SFPP, L.P.
Operating Partnership

October 30, 2017

Ching Yin To
Industrial Permitting Unit
California Regional Water Quality Control Board
Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, California 90013

Subject: Draft Monitoring Plan and Quality Assurance Project Plan (QAPP) to Address Harbor Toxics Total Maximum Daily Load Monitoring Requirements. SFPP Norwalk Pump Station, National Pollutant Discharge Elimination System Permit Number CA0063509 (Order No. R4-2016-0309).

Dear Ms. To,

SFPP, L.P. (SFPP), an operating partner of Kinder Morgan Energy Partners, L.P., is pleased to submit the enclosed draft Monitoring Plan and Quality Assurance Project Plan (QAPP) for Harbor Toxics Total Maximum Daily Load (TMDL) monitoring to the California Regional Water Quality Control Board, Los Angeles Region (Water Board) for review. This document addresses surface water and sediment sampling and reporting requirements established in Order R4-2016-0309 (Provision VII.C.2.b) for a site-specific study by the SFPP Norwalk Pump Station.

We look forward to receiving any Water Board comments on this draft Work Plan and QAPP. Please do not hesitate to contact me at 714.560.4802 or Eric Davis of CH2M at 213.228.8262 should you have any questions or desire additional information.

Sincerely,

Kinder Morgan Energy Partners, L.P.

Stephen Defibaugh, RG, CHG
Remediation Project Manager

cc: Cassandra D. Owens, Water Board
Paul Cho, Water Board
Eric Davis, CH2M
Cameron Irvine, CH2M
Norwalk Tank Farm Restoration Advisory Board

DRAFT

Monitoring Plan and Quality Assurance Project Plan for Harbor Toxics Total Maximum Daily Load Sampling – SFPP Norwalk Pump Station

Prepared for

Los Angeles Regional Water Quality Control Board

Prepared on behalf of

Kinder Morgan Energy Partners, L.P.

October 2017

CH2M

6 Hutton Centre Drive, Suite 700
Santa Ana, California 92707

Title and Approval Sheets (QAPP Element A1)

MONITORING PLAN AND QUALITY ASSURANCE PROJECT PLAN FOR HARBOR TOXICS TOTAL MAXIMUM DAILY LOAD SAMPLING - SFPP NORWALK PUMP STATION

The material presented in this Monitoring Plan and Quality Assurance Project Plan was prepared consistent with current and generally accepted consulting principles and practices. This document was developed and supervised by the following environmental professionals:

__________________________ Eric Davis, M.S, P.G. CH2M Project Manager California Professional Geologist No.9443	________________ Date
__________________________ Cameron Irvine, M.S. CH2M Senior Technical Coordinator	________________ Date
__________________________ Bernice Kidd CH2M Quality Assurance Officer	________________ Date
__________________________ Water Board Quality Assurance Officer	________________ Date

Contents (QAPP Element A2)

Appendixes

Tables

Figures

Distribution List (QAPP Element A3)

Individuals listed below will receive a copy of this document.

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- Minxia Dong, Norwalk Public Library (electronic copy and hard copy)
- Paul Cho, Regional Water Quality Control Board, Los Angeles Region (electronic copy)
- Cassandra Owens, Regional Water Quality Control Board, Los Angeles Region (electronic copy)
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Acronyms and Abbreviations

Cd	cadmium
cfs	cubic feet per second
CH2M	CH2M HILL Engineers, Inc.
COC	chain-of-custody
Cu	copper
DDT	dichlorodiphenyltrichloroethane
DFSP	defense fuel support point
DO	dissolved oxygen
DQO	data quality objective
EDD	electronic data deliverables
EPA	United States Environmental Protection Agency
FTL	field team leader
GWTS	groundwater treatment system
Hg	mercury
HSP	health and safety plan
IDW	investigation-derived waste
JP	jet propellant (e.g., JP-4 and JP-8)
Kinder Morgan	Kinder Morgan Energy Partners, L.P.
LGAC	liquid-phase granular activated carbon
mg/L	milligram(s) per liter
MQO	measurement quality objectives
MS/MSD	matrix spike/matrix spike duplicate
MTBE	methyl tertiary butyl ether
NPDES	National Pollutant Discharge Elimination System
No.	number
Norwalk Station	Santa Fe Pacific Pipeline Norwalk Pump Station
OWS	oil-water separator
PAH	polyaromatic hydrocarbon
Pb	lead
PCB	polychlorinated biphenyl
PM	project manager
PPE	personal protective equipment
QA	quality assurance

QAPP	Quality Assurance Project Plan
QC	quality control
RL	reporting limit
SFPP	Santa Fe Pacific Pipeline
SOP	standard operating procedure
STC	senior technical coordinator
SWAMP	Surface Water Ambient Monitoring Program
SWRCB	California State Water Resources Control Board
TBA	tertiary butyl alcohol
TMDL	total maximum daily load
TOC	total organic carbon
TSS	total suspended solids
USGS	United States Geological Survey
Water Board	California Regional Water Quality Control Board, Los Angeles Region
Zn	zinc

SECTION 1

Problem Definition and Background (QAPP Element A5)

Kinder Morgan Energy Partners, L.P. (Kinder Morgan) owns and operates a groundwater treatment system (GWTS) at the former Santa Fe Pacific Pipeline (SFPP) Norwalk Pump Station (Norwalk Station) located within the Defense Fuel Support Point (DFSP) Norwalk site, at 15306 Norwalk Boulevard, Norwalk, California. Treated groundwater is discharged from Norwalk Station to Coyote Creek, located within the San Gabriel River Watershed, under a National Pollutant Discharge Elimination System (NPDES) Permit (Order Number [No.] R4-2016-0309), as adopted by the California Regional Water Quality Control Board, Los Angeles Region (Water Board). Section VII.C.2.b of the Norwalk Station NPDES Permit states that dischargers into the San Gabriel River Watershed shall conduct ambient surface water and sediment monitoring at the mouth of the San Gabriel River to comply with the Toxic Pollutants in the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters total maximum daily load (TMDL) [Harbor Toxics TMDL] requirement (Water Board, 2011).

CH2M HILL Engineers, Inc. (CH2M) prepared this Monitoring Plan and Quality Assurance Project Plan (QAPP) on behalf of Kinder Morgan to present the approach for performing Harbor Toxics TMDL monitoring for this site. This document provides background information about the Norwalk Station site, presents required Harbor Toxics TMDL monitoring requirements in the San Gabriel River, and contains the sampling and analytical procedures and a health and safety plan (HSP) to support data collection and reporting of the ambient monitoring data to the Water Board. QAPP elements required by the California State Water Resources Control Board (SWRCB) Surface Water Ambient Monitoring Program (SWAMP) (2017) and United States Environmental Protection Agency (EPA) (2002) are identified in the section headings or applicable text. These elements are not necessarily presented in order because of the nature of this document performing the role of both Workplan and QAPP, which have similar but not identical sequences.

1.1 Objectives /Task Description (QAPP Element A6)

This *Monitoring Plan and QAPP* provides the approach for data collection to achieve the following objectives in support of the Harbor Toxics TMDL:

1. Characterize concentrations and loads of Harbor Toxics TMDL constituents in surface waters at the mouth of the San Gabriel River
2. Characterize concentrations of Harbor Toxics TMDL constituents in sediment at the mouth of the San Gabriel River

Monitoring will be performed in the San Gabriel River to assess if sediment and water quality benchmarks (e.g., sediment quality objectives and water quality objectives) are being met in the San Gabriel River, which discharges into the Greater Los Angeles Harbor. Harbor Toxics TMDL constituents include metals, organochlorine pesticides (chlordanes, dichlorodiphenyltrichloroethane [DDT], dieldrin), polyaromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs).

1.2 Monitoring Requirements

NPDES dischargers are responsible parties that are required to collect data informing the Water Board of status and trends for Harbor Toxics TMDL constituents (i.e., metals, pesticides, PCBs, and PAHs) in surface water and sediment. The Norwalk Station NPDES Permit, Section VII.C.2.b, requires ambient surface water and sediment monitoring as part of the Harbor Toxics TMDL:

> ***"The Compliance Monitoring Program shall include:***
>
> ***i. Water Column Monitoring***. *Water samples and total suspended solids samples shall be collected at no less than one site, and preferably more than one site, during two wet weather events and one dry weather event each year. The first large storm event of the season shall be included as one of the wet weather monitoring events. Water samples and total suspended solid samples shall be analyzed for metals, DDT, PCBs, and PAHs. Sampling shall be designed to collect sufficient volumes of suspended solids to allow for analysis of the listed pollutants in the bulk sediment. General water chemistry (temperature, dissolved oxygen, pH, and electrical conductivity) and a flow measurement shall be required at each sampling event. General chemistry measurements may be taken in the laboratory immediately following sample collection if auto samplers are used for sample collection or if weather conditions are unsuitable for field measurements.*
>
> ***ii. Sediment Monitoring.*** *For sediment chemistry, sediment samples shall be collected at, at least one site every two years for analysis of general sediment quality constituents and the full chemical suite as specified in the State Water Quality Control Plan for Enclosed Bays and Estuaries-Part 1 Sediment Quality (SQO Part 1). All samples shall be collected in accordance with Surface Water Ambient Monitoring Program (SWAMP) protocols."*

Each discharger is required to contribute to the regional effort in gathering data on the watersheds to satisfy the TMDL monitoring requirements, and all data collected will be used by the Water Board to assess pollutant loadings/ future allocations for the watersheds through possible TMDL revisions in the future, if necessary.

The Harbor Toxics TMDL requires monitoring in three water body areas, subject to applicability:

1. Dominguez Channel, Torrance Lateral, and Dominguez Channel Estuary
2. Greater Los Angeles and Long Beach Harbor Waters (including Consolidated Slip)
3. Los Angeles and San Gabriel Rivers

Kinder Morgan, as operator of the Norwalk Station, is a responsible party discharging to Coyote Creek, a tributary of the San Gabriel River (Figure 1), and the location that will be sampled to comply with the Harbor Toxics TMDL monitoring is located at the mouth of the San Gabriel River (Figure 2).

1.3 San Gabriel River Watershed Description

The San Gabriel River is a major watershed found mostly within southeastern Los Angeles County (Figure 1). Headwaters of this 689-square-mile drainage are located in the San Gabriel mountains. This includes the 150-square-mile watershed of Coyote Creek, originating in western Orange County. The watershed contains diverse land uses from the wilderness area of undisturbed riparian and woodland habitats in the upper reaches of the San Gabriel River to concrete-lined channels through urban centers (Water Board, 2000).

The Whittier Narrows Reservoir (shown on Figure 1) connects the San Gabriel River with the Los Angeles River. However, the lower portion of the San Gabriel River is hydrologically separated from the upper portion of the San Gabriel River at the Whittier Narrows dam when flows are low (i.e., <260 cubic feet per second [cfs]) at United States Geological Survey (USGS) gauging station 11085000 (shown on Figure 1). This gauging station is located above the Whittier Narrows Dam and is an appropriate indicator of wet weather conditions because flows there exceeding the 90th percentile will likely exceed the dam's capacity runoff and signal when the upper and lower portions of the watershed are connected (EPA, 2007).

1.4 Norwalk Station Description

Norwalk Station is part of the former DFSP, located at 15306 Norwalk Boulevard, Norwalk, California (Figure 1). The DFSP is owned by DLA Energy (formerly Defense Energy Support Center) and was formerly occupied by 12 aboveground fuel storage tanks and associated piping and facilities. The tanks had a maximum capacity of 35 million gallons and were used to store and distribute refined petroleum products including jet propellant numbers 5 and 8 (JP-5 and JP-8), and reportedly also stored aviation gasoline and JP-4. DLA Energy also previously operated truck fill stands and various fuel transfer systems. The facility was decommissioned in 2001 and is no longer used to handle fuel. The aboveground tanks and the main infrastructure were demolished in 2011; demolition of the subsurface piping was completed in 2012.

SFPP has equipment within 2 acres at the DFSP facility and easements for its pipelines along the southern and eastern boundaries of the facility. Previously, SFPP operated a pump station near the south-central area of the site. The pump station was used to transfer fuel to and from the DFSP facility, and as an in-line pumping station for portions of the SFPP pipeline network. The pump station was decommissioned in 2001, but three pipelines heading eastward along the southern boundary of the DFSP facility (one of which bends at the southeastern corner of the facility and continues northward within the eastern easement) remain in service and continue to convey refined petroleum fuels including gasoline, diesel, and jet fuel.

Because of historical releases of fuel-related petroleum hydrocarbons at this site, subsurface assessments have been performed at the DFSP facility since 1986 to evaluate the extent of impacts to soil and groundwater. The primary impacts are to groundwater associated with fuel product that historically leaked from block valves and migrated vertically downward to the water table. Separate-phase floating product, or light-non-aqueous phase liquid, as well as sorbed-phase and dissolved-phase fuel hydrocarbons have been delineated in areas beneath the DFSP facility and at offsite properties to the south, west, and east. Site assessments indicated that the contaminants of potential concern are total petroleum hydrocarbons, including those quantified as gasoline, diesel fuel, JP-4, JP-5, and JP-8; benzene, toluene, ethylbenzene, and total xylenes; 1,2-dichloroethane; methyl tertiary butyl ether (MTBE); and tertiary butyl alcohol (TBA). A groundwater Monitoring and Reporting Program has been in effect at the site since 1995.

Kinder Morgan operates a GWTS that processes free product and groundwater that has been impacted by historical releases of gasoline, diesel, and jet fuel from pipeline operations that have been recovered from extraction wells. Free product and groundwater recovered by pneumatically operated top-loading total fluid pumps and bottom-loading groundwater pumps are conveyed to an oil-water separator (OWS). Free product, if any, from the OWS is collected in a storage tank and recycled at an offsite location. Water from the OWS is treated using liquid-phase granular activated carbon (LGAC). Treated water is routed through an onsite 3,000-gallon equalization tank. Two fluidized bed bioreactors installed downstream of the equalization tank treat MTBE, a fuel oxygenate, and TBA, a fuel oxygenate and breakdown product of MTBE. The treated groundwater then passes through polishing LGAC units before discharging to a storm drain that leads to Coyote Creek. Monthly effluent monitoring is reported quarterly to the Water Board in accordance with NPDES Order No. R4-2016-0309.

1.5 Project Organization (QAPP Element A4)

The organizational structure for activities associated with the study is described below (see Appendix A, Table 1 for contact information).

Kinder Morgan Project Manager – will have primary oversight responsibility for project activities.

CH2M Project Manager (PM) — is responsible for coordinating the tasks of all team members to enable the completion of all required activities in sequence and on time. The PM will work closely with the project team to meet all requirements and study objectives, including approving responses to any comments on planning documents and reports, approving sampling activities and QA reports, and authorizing necessary actions and adjustments needed to accomplish program QA objectives.

Quality Assurance (QA) Manager — is responsible for reviewing and approving this *Monitoring Plan and QAPP*, contract laboratory oversight, and data validation.

Senior Technical Coordinator (STC) — is responsible for providing technical oversight in the design and implementation of a *Monitoring Plan and QAPP* that meets the Norwalk Station NPDES permit and Harbor Toxics TMDL requirements and is consistent with all applicable guidance (e.g., the SWRCB's Surface Water Ambient Monitoring Program). The STC will coordinate responses to any comments on planning documents and reports by the Water Board, oversee sampling activities, review QA reports, and coordinate with the PM to authorize necessary actions and adjustments needed to accomplish program QA objectives.

Field Team Leader (FTL) / Site Safety Coordinator (SSC) — is responsible for implementing and conducting the sampling in a manner consistent with the objectives of the study. The FTL is responsible for overseeing the planning, coordination, and implementation of sample collection and processing activities according to the Workplan and QAPP. They will work closely with the STC, QA Manager, and PM if problems occur, and they will communicate and document any corrective actions taken.

Analytical Chemistry Laboratory Coordinator— is responsible for coordinating laboratory activities, tracking the laboratories' progress, verifying that the laboratories have implemented requirements of this plan, addressing QA issues related to the laboratory analyses, conducting the required analyses in a timely manner, and addressing scheduling issues related to laboratory analyses. The Laboratory Coordinator works closely with the laboratory PM, STC, QA Manager, and the PM.

Laboratory PM – Asset Laboratories will perform the sample processing and analyses. The laboratory PM is responsible for the successful and timely completion of sample analyses, as well as the following:

- Receiving and logging samples correctly, that the correct methods and modifications are used, and that data are reported within specified turnaround times
- Reviewing analytical data to confirm that procedures were followed as required, as well as reviewing the cited methods, and laboratory standard operating procedures (SOPs)
- Apprising the laboratory coordinator of the schedule and status of sample analyses and data package preparation
- Notifying the analytical chemistry laboratory coordinator if problems occur in sample receiving, analysis, or scheduling, or if control limits cannot be met
- Taking appropriate corrective action as necessary
- Reporting data and supporting QA information as specified
- Providing electronic data deliverables (EDDs) in a format consistent and compatible with the project electronic database.

Data Manager – is responsible for receiving validated data, storing it in a secure database, and accessing these data for reporting.

SECTION 2

Surface Water and Sediment Monitoring

This section describes the location where Harbor Toxics TMDL required sampling will occur, media that will be sampled, timing and the conditions under which sampling will occur, and the contaminant classes that will be analyzed in each medium.

2.1 Sampling Location

Sampling will be conducted at one location at mid-channel of the San Gabriel River near its outlet to the Pacific Ocean (Figure 2). This is immediately upstream of the bridge where Marina Drive crosses the San Gabriel River.

2.2 Sample Media and Frequency

The Harbor Toxics TMDL requires surface water and sediment monitoring at the mouth of the San Gabriel River during both wet and dry weather conditions. Surface water will be collected during two wet weather and one dry weather events, annually. Sediment samples will be collocated and collected concurrently with surface water samples once every two years.

Dry-weather conditions are defined as:

- Less than 0.1 inch of rain on the day of the sampling
- No less than 3 days of dry weather after a rain event of 0.1 inch or greater within the watershed, as measured from at least 50 percent of Los Angeles County-controlled rain gauges[1] within the watershed

These dry weather conditions will be interpreted as 50 percent of the rain gauges within the lower San Gabriel River watershed and downstream of the Whittier Narrows dam not exceeding precipitation limits when flows are low (i.e., <260 cfs at USGS gauging station 11085000[2]).

Wet weather sampling will include the first large storm event of the season and where storm events in southern California meet the following criteria:

- Storm events occur during the wet season from October 1 to April 15
- Storm events are preceded by less than 0.1 inch of rainfall within the watershed over a 3-day period
- Storm events consist of rainfall of at least 0.25 inch (within 24 hours) with at least 70 percent probability of sufficient rainfall at least 24 hours before the event
- The maximum daily flow at USGS gauging station 11085000 is equal to or greater than 260 cfs

This final criterion defining wet weather conditions is based on the 90th percentile flow condition, as described in the San Gabriel River Metals TMDL (EPA, 2007).

The second wet weather event would depend on forecasts (drought year vs. wet year) predicting at least 0.1 inch of precipitation preceded by a 72-hour dry period. Consideration will be given to monitor "larger storm events" (greater than 0.5 inch) and meeting the criteria above, if forecasted.

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[1] Los Angeles County rain gauge data are currently available online (http://www.ladpw.org/wrd/Precip/index.cfm).

[2] USGS gauging station 11085000 data are currently available online (https://waterdata.usgs.gov/usa/nwis/uv?11085000).

Sampling will begin within 6 months of the final *Monitoring Plan and QAPP* approval from the Water Board, but specific sampling dates are yet to be determined. When planned, the sampling events over the term of the current SFPP Norwalk Station Permit will follow the schedule outlined in Table 1.

Table 1. Harbor Toxics TMDL Sampling Schedule

	Target Samples/ TMDLs Addressed	
Event	**Water**	**Sediment**
First and Third Annual Event		
Wet-1	Water Quality[1] and Flow Aqueous Concentrations of Metals, DDT, PAHs, and PCBs Suspended Sediment Concentrations of Metals, DDT, PAHs, and PCBs	-
Wet-2	Water Quality[1] and Flow Aqueous Concentrations of Metals, DDT, PAHs, and PCBs Suspended Sediment Concentrations of Metals, DDT, PAHs, and PCBs	-
Dry-1	Water Quality[1] and Flow Aqueous Concentrations of Metals, DDT, PAHs, and PCBs Suspended Sediment Concentrations of Metals, DDT, PAHs, and PCBs	-
Second and Fourth Annual Event		
Wet-1	Water Quality[1] and Flow Aqueous Concentrations of Metals, DDT, PAHs, and PCBs Suspended Sediment Concentrations of Metals, DDT, PAHs, and PCBs	-
Wet-2	Water Quality[1] and Flow Aqueous Concentrations of Metals, DDT, PAHs, and PCBs Suspended Sediment Concentrations of Metals, DDT, PAHs, and PCBs	-
Dry-1	Water Quality[1] and Flow Aqueous Concentrations of Metals, DDT, PAHs, and PCBs Suspended Sediment Concentrations of Metals, DDT, PAHs, and PCBs	TOC, percent fines, Meals (Cd, Cu, Pb, Hg, Zn), PAHs, PCBs, Pesticides

Notes:

[1] Water Quality Measurements: temperature, DO, pH, specific conductivity

Cd = cadmium
Cu = copper
DO = dissolved oxygen
Hg = mercury
Pb = lead
TOC = total organic carbon
Zn = zinc

Field and Laboratory Procedures (QAPP Element B1)

This section describes the general procedures for water and sediment sample collection (including health and safety guidelines), specific contaminants in each medium, flow documentation procedures, and investigation-derived waste (IDW) management. Field procedures are based on guidance from SWAMP (SWRCB, 2014). Detailed SOPs for sampling are described in detail in Appendix A, and laboratory analytical methods and data quality are described in Appendix B.

3.1 Collection Procedures (QAPP Element B2)

Laboratories will provide clean sample containers with labels identifying the preservative. Pre-printed, waterproof labels and waterproof ink pens will be used whenever possible to complete sample labels. Immediately before sample collection, the sample ID, date, time of sampling, and sampler's initials will be recorded onto the label. Sample containers will be placed into resealable plastic zipper bags and packed on ice in coolers provided by the laboratory. Ice used in shipping containers must be double bagged. Vital information regarding the collection of each sample will be recorded into a field logbook and/or field sampling form(s) and chain-of-custody (COC) form(s).

Detailed field sampling SOPs are provided in Appendix A and summarized below.

- Surface water quality measurement procedures are described in Appendix A, SOP-1.
- Surface water sample collection procedures are provided in Appendix A, SOP-2.
- Sediment sample collection procedures are provided in Appendix A, SOP-3.
- Sample storage, packing, and shipping procedures are provided in Appendix A, SOP-4.
- Sample container, volumes, and preservation requirements are provided in Appendix B, Table B-4.

Table 2 summarizes the specific Harbor Toxics TMDL contaminants that will be analyzed in each medium.

Table 2. SFPP Norwalk Analyses in Harbor Toxics TMDL Monitoring Plan Samples

Media	Analyses
Surface Water & Suspended Solids	Water Quality: temperature, DO, pH, and specific conductivity General: TSS Metals: Cu, Pb, Zn Pesticides: 2,4,-DDT, 4,4-DDT, reported as total DDT PAHs: 1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthe chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, pyrene PCBs: Total PCBs
Sediment	General: TOC, % fines Metals: Cd, Cu, Pb, Ni, Hg, Zn Pesticides: alpha chlordane, gamma chlordane, trans nonachlor, dieldrin, DDT derivatives PAHs: 1-methylnaphthalene, 1-methylphenanthrene, 2-methylnaphthalene, 2,6-dimethylnaphthalene, acenaphthene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(e)pyrene, biphenyl, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, naphthalene, phenanthrene, perylene, pyrene PCB congeners: 2,4'-dichlorobiphenyl (PCB-8), 2,2',5-trichlorobiphenyl (PCB-18), 2,4,4'-trichlorobiphenyl (PCB-28), 2,2',3,5'-tetrachlorobiphenyl (PCB-44), 2,2',5,5'-tetrachlorobiphenyl (PCB-52), 2,3',4,4'-tetrachlorobiphenyl (PCB-66), 2,2',4,5,5'-pentachlorobiphenyl (PCB-101), 2,3,3',4,4'-

Table 2. SFPP Norwalk Analyses in Harbor Toxics TMDL Monitoring Plan Samples

Media	Analyses
	pentachlorobiphenyl (PCB-105), 2,3',4,4',5-pentachlorobiphenyl (PCB-118), 2,2',3,3',4,4'-hexachlorobiphenyl (PCB-128), 2,2',3,4,4',5'-hexachlorobiphenyl (PCB-138), 2,2',4,4',5,5'-hexachlorobiphenyl (PCB-153), 2,2',3,3',4,4',5-heptachlorobiphenyl (PCB-170), 2,2',3,4,4',5,5'-heptachlorobiphenyl (PCB-180), 2,2',3,4',5,5',6-heptachlorobiphenyl (PCB-187), 2,2',3,3',4,4',5,6-octachlorobiphenyl (PCB-195), 2,2',3,3',4,4',5,5',6-nonachlorobiphenyl (PCB-206), decachlorobiphenyl

Note:

Required sediment parameters are described in Attachment A of SWRCB (2009)

TSS = total suspended solids

3.1.1 Water Sampling

Field measurements of surface water quality will be collected at the water sampling location before potential site disturbance by any sampling equipment. These measurements will include temperature, DO, pH, and specific conductivity. Measurements will be collected with a hand-held water quality meter that has been calibrated and determined to be in good working order. Detailed procedures for these activities are described in Appendix A, SOP-1.

Water grab samples will be collected from immediately below the water surface (approximately 0.1 meter depth) at mid-channel of the San Gabriel River. Pre-cleaned and double-bagged Teflon tubing will be required for water sampling and will be provided by the contracted laboratory if a peristaltic pump is used for sample collection. Water samples may also be collected as subsurface grabs by hand (e.g., from a boat positioned mid-channel) or by using a sampling device (e.g., van Dorn or Kemmerer bottle). Detailed procedures for these activities are described in Appendix A, SOP-2.

Aqueous concentrations of target parameters and concentrations in TSS are required. Direct measurement of contaminant concentrations in suspended solids is challenging. TSS varies with flow, but has been reported to range from <1.9 to 281 milligrams per liter (mg/L) in samples reported from Los Angeles County and with an average concentration of 16 mg/L[3]. The expected volume of surface water needed to produce sufficient TSS for conventional chemical analysis is very large (e.g, ranging from approximately 500 liters to over 1000 liters when TSS is 50 to 200 mg/L). Filtering or centrifuging these large volumes to isolate suspended solids is logistically difficult, and these procedures can cause artifacts of the treatment. TSS is very likely to be less than 50 mg/L during dry weather flows; therefore, insufficient mass would be available for conventional chemical analysis of the TSS. Mass transport of contaminants would also be negligible in the suspended solids during low flows, and therefore, load estimates could be reasonably assumed to occur wholely in the aqueous phase. Conversely, the majority of contaminant loads will likely be associated with solids during high flows when TSS is elevated.

The contaminant loads in suspended solids will therefore be determined by analyzing contaminants in the total (i.e., unfiltered) sample and then again in samples filtered through 0.45 micrometers to characterize the dissolved fraction. The difference between total and dissolved fractions will be attributed to contamination associated with the suspended solids. This approach is consistent with best practices, is in use by other NPDES permitees in the region for reporting contaminant concentrations in suspended solids, and will achieve the desired data with reasonable effort.

3.1.2 Sediment Sampling

A surficial sediment grab sample will be collected from mid-channel of the San Gabriel River once every 2 years to support long-term sediment quality monitoring. The sediment will be sampled from the

[3] http://www.ceden.org, accessed 09/29/2017; n=58

bottom of the San Gabriel River using an Ekman dredge or a similar device. The field crew will then scoop the top 2 centimeters of sediment from the sampler and place it in a glass bowl for compositing. This procedure will be repeated as needed to meet the sediment sample mass requirements. Additional grab samples, if needed, will be carefully collected so that the exact same location is not sampled repeatedly. The final composited sample will be mixed and placed into the appropriate sample jars. Detailed procedures for these activities are described in Appendix A, SOP-3.

3.2 Sample Handling and Custody (QAPP Element B3)

Principal documents used to identify samples and to document possession will be field logbooks and COC records. COC forms will be used to document sample custody from the time of collection through processing and analysis until final disposition. Detailed procedures for sample handling and custody are described in Appendix A, SOP-5. It will not be acceptable for samples to be outside of project personnel custody unless the samples have been transferred to a secure area (i.e., locked up and custody sealed) or transferred to a courier. If the samples cannot be placed in a secure area, then a field team member must physically remain with the samples.

Upon receipt of samples, the laboratory will check the physical integrity of the containers and custody seals, and samples will be inventoried by comparing sample labels to those on the COC forms. The laboratory will sign COCs and will include completed COCs and shipping container receipt forms in the data package. The laboratory PM will maintain a sample-tracking record that follows each sample through all stages of sample processing at the laboratory.

3.3 Analytical Methods (QAPP Element B4)

Detailed analytical methods and data quality control information for laboratory-analyzed parameters in surface water and sediment are presented in Appendix B, Tables B-1 and B-2, respectively. Reporting limits (RLs) will meet available water and sediment quality objectives unless matrix interference is encountered that cause an increase in RLs that cannot be eliminated by additional chemical clean-up procedures by the laboratory. Data quality objectives (DQOs) for chemical analyses are provided in Appendix B, Table B-3 (QAPP Element A7).

3.4 Investigation-derived Waste

Only a small amount of IDW is expected to be generated as part of Harbor Toxics TMDL sampling activities. Solid materials will consist of disposable personal protective equipment (PPE) (e.g., used nitrile gloves) and general refuse (e.g., paper towels). A small volume of liquid waste will be generated from decontamination of sampling devices. The following potentially contaminated IDW might be generated during field activities:

- **Used PPE and disposable equipment.** Used PPE will be double-bagged and placed in a municipal refuse dumpster at the Norwalk Station. PPE and disposable equipment that is still serviceable will be rendered unusable before disposal into the dumpster.

- **Decontamination fluids.** Decontamination fluids include a non-phosphate detergent, deionized water, residual contaminants, and site water. These fluids will be collected in a 5-gallon bucket for transfer to the Norwalk Station site. Samples of the decontamination fluids will be collected for waste profiling. The waste will then be transported offsite with proper labels and a manifest in accordance with EPA and California regulations, if required. The waste will be transported to a permitted facility.

3.5 Flow Measurements

Harbor Toxics TMDL monitoring requirements include a flow measurement during each sampling event. Flow, meaning discharge, can be determined by collecting several water velocity measurements that are multiplied by the cross-sectional area. These measurements may not be feasible at the mouth of the San Gabriel River during high flows because of potential safety concerns for personnel and the loss or damage of equipment under storm conditions. Instead, flows will be calculated for this location from the sum of flow from permanent monitoring station data at the Los Angeles County Department of Public Works gauging station F42B-R, located just above Spring Street on the San Gabriel River and station F354-R in Coyote Creek (Figure 1). These data will be requested[4] and reported for the days when sampling occurs.

3.6 Health and Safety

Team member and public safety is of paramount importance, therefore guidance provided in the Project HSP will be strictly adhered. Field team members will be current in all required training, will review the HSP, and will sign the Employee Signoff Form before participating in any field activities. The HSP will be provided in Appendix C of the final *SFPP Norwalk Harbor Toxics TMDL Monitoring Plan*.

3.7 Training and Certifications (QAPP Element A8)

Training and certifications are required to demonstrate competence in generating data of high quality that can inform management decisions. Laboratory certifications will be documented in Appendix B (e.g., State of California's Department of Health Services Environmental Laboratory Accreditation Program and National Environmental Laboratory Accreditation Program).

Field sampling crews will be trained in standardized sample collection and will be experienced in sampling the target media with the specified sampling equipment. Field staff will participate in safety training to mitigate potential injury to people, property, or equipment, and will be documented in the HSP (Appendix C).

3.8 Field Documentation (QAPP Element A9)

A designated logbook and/or field sampling forms will be used for each event. The logbook will be bound with consecutively numbered pages. All entries will be written in legible black ink and signed and dated by the FTL. Factual and objective language will be used to document sampling condition and details. All entries will be complete and accurate to allow reconstruction of each field activity. A line will be placed through any portion of a field notebook that is unused. Detailed documentation requirements are described in Appendix A, SOP-6. Electronic copies of all field documents will be maintained in the project folder on a secure network and original hard copies will be maintained by the PM.

3.8.1 Field Forms

Field data forms and a COC form are provided in Appendix A.

[4] Los Angeles County flow data are currently available from Arthur Gotingco (AGOTING@dpw.lacounty.gov)

3.8.2 Sample Labeling

Samples will be labeled with a unique identifier to coordinate correct reporting of results. These labels will include the sampling location, date, and sample type (i.e., sediment, water, or quality control [QC] sample).

For Example: SG1 – 092918 – WD

Where:

- Location – SG1
- Date – six digits identifying the month, day, and year (i.e., MMDDYY)
- Sample type
  - Dry weather water sample – DW
  - Wet weather water sample – WW
  - Dry weather duplicate water – DD
  - Wet weather duplicate water – WD
  - Dry weather suspended sediment – DS
  - Wet weather suspended sediment – WS
  - Wet weather suspended sediment duplicate - WSD
  - Equipment Blank - EB
  - Surficial Sediment – SS
  - Surficial Sediment duplicate – SD
  - Matrix spike/matrix spike duplicate – MS and MSD

3.8.3 Corrections to Documentation

All original data in field sampling forms and COC records will be recorded using waterproof ink. If an error is made on a document assigned to one individual, the individual will make corrections with a single line through the error and entering the correct information. The strike-through will be initialed and dated. No correction fluid will be used. The erroneous information is *not* to be obliterated. Any subsequent error discovered on an accountable document will be corrected by the person who made the entry, if possible. All subsequent corrections will be initialed and dated.

SECTION 4

Quality Assurance/Quality Control

This section describes the QA/QC procedures for the surface water and sediment monitoring program. The QA program will consist of QC samples, field documentation, and data quality assessment to describe data quality (SWRCB, 2017).

4.1 QC Samples (QAPP Element B5)

A field QC program will be implemented to help maintain the required level of confidence in the field data and to provide cross-checks on the laboratory performing the analyses. QC samples, such as blanks, duplicates, and surrogate spikes will be routinely collected. QC samples will be collected for each analyte or each analytical method. Because the number of QC samples typically depends on how the fieldwork is organized and implemented, the frequency of QC sample collection will be continually monitored to avoid unnecessary sampling.

The following types of field QC samples will be collected:

- Duplicate samples
- MS/MSD
- Equipment rinsate samples

QC samples are described in detail in the following sections.

4.1.1 Duplicate Samples

A field duplicate sample is a second sample collected at the same location as the original sample and for the same analyses. Duplicate samples are collected simultaneously or in immediate succession, using identical recovery techniques and treated in an identical manner during storage, transportation, and analysis. The sample containers are assigned an identification number in the field such that they cannot be identified (blind duplicate) as duplicate samples by laboratory personnel performing the analysis.

Field duplicate samples will be collected to assess the reproducibility of field sampling methods. One duplicate sample would typically be collected for every 10 samples collected during each monitoring event or a minimum of 1 duplicate per monitoring event when less than 10 samples are collected. The duplicates will be analyzed for the same parameters as the primary samples.

4.1.2 Matrix Spike/Matrix Spike Duplicate

An MS/MSD sample is a replicate site sample that is spiked with known amounts of standard compounds identical to the compounds being measured and are added to the sample to evaluate interferences or other sample-specific characteristics that can affect chemical analysis to indicate the closeness of measured values to the true values. These QC samples will be collected at a frequency of once per sampling event (once per analytical batch) for each sample medium.

4.1.3 Equipment Blank Samples

Equipment rinsate blanks will be collected on the sampling equipment to assess the effectiveness of equipment decontamination procedures and to evaluate the potential for cross-contamination between sample locations. One equipment rinsate blank sample will be collected per sampling event for sediment and water sampling equipment. These blanks will be analyzed for all analytes relevant to the media and will be collected by pouring certified clean water over cleaned sampling equipment and collecting the water that has contacted the equipment (see the decontamination SOP in Appendix A). Laboratory-grade deionized water provided by the analytical laboratory will be used for sample blanks.

Alternatively, only one equipment blank may be needed annually for surface water sampling equipment if collected with a peristaltic pump. This would be the case where only the peristaltic tubing is in contact with the sampled surface water and if certified clean tubing is provided by the analytical lab. The equipment blank for this collection method would be valid for the same roll of tubing used for sampling later in the same year if the unused portion is wrapped in foil (shiny side out) and maintained in a sealed container between sampling evets.

4.2 Instrument/Equipment Testing, Inspection, and Maintenance (QAPP Element B6)

Analytical instrument testing, inspection, maintenance, setup, and calibration will be conducted by the laboratory in accordance with requirements identified in laboratory SOPs and manufacturer instructions. In addition, each of the specified analytical methods provides protocols for proper instrument setup and tuning and critical operating parameters. Instrument maintenance and repair will be documented in the laboratory's maintenance logs or record books.

4.3 Instrument/Equipment Calibration and Frequency (QAPP Element B7)

Before beginning each analysis, laboratory instruments will be properly calibrated, and the calibration will be verified with appropriate check standards and calibration blanks for each parameter. Instrument calibration procedures and schedules will conform to analytical protocol requirements and descriptions provided in the laboratory QA plan.

Calibration standards will be obtained from either the EPA repository or a commercial vendor, and the laboratories will maintain traceability back to the National Institute of Standards and Technology. Stock standards will be used to establish intermediate standards and calibration standards. Special attention will be given to expiration dating, proper labeling, proper refrigeration, and prevention of contamination. Documentation relating to the receipt, mixing, and use of standards will be recorded in a laboratory logbook. All calibration and spiking standards will be checked against standards from another source, as specified in the methods and the laboratory QA manual.

4.4 Inspection/Acceptance of Supplies and Consumables (QAPP Element B8)

The quality of supplies and consumables used during sample collection and laboratory analysis can affect the quality of the data. Any equipment that contacts samples and extracts must be sufficiently clean to prevent detectable contamination, and the analyte concentrations must be accurate in all standards used for calibration and QC purposes.

The quality of laboratory water used will be documented at the laboratory. All containers will be visually inspected before use, and any suspect containers will be discarded.

Reagents of appropriate purity and suitably cleaned laboratory equipment will also be used for all stages of laboratory analyses. Details for acceptance requirements for supplies and consumables at the laboratories are provided in laboratory SOPs and QA plans. All supplies will be obtained from reputable suppliers with appropriate documentation or certification. Supplies will be inspected to confirm that they meet use requirements, and certification records will be retained by the field supervisor (i.e., for supplies used in the field) or the laboratory QA manager (i.e., for supplies used in the laboratory).

4.5 Non-direct Measurements (QAPP Element B9)

Flow and precipitation measurements are being provided by Los Angeles County and USGS to determine the timing and status of dry weather and wet weather conditions based on the magnitude of flows in the San Gabriel River. These data will be assumed to be accurate.

4.6 Data Quality

Measurement quality objectives (MQO) for data quality will be assessed by measures of representativeness, comparability, accuracy, precision, and completeness. Definitions of these terms, the applicable procedures, and level of effort are described below. The applicable QC procedure, quantitative target limits, and level of effort for assessing data quality are dictated by the intended use of the data and the nature of the analytical methods. The following is a description of the data quality assessment criteria.

Representativeness is a measure of how closely the results reflect the actual concentration or distribution of the analytes in the matrix samples. Equipment rinsate blanks and field duplicate samples will be used to assess field and transport contamination and method variation. To assess laboratory contamination, laboratory method blanks will be run at a minimum frequency of one per analytical batch.

Comparability expresses the confidence with which one data set can be compared to another. Data comparability will be maintained using standard procedures, where available, and by the use of consistent methods and consistent units. Actual detection limits will depend on the sample matrix and will be reported as defined for the specific samples.

Accuracy is an assessment of the closeness of the measured value to the true value. For samples, accuracy of analytical test results is assessed by spiking samples with known standards and establishing the average recovery. Target accuracy goals for the analytical methods proposed, expressed as percent recovery of spiked sample and are presented in Appendix B, Table B-3. Percent recoveries outside these goals will be qualified appropriately.

Precision of the data is a measure of the data spread when more than one measurement has been taken on the same sample. Precision can be expressed as the relative percent difference. The target precision goal for the analytical methods proposed, expressed as relative percent difference between duplicate samples. Precision targets are presented in Appendix B, Table B-3. A relative percent difference outside this goal will be qualified appropriately.

Completeness is a measure of the amount of valid data obtained from the analytical measurement system and the complete implementation of defined field procedures. The target completeness objective will be 90 percent; the actual completeness may vary depending on the intrinsic nature of the samples. Completeness of the data will be assessed during QC reviews.

4.7 Data Management (QAPP Element B10)

Harbor Toxics TMDL data will be generated both in the field and at an analytical laboratory. The contract laboratory will submit data in electronic format. The laboratory project manager will contact the laboratory QA manager and data manager before data delivery to discuss specific format requirements. Written documentation will also be used to clarify how field duplicate and split samples, and laboratory duplicates and QA/QC samples were recorded in the data tables, and to provide explanations of other issues that may arise. The data management task will include keeping accurate records of field and laboratory QA/QC samples so that technical team personnel who use the data will have appropriate documentation. Data management files will be stored on a secure computer.

In addition to placing all data and identifiers in an electronic database (i.e., labspec 7), electronic files of printable reports (i.e., .pdf files) for all original analytical data or study records will be filed by the PM. Each analytical data set (or supporting laboratory document) will be given a unique documentation code based on the original source of the data or information, and filed based on that code. A master list of all filed documents, sorted in order by filing code, will be maintained for easy retrieval from the document library. Sample results will be reported in tabular format in the field sampling report.

4.8 Data Review, Verification, and Validation (QAPP Element D1)

Laboratory and field data will be subject to verification and validation before submittal. Data qualifiers may be added or clarified because of data validation. For example, if results for surrogates, laboratory control standards, MS/MSD samples, or laboratory duplicates do not meet method-specified control limits, including performance-based control limits.

Equipment rinse blanks will be evaluated and data qualifiers applied in the same manner as method blanks, described in the functional guidelines for data review (EPA 2017a; 2017b). Data will be rejected if control limits for acceptance of data are not met, as described in the EPA's national functional guidelines (2017a; 2017b).

Validated data will be provided electronically within 90 days of receipt of the final samples at the lab.

4.9 Verification and Validation Methods (QAPP Element D2)

Field data will be verified during preparation of samples and COC forms. Field data and COC forms will be reviewed daily by the FTL. After field data are entered into the project database, 10 percent verification of the entries will be completed to assess the accuracy and completeness of the database. Any discrepancies will be resolved before the final database is released for use. Accuracy and completeness of each data set will be verified at the laboratory when EDDs are prepared and again as part of data validation.

Harbor Toxics TMDL sampling results will be validated to Level II. This may be performed by the project chemist or other program team members.

- Level I – Verification that samples were analyzed for the methods requested and review of the data for outliers and anomalies.
- Level II – Includes all activities of Level I in addition to verification that samples were analyzed for the methods requested, review of the laboratory case narrative for events in the laboratory that affect the accuracy or precision of the data, review of quality control indicator data, and a "reasonableness" review of the data.

4.10 Reconciliation with User Requirements (QAPP Element D3)

The goal of data validation is to determine the quality of each data result and to identify those that do not meet the task MQOs and DQOs. The QA Manager will review data to determine if data quality has been met. Any data that do not meet these project criteria will be subject to qualification and corrective action will be taken to confirm there are no preventable problems that recur. Non-conforming data may be qualified as estimated (i.e., a “J” qualifier will be applied to the result) or rejected as unusable (i.e., an “R” qualifier will be applied to the result) during data validation if criteria for data quality are not met. Data may also be qualified as undetected during validation based on laboratory and field blank results. Rejected data will not be used for any purpose.

Data qualified as estimated will be used for all intended purposes and will be appropriately qualified in the final project database. However, these data are less precise or less accurate than unqualified data. Data users are responsible for assessing the effect of the inaccuracy or imprecision of the qualified data on statistical procedures and other data uses. The data validation discussion will include information regarding the direction or magnitude of bias or the degree of imprecision for qualified data to facilitate the assessment of data usability.

Assessment and Response Actions (QAPP Element C1)

Unexpected conditions can be encountered in the field or when processing samples. These situations will be recognizable to the properly trained and experienced personnel conducting these data collection tasks, will be documented, and will be reported to the STC and PM.

If unanticipated or changed conditions occur in the field, the FTL will institute the necessary corrective actions, document the cause and reason for correction action in the field notebook or form, communicate this to the STC and PM, and confirm that the appropriate procedures are followed. Any problems that cannot be easily resolved or that affect the final quality of the work product will be brought to the attention of the STC and PM before taking corrective action. These changes will be reported to the Water Board in the annual report if corrective actions require a departure from the *Monitoring Plan and QAPP*. In most circumstances where sampling conditions are unexpected, the appropriate sampling actions consistent with this task's objectives will be conducted.

SECTION 6

Reporting (QAPP Element C2)

Results from Harbor Toxics TMDL required monitoring will be provided to the Water Board annually as part of the Norwalk Station Fourth Quarter NPDES discharge monitoring report. Each report will include Harbor Toxics TMDL monitoring data collected from January 1 through December 31 and will be reported by February 15th of the following year. Each report will provide the following information:

- Descriptions of field and laboratory methods
- Tables of San Gabriel River surface water and sediment analytical results
- Field sampling forms, laboratory analytical reports, and COC documentation

This report will be prepared under the supervision of a California Registered Geologist or Professional Engineer and will be submitted to the Water Board for review and approval.

References

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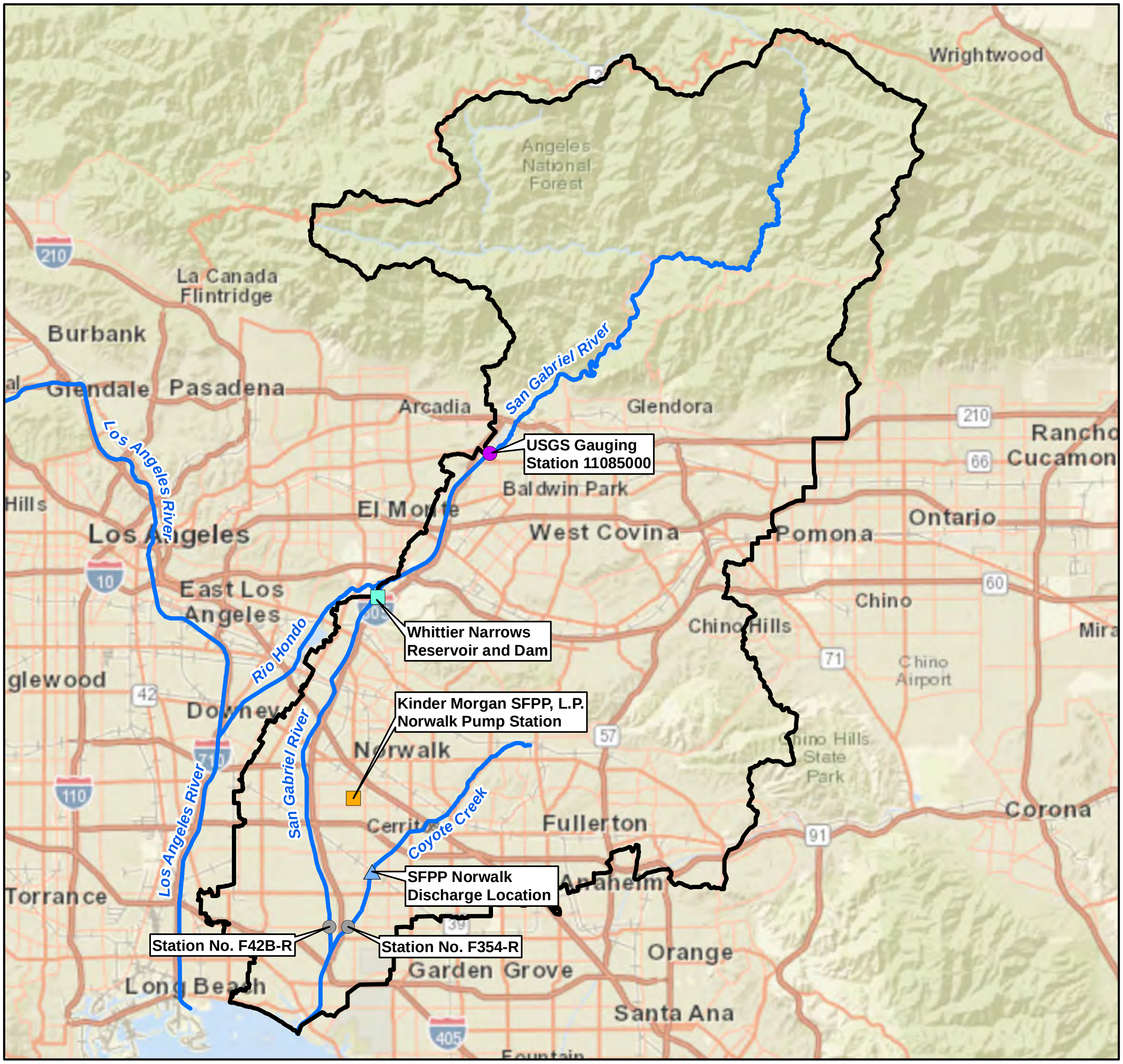
Figures



Basemap Source: ESRI World Streetmap

LEGEND

- Kinder Morgan SFPP, L.P. Norwalk Pump Station
- Whittier Narrows Reservoir and Dam
- SFPP Norwalk Discharge Location
- LADPW Gauging Station
- USGS Gauging Station 11085000
- River/Creek
- San Gabriel River Watershed

Figure 1
San Gabriel River Watershed
Harbor Toxics TMDL Sampling for the
SFPP Norwalk Pump Station
Los Angeles County, California

ch2m:

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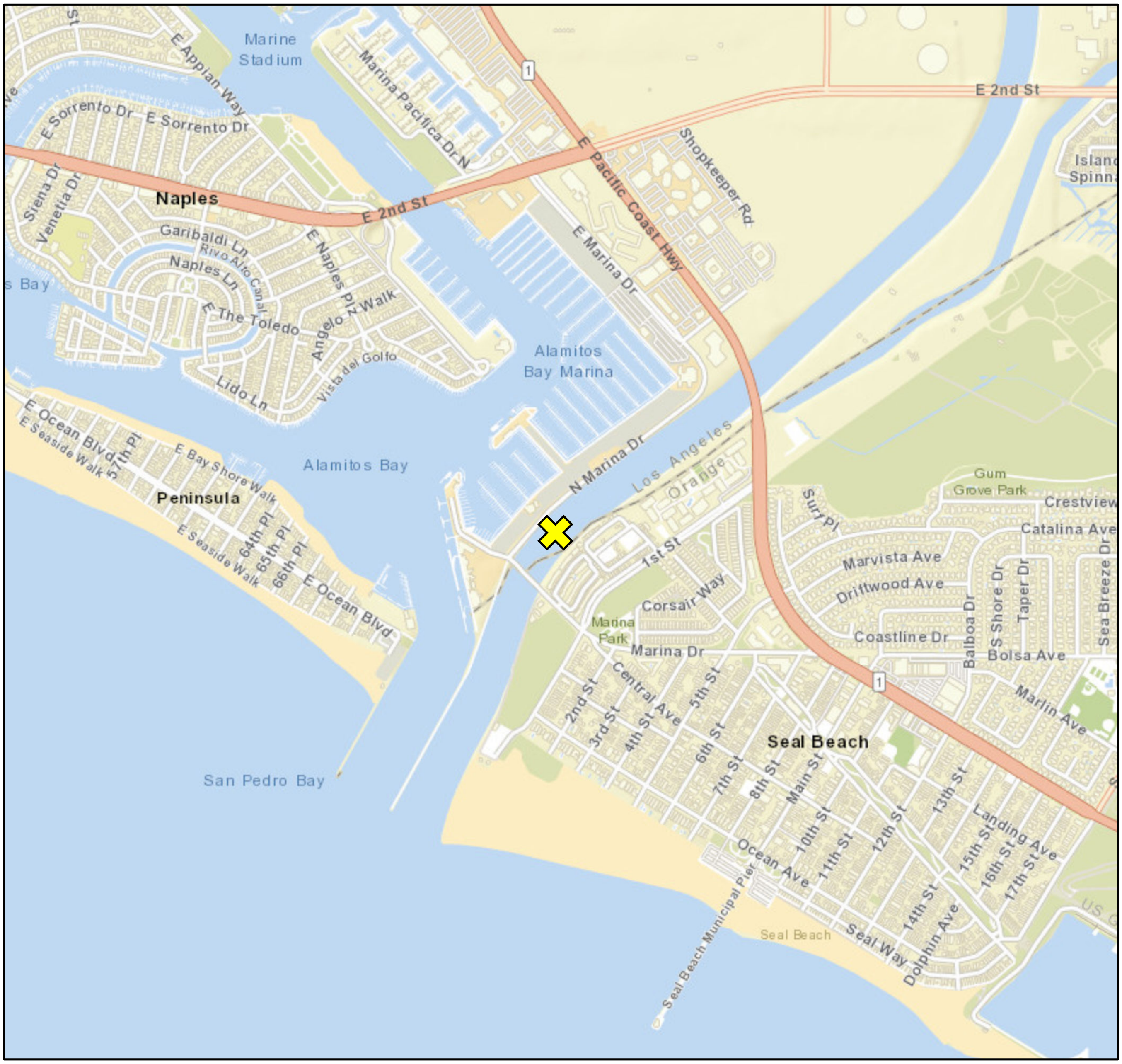

Basemap Source: ESRI World Streetmap

LEGEND

Approximate Water/Sediment Sampling Location

N

0 750 1,500
Feet

Figure 2
San Gabriel River Sampling Location
Harbor Toxics TMDL Sampling for the SFPP Norwalk Pump Station
Los Angeles County, California

ch2m

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Appendix A
Standard Operating Procedures

SOP-1 WATER QUALITY MEASUREMENTS

Scope and Applicability

Specific requirements and operating procedures for field measurements of surface water quality parameters (i.e., temperature, dissolved oxygen (DO), pH, and conductivity normalized to 25°C) are addressed in this Standard Operating Procedure (SOP) for SFPP Norwalk Pump Station Harbor Toxics TMDL (Total Maximum Daily Load) compliance sampling. Field personnel will have been trained in the use of specific instruments and are familiar with the theory behind their use.

Acronyms

- cm - Centimeter
- DO – Dissolved Oxygen
- Ft – feet
- Ft^3/s – Cubic feet per second
- In – inches
- m – meters
- mg/L – Milligram per liter
- mV – millivolt(s)
- NIST – National Institute of Standards and Technology
- ORP – Oxidation Reduction Potential
- PPT – Parts per thousand
- QAPP - Quality Assurance Project Plan
- S/m – Siemen(s) per meter
- SOP – Standard Operating Procedure
- S.U. – Standard unit
- TMDL – Total Maximum Daily Load

Equipment and Materials

- Water quality multi-meter (e.g., Horiba U-52) with flow-through cell and Calibration Standard Solutions (4.0, 7.0, and 10 pH, 4.49 mS/cm, 0 NTU)
- Spare batteries
- Peristaltic pump or water sampling device (if needed)
- Squirt bottle containing distilled or deionized water
- Kim wipes or other non-abrasive cleaning fabric
- Disposable or cleanable sample collection containers
- Decontamination supplies
- NIST-certified thermometer

- Spare batteries

Procedures

1. Position the vessel over the sampling station and bring vessel to a complete halt prior to exposure chamber deployment. Field measurements should be made at the centroid of flow (the midpoint of the portion of the stream width which contains 50% of the total flow), if the stream visually appears to be completely mixed from shore to shore.
2. Record: GPS coordinates, equipment details, sampling personnel, weather, and time.
3. Calibrate the meter prior to each use in accordance with the manufacturer's instructions. The calibration and maintenance log will be documented on a field form or in a field notebook and include: Instrument model and serial number, calibration solution concentrations or values, temperatures of solutions, and time of calibration.
4. Immerse the probes into the surface water at the desired depth (see Table A-1), collect a sample into a clean container for water quality measurements, or circulate surface water through a flow-through cell using a peristaltic pump. Probes should be positioned or samples collected from approximately 0.5 m below the water surface at the site or in at least 1 m of water near the site when tide is low– without disturbing the sediment. Indicate the type of sample being analyzed and the collection depth on the sample collection form.
5. Record the stable readings on a field form using Table A-2 as a guide for significant figures. DO should be recorded last. If the DO probe does not have an automatic stirrer attached, or flowing water is not being measured, then manual stirring must be provided by raising and lowering the probe at a rate of 1 ft/s without agitating the water surface. Documentation shall include: measurement location and conditions (e.g., flow-through, grab, 24-hour composite), time of sample measurement, and comments on adjustments, cleaning requirements, or other observations.
6. Rinse the probe with deionized water when done and decontaminate between sample locations.
7. The field team should have a spare unit and spare batteries readily available in case of an equipment malfunction, due to the importance of obtaining these parameters. A colorimetric kit can be maintained on-site and used as a backup.

Table A-1. Recommended depths for conducting field data measurements

Water Depth Less than 5 ft (<1.5 m)	If the water depth is less than 5 ft (1.5 m), grab samples for water are taken at approximately 0.1 m (4 in.), and multi-probe measurements are taken at approximately 0.2 m (8 in.). This is because all sensors have to be submerged, so 0.1 m would not be deep enough. But taking a grab sample at 0.2 m is not always feasible, as it is difficult to submerge bottles to that depth, and in many cases the bottle will hit the stream bottom.
Water Depth Greater than 5 ft (>1.5 m)	If the water depth at the sampling point exceeds 5 ft (1.5 m) in depth, a vertical profile of dissolved oxygen, temperature, pH, and specific conductance are made using the multi-parameter probe equipment. The depth of the sonde at the time of measurement is most accurately determined from the depth sensor on the multi-parameter sonde rather than depth labels on the cable.
Vertical Depth Profiles and Depth-Integrated Sample Collection	If depth integration sampling is being conducted, or if vertical profile measurements are requested, multi-probe measurements are made starting at a depth of 0.2 m, and are then conducted at 1.0, 2.0, 3.0, 4.0, and 5.0 m depths after that until 5.0 m depth is reached. Beginning at 5.0 m, measurements are made every 5.0 m through depth profile.

SWAMP 2017. Collections of Water and Bed Sediment Samples with Associated Field Measurements and Physical Habitat in California. Version 1.1, updated March 2014.

Table A-2 Collections of Water and Bed Sediment Samples with Associated Field Measurements and Physical Habitat in California

Parameter	Field Data Reporting Requirements
Water Temperature (°C)	Report temperature to the nearest tenth of a degree. Round significant figures 0 through 4 down and 5 thru 9 up.
pH (s.u.)	Report pH to the nearest tenth of a pH standard unit.
D.O. mg/L D.O. (% saturation)	Report dissolved oxygen to the nearest tenth of a mg/L. Report % saturation to the nearest tenth of a percent.
Specific Conductance (micro siemens/cm)	Report specific conductance to only three significant figures if the value exceeds 100. Do not report ORP which is displayed by some multiprobes.
Salinity (ppt)	Report salinity values above 2.0 ppt to the nearest tenth of a part per thousand. In estuarine waters report the actual values displayed by the multi-probe above 2.0 ppt and values less than 2.0 as <2.0 or <1.0 only. Determine if a station is estuarine (i.e., experiences cases where salinity is >2.0 ppt) and always report salinity at this station, regardless of the salinity during periods of high flow.
Secchi Disk (meters)	Report Secchi depth transparency in meters to two significant figures.
Flow (ft^3/s)	Report instantaneous flow values less than 10 ft^3/s to two significant figures. Report flow values greater than 10 ft^3/s to the nearest whole number, but no more than three significant figures. When there is no flow (pools), report as 0.0. When there is no water, do not report a value, but report as "dry" in the observations.

Source: SWAMP 2017. Version 1.1, updated March 2014.

Parameters and Specifications

Parameter	Range of measurement	Accuracy
pH	0 to 14 pH units	± 0.1 pH units
Specific conductance	0 to 9.99 S/m	± 3% full scale
DO	0 to 19.99 mg/L	± 0.2 mg/L
Temperature	0 to 55°C	± 0.5°C
Salinity	0 to 4 %	± 0.3%

Source: Horiba U-52 Manual; SWAMP (2017) Field Measurements in Fresh and Marine Water.

Notes: Readings should be recorded with significant figures supported by the measurement accuracy.

SOP-2 SURFACE WATER SAMPLING

Scope and Applicability

Specific requirements and operating procedures for surface water collection are addressed in this Standard Operating Procedure (SOP) for SFPP Norwalk Pump Station Harbor Toxics TMDL (Total Maximum Daily Load) compliance sampling.

Acronyms

- cm - Centimeter
- COC – Chain of Custody
- DO – Dissolved oxygen
- HSP – Health and Safety Plan
- mL – Milliliter
- min - Minute
- PPE – Personal Protective Equipment
- QAPP - Quality Assurance Project Plan
- SOP - Standard Operating Procedure
- TMDL – Total Maximum Daily Load
- VOC – Volatile Organic Compound
- µm - Micrometer

Equipment and Materials

- Field logbook
- Weighted measuring line or sounding pole
- Bottleware, labels, and appropriate preservatives for samples
- Pens and markers
- PPE as directed in the HSP
- Sampling device: Kemmerer sampler, Van Dorn bottles, or other appropriate discrete water sampler; or, peristaltic pump (with power source), 0.45 µm inline filters, and tubing
- Ziploc bags
- Ice
- Cooler
- Decontamination solution, DI water, spray bottle(s), scrub brush, bowl
- Digital camera

Procedures

Surface water sample collection may be conducted from a bridge over the target location or from a boat. Vessel maneuvering and positioning will be performed by a qualified subcontractor in accordance with their standard procedures and specifications noted in the HSP. The subcontractor may also support the sampling. Surface water samples should be collected before any other work is performed (e.g., sediment sampling and water quality monitoring) to avoid potential contamination or disturbing the substrate.

1. The sample site is approached from downstream in a manner that avoids disturbance of bottom sediments as much as possible.
2. Sub-surface grab samples may be collected directly into sample containers not containing preservative at 0.1 m below the water surface. Containers should be opened and re-capped under water in most cases. Surface water should be noted on the field data sheet as 0 m.
3. Sub-surface water samples to be collected in containers with preservative already added will be collected using a properly decontaminated or new pond sampler, Kemmerer or Van Dorn bottle, or a with a peristaltic pump with pre-cleaned and blanked Teflon lined tubing.
4. For discrete sampling devices:
    a) Lower the pre-set sampling device to approximately 10 cm below the water surface. Avoid bottom disturbance. When the discrete sampler bottle is at the required depth, send down the messenger, closing the sampling device.
    b) Retrieve the sampler and discharge the first 10 to 20 mL to clear any potential contamination on the valve. Transfer the sample to the appropriate sample container.
    c) Use special attachments available on some discrete samplers to distribute small volumes at low flow rates (e.g., 100 to 200 mL/ min for VOCs).
    d) For sample collection with a peristaltic pump, begin pump operation once the peristaltic pump tubing is at the desired depth. Allow several volumes to be purged from the tubing before collecting water into sample containers.
5. Collect and record in-situ water quality parameters (temperature, DO, pH, and conductivity) from the depth at which the water sample is to be collected.
6. Record the following sample collection information in the field book or sampling form: Date and time of sample collection, weather, station location/coordinates (as-sampled), depth, personnel, analytical samples collected, any problems or other observations (e.g., odor, color of water, clarity/turbidity, presence of floating debris/trash). Water depth can be determined with a weighted line or sounding pole.

Precautions

Sample preservatives may include acids or bases and require use of nitrile gloves and safety glasses. Sampling devices with “snap-top” designs can pose a pinch hazard and care should be taken when setting the devices.

SOP-3 SEDIMENT SAMPLING

Scope and Applicability

Specific requirements and operating procedures for sediment collection with an Ekman dredge, petite Ponar, or similar grab sampler from a vessel are addressed in this Standard Operating Procedure (SOP) for SFPP Norwalk Pump Station Harbor Toxics TMDL (Total Maximum Daily Load) compliance sampling.

Acronyms

- cm - Centimeter
- COC – Chain of Custody
- m – Meter
- PFD – Personal flotation device
- QAPP - Quality Assurance Project Plan
- SOP - Standard Operating Procedure
- TMDL – Total Maximum Daily Load

Equipment and Materials

- Ekman or Ponar grab sampler (or similar) and rope (and a backup sampler)
- Plastic float for Ekman grab
- Polyethylene or Teflon (polytetrafluoroethylene; PTFE) disposable scoop
- Glass mixing bowl
- Camera (plus applicable batteries, chargers, etc)
- Measuring tape
- Forceps
- GPS
- Field notebook
- Waterproof pens /markers
- Sample containers and labels
- Personal protection equipment as required by the Health and Safety Plan (e.g., nitrile gloves, safety glasses, PFD)
- Coolers with ice (double-bagged) for sample storage
- Packing tape

Procedures

Vessels equipped with an Ekman dredge (or equivalent) may be used to collect below-water sediment samples. A backup dredge shall also be available in the event that the primary dredge is damaged, malfunctions, or is lost. It can also be helpful to bring multiple devices suitable for different sediment densities if site conditions are not known.

The dredge will be decontaminated prior to sample collection. The dredge must be cleaned according to the decontamination SOP (Appendix A, SOP 7) prior to sampling and ensure it is in good working condition.

1. Position the vessel over the sampling station and bring vessel to a complete halt prior to deployment of the dredge. Sampling locations will be approached at slow boat speeds with minimal wake to minimize disturbance of bottom sediment prior to sampling, particularly in shallow sampling locations. Record the coordinates from a GPS. Note: to ensure that the position fix represents the actual location sampled, the antenna for the GPS unit must be as close as practical to the sampler (e.g., within 1 to 2 meters).
2. Prepare the sampler by opening the jaws and setting the trigger mechanism, if applicable.
3. Lower the sampler at a steady pace that avoids creating a bow wave that could disrupt the surface sediment. Drop the sampler onto the sediment from approximately 0.5 m above the sediment surface. Keep the rope snug so there is no slack and it is vertical in the water.
4. Note the depth marked on the sampler rope and record in field book (depth numbering should be properly marked on the rope; zero meters begins at the hinge between the jaws).
5. If necessary, trigger the jaw release mechanism by lowering a messenger down the line, or by depressing the button on the upper end of the extended handle.
6. Raise the sampler firmly and steadily - at a rate of approximately 1 meter per second – and bring on-board into a sampling table or stand (e.g., an empty cooler).
7. Slowly decant free liquid through the top of the sampler once it is on-board. Be careful to retain fine sediment. A peristaltic pump and/or tubing may be used to siphon water from sampler.
8. Check sample acceptability (e.g., closed sampler, not overfilled, adequate penetration depth achieved, minimal winnowing, approximately 10 cm sediment depth collected; Figure A-1). Accept the sample if criteria are met. If not acceptable, then the rejected sediment shall be temporarily stored until sampling at the site has been completed. Rejected sediment can be returned to the site – adjacent to the collection location – once sampling is complete.
9. Photograph acceptable sediment while in the sampler and document and document any notable observations (e.g., odors, colors, layering, consistency).
10. Open the top of the dredge and transfer the top 2 cm of the sediment into a glass bowl using a Teflon scoop. Team members conducting the sample processing will use a clean polyethylene or PTFE scoop and wear clean disposable nitrile gloves. Sediment that is in direct contact with the sides of the grab sampler should not be collected. Continue to collect additional sediment samples until sufficient material has been secured to fill all sample containers.
11. Thoroughly mix sediment to obtain a homogeneous sample with disposable hand tools.
12. Label sample containers and cover the label with packing tape.
13. Transfer the sample into the appropriate sample container(s). Sample containers shall be filled to capacity, and stored in a cooler with a maximum temperature of 4°C.
14. Double-bag the sample container within resealable bags and place an additional label marked with pencil on label or on a piece of waterproof paper between the 2 bags.
15. Return any excess sediment to the site with care not to disturb the location.

16. Once sampling is complete, thoroughly rinse the dredge using a brush and site water. Decontaminate the sampler between stations and when sampling is complete.
17. Sediment samples will be handled carefully to minimize disturbance during collection and transportation to the analytical laboratory. Additional guidance on sample shipping and handling is provided in Appendix A SOPs 4 and 5.
18. Record the following sample collection information in the field book or sampling form: Date and time of sample collection, weather, station location/coordinates (as-sampled), depth, personnel, analytical samples collected, any problems or other observations (e.g., odor, colors, presence of debris/trash).

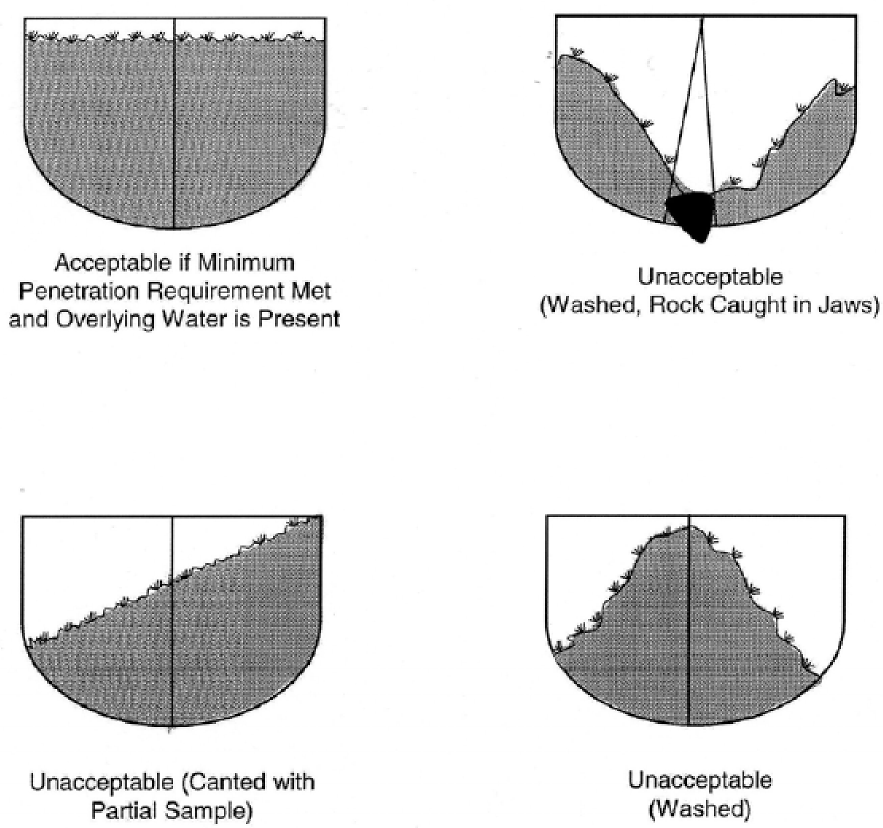


Figure A-1. Examples of Acceptable and Unacceptable Sediment Grab Samples.

SOP-4 SAMPLE STORAGE, PACKING, AND SHIPPING

Scope and Applicability

Specific requirements for sample storage on-site, packaging of sample coolers, and shipment to the off-site analytical laboratory are addressed in this Standard Operating Procedure (SOP) for SFPP Norwalk Pump Station Harbor Toxics TMDL (Total Maximum Daily Load) compliance sampling.

Acronyms

- COC – Chain of Custody
- FS – Field Supervisor
- NPDES – National Pollutant Discharge Elimination System
- QAPP - Quality Assurance Project Plan
- SPC - Sample Processing Coordinator
- SOP - Standard Operating Procedure
- TMDL – Total Maximum Daily Load

Equipment and Materials

Specific equipment or supplies necessary to properly pack and ship samples include the following:

- Quality Assurance Project Plan
- Thermometers
- Resealable plastic bags (assorted sizes)
- Wet ice in doubled, sealable bags
- Coolers
- Bubble wrap
- Fiber-reinforced packing/strapping tape and clear plastic packing tape
- Scissors
- Chain-of-custody (COC) forms
- Ziploc bags (1-gallon size recommended)
- COC seals
- Large plastic garbage bags (preferably 3-mil-thick) for cooler lining
- Paper towels
- “Fragile,” “This End Up,” or “Handle with Care” labels

Procedures

All sample shipping will utilize a commercial courier or shipping service. As a courier will be used, CH2M field personnel will need to be aware of any potentially limiting factors to timely shipping (e.g., availability of overnight service and weekend deliveries to specific areas of the country, shipping regulations “restricted articles” [e.g., dry ice]) prior to shipping the samples.

On-site Sample Storage

Samples will be placed in secure storage (i.e., locked room or vehicle) or remain in the possession of CH2M sampling personnel prior to shipment. Any sample storage areas will be locked and secured to maintain sample integrity and COC requirements.

Packing and Preparation

The following steps should be followed to ensure the proper transfer of samples from the field to the off-site analytical laboratory.

1. Confirm each sample container against the COC form to ensure all samples intended for shipment are accounted and labels match the IDs listed on the COC.
2. Choose the appropriate size cooler (or coolers) and make sure that the outside and inside of the cooler is clean of gross contamination. If the cooler has a drain on the outside at the bottom of the cooler, the drain should be capped and securely taped shut with duct tape.
3. The cooler should be lined with a large plastic bag (preferably a bag with a thickness of 3 mil) should be opened and placed inside the cooler.
4. Individual sample containers should be secured in bubble-wrap (or other available clean packing material) to reduce movement and the potential for breakage or opening inside the cooler during shipment.
5. Place the individual subsamples into the large plastic bag in the cooler, leaving space for sufficient ice that it will not be melted prior to receipt at the lab.
6. Add double-bagged wet ice to keep the samples cool during shipping (i.e., 4°C). Always over-estimate the amount of ice that you think will be required. After all samples and ice have been added to the cooler, use bubble wrap (or other available clean packing material) to fill any empty space to keep the samples from shifting during transport.
7. Sign and date the completed COC form and retain the pink (back) copy for project files. Take a photo of the COC for the project file if carbon copies are not available. Place the rest of the signed COC form in a resealable bag (e.g., 1 gallon Ziploc) and tape the bag containing the form to the inside of the cooler lid. Each cooler should contain an individual COC form for the samples contained in each respective cooler. If time constraints impact sample shipping, and it becomes necessary to combine all the samples onto a single set of COC forms, and the shipment contains multiple coolers, indicate on the outside of the respective cooler "Chain-of-Custody Inside."
8. After the cooler is sufficiently packed to prevent shifting of the containers, close the lid and seal it shut with fiber-reinforced packing tape. The cooler should be taped shut around the opening between the lid and the bottom of the cooler and around the circumference of the cooler at both hinges.
9. As security against unauthorized handling of the samples, apply two COC seals across the opening of the cooler lid. One seal should be placed on the front right portion of the cooler and one seal should be placed on the back-left portion of the cooler. Be sure the seals are properly affixed to the cooler so they are not removed during shipment. Additional clear packing tape across the seal may be necessary if the outside of the cooler is wet.

The sample processing coordinator (SPC) should notify the laboratory contact will be shipped and the estimated arrival time. This must be done for Saturday deliveries. The SPC should also send copies of all COC forms to the project manager or place electronic copies on the project folder (\\Cheron\Proj\KinderMorgan\407609Norwalk\), as appropriate.

Shipping

1. Shipping labels will be generated using CH2M's shipping tools (e.g., CH Express or Ship Right) (https://www.int.ch2m.com/VO/Site?folders=RFOM&file=tools).
2. Add appropriate labels, such as "This End Up," "Fragile," and "Handle with Care." If the shipment contains multiple coolers, indicate on the mailing label the number of coolers that the testing laboratory should expect to receive (e.g., 1 of 2; 2 of 2).
3. Samples shipped for Saturday delivery, or for overnight delivery expected on Friday, shall indicate Saturday delivery on the shipping label – in case of delay by the courier.

SOP-5 SAMPLE CUSTODY

Scope and Applicability

This SOP describes CH2M procedures for custody management of environmental samples during SFPP Norwalk Pump Station Harbor Toxics TMDL (Total Maximum Daily Load) compliance sampling.

Chain-of-custody (COC) forms ensure that samples are traceable from the time of collection through processing and analysis until final disposition. A sample is in a person's custody if any of the following criteria are met:

1. The sample is in the person's possession
2. The sample is in the person's view after being in possession
3. The sample is in the person's possession and is being transferred to a designated secure area
4. The sample has been locked up to prevent tampering after it was in the person's possession.

At no time is it acceptable for samples to be outside of CH2M personnel's custody unless the samples have been transferred to a secure area (i.e., locked up and custody sealed). If the samples cannot be placed in a secure area, then a CH2M field team member must physically remain with the samples (e.g., at lunch time one team member must remain with the samples).

Acronyms

- COC – Chain of Custody
- FS – Field Supervisor
- PM – Project Manager
- QA/QC – Quality Assurance/Quality Control
- SPC - Sample Processing Coordinator
- TMDL – Total Maximum Daily Load

Chain-of-Custody Forms

The COC form is critical because it documents sample possession from the time of collection through the final disposition of the sample. The form also provides information to the laboratory regarding what analyses are to be performed on the samples that are shipped.

The COC form will be completed after each field collection activity and before the samples are shipped to the laboratory. Sampling personnel are responsible for the care and custody of the samples until they are shipped. When transferring possession of the samples, the individuals relinquishing and receiving the samples must sign the COC form(s), indicating the time and date that the transfer occurs.

COC forms typically consist of 3-part carbon-less paper with white, yellow, and pink copies. The white sheet and the yellow sheet will be placed into a plastic sealable bag and secured to the inside top of each transfer container (e.g., cooler). The pink sheet will be retained by the field staff for filing at the CH2M PM's location.

Each COC form has a unique number. This number and the samples on the form shall be recorded in the field logbook. CH2M also uses computer-generated COC forms.

If computer-generated forms are used, then the forms will be printed in triplicate, sequentially numbered, and all three sheets signed so that two sheets can accompany the shipment to the laboratory and one sheet can be retained on file at the CH2M PM's location. Alternatively, if sufficient lead time is available, the computer-generated forms should be printed on 3-part carbon-less paper.

The individual sample identifiers will be recorded on the COC form. The COC form will also identify the following:

- sample collection date and time
- sample location
- sample media (e.g., effluent or surface water)
- type of sample (e.g., grab or composite)
- number of containers per sample
- each sample container volume and material
- preservatives (if any)

In addition, the COC form provides information on any other sample pretreatment applied in the field and the analyses to be conducted by referencing a list of specific analyses or the statement of work for the laboratory. The COC form will be sent to the laboratory along with the sample(s).

Procedures

The following guidelines will be followed to ensure the integrity of the samples:

1. COC forms will be completed in ink.
2. At the end of each sampling day and prior to shipping or storage, COC entries will be made for all samples and COCs will be filled out for all samples. Information on the COCs will be checked against field logbook entries.
3. At the bottom of each COC form is a space for the signatures of the persons relinquishing and receiving the samples and the time and date that the transfer occurred. Usually either the Sample Processing Coordinator (SPC) or Field Supervisor (FS) will relinquish the samples. The time that the samples were relinquished should match. Each COC form must be appropriately signed and dated by the sampling personnel. The person who relinquishes custody of the samples must also sign this form.
4. The COC form should not be signed until the information has been checked for inaccuracies by the FS. All changes should be made by drawing a single line through the incorrect entry and initialing and dating it. Revised entries should be made in the space below the entries. Any blank lines remaining on the COC form after corrections are made should be marked out with single lines that are initialed and dated. This procedure will preclude any unauthorized additions.
5. At the bottom of each COC form is a space for the signatures of the persons relinquishing and receiving the samples and the time and date that the transfer occurred. The time that the samples were relinquished should match exactly the time they were received by another party. Under no circumstances should there be any time when custody of the samples is undocumented.
6. If samples are sent by a commercial carrier not affiliated with the laboratory, such as Federal Express (FedEx) or United Parcel Service (UPS), the name of the carrier should be recorded on the COC form. Any

tracking numbers supplied by the carrier should be also entered on the COC form. The time of transfer should be as close to the actual drop-off time as possible. After the COC forms are signed and the "pink" copy has been removed, they should be sealed inside the transfer container.

7. If errors are found after the shipment has left the custody of sampling personnel, a corrected version of the forms must be made and sent to all relevant parties. Minor errors can be rectified by making the change on a copy of the original with a brief explanation and signature. Errors in the signature block may require a letter of explanation.
8. Upon completion of a field sampling event, the FS will be responsible for submitting all COC forms to be scanned and posted to the project folder.

Custody Seal

As security against unauthorized handling of the samples during shipping, two custody seals will be affixed to each sample cooler. The custody seals will be placed across the opening of the cooler (front right and back left) prior to shipping. Be sure the seals are properly affixed to the cooler so they cannot be removed during shipping. Additional tape across the seal may be prudent.

Shipping Air Bills

When samples are shipped from the field to the testing laboratory via a commercial carrier (e.g., Federal Express, UPS), an air bill or receipt is provided by the shipper. The FS is responsible for posting a copy of the shipping air bills to the project LAN folder upon completion of the field sampling event. The air bill number (or tracking number) shall be noted on the applicable COC forms and the applicable COC form number should be noted on the air bill to enable sample tracking if a cooler becomes lost.

Acknowledgement of Sample Receipt Forms

In most cases, when samples are sent to a testing laboratory, an Acknowledgment of Sample Receipt form is faxed to the project QA/QC coordinator the day the samples are received by the laboratory. It is the responsibility of the person receiving this form (designated by PM) to review the form and make sure that all the samples that were sent to the laboratory were received by the laboratory and that the correct analyses were requested. If an error is found, the laboratory must be called immediately. Decisions made during the telephone conversation should be documented in writing on the Acknowledgment of Sample Receipt Form. In addition, corrections should be made to the COC form and the corrected version of the COC form should be faxed to the laboratory.

The Acknowledgment of Sample Receipt form (and any modified COC forms) will then be submitted to be scanned and copied to the project folder.

Archive Record Forms

On occasion, samples are archived at a CH2M office or a CH2M authorized laboratory. If samples are to be archived, it is the responsibility of the PM or analytical laboratory manager to complete an Archive Record form. This form is to be accompanied by a copy of the COC form for the samples, and will be placed in a locked file cabinet. The original COC form will remain with the samples in a resealable plastic bag.

SOP-6 FIELD DOCUMENTATION

Scope and Applicability

The integrity of each sample from the time of collection to the point of data reporting must be maintained throughout SFPP Norwalk Pump Station Harbor Toxics TMDL (Total Maximum Daily Load) compliance sampling. Proper record keeping will be implemented in the field to allow samples to be tracked from collection to final disposition.

All information pertaining to field operations during sample collection must be properly documented to ensure transparency (and reproducibility) of methods and procedures. Several types of field documents will be used for this purpose by field personnel.

Acronyms

- COC – Chain of Custody
- FS – Field Supervisor
- FTL – Field Team Leader
- PM – Project Manager
- QAPP - Quality Assurance Project Plan
- SOP – Standard Operating Procedure
- STC – Senior Technical Consultant
- TMDL – Total Maximum Daily Load

Field Logbooks

During field sampling events, field logbooks are used to record all daily field activities during sample collection. The purpose of the field logbook is to document events that occur during field activities and to record data measured in the field to ensure transparency and reproducibility.

The field logbook is the responsibility of, and maintained by the Field Team Leader (FTL). A site logbook may be kept by the Field Supervisor (FS) during sampling activities and will be placed in the project files when filled or at the conclusion of field activities.

The field logbook will be bound and waterproof with consecutively numbered pages. All entries will be made using waterproof ink and no erasures will be made. Any necessary corrections in the logbook should consist of a single line-out deletion, followed by the author's initials and the date. The author will initial and date each page of the field logbook, sign and date the last page at the end of each day, and draw a line through the remainder (unused portion) of that page.

The project name, dates of the field work, site name, and location (city and state) should be written on the cover of the field logbook. If more than one logbook is used during a single sampling event, then the upper right-hand corner of the logbook will be annotated (e.g., Volume 1 of 2, 2 of 2) to indicate the number of logbooks used during the field event. Field logbooks will be stored in a secure manner when not in use in the field.

At a minimum, the following information will be recorded in the field logbook:

- Project name and location.
- Purpose and description of the field task.
- Date(s) and times of activities (24-hour clock; e.g., 1400).
- Name and affiliation of person making entries and other field personnel and their duties, including the times that they are present.

The following information may be event specific and should be recorded in the field logbook when applicable:

- Health and Safety (tailgate) discussion topic and any issues encountered.
- The sample identifier and analysis code for each sample to be submitted for laboratory analysis, if not included on separate field data sheets (cross reference provided).
- All field measurements made (or reference to specific field data sheets used for this purpose), including the time that the measurement was collected and the date of calibration, if appropriate.
- The sampling location name, date, gear, water depth (if applicable), and sampling location coordinates, if not included on separate field data sheets.
- Specific information on each type of sampling activity and a sample description.
- The sample type, sample number, sample tag number, and preservatives used (if any), if not included on separate field data sheets.
- Weather conditions at the beginning of the field work and any changes that occur throughout the day, including the approximate time of the change (e.g., wind speed and direction, rain, thunder, etc.).
- The location and description of the work area, including sketches, map references, and photograph log, if appropriate.
- Level of personal protection being used.
- Onsite visitors (names and affiliations), if any, including the times that they are present (e.g., cultural resource personnel, agency observers, etc.).
- The name, affiliation, and telephone number(s) of any key field contacts.
- Notation of the coordinate system used to determine the station location information.
- Sample storage methods.
- Cross-references of numbers for duplicate samples.
- Photographs (uniquely identified) taken at the sampling location, if any.
- Details of the work performed.
- Variations, if any, from the project-specific Quality Assurance Project Plan (QAPP) or standard operating protocols, reasons for deviation, and project personnel (e.g., PM or STC) contacted to discuss the deviation.
- Details pertaining to unusual events which might have occurred during sample collection (e.g., possible sources of sample contamination, equipment failure, unusual appearance of sample integrity).
- References to other logbooks or field forms used to record information (e.g., field data sheets, health

and safety log).

- Sample shipment information (e.g., shipping manifests, COC form numbers, carrier, air bill numbers, time addresses).
- A record of quantity of investigation derived wastes (if any) and storage and handling procedures.

A summary of all daily site activities should be recorded in the logbook. The information need not duplicate anything recorded in other field logbooks or field forms (e.g., Site Health and Safety Officer's logbook, calibration logbook, field data sheets), but should summarize the contents of the other logbooks and refer to the page locations in these logbooks for detailed information.

If measurements are made at any location, the measurements and equipment used must either be recorded in the field logbook or reference must be made to the logbook and page number(s) or data from on which they are recorded. All maintenance and calibration records for equipment should be traceable through field records to the person using the instrument and to the specific piece of instrumentation itself.

Field Data Forms

Upon completion of the field sampling event, the FS will be responsible for submitting all field data forms to be scanned and copied to the project folder.

Photographs

In certain instances, photographs (print or digital) of samples, activities, and/or sampling locations may be taken. Photographs should include an item of known size for scale, when practical (e.g., pencil, coin, ruler, etc.). Telephoto/zoom or wide-angle shots should not be used because they cannot be used in enforcement proceedings. The following items should be recorded in the field logbook for each photograph taken:

1. The photographer's name or initials, date and time of the photograph, and the general direction faced (orientation).
2. A brief description of the subject and the field work portrayed in the picture.
3. For print photographs, the sequential number of the photograph and the film roll number (if applicable) on which it is contained.
4. For digital photographs, the sequential number of the photograph, the file name, the file location, and any back-up (if applicable).

Upon completion of the field sampling event, the FS will be responsible for submitting all photographic materials to be developed (prints) or to be copied from electronic media, as appropriate. Digital copies of all photos and scans of photo logs or supporting documentation from the field logbook will be copied into in the project folder. Prints or electronic media, any associated negatives, and hard copies of supporting documentation will be held in the project files (at the CH2M PM's location).

SOP-7 DECONTAMINATION

Scope and Applicability

This standard operating procedure (SOP) provides the general technical requirements and operational guidelines associated with documenting environmental sampling and field investigations for SFPP Norwalk Pump Station Harbor Toxics TMDL (Total Maximum Daily Load) compliance sampling. All reusable sediment sampling and water sampling and processing equipment will be decontaminated prior to each use to prevent cross-contamination of samples from residual material on sampling devices. Decontaminated equipment will be wrapped in foil (shiny side out) and stored to avoid recontamination. Blanks will also be collected to confirm there is no potential for sample contamination from the equipment.

Acronyms

- DI – Deionized
- HSP - Health and Safety Plan
- IDW – Incident Derived Waste
- PPE - Personal Protective Equipment
- SOP - Standard Operating Procedure
- TMDL – Total Maximum Daily Load

Equipment and Materials

- Deionized (DI) water (ASTM Type II water or lab-grade DI water if available)
- Tap water or site water
- 2.5% (w/w) Liquinox® and water solution
- Scrub brushes
- Squirt bottles labelled to identify contents (e.g., site water, Liquinox)
- Polyethylene or polypropylene tub or bucket (to collect rinsate)
- Plastic garbage bag
- Aluminum foil
- Personal Protective Equipment (PPE) as specified by the Health and Safety Plan (HSP)

Procedures

Reusable sampling equipment is decontaminated before and after each use as follows.

1. Don nitrile gloves.
2. Rinse and scrub equipment thoroughly with site water or tap water to remove debris.
3. Wash all equipment surfaces that contacted the potentially contaminated soil/water with Liquinox© solution (e.g., about 0.5 tablespoon in 2.5 gallons of water).
4. Double-rinse with potable water or site water.
5. Rinse with distilled or DI water.

6. Set the equipment in a clean location to dry.
7. Equipment does not need to be dry before use.
8. Wrap equipment with aluminum foil (shiny side out) for transport and handling if equipment will not be used immediately.
9. Collect all rinsate and waste materials to dispose according to IDW plan.

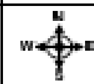
Attachment 1

Field Form and COC examples

SWAMP Field Data Sheet (Water Chemistry & Discrete Probe) - EventType=WQ

SWAMP Field Data Sheet (Water Chemistry & Discrete Probe) - EventType=WQ			Entered in d-base (Initial/date)	Pg of Pgs
*StationID: ___ ___ ___ ___ ___ ___ ___ ___ ___	*Date (mm/dd/yyyy): / /		*Group:	*Agency:
*Funding: ___ ___ ___ ___ ___ ___ ___ ___	ArrivalTime:	DepartureTime:	*SampleTime (1st sample):	*Protocol:
*ProjectCode:	*Personnel:		*Purpose (circle applicable): WaterChem WaterTox Habitat FieldMeas	*PurposeFailure:

*Location: Bank Thalweg Midchannel OpenWater	*GPS/DGPS	**Lat (dd.ddddd)**	**Long (ddd.ddddd)**	OCCUPATION METHOD: Walk-in Bridge R/V __________ Other
GPS Device:	**Target:**		–	STARTING BANK (facing downstream): LB / RB / NA
Datum: NAD83 / Accuracy (ft / m):	***Actual:**		–	Point of Sample (If Integrated, then -88 in dbase)

Habitat Observations (CollectionMethod = Habitat_generic)	WADEABILITY: Y / N / Unk	BEAUFORT SCALE (see attachment):	DISTANCE FROM BANK (m):	STREAM WIDTH (m): / WATER DEPTH (m):
SITE ODOR: None,Sulfides,Sewage,Petroleum,Smoke,Other_______				
SKY CODE: Clear, Partly Cloudy, Overcast, Fog, Smoky, Hazy	WIND DIRECTION (from):		HYDROMODIFICATION: None, Bridge, Pipes, ConcreteChannel, GradeControl, Culvert, AerialZipline, Other_______ LOCATION (to sample): US / DS / WI / NA	
OTHER PRESENCE: Vascular,Nonvascular,OilySheen,Foam,Trash,Other___			**PHOTOS** (RB & LB assigned when facing downstream; RENAME to StationCode_yyyy_mm_dd_uniquecode):	1: (RB / LB / BB / US / DS / ##)
DOMINANT SUBSTRATE: Bedrock, Concrete, Cobble, Boulder, Gravel, Sand, Mud, Unk, Other_______				
WATERCLARITY: Clear (see bottom), Cloudy (>4" vis), Murky (<4" vis)	PRECIPITATION: None, Fog, Drizzle, Rain, Snow			2: (RB / LB / BB / US / DS / ##)
WATERODOR: None, Sulfides, Sewage, Petroleum, Mixed, Other_____	PRECIPITATION (last 24 hrs): Unknown, <1", >1", None			
WATERCOLOR: Colorless, Green, Yellow, Brown	EVIDENCE OF FIRES: No, <1 year, <5 years			3: (RB / LB / BB / US / DS / ##)
OVERLAND RUNOFF (Last 24 hrs): none, light, moderate / heavy, unknown				
OBSERVED FLOW: NA, Dry Waterbody Bed, No Obs Flow, Isolated Pool, Trickle (<0.1cfs), 0.1-1cfs, 1-5cfs, 5-20cfs, 20-50cfs, 50-200cfs, >200cfs				

Field Measurements (SampleType = FieldMeasure; Method = Field)

	DepthCollec (m)	Velocity (fps)	Air Temp (°C)	Water Temp (°C)	pH	O_2 (mg/L)	O_2 (%)	Specific Conductivity (uS/cm)	Salinity (ppt)	Turbidity (ntu)			
SUBSURF/MID/ BOTTOM/REP													
SUBSURF/MID/ BOTTOM/REP													
SUBSURF/MID/ BOTTOM/REP													
Instrument:													
Calib. Date:													

Samples Taken (# of containers filled) - Method=Water_Grab

Field Dup YES / NO: (SampleType = Grab / Integrated; LABEL_ID = FieldQA; create collection record upon data entry

SAMPLE TYPE: Grab / Integrated COLLECTION DEVICE: Indiv bottle (by hand, by pole, by bucket); Teflon tubing; Kemmer; Pole & Beaker; Other _______

	DepthCollec (m)	Inorganics	Bacteria	Chl a	TSS / SSC	TOC / DOC	Total Hg	Dissolved Mercury	Total Metals	Dissolved Metals	Organics	Toxicity	VOAs
Sub/Surface													
Sub/Surface													

COMMENTS:

Modified 02/10/11

SWAMP Field Data Sheet (Sediment Chemistry) - EventType=WQ

Entered in d-base (initial/date) | Pg ___ of ___ Pgs

*StationID: __ __ __ __ __ __ __ __ __ __ | *Date (mm/dd/yyyy): / / | *Group: | *Agency:

*Funding: __ __ __ __ __ __ __ __ __ | ArrivalTime: | DepartureTime: | *SampleTime (1st sample): | *Protocol:

*ProjectCode: | *Personnel: | *Purpose (circle applicable): SedChem SedTox Habitat Benthic | *PurposeFailure:

*Location: Bank Thalweg Midchannel OpenWater | *GPS/DGPS | Lat (dd.ddddd) | Long (ddd.ddddd) | OCCUPATION METHOD: Walk-in Bridge R/V __________ Other

GPS Device: | Target: | – | STARTING BANK (facing downstream): LB / RB / NA

*Actual: | – | Point of Sample (If Integrated, then -88 in dbase)

Datum: NAD83 Accuracy (ft / m): | Same as Water/Probe Collection? YES NO | DISTANCE FROM BANK (m): | STREAM WIDTH (m): | WATER DEPTH (m):

Habitat Observations (CollectionMethod = Habitat_generic) **Only complete Sed Observations (bolded) if WQ Observations are already recorded

WADEABILITY: Y / N / Unk | BEAUFORT SCALE see Attachment

SITE ODOR: None,Sulfides,Sewage,Petroleum,Smoke,Other______

HYDROMODIFICATION: None, Bridge, Pipes, ConcreteChannel, GradeControl, Culvert, AerialZipline, Other

LOCATION (to sample): US / DS / WI / NA

SKY CODE: Clear, Partly Cloudy, Overcast, Fog, Smoky, Hazy | WIND DIRECTION (from):

OTHERPRESENCE: Vascular,Nonvascular,OilySheen,Foam,Trash,Other___

PHOTOS (RB & LB assigned when facing downstream; RENAME to StationCode_yyyy_mm_dd_uniquecode):
1: (RB / LB / BB / US / DS / ##)
2: (RB / LB / BB / US / DS / ##)
3: (RB / LB / BB / US / DS / ##)

DOMINANTSUBSTRATE: Bedrock, Concrete, Cobble, Boulder, Gravel, Sand, Mud, Unk, Other__________

SEDODOR: None, Sulfides, Sewage, Petroleum, Mixed, Other_____ | PRECIPITATION: None, Fog, Drizzle, Rain, Snow

SEDCOLOR: Colorless, Green, Yellow, Brown | PRECIPITATION (last 24 hrs): Unknown, <1", >1", None

SEDCOMPOSITION: Silt/Clay, FineSand, CoarseSand, Gravel, Cobble, Mixed, HardPanClay | EVIDENCE OF FIRES: No, <1 years, <5 years

OBSERVED FLOW: NA, Dry Waterbody Bed, No Obs Flow, Isolated Pool, Trickle (<0.1cfs), 0.1-1cfs, 1-5cfs, 5-20cfs, 20-50cfs, 50-200cfs, >200cfs

Samples Taken (# of containers filled) - Method=Sed_Grab | Field Dup YES / NO: (SampleType = Grab / Integrated; LABEL_ID = FieldQA; create collection record upon data entry

COLLECTION DEVICE: Scoop (SS / PC / PE, Core (SS / PC / PE), Grab (Van Veen / Eckman / Petite Ponar) | COLLECTION DEVICE AREA (m2): ___________

Sample Type:	DepthCollec (cm)	Equipment Used	Sediment Only (Y / N)	Grain Size/TOC	Organics	Metals/HgT	Selenium	Toxicity	SWI	Archive Chemistry	Benthic Infauna	Benthic Coll. Area (m^2)	Sieve Size (mm)
Integrated Grab													
Integrated Grab													
Integrated Grab													
Integrated Grab													

COMMENTS:

Modified 06/27/08

Notes to Standardize SWAMP Field Data Sheets
(For in the field use)

Key Reminders to identify samples:

1. **Sample Time** is the SAME for all samples (Water, Sediment, & Probe) taken at the sampling event. Use time of FIRST sample; important for COC.
2. **Group**; many diffrent ways to do a group, one suggestion is to create groups which assign trips to assess frequency of field QA

Collection Details

1. **Personnel:** S. Mundell, G Ichikawa (first person listed is crew leader)
2. **Location:** Use "openwater" in bay/estuary/harbor only if no distinguishable channel exists
3. **GRAB vs INTEGRATED:** GRAB samples are when bottles are filled from a single depth; INTEGRATED sample are taken from MULTIPLE depths and combined.
   a. GRAB: use 0.1 for subsurface samples; if too shallow to submerge bottle; depth =0
   b. INTEGRATED: -88 in depth sampled, record depths combined in sample comments
4. **TARGET LAT/LONG:** Refers to the existing station location that the sampling crew is trying to achieve; can be filled out prior to sampling
5. **ACTUAL LAT/ LONG:** is the location of the current sample event.
6. **HYDROMODIFICATION:** Describe existing hydromodifications such as a grade control, drainage pipes, bridge, culvert
7. **HYDROMOD LOC:** if there is an IMMEDIATE (with in range potentially effecting sample) hydromodification; is the hydromodification upstream/downstream/within area of sample; if there is no hydromodification, NA is appropriate
8. **STREAM WIDTH and DEPTH:** describe in meters at point of sample.

FIELD OBSERVATIONS: (each one of these observations has a comment field in the database so use comment space on data sheet to add information about an observation if necessary)

1. **PICTURES:** use space to record picture numbers given by camera; be sure to rename accordingly back in the office. (StationCode_yyyy_mm_dd_uniquecode)
2. **WADEABILITY:** in general, is waterbody being sampled wadeable to the average person AT the POINT of SAMPLE
3. **DOMINANT SUBSTRATE:** if possible; describe DOMINANT substrate type; use UNK if you cannot see the dominant substrate type
4. **BEAUFORT SCALE:** use scale 0-12; refer to scales listed below.
5. **WIND DIRECTION:** records the direction from which the wind is blowing
6. **OTHER PRESENCE:** VASCULAR refers to terrestrial plants or submerged aquatic vegetation (SAV) and NONVASCULAR refers to plankton, periphyton etc. These definitions apply to vegetation IN the water at the immediate sampling area.
7. **OBSERVED FLOW:** Visual estimates in cubic feet/ second.
8. **WATER COLOR:** This is the color of the water from standing creek side
9. **WATER CLARITY:** this describes the clarity of the water while standing creek side; clear represents water that is clear to the bottom, cloudy may not be clear to bottom but greater than 4" can be seen through the water column.
10. **PRECIPITATION LAST24hrs:** refers to field crews best categorization of rainfall in the last 24 hrs; may or may not effect Overland Runoff Last 24 hrs
11. **OVERLAND RUNOFF LAST 24 hrs:** Light Precip = fog, drizzle, and/or light rain with no overland runoff; Mod to Heavy Precip = rain such that site probably or definitely received at least some overland runoff
12. **SedimentComp:** generally described sediments used for chemistry sample

Note: these reminders do not give all details needed to maintain equivalent SWAMP sampling protocols, they are strictly for "infield" use to help insure comparability of field observations.

BEAUFORT SCALE: Specifications and equivalent speeds for use at sea

FORCE	EQUIVALENT SPEED 10 m above ground miles/hour	knots	DESCRIPTION	SPECIFICATIONS FOR USE AT SEA
0	0-1	0-1	Calm	Sea like a mirror.
1	1-3	1-3	Light air	Ripples with the appearance of scales are formed, but without foam crests.
2	4-7	4-6	Light breeze	Small wavelets, still short, but more pronounced. Crests have a glassy appearance and do not break.
3	8-12	7-10	Gentle breeze	Large wavelets. Crests begin to break. Foam of glassy appearance. Perhaps scattered white horses.
4	13-18	11-16	Moderate breeze	Small waves, becoming larger; fairly frequent white horses.
5	19-24	17-21	Fresh breeze	Moderate waves, taking a more pronounced long form; many white horses are formed. Chance of some spray.
6	25-31	22-27	Strong breeze	Large waves begin to form; the white foam crests are more extensive everywhere. Probably some spray.
7	32-38	28-33	Near gale	Sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of the wind.
8	39-46	34-40	Gale	Moderately high waves of greater length; edges of crests begin to breakinto spindrift. The foam is blown in well-marked streaks along the direction of the wind.
9	47-54	41-47	Severe gale	High waves. Dense streaks of foam along the direction of the wind. Crests of waves begin to topple, tumble and roll over. Spray may affect visibility.
10	55-63	48-55	Storm	Very high waves with long over-hanging crests. The resulting foam, in great patches, is blown in dense white streaks along the direction of the wind. On the whole the surface of the sea takes on a white appearance. The 'tumbling' of the sea becomes heavy and shock-like. Visibility affected.

Source:
Last edited on 09 January, 1999 Dave Wheeler weatherman@zetnet.co.uk
Web Space kindly provided by Zetnet Services Ltd, Lerwick, Shetland.

BEAUFORT SCALE: Specifications and equivalent speeds for use on land

FORCE	EQUIVALENT SPEED 10 m above ground miles/hour	knots	DESCRIPTION	SPECIFICATIONS FOR USE ON LAND
0	0-1	0-1	Calm	Calm; smoke rises vertically
1	1-3	1-3	Light air	Direction of wind shown by smoke drift, but not by wind vanes
2	4-7	4-6	Light Breeze	Wind felt on face; leaves rustle; ordinary vanes moved by wind
3	8-12	7-10	Gentle Breeze	Leaves and small twigs in constant motion; wind extends light flag
4	13-18	11-16	Moderate Breeze	Raises dust and loose paper; small branches are moved.
5	19-24	17-12	Fresh Breeze	Small trees in leaf begin to sway crested wavelets form on inland waters
6	25-31	22-27	Strong Breeze	Large branches in motion; whistling heard in telegraph wires umbrellas used with difficulty
7	32-38	28-33	Neargale	Whole trees in motion; inconvenience felt when walking against the wind
8	39-46	34-40	Gale	Breaks Twigs and generally impedes progress

Source:

Last edited on [illegible] January, [illegible] Dave Wheeler weatherman@zetnet.co.uk

Web Space kindly provided by Zetnet Services Ltd, Lerwick, Shetland.

Advanced Technology Laboratories
3151 W. Post Road
Las Vegas, NV 89118
Tel: 702-307-2659 Fax: 702-307-2691
Marlon Cartin (marlon@atl-labs.com)

CHAIN OF CUSTODY RECORD

DATE: ____________________
PAGE: __________ of __________

Section A Required Client Information:		Section B Required Project Information:	Section C Invoice Information:	Section D Sampler Information:
Company: **Kinder Morgan Energy Partners** **Attention: Steve Defibaugh**		Report To: Eric Davis	Attention: Steve Defibaugh	Sampler Name: James Dye
Address: 1100 Town & Country Road Orange, CA 92868		Copy To: Steve Defibaugh	Company Name: Kinder Morgan Energy Partners	Sampler Signature:
Email To: steve_defibaugh@kindermorgan.com eric.davis@ch2m.com		Purchase Order No.:	Address: 1100 Town & Country Road Orange, CA 92868	Sample Date:
Phone: 714-560-4802	Fax: 714-560-4801	Project Name: **SFPP Norwalk**	ATL Project Manager: Marlon Cartin	

Section E
Required Sample Information

					CONTAINER TYPE																			
					# OF CONTAINERS																			
					PRESERVATIVE																			
					VOLUME (mL)																			
ITEM #	SAMPLE ID	LOCATION/ DESCRIPTION	MATRIX	SAMPLE TYPE (G=GRAB C=COMP)	SAMPLING DATE	SAMPLING TIME	TOTAL # OF CONTAINERS	SAMPLE TEMPERATURE (°F)	Analysis Test															Comments
1																								
2																								
3																								
4																								
5																								
6																								
7																								
8																								
9																								
10																								
11																								
12																								

Relinquished by (Signature and Printed Name):	Date / Time	Relinquished by (Signature and Printed Name):	Date / Time
Relinquished by (Signature and Printed Name):	Date / Time	Relinquished by (Signature and Printed Name):	Date / Time
Relinquished by (Signature and Printed Name):	Date / Time	Relinquished by (Signature and Printed Name):	Date / Time

Turn Around Time (TAT):
- ☐ A = Same Day
- ☐ B = 24 Hours
- ☐ C = 48 Hours
- ☐ D = 72 Hours
- ☐ E = 5 Workdays
- ☐ E = 10 Workdays

TAT Starts at 8 AM the following day if samples received after 3:00 PM.

Special Instruction:

Matrix:		
W = Water	WW = Wastewater	
O = Oil	P = Product	S = Soil
Others/Specify:		

Preservatives:		
H = HCl	N = HNO3	S = H2SO4
Z = Zn(AC)2	O = NaOH	T = Na2S2O3
Others/Specify:		

Container Type:			
T = Tube	V = VOA	P = Pint	A = Amber
J = Jar	B = Tedlar	G = Glass	
M = Metal	P = Plastic	C = Can	

Attachment 2

Contact List

Contact List – NPDES Compliance

SFPP Norwalk Pump Station

Name	Affiliation	Position	Phone	Email / Address
Paul Cho	Water Board	Case Manager	(213) 576-6721	Paul.Cho@waterboards.ca.gov
Ching Yin To	Water Board	Permit Contact	(213) 576-6696	Ching-Yin.To@waterboards.ca.gov 320 W. 4th Street, Suite 200 Los Angeles, CA 90013
Steve Defibaugh	Kinder Morgan Energy Partners	Client Project Manager	(714) 560-4802	Steve_Defibaugh@kindermorgan.com 1100 Town & Country Road Orange, CA 92868
Eric Davis	CH2M	Project Manager	(213) 228-8262	Eric.Davis@CH2M.com
Vladmir Carino	CH2M	Site Engineer	(714) 435-6017	Vladimir.Carino@CH2M.com
Benny Pataray	CH2M	Data Manager	(385) 474-8545	Benny.Pataray@CH2M.com
Cameron Irvine	CH2M	Senior Technical Coordinator	(916) 335-2369	cirvine@ch2m.com
Bernice Kidd	CH2M	Quality Assurance Manager and Laboratory Coordinator	(530) 229-3203	Bernice.Kidd@CH2M.com
Marlon Cartin	Asset Laboratories	Chemistry Lab - Norwalk Project Manager	(702) 307-2659 Ext. 410	marlon@assetlaboratories.com 3151 W. Post Road Las Vegas, NV 89118
Fern Rivera	Asset Laboratories	Chemistry Lab - Norwalk Data Manager	(702) 307-2659	reports.lv@assetlaboratories.com

Project files \\Cheron\Proj\KinderMorgan\407609Norwalk\

Appendix B
Analytical and Monitoring Procedures

APPENDIX B

Analytical and Monitoring Procedures

Appendix B details the monitoring procedures that will be utilized to analyze samples to meet the goals and objectives of Harbor Toxics Total Maximum Daily Load (TMDL) required sampling. These details are described to ensure that consistent protocols and procedures are applied to chemical analysis. Appendix A describes the standard operating protocols for sample collection. This appendix is divided into the following sections:

- Analytical Procedures
- Laboratory Quality Assurance/Quality Control
- Data Validation and Management

B.1 Analytical Procedures

The following subsections detail the analytical procedures for data generated in the laboratory.

B.1.1 Analytical Methods and Method Detection and Reporting Limits

Analytical methods, method detection limits (MDL), and reporting limits (RLs) for parameters analyzed in the laboratory are described in Tables B-1 and B-2 for water and sediment. Analyses will be performed by Asset Laboratories (Las Vegas, NV, contact Marlon Cartin, marlon@assetlaboratories.com, 702-307-2659).

The MDL is a minimum analyte concentration of an analyte that can be measured and reported with a 99% confidence that the concentration is greater than zero; whereas, an RL is the concentration that can be routinely measured in the sampled matrix within stated limits and with confidence in both identification and quantitation. RLs are established based on the verifiable levels and general measurement capabilities demonstrated for each method.

The laboratory has demonstrated the ability to meet the minimum performance requirements for each analytical method, including precision and accuracy. Data quality objectives for precision and accuracy are summarized in Table B-3.

B.1.2 Sample Containers, Storage, Preservation, and Holding Times

Sample container, storage, preservation, and holding time requirements are presented in Table B-4. The analytical laboratory will provide sample containers that are pre-cleaned and certified to be free of contamination, and containing preservative, where necessary. Samples will be stored at 4±2 °C upon collection and until received by the analytical laboratory.

B.2 Laboratory Quality Assurance/Quality Control

B.2.1 Method Blank

Blanks are used to monitor each preparation or analytical batch for interference and/or contamination from glassware, reagents, and other potential sources within the laboratory. A method blank is an analyte-free matrix (i.e., laboratory reagent water for aqueous samples or Ottawa sand, sodium sulfate, or glass beads (metals) for soil samples) to which all reagents are added in the same amount or proportions as are added to the samples. It is processed through the entire sample preparation and analytical procedures along with the samples in the batch. There will be at least one method blank per preparation or analytical batch. If a target analyte is found at a concentration that exceeds the reporting limit, corrective action must be performed to identify and eliminate the contamination source. All associated samples must be re-prepared and reanalyzed after the contamination source has been eliminated. No analytical data may be corrected for the concentration found in the blank.

B.2.2 Laboratory Control Sample

The laboratory control sample (LCS) will consist of an analyte-free matrix (laboratory reagent water for aqueous samples or Ottawa sand, sodium sulfate, or glass beads (metals) for soil samples spiked with known amounts of analytes that come from a source different than that used for calibration standards). All target analytes specified for each method will be spiked into the LCS. The spike levels will be less than or equal to the mid-point of the calibration range. If LCS results are outside the specified control limits, corrective action must be taken, including sample re-preparation and reanalysis, if appropriate. If more than one LCS is analyzed in a preparation or analytical batch, the results of all LCSs must be reported. Any LCS recovery outside quality control limits affects the accuracy for the entire batch and requires corrective action. A LCS duplicate must be analyzed if an analytical batch does not contain a laboratory duplicate or project-specific matrix spike/matrix spike duplicate (MS/MSD).

B.2.3 Surrogates

Surrogates are organic analytes that behave similarly to the analytes of interest but are not expected to occur naturally in the samples. They are spiked into the standards, samples, and quality control samples prior to sample preparation. Recoveries of surrogates are used to indicate accuracy, method performance, and extraction efficiency. If surrogate recoveries are outside the specified control limits, corrective action must be taken, including sample re-preparation and reanalysis, if appropriate.

B.2.4 Internal Standards

Some methods require the use of internal standards to compensate for losses during injection or purging or losses due to viscosity. Internal standards are compounds that have similar properties as the analytes of interest but are not expected to occur naturally in the samples. A measured amount of the internal standard is added to the standards, samples, and quality control samples following preparation. When the internal standard results are outside the control limits, corrective action must be taken, including sample reanalysis, if appropriate.

B.2.5 Laboratory Sample Duplicate

A sample duplicate selected by the laboratory is called a laboratory sample duplicate. It is subjected to the same preparation and analytical procedures as the native sample. The relative percent difference (RPD) between the results of the native sample and laboratory sample duplicate measures the precision of sample results. The data collected may also yield information regarding whether the sample matrix is heterogeneous.

B.2.6 Interference Check Samples

The interference check samples are used in inductively-coupled plasma (ICP) analyses to verify background and inter-element correction factors. They consist of two solutions: A and AB. Solution A contains the interfering analytes, and Solution B contains both the analytes of interest and the interfering analytes. Both solutions are analyzed at the beginning and at the end of each analytical sequence. When the interference check samples results are outside the control limits, corrective action must be taken, including sample reanalysis, if appropriate.

B.2.7 Retention Time Windows

Retention time windows for gas, ion and liquid chromatographic analyses must be established by replicate injections of the calibration standard over multiple days, as described in SW846 8000B, analytical method, or appropriate laboratory SOP. The absolute retention time of the calibration verification standard at the start of each analytical sequence will be used as the centerline of the window. For an analyte to be reported as positive, its elution time must be within the retention time window.

B.3 Data Validation and Management

Analytical results of the data collection effort will be validated. In general, there are four levels of validation. Levels I and II may be performed by the project chemist (PC) or other program team members. Level III and IV validation will always be performed by the PC or their designee. Harbor Toxics TMDL sampling results will be validated to Level II.

- Level I – Verification that samples were analyzed for the methods requested and review of the data for outliers and anomalies.
- Level II – Verification that samples were analyzed for the methods requested, review of the laboratory case narrative for events in the laboratory that affect the accuracy or precision of the data, review of quality control indicator data and a “reasonableness” review of the data.
- Level III – Validation of the analytical data as described below without review of any raw data or analyte verification.
- Level IV – Validation of the analytical data will be performed as described below, including review of the analytical raw data.

B.3.1 Level II, III and IV Validation Procedures

Personnel involved in the data validation function will be independent of any data generation effort. The PC will have responsibility for oversight of the data validation effort. Data validation will be carried out when the data packages are received from the laboratory. It will be performed on an analytical batch basis using the summary results of calibration and laboratory quality control, as well as those of the associated field samples. Data packages will be reviewed for all constituents of concern. Raw data will be reviewed when deemed necessary by the PC.

Level II data validation will most often be performed and the data validation procedures will include:

- A review of the data set narrative to identify any issues that the lab reported in the data deliverable;
- A check of sample integrity (sample collection, preservation, and holding times);
- An evaluation of basic quality control (QC) measurements used to assess the accuracy, precision and representativeness of data including QC blanks, LCS, MS/MSD, surrogate recovery when applicable, and field or laboratory duplicate results.
- A review of sample results, target compound lists, and detection limits to verify that project analytical requirements are met.
- Initiation of corrective actions, as necessary, based on the data review findings.
- Qualification of the data using appropriate qualifier flags, as necessary, to reflect data usability limitations.

Level III validation procedures will also include review of;

- Evaluation of calibration and quality control summary results against the project requirements.
- Other method specific QC requirements

Level IV validation will include a review of sample chromatograms and,

- Verification of analyte identification and calculations for at least 10 percent of the data.

Data validation will be patterned after the latest versions of the United States Environmental Protection Agency Contract Laboratory Program National Functional Guidelines.

Table B-1. Analytical Methods, MDLs, and RLs for Laboratory Analysis of Water Samples and their Benchmarks

Parameter/Constituent	Method[1]	Units	Target MDL	Target RL	Benchmark	Reference
Solids						
Total Suspended Solids (TSS)	SM 2540D	mg/L	10	10	n/a	n/a
Metals						
Copper	EPA200.8	µg/L	0.25	0.5	4.95	CTR[2]
Lead	EPA200.8	µg/L	0.05	0.5	1.17	CTR[2]
Zinc	EPA200.8	µg/L	0.1	1.0	65.7	CTR[2]
Pesticides						
2,4'-DDT	SW8081A	µg/L	0.1	0.1	0.001	CTR
4,4’-DDT	SW8081	µg/L	0.0072	0.05	0.001	CTR
PAHs						
1-Methylnaphthalene	SW8270A-SIM	µg/L	0.0177	0.2	n/a	CTR
2-Methylnaphthalene	SW8270A-SIM	µg/L	0.022	0.2	n/a	
Acenaphthene	SW8270A-SIM	µg/L	0.0177	0.2	n/a	
Acenaphthylene	SW8270A-SIM	µg/L	0.017	0.2	n/a	
Anthracene	SW8270A-SIM	µg/L	0.018	0.2	110000	
Benz(a)anthracene	SW8270A-SIM	µg/L	0.015	0.2	0.049	
Benzo(a)pyrene	SW8270A-SIM	µg/L	0.03	0.2	0.049	
Benzo(b)fluoranthene	SW8270A-SIM	µg/L	0.043	0.2	0.049	
Benzo(g,h,i)perylene	SW8270A-SIM	µg/L	0.015	0.2	n/a	
Benzo(k)fluoranthene	SW8270A-SIM	µg/L	0.015	0.2	0.049	
Chrysene	SW8270A-SIM	µg/L	0.026	0.2	0.049	
Dibenz(a,h)anthracene	SW8270A-SIM	µg/L	0.015	0.2	0.049	
Fluoranthene	SW8270A-SIM	µg/L	0.017	0.2	370	
Fluorene	SW8270A-SIM	µg/L	0.017	0.2	14000	
Indeno(1,2,3-cd)pyrene	SW8270A-SIM	µg/L	0.017	0.2	0.049	
Naphthalene	SW8270A-SIM	µg/L	0.022	0.2	n/a	

Table B-1. Analytical Methods, MDLs, and RLs for Laboratory Analysis of Water Samples and their Benchmarks

Parameter/Constituent	Method[1]	Units	Target MDL	Target RL	Benchmark	Reference
Phenanthrene	SW8270A-SIM	µg/L	0.018	0.2	n/a	
Pyrene	SW8270A-SIM	µg/L	0.015	0.2	11000	
PCB Congeners						
Total PCBs	EPA 1668A	pg/L	40	250	170	CTR

µg/L – microgram(s) per liter; CTR – California Toxics Rule; MDL – Method Detection Limit; mg/L – milligram(s) per liter; n/a – Not applicable; PAH – Polynuclear Aromatic Hydrocarbons; PCB – polychlorinated biphenyls; RL – Reporting Limit

1 Methods may be substituted by an equivalent method that is lower than or meets the project RL.

2 Hardness dependent criteria. Chronic Freshwater Criteria described in the Harbor Toxics TMDL is based on a hardness of 50 mg/L.

Table B-2. Analytical Methods, MDLs and RLs for Laboratory Analysis of Sediment and their Benchmarks

Parameter/Constituent	Method[1]	Units	Target MDL	Target RL	Benchmark	Reference
General Parameters						
Total Organic Carbon (TOC)	Lloyd Kahn	mg/kg	40	100	n/a	n/a
Metals						
Cadmium	SW6010B	mg/kg	0.0362	1	n/a	Harbor Toxics TMDL (based on the TEC from Macdonald et al. 2000 for freshwater sediment)
Copper	SW6010B	mg/kg	0.0399	2	31.6	
Lead	SW6010B	mg/kg	0.0399	1	35.8	
Mercury	SW7471A	mg/kg	0.012	0.1	n/a	
Zinc	SW6010B	mg/kg	0.0625	1	121	
Pesticides						
alpha-Chlordane	SW8081A	µg/kg	0.139	1	0.5 µg/kg (dw) (Total Chlordanes)	Harbor Toxics TMDL target for (marine sediment)
gamma-Chlordane	SW8081A	µg/kg	0.189	1		
trans-Nonachlor	SW8081A	µg/kg	TBD	TBD		
Dieldrin	SW8081A	µg/kg	0.364	2	0.02 µg/kg (dw)	
2,4'-DDD	SW8081A	µg/kg	4	4	1.58 µg/kg (dw) (Total DDT)	
2,4'-DDE	SW8081A	µg/kg	4	4		

Table B-2. Analytical Methods, MDLs and RLs for Laboratory Analysis of Sediment and their Benchmarks

Parameter/Constituent	Method[1]	Units	Target MDL	Target RL	Benchmark	Reference
2,4'-DDT	SW8081A	µg/kg	4	4		
4,4'-DDD	SW8081A	µg/kg	0.421	2		
4,4'-DDE	SW8081A	µg/kg	0.248	2		
4,4'-DDT	SW8081A	µg/kg	0.222	2		
PAHs						
1-Methylnaphthalene	SW8270A- SIM	µg/kg	1.02	5	552 µg/kg (dw) (LMW) (2) 1700 µg/kg (dw) (HMW) (3) 4022 µg/kg (dw) (Total PAHs)	Harbor Toxics TMDL (target for marine sediment)
1-Methylphenanthrene	SW8270A- SIM	µg/kg	TBD	TBD		
2-Methylnaphthalene	SW8270A- SIM	µg/kg	1.68	5		
2,6-Dimethylnaphthalene	SW8270A- SIM	µg/kg	TBD	TBD		
Acenaphthene	SW8270A- SIM	µg/kg	0.82	5		
Anthracene	SW8270A- SIM	µg/kg	0.79	5		
Benzo(a)anthracene	SW8270A- SIM	µg/kg	1	5		
Benzo(a)pyrene	SW8270A- SIM	µg/kg	1.7	5		
Benzo(e)pyrene	SW8270A- SIM	µg/kg	1.41	5		
Biphenyl	SW8270A- SIM	µg/kg	TBD	TBD		
Chrysene	SW8270A- SIM	µg/kg	1.48	5		
Dibenz(a,h)anthracene	SW8270A- SIM	µg/kg	1.7	5		
Fluoranthene	SW8270A- SIM	µg/kg	1.7	5		
Fluorene	SW8270A- SIM	µg/kg	TBD	TBD		
Naphthalene	SW8270A- SIM	µg/kg	1.7	5		
Perylene	SW8270A- SIM	µg/kg	1.31	5		
Phenanthrene	SW8270A- SIM	µg/kg	1.33	5		
Pyrene	SW8270A- SIM	µg/kg	1.21	5		
PCB Congeners						
2,4'-Dichlorobiphenyl (PCB-8)	EPA 1668A	ng/kg	4.39	25	3.2 ng/g (dw) total PCBs	
2,2',5-Trichlorobiphenyl (PCB-18)	EPA 1668A	ng/kg	25.00	50		

Table B-2. Analytical Methods, MDLs and RLs for Laboratory Analysis of Sediment and their Benchmarks

Parameter/Constituent	Method[1]	Units	Target MDL	Target RL	Benchmark	Reference
2,4,4'-Trichlorobiphenyl (PCB-28)	EPA 1668A	ng/kg	20.87	130		Harbor Toxics TMDL (target for indirect effects)
2,2',3,5'-Tetrachlorobiphenyl (PCB-44)	EPA 1668A	ng/kg	14.37	300		
2,2',5,5'-Tetrachlorobiphenyl (PCB-52)	EPA 1668A	ng/kg	18.17	123		
2,3',4,4'-Tetrachlorobiphenyl (PCB-66)	EPA 1668A	ng/kg	10.5	84		
2,2',4,5,5'-Pentachlorobiphenyl (PCB-101)	EPA 1668A	ng/kg	14.4	300		
2,3,3',4,4'-Pentachlorobiphenyl (PCB-105)	EPA 1668A	ng/kg	3.89	100		
2,3',4,4',5-Pentachlorobiphenyl (PCB-118)	EPA 1668A	ng/kg	9.46	50		
2,2',3,3',4,4'-Hexachlorobiphenyl (PCB-128)	EPA 1668A	ng/kg	6.80	100		
2,2',3,4,4',5'-Hexachlorobiphenyl (PCB-138)	EPA 1668A	ng/kg	27.3	300		
2,2',4,4',5,5'-Hexachlorobiphenyl (PCB-153)	EPA 1668A	ng/kg	12.9	200		
2,2',3,3',4,4',5-Heptachlorobiphenyl (PCB-170)	EPA 1668A	ng/kg	5.96	50		
2,2',3,4,4',5,5'-Heptachlorobiphenyl (PCB-180)	EPA 1668A	ng/kg	7.46	100		
2,2',3,4',5,5',6-Heptachlorobiphenyl (PCB-187)	EPA 1668A	ng/kg	8.30	50		
2,2',3,3',4,4',5,6-Octachlorobiphenyl (PCB-195)	EPA 1668A	ng/kg	6.50	75		
2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl (PCB-206)	EPA 1668A	ng/kg	7.79	75		

µg/kg – microgram(s) per kilogram; mg/kg – milligram(s) per kilogram; ng/kg – nanogram(s) per kilogram TBD – to be determined

1 Methods may be substituted by an equivalent method that is lower than or meets the project RL.

2 Low Molecular Weight PAHs include: Acenaphthene, Anthracene, Phenanthrene, Biphenyl, Naphthalene, 2,6-dimethylnaphthalene, Fluorene, 1-methylnaphthalene, 2-methylnaphthalene, 1-methylphenanthrene, with PAH specific targets for: Phenanthrene = 240 µg/kg; 2-methylnaphthalene = 201.

3 High Molecular Weight PAHs: Benzo(a)anthracene, Benzo(a)pyrene, Benzo(e)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, Perylene, Pyrene. with PAH specific targets for: Dibenz(a,h)anthracene = 260; Chrysene = 384; Pyrene = 665; Benzo(a)anthracene = 261; Benzo(a)pyrene = 430.

Table B-3. Data Quality Objectives

Parameter	Accuracy	Precision	Completeness
Field Measurements			
pH	+ 0.2 pH units	+ 0.5 pH units	90%
Temperature	+ 0.5 oC	+ 5%	90%
Dissolved Oxygen	+ 0.5 mg/L	+ 10%	90%
Conductivity	5%	5%	90%
Laboratory Analyses – Water			
Total Suspended Solids	80-120	5	90%
Copper	85-115	20	90%
Lead	85-115	20	90%
Zinc	85-115	20	90%
1-Methylnaphthalene	35-131	30	90%
2-Methylnaphthalene	36-121	30	90%
Acenaphthene	39-125	30	90%
Acenaphthylene	43-140	30	90%
Anthracene	41-132	30	90%
Benz(a)anthracene	58-141	30	90%
Benzo(a)pyrene	31-142	30	90%
Benzo(b)fluoranthene	42-156	30	90%
Benzo(g,h,i)perylene	12-171	30	90%
Benzo(k)fluoranthene	49-165	30	90%
Chrysene	51-155	30	90%
Dibenz(a,h)anthracene	28-153	30	90%
Fluoranthene	47-158	30	90%
Fluorene	40-140	30	90%
Indeno(1,2,3-cd)pyrene	20-167	30	90%
Naphthalene	39-125	30	90%
Phenanthrene	46-144	30	90%
Pyrene	39-158	30	90%
Alpha Chlordane	63-123	30	90%
Gamma Chlordane	67-120	30	90%
Trans Nonachlor	TBD	30	90%
Dieldrin	62-129	30	90%
2,4-DDT	70-130	30	90%
4,4-DDT	47-138	30	90%
Total PCBs	50-150	20	90%
Aroclor-1248	50-150	20	90%
Aroclor-1254	50-150	20	90%

Table B-3. Data Quality Objectives

Parameter	Accuracy	Precision	Completeness
Aroclor-1260	50-150	20	90%
Laboratory Analyses – Sediment			
Total Organic Carbon	70-130	20	90%
Cadmium	85-115	20	90%
Copper	85-115	20	90%
Lead	85-115	20	90%
Mercury	75-125	20	90%
Zinc	85-115	20	90%
1-Methylnaphthalene	30-111	30	90%
1-Methylphenanthrene	TBD	TBD	90%
2-Methylnaphthalene	30-111	30	90%
2,6-Dimethylnaphthalene	TBD	TBD	90%
Acenaphthene	28-110	30	90%
Acenaphthylene	23-126	30	90%
Anthracene	28-136	30	90%
Benz(a)anthracene	31-146	30	90%
Benzo(a)pyrene	28-128	30	90%
Benzo(e)pyrene	TBD	TBD	90%
Benzo(b)fluoranthene	30-139	30	90%
Benzo(g,h,i)perylene	21-149	30	90%
Benzo(k)fluoranthene	42-129	30	90%
Biphenyl	TBD	TBD	90%
Chrysene	39-134	30	90%
Dibenz(a,h)anthracene	30-138	30	90%
Fluoranthene	30-142	30	90%
Fluorene	27-116	30	90%
Indeno(1,2,3-cd)pyrene	17-164	30	90%
Naphthalene	29-106	30	90%
Phenanthrene	32-127	30	90%
Perylene	TBD	TBD	90%
Pyrene	28-130	30	90%
Alpha Chlordane	63-121	50	90%
Gamma Chlordane	48-124	50	90%
Trans Nonachlor	TBD	50	90%
Dieldrin	67-125	50	90%
2,4-DDE	70-130	50	90%
2,4-DDD	70-130	50	90%

Table B-3. Data Quality Objectives

Parameter	Accuracy	Precision	Completeness
2,4-DDT	70-130	50	90%
4,4-DDE	68-126	50	90%
4,4-DDD	50-139	50	90%
4,4-DDT	46-135	50	90%
2,4'-Dichlorobiphenyl (PCB-8)	50-150	20	90%
2,2',5-Trichlorobiphenyl (PCB-18)	50-150	20	90%
2,4,4'-Trichlorobiphenyl (PCB-28)	50-150	20	90%
2,2',3,5'-Tetrachlorobiphenyl (PCB-44)	50-150	20	90%
2,2',5,5'-Tetrachlorobiphenyl (PCB-52)	50-150	20	90%
2,3',4,4'-Tetrachlorobiphenyl (PCB-66)	50-150	20	90%
2,2',4,5,5'-Pentachlorobiphenyl (PCB-101)	50-150	20	90%
2,3,3',4,4'-Pentachlorobiphenyl (PCB-105)	50-150	20	90%
2,3',4,4',5-Pentachlorobiphenyl (PCB-118)	50-150	20	90%
2,2',3,3',4,4'-Hexachlorobiphenyl (PCB-128)	50-150	20	90%
2,2',3,4,4',5'-Hexachlorobiphenyl (PCB-138)	50-150	20	90%
2,2',4,4',5,5'-Hexachlorobiphenyl (PCB-153)	50-150	20	90%
2,2',3,3',4,4',5-Heptachlorobiphenyl (PCB-170)	50-150	20	90%
2,2',3,4,4',5,5'-Heptachlorobiphenyl (PCB-180)	50-150	20	90%
2,2',3,4',5,5',6-Heptachlorobiphenyl (PCB-187)	50-150	20	90%
2,2',3,3',4,4',5,6-Octachlorobiphenyl (PCB-195)	50-150	20	90%
2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl (PCB-206)	50-150	20	90%

Table B-4. Sample Container, Volume, Preservation, and Holding Times

Parameter	Sample Container	Sample Volume[1]	Storage	Holding Time
Water (total)				
Total Suspended Solids (TSS)	HDPE	250 mL	Store at 4±2 °C	7 days
Metals	HDPE	500 mL	Store at 4±2 °C	6 months
Total PCBs, Pesticides	Amber glass	4 x 1 L	Store at 4±2 °C	7/40 days[2]
PAHs	Amber glass	2 x 1 L	Store at 4±2 °C	7/40 days[2]
Water (dissolved)				
Metals	HDPE	500 mL	Store at 4±2 °C	Filter within 72 hours; analyze within 6 months
Total PCBs, Pesticides	Amber glass	4 x 1 L	Store at 4±2 °C	Filter within 72 hours; 7/40 days[2]
PAHs	Amber glass	2 x 1 L	Store at 4±2 °C	Filter within 72 hours; 7/40 days[2]

Table B-4. Sample Container, Volume, Preservation, and Holding Times

Parameter	Sample Container	Sample Volume[1]	Storage	Holding Time
Sediment				
% Solids	Glass	2 x 8-ounce jars	Store at 4°C	7 days
Metals				6 months
Total Organic Carbon (TOC)				28 days
Pesticides, PCBs, PAHs				14/40 days[3]

Notes:

1 Additional volume may be required for QC analyses.

2 7/40 = 7 days to extract and 40 days from extraction to analysis.

3 14/40 = 14 days to extract and 40 days from extraction to analysis.

°C – degree(s) Celsius; HDPE – high density polyethylene; L – liter(s); mL – milliliter(s)

Appendix C
Health and Safety Plan
(to be provided with the final document)