

**Cruise Report
Regional Monitoring Program
Water Sampling Cruise #21**

July 13-16, 19-22, 1999

1.0 INTRODUCTION

This report describes activities associated with the third 1999 water sampling cruise (Cruise #21) of the Regional Monitoring Program for Trace Substances in the San Francisco Estuary.

Water samples were collected and distributed to the following laboratories for analysis: Samples for the analysis of arsenic and selenium collected from 26 sites, and mercury intercalibration samples collected from three sites were sent to Brooks-Rand, Ltd. in Seattle, Washington at the mid-point and end of the cruise. Samples for the analysis of other trace elements (cadmium, chromium, copper, lead, nickel, silver, and zinc) and ancillary measurements (salinity, total suspended solids, dissolved organic carbon, chlorophyll a, ammonium, nitrate, nitrite, and orthophosphate) were collected from 26 sites and retained by personnel of Dr. Russ Flegal's laboratory at the University of California, Santa Cruz, at the conclusion of the cruise. Samples for total and methyl mercury analysis collected from 26 sites were sent to Dr. Rob Mason at the University of Indiana. Samples for analysis of total hardness were collected from 14 sites and retained at the conclusion of the cruise by Applied Marine Sciences, Inc. (AMS) personnel for delivery to Union Sanitary District in Union City. Samples for analysis of trace organics from 18 sites were collected and retained by personnel of Dr. Wally Jarman's group at University of Utah. Measurement of surface water salinity, temperature, conductivity, pH, and dissolved oxygen were conducted by Flegal's group at each site, and the water column at each site (except Standish dam and Guadalupe river) was profiled by AMS personnel for conductivity, temperature, salinity, dissolved oxygen, and optical back-scatterance. All sampling except for the two watershed sites was conducted from the R/V *David Johnston*. Additionally, samples for bacterial analysis were collected from 26 sites for Dr. Brian Palenik of UCSD, and sediment samples for foraminiferan analysis were collected from 6 sites for Dr. Mary McGann of the USGS.

2.0 CRUISE REPORT

2.1 Objectives

The objectives of this cruise were to:

1. Collect water samples from 26 sites for analysis of total and dissolved trace elements.
2. Collect water samples from 18 sites for analysis of particulate and dissolved organic contaminants.
3. Collect water samples from 26 sites for analysis of salinity, total suspended solids, chlorophyll a, nutrients (ammonium, nitrate, nitrite, orthophosphate, silicate), and dissolved organic carbon.
4. Collect water samples for analysis of total hardness at sites where salinity is <5ppt and at 13 specified locations.
5. Collect profiles of water-column temperature, conductivity, salinity, dissolved oxygen, and optical back-scatterance at 24 sites (not done at watershed sites).
6. Collect water samples for bacterial analysis from 26 sites for UCSD.
7. Collect sediment samples for foraminiferan analysis from 6 sites for USGS.
8. Collect water samples for methyl mercury analysis from 10 sites.

2.2 Personnel

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

Name	Affiliation	Duties
Corrine Bacon (7/19-22)	UU	Organic Chemistry
David Bell (7/13-16)	AMS	Cruise Manager, Bacterial Samples, CTD, Foraminiferan
Kim Bracchi (7/13-16, 19-22)	UCSC	Trace Metal Chemistry
Kit Conoway (7/16)	UCSC	Trace Metal Chemistry
Iris Faraklas (7/19-22)	UU	Organic Chemistry
Priya Ganguli (13-16,19)	UCSC	Trace Metal Chemistry
Jordan Gold (7/19-22)	AMS	Cruise Manager, Bacterial Samples, CTD, Foraminiferan
Andrew Gunther (7/16)	AMS	Observer
Sharon Hibdon (7/19-22)		Trace Metal Chemistry
Lisa Jacobsen (7/13-16, 19-22)	UU	Organic Chemistry
Theresa Lowe (7/13-16)	UU	Organic Chemistry
Allison Luengen (7/13-16)	UCSC	Trace Metal Chemistry
Rachael Mills (7/19-22)	UCSC	Trace Metal Chemistry
Gordon Smith (13-16, 19-21)	UCSC	<i>RV David Johnston Skipper</i>
Lindsay Whalin (7/19-22)	UCSC	Trace Metal Chemistry

2.3 Sampling Activities

Date	Time	Activity
July 13, 1999	0700–0835	Mobilized gear onto the R/V David Johnston Emeryville marina, conducted safety briefing, and departed for Oyster Point site (BB30).
	0948–1145	Sampled at Oyster Point, departed for San Bruno Shoal site (BB15).
	1218–1334	Sampled at San Bruno Shoal, departed for Redwood Creek site (BA40).
	1327–1541	Sampled at Redwood Creek, departed for Coyote Creek site (BA10).
	1641–1828	Sampled at Coyote Creek, departed for MARFAC (USGS Marine Facility in Redwood City).
	1000–1030	Arrived at MARFAC, demobilized gear and departed for the motel.

2.3 Sampling Activities (cont.)

Date	Time	Activity
July 14, 1999	0730–0810	Departed from the motel, mobilized gear onto the vessel and departed for Dumbarton Bridge site (BA30).
	0850–1020	Sampled at Dumbarton Bridge, departed for South Bay site (BA20).
	1047–1143	Sampled at South Bay, departed for San Jose site (C-3-0).
	1229–1349	Sampled at San Jose, departed for Sunnyvale site (C-1-3).
	1442–1602	Sampled at Sunnyvale, departed for Emeryville marina.
	1922–2100	Arrived at Emeryville marina, demobilized gear off vessel, dropped samples for Brooks-Rand off at AMS for shipment on 7/15, departed for motel and home.
July 15, 1999	0730–0810	Departed from the motel, mobilized gear onto vessel, and departed for Golden Gate site (BC20).
	1023–1142	Sampled at Golden Gate, departed for Richardson Bay site (BC30).
	1306–1415	Sampled at Richardson Bay, departed for Red Rock site (BC60).
	1445–1615	Sampled at Red Rock,
	1710–1740	Arrived at Emeryville marina, demobilized gear off vessel and departed for motel and home.
July 16, 1999	0730–0800	Departed from the motel, mobilized gear onto vessel, departed for Pt. Isabel site (BC41).
	0913–1023	Sampled at Pt. Isabel, departed for Alameda site (BB70).
	1130–1252	Sampled at Alameda, departed for Yerba Buena Island site (BC10).

2.3 Sampling Activities (cont.)

Date	Time	Activity
July 16, 1999 (cont.)	1335–1520	Sampled at Yerba Buena Island, departed for Emeryville marina.
	1545–1615	Arrived at Emeryville marina, demobilized gear off vessel, departed for home.
July 17, 1999	0800–1200	Captain Smith transits vessel to Benicia marina.
July 19, 1999	0630–0733	Departed motel, mobilized gear onto vessel at Benicia marina, conducted safety briefing and departed for Davis Point site (BD40).
	0817–0950	Sampled at Davis Point, departed for Pinole Point site (BD30).
	1023–1136	Sampled at Pinole Point, departed for San Pablo Bay site (BD20).
	1207–1324	Sampled at San Pablo Bay, departed for Petaluma River site (BD15).
	1403–1524	Sampled at Petaluma River, departed for Benicia Marina.
	1721–1830	Arrived at Benicia marina, demobilized gear off vessel, delivered toxicity samples to PERL personnel, departed for motel.
	July 20, 1999	0640–0720
0833–0940		Sampled at Honker Bay, departed for departed for Grizzly Bay site (BF20).
1029–1144		Sampled at Grizzly Bay, departed for Pacheco Creek site (BF10).
1224–1326		Sampled at Pacheco Creek, departed for Napa River site (BD50).
1429–1546		Sampled at Napa River, departed for Benicia marina.
1646–1700		Arrived at Benicia marina, demobilized gear off vessel, departed for motel.

2.3 Sampling Activities (cont.)

Date	Time	Activity
July 21, 1999	0730–0825	Departed from motel, mobilized gear onto vessel, conducted safety briefing, departed for Sacramento River site (BG20).
	1004–1123	Sampled at Sacramento River site, departed for San Joaquin River site (BG30).
	1148–1321	Sampled at San Joaquin River site, departed for Benicia marina.
	1504–1630	Arrived at Benicia marina, demobilized gear off vessel, delivered toxicity samples to PERL personnel, departed for motel.
July 22, 1999	0730–1050	Sampled at Standish Dam (BW10), departed for Guadalupe River site (BW15).
	1110–13450	Sampled at Guadalupe River (South Bay Yacht Club), delivered Brooks Rand samples to AMS for shipment, departed for home.

2.4 Discussion

Site Locations and Sample Collections

Sampling was conducted at the locations described in Table 1. Samples collected from each site are indicated in Table 2.

General Comments

All cruise objectives were accomplished within the scheduled number of days. The primary and duplicate unfiltered mercury intercalibration samples from the Petaluma river site were broken in shipment to Brooks Rand, so there will be no data produced for those samples. The city of San Jose typically has samples provided to them from selected sites in the south bay, however they declined to participate in this water cruise.

Table 1. Coordinates of Water Samples Collected During Regional Monitoring

Site Name/Code	Latitude (N)	Longitude (W)	Depth When Sampled (m)	Comments
Standish Dam/BW10	37° 27.152'	121° 55.481'	shore	Standish Dam on E bank
Guadalupe River/BW15	37° 25.554'	121° 58.786'	shore	South Bay Yacht Club Dock
San Jose/C-3-0	37° 27.613'	121° 58.554'	2.7	Just W of railroad bridge in Coyote Creek
Sunnyvale/C-1-3	37° 26.036'	122° 00.588'	2.4	Approximately 2.23 nmi up Guadalupe Slough from channel marker "1"
Coyote Creek/BA10	37° 28.126'	122° 03.765'	5.9	75 m S of channel marker "18"
South Bay/BA20	37° 29.580'	122° 05.253'	2.7	200 m W of channel marker "16"
Dumbarton Bridge/BA30	37° 30.815'	122° 08.061'	6.2	20 m E of channel marker "14"
Redwood Creek/BA40	37° 33.525'	122° 12.539'	5.4	50 m W of channel marker "12"
San Bruno Shoal/BB15	37° 36.852'	122° 16.925'	12.7	1 nmi NE of channel marker "8"
Oyster Point/BB30	37° 40.109'	122° 19.723'	8.0	50 m W of channel marker "4"
Alameda/BB70	37° 44.533'	122° 19.303'	9.5	20 m SSE of Buoy "A"
Yerba Buena Island/BC10	37° 49.283'	122° 20.947'	7.3	0.25 nmi N of Bay Bridge between bridge supports K and L
Golden Gate/BC20	37° 46.935'	122° 40.121'	29	near the shipping channel
Richardson Bay/BC30	37° 51.722'	122° 28.732'	3.1	30 m NW of channel marker "4"
Point Isabel/BC41	37° 53.211'	122° 20.558'	1.2	0.61 nmi from Brooks Island and 0.81 nmi from Fleming Point
Red Rock/BC60	37° 55.115'	122° 26.125'	11.3	0.7 nmi SW of Red Rock
Petaluma River/BD15	38° 06.633'	122° 29.265'	4.6	50 m W of channel marker "19"
San Pablo Bay/BD20	38° 02.908'	122° 25.292'	2.7	100 m S of channel marker "2"
Pinole Point/BD30	38° 01.440'	122° 21.753'	5.5	0.5 nmi from marker off end of pier and 0.7 nmi from channel marker "7"
Davis Point/BD40	38° 03.025'	122° 16.646'	6.1	0.2 nmi SW from W end of barge pier
Napa River/BD50	38° 05.812'	122° 15.658'	2.2	50 m off concrete seawall and E of NE corner of Mare Island Naval Shipyard building
Pacheco Creek/BF10	38° 03.071'	122° 05.969'	10.9	0.2 nmi N of buoy "7"
Grizzly Bay/BF20	38° 06.936'	122° 02.350'	1.7	100 m S of dolphin
Honker Bay/BF40	38° 04.015'	121° 56.053'	2.0	0.65 nmi N of Simmons Point
Sacramento River/BG20	38° 03.580'	121° 48.635'	9.6	0.1 nmi W of channel marker "8"
San Joaquin River/BG30	38° 01.231'	121° 48.302'	6.8	0.11 nmi E of channel marker "8"

Table 2. Samples Collected During Regional Monitoring Program

Collection Information		Filtered and Unfiltered			Filtered				Unfiltered	
Site	Day	As, Hg, Se	Cr.	Other Trace Elements	Nutr.	DOC	Sal.	Org. Comp.	Chl	TSS
Oyster Point	1	•	•	•	•	•	•		•2	•
San Bruno Shoal	1	•	•	•	•	•	•		•2	•
Coyote Creek	1	•	•	•	•	•	•	•	•2	•
Redwood Creek	1	•	•	•	•	•	•	•	•2	•
Dumbarton Bridge	2	•	•	•	•	•	•	•	•2	•
Sunnyvale	2	•	•	•3	•1	•	•		•2	•
San Jose	2	•	•	•	•1	•	•	•	•2	•
South Bay	2	•	•	•	•1	•	•		•2	•
Golden Gate	3	•	•	•	•	•	•	•	•2	•
Richardson Bay	3	•	•	•	•	•	•		•2	•
Red Rock	3	•	•	•	•	•	•	•	•2	•
Point Isabel	4	•	•	•	•	•	•	•	•2	•
Alameda	4	•	•	•	•	•	•	•	•2	•
Yerba Buena Island	4	•	•	•	•	•	•	•	•2	•
Petaluma River	6	•	•	•3	•1	•	•	•	•2	•
San Pablo Bay	6	•	•	•	•1	•	•	•	•2	•
Pinole Point	6	•	•	•	•1	•	•	•	•2	•
Davis Point	6	•	•	•	•1	•	•	•	•2	•
Honker Bay	7	•	•	•	•1	•	•		•2	•
Grizzly Bay	7	•	•	•3	•1	•	•	•	•2	•
Napa River	7	•	•	•	•1	•	•	•	•2	•
Pacheco Creek	8	•	•	•	•	•	•		•2	•
Sacramento River	8	•	•	•	•1	•	•	•	•2	•
San Joaquin River	8	•	•	•	•1	•	•	•	•2	•
Standish Dam	9	•	•	•	•1	•	•	•	•2	•
Guadalupe River	9	•	•	•	•1	•	•	•	•2	•

- = Indicates that a sample was collected.
- 1 = Samples were collected for analysis of total hardness.
- 2 = Samples were collected for bacterial analysis.
- 3 = Samples were collected for Hg intercalibration.