Regional Monitoring Program

for Water Quality in San Francisco Bay

2015 Bay Margins Sediment Study

Cruise Plan

RMP

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1. Introduction

This report details plans associated with sediment sampling for the Bay Margins Sediment Study for the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP). Bay margins (i.e., mud flats and adjacent shallow areas of the Bay) are more productive and highly utilized by biota of interest (humans or wildlife) than the open Bay areas. This study will provide a spatially-distributed, urban-focused characterization of surface sediment contamination and ancillary characteristics within shallow Central Bay margin areas.

The specific objectives of the sampling effort are:

1. Measure sediment parameters (pH, ORP) at 40 sites.
2. Collect sediment samples from 40 sites for analysis of:
    - Sediment Grain Size
    - Sediment Quality Parameters (% solids, total solids, CHN, TOC)
    - Mercury and methylmercury
    - Trace Metals (Al, Ag, As, Cd, Cu, Fe, Mn, Ni, Pb, Se, Zn)
    - PCBs (209 Congeners)
3. Collect sediment samples from 40 sites for archives (organics, trace metals, PFCs).
4. Collect sediment samples for add-on studies
    - Microplastics analysis (10 sites)
    - Antibiotic resistant bacteria (40 sites)

2. Key Personnel and Approvals

The personnel and work assignments for this cruise are shown in Table 1. These key personnel have indicated their approval of the Cruise Plan by adding their initials and date in the far right column.

Table 1. Key Personnel for 2015 RMP Sediment Cruise

Name	Affiliation	Duties	Cell	Initial and Date to Indicate Approval of Plan
Rusty Fairey	CCR	Project Manager	831-737-3409	RF 7/10/15
Phil Trowbridge	SFEI	RMP Program manager	603-340-5220	PT 7/3/15
Jay Davis	SFEI	RMP Lead Scientist	530-304-2308	JD 7/7/15
Don Yee	SFEI	RMP QA Officer	510-508-2995	dy 7/3/15
Amy Franz	SFEI	RMP Data Manager	510-282-5012	af 7/6/15

3. Cruise Schedule

The cruise schedule is shown in Table 2. The schedule is for planning purposes only, and may be revised during sampling operations to reflect weather conditions, tide restrictions, equipment performance, or other factors. Any sites unable to be sampled at the scheduled time will be rescheduled later in the cruise, if possible,

Table 2. Anticipated Cruise Schedule for 2015 RMP Sediment Cruise

Date	Time	Activity
July 27-31		Tentatively scheduled as Sample Week ~13 stations
Aug 31-Sept 4		Tentatively scheduled as Sample Week ~14 stations
Aug 14-18		Tentatively scheduled as Sample Week ~13 stations

4. Sampling Procedure

At each station, samples/data will be collected in the following order:

1. 2-3 sediment grabs for pH, oxidation-reduction potential (ORP), and chemistry samples.
2. Field observations should also be noted for each site (e.g,. wind speed, wave height, weather, etc.).

Sediment samples will be collected and processed following the procedures in the following subsections.

Sample Equipment and Cleaning

Intertidal sampling in San Francisco Bay will be conducted from an 18' Boston Whaler equipped with frame and hydraulics for deploying a 0.1 m^2 modified Van Veen sediment grab. The grab is constructed entirely of stainless steel and the jaws and doors are coated with Kynar™ to improve chemical inertness. A scoop and bucket used to remove and composite sediments are constructed of polycarbonate material.

All sampling and handling will be conducted using clean techniques. Prior to sampling, all sampling equipment will be thoroughly cleaned. Equipment that is pre-cleaned includes the Van Veen grab, sample scoops, compositing (or storage) buckets, polycarbonate coring devices, and wash bottles. The grab will be cleaned with detergent and pressure washed at the lab. Other equipment is washed, with a detergent and deionized water solution, and rinsed three times with deionized water in lab pre-cleaning, which can be substituted by ambient water in the field. Equipment is next rinsed with 1.0 % solution of hydrochloric acid (or equivalent), followed by a rinse with methanol, followed by another set of three rinses with deionized water (or ambient water in the field). All equipment besides the grab is stored in clean Ziploc™ bags until used in the field. It is critical that sample contamination be avoided during collection. Equipment used at different sampling stations should be re-cleaned in the field between uses.

Sampling personnel should wear nitrile gloves whenever taking or processing samples to avoid contact contamination (and for personal protection). In addition, airborne contamination is avoided by keeping sample containers, sample scoops and compositing bucket covered when not in use.

Sediment Collection and Sediment Field Measurement Protocol

The A-frame at the stern of the vessel will be used for deploying the Van Veen grab. If water depth is insufficient to reach the sampling location by boat, sediment samples will be collected by hand using 4" polycarbonate sediment cores. The quality of grab samples will be ensured by requiring each sample to satisfy a set of criteria concerning the depth of penetration and disturbance of the sediment within the grab. In this way, each sample will normally contain the top 5-cm of sediment within the area of the grab jaws. Grab samples will be rejected for the following conditions:

- There is a rock or shell fragment wedged between the jaws of the grab allowing the sample to wash out.
- The sample surface is significantly disturbed.
- The sample is uneven from side to side, indicating that the grab was tilted when it penetrated the sediment.
- The surface of the sample is in contact with the top doors of the grab, indicating over-penetration of the grab and possible loss of material around the doors.

The total number of grabs or cores taken will be recorded by field personnel on the field datasheets.

pH measurements from each grab or exposed sediment (preferably 2 or more points) will be recorded by submerging a pH probe into the sediment (or a mini-core from a grab) to a depth of approximately 4 cm and allowing it to equilibrate. pH probes should be checked against pH standards each day before sampling and recalibrated if the measured value varies by more than 0.05 units from the expected value. ORP measurements will be made in a mini-core taken either from a grab or exposed sediment at a depth of 2.5cm according to the RMP Short Sediment ORP measurement SOP (**Attachment A**). Field measurements of pH, ORP and other parameters will be recorded on the Field Data Sheet (**Attachment B-1**).

Sediment samples will be collected to a depth of 5 cm and composite samples will be taken until at least 2-3 L (2 liters for chemistry at all stations and additional 1 liter for microplastics at a subset of ten stations) of sediment is collected. Multiple deployments of the grab or hand cores will be composited together to obtain the required volume and to average out ultra-fine scale spatial variation. Sediment grabs showing prior disturbance (e.g. from immediate/recent prior grabs at the same site) should be retaken from an undisturbed area. Hand collected core samples should composite material from a 2-3 m radius (rather than collecting only contiguously adjacent hand cores).

Chemistry Sample Handling and Processing Protocol

After the overlying water has been drained off the grab sample, several sub-samples will be collected directly from the first and second grab. Some of these subsamples will be field frozen. The subsamples to be collected and the order in which they should be collected are:

- Grab 1 - Half of the grab will be used for the ORP core and disturbed. Use the other side for Hg/MeHg (4 oz jar), LOST (60 ml jar), and AGAB (50 ml tube).
- Grab 2 - Collect 5 PFC cryovials (PFLT, PFST) first by hand-dipping the containers directly into grab. Then collect the 3 POLT Teflon tubes. The POLT Teflon tubes must be collected after the PFLT and PFST cryovials to avoid cross contamination by PFCs in the Teflon. Any undisturbed sediment will be scooped into bucket.
- Grabs 3 and 4 - Fill bucket for composite samples to be filled in the laboratory.

Attachment C contains the details for how each field-filled sample should be collected. Important points are reiterated below:

- The mercury sample must be collected and field frozen on dry ice within 20 minutes of sample collection. If the 20 minute time limit is not met, add a note in the collection information with the amount of time that passed between collection and freezing.
- The samples for perfluorinated analysis archives (PFLT, PFST) will be collected from the center of the grab, avoiding contact with the edges of the Van Veen or sediment that may have been in contact with the grab. The sample container will be used to collect the sample directly into the container. The sampler should wear clean nitrile gloves and IF NEEDED should brush off excess sediment on the top rim and grooves of the vial to allow for a good seal.
- AGAB samples should be collected by just scraping the vial sideways along the surface of the sediment until approx 15 ml are added. An alternative would be to attempt a "core" of the surface to 15 ml "depth". Whichever method is most effective should be used at all sites for consistency. After collecting the 15 ml of sediment, pour the pre-measured solution into the vial, shake to mix, and put on dry ice.

The remainder of the sediment will be collected and stored at 4 degC in a polycarbonate bucket in a cooler. This sediment will be homogenized and subsequently sub-sampled to the appropriate laboratory specific containers in the lab within 7 days following collection. **See Attachment C for details.**

The number of sample containers that need to be filled with sediment from each site, the volume of sediment required for each container, and sample handling, storage, and shipping requirements are listed in **Attachment C.**

All sample bottles should be filled to 75% of total capacity unless otherwise specified, to allow room for expansion on freezing, as needed. Sample containers for MeHg/Hg will be double-bagged in ziploc bags, others (especially glass) may be bagged in ziploc to avoid contamination and then bubble wrap bagged or placed in their original shipping box with cardboard separators to reduce potential container breakage.

QA/QC Sample Collection

Field duplicates will be collected for all analyses at two sites, CB01 and CB33.

For the mercury/TE, PCB, and short term archive samples, two spare bottles will be retained with the set of samples to act as bottle blanks for container type. These containers have been purchased 'pre-cleaned' from ESS Vial or VWR, or provided by NIST. Bottle blanks will not be opened and will be kept with other RMP samples in case container contamination issues arise. These bottles do not need to be brought into the field. They can remain in the lab during the cruise.

The antibiotic resistant bacteria samples will include field blanks at stations CB01 and CB33. The field blanks will be handled identically with all the same steps as the field samples, except not dipped into the sediment. This would include handling with gloves, pouring in the PBS solution, changing the label if necessary, and wiping with lint-free towel if needed.

Attachment C lists the container types for which field duplicates, bottle/field blanks must be collected.

Special Instructions for Microplastics Samples

Microplastics samples will only be collected at the 10 sites shown below. If any of these sites are deemed too difficult to sample (see section 6), the microplastic sample will be collected at the replacement site. Containers for microplastics can be filled in the field (from the grab) or the laboratory (from the compositing bucket), whichever is deemed logistically easier by the field team leader.

Sites for Microplastics Samples

CB04	CB32
CB10	CB37
CB15	CB39
CB24	CB48
CB30	CB49

5. Laboratories

Contact information for the laboratories and archive agencies receiving samples from the sampling event is shown in Table 3.

Table 3. Contact Information for laboratories for the 2015 Bay Margins Sediment Study

Lab / Company / Agency	Contact	Shipping Address	Phone / Email
Laboratory Contacts			
ALS-Kelso	Howard Boorse Shar Samy	1317 South 13th Ave Kelso, WA 98626	360-577-7222 Howard.Boorse@alsglobal.com 360-501-3293 Shar.Samy@alsglobal.com
ALS-Tucson	Ralph Poulsen	3860 S. Palo Verde Rd., Suite 302 Tuscon, AZ 85714	520-573-1061 Ralph.Poulsen@alsglobal.com
BRL	Tiffany Stilwater	3958 Sixth Avenue, NW Seattle, Washington 98107	206-753-6129 tiffany@brooksrand.com
SFPUC	Robert Wellbrock	1000 El Camino Real, Millbrae, CA, 94030	650-871-3011 RWellbrock@sfwater.org
PCB lab TBD			
UC Berkeley	Ben Greenfield	Ben will pick up samples [Lee Riley Laboratory 530E Li Ka Shing Center Univ. of California Berkeley, CA, 94720]	510-507-2365 greenfieldben1@gmail.com
Archive Agency Contacts			
NIST	Rebecca Pugh	NIST Hollings Marine Laboratory 331 Ft. Johnson Rd. Charleston, SC 29412	843-762-8952 Rebecca.Pugh@noaa.gov
AMS	Paul Salop	Applied Marine Sciences 4749 Bennett Dr., Ste. L Livermore, CA 94551	925-373-7142 salop@amarine.com
SFEI (microplastics)	Rebecca Sutton	San Francisco Estuary Institute 4111 Central Avenue Richmond, CA 94804	510-746-7388 rebeccas@sfei.org

Sampling Sites

Forty sites will be targeted in 2015. Coordinates for all RMP sampling sites are shown in Table 4 and Figure 1.

Site Access and Selection

The list of the 40 target sampling sites is shown in Tables 4.A.1 and 4.B.1. The target sites are grouped into two strata: margin areas outside of Marin county and margin areas inside Marin county. There are 33 target sites in the non-Marin stratum (Table 4.A.1) and 7 in the Marin stratum (Table 4.B.1).

Field teams will navigate to the coordinates for the target sites within the accuracy of the shipboard GPS. However, the field team can move around within 50 meters of the planned site to find a suitable location with target habitat nearby if any of the following logistical problems prevent sampling at the planned site coordinates:

- Access/safety: The site cannot be accessed safely; OR
- Substrate: The substrate at the site is too coarse to collect a cohesive sample, is rocky shoreline, is covered with dense aquatic vegetation, or is shell hash; OR
- Upland area (above MHW): The planned site is in a salt marsh or upland area; OR
- Deep subtidal area: The planned site is deeper than 1 ft below MLW.

For sites that need to be relocated within the 50 meter allowable radius, the sample should be collected at the expected water depth for the original site to avoid biasing (e.g., always going to the deepest allowed depth). The expected water depths for the target sites are shown on Table 4.

Sites that are not at their expected depth but are still within acceptable habitat and depth range (MHW to 1 foot below MLW) at their planned coordinates will be sampled at the target coordinates.

If no suitable locations are found within 50 meters, the site will be rejected as not possible to sample. The next available site in the respective overdraw lists in Tables 4.A.2 and 4.B.2 will be added in its place depending on the strata. For example, if one of the sites in the non-Marin strata cannot be sampled, then site CB54 from Table 4.A.2 would be added in its place. Similarly, if one of the sites in the Marin strata cannot be unsampled, then site CB41 from Table 4.B.2 would be added in its place.

Table 4. Coordinates for 2015 Bay Margins Target Sampling Sites. All coordinates are listed in WGS-84 datum.

Table 4.A.1 Non-Marin Strata Sites

If any of the first 33 target sites in the non-Marin strata cannot be sampled, they should be replaced by sites from the non-Marin overdraw list (Table 4.A.2) in ascending order.

Site Code	Site Region	Target Latitude	Target Longitude	Target Elevation (vs. MLW, m)
CB01	Central Bay	37.722188	-122.382351	+2
CB03	Central Bay	37.878131	-122.310862	+1
CB04	Central Bay	37.767614	-122.277808	+0.5
CB05	Central Bay	37.668048	-122.38605	0
CB10	Central Bay	37.906718	-122.346692	+1
CB12	Central Bay	37.748919	-122.244206	0
CB14	Central Bay	37.888461	-122.326734	+1.5
CB15	Central Bay	37.827887	-122.303561	+0.5
CB16	Central Bay	37.750283	-122.218611	+0.5
CB17	Central Bay	37.708896	-122.385233	0
CB20	Central Bay	37.778948	-122.24553	+2
CB21	Central Bay	37.643081	-122.387888	+1
CB24	Central Bay	37.786283	-122.248067	+1.5
CB26	Central Bay	37.929034	-122.399457	+1.5
CB27	Central Bay	37.83772	-122.308601	+1
CB28	Central Bay	37.74807	-122.236739	+2
CB30	Central Bay	37.892829	-122.312071	+1
CB31	Central Bay	37.794937	-122.288496	+1
CB32	Central Bay	37.756571	-122.220437	+1
CB33	Central Bay	37.680658	-122.388045	+2
CB36	Central Bay	37.755244	-122.255425	+2
CB37	Central Bay	37.641418	-122.394541	+1.5

CB38	Central Bay	37.901622	-122.377097	+1
CB42	Central Bay	37.905501	-122.332335	0
CB43	Central Bay	37.829205	-122.309408	0.5
CB44	Central Bay	37.749936	-122.225184	0
CB45	Central Bay	37.943148	-122.411946	+1.5
CB46	Central Bay	37.899036	-122.325568	+1
CB47	Central Bay	37.793778	-122.316663	+2
CB48	Central Bay	37.742746	-122.21561	0
CB49	Central Bay	37.776982	-122.388918	+1
CB52	Central Bay	37.750125	-122.247018	0.5
CB53	Central Bay	37.62998	-122.382614	+1

Table 4.A.2 Non-Marin Strata Overdraw Sites

Site Code	Site Region	Target Latitude	Target Longitude	Target Elevation (vs. MLW, m)
CB54	Central Bay	37.907329	-122.355094	0
CB56	Central Bay	37.834659	-122.29881	+1.5
CB58	Central Bay	37.906875	-122.330989	+1
CB59	Central Bay	37.828478	-122.303904	0.5
CB60	Central Bay	37.749028	-122.220433	0.5
CB62	Central Bay	37.863738	-122.308229	+1.5
CB63	Central Bay	37.800313	-122.327595	+2
CB64	Central Bay	37.751254	-122.214651	0

Table 4.B.1 Marin Strata Sites

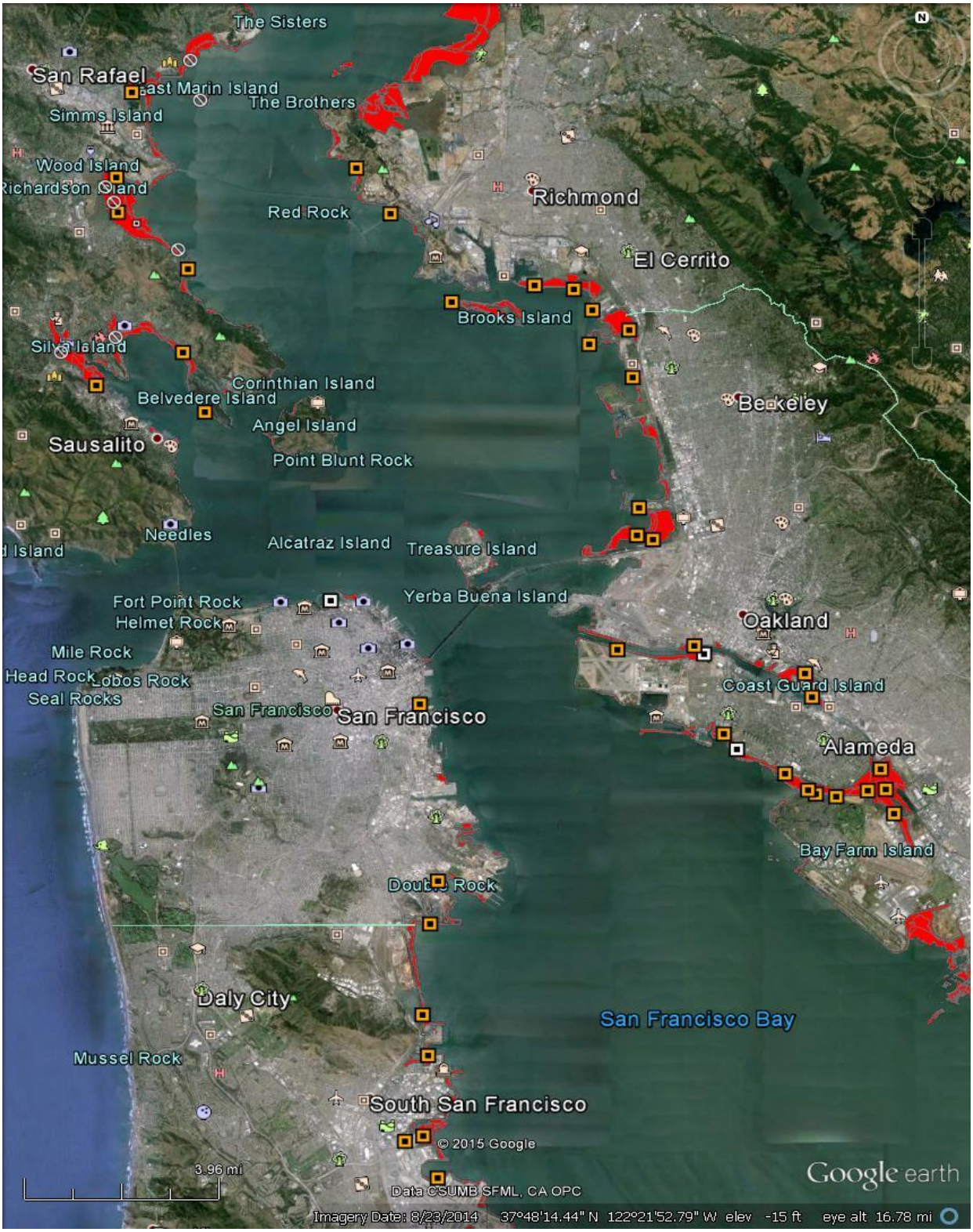
If any of the 7 target sites in the Marin strata cannot be sampled, they should be replaced by sites from the Marin overdraw list (Table 4.B.2) in ascending order.

Site Code	Site Region	Target Latitude	Target Longitude	Target Elevation (vs. MLW, m)
CB19	Marin	37.867506	-122.467395	0
CB22	Marin	37.940228	-122.499832	0
CB23	Marin	37.886034	-122.475494	+1.5
CB25	Marin	37.929527	-122.499415	+1
CB29	Marin	37.91195	-122.473718	+1.5
CB34	Marin	37.966809	-122.494303	+2
CB39	Marin	37.875809	-122.507246	0

Table 4.B.2 Marin Strata Overflow Sites

Site Code	Site Region	Target Latitude	Target Longitude	Target Elevation (vs. MLW, m)
CB41	Marin	37.925963	-122.49279	0.5
CB50	Marin	37.966632	-122.490542	+1
CB51	Marin	37.887021	-122.511609	+1.5
CB55	Marin	37.883362	-122.51132	0
CB57	Marin	37.92215	-122.492512	+1.5
CB61	Marin	37.984082	-122.467885	+2

Figure 1: 2015 RMP Sediment Cruise Target Sampling Sites. The first 40 target sites in Central Bay are shown as orange symbols. Red areas are margins.



6. Sample Labeling

The sample ID system used for the Bay Margins cruise for analytical samples is as follows:

YYRMPMC-STA#-AGX-rep#

Where:

YY = Year (for 2015, YY=15)

RMPMC = Project (RMP Margins Cruise)

STA# = Station ID (CB01 through CB64)

AGX = Acronym for analyte group. See **Attachment C** for acronyms

Rep# = Replicate number.

The sample ID system used for the Bay Margins cruise for archive samples is as follows:

YYRMPMC-STA#-AGXAARep#

Where:

YY = Year (for 2015, YY=15)

RMPMC = Project (RMP Margins Cruise)

STA# = Station ID (CB01 through CB64)

AGX = Acronym for analyte group. **See Attachment C for acronyms.**

AA = Archive type (when applicable). (ST = short term, LT = long term)

Rep# = Replicate jar number for each analyte group

Notes on Assigning Rep#: The replicate number should be increased sequentially as needed to characterize a field replicate and duplicates. For example, for mercury samples, there is only one container to be filled for each sample. The Rep# will be 1 for the primary sample and 2 for the field duplicate. In contrast, for PFLT archive samples, there are two containers to be filled for each sample. The Rep# will be 1-1, 1-2 etc. for the primary sample and 2-1, 2-2 etc. for the field duplicates. For field blanks, use "BottleBlank".

Every container will be labeled with a unique sample ID following this system. The sample ID will be recorded on a field data sheet (**Attachment B-1**).

Chain of custody records will be maintained throughout the course of the sampling effort. For each set of samples being shipped to a laboratory or archive, CCR will initiate a COC form **(Attachment B-2)**, include the original form with the sample shipment, and provide a copy/scan of the form to SFEI at the time of the shipment.

Attachment A

RMP Short Sediment ORP measurement SOP (revised 2015-05 for margins)

The method is modified to take a single reading at 2.5cm depth rather than at 3 depths in standard RMP method. Steps for taking a picture also dropped/made optional.

Oxidation/reduction potential (ORP) readings are taken at each station from a grab core or direct insertion in exposed sediment. Additional readings can also be taken, time permitting. Instrument ORP readings are offset from true "Eh" readings, by an amount specific to the particular electrode type: the Sentix ORP (platinum) probe for the WTW meter is -~210mV relative to true Eh (hydrogen electrode): Eh= ORPreading + 210mV (at 20C). DO NOT make correction to the ORP reading in the field- record what you read.

Materials:

Meter with mV readings (WTW Multi 340i as of writing of this SOP)

ORP electrode (WTW Sentix ORP, platinum electrode, Ag free)

Clear coring tube, ~5cm diameter or larger, ~5cm height

Watch or timer to track probe equilibration time

Collection method:

1. Push the corer tube into the grab, let crew collect the rest of the material.

2. Dig a spoon/spatula under to help lift it out

3. Once out, place on a jar lid or other flat surface (to prevent core sliding out of tube).

Measurements:

1. Make a note in the field log of depth below surface any transitions or notable features in the core or surrounding grab (e.g. gray below 4 cm, fine shell fragments throughout). Optionally take a picture of core/grab/in situ sediment cross section.

2. Uncap & push the ORP probe, to **2.5cm** depth ("0" point is bottom of cylindrical portion, roughly midway between platinum tip and small hole near tip).

a. if probe hits something hard like shell, rock, or wood fragment, do not force through, as probe tip may break. If close to target depth (e.g., >2cm), keep that location. If a long way from target depth, note the depth of the obstruction, and pull out the probe. In site sediment, just insert at another point.

b. In a core, there is less space to relocate so use a wire or skinny screwdriver to poke at locations to find a way around the object, but do not poke all the way to the target depth (or you may expose that point to air).

c. If a clear path is found with test wire/screwdriver, insert the probe along that path. If near the core edge, be sure the ORP probe orifice (small hole in the probe side about 0.5cm from the tip) is facing toward the core center.

3. Note time/set timer. Record reading @10 min (will continually drift, so consistently read at 10 because drift is slow by then). Record raw ORP, **NOT** Eh conversion.

4. If ORP >0 in anoxic (black/sulfidic) sediment probe may be broken. Switch probe.

5. Dump core, rinse probe in site water, re-cap, and get ready for the next station, or take another reading from the same station if there is enough time.

6. Clean well , rinse/store with DI water in cap at day end.

Station Information:				
Station Code:		Date:	Time On Station:	
Station Coordinates (decimal degrees, 6 decimal places)		Latitude North	Longitude West	
Field Observations:				
Wave Height (ft):		Wind speed (circle one): Calm Breezy Strong		
Filenames of Any Photos Taken:		General Comments:		
Grab 1 - Sediment Description (circle one) Sand Silt Mud Rocky/Shell Hardpan		Grab 2 - Sediment Description Sand Silt Mud Rocky/Shell Hardpan		
Grab 3 - Sediment Description Sand Silt Mud Rocky/Shell Hardpan		Grab 4 - Sediment Description Sand Silt Mud Rocky/Shell Hardpan		
pH measurements				
pH in Grab 1	pH in Grab 2	pH in Grab 3	pH in Grab 4	
Eh/ORP measurement				
Total Core Depth (cm): 5 cm		Anoxic (Gray/Blank) transition depth (cm):		
Description at surface: Color: Tan Brown Gray Black Sand Silt Mud Rocky/Shell Hardpan		Description at bottom (5 cm depth): Color: Tan Brown Gray Black Sand Silt Mud Rocky/Shell Hardpan		
Probe depth (cm)	ORP (mV)	Equilibration Time (10 min default)	Comments:	
2.5				

Station Code and Date Samples Were Collected:

Field Filled Samples

Container Type	# per Site	Collection and Handling	Collected	From Grab Number(s)	Sample ID 15RMPMC-Site#-AnalyteRep#	Analysis or Purpose
4 oz or 8 oz plastic jar (mixture of sizes sent)	1	Collect directly from top 5 cm of grab using scoop to 75% full. MUST FIELD FREEZE ON DRY ICE WITHIN 20 MINUTES OF COLLECTION.	Yes / No	1	15RMPMC-_____-HG____	Hg and MeHg for BRL
60 ml clear glass jar	1	Collect directly from top 5 cm of grab using scoop to 75% full. Field freeze	Yes / No	1	15RMPMC-_____-LOST__	Labile non-PFC EC short term archive
50 ml tube	1	Field filled to 15 mL mark, add sterile solution from separate vial, mix by shaking, field freeze	Yes / No	1	15RMPMC-_____-AGAB___	Antibiotic-Resistant bacteria
10 ml PP cryovials	2	Collect directly from grab using the container. Optional field freeze	Yes / No	2	15RMPMC-_____-PFLT___ 15RMPMC-_____-PFLT___	PFCs for long term archive
10 ml PP cryovials	3	Collect directly from grab using the container. Optional field freeze	Yes / No	2	15RMPMC-_____- PFST____ 15RMPMC-_____- PFST____ 15RMPMC-_____- PFST____	PFCs for short term archive
22 ml teflon vial	3	Collect directly from top 5 cm of grab using scoop to 75% full. Field freeze	Yes / No	2	15RMPMC-_____-POLT____ 15RMPMC-_____-POLT____ 15RMPMC-_____-POLT____	Non-PFC Organics or Trace Metals long term archive

Station Code and Samples Were Collected:

Lab Filled Samples

Container Type	# per Site	Collection and Handling	Sample ID: 15RMPMC-Site#-AnalyteRep#	Analysis or Purpose	Date Filled
16 oz glass	1	Keep chilled at 4°C. Do NOT Freeze. Keep Dark. Homogenize in lab. Fill at least 3/4. Refrigerate and store at MLML until end of field season.	15RMPMC-_____-GS_____	Grain Size / Total solids by ALS	
4 oz glass	1	Freeze at -20 degC within a week of collection and add the date frozen to the COC (CHN hold time is 100 days if not frozen). Store at MLML until end of field season.	15RMPMC-_____-CHN_____	CHN by ALS	Date Frozen:
4 oz glass	1	Freeze at -20 degC within a week of collection and add the date frozen to the COC (TOC hold time is 28 days if not frozen). Store at MLML until end of field season.	15RMPMC-_____-TOC_____	TOC by ALS	Date Frozen:
250 mL glass	1	Freeze at -20 degC. Store at MLML until field season is complete.	15RMPMC-_____-PO_____	PCBs	
250 mL HDPE	1	Freeze at -20 degC. Store at MLML until field season is complete.	15RMPMC-_____-TM_____	Trace Metals by SFPUC	
60 mL glass	4	Freeze at -20 degC. Store at MLML until field season is complete.	15RMPMC-_____-POST_____ 15RMPMC-_____-POST_____ 15RMPMC-_____-POST_____ 15RMPMC-_____-POST_____	Non-PFC organics short term archive	
250 mL PE	1	Freeze at -20 degC. Store at MLML until field season is complete.	15RMPMC-_____-TMST_____	Trace Metals short term archive	
16 oz HDPE	1	Refrigerate or freeze. Store at MLML until field season is complete.	15RMPMC-_____-MP_____	Micro-plastics	

Chain of Custody Record

Results to:	Invoice to:	Ship to:
San Francisco Estuary Institute 4111 Central Ave Richmond, CA 94804 Phone: 510-746-7334 Fax: 510-746-7300	San Francisco Estuary Institute 4111 Central Ave Richmond, CA 94804	

Sampled by [Print Name(s)] / Affiliation	Analyses Requested	Project Name: 2015 Bay Margins Sediment Study
Sampler(s) Signature(s)		Billing Code: 3015.00/ 6 / I / 531.10

Sample ID	Sampled Date	Sampled Time	Matrix	Container Type/#	Notes
			Sed		
			Sed		
			Sed		
			Sed		
			Sed		
			Sed		
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					← Total number of containers

Relinquished by (Signature) / Affiliation	Date	Time	Received by (Signature) / Affiliation	Date	Time

Shipping Information	Additional Comments
Shipping Date: Courier: Number of Coolers: Cooler Temperature (C):	

Attachment C: Containers, Field Handling, Storage, and Shipping Protocols for 2015 Bay Margins Sediment Study

Group	Sample Type	Analysis or Purpose	Labeling Acronym	Receive from	Product	# containers	container 75% full volume ml or desired volume	net volume ml	Number of sites	Containers for field dupes	Containers for bottle blanks	Containers for backups	Quantity	Notes	Field Handling	Storage	Shipping	Ship to
1. Field Filled	Archive	PFCs	PFLT	NIST	10 ml PP Cryovials	2	7.5	15	40	0	0	10	90	From SFEI stock at NIST.	Nitrile gloves; avoid Teflon/Goretex materials. Collect directly from grab using the container. Chill to 4 degC on wet ice. Optional field freeze.	Freeze at -20 degC. Store at MLML until field season is complete then ship to destination.	Ship overnight on dry ice	NIST
1. Field Filled	Archive	PFCs	PFST	NIST	10 ml PP Cryovials	3	7.5	22.5	40	0	2	3	125	From SFEI stock at NIST.	Nitrile gloves; avoid Teflon/Goretex materials. Collect directly from grab using the container. Chill to 4 degC on wet ice. Optional field freeze.	Freeze at -20 degC. Store at MLML until field season is complete then ship to destination.	Ship overnight on dry ice	AMS/Schaefer's
2. Field Filled, Field Frozen	Target Analytes	Hg and MeHg	Hg	BRL	4 oz plastic container provided by BRL	1	187.5	187.5	40	2	2	8	52	Per TS all analytes can come out of the same jar	Collect directly from top 5 cm of grab using scoop to 75% full. MUST FIELD FREEZE ON DRY ICE WITHIN 20 MINUTES OF COLLECTION. Bottles must be double bagged with an extra label between the inner and outer bags.	Freeze at -20 degC. Store at MLML until field season is complete then ship to destination.	Ship overnight on dry ice	BRL
2. Field Filled, Field Frozen	Archive	Labile NON PFC Emerging Contaminants	LOST	ESS Vial	60 ml clear short glass jar; PC class (24/case)	1	45	45	40	0	2	8	50		Nitrile gloves. Collect directly from top 5 cm of grab using scoop to 75% full. FIELD FREEZE on dry ice.	Freeze at -20 degC. Store at MLML until field season is complete then ship to destination.	Ship overnight on dry ice	AMS/Schaefer's
2. Field Filled, Field Frozen	Archive	Non-PFC Organics or Trace Metals	POLT	NIST	22 ml standard vial, round interior - Teflon container	3	16.5	49.5	40	0	0	10	130	NIST will pre-clean and ship to Rusty Fairey.	Collect directly from top 5 cm of grab using scoop to 75% full. FIELD FREEZE on dry ice.	Freeze at -20 degC. Store at MLML until field season is complete then ship to destination.	Ship overnight on dry ice	NIST
2. Field Filled, Field Frozen	Add-Ons	Antibiotic-Resistant Bacteria	AGAB	UC Berkeley	50 mL collection tube	1	15	15	40	2	2	5	49		Wearing gloves, fill site-labeled vial to 15 ml mark from the grab. Then add sterile storage solution (phosphate buffered saline/15% glycerol) from separate vial (15 ml measured aliquat). Mix by inverting/shaking. Okay to change site label for oversampling.	Freeze at -20 degC. Store at MLML until field season is complete then call Ben Greenfield at 510-507-2365 or email at greenfieldben1@gmail.com	Ben Greenfield will arrange to pick up samples after field season completion	UC Berkeley
3. Processed in Lab	Target Analytes	Grain Size / Total solids	GS	ALS-Kelso	16 oz glass provided by ALS for 2014 S&T	1	500	500	40	2	0	8	50		Chill to 4 degC. Fill container from homogenized sample in the lab. Fill as full as possible, place on wet ice (4 degC). Keep dark	Refrigerate at 4 C and keep dark. Do NOT freeze. Store at MLML until field season is complete then ship to destination.	Ship overnight on blue ice	ALS-Kelso
3. Processed in Lab	Target Analytes	CHN	CHN	ALS-Kelso	4 oz glass provided by ALS for 2014 S&T	1	93.75	93.75	40	2	0	8	50		Chill to 4 degC. Fill container from homogenized sample in the lab.	Freeze at -20 degC within a week of collection and add the date frozen to the COC (CHN hold time is 100 days if not frozen). Store at MLML until field season is complete then ship to destination.	Ship overnight on dry ice	ALS-Tuscon
3. Processed in Lab	Target Analytes	TOC	TOC	ALS-Kelso	4 oz glass provided by ALS for 2014 S&T	1	93.75	93.75	40	2	0	8	50		Chill to 4 degC. Fill container from homogenized sample in the lab.	Freeze at -20 degC within a week of collection and add the date frozen to the COC (TOC hold time is 28 days if not frozen). Store at MLML until field season is complete then ship to destination.	Ship overnight on dry ice	ALS-Kelso
3. Processed in Lab	Target Analytes	PCBs	PO	AXYS or Frontier	VWR 250 mL (8.4 oz.) 70-400 Solid-Top Clear glass part # 89093-988 Case of 24 $120.93	1	187.5	187.5	40	2	2	10	54		Chill to 4 degC. Fill container from homogenized sample in the lab.	Freeze at -20 degC. Store at MLML until field season is complete then ship to destination.	Ship overnight on dry ice	AXYS or Frontier
3. Processed in Lab	Target Analytes	Trace Metals	TM	SFPUC	250 mL HDPE provided by SFPUC	1	187.5	187.5	40	2	2	1	45		Chill to 4 degC. Fill container from homogenized sample in the lab.	Freeze at -20 degC. Store at MLML until field season is complete then ship to destination.	Ship overnight on dry ice	SFPUC
3. Processed in Lab	Archive	Non-PFC Organics	POST	ESS Vial	60 ml clear short glass jar; PC class (24/case)	4	45	180	40	0	2	8	170	Containers will not need to be pre-cleaned. They are prepared by ESS.	Chill to 4 degC on wet ice. Fill container from homogenized sample in the lab.	Freeze at -20 degC. Store at MLML until field season is complete then ship to destination.	Ship overnight on dry ice	AMS/Schaefer's
3. Processed in Lab	Archive	Trace Metals	TMST	ESS Vial	250 ml PE jar	1	187.5	187.5	40	0	2	6	48		Chill to 4 degC on wet ice. Fill container from homogenized sample in the lab.	Freeze at -20 degC. Store at MLML until field season is complete then ship to destination.	Ship overnight on dry ice	AMS/Schaefer's
3. Processed in Lab	Add-Ons	Microplastics	MP	SFEI	16 oz HDPE	1	250	250	10	0	0	2	12		Containers can be filled in the filed or the lab. Fill directly from grab if insufficient volume in compositing bucket. Fill containers at least half full; No special storage instructions.	Refrigerate or freeze. Store at MLML until the field season is complete then ship to destination.	Arrange for delivery to SFEI. Refrigerate or freeze at SFEI until funding and analytical partners are identified. NOTE: Contaminants will not degrade; refrigeration is suggested to reduce matrix odor.	SFEI