

**Cruise Report
Regional Monitoring Program
Summer 2000 Sediment Sampling Cruise**

July 11, 20-21, 24-26 2000

1. INTRODUCTION

This report describes activities associated with the 2000 dry-season sediment sampling cruise of the Regional Monitoring Program for Trace Substances in the San Francisco Estuary (RMP). Sediment sampling is one component of this program that is designed to provide long-term data on concentrations of trace metals and organic compounds, as well as toxicity, throughout the estuary.

Sediment samples were collected and distributed to seven laboratories for analysis under RMP protocols. Sample distribution is shown in Table 1.

2. CRUISE REPORT

2.1 Objectives

The objectives of this cruise were:

1. Collect sediment samples at 26 stations for the analysis of:
 - Trace elements and trace organics by Bay Area Dischargers Authority (BADA)
 - As and Se by Brooks Rand, LTD (BRL)
 - Grain size, TOC and total nitrogen by UC Santa Cruz (UCSC)
 - CTD profiles by AMS
 - Mercury and monomethyl mercury by Chesapeake Biological Laboratory (CBL)
 - Pore water pH and ammonia by AMS
 - Benthic foraminifera by USGS
2. Collect sediment samples at 13 stations for the analysis of:
 - Toxicity, Surface Water Interface Cores (SWICs) and pore water sulfides by MPSL
3. Collect sediment samples at 9 stations for the analysis of:
 - Benthic infauna by City and County of San Francisco (CCSF)
4. Collect sediment samples at 6 stations for the analysis of:
 - Hydrofluoric extraction by UCSC
 - Hydrofluoric extraction by BADA

2.2 Personnel

The personnel and work assignments for this cruise were as follows:

<u>Name</u>	<u>Affiliation</u>	<u>Duties</u>
David Bell	AMS	Cruise Manager, sediment chemistry, CTD, watershed sampling
Michael Kellogg (7/21)	CCSF	Benthic sample collection
Sarah Lowe	SFEI	Sample collection
Paul Salop	AMS	Sample collection, sediment chemistry, watershed sampling, and CTD
Gordon Smith	UCSC	Vessel skipper
Laura Targart (7/24 - 7/25)	CCSF	Benthic sample collection

2.3 Activities

<u>Date</u>	<u>Time</u>	<u>Activity</u>
Day 1	1300-1330	Bell and Salop mobilized for watershed sites. Departed for Standish Dam site (BW10).
July 11, 2000	1535-1555	Sampled Standish Dam (BW10), departed for Guadalupe River site (BW15).
	1615-1630	Sampled Guadalupe River. All sediment samples were returned to AMS for storage. Porewater chemistry samples analyzed at AMS.
Day 2		
July 19, 2000	1500-1800	Demobilized water cruise gear and mobilized sediment cruise gear aboard <i>R/V David Johnston</i> , Benicia Marina.
Day 3		
July 20, 2000	0730-0745	Mobilized remaining gear, conducted safety briefing at Benicia Marina. Departed for Sacramento River site (BG20).
	1015-1108	Sampled Sacramento River, departed for San Joaquin River site (BG30).
	1145-1307	Sampled San Joaquin River, departed for Honker Bay site (BF40).
	1406-1433	Sampled Honker Bay, departed for Grizzly Bay site (BF21).
	1522-1554	Sampled Grizzly Bay, departed for Pacheco Creek site (BF10).

<u>Date</u>	<u>Time</u>	<u>Activity</u>
	1643-1716	Sampled Pacheco Creek, departed for Benicia Marina.
	1741-1810	Arrived at Benicia Marina. M. Kellogg loads benthic infauna sampling gear onto vessel.
Day 4 July 21, 2000	0730-0742	Mobilized gear aboard <i>R/V David Johnston</i> , Benicia Marina. Departed for Napa River site (BD50).
	0831-0903	Sampled Napa River, departed for Davis Point site (BD41).
	0933-1039	Sampled Davis Point, departed for Pinole Point site (BD30).
	1108-1132	Sampled Pinole Point, departed for San Pablo Bay site (BD20).
	1158-1232	Sampled San Pablo Bay site, departed for Petaluma River site (BD15).
	1308-1344	Sampled Petaluma River site, departed for Emeryville Marina.
	1623-1700	Arrived at Emeryville Marina, demobilized vessel. All samples for trace elements and trace organics were transferred to a BADA lab representative. All other chemistry and toxicity samples were kept aboard the vessel on dry ice and wet ice, respectively.
Day 5 July 24, 2000	0700-0724	Mobilized gear aboard <i>R/V David Johnston</i> , Emeryville Marina. Departed for Red Rock (BC60).
	0814-0855	Sampled Red Rock, departed for Point Isabel site (BC41).
	0931-1000	Sampled Point Isabel, departed for Richardson Bay site (BC32).
	1051-1109	Sampled Richardson Bay, departed for Horseshoe Bay site (BC21).
	1132-1226	Sampled Horseshoe Bay site, departed for Alameda site (BB71).

<u>Date</u>	<u>Time</u>	<u>Activity</u>
	1331-1421	Sampled Alameda, departed for Yerba Buena Island site (BC11).
	1502-1525	Sampled Yerba Buena Island, departed for Emeryville Marina.
	1605-1630	Arrived at Emeryville Marina. Demobilized vessel.
Day 5 July 25, 2000	0745-0800	Mobilized gear aboard <i>R/V David Johnston</i> , Emeryville Marina. Departed for Oyster Point site (BB30).
	0940-1011	Sampled Oyster Point, departed for San Bruno Shoal site (BB15).
	1043-1123	Sampled San Bruno Shoal, departed for Redwood Creek site (BA41).
	1205-1234	Sampled Redwood Creek, departed for Dumbarton Bridge site (BA30).
	1312-1349	Sampled Dumbarton Bridge, departed for South Bay site (BA21).
	1411-1441	Sampled South Bay, departed for Coyote Creek site (BA10).
	1512-1542	Sampled Coyote Creek, departed for USGS dock, Redwood City.
	1704-1744	Arrived Redwood City USGS dock, demobilized vessel. Benthic infauna samples removed by CCSF. All other samples stored on dry or wet ice on the vessel.
Day 6 July 28, 1999	0655-0700	Mobilized gear aboard <i>R/V David Johnston</i> , Redwood City. Departed for San Jose site (C-3-0).
	0837-0913	Sampled San Jose, departed for Sunnyvale site (C-1-3).
	1013-1036	Sampled Sunnyvale, departed for Emeryville Marina.
	1430-1530	Arrived Emeryville Marina, demobilized vessel. All remaining samples for trace elements and trace organics were transferred to a BADA lab representative. SWICs, toxicity, and pore water sulfide samples were taken by W. Vwpiekarski to MPSL. Cognates, archives, As & Se, HF extractions, and Hg & mmHG samples were transferred to AMS for shipment the following week.

2.4 Discussion

Sample Collection and Handling Procedures

Prior to sampling, all equipment was thoroughly cleaned. The cleaning process began with a thorough washing with Alconox[®] detergent. The scoops and stirrers were soaked in detergent for two days before washing. Following the detergent wash, the grab and compositing bucket were rinsed with tap water, followed by three rinses with de-ionized water, a rinse with 10% HCl, and a rinse with petroleum ether. The utensils were rinsed three times with de-ionized water, soaked three days with 10% HCl, and rinsed with petroleum ether. Cleaned utensils were sealed in Ziploc[®] bags until used in the field.

Sampling procedures ensured that samples were collected from a localized area at each site to reduce uncontrolled temporal and spatial variation. In the field, the vessel was anchored at the coordinates listed in Table 2. The coordinates were checked throughout sampling to ensure that the anchor had not dragged. Coordinates were recorded for each site.

The first sampling operation at each site, where required, was the collection of the benthic samples with the Ponar grab. After the required benthic samples were collected, the Ponar grab was replaced with the Van Veen grab for collection of chemistry samples. After being sieved, benthic samples were preserved in buffered 10% formalin/seawater according to the standard operating procedures used by the City of San Francisco.

When the Van Veen grab was brought on deck, the procedure to be followed for sampling was dependent upon the samples required for each station. At stations requiring toxicity samples, one acceptable grab was used to collect SWICs; for this process, six 3" cores were placed into the sediment to a depth of 5 cm. After the surface water was drained, the cores were removed sequentially, wrapped in parafilm, capped, then rinsed and labeled.

After SWICs were taken (or at stations not requiring SWICS), the following procedure was followed. After any overlying water was siphoned off, glass cores containing approximately 5 cm of sediment were removed for measurement of pH, ammonia, and total sulfides in pore water. Next, samples for analysis of benthic foraminifera were removed from the grab. The top 5-cm of sediment was scooped from each of two subsequent grabs and mixed in the bucket to provide a single composite sample for each site for analysis of chemistry, TOC, grainsize, and toxicity. Portions of the composited sample were placed into containers provided by each laboratory. Duplicate chemistry samples were collected from this composite for archival. Cores collected for analysis of pore water were centrifuged onboard the vessel, with 5 ml of supernatant preserved for analysis of sulfides by MPSL. The remainder of the supernatant was to be analyzed on-board for pH and ammonia levels.

The quality of grab samples was ensured by requiring each sample to satisfy a set of criteria concerning the depth of penetration and disturbance of the sediment within the grab. Each sample normally contained the top 5-cm of sediment within the area of the grab jaws. Samples were rejected for the following conditions:

- There was a rock or shell fragment wedged between the jaws of the grab allowing the sample to wash out.
- The surface of the sample was significantly disturbed.

- The sample was uneven from side to side, indicating that the grab was tilted when it penetrated the sediment.
- The surface of the sample was in contact with the top doors of the grab, indicating over-penetration of the grab and possible loss of material around the doors.

Samples were collected from each site, composited in the bucket and placed into containers as indicated in Table 3.

General Comments

A technical malfunction of the CTD during the RMP Dry Season 2000 Water Cruise disabled the unit's ability to store dissolved oxygen data and backscatterance. The problem only became apparent while retrieving and processing data for the two cruises in the laboratory following the cruise. Therefore only temperature, salinity, conductivity and depth data will be reported for the 2000 sediment cruise.

Table 1. Sample Distribution List for RMP Dry Season 2000 Sediment Cruise.

Laboratory	Sample Type	# of Sites Sampled
BADA	Trace elements	26
BADA	Trace organics	26
BRL	As, Se	26
CBL	Mercury, methylmercury	26
UCSC	TOC, total N, and grain size	26
AMS	Pore water ammonia, pH	26
AMS	Archive	26
MPSL	Toxicity	13
MPSL	Pore water sulfides	13
MPSL	Surface Water Interface Cores	13
CCSF	Benthic infauna	9
BADA	HF extraction	6
UCSC	HF extraction	6

Table 2. Coordinates of Regional Monitoring Program Sediment Sampling Sites

Site Name/Code	Latitude	Longitude	Depth (m)	Sediment Description from 2/94
Standish Dam/BW10	37° 27.20'	121° 55.45'	shore	silty sand
Guadalupe River/BW15	-	-	shore	silty sand
San Jose/ C-3-0	37° 27.60'	121° 58.55'	2.5	approximately 5 cm of coarse sand with shell debris over mud
Sunnyvale/C-1-3	37° 26.09'	122° 00.60'	2.5	soft to semi-soft light brown sediment with some plant debris
South Bay/BA20	37° 29.55'	122° 05.20'	4.5	top 8–10 cm of sediment very soft light brown with Potamocorbula
Coyote Creek/BA10	37° 28.08'	122° 03.76'	4.5	Shell debris and sandy silt over gray clay
Dumbarton Bridge/BA30	37° 30.77'	122° 08.02'	6	soft brown sediment with shell debris and numerous polychaete tubes near surface over dark gray clayey sediment
Redwood Creek/BA41	37° 33.56'	122° 12.56'	4.5	shell debris near the surface with numerous polychaete tubes over dark gray clayey sediment
San Bruno Shoal/BB15	37° 36.92'	122° 16.92'	11.5	sandy mud with shell debris over gray clay
Oyster Point/BB30	37° 40.12'	122° 19.73'	9	soft brown sediment with shell debris and numerous polychaete tubes near the surface over very firm dark gray clay
Alameda/BB70	37° 44.80'	122° 19.34'	10.5	soft brown sediment with numerous polychaete tubes near the surface over gray clay
Yerba Buena Island/BC11	37° 49.37'	122° 20.89'	6	mixed soft sediment with shell debris over clay
Horseshoe Bay/BC21	37° 49.86'	122° 28.64'	12	very soft light brown sediment with sulfide pockets, over gray clay
Richardson Bay/BC32	37° 51.73'	122° 28.74'	3	soft light brown surficial sediment over firm dark clay
Point Isabel/BC41	37° 53.27'	122° 20.55'	2	soft dark brown surficial sediment with dense polychaete tubes over firm, dark clay
Red Rock/BC60	37° 54.88'	122° 25.96'	10	heavy shell debris and coarse sand
Petaluma River/BD15	38° 06.64'	122° 29.20'	3.5	soft light brown surficial sediment over dark gray mud/clay
San Pablo Bay/BD22	38° 02.88'	122° 25.34'	3.5	soft light brown surficial sediment over dark gray mud/clay
Pinole Point/BD30	38° 01.48'	122° 21.78'	6.5	soft light brown surficial sediment over dark gray clay

Site Name/Code	Latitude	Longitude	Depth (m)	Sediment Description from 2/94
Davis Point/BD41	38° 03.05'	122° 16.78'	6.5	sandy silt with shell debris
Napa River/BD50	38° 05.31'	122° 15.66'	4	soft light brown silty mud with high density of Potamocorbula
Pacheco Creek/BF10	38° 02.83'	122° 05.77'	5.5	sandy sediments with layers of soft fine material, with occasional oil droplets
Grizzly Bay/BF21	38° 06.92'	122° 02.37'	1.5	very soft light brown sediment
Honker Bay/BF40	38° 04.03'	121° 56.00'	2	very soft light brown sediment
Sacramento River/BG20	38° 03.51'	121° 48.72'	9	soft light brown silty sand with high densities of Potamocorbula, over sandier sediments
San Joaquin River/BG30	38° 01.38'	121° 48.47'	8	sandy sediments with plant debris and Corbicula