

Cruise Report
2001 Regional Monitoring Program
Winter Sediment Cruise

February 14-16, 2001

1. INTRODUCTION

This report describes activities associated with the 2001 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.

A total of five stations in the North Bay and Delta were sampled. 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 four stations for the analysis of:
 - Trace metals and trace organics by Bay Area Clean Water Agencies (BACWA)
 - As and Se by Brooks Rand, LTD (BRL)
 - Grain size, TOC and total nitrogen by UC Santa Cruz (UCSC)
 - Pore water pH and ammonia by Applied Marine Sciences (AMS)
 - Pore water sulfides by Marine Pollution Studies Lab (MPSL)
 - CTD profiles by AMS
 - Mercury and mono-methylmercury (mmHg) by University of Maryland Chesapeake Biological Laboratory (UMCBL)
2. Collect sediment samples at three stations for the analysis of:
 - Mercury and mono-methylmercury splits by University of California Santa Cruz Department of Environmental Toxicology (UCSC)
3. Collect sediment samples at one station for the analysis of:
 - Toxicity Identification Evaluation (TIE) by MPSL
4. Collect sediment samples at two stations for the analysis of:
 - Benthic infauna by City and County of San Francisco (CCSF)

2.2 Personnel

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

Name	Affiliation	Duties
David Bell	AMS	Cruise Manager, sediment chemistry, pH; CTD,
Patricia Chambers (2/16)	SFEI	Observer
Sarah Lowe (2/15)	SFEI	Benthic sample collection
Paul Salop	AMS	Sample collection, sediment chemistry, and CTD
Gordon Smith	UCSC	Vessel skipper

2.3 Activities

Date	Time	Activity
Day 1 February 14, 2001	1400-1600	Demobilized water cruise gear and mobilized sediment cruise gear aboard <i>R/V David Johnston</i> , Benicia Marina.
Day 2 February 15, 2001	0630-0648	Mobilized remaining sediment cruise gear and conducted safety briefing at Benicia Marina. Departed for Davis Point site (BD41).
	0725-0818	Sampled Davis Point, departed for San Pablo Bay site (BD22).
	0903-0936	Sampled San Pablo Bay, departed for Petaluma River site (BD15).
	1017-1105	Sampled Petaluma River site, departed for Napa River site (BD50).
	1311-1355	Sampled Napa River, departed for Benicia Marina.
	1455-1525	Arrived at Benicia Marina. Benthic infauna samples removed from vessel by Sarah Lowe. All other samples stored on dry ice on the vessel.

Day 3

February 16, 2001	0730-0803	Mobilized gear aboard R/V David Johnston. Departed for Grizzly Bay site (BF21).
	0850-1017	Sampled Grizzly Bay, departed for Benicia Marina.
	1107-1400	Arrived Benicia Marina, demobilized vessel. Samples for analysis of trace metals and trace organics were delivered to the EBMUD laboratory in Oakland. Toxicity samples were shipped via FEDEX for Saturday delivery to MPSL. Cognates, archives, mercury, mmHg, and As and Se samples were transferred to AMS for distribution to the appropriate laboratories.

2.4 Discussion

Sample Collection and Handling Procedures

Prior to sampling, all equipment was thoroughly cleaned. The cleaning process began with a two-day soaking of all sampling equipment in an Alconox[®] detergent bath. Following the detergent soak, all equipment was washed with Alconox[®] detergent, rinsed with tap water, followed by three rinses each with de-ionized water, 10% HCl, and 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 two grabs from each site.

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

After the benthic samples were collected, the Ponar grab was replaced with the Van Veen grab for collection of chemistry samples. When the Van Veen grab was brought on deck, the following procedure was followed. After any overlying water was drained off, six glass cores were submerged to a depth of approximately 5 cm and sediment removed for measurement of pH, ammonia, and total sulfides in pore water. Next, 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, and grain size. 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 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 for delivery to the appropriate laboratory.

General Comments

All cruise objectives were met. MPSL was given 20 litres of sediment obtained from the Grizzly Bay station for processing of a TIE at a location where sediments had previously been shown to be toxic. Table 1 shows a summary of all samples taken for each laboratory. Table 2 shows coordinates and sampling depths of each station during the 2001 cruise. Table 3 presents the results of porewater analyses for pH and ammonia. Table 4 lists distinct sample IDs for each of the samples taken.

Table 1. Sample Distribution List for RMP Winter 2001 Sediment Cruise.

Sample Type	Laboratory	# of Sites Sampled
Pore water ammonia, pH	AMS	5
As & Se	BRL	4
Trace elements	BACWA	4
Organic compounds	BACWA	4
Archive	AMS	4
Mercury, mmHg	UMCBL	4
Mercury, mmHg (splits)	UCSC	3
Benthic infauna	CCSF	2
Toxicity Identification Evaluation	MPSL	1
Pore water sulfides	MPSL	5
TOC, total N, and grain size	UCSC	4

Table 2. Coordinates of Regional Monitoring Program Sediment Sampling Sites

Site Name/Code	Latitude	Longitude	Depth (m)	Sediment Description from 2/94
Petaluma River/BD15	38° 06.63'	122° 29.17'	2	soft light brown surficial sediment over dark gray mud/clay
San Pablo Bay/BD22	38° 02.86'	122° 25.38'	2	soft light brown surficial sediment over dark gray mud/clay
Davis Point/BD41	38° 03.05'	122° 16.81'	6	sandy silt with shell debris
Napa River/BD50	38° 05.82'	122° 15.56'	1	soft light brown silty mud with high density of Potamocorbula
Grizzly Bay/BF21	38° 06.94'	122° 02.35'	1	very soft light brown sediment

Table 3. Results of Porewater pH and Ammonia Analyses, Winter Sediment Cruise 2001

Site Name/Code	PH	Ammonia (mg/l)	Comments
Petaluma River/BD15	7.16	1.43	
San Pablo Bay/BD22	7.30	0.82	
Davis Point/BD41	7.75	2.0	
Napa River/BD50	6.97	6	High Range Test (>2.5 mg/l) Required
Grizzly Bay/BF21	7.39	0.80	

Table 4. Sample Identification for 2001 RMP Winter Sediment Cruise

Sample ID	Collection Date	Site Name	Site Code	Parameter	Lab
RMP01-SED-001	2/15/01	Davis Point	BD41	Archive	AMS
RMP01-SED-002	2/15/01	Davis Point	BD41	Trace Elements	BACWA
RMP01-SED-003	2/15/01	Davis Point	BD41	Organics	BACWA
RMP01-SED-004	2/15/01	Davis Point	BD41	As, Se	BRL
RMP01-SED-005	2/15/01	Davis Point	BD41	Sulfides	MPSL
RMP01-SED-006	2/15/01	Davis Point	BD41	Cognates	UCSC
RMP01-SED-007	2/15/01	Davis Point	BD41	Hg, mmHg	UMCBL
RMP01-SED-027	2/15/01	Davis Point	BD41	Addl. Archive	AMS
RMP01-SED-008	2/15/01	San Pablo Bay	BD22	Archive	AMS
RMP01-SED-009	2/15/01	San Pablo Bay	BD22	Trace Elements	BACWA
RMP01-SED-010	2/15/01	San Pablo Bay	BD22	Organics	BACWA
RMP01-SED-011	2/15/01	San Pablo Bay	BD22	As, Se	BRL
RMP01-SED-012	2/15/01	San Pablo Bay	BD22	Sulfides	MPSL
RMP01-SED-013	2/15/01	San Pablo Bay	BD22	Cognates	UCSC
RMP01-SED-014	2/15/01	San Pablo Bay	BD22	Hg, mmHg split	UCSC
RMP01-SED-023	2/15/01	San Pablo Bay	BD22	Hg, mmHg	UMCBL
RMP01-SED-015	2/15/01	Petaluma River	BD15	Archive	AMS
RMP01-SED-016	2/15/01	Petaluma River	BD15	Trace Elements	BACWA
RMP01-SED-017	2/15/01	Petaluma River	BD15	Organics	BACWA
RMP01-SED-018	2/15/01	Petaluma River	BD15	As, Se	BRL
RMP01-SED-019	2/15/01	Petaluma River	BD15	Sulfides	MPSL
RMP01-SED-020	2/15/01	Petaluma River	BD15	Cognates	UCSC
RMP01-SED-021	2/15/01	Petaluma River	BD15	Hg, mmHg split	UCSC
RMP01-SED-022	2/15/01	Petaluma River	BD15	Hg, mmHg	UMCBL
RMP01-SED-028	2/15/01	Napa River	BD50	Archive	AMS
RMP01-SED-029	2/15/01	Napa River	BD50	Trace Elements	BACWA
RMP01-SED-030	2/15/01	Napa River	BD50	Organics	BACWA
RMP01-SED-031	2/15/01	Napa River	BD50	As, Se	BRL
RMP01-SED-032	2/15/01	Napa River	BD50	Sulfides	MPSL
RMP01-SED-033	2/15/01	Napa River	BD50	Cognates	UCSC
RMP01-SED-034	2/15/01	Napa River	BD50	Hg, mmHg split	UCSC
RMP01-SED-035	2/15/01	Napa River	BD50	Hg, mmHg	UMCBL
RMP01-SED-036	2/16/01	Grizzly Bay	BD50	TIE	MPSL
RMP01-SED-037	2/16/00	Grizzly Bay	BF21	Sulfides	MPSL