Sampling and Analysis Plan

Clean Watersheds for a Clean Bay – Implementing the San Francisco Bay’s PCBs and Mercury TMDLs with a Focus on Urban Runoff, Task 3

EPA San Francisco Bay Water Quality Improvement Fund
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Submitted to:

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</table>
Acronyms and Abbreviations

ACCWP Alameda Countywide Clean Water Program
ASTM American Society for Testing and Materials
BASMAA Bay Area Stormwater Management Agencies Association
CCCWPC Contra Costa Clean Water Program
CW4CB Clean Watersheds for a Clean Bay
DOT Department of Transportation (U.S.)
DQO Data Quality Objective
EPA Environmental Protection Agency (U.S.)
ESL Environmental Screening Levels
IATA International Air Transport Association
IDW Investigation-Derived Waste
MDL Method Detection Limit
MQO Measurement Quality Objective
MRP Municipal Regional Permit
OC Organochlorine
OERR Office of Emergency and Remedial Response
PAH Polycyclic Aromatic Hydrocarbon
PBDE Polybrominated Diphenyl Ether
PCB Polychlorinated Biphenyl
PMT Project Management Team
PPE Personal Protective Equipment
QA Quality Assurance
QA/QC Quality Assurance / Quality Control
QAPP Quality Assurance Project Plan
QC Quality Control
RMC Regional Monitoring Coalition
RMP San Francisco Estuary Regional Monitoring Program
SAP Sampling and Analysis Plan
SCVURPPP Santa Clara Valley Urban Runoff Pollution Prevention Program
SMSTOPPP San Mateo Countywide Stormwater Pollution Prevention Program
SOP Standard Operating Procedure
SVOC Semi-volatile Organic Compound
SWAMP Surface Water Ambient Monitoring Program (California)
TOC Total Organic Carbon
VOC Volatile Organic Compound
1. Introduction
This SAP covers sampling and analysis activities related to implementation of CW4CB Task 3. Task 3 implements a process to identify specific PCB and mercury source properties within the five project watersheds and refer these sites to regulatory agencies for cleanup and abatement. The process consists of the following five steps:

1. Records review. Review general information sources (e.g., spill site databases) and records on specific properties/businesses to begin identifying potential source properties within the project watersheds.
2. Driving/walking survey. Perform a driving/walking survey of each project watershed to further identify potential source properties and begin looking for evidence that runoff from such locations is likely to convey pollutants to storm drains.
3. Facility inspections. Perform inspections of selected facilities within each project watershed.
4. Surface soil/sediment testing. Test surface soils/sediments from the public right-of-way and private properties in the project watersheds for PCBs, mercury and other particle-bound pollutants.
5. Property referrals. Where laboratory data confirm elevated pollutant concentrations, refer properties to regulatory agencies for cleanup and abatement.

A model for Task 3 is a recent project conducted by the City of Oakland through a Proposition 13 grant awarded by the California State Water Resources Control Board (Kleinfelder 2006). The project focused on identifying sources of PCB-containing sediments to the storm drain system in the Ettie Street pump station watershed in Oakland. CW4CB will adapt and refine the Ettie Street project methodologies as appropriate for local conditions in each of the five project watersheds.

It should also be noted that CW4CB has selected the Ettie Street pump station watershed as one of CW4CB's five project watersheds. Some properties in this watershed have already been referred to regulatory agencies through the existing project (Kleinfelder 2006). However, based on discussions with City of Oakland staff, additional work is needed to identify other contaminated properties for referral and abatement.

1.1. Project Region Location
All project sampling sites are located in the San Francisco Bay Area, within the jurisdictions of BASMAA member agencies.

1.2. Sampling Area Locations
Task 2 of CW4CB, which has been completed, entailed selecting five Bay Area region watersheds for pilot source property identification and referral investigations conducted via Task 3 of CW4CB. The following five project watersheds were selected using the methodology summarized by BASMAA (2011a). Figure 1 provides an overview of the watershed locations.

1. Ettie Street pump station watershed in the City of Oakland, Alameda County (Figure 2).
2. Lauritzen Channel watershed in the City of Richmond in Contra Costa County (Figure 3).
3. Parr Channel watershed in the City of Richmond in Contra Costa County (Figure 4).
4. Pulgas Creek pump station watershed in the City of San Carlos, San Mateo County (Figure 5).
5. Leo Avenue watershed in the City of San Jose, Santa Clara County (Figure 6).

**1.3. Responsible Agency**

The responsible agency for implementation of the CW4CB project is BASMAA. BASMAA is a 501(c)(3) non-profit organization that coordinates and facilitates regional activities of municipal stormwater programs in the San Francisco Bay Area. BASMAA represents 96 agencies, including 84 cities, 7 counties, and several special districts.

**1.4. Project Organization**

The project organization is detailed within Section 4 of the CW4CB Project Quality Assurance Project Plan (QAPP) (BASMAA 2012).
Figure 1. Overview of Selected Watershed Locations
Figure 2. Ettie Street Pump Station Watershed
Figure 3. Lauritzen Channel Watershed
Figure 4. Parr Channel Watershed
Figure 5. Pulgas Creek Pump Station Watershed
Figure 6. Leo Avenue Watershed
2. Background

2.1. Previous Investigations / Regulatory Involvement

A description of previous investigations and project evolution is presented in Section 5.1 of the CW4CB project QAPP (BASMAA 2012).

2.2. Scoping Meetings

A Project Management Team (PMT) consisting of BASMAA’s executive director and representatives from several BASMAA member agencies (i.e., Bay Area stormwater programs)\(^1\) and Bay Area cities\(^2\) was formed at the outset of the project. The PMT provides project oversight, refines project implementation, and facilitates coordination among the participating stormwater programs and cities. The PMT generally meets every other month. The PMT has also formed three workgroups, one each for Tasks 3, 4 and 5.

2.3. Geological Information

Field operations for Task 3 of CW4CB will be conducted in the five project watersheds (see Section 1.2), which are located in the San Francisco Bay region within the counties of San Mateo, Santa Clara, Alameda, and Contra Costa. Most sampling is expected to collect 1) sediments/soils accumulated on urban hardscape areas (e.g., streets, gutters), 2) sediments/soils accumulated within stormwater conveyance infrastructure (e.g., inlets, piping), or 3) shallow surface soils in unpaved areas. Individual site geology is expected to vary among project watersheds and sampling locations within the watersheds.

2.4. Impact on the Environment

Multiple segments of San Francisco Bay are listed on the Clean Water Act “303(d) list” as impaired by mercury and PCBs due to identified impacts upon beneficial uses such as sport fishing and rare and endangered species (SFBRWQCB 2003 and 2006). The results of the CW4CB project will be used to support TMDL implementation as well as comply with certain provisions of the Bay Area stormwater Municipal Regional Permit (SFBRWQCB 2009). It is anticipated that reductions in loadings of priority pollutants such as mercury and PCBs will reduce concentrations of pollutants in environmental media and over time help with reaching targets protective of the environment and human health.

3. Project and Data Quality Objectives

Complete details are provided in Section 7 and Appendix A of the CW4CB project QAPP (BASMAA 2012).

4. Sampling Design and Rationale

CW4CB Task 3 is identifying high priority sites for initial sampling and analysis within the five project watersheds (see Section 1.2) through a process consisting of records review, field surveys, and facility inspections. Figure 7 illustrates the sequence of Task 3 activities to identify properties and refer to regulatory agencies for abatement. Each property inspected in the project watersheds will be categorized

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\(^{1}\)The following BASMAA agencies are represented on the PMT: San Mateo Countywide Water Pollution Prevention Program, Santa Clara Valley Urban Runoff Pollution Prevention Program, Alameda Countywide Clean Water Program, Contra Costa Clean Water Program, and Fairfield-Suisun Urban Runoff Management Program.

\(^{2}\)The following cities currently participate in PMT meetings: City of Oakland, City of San Carlos, City of Richmond, and the City of San Jose.
as having higher, medium or lower potential to release PCBs/mercury to streets and stormwater conveyances. The categorization will be based on the results of all three of the above steps, i.e., records review, walking/driving survey, and the facility inspections. Table 4-1 presents typical attributes of sites with higher, medium or lower potential for PCB/mercury release. A map of each watershed showing the locations of sites with higher potential for PCB/mercury release will be created using GIS software. This information will be used to inform the development of a soil/sediment sampling and chemical analysis monitoring program designed to identify potential source properties (BASMAA 2011).

Sampling is anticipated to be conducted on both the public right-of-way and private properties within the project watersheds. The CW4CB Task 3 budget allows for the collection and analysis of 175 soil/sediment samples, or approximately 35 samples from each of the five project watersheds (BASMAA 2010), including duplicate samples for QA/QC purposes.

During the Ettie Street project about 50 sediment samples were initially collected in the public right-of-way adjacent to selected suspect properties (i.e., properties assigned medium to high potential for PCBs release). The chemical analysis results from these samples were used to prioritize properties for on-site sampling and areas in the right-of-way for abatement measures (e.g., removal of sediment via sweeping/shoveling and street power washing). About 20 sediment samples were then collected on suspect properties with one sample collected per property in most cases (Kleinfelder 2006). It is anticipated that a similar process will be used in the CW4CB watersheds, with the number of samples collected on the public right-of-way vs. the number collected on suspect properties adjusted according to local conditions and findings.

Table 4-1. Typical attributes of sites with higher, medium and lower potential for PCB/mercury release to streets and stormwater conveyances.

<table>
<thead>
<tr>
<th>Typical attributes of sites with higher potential for PCB/mercury release:</th>
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<tbody>
<tr>
<td>• Records of PCB/mercury release at the site.</td>
</tr>
<tr>
<td>• Indications of PCB/mercury-associated materials/processes.</td>
</tr>
<tr>
<td>• Locations where sediment may erode and be mobilized off-site by stormwater runoff, vehicles, and/or wind (e.g., unpaved areas).</td>
</tr>
<tr>
<td>• Illegal dumping occurs.</td>
</tr>
<tr>
<td>• Outdoor hazardous material/waste storage areas (e.g., tanks, drums) with poor housekeeping.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Typical attributes of sites with medium potential for PCB/mercury release:</th>
</tr>
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<tbody>
<tr>
<td>• Industrial land uses.</td>
</tr>
<tr>
<td>• Electrical equipment (e.g., PCB transformers).</td>
</tr>
<tr>
<td>• Outdoor hazardous material/waste storage areas (e.g., tanks, drums) with good housekeeping.</td>
</tr>
<tr>
<td>• Unidentified barrels or drums.</td>
</tr>
<tr>
<td>• Demolition, large-scale window replacements, or other renovations have occurred (potentially releasing PCB caulks/sealants).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Typical attributes of sites with lower potential for PCB/mercury release:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Non-industrial land uses.</td>
</tr>
<tr>
<td>• Minimal potential for sediment loading to stormwater collection system.</td>
</tr>
<tr>
<td>• No history of PCB/mercury-related activities.</td>
</tr>
</tbody>
</table>
The first phase of Task 3 (records review, field surveys, and facility inspections) is scheduled for completion by September 2011 and soil/sediment sampling is scheduled for September through December 2012. Additional detail on soil and sediment sampling methods is described below.

4.1. **Soil and Sediment Samples, Dry**

Dry soil and sediment samples may be present on-site in surface areas such as unpaved lots and storage yards, or may have accumulated within stormwater conduits, public right-of-ways, etc. Field crews will have the responsibility to identify areas of sediment accumulation within areas targeted for sampling and analysis. Field crews must also record what can be determined about the source area of the sediments (i.e., sediments accumulating within a specific property that can be traced to that property vs. sediments in a public right-of-way that may only be traceable to multiple properties that drain to a particular stormwater conveyance).

Field duplicates (FDs) will be collected at the rate of 10% of analyses conducted or once per day, whichever is less frequent, per Section 14 of the CW4CB QAPP (BASMAA 2012). Identification of tentative locations for collection of FDs will be made through the sampling design process. Field Crews will have the discretion to alter locations based upon schedule or site conditions. More detail on collection of FDs is described below under Field Duplicate Samples.

4.2. **Soil and Sediment Samples, Wet**

Wet soil and sediment samples may be collected from within on-site stormwater facilities or within areas of ponded water. Sample crews must exercise judgment on whether submerged samples can be collected in a manner that does not substantially change the character of the soil/sediment collected for analysis (e.g., loss of fine materials).
Select Project Watersheds

Review Records

Perform Field Driving / Walking Surveys

Perform Facility Inspections

Select Sediment / Soil Sampling Locations within Public Right of Way

Conduct Sediment / Soil Sampling within Public Right of Way

Select Sediment / Soil Sampling Locations on Suspect Properties

Conduct Sediment / Soil Sampling on Suspect Properties

Review Results, Refer Properties for Abatement

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Figure 7. Process Diagram for CW4CB Task 3 Activities to Identify Properties for Referral

5. Request for Analyses
Each soil/sediment sample will be analyzed for PCBs, mercury, total organic carbon (TOC), and grain size. Approximately 10 percent of these samples (selected randomly) will also be analyzed for dioxins, PBDEs, organochlorine pesticides, and PAHs, per the CW4CB project work plan (BASMAA 2010). Analytical methods are described in Section 13 of the CW4CB QAPP (BASMAA 2012).

CW4CB does not anticipate requesting that laboratories achieve expedited turnaround times (i.e., less than two weeks). Project laboratories will be required to meet the QA/QC requirements within Section 14 of the CW4CB QAPP (BASMAA 2012).

5.1. Analytical Laboratories

MQOs for laboratory analyses are defined in the CW4CB QAPP (BASMAA 2012). Prospective laboratories will be provided with the QAP and MQOs during a competitive selection process. Selected project laboratories will have exhibited the ability to successfully meet relevant MQOs and conform to them for the duration of the CW4CB Project.

6. Field Methods and Procedures

This version of the SAP covers all sampling and analysis related activities associated with Task 3 of the CW4CB project. As such, sampling activities will only involve soil/sediment sampling to be conducted at locations to be identified through the earlier described process. Sampling methods described below are adapted from those employed by the City of Oakland for the Ettie Street project (AMS 2004).

Most sampling is expected to collect 1) sediments/soils accumulated on urban hardscape areas (e.g., streets, gutters), 2) sediments/soils accumulated within stormwater conveyance infrastructure (e.g., inlets, piping), or 3) shallow surface soils in unpaved areas. It is expected that samples may be collected from a number of different types of facilities within an individual site. Examples may include surface sediments/soils and sediments accumulated in drop inlets, sumps, and piping beneath manholes. In certain instances, sampling techniques may need to be adjusted in response to sampling conditions present (see Section 11, Field Variances). Additional safety measures may be necessary in some cases; for example, if traffic control or confined space entry is required to conduct the sampling.

Cleaning and decontamination techniques required for sampling equipment will vary depending on the media sampled and analyte measured. Cleaning and decontamination procedures are summarized below.

6.1. Field Equipment

A list of recommended sampling equipment is presented in Table 6-1. Appropriate sampling equipment is prepared in the laboratory a minimum of four days prior to sampling. Prior to sampling, all equipment will be thoroughly cleaned. Equipment is soaked (fully immersed) for three days in a solution of Alconox, Liquinox, or similar phosphate-free detergent and deionized water. Equipment is then rinsed three times with deionized water. Equipment is next rinsed with a dilute solution (1-2%) of hydrochloric acid, followed by a rinse with reagent grade methanol, followed by another set of three rinses with deionized water. All equipment is then allowed to dry in a clean place. The cleaned equipment is then wrapped in aluminum foil or stored in clean Ziploc bags until used in the field.
Table 6-1. Field Sampling Equipment

<table>
<thead>
<tr>
<th>Description of Equipment</th>
<th>Material (if applicable)</th>
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<tbody>
<tr>
<td>Sample scoops</td>
<td>Stainless steel or Kynar coated</td>
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<tr>
<td>Sample trowels</td>
<td>Stainless steel or Kynar coated</td>
</tr>
<tr>
<td>Compositing bucket</td>
<td>Stainless steel or Kynar coated</td>
</tr>
<tr>
<td>Hand auger</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>Broom (for street dust collection)</td>
<td>Natural fiber</td>
</tr>
<tr>
<td>Sample containers (with labels)</td>
<td>Per method – see project QAPP (BASMAA 2012)</td>
</tr>
<tr>
<td>Methanol, Reagent grade (Teflon squeeze bottle with refill)</td>
<td></td>
</tr>
<tr>
<td>Hydrochloric acid, 1-2%, Reagent grade (Teflon squeeze bottle with refill)</td>
<td></td>
</tr>
<tr>
<td>Liquinox detergent (diluted in Teflon squeeze bottle with refill)</td>
<td></td>
</tr>
<tr>
<td>Deionized / reverse osmosis water</td>
<td></td>
</tr>
<tr>
<td>Plastic scrub brushes</td>
<td></td>
</tr>
<tr>
<td>Container for storage of sampling derived waste, dry</td>
<td></td>
</tr>
<tr>
<td>Container for storage of sampling derived waste, wet</td>
<td></td>
</tr>
<tr>
<td>Wet ice</td>
<td></td>
</tr>
<tr>
<td>Dry ice (for samples requiring immediate freezing)</td>
<td></td>
</tr>
<tr>
<td>Coolers, as required</td>
<td></td>
</tr>
<tr>
<td>Aluminum foil (heavy duty recommended)</td>
<td></td>
</tr>
<tr>
<td>Protective packaging materials</td>
<td>Bubble / foam bags</td>
</tr>
<tr>
<td>Splash proof eye protection</td>
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<tr>
<td>PPE for sampling personnel, including traffic mgmt as required</td>
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<tr>
<td>Gloves for dry ice handling</td>
<td>Cotton, leather, etc.</td>
</tr>
<tr>
<td>Gloves for sample collection, reagent handling</td>
<td>Nitrile</td>
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<tr>
<td>Field datasheets</td>
<td></td>
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<tr>
<td>COC forms</td>
<td></td>
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<tr>
<td>Shipping materials (as required)</td>
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<tr>
<td>GPS</td>
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Equipment that is pre-cleaned includes:

- Kynar (or similar) coated sample scoops, trowels, etc.
- Kynar (or similar) coated compositing buckets
- Wash bottles for deionized water, hydrochloric acid, and methanol
- Hand augers
6.2. Surface Soil/Sediment Sampling

General sampling locations (e.g., adjacent to suspect properties and/or on-site) will be identified via the process described previously (Section 4). Exact soil/sediment sampling locations will be determined in the field based on sediment availability, site accessibility, signs of sediment accumulation/wash off, visible signs of potential contamination (e.g., stained soils), and topographical features which may indicate location of prior disposal (e.g., depressions that may indicate a historic excavation). Soil sample locations and coordinates will be recorded on field datasheets as sampling is completed. Field crews will be expected to use best professional judgment in whether composites will be created for a particular site, and how many, depending on various factors, including the size of the property, location of accumulated sediments, visible indicators of contamination, etc. A sketch of the sample location will be entered into the logbook/datasheet and any physical reference points will be labeled. If possible, distances to the reference points will be given.

Field personnel will collect the surface soil/sediment samples using the general procedures described in the RMC SOP FS-6 Collection of Bedded Sediment Samples for Chemical Analysis & Toxicity (BASMAA 2011b).

6.3. Equipment Decontamination Procedures

Decontamination of sampling equipment used for implementation of Task 3 must be conducted consistently as to ensure the quality of samples collected. All equipment that comes into contact with potentially contaminated soil or water will be decontaminated. Decontamination will occur prior to and after each use of a piece of equipment.

The following, to be carried out in sequence, is the procedure for the decontamination of field sampling equipment. It is adapted from those employed for use with the Regional Monitoring Program for Water Quality in the San Francisco Estuary (David et al. 2001) and consistent with decontamination procedures used for the prior BASMAA watershed characterization and source control investigations (e.g., AMS 2004).

- Non-phosphate detergent and deionized/reverse osmosis water (DI/RO) wash, using a brush
- DI/RO rinse
- 1 – 2% HCl acid rinse
- DI/RO rinse
- Reagent grade methanol rinse in a decontamination bucket
- DI/RO rinse (three times)

Equipment will be decontaminated in a predesignated area on plastic sheeting or other material capable of containing overspill. Clean bulky equipment will be stored on plastic sheeting in uncontaminated areas. Cleaned small equipment will be stored in plastic bags. Materials to be stored more than a few hours will also be covered.

7. Sample Containers, Preservation, Packaging, and Shipping

The number and type of sample containers, volumes, and preservatives are listed in the project QAPP (BASMAA 2012). The containers are pre-cleaned and will not be rinsed prior to sample collection.

Sample handling and chain of custody procedures are described in detail in RMC SOP FS-9 (BASMAA 2011b) and Section 12 of the project QAPP (BASMAA 2012).
7.1. Soil/Sediment Samples

With the exception of samples collected for analysis of dioxins, all soil/sediment samples for organics and metals analyses will be homogenized and transferred from the sample-dedicated homogenization pail into factory-supplied wide-mouth glass jars using a clean trowel or scoop. A separate container will be collected for each laboratory. The samples will be transferred to coolers containing double-bagged wet ice and chilled to 6°C immediately upon collection.

For dioxins samples, samples are required to be frozen immediately after collection. Samples should be collected, homogenized, and aliquotted as described above. Samples should then be wrapped in protective bubble wrap and placed in a cooler or dry ice shipper with sufficient dry ice to freeze and maintain samples until they can be returned to a sample freezer or cold storage facility.

7.2. Packaging and Shipping

All sample containers will be placed in appropriate shipping containers. Shipping procedures to be followed are divided into one of two categories, based upon the type of analyses required:

7.2.1. Non-dioxins Samples

The following summarizes the packaging procedures that will be followed for low concentration samples that are to be shipped cold (i.e., not frozen). This encompasses all CW4CB project samples with the exception of dioxin samples.

- When ice is used, pack it in zip-locked, double plastic bags. If applicable, seal the drain plug of the cooler with duct tape to prevent melting ice from leaking out of the cooler.
- The bottom of the cooler should be lined with bubble wrap to prevent breakage during shipment.
- Check screw caps for tightness.
- Ensure sample labels are securely fastened and legible.
- Wrap all glass sample containers in bubble wrap / bubble bags to prevent breakage.
- Place samples in a sturdy cooler(s). Enclose the appropriate COC(s) in a zip-lock plastic bag affixed to the underside of the cooler lid.

7.2.2. Dioxins Samples

For dioxins samples, samples must be delivered to the contract laboratory on dry ice to maintain them as frozen throughout transport. Dry ice is considered a hazardous material due to its sublimation properties. The U.S. Department of Transportation (DOT) and the International Air Transport Association (IATA) have established shipping requirements when packaging and shipping materials with dry ice to reduce potential hazards associated with the build-up and release of carbon dioxide from the shipping package. These regulations call for specific packaging requirements, labeling of packages containing dry ice, and a record of training for shipping with dry ice. For these reasons, samples for dioxins analysis should only be shipped by an authorized packager and shipper via an authorized delivery service. Procedures should follow those adopted by the shipper.

8. Disposal of Residual Materials

In the process of collecting environmental samples, the field teams will generate different types of potentially contaminated Investigation Derived Waste (IDW) that include the following:

- Used personal protective equipment (PPE)
- Decontamination fluids
• Soil remaining after compositing

The EPA's National Contingency Plan (NCP) requires that management of IDW generated during sampling comply with all applicable or relevant and appropriate requirements (ARARs) to the extent practicable. The sampling plan will follow the Office of Emergency and Remedial Response (OERR) Directive 9345.3-02 (May 1991), which provides the guidance for the management of IDW. In addition, other legal and practical considerations that may affect the handling of IDW will be considered.

Sampling wastes generated through implementation of the CW4CB soil/sediment sampling will be contained and managed as described below:

• Used personal protective equipment (PPE) and disposable equipment will be double bagged and placed in a municipal refuse dumpster. These wastes are not considered hazardous and can be sent to a municipal landfill.

• Decontamination fluids that will be generated in the sampling event will consist of dilute hydrochloric acid, reagent-grade solvent, DI/RO water, residual contaminants, and water with non-phosphate detergent. The volume and concentration of the decontamination fluid will be sufficiently low to allow collection for off-site disposal in municipal sanitary systems. No waste water will be left on-site at the conclusion of sampling.

• At the discretion of sampling personnel, soil/sediment residuals may be placed back onto the site in the sample locations. If required (e.g., suspected contaminated material), the residuals will be containerized in 5-gallon buckets and stored at an appropriate storage facility until disposal requirements are known.

9. Sample Documentation

Individual field crews are responsible for generating sample documentation in the field, archiving, and delivering to the Data Manager and the PMT member representing the jurisdiction of the fieldwork. Various methods of field documentation are described below.

9.1. Field Datasheets

All field data gathered by this project will be recorded on standardized field data entry forms. These forms are shown in Appendix A - Field Datasheet for CW4CB Task 3 Soil/Sediment Sampling. Field data sheets shall include at a minimum: date, names of crew members, narrative description of the sampling site (general location), other relevant catchment information such as constructions activities, weather conditions, sample matrix, whether soil / sediment is submerged or exposed, method used to collect sample, and sample IDs collected for analysis or archive. Additionally, a minimum of one set of latitude/longitude per sample site shall be obtained from an appropriate GPS unit and recorded at time of sampling.

9.2. Field Logbooks

In addition to completing field data sheets, sampling personnel should record relevant information in bound logbooks. All information should be recorded in permanent ink. Any changes made to recorded information will be made using single strike-through and will be initialed and dated by the person making the change. Information will be photocopied/scanned and delivered to PMT representative along with field datasheets. All entries should be legible and signed by the individual making the entries.

In addition to the sampling information, the following specific information will also be recorded in the
field logbook for each day of sampling:

- Team members and their responsibilities
- Time of arrival / entry on site and time of site departure
- Other personnel on site
- Summary of any meetings or discussions with property owner or agency personnel
- Deviations from sampling plans, site safety plans, and QAPP procedures
- Changes in personnel and responsibilities with reasons for the changes

9.3. Photographs

Photographic documentation is an important part of sampling procedures. An associated photo log will be maintained documenting sites and subjects associated with photographs. The date function on the camera, if available, shall be turned on. A copy of all photographs should be provided to the Data Manager at the conclusion of sampling efforts and maintained for grant duration.

For each photograph taken, the following information shall be recorded in a separate field photography log (see Appendix B - Field Sampling Photographic Log):

- Photo ID – Will be assigned in the office after completion of sampling. ID will be assigned per the following convention WWW-P-NN-## (where WWW indicates watershed name, P indicates “Photo”, NN indicates site number within the watershed, and ## indicates photo number at that site, starting at zero and numbered sequentially from start of project (i.e., numbering for any Phase II sampling will continue where Phase I left off)
- Time, date, location
- Description of the subject photographed
- Name of person taking the photograph

9.4. Sample Labeling

All samples collected will be labeled in a clear and precise way for proper identification in the field and for tracking in the laboratory. The samples will have pre-assigned, identifiable, and unique numbers. At a minimum, the sample labels will contain the following information: station location, date of collection, analytical parameter(s), and method of preservation. Every sample, including samples collected from a single location but going to separate laboratories, will be assigned a unique sample number.

9.4.1. Sample Label Naming Convention

Each sediment/soil sample collected for CW4CB Task 3 will labeled according to the following naming convention:

WWW-M-NN-##

where:

- WWW - Project watershed code (first three letters, i.e., ETT, LAU, PAR, PUL, or LEO)
- M - Media (S for soil / sediment)
- NN - Sequential Site Number (i.e., 01, 02, 03…etc.)
- ## - Sequential sample number within a particular site
9.5. Sample Chain-Of-Custody Forms and Custody Seals

Detailed sample handling and chain of custody procedures are described in detail in RMC SOP FS-9 (BASMAA 2011b) and summarized below.

All sample shipments for analyses will be accompanied by a chain-of-custody record (COC). Contractors will be expected to supply their own form, or to use forms supplied by contract laboratories. COCs will be completed and sent with the samples for each laboratory and each shipment (e.g., each day). If multiple coolers are sent to a single laboratory on a single day, multiple forms will be completed and sent with the samples for each cooler.

The COC will identify the contents of each shipment and maintain the custodial integrity of the samples. Generally, a sample is considered to be in someone's custody if it is either in someone’s physical possession, in someone’s view, locked up, or kept in a secured area that is restricted to authorized personnel. Until the samples are shipped, the custody of the samples will be the responsibility of the field contractor. The sampling team leader or designee will sign the COC in the "relinquished by" box and note date and time.

A self-adhesive custody seal will be placed across the lid of each sample at a point of closure. The shipping containers in which samples are stored (usually an ice chest or designated dry ice shipper) will be sealed with self-adhesive custody seals any time they are not in someone's possession or view before shipping. All custody seals will be signed and dated.

10. Quality Control

Field personnel will strictly adhere to Section 11 of the CW4CB QAPP (BASMAA 2012) to ensure the collection of representative, uncontaminated samples. Sampling methods are designed to be consistent with those employed for the previous BASMAA investigations in order to facilitate comparability with prior results. The most important aspects of quality control associated with sample collection are as follows:

- Field personnel will be thoroughly trained in the proper use of sample collection equipment and will be able to distinguish acceptable versus unacceptable samples in accordance with pre-established criteria presented in this SAP and relevant SOPs.
- Field personnel will be thoroughly trained to recognize and avoid potential sources of sample contamination (e.g., dirty hands, ice used for cooling).
- Samplers and utensils that come in direct contact with the sample will be made of non-contaminating materials (e.g., glass, inert chemical coatings) and will be thoroughly cleaned between sampling stations.
- Sample containers will be pre-cleaned and of the recommended type.

Aspects of particular relevance to the sampling program are described below.

10.1. Field Blanks

No field blanks will be analyzed as part of the CW4CB Task 3 sampling operations. As all samples are anticipated to be of the soil/sediment matrix, equipment, trip, and field blanks are considered to be of limited value to the quality control process. Similarly, as laboratories are now consistently using electronic temperature gauges that do not require sample immersion, temperature blanks are not required to be submitted with field samples to laboratories.
10.2. **Field Duplicate Samples**

As all samples collected under CW4CB Task 3 are soil/sediment matrix, there is anticipated to be a large degree of heterogeneity associated with sample matrix and therefore variability within analytical results. Field duplicate (FD) samples will assist with interpretation of analytical results by providing an indication of this variability.

FD samples will be collected at a rate of ten percent of sample locations or once per day, whichever is less frequent. Identification of tentative locations for collection of FDs will be made through the sampling design process. Field Crews will have the discretion to alter locations based upon schedule or site conditions. Contributing factors to be considered within the sampling design process or by sampling crews for determination or relocation of FD locations include soil/sediment availability, interval spacing over course of sampling (i.e., minimum of one FD per sampling day), and analysis conducted.

Soil samples will be homogenized with a trowel in sample-dedicated compositing buckets where sample volume allows. Homogenized material from the bucket will then be transferred to the appropriate wide-mouth glass jars for both the regular and duplicate samples. All jars designated for a particular analysis (e.g., PCBs) will be filled sequentially before jars designated for another analysis are filled (e.g., metals). Duplicate samples will be preserved, packaged, and sealed in the same manner as other samples of the same matrix. A separate sample number and station number will be assigned to each duplicate, and it will be submitted blind to the laboratory.

10.3. **Background Samples**

Background samples will not be collected as part of the CW4CB project.

11. **Field Variances**

As conditions in the field may vary, it may become necessary to implement minor modifications to the sampling methodologies presented in this plan. When appropriate, the Project Manager and QA Officer will be notified and a verbal approval will be obtained before implementing the changes. Modifications to the approved plan will be documented in the sampling project report.

12. **Field Health and Safety Procedures**

All field crews will be expected to abide by their employer’s (i.e., the field contractor’s) health and safety programs. Additionally, prior to the fieldwork, field contractors are required to develop site-specific Health and Safety plans that include the locations of the nearest emergency medical services.

13. **References**


City of San Jose and EOA, 2003. Year Two Case Study Investigating Elevated Levels of PCBs in Storm Drain Sediments in San Jose, California. July 2003.


14. Appendix A - Field Datasheet for CW4CB Task 3 Soil/Sediment Sampling
### CW4CB Field Data Sheet (Sediment Chemistry)

**Watershed:**
- Date (mm/dd/yyyy): / / *Contractor:

**StationID:**
- ArrivalTime: 
- DepartureTime: *SampleTime (1st sample): 
- Failure Reason 
- Personnel: 

**Photos (Y/N)**
- *GPS/DGPS
- Lat (dd.ddddd) 
- Long (ddd.ddddd) 
- Address, Location, and Sketches (if needed)

**Env. Conditions**
- SITE ODOR: None, Sulfides, Sew age, Petroleum, Smoke, Other
- SKY CODE: Clear, Partly Cloudy, Overcast, Fog, Smoky, Hazy
- PRECIP: None, Fog, Drizzle, Rain
- PRECIP (last 24 hrs): Unknown, <1", >1", None
- SOILCOLOR: Colorless, Green, Yellow, Brown
- SOILCOMPOSITION: Silt/Clay, Sand, Gravel, Cobble, Mixed, Debris
- SOILPOSITION: Submerged, Exposed

**Samples Taken (3 digit ID nos. of containers filled)**
- Sample ID (site code info)
- Collection Device: Scoop (SS/PC/PE), Core (SS/PC/PE), Grab (Van Veen/Eckman/ Petite Ponar), Broom (nylon, natural fiber)

**Field Dup at Site?**
- YES / NO: (Create separate datasheet for FDs, with unique IDs (i.e., blind samples)

**Site/Sampling Description and Comments:**
- Address, Location, and Sketches (if needed)
15. **Appendix B - Field Sampling Photographic Log**
### CW4CB Photographic Log

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**Comments:**