

Cruise Report
1998 Regional Monitoring Program
Sediment Sampling Cruise #16

February 4-6, 9-11, 1998

1. INTRODUCTION

This report describes activities associated with the 1998 wet-season sediment sampling cruise of the Regional Monitoring Program (RMP) for Trace Substances in the San Francisco Estuary. 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 five laboratories for analysis under RMP protocols. Sample distribution is shown on 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 metals and trace organics by Bay Area Dischargers Authority (BADA)
 - As, Hg, Se by Brooks Rand - LTD (BRL)
 - Grain size, TOC and total nitrogen by UC Santa Cruz (UCSC)
 - Pore water pH, ammonia and CTD profiles by Applied Marine Sciences (AMS)
 - Pore water sulfides by Marine Pollution Studies Lab (MPSL)
 - Foraminifera by US Geological Survey (USGS)
2. Collect sediment samples at 13 stations for the analysis of:
 - Toxicity by MPSL
3. Collect sediment samples at nine stations for the analysis of:
 - Benthic infauna by City and County of San Francisco (CCSF)
4. Collect sediment samples at five stations for the intercalibration analysis of:
 - Trace elements by UCSC
 - Trace organics by Texas A&M University (GERG)
5. Collect sediment samples at three stations for the intercalibration analysis of:
 - As, Hg, Se by BADA
6. Collect sediment samples at one "blind" station for the intercalibration analysis of:
 - Trace metals and trace organics 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>
Samir Arora (2/6, 2/9)	SFEI	Sample collection
David Bell	AMS	Cruise Manager, sediment chemistry, pH; CTD, watershed sampling
Michael Kellogg (2/6, 2/9-2/10)	CCSF	Benthic samples
Mike May (2/5)	SFEI	Sample collection
Sarah Lowe (2/10-2/11)	SFEI	Sample collection
Paul Salop	AMS	Sample collection, watershed sampling and CTD
Gordon Smith	UCSC	Vessel skipper

2.3 Activities

<u>Date</u>	<u>Time</u>	<u>Activity</u>
Day 1 February 4, 1998	1300-1600	Bell and Salop sample Standish Dam (BW10) and Guadalupe River (BW15). All samples stored on ice and brought to vessel the following day.
Day 2 February 5, 1998	0630-0730	Mobilized gear aboard <i>R/V David Johnston</i> , conducted safety briefing at Martinez Marina. Departed for Grizzly Bay (BF21).
	0830-0930	Sampled Grizzly Bay, departed for Honker Bay (BF40).
	1030-1100	Sampled Honker Bay, departed for Sacramento River (BG20).
	1200-1250	Sampled Sacramento River, departed for San Joaquin River (BG30).
	1330-1410	Sampled San Joaquin River, departed for Pacheco Creek (BF10).
	1530-1630	Sampled Pacheco Creek, departed for Martinez Marina to drop-off crew and shuttle vehicles to Vallejo. G. Smith transits vessel to Vallejo Marina.
	1730	Arrived at Vallejo Marina. M. Kellogg and D. Bell load benthic infauna sampling gear onto vessel.
Day 3 February 6, 1998	0645-0710	Mobilized gear aboard <i>R/V David Johnston</i> , conducted safety briefing at Vallejo Marina. Departed for Napa River site (BD50).
	0735-0800	Sampled Napa River, departed for Davis Point site (BD41).

	0830-0930	Sampled Davis Point, departed for Pinole Point site (BD30).
	1010-1045	Sampled Pinole Point, departed for Petaluma River site (BD15).
	1200-1300	Sampled Petaluma River, departed for San Pablo Bay site (BD20).
	1340-1415	Sampled San Pablo Bay, departed for Emeryville Marina.
	1700	Arrived at Emeryville Marina, demobilized vessel. All samples for trace elements, organic compounds and intercalibration 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 4 February 9, 1998	0700-0740	Mobilized gear aboard <i>R/V David Johnston</i> , conducted safety briefing at Emeryville Marina. Departed for Point Isabel site (BC41).
	0815-0850	Sampled Point Isabel, departed for Red Rock site (BC60).
	0920-1050	Sampled Red Rock, departed for Richardson Bay site (BC32).
	1120-1150	Sampled Richardson Bay, departed for Horseshoe Bay site (BC21).
	1200-1255	Sampled Horseshoe Bay, departed for Yerba Buena Island site (BC11).
	1350-1430	Sampled Yerba Buena Island, departed for Emeryville Marina.
	1530	Arrived at Emeryville Marina. Demobilized and refueled vessel.
Day 5 February 10, 1998	0700-0720	Mobilized gear aboard <i>R/V David Johnston</i> , conducted safety briefing at Emeryville Marina. Departed for Alameda site (BB70).
	0805-0900	Sampled Alameda, departed for Oyster Point site (BB30).
	1000-1030	Sampled Oyster Point, departed for San Bruno Shoal site (BB15).
	1055-1140	Sampled San Bruno Shoal, departed for Redwood Creek site (BA41).

	1220-1300	Sampled Redwood Creek, departed for South Bay site (BA20).
	1410-1440	Sampled South Bay, departed for Dumbarton Bridge site (BD40).
	1500-1545	Sampled Dumbarton Bridge, departed for Redwood City USGS dock.
	1700	Arrived Redwood City USGS dock, demobilized vessel. Benthic infauna samples removed by CCSF. All other samples stored on ice on the vessel.
Day 6 February 11, 1998	0745-0815	Mobilized gear aboard <i>R/V David Johnston</i> , conducted safety briefing at Redwood City. Departed for Coyote Creek site (BA10).
	0930-1005	Sampled Coyote Creek, departed for San Jose site (C-3-0).
	1030-1110	Sampled San Jose, departed for Sunnyvale site (C-1-3).
	1210-1250	Sampled Sunnyvale, departed for Emeryville Marina. Arrived Emeryville Marina, demobilized vessel. All remaining samples for trace elements, organic compounds and intercalibration were transferred to a BADA lab representative. Toxicity and pore water samples were held on ice and picked up by MPSL the following day. Foraminifera samples were held on ice and picked up by USGS the following day. Samples for As, Hg, Se were shipped to BRL from AMS on 2/17/98.

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 are 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 two grabs from each site.

The first sampling operation at each site 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, sediment was carefully removed for compositing. After any overlying water was drained off, a single scoop was taken from each grab for foraminifera sampling and six, 5-cm deep cores were removed for measurement of pH, ammonia, and total sulfides in pore water. The remaining top 5-cm of sediment was scooped from each of two replicate grabs and mixed in the bucket to provide a single composite sample for each site for analysis of chemistry, TOC, grain size, and toxicity. Portions of the composited sample were placed into the containers provided by each laboratory. Chemistry samples for intercalibration were also collected from the composite. Cores collected for analysis of pore water were centrifuged onboard the vessel, with some of the supernatant being preserved for analysis of sulfides in the Marine Pollution Studies Laboratory at Granite Canyon and the remainder being analyzed for ammonia onboard the vessel.

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

All cruise objectives were achieved and the cruise was completed on schedule. Due to storm-related problems at MPSL, the sample containers for sediment toxicity were not delivered to AMS in time for the first half of the cruise. Alternate toxicity containers were found, however the sample volume for most of the north bay stations was approximately half of the normal 3.0 liter sample volume.

Table 1. Sample Distribution List for Sediment Cruise 16, 1998.

Laboratory	Sample Type	# of Sites Sampled
AMS	Pore water sulfides, pH	26
BRL	As, Hg, Se	26
BADA	Trace elements	26
BADA	Organic compounds	26
BADA	Archive	26
BADA	Blind intercalibration sample for trace elements and organic compounds (<i>unmarked container</i>)	1
CCSF	Benthic infauna	9
GERG	Intercalibration of organic compounds	5
MPSL	Toxicity	14
MPSL	Pore water sulfides	26
USGS	Foraminifera	26
UCSC	Intercalibration of trace elements	5
UCSC	TOC and grain size	26

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° 27.72'	121° 58.53'	3	approximately 5 cm of coarse sand with shell debris over mud
Sunnyvale/C-1-3	37° 26.13'	122° 00.67'	2.5	soft to semi-soft light brown sediment with some plant debris
South Bay/BA20	37° 29.64'	122° 05.25'	5.5	top 8–10 cm of sediment very soft light brown with Potamocorbula
Coyote Creek/BA10	37° 28.20'	122° 03.80'	5	Shell debris and sandy silt over gray clay
Dumbarton Bridge/BA30	37° 30.87'	122° 08.08'	7	soft brown sediment with shell debris and numerous polychaete tubes near surface over dark gray clayey sediment
Redwood Creek/BA41	37° 33.67'	122° 12.62'	2.5	shell debris near the surface with numerous polychaete tubes over dark gray clayey sediment
San Bruno Shoal/BB15	37° 37.00'	122° 17.00'	12	sandy mud with shell debris over gray clay
Oyster Point/BB30	37° 40.21'	122° 19.77'	9	soft brown sediment with shell debris and numerous polychaete tubes near the surface over very firm dark gray clay
Alameda/BB70	37° 44.84'	122° 19.40'	10	soft brown sediment with numerous polychaete tubes near the surface over gray clay

Site Name/Code	Latitude	Longitude	Depth (m)	Sediment Description from 2/94
Yerba Buena Island/BC11	37° 49.44'	122° 20.93'	6	mixed soft sediment with shell debris over clay
Horseshoe Bay/BC21	37° 49.98'	122° 28.43'	12	very soft light brown sediment with sulfide pockets, over gray clay
Richardson Bay/BC32	37° 51.82'	122° 28.72'	1	soft light brown surficial sediment over firm dark clay
Point Isabel/BC41	37° 53.34'	122° 20.55'	1.5	soft dark brown surficial sediment with dense polychaete tubes over firm, dark clay
Red Rock/BC60	37° 55.00'	122° 25.97'	11	heavy shell debris and coarse sand
Petaluma River/BD15	38° 06.66'	122° 29.00'	4	soft light brown surficial sediment over dark gray mud/clay
San Pablo Bay/BD22	38° 02.86'	122° 25.24'	3	soft light brown surficial sediment over dark gray mud/clay
Pinole Point/BD30	38° 01.49'	122° 21.71'	6.5	soft light brown surficial sediment over dark gray clay
Davis Point/BD41	38° 03.11'	122° 16.65'	6.5	sandy silt with shell debris
Napa River/BD50	38° 05.79'	122° 15.61'	4	soft light brown silty mud with high density of Potamocorbula
Pacheco Creek/BF10	38° 02.85'	122° 05.66'	4	sandy sediments with layers of soft fine material, with occasional oil droplets
Grizzly Bay/BF21	38° 06.97'	122° 02.35'	3	very soft light brown sediment
Honker Bay/BF40	38° 04.00'	121° 56.00'	3	very soft light brown sediment
Sacramento River/BG20	38° 03.36'	121° 48.63'	8	soft light brown silty sand with high densities of Potamocorbula, over sandier sediments
San Joaquin River/BG30	38° 01.36'	121° 48.44'	5	sandy sediments with plant debris and Corbicula