1950 and undeveloped plots to the west through the 1950s.

The current understanding of potential sources of PCBs at the RFS includes:

- Electrical distribution transformers and other oil-filled devices. Electrical power distribution equipment currently present on the RFS contains only non-PCB dielectric fluids. Records showed that all PCB-containing electrical distribution system transformers were either removed for off-site disposal or retrofilled onsite with non-PCB oils in the late 1980s and early 1990s. During this time period, approximately 40 pieces of electrical equipment (mostly capacitors and some transformers) were temporarily placed on a concrete pad in the northern portion of Building 280B, as part of a campus-wide cleanout of PCB items. (Note: there are no records of spills in B280 and inspections have not found evidence of oil stains where the equipment was stored.) Records also show that oil filled transformers had been staged in the Corporation Yard in the 1980s. There are no records indicating that spills of PCB oils ever occurred, and former employees did not recall any leaks or spill associated with the transformers at the RFS.
- Building materials. Caulking and possibly other building materials, such as exterior paint may contain PCBs.
- Laboratory equipment. Historic laboratory research operations likely used oil-filled equipment such as power supplies with large PCB capacitors, diffusion pumps, and other devices. There is no known laboratory equipment currently on site that contains PCBs.
- PG&E Storage Yard to the north of RFS. The storage yard historically located immediately north of the Western Storm Drain is a possible source of PCBs in the storm drain and Western Stege Marsh.
- Western Storm Drain overflows. Storm drainage from northern off-site properties entered RFS through underground culverts and open ditches. Prior to the construction of the City of Richmond's publicly owned treatment works in the early 1950s, sewage and industrial

wastes were discharged directly to the San Francisco Bay through a system of combined sanitary sewer and storm drains. The RFS Western Storm Drain line was one of a number of wastewater and stormwater conveyance pipes located on and around the RFS. The date of construction of RFS's Western Storm Drain line is unknown. It is believed to have served as a combined sewer through the 1900s until the early 1950s, draining industrial and residential wastewater and stormwater from a portion of the City of Richmond upstream of the California Cap Company and from portions of the RFS site itself. Sometime in the late 1940s or early 1950s, the City of Richmond wastewater treatment plant was constructed and historic sewers were routed to newly constructed sanitary sewer lines. The northern sewer line was constructed with an overflow into the Western Storm Drain and therefore possibly served as a source of PCBs until the overflow was plugged in 2004.

- Former Stauffer Chemical/Zeneca Site. Aerial photos dating from the 1940's show a line of manholes on the tidal flat south of the Zeneca and RFS sites indicating a sanitary sewer system running approximately east/west. This system is believed to have flowed directly to the Bay prior to the construction of the City of Richmond wastewater treatment plant in the early 1950's. During Phase 2 remediation, the pipe was exposed in Area 4 or Subunit 2A and removed. On October 3, 2003 a hotspot of volatile organic compounds was encountered in soil that apparently leaked from the pipe. This soil was analyzed and contained 63 mg/kg total PCBs. This result suggests that the Zeneca site or another site upstream along this pipe may be a source of PCBs in the marsh.

PCB Sources for the EPA North Meadow Cleanup Site

There are no records of spills of PCB oils, or historic laboratory research operations at the proposed cleanup site. The source of PCBs is likely contamination originally with the Western Storm Drain soils which were excavated during the construction of B201 and placed as the current EPA NW and NE piles. Field investigations in the early 2000s determined that the Western Storm Drain was contaminated with PCBs from a probable disposal of PCB oil through the storm drain. Significant PCB contamination was found in Meeker Slough sediments at the Western Storm Drain outfall and much of the contaminated sediments and portions of the distal Western Storm Drain were removed for off-site disposal in 2003. Prior to the excavation activities in 2003, soil from the excavation of the historic Western Storm Drain was removed and relocated to the EPA North Meadow soil piles as part of the construction of Building 201 by Wareham Property Group in the early 1990s.

Other contaminants present such as volatile organic compounds (VOCs), total petroleum hydrocarbons (TPH), or metals including a list of those that can enhance mobility of PCBs.

Other RFS site-wide contaminants that have been addressed through remediation actions or continue be addressed in field investigation and planned removal include:

- Mercury, primarily from former mercury fulminate manufacturing at the California Cap Company
- Arsenic, primarily from pyrite cinders deposited from sulfuric acid manufacturing at the Stauffer Chemical/ former Zeneca site
- Other pyrite cinder related metals (lead, copper, zinc)

- Polyaromatic hydrocarbons, believed to have originated from legacy industrial emissions and/ or spills of petroleum compounds
- Dioxins, at the Corporation Yard due to historic trash incineration
- Volatile organic compounds (VOCs, particularly PCE, TCE, and breakdown products), carbon tetrachloride, and other solvents in groundwater.

VOCs are present in groundwater along the eastern property boundary of the RFS and adjacent areas of the former Zeneca site. UC Berkeley concludes that the source of known TCE and related chlorinated hydrocarbons in groundwater is legacy industrial activities at the former Zeneca site, based on (1) the measured groundwater gradient from the former Zeneca site to RFS, (2) known historical TCE sources and groundwater contamination at the upgradient former Zeneca site, and (3) lack of measured or identified TCE sources within the RFS property.

VOCs are not present in the vicinity of the EPA North Meadow.

Cleanup sites other contaminants that can affect mobility of PCBs

VOCs in groundwater could affect mobility of PCBs, however the VOCs of concern along the property boundary, PCE, TCE and vinyl chloride, have been found at relatively low concentrations.

Current site environmental conditions including extent of PCB contamination onsite and beyond the property boundary

Detailed current site environmental conditions at the RFS are presented in the 2013 Site Characterization Report, the 2014 RBC Long Range Development Plan EIR, the 2014 Removal Action Workplan, the 2016 Field Sampling Plan Phase IV Results Technical Memorandum, the Draft 2017 Groundwater Sampling Results Technical Memorandum, the 2017 Soil Management Plan Revision 1, and the Draft 2017 Phase V Results Technical Results Memorandum; all documents are available on the Technical Documents page of the RFS Environmental Website at http://rfs-env.berkeley.edu/tech_doc.html.

The RFS is currently undergoing continued site assessment under the DTSC Order. In summary three soil removal actions (Corporation Yard, Former PCB Transformer areas at B150 and B112, and the Mercury Fulminate Plant Area), and one groundwater investigation action have been identified.

The extent of PCBs on site is undergoing continued evaluation. The 2005 Summary of PCB Results Richmond Field Station (July 8, 2005, BBL, http://rfs-env.berkeley.edu/documents/2005.07.08.RFSPCBsBBL.pdf) provides a site-wide summary of PCB contamination up to that date. Additional sampling conducted since 2005 under the FSW has increased knowledge of site PCB conditions in the Corporation Yard and at PCB transformers. UC Berkeley completed a PCB removal action at the Corporation Yard in the Fall of 2017 and a draft report is pending.

The current PCB site conditions reported in the 2017 Draft Phase V Results Technical Memorandum, the September 30, 2010 Year 5 Monitoring Report for the Western Stege Marsh Restoration Project (http://rfs-

env.berkeley.edu/documents/2010.10.06.RFS.Year5MonitoringReportWSM.pdf), and 2005 BBL report are generally representative of current conditions in Western Stege Marsh.

At the proposed excavation site, PCBs were found in the EPA North Meadow soil piles during FSP IV implementation with a maximum concentration of 38 mg/kg total Aroclors. (May 16, 2016 Final Phase IV Sampling Results Technical Memorandum, http://rfs-env.berkeley.edu/tech_doc.html). Additional ISM samples of the EPA North Meadow soil piles and storm drains were collected in November 2017, and indicate that PCBs are present at the soil piles at concentrations above 1 mg/kg, with storm drain samples between 0.8 -1.1 mg/kg. (June 4, 2018 Phase IV, EPA North Meadow, Supplementary PCB Sampling Results, http://rfs-env.berkeley.edu/tech_doc.html).

Other Site Conditions including:

- **Identification of threatened or endangered species (Endangered Species Act)**
- **Identification of any historic or culturally sensitive landmarks (National Historic Preservation Act)**
- **Identification of any potentially impacted environments and receptors**

The RFS contains natural open space consisting of rare coastal terrace prairie, seasonal wet meadows, and tidal salt marsh. One federally listed endangered species, the Ridgway's rail (formerly called the California Clapper Rail), has been sighted in Western Stege Marsh. The natural open space is home to other special status plants and animals. The EPA North Meadow is one of four large meadows in the western portion of the RFS separated by roadways that make up the approximately 20 acres of remnant coastal terrace prairie (CTP). EPA NE and EPA NW soil piles were placed on top of the CTP meadow and graded to an even elevation. The piles are separated by a lower area of remaining remnant native grassland that includes a seasonal wet meadow.

The RFS contains or potentially contains cultural resources, both prehistoric Native American archaeological resources and historic buildings and objects associated with the California Cap Company that are subject to the requirements of the National Historic Preservation Act. The BGC Long Range Development Plan addresses these cultural resources through required mitigation measures that must be implemented for all projects. The current proposed excavation at the cleanup site will not affect NHPA resources. However, any excavation could potentially uncover unexpected archaeological resources or historic resources associated with the California Cap Company, and contractors will be instructed to stop work in the event that a potential cultural resource is uncovered for evaluation by an archaeologist.

Sensitive environments such as crops, livestock, wetlands, waterways

The RFS contains natural open space consisting of rare coastal terrace prairie, seasonal wet meadows, and tidal salt marsh. EPA NE and EPA NW soil piles are separated by a lower area of remaining remnant native grassland that includes a seasonal wet meadow.

Sensitive receptors such as children

There are no sensitive receptors at RFS or in the vicinity of the EPA North Meadow cleanup site.

Brief summary of Comprehensive Site-Specific Conceptual Site Model and Data Quality Objectives included under Site Characterization and Data Gaps in Item 5 below

The 2013 Site Characterization Report Proposed Richmond Bay Campus (RBC) Research, Education, and Support Area and Groundwater within the Richmond Field Station (May 28, 2013 Tetra Tech, "Site Characterization Report" or "SCR", http://rfs-env.berkeley.edu/documents/2013.05.28.RFS.SCR.FINAL.pdf) contains an updated comprehensive Conceptual Site Model (CSM) for the RBC including the RFS, based on the 2008 Current Conditions Report for the RFS. The CSM describes possible migration of potential contaminants through the primary pathways in soil, water, and utilities. The CSM identifies on- and off-site storm water drainage systems likely contributed to transport of contaminants to the RFS upland and marsh areas. On- and off-site sources may have affected the RFS in two primary ways: (1) direct release of chemicals to soils and sediments, and (2) transport of chemicals onto the RFS and into the marsh and slough areas via surface water overland flow, storm drain and sanitary sewer flows, and groundwater transport. Soil samples collected from the storm drain inlets at the EPA North Meadow confirm there is overland transport of PCB-impacted soils to the storm drains.

3. Description of PCB "Cleanup Site"

Define and describe the "cleanup site" being addressed in the Application

The EPA North Meadow is defined as the meadow bounded by Lark Drive to the north, Avocet Way to the east, and Building 201's northern parking lot to the south. The two soil piles, EPA NE and EPA NW, were placed on top of the native CTP meadow in the mid-1990s during the construction of Building 201. The piles are separated by a lower area of remaining remnant native grassland that includes a seasonal wet meadow. The north edge of the meadow consists of non-native landscaping. The two soil piles are covered with mostly non-native weeds and are maintained as a mowed area through most of the year (when soils are dry enough for mowing).

The entire EPA North Meadow is approximately 81,000 square feet (1.86 acre). Each soil pile covers approximately 24,000 square feet (0.56 acre) with a perimeter of 640 (EPA NW) and 690 (EPA NE) feet. The soil piles together cover approximately 60% of the meadow.

The EPA North Meadow slopes gently uphill from south to north at a grade of approximately 1 foot elevation in 300 feet distance from 13.5 feet to 14.5 feet NGVD29. The two piles were graded to final elevations of approximately 1.5 feet above the historic prairie. The EPA NE pile includes a higher central mounded area (~0.7 acres) approximately 2.5 feet in depth. A survey of the soil piles completed in June 2018 calculated total volume of the two piles as:

- EPA NW = 672 CY
- EPA NE= 360 CY
- Total Volume = 1,032 CY

Describe the need for access for investigation/cleanup beyond impacted property boundary, if applicable

Not applicable. There is no need for access beyond the property boundary at this time for the proposed excavations at the two cleanup sites.

4. Proposed Risk-Based PCB Cleanup Levels

Description and justification of PCB cleanup goals to be applied. Cleanup goals that may be applied include:

- **EPA risk-based Regional Screening Levels**
- **Site-specific risk-assessment derived values, or**
- **State and County agency established PCB cleanup levels- EPA's agreement is needed for us of such levels**

Following review of the November 2017 sampling results (See June 4, 2018 Phase IV, EPA North Meadow, Supplementary PCB Sampling Results, http://rfs-env.berkeley.edu/tech_doc.html), EPA established a site specific risk-assessment derived value of 1 ppm that will be protective of receptors in Western Stege Marsh (email communication March 19, 2018).

5. Site Characterization and Data Gaps

Detailed Comprehensive Site-Specific Conceptual Site Model and Data Quality Objectives

Conceptual Site Model

The 2013 Site Characterization Report Proposed Richmond Bay Campus (RBC) Research, Education, and Support Area and Groundwater within the Richmond Field Station (May 28, 2013 Tetra Tech, "Site Characterization Report" or "SCR", http://rfs-env.berkeley.edu/documents/2013.05.28.RFS.SCR.FINAL.pdf) contains an updated comprehensive Conceptual Site Model (CSM) for the RBC including the RFS, based on the 2008 Current Conditions Report (CCR) for the RFS. The CSM describes possible migration of potential contaminants through the primary pathways in soil, water, and utilities.

The CSM identifies on- and off-site storm water drainage systems likely contributed to transport of contaminants to the RFS upland and marsh areas. The configuration of the Western Storm Drain line from eastern and northern off-site properties that discharged into the marsh has changed over the years. The line continued to be used by the City of Richmond as a sanitary sewer overflow line until the northern portion of the line was disconnected from the City of Richmond's sanitary sewer system in 2004. On- and off-site sources may have affected the RFS in two primary ways: (1) direct release of chemicals to soils and sediments, and (2) transport of chemicals onto the RFS and into the marsh and slough areas via surface water overland flow, storm drain and sanitary sewer flows, and groundwater transport. The possible presence of contaminant spills or releases to near-surface or subsurface soils throughout the RFS was identified in the CCR as data gaps and therefore were subject to further field investigations. Therefore conditions in the soil of the Upland meadows, including EPA North Meadow, were subject to field investigation under the Field Sampling Workplan, with implementation in the upland meadows beginning in 2014 with the Phase IV Field Sampling Plan.

Data Quality Objectives

The data quality objectives copied below for the soil in the Upland Meadows were presented in the 2014 Phase IV Field Sampling Plan (October 6, 2014 Tetra Tech, http://rfs-env.berkeley.edu/documents/FSP_PhaseIV.pdf).

3.2.1 DQOs for Soil in Upland Meadows

Step 1: State the Problem

- Only limited soil sampling data are available for the Upland meadows designated as NOS; therefore, additional data are necessary to determine if chemicals are present that pose unacceptable risks to human health or the environment.
- The Upland meadows were identified during discussions with DTSC in 2009 as needing characterization of ecological risk from soil.
- If contaminants are present in soil, unacceptable exposures to human and ecological receptors are possible.

Step 2: Identify the Goals of the Study

- What are the concentrations of metals, PCBs, polycyclic aromatic hydrocarbons (PAH), pesticides, and VOCs in soil in the Upland meadows?
- Are contaminants of concern present within the study area in quantities or concentrations requiring an immediate action, or consideration of further evaluation in a Remedial Investigation/Feasibility Study (RI/FS) or SCR?

Step 3: Identify Information Inputs

- Information provided within historical documents including the CCR, FSW, Phases I, II and III FSPs, SCR, RAW, and historical aerial photographs.
- Chemical concentrations detected in samples previously collected via ISM sampling within the areas investigated.

Step 4: Define the Boundaries of the Study

- The sampling includes portions of the Big Meadow, EPA Meadow North, and West Meadow designated as NOS.
- Initially, the soil from 0 to 0.5 feet bgs will be sampled on an approximately 125-foot grid spacing, and the soil from 1.5 to 2 feet bgs will be sampled on an approximately 125- by 250-foot grid spacing. If surface soils have elevated concentrations of chemicals, additional samples will be collected from deeper intervals (0-6 feet bgs for burrowing mammals and plants and 0-10 feet bgs for future maintenance workers). A separate FSP would be prepared for this supplemental sampling.
- No temporal boundaries are imposed upon this investigation.

Step 5: Develop the Decision Rules

- Chemical concentrations in soil detected in this investigation will be screened against applicable screening levels as described in Step 6.
- Chemical concentrations in soil detected in this investigation will be used in an ecological risk assessment (ERA) if warranted. The need for an ERA will be

determined by comparing soil concentrations to ecological screening benchmarks; and the methodology will be developed with concurrence of DTSC.

- For areas requiring 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), consideration of further evaluation in an RI/FS or SCR, or immediate consideration for remedial or response action.

Step 6: Specify Performance or Acceptance Criteria

- Maintenance workers may potentially be exposed to chemicals as deep as 10 feet bgs if deep utility corridors are installed. Off-site receptors may be exposed to chemicals via the inhalation pathway during potential excavation activities. Therefore, chemical concentrations in soil will be screened against human health screening criteria for maintenance workers and the off-site receptor inhalation pathway, as developed in the SCR.
- Invertebrates, birds, and non-burrowing mammals may potentially be exposed to chemicals as deep as 2 feet bgs, and plants and burrowing mammal may potentially be exposed to chemicals as deep as 6 feet bgs; therefore chemical concentrations in soil will be screened against EPA's Ecological Soil Screening Levels (Eco-SSL) (EPA 2010) for plants, invertebrates, birds, and mammals (Table 1). If an Eco-SSL is not available, Oak Ridge National Laboratory (ORNL) phytotoxicity and earthworm toxicity benchmarks will be used (Efroymson and others 1997a, 1997b). The data will also be used in an ERA, if warranted, based by comparing soil concentrations to the ecological screening benchmarks.
- Decision errors associated with the sampling event will be evaluated. Decision errors are generally depicted as implications of false positive or false negative results. False positive results are detections of chemicals above screening results that do not accurately represent the geographic area the sample result is intended to represent. False positive results overestimate chemicals concentrations within an area of interest, and generally result in unnecessary costs and resources required to further characterize the area or conduct cleanup activities. False negative results are detections of chemicals below screening criteria that do not accurately represent the geographic area the sample result is intended to represent. False negative results are underestimates of chemicals within an area of interest, and generally result in leaving contaminants in place that could result in unacceptable exposures to human health or the environment.
- Triplicate discrete soil samples will be collected during the investigation to help determine the confidence associated with representing soil conditions within a very short distance (1 to 2 feet) according to results from discrete samples, and therefore will help evaluate potential for false positive or false negative results for the areas sampled. Triplicate results will be used to help determine the margin of error within the discrete samples. Triplicates will be collected at a minimum of 10 percent of the discrete sample locations; higher frequency of triplicates may be sampled per the discretion of UC Berkeley.

- If analytical results and associated margin of error are near screening criteria values, risk of false positive and false negative results increases, and additional sampling or sampling techniques may be required—for example, a detected concentration of 10 mg/kg with a margin of error of 25 percent and a screening level of 12 mg/kg. If the analytical results and associated margin of error are well above or well below the screening criteria, the data will be considered usable for decision making—for example, a detected concentration of 10 mg/kg with a margin of error of 25 percent and screening level of 100 mg/kg.

Step 7: Optimize Design for Obtaining Data

- Soil samples will be collected from 0-0.5 feet bgs at every location, and from 1.5-2 feet bgs at half of the total number of locations because contamination is not suspected at depth. Samples will be collected using a hand auger and analyzed for metals, PCBs, PAHs, and VOCs (1.5-2 feet bgs only; VOCs are not expected to be detectable in surface soil), which have been identified as potential chemicals of concern. Additionally, samples collected adjacent to Building 280A and Building 280B will be analyzed for pesticides.
- Soil sampling locations are randomly distributed on a gridded basis to provide overall coverage of the Upland meadows.
- Following receipt and review of the laboratory results from this soil investigation, any additional sampling, if deemed necessary, will be considered under a future FSP.

Phase IV Samples were collected in the EPA North Meadow soil piles in October 2014 and September 2015. Further evaluation was completed in the winter of 2017, with an ISM sample collected from each soil pile in November 2017. In December 2017, ISM samples were also collected from soil/dry sediment which had accumulated at the collars of the storm drains located downgradient of each soil piles. Data were reported in the May 16, 2016 Phase IV Sampling Results Tech Memo (http://rfs-env.berkeley.edu/documents/Final_PhaseIV_TechMemo_2016.05.16.pdf), and the June 4, 2018 Phase IV, EPA North Meadow, Supplementary PCB Sampling Results (http://rfs-env.berkeley.edu/documents/2018.06.04.EPAMeadowNorthSamplingSummary_20180604.pdf).

Sampling and Analysis Plan (SAP) developed using a site-specific comprehensive conceptual site model and data quality objectives

The May 2016 Phase IV Sampling Results Tech Memo provides a comprehensive description of the sampling completed in Upland Meadows, including EPA North Meadow, during implementation of Phase IV of the Field Sampling Plan. The summary of the Upland Meadows and PCBs results is copied below from Phase IV Sampling Results Tech Memo Section 2.2 Hand Augering and Soil Sampling in the Upland Meadows (pages 6-8) and Section 4.1.3 PCBs (pages 26-27).

Hand Augering and Soil Sampling in the Upland Meadows

The Upland Meadows soil investigation was conducted in two phases. In the initial investigation phase, soil samples in the Upland Meadows were collected along 125-foot-spaced grids. Samples were collected from 0 to 0.5 feet bgs at all locations on the 125-

foot by 125-foot grid spacing and 1.5 to 2 feet bgs at half of the total number of locations, on an approximately 125-foot x 250-foot grid spacing. This sampling grid was designed to assess any impacts from historical site use. Sampling of locations UM01 through UM42 occurred on October 20 and 22, 2014.

Based on PCB results exceeding and nearly exceeding the TSCA criterion of 1 mg/kg at locations UM33 (4.8 mg/kg total Aroclors) and UM36 (0.69 mg/kg total Aroclors), DTSC recommended that supplementary sampling be conducted to further characterize the potential distribution of PCBs in shallow soil in the east and west portions of the EPA Meadow North. Supplementary sampling occurred on September 8, 2015. The sampling depth intervals selected were based on current topography in the EPA Meadow North; the east and west sides of the meadow are approximately 1 to 3 feet higher than the middle portion due to soil staging in those locations during the construction of the EPA Laboratory building in 1991 located south of the EPA Meadow. Soil samples were collected from 0 to 0.5 feet bgs and 1.5 to 2 feet bgs from six locations (UM43 to UM48). In addition, due to variations in topography, an additional soil sample was collected from 2.5 to 3 feet bgs at location UM47, from only 0 to 0.5 feet bgs at location UM49, and from 0 to 0.5 feet bgs and at 1 foot bgs at locations UM50 and UM51.

All samples collected as part of the Upland Meadows field investigation were collected in accordance with the QAPP (Tetra Tech 2010). For the initial field investigation, Tetra Tech contracted with Cascade Drilling, L.P. to complete sampling using hand augers at 42 locations from 0 to 0.5 feet bgs, and 21 of those locations from 1.5 to 2 feet bgs. Triplicate quality control (QC) samples were collected at locations UM04 and UM30 from 0 to 0.5 and 1.5 to 2 feet bgs, and at locations UM19 and UM28 from 0 to 0.5 feet bgs. A representative soil sample was collected from each depth interval. Soil from the designated depth interval was placed into a Ziploc bag for temporary storage then transferred into the sampling container appropriate for each analysis within 5 minutes of sample collection. For the supplementary PCB investigation, a bobcat vehicle with an auger attachment was used to loosen the soil for the top sample and used to arrive at the bottom sample depth for the deeper sample. At each sample depth interval, a disposable plastic scoop was used to collect the soil sample and place it directly into the sample jar.

At each sampling location, the hand auger or auger attachment was decontaminated using dry brushes before collection of the surface sample, and again when the top of the second sample was reached, if applicable, to reduce possibility of cross contamination between sampling depths. Only the amount necessary for the sample was collected from the entire length of the horizon; the rest of the plug was replaced to maintain the integrity of the valuable top 6 inches of the coastal terrace prairie soil.

All samples collected during the initial investigation were submitted to Curtis and Tompkins Laboratory in Berkeley, California for analysis of metals, PCBs, polycyclic aromatic hydrocarbons (PAH), and VOCs. Samples collected from 0 to 0.5 feet bgs from six locations near buildings or roads (UM01, UM03, UM09, UM20, UM28, and UM40) were analyzed for pesticides as well. In addition, triplicate samples were collected at six sample locations selected randomly in order to evaluate the confidence associated with representing soil conditions within a very short distance (2 feet). Soil samples collected during the supplementary PCB investigation were submitted to the sample laboratory for

analysis of PCBs only. Soil sampling activities were conducted in accordance with the FSW (Tetra Tech 2010).

Soil samples collected for analysis of metals, pesticides, PCBs, and PAHs were placed directly into clean glass jars provided by the laboratory. Soil samples collected for VOC analysis were collected using Encore samplers consistent with EPA Method 5035. Following collection, all samples were labeled, wrapped with protective bubble wrap material and placed into a cooler with ice to maintain a temperature at or below 4° Celsius. The coolers were transported via car at the end of each day to Curtis and Tompkins Laboratory, where they were placed in freezers to preserve the samples. A copy of complete analytical results are presented in Appendix A, chain-of-custody forms are presented in Attachment 4, and the laboratory report is presented in Attachment 1

Protection of Native Plant Species

Native plant species are present in the Upland Meadows soil and passive soil gas sampling areas. Consequently, no vehicles were used and sample locations were biased toward locations not occupied by native plants to minimize impacts on the grasslands. In addition, all activities in the Upland Meadows adhered to the requirements of the Coastal Terrace Prairie Management Plan (Appendix G of the RBC Environmental Impact Report [Tetra Tech 2014a]).

PCBs

In the initial sampling event conducted in April 2015, all 75 samples were submitted for analysis of PCBs by EPA Method 8082. Aroclor-1248 was detected in four samples, Aroclor-1254 was detected in 46 samples, and Aroclor-1260 was detected in 43 samples. There were no detections of Aroclor-1016, Aroclor-1221, Aroclor-1232, or Aroclor-1242. Results are presented in Table 1.

The sample result from location UM33 collected from 0 to 0.5 feet bgs exceeded the TSCA screening criterion of 1 mg/kg total PCBs for high occupancy areas. This sample contained both Aroclor-1248 (2.2 mg/kg) and Aroclor-1254 (2.2 mg/kg) for a total of 4.4 mg/kg Aroclors.

In the supplementary PCB investigation in EPA Meadow North conducted in September 2015, all 18 samples were submitted for analysis of PCBs. Aroclor-1248 was detected in 15 samples, and Aroclor1254 and -1260 were detected in all 18 samples. Similar to the initial sampling event results, there were no detections of Aroclor-1016, Aroclor-1221, Aroclor-1232, or Aroclor-1242. PCB results are presented in Table 9. The sample results from locations UM46, UM50, and UM51, which are all located within 25 feet of location UM33, collected from varying depths between 0 and 2.0 feet bgs, exceeded the TSCA screening criterion of 1 mg/kg total PCBs for high occupancy areas. These samples contained both Aroclor-1248 and Aroclor-1254 and ranged from 2.9 to 38 mg/kg total Aroclors. Figure 6 presents the PCB results from the initial and supplementary sampling investigations.

The plant Eco-SSL for Aroclor-1254 is 40 mg/kg. None of the detected results exceeded this benchmark. Eco-SSLs or ORNL benchmarks for PCBs have not been established for invertebrates, birds, and mammals, or for other PCB congeners for plants.

Further evaluation of PCBs in the immediate area around locations UM33, UM46, UM50, and UM51 is recommended and will be conducted as part of a separate future investigation.

The June 2018 Phase IV, EPA North Meadow, Supplementary PCB Sampling Results provides a comprehensive description of the additional sampling completed in EPA North Meadow as recommended by the 2016 Phase IV Tech Memo. The summary of the EPA North Meadow and PCBs results is copied below from the June 2018 Sampling Results (pages 2-5).

Sampling Protocols

Soil samples for characterizing PCBs in the two piles were collected using incremental sampling methodology (ISM). Each soil pile was identified as a decision unit, and a 75-increment grid was generated for each decision unit using Visual Sample Plan (VSP), as shown on Figure 5. EPA NW and EPA NE samples were collected on November 14 and 15, 2017, respectively.

An ISM sample was collected from each soil pile decision unit. Each ISM sample was composed of a minimum of 75 soil increments from the soil pile material and not soil from the native prairie plain. Prior to sampling, a small cross-section was cut with the backhoe to establish a clear visual characterization of the historic prairie plain underneath the soil piles. The composition of the soil piles was observed as unconsolidated sandy silts and silty sands with intermixed gravels, and the native prairie plan was observed as highly plastic, silty clays.

Each increment was collected with the assistance of an auger attachment mounted to small Bobcat track loader. The auger attachment was forwarded through the soil piles to the native prairie plain. As the auger attachment was advanced, soil cuttings (spoils) were raised to the surface in small piles surrounding the auger. A single increment of approximately 15 grams was collected from each of the 75 spoil piles at random locations within the spoil pile, thereby representing different depths for each increment. Professional judgement was used to ensure that the 15-gram increments from each spoil pile were collected randomly.

The auger attachment was decontaminated with water and brush scrub between each decision unit. The auger attachment was not decontaminated between increment locations which is consistent with industry standards for incremental sampling. No decontamination is necessary since soil from all increments are combined into the same sample and therefore cross-contamination is not relevant.

Sixteen increment locations from EPA NW and seven increment locations from EPA NE identified in the original sampling plan were located on native prairie and therefore not sampled. The native prairie edges were identified with the presence of native bunchgrasses along the perimeter of the soil piles. Additional increments were identified within the soil piles to ensure a minimum of 75 increments were collected from each soil pile. The locations of increments removed from the native prairie and additional increments within the piles are shown on Figure 5.

Field triplicates also collected at the apices of a triangle centered at each of the 75 increment grid locations at the EPA NE decision unit, as described in the field sampling plan and also depicted on Figure 5. Laboratory triplicates were also conducted for one of the EPA NE triplicate samples.

In addition to the two soil pile decision unit sampling, ISM samples were collected from soil/dry sediment which had accumulated at the collars of the storm drains located downgradient of each soil pile decision unit, as shown on Figure 5. The two ISM samples were each composed of 75-increments collected randomly from the entire soil mass present. Storm drain samples were collected on December 14, 2017. The EPA NE storm drain collar is 2-feet in diameter; the EPA NW storm drain collar is approximately 2 by 2 feet square. Each storm drain collar contained approximately 1 to 3 inches of soil/dry sediment along the edges. The storm drains are shown on the photo log included as Attachment 2.

For all ISM samples, a disposable plastic scoop was used to collect the soil increment from the locations described above. Increments for each DU and triplicates were placed within a 32-ounce glass jar (~ 1.5 kg total mass). The jars were labeled and packed into an insulated cooler. The samples were transported under chain-of custody procedures directly to Enthalpy Laboratory in Berkeley, California.

All sample collection protocols are consistent with the Final Phase IV Field Sampling Plan with the exception that ISM methodology is being used as it is acceptable to EPA Region IX.

Analysis and Results

Soil samples were processed according to Enthalpy's internal ISM protocol including sample drying, sieving, and subsampling. A minimum of 75 subsample increments were specified for collected from each dried sample to a final analytical aliquot of 30 grams. Samples were analyzed for PCBs by EPA method 8082A using EPA Method with 3540C Soxhlet extraction. One of the triplicate ISM samples from EPA NE was subsampled three times for separate analysis as a laboratory triplicate to evaluate the subsampling process and analytical variability.

Analytical results are presented in Table 1 and shown on Figure 7.

Additionally, the sample with the most elevated total Aroclor result (EPA-NE-01-T1) was analyzed for metals by EPA Methods 6010B and 7471A, and semi-volatile organics by EPA Method 8270 SIM for waste characterization purposes in the event the soil is disposed off site.

Vertical and horizontal extent of PCB contamination

The two soil piles currently planned for excavation have been sampled and found to contain PCBs. Figure 5 provides the locations of the anticipated soil removal.

The entire EPA North meadow is approximately 81,000 square feet (1.86 acre). Both piles cover approximately 24,000 square feet (0.56 acre) with a perimeter of 640 (EPA NW) and 690 (EPA NE) feet. The soil piles together cover approximately 60% of the meadow.

The EPA North Meadow slopes gently uphill from south to north at a grade of approximately 1 foot elevation in 300 feet distance from 13.5 feet to 14.5 feet NGVD29. The two piles were graded to final elevations of approximately 1.5 feet above the historic prairie. The EPA NE pile includes a higher central mounded area (~0.7 acres) approximately 2.5 in depth. A survey of the soil piles completed in June 2018 calculated total volume of the two piles as:

- EPA NW = 672 CY
- EPA NE= 360 CY

Total Volume = 1,032 CY

The EPA North Meadow was first investigated for chemicals of potential concern in October 2014 during implementation of the Phase IV Field Sampling Plan, dated October 6, 2014. Five locations were sampled using discrete sampling methodology on October 22, 2014: UM28, UM32, UM33, UM36 and UM37. Sample UM33 exhibited the most elevated concentration of total PCBs at 4.76 milligrams per kilogram (mg/kg). As a result, step-out sampling using discrete sampling methodology was conducted on September 8, 2015 at nine additional locations (UM43-UM51). All samples surrounding previous sampling location UM33 were found to contain PCBs at concentrations greater than the 1.0 mg/kg TSCA self-implementing criterion with Aroclor 1248 being the prevalent Aroclor; however, Aroclors 1254 and 1260 were also detected. Sample UM46 exhibited the most elevated concentration of total PCBs at 37.93 mg/kg. Previous investigation sample results are presented on Figure 6.

Further ISM sampling completed in November and December 2017 results indicated that PCBs are present in both soil piles at concentrations greater than the 1.0 mg/kg TSCA self-implementing criterion. Sample EPA-NE-01-T1 exhibited the most elevated concentration of total PCBs at 5.1 mg/kg. Sampling results are shown in Figure 7.

Figures and tables

Figures provided include a site location map, site map, physical features map, RFS hydrology, EPA North Meadow run off flow, survey topos and volumes, summary and location of PCB sampling results at EPA North Meadow PCB excavation areas. Table 1 provides a comprehensive summary of all PCB results, including non-detects, at the EPA North Meadow soil piles.

Identification and Description of Data Gaps

The two soil piles proposed excavation areas have been well characterized and there are no current data gaps. Confirmation sampling, as described in section 6.1d, will ensure no residual PCB concentrations are above the cleanup level.

6. Application and Cleanup Plan

Inclusion of the Notification of PCB Activity Form required in 40 CFR 761, Subpart K

Notification of PCB Activity Form is attached.

Description of storage for disposal activities that will be carried out, including waste containers that will be used, marking, labeling, and manifesting.

The University will procure a hazardous materials contractor to excavate and dispose of the soil following approval of this application. Soil will either be placed directly into covered trucks or placed into roll-off bins and/or cubic yard boxes for eventual off-site disposal at licensed disposal facilities approved for the PCB waste stream. It is estimated that the excavation work will take two weeks to complete. If the soil is containerized, the bins will remain on-site for up to a month to receive approval from disposal sites.

Description of disposal methods that will be used

Soils contain PCBs at concentrations less than 50 mg/kg and will be transported to Potrero Hills Landfill, Altamont Landfill or a similar facility as Class II waste to be disposed of as alternative landfill cover.

Description and evaluation of cleanup alternatives

1. **Soils**
    - **a.** Identify, evaluate, and justify cleanup alternatives in addition to excavation and onsite disposal. Among other factors, the evaluation should consider investigation data, risk-based cleanup levels, receptors, sensitive habitats and/or environments, presence of other contaminants that may enhance PCB solubility and/or mobility (PCB co-solvency), and depth to ground water and flow direction

      The current planned removal action excavations are being completed to remove soil containing PCBs that could become sources for runoff to the marsh, in addition to eliminating exposure risk to future construction and maintenance workers. Excavation and off-site disposal was selected based on the following factors:

        - Designation of the EPA North Meadow as Natural Open Space does not allow for capping or asphalt cover options
        - UC Berkeley has not identified any areas within RFS currently suitable for on-site placement or disposal
        - Proximity of the contaminated soil to storm drain inlets and Western Steget Marsh justify the complete removal of the contaminants above the cleanup level.

    - b. **Identify and justify preferred cleanup alternative**

      Soil excavation and off-site disposal per Section 6.1.a.

    - c. **Describe cleanup verification sampling methods and include a SAP for this purpose**

      PCB confirmation sampling will follow the TSCA confirmation sampling guidance in 40 CFR Part 761.280. PCB excavation confirmation samples will be collected on a 1.5-meter grid basis, at the limits of each PCB soil excavation. At least one confirmation sample will be collected at the bottom of each excavation and at least one sample will be collected from each excavation sidewall. The remedial goal for total PCBs is a not-to-exceed concentration of 1 mg/kg. Per current EPA guidance, confirmation samples will be collected either as a single

grab sample, on a 1.5 meter grid basis, or as a ISM sample with a minimum of 75 increments.

The Sampling and Analysis plan for this current removal action excavation is contained in the October 2017 EPA North Meadow Field Sampling Plan (October 25, 2017 Tetra Tech http://rfs-env.berkeley.edu/documents/2017.10.25.EPANSamplingPlanFIN.pdf).

d. **Describe methods for evaluating cleanup verification sample results**

For the purposes of confirmation sampling, each soil pile bottom will be divided into ten decision units (DU) approximately 50 x 50 ft, with six perimeter DUs approximately 50 x 10 ft, for a combined total of 32 DUs for both soil piles (Figure 8). If total PCBs are present at concentrations greater than 1 mg/kg along the bottom or perimeter, the excavation will be expanded 6 inches vertically and 3 feet laterally, as appropriate. It is expected that current funding for the project will not allow more than one step-out excavation per pile. Perimeter DUs will be sampled prior to excavation.

e. **Describe methods for demonstrating compliance with cleanup goals (e.g., statistical methods)**

As described in d. above, compliance with the cleanup goal will be demonstrated through confirmation samples.

f. **Describe any capping, long-term inspection, maintenance, and repairs expected to occur at the site**

If the planned removal action excavations are successful in removing contamination as planned at the excavation site, including over-excavation as needed demonstrated on confirmation sampling, then no long-term inspection or maintenance will be required.

If excavation is not successful in removing all of the contamination, then a long-term inspection and maintenance plan will be developed in consultation with EPA. This plan may include implementation of best management practices to ensure no residual contamination can enter the storm drain inlets.

g. **Describe any land use covenants that will be used for caps or fences; or when caps and fences are not used and the site is not cleaned up to risk-based unrestricted land use levels**

There are no anticipated land use covenants directly applicable to the EPA North Meadow as no caps or fencing or access restrictions are anticipated.

h. **If ISM is used, provide the information described in 1.a through 1.g above for each decision unit**

For the current scope of removal action excavations ISM was used for both the EPA NW and EPA NE decision units, and the information in 6.1.a through 6.1.g above apply to these units.

2. **Storm water runoff collection systems, piping, and impacted receiving areas**
    - **a. Identify, evaluate, and justify cleanup alternatives. Among other factors consider human and ecological receptors, surface water impacts, and recreational use**
    - **b. Describe and justify preferred cleanup alternative**
    - **c. Describe methods for debris/sediment removal**
    - **d. Describe post-removal sampling methods**
    - **e. Describe methods for demonstrating compliance with cleanup level**
    - **f. Describe methods for post-cleanup monitoring with routine sediment removal depending on PCB levels**
    - g. **Describe land use restrictions expected to be used at the site, as applicable**

    The planned removal action will include removal of PCB contaminated soils adjacent to and upgradient of the two EPA North Meadow storm drain inlets runoff. The initial area of removal will be the foot print described above in section 5. Excavation will be extended if necessary based on confirmation sampling. In addition to the soil removal, any sediment identified within the existing storm drains will be removed, the storm drains flushed, and sediment traps/filters installed around the storm drain inlets.

    After completion of the planned removal action excavations, a filter will be placed over the storm drain inlets. During the rainy season straw wattles will be staked around the inlets to reduce inflow of sediment from the EPA North Meadow. The inlets will be monitored to prevent clogging of the filter and once a sufficient amount of sediment has accumulated on the filter for a PCB sample analysis, a sample will be collected to determine if the EPA North Meadow contains a continuing source of PCBs to the inlet.

3. **Surface Water**
    - a. **If applicable, include measures for surface water protection**

    As described in Section 2, the excavation area is adjacent to and upgradient of two storm drain inlets that drain to Western Stege Marsh. This area is to be excavated with further evaluation of runoff potential as describe above.

4. **Buildings and non-Building structures**
    - **a. Describe risk-based cleanup goals for on-site buildings and structures**
    - **b. Describe decontamination methods for on-site buildings and structures**
    - **c. Describe verification sampling that will be used for non-building structures**
    - **d. Describe verification sampling that will be used for building structures that will remain in use**
        - **i. Description of sampling and analysis methods for substrates**
        - **ii. Description of indoor air, bulk dust, and surface wipe sampling and analytical methods**

iii. **Descriptions of methods that will be used to demonstrate achievement of air target levels**

e. **Description of BMPs to be used**
f. **Description of land use covenants to be used, if applicable**
g. **Description of any contingencies that may apply (e.g., tenant protection in occupied buildings)**

There are currently no anticipated building or non-building structures included in the planned removal action excavations.

7. Decontamination of Tools, Equipment, and Movable Equipment

Description of applicable decontamination standards and procedures to be applied (410 CFR 761.79).

All equipment will be decontaminated prior to and following exposure to the two soil piles. Decontamination is not necessary between the two soil piles. The equipment will first be dry brushed into soil waste containers, followed by a double wash/rinse with Alconox or an alternative detergent and wet-wiped clean. Water, detergent, wipes and PPE will be disposed of in the waste soil containers. Complete decontamination procedures are included in the 2014 Field Sampling Workplan, Appendix A Section 4.10.

8. Waste Disposal – PCB Remediation Waste and Cleanup Wastes

Description of applicable disposal procedures for bulk, porous, non-porous, and liquid PCB remediation wastes that will be implemented.

All wastes generated from the planned removal action excavations will be non-liquid soil with small amounts of miscellaneous debris (rags, PPE, etc.). Soil will be either direct-load to appropriate covered trucks for disposal or contained in roll-off bins and cubic yard (or cubic meter) boxes. Equipment will be decontaminated with the minimal amount of liquid detergent as necessary and rinsate placed into soil containers.

Soils contain PCBs at concentrations less than 50 mg/kg and will be transported to Potrero Hills Landfill, Altamont Landfill or a similar facility as Class II waste to be disposed of as alternative landfill cover.

Description of applicable disposal procedures for cleanup wastes that will be implemented.

See above.

9. PCB Cleanup Completion Report

Descriptive Outline of the PCB cleanup report that covers all the PCB cleanup activities completed for the site such as removal of PCB remediation wastes, removal of other PCB containing wastes, cleanup verification sampling and results, data evaluation including statistics, waste storage (as applicable), and waste disposal. EPA may recommend additional information that should be included in the PCB cleanup completion report.

The implementation summary report will be organized in the same manner as previous removal action implementation reports conducted at the RFS and contain the data and information listed below. It will be comprehensive for both PCB and non-PCB contaminant removal actions and activities. An anticipated table of contents appears below (based on the Implementation Summary Report for a Time Critical Removal Action at the Former Forest Products Laboratory Wood Treatment Laboratory available at http://rfs-env.berkeley.edu/documents/TCRA_Final_03_14_08.pdf):

10. Land Use Restrictions

The Richmond Bay Campus Long Range Development Plan (LRDP) identifies the developable portion of the Richmond Field Station as Research, Education, and Support (RES), and the remainder as Natural Open Space (NOS). The EPA North Meadow and other Upland Meadows are part of the NOS. The NOS land use applies to areas that UC plans to protect from development and maintain in their natural condition.

11. Certification

I certify that all sampling plans, sample collection procedures, sample preparation procedures, extraction procedures, and instrumental/chemical analysis procedures used to assess or characterize the PCB contamination at the cleanup site, are on file at the location designated in the certificate, and are available for EPA inspection.

Under civil and criminal penalties of law for the making or submission of false or fraudulent statements or representations (18U.S.C. 1001 and 15 U.S.C. 2615), I certify that the information contained in or accompanying this document is true, accurate, and complete. As to the identified section(s) of this document for which I cannot personally verify truth and accuracy, I certify as the company official having supervisory responsibility for the persons who, acting under my direct instructions, made the verification that this information is true, accurate, and complete.

Signed by:

Patrick Goff, P.T. Goff, as Executive Director of UC Berkeley's Office of Environment Health & Safety and representing the Owner where the site is located (Richmond Field Station) and the Party Conducting the Cleanup (UC Berkeley)

UC Berkeley
Office of Environment Health & Safety
University Hall, 3rd Fl. #1150
Berkeley, CA 94720

12. Figures, Tables, and Attachments

Figures:

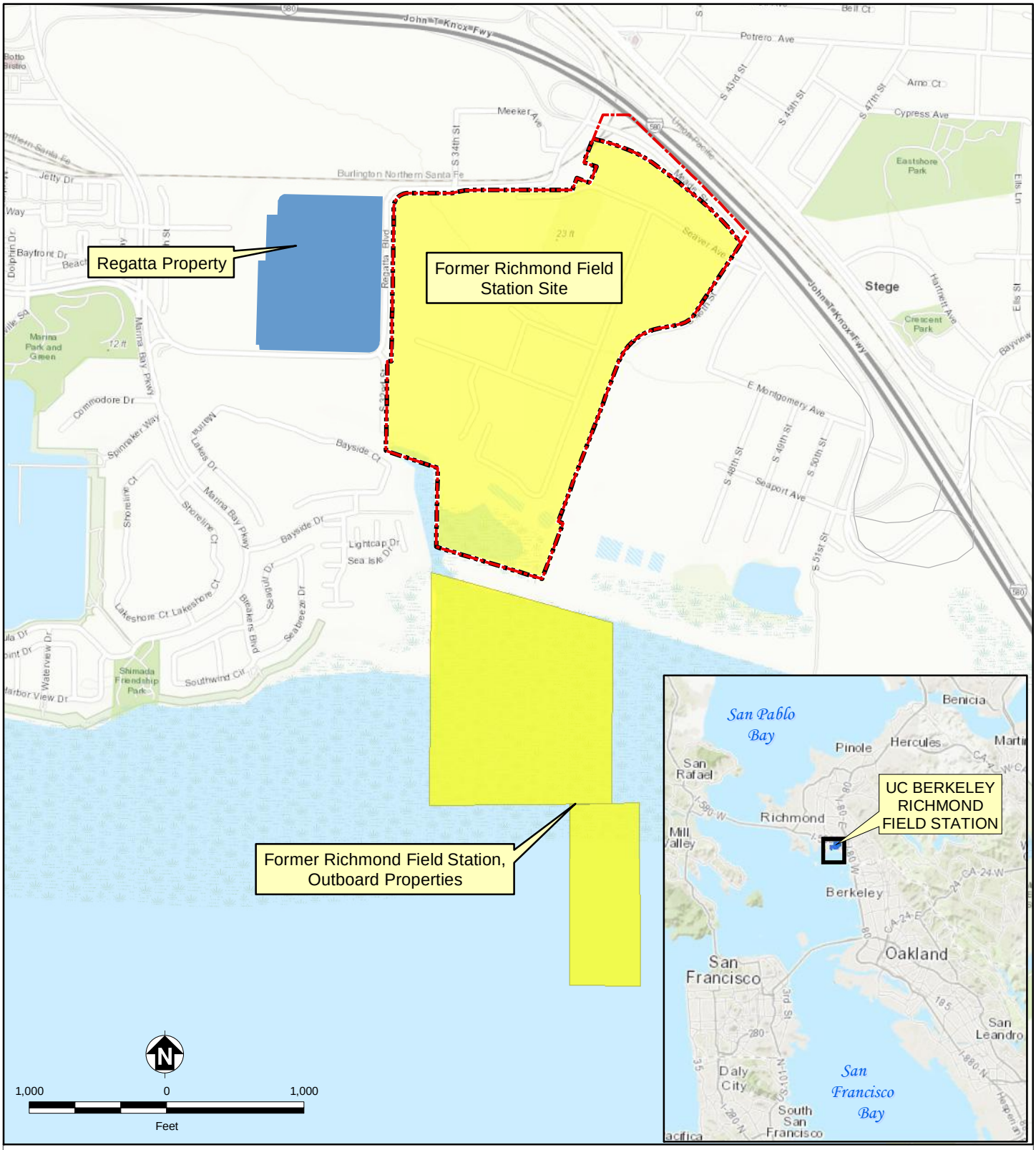
1. Site Location
2. Site Map
3. RFS Physical Features
4. RFS Hydrology
5. EPA North Meadow ISM Locations with Runoff flow
6. Phase IV PCB Sampling Results (October 2014 and September 2015)
7. Phase IV PCB ISM Sampling Results (November and December 2017)
8. Proposed Confirmation Sampling Plan

Tables:

1. EPA North Meadow PCB Sampling Results

Attachments:

Notification of PCB Activity Form required in 40 CFR 761, Subpart K



RFS DTSC Order Boundary

Former Richmond Field Station Properties

Former Richmond Field Station Site Boundary

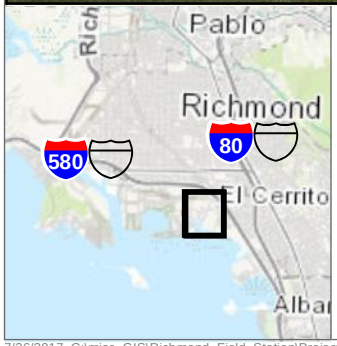
Regatta Property

TETRA TECH

Richmond Field Station Site
University of California, Berkeley

FIGURE 1
SITE LOCATION MAP

Phase IV Sampling Results Technical Memorandum



- Bay Trail
- Meeker Slough
- Western Stege Marsh
- Transition Area (Including Bulb)
- Upland
- Richmond Field Station Site Boundary

Notes:

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

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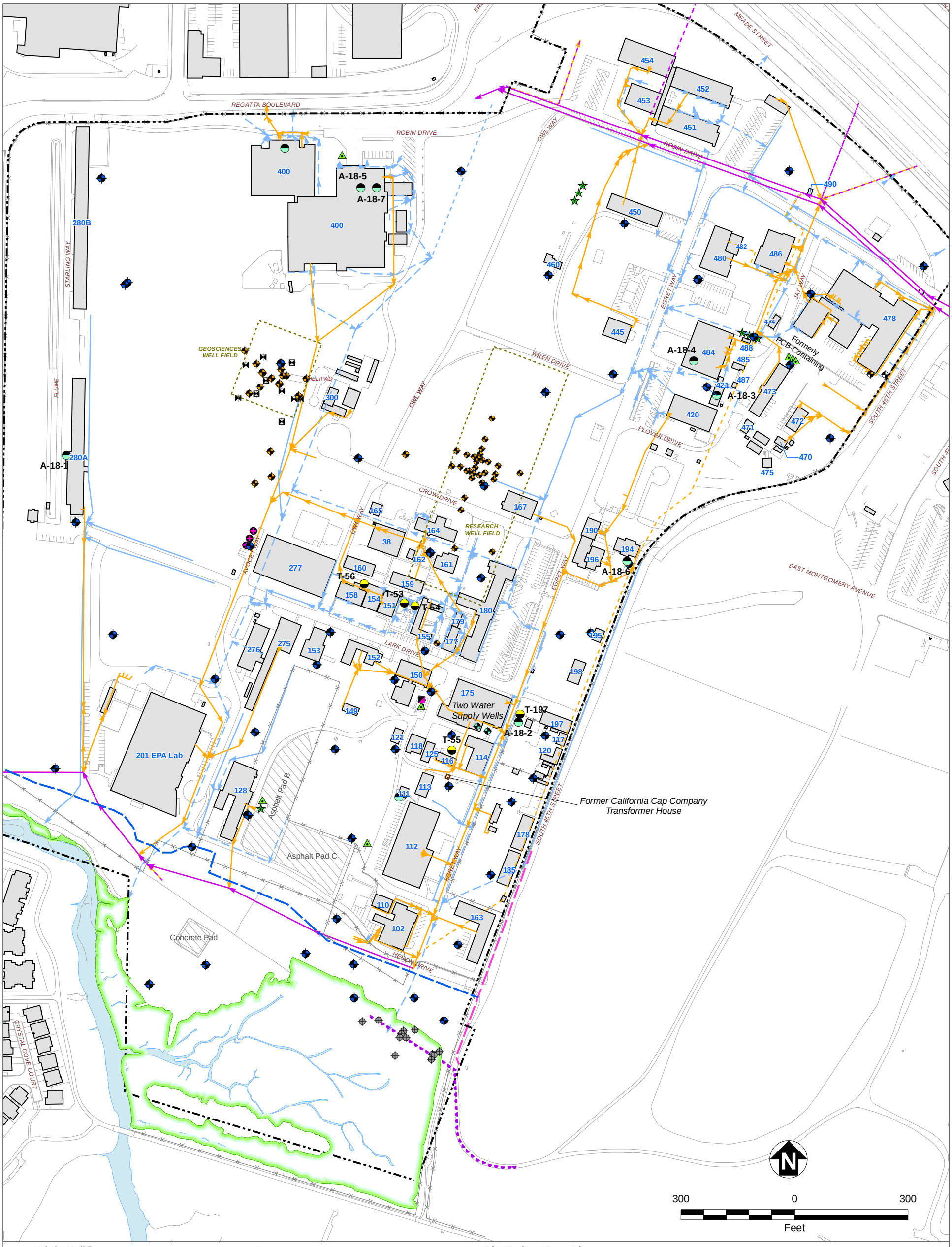
Richmond Field Station Site
University of California, Berkeley

FIGURE 2
SITE MAP

Phase V Sampling Results Technical Memorandum

7/26/2017 C:\misc_GIS\Richmond_Field_Station\Projects\013_Phase_V_Report\02_Site_Map.mxd TtEMI-ABQ michelle.handley



Existing Building (Building Numbers Shown in Blue)
Marsh Boundary
Surface Water
Asphalt/Concrete Pads
Well Field Boundary
Portion of RFS Property Subject to DTSC order, Defined as "Site"
Fenceline
Biologically Active Permeable Barrier Wall
Former Seawall
Slurry Wall
Aboveground Storage Tank (AST)
Former Underground Storage Tank (UST)

Open Well (Not in Use)
Closed Well (Pressure Grouted)
Open Piezometer
Open Geosciences Well
BAPB Wells on RFS Property
Zeneca Wells on RFS Property

Transformer Locations:

Pad-Supported, Non PCB-Containing
Pad-Supported, Former PCB-Containing (Removed)
Pole-Mounted, Non PCB-Containing
Pole-Mounted, Former PCB-Containing (Removed)

City Sanitary Sewer Lines:

Existing City of Richmond Sewer
Abandoned City of Richmond Sewer
Existing RFS Sewer
Abandoned RFS Sewer

Storm Drain Lines:

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

Note:

BAPB	Biologically Active Permeable Barrier
DTSC	Department of Toxic Substances Control
EBRPD	East Bay Reagional Parks District
EPA	Evironmental Protection Agency
PCB	Polychlorinated biphenyls
RFS	Richmond Field Station

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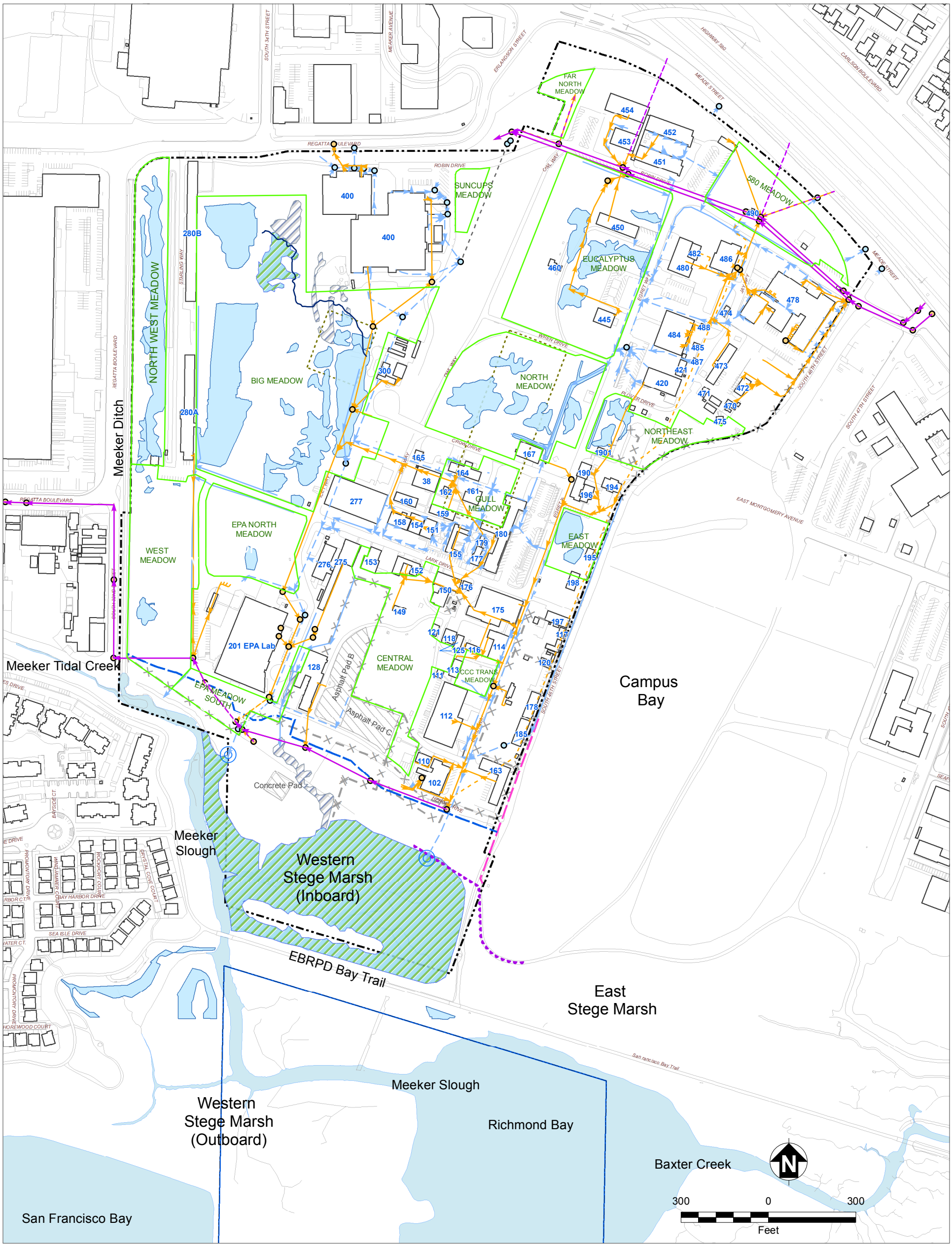
Berkeley Global Campus at Richmond Bay

FIGURE 3
PHYSICAL FEATURES

Soil Management Plan



Jurisdictional Status

- Not Surveyed
- Not Jurisdictional
- Jurisdictional
- Surface Water (sea level)
- Asphalt/Concrete Pads
- Well Field Boundary
- Portion of RFS Property Subject to DTSC order, Defined as "Site"
- Biologically Active Permeable Barrier Wall
- Former Seawall
- Slurry Wall

City Sanitary Sewer Lines:

- Existing City of Richmond Sewer
- Abandoned City of Richmond Sewer
- Existing RFS Sewer
- Abandoned RFS Sewer
- Open Swale
- Underground Culvert
- Gutters
- Underground Culvert, Abandoned (Grouted at Manholes)
- Storm Drain Outfalls
- UC outboard parcels
- Meadows (2006 Botanical Survey)
- NRLF Coastal Prairie high quality edge

Berkeley EH&S

University of California, Berkeley
Richmond Field Station

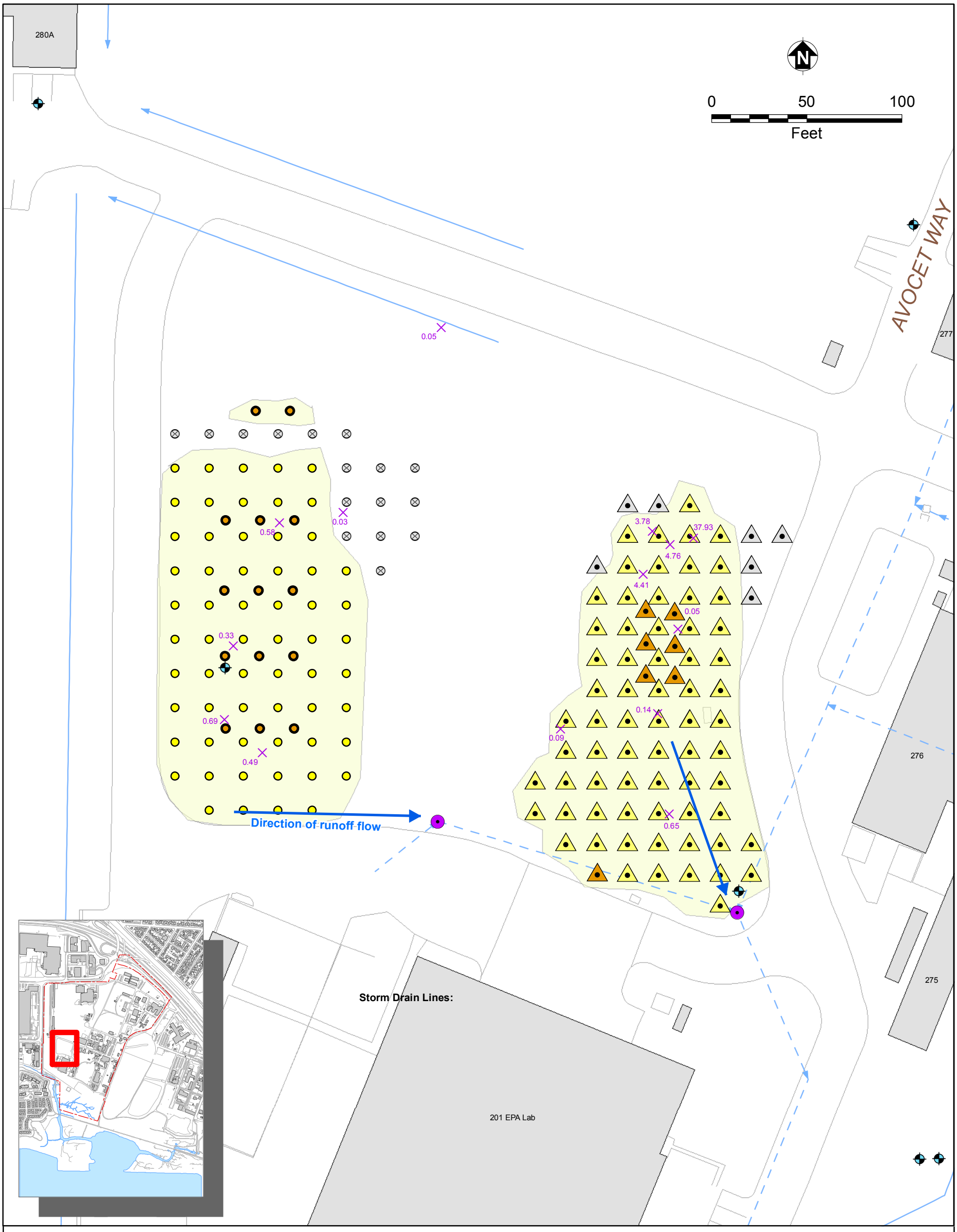
Figure 4
RFS Hydrology

Richmond, CA Southeast Shoreline

Note:

BAPB	Biologically Active Permeable Barrier
DTSC	Department of Toxic Substances Control
EBRPD	East Bay Reagional Parks District
EPA	Evironmental Protection Agency
PCB	Polychlorinated biphenyls
RFS	Richmond Field Station

2018.08.13 UC Berkeley EH&S ANB



Storm Drain Inlet Sample

Groundwater Well

PCBs Discrete Sample Results (mg/kg)

EPA NW relocated or removed increments- previous locations

EPA NW relocated increment locations (11/14/17 sample)

EPA NE moved increments- previous locations

EPA NE relocated increments locations (11/15/17 samples)

EPA NE triplicate locations (triangle apices) (11/15/17 samples)

EPA NW Increments (11/14/17 sample)

Open Swale

Underground Culvert

EPA North Final Decision Units

Buildings

Roads and other Landscape Features

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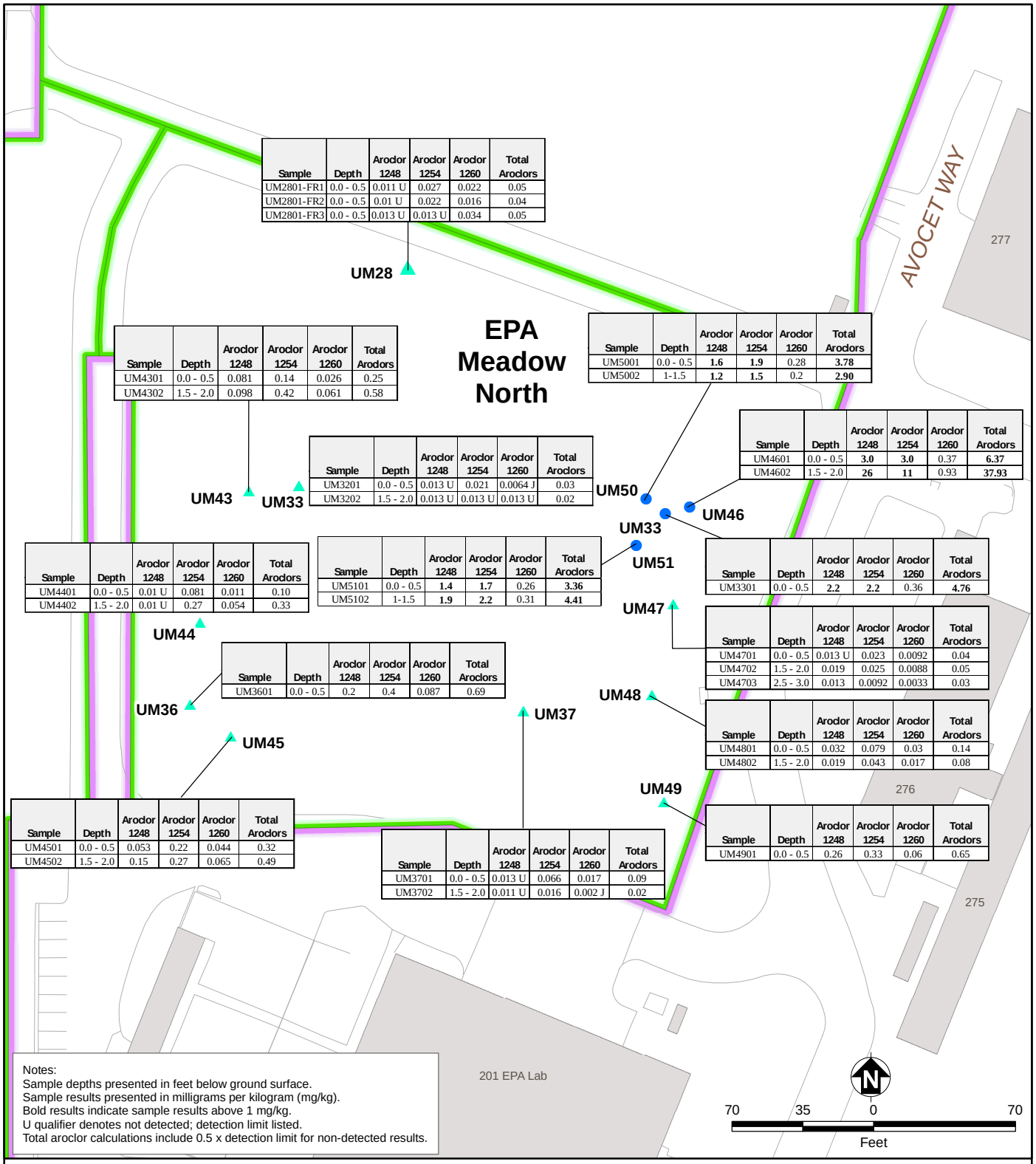
Richmond Field Station Site
University of California, Berkeley

FIGURE 5
RFS FIELD SAMPLING PLAN, PHASE V
EPA NORTH MEADOW
SUPPLEMENTARY PCB SAMPLE LOCATIONS



Sample	Depth	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total Aroclors
UM2801-FR1	0.0 - 0.5	0.011 U	0.027	0.022	0.05
UM2801-FR2	0.0 - 0.5	0.01 U	0.022	0.016	0.04
UM2801-FR3	0.0 - 0.5	0.013 U	0.013 U	0.034	0.05

Sample	Depth	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total Aroclors
UM4301	0.0 - 0.5	0.081	0.14	0.026	0.25
UM4302	1.5 - 2.0	0.098	0.42	0.061	0.58

Sample	Depth	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total Aroclors
UM5001	0.0 - 0.5	**1.6**	**1.9**	0.28	**3.78**
UM5002	1-1.5	**1.2**	**1.5**	0.2	**2.90**

Sample	Depth	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total Aroclors
UM3201	0.0 - 0.5	0.013 U	0.021	0.0064 J	0.03
UM3202	1.5 - 2.0	0.013 U	0.013 U	0.013 U	0.02

Sample	Depth	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total Aroclors
UM4601	0.0 - 0.5	**3.0**	**3.0**	0.37	**6.37**
UM4602	1.5 - 2.0	**26**	**11**	0.93	**37.93**

Sample	Depth	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total Aroclors
UM4401	0.0 - 0.5	0.01 U	0.081	0.011	0.10
UM4402	1.5 - 2.0	0.01 U	0.27	0.054	0.33

Sample	Depth	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total Aroclors
UM5101	0.0 - 0.5	**1.4**	**1.7**	0.26	**3.36**
UM5102	1-1.5	**1.9**	**2.2**	0.31	**4.41**

Sample	Depth	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total Aroclors
UM3301	0.0 - 0.5	**2.2**	**2.2**	0.36	**4.76**

Sample	Depth	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total Aroclors
UM4701	0.0 - 0.5	0.013 U	0.023	0.0092	0.04
UM4702	1.5 - 2.0	0.019	0.025	0.0088	0.05
UM4703	2.5 - 3.0	0.013	0.0092	0.0033	0.03

Sample	Depth	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total Aroclors
UM3601	0.0 - 0.5	0.2	0.4	0.087	0.69

Sample	Depth	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total Aroclors
UM4801	0.0 - 0.5	0.032	0.079	0.03	0.14
UM4802	1.5 - 2.0	0.019	0.043	0.017	0.08

Sample	Depth	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total Aroclors
UM4501	0.0 - 0.5	0.053	0.22	0.044	0.32
UM4502	1.5 - 2.0	0.15	0.27	0.065	0.49

Sample	Depth	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total Aroclors
UM3701	0.0 - 0.5	0.013 U	0.066	0.017	0.09
UM3702	1.5 - 2.0	0.011 U	0.016	0.002 J	0.02

Sample	Depth	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total Aroclors
UM4901	0.0 - 0.5	0.26	0.33	0.06	0.65

Notes:
Sample depths presented in feet below ground surface.
Sample results presented in milligrams per kilogram (mg/kg).
Bold results indicate sample results above 1 mg/kg.
U qualifier denotes not detected; detection limit listed.
Total aroclor calculations include 0.5 x detection limit for non-detected results.

Soil Sampling Locations

Sample result exceeds TSCA self-implementing cleanup criteria of 1 mg/kg.

Designated Natural Open Space

Meadow Boundary

Existing Buildings

Asphalt/Concrete Pads

Roads and Other Landscape Features

J	Estimated result
mg/kg	Milligram per kilogram
PCB	Polychlorinated biphenyl
U	Not detected

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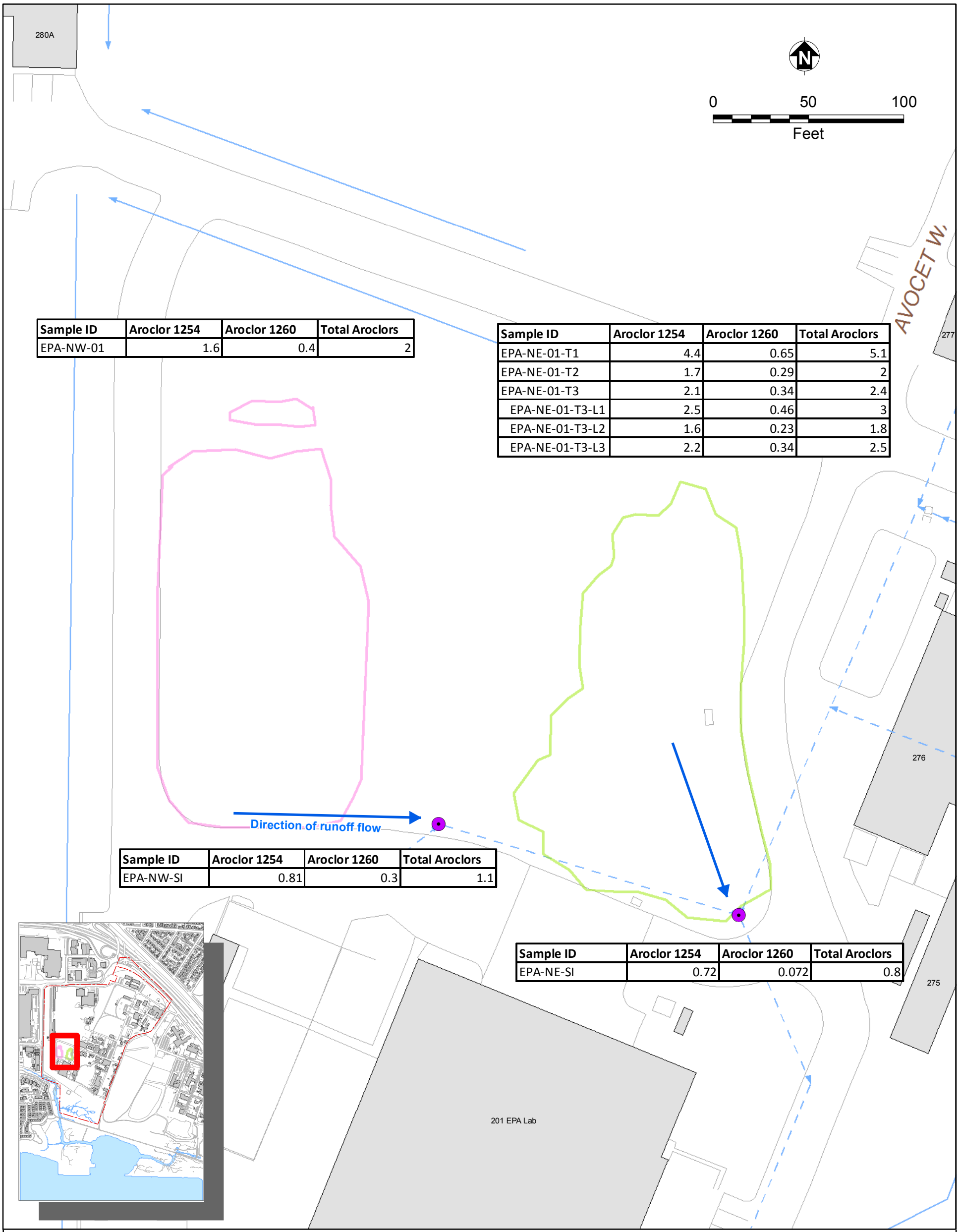
University of California, Berkeley

FIGURE 6
PHASE IV, EPA MEADOW NORTH SUPPLEMENTARY PCB SAMPLING RESULTS



Sample ID	Aroclor 1254	Aroclor 1260	Total Aroclors
EPA-NW-01	1.6	0.4	2

Sample ID	Aroclor 1254	Aroclor 1260	Total Aroclors
EPA-NE-01-T1	4.4	0.65	5.1
EPA-NE-01-T2	1.7	0.29	2
EPA-NE-01-T3	2.1	0.34	2.4
EPA-NE-01-T3-L1	2.5	0.46	3
EPA-NE-01-T3-L2	1.6	0.23	1.8
EPA-NE-01-T3-L3	2.2	0.34	2.5

Sample ID	Aroclor 1254	Aroclor 1260	Total Aroclors
EPA-NW-SI	0.81	0.3	1.1

Sample ID	Aroclor 1254	Aroclor 1260	Total Aroclors
EPA-NE-SI	0.72	0.072	0.8

Storm Drain Inlet Sample

EPA Northwest Decision Unit

EPA Northeast Decision Unit (in triplicate)

Storm Drain Lines:

Open Swale

Underground Culvert

Buildings

Roads and other Landscape Features

Notes:
1. All results in milligrams per kilogram (mg/kg).
2. EPA-NE-01-T3-L1, L2 and L3 are laboratory triplicate samples.
3. EPA-NE-01-T3 concentration is the average result of laboratory triplicates L1, L2 and L3.

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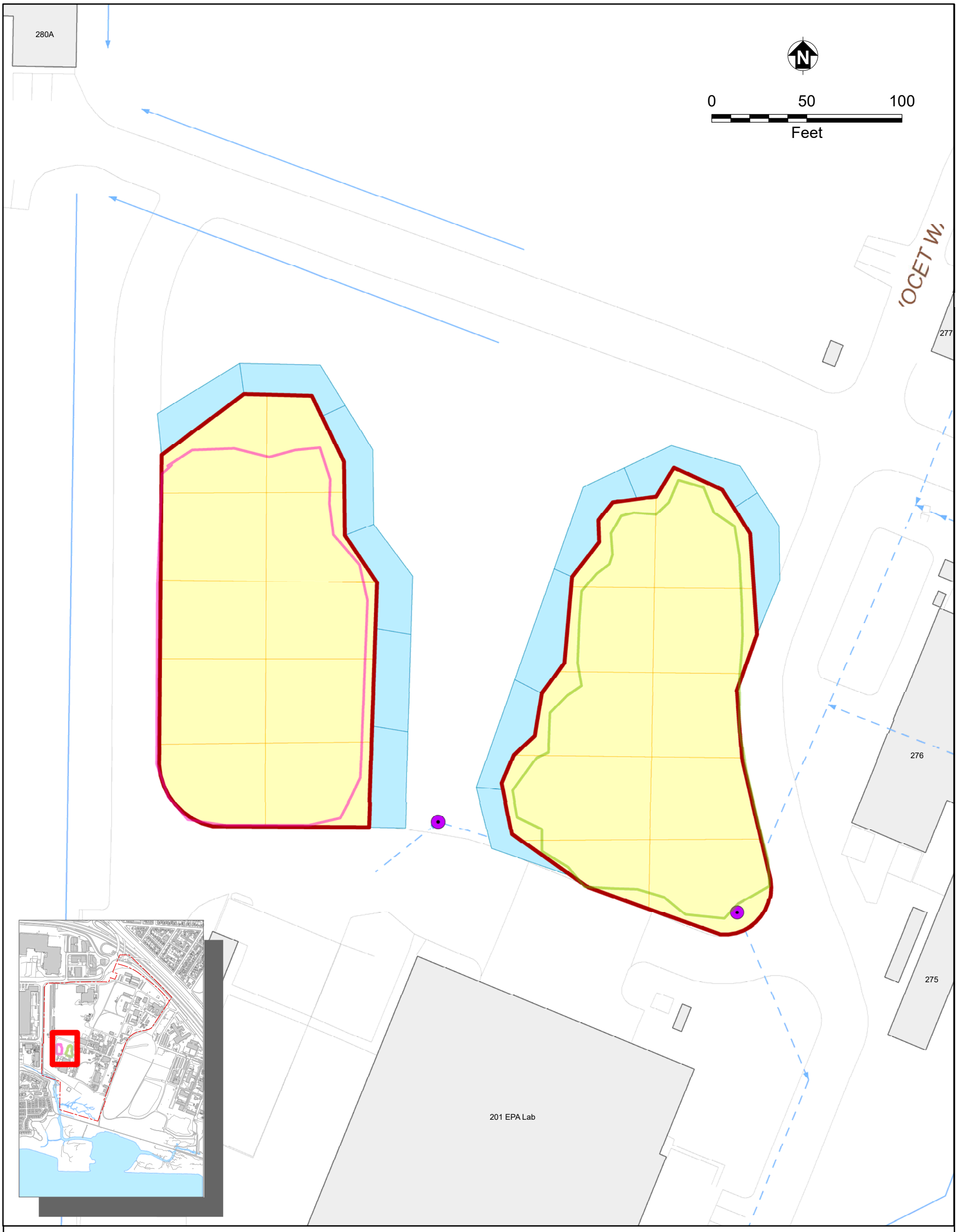
University of California, Berkeley

FIGURE 7
EPA NORTH MEADOW
INCREMENTAL SAMPLE RESULTS



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Richmond Field Station Site
University of California, Berkeley

FIGURE 8
EPA NORTH MEADOW
CONFIRMATION SAMPLES

Notes:
1. A minimum 75 increments will be collected at each decision unit
2. 10 Percent of the decision units will be collected in triplicate

Table 1. EPA North Meadow PCB Sampling Results

Sample Number	PCBs (mg/kg)			
	Aroclor-1248	**Aroclor-1254**	**Aroclor-1260**	**Total Aroclors**
TSCA Cleanup Criteria	*1*	*1*	*1*	*1*
UM2801-FR1	--	0.027	0.022	0.05
UM2801-FR2	--	0.022	0.016	0.04
UM2801-FR3	--	--	0.034	0.05
UM3201	--	0.021	0.0064	0.03
UM3202	--	--	--	0.02
UM3301	**2.2**	**2.2**	0.36	**4.76**
UM3601	0.2	0.4	0.087	0.69
UM3701	--	0.066	0.017	0.09
UM3702	--	0.016	0.002	0.02
UM4301	0.081	0.14	0.026	0.25
UM4302	0.098	0.42	0.061	0.58
UM4401	--	0.081	0.011	0.1
UM4402	--	0.27	0.054	0.33
UM4501	0.053	0.22	0.044	0.32
UM4502	0.15	0.27	0.065	0.49
UM4601	**3**	**3**	0.37	**6.37**
UM4602	**26**	**11**	0.93	**37.93**
UM4701		0.023	0.0092	0.04
UM4702	0.019	0.025	0.0088	0.05
UM4703	0.013	0.0092	0.0033	0.03
UM4801	0.032	0.079	0.03	0.14
UM4802	0.019	0.043	0.017	0.08
UM4901	0.26	0.33	0.06	0.65
UM5001	**1.6**	**1.9**	0.28	**3.78**
UM5002	**1.2**	**1.5**	0.2	**2.9**
UM5101	**1.4**	**1.7**	0.26	**3.36**
UM5102	**1.9**	**2.2**	0.31	**4.41**
EPA-NW-01	--	**1.6**	0.4	**2**
EPA-NW-SI	--	0.81	0.3	**1.1**
EPA-NE-01-T1	--	**4.4**	0.65	**5.1**
EPA-NE-01-T2	--	**1.7**	0.29	**2**
EPA-NE-01-T3	--	**2.1**	0.34	**2.4**
EPA-NE-01-T3-L1	--	**2.5**	0.46	**3**
EPA-NE-01-T3-L2	--	**1.6**	0.23	**1.8**
EPA-NE-01-T3-L3	--	**2.2**	0.34	**2.5**
EPA-NE-SI	--	0.72	0.072	0.8

Notes:

-- Not detected

All concentrations listed in milligrams per kilogram (mg/kg)

BOLD concentrations above TSCA cleanup level 1 mg/kg

Concentrations listed for EPA-NE-01-T3 are the averages of laboratory triplicates L1, L2, L3

USEPA

United States
Environmental Protection Agency
Washington, DC 20460

Form Approved
OMB No. 2070-0112

Notification of PCB Activity

Return To:
Document Control Officer (5305P)
Office of Solid Waste
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., N.W.
Washington, DC 20460-0001

For Official Use Only

1. Name of Facility	Name of Owner Facility	2. EPA Identification Number (if already assigned under RCRA)
University of California, Berkeley	The Regents of the University of California	CAD983669268

3. Facility Mailing Address (Street or PO Box, City, State, & Zip Code)
Office of Environment, Health & Safety
University Hall, 3rd Fl. #1150
Berkeley, CA 94720

4. Location of Facility (No. Street, City, State, & Zip Code)
Richmond Field Station
1301 S. 46th St.
Richmond, CA 94804

5. Installation Contact (Name and Title)
Greg Haet
EH&S Associate Director, Environmental Protection

Telephone Number (Area Code and Number)
(510) 642-4848

6. Type of PCB Activity (Mark 'X' in appropriate box. See Instructions.

- [■] A. Generator w/onsite storage facility
- [ ] B. Storer (Commercial)
- [ ] C. Transporter
- [ ] D. R&D/Treatability
- [ ] E. Approved Disposer
- [ ] F. Scrap Metal Recovery Oven/Smelter, High Efficiency Boilers

7. Certification

Under civil and criminal penalties of law for the making or submission of false or fraudulent statements or representations (18 U.S.C. 1001 and 15 U.S.C. 2615), I certify that the information contained in or accompanying this document is true, accurate, and complete. As to the identified section(s) of this document for which I cannot personally verify truth and accuracy, I certify as a company official having supervisory responsibility for the persons who, acting under my direct instructions, made the verification that this information is true, accurate, and complete.

Signature	Name and Official Title (Type of Print)	Date Signed
P.T. Goff	Patrick Goff, Executive Director Office of Environment, Health & Safety	8/15/2018

Paperwork Reduction Act Notice

The annual public burden for this collection of information is estimated to average 0.57 hours per response. This estimate includes time for reading instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden to: Director, Collection Strategies Division, U.S. Environmental Protection Agency (mail code 2822), 1200 Pennsylvania Ave., N.W., Washington, D.C. 20460-0001. Include the OMB number identified above in any correspondence. Do not send the completed form to this address. The actual information or form should be submitted in accordance with the instructions accompanying the form, or as specified in the corresponding regulations.