SAMPLING AND ANALYSIS PLAN: LOW DETECTION LIMIT WATER COLUMN STUDY PHASE 2

GREATER LOS ANGELES AND LONG BEACH HARBOR WATERS

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1 INTRODUCTION

1.1 Background

The *Final Basin Plan Amendment,* an amendment to the *Water Quality Control Plan – Los Angeles Region to Incorporate the Total Maximum Daily Load for Toxic Pollutants in Dominguez Channel and Greater Los Angeles and Long Beach Harbor Water*s (RWQCB 2011) includes fish tissue and sediment total polychlorinated biphenyl (TPCB) and total dichlorodiphenyltrichloroethane (TDDT) numeric targets. A technically sound and logistically feasible management strategy for attaining these targets is needed due to the size and complexity of the Los Angeles/Long Beach (LA/LB) Harbor, the widespread distribution of legacy pollutants within the region, and the potential ecological and financial costs associated with sediment remediation. To better understand how compliance with Harbor Toxics Total Maximum Daily Load (TMDL) targets may be achieved, the Ports of Long Beach and Los Angeles (Ports) are developing a bioaccumulation model as part of a Sediment Quality Objective (SQO) indirect effects Tier III assessment of the LA/LB Harbor. The objectives of the bioaccumulation model are to develop a scientifically defensible link between fish contaminant concentrations and contaminant sources and provide the Ports with a tool to identify effective remediation options.

The Water Resources Action Plan (WRAP) Model will be used to understand the chemical fate and sediment transport mechanisms affecting polychlorinated biphenyl (PCBs) and dichlorodiphenyltrichloroethane and its derivatives (DDX) in the LA/LB Harbor and will be linked to the bioaccumulation model. In support of modeling efforts, conceptual site models for contaminant fate and bioaccumulation have been developed and data gaps identified, which include water column PCBs and DDX. Specifically, previous water quality studies conducted in the harbor demonstrated primarily non-detect PCB and DDX results and used detection limits higher than values relevant to the TMDL. Additionally, where there were detects, results were sporadic and not necessarily representative of annual concentrations. Consequently, it was determined that water column PCB and DDX, as well as additional conventional data from the LA/LB Harbor, are necessary to fill data gaps to reduce uncertainty in the WRAP Model. These data will be used in the calculation of various processes, including settling, tidal exchange, and sediment-water fluxes (Anchor QEA and Everest 2014).

The Ports have designed a low detection limit water column study to address this data gap. The first phase of this study involved comparing methods to determine the most reliable method for collecting water column PCB and DDX concentrations. The second phase of this study involves using the selected method to assess the spatial variability of water column PCB and DDX concentrations throughout the greater harbor waters during different seasons and across depths.

In February through March 2014, Anchor QEA, LLC, implemented the first phase of the study using three different water column collection techniques coupled with state-of-the-art analytical methods to obtain ultra-low detections of PCBs and DDX. The objectives of the study were to determine the most reliable method to obtain accurate concentration measurements and establish site-specific partition coefficients that could be used to translate data between freely dissolved and particulate-associated fractions in the future and thus streamline future collection efforts. The collection techniques included solid phase microextraction (SPME), high-volume sampling using solid phase extraction (SPE), and 2-liter grab samples. Samples were collected using all three methods at five stations distributed across LA/LB Harbor and Eastern San Pedro Bay. PCB and DDX congeners were detected by all three methods. Results across the three methods are generally consistent, indicating accuracy of both collection and analytical methods. SPME provided more detections than the other methods and measured the equilibrated freely dissolved fraction, which best represents the bioavailability of the contaminants. Based on the results of the method comparison study, it was concluded that SPME would provide the most useful data and this method was recommended for the second phase of the low detection limit water column study. The Harbor Technical Working Group reviewed these findings and agreed with the recommendation for using only SPME in the second phase of the study.

1.2 Study Purpose

This study is the second phase of the Ports' low detection limit water column study. The purpose of this study is to assess the spatial variability in water column PCB and DDX concentrations throughout LA/LB Harbor and Eastern San Pedro Bay during two seasons using SPME.

1.3 Programmatic Quality Assurance Project Plan

A Programmatic Quality Assurance Project Plan (PQAPP; Appendix A) was developed to ensure high-quality data collection as part of compliance monitoring and special studies required by and in support of the Harbor Toxics TMDL. The PQAPP includes the following elements that focus on analytical methods and data generated during a project:

- **Program Management**. This section identifies specific roles and responsibilities of data collectors and data managers and describes the sequence for processing, reducing, and storing field analytical data in an Environmental Quality Information System (EQuIS) database by the managing consultant.
- **Field Sampling Data Quality Objectives**. This section includes detailed information on field collection requirements, including sample processing, sample handling, sample identification codes, sample custody and shipping, field quality control (QC) sample requirements with associated performance criteria, field records, and field electronic data deliverable (EDD) requirements.
- **Laboratory Data Quality Objectives**. This section includes detailed information on analytical methods, analyte lists and reporting limits, laboratory QC sample requirements with associated performance criteria and corrective actions, laboratory record requirements, and laboratory EDD requirements.
- **Data Review, Verification, and Validation**. This section outlines procedures used to ensure that project data quality objectives are met.

The PQAPP was designed to be programmatic in nature and does not target any one study as it plans for both compliance monitoring and a variety of other Harbor Toxics TMDL-related sampling and analysis activities over the next 5 years. While the PQAPP complies with California Surface Water Ambient Monitoring Program (SWAMP) protocols and is SWAMP compatible, it is not written in the format of a SWAMP Quality Assurance Project Plan (QAPP). In addition, it does not include all elements of SWAMP QAPP guidance (SWRCB 2008). This format was not possible because not all special studies have been designed or contractors determined. Instead, the PQAPP states that elements of the SWAMP QAPP guidance relating to project-specific field collection requirements will be included in Sampling and Analysis Plans (SAPs) developed to support Harbor Toxics TMDL-related studies. The programmatic approach outlined in the PQAPP provides a uniform data

collection and management program for all Harbor Toxics TMDL-related studies that provides high-quality data and efficiencies by standardizing sample collection, nomenclature, analysis, data review/validation, processing, storage, management, and seamless data export to the Regional Monitoring Coalition and State of California databases, regardless of study type or contractors performing the work.

This SAP has been designed accordingly and incorporates relevant PQAPP elements and supplemental information specific to the SAP in order to develop a single, all-inclusive, SAP compatible with SWAMP QAPP requirements (SWRCB 2008).

1.4 Document Organization

The remainder of the document is organized as follows:

- **Section 2: Project Task and Coordination.** This section presents the organizational relationship between and responsibilities of field program managers and subcontractor(s).
- **Section 3: Field Sampling Methods.** This section presents details of the field sampling program.
- **Section 4: Laboratory Analytical Methods.** This section presents key analytes, methods, associated detection limits, and minimum requirements.
- **Section 5: Quality Assurance and Quality Control.** This section presents quality assurance (QA) and QC procedures associated with field sampling methods and chemical analyses.
- **Section 6: Data Analysis and Reporting.** This section presents data processing objectives and report requirements.
- **Section 7: References.** This section presents relevant citations or reference material.

2 PROJECT TASK AND COORDINATION

The Ports' contractor will coordinate most aspects of the field work, including sampling and retrieval vessels and water sampling equipment, and secure a subcontract with the laboratories specified in this SAP. These laboratories were selected based on proven experience for analysis of SPME fibers for PCBs and DDX or grab samples for other analytes (i.e., DOC), for purposes of consistency with the first phase of the study or other ongoing Port studies, and because they are likely to have capacity to analyze the samples within a reasonable time period that will allow the Ports' TMDL program to stay on schedule. Anchor QEA will conduct laboratory coordination, SPME assembly preparation, and post-deployment sample processing. The Ports' contractor will deploy Anchor QEA-prepared SPME assemblies and retrieve them after the established equilibrium period has been reached. Upon SPME assembly retrieval, Anchor QEA will process fibers and submit them for analysis. All water quality profiles and grab samples for conventional parameters will be collected by the Ports' contractor and submitted for analysis (if applicable). Electronic data deliverables prepared by the laboratory will be submitted to the Ports' contractor for data validation.

3 FIELD SAMPLING METHODS

3.1 Field Program Overview

The second phase of the low detection limit water column study targets water column sample collection using SPME during two events: a dry season event and a wet season event. Nine stations will be sampled during each event with one to two depths sampled per station. Station locations, with target coordinates and prescribed laboratory analyses, are summarized in Table 1.

3.2 Sampling Design

Nine station locations were selected throughout LA/LB Harbor and Eastern San Pedro Bay to provide spatial coverage of areas with a range of sediment and water column PCB and DDX concentrations. Station locations were selected based on existing sediment and water column PCB and DDX concentrations, the ability to place SPME assemblies in the water column without compromising the safety of the field crew, interfering with ship traffic, loading and unloading activities, and anchorages. Station location selection also considered target biota sampling locations as part of the planned food web sampling and surface sediment sampling programs. Locations less accessible to the public were targeted when possible to reduce the potential for vandalism. A random approach to station placement was considered, but it was not possible due to the large number of potential issues associated with SPME assembly placement within the water column for a minimum of 28 days.

Five of the nine recommended station locations are stations previously sampled as part of the first phase of the study including LARE-01, SP-01, CS-01, OB-01, and REF-01 (Figures 1 and 2). Four additional stations have been added to further increase the spatial coverage of stations across LA/LB Harbor (CP-01, FH-01, IB-01, and IA-01). As shown by different colored symbols in Figure 1, SPME assemblies will be placed at one depth only (mid-water column depth) at six stations and at two depths (mid and bottom) at three stations. At all stations, water profiles will be taken during SPME assembly deployment and retrieval events. Grab samples will be collected at the time of SPME assembly retrieval.

As described in more detail below, SPME samples will be analyzed for 209-PCB congeners and high-resolution DDX isomers (including 2-Chloro-1,1-bis(4-chlorophenyl)-ethene

(DDMU)). Grab samples will be measured for total organic carbon (TOC), dissolved organic carbon (DOC), particulate organic carbon (POC), total suspended solids (TSS), total solids, and grain size.

3.3 Sampling Locations and Depths

Table 1 presents the sample design, including station location information, sampling depth, collection methods, field measurements, testing parameters, and field QC for each sampling location. The sampling depth will be the mid-point of the water column for all stations with an additional bottom sampling depth (1 meter above the mudline or as close to this as practicable) at three stations (IB-01, CS-01, and OB-01).

3.4 Station and Sample Identification

Each sample will have an adhesive plastic or waterproof paper label affixed to the container and will be labeled at the time of deployment or collection, for SPME and grab samples, respectively. The following information will be recorded on the label:

- Project name
- Sample identifier
- Date and time of sample collection
- Preservative type (if applicable)
- Analysis to be performed

The sample nomenclature should include the identifiers listed below:

- Waterbody or site as shown in Table 1
- Media or sampling method code (RW for receiving water)
- Station number as shown in Table 1
- Sample type
  - S = SPME
  - G = grab (physical and conventional tests)
- Sampling depth
  - M = mid-depth
  - B = bottom depth

- Date of collection
- Indication of field duplicate if applicable (i.e., add 1000 to station number)

For equipment rinsate blank or field blank samples, "EB" or "FB" will be used, respectively, in place of the waterbody or site and station number. The date of sample collection will be added to end in YYYYMMDD format.

An example sample identifier for a mid-depth water sample collected using SPME at Station 01 from the LA Inner Harbor on March 28, 2014:

IA-RW-01-S-M-20140328

An example sample identifier for an equipment blank of decontaminated sample processing equipment after sample collection of the above sample would be:

EB-20140328

3.5 Sample Platform

The sampling vessel will conform to U.S. Coast Guard safety standards. The vessel will be equipped with the proper equipment for the safe deployment and retrieval of sampling gear. In addition, the vessel will have sufficient deck space for sample processing and water pumps available to aid in sample processing and cleaning of the deck and equipment between stations.

3.6 Navigation

On-vessel navigation and positioning will be accomplished using a differential GPS. The navigation system will be used to guide the vessel to pre-determined sampling locations, with an accuracy of plus or minus 3.0 meters. The coordinates of the actual sampling locations will be reported in latitude and longitude in decimal degrees (to five decimal places). Positions will be relative to the World Geodetic System 1984 (WGS84).

Upon locating the sampling location, station depth will be measured using an onboard calibrated fathometer or a leadline. The mudline elevation relative to the mean lower low water (MLLW) datum will be determined by adding the tidal elevation to the measured depth. All vertical elevations will be reported to the nearest 0.03 meter relative to MLLW.

3.7 Collection Methods

SPME (PCB and DDX) and grab sampling (TOC, DOC, POC, TSS, and grain size) collection procedures are being used for this program. Field procedures and documentation will conform to the PQAPP (Appendix A) where applicable. Health and safety procedures will follow the Ports' contractor's Health and Safety Plan (HASP). Photographs will be taken at each location to document SPME assembly deployment and retrieval.

For each sample location, the following information will be recorded on a hand-written or electronic field log during SPME assembly deployment and retrieval:

- Station identifier and description
- Date
- Sample start and end times
- Field profiles (every meter if possible) of salinity, temperature, dissolved oxygen , pH, turbidity, and conductivity using a Hydrolab or YSI
- Sampling water depth(s)
- Observations (weather, water quality, etc.)
- Reference to photos, if collected

3.7.1 SPME Assembly Collection Procedures

At each sampling location and depth, one SPME buoy holding two SPME assemblies will be deployed. One SPME assembly is for DDX and PCB analysis and the other assembly is for performance reference compounds (PRC) analysis. The PRC SPME assembly should be offset by approximately 0.15 meter from the sample SPME assembly. At some designated stations (Table 1), field QC samples will also be deployed and/or collected. SPME assemblies and field QC samples will be prepared by Anchor QEA and shipped to the Ports' contractor for deployment.

If the contractor cannot deploy these SPME assemblies at the target stations (Figures 1 and 2; Table 1) due to obstacles, ship traffic, or loading/unloading issues, the following strategy is recommended for alternate SPME assembly placement:

- The alternate location for SPME assembly placement should be in the same TMDL waterbody as the target location.
- The alternate location should be placed in an area outside of known loading and unloading activities and areas of heavy ship traffic.
- The alternate location should avoid publically accessible locations if possible.
- For SPME assemblies being tied to docks or piers, locations that are at the end of piers and docks should be considered to avoid ship traffic.

3.7.1.1 SPME Assembly Pre-Deployment Preparation

Anchor QEA personnel will be responsible for SPME assembly pre-deployment preparation, as described in detail below. SPME fibers will be cleaned in the laboratory and before deployment by sequentially soaking them in hexane and methanol, then rinsing them with distilled water and drying them with tissue paper. PRCs will be used to evaluate the uptake kinetics of PCBs and DDX to the fiber and estimate the fraction to steady state. PRCs are analytically non-interfering, chemicals. Six ^{13}C labeled PCBs (^{13}C-PCB-8, -31, -79, -85, -133 and -185) and four deuterated DDX (4,4'-DDE-d8, 2,4'-DDE-d8, 4,4'-DDD-d8, and 4,4'-DDT-d8) will be used as PRCs for PCBs and DDX, respectively. The PRC standard will be provided by Vista Analytical Laboratory. Spiking PRCs will be conducted in a 2-inch-diameter and 1-meter-long glass tube sealed with a Teflon-lined cap. The glass tube will be filled two thirds with 20 percent methanol and deionized water solution, and PRC stocks in methanol solution will be spiked to the water and shaken well before adding the fibers. The volume of the stock solution depends on the concentration of the stock and the volume of fiber spiked. After fibers are introduced, the tube will be filled with minimum head space. Fibers and the spiked aqueous solution will be mixed on a shaking table at 80 revolutions per minute (rpm) for 2 weeks. At the end of spiking, three 40-centimeter (cm) fiber samples from different fiber rods will be analyzed to measure initial PRC concentrations and evaluate the spiking variability.

Anchor QEA personnel will attach cleaned SPME fibers and fibers spiked with PRCs to copper mesh with twist ties and placed into a protective stainless steel and copper mesh housing (Figure 3). Four 1-meter-long SPME fiber rods will be cut into 12 pieces and will be separated from each other by ties at several points along the fiber. The PRC-spiked fiber will be loaded in a separate housing assembly from the regular un-spiked fibers. SPME samples and PRCs will be clearly and permanently marked by Anchor QEA personnel prior to shipment to the Ports' contractor.

3.7.1.2 SPME Assembly Deployment

The deployment of SPME assemblies will be the responsibility of the Ports' contractor. Only basic guidance for SPME assembly deployment is provided below.

SPME assemblies will be deployed in the field by attaching the housing to a location on the mooring line measured to reach the target depth within the water column and anchoring the mooring line to the sediment bed at the target station. At five stations located at the Ports' tenant docks and Harborlight Marina, SPME assemblies will be tied to private, secured docks or piers. The remaining four stations will not be tied to an existing structure but will be anchored in the sediment. At these stations, acoustic releases should be used for retrieval purposes; alternately, the Ports' contractor may use other cost-effective methods for retrieval of SPME assemblies that are not tied to structures.

It is critical that sufficient weight is used to anchor the mooring line. The amount of weight will be dependent on the type of mooring (e.g., tied to structure versus placed in open water that is subject to swell). It is recommended the anchor weight be a minimum three times the buoyancy of the mooring buoys in areas not subject to ocean swell, and a minimum five times the buoyancy of the mooring buoys in areas subject to ocean swell. Anchoring systems may be concrete block, sand bags, river or mushroom anchors, or other suitable anchor types, used alone or in combination. Samplers will be suspended in the water column with submerged mooring buoys. It is recommended the submerged mooring buoys be placed in the water column at a depth equal to -3.0 meters below the anticipated lowest sea level relative to MLLW during the period of deployment to ensure mooring buoys stay submerged during low tide events and deeper than most recreational and commercial vessel traffic.

Surface buoys will not be used due to the heavy ship traffic at and near sampling locations. The mooring buoys shall be of sufficient size to provide adequate buoyancy to ensure the SPME assembly is maintained at the target depth within the water column. The amount of buoyancy will be dependent on the number of SPME assemblies attached per mooring line and whether or not acoustic releases are used for retrieval.

The PRC-spiked SPME fiber housing assembly will be deployed on the same anchor line as the un-spiked SPME fiber housing assembly but offset by approximately 0.15 meter to avoid uptake of released PRCs by clean, un-spiked fibers.

3.7.1.3 SPME Assembly Retrieval and Sample Processing

SPME fiber samples will be retrieved by a field team, consisting of both the Ports' contractor and Anchor QEA personnel, after at least 28 days. Retrieval at the five stations with tie-offs (CS-01, IA-01, IB-01, FH-01, and LARE-01) will be conducted from the boat by un-securing the anchor line and pulling the assembly into the boat. Retrieval at the remaining stations will be conducted using an acoustic release device or alternative cost-effective method.

The SPME assembly will be un-tied from the anchor line, and fibers will be removed from the assembly and photographed. Any biofouling, color change, breakage, or loss of fiber will be recorded. Each fiber will be wiped with damped tissue paper, cut into approximately 10-cm-long pieces, and transferred into a 60-milliliter (mL) ultra-clean amber glass vial. PRC fibers will be combined with un-spiked fibers from the same location and analyzed as one sample at all locations except LARE-01, REF-01, and IA-01. At stations LARE-01, REF-01, and IA-01, PRC samples will be submitted and analyzed as separate samples. Sample identifiers for PRC samples are provided in Table 1.

The total length of fibers is targeted at 2 meters with 30 to 40 cm of PRC fiber in each vial. Individual or total fiber lengths for sample SPME fibers and PRC SPME fibers will be separately recorded in the field logs. Sealed vials containing SPME fibers will be packed in a cooler packed with ice and shipped to the laboratory by the field team.

3.7.2 Water Column Profiles – Procedures

During each SPME assembly deployment and retrieval event in situ water quality parameters will be measured using a multi-parameter water quality instrument equipped with sensors to measure dissolved oxygen, turbidity, pH, temperature, and salinity. At each station, the multi-parameter probe will be lowered through the water column at a rate of approximately 1 meter per second. A lead line will be attached to the multi-parameter probe to estimate water depth. Contact with the substrate should be avoided. Data from the multi-parameter probe may be recorded manually on field forms (at 1-meter intervals) or electronically to a data logger.

3.7.3 Grab Collection Procedures

During SPME assembly retrieval events, grab samples will be collected using a Van Dorn style water sampler or peristaltic pump with tubing. Grab samples will be collected at the same depth or depths at which SPME assemblies were deployed. For the lower sampling depth, the mudline will be avoided to prevent disturbance of the sediment surface and potential bias of the results. Sampling depths and times should be recorded on the field log. Grab samples will be submitted for conventional parameters listed in Table 2.

3.8 Sample Handling

Sample transport and chain-of-custody procedures, chemical and physical testing, and QA requirements will adhere to the procedures identified in the PQAPP (Appendix A).

Samples for PCB and DDX analysis will be shipped to:

Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762

Samples for all other analyses will be shipped to:

Eurofins Calscience, Inc.
7740 Lincoln Way
Garden Grove, CA 92841
Eurofins Calscience, Inc. (ECI), will subcontract TOC, DOC, and POC analyses to the Marine Science Institute for specialized analysis of seawater.

3.9 Waste Disposal

All disposable sampling materials and personnel protective equipment used in sample processing, such as disposable gloves, tissue paper, and paper towels, will be placed in heavy-duty garbage bags for disposal in the municipal waste.

3.10 Sampling Schedule and Contingency

3.10.1 Event 1

Deployment of SPME assemblies for the first event is targeted for fall 2014 (targeting a dry season event if possible). SPME assembly retrieval must occur at least 28 days after deployment and is anticipated to take 2 to 4 days. Retrievals would preferably not be conducted within 3 days of a heavy rain fall.

If weather reports indicate a large storm event, the retrieval event would be rescheduled to ensure that sampling activities occur at least 3 days after heavy rains. If an unexpected storm event occurs during the sampling event, sampling stations with the shallowest sampling depths will be collected first (during the storm), because historical salinity data indicate that only shallow depths (2.7 to 3.7 meters) are directly impacted by stormwater inputs.

3.10.2 Event 2

A second event targeting the wet season (after October 1) is planned for Winter 2014/2015, assuming the first event is representative of the dry season. If significant rainfall occurs during the first event, then that event should be considered the wet season event and the second event should target the dry season. Similar to the first event, SPME assembly retrieval must occur at least 28 days after deployment.

4 LABORATORY ANALYTICAL METHODS

SPME samples will be analyzed for 209-PCB congeners and high-resolution DDX including DDMU (Table 1 through Table 5). At each retrieval event, grab samples from each station will be analyzed for TOC, DOC, POC, TSS, total solids, and grain size. Analytical methods and QA/QC procedures will comply with the PQAPP (Appendix A). Table 2 provides the sample container information, holding times, and preservation methods for each sampling parameter. Table 3 provides analytical methods and target analyte lists for waters and SPME samples. Table 4 provides the required laboratory QA/QC sample frequency. Table 5 provides data quality objectives (precision and accuracy goals) for chemical data. See Section 4 of the PQAPP for more information regarding analytical methods.

5 QUALITY ASSURANCE AND QUALITY CONTROL

Field and laboratory QA/QC requirements are described in detail in Sections 3 and 4 of the PQAPP (Appendix A). The laboratories will prepare detailed reports in accordance with Section 4.4 of the PQAPP (Appendix A). Laboratory QA/QC frequencies are summarized in Tables 4.

The following field QA/QC samples will be collected for this program:

- DOC split sample for additional analysis at ECI
- TOC split sample for archive (held at ECI)
- Field duplicate
  - SPME (PCB and DDX)
  - Grab (TOC, DOC, TSS, and POC only)
- Field blank/equipment blank
  - SPME field blank, collected by bringing a clean, unused fiber to the field on the retrieval event and then submitting it to the laboratory for PCB and DDX analysis
  - Grab equipment blank, collected by filling the water sampling device with clean laboratory-provided water and then pouring directly into sampling bottles for TOC, DOC and POC analysis
- Fiber blank
  - SPME, collected by submitting clean, unused fiber directly to the laboratory after preparation (i.e., not brought into the field) and analyzed for PCB and DDX
  - Analyzed for each new lot of SPME fibers prior to deployment to ensure that the lot of fibers is contaminant free

5.1 Field Measurement Quality Objectives

Field measurement quality objectives will be met by performing a daily calibration for all parameters.

6 DATA ANALYSIS AND REPORTING

At a minimum, the Sampling and Analysis Report (SAR) will detail the sample collection and analytical methods used to generate project data, any deviations from the SAP, a summary of the data validation evaluation, and a summary of chemistry results. Results from the study will be presented in a manner to facilitate peer and agency review and acceptance.

To facilitate data validation and management for the Ports' TMDL program, field and analytical EDDs will be provided to the Ports as specified in Sections 3.3.2.3 and 4.5 of the PQAPP (Appendix A). Briefly, field data collection, including observations, field measurements, and sample generation, will be compiled into a field EDD generated from the custom field application or field collection logs and provided to the Ports in an electronic format. A template for the field and analytical EDD will be provided to the Ports' contractor upon request. Final, validated analytical EDDs will be provided to the Ports in a pre-specified custom EQuIS EDD format. The Ports' contractor may request analytical laboratory EDDs in any format as long as final data to the Ports' data manager is provided in the custom EQuIS EDD format described in the PQAPP. At the time of submittal of the final, validated analytical and field EDDs, laboratory reports (PDF format) associated with the analytical data should also be provided to the Ports' data manager.

7 REFERENCES

Anchor QEA and Everest, 2014. Memorandum to Andrew Jirik, Port of Los Angeles, and James Vernon, Port of Long Beach. Regarding: Development of a Chemical Fate Conceptual Site Model for the Greater Los Angeles and Long Beach Harbor Waters. February 2014.

RWQCB (Regional Water Quality Control Board), 2011. *Final Basin Plan Amendment*. Attachment A to Resolution No. R11-008. Amendment to the *Water Quality Control Plan – Los Angeles Region to Incorporate the Total Maximum Daily Load for Toxic Pollutants in Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters*. Adopted by the RWQCB on May 5, 2011.

SWRCB (State Water Resources Control Board), 2008. *Surface Water Ambient Monitoring Program Quality Assurance Program Plan*. Final Technical Report Version 1. September 2008.

TABLES

Table 1
Sampling Design

Location ID	Location Description	Latitude (DDM)[1]	Longitude (DDM)[1]	Deployment System	Mudline Elevation[2] (meters MLLW)	Depth(s) Targeted	Approximate Sampling Depth (meters MLLW)[6]	Collection Methods	Sample ID	Testing Parameters[3]	Performance Reference Compound Sample Identifiers [4,5,6]	Field Quality Control Samples and Sample Identifiers
CS-01	Consolidated Slip (Tenant Dock)	33° 46.335'	-118° 14.976'	Tie off to dock	-7.77	Mid-depth	-3.89	SPME	CS-RW-01-S-M-YYYYMMDD	209-PCBs and DDX	Combine with un-spiked sample	--
								Grab	CS-RW-01-G-M-YYYYMMDD	TOC, DOC, POC, TSS, and grain size	--	DOC split sample (same sample identifier)
						Bottom (1 meter above sediment)	-6.77	SPME	CS-RW-01-S-B-YYYYMMDD	209-PCBs and DDX	Combine with un-spiked sample	--
								Grab	CS-RW-01-G-B-YYYYMMDD	TOC, DOC, POC, TSS, and grain size	--	DOC split sample (same sample identifier)
OB-01	Long Beach Outer Harbor (Shallow Water Habitat Area)	33° 43.865'	-118° 14.114'	Acoustic release	-9.30	Mid-depth	-4.65	SPME	OB-RW-01-S-M-YYYYMMDD	209-PCBs and DDX	Combine with un-spiked sample	--
								Grab	OB-RW-01-G-M-YYYYMMDD	TOC, DOC, POC, TSS, and grain size	--	DOC split sample (same sample identifier)
						Bottom (1-meter above sediment)	-8.29	SPME	OB-RW-01-S-B-YYYYMMDD	209-PCBs and DDX	Combine with un-spiked sample	--
								Grab	OB-RW-01-G-B-YYYYMMDD	TOC, DOC, POC, TSS, and grain size	--	DOC split sample (same sample identifier)
REF-01	Reference Station: San Pedro Shelf (just outside breakwater)	33° 43.085'	-118° 12.426'	Acoustic release	-17.3	Mid-depth	-8.64	SPME	REF-RW-01-S-M-YYYYMMDD	209-PCBs and DDX	REF-RW-01-S-M-PRC-YYYYMMDD	--
								Grab	REF-RW-01-G-M-YYYYMMDD	TOC, DOC, POC, TSS, and grain size	--	DOC split sample (same sample identifier)
LARE-01	Los Angeles River Estuary (Harborlight Marina)	33° 45.378'	-118° 11.788'	Tie off to dock	-2.04	Mid-depth	-1.02	SPME	LARE-RW-01-S-M-YYYYMMDD	209-PCBs and DDX	LARE-RW-01-S-M-PRC-YYYYMMDD	--
								Grab	LARE-RW-01-G-M-YYYYMMDD	TOC, DOC, POC, TSS, and grain size	--	DOC split sample (same sample identifier)
SP-01	Eastern San Pedro Bay (west of the Alamitos Bay entrance channel)	33° 44.213'	-118° 8.090'	Acoustic release	-8.78	Mid-depth	-4.39	SPME	SP-RW-01-S-M-YYYYMMDD	209-PCBs and DDX	Combine with un-spiked sample	--
								Grab	SP-RW-01-G-M-YYYYMMDD	TOC, DOC, POC, TSS, and grain size	--	DOC split sample (same sample identifier)
CP-01	Cabrillo Pier vicinity	33° 42.310'	-118° 16.258'	Acoustic release	-12.1	Mid-depth	-6.04	SPME	CP-RW-01-S-M-YYYYMMDD	209-PCBs and DDX	Combine with un-spiked sample	Field blank, expose SPME fiber to ambient air at station for 5 minutes, FB-YYYYMMDD
								Grab	CP-RW-01-G-M-YYYYMMDD	TOC, DOC, POC, TSS, and grain size	--	Equipment blank, fill water sampling device with lab deionized water, EB-YYYYMMDD DOC split sample (same sample identifier)
IA-01	Los Angeles Inner Harbor (Main Channel - North End	33° 45.390'	-118° 15.831'	Tie off to dock	-6.92	Mid-depth	-3.46	SPME	IA-RW-01-S-M-YYYYMMDD	209-PCBs and DDX	IA-RW-01-S-M-PRC-YYYYMMDD	--
								Grab	IA-RW-01-G-M-YYYYMMDD	TOC, DOC, POC, TSS, and grain size	--	DOC split sample (same sample identifier)
IB-01	Long Beach Inner Harbor (Channel 2 - off Pier C)	33° 46.301'	-118° 13.191'	Tie off to dock	-8.47	Mid-depth	-4.24	SPME	IB-RW-01-S-M-YYYYMMDD	209-PCBs and DDX	Combine with un-spiked sample	SPME field duplicate, IB-RW-1001-S-M-YYYYMMDD
								Grab	IB-RW-01-G-M-YYYYMMDD	TOC, DOC, POC, TSS, and grain size	--	Grab field duplicate, IB-RW-1001-G-M-YYYYMMDD DOC split sample (same sample identifier)
						Bottom (1 meter above sediment)	-7.47	SPME	IB-RW-01-S-B-YYYYMMDD	209-PCBs and DDX	Combine with un-spiked sample	--
								Grab	IB-RW-01-G-B-YYYYMMDD	TOC, DOC, POC, TSS, and grain size	--	DOC split sample (same sample identifier)
FH-01	Fish Harbor (Dock off Berth 260)	33° 44.165'	-118° 16.161'	Tie off to dock	-5.33	Mid-depth	-2.67	SPME	FH-RW-01-S-M-YYYYMMDD	209-PCBs and DDX	Combine with un-spiked sample	--
								Grab	FH-RW-01-G-M-YYYYMMDD	TOC, DOC, POC, TSS, and grain size	--	DOC split sample (same sample identifier)

Table 1
Sampling Design

Notes:

Field measurements for all samples include profiles (one reading per meter) of pH, dissolved oxygen, turbidity, conductivity, salinity, and temperature from surface to sampling depth and particle size determination at sampling depth.

DDX = dichlorodiphenyltrichloroethane derivatives
DOC = dissolved organic carbon
MLLW = mean lower low water
PCB = polychlorinated biphenyl
POC = particulate organic carbon
SPME = solid phase microextraction
TOC = total organic carbon
TSS = total suspended solids

1 Coordinates are provided in DDM (degrees, decimal, minutes).
2 Elevations are based on bathymetry data compiled by Everest (2013)
3 Grain size will be analyzed in the laboratory if a LISST is not used in the field.
4 Performance reference compounds (PRCs) will be spiked on SPME fibers and deployed in separate housing at all locations; results will be used to determine the fraction of steady-state.
5 PRC-spiked fibers will be analyzed separately at some locations (and will have a separate sample identifier associated with them) and at locations will be analyzed in combination with un-spiked SPME fibers as indicated in this table.
6 PRC-spiked fibers should be deployed at a slightly different depth than the SPME fibers. Offset by approximately 0.15 meter.

Everest International Consultants, Inc., 2013. Compiled Bathymetry Data from Port of Los Angeles, Port of Long Beach, and NOAA. AutoCAD file.

Table 2
Sample Containers, Holding Times, and Preservation Methods

Parameter	Sample Size	Container Size and Type	Holding Time	Preservative	Laboratory Conducting Analysis
Water (Grab)					
Particle size determination	2 L[1]	2 X 1-L HDPE	7 days	Cool ≤6°C	TBD
TSS	1 L	1-L HDPE	7 days	Cool ≤6°C	
TOC	150 mL	2 x 250-mL glass	28 days	Cool ≤6°C and dark; HCl or H2SO4 to pH<2	
DOC	150 mL	2 x 250-mL glass	48 hours to filtration; 28 days to analysis	Cool ≤6°C and dark; HCl or H2SO4 to pH<2 after filtration	
POC	2 L[1]	2 X 1-L glass	48 hours to filtration; 28 days to analysis	Cool ≤6°C	
SPME					
DDX	NA	SPME fibers sent to laboratory in clean sealed vial	Extract from SPME fiber as soon as possible; 40 days after extraction	Cool ≤6°C	Vista Analytical Laboratory
PCB Congeners					

Notes:

°C = degrees Celsius

DDX = dichlorodiphenyltrichloroethane derivatives

DOC = dissolved organic carbon

HPDE = high-density polyethylene

L = liter

mL = milliliter

NA = not applicable

PCB = polychlorinated biphenyl

POC = particulate organic carbon

PUF = polyurethane foam

SPME = solid phase microextraction

TOC = total organic carbon

TSS = total suspended solids

1 Higher volumes of water should be collected if turbidity is low.

Table 3
Water Analytical Methods and Target Reporting Limits

Parameter	Analytical Method	Target Reporting Limit[2] Grab Sample	Target Reporting Limit[2] SPME
Conventional Parameters			
Total suspended solids (mg/L)	USEPA 160.2/SM 2540 D	1.0	--
Total and dissolved organic carbon (mg/L)	SM 5310 B/Carlson et al. 2010	0.5	--
Particulate organic carbon (mg/L)	USEPA 440	0.1	--
Particle size determination (%)	Laser diffraction (ASTM D4464M)	0.1	--
Organochlorine Pesticides (ng/L) - High-resolution Analytical Method			
2,4'-DDD	USEPA 1699	--	0.002
2,4'-DDE	USEPA 1699	--	0.001
2,4'-DDT	USEPA 1699	--	0.001
4,4'-DDD	USEPA 1699	--	0.004
4,4'-DDE	USEPA 1699	--	0.001
4,4'-DDT	USEPA 1699	--	0.001
4,4'-DDMU	USEPA 1699	--	0.004
PCB Congeners (ng/L)[1] - High-resolution Analytical Method			
PCB-01 through PCB-209	USEPA 1668B	--	0.008

Notes:
High-volume alternative sampling techniques will be used to achieve lower reporting limits for PCBs and DDX.

DDX = dichlorodiphenyltrichloroethane derivatives

mg/L = milligrams per liter

ng/L = nanograms per liter

PCB = polychlorinated biphenyl

POC = particulate organic carbon

SM = Standard Method

SPE = solid phase extraction

SPME = solid phase microextraction

USEPA = U.S. Environmental Protection Agency

1 PCB co-elutions will vary by instrument and column and may increase reporting limits for some congeners.

2 Laboratory reporting limits are revised periodically and may change over the duration of the project. The values for SPME and high-volume sampling are actually estimated detection limits.

Carlson, C.A., D.A. Hansell, N.B. Nelson, D.A. Siegel, W.M. Smethie, S. Khatiwala, M.M. Meyers, and E. Halewood, 2010. Dissolved organic carbon export and subsequent remineralization in the mesopelagic and bathypelagic realms of the North Atlantic basin. *Deep-Sea Res. II* , 57:1433-1445.

Table 4
Frequencies for Laboratory Quality Assurance/Quality Control Samples

Analysis Type	Initial Calibration[1,2]	Continuing Calibration Verification	LCS or SRM[3]	Replicates	Matrix Spikes	Matrix Spike Duplicates	Method Blanks	Surrogate Spikes	Internal Standard
Total solids	Daily or each batch	NA	NA	1 per 20 samples	NA	NA	NA	NA	NA
Particle size determination/grain size	Daily or each batch	NA	NA	1 per 20 samples	NA	NA	NA	NA	NA
TSS	Daily or each batch	NA	NA	1 per 20 samples	NA	NA	NA	NA	NA
TOC/DOC	As needed	1 per 10 analytical runs	1 per 20 samples or 1 per batch	NA	1 per 20 samples or 1 per batch	1 per 20 samples or 1 per batch	Each batch	NA	NA
POC	Daily or each batch	1 per 16 samples	1 per 20 samples	1 per 20 samples	NA	NA	Each batch	NA	NA
PCB congeners by high-resolution method	As needed	Every 12 hours	1 per 20 samples	NA	NA[4]	NA[4]	1 per 20 samples	NA[4]	Every sample
Organochlorine pesticides by high-resolution method	As needed	Every 12 hours	1 per 20 samples	NA	NA[4]	NA[4]	1 per 20 samples	NA[4]	Every sample

Notes:
Values should have relative percent differences less than 40 percent or they are P flagged. ICALS = 20 percent or less and CCALS = 15 percent or less.

DOC = dissoved orgnaic carbon
LCS = Laboratory control sample
NA = not applicable
PCB = polychlorinated biphenyl
POC = particulate organic carbon
SRM = standard reference material
TOC = total organic carbon

1 For physical tests, calibration and certification of drying ovens and weighing scales are conducted annually.
2 Calibrations should be conducted per analytical methods or instrument manufacturers specifications.
3 When a SRM is not available, an LCS will be analyzed.
4 Isotope dilution quantitation technique accounts for matrix interferences thus matrix spike/matrix spike duplicate are not required.

Table 5
Laboratory and Reporting Data Quality Objectives

Parameter	Precision[1]	Accuracy[2]	Completeness[3]
Water			
Particle size determination	± 25% RPD	NA	90%
TSS	± 25% RPD	NA	90%
TOC/DOC	± 25% RPD	80-120% R	90%
POC	± 25% RPD	80-120% R	90%
Organochlorine pesticides[4]	± 25% RPD	50-150% R	90%
PCB congeners[4]	± 25% RPD	50-150% R	90%

Notes:

CRM = certified reference material

DOC = dissoved orgnaic carbon

LCS = laboratory control sample

PCB = polychlorinated biphenyl

POC = particulate organic carbon

R = recovery

RPD = relative percent difference

TOC = total organic carbon

1 Not applicable if native concentration of either sample is greater than the reporting limit.

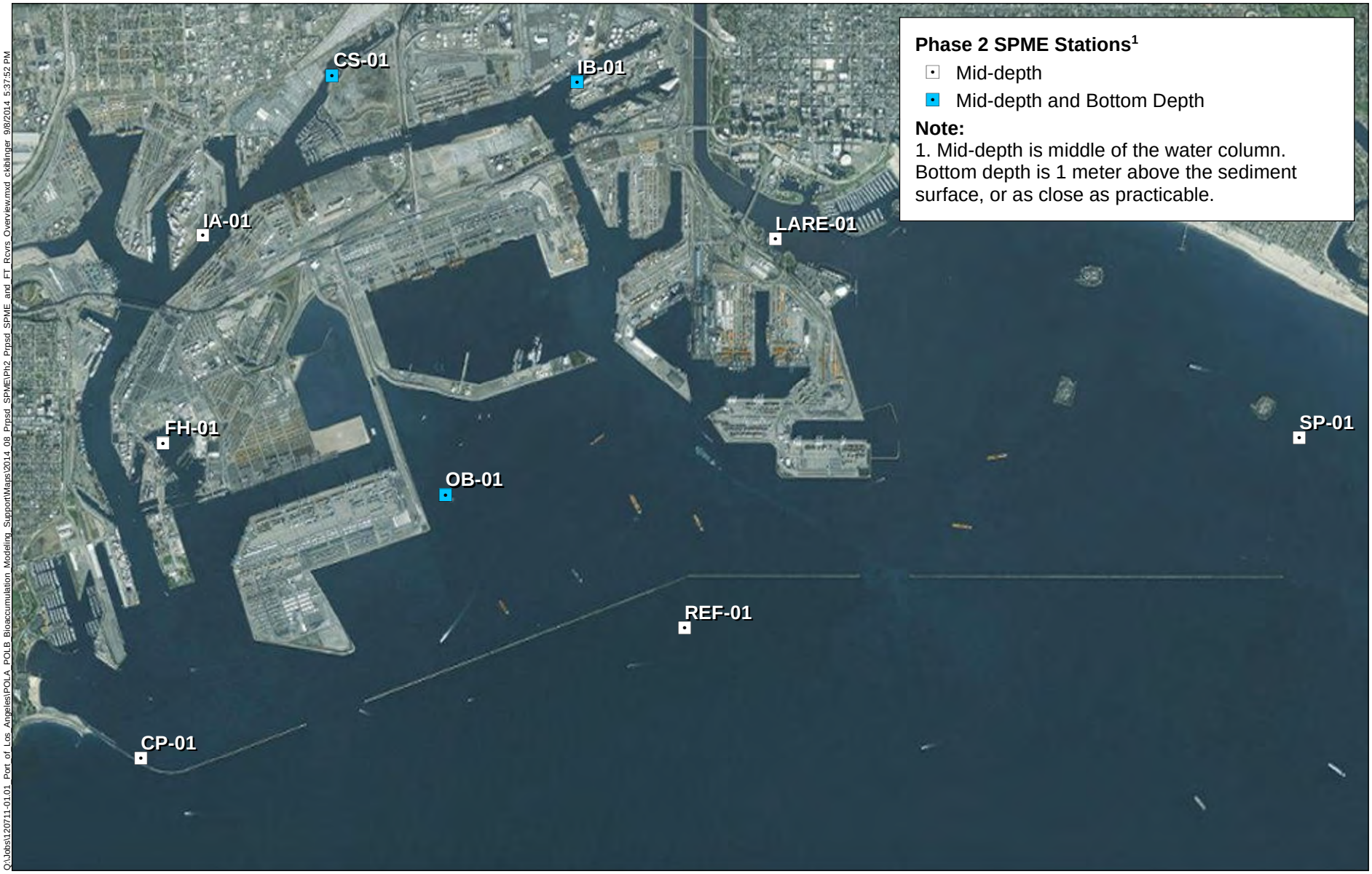
2 LCSs, CRMs, and matrix spike/matrix spike duplicate percent recovery.

3 Percent of each class of analytes that are not rejected after data validation conducted in accordance with the Technical Support Manual (Bay et al. 2009).

4 The accuracy goal is 70 to 130% R if certified reference material is used.

Bay, S.M., D.J. Greenstein, J.A. Ranasinghe, D.W. Diehl, and A.E. Fetscher, 2009. *Sediment Quality Assessment Draft Technical Support Manual.* Technical Report 582. Southern California Coastal Water Research Project. May 2009.

FIGURES



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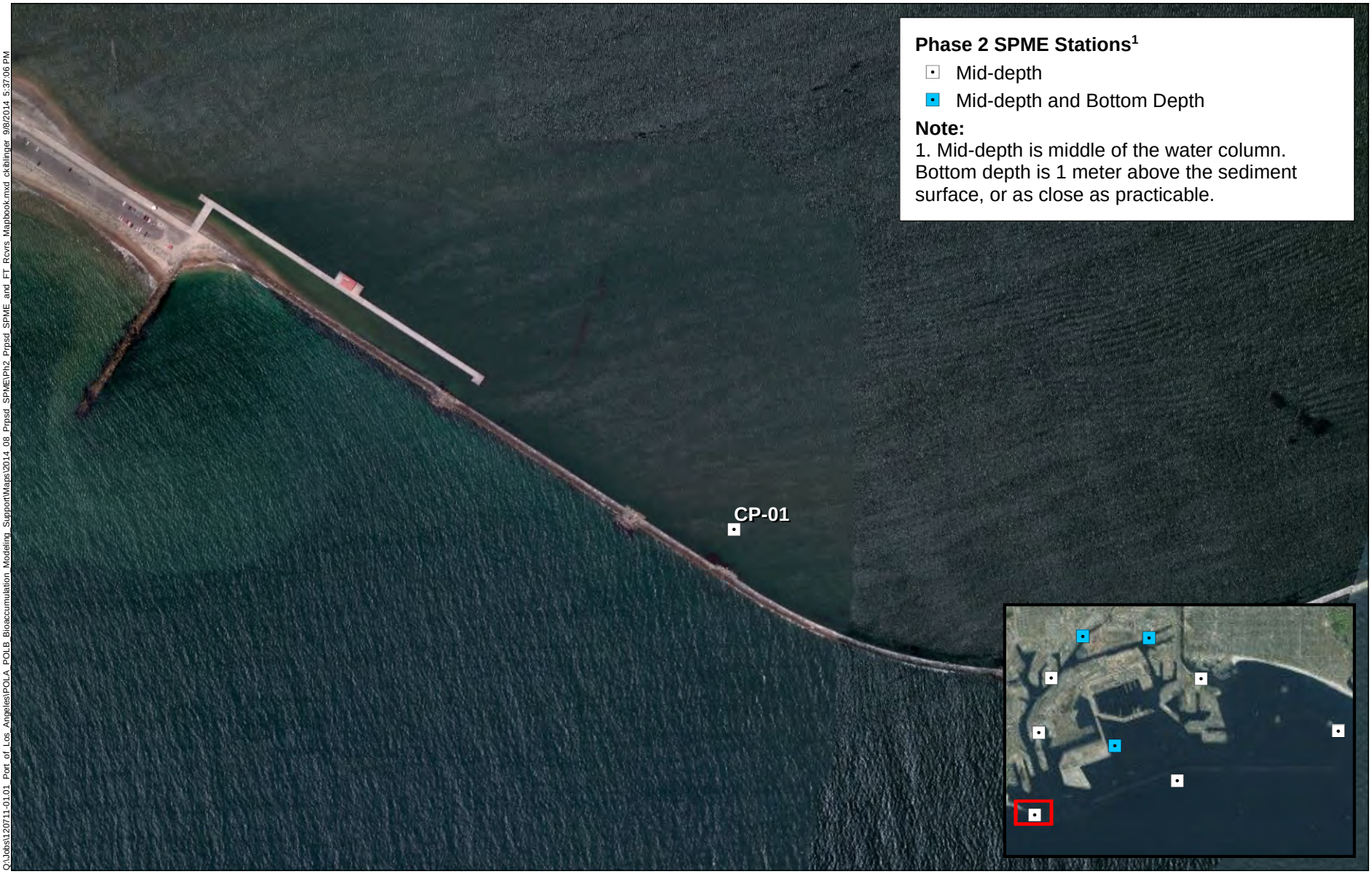
ANCHOR QEA

Feet
0 2,500 5,000

Figure 1
Sampling Locations
Low Detection Limit Water Column Study Phase 2
Greater Los Angeles and Long Beach Harbor Waters



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DRAFT

ANCHOR QEA

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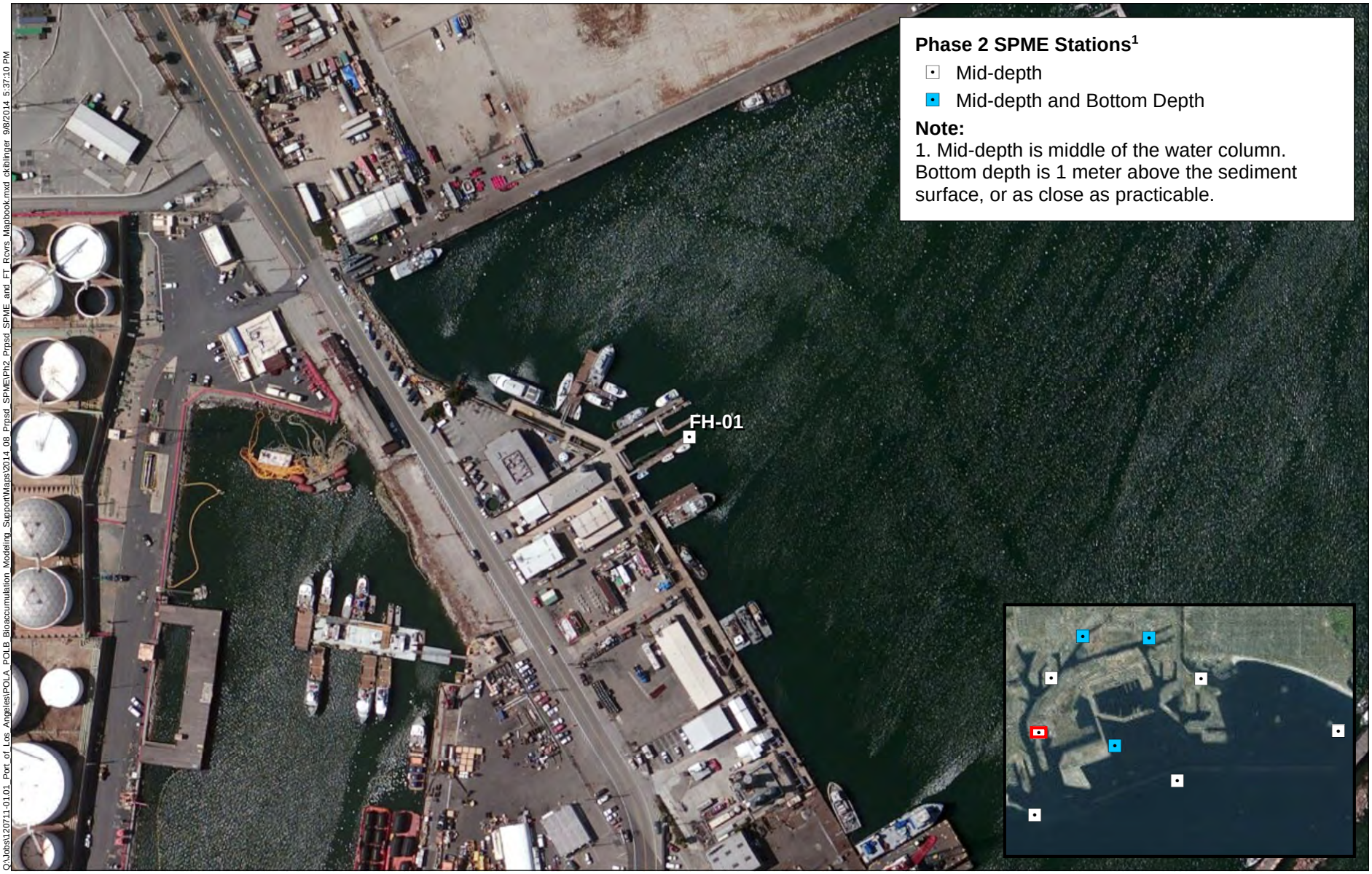
Figure 2a
CP-01
Low Detection Limit Water Column Study Phase 2
Greater Los Angeles and Long Beach Harbor Waters



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Feet
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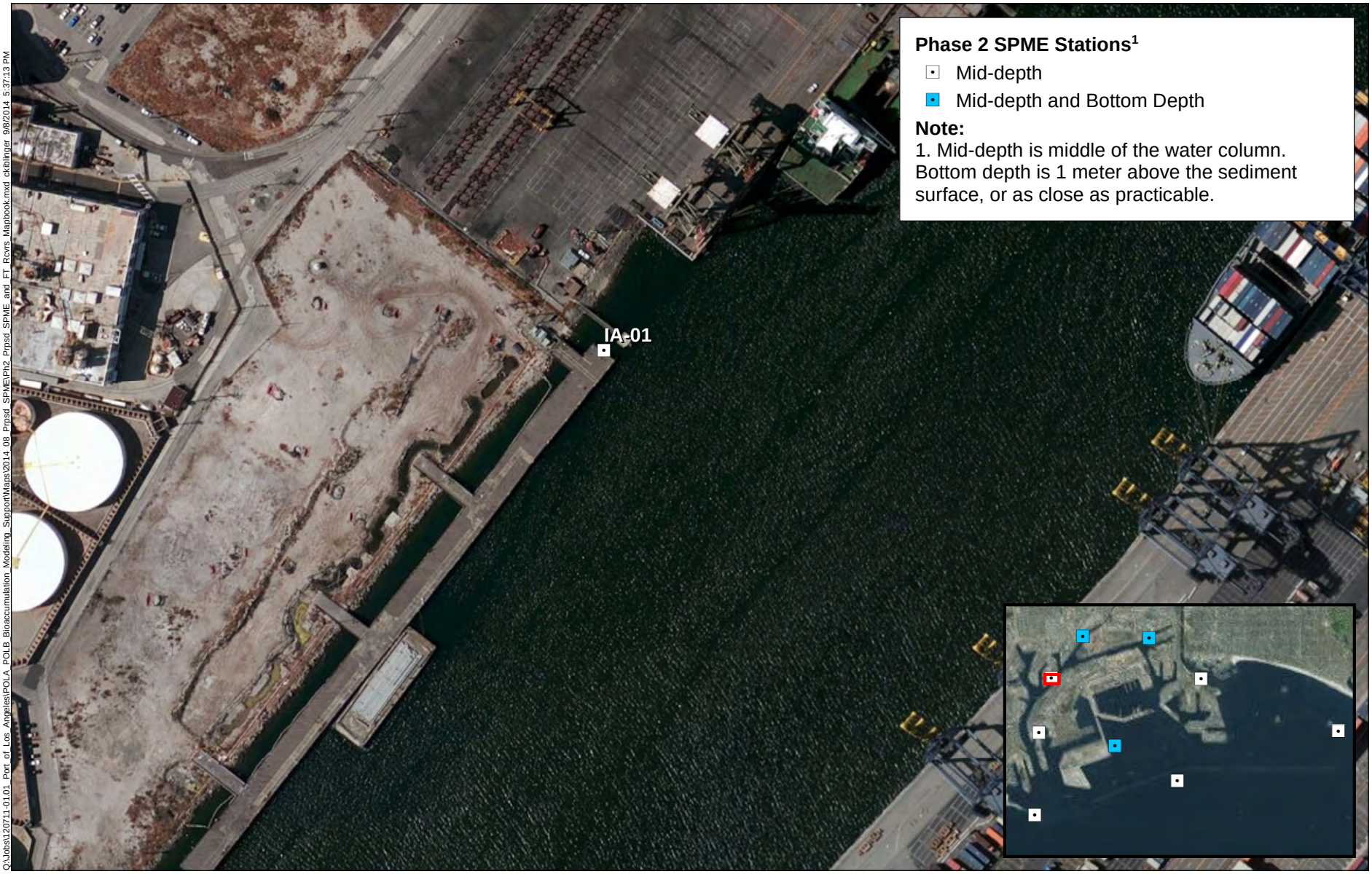
Figure 2b
FH-01
Low Detection Limit Water Column Study Phase 2
Greater Los Angeles and Long Beach Harbor Waters



DRAFT

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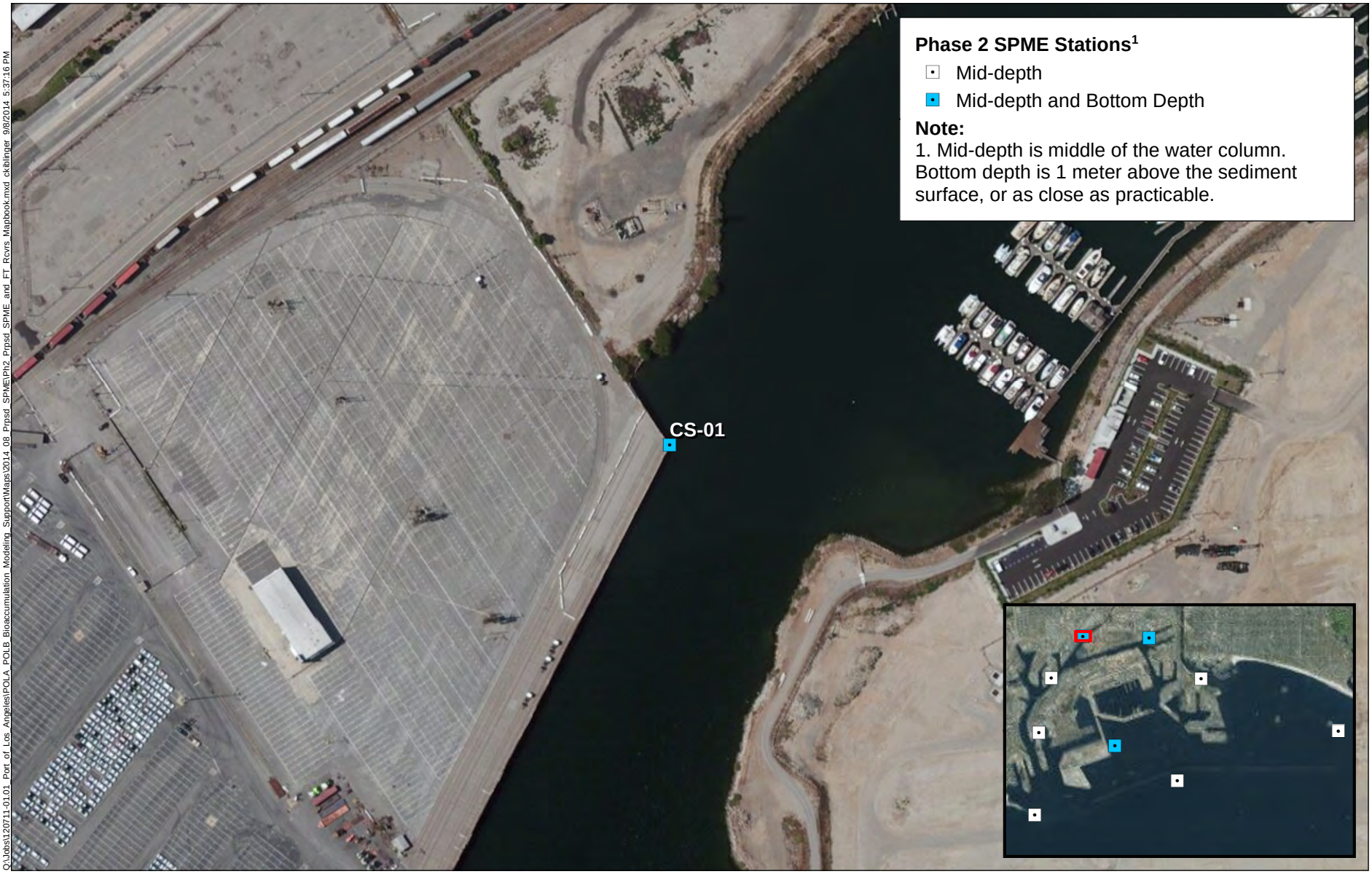
Figure 2c
IA-01
Low Detection Limit Water Column Study Phase 2
Greater Los Angeles and Long Beach Harbor Waters



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Feet
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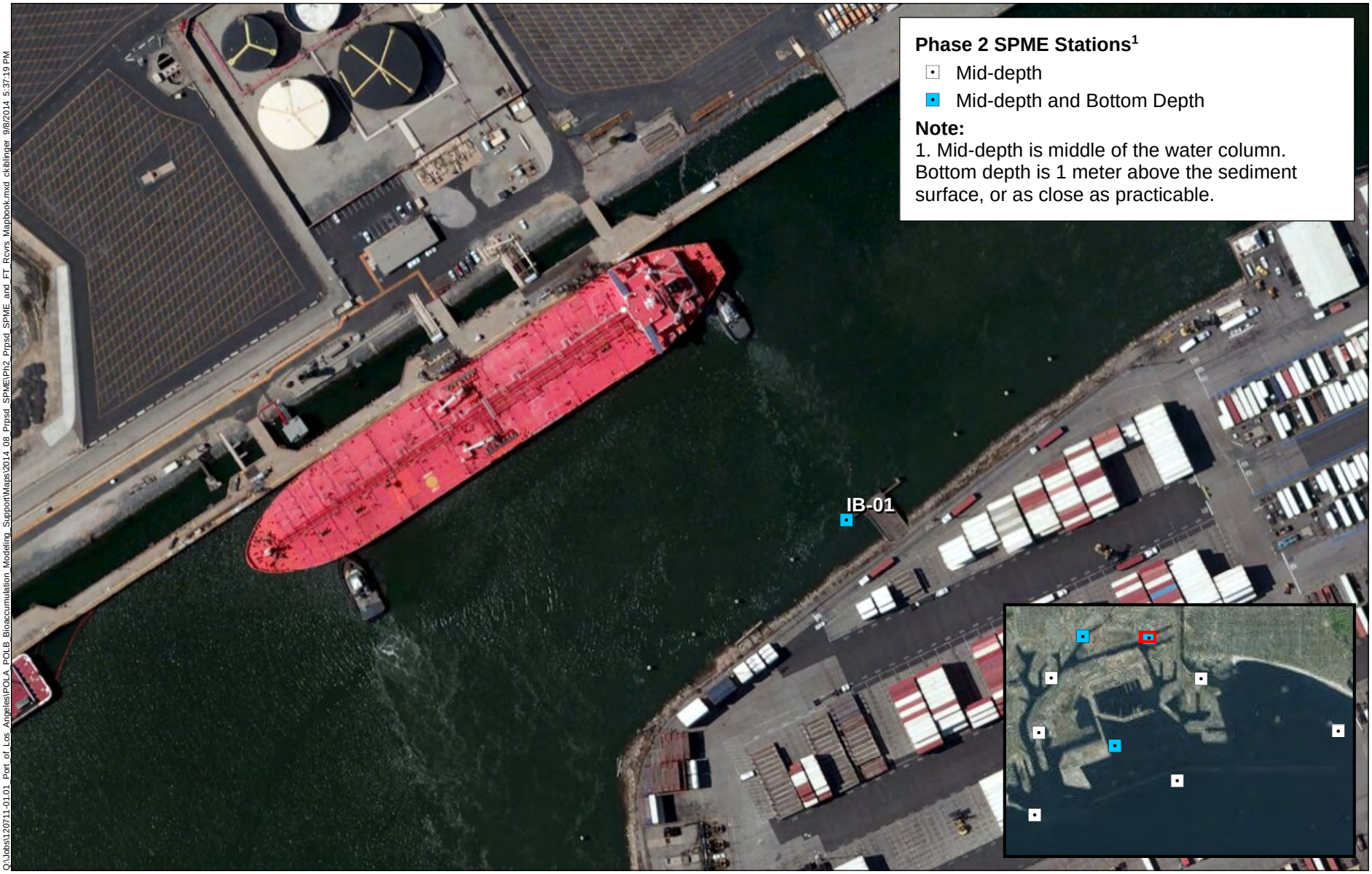
Figure 2d
CS-01
Low Detection Limit Water Column Study Phase 2
Greater Los Angeles and Long Beach Harbor Waters



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Feet
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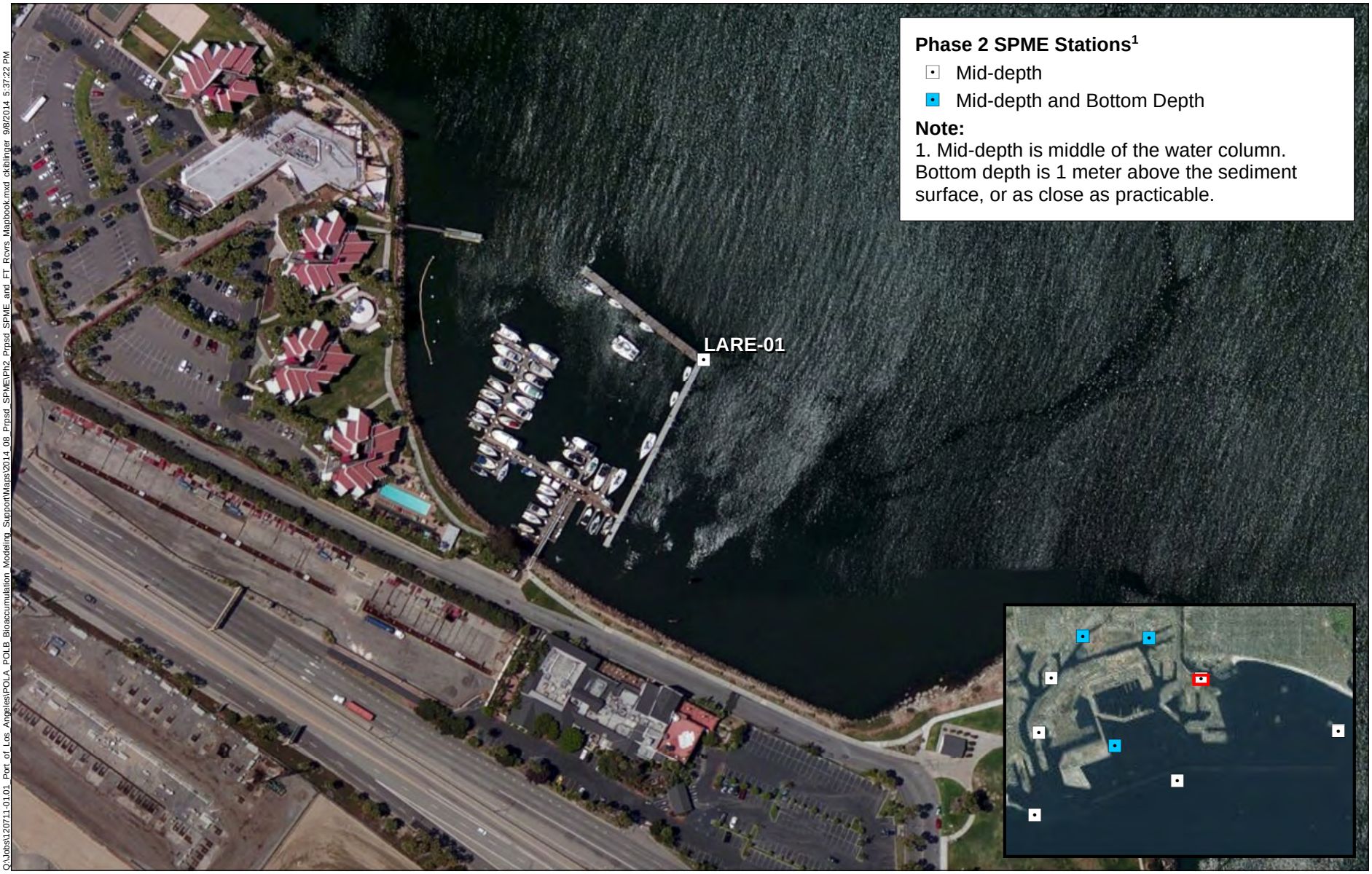
Figure 2e
IB-01
Low Detection Limit Water Column Study Phase 2
Greater Los Angeles and Long Beach Harbor Waters



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Feet
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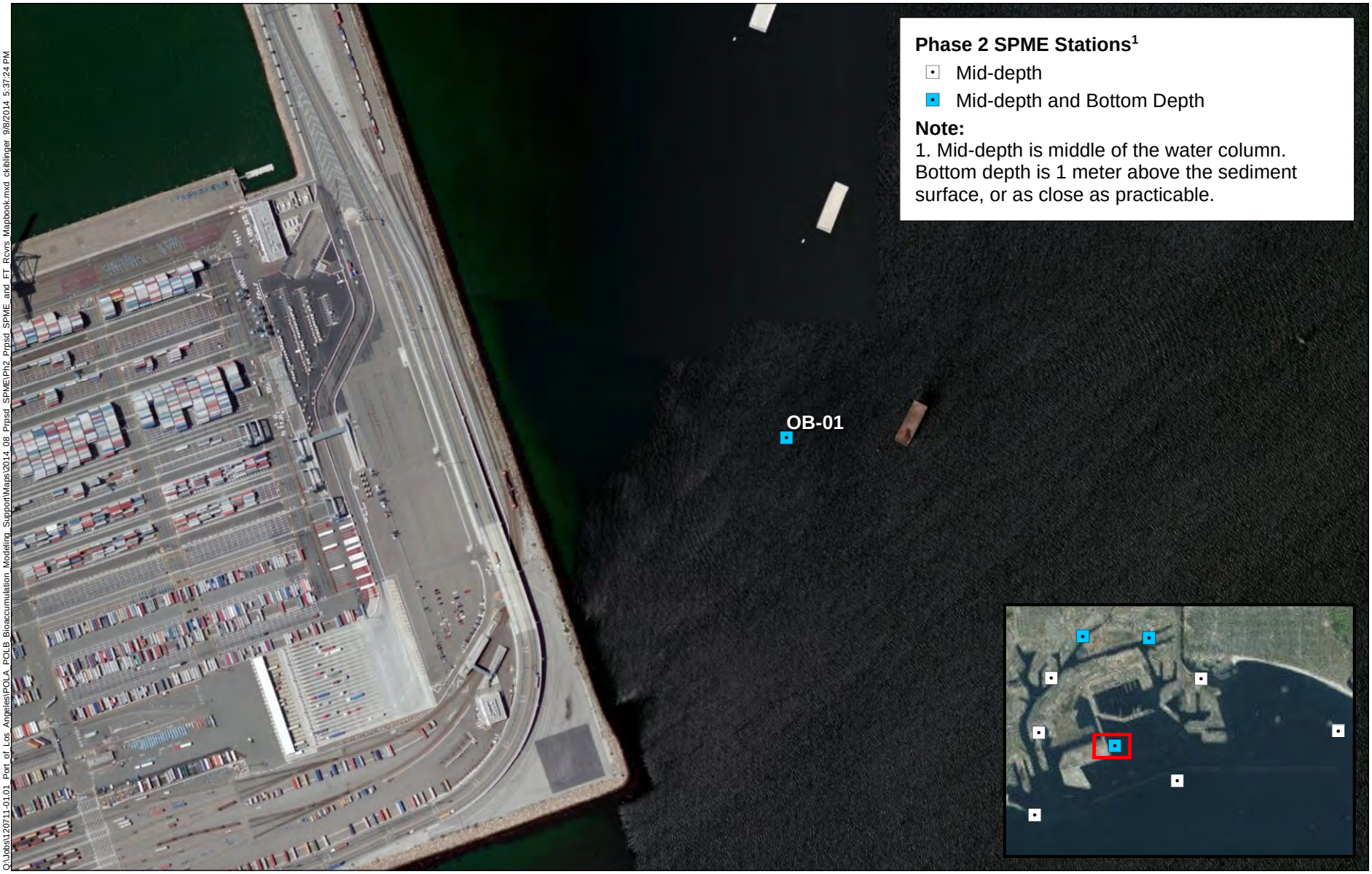
Figure 2f
LARE-01
Low Detection Limit Water Column Study Phase 2
Greater Los Angeles and Long Beach Harbor Waters



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ANCHOR QEA

Feet
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Figure 2g
OB-01
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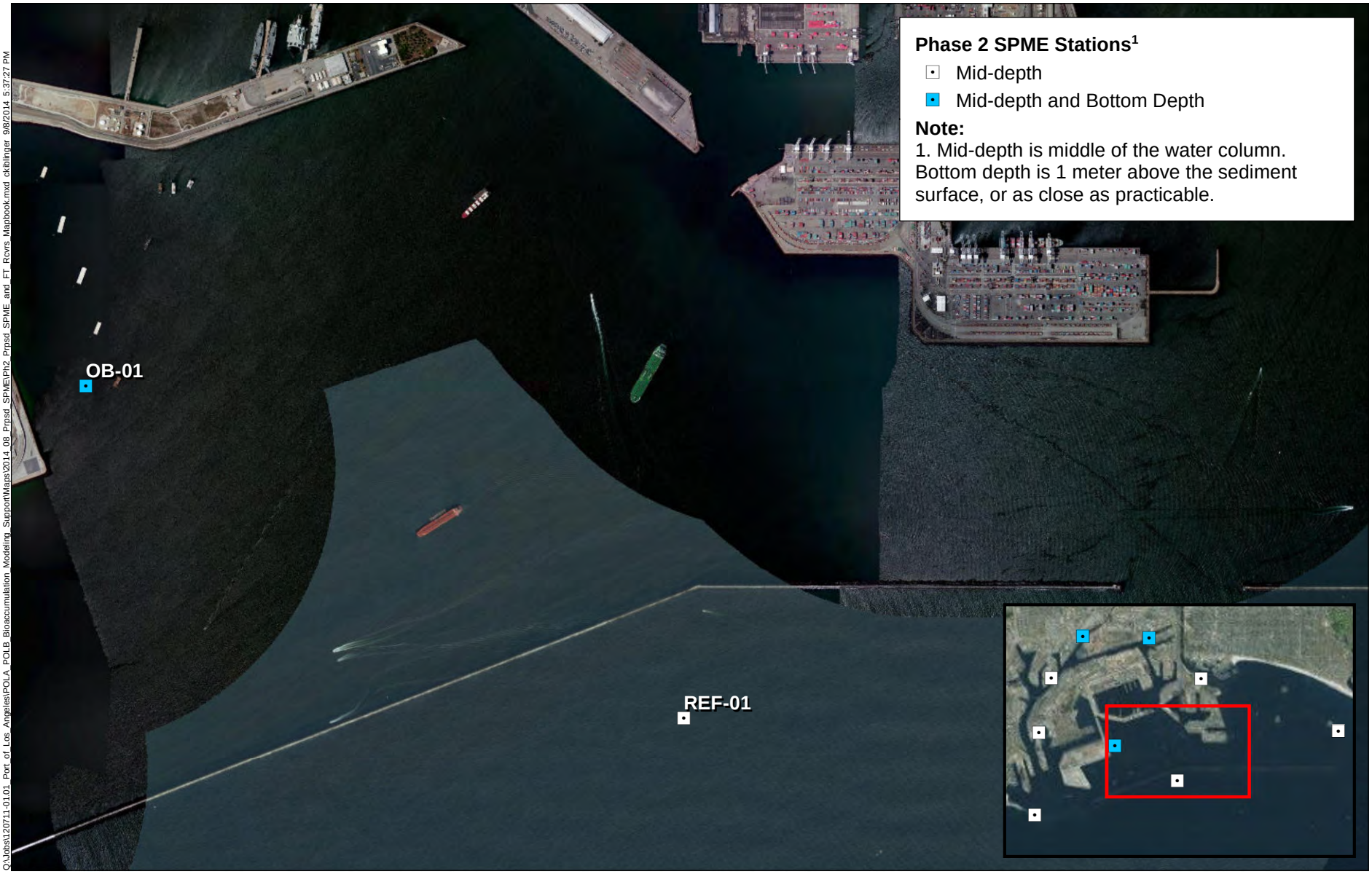

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ANCHOR QEA

Feet
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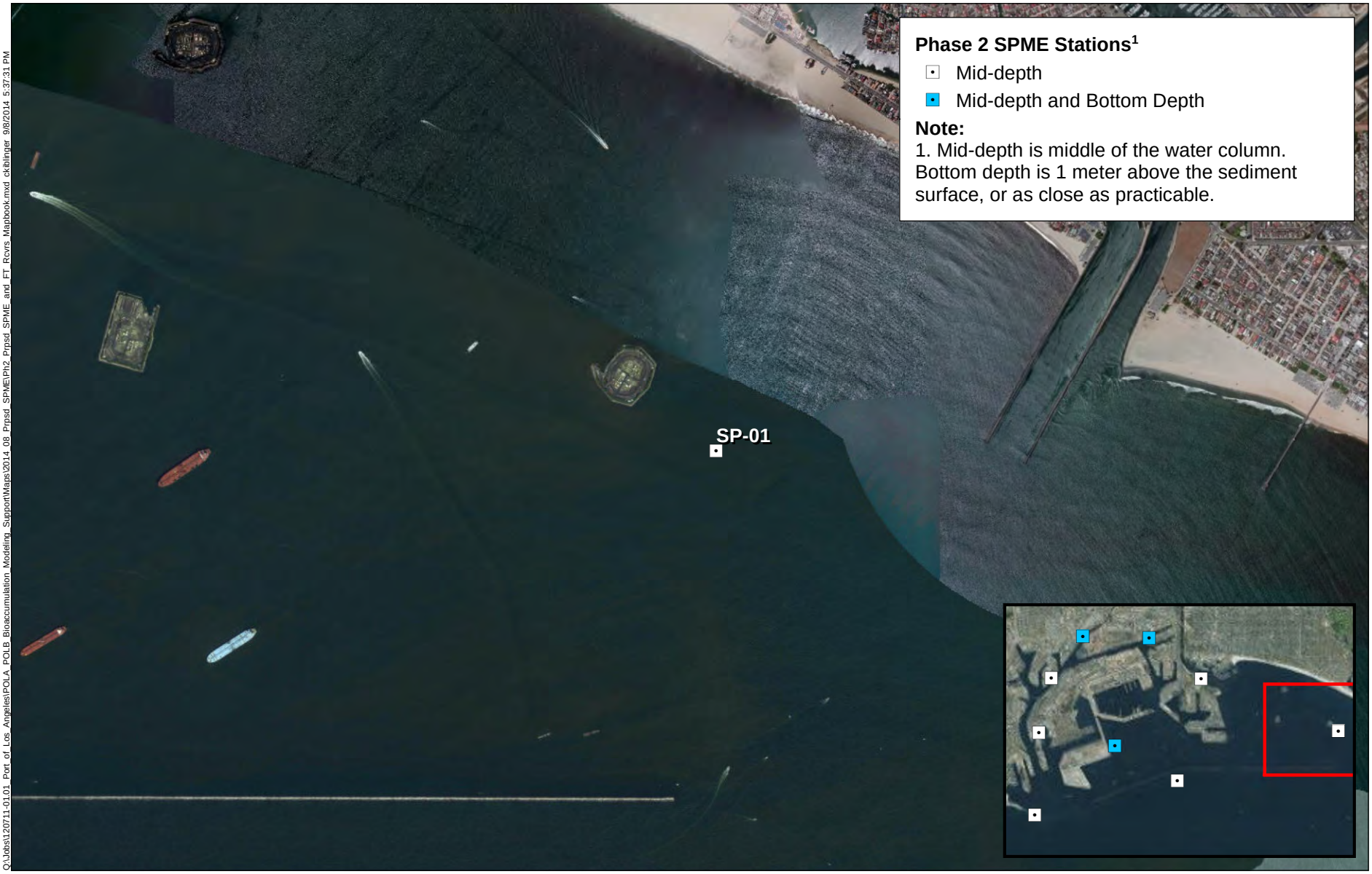
Figure 2h
REF-01
Low Detection Limit Water Column Study Phase 2
Greater Los Angeles and Long Beach Harbor Waters



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ANCHOR QEA

Feet
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Figure 2i
SP-01
Low Detection Limit Water Column Study Phase 2
Greater Los Angeles and Long Beach Harbor Waters

Figure 3
SPME Assembly
Low Detection Limit Water Column Study Phase 2
Greater Los Angeles and Long Beach Harbor Waters

APPENDIX A
PROGRAMMATIC QUALITY ASSURANCE PROJECT PLAN

DRAFT PROGRAMMATIC QUALITY ASSURANCE PROJECT PLAN

SUPPORTING COMPLIANCE MONITORING AND SPECIAL STUDIES RELATED TO THE HARBOR TOXICS TOTAL MAXIMUM DAILY LOAD

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August 2014

DOCUMENT TITLE

Draft Programmatic Quality Assurance Project Plan Supporting Compliance Monitoring and Special Studies Related to the Harbor Toxics Total Maximum Daily Load

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LIST OF ACRONYMS AND ABBREVIATIONS

ADR	Automated Data Review
CLP	Contract Laboratory Program
COC	chain-of-custody
DQO	data quality objective
eCOC	electronic chain-of-custody
EDD	Electronic Data Deliverable
EDL	estimated detection limit
Harbor Toxics TMDL	*Final Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants Total Maximum Daily Load*
HAZWOPER	Hazardous Waste Operations and Emergency Response
HDPE	high-density polyethylene
LOD	limit of detection
MDL	method detection limit
MRL	method reporting limit
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
POLA	Port of Los Angeles
POLB	Port of Long Beach
Ports	Ports of Long Beach and Los Angeles
PQAPP	Programmatic Quality Assurance Project Plan
PTFE	polytetrafluoroethylene
QA	quality assurance
QC	quality control
SAP	Sampling and Analysis Plan
SQO	Sediment Quality Objective
SOP	standard operating procedure
SWAMP	Surface Water Ambient Monitoring Program
TMDL	total maximum daily load
USEPA	U.S. Environmental Protection Agency

1 INTRODUCTION

This section includes an overview of the *Final Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants Total Maximum Daily Load* (Harbor Toxics TMDL; RWQCB and USEPA 2011), a brief description of studies required to support its implementation, and the rationale and intent of a Programmatic Quality Assurance Project Plan (PQAPP) for ensuring data quality as part of upcoming TMDL compliance monitoring studies and other special studies.

1.1 Background

The Harbor Toxics TMDL has been established to protect marine life and minimize human health risks from the consumption of fish in the Los Angeles and Long Beach Harbor and adjacent waterbodies. The Harbor Toxics TMDL includes annual contaminant limits in surface sediment, stormwater effluent, and fish tissues in these waterbodies. These limits are defined as target loads or concentrations for compliance by 2032 within the Harbor Toxics TMDL. The City of Los Angeles (including the Port of Los Angeles [POLA]) and the City of Long Beach (including the Port of Long Beach [POLB]) are identified in the Harbor Toxics TMDL as two of the responsible parties. Consequently, the Ports of Long Beach and Los Angeles (Ports) are responsible, together with other stakeholders, for complying with the Harbor Toxics TMDL and ultimately identifying and reducing sediment and fish tissue concentrations in harbor waters to levels that do not cause further social or environmental harm.

To assist with the long-term goal of compliance, the Harbor Toxics TMDL includes a phased Implementation Plan that specifies implementation actions required to meet the goals of the total maximum daily load (TMDL). Implementation will be iterative, and information acquired during each phase of implementation will be used to inform later phases. The Harbor Toxics TMDL requires that the first phase of implementation include the development and initiation of the required compliance monitoring program. Monitoring must be initiated in May 2014 at specific locations and frequencies for water column chemistry (annually), sediment chemistry (every 2 years), Sediment Quality Objectives (SQO) evaluation (every 5 years), and fish tissue chemistry (every 2 years). Specific locations and analytes to be monitored are provided in Section 7.6.2 of the Harbor Toxics TMDL and

will be detailed in the Coordinated Compliance Monitoring and Reporting Plan. The Harbor Toxics TMDL also states that "All samples will be collected in accordance with California Surface Water Ambient Monitoring Program (SWAMP) protocols."

In addition to compliance monitoring as part of Phase I implementation, the Ports' plan to perform special studies to support TMDL compliance and site-specific management strategies and their implementation, which are required as part of Phases II and III of implementation activities. Planned special studies have been designed to determine causes of elevated fish tissue concentrations (e.g., site-specific harbor sediments, ongoing sources, and off-site regional sources) and the necessary reductions of these sources that will effectively reduce fish tissue concentrations. To identify these causes, the Ports' plan includes using scientific- and data-based models of the conditions in the harbor and the food web. Specifically, hydrodynamic, sediment transport, chemical fate, and bioaccumulation models will be integrated and used to evaluate the effectiveness of specific remedial actions and the impact of out-of-harbor sources (e.g., Palos Verdes Shelf). Calibration and validation of these models will require the collection of physical, chemical, and biological data to fill current data gaps.

1.2 Rationale and Intent of the Programmatic Quality Assurance Project Plan

A PQAPP is necessary to support all sampling and analysis activities planned as part of either the required compliance monitoring or the special studies needed to support model development. Specifically, the intent of this PQAPP is to:

- Provide a user-friendly QAPP that will provide consistency and will result in cost savings through the use of a standardized, pre-defined data collection and reporting process, which can be easily followed by contractors performing monitoring or other special studies for the Ports.
- Provide necessary procedures to ensure that data collection and analysis is standardized, efficient, and of high quality, regardless of study type or the contractors/subcontractors involved in data collection, testing, or analysis.
- Ensure that all field and laboratory data are defensible and meet specified data quality objectives (DQOs), which are based on the (Surface Water Ambient Monitoring Program (SWAMP) protocols (SWRCB 2008), U.S. Environmental Protection Agency

(USEPA) SW-846 (2004), and USEPA National Functional Guidelines data validation criteria (1999, 2004b, 2005, 2008), and other applicable analytical method guidance.

- Outline data management steps that will allow for quality-ensured, integrated, and efficient data management, including importing collected data to an EQuIS database, processing, and exporting to the Ports and agency databases.

Given the extent and variety of sampling and analysis activities planned for the next 5 years, it is essential that this PQAPP be programmatic in nature and not target one study. Each study is anticipated to have its own Sampling and Analysis Plan (SAP) specifying study-specific details that have not yet been defined. This programmatic approach will allow for an overall data collection program that provides high quality data and is highly efficient due to standardization of sample collection, nomenclature, analysis, data review/validation, processing, storage, management, and seamless data export to Ports and State databases, regardless of study type or contractors performing the work. Consequently, while this PQAPP complies with SWAMP protocols and is SWAMP compatible, it is not written in the format of a SWAMP QAPP with elements specified as A1 through D3. This format is not possible, because sampling and analysis details (i.e., equipment and instrument types) will vary by study type and contractor, which have not been identified at this time. Those elements not covered in this document will be covered in the Coordinated Compliance Monitoring and Reporting Plan and in every SAP associated with a special study. Table 1 summarizes the recommended SWAMP QAPP elements and indicates whether each element is included in this PQAPP or will be included in the corresponding Compliance Monitoring and Reporting Plan or special study SAPs.

1.3 Updates

The intent of this PQAPP is to ensure data quality as part of all sampling and analysis activities associated with compliance monitoring or special studies mentioned above. Updates to this document may be required to address any unanticipated special studies with methods currently not described herein, improvements in analytical methods or detection limits over time, or changes associated with monitoring requirements that may occur as part of the TMDL reopener process.

2 PROGRAM MANAGEMENT

This section identifies specific roles and responsibilities of team members and describes the process through which field and analytical data will be processed, reduced, and stored in an EQuIS database. A project organization chart is presented as Figure 1.

2.1 Roles and Responsibilities

Specific roles and responsibilities of project managers, data managers, and laboratory project managers are shown on Figure 1. The contact information for key members of the TMDL Study Team are provided in Table 2.

2.1.1 Project Managers

The Ports' project managers will be responsible for project administration and will serve as the lead contacts for TMDL compliance monitoring and TMDL-related special studies. The Ports' project managers will also serve as the point of contact between the Ports and the consulting team and will manage all project activities.

The TMDL Study project manager will be responsible for:

- Managing the overall TMDL program
- Ensuring the project and the Ports' objectives are met throughout project activities
- Coordinating internal communications with the Ports, the Ports' contractors, the data manager, and the quality assurance (QA) manager
- Overseeing all project deliverables
- Performing administrative tasks needed to ensure timely and successful completion of TMDL program special studies
- Resolution of project concerns or conflicts related to technical matters

For each compliance monitoring event or special study, the Ports will select a contractor to be the monitoring/special study project manager. This project manager will be identified in the SAP prepared prior to conducting the study. The monitoring/special study project manager will be responsible for:

- Providing oversight, overall special study project management, and progress reports

- Communicating with the TMDL study project manager and the Ports
- Organizing field staff
- Coordinating with subcontract laboratories
- Scheduling sampling days
- Installing and maintaining field sampling equipment, sample handling and transport, data transmittal in accordance with this PQAPP, and study reporting

2.1.2 Field Coordinator

For each compliance monitoring event or special study, a field coordinator will be identified in the SAP prepared by the contractor awarded the work. The field coordinator for each sampling program will be responsible for day-to-day technical and QA and quality control (QC) oversight. The field coordinator will ensure that appropriate protocols for sample collection, preservation, and holding times are observed and will submit environmental samples to selected laboratories for chemical and physical analyses. The field coordinator will also be responsible for submitting the finalized field data to the QA manager in a pre-determined format, as discussed in Section 2.2.

2.1.3 Laboratory Project Managers

The laboratory manager of any laboratory testing samples for the Ports will oversee all laboratory operations associated with the receipt of environmental samples, chemical and physical analyses, and laboratory report preparation for special studies. The laboratory manager will review all laboratory reports and prepare case narratives describing any anomalies and exceptions that occurred during analysis.

Analytical testing laboratories will be responsible for the following:

- Delivering sample confirmation receipt notifications to the field coordinator and QA manager (by submittal to the TMDL Study project manager)
- Performing analytical methods described in this PQAPP
- Following documentation, custody, and sample logbook procedures
- Ensuring that personnel engaged in preparation and analysis tasks have appropriate, documented training
- Meeting all reporting and QA/QC requirements

- Delivering electronic data files as specified in this PQAPP
- Meeting turnaround times for deliverables

2.1.4 QA Manager

The QA manager will provide QA oversight for field sampling and laboratory programs associated with the TMDL study (i.e., either compliance monitoring or special studies). The QA manager will also ensure that samples are collected and documented appropriately, ensure field and analytical data quality, oversee data validation, and supervise overall project QA coordination.

2.1.5 Data Managers

The data manager will compile field observations and analytical data from laboratories into a database, review data for completeness and consistency, append the database with qualifiers assigned by the data validator, and ensure that data obtained is in a format suitable for inclusion in the appropriate databases and delivery to the Ports and agencies.

The data validator will be responsible for verifying and validating all analytical data and submitting assigned data qualifiers to the database manager.

2.2 Overview of Data Management Process

Figures 2 provides an overview of the data flow process. After each field event, field data will be imported into the EQuIS database. These field data will undergo QC checks such as sample identifier review, transcription error review, and completeness verification. Independent of field data, laboratory data will be submitted to the QA manager in specified PDF and electronic data deliverable (EDD) formats. These data will undergo verification and validation using a combination of manual validation and Automated Data Review (ADR) software and then will be uploaded into the EQuIS database with the applied final validation qualifiers. These two datasets will be linked in the database to retain corresponding field data for each sample. Data will be exported from EQuIS in custom formats to meet POLB, POLA, and agency database requirements.

3 FIELD SAMPLING DATA QUALITY OBJECTIVES

This section includes detailed information on field collection requirements, including sample processing, handling, and identification; sample custody and shipping requirements; and field QC protocols.

3.1 Sample Processing, Handling, and Identification

Field personnel will identify and label samples in a consistent manner to ensure that field samples are traceable and that labels provide all information necessary for the laboratory to conduct required analyses properly. Samples will be placed in appropriate containers and preserved for shipment to the laboratory.

3.1.1 Sample Processing

Sample containers, instruments, working surfaces, technician protective gear, and other items that may come into contact with sample material must meet high standards of cleanliness. All equipment and instruments used that are in direct contact with various media collected for chemical analysis must be made of glass, stainless steel, high-density polyethylene (HDPE), or polytetrafluoroethylene (PTFE) and will be cleaned prior to each day's use and between sampling or compositing events. The decontamination procedure is as follows:

1. Pre-wash rinse with tap or site water.
2. Wash with solution of warm tap water or site water and Alconox soap.
3. Rinse with tap or site water.
4. Rinse thoroughly with organic-free water.
5. Cover (no contact) all decontaminated items with aluminum foil.
6. Store in a clean, closed container for next use.

3.1.2 Sample Containers

Sample containers and preservatives will be provided by the laboratory. The laboratory will maintain documentation certifying the cleanliness of bottles and the purity of preservatives provided. Specific container requirements are included in Table 3.

3.1.3 Sample Identification and Labels

Each sample will have an adhesive plastic or waterproof paper label affixed to the container and will be labeled at the time of collection. The following information will be recorded on the container label at the time of collection:

- Project name
- Sample identifier
- Date and time of sample collection
- Preservative type (if applicable)
- Analysis to be performed

The sample nomenclature should include the identifiers listed below. A catalogue of identification codes is provided in Table 4. Identifiers shown below should be used when applicable; however, sample identification requirements for special studies are not yet defined and consequently, minor modifications to the recommended identification codes will be acceptable in these cases.

- Waterbody or site as shown in Table 4 (i.e., TMDL waterbody or other site in which sample was collected within each port jurisdiction)
- Media or sampling method code
- Organism common name, if applicable
- Station number
- Depth interval (in metric units), if applicable
- Date of collection
- Indication of field duplicate (i.e., add 1000 to station number)

For equipment rinsate blank or field blank samples, "EB" or "FB" will be used, respectively, in place of the waterbody or site and station number. The date of sample collection will be added to end in YYYYMMDD format.

An example sample identifier for a sediment core at 0 to 15 centimeters, Station 54 from Outer Harbor – Los Angeles on July 31, 2013:

OA-SC-54-0-15-20130731

An example sample identifier for an equipment blank of the decontaminated sample processing equipment after sample collection of the above sample would be:

EB-20130731

An example sample identifier for a sediment core at 0 to 15 centimeters, Station 54 from Outer Harbor – Los Angeles on July 31, 2013, that is a field duplicate:

OA-SC-1054-0-15-20130731

An example sample identifier for a white croaker fish fillet skin off, station number 23 from Inner Harbor – Long Beach on July 31, 2013:

IH-FF-WC-23-20130731

3.2 Sample Custody and Shipping Requirements

Samples are considered to be in one's custody if they are: 1) in the custodian's possession or view; 2) in a secured location (under lock) with restricted access; or 3) in a container that is secured with an official seal(s) so that the sample cannot be reached without breaking the seal(s).

Chain-of-custody (COC) procedures will be followed for all samples throughout the collection, handling, and analysis process. The principal document used to track possession and transfer of samples is the COC form. Each sample will be represented on a COC form the day it is collected. All manual data entries will be made using an indelible ink pen. Corrections will be made by drawing a single line through the error, writing in the correct information, then dating and initialing the change. Blank lines and spaces on the COC form will be lined out, dated, and initialed by the individual maintaining custody. Electronic COC (eCOC) forms generated from a custom field application will be emailed directly to the laboratory and QA managers.

A COC form will accompany each container of samples to the analytical laboratory. Each person in custody of samples will sign the COC form and ensure the samples are not left

unattended unless properly secured. Copies of all COC forms will be retained in the project files.

All samples will be shipped or hand delivered to the analytical laboratory no later than the day after collection. Samples collected on Friday may be held until the following Monday for shipment provided that this delay does not jeopardize any holding time requirements. Specific sample shipping procedures are as follows:

- Each cooler or container containing samples for analysis will be shipped via overnight delivery to the laboratory. In the event that Saturday delivery is required, the field coordinator will contact the analytical laboratory before 3 p.m. on Friday to ensure that the laboratory is aware of the number of containers shipped and the airbill tracking numbers for those containers. Following each shipment, the field coordinator will call the laboratory and verify that the shipment from the day before has been received and is in good condition.
- Coolant ice will be sealed in separate double plastic bags and placed in the shipping containers.
- Individual sample containers will be placed in a sealable plastic bag, packed to prevent breakage, and transported in a sealed ice chest or other suitable container.
- Glass jars will be separated in the shipping container by shock-absorbent material (e.g., bubble wrap) to prevent breakage.
- The shipping containers will be clearly labeled with sufficient information (name of project, time and date container was sealed, person sealing the container, and consultant's office name and address) to enable positive identification.
- Shipping waybill number will be documented on all COC forms accompanying samples.
- A sealed envelope containing COC forms will be enclosed in a plastic bag and taped to the inside lid of the cooler.
- A minimum of two signed and dated custody seals will be placed on adjacent sides of each cooler prior to shipping.
- Each cooler will be wrapped securely with strapping tape, labeled "Glass – Fragile" and "This End Up," and will be clearly labeled with the laboratory's shipping address and the consultant's return address.

Upon transfer of sample possession to the analytical laboratory, the person(s) transferring custody of the sample container will sign the COC form. Upon receipt of samples at the laboratory, the custody seals will be broken, and the receiver will record the condition of the samples on a sample receipt form. COC forms will be used internally in the laboratory to track sample handling and final disposition.

3.3 Field Quality Assurance and Quality Control

Field QA/QC sampling and analysis procedures that will be conducted as part of Compliance Monitoring or special studies conducted by contractors for the Ports and steps will be taken to ensure all field records are retained and submitted accurately as part of the data flow process described above (see Section 2.2 and Figure 2).

3.3.1 Field Quality Assurance and Quality Control Sampling and Analysis

Field QA/QC samples will be collected along with environmental samples. Field QA/QC samples will be useful in identifying possible problems resulting from sample collection or sample processing in the field. The collection of field QA/QC samples will follow SWAMP guidance and may include field (homogenization) duplicates, rinsate (equipment) blanks, and/or field blanks (SWRCB 2008). Field duplicates will be collected at a frequency of 5 percent of total project sample count. Rinsate blanks or field blanks will be collected as needed (e.g., when low level contamination is suspected). Field QA/QC sample frequencies and performance criteria are presented in Table 5.

Additional sample volume will be collected to ensure that the laboratory has sufficient sample volume to run the program-required analytical QA/QC samples for analysis, as specified in Section 4.2.

3.3.2 Field Records

All collected field samples will be documented using a custom field application or field collection logs that will be manually converted to a field EDD prior to data submittal. Additionally, the field coordinator or designee will keep a daily record of significant events, observations, and measurements on a daily log. Entries for each day will begin on a new page. The person recording information must enter the date and time and initial each entry.

In general, sufficient information will be recorded during sampling to reconstruct the event can without relying on the memory of the field personnel.

The daily log will contain the following information, at a minimum:

- Project name
- Field personnel on site
- Site visitors
- Weather conditions
- Field observations
- Maps and/or drawings
- Date and time sample collected
- Sampling method and description of activities
- Identification or serial numbers of instruments or equipment used
- Deviations from the PQAPP or SAP
- Conferences associated with field sampling activities

After each field event, field data will be imported into the EQuIS database either by direct import using a custom field application export or manual submittal of a field EDD containing information from field collection logs (Figure 2). Field data collection and management options are described below along with field EDD requirements.

3.3.2.1 Field Data Option 1: Custom Field Application

Electronic field EDDs can be generated from a custom field application that provides electronic data entry forms for field information and generates field collection logs, sample labels, and eCOCs. A custom field application improves data quality by minimizing hand-written errors through the use of required data entry elements and controlled, unique identifiers for locations, samples, and analytical test requests. In addition, it promotes efficiency in the field and provides eCOCs for laboratory sample check-in and for loading field information to the TMDL Study Team's data management system, further reducing transcription errors. When a custom field application is used in place of field collection logs, all information and generated forms are backed up to removable storage devices and should be emailed to the QA manager at the end of each field day, for data security. The same

elements required for the field logs described in Sections 3.3.2.2 would be captured in the custom field application. To use this application, the field coordinator should coordinate with the QA manager.

3.3.2.2 Field Data Option 2: Field Collection Logs

All field sample collection information will be recorded on field collection logs maintained by the field coordinator, or designee, for each activity. Key information should be recorded for each sample, such as sample station, station coordinates, sample identifier, and sample matrix. The information recorded during sample collection should fulfill requirements of the field EDD described in Section 3.3.2.3.

Notes will be taken in indelible, waterproof blue or black ink. Errors will be corrected by crossing out with a single line, dating, and initialing. Each field collection log will be marked with the project name, number, and date. The field logs will be will be scanned at the end of each field day and emailed to the monitoring/special study project manager.

3.3.2.3 Field Electronic Data Deliverable Requirements

Field data collection, including observations, field measurements, and sample generation, will be facilitated by submittal of a field EDD generated from the custom field application or field collection logs. Field data must be submitted to the managing consultant. It is imperative that the field sample data match field forms and COC forms. The field EDD template (Excel workbook format) will be provided by the QA manager upon request. Required, conditional, and optional fields will be identified in the field EDD template along with defined valid values. Required fields must be filled out prior to submittal of field data. Conditional fields are required for specific matrices, collection methods, or if a field QC sample is collected. Optional fields may be populated at the field coordinator's discretion. Columns may be left blank but should not be deleted. Any questions with regarding completion of the field EDD should be directed to the QA manager.

4 LABORATORY DATA QUALITY OBJECTIVES

It is critical to ensure that data collected are of acceptable quality so that the project objectives for each special study or monitoring program sampling are achievable. Guidance for DQOs is derived from the SWAMP guidance (SWRCB 2008). The quality of laboratory data is assessed by precision, accuracy, representativeness, comparability, completeness, and sensitivity. Applicable quantitative goals for laboratory precision, accuracy, and completeness are described in Section 4.3. The definitions for the data quality indicators are as follows:

- Precision is the ability of an analytical method or instrument to reproduce its own measurement. It is a measure of the variability, or random error, in sampling, sample handling, and laboratory analysis.
- Accuracy is a measure of the closeness of an individual measurement (or an average of multiple measurements) to the true or expected value.
- Representativeness expresses the degree to which data accurately and precisely represent an environmental condition. For the sampling program, analyte lists presented in Section 4.1 have been identified to provide a comprehensive assessment of sediment, water, and tissue quality at the Ports.
- Comparability expresses the confidence with which one dataset can be evaluated in relation to another dataset. For this program, comparability of data will be established through the use of standard analytical methodologies and reporting formats and use of common traceable calibration and reference materials.
- Completeness is a measure of the amount of data that is determined to be valid in proportion to the amount of data collected.
- Sensitivity is related to the instrument calibration low level standard, method detection limits (MDLs), and/or estimated detection limits (EDLs). For each special study, analytical methods will be selected to achieve reporting limits that comply with, or are close to, target detection limits.

4.1 Analyte Lists, Analytical Methods, and Reporting Limits

Analyte lists and target reporting limits for sediment, water, and tissues are identified in Tables 6, 7, and 8, respectively. Analytical methods and target detection limits were selected to comply with SWAMP guidance (SWRCB 2008). The analyte list for sediments includes

recommended chemical analytes needed to calculate the chemistry exposure line of evidence for application of the California sediment quality assessment framework (SWRCB 2009). For some analyte groups (e.g., polychlorinated biphenyls [PCBs]), several methodologies have been included to allow for flexibility of method selection based on the DQOs for compliance monitoring and special studies.

For high-resolution isotope dilution methods, the EDL sample concentration, or the estimated maximum possible concentration, should be calculated and reported for each target compound. For all other methods, the laboratory should report detected compounds to the MDL, if applicable. The laboratory should also provide the instrument verified limit of detection (LOD) for each analyte in the laboratory report and EDD, whenever possible. Reported values between the MDL and method reporting limit (MRL) should be qualified with a "J." Non-detects should be reported at the lowest calibration level (typically the MRL) or LOD, whichever is lower. In some cases, non-detects may be reported at the MDL.

4.2 Laboratory Quality Control Sample Requirements

Laboratory QA/QC definitions are identified in Table 9. Laboratory QC frequency requirements were derived from SWAMP guidance (SWRCB 2008) and are identified in Table 10.

4.3 Performance Criteria

Applicable quantitative goals for precision, accuracy, and completeness are derived from SWAMP guidance (SWRCB 2008) and provided in Table 11.

4.4 Laboratory Record Requirements

Analytical data records (bookmarked PDF and EDD formats) will be generated by the laboratory and submitted to the TMDL study project manager upon completion. If files are too large to be emailed, a notification email with download instructions can be sent to the TMDL Study Team at labdata@anchorqea.com. The data package level will depend on the sampling event. The field coordinator or QA manager will identify the required data package level on the COC.

The analytical laboratory will be required to report the following, where applicable:

- **Case Narrative.** This summary will discuss problems encountered during any aspect of analysis, if any. It should discuss, but is not be limited to, QC issues, sample shipment, sample storage, and analytical difficulties. Any problems encountered, actual or perceived, and their resolutions will be documented in as much detail as appropriate. Analytical QC samples that exceed project performance criteria and/or laboratory performance criteria should also be discussed in the case narrative.
- **COC Records.** Legible copies of COC forms will be provided as part of the data package. This documentation will include the time of receipt and condition of each sample received by the laboratory. Additional internal tracking of sample custody by the laboratory will also be documented on a sample receipt form. The form must include all sample shipping container temperatures measured at the time of sample receipt.
- **Sample Results.** The data package will summarize results for each sample analyzed. The summary will include the following information when applicable:
  - Field sample identifier and corresponding laboratory identification code
  - Sample matrix
  - Date and time of sample extraction
  - Date and time of analysis
  - Final concentration volumes and dilution factors
  - Instrument and analyst identification
  - MRLs and MDLs accounting for sample-specific factors (e.g., dilution and total solids)
  - Analytical results with reporting units identified
  - Data qualifiers and their definitions
  - Raw data including instrument printouts, chromatograms, and bench sheets (required for full data packages)
- **QA/QC Summaries.** Contract Laboratory Program (CLP)-like form summaries should be generated for all required laboratory QC components and samples (i.e., method blanks, instrument daily tunes, surrogate spikes, internal standards, and laboratory control samples). These summaries should include spike volumes, parent sample concentrations, percent recoveries, relative percent differences, area counts, and

laboratory control limits as applicable. For full data packages, associated raw data files should be included.

- **Instrument Calibration Data.** CLP-like form summaries of calibration data (i.e., initial calibration, initial calibration verification, and continuing calibration verification) should be included in all data packages. For full data packages, associated raw data files should be included.

All instrument data shall be fully restorable at the laboratory from electronic backup. The laboratory will be required to maintain all records relevant to project analyses for a minimum of 5 years.

4.5 Laboratory Electronic Deliverable Requirements

The Ports contractor may obtain laboratory EDDs in any format as long as the key fields and formats required by the Ports (Appendix A) are populated. Final, validated laboratory EDDs will be submitted to the Ports' data manager in a custom EQuIS format. Specifications and valid values associated with this format can be found in Appendix A. Updates to specifications and valid values will occur over time and will be distributed to the laboratory or Ports' contractor when they become available. Laboratory reports (in PDF format) associated with final electronic analytical data should also be submitted to the Ports' data manager.

5 ASSESSMENTS AND OVERSIGHT

The following sections describe the types of assessments that may be conducted for this project and how these assessments will be reported to project management.

5.1 Assessments and Response Actions

Laboratory and field performance audits consist of on-site reviews of QA systems and equipment for sampling, calibration, and measurement. The field coordinator is responsible for assessing field activities and has the authority to issue a stop work order on sample collection. The TMDL study project manager or designee provides additional oversight on all field and laboratory activities and consequently may also issue a stop work order on sample collection if warranted. Laboratory audits are not anticipated to be conducted as part of this study; however, all laboratory audit reports will be made available to the project QA manager upon request. The laboratory is required to have written procedures addressing internal QA/QC (i.e., QA Plan), which will be reviewed by the project QA manager to ensure compliance with the project SAP. The laboratory must ensure that personnel engaged in sampling and analysis tasks have appropriate training. As part of the audit process, the laboratory will provide written details of any and all method modifications planned for consultant's review. Laboratory non-conformances will be documented and submitted to the QA manager for review. All non-conformances will be discussed in the final data report.

5.2 Corrective Actions

The following sections identify the responsibilities of key project team members and actions to be taken in the event of an error, problem, or nonconformance to protocols identified in this document.

5.2.1 Field Activities

The field coordinator will be responsible for correcting equipment malfunctions during the field sampling effort. The QA manager will be responsible for resolving situations identified by the field coordinator that may result in noncompliance with the SAP. All corrective measures will be immediately documented in the field logbook.

5.2.2 Laboratory

The laboratory is required to comply with its standard operating procedures (SOPs). The laboratory manager will be responsible for ensuring that appropriate corrective actions are initiated as required for conformance with this PQAPP. All laboratory personnel will be responsible for reporting problems that may compromise quality data.

The laboratory manager will be notified if any QC sample grossly exceeds the laboratory in-house control limits. The analyst will identify and correct the anomaly before continuing with the sample analysis. If the anomaly cannot be corrected, the laboratory manager will document the corrective action taken in a memorandum submitted to the QA manager within 5 days of the initial notification. A narrative describing the anomaly, steps taken to identify and correct the anomaly, and the treatment of the relevant sample batch (i.e., recalculation, reanalysis, and re-extraction) will be submitted with the data package.

5.3 Reports to Management

QA reports to project management will include verbal status reports, written reports on field sampling activities and laboratory processes, data validation reports, and final project reports. These reports shall be the responsibility of the TMDL study project manager.

Progress reports will be prepared by the field coordinator and delivered to the TMDL study project manager following each sampling event. These progress reports will contain final versions (peer reviewed) of field logs, field notebooks, COCs, observations, etc.

6 DATA VALIDATION AND USABILITY

The following sections describe the processes that will be used to review project data quality.

6.1 Data Review, Validation, and Verification

During the validation process, analytical data will be electronically and/or manually evaluated for method and laboratory QC compliance and their validity and applicability for program purposes will be determined.

Based on findings of the validation process, data validation qualifiers may be assigned. Validated project data, including qualifiers, will be entered into the project database, thus enabling this information to be retained or retrieved, as needed.

6.2 Verification and Validation Methods

Data verification includes a review for completeness and accuracy by the field coordinator and laboratory manager; review by the data manager for outliers and omissions; and the use of performance criteria to identify laboratory QC sample outliers. Data verification can be conducted manually or using specialized automated software programs such as ADR. ADR is an efficient tool that can be used to generate outlier reports for all analytical results outside the performance criteria presented in this PQAPP. For this program, Stage 2A verification/validation will be conducted consisting of completeness checks (target analyte lists, etc.), holding time compliance, and laboratory QC sample performance evaluations (see the list in the next paragraph). Data validation will then be conducted by the data validator and will consist of accepting, rejecting, or applying qualifiers to data based on the verification findings, analytical method criteria, National Functional Guidelines data validation guidance (USEPA 1999, 2004, 2005, 2008), and professional judgment. A data validation report will be generated to document qualifications applied to data. All validated data will be entered into the Ports' data manager's EQuIS database, and a final data file will be exported. Verification of the database export against the PDF data report will be performed by the QA manager or designee. Any errors found in the data file export will be corrected in the database and reviewed for systemic reporting errors. Once all discrepancies are resolved, the database will be established.

All laboratory data will receive a Stage 2A validation (USEPA 2009). The recommended QC checks identified in a Stage 2A validation are as follows:

- Completeness
- Holding times
- Requested methods were performed
- MRLs and EDLs - project requirements were met
- Sample-related QC data were analyzed at the required frequencies
- QC performance criteria were met for the following:
  - Laboratory control samples
  - Matrix spike/matrix spike duplicate
  - Standard reference material
  - Surrogate recoveries
  - Method blanks
- Field QC samples

The QA manager will be responsible for the final review of all data validation reports.

6.3 Reconciliation with User Requirements

The QA manager will review data at the completion of each task to determine if DQOs have been met. If data do not meet the project's specifications, the QA manager will review the errors and determine if the problem is due to calibration/maintenance, sampling techniques, or other factors and will suggest corrective action, if appropriate. It is expected that problem would be able to be corrected by retraining, revising techniques, or replacing supplies/equipment; if not, the DQOs will be reviewed for feasibility. If specific DQOs are not achievable, the QA manager will recommend appropriate modifications. If matrix interference is suspected to have attributed to the exceedance, adequate laboratory documentation must be presented to demonstrate that instrument performance and/or laboratory technique did not bias the result. In cases where the DQOs have been exceeded and corrective actions did not resolve the outlier, data will be qualified per USEPA National Functional Guidelines (1999, 2004, 2005, 2008). In these instances, the usability of data will be determined by the extent of the exceedance. Rejected data will be assigned an "R" qualifier and will not be used for any purposes.

7 ADDITIONAL QUALITY ASSURANCE PROJECT PLAN ELEMENTS

The following section provides general guidance on special training and certifications; documentation and record keeping; and instrument/equipment maintenance and calibration protocols. More specific requirements for special training and certifications may be included in the Compliance Monitoring and Reporting Plan or special study SAPs; if provided, these documents would supersede the information provided below.

7.1 Special Training Requirements and Certifications

For sample preparation tasks, field crews will be trained in standardized sample collection requirements so that the samples collected and data generated from samples are consistent among field crews. The field coordinator must ensure that all field crew members are fully trained in the collection and processing of sediment, surface water, tissues, decontamination protocols, and sample transport and COC procedures.

Some special studies may require that all sampling personnel have 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training and the 8-hour refresher course, as necessary, to meet the 29 Code of Federal Regulations 1910.120 Occupational Safety and Health Administration (OSHA) regulations. The Ports will determine if this training is necessary.

7.2 Documentation and Records

Document requirements for field records and laboratory reports are provided in Sections 3.3.2 and 4.5, respectively. Each project team member (field coordinator, QA manager, etc.) is responsible for documenting all necessary project information and should maintain files for individual tasks but must provide such files to the TMDL study project manager upon completion of each sampling event. A central project file will be maintained by the TMDL Study Team. Hard copy documents will be kept on file with the TMDL Study Team or at a document storage facility throughout the duration of the project. All electronic documents and work products will be stored in a project-specific directory on secured and a backed-up server. All electronic analytical data will be maintained in a central database with the TMDL Study Team. Data will be periodically exported to the POLB and POLA databases after the completion of each monitoring event or special study. Additionally as required, data will be

submitted to the California Environmental Data Exchange Network using templates provided on its website: http://water100.waterboards.ca.gov/ceden/ceden_submitdata.shtml# templates.

7.3 Instrument and Equipment Testing, Inspection, and Maintenance Requirements

This section describes procedures for testing, inspection, and maintenance of field and laboratory equipment.

7.3.1 Field Instruments and Equipment

The field coordinator or designee will maintain inventories of field instruments and equipment and will be responsible for the preparation, documentation, and implementation of preventative maintenance. The frequency and types of maintenance will be based on the manufacturer's recommendations and/or previous experience with the equipment. The frequency of maintenance is dependent on the type and stability of the equipment, the methods used, the intended use of the equipment, and recommendations of the manufacturer. Detailed information regarding the calibration and frequency of equipment calibration is provided in specific manufacturer's instruction manuals.

The field coordinator or designee will also be responsible for navigation and will confirm proper operation of the navigation equipment daily. This verification may consist of internal diagnostics or visiting a location with known coordinates to confirm the coordinates indicated by the navigation system. Samplers will be inspected daily for any mechanical problems, and problems will be noted in the field logbook and corrected prior to continuing sampling operations.

7.3.2 Laboratory Instruments and Equipment

Selected laboratories will maintain an inventory of instruments and equipment, and the frequency of maintenance will be based on the manufacturer's recommendations and/or previous experience with the equipment.

Selected laboratories will have a preventative maintenance program, as detailed in their QA Plans, organized to maintain proper instrument and equipment performance and to prevent instrument and equipment failure during use. The program considers instrumentation, equipment, and parts that are subject to wear, deterioration, or other changes in operational characteristics, the availability of spare parts, and the frequency at which maintenance is required. Any equipment that has been overloaded, mishandled, shown to give suspect results, determined to be defective will be taken out of service, or tagged with the discrepancy note, and stored in a designated area until the equipment has been repaired. After repair, the equipment will be tested to ensure that it is in proper operational condition. The QA manager will be promptly notified in writing if defective equipment casts doubt on the validity of analytical data. The QA manager will also be notified immediately regarding any delays due to instrument malfunctions that could impact holding times. Selected laboratories will be responsible for the preparation, documentation, and implementation of the preventative maintenance program. All maintenance records will be checked according to the schedule on an annual basis and recorded by the responsible individual. A laboratory QA/QC manager or designee shall be responsible for verifying compliance.

7.4 Instrument and Equipment Calibration

Proper calibration of equipment and instrumentation is an integral part of providing quality data. Instrumentation and equipment used to generate data must be calibrated at a frequency that ensures sufficient and consistent accuracy and reproducibility.

7.4.1 Field Instrument and Equipment Calibration

Field equipment will be calibrated prior to the sampling event according to manufacturer's recommendations using manufacturer's standards. A calibration check will be performed at the beginning of each day. The equipment, calibration, and maintenance information will be documented in the instrument calibration log. The frequency of calibration is dependent on the type and stability of the equipment, the methods used the intended use of the equipment, and the recommendations of the manufacturer. Detailed information regarding the calibration and frequency of equipment calibration is provided in specific manufacturer's instruction manuals. Equipment that fails calibration will be recalibrated prior to use.

7.4.2 Laboratory Instrument and Equipment Calibration

As part of their QC program, selected laboratories will perform two types of calibrations. A periodic calibration is performed at prescribed intervals for relevant instruments and laboratory equipment (i.e., balances, drying ovens, refrigerators, and thermometers), and operational calibrations are performed daily, at a specified frequency, or prior to analysis (i.e., initial calibrations) according to method requirements. Calibration procedures and frequency are discussed in the laboratory's QA Plan. Calibrations are discussed in the laboratory's SOPs for analyses.

The laboratory QA/QC manager will be responsible for ensuring that the laboratory instrumentation is calibrated in accordance with specifications. Implementation of the calibration program shall be the responsibility of the respective laboratory manager. Recognized procedures (USEPA, ASTM, or manufacturer's instructions) shall be used when available.

Physical standards (i.e., weights or certified thermometers) shall be traceable to nationally recognized standards such as the National Institute of Standards and Technology. Chemical reference standards shall be NIST standard reference materials or vendor-certified materials traceable to these standards.

The calibration requirements for each method and respective corrective actions shall be accessible, either in the laboratory's SOPs or QA Plan for each instrument or analytical method in use. An instrument that fails calibration will be recalibrated prior to use. All calibrations shall be preserved on electronic media.

8 REFERENCES

RWQCB and USEPA (Los Angeles Regional Water Quality Control Board and U.S. Environmental Protection Agency), 2011. *Final Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants Total Maximum Daily Loads*. June 2011.

SWRCB (State Water Resources Control Board), 2008. *Surface Water Ambient Monitoring Program Quality Assurance Program Plan.* Final Technical Report Version 1. September 2008.

SWRCB (State Water Resource Control Board), 2009. *Water Quality Control Plan for Enclosed Bays and Estuaries.* August 25, 2009.

USEPA (U.S. Environmental Protection Agency), 1999. *Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review*. USEPA, Office of Emergency Response. USEPA 540/R-99/008. October 1999.

USEPA, 2004a. SW-846 On-line, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. Revision 6. Available online at: http://www.epa.gov/epaoswer/hazwaste/test/sw846.htm.

USEPA, 2004b. *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. USEPA540-R-04-004. October 2004.

USEPA, 2005. *National Functional Guidelines for Chlorinated Dibenzo-p-Dioxins and Chlorinated Dibenzofurans Data Review*. OSWER 9240.1-51, USEPA-540-R-05-001. September 2005.

USEPA, 2008. *Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review*. USEPA, Office of Emergency Response. USEPA 540/R-08-01. June 2008.

USEPA, 2009. *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use*. USEPA, Office of Solid Waste and Emergency Response. OSWER No. 9200.1-85. January 2009.

TABLES

Table 1
SWAMP, USEPA, and QAPP Review Checklist

SWAMP Element Number	Element Name and Review Aspect	PQAPP	Compliance Monitoring Plans, Sampling and Analysis Plans, or Other Documents
A	**PROJECT MANAGEMENT**		
A1.	**Title and Approval Sheet (s)**		
A1.1	Contains project title	X	X
A1.2	Indicates revision number, if applicable	X	X
A1.3	Indicates organization's name	X	
A1.4	Includes signature of organization's project manager	X	
A1.5	Includes signature block for organization's project manager	X	
A1.6	Includes signature block for organization's QA officer	X	
A1.7	Includes signature block for Port program managers	X	
A1.8	Includes signature block for RWQCB QA officer	N/A	N/A
A2.	**Table of Contents**		
A2.1	Lists QAPP information sections	X	X
A2.2	Includes document control information	X	X
A2.3	Provides lists of tables and figures	X	X
A2.4	Provides contents of each appendix	X	X
A2.5	Lists all attached standard operating procedures (with names, not just numbers)	N/P	
A3.	**Distribution List**		
A3.1	Includes all individuals who are to receive a copy of the QAPP, and identifies their organization	X	X
A4.	**Project/Task Organization**		
A4.1	Identifies key individuals involved in all major aspects of the project, including contractors	X	
A4.2	Discusses their responsibilities	X	
A4.3	Confirms that the project QA officer position is independent of data generation	X	
A4.4	Identifies individual responsible for maintaining the official, approved QAPP	X	
A4.5	Includes organizational chart that shows lines of authority and reporting responsibilities	X	
A4.6	Clearly identifies who is part of the project team and who is related to the project in an advisory role (but is not responsible for delivery of any product)	X	
A5.	**Problem Definition/Background**		
A5.1	States decisions to be made, actions to be taken, or outcomes expected from the information to be obtained	X	
A5.2	Clearly explains the reason (site background or historical context) for initiating this project	X	
A5.3	Identifies regulatory information, applicable criteria, or action limits necessary to the project		X
A6.	**Project/Task Description**		
A6.1	Summarizes work to be performed (e.g., measurements to be made, data files to be obtained)	X	X
A6.2	Provides a work schedule, indicating critical project points (e.g., start and completion dates for activities such as sampling, analysis, data reviews, assessments)		X
A6.3	Details geographical locations to be studied, including maps where possible		X
A6.4	Describes resource and time constraints, if applicable		X
A7.	**Quality Objectives and Criteria**		X
A7.1	Identifies measurement quality objectives that meet or exceed those mandated by SWAMP	X	
A7.2	Identifies project action limits for all parameters of interest	X	X
A7.3	Identifies acceptance criteria for all previously collected information	X	
A7.4	Discusses precision	X	X
A7.5	Addresses bias	X	X
A7.6	Discusses representativeness and how it will be assessed and controlled	X	X
A7.7	Identifies the need for completeness	X	X
A8.	**Special Training/Certifications**		X
A8.1	Identifies any specialized training or certifications required of project personnel	X	X
A8.2	Discusses how this training will be provided		X
A8.3	Identifies individual(s) responsible for ensuring sufficient training and certification	X	X

Table 1
SWAMP, USEPA, and QAPP Review Checklist

SWAMP Element Number	Element Name and Review Aspect	PQAPP	Compliance Monitoring Plans, Sampling and Analysis Plans, or Other Documents
A8.4	Identifies where training and certification information is documented		X
A9.	**Documentation and Records**		
A9.1	Identifies report format and summarizes all data report package information	X	
A9.2	Lists all other project documents, records, and electronic files that will be produced	X	
A9.3	Identifies where project information should be kept and for how long	X	
A9.4	Discusses backup plans for records stored electronically	X	
A9.5	States how the individuals identified in Element A3 will receive the most current copy of the approved QAPP, and identifies the individual(s) responsible for this	X	
B	**DATA GENERATION AND ACQUISITION**		
B01.	**Sampling Process Design (Sampling Design and Logistics)**		
B01.1	Provides the design information, or a reference to a specific document that contains it, with sufficient detail to assess data against project objectives		X
B01.2	Describes and justifies design strategy, indicating the size of the area and time period to be represented by a sample		X
B01.3	Details the type and total number of samples, matrices, and runs expected and needed		X
B01.4	Indicates where samples should be taken and how sites will be identified		X
B01.5	Discusses what to do if sampling sites become inaccessible		X
B01.6	Identifies project activity schedules (e.g., sampling events, shipping times)		X
B01.7	Specifies what information is critical and what is for informational purposes only		X
B01.8	Identifies sources of natural variability and how this variability should be reconciled with project information		X
B01.9	Identifies potential sources of bias or misrepresentation and how their contribution can be minimized		X
B02.	**Sampling (sample collection) Methods**		
B02.1	Identifies all sampling standard operating procedures by number, date, and regulatory citation, indicating sampling options or modifications to be taken. Non-SWAMP standard operating procedures should be attached		X
B02.2	If bioassessment sampling, implements the standard operating procedure *Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California*		X
B02.3	Indicates how each kind of matrix and each sample type should be collected		X
B02.4	Indicates how samples are to be homogenized, composited, split, or filtered		X
B02.5	Indicates what sample containers and sample volumes should be used		X
B02.6	Identifies whether samples should be preserved, and indicates methods that should be followed	X	X
B02.7	Describes how sampling equipment and samplers should be cleaned and decontaminated, including the disposal of byproducts	X	X
B02.8	Identifies any equipment and support facilities needed		X
B02.9	Addresses actions to be taken when problems occur, identifying individual(s) responsible for corrective action and how this should be documented	X	X
B03.	**Sample Handling and Custody**		
B03.1	For each parameter, states maximum holding times allowed from sample collection to preparation and analysis	X	X
B03.2	Identifies how samples should be physically handled, transported, received, and stored in the laboratory or office (including temperature upon receipt)	X	X
B03.3	Indicates how sample handling and custody information should be documented, identifying individual(s) responsible	X	X
B03.4	Identifies chain-of-custody procedures and includes form to track custody	X	X
B04.	**Analytical Methods and Field Measurements**		
B04.01	Identifies all standard operating procedures that should be followed by number, date, and regulatory citation, indicating options or modifications; standard operating procedures should be attached or referenced	N/P	X
B04.02	Lists all the instruments and kits that will be used in the field and describes their measurement principle (e.g., nephelometric or transparency) and major attributes (e.g., automatic temperature compensation, range and resolution)		X

Table 1
SWAMP, USEPA, and QAPP Review Checklist

SWAMP Element Number	Element Name and Review Aspect	PQAPP	Compliance Monitoring Plans, Sampling and Analysis Plans, or Other Documents
B04.03	If in situ monitoring, indicates how instruments should be deployed and operated to avoid fouling and ensure maintenance of proper data		X
B04.04	If continuous monitoring, indicates how instruments should store and maintain raw data		X
B04.05	Identifies all laboratory standard operating procedures that should be followed by number, date, and regulatory citation, indicating options or modifications to be taken (e.g., such as sub-sampling and extraction procedures)	N/P	X
B04.06	Identifies equipment or instrumentation needed for laboratory analyses	X	
B04.07	Specifies any specific method performance criteria	X	X
B04.08	Provides target analytical reporting limits or method detection limits	X	X
B04.09	Identifies procedures to follow when failures occur, identifying individual(s) responsible for corrective action and associated documentation	X	X
B04.10	Identifies sample disposal procedures		X
B04.11	Specifies laboratory turnaround times needed		X
B04.12	Provides documentation for the use of non-standard methods		X
B05.	**Quality Control**		
B05.1	For each parameter, identifies quality control activities (e.g., blanks, spikes, duplicates) that meet those mandated by SWAMP	X	X
B05.2	Details what should be done when control limits are exceeded and how corrective actions will be assessed and documented	X	X
B05.3	Identifies procedures and formulas for calculating quality control results (e.g., precision, bias)	X	
B06.	**Instrument/Equipment Testing, Inspection, and Maintenance**		
B06.1	Identifies field and laboratory equipment needing periodic maintenance and the associated schedule	X	X
B06.2	Identifies testing criteria; this information is instrument-specific and may be included in the standard operating procedure for each instrument	X	X
B06.3	Notes availability and location of spare parts	X	X
B06.4	Indicates procedures in place for inspecting equipment before usage (this information is instrument-specific and may be already included in the standard operating procedure for each Instrument)	X	X
B06.5	Identifies individual(s) responsible for testing, inspection, and maintenance	X	X
B06.6	Indicates how deficiencies should be resolved, and how corrective actions should be assessed and documented	X	X
B07.	**Instrument/Equipment Calibration and Frequency**		
B07.1	Identifies equipment, tools, and instruments that should be calibrated, and the frequency for this calibration		X
B07.2	Describes how calibrations should be performed and documented, indicating test criteria and standards or certified equipment (this information is instrument-specific and may be already included in the standard operating procedure for each Instrument)		X
B07.3	Identifies how deficiencies should be resolved and documented		X
B08.	**Inspection/Acceptance for supplies and Consumables**		
B08.1	Identifies critical field and laboratory supplies and consumables; noting supply source, acceptance criteria, and procedures for tracking, storing, and retrieving these materials		X
B08.2	Identifies the individual(s) responsible for this task		X
B09	**Non-direct Measurements**		
B09.1	Identifies data sources (e.g., computer databases, literature files, models) that should be assessed and used		X
B09.2	Describes the intended use of this information and the rationale for their selection		X
B09.3	Indicates the acceptance criteria for these data sources or models		X
B09.4	Identifies key resources and support facilities needed		X
B09.5	Describes how limits to validity and operating conditions should be determined (e.g., internal checks, beta testing)		X
B10.	**Data Management**		

Table 1
SWAMP, USEPA, and QAPP Review Checklist

SWAMP Element Number	Element Name and Review Aspect	PQAPP	Compliance Monitoring Plans, Sampling and Analysis Plans, or Other Documents
B10.01	Describes the data management scheme from field to final use and storage	X	
B10.02	Verifies that all continuous monitoring raw data will be kept in the original sonde file (and stored on a PC); Endpoints (e.g., averages) can be calculated after downloading and trimming records		X
B10.03	Describes the filing and document control system, or cites documentation such as standard operating procedures	X	
B10.04	Identifies data handling equipment and procedures that should be used to process, compile, analyze, and transmit data reliably and accurately	X	
B10.05	Describes how field and laboratory data will be formatted and entered into SWAMP's Information Management System	X	
B10.06	Identifies individual(s) responsible for each step and task	X	
B10.09	Describes procedures to demonstrate the acceptability of hardware and software configurations	X	
B10.10	Attaches checklists and forms that should be used (or refers to standard operating procedures)	X	
C	**ASSESSMENT AND OVERSIGHT**		
C1.	**Assessments and Response Actions**		
C1.1	Lists the number, frequency, and type of assessment activities that should be conducted, including approximate dates	X	X
C1.2	Identifies individual(s) responsible for conducting assessments; including their authority to issue stop work orders	X	X
C1.3	Describes how and to whom assessment information should be reported	X	X
C1.4	Identifies how corrective actions should be addressed and by whom, and how they should be verified and documented	X	X
C2.	**Reports to Management**		
C2.1	Identifies what project quality assurance reports are needed and how frequently		X
C2.2	Identifies who should write and receive these reports		X
D	**DATA VALIDATION AND USABILITY**		
D1.	**Data Review, Verification, and Validation**		
D1.1	Describes SWAMP criteria that should be used for accepting, rejecting, or qualifying project data (or refers to Element 7)	X	
D2	**Verification and Validation Methods**		
D2.1	Describes processes for data verification and validation, including standard operating procedures and data validation software	X	
D2.2	Identifies who is responsible for verifying and validating different components of project information (e.g., chain-of-custody forms, receipt logs, calibration information)	X	
D2.3	Describes the issue resolution process, and individual(s) responsible for conveying results to data users	X	
D2.4	Attaches checklists, forms, and calculations (including electronic formulae if using spreadsheets)	X	
D3.	**Reconciliation with User Requirements**		
D3.1	Describes procedures used to evaluate the uncertainty of the validated data (or refers to previous elements)	X	
D3.2	Describes how limitations on data use should be reported to the data users	X	
D3.3	Identifies how the data will be used in the context of the various SWAMP components, including the SWAMP Information Management System	X	

Table 2
Contact Information

Name	Title/Position	Organization	Phone Number	Email	Mailing Address
Kathryn Curtis Andrew Jirik	POLA Project Managers	Port of Los Angeles Environmental Management Division	(310) 732-3681	kcurtis@portla.org ajirik@portla.org	425 S. Palos Verdes Street San Pedro, California 90731
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Laurel Menoche	Data Manager	Anchor QEA	(206) 903-3372	lmenoche@anchorqea.com	720 Olive Way, Suite 1900 Seattle, Washington 98101
Joy Dunay	QA Manager	Anchor QEA	(206) 903-3320	jdunay@anchorqea.com	720 Olive Way, Suite 1900 Seattle, Washington 98101
Cindy Fields	Data Validator	Anchor QEA	206-903-3394	cfields@anchorqea.com	720 Olive Way, Suite 1900 Seattle, Washington 98101

Table 3
Sample Containers, Holding Times, and Preservation Methods

Parameter	Sample Size	Container Size and Type	Holding Time	Preservative
Sediments				
Bulk density	50 g	4-oz glass	None established	Ambient
Ammonia	10 g	4-oz glass	7 days to extraction; 48 hours cooled, 28 days frozen	Cool ≤ 6°C, pH <2 with 2 mL 9N H_2SO_4
Sulfide	20 g	4-oz glass	7 days	Cool ≤4°C
Specific gravity	100 g	16-oz glass	None established	Ambient
Total solids	10 g	8-oz glass (can be combined with other parameters)	14 days	Cool ≤6°C
			1 year	Freeze -20°C
Grain size	300 g	16-oz plastic	6 months	Cool ≤6°C
DOC in porewater	1- 2 L sediment[a]	2 X 1-L amber glass	48 hours for extraction, filtration and preservation; 28 days to analysis	HCl or H2SO4 to pH<2 after filtration; Cool ≤6°C and dark
TOC	10 g	4-oz glass	28 days	Cool ≤6°C
			1 year, if frozen within 28 days of collection	Freeze -20°C
Total metals and mercury	100 g	4-oz glass	6 months	Cool ≤6°C
			1 year; samples must be extracted within 14 days of thawing	Freeze -20°C[c]
PAHs/ Organochlorine pesticides	500 g	8-oz glass	14 days to extraction	Cool ≤6°C
			1 year to extraction; samples must be extracted within 14 days of thawing	Freeze -20°C
			40 days after extraction	Cool ≤6°C
PCBs	500 g	8-oz glass	None[a]	Cool ≤6°C
				Freeze -20°C
Tissues				
Lipids	200 g	Split taken from sample for chemistry analyses	1 year	Freeze -20°C
Organochlorine pesticides	200 g	Foil or 8-oz glass	14 days to extraction	Cool ≤6°C
			1 year to extraction; samples must be extracted within 14 days of thawing	Freeze -20°C
			40 days after extraction	Cool ≤6°C
PCBs	200 g	Foil or 8-oz glass	None[b]	Cool ≤6°C
				Freeze -20°C

Table 3
Sample Containers, Holding Times, and Preservation Methods

Parameter	Sample Size	Container Size and Type	Holding Time	Preservative
Waters				
Particle size determination	1 L	1-L HDPE	7 days	Cool ≤6°C
Total suspended solids	1 L	1-L HDPE	7 days	Cool ≤6°C
Total dissolved solids	1 L	1-L HDPE	7 days	Cool ≤6°C
TOC	150 mL	250 mL amber glass	28 days	Cool ≤6°C and dark; HCl or H2SO4 to pH<2
	40 mL	40 mL VOA vials		
DOC	200 mL	3 x 250mL glass	48 hours to filtration; 28 days to analysis	Cool ≤6°C and dark; HCl or H2SO4 to pH<2 after filtration
POC	2 - 5 L[d]	10L	48 hours to filtration; 28 days to analysis	Cool ≤6°C
Total Metals and hardness	100 mL	250 mL HDPE	48 hours until preservation	Cool ≤6°C
			6 months to analysis	Ambient; HNO3 to pH<2
Dissolved metals	100 mL	250 mL HDPE	Field filter; 48 hours until preservation	Cool ≤6°C
			6 months to analysis	Ambient; HNO_3 to pH<2 after filtration
Organochlorine pesticides	1 to 2 L	2 X 1-L amber glass	14 days to extraction	Cool ≤6°C; pH 5-9
			40 days after extraction	Cool ≤6°C
PCBs	1 to 2 L	2 X 1-L amber glass	None[b]	Cool ≤6°C

Notes:
Some criteria may differ from SWAMP guidance; however, criteria are consistent with analytical methods.
Recommendations are intended as guidance only. The selection of sample container and amount of sample required may vary per contracted laboratory sampling requirements.

°C = degrees Celsius
DOC = dissolved organic carbon
g = gram
HDPE = high-density polyethylene
L = liter
mL = milliliter
oz = ounce
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
POC = particulate organic carbon
SWAMP = California Surface Water Ambient Monitoring Program
TOC = total organic carbon
USEPA = U.S. Environmental Protection Agency
VOA = volatile organic analysis

a Volume of sediment collected must be sufficient to produce a minimum of 40 mL of porewater.
b PCB hold time was removed in SW-846, Chapter 4, Revision 4, February 2007 for aqueous and solid samples stored cool ≤6°C.
c Mercury will be analyzed prior to freezing.
d POC solids are analyzed for TOC by USEPA 9060. The volume of water collected must be sufficient to produce a minimum of 10 g of suspended sediment. Water may be field filtered.

Table 4
Sample Nomenclature Codes

Waterbody or Other Area Codes												
Actual	Outer Harbor - LA	Outer Harbor - LB	Inner Harbor - LA	Inner Harbor - LB	Consolidated Slip	Fish Harbor	Cabrillo Marina	Inner Cabrillo Beach	Eastern San Pedro Bay	Dominguez Channel	Cabrillo Pier	Angels Gate
Code	OA	OB	IA	IB	CS	FH	CM	CB	SP	DC	CP	AG

Media Codes												
Actual	Receiving Water	Porewater	Stormwater	Surface Sediment	Sediment Core	Whole Organism	Fish Fillet skin off (muscle)	Soft Tissue	Offal	Otolith	Field Blank	Equipment Rinsate Blank
Code	RW	PW	STW	SS	SC	WO	FF	ST	OF	OL	FB	EB

Organism									
Scientific Name	*Genyonemus lineatus*	*Cymatogaster aggregata*	*Atherinops affinis*	*Seriphus politus*	*Paralichthys californicus*	*Scomber japonicus*	*Paralabrax clathratus*	*Mytilus spp.*	*Polychaeta*
Common Name	White Croaker	Shiner Surfperch	Topsmelt	Queenfish	California Halibut	Chub Mackerel	Kelp Bass	Mussels	Polychaete worms
Code	WC	SS	TS	QF	CH	CM	KB	MS	PW

Organism or Composite Number	
Individual fish	1 or COMP1
Code	01 or C1

Station Number	
Station	01
Code	01

Date of Collection	
Date	1-Jul-14
Code	20140701

Depth	
Actual	0-15 cm
Code	0-15

Table 5
Frequencies and Performance Criteria for Field Quality Assurance/Quality Control Samples

Analysis Type	Field Duplicate	Field Duplicate Performance Criteria[a,b]	Field and Rinse Blank[c]	Field and Rinse Performance Criteria[d]
Total solids and conventionals	5% of total project sample count	≤25%RPD if both result(s) are >5x RL. Difference ≤2x RL if result(s) are ≤5x RL.	NA	NA
Lipids	5% of total project sample count	≤25%RPD if both result(s) are >5x RL. Difference ≤2x RL if result(s) are ≤5x RL.	NA	NA
Grain size	5% of total project sample count	≤25%RPD if both result(s) are >5x RL. Difference ≤2x RL if result(s) are ≤5x RL.	NA	NA
Particle size determination for suspended solids	5% of total project sample count	≤25%RPD if both result(s) are >5x RL. Difference ≤2x RL if result(s) are ≤5x RL.	NA	NA
Total suspended and dissolved solids	5% of total project sample count	≤25%RPD if both result(s) are >5x RL. Difference ≤2x RL if result(s) are ≤5x RL.	NA	NA
Total and dissolved organic carbon	5% of total project sample count	≤25%RPD if both result(s) are >5x RL. Difference ≤2x RL if result(s) are ≤5x RL.	Not a method requirement. Task specific	<RL
Particulate organic carbon	5% of total project sample count	≤25%RPD if both result(s) are >5x RL. Difference ≤2x RL if result(s) are ≤5x RL.	Not a method requirement. Task specific	<RL
Total metals	5% of total project sample count	≤25%RPD if both result(s) are >5x RL. Difference ≤2x RL if result(s) are ≤5x RL.	Not a method requirement. Task specific	<RL
Polycyclic aromatic hydrocarbons	5% of total project sample count	≤25%RPD if both result(s) are >5x RL. Difference ≤2x RL if result(s) are ≤5x RL.	Not a method requirement. Task specific	<RL
Organochlorine pesticides	5% of total project sample count	≤25%RPD if both result(s) are >5x RL. Difference ≤2x RL if result(s) are ≤5x RL.	Not a method requirement. Task specific	<RL
PCB Congeners	5% of total project sample count	≤25%RPD if both result(s) are >5x RL. Difference ≤2x RL if result(s) are ≤5x RL.	Not a method requirement. Task specific	<RL

Notes:
NA = not applicable
PCB = polychlorinated biphenyl
RL = reporting limit
RPD = relative percent difference
SWAMP = California Surface Water Ambient Monitoring Program

a Field duplicate RPD exceedances alone would not result in data qualification. Further evaluation into the sample collection procedures should be conducted.

b This criteria is a slight deviation from SWAMP due to the ultra low detection levels utilized for these studies.

c If low level contamination could potentially bias results, field blanks and/or rinse (equipment) blanks should be collected.

d The determination to qualify results based on field and/or rinse blank concentrations will be made by the QA Manager as part of the overall data usability assessment.

Table 6
Sediment Analytical Methods and Target Reporting Limits

Parameter[a,b]	Analytical Method[c]	Target Reporting Limit[d]
Conventional Parameters		
Ammonia (mg/kg)	SM 4500-NH_3 B/C/D (M)	0.20
Sulfide (mg/kg)	USEPA 376.2	0.50
Bulk density	ASTM D7263	--
Specific gravity	ASTM D854	--
Total solids (% wet weight)	SM 2540B/G / USEPA 160.3	0.1
Grain size (% retained)	ASTM D442 / SM 2560	1.0
Total organic carbon (%)	SM 5310B / USEPA 9060A	0.01% OC
Sediment porewater dissolved organic carbon (mg/L)	USEPA 9060M	0.5
Metals (µg/g or mg/kg)		
Cadmium	USEPA 6010B/6020	0.01
Chromium	USEPA 6010B/6020	0.1
Copper	USEPA 6010B/6020	0.01
Lead	USEPA 6010B/6020	0.01
Mercury	USEPA 6010B/6020/7471A/245.7/1631	0.03
Zinc	USEPA 6010B/6020	0.10
Polycyclic Aromatic Hydrocarbons (ng/g or µg/kg)		
Acenaphthene	USEPA 8270C / 8270D - SIM	20
Anthracene	USEPA 8270C / 8270D - SIM	20
Biphenyl	USEPA 8270C / 8270D - SIM	20
Naphthalene	USEPA 8270C / 8270D - SIM	20
2,6-Dimethylnaphthalene	USEPA 8270C / 8270D - SIM	20
Fluorene	USEPA 8270C / 8270D - SIM	20
1-Methylnaphthalene	USEPA 8270C / 8270D - SIM	20
2-Methylnaphthalene	USEPA 8270C / 8270D - SIM	20
1-Methylphenanthrene	USEPA 8270C / 8270D - SIM	20
Phenanthrene	USEPA 8270C / 8270D - SIM	20
Benz[a]anthracene	USEPA 8270C / 8270D - SIM	20
Benzo[a]pyrene	USEPA 8270C / 8270D - SIM	20
Benzo(e)pyrene	USEPA 8270C / 8270D - SIM	20
Chrysene	USEPA 8270C / 8270D - SIM	20
Dibenz[a,h]anthracene	USEPA 8270C / 8270D - SIM	20
Fluoranthene	USEPA 8270C / 8270D - SIM	20
Perylene	USEPA 8270C / 8270D - SIM	20
Pyrene	USEPA 8270C / 8270D - SIM	20
Organochlorine Pesticides (ng/g or µg/kg) - Low Resolution Analytical Methods		
Total Chlordane[e]	USEPA 8081A / 8270C	--
alpha-Chlordane (cis-chlordane)	USEPA 8081A / 8270C	0.5
gamma-Chlordane (trans-chlordane)	USEPA 8081A / 8270C	0.5
Oxychlordane	USEPA 8081A / 8270C	0.5
cis-Nonachlor	USEPA 8081A / 8270C	0.5
trans-Nonachlor	USEPA 8081A / 8270C	0.5
Dieldrin[f]	USEPA 8081A / 8270C	0.02
Toxaphene[f]	USEPA 8081A / 8270C	0.10
2,4'-DDD	USEPA 8081A / 8270C	1.0
2,4'-DDE	USEPA 8081A / 8270C	1.0
2,4'-DDT	USEPA 8081A / 8270C	1.0
4,4'-DDD	USEPA 8081A / 8270C	1.0
4,4'-DDE	USEPA 8081A / 8270C	1.0
4,4'-DDT	USEPA 8081A / 8270C	1.0
DDMU	USEPA 8081A / 8270C	1.0

Table 6
Sediment Analytical Methods and Target Reporting Limits

Parameter[a,b]	Analytical Method[c]	Target Reporting Limit[d]
Organochlorine Pesticides (ng/g or µg/kg) - High Resolution Analytical Methods		
Total Chlordane[e]	USEPA 1699	--
alpha-Chlordane (cis-chlordane)	USEPA 1699	0.5
gamma-Chlordane (trans-chlordane)	USEPA 1699	0.5
Oxychlordane	USEPA 1699	0.5
cis-Nonachlor	USEPA 1699	0.5
trans-Nonachlor	USEPA 1699	0.5
Dieldrin	USEPA 1699	0.02
Toxaphene[f]	USEPA 1699	0.10
2,4'-DDD	USEPA 1699	1.0
2,4'-DDE	USEPA 1699	1.0
2,4'-DDT	USEPA 1699	1.0
4,4'-DDD	USEPA 1699	1.0
4,4'-DDE	USEPA 1699	1.0
4,4'-DDT	USEPA 1699	1.0
4,4'-DDMU	USEPA 1699	1.0
PCB Aroclors (ng/g or µg/kg)		
Aroclor-1016	USEPA 8082 / 8270C	10.0
Aroclor-1221	USEPA 8082 / 8270C	10.0
Aroclor-1232	USEPA 8082 / 8270C	10.0
Aroclor-1242	USEPA 8082 / 8270C	10.0
Aroclor-1248	USEPA 8082 / 8270C	10.0
Aroclor-1254	USEPA 8082 / 8270C	10.0
Aroclor-1260	USEPA 8082 / 8270C	10.0
Aroclor-1262	USEPA 8082 / 8270C	10.0
Aroclor-1268	USEPA 8082 / 8270C	10.0
PCB Congeners (ng/g or µg/kg)[g] - Low Resolution Analytical Methods		
CL1-PCB-3	USEPA 8270C / 8270D-SIM	0.2
CL2-PCB-5	USEPA 8270C / 8270D-SIM	0.2
CL2-PCB-8	USEPA 8270C / 8270D-SIM	0.2
CL2-PCB-15	USEPA 8270C / 8270D-SIM	0.2
CL3-PCB-18	USEPA 8270C / 8270D-SIM	0.2
CL3-PCB-27	USEPA 8270C / 8270D-SIM	0.2
CL3-PCB-28	USEPA 8270C / 8270D-SIM	0.2
CL3-PCB-29	USEPA 8270C / 8270D-SIM	0.2
CL3-PCB-31	USEPA 8270C / 8270D-SIM	0.2
CL3-PCB-33	USEPA 8270C / 8270D-SIM	0.2
CL3-PCB-37	USEPA 8270C / 8270D-SIM	0.2
CL4-PCB-44	USEPA 8270C / 8270D-SIM	0.2
CL4-PCB-49	USEPA 8270C / 8270D-SIM	0.2
CL4-PCB-52	USEPA 8270C / 8270D-SIM	0.2
CL4-PCB-56	USEPA 8270C / 8270D-SIM	0.2
CL4-PCB-60	USEPA 8270C / 8270D-SIM	0.2
CL4-PCB-66	USEPA 8270C / 8270D-SIM	0.2
CL4-PCB-70	USEPA 8270C / 8270D-SIM	0.2
CL4-PCB-74	USEPA 8270C / 8270D-SIM	0.2
CL4-PCB-77	USEPA 8270C / 8270D-SIM	0.2
CL4-PCB-81	USEPA 8270C / 8270D-SIM	0.2
CL5-PCB-87	USEPA 8270C / 8270D-SIM	0.2
CL5-PCB-95	USEPA 8270C / 8270D-SIM	0.2
CL5-PCB-97	USEPA 8270C / 8270D-SIM	0.2
CL5-PCB-99	USEPA 8270C / 8270D-SIM	0.2
CL5-PCB-101	USEPA 8270C / 8270D-SIM	0.2

Table 6
Sediment Analytical Methods and Target Reporting Limits

Parameter[a,b]	Analytical Method[c]	Target Reporting Limit[d]
CL5-PCB-105	USEPA 8270C / 8270D-SIM	0.2
CL5-PCB-110	USEPA 8270C / 8270D-SIM	0.2
CL5-PCB-114	USEPA 8270C / 8270D-SIM	0.2
CL5-PCB-118	USEPA 8270C / 8270D-SIM	0.2
CL5-PCB-119	USEPA 8270C / 8270D-SIM	0.2
CL5-PCB-123	USEPA 8270C / 8270D-SIM	0.2
CL5-PCB-126	USEPA 8270C / 8270D-SIM	0.2
CL6-PCB-128	USEPA 8270C / 8270D-SIM	0.2
CL6-PCB-137	USEPA 8270C / 8270D-SIM	0.2
CL6-PCB-138	USEPA 8270C / 8270D-SIM	0.2
CL6-PCB-141	USEPA 8270C / 8270D-SIM	0.2
CL6-PCB-149	USEPA 8270C / 8270D-SIM	0.2
CL6-PCB-151	USEPA 8270C / 8270D-SIM	0.2
CL6-PCB-153	USEPA 8270C / 8270D-SIM	0.2
CL6-PCB-156	USEPA 8270C / 8270D-SIM	0.2
CL6-PCB-157	USEPA 8270C / 8270D-SIM	0.2
CL6-PCB-158	USEPA 8270C / 8270D-SIM	0.2
CL6-PCB-167	USEPA 8270C / 8270D-SIM	0.2
CL6-PCB-168	USEPA 8270C / 8270D-SIM	0.2
CL6-PCB-169	USEPA 8270C / 8270D-SIM	0.2
CL7-PCB-170	USEPA 8270C / 8270D-SIM	0.2
CL7-PCB-174	USEPA 8270C / 8270D-SIM	0.2
CL7-PCB-177	USEPA 8270C / 8270D-SIM	0.2
CL7-PCB-180	USEPA 8270C / 8270D-SIM	0.2
CL7-PCB-183	USEPA 8270C / 8270D-SIM	0.2
CL7-PCB-187	USEPA 8270C / 8270D-SIM	0.2
CL7-PCB-189	USEPA 8270C / 8270D-SIM	0.2
CL8-PCB-194	USEPA 8270C / 8270D-SIM	0.2
CL8-PCB-195	USEPA 8270C / 8270D-SIM	0.2
CL8-PCB-200	USEPA 8270C / 8270D-SIM	0.2
CL8-PCB-201	USEPA 8270C / 8270D-SIM	0.2
CL8-PCB-203	USEPA 8270C / 8270D-SIM	0.2
CL9-PCB-206	USEPA 8270C / 8270D-SIM	0.2
CL10-PCB-209	USEPA 8270C / 8270D-SIM	0.2
PCB Congeners (ng/g or µg/kg)[g] - High Resolution Analytical Methods		
CL1-PCB-1	USEPA 1668	0.0025
CL1-PCB-2	USEPA 1668	0.0025
CL1-PCB-3	USEPA 1668	0.0025
CL2-PCB-4	USEPA 1668	0.0025
CL2-PCB-5	USEPA 1668	0.0025
CL2-PCB-6	USEPA 1668	0.0025
CL2-PCB-7	USEPA 1668	0.0025
CL2-PCB-8	USEPA 1668	0.0025
CL2-PCB-9	USEPA 1668	0.0025
CL2-PCB-10	USEPA 1668	0.0025
CL2-PCB-11	USEPA 1668	0.0025
CL2-PCB-12	USEPA 1668	0.0025
CL2-PCB-13	USEPA 1668	0.0025
CL2-PCB-14	USEPA 1668	0.0025
CL2-PCB-15	USEPA 1668	0.0025
CL3-PCB-16	USEPA 1668	0.0025
CL3-PCB-17	USEPA 1668	0.0025
CL3-PCB-18	USEPA 1668	0.0025
CL3-PCB-19	USEPA 1668	0.0025

Table 6
Sediment Analytical Methods and Target Reporting Limits

Parameter[a,b]	Analytical Method[c]	Target Reporting Limit[d]
CL3-PCB-20	USEPA 1668	0.0025
CL3-PCB-21	USEPA 1668	0.0025
CL3-PCB-22	USEPA 1668	0.0025
CL3-PCB-23	USEPA 1668	0.0025
CL3-PCB-24	USEPA 1668	0.0025
CL3-PCB-25	USEPA 1668	0.0025
CL3-PCB-26	USEPA 1668	0.0025
CL3-PCB-27	USEPA 1668	0.0025
CL3-PCB-28	USEPA 1668	0.0025
CL3-PCB-29	USEPA 1668	0.0025
CL3-PCB-30	USEPA 1668	0.0025
CL3-PCB-31	USEPA 1668	0.0025
CL3-PCB-32	USEPA 1668	0.0025
CL3-PCB-33	USEPA 1668	0.0025
CL3-PCB-34	USEPA 1668	0.0025
CL3-PCB-35	USEPA 1668	0.0025
CL3-PCB-36	USEPA 1668	0.0025
CL3-PCB-37	USEPA 1668	0.0025
CL3-PCB-38	USEPA 1668	0.0025
CL3-PCB-39	USEPA 1668	0.0025
CL4-PCB-40	USEPA 1668	0.0025
CL4-PCB-41	USEPA 1668	0.0025
CL4-PCB-42	USEPA 1668	0.0025
CL4-PCB-43	USEPA 1668	0.0025
CL4-PCB-44	USEPA 1668	0.0025
CL4-PCB-45	USEPA 1668	0.0025
CL4-PCB-46	USEPA 1668	0.0025
CL4-PCB-47	USEPA 1668	0.0025
CL4-PCB-48	USEPA 1668	0.0025
CL4-PCB-49	USEPA 1668	0.0025
CL4-PCB-50	USEPA 1668	0.0025
CL4-PCB-51	USEPA 1668	0.0025
CL4-PCB-52	USEPA 1668	0.0025
CL4-PCB-53	USEPA 1668	0.0025
CL4-PCB-54	USEPA 1668	0.0025
CL4-PCB-55	USEPA 1668	0.0025
CL4-PCB-56	USEPA 1668	0.0025
CL4-PCB-57	USEPA 1668	0.0025
CL4-PCB-58	USEPA 1668	0.0025
CL4-PCB-59	USEPA 1668	0.0025
CL4-PCB-60	USEPA 1668	0.0025
CL4-PCB-61	USEPA 1668	0.0025
CL4-PCB-62	USEPA 1668	0.0025
CL4-PCB-63	USEPA 1668	0.0025
CL4-PCB-64	USEPA 1668	0.0025
CL4-PCB-65	USEPA 1668	0.0025
CL4-PCB-66	USEPA 1668	0.0025
CL4-PCB-67	USEPA 1668	0.0025
CL4-PCB-68	USEPA 1668	0.0025
CL4-PCB-69	USEPA 1668	0.0025
CL4-PCB-70	USEPA 1668	0.0025
CL4-PCB-71	USEPA 1668	0.0025
CL4-PCB-72	USEPA 1668	0.0025
CL4-PCB-73	USEPA 1668	0.0025
CL4-PCB-74	USEPA 1668	0.0025

Table 6
Sediment Analytical Methods and Target Reporting Limits

Parameter[a,b]	Analytical Method[c]	Target Reporting Limit[d]
CL4-PCB-75	USEPA 1668	0.0025
CL4-PCB-76	USEPA 1668	0.0025
CL4-PCB-77	USEPA 1668	0.0025
CL4-PCB-78	USEPA 1668	0.0025
CL4-PCB-79	USEPA 1668	0.0025
CL4-PCB-80	USEPA 1668	0.0025
CL4-PCB-81	USEPA 1668	0.0025
CL5-PCB-82	USEPA 1668	0.0025
CL5-PCB-83	USEPA 1668	0.0025
CL5-PCB-84	USEPA 1668	0.0025
CL5-PCB-85	USEPA 1668	0.0025
CL5-PCB-86	USEPA 1668	0.0025
CL5-PCB-87	USEPA 1668	0.0025
CL5-PCB-88	USEPA 1668	0.0025
CL5-PCB-89	USEPA 1668	0.0025
CL5-PCB-90	USEPA 1668	0.0025
CL5-PCB-91	USEPA 1668	0.0025
CL5-PCB-92	USEPA 1668	0.0025
CL5-PCB-93	USEPA 1668	0.0025
CL5-PCB-94	USEPA 1668	0.0025
CL5-PCB-95	USEPA 1668	0.0025
CL5-PCB-96	USEPA 1668	0.0025
CL5-PCB-97	USEPA 1668	0.0025
CL5-PCB-98	USEPA 1668	0.0025
CL5-PCB-99	USEPA 1668	0.0025
CL5-PCB-100	USEPA 1668	0.0025
CL5-PCB-101	USEPA 1668	0.0025
CL5-PCB-102	USEPA 1668	0.0025
CL5-PCB-103	USEPA 1668	0.0025
CL5-PCB-104	USEPA 1668	0.0025
CL5-PCB-105	USEPA 1668	0.0025
CL5-PCB-106	USEPA 1668	0.0025
CL5-PCB-107	USEPA 1668	0.0025
CL5-PCB-108	USEPA 1668	0.0025
CL5-PCB-109	USEPA 1668	0.0025
CL5-PCB-110	USEPA 1668	0.0025
CL5-PCB-111	USEPA 1668	0.0025
CL5-PCB-112	USEPA 1668	0.0025
CL5-PCB-113	USEPA 1668	0.0025
CL5-PCB-114	USEPA 1668	0.0025
CL5-PCB-115	USEPA 1668	0.0025
CL5-PCB-116	USEPA 1668	0.0025
CL5-PCB-117	USEPA 1668	0.0025
CL5-PCB-118	USEPA 1668	0.0025
CL5-PCB-119	USEPA 1668	0.0025
CL5-PCB-120	USEPA 1668	0.0025
CL5-PCB-121	USEPA 1668	0.0025
CL5-PCB-122	USEPA 1668	0.0025
CL5-PCB-123	USEPA 1668	0.0025
CL5-PCB-124	USEPA 1668	0.0025
CL5-PCB-125	USEPA 1668	0.0025
CL5-PCB-126	USEPA 1668	0.0025
CL5-PCB-127	USEPA 1668	0.0025
CL6-PCB-128	USEPA 1668	0.0025
CL6-PCB-129	USEPA 1668	0.0025

Table 6
Sediment Analytical Methods and Target Reporting Limits

Parameter[a,b]	Analytical Method[c]	Target Reporting Limit[d]
CL6-PCB-130	USEPA 1668	0.0025
CL6-PCB-131	USEPA 1668	0.0025
CL6-PCB-132	USEPA 1668	0.0025
CL6-PCB-133	USEPA 1668	0.0025
CL6-PCB-134	USEPA 1668	0.0025
CL6-PCB-135	USEPA 1668	0.0025
CL6-PCB-136	USEPA 1668	0.0025
CL6-PCB-137	USEPA 1668	0.0025
CL6-PCB-138	USEPA 1668	0.0025
CL6-PCB-139	USEPA 1668	0.0025
CL6-PCB-140	USEPA 1668	0.0025
CL6-PCB-141	USEPA 1668	0.0025
CL6-PCB-142	USEPA 1668	0.0025
CL6-PCB-143	USEPA 1668	0.0025
CL6-PCB-144	USEPA 1668	0.0025
CL6-PCB-145	USEPA 1668	0.0025
CL6-PCB-146	USEPA 1668	0.0025
CL6-PCB-147	USEPA 1668	0.0025
CL6-PCB-148	USEPA 1668	0.0025
CL6-PCB-149	USEPA 1668	0.0025
CL6-PCB-150	USEPA 1668	0.0025
CL6-PCB-151	USEPA 1668	0.0025
CL6-PCB-152	USEPA 1668	0.0025
CL6-PCB-153	USEPA 1668	0.0025
CL6-PCB-154	USEPA 1668	0.0025
CL6-PCB-155	USEPA 1668	0.0025
CL6-PCB-156	USEPA 1668	0.0025
CL6-PCB-157	USEPA 1668	0.0025
CL6-PCB-158	USEPA 1668	0.0025
CL6-PCB-159	USEPA 1668	0.0025
CL6-PCB-160	USEPA 1668	0.0025
CL6-PCB-161	USEPA 1668	0.0025
CL6-PCB-162	USEPA 1668	0.0025
CL6-PCB-163	USEPA 1668	0.0025
CL6-PCB-164	USEPA 1668	0.0025
CL6-PCB-165	USEPA 1668	0.0025
CL6-PCB-166	USEPA 1668	0.0025
CL6-PCB-167	USEPA 1668	0.0025
CL6-PCB-168	USEPA 1668	0.0025
CL6-PCB-169	USEPA 1668	0.0025
CL7-PCB-170	USEPA 1668	0.0025
CL7-PCB-171	USEPA 1668	0.0025
CL7-PCB-172	USEPA 1668	0.0025
CL7-PCB-173	USEPA 1668	0.0025
CL7-PCB-174	USEPA 1668	0.0025
CL7-PCB-175	USEPA 1668	0.0025
CL7-PCB-176	USEPA 1668	0.0025
CL7-PCB-177	USEPA 1668	0.0025
CL7-PCB-178	USEPA 1668	0.0025
CL7-PCB-179	USEPA 1668	0.0025
CL7-PCB-180	USEPA 1668	0.0025
CL7-PCB-181	USEPA 1668	0.0025
CL7-PCB-182	USEPA 1668	0.0025
CL7-PCB-183	USEPA 1668	0.0025
CL7-PCB-184	USEPA 1668	0.0025

Table 6
Sediment Analytical Methods and Target Reporting Limits

Parameter[a,b]	Analytical Method[c]	Target Reporting Limit[d]
CL7-PCB-185	USEPA 1668	0.0025
CL7-PCB-186	USEPA 1668	0.0025
CL7-PCB-187	USEPA 1668	0.0025
CL7-PCB-188	USEPA 1668	0.0025
CL7-PCB-189	USEPA 1668	0.0025
CL7-PCB-190	USEPA 1668	0.0025
CL7-PCB-191	USEPA 1668	0.0025
CL7-PCB-192	USEPA 1668	0.0025
CL7-PCB-193	USEPA 1668	0.0025
CL8-PCB-194	USEPA 1668	0.0025
CL8-PCB-195	USEPA 1668	0.0025
CL8-PCB-196	USEPA 1668	0.0025
CL8-PCB-197	USEPA 1668	0.0025
CL8-PCB-198	USEPA 1668	0.0025
CL8-PCB-199	USEPA 1668	0.0025
CL8-PCB-200	USEPA 1668	0.0025
CL8-PCB-201	USEPA 1668	0.0025
CL8-PCB-202	USEPA 1668	0.0025
CL8-PCB-203	USEPA 1668	0.0025
CL8-PCB-204	USEPA 1668	0.0025
CL8-PCB-205	USEPA 1668	0.0025
CL9-PCB-206	USEPA 1668	0.0025
CL9-PCB-207	USEPA 1668	0.0025
CL9-PCB-208	USEPA 1668	0.0025
CL10-PCB-209	USEPA 1668	0.0025

Notes:
Laboratory reporting limits are revised periodically and may change over the duration of this project. Reporting limits should be verified by each laboratory when writing Sampling and Analysis Plans.
µg/g = microgram per gram
EDL = estimated detection limit
MDL = method detection limit
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
N/A = not applicable
ng/g = nanogram per gram
OC = organic carbon
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
RL = reporting limit
SQO = sediment quality objectives
SWAMP = California Surface Water Ambient Monitoring Program
TBD = to be determined
TMDL = Total Maximum Daily Load
USEPA = U.S. Environmental Protection Agency
wt = weight
a Specific analytes used for each study conducted for the Ports may vary by waterbody, according to the listings.
b Units in dry weight unless otherwise noted. Specific analytes used for each study conducted for the Ports may vary by waterbody, according to the listings.
c Laboratories may use different versions of recommended methods (i.e. USEPA 8270C) as long as the QA/QC elements identified in this QAPP are met.
d Matrix interference, total solid concentrations and/or dilutions due to non-target analytes may increase actual reporting limits. The method detection limit (MDL) should be at least three times lower than the reporting limit (40 CFR part 136) but will vary per instrument by MDL study.
e Total chlordane is calculated using the following compounds: alpha-chlordane, gamma-chlordane, oxychlordane, cis-nonachlor, and trans-nonachlor.
f TMDL sediment target for this compound is currently below achievable laboratory reporting limits. Results should be reported to the EDL/MDL.
g PCB co-elutions will vary by instrument and column, and may increase reporting limits for some congeners.

Table 7
Water Analytical Methods and Target Reporting Limits

Parameter[a]	Analytical Method[b]	Target Reporting Limit[c]
Conventionals		
Total dissolved solids (mg/L)	USEPA 160.1 / SM 2540 C	2.0
Total suspended solids (mg/L)	USEPA 160.2 / SM 2540 D	0.5
Hardness (mg $CaCO_3$ / L)[d]	SM2340B	1
Total and dissolved organic carbon (mg/L)	9060M / SM 5310 D	0.6
Particulate organic carbon (mg/L)	9060 Modified/Lloyd Kahn with filtrate/USEPA 440	0.1
Particle size determination (%)	Laser diffraction (ASTM D4464M) or SSC (ASTM 3977)	0.1
Water Total and Dissolved Metals (µg/L)		
Cadmium	USEPA 6010A/6020/200.8/1640	0.01
Chromium	USEPA 6010A/6020/200.8/1640	0.1
Copper	USEPA 6010A/6020/200.8/1640	0.01
Lead	USEPA 6010A/6020/200.8/1640	0.01
Mercury	USEPA 7470A/245.7/1631	0.0002
Zinc	USEPA 6010A/6020/200.8/1640	0.10
Organochlorine Pesticides (ng/L) - Low Resolution Analytical Methods		
Total Chlordane[e]	USEPA 8081A / 625	--
alpha-Chlordane (cis-chlordane)	USEPA 8081A / 625	0.50
gamma-Chlordane (trans-chlordane)	USEPA 8081A / 625	0.50
Oxychlordane	USEPA 8081A / 625	0.50
cis-Nonachlor	USEPA 8081A / 625	0.50
trans-Nonachlor	USEPA 8081A / 625	0.50
Dieldrin	USEPA 8081A / 625	0.10
Toxaphene	USEPA 8081A / 625	2.0
2,4'-DDD	USEPA 8081A / 625	0.50
2,4'-DDE	USEPA 8081A / 625	0.50
2,4'-DDT	USEPA 8081A / 625	0.50
4,4'-DDD	USEPA 8081A / 625	0.50
4,4'-DDE	USEPA 8081A / 625	0.50
4,4'-DDT	USEPA 8081A / 625	0.50
4,4'-DDMU	USEPA 8081A / 625	0.50
Organochlorine Pesticides (ng/L) - High Resolution Analytical Method		
Total Chlordane[e]	USEPA 1699	--
alpha-Chlordane (cis-chlordane)	USEPA 1699	0.50
gamma-Chlordane (trans-chlordane)	USEPA 1699	0.50
Oxychlordane	USEPA 1699	0.50
cis-Nonachlor	USEPA 1699	0.50
trans-Nonachlor	USEPA 1699	0.50
Dieldrin	USEPA 1699	0.10
Toxaphene	USEPA 1699	2.0
2,4'-DDD	USEPA 1699	0.50
2,4'-DDE	USEPA 1699	0.50

Table 7
Water Analytical Methods and Target Reporting Limits

Parameter[a]	Analytical Method[b]	Target Reporting Limit[c]
2,4'-DDT	USEPA 1699	0.50
4,4'-DDD	USEPA 1699	0.50
4,4'-DDE	USEPA 1699	0.50
4,4'-DDT	USEPA 1699	0.50
4,4'-DDMU	USEPA 1699	0.50
PCB Aroclors (ng/L) - Low Resolution Analytical Method		
Aroclor-1016	USEPA 8082 / 625	500
Aroclor-1221	USEPA 8082 / 625	500
Aroclor-1232	USEPA 8082 / 625	500
Aroclor-1242	USEPA 8082 / 625	500
Aroclor-1248	USEPA 8082 / 625	500
Aroclor-1254	USEPA 8082 / 625	500
Aroclor-1260	USEPA 8082 / 625	500
Aroclor-1262	USEPA 8082 / 625	500
Aroclor-1268	USEPA 8082 / 625	500
PCB Congeners (ng/L)[f] - Low Resolution Analytical Methods		
CL1-PCB-3	USEPA 8270C (SIM or TQ) / 625	0.1
CL2-PCB-5	USEPA 8270C (SIM or TQ) / 625	0.1
CL2-PCB-8	USEPA 8270C (SIM or TQ) / 625	0.1
CL2-PCB-15	USEPA 8270C (SIM or TQ) / 625	0.1
CL3-PCB-18	USEPA 8270C (SIM or TQ) / 625	0.1
CL3-PCB-27	USEPA 8270C (SIM or TQ) / 625	0.1
CL3-PCB-28	USEPA 8270C (SIM or TQ) / 625	0.1
CL3-PCB-29	USEPA 8270C (SIM or TQ) / 625	0.1
CL3-PCB-31	USEPA 8270C (SIM or TQ) / 625	0.1
CL3-PCB-33	USEPA 8270C (SIM or TQ) / 625	0.1
CL3-PCB-37	USEPA 8270C (SIM or TQ) / 625	0.1
CL4-PCB-44	USEPA 8270C (SIM or TQ) / 625	0.1
CL4-PCB-49	USEPA 8270C (SIM or TQ) / 625	0.1
CL4-PCB-52	USEPA 8270C (SIM or TQ) / 625	0.1
CL4-PCB-56	USEPA 8270C (SIM or TQ) / 625	0.1
CL4-PCB-60	USEPA 8270C (SIM or TQ) / 625	0.1
CL4-PCB-66	USEPA 8270C (SIM or TQ) / 625	0.1
CL4-PCB-70	USEPA 8270C (SIM or TQ) / 625	0.1
CL4-PCB-74	USEPA 8270C (SIM or TQ) / 625	0.1
CL4-PCB-77	USEPA 8270C (SIM or TQ) / 625	0.1
CL4-PCB-81	USEPA 8270C (SIM or TQ) / 625	0.1
CL5-PCB-87	USEPA 8270C (SIM or TQ) / 625	0.1
CL5-PCB-95	USEPA 8270C (SIM or TQ) / 625	0.1
CL5-PCB-97	USEPA 8270C (SIM or TQ) / 625	0.1
CL5-PCB-99	USEPA 8270C (SIM or TQ) / 625	0.1
CL5-PCB-101	USEPA 8270C (SIM or TQ) / 625	0.1

Table 7
Water Analytical Methods and Target Reporting Limits

Parameter[a]	Analytical Method[b]	Target Reporting Limit[c]
CL5-PCB-105	USEPA 8270C (SIM or TQ) / 625	0.1
CL5-PCB-110	USEPA 8270C (SIM or TQ) / 625	0.1
CL5-PCB-114	USEPA 8270C (SIM or TQ) / 625	0.1
CL5-PCB-118	USEPA 8270C (SIM or TQ) / 625	0.1
CL5-PCB-119	USEPA 8270C (SIM or TQ) / 625	0.1
CL5-PCB-123	USEPA 8270C (SIM or TQ) / 625	0.1
CL5-PCB-126	USEPA 8270C (SIM or TQ) / 625	0.1
CL6-PCB-128	USEPA 8270C (SIM or TQ) / 625	0.1
CL6-PCB-137	USEPA 8270C (SIM or TQ) / 625	0.1
CL6-PCB-138	USEPA 8270C (SIM or TQ) / 625	0.1
CL6-PCB-141	USEPA 8270C (SIM or TQ) / 625	0.1
CL6-PCB-149	USEPA 8270C (SIM or TQ) / 625	0.1
CL6-PCB-151	USEPA 8270C (SIM or TQ) / 625	0.1
CL6-PCB-153	USEPA 8270C (SIM or TQ) / 625	0.1
CL6-PCB-156	USEPA 8270C (SIM or TQ) / 625	0.1
CL6-PCB-157	USEPA 8270C (SIM or TQ) / 625	0.1
CL6-PCB-158	USEPA 8270C (SIM or TQ) / 625	0.1
CL6-PCB-167	USEPA 8270C (SIM or TQ) / 625	0.1
CL6-PCB-168	USEPA 8270C (SIM or TQ) / 625	0.1
CL6-PCB-169	USEPA 8270C (SIM or TQ) / 625	0.1
CL7-PCB-170	USEPA 8270C (SIM or TQ) / 625	0.1
CL7-PCB-174	USEPA 8270C (SIM or TQ) / 625	0.1
CL7-PCB-177	USEPA 8270C (SIM or TQ) / 625	0.1
CL7-PCB-180	USEPA 8270C (SIM or TQ) / 625	0.1
CL7-PCB-183	USEPA 8270C (SIM or TQ) / 625	0.1
CL7-PCB-187	USEPA 8270C (SIM or TQ) / 625	0.1
CL7-PCB-189	USEPA 8270C (SIM or TQ) / 625	0.1
CL8-PCB-194	USEPA 8270C (SIM or TQ) / 625	0.1
CL8-PCB-195	USEPA 8270C (SIM or TQ) / 625	0.1
CL8-PCB-200	USEPA 8270C (SIM or TQ) / 625	0.1
CL8-PCB-201	USEPA 8270C (SIM or TQ) / 625	0.1
CL8-PCB-203	USEPA 8270C (SIM or TQ) / 625	0.1
CL9-PCB-206	USEPA 8270C (SIM or TQ) / 625	0.1
CL10-PCB-209	USEPA 8270C (SIM or TQ) / 625	0.1
PCB Congeners (ng/L) [f,g] - High Resolution Analytical Method		
CL1-PCB-1	USEPA 1668B	0.005
CL1-PCB-2	USEPA 1668B	0.005
CL1-PCB-3	USEPA 1668B	0.005
CL2-PCB-4	USEPA 1668B	0.005
CL2-PCB-5	USEPA 1668B	0.005
CL2-PCB-6	USEPA 1668B	0.005
CL2-PCB-7	USEPA 1668B	0.005
CL2-PCB-8	USEPA 1668B	0.005

Table 7
Water Analytical Methods and Target Reporting Limits

Parameter[a]	Analytical Method[b]	Target Reporting Limit[c]
CL2-PCB-9	USEPA 1668B	0.005
CL2-PCB-10	USEPA 1668B	0.005
CL2-PCB-11	USEPA 1668B	0.005
CL2-PCB-12	USEPA 1668B	0.005
CL2-PCB-13	USEPA 1668B	0.005
CL2-PCB-14	USEPA 1668B	0.005
CL2-PCB-15	USEPA 1668B	0.005
CL3-PCB-16	USEPA 1668B	0.005
CL3-PCB-17	USEPA 1668B	0.005
CL3-PCB-18	USEPA 1668B	0.005
CL3-PCB-19	USEPA 1668B	0.005
CL3-PCB-20	USEPA 1668B	0.005
CL3-PCB-21	USEPA 1668B	0.005
CL3-PCB-22	USEPA 1668B	0.005
CL3-PCB-23	USEPA 1668B	0.005
CL3-PCB-24	USEPA 1668B	0.005
CL3-PCB-25	USEPA 1668B	0.005
CL3-PCB-26	USEPA 1668B	0.005
CL3-PCB-27	USEPA 1668B	0.005
CL3-PCB-28	USEPA 1668B	0.005
CL3-PCB-29	USEPA 1668B	0.005
CL3-PCB-30	USEPA 1668B	0.005
CL3-PCB-31	USEPA 1668B	0.005
CL3-PCB-32	USEPA 1668B	0.005
CL3-PCB-33	USEPA 1668B	0.005
CL3-PCB-34	USEPA 1668B	0.005
CL3-PCB-35	USEPA 1668B	0.005
CL3-PCB-36	USEPA 1668B	0.005
CL3-PCB-37	USEPA 1668B	0.005
CL3-PCB-38	USEPA 1668B	0.005
CL3-PCB-39	USEPA 1668B	0.005
CL4-PCB-40	USEPA 1668B	0.005
CL4-PCB-41	USEPA 1668B	0.005
CL4-PCB-42	USEPA 1668B	0.005
CL4-PCB-43	USEPA 1668B	0.005
CL4-PCB-44	USEPA 1668B	0.005
CL4-PCB-45	USEPA 1668B	0.005
CL4-PCB-46	USEPA 1668B	0.005
CL4-PCB-47	USEPA 1668B	0.005
CL4-PCB-48	USEPA 1668B	0.005
CL4-PCB-49	USEPA 1668B	0.005
CL4-PCB-50	USEPA 1668B	0.005
CL4-PCB-51	USEPA 1668B	0.005

Table 7
Water Analytical Methods and Target Reporting Limits

Parameter[a]	Analytical Method[b]	Target Reporting Limit[c]
CL4-PCB-52	USEPA 1668B	0.005
CL4-PCB-53	USEPA 1668B	0.005
CL4-PCB-54	USEPA 1668B	0.005
CL4-PCB-55	USEPA 1668B	0.005
CL4-PCB-56	USEPA 1668B	0.005
CL4-PCB-57	USEPA 1668B	0.005
CL4-PCB-58	USEPA 1668B	0.005
CL4-PCB-59	USEPA 1668B	0.005
CL4-PCB-60	USEPA 1668B	0.005
CL4-PCB-61	USEPA 1668B	0.005
CL4-PCB-62	USEPA 1668B	0.005
CL4-PCB-63	USEPA 1668B	0.005
CL4-PCB-64	USEPA 1668B	0.005
CL4-PCB-65	USEPA 1668B	0.005
CL4-PCB-66	USEPA 1668B	0.005
CL4-PCB-67	USEPA 1668B	0.005
CL4-PCB-68	USEPA 1668B	0.005
CL4-PCB-69	USEPA 1668B	0.005
CL4-PCB-70	USEPA 1668B	0.005
CL4-PCB-71	USEPA 1668B	0.005
CL4-PCB-72	USEPA 1668B	0.005
CL4-PCB-73	USEPA 1668B	0.005
CL4-PCB-74	USEPA 1668B	0.005
CL4-PCB-75	USEPA 1668B	0.005
CL4-PCB-76	USEPA 1668B	0.005
CL4-PCB-77	USEPA 1668B	0.005
CL4-PCB-78	USEPA 1668B	0.005
CL4-PCB-79	USEPA 1668B	0.005
CL4-PCB-80	USEPA 1668B	0.005
CL4-PCB-81	USEPA 1668B	0.005
CL5-PCB-82	USEPA 1668B	0.005
CL5-PCB-83	USEPA 1668B	0.005
CL5-PCB-84	USEPA 1668B	0.005
CL5-PCB-85	USEPA 1668B	0.005
CL5-PCB-86	USEPA 1668B	0.005
CL5-PCB-87	USEPA 1668B	0.005
CL5-PCB-88	USEPA 1668B	0.005
CL5-PCB-89	USEPA 1668B	0.005
CL5-PCB-90	USEPA 1668B	0.005
CL5-PCB-91	USEPA 1668B	0.005
CL5-PCB-92	USEPA 1668B	0.005
CL5-PCB-93	USEPA 1668B	0.005
CL5-PCB-94	USEPA 1668B	0.005
CL5-PCB-95	USEPA 1668B	0.005

Table 7
Water Analytical Methods and Target Reporting Limits

Parameter[a]	Analytical Method[b]	Target Reporting Limit[c]
CL5-PCB-96	USEPA 1668B	0.005
CL5-PCB-97	USEPA 1668B	0.005
CL5-PCB-98	USEPA 1668B	0.005
CL5-PCB-99	USEPA 1668B	0.005
CL5-PCB-100	USEPA 1668B	0.005
CL5-PCB-101	USEPA 1668B	0.005
CL5-PCB-102	USEPA 1668B	0.005
CL5-PCB-103	USEPA 1668B	0.005
CL5-PCB-104	USEPA 1668B	0.005
CL5-PCB-105	USEPA 1668B	0.005
CL5-PCB-106	USEPA 1668B	0.005
CL5-PCB-107	USEPA 1668B	0.005
CL5-PCB-108	USEPA 1668B	0.005
CL5-PCB-109	USEPA 1668B	0.005
CL5-PCB-110	USEPA 1668B	0.005
CL5-PCB-111	USEPA 1668B	0.005
CL5-PCB-112	USEPA 1668B	0.005
CL5-PCB-113	USEPA 1668B	0.005
CL5-PCB-114	USEPA 1668B	0.005
CL5-PCB-115	USEPA 1668B	0.005
CL5-PCB-116	USEPA 1668B	0.005
CL5-PCB-117	USEPA 1668B	0.005
CL5-PCB-118	USEPA 1668B	0.005
CL5-PCB-119	USEPA 1668B	0.005
CL5-PCB-120	USEPA 1668B	0.005
CL5-PCB-121	USEPA 1668B	0.005
CL5-PCB-122	USEPA 1668B	0.005
CL5-PCB-123	USEPA 1668B	0.005
CL5-PCB-124	USEPA 1668B	0.005
CL5-PCB-125	USEPA 1668B	0.005
CL5-PCB-126	USEPA 1668B	0.005
CL5-PCB-127	USEPA 1668B	0.005
CL6-PCB-128	USEPA 1668B	0.005
CL6-PCB-129	USEPA 1668B	0.005
CL6-PCB-130	USEPA 1668B	0.005
CL6-PCB-131	USEPA 1668B	0.005
CL6-PCB-132	USEPA 1668B	0.005
CL6-PCB-133	USEPA 1668B	0.005
CL6-PCB-134	USEPA 1668B	0.005
CL6-PCB-135	USEPA 1668B	0.005
CL6-PCB-136	USEPA 1668B	0.005
CL6-PCB-137	USEPA 1668B	0.005
CL6-PCB-138	USEPA 1668B	0.005
CL6-PCB-139	USEPA 1668B	0.005

Table 7
Water Analytical Methods and Target Reporting Limits

Parameter[a]	Analytical Method[b]	Target Reporting Limit[c]
CL6-PCB-140	USEPA 1668B	0.005
CL6-PCB-141	USEPA 1668B	0.005
CL6-PCB-142	USEPA 1668B	0.005
CL6-PCB-143	USEPA 1668B	0.005
CL6-PCB-144	USEPA 1668B	0.005
CL6-PCB-145	USEPA 1668B	0.005
CL6-PCB-146	USEPA 1668B	0.005
CL6-PCB-147	USEPA 1668B	0.005
CL6-PCB-148	USEPA 1668B	0.005
CL6-PCB-149	USEPA 1668B	0.005
CL6-PCB-150	USEPA 1668B	0.005
CL6-PCB-151	USEPA 1668B	0.005
CL6-PCB-152	USEPA 1668B	0.005
CL6-PCB-153	USEPA 1668B	0.005
CL6-PCB-154	USEPA 1668B	0.005
CL6-PCB-155	USEPA 1668B	0.005
CL6-PCB-156	USEPA 1668B	0.005
CL6-PCB-157	USEPA 1668B	0.005
CL6-PCB-158	USEPA 1668B	0.005
CL6-PCB-159	USEPA 1668B	0.005
CL6-PCB-160	USEPA 1668B	0.005
CL6-PCB-161	USEPA 1668B	0.005
CL6-PCB-162	USEPA 1668B	0.005
CL6-PCB-163	USEPA 1668B	0.005
CL6-PCB-164	USEPA 1668B	0.005
CL6-PCB-165	USEPA 1668B	0.005
CL6-PCB-166	USEPA 1668B	0.005
CL6-PCB-167	USEPA 1668B	0.005
CL6-PCB-168	USEPA 1668B	0.005
CL6-PCB-169	USEPA 1668B	0.005
CL7-PCB-170	USEPA 1668B	0.005
CL7-PCB-171	USEPA 1668B	0.005
CL7-PCB-172	USEPA 1668B	0.005
CL7-PCB-173	USEPA 1668B	0.005
CL7-PCB-174	USEPA 1668B	0.005
CL7-PCB-175	USEPA 1668B	0.005
CL7-PCB-176	USEPA 1668B	0.005
CL7-PCB-177	USEPA 1668B	0.005
CL7-PCB-178	USEPA 1668B	0.005
CL7-PCB-179	USEPA 1668B	0.005
CL7-PCB-180	USEPA 1668B	0.005
CL7-PCB-181	USEPA 1668B	0.005
CL7-PCB-182	USEPA 1668B	0.005

Table 7
Water Analytical Methods and Target Reporting Limits

Parameter[a]	Analytical Method[b]	Target Reporting Limit[c]
CL7-PCB-183	USEPA 1668B	0.005
CL7-PCB-184	USEPA 1668B	0.005
CL7-PCB-185	USEPA 1668B	0.005
CL7-PCB-186	USEPA 1668B	0.005
CL7-PCB-187	USEPA 1668B	0.005
CL7-PCB-188	USEPA 1668B	0.005
CL7-PCB-189	USEPA 1668B	0.005
CL7-PCB-190	USEPA 1668B	0.005
CL7-PCB-191	USEPA 1668B	0.005
CL7-PCB-192	USEPA 1668B	0.005
CL7-PCB-193	USEPA 1668B	0.005
CL8-PCB-194	USEPA 1668B	0.005
CL8-PCB-195	USEPA 1668B	0.005
CL8-PCB-196	USEPA 1668B	0.005
CL8-PCB-197	USEPA 1668B	0.005
CL8-PCB-198	USEPA 1668B	0.005
CL8-PCB-199	USEPA 1668B	0.005
CL8-PCB-200	USEPA 1668B	0.005
CL8-PCB-201	USEPA 1668B	0.005
CL8-PCB-202	USEPA 1668B	0.005
CL8-PCB-203	USEPA 1668B	0.005
CL8-PCB-204	USEPA 1668B	0.005
CL8-PCB-205	USEPA 1668B	0.005
CL9-PCB-206	USEPA 1668B	0.005
CL9-PCB-207	USEPA 1668B	0.005
CL9-PCB-208	USEPA 1668B	0.005
CL10-PCB-209	USEPA 1668B	0.005

Notes:

High volume alternative sampling techniques may be used to achieve lower reporting limits for these analyses.

Laboratory reporting limits are revised periodically, and may change over the duration of this project.

Reporting limits should be verified by each lab when writing Sampling and Analysis Plans.

mg/L = milligram per liter

µg/L = microgram per liter

ng/L = nanogram per liter

pg/L = picogram per liter

EDL = estimated detection limit

MDL = method detection limit

RL = reporting limit

PCB = polychlorinated biphenyl

TBD = to be determined

wt = weight

Table 8
Tissue Analytical Methods and Target Reporting Limits

Parameter[a]	Analytical Method[b]	Target Reporting Limit[c]
Conventionals (%)		
Lipids	NOAA 1993a / Gravimetric	0.5
Organochlorine Pesticides (ng/g or µg/kg wet weight) - Low Resolution Analytical Methods		
Total Chlordane[d]	USEPA 8081A / 8270C / 8270D TQ	--
alpha-Chlordane (cis-chlordane)	USEPA 8081A / 8270C / 8270D TQ	4.0
gamma-Chlordane (trans-chlordane)	USEPA 8081A / 8270C / 8270D TQ	4.0
Oxychlordane	USEPA 8081A / 8270C / 8270D TQ	2.0
cis-Nonachlor	USEPA 8081A / 8270C / 8270D TQ	4.0
trans-Nonachlor	USEPA 8081A / 8270C / 8270D TQ	2.0
Dieldrin[f]	USEPA 8081A / 8270C / 8270D TQ	0.46
Toxaphene[f]	USEPA 8081A / 8270C / 8270D TQ	6.1
2,4'-DDD	USEPA 8081A / 8270C / 8270D TQ	4.0
2,4'-DDE	USEPA 8081A / 8270C / 8270D TQ	4.0
2,4'-DDT	USEPA 8081A / 8270C / 8270D TQ	6.0
4,4'-DDD	USEPA 8081A / 8270C / 8270D TQ	4.0
4,4'-DDE	USEPA 8081A / 8270C / 8270D TQ	4.0
4,4'-DDT	USEPA 8081A / 8270C / 8270D TQ	10.0
4,4'-DDMU	USEPA 8081A / 8270C / 8270D TQ	10.0
Organochlorine Pesticides (ng/g or µg/kg wet weight) - High Resolution Analytical Method		
Total Chlordane[d]	USEPA 1699	--
alpha-Chlordane (cis-chlordane)	USEPA 1699	4.0
gamma-Chlordane (trans-chlordane)	USEPA 1699	4.0
Oxychlordane	USEPA 1699	2.0
cis-Nonachlor	USEPA 1699	4.0
trans-Nonachlor	USEPA 1699	2.0
Dieldrin[f]	USEPA 1699	0.46
Toxaphene	USEPA 1699	6.1
2,4'-DDD	USEPA 1699	4.0
2,4'-DDE	USEPA 1699	4.0
2,4'-DDT	USEPA 1699	6.0
4,4'-DDD	USEPA 1699	4.0
4,4'-DDE	USEPA 1699	4.0
4,4'-DDT	USEPA 1699	10.0
4,4'-DDMU	USEPA 1699	10.0
PCB Aroclors (ng/g or µg/kg)		
Aroclor-1016	USEPA 8082 / 8270C	2.0
Aroclor-1221	USEPA 8082 / 8270C	2.0
Aroclor-1232	USEPA 8082 / 8270C	2.0
Aroclor-1242	USEPA 8082 / 8270C	2.0
Aroclor-1248	USEPA 8082 / 8270C	2.0
Aroclor-1254	USEPA 8082 / 8270C	2.0
Aroclor-1260	USEPA 8082 / 8270C	2.0
Aroclor-1262	USEPA 8082 / 8270C	2.0
Aroclor-1268	USEPA 8082 / 8270C	2.0
PCB Congeners (ng/g or µg/kg wet weight) - Low Resolution Analytical Methods		
CL1-PCB-3	USEPA 8270C / 8270D	0.4
CL2-PCB-5	USEPA 8270C / 8270D	0.4

Table 8
Tissue Analytical Methods and Target Reporting Limits

Parameter[a]	Analytical Method[b]	Target Reporting Limit[c]
CL2-PCB-8	USEPA 8270C / 8270D	0.4
CL2-PCB-15	USEPA 8270C / 8270D	0.4
CL3-PCB-18	USEPA 8270C / 8270D	0.4
CL3-PCB-27	USEPA 8270C / 8270D	0.4
CL3-PCB-28	USEPA 8270C / 8270D	0.4
CL3-PCB-29	USEPA 8270C / 8270D	0.4
CL3-PCB-31	USEPA 8270C / 8270D	0.4
CL3-PCB-33	USEPA 8270C / 8270D	0.4
CL3-PCB-37	USEPA 8270C / 8270D	0.4
CL4-PCB-44	USEPA 8270C / 8270D	0.4
CL4-PCB-49	USEPA 8270C / 8270D	0.4
CL4-PCB-52	USEPA 8270C / 8270D	0.4
CL4-PCB-56	USEPA 8270C / 8270D	0.4
CL4-PCB-60	USEPA 8270C / 8270D	0.4
CL4-PCB-66	USEPA 8270C / 8270D	0.4
CL4-PCB-70	USEPA 8270C / 8270D	0.4
CL4-PCB-74	USEPA 8270C / 8270D	0.4
CL4-PCB-77	USEPA 8270C / 8270D	0.4
CL4-PCB-81	USEPA 8270C / 8270D	0.4
CL5-PCB-87	USEPA 8270C / 8270D	0.4
CL5-PCB-95	USEPA 8270C / 8270D	0.4
CL5-PCB-97	USEPA 8270C / 8270D	0.4
CL5-PCB-99	USEPA 8270C / 8270D	0.4
CL5-PCB-101	USEPA 8270C / 8270D	0.4
CL5-PCB-105	USEPA 8270C / 8270D	0.4
CL5-PCB-110	USEPA 8270C / 8270D	0.4
CL5-PCB-114	USEPA 8270C / 8270D	0.4
CL5-PCB-118	USEPA 8270C / 8270D	0.4
CL5-PCB-119	USEPA 8270C / 8270D	0.4
CL5-PCB-123	USEPA 8270C / 8270D	0.4
CL5-PCB-126	USEPA 8270C / 8270D	0.4
CL6-PCB-128	USEPA 8270C / 8270D	0.4
CL6-PCB-137	USEPA 8270C / 8270D	0.4
CL6-PCB-138	USEPA 8270C / 8270D	0.4
CL6-PCB-141	USEPA 8270C / 8270D	0.4
CL6-PCB-149	USEPA 8270C / 8270D	0.4
CL6-PCB-151	USEPA 8270C / 8270D	0.4
CL6-PCB-153	USEPA 8270C / 8270D	0.4
CL6-PCB-156	USEPA 8270C / 8270D	0.4
CL6-PCB-157	USEPA 8270C / 8270D	0.4
CL6-PCB-158	USEPA 8270C / 8270D	0.4
CL6-PCB-167	USEPA 8270C / 8270D	0.4
CL6-PCB-168	USEPA 8270C / 8270D	0.4
CL6-PCB-169	USEPA 8270C / 8270D	0.4
CL7-PCB-170	USEPA 8270C / 8270D	0.4
CL7-PCB-174	USEPA 8270C / 8270D	0.4
CL7-PCB-177	USEPA 8270C / 8270D	0.4

Table 8
Tissue Analytical Methods and Target Reporting Limits

Parameter[a]	Analytical Method[b]	Target Reporting Limit[c]
CL7-PCB-180	USEPA 8270C / 8270D	0.4
CL7-PCB-183	USEPA 8270C / 8270D	0.4
CL7-PCB-187	USEPA 8270C / 8270D	0.4
CL7-PCB-189	USEPA 8270C / 8270D	20.0
CL8-PCB-194	USEPA 8270C / 8270D	0.4
CL8-PCB-195	USEPA 8270C / 8270D	0.4
CL8-PCB-200	USEPA 8270C / 8270D	0.4
CL8-PCB-201	USEPA 8270C / 8270D	0.4
CL8-PCB-203	USEPA 8270C / 8270D	0.4
CL9-PCB-206	USEPA 8270C / 8270D	0.4
CL10-PCB-209	USEPA 8270C / 8270D	0.4
PCB Congeners (ng/g or µg/kg)[e] - High Resolution Analytical Methods		
CL1-PCB-1	USEPA 1668	0.001
CL1-PCB-2	USEPA 1668	0.001
CL1-PCB-3	USEPA 1668	0.001
CL2-PCB-4	USEPA 1668	0.001
CL2-PCB-5	USEPA 1668	0.001
CL2-PCB-6	USEPA 1668	0.001
CL2-PCB-7	USEPA 1668	0.001
CL2-PCB-8	USEPA 1668	0.001
CL2-PCB-9	USEPA 1668	0.001
CL2-PCB-10	USEPA 1668	0.001
CL2-PCB-11	USEPA 1668	0.001
CL2-PCB-12	USEPA 1668	0.001
CL2-PCB-13	USEPA 1668	0.001
CL2-PCB-14	USEPA 1668	0.001
CL2-PCB-15	USEPA 1668	0.001
CL3-PCB-16	USEPA 1668	0.001
CL3-PCB-17	USEPA 1668	0.001
CL3-PCB-18	USEPA 1668	0.001
CL3-PCB-19	USEPA 1668	0.001
CL3-PCB-20	USEPA 1668	0.001
CL3-PCB-21	USEPA 1668	0.001
CL3-PCB-22	USEPA 1668	0.001
CL3-PCB-23	USEPA 1668	0.001
CL3-PCB-24	USEPA 1668	0.001
CL3-PCB-25	USEPA 1668	0.001
CL3-PCB-26	USEPA 1668	0.001
CL3-PCB-27	USEPA 1668	0.001
CL3-PCB-28	USEPA 1668	0.001
CL3-PCB-29	USEPA 1668	0.001
CL3-PCB-30	USEPA 1668	0.001
CL3-PCB-31	USEPA 1668	0.001
CL3-PCB-32	USEPA 1668	0.001
CL3-PCB-33	USEPA 1668	0.001
CL3-PCB-34	USEPA 1668	0.001
CL3-PCB-35	USEPA 1668	0.001
CL3-PCB-36	USEPA 1668	0.001
CL3-PCB-37	USEPA 1668	0.001
CL3-PCB-38	USEPA 1668	0.001

Table 8
Tissue Analytical Methods and Target Reporting Limits

Parameter[a]	Analytical Method[b]	Target Reporting Limit[c]
CL3-PCB-39	USEPA 1668	0.001
CL4-PCB-40	USEPA 1668	0.001
CL4-PCB-41	USEPA 1668	0.001
CL4-PCB-42	USEPA 1668	0.001
CL4-PCB-43	USEPA 1668	0.001
CL4-PCB-44	USEPA 1668	0.001
CL4-PCB-45	USEPA 1668	0.001
CL4-PCB-46	USEPA 1668	0.001
CL4-PCB-47	USEPA 1668	0.001
CL4-PCB-48	USEPA 1668	0.001
CL4-PCB-49	USEPA 1668	0.001
CL4-PCB-50	USEPA 1668	0.001
CL4-PCB-51	USEPA 1668	0.001
CL4-PCB-52	USEPA 1668	0.001
CL4-PCB-53	USEPA 1668	0.001
CL4-PCB-54	USEPA 1668	0.001
CL4-PCB-55	USEPA 1668	0.001
CL4-PCB-56	USEPA 1668	0.001
CL4-PCB-57	USEPA 1668	0.001
CL4-PCB-58	USEPA 1668	0.001
CL4-PCB-59	USEPA 1668	0.001
CL4-PCB-60	USEPA 1668	0.001
CL4-PCB-61	USEPA 1668	0.001
CL4-PCB-62	USEPA 1668	0.001
CL4-PCB-63	USEPA 1668	0.001
CL4-PCB-64	USEPA 1668	0.001
CL4-PCB-65	USEPA 1668	0.001
CL4-PCB-66	USEPA 1668	0.001
CL4-PCB-67	USEPA 1668	0.001
CL4-PCB-68	USEPA 1668	0.001
CL4-PCB-69	USEPA 1668	0.001
CL4-PCB-70	USEPA 1668	0.001
CL4-PCB-71	USEPA 1668	0.001
CL4-PCB-72	USEPA 1668	0.001
CL4-PCB-73	USEPA 1668	0.001
CL4-PCB-74	USEPA 1668	0.001
CL4-PCB-75	USEPA 1668	0.001
CL4-PCB-76	USEPA 1668	0.001
CL4-PCB-77	USEPA 1668	0.001
CL4-PCB-78	USEPA 1668	0.001
CL4-PCB-79	USEPA 1668	0.001
CL4-PCB-80	USEPA 1668	0.001
CL4-PCB-81	USEPA 1668	0.001
CL5-PCB-82	USEPA 1668	0.001
CL5-PCB-83	USEPA 1668	0.001
CL5-PCB-84	USEPA 1668	0.001
CL5-PCB-85	USEPA 1668	0.001
CL5-PCB-86	USEPA 1668	0.001
CL5-PCB-87	USEPA 1668	0.001
CL5-PCB-88	USEPA 1668	0.001

Table 8
Tissue Analytical Methods and Target Reporting Limits

Parameter[a]	Analytical Method[b]	Target Reporting Limit[c]
CL5-PCB-89	USEPA 1668	0.001
CL5-PCB-90	USEPA 1668	0.001
CL5-PCB-91	USEPA 1668	0.001
CL5-PCB-92	USEPA 1668	0.001
CL5-PCB-93	USEPA 1668	0.001
CL5-PCB-94	USEPA 1668	0.001
CL5-PCB-95	USEPA 1668	0.001
CL5-PCB-96	USEPA 1668	0.001
CL5-PCB-97	USEPA 1668	0.001
CL5-PCB-98	USEPA 1668	0.001
CL5-PCB-99	USEPA 1668	0.001
CL5-PCB-100	USEPA 1668	0.001
CL5-PCB-101	USEPA 1668	0.001
CL5-PCB-102	USEPA 1668	0.001
CL5-PCB-103	USEPA 1668	0.001
CL5-PCB-104	USEPA 1668	0.001
CL5-PCB-105	USEPA 1668	0.001
CL5-PCB-106	USEPA 1668	0.001
CL5-PCB-107	USEPA 1668	0.001
CL5-PCB-108	USEPA 1668	0.001
CL5-PCB-109	USEPA 1668	0.001
CL5-PCB-110	USEPA 1668	0.001
CL5-PCB-111	USEPA 1668	0.001
CL5-PCB-112	USEPA 1668	0.001
CL5-PCB-113	USEPA 1668	0.001
CL5-PCB-114	USEPA 1668	0.001
CL5-PCB-115	USEPA 1668	0.001
CL5-PCB-116	USEPA 1668	0.001
CL5-PCB-117	USEPA 1668	0.001
CL5-PCB-118	USEPA 1668	0.001
CL5-PCB-119	USEPA 1668	0.001
CL5-PCB-120	USEPA 1668	0.001
CL5-PCB-121	USEPA 1668	0.001
CL5-PCB-122	USEPA 1668	0.001
CL5-PCB-123	USEPA 1668	0.001
CL5-PCB-124	USEPA 1668	0.001
CL5-PCB-125	USEPA 1668	0.001
CL5-PCB-126	USEPA 1668	0.001
CL5-PCB-127	USEPA 1668	0.001
CL6-PCB-128	USEPA 1668	0.001
CL6-PCB-129	USEPA 1668	0.001
CL6-PCB-130	USEPA 1668	0.001
CL6-PCB-131	USEPA 1668	0.001
CL6-PCB-132	USEPA 1668	0.001
CL6-PCB-133	USEPA 1668	0.001
CL6-PCB-134	USEPA 1668	0.001
CL6-PCB-135	USEPA 1668	0.001
CL6-PCB-136	USEPA 1668	0.001
CL6-PCB-137	USEPA 1668	0.001

Table 8
Tissue Analytical Methods and Target Reporting Limits

Parameter[a]	Analytical Method[b]	Target Reporting Limit[c]
CL6-PCB-138	USEPA 1668	0.001
CL6-PCB-139	USEPA 1668	0.001
CL6-PCB-140	USEPA 1668	0.001
CL6-PCB-141	USEPA 1668	0.001
CL6-PCB-142	USEPA 1668	0.001
CL6-PCB-143	USEPA 1668	0.001
CL6-PCB-144	USEPA 1668	0.001
CL6-PCB-145	USEPA 1668	0.001
CL6-PCB-146	USEPA 1668	0.001
CL6-PCB-147	USEPA 1668	0.001
CL6-PCB-148	USEPA 1668	0.001
CL6-PCB-149	USEPA 1668	0.001
CL6-PCB-150	USEPA 1668	0.001
CL6-PCB-151	USEPA 1668	0.001
CL6-PCB-152	USEPA 1668	0.001
CL6-PCB-153	USEPA 1668	0.001
CL6-PCB-154	USEPA 1668	0.001
CL6-PCB-155	USEPA 1668	0.001
CL6-PCB-156	USEPA 1668	0.001
CL6-PCB-157	USEPA 1668	0.001
CL6-PCB-158	USEPA 1668	0.001
CL6-PCB-159	USEPA 1668	0.001
CL6-PCB-160	USEPA 1668	0.001
CL6-PCB-161	USEPA 1668	0.001
CL6-PCB-162	USEPA 1668	0.001
CL6-PCB-163	USEPA 1668	0.001
CL6-PCB-164	USEPA 1668	0.001
CL6-PCB-165	USEPA 1668	0.001
CL6-PCB-166	USEPA 1668	0.001
CL6-PCB-167	USEPA 1668	0.001
CL6-PCB-168	USEPA 1668	0.001
CL6-PCB-169	USEPA 1668	0.001
CL7-PCB-170	USEPA 1668	0.001
CL7-PCB-171	USEPA 1668	0.001
CL7-PCB-172	USEPA 1668	0.001
CL7-PCB-173	USEPA 1668	0.001
CL7-PCB-174	USEPA 1668	0.001
CL7-PCB-175	USEPA 1668	0.001
CL7-PCB-176	USEPA 1668	0.001
CL7-PCB-177	USEPA 1668	0.001
CL7-PCB-178	USEPA 1668	0.001
CL7-PCB-179	USEPA 1668	0.001
CL7-PCB-180	USEPA 1668	0.001
CL7-PCB-181	USEPA 1668	0.001
CL7-PCB-182	USEPA 1668	0.001
CL7-PCB-183	USEPA 1668	0.001
CL7-PCB-184	USEPA 1668	0.001
CL7-PCB-185	USEPA 1668	0.001
CL7-PCB-186	USEPA 1668	0.001

Table 8
Tissue Analytical Methods and Target Reporting Limits

Parameter[a]	Analytical Method[b]	Target Reporting Limit[c]
CL7-PCB-187	USEPA 1668	0.001
CL7-PCB-188	USEPA 1668	0.001
CL7-PCB-189	USEPA 1668	0.001
CL7-PCB-190	USEPA 1668	0.001
CL7-PCB-191	USEPA 1668	0.001
CL7-PCB-192	USEPA 1668	0.001
CL7-PCB-193	USEPA 1668	0.001
CL8-PCB-194	USEPA 1668	0.001
CL8-PCB-195	USEPA 1668	0.001
CL8-PCB-196	USEPA 1668	0.001
CL8-PCB-197	USEPA 1668	0.001
CL8-PCB-198	USEPA 1668	0.001
CL8-PCB-199	USEPA 1668	0.001
CL8-PCB-200	USEPA 1668	0.001
CL8-PCB-201	USEPA 1668	0.001
CL8-PCB-202	USEPA 1668	0.001
CL8-PCB-203	USEPA 1668	0.001
CL8-PCB-204	USEPA 1668	0.001
CL8-PCB-205	USEPA 1668	0.001
CL9-PCB-206	USEPA 1668	0.001
CL9-PCB-207	USEPA 1668	0.001
CL9-PCB-208	USEPA 1668	0.001
CL10-PCB-209	USEPA 1668	0.001

Notes:

Data will be reported uncorrected for lipids or moisture content.

Laboratory reporting limits are revised periodically, and may change over the duration of this project. Reporting limits should be verified by each lab when

CFR = Code of Federal Regulations

ng/g = nanogram per gram

MDL = method detection limit

N/A = not applicable

NOAA = National Oceanic and Atmospheric Administration

QAPP = Quality Assurance Project Plan

QA/QC = quality assurance/quality control

RL = reporting limit

PCB = polychlorinated biphenyl

SWAMP = California Surface Water Ambient Monitoring Program

TBD = to be determined

USEPA = U.S. Environmental Protection Agency

a Specific analytes used for each study conducted for the Ports may vary by waterbody, according to the listings.

b Laboratories may use different versions of recommended methods (i.e. USEPA 8270C) as long as the QA/QC elements identified in this QAPP are met.

c Matrix interference and/or dilutions due to non-target analytes may increase target reporting limits. The method detection limit (MDL) should be at least three times lower than the reporting limit (40 CFR part 136) but will vary per instrument by MDL study.

d Total chlordane is calculated using the following compounds: alpha-chlordane, gamma-chlordane, oxychlordane, cis-nonachlor, and trans-nonachlor.

e PCB co-elutions will vary by instrument and column, and may increase reporting limits for some congeners.

f TMDL sediment target for this compound is currently below achievable laboratory reporting limits. Results should be reported to the EDL/MDL.

Table 9
Laboratory Quality Assurance/Quality Control Definitions

Laboratory Quality Control	Definition
Calibration	A comparison of a measurement standard, instrument, or item with one having higher accuracy to detect, quantify, and record any inaccuracy or variation; the process by which an instrument setting is adjusted based on response to a standard to eliminate the inaccuracy.
Certified/Standard Reference Material	A substance whose property values are certified by a procedure that establishes its traceability and uncertainty at a stated level of confidence.
Continuing Calibration Verification	A periodic standard used to assess instrument drift between calibrations.
Internal Standard	Pure analyte(s) added to a sample, extract, or standard solution in known amount(s) and used to measure the relative responses of othermethod analytes that are components of the same sample or solution. The internal standard must be an analyte that is not a sample component.
Laboratory Replicate	Two or more representative portions taken from one homogeneous sample by the analyst and analyzed in the same testing facility.
Laboratory Control Sample	A specimen of known composition prepared using contaminant-free reagent water, or an inert solid, which is spiked with the analyte of interest at the midpoint of the calibration curve or at the level of concern, and then analyzed using the same preparation, reagents, and analytical methods employed for regular specimens and at the intervals set in the Quality Assurance Project Plan.
Matrix Spike	A test specimen prepared by adding a known concentration of the target analyte to a specified amount of a specific homogenized specimen where an estimate of the target concentration is available and subjected to the entire analytical protocol.
Matrix Spike Duplicate	A sample prepared simultaneously as a split with the matrix spike sample with each specimen being spiked with identical, known concentrations of targeted analyte.
Method Blank	A blank prepared to represent the sample matrix as closely as possible and analyzed exactly like the calibration standards, samples, and quality control (QC) samples. Results of method blanks provide an estimate of the within-batch variability of the blank response and an indication of bias introduced by the analytical procedure.
Sample Batch	Twenty or fewer field samples prepared and analyzed with a common set of quality assurance samples.
Surrogate	A pure substance with properties that mimics the analyte of interest (organics only) and which is unlikely to be found in environmental samples. It is added into a sample before sample preparation.

Table 10
Frequencies for Laboratory Quality Assurance/Quality Control Samples

Analysis Type	Initial Calibration[a,b]	Continuing Calibration Verification	LCS or SRM[c]	Replicates	Matrix Spikes	Matrix Spike Duplicates	Method Blanks	Surrogate Spikes	Internal Standard
Total solids and conventionals	Daily or each batch	N/A	N/A	1 per 20 samples	N/A	N/A	N/A	N/A	N/A
Lipids	Daily or each batch	N/A	N/A	1 per 20 samples	N/A	N/A	N/A	N/A	N/A
Grain size	Daily or each batch	N/A	N/A	1 per 20 samples	N/A	N/A	N/A	N/A	N/A
Particle size determination	Daily or each batch	N/A	N/A	1 per 20 samples	N/A	N/A	N/A	N/A	N/A
Total suspended and dissolved solids	Daily or each batch	N/A	N/A	1 per 20 samples	N/A	N/A	N/A	N/A	N/A
Total and dissolved organic carbon	Daily or each batch	1 per 10 analytical runs	1 per 20 samples or 1 per batch	1 per 20 samples or 1 per batch	1 per 20 samples or 1 per batch	N/A	Each batch	N/A	N/A
Particulate organic carbon	Daily or each batch	1 per 10 samples	1 per 20 samples	1 per 20 samples	1 per 20 samples	N/A	Each batch	N/A	N/A
Total and dissolved metals	Daily or each batch	Per 10 analytical runs	1 per 20 samples or 1 per batch	1 per 20 samples or 1 per batch	1 per 20 samples or 1 per batch	N/A	Each batch	N/A	Per method
PCBs by low resolution method	As needed	Every 12 hours	1 per 20 samples or 1 per batch	N/A	1 per 20 samples or 1 per batch	1 per 20 samples or 1 per batch	Each batch	Every sample	Every sample
PCB Congeners by high resolution method	As needed	Every 12 hours	1 per 20 samples	N/A	N/A[d]	N/A[d]	1 per 20 samples	N/A[d]	Every sample
PAHs	As needed	Every 12 hours	1 per 20 samples or 1 per batch	N/A	1 per 20 samples or 1 per batch	1 per 20 samples or 1 per batch	Each batch	Every sample	Every sample
Organochlorine pesticides by low resolution method	As needed	Per 10 analytical runs	1 per 20 samples or 1 per batch	N/A	1 per 20 samples or 1 per batch	1 per 20 samples or 1 per batch	Each batch	Every sample	Every sample
Organochlorine pesticides by high resolution method	As needed	Every 12 hours	1 per 20 samples	N/A	N/A[d]	N/A[d]	1 per 20 samples	N/A[d]	Every sample

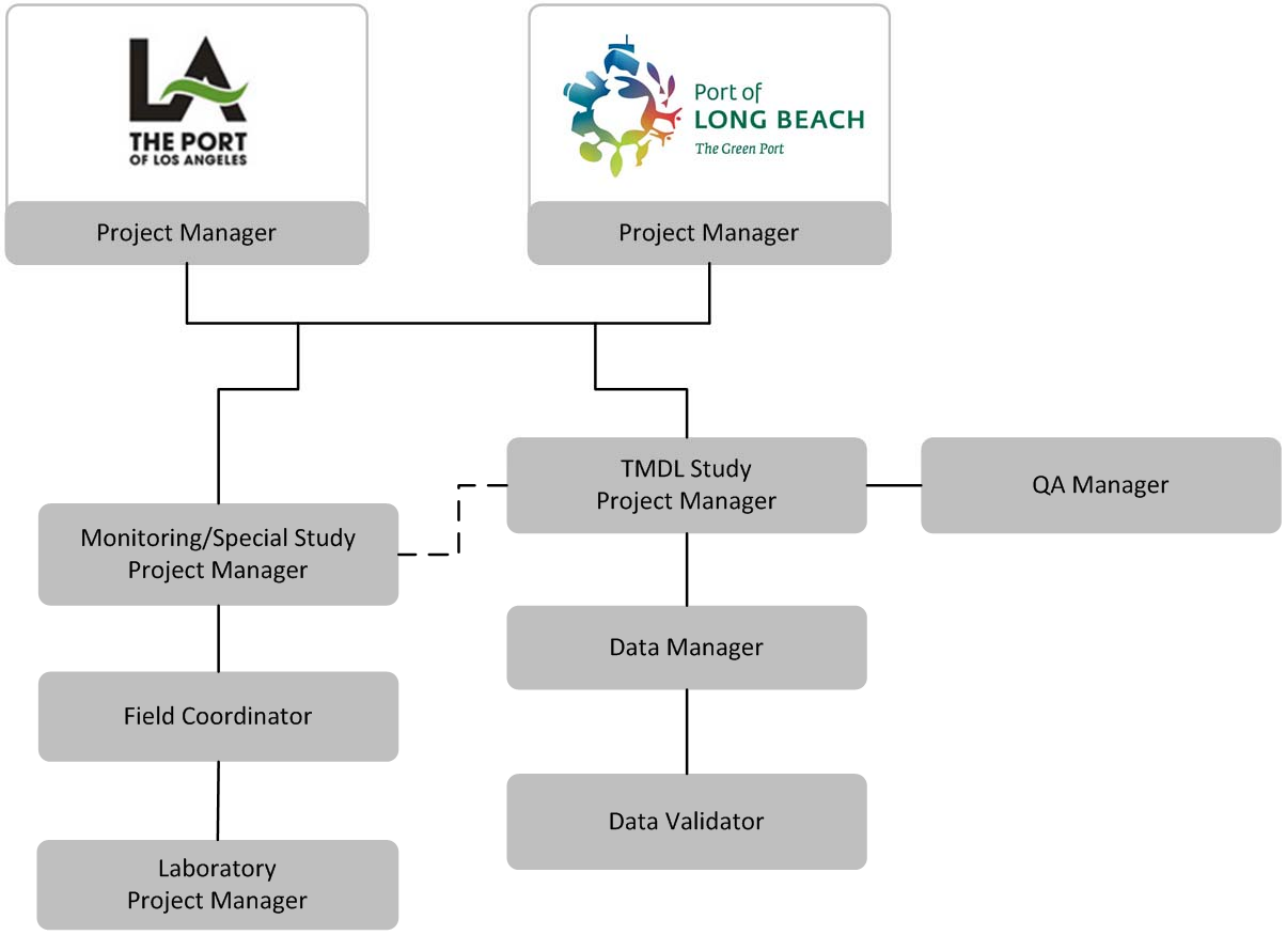
Notes:
Primary column is considered the column that contains the highest value with the least interference.
Values should have RPDs less than 40 percent or they are P flagged. ICALS = 20 percent or less and CCALS = 15 percent or less.
LCS = Laboratory control sample
N/A = not applicable
SRM = standard reference material
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
a For physical tests, calibration and certification of drying ovens and weighing scales are conducted annually.
b Calibrations should be conducted per analytical methods or instrument manufacturers specifications.
c When a Standard Reference Material is not available, an LCS will be analyzed.
d Isotope dilution quantitation technique accounts for matrix interferences thus MS/MSD are not required.

Table 11
Laboratory and Reporting Data Quality Objectives

Parameter	Precision[a]	Accuracy[b]	Completeness[c]
Sediments			
Total solids and conventionals	± 25% RPD	N/A	90%
Grain size	± 25% RPD	N/A	90%
Total organic carbon	± 25% RPD	80-120% R	90%
Porewater dissolved organic carbon	± 25% RPD	80-120% R	90%
Total metals	± 25% RPD	75-125% R	90%
Polycyclic aromatic hydrocarbons[d]	± 25% RPD	50-150% R	90%
Organochlorine pesticides[d]	± 25% RPD	50-150% R	90%
PCB Congeners[d]	± 25% RPD	50-150% R	90%
Tissues			
Lipids	± 25% RPD	N/A	90%
Organochlorine pesticides[d]	± 25% RPD	50-150% R	90%
PCB Congeners[d]	± 25% RPD	50-150% R	90%
Water			
Particle size determination	± 25% RPD	N/A	90%
Hardness	± 25% RPD	N/A	90%
Total suspended and dissolved solids	± 25% RPD	N/A	90%
Total and dissolved organic carbon	± 25% RPD	80-120% R	90%
Particulate organic carbon	± 25% RPD	80-120% R	90%
Total and dissolved metals	± 25% RPD	75-125% R	90%
Organochlorine pesticides[d]	± 25% RPD	50-150% R	90%
PCB Congeners[d]	± 25% RPD	50-150% R	90%

Notes:
CRM = certified reference material
PCB = polychlorinated biphenyl
R = recovery
RPD = relative percent difference
a Not applicable if native concentration of either sample is less than five times the reporting limit. In these situations, the difference between the sample result and duplicate result must be within ± 2 times the reporting limit for sediments, or ± 1 times the reporting limit for waters to meet control
b Laboratory control sample , CRMs, and matrix spike/matrix spike duplicate percent recovery.
c Percent of each class of analytes that are not rejected after data validation conducted in accordance
d The accuracy goal is 70 to 130% R if certified reference material is used.

FIGURES



ANCHOR QEA

Figure 1
Organizational Chart
Monitoring/Special Studies for Harbor Toxics TMDL

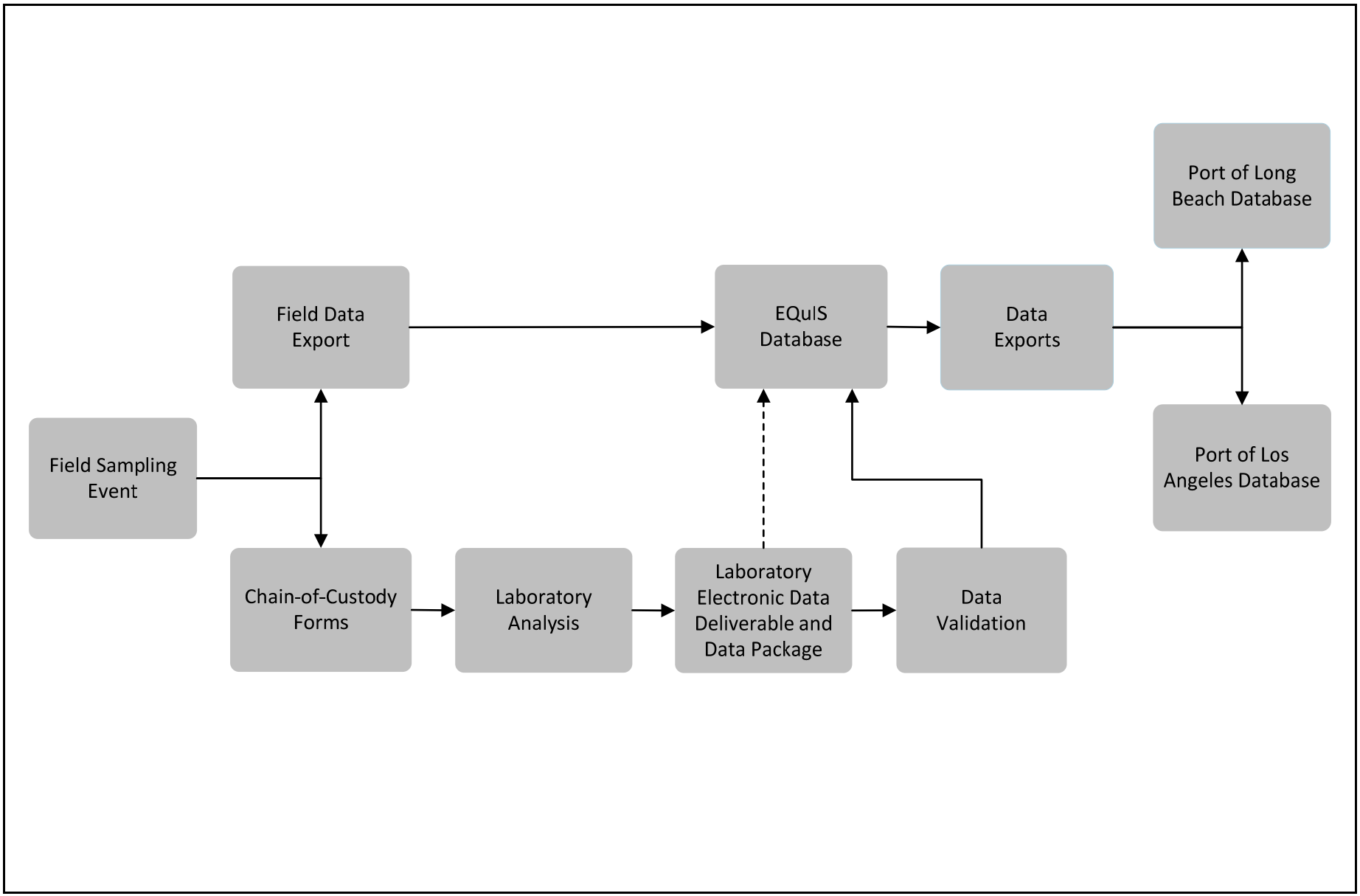


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Figure 2
Data Flow Diagram
Monitoring/Special Studies for Harbor Toxics TMDL

APPENDIX A
CUSTOM EQUIS ELECTRONIC DATA DELIVERABLE SPECIFICATIONS

Table A-1
SMP File Structure and Type Descriptions

Field Name	Description	Format	Valid Values	Example	Comments
sys_sample_code	Unique sample identifier	**REQUIRED.** Text(40)		Sample-CMP4	Each sample, including field and laboratory QC samples, spikes, duplicates, and blanks must have a unique value. It should match the sample ID on the chain-of-custody form. For example, trip blanks should be given a unique value such as "TB-01-20140101" instead of "Trip Blank".
sample_name	Sample identifier	Text(50)		*NULL*	Populate with the sys_sample_code or leave as NULL.
sample_matrix_code	Code that distinguishes between different types of sample matrix. For example, soil samples must be distinguished from ground water samples.	**REQUIRED.** Text(10)	Refer to rt_matrix	SE	The matrix of the sample as analyzed may be different from the matrix of the sample as collected (e.g., leachates), so this field is required at both the sample and the test level. For samples that have sample_type_code of MB, BS, BSD, SRM, RB, or TB, the sample_matrix_code should be SQ or WQ.
sample_type_code	Code that distinguishes between different types of samples. For example, normal field samples must be distinguished from laboratory method blank samples.	**REQUIRED.** Text(20)	Refer to rt_sample_type	N	Use "BS" for ongoing precision and recovery samples.
sample_source	Field that identifies the location where the sample was collected or where the field observation or measurement was made.	**REQUIRED.** Text(10)	**Field** - if a test was requested by the client **Lab** - if a test is run for laboratory QC purposes	Field	
parent_sample_code	The source sample associated with this sample. For example, the parent sample of a lab duplicate sample would be the sample that was duplicated.	**REQUIRED if the sample is a matrix spike or a replicate.** Text(40)	Must match an existing sys_sample_code in this table.	(Where applicable)	A matrix spike or a replicate would have a sample_type_code of LR, MS, MSD, or BSD, for example. Field replicates may be submitted blind to the laboratory, so this field is not required for those samples. Must be NULL for samples that have no parent (e.g., normal field sample, blank, and blank spike).
sample_date	The date/time data were collected in the field (e.g., sample collection, field measurement, and field observation).	**REQUIRED.** DateTime (mm/dd/yyyy HH:MM)		6/5/02 14:30	Date/time information must be identical with the date/time on the chain-of-custody form. Leave blank for laboratory samples.
sys_loc_code	Unique location ID	Optional. Text(20)		*NULL*	
start_depth	Beginning depth (top) of soil sample	Optional. Numeric		*NULL*	
end_depth	Ending depth (bottom) of soil sample	Optional. Numeric		*NULL*	
depth_unit	Depth unit	Optional. Text(15)		*NULL*	
chain_of_custody	Chain-of-custody identifier	Optional. Text(40)		*NULL*	
sent_to_lab_date	The date/time sample was sent to the laboratory	Optional. DateTime (mm/dd/yyyy HH:MM)		6/10/02 15:01	Date/time information must be identical with the date/time on the chain-of-custody form. Leave blank for laboratory samples.
sample_receipt_date	The date/time sample was received by the laboratory	**REQUIRED.** DateTime (mm/dd/yyyy HH:MM)		6/10/02 15:02	Date/time information must be identical with the date/time on the chain-of-custody form. Leave blank for laboratory samples.

Table A-1
SMP File Structure and Type Descriptions

Field Name	Description	Format	Valid Values	Example	Comments
sampler	Name of person who collected data (e.g., sample, measurement, and observation)	Optional. Text(50)		*NULL*	
sampling_company_code	Name of the company associated with the sampler	Optional. Text(20)		*NULL*	
sampling_reason	Reason for sampling	Optional. Text(30)		*NULL*	
sample_method	Sampling technique	Optional. Text(40)		*NULL*	
task_code	Task code specific to Anchor QEA's EQuIS database	Optional. Text(40)		*NULL*	
composite_yn	Indicates whether or not the sample is a composite	Optional. Text(1)	**Y** - Yes **N** - No	*NULL*	
composite_desc	Description related to the composite sample or compositing procedures	Optional. Text(255)		*NULL*	
sample_class		Optional. Text(10)		*NULL*	
comment	Sample-specific comments	Optional. Text(2000)		*NULL*	

Notes:
Red fields are required.
NULL = no value expected from laboratory

Table A-2
TST File Structure and Type Descriptions

Field Name	Description	Format	Valid Values	Example	Comments
sys_sample_code	Unique sample identifier	**REQUIRED.** Text(40)	Must match the sys_sample_codes listed in .SMP file	Sample-CMP1	Each sample, including field and laboratory QC samples, spikes, duplicates, and blanks must have a unique value. It should match the sample ID on the chain of custody form. For example, trip blanks should be given a unique value such as "TB-01-20140101" instead of "Trip Blank".
analytic_method	Laboratory analytical method name	**REQUIRED.** Text(20)	Refer to rt_analytic_method	SW8081	Contact Anchor QEA personnel to request a method to be added to the reference tables.
analysis_date	The date/time sample was analyzed in the laboratory	**REQUIRED.** DateTime (mm/dd/yyyy HH:MM)		6/21/02 14:10	
fraction	Sample fraction	**REQUIRED.** Text(10)	**T -** Total or not applicable **D -** Dissolved	T	Use "D" for total dissolved solids results.
column_number	Column number assigned by the laboratory	**REQUIRED.** Text(2)	**NA** - not applicable **1C** - column 1 **2C** - column 2	NA	All results can be reported as "NA". The column_number could also be 1C or 2C, etc., if the instrument uses multiple columns.
test_type	Type of test in the laboratory. This field is used to distinguish between initial runs, reextractions, reanalysis, and dilutions.	**REQUIRED.** Text(10)	**AverageLab** - Average of several results, laboratory calculated **Dilution** - Dilution **Dilution2** - Dilution (second time) **Initial** - Initial **Initial2** - Second initial run where multiple analysis on same sample and test is requested **Reanalysis** - Reanalysis (first time) **Reanal2** - Reanalysis (second time) **Reextract** - Reextract Refer to rt_test_type for more details.	Initial	

Table A-2
TST File Structure and Type Descriptions

Field Name	Description	Format	Valid Values	Example	Comments
lab_matrix_code	Code which describes the matrix as analyzed by the laboratory	**REQUIRED.** Text(10)	**AIR** - Air **SE** - Sediment **SO** - Soil **SQ** - Soil/solid quality control matrix **STS** - Stormwater solids **TA** - Animal tissue **TBIO** - Tissue bioaccumulation testing **TQ** - Tissue quality control matrix **WEL** - Elutriate **WG** - Groundwater **WH** - Equipment wash water **WIPE** - Swab or wipe **WL** - Leachate **WQ** - Water quality control matrix **WS** - Surface water **WSP** - Seep water **WST** - Stormwater **WW** - Wastewater **WX** - Porewater Refer to rt_matrix for complete list.	SE	Lab_matrix_code must match sample_matrix_code for all samples except leachate, elutriate, and porewater samples. All leachate, elutriate, and porewater samples are required to have unique test records that have lab_matrix_code of "WL", "WEL", and "WX", respectively. Do not use "SO" for Solid. SO = Soil Use "SQ" or "WQ" for laboratory or field QC samples (e.g. blank, blank spike, blank spike duplicate, and rinse blank). For samples that have a parent sample (e.g. laboratory replicate, matrix spike, matrix spike duplicate, and field replicate), use the same code as the parent sample.
analysis_location	Note where was sample analyzed	**REQUIRED.** Text(2)	**FI** - Field instrument **FL** - Mobile field laboratory analysis **LB** - Fixed-based laboratory analysis	LB	Most commonly LB.
basis	Measurement basis for the data	**REQUIRED.** Text(10)	**Dry** - Dry-weight basis reporting **Wet** - Wet-weight basis reporting **NA** - Not applicable	Dry	For solid matrices, basis must be either "Dry" for dry-weight basis reporting, "Wet" for wet-weight basis reporting, or "NA" for tests for which this distinction is not applicable. For example, total solids should be reported as "NA". For aqueous matrices, basis must be "NA" since measuring basis conversions cannot be performed. Total dissolved solids should be reported as "NA".
container_id	Sample container identifier	Optional. Text(30)			
dilution_factor	Dilution factor at which the analyte was measured effectively	**REQUIRED.** Numeric		1	Enter "1" if not diluted.
prep_method	Laboratory sample preparation method code	**REQUIRED.** Text(20)	Refer to rt_prep_method	SW3550B	Use "METHOD" if the preparation method is included in the analytic_method. Contact Anchor QEA personnel to request a value to be added to the reference tables.
prep_date	The date/time sample was prepared or extracted in the laboratory	**REQUIRED.** DateTime (mm/dd/yyyy HH:MM)		6/14/02 13:10	

Table A-2
TST File Structure and Type Descriptions

Field Name	Description	Format	Valid Values	Example	Comments
leach_elut_method	Laboratory leachate generation method name	**REQUIRED if lab_matrix_code is WL or WEL.** Text(15)	**DI-WET** - Waste Extraction Test with deionized water **DRET** - Dredge Elutriate Test **MET** - Modified Elutriate Test **PCLT** - Pancake Column Leachate Test **SBLT** - Sequential Batch Leachate Test **SET** - Standard Elutriate Test **SW1311** - TCLP **SW1312** - SPLP	SW1311	Must be populated for leachate or elutriate samples. Contact Anchor QEA personnel to request a value to be added to the reference tables.
leach_elut_date	The date/time leachate was prepared or extracted in the laboratory	**REQUIRED if lab_matrix_code is WL or WEL.** DateTime (mm/dd/yyyy HH:MM)		6/15/02 13:10	
lab_name_code	Unique identifier of the laboratory	**REQUIRED.** Text(20)	Refer to rt_company	ARIS	Contact Anchor QEA personnel to request a value to be added to the reference tables.
qc_level	Quality control level of analysis	Optional. Text(10)			
lab_sample_id	Laboratory LIMS sample identifier	**REQUIRED.** Text(40)		02-7599-EL34A	If necessary, a field sample may have more than one LIMS lab_sample_id (maximum one per each test event).
percent_moisture	Default is NULL	*NULL*		*NULL*	DO NOT POPULATE WITH A RESULT. These results should be included as a row in the RES file.
subsample_amount	Amount of sample used for test	Optional. Text(14)		25.4	
subsample_amount_unit	Unit of measurement for subsample_amount	Optional. Text(15)	Refer to rt_unit	g	Contact Anchor QEA personnel to request a value to be added to the reference tables.
analyst_name	Name or initials of laboratory analyst	Optional. Text(50)		MDR	
instrument_id	Instrument identifier	Optional. Text(60)		ECD4	
comment	Test-specific comments	Optional. Text(2000)		*NULL*	
preservative	Sample preservative used	Optional. Text(20)	**4degC** - Store cool at 4 degC **Frozen** - Frozen, anything below zero degrees Celsius **H2SO4** - Sulfuric acid **HCl** - Hydrochloric acid **HNO3** - Nitric acid **MeOH** - Methanol **NaHSO4** - Sodium bisulfate **NaOH** - Sodium hydroxide **NaOH-ZnAc** - Sodium hydroxide and zinc acetate (common preservative for sulfide analysis) **None** - Unpreserved Refer to rt_preservative	*NULL*	Contact Anchor QEA personnel to request a value to be added to the reference tables.
final_volume	The final volume of the sample after sample preparation	**REQUIRED.** Text(15)		5	Include all dilution factors.
final_volume_unit	Unit of measurement for final_volume	**REQUIRED.** Text(15)		mL	

Table A-2
TST File Structure and Type Descriptions

Field Name	Description	Format	Valid Values	Example	Comments
Lab_SDG	Sample delivery group number assigned by the laboratory	**REQUIRED.** Text(20)		EL34	

Notes:
Red fields are required.
NULL = no value expected from laboratory

Table A-3
RES File Structure and Type Descriptions

Field Name	Description	Format	Valid Values	Example	Comments
sys_sample_code	Unique sample identifier	**REQUIRED.** Text(40)	Must match the sys_sample_codes listed in .SMP file	Sample-CMP4	Each sample, including field and laboratory QC samples, spikes, duplicates, and blanks, must have a unique value. It should match the sample ID on the chain of custody form. For example, trip blanks should be given a unique value such as "TB-01-20140101" instead of "Trip Blank".
analytic_method	Laboratory analytic method name	**REQUIRED.** Text(20)	Refer to rt_analytic_method Must match the analytical method entered in .TST file	SW8270	Contact Anchor QEA personnel to request a method to be added to the reference tables.
analysis_date	The date/time sample was analyzed in the laboratory	REQUIRED. DateTime (mm/dd/yyyy HH:MM)		6/21/02 14:10	
fraction	Sample fraction	**REQUIRED.** Text(10)	**T -** Total or not applicable **D -** Dissolved	T	
column_number	Column number assigned by the laboratory	**REQUIRED.** Text(2)	**NA - not applicable** **1C - column 1** **2C - column 2**	NA	All results can be reported as "NA". The column_number could also be 1C or 2C, etc., if the instrument uses multiple columns.
test_type	Type of test in the laboratory. This field is used to distinguish between initial runs, reextractions, reanalysis, and dilutions.	**REQUIRED.** Text(10)	AverageLab - Average of several results, laboratory calculated Dilution - Dilution Dilution2 - Dilution (second time) Initial - Initial Initial2 - Second initial run where multiple analysis on same sample and test is requested Reanalysis - Reanalysis (first time) Reanal2 - Reanalysis (second time) Reextract - Reextract Refer to rt_test_type for more details.	Initial	
cas_rn	CAS Registry Number	**REQUIRED.** Text(15)	Refer to rt_analyte	108-95-2	
chemical_name	Corresponding chemical name of CAS number	**REQUIRED.** Text(255)	Must match the CAS number and chemical as listed in rt_analyte	Phenol	

Table A-3
RES File Structure and Type Descriptions

Field Name	Description	Format	Valid Values	Example	Comments
result_value	Result value with appropriate significant digits	**REQUIRED.** Text(19)		20	Must be left blank if analyte was not detected. Surrogates must be reported as a percent recovery in "pct" units and not as the measured concentration. Laboratory QC samples (e.g., blank, blank spike, and matrix spike) must be reported as a measured concentration. If result is numeric, ensure that significant digits for zeros are maintained. May be populated with non-numeric results (e.g., "Non-Plastic" for Atterberg Limits or "DETECT" for TPH-HCID results).
result_error_delta	Error range applicable to the result value	**REQUIRED for radiochemistry results.** Text(20)		0.07	Typically used for radiochemistry results
uncertainty	Amount of uncertainty associated with result_value	**REQUIRED for radiochemistry results.** Text(10)		2 sigma	Typically used for radiochemistry results (e.g., 2 sigma)
result_type_code	Result type	**REQUIRED.** Text(10)	**IS** - Internal standard **SC** - Spiked compound **SUR** - Surrogate **TIC** - Tentatively identified compound **TRG** - Target compound (regular result)	TRG	Typically "TRG" for regular results and "SC" for blank spikes and matrix spikes
reportable_result	Indicates whether or not the result is reportable or useable	**REQUIRED.** Text(10)	**Yes** **No**	Yes	If a dilution, reextraction, or reanalysis was completed, assign "No" to the superseded or unusable results.
detect_flag	Indicates whether or not the result is detected	**REQUIRED.** Text(2)	**Y** - detect **N** - non-detect	Y	
lab_qualifiers	Qualifier flags assigned by the laboratory	**REQUIRED.** Text(20)		J	If applicable
method_detection_limit	MDL value	**REQUIRED.** Text(20)		15	May be populated with the EDL for high-resolution methods or CRDL. Limits should be reported in the same unit as the result_value.
reporting_detection_limit	MRL	**REQUIRED.** Text(20)		20	Limits should be reported in the same unit as the result_value.
quantitation_limit	PQL	Optional. Text(20)		15	Limits should be reported in the same unit as the result_value.
result_unit	Units of measurement for the result unit	**REQUIRED.** Text(15)	Refer to rt_unit	µg/kg	
tic_retention_time	TIC retention time	Optional. Text(8)			
result_comment	Result-specific comments	Optional. Text(2000)			

Table A-3
RES File Structure and Type Descriptions

Field Name	Description	Format	Valid Values	Example	Comments
qc_original_conc	The concentration of the analyte in the original (unspiked) sample	**REQUIRED for laboratory QC samples.** Text(14)		0	Might be required for spikes and spike duplicates (depending on user needs). Not necessary for surrogates or blank spikes where the original concentration is assumed to be zero. Must be reported in the same units as the result_value.
qc_spike_added	The concentration of the analyte added to the original sample	**REQUIRED for laboratory QC samples.** Text(14)		450	Might be required for matrix spikes, surrogates, blank spikes, and any spiked samples (depending on user needs). Must be reported in the same units as the result_value.
qc_spike_measured	The measured concentration of the analyte	**REQUIRED for laboratory QC samples.** Text(14)		400	Use zero for spiked compounds that were not detected in the sample. Might be required for matrix spikes, spike duplicates, surrogates, blank spikes, and any spiked samples (depending on user needs). Must be reported in the same units as the result_value.
qc_spike_recovery	The percent recovery calculated as specified by the laboratory QC program	**REQUIRED for laboratory QC samples.** Text(14)		0	Always required for matrix spikes, spike duplicates, surrogates, blank spikes, and any spiked samples. Report as percentage multiplied by 100 (e.g., report 120% as 120).
qc_dup_original_conc	The concentration of the analyte in the original (unspiked) sample	**REQUIRED for laboratory QC samples.** Text(14)			Might be required for spike or blank spike duplicates only (depending on user needs). Not necessary for surrogates or blank spikes (where the original concentration is assumed to be zero). Must be reported in the same units as the result_value.
qc_dup_spike_added	The concentration of the analyte added to the duplicate sample	**REQUIRED for laboratory QC samples.** Text(14)			Might be required for spike or blank spike duplicates, surrogates, and any spiked and duplicated samples (depending on user needs). Must be reported in the same units as the result_value.
qc_dup_spike_measured	The measured concentration of the analyte in the duplicate	**REQUIRED for laboratory QC samples.** Text(14)			Use zero for spiked compounds that were not detected in the sample. Might be required for matrix spikes and blank spike duplicates, surrogates, and any other spiked and duplicated samples.
qc_dup_spike_recovery	The duplicate percent recovery calculated as specified by the laboratory QC program	**REQUIRED for laboratory QC samples.** Text(14)			Always required for matrix spike or blank spike duplicates, surrogates, and any other spiked and duplicated samples. Report as percentage multiplied by 100 (e.g., 50% as 50).

Table A-3
RES File Structure and Type Descriptions

Field Name	Description	Format	Valid Values	Example	Comments
qc_rpd	The relative percent difference calculated as specified by the laboratory QC program	**REQUIRED for laboratory QC samples.** Text(14)			Required for duplicate samples as appropriate. Report as percentage multiplied by 100 (e.g., report 30% as 30).
qc_spike_lcl	Lower control limit for spike recovery	**REQUIRED for laboratory QC samples.** Text(14)		52	Required for matrix spikes, spike duplicates, surrogates, blank spikes, and any spiked samples. Report as percentage multiplied by 100 (e.g., report 80% as 80).
qc_spike_ucl	Upper control limit for spike recovery	**REQUIRED for laboratory QC samples.** Text(14)		130	Required for matrix spikes, spike duplicates, surrogates, blank spikes, and any spiked samples. Report as percentage multiplied by 100 (e.g., report 120% as 120).
qc_rpd_cl	Relative percent difference control limit	**REQUIRED for laboratory QC samples.** Text(14)			Required for any duplicated sample. Report as percentage multiplied by 100 (e.g., report 25% as 25).
qc_spike_status	Used to indicate whether the spike recovery was within control limits	**REQUIRED for laboratory QC samples.** Text(10)	**NULL** - if within control limits ***** - if out of control limits		Use the * character to indicate failure, otherwise leave blank. Required for matrix spikes, spike duplicates, surrogates, blank spikes, and any spiked samples.
qc_dup_spike_status	Used to indicate whether the duplicate spike recovery was within control limits	**REQUIRED for laboratory QC samples.** Text(10)	**NULL** - if within control limits ***** - if out of control limits		Use the * character to indicate failure, otherwise leave blank. Required for any spiked and duplicated sample.
qc_rpd_status	Used to indicate whether the relative percent difference was within control limits	**REQUIRED for laboratory QC samples.** Text(10)	**NULL** - if within control limits ***** - if out of control limits		Use the * character to indicate failure, otherwise leave blank. Required for any duplicated sample.

Notes:
Red fields are required.
NULL = no value expected from laboratory

Table A-4
BCH File Structure and Type Descriptions

Field Name	Description	Format	Valid Values	Example	Comments
sys_sample_code	Unique sample identifier	**REQUIRED.** Text(40)	Must match the sys_sample_codes listed in .SMP file	Sample-CMP4	Each sample, including field and laboratory QC samples, spikes, duplicates, and blanks, must have a unique value. It should match the sample ID on the chain of custody form. For example, trip blanks should be given a unique value such as "TB-01-20140101" instead of "Trip Blank".
analytic_method	Laboratory analytic method name	**REQUIRED.** Text(20)	Refer to rt_analytic_method Must match the analytical method entered in .TST file	SW8270	
analysis_date	The date/time sample was analyzed in the laboratory	**REQUIRED.** DateTime (mm/dd/yyyy HH:MM)		6/20/02 17:10	
fraction	Sample fraction	**REQUIRED.** Text(10)	**T -** Total or not applicable **D -** Dissolved	T	
column_number	Column number assigned by the laboratory	**REQUIRED.** Text(2)	**NA** - not applicable **1C** - column 1 **2C** - column 2	NA	All results can be reported as "NA". The column_number could also be 1C or 2C, etc., if the instrument uses multiple columns.
test_type	Type of test in the laboratory. This field is used to distinguish between initial runs, reextractions, reanalysis, and dilutions.	**REQUIRED.** Text(10)	**AverageLab** - Average of several results, laboratory calculated **Dilution** - Dilution **Dilution2** - Dilution (second time) **Initial** - Initial **Initial2** - Second initial run where multiple analysis on same sample and test is requested **Reanalysis** - Reanalysis (first time) **Reanal2** - Reanalysis (second time) **Reextract** - Reextract Refer to rt_test_type for more details.	Initial	
test_batch_type	Laboratory batch type	**REQUIRED.** Text(10)	**Analysis** - Sample analysis batch **Elut** - Elutriate batch **Leach** - Leachate batch **Prep** - Sample preparation batch	Prep	
test_batch_id	Unique identifier for all laboratory batches	**REQUIRED.** Text(20)		580-12345	

Notes:
Red fields are required.
NULL = no value expected from laboratory

APPENDIX B
FIELD ELECTRONIC DATA DELIVERABLE FILE SPECIFICATIONS

Table B-1
Sample Location EDD Field Requirements

Field	Required/Conditional /Optional	Description
#station_id	Required	#Unique location/station identifier used to track spatial point through database system. This is a key field in the database and must be unique for each collection. If the same location is sampled more than once- append the date to the location. Set to 'Field QC' if sample_type is 'RB', 'EB', or 'TB'.
coord_datum_code	Required	Code used to identify correct coordinate system and datum for point projection. This field's vocabulary is controlled. See 'valid coord type codes' tab.
x_coord	Required	Easting/Longitude
y_coord	Required	Northing/Latitude
sample_id	Required	Unique sample identifier, these values must match the IDs provided on the Chain of Custody document. Refer to the 'Sample Nomenclature' tab for ID construction decision making flowchart.
sample_type	Required	Code used to identify sample type. This field's vocabulary is controlled and must match a provided valid value. See 'valid sample type codes' tab.
sample_parent	Conditional	Parent sample identifier for field duplicate/replicate; must match an entry in column E. This field is required if sample_type_code is 'FD' or composite_yn is 'Y'.
matrix_code	Required	Code used to identify type of sample material. This field's vocabulary is controlled and must match a provided valid value. See 'valid sample matrix codes' tab.
sample_date	Required	Date and time of field sample collection, time must be in 24-hour military time.
start_depth	Conditional	Shallowest point of the interval. Required for soil/sediment samples. Not required for composite samples.
end_depth	Conditional	Deepest point of the interval. Required for soil/sediment samples. Not required for composite samples.
depth_unit	Conditional	Code used to identify depth units. This field's vocabulary is controlled and must match a provided valid value. See 'valid units' tab.
composite_yn	Required	'Y' for Yes if sample is a composite or 'N' for No if not.

Table B-1
Sample Location EDD Field Requirements

Field	Required/Conditional /Optional	Description
composite_desc	Conditional	General description of composite. Required if composite_yn is 'Y'. Should include the list of samples combined in the composite.
archive_yn	Required	'N' if the sample is active, 'Y' if the sample is archive.
sampler	Required	Initials or name of the custodian responsible for sampling.
sampling_company	Required	Company responsible for field sampling.
comment	Optional	Optional comment about sample.

Table B-2
Tissue Sample EDD Field Requirements

Field	Required/Conditional /Optional	Description
#sample_id	Required	#Unique sample identifier, these values must match the IDs entered in the Loc_Smp tab. Refer to the 'Sample Nomenclature' tab for ID construction decision making flowchart.
parent_composite	Required	Points to the composite that the individual is a part of.
measurement_date	Required	Date and time of sample measurement, time must be in 24-hour military time.
species	Required	Common name (Genus species).
specimen_length	Required	Measured fish length (nose to caudal fork).
length_unit	Required	This field's vocabulary is controlled and must match a provided valid value. See 'valid units' tab.
specimen_weight	Required	Measured fish weight.
weight_unit	Required	This field's vocabulary is controlled and must match a provided valid value. See 'valid units' tab.