FINAL REPORT

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WORKPLAN FOR ADDITIONAL SEDIMENT AND SURFACE WATER SAMPLING

MARSH PORTION OF SUBUNIT 2B, RICHMOND FIELD STATION, RICHMOND, CALIFORNIA

(TASKS 5A, RWQCB ORDER NO. 01-102)

Prepared for
University of California Berkeley
Environment, Health, and Safety
317 University Hall, #1150
Berkeley, California 94720

February 28, 2002

URS
URS Corporation
500 12th Street, Suite 200
Oakland, CA 94607

51-0996706700

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Cecilio S. Felix
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, California 94612

Subject: **Workplan for Additional Sediment Sampling and Surface Water Monitoring, Marsh Portion of Subunit 2B, Richmond Field Station, Richmond, California**

Dear Mr. Felix:

In compliance with the California Regional Water Quality Control Board, San Francisco Bay Region's (RWQCB) Order No. 01-102, Task 5a, URS Corporation is pleased to submit the enclosed document titled *Workplan for Additional Sediment Sampling and Surface Water Monitoring, Marsh Portion of Subunit 2B, Richmond Field Station, Richmond, California* on the behalf of the University of California, Berkeley.

We appreciate the additional time granted us for completion of the report. If you have any questions or need further information, please call me at (510) 874-3284.

Sincerely,

URS CORPORATION

Diane K. Mims
Project Manager

James Durkin, R.G.
Project Geologist

REGISTERED GEOLOGIST
JAMES F. DURKIN
No. 6511
STATE OF CALIFORNIA

Enclosure

Cc: Mark Freiberg, Environment, Health, & Safety, University of California, Berkeley
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TABLE OF CONTENTS

Tables

Figures

Appendices

The California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) has identified the University of California, Berkeley (UC Berkeley) Richmond Field Station (RFS) and the neighboring Zeneca, Inc. property as the Meade Street Operable Unit for purposes of required remedial activities. The Zeneca property is designated as Subunit 1 and the RFS property is designated as Subunit 2. The RWQCB issued Site Cleanup Requirements (SCR) on September 19, 2001 that identified a number of tasks to be completed for each subunit. UC Berkeley submits this technical report, prepared by URS Corporation (URS), UC Berkeley's environmental consultant, in compliance with Task 5a of Order No. 01-102.

The SCR Task 5a states:

"The discharger shall submit a technical report, acceptable to the Executive Officer, which proposes any additional surface water and sediment sampling necessary to monitor the extent of contamination within the Stege Marsh area of Subunit 2A (assumed meant to be 2B). The workplan shall specify at a minimum, sample location, sampling methods, and quality assurance controls."

UC Berkeley's RFS is designated as Subunit 2 and is located at 1301 S. 46th Street in Richmond, California (the "Site") as shown on Figure 1. Subunit 2 was divided by the RWQCB into two subunits. Subunit 2A consists of the southeastern portion of the RFS for which UC Berkeley and Zeneca are named as joint responsible parties. Subunit 2B consists of the northern portion of the upland area of the RFS and the western portion of Western Stege Marsh for which UC Berkeley is named as the sole responsible party for Subunit 2B. The location of Subunits 2A and 2B and their respective boundaries are shown on Figure 2. The marsh portion of Subunit 2B is the subject of this report. A map showing the layout and features of the marsh portion is shown on Figure 3.

On-site and off-site activities have resulted in elevated concentrations of specific metals and PCBs in various areas within the western portion of Western Stege Marsh. These areas, defined by levels of unacceptable risk to human health or the environment, are identified as Areas of Concern (AOCs) in UC Berkeley's report titled "Human Health and Ecological Tiered Risk Evaluation, University of California Berkeley, Richmond Field Station/Stege Marsh" (Risk Assessment) dated November 21, 2001. In this Task 5a report, the chemicals of concern (COCs) in each of the AOCs is addressed and a sampling plan is proposed to define the extent of each AOC within the boundaries defined in the RWQCB Order. It should be noted that one AOC (AOC 6) located in the outer marsh adjacent to the pier located outside the specified boundary in the Order. The sampling will be performed during 2002 in following the remedial activities planned for Subunit 2A.

The identification of the AOCs and the sampling plan presented here are based on historical information and analytical data from the following:

- UC Berkeley's report titled "Field Sampling and Analysis Plan and Tiered Risk Evaluation", dated December 10, 1999;
- UC Berkeley's report titled "Field Sampling and Analysis Results, University of California, Berkeley, Richmond Field Station/Stege Marsh, Richmond, California", dated December 2000 (FSAP December 2000 Report);

- UC Berkeley's report titled "Results of Additional Soil and Groundwater Investigations and Surface Water Monitoring Plan, Marsh Portion of Subunit 2A, Richmond Field Station, Richmond, California", dated November 21, 2001; and
- Additional investigations performed by UC Berkeley, primarily in the Western Storm Drain Outfall area, since December 2000. A discussion of the results of that investigation is contained in this report.

1.1 SUMMARY OF REPORT ORGANIZATION

This submittal, as required under SCR Tasks 5a of Order No. 01-102, is organized as follows:

- Section 2 briefly summarizes the history of the RFS and adjacent sites;
- Section 3 discusses the findings of previous investigations and the Risk Assessment in each of the AOCs, and proposes additional sediment sampling locations to define the extent of the AOCs;
- Section 4 discusses recommendations regarding locations for surface water sampling to establish baseline water quality in the marsh, identify areas in excess of United States Environmental Protection Agency (USEPA) Ambient Water Quality Criteria (AWQC), and to monitor the extent of surface water contamination before and after remedial activities in Subunit 2B;
- Section 5 summarizes the recommendations for sediment and surface water sampling to delineate the AOCs and aid in the development of a marsh restoration plan; and
- Section 6 discusses data quality objectives for sediment and surface water samples in the proposed additional investigations and monitoring program.

A comprehensive discussion of the site history is presented in UC Berkeley's FSAP December 2000 report. The following discussion briefly summarizes historical findings. In 1877, the California Cap Company purchased the property for the manufacturing of blasting caps. Manufacturing of the explosives in the caps included the production of mercury fulminate, $Hg(CNO)_2$, a whitish-gray solid material derived by treating mercury with nitric acid and alcohol. The former mercury fulminate facility was located in the southeastern, upland portion of the property just north of the former seawall. Other former facilities associated with the Cap Company included the shell manufacturing area, the blasting cap manufacturing area, an explosives test pit area, and an explosives storage area.

In October 1950, UC Berkeley purchased the Cap Company property with the agreement that the Cap Company would remove all hazardous materials from the property. The Cap Company reportedly complied with the purchase agreement, though subsequent site testing and on-site observations revealed potential hazardous material problems remaining onsite *(pc, Larry Bell, RFS personnel)*. The current status regarding soil and groundwater contamination is discussed in UC Berkeley's report to the RWQCB titled "Workplan for Additional Soil and Groundwater Investigation and Groundwater Sampling and Analyses Plan, Upland Portion of Subunit 2B" to be submitted concurrently with this report.

Beginning in the late 1800's the adjacent property to the east (the Zeneca site) was owned and operated by Stauffer Chemical and other companies to manufacture chemicals, including sulfuric acid, nitric acid, and pesticides. Stauffer's sulfuric acid production facility, which operated from 1897 through 1970, resulted in chemical releases and deposition of pyrite cinders, a by-product of their sulfuric acid production process. Filling of the tidal mudflats with debris and industrial wastes most likely began in the early 1900's. Numerous aerial photographs from 1939 to the late 1950's show the placement of pyrite cinders and debris into the eastern area of RFS's portion of Stege Marsh.

Stege Marsh has been highly altered by fill activities. A large cinder landfill constructed by Stauffer in the 1970's at the eastern edge of the RFS property bisects Stege Marsh into eastern and western portions. In addition, the Sante Fe Railroad constructed a rail spur across the mudflats in 1959. The rail spur embankment converted the once-open intertidal mudflats and marsh into a muted inner tidal marsh with two outlets at Meeker Slough on the western side and Baxter Creek on the eastern side. The East Bay Regional Park District (EBRPD) converted the rail spur to the Bay Trail in the late 1990's.

Chemicals of concern (COCs) in the western portion of Stege Marsh are believed to originate primarily from four sources:

- Storm water runoff and possible waste discharges into the marsh from the upland area of the RFS. In particular, mercury from the former mercury fulminate plant;
- Storm water runoff and waste discharges from the former Stauffer Chemical facility and leaching of metals (arsenic, copper, nickel, mercury, selinium, and zinc) from pyrite cinders that occur both in the upland area and in the marsh;
- PCBs are believed to have originated offsite and to have migrated through the western storm drain on the RFS site. The former PG&E facility just north of the RFS site is also a possible source; and

- The former shipyard on the Marina Bay site just to the west of Meeker Slough may have contributed COCs into the marsh.

The following section discusses the findings of previous investigations and the distribution of COCs detected in the western portion of Western Stege Marsh (marsh portion of Subunit 2B).

This section discusses the findings of previous investigations and AOCs identified in the marsh portion of Subunit 2B and proposes additional sampling to define the extent of COCs in these areas. The AOCs are defined in the Risk Assessment and are based on analytical results exceeding human health and/or ecological site-specific target levels (H-SSTLs or E-SSTLs). The SSTLs and analytical results for soil and sediment samples are summarized in Tables 1 and 2.

3.1 AOC 1: WESTERN STORM DRAIN OUTFALL

AOC 1 is located in the western portion of Western Stege Marsh adjacent to Meeker Slough and at the outfall of a storm drainpipe that extends along the western side of the RFS. The storm drainpipe is actually a combination storm drain and sanitary sewer overflow extending southward to the marsh from a manhole just off-site at the northern RFS property boundary. The manhole is on property currently owned by CalTrans but formerly owned by PG&E. The sanitary sewer extends across the northern portion of the upland RFS property and drains a large, unknown area of Richmond to the north and east including Subunit 1.

The analysis of sediment samples by URS in year 2000 detected concentrations of PCBs (Aroclor 1248) as high as 1,600 mg/kg at the mouth of the storm drainpipe located on property owned by the Richmond Redevelopment Agency (RRA). Based on these results, URS, on behalf of UC Berkeley, performed additional sampling to delineate PCBs in, and laterally from, the flow channel between the outfall and Meeker Slough. The sampling locations and storm drainpipe are shown on Figure 3. The PCB analytical results are summarized in Table 2.

In summary, seven locations were sampled in the area between the outfall and the Slough. Three locations were sampled in the storm drain channel using a hand auger. At the mouth of the storm drainpipe, total PCB concentrations ranged to a maximum of 61,000 mg/kg (location SM128) at a depth of 2 feet below the sediment surface (bss). The location nearest Meeker Slough contained 45 mg/kg (location SM133) at the sediment surface. The remaining four locations are lateral to the flow line and/or adjacent to the nearby fill area. The maximum concentration in samples from these locations was 6,000 mg/kg (location SM130) at a depth of 2 feet bss. PCB concentrations to 1,600 mg/kg were detected in samples from 4 feet bss. To assist in identifying the source of the PCBs detected in AOC 1, three samples were analyzed for individual congeners. The results are under review and will be reported with the results of the work performed under this plan. In addition, several metals, including arsenic, copper, lead, mercury, nickel, silver, and zinc, were detected at three marsh locations in this area at concentrations (< 10 times) above their respective National Oceanic and Atmospheric Administration (NOAA) Effects Range - Median (ERMs) concentrations.

Additional sediment sampling will be performed in AOC 1 to further delineate PCBs and metals. Eight locations will be sampled at the sediment surface, 2 feet, and 4 feet below sediment surface (bss) and are shown on Figure 3. Four of the locations are stepped out from previous sampling locations to delineate the extent of PCBs to the north and south of the storm drain outfall with the cord grass habitat. One location, just south of the AOC, will be sampled to evaluate whether PCBs have migrated along the upland edge of the marsh and whether metals reported at location PC-102 in the upland fill area have migrated into marsh sediments. Furthermore, samples will be collected from three locations in Meeker Slough to evaluate the impacts of PCBs. The

samples will be analyzed for PCBs by EPA Method 8082, Priority Pollutant metals by EPA Method 6010, and pH by EPA Method 9040/9045.

3.2 AOC 2: EAST SIDE OF MEEKER SLOUGH

AOC 2 is located near the east bank of Meeker Slough between AOC 1 and the EBRPD Bay Trail Bridge over the slough. The definition of AOC 2 in the risk assessment is based on two sample locations, SD2SL and SM105. Both of these locations exceed the ERM for mercury. No PCB data has been collected for this area.

Five additional sampling locations are proposed for this area and are shown on Figure 3. One sediment sampling location is within Meeker Slough to evaluate whether PCBs and metals have migrated into slough sediments. Sampling at the other four locations will provide additional delineation of metals and indicate whether PCBs have impacted this area. At these locations, samples will be collected from the sediment surface and a depth of 2 feet and 4 feet bss and will be analyzed for PCBs by EPA Method 8082, Priority Pollutant metals by EPA Method 6010, and pH by EPA Method 9040/9045.

3.3 AOC 3: NORTH CENTRAL AREA

AOC 3 is located approximately midway between Meeker Slough and the eastern end of Western Stege Marsh just south of the rectangular pond located in the upland portion of Subunit 2A. AOC 3 contains three sample locations sampled by URS and two historical sampling locations.

The locations of the historical samples B5MA and SD3MA are approximate. These samples contained exceedances for arsenic, copper, mercury, and/or zinc. URS location SM-126 contained exceedances for arsenic, cadmium, mercury, and nickel.

Only one location was sampled for PCBs. The result from location SM-126SO was 0.63 mg/kg, in excess of the ERM of 0.18 mg/kg but well below the human and ecological SSTLs of 19.1 mg/kg and 5.9 mg/kg, respectively.

Sediment samples from four additional locations, as shown on Figure 3, will be collected for analysis. Two of the locations will be used to delineate the northern boundary of the AOC and two locations to delineate the southern boundary of the AOC. Sediment samples will be collected at the sediment surface and at a depth of 2 feet and 4 feet bss. The samples will be analyzed for PCBs by EPA Method 8082, Priority Pollutant metals by EPA Method 6010, and pH by EPA Method 9040/9045.

3.4 AOC 4: CENTRAL LATERAL SLOUGH

AOC 4 is located along the central lateral slough flowing into Meeker Slough from the inner marsh area. This slough, along with a slough adjacent to the East Bay Regional Parks Bay Trail, drains most of Western Stege Marsh. AOC 4 is defined in the risk assessment based on six sample locations, two samples collected by URS and four historical samples.

Numerous exceedances of the ERMs and SSTLs were identified from these six locations for arsenic, copper, lead, nickel, zinc, and PCBs. Arsenic exceeds the H-SSTL by approximately 5 times (maximum concentration of 186 mg/kg) and mercury exceeds the ERM by approximately

15 times (maximum concentration of 10.5 mg/kg) at location B4-MA. This location also has the highest copper and zinc concentrations (514 mg/kg and 906 mg/kg, respectively) reported in this area. In summary, of the 12 samples collected in this area, only one sample, from a depth of 4.5 feet at location SM-105, had concentrations of metals below their respective SSTLs and ERMs.

PCBs were also detected at the sediment surface in both URS samples at a maximum concentration of 0.81 mg/kg slightly above the ERM of 0.18 mg/kg but well below the human and ecological SSTLs of 19.1 mg/kg and 5.9 mg/kg, respectively.

Samples will be collected from ten locations, shown on Figure 3, to delineate the extent of metals and PCBs in AOC4. Analytical data, particularly from the slough samples, will aid in an evaluation of effects from COCs on benthic organisms and be used in the development of a marsh restoration plan. From these eight locations, sediment samples will be collected from the sediment surface and a depth of 2 feet and 4 feet bss. The samples will be analyzed for PCBs by EPA Method 8082, Priority Pollutant metals by EPA Method 6010, and pH by EPA Method 9040/9045.

3.5 LOWER LATERAL SLOUGH

Two sediment samples will be collected from the lower slough tributary adjacent to the EPRPD Bay Trail. The locations, shown on Figure 3, are in the slough between the fill area and the Bay Trail and in the main channel of Meeker Slough. The analytical results will be used to prepare a marsh restoration plan and to evaluate whether metals from Subunit 2A are impacting this area. These samples will be analyzed for PCBs by EPA Method 8082, Priority Pollutant metals by EPA Method 6010, and pH by EPA Method 9040/9045.

This section presents the previous data regarding COCs in surface water within the marsh portion of Subunit 2B and recommends locations for the collection of surface water samples to monitor the extent of dissolved COCs in surface water. Tables 3 summarize analytical data for surface water samples collected prior to, and since, UC Berkeley's December 2000 report. The samples were analyzed for priority pollutant metals by EPA Method 6010. One surface water sample was collected from Meeker Slough and analyzed for PCBs by EPA Method 8082. The analytical results were screened against the AWQC.

4.1 AOC 1: WESTERN STORM DRAIN OUTFALL

One grab groundwater sample (PC-102) and a surface water sample (SM-104) were collected by URS in this area and analyzed for priority pollutant metals and pH in the spring of 2000. Two additional surface water samples (SM-102 and SM-103) were also collected from the adjacent Meeker Slough were analyzed for metals and pH. Sample location SM-103 was also analyzed for PCBs. The analytical results of the surface and groundwater sampling are presented in Table 3. The groundwater sample collected from PC-102 contained 65 ug/L arsenic, above the AWQC of 36 ug/L. This sample location also showed pH in groundwater at 9.7. As discussed above, the sampling location PC-102 is located in a pocket of cinders in the upland fill area adjacent to the marsh. The arsenic in groundwater is likely the result of the cinders. Two surface water samples will be collected in the marsh adjacent to sample location PC-102 to evaluate pH and whether the arsenic is impacting the marsh. The sample locations are shown on Figure 4.

Due to the elevated concentrations of PCBs in sediment in this area, a surface water sample will be collected from the storm water drainage channel. In addition, two surface water samples will be collected from Meeker Slough upstream and downstream from AOC 1 (adjacent to the lower lateral slough), shown on Figure 4, to monitor water quality entering Western Stege Marsh and the impacts of the PCB-laden sediments within this area. The surface water samples from Meeker Slough will be collected during on outgoing tide. These three samples will be analyzed for PCBs by EPA Method 8082, Priority Pollutant metals by EPA Method 6010, and pH by EPA Method 9040/9045.

4.2 AOC 2: EAST SIDE OF MEEKER SLOUGH

No surface water samples have been collected from this area. One surface water sample will be collected from the location shown on Figure 4. The analytical results will be used to evaluate whether COC impacts to surface water are present in this area and evaluate possible migration of COCs in groundwater from the adjacent upland fill area. These samples will be analyzed for PCBs by EPA Method 8082, Priority Pollutant metals by EPA Method 6010, and pH by EPA Method 9040/9045.

4.3 AOC 3: NORTH CENTRAL AREA

No surface water samples have been collected from this area. One surface water sample will be collected from the location in this area shown on Figure 4. The purpose of this sample is to evaluate whether COC impacts to surface water extend into this area and to evaluate possible migration of COCs in water from the adjacent upland fill area and upland portion of Subunit 2A. The sample will be collected from a small channel that drains this area. This sample will be

analyzed for PCBs by EPA Method 8082, Priority Pollutant metals by EPA Method 6010, and pH by EPA Method 9040/9045.

4.4 AOC 4: CENTRAL LATERAL SLOUGH

One surface water sample was collected from location SM-105 in this area. This sample contained 390 ug/L zinc exceeding the AWQC of 81 ug/L. The analytical results are presented in Table 3. Four additional surface water samples will be collected to evaluate the existence of dissolved COCs in surface water. The locations, shown on Figure 4, are at the mouth of the slough, in a small slough north of AOC 4 adjacent to the fill area, at the confluence of two tributaries, and in a small slough at the western extent of AOC4. The analytical results will be used to evaluate the source of PCBs found in fish tissue and the contribution of COCs from each area. These samples will be analyzed for PCBs by EPA Method 8082, Priority Pollutant metals by EPA Method 6010, and pH by EPA Method 9040/9045.

4.5 LOWER LATERAL SLOUGH

Two surface water samples will be collected from the lower slough tributary adjacent to the EPRPD Bay Trail. The locations, shown on Figure 4, are in the slough between the fill area and the Bay Trail and in the main channel of Meeker Slough. The analytical results will be used to prepare a marsh restoration plan and to evaluate whether metals from Subunit 2A are impacting this area. These samples will be analyzed for PCBs by EPA Method 8082, Priority Pollutant metals by EPA Method 6010, and pH by EPA Method 9040/9045.

Based on the findings of previous investigations in the marsh portion of Subunit 2B and to meet the requirements of Task 5a, we recommend the following:

- Sediment samples will be collected from eight locations and surface water samples from three locations in AOC 1 to delineate the extent of PCBs in the vicinity of the storm drain outfall and in the adjacent portion of Meeker Slough. PCB data collected from the storm drain channel and Meeker Slough sediments will be used to evaluate whether the sediment within these areas is the source of the elevated PCBs detected in the fish tissue collected in Meeker Slough. The surface water sample collected in Meeker Slough upstream from Western Stege Marsh at low tide will also be used evaluate water quality entering the marsh. The samples will also be used to evaluate whether the arsenic detected in groundwater (PC102) in the fill area located to the east has impacted the marsh in this area.
- Sediment samples will be collected from five locations and surface water samples from one locations in AOC 2 to delineate the extent of metals detected at location SD2SL and to evaluate whether PCBs have migrated downstream from AOC 1 and into this area of the marsh;
- Sediment samples from four locations and a surface sample from one location will be collected in AOC 3 to delineate the extent of metals detected in AOC 3 and to evaluate whether PCBs and low pH conditions have impacted the area;
- Sediment samples from ten locations and surface water samples from four locations will be collected in AOC 4 to delineate the extent of metals detected in AOC 4 and to evaluate whether PCBs and low pH conditions have impacted the area. The primary focus of the investigation activities in this area will be 1) to evaluate the impacts to the benthic community within the slough channel and its tributaries, 2) to determine whether the source of PCBs in fish tissue from Meeker Slough is sediment or surface water, and 3) to assist in developing elements of the marsh restoration plan; and
- Two sediment and two surface water samples will be collected in the lower lateral slough adjacent to the EBRPD Bay Trail and in the confluence of the slough with Meeker Slough to evaluate whether the slough has been impacted by metals, PCBs, and low pH conditions in this portion of the marsh and adjacent Meeker Slough. PCB data collected within this slough will also be used to evaluate whether the slough sediments are the source of the elevated PCBs detected in the fish tissue collected in Meeker Slough. These samples will also assist in development of the marsh restoration plan.

Sediment and surface water samples will be collected in clean containers supplied by a California Certified Laboratory. After collection, the samples will be placed in a chilled ice chest for transport to the laboratory. The surface water samples will be filtered within 24 hours. The sediment and water samples will be analyzed for the following: Priority Pollutant Metals using EPA Method 6010/7400, PCBs using EPA Method 8082, and pH using EPA Method 9040/9045. A licensed surveyor will survey the location of each sample.

6.1 SAMPLE LABELS

Sample labels should be affixed to each sample bottle. These labels should be durable and water-resistant so they remain legible when wet. Each label will contain the following information.

- Sample Identification
- Initials of sample collector
- Time and date of sample collection
- Preservatives (if any); and
- Required Analysis.

6.2 CHAIN OF CUSTODY

Tracing sample possession will be accomplished by using the Chain-of-Custody (COC) record. A COC entry will be recorded for every sample and will accompany every shipment of samples to the laboratory.

6.3 QUALITY ASSURANCE / QUALITY CONTROL SAMPLES

The purpose of QA/QC procedures is to produce data of known high quality that meet or exceed the requirements of standard analytical methods. It is essential that data collection personnel adhere to strict QA/QC procedures to establish quality. The objectives of the quality assurance program are twofold:

- To provide the mechanism for ongoing control, and
- Evaluation of measurement data quality throughout the course of the project and to qualify data precision and accuracy.

The following data quality indicators will be used to evaluate the data usability and certainty:

- Accuracy
- Precision
- Representativeness
- Completeness
- Comparability

A discussion of each of these data quality indicators is provided below.

6.3.1 Accuracy

Accuracy is a measure of how close a reported value is to the true value and is evaluated using spike analyses. Spike analyses are performed by adding a known quantity of analyte to a sample, analyzing the sample, and comparing the observed result to the known addition. Accuracy is expressed as percent recovery (the difference between known and observed concentrations divided by the known concentration) and is calculated as:

$$\%R = \left(\frac{C_{OB} - C_X}{C_{sp}} \right) x\,100$$

Where:

%R	=	percent recovery
C_{sp}	=	concentration of spike
C_{OB}	=	concentration measured in spiked sample analysis
C_x	=	concentration measured in unspiked sample analysis

Accuracy is evaluated using matrix spike (MS), laboratory control spikes (LCS), and surrogate spikes. Matrix spikes are spikes of target analytes into environmental samples and are used to evaluate impacts of matrix interference on accuracy. Laboratory control spikes are spikes of target analytes into clean water or sand and are used to evaluate accuracy of laboratory performance. Surrogate spikes are spikes of non-target analytes (compounds that are not likely to be detected in the sample but that behave similarly to the target analytes) into each sample. Surrogate spikes can only be performed for organic analyses and are used to evaluate accuracy on a sample specific basis.

Matrix spikes and LCS will be analyzed with each analytical batch. (A batch is up to 20 samples extracted and analyzed together under a given method protocol. Samples in an analytical batch should be of the same matrix. Reagent lots and handling procedures should be the same for all samples in a batch.) Surrogate spikes will be analyzed with each sample. Matrix spikes, LCS, and surrogate spike percent recoveries will be calculated and compared to the control limits provided in Appendix B. Analyses exhibiting recoveries outside control limits will be considered for re-analysis.

6.3.2 Precision

Precision refers to the level of agreement among repeated measurements of the same parameter. Precision is expressed as the relative percent difference (RPD) between duplicate measurements, calculated as:

$$RPD = \left(\frac{(C_1 - C_2)}{\left[\frac{(C_1 + C_2)}{2} \right]} \right) x \quad 100$$

Where:

RPD	=	relative percent difference

C_1 = result from first sample

C_2 = result from second sample

Precision is evaluated using duplicate analyses and analyses of duplicate matrix spike samples (MS/MSD). Objectives for precision are provided in Appendix B.

6.3.3 Representativeness

Representativeness is the degree to which data accurately and precisely represent variations at a sampling point. Representativeness is a qualitative parameter.

To ensure representativeness in the samples being collected for this investigation, standard sampling procedures, as described above, will be strictly adhered to. Any deviations from these procedures will be noted in permanent ink in the field notebook. The field notebooks will be reviewed for deviations as part of evaluation of representativeness.

To ensure representativeness in the analyses being performed, the laboratory will follow standard procedures for collecting the aliquot of sample used for analysis as representative of the whole. Additional laboratory procedures to ensure representativeness include proper log-in, storage, handling, and tracking of samples to minimize possibility of sample contamination, loss, or cross-labeling, and discrete sampling and analysis of immiscible layers, if present in sufficient quantity.

6.3.4 Completeness

Completeness will be evaluated as the amount of valid, usable data obtained from a measurement system compared to the amount that was expected. The quantitative description of completeness will be evaluated as the percentage of analytical results that are usable (i.e., results that do not require rejection based on review of QA/QC data). The objective for completeness for this investigation is 90 percent for each analytical parameter.

6.3.5 Comparability

Comparability is a qualitative evaluation of the confidence with which one data set can be compared to another measuring the same parameters. Comparability will be ensured through the use of the standard operating procedures for sampling and field operations as described in this Sampling and Analysis Plan.

6.3.6 Field Sampling Quality Control

Field quality assurance data are provided by the analysis of rinsate blanks and field duplicate samples. The following field QA/QC sample will be submitted for laboratory analysis:

- Rinsate Blanks - Rinsate blanks will be obtained by the collection of water used to rinse the sampling equipment following decontamination. Rinsate blanks will be collected and analyzed at a frequency of about 10 percent of the number of sediment samples collected.
- Field Duplicate Samples - Blind field duplicate samples will be collected and analyzed at a frequency of about 5 percent of the number of samples collected for each medium.

TABLES

TABLE 1
ANALYTICAL RESULTS FOR METALS AND pH IN SOIL/SEDIMENT SAMPLES
MARSH PORTION OF SUBUNIT 2B
RICHMOND FIELD STATION

Results reported as mg/kg

Sample Type	Location/Sample ID			Sample Depth (feet)	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc	pH
SCREENING CRITERIA FOR UPLAND FILL SAMPLES (bold indicates the lowest value of the applicable screening criteria)																		
H-SSTL (commercial/construction)					818	**27.3**	3,690	**147**	217	75,900	750	264	40,900	10,200	10,200	135	100,000	
E-SSTL (Red-tailed hawk)								230	**157**	**412**	**437**	**42**	**621**				**760**	
E-SSTL (squirrel)								525	27,167	429,123	326,825	5,017	7,691				111,817	
SCREENING CRITERIA FOR MARSH, SLOUGH, AND SHALLOW BAY SAMPLES (bold indicates the lowest value of the applicable screening criteria)																		
H-SSTL (recreator)					8,180	**35.4**	38,800	155	9,340	100,000	400	4,380	100,000	100,000	**3.7**	1,350	100,000	
ERM						70		**9.6**	**370**	**270**	**218**	**0.71**	**51.6**				**410**	
E-SSTL (clapper rail)						688		57		630	576	3.8	2,778	**16**				
E-SSTL (harvest mouse)					**26**	355	**68**	15		14,399	19,026	143		145			7,905	
AOC 1 - Western Storm Drain Outfall Area																		
upland	B1	MA	2-91	1	na	3.5	na	2.2	59.6	44.4	7.5	<0.12	na	<7.9	na	na	96	na
upland	PC-	102-	B-	0	<3.3	17	0.31	2.7	34 J	260	240	1.3	47 J	0.67	1.5	1.1	700	8.4
upland	PC-	102-	B-	4	<5.5	4.9	0.35	1.6	25 J	28	7.8	28	40 J	<0.46	<0.46	1.4	80	12.1
upland	PC-	102-	B-	6	<4	3	0.33	1.5	39 J	26	0.2	120	49 J	<0.33	<0.33	0.71	52	9.0
marsh	SM-	104-	BIO	0 (grab)	<5.3	120	0.44	8.3	85	670	280	<0.19	78	4.2	11	<0.44	1,100	na
marsh	SM-	104-	B-	0	<3.7	36	0.28	3.3	58	180	110	1.2	50	1	3.4	0.91	480	7.8
marsh	SM-	104-	B-	2	<3.8	30	0.49	3.2	48	87	25	0.84	77	0.51	<0.31	1.3	180	8.2
marsh	SM-	104-	B-	4	<3.5	14	0.36	2.4	29	92	24	1.1	60	<0.29	<0.29	1.2	190	8.3
unknown	SD1	WSD	2-91	1	na	<25.1	na	5.7	115	152	188	2.3	na	<12.9	na	na	612	na
marh	SD3	SL	2-91	1	na	101	na	10.8	138	692	485	1.4	na	<14.3	na	na	1,060	na
AOC 2 - Near Meeker Slough																		
marsh	SD2	SL	2-91	1	na	<2.7	na	2	89.7	106	108	2.9	na	<14	na	na	317	na
unknown	B3	MA	2-91	1	na	<33.4	na	3.8	102	88.6	84	2.0	na	<17.2	na	na	325	na
AOC 3 - Near Fill Area																		
upland	B5	MA	2-91	1	na	674	na	8.2	110	494	221	1.74	na	<28.9	na	na	1470	na
marsh	SD3	MA	2-91	1	na	190	na	5	116	145	153	2.4	na	<13.9	na	na	501	na
marsh	SD3	MA	TOX	0 (grab)	<7.8	77	0.55	4	74	100	71	5.4	88	1.3	<0.65	<0.65	310	na
marsh	SM-	126-	TOX	0 (grab)	<7.4	650	<0.25	28	5.3	94	23	1	130	<0.62	<0.62	<0.62	220	2.3
marsh	SM-	126-	S0	0 (grab)	0.48 J	33	0.6	0.25	113	84	91	1.3	75.6	<2.47	0.47	0.17	259	na
AOC 4 - Large Tributary Slough to Meeker Slough																		
marsh	SM-	105-	TOX	0 (grab)	<6.1	32	0.58	3.8	64	110	84	2.1	77	0.86	<0.51	<0.51	330	7.1
marsh	SM-	105-	B-	0	<6.6	43	0.41	2.6	47	110	62	4.3	57	2	<0.55	1.1	520	7.3
marsh	SM-	105-	B-	1.5	<3.9	4.6	0.16	0.57	20	7.8	3.6	1.7	25	0.75	<0.32	0.63	29	8.3
marsh	SM-	105-	B-	4.5	<3.9	4.6	0.26	0.84	33	18	5.5	0.51	41	0.78	<0.33	0.7	47	8.5
marsh	SM-	127-	S0	0 (grab)	0.48 J	27.8	0.64	0.18	104	74	85	0.92	71	<2.56	0.35	0.17	202	na
marsh	B6	MA	2-91	1	na	<3.1	na	5.3	115	122	100	2.3	na	<16.2	na	na	446	na
marsh	B6	MA	TOX	0 (grab)	<6.9	110	0.5	3.5	68	88	76	1.9	79	1.4	<.58	<.58	230	na
marsh	SD1	MA	2-91	1	na	50.6	na	5.9	105	154	123	3.0	na	<13.7	na	na	356	na
marsh	SD2	MA	2-91	1	na	27.2	na	2.8	105	127	95.4	2.5	na	<13.9	na	na	343	na
marsh	B4	MA	2-91	1	na	186	na	5	100	514	122	10.5	na	<1.1	na	na	906	na
marsh	B4	MA	TOX	0 (grab)	<7.2	56	0.63	2.6	73	160	210	9.3	75	2.4	<0.60	<0.60	210	na
marsh	SD1	SL	2-91	1	na	<2.6	na	4.8	95.6	178	143	1.8	na	<13.5	na	na	661	na

Notes: 1) na = not analyzed

650 = exceeds Ecological of Human Health SSTL

11 = exceeds ERM

TABLE 2
ANALYTICAL RESULTS FOR PCBs IN SOIL/SEDIMENT SAMPLES
MARSH PORTION OF SUBUNIT 2B
RICHMOND FIELD STATION

Screening Criteria (bold indicates lowest applicable screening criteria	Sample Depth (feet)	Total PCBs	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262
H-SSTL (recreator)			103	19.1	19.1	**19.1**	19.1	**19.1**	19.1	19.1
ERM		**0.18**	na	na	na	na	na	na	na	na
E-SSTL (clapper rail)			**4.2**	na	na	na	**5.9**	24	na	na
E-SSTL (mouse)			na	na	na	na	na	na	na	na
Location/Sample ID										
AOC 1 - Western Storm Drain Outfall										
Round 1 (March 2000)										
SM- 104- BIO	0 (grab)	1,600	1,200	<58	<58	<58	<58	400	<58	na
SM- 104- B-	0	23	<5	<5	<5	<5	23	<5	<5	<5
SM- 104- B-	2	1,600	<170	<170	<170	<170	1,600	<170	<170	<170
SM- 104- B-	4	1,200	<100	<100	<100	<100	1,200	<100	<100	<100
Round 2 (September 2001)										
In Storm Drain Channel										
SM- 128	0	370	<7.8	<16	<7.8	370	<7.8	<7.8	<7.8	na
SM- 128	2	61,000	<2100	<4300	<2100	61,000	<2100	<2100	<2100	na
SM- 128	4	1,600	<36	<73	<36	1,600	<36	<36	<36	na
SM- 131	0	47	<1.2	<2.4	<1.2	47	<1.2	<1.2	<1.2	na
SM- 131	2	0.14	<0.015	<0.03	<0.015	0.14	<0.015	<0.015	<0.015	na
SM- 133	0	45	<0.82	<1.6	<0.82	45	<0.82	<0.82	<0.82	na
SM- 133	0.5	0.14	<0.015	<0.03	<0.015	0.14	<0.015	<0.015	<0.015	na
SM- 133	2	0.17	<0.014	<0.029	<0.014	0.17	<0.014	<0.014	<0.014	na
Adjacent to fill area										
SM- 127	0	20	<0.45	<0.91	<0.45	20	<0.45	<0.45	<0.45	na
SM- 127	2	8.2	<0.37	<0.75	<0.37	8.2	<0.37	<0.37	<0.37	na
SM- 127	3.5	0.94	<0.072	<0.14	<0.072	0.94	<0.072	<0.072	<0.072	na
Lateral from channel										
SM- 129	0	8.9	<0.22	<0.44	<0.22	8.9	<0.22	<0.22	<0.22	na
SM- 129	2.5	1.3	<0.074	<0.15	<0.074	1.3	<0.074	<0.074	<0.074	na
SM- 129	3.5	1.2	<0.074	<0.15	<0.074	1.2	<0.074	<0.074	<0.074	na
SM- 130	0	4.5	<0.18	<0.36	<0.18	4.5	<0.18	<0.18	<0.18	na
SM- 130	2	6,000	<120	<240	<120	6,000	<120	<120	<120	na
SM- 130	4	770	<15	<29	<15	770	<15	<15	<15	na
SM- 132	0	96	<1.9	<3.8	<1.9	96	<1.9	<1.9	<1.9	na
SM- 132	2	14	<0.9	<1.8	<0.9	14	<0.9	<0.9	<0.9	na
SM- 132	3	0.96	<0.074	<0.15	<0.074	0.96	<0.074	<0.074	<0.074	na

TABLE 2
ANALYTICAL RESULTS FOR PCBs IN SOIL/SEDIMENT SAMPLES
MARSH PORTION OF SUBUNIT 2B
RICHMOND FIELD STATION

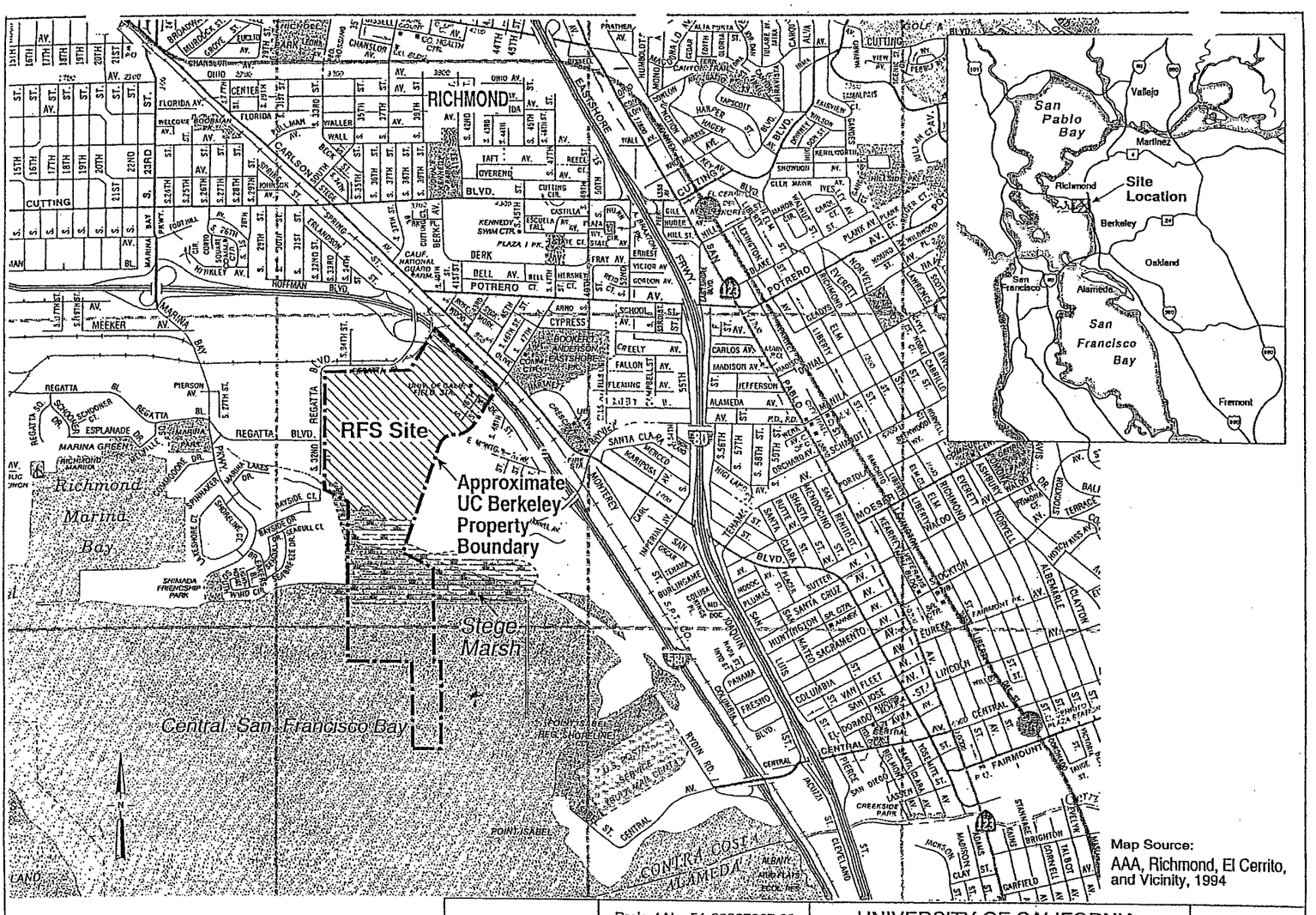
Screening Criteria (bold indicates lowest applicable screening criteria			Sample Depth (feet)	Total PCBs	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262
H-SSTL (recreator)					103	19.1	19.1	**19.1**	19.1	**19.1**	19.1	19.1
ERM				**0.18**	na	na	na	na	na	na	na	na
E-SSTL (clapper rail)					**4.2**	na	na	na	**5.9**	24	na	na
E-SSTL (mouse)					na	na	na	na	na	na	na	na
Location/Sample ID												
AOC 3 - Near Fill Area												
SM-	126-	S0	0 (grab)	**0.63**	<0.1	<0.2	<0.1	<0.1	0.63	<0.1	<0.1	na
AOC 4												
SM-	105-	TOX	0 (grab)	0	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	na
SM-	105-	B-	0	**0.64**	<0.05	<0.05	<0.05	<0.05	0.64	<0.05	<0.05	<0.05
SM-	105-	B-	1.5	0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SM-	105-	B-	4.5	0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SM-	127-	S0	0 (grab)	**0.81**	<0.1	<0.2	<0.1	<0.1	0.81	<0.1	<0.1	na
Meeker Slough - upstream from AOC 1												
SM-	102-	B-	0	**0.5**	<0.05	<0.05	<0.05	<0.05	0.5	<0.05	<0.05	<0.05
SM-	102-	B-	2	**0.6**	<0.05	<0.05	<0.05	<0.05	0.6	<0.05	<0.05	<0.05
SM-	102-	B-	5	0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SM-	103-	TOX/BIO	0 (grab)	**0.45**	<0.2	<0.2	<0.2	<0.2	<0.2	0.45	<0.2	na
SM-	103-	B-	0	**0.84**	<0.05	<0.05	<0.05	<0.05	0.84	<0.05	<0.05	<0.05
SM-	103-	B-	1.5	**0.65**	<0.05	<0.05	<0.05	<0.05	0.65	<0.05	<0.05	<0.05
SM-	103-	B-	3	**0.27**	<0.054	<0.054	<0.054	<0.054	0.27	<0.054	<0.054	<0.054

Notes: na = not analyzed
0.81 = ERM exceedance
400 = SSTL exceedance
EPA Method 8082; Results reported in mg/kg

TABLE 3
ANALYTICAL RESULTS FOR METALS, PCBs, AND pH IN SURFACE WATER AND GROUNDWATER SAMPLES
MARSH PORTION OF SUBUNIT 2B
RICHMOND FIELD STATION

Sample Location	Antimony	Arsenic	Berullium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc	PCBs	pH
AWQC		**36**		**9.3**	**50**	**3.1**	**8.1**	**0.05**	**8.2**	**71**	**1.9**		**81**	**0.03**	
AOC 1 - Western Storm Drain Outfall Area															
PC- 102- GW	<60	65	<2	<5	<10	<10	<3	<0.2	<20	<5	<5	<5	<20	na	9.7
SM- 104- SW	<60	<5	<2	<5	<10	<10	<3	<0.2	<20	<5	<5	<5	25	na	7.7
AOC 4 - Large Tributary Slough to Meeker Slough															
SM- 105- SW	<60	6.6	<2	<5	<10	<10	<3	<0.2	<20	<5	<5	<5	390	na	7.1
Meeker Sough															
SM- 102 SW	<60	<5	<2	<5	<10	<10	<3	<0.2	<20	<5	<5	<5	<20	na	9.7
SM- 103 SW	<60	<5	<2	<5	<10	<10	<3	<0.2	<20	<5	<5	<5	<20	<1	9.2

Notes: 390 = Exceeds AWQC (USEPA Ambient Water Quality Criteria for marine water, chronic exposure)
<0.1 = The laboratory reporting limit exceeds the screening value.
EPA Method 6010 (7470 for mercury); units = ug/L



Map Source:
AAA, Richmond, El Cerrito, and Vicinity, 1994

0 3000 feet

URS

Project No. 51-09967067.00

UC Berkeley
Richmond Field Station

UNIVERSITY OF CALIFORNIA,
BERKELEY
RICHMOND FIELD STATION
SITE LOCATION MAP

Figure
1

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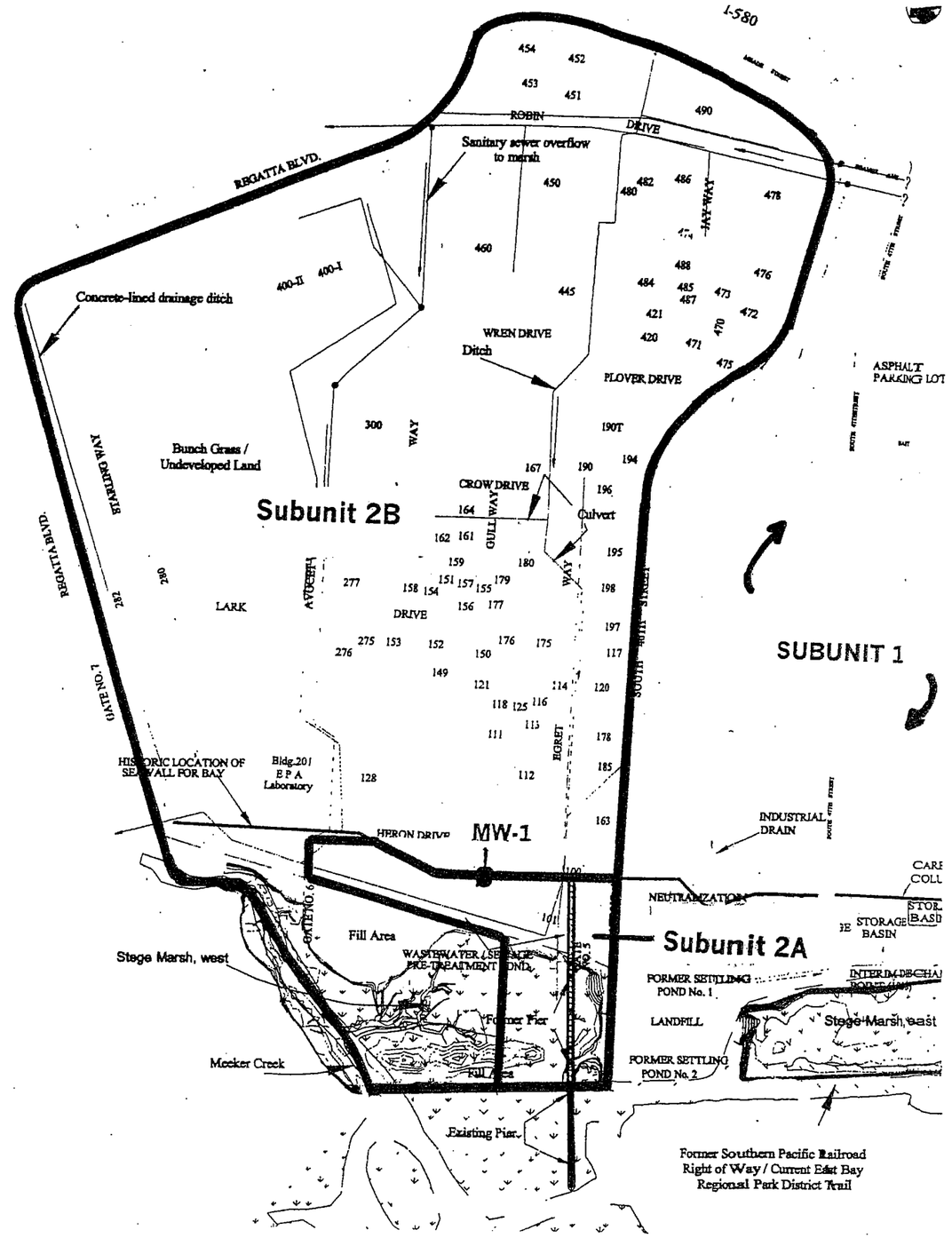
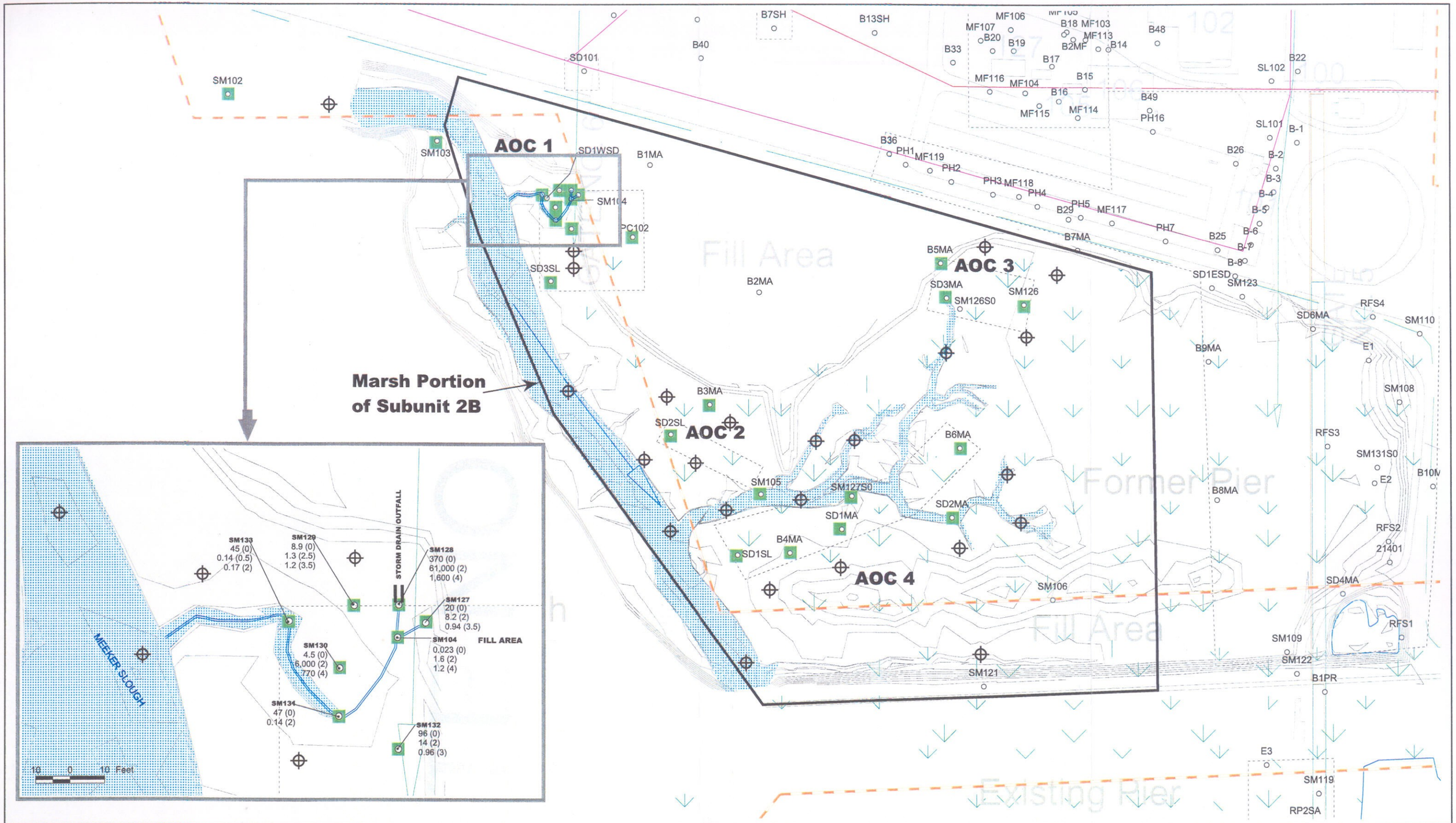


Subunits 2A and 2B
Locations and Boundaries

Figure 2

APPENDIX A



LEGEND

- Sampling Locations
- Proposed Sampling Locations
- Locations exceeding SSTLs and/or ERM for PCBs and/or metals
- Storm Drain System (Approximate)
- Industrial Drain (Approximate)
- Sanitary Sewer System (Approximate) (dashed line to be verified)
- Building Identification Number
- Stege Marsh
- Surface Water Fow Direction
- Edge of Surface Water
- Property Boundary

30 0 30 60 Feet

NOTES :

PCB Concentration (mg/kg) 96 (0) DEPTH

Project No. 51-09967067.00

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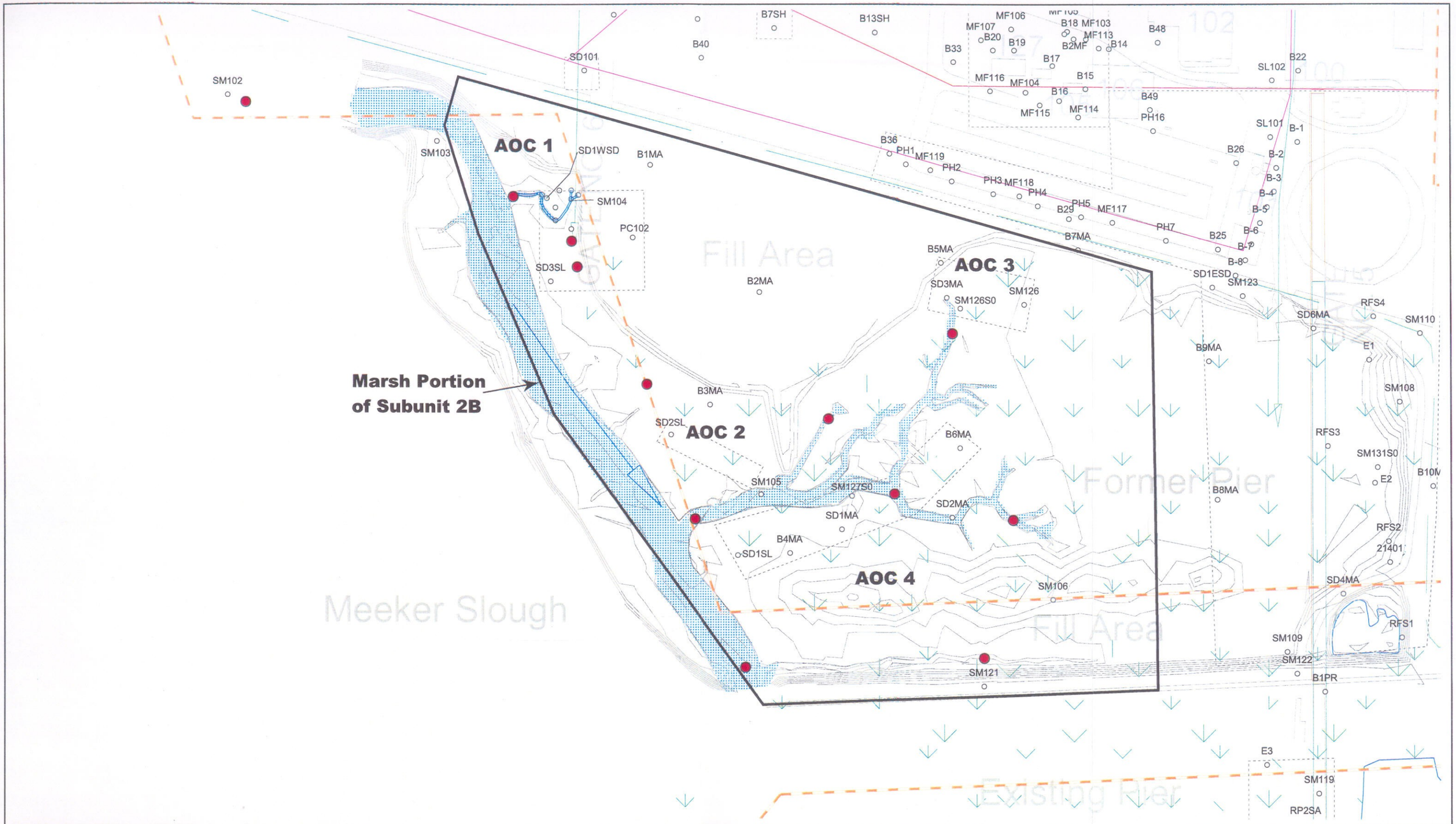
Previous and Proposed Sediment Sampling Locations. Western Stege Marsh

February 2002 | Scale 1" = 90' | Figure 3



LEGEND

- Sampling Locations
- Proposed surface water sampling locations
- Storm Drain System (Approximate)
- Industrial Drain (Approximate)
- Sanitary Sewer System (Approximate) (dashed line to be verified)
- 111 Building Identification Number
- Stege Marsh
- Surface Water Fow Direction
- Edge of Surface Water
- Property Boundary

NOTES :

DEPTH
96 (0)
PCB Concentration (mg/kg)

Project No.
51-09967067.00

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Proposed Surface Water Sampling Locations, Subunit 2B, Western Stege Marsh

February 2002 | Scale 1" = 100' | Figure 4

APPENDIX A

Project: UC Berkeley Richmond Field Station
Project Number: 510996706700
Location: Near Western Storm Drain Outfall

Log of SM127

Date(s) Drilled: 8-7-01	Total Depth Drilled (feet): 4'	Top of Casing Elevation (feet):	Groundwater Level (feet): First ▽	Completion ▼	24 Hours ▽		
Logged by: B. Copeland	Checked by:	Diameter of Hole (Inches): 2"	Diameter of Well (inches):	Number of Samples:	Disturbed: 3	Undisturbed: —	
Drilling Company: —		Drilling Method: Hand Auger		Drill Rig Type: —			
Sampler Type: Hand Auger		Drill Bit Size:		Type of Well Casing:			
Screen Perforation: —			Type of Sand Pack:				
Type of Seals:							
Comments: Low Tide, Sample collected in slough directly adjacent to concrete rip rap							

Depth, feet	Elevation, feet	SAMPLES: Recovery / Sample	SAMPLES: Blows/foot	USCS Classification	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	HNu (ppm)	REMARKS
0						0-6" sandy, clayey gravel - black, up to 1" gravel			Sample 0-6" (No odor)
						6"-1½' clay - black, wet, little course sand and fine gravel			Sample 2-2½' (Hydrocarbon odor)
						1½'-5' clay - tan, mottled, stiff			Sheen observed in standing water in borehole
5						Bottom of boring 4'			Sample 3½-4' (No odor)
10									
15									
20									
25									

URS Greiner Woodward Clyde

1/28/97 SFOUADW TEMPL

Project: HCB-RFS
Project Number: SI0996706700
Location:

Log of SM-128

Date(s) Drilled: 8-7-01	Total Depth Drilled (feet): 45	Top of Casing Elevation (feet): —	Groundwater Level (feet): First ▽	Completion ▽	24 Hours ▽	
Logged by: B. Copeland	Checked by:	Diameter of Hole (inches): 2"	Diameter of Well (inches): —	Number of Samples:	Disturbed: 4	Undisturbed:
Drilling Company: —		Drilling Method: —		Drill Rig Type: —		
Sampler Type: Hand Auger		Drill Bit Size: —		Type of Well Casing: —		
Screen Perforation: —			Type of Sand Pack: —			
Type of Seals: —						

Comments: Located in Slough directly outside storm drain outfall, 2' standing water in coming tide

Depth, feet	Elevation, feet	SAMPLES: Recovery / Sample	SAMPLES: Blows/foot	USCS Classification	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	HNu (ppm)	REMARKS
0		0-6"				gravelly sand - black, saturated, strong hydrocarbon odor			Sample 0-6" (black sand) strong odor TPH
		2-2.5'				decreasing gravel, increasing sand - course grained @ 3'			Sample 2-2.5 (black sand)
		3-3.5'							
5		4-4.5'				clay - tan, very stiff, saturated			Sample 3-3.5 tan clay Hydrocarbon odors
						Bottom of boring 4.5'			Sample 4-4.5 extra sample due to TPH odor in Sample above TPH - strong odor
10									
15									
20									
25									

URS Greiner Woodward Clyde

1/28/97 SFOUADW TEMPL

Project: UCB-RFS
Project Number: 51-0996706.00
Location:

Log of SM-129

Date(s) Drilled: 8-7-01	Total Depth Drilled (feet): 4'	Top of Casing Elevation (feet):	Groundwater Level (feet): ▽ First ▼ Completion ▽ 24 Hours				
Logged by: B. Copeland	Checked by:	Diameter of Hole (inches): 2"	Diameter of Well (inches): —	Number of Samples:	Disturbed: 3	Undisturbed:	
Drilling Company: —		Drilling Method: Hand Auger		Drill Rig Type: —			
Sampler Type: Hand Auger		Drill Bit Size: —		Type of Well Casing: —			
Screen Perforation: —			Type of Sand Pack: —				
Type of Seals: —							
Comments: Location in the Salt grass, incoming tide, 1" standing water							

Depth, feet	Elevation, feet	SAMPLES: Recovery / Sample	Blows/foot	USCS Classification	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	HNu (ppm)	REMARKS
0		0-0.5				Clay - V. dk gray, V. soft, saturated high organic content inc. silt			← pyrite cinders at 1" layer
		2.5-3				Clay - tan, V. stiff			
		3.5-4				Bottom of Boring @ 4'			refusal @ 4', V. hard clay
5									Sample 0-6" (no odor)
10									Sample 2-2.5' hydrocarbon odor
									Sample 3.5-4' (strong TPH odor)
15									
20									
25									

URS Greiner Woodward Clyde

1/28/97 SFOUADW TEMPL

Project:	UCBerkeley – RFS	Log of SM130
Project Number:	51-09967067.00 Task 6000A	
Location:		

Date(s) Drilled: 8-7-01	Total Depth Drilled (feet): 4.5'	Top of Casing Elevation (feet):	Groundwater Level (feet): First ▽	Completion ▼	24 Hours ▽	
Logged by: B. Copeland	Checked by:	Diameter of Hole (inches): 2"	Diameter of Well (inches):	Number of Samples:	Disturbed: 3	Undisturbed
Drilling Company: —		Drilling Method: Hand Auger		Drill Rig Type: —		
Sampler Type: Hand Auger		Drill Bit Size: —		Type of Well Casing: —		
Screen Perforation: —			Type of Sand Pack: —			
Type of Seals: —						
Comments: Location salt grass, low tide, No standing water						

Depth, feet	Elevation, feet	SAMPLES: Recovery	SAMPLES: Sample	SAMPLES: Blows/foot	USCS Classification	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	HNu (ppm)	REMARKS
0							Clay – dk grey, very soft, saturated, high organic content, roots (No odor)			Sample 0-6"
										Sample 2-3' (grey clay w/ sweet odor
										Sample 4-4.5' (tan clay) (sweet odor)
5							Clay – tan, very stiff, saturated (sweet odor)			
							Bottom of boring 4.5'			
10										
15										
20										
25										

Project: UC Berkeley-Richmond Field Station	**Log of** SM 131
Project Number: 51-0496.7067.00	
Location:	

Date(s) Drilled: 8-7-01	Total Depth Drilled (feet): 3	Top of Casing Elevation (feet):	Groundwater Level (feet): ▽ First ▼ Completion ▽ 24 Hours				
Logged by: B. Copeland	Checked by:	Diameter of Hole (inches): 2"	Diameter of Well (inches): —	Number of Samples:	Disturbed: 2	Undisturbed:	
Drilling Company: —		Drilling Method: Hand Auger		Drill Rig Type: —			
Sampler Type: Hand Auger		Drill Bit Size: —		Type of Well Casing: —			
Screen Perforation: —			Type of Sand Pack: —				
Type of Seals:							
Comments: Low Tide, Sample collected in small slough, standing water							

Depth, feet	Elevation, feet	SAMPLES: Recovery	SAMPLES: Sample	SAMPLES: Blows/foot	USCS Classification	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	HNu (ppm)	REMARKS
0							gravelly sandy clay - dark grey fine grained sand, fine grained gravel, soft, saturated - (TPH odor)			Sample 0-6" (TPH odor)
							grades to clayey sand, - dk grey, very soft, fine sand, saturated			glass tube found in upper 2'
5							Clay - tan, stiff, saturated			sample 2-2.5'
							gravels - 1" in clay @ bottom of boring			
							Bottom of boring 3'			
10										
15										
20										
25										

URS Greiner Woodward Clyde

1/28/97 SFOUADW TEMPL

Project:	UCBerkeley-RFS	Log of SM 132
Project Number:	51-09967067.00 Task 00004	
Location:		

Date(s) Drilled	8-7-01	Total Depth Drilled (feet)	3.5	Top of Casing Elevation (feet)		Groundwater Level (feet)	First ▽ Completion ▽ 24 Hours ▽
Logged by	B. Copeland	Checked by		Diameter of Hole (inches)	2"	Diameter of Well (inches)	—
Number of Samples	Disturbed 3	Undisturbed					
Drilling Company	—			Drilling Method	Hand Auger	Drill Rig Type	—
Sampler Type	Hand Auger			Drill Bit Size	—	Type of Well Casing	—
Screen Perforation	—			Type of Sand Pack	—		
Type of Seals	—						
Comments	Sample located in cord grass, 1" standing water						

Depth, feet	Elevation, feet	SAMPLES Recovery	SAMPLES Sample	SAMPLES Blows/foot	USCS Classification	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	HNu (ppm)	REMARKS
0							Clay - very dk grey, very soft, high organic content, saturated (grades to a)			Sample 0-6" (Sweet odor)
							clayey silt - very dk grey, very soft high organic content saturated (2-2½') (TPH odor)			Sample 2-2.5' (clayey silt) (TPH odor)
5							Clay - medium grey, saturated, very stiff			Sample 3-3.5 (tan clay)
							Clay - tan saturated very stiff			
							Bottom of Boring @ 3.5'			
10										
15										
20										
25										

Project:	UC Berkeley - Richmond Field Station
Project Number:	51-0996706 7.00 Task 00004
Location:	

Log of SM133

Date(s) Drilled: 8-7-01	Total Depth Drilled (feet): 2.5	Top of Casing Elevation (feet):	Groundwater Level (feet): ▽ First	▼ Completion	▼ 24 Hours	
Logged by: B. Copeland	Checked by:	Diameter of Hole (inches): 2"	Diameter of Well (inches):	Number of Samples:	Disturbed: 3	Undisturbed:
Drilling Company: —		Drilling Method: Hand Auger		Drill Rig Type: —		
Sampler Type: Hand Auger		Drill Bit Size: —		Type of Well Casing: —		
Screen Perforation:			Type of Sand Pack:			
Type of Seals:						
Comments: Sample located in slough, low tide, 3" standing water flowing toward Meeker Slough						

Depth, feet	Elevation, feet	SAMPLES: Recovery	SAMPLES: Sample	SAMPLES: Blows/foot	USCS Classification	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	HNu (ppm)	REMARKS
0							Clayey sand - very dk. grey, saturated, fine grained sand, organic debris (0-6")			Sample 0-6" (possible odor), Sample 6-12" (possible odor)
							Clay - tan, stiff, saturated (6"-2.5')			Sample 2-2.5' (No odor)
5							bottom of boring (2.5')			
10										
15										
20										
25										

APPENDIX B

Analytical laboratory results were evaluated to assess the quality of individual sample results and overall method performance. Analytical performance was evaluated on both an individual sample and a quality control batch (groups of samples prepared and analyzed together) basis. The data evaluation performed included review of:

- Blanks (method and trip blanks);
- Spikes (surrogate, laboratory control, and matrix spikes); and
- Sample Integrity (chain-of-custody documentation, sample preservation, and holding time compliance).

Surrogate spikes were diluted out of many of the samples analyzed due to high concentrations of aroclor-1242, one of the target analytes. The affected samples had dilution factors ranging from 25 to 50,000. All other QA/QC elements were within control limits and therefore no qualification was judged to be necessary.

APPENDIX C

Appendix C
Laboratory Analytical Reports

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900, Fax (510) 486-0532

A N A L Y T I C A L R E P O R T

Prepared for:

URS Corporation
500 12th Street
Suite 200
Oakland, CA 94607

Date: 27-AUG-01
Lab Job Number: 153457
Project ID: 510996706700
Location: UCB-Richmond Field Sta.

This data package has been reviewed for technical correctness and completeness. Release of this data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signatures. The results contained in this report meet all requirements of NELAC and pertain only to those samples which were submitted for analysis.

Reviewed by: _____
Project Manager

Reviewed by: _____
Operations Manager

153457

URS

500 12th Street, Suite 200
Oakland, CA 94607-4014
(510) 893-3600

Chain of Custody Record

PROJECT NO. 51099670670.00

SAMPLERS: (Signature) BCopeland

DATE	TIME	SAMPLE NUMBER	Sample Matrix (S)oil, (W)ater, (A)ir	ANALYSES: EPA Method 8082 PCBs	EPA Method	EPA Method	EPA Method	Moisture Content								Number of Containers	REMARKS (Sample preservation, handling procedures, etc.)
8/7/01	9:45	SM127-0	S	X				X								1	
	9:55	SM127-2	S	X				X								1	
	10:10	SM127-3.5	S	X				X								1	
	10:20	SM133-0	S	X				X								1	
	10:30	SM133-0.5	S	X				X								1	
	10:40	SM133-2	S	X				X								1	
	11:00	SM131-0	S	X				X								1	
	11:10	SM131-2	S	X				X								1	
	11:30	SM132-0	S	X				X								1	
	11:45	SM132-2	S	X				X								1	
	11:55	SM132-3	S	X				X								1	
	12:00	SM130-0	S	X				X								1	
	12:05	SM130-2	S	X				X								1	
	12:10	SM130-4	S	X				X								1	
	12:30	SM129-0	S	X				X								1	
	1:00	SM129-2.5	S	X				X								1	
	1:15	SM129-3.5	S	X				X								1	
	1:35	SM128-0	S	X				X								1	
	1:40	SM128-2	S	X				X								1	
	1:45	SM128-3	S	X				X								1	
	2:00	SM128-4	S	X				X								1	

Normal TAT

Results to Bill Copeland (510) 874-3172

Hold SM128-3

Preservation Correct? ☒ Yes ☐ No ☐ N/A

Received ☒ On Ice ☐ Cold ☐ Ambient ☐ Intact

TOTAL NUMBER OF CONTAINERS

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
BCopeland	8/7/01 4:1pm	8/7/01 2:41pm			

METHOD OF SHIPMENT:	SHIPPED BY: (Signature)	COURIER: (Signature)	RECEIVED FOR LAB BY (Signature)	DATE/TIME

SOP Volume: Client Services
Section: 1.1.2
Page: 1 of 1
Effective Date: 10-May-99
Revision: 1 Number 1 of 3
Filename: F:\QC\Forms\QC\Cooler.wpd

Curtis & Tompkins, Ltd.

COOLER RECEIPT CHECKLIST

Login#: 153457 Date Received: 8/7/01 Number of Coolers: 1
Client: VRS Project: 5109967 06700

A. Preliminary Examination Phase
Date Opened: 8/7/01 By (print): Derek Fowler (sign) Derek Fowler

1. Did cooler come with a shipping slip (airbill, etc.)? ..... YES (NO)
   If YES, enter carrier name and airbill number: _____
2. Were custody seals on outside of cooler? ..... YES (NO)
   How many and where? _____ Seal date: _____ Seal name: _____
3. Were custody seals unbroken and intact at the date and time of arrival? ..... YES NO
4. Were custody papers dry and intact when received? ..... (YES) NO
5. Were custody papers filled out properly (ink, signed, etc.)? ..... (YES) NO
6. Did you sign the custody papers in the appropriate place? ..... (YES) NO
7. Was project identifiable from custody papers? ..... (YES) NO
   If YES, enter project name at the top of this form.
8. If required, was sufficient ice used? Samples should be 2-6 degrees C. ..... YES NO
   Type of ice: Wet Ice Temperature: Chilled

B. Login Phase
Date Logged In: 8/7/01 By (print): Derek Fowler (sign) Derek Fowler

1. Describe type of packing in cooler: —
2. Did all bottles arrive unbroken? ..... (YES) NO
3. Were labels in good condition and complete (ID, date, time, signature, etc.)? ... (YES) NO
4. Did bottle labels agree with custody papers? ..... (YES) NO
5. Were appropriate containers used for the tests indicated? ..... (YES) NO
6. Were correct preservatives added to samples? ..... (YES) NO
7. Was sufficient amount of sample sent for tests indicated? ..... (YES) NO
8. Were bubbles absent in VOA samples? If NO, list sample Ids below ..... (YES) NO
9. Was the client contacted concerning this sample delivery? ..... YES NO
   If YES, give details below.
   Who was called? _____ By whom? _____ Date: _____

Additional Comments:

Percent Moisture Summary Report

Date: 14-AUG-01
Batch: 65667
Analyst: MLT

Sample	Method	Date	Tare(g)	Wet(g)	Dry(g)	Percent Solids	Percent Moisture
153457-001	CLP SOW 390	14-AUG-01	15.2975	22.1416	19.8432	66	34
153457-002	CLP SOW 390	14-AUG-01	15.2121	21.2384	20.0236	80	20
153457-003	CLP SOW 390	14-AUG-01	15.7284	21.1314	20.2196	83	17
153457-004	CLP SOW 390	14-AUG-01	15.4008	21.3548	19.7615	73	27
153457-005	CLP SOW 390	14-AUG-01	15.0165	20.3634	19.2613	79	21
153457-006	CLP SOW 390	14-AUG-01	15.6634	20.3617	19.5499	83	17
153457-007	CLP SOW 390	14-AUG-01	15.279	21.1042	18.1518	49	51
153457-008	CLP SOW 390	14-AUG-01	15.9689	20.3455	19.5124	81	19
153457-009	CLP SOW 390	14-AUG-01	15.6217	20.695	17.2004	31	69
153457-010	CLP SOW 390	14-AUG-01	15.3379	21.1439	19.2255	67	33
153457-011	CLP SOW 390	14-AUG-01	15.3361	20.1908	19.2525	81	19
153457-012	CLP SOW 390	14-AUG-01	14.9801	20.0321	16.6368	33	67
153457-013	CLP SOW 390	14-AUG-01	15.4889	20.1334	17.7461	49	51
153457-014	CLP SOW 390	14-AUG-01	15.3406	20.8486	19.8317	82	18
153457-015	CLP SOW 390	14-AUG-01	14.9725	20.1254	16.3824	27	73
153457-016	CLP SOW 390	14-AUG-01	15.2691	20.4908	19.5147	81	19
153457-017	CLP SOW 390	14-AUG-01	15.2614	21.0882	19.9619	81	19
153457-018	CLP SOW 390	14-AUG-01	15.6321	20.7179	19.5249	77	23
153457-019	CLP SOW 390	14-AUG-01	15.8153	20.3082	17.0526	28	72
153457-021	CLP SOW 390	14-AUG-01	15.0508	20.3785	19.3984	82	18
QC153138 of 153457-001	CLP SOW 390	14-AUG-01	15.3768	21.8759	19.6487	66	34
					RPD:	1.0%	2.0%

Curtis & Tompkins, Ltd.

Polychlorinated Biphenyls (PCBs)

Lab #:	153457	Location:	UCB-Richmond Field Sta.
Client:	URS Corporation	Prep:	EPA 3550
Project#:	510996706700	Analysis:	EPA 8082
Matrix:	Soil	Sampled:	08/07/01
Units:	ug/Kg	Received:	08/07/01
Batch#:	65576	Prepared:	08/09/01

Field ID:	SM127-0	Moisture:	34%
Type:	SAMPLE	Diln Fac:	25.00
Lab ID:	153457-001	Analyzed:	08/12/01
Basis:	dry	Cleanup Method:	EPA 3665A

Analyte	Result	RL
Aroclor-1016	ND	450
Aroclor-1221	ND	910
Aroclor-1232	ND	450
Aroclor-1242	20,000	450
Aroclor-1248	ND	450
Aroclor-1254	ND	450
Aroclor-1260	ND	450

Surrogate	%REC	Limits
TCMX	DO	39-150
Decachlorobiphenyl	DO	33-144

Field ID:	SM127-2	Moisture:	20%
Type:	SAMPLE	Diln Fac:	25.00
Lab ID:	153457-002	Analyzed:	08/12/01
Basis:	dry	Cleanup Method:	EPA 3665A

Analyte	Result	RL
Aroclor-1016	ND	370
Aroclor-1221	ND	750
Aroclor-1232	ND	370
Aroclor-1242	8,200	370
Aroclor-1248	ND	370
Aroclor-1254	ND	370
Aroclor-1260	ND	370

Surrogate	%REC	Limits
TCMX	DO	39-150
Decachlorobiphenyl	DO	33-144

DO= Diluted Out
ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Polychlorinated Biphenyls (PCBs)

Lab #:	153457	Location:	UCB-Richmond Field Sta.
Client:	URS Corporation	Prep:	EPA 3550
Project#:	510996706700	Analysis:	EPA 8082
Matrix:	Soil	Sampled:	08/07/01
Units:	ug/Kg	Received:	08/07/01
Batch#:	65576	Prepared:	08/09/01

Field ID:	SM127-3.5	Moisture:	17%
Type:	SAMPLE	Diln Fac:	5.000
Lab ID:	153457-003	Analyzed:	08/11/01
Basis:	dry	Cleanup Method:	EPA 3665A

Analyte	Result	RL
Aroclor-1016	ND	72
Aroclor-1221	ND	140
Aroclor-1232	ND	72
Aroclor-1242	940	72
Aroclor-1248	ND	72
Aroclor-1254	ND	72
Aroclor-1260	ND	72

Surrogate	%REC	Limits
TCMX	93	39-150
Decachlorobiphenyl	112	33-144

Field ID:	SM133-0	Moisture:	27%
Type:	SAMPLE	Diln Fac:	50.00
Lab ID:	153457-004	Analyzed:	08/12/01
Basis:	dry	Cleanup Method:	EPA 3665A

Analyte	Result	RL
Aroclor-1016	ND	820
Aroclor-1221	ND	1,600
Aroclor-1232	ND	820
Aroclor-1242	45,000	820
Aroclor-1248	ND	820
Aroclor-1254	ND	820
Aroclor-1260	ND	820

Surrogate	%REC	Limits
TCMX	DO	39-150
Decachlorobiphenyl	DO	33-144

DO= Diluted Out
ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Polychlorinated Biphenyls (PCBs)

Lab #:	153457	Location:	UCB-Richmond Field Sta.
Client:	URS Corporation	Prep:	EPA 3550
Project#:	510996706700	Analysis:	EPA 8082
Matrix:	Soil	Sampled:	08/07/01
Units:	ug/Kg	Received:	08/07/01
Batch#:	65576	Prepared:	08/09/01

Field ID:	SM133-0.5	Moisture:	21%
Type:	SAMPLE	Diln Fac:	1.000
Lab ID:	153457-005	Analyzed:	08/11/01
Basis:	dry	Cleanup Method:	EPA 3665A

Analyte	Result	RL
Aroclor-1016	ND	15
Aroclor-1221	ND	30
Aroclor-1232	ND	15
Aroclor-1242	140	15
Aroclor-1248	ND	15
Aroclor-1254	ND	15
Aroclor-1260	ND	15

Surrogate	%REC	Limits
TCMX	84	39-150
Decachlorobiphenyl	86	33-144

Field ID:	SM133-2	Moisture:	17%
Type:	SAMPLE	Diln Fac:	1.000
Lab ID:	153457-006	Analyzed:	08/11/01
Basis:	dry	Cleanup Method:	EPA 3665A

Analyte	Result	RL
Aroclor-1016	ND	14
Aroclor-1221	ND	29
Aroclor-1232	ND	14
Aroclor-1242	170	14
Aroclor-1248	ND	14
Aroclor-1254	ND	14
Aroclor-1260	ND	14

Surrogate	%REC	Limits
TCMX	90	39-150
Decachlorobiphenyl	86	33-144

DO= Diluted Out
ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Polychlorinated Biphenyls (PCBs)

Lab #:	153457	Location:	UCB-Richmond Field Sta.
Client:	URS Corporation	Prep:	EPA 3550
Project#:	510996706700	Analysis:	EPA 8082
Matrix:	Soil	Sampled:	08/07/01
Units:	ug/Kg	Received:	08/07/01
Batch#:	65576	Prepared:	08/09/01

Field ID:	SM131-0	Moisture:	51%
Type:	SAMPLE	Diln Fac:	50.00
Lab ID:	153457-007	Analyzed:	08/12/01
Basis:	dry	Cleanup Method:	EPA 3665A

Analyte	Result	RL
Aroclor-1016	ND	1,200
Aroclor-1221	ND	2,400
Aroclor-1232	ND	1,200
Aroclor-1242	47,000	1,200
Aroclor-1248	ND	1,200
Aroclor-1254	ND	1,200
Aroclor-1260	ND	1,200

Surrogate	%REC	Limits
TCMX	DO	39-150
Decachlorobiphenyl	DO	33-144

Field ID:	SM131-2	Moisture:	19%
Type:	SAMPLE	Diln Fac:	1.000
Lab ID:	153457-008	Analyzed:	08/11/01
Basis:	dry	Cleanup Method:	EPA 3665A

Analyte	Result	RL
Aroclor-1016	ND	15
Aroclor-1221	ND	30
Aroclor-1232	ND	15
Aroclor-1242	140	15
Aroclor-1248	ND	15
Aroclor-1254	ND	15
Aroclor-1260	ND	15

Surrogate	%REC	Limits
TCMX	81	39-150
Decachlorobiphenyl	84	33-144

DO= Diluted Out
ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Polychlorinated Biphenyls (PCBs)

Lab #:	153457	Location:	UCB-Richmond Field Sta.
Client:	URS Corporation	Prep:	EPA 3550
Project#:	510996706700	Analysis:	EPA 8082
Matrix:	Soil	Sampled:	08/07/01
Units:	ug/Kg	Received:	08/07/01
Batch#:	65576	Prepared:	08/09/01

Field ID:	SM132-0	Moisture:	69%
Type:	SAMPLE	Diln Fac:	50.00
Lab ID:	153457-009	Analyzed:	08/12/01
Basis:	dry	Cleanup Method:	EPA 3665A

Analyte	Result	RL
Aroclor-1016	ND	1,900
Aroclor-1221	ND	3,800
Aroclor-1232	ND	1,900
Aroclor-1242	96,000	1,900
Aroclor-1248	ND	1,900
Aroclor-1254	ND	1,900
Aroclor-1260	ND	1,900

Surrogate	%REC	Limits
TCMX	DO	39-150
Decachlorobiphenyl	DO	33-144

Field ID:	SM132-2	Moisture:	33%
Type:	SAMPLE	Diln Fac:	50.00
Lab ID:	153457-010	Analyzed:	08/14/01
Basis:	dry	Cleanup Method:	EPA 3665A

Analyte	Result	RL
Aroclor-1016	ND	900
Aroclor-1221	ND	1,800
Aroclor-1232	ND	900
Aroclor-1242	14,000	900
Aroclor-1248	ND	900
Aroclor-1254	ND	900
Aroclor-1260	ND	900

Surrogate	%REC	Limits
TCMX	DO	39-150
Decachlorobiphenyl	DO	33-144

DO= Diluted Out
ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Polychlorinated Biphenyls (PCBs)

Lab #:	153457	Location:	UCB-Richmond Field Sta.
Client:	URS Corporation	Prep:	EPA 3550
Project#:	510996706700	Analysis:	EPA 8082
Matrix:	Soil	Sampled:	08/07/01
Units:	ug/Kg	Received:	08/07/01
Batch#:	65576	Prepared:	08/09/01

Field ID:	SM132-3	Moisture:	19%
Type:	SAMPLE	Diln Fac:	5.000
Lab ID:	153457-011	Analyzed:	08/14/01
Basis:	dry	Cleanup Method:	EPA 3665A

Analyte	Result	RL
Aroclor-1016	ND	74
Aroclor-1221	ND	150
Aroclor-1232	ND	74
Aroclor-1242	960	74
Aroclor-1248	ND	74
Aroclor-1254	ND	74
Aroclor-1260	ND	74

Surrogate	%REC	Limits
TCMX	77	39-150
Decachlorobiphenyl	103	33-144

Field ID:	SM130-0	Moisture:	67%
Type:	SAMPLE	Diln Fac:	5.000
Lab ID:	153457-012	Analyzed:	08/14/01
Basis:	dry	Cleanup Method:	EPA 3665A

Analyte	Result	RL
Aroclor-1016	ND	180
Aroclor-1221	ND	360
Aroclor-1232	ND	180
Aroclor-1242	4,500	180
Aroclor-1248	ND	180
Aroclor-1254	ND	180
Aroclor-1260	ND	180

Surrogate	%REC	Limits
TCMX	82	39-150
Decachlorobiphenyl	87	33-144

DO= Diluted Out
ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Polychlorinated Biphenyls (PCBs)

Lab #:	153457	Location:	UCB-Richmond Field Sta.
Client:	URS Corporation	Prep:	EPA 3550
Project#:	510996706700	Analysis:	EPA 8082
Matrix:	Soil	Sampled:	08/07/01
Units:	ug/Kg	Received:	08/07/01
Batch#:	65576	Prepared:	08/09/01

Field ID:	SM130-2	Moisture:	51%
Type:	SAMPLE	Diln Fac:	5,000
Lab ID:	153457-013	Analyzed:	08/15/01
Basis:	dry	Cleanup Method:	EPA 3665A

Analyte	Result	RL
Aroclor-1016	ND	120,000
Aroclor-1221	ND	240,000
Aroclor-1232	ND	120,000
Aroclor-1242	6,000,000	120,000
Aroclor-1248	ND	120,000
Aroclor-1254	ND	120,000
Aroclor-1260	ND	120,000

Surrogate	%REC	Limits
TCMX	DO	39-150
Decachlorobiphenyl	DO	33-144

Field ID:	SM130-4	Moisture:	18%
Type:	SAMPLE	Diln Fac:	1,000
Lab ID:	153457-014	Analyzed:	08/15/01
Basis:	dry	Cleanup Method:	EPA 3665A

Analyte	Result	RL
Aroclor-1016	ND	15,000
Aroclor-1221	ND	29,000
Aroclor-1232	ND	15,000
Aroclor-1242	770,000	15,000
Aroclor-1248	ND	15,000
Aroclor-1254	ND	15,000
Aroclor-1260	ND	15,000

Surrogate	%REC	Limits
TCMX	DO	39-150
Decachlorobiphenyl	DO	33-144

DO= Diluted Out
ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Polychlorinated Biphenyls (PCBs)

Lab #:	153457	Location:	UCB-Richmond Field Sta.
Client:	URS Corporation	Prep:	EPA 3550
Project#:	510996706700	Analysis:	EPA 8082
Matrix:	Soil	Sampled:	08/07/01
Units:	ug/Kg	Received:	08/07/01
Batch#:	65576	Prepared:	08/09/01

Field ID:	SM129-0	Moisture:	73%
Type:	SAMPLE	Diln Fac:	5.000
Lab ID:	153457-015	Analyzed:	08/14/01
Basis:	dry	Cleanup Method:	EPA 3665A

Analyte	Result	RL
Aroclor-1016	ND	220
Aroclor-1221	ND	440
Aroclor-1232	ND	220
Aroclor-1242	8,900	220
Aroclor-1248	ND	220
Aroclor-1254	ND	220
Aroclor-1260	ND	220

Surrogate	%REC	Limits
TCMX	97	39-150
Decachlorobiphenyl	122	33-144

Field ID:	SM129-2.5	Moisture:	19%
Type:	SAMPLE	Diln Fac:	5.000
Lab ID:	153457-016	Analyzed:	08/14/01
Basis:	dry	Cleanup Method:	EPA 3665A

Analyte	Result	RL
Aroclor-1016	ND	74
Aroclor-1221	ND	150
Aroclor-1232	ND	74
Aroclor-1242	1,300	74
Aroclor-1248	ND	74
Aroclor-1254	ND	74
Aroclor-1260	ND	74

Surrogate	%REC	Limits
TCMX	77	39-150
Decachlorobiphenyl	106	33-144

DO= Diluted Out
ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Polychlorinated Biphenyls (PCBs)

Lab #:	153457	Location:	UCB-Richmond Field Sta.
Client:	URS Corporation	Prep:	EPA 3550
Project#:	510996706700	Analysis:	EPA 8082
Matrix:	Soil	Sampled:	08/07/01
Units:	ug/Kg	Received:	08/07/01
Batch#:	65576	Prepared:	08/09/01

Field ID:	SM129-3.5	Moisture:	19%
Type:	SAMPLE	Diln Fac:	5.000
Lab ID:	153457-017	Analyzed:	08/14/01
Basis:	dry	Cleanup Method:	EPA 3665A

Analyte	Result	RL
Aroclor-1016	ND	74
Aroclor-1221	ND	150
Aroclor-1232	ND	74
Aroclor-1242	1,200	74
Aroclor-1248	ND	74
Aroclor-1254	ND	74
Aroclor-1260	ND	74

Surrogate	%REC	Limits
TCMX	85	39-150
Decachlorobiphenyl	112	33-144

Field ID:	SM128-0	Moisture:	23%
Type:	SAMPLE	Diln Fac:	500.0
Lab ID:	153457-018	Analyzed:	08/15/01
Basis:	dry	Cleanup Method:	EPA 3665A

Analyte	Result	RL
Aroclor-1016	ND	7,800
Aroclor-1221	ND	16,000
Aroclor-1232	ND	7,800
Aroclor-1242	370,000	7,800
Aroclor-1248	ND	7,800
Aroclor-1254	ND	7,800
Aroclor-1260	ND	7,800

Surrogate	%REC	Limits
TCMX	DO	39-150
Decachlorobiphenyl	DO	33-144

DO= Diluted Out
ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Polychlorinated Biphenyls (PCBs)

Lab #:	153457	Location:	UCB-Richmond Field Sta.
Client:	URS Corporation	Prep:	EPA 3550
Project#:	510996706700	Analysis:	EPA 8082
Matrix:	Soil	Sampled:	08/07/01
Units:	ug/Kg	Received:	08/07/01
Batch#:	65576	Prepared:	08/09/01

Field ID:	SM128-2	Moisture:	72%
Type:	SAMPLE	Diln Fac:	50,000
Lab ID:	153457-019	Analyzed:	08/17/01
Basis:	dry	Cleanup Method:	EPA 3665A

Analyte	Result	RL
Aroclor-1016	ND	2,100,000
Aroclor-1221	ND	4,300,000
Aroclor-1232	ND	2,100,000
Aroclor-1242	61,000,000	2,100,000
Aroclor-1248	ND	2,100,000
Aroclor-1254	ND	2,100,000
Aroclor-1260	ND	2,100,000

Surrogate	%REC	Limits
TCMX	DO	39-150
Decachlorobiphenyl	DO	33-144

Field ID:	SM128-4	Moisture:	18%
Type:	SAMPLE	Diln Fac:	2,500
Lab ID:	153457-021	Analyzed:	08/17/01
Basis:	dry	Cleanup Method:	EPA 3665A

Analyte	Result	RL
Aroclor-1016	ND	36,000
Aroclor-1221	ND	73,000
Aroclor-1232	ND	36,000
Aroclor-1242	1,600,000	36,000
Aroclor-1248	ND	36,000
Aroclor-1254	ND	36,000
Aroclor-1260	ND	36,000

Surrogate	%REC	Limits
TCMX	DO	39-150
Decachlorobiphenyl	DO	33-144

DO= Diluted Out
ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Polychlorinated Biphenyls (PCBs)

Lab #:	153457	Location:	UCB-Richmond Field Sta.
Client:	URS Corporation	Prep:	EPA 3550
Project#:	510996706700	Analysis:	EPA 8082
Matrix:	Soil	Sampled:	08/07/01
Units:	ug/Kg	Received:	08/07/01
Batch#:	65576	Prepared:	08/09/01

Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC152773	Analyzed:	08/10/01
Basis:	wet	Cleanup Method:	EPA 3665A

Analyte	Result	RL
Aroclor-1016	ND	12
Aroclor-1221	ND	24
Aroclor-1232	ND	12
Aroclor-1242	ND	12
Aroclor-1248	ND	12
Aroclor-1254	ND	12
Aroclor-1260	ND	12

Surrogate	%REC	Limits
TCMX	96	39-150
Decachlorobiphenyl	103	33-144

DO= Diluted Out
ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Polychlorinated Biphenyls (PCBs)

Lab #:	153457	Location:	UCB-Richmond Field Sta.
Client:	URS Corporation	Prep:	EPA 3550
Project#:	510996706700	Analysis:	EPA 8082
Type:	LCS	Diln Fac:	1.000
Lab ID:	QC152774	Batch#:	65576
Matrix:	Soil	Prepared:	08/09/01
Units:	ug/Kg	Analyzed:	08/10/01
Basis:	wet		

Cleanup Method: EPA 3665A

Analyte	Spiked	Result	%REC	Limits
Aroclor-1260	166.1	164.0	99	58-124

Surrogate	%REC	Limits
TCMX	107	39-150
Decachlorobiphenyl	108	33-144

Curtis & Tompkins, Ltd.

Polychlorinated Biphenyls (PCBs)

Lab #:	153457	Location:	UCB-Richmond Field Sta.
Client:	URS Corporation	Prep:	EPA 3550
Project#:	510996706700	Analysis:	EPA 8082
Field ID:	SM133-0.5	Batch#:	65576
MSS Lab ID:	153457-005	Sampled:	08/07/01
Matrix:	Soil	Received:	08/07/01
Units:	ug/Kg	Prepared:	08/09/01
Basis:	dry	Analyzed:	08/12/01
Diln Fac:	1.000		

Type:	MS	Moisture:	21%
Lab ID:	QC152775	Cleanup Method:	EPA 3665A

Analyte	MSS Result	Spiked	Result	%REC	Limits
Aroclor-1260	<3.291	210.5	197.5	94	26-133

Surrogate	%REC	Limits
TCMX	87	39-150
Decachlorobiphenyl	85	33-144

Type:	MSD	Moisture:	21%
Lab ID:	QC152776	Cleanup Method:	EPA 3665A

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Aroclor-1260	211.0	212.1	101	26-133	7	40

Surrogate	%REC	Limits
TCMX	98	39-150
Decachlorobiphenyl	98	33-144

RPD= Relative Percent Difference