

Cruise Report
2001 Regional Monitoring Program
Summer Sediment Cruise

A P P L I E D
marine
S C I E N C E S

August 9-10, 13-16, 21, 2001

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1. INTRODUCTION

This report describes activities associated with the 2001 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 five 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 by Bay Area Clean Water Authority (BACWA)
 - As and Se by Brooks Rand, LTD (BRL)
 - Grain size, TOC and total nitrogen by UC Santa Cruz Dept. of Environmental Toxicology (UCSCDET)
 - Mercury and monomethyl mercury by UCSCDET
 - CTD profiles by AMS
 - Pore water pH and ammonia by AMS
 - Pore water sulfides by Marine Pollution Studies Lab (MPSL)
2. Collect sediment samples at 25 stations for the analysis of:
 - Trace organics by BACWA
3. Collect sediment samples at 13 stations for the analysis of:
 - Toxicity, Surface Water Interface Cores (SWICs) and pore water sulfides by MPSL
4. Collect sediment samples at 6 stations for the analysis of:
 - Hydrofluoric (HF) extraction by BACWA

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
Paul Salop	AMS	Sample collection, watershed sampling,
John Ross	SFEI	Sample collection
Gordon Smith	UCSC	Vessel skipper

2.3 Activities

<u>Date</u>	<u>Time</u>	<u>Activity</u>
August 8, 2001	1430-1700	Bell , Salop, Ross, and Smith demobilized water cruise gear and mobilized sediment cruise gear aboard RV David Johnston at Benicia Marina.
August, 9, 2001	0700-0746	Mobilized remaining gear, conducted safety briefing at Benicia Marina. Departed for Pacheco Creek site (BF10).
	0811-0859	Sampled Pacheco Creek, departed for San Joaquin River site (BG30).
	1037-1150	Sampled San Joaquin River, departed for Sacramento River site (BG20).
	1236-1334	Sampled Sacramento River, departed for Honker Bay site (BF40).
	1441-1508	Sampled Honker Bay, departed for Grizzly Bay site (BF21).
	1552-1628	Sampled Grizzly Bay, departed for Benicia Marina.
	1729-1745	Arrived at Benicia Marina, demobilized vessel.
August 10, 2001	0744-0753	Mobilized gear aboard R/V David Johnston. Departed for Napa River site (BD50).
	0839-0916	Sampled Napa River, departed for Davis Point site (BD41).
	0942-1014	Sampled Davis Point, departed for Pinole Point site (BD30).
	1041-1120	Sampled Pinole Point, departed for San Pablo Bay site (BD20).

<u>Date</u>	<u>Time</u>	<u>Activity</u>
August 10, 2001 (cont.)	1142-1214	Sampled San Pablo Bay site, departed for Petaluma River site (BD15).
	1245-1318	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 BACWA lab representative. Cognates and Hg, mmHg samples transferred via Gordon Smith to UCSCDET at their request. All other chemistry and toxicity samples were kept aboard the vessel on dry ice and wet ice, respectively.
August 13, 2001	0900-0910	Mobilized gear aboard R/V David Johnston at Emeryville Marina. Departed for Point Isabel site (BC41).
	0934-1002	Sampled Point. Isabel, departed for Red Rock (BC60).
	1034-1128	Sampled Red Rock, departed for Richardson Bay site (BC32).
	1202-1225	Sampled Richardson Bay, departed for Horseshoe Bay site (BC21).
	1240-1327	Sampled Horseshoe Bay site departed for Yerba Buena Island site (BC11).
	1502-1525	Sampled Yerba Buena Island, departed for Emeryville Marina.
	1507-1530	Arrived at Emeryville Marina. Demobilized vessel.
August 14, 2001	0900-0919	Mobilized gear aboard R/V David Johnston at Emeryville Marina. Departed for Alameda site (BB71).
	1005-1040	Sampled Alameda, departed for Oyster Point site (BB30).
	1120-1148	Sampled Oyster Point, departed for San Bruno Shoal site (BB15).
	1219-1259	Sampled San Bruno Shoal, departed for Redwood Creek site (BA41).
	1336-1409	Sampled Redwood Creek, departed for Dumbarton Bridge site (BA30).
	1443-1511	Sampled Dumbarton Bridge, departed for USGS Marine Facility (MARFAC) in Redwood City.
	1600-1615	Arrived MARFAC, demobilized vessel. All samples stored on dry or wet ice on the vessel.

<u>Date</u>	<u>Time</u>	<u>Activity</u>
	0943-1009	Sampled San Jose, departed for Sunnyvale site (C-1-3).
	1115-1138	Sampled Sunnyvale, departed for Coyote Creek site (BA10).
	1219-1250	Sampled Coyote Creek, departed for South Bay site (BA21).
	1307-1340	Sampled South Bay, departed for MARFAC.
	1450-1510	Arrived MARFAC, demobilized vessel. All samples stored on dry or wet ice on the vessel.
August 16, 2001	0759-0840	Mobilized gear aboard R/V David Johnston at MARFAC. Met representative of MPSL at MARFAC and relinquished all toxicity, SWICs, and pore water sulfides samples. Departed for Emeryville Marina.
	1200-1330	Arrived Emeryville Marina, demobilized vessel. All remaining samples for trace elements, trace organics, and HF extraction were delivered to EBMUD by Mr. Salop. Cognates, archives, As & Se, and Hg & mmHG samples were transferred to AMS by Mr. Bell.
August 21, 2001	0800	Bell and Salop mobilized for watershed sites. Departed for Standish Dam site (BW10).
	0945-1100	Sampled Standish Dam (BW10), departed for Guadalupe River site (BW15).
	1020-1050	Sampled Guadalupe River. Mr. Salop delivered samples for analysis of trace metals, trace organics, and HF extraction to EBMUD facility. All remaining sediment samples were returned to AMS by Mr. Bell for storage. Porewater chemistry for watershed sites analyzed at AMS.

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.

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. 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

All objectives were met. Two objectives listed in the original cruise plan (analysis of benthos at the Petaluma River and Davis Point stations, and trace organics at the Sunnyvale site) were inadvertently included in the RMP dataflow diagram and thus in the cruise plan, but this mistake was identified on board and these samples were not collected.

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

Laboratory	Sample Type	# of Sites Sampled
BACWA	Trace elements	26
BACWA	Trace organics	25
BRL	As, Se	26
UCSCDET	Mercury, methylmercury	26
UCSCDET	TOC, total N, and grain size	26
AMS	Pore water ammonia, pH	26
AMS	Archive	26
MPSL	Pore water sulfides	26
MPSL	Toxicity	13
MPSL	Surface Water Interface Cores	13
BACWA	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	-	-	shore	silty sand
Guadalupe River/BW15	-	-	shore	silty sand
San Jose/ C-3-0	37° 27.61'	121° 58.54'	2	approximately 5 cm of coarse sand with shell debris over mud
Sunnyvale/C-1-3	37° 26.06'	122° 00.59'	1	soft to semi-soft light brown sediment with some plant debris
South Bay/BA20	37° 29.58'	122° 05.19'	3	top 8–10 cm of sediment very soft light brown with Potamocorbula
Coyote Creek/BA10	37° 28.09'	122° 03.77'	4	Shell debris and sandy silt over gray clay
Dumbarton Bridge/BA30	37° 30.77'	122° 08.02'	1	soft brown sediment with shell debris and numerous polychaete tubes near surface over dark gray clayey sediment
Redwood Creek/BA41	37° 33.52'	122° 12.54'	2	shell debris near the surface with numerous polychaete tubes over dark gray clayey sediment
San Bruno Shoal/BB15	37° 36.94'	122° 16.95'	10	sandy mud with shell debris over gray clay
Oyster Point/BB30	37° 40.12'	122° 19.73'	8	Soft brown sediment with shell debris and numerous polychaete tubes near the surface over very firm dark gray clay
Alameda/BB70	37° 44.79'	122° 19.33'	9	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° 49.34'	122° 20.87'	5	mixed soft sediment with shell debris over clay
Horseshoe Bay/BC21	37° 49.85'	122° 28.66'	6	very soft light brown sediment with sulfide pockets, over gray clay
Richardson Bay/BC32	37° 51.73'	122° 28.73'	2	soft light brown surficial sediment over firm dark clay
Point Isabel/BC41	37° 53.25'	122° 20.57'	2	soft dark brown surficial sediment with dense polychaete tubes over firm, dark clay
Red Rock/BC60	37° 54.89'	122° 26.04'	10	heavy shell debris and coarse sand
Petaluma River/BD15	38° 06.65'	122° 29.19'	2	soft light brown surficial sediment over dark gray mud/clay
San Pablo Bay/BD22	38° 02.88'	122° 25.37'	2	soft light brown surficial sediment over dark gray mud/clay
Pinole Point/BD30	38° 01.45'	122° 21.77'	5	soft light brown surficial sediment over dark gray clay
Davis Point/BD41	38° 03.04'	122° 16.83'	7	sandy silt with shell debris
Napa River/BD50	38° 05.81'	122° 15.64'	1	soft light brown silty mud with high density of Potamocorbula
Pacheco Creek/BF10	38° 02.85'	122° 05.52'	4	sandy sediments with layers of soft fine material, with occasional oil droplets
Grizzly Bay/BF21	38° 06.95'	122° 02.36'	1	very soft light brown sediment
Honker Bay/BF40	38° 04.04'	121° 55.99'	2	very soft light brown sediment
Sacramento River/BG20	38° 03.53'	121° 48.77'	7	soft light brown silty sand with high densities of Potamocorbula, over sandier sediments
San Joaquin River/BG30	38° 01.38'	121° 48.45'	8	sandy sediments with plant debris and Corbicula