

**Cruise Report**  
**Regional Monitoring Program**  
**Water Sampling Cruise #20**

April 12-16, 19-22, 1999

## **1.0 INTRODUCTION**

This report describes activities associated with the second 1999 water sampling cruise (Cruise #20) 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 mercury analysis collected from 26 sites, and for methyl mercury analysis collected from ten sites were sent to Dr. Rob Mason at the University of Indiana. Samples for analysis of total hardness were collected from 15 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 backscatterance. All sampling except for the two watershed sites was conducted from the R/V *David Johnston*. Additionally, water samples for total suspended solids, total and dissolved trace metals and mercury were collected from 4 sites for the city of San Jose, samples for bacterial analysis were collected from 26 sites for Dr. Brian Palenik of UCSD, and sediment samples for foraminiferan analysis were collected from 24 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 total and dissolved (filtered and unfiltered) water samples from Coyote Creek, San Jose, South Bay, and Dumbarton Bridge sites for the city of San Jose.
6. Collect profiles of water-column temperature, conductivity, salinity, dissolved oxygen, and optical back-scatterance at 24 sites (not done at watershed sites).
7. Collect water samples for bacterial analysis from 26 sites for UCSD.
8. Collect sediment samples for foraminiferan analysis from 26 sites for USGS.
9. 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
Khalil Abu Saba (4/21)	SFRWQCB	Observer
David Bell (4/12, 13, 22)	AMS	Cruise Manager, Bacterial Samples, CTD, Foraminiferan
Priya Ganguli (4/12-15, 19-22)	UCSC	Trace Metal Chemistry
Jordan Gold (4/14-15, 19-21)	AMS	Cruise Manager, Bacterial Samples, CTD, Foraminiferan
Lisa Jacobsen (4/19-22)	UU	Organic Chemistry
Rachael Mills (4/19-22)	UCSC	Trace Metal Chemistry
Kim Norman (4/12-15)	UU	Organic Chemistry
Genine Scelfo (4/12-15)	UCSC	Trace Metal Chemistry
Gordon Smith (4/12-16, 19-21)	UCSC	<i>RV David Johnston</i> Skipper
Linda Spencer (4/21)	SFRWQCB	Observer
Doug Stedding (4/19-22)	UCSC	Trace Metal Chemistry
Lisa Thogerson (4/19-22)	UCSC	Trace Metal Chemistry
Jocelyn Vedder (4/12-15, 19-22)	UU	Organic Chemistry
Lindsay Whalin (4/12-15)	UCSC	Trace Metal Chemistry

## 2.3 Sampling Activities

Date	Time	Activity
April 12, 1999	0700–0820	Mobilized gear onto the <i>R/V David Johnston</i> Emeryville marina, conducted safety briefing, and departed for Oyster Point site (BB30).
	0935–1100	Sampled at Oyster Point, departed for San Bruno Shoal site (BB15).
	1132–1245	Sampled at San Bruno Shoal, departed for Redwood Creek site (BA40).
	1327–1435	Sampled at Redwood Creek, departed for Dumbarton Bridge site (BA30).
	1515–1642	Sampled at Dumbarton Bridge, departed for MARFAC (USGS Marine Facility in Redwood City).
	1730–1845	Arrived at MARFAC, demobilized gear and departed for the motel.

### 2.3 Sampling Activities (cont.)

Date	Time	Activity
April 13, 1999	0630–0720	Departed from the motel, mobilized gear onto the vessel and departed for San Jose site (C–3–0).
	0842–1042	Sampled at San Jose, departed for Sunnyvale site (C–1–3).
	1118–1229	Sampled at Sunnyvale, departed for Coyote Creek site (BA10).
	1306–1428	Sampled at Coyote Creek, departed for South Bay site (BA20).
	1447–1610	Sampled at South Bay, departed for Emeryville marina.
	1920–2000	Arrived at Emeryville marina, demobilized gear off vessel, departed for motel and home.
April 14, 1999	0800–0824	Mobilized gear onto vessel, conducted safety briefing and departed for Alameda site (BB70).
	0910–1042	Sampled at Alameda, departed for Yerba Buena Island site (BC10).
	1128–1245	Sampled at Yerba Buena Island, departed for Red Rock site (BC60).
	1331–1446	Sampled at Red Rock, departed for Pt. Isabel site (BC41).
	1526–1636	Sampled at Pt. Isabel, departed for Emeryville marina.
	1710–1730	Arrived at Emeryville marina, demobilized gear off vessel and departed for motel and home.
April 15, 1999	0730–0800	Mobilized gear onto vessel, departed for Golden Gate site (BC20).
	1007–1128	Sampled at Golden Gate, departed for Richardson Bay site (BC30).

### 2.3 Sampling Activities (cont.)

Date	Time	Activity
April 15, 1999 (cont.)	1259–1427	Sampled at Richardson Bay, departed for Emeryville marina.
	1531–1700	Arrived at Emeryville marina, demobilized gear off vessel. Shipped As, Se and Hg intercalibration samples to Brooks Rand and departed for home.
April 16, 1999	0800–1200	Captain Smith transits vessel to Benicia marina.
April 19, 1999	0715–0839	Departed motel, mobilized gear onto vessel at Benicia marina, conducted safety briefing and departed for Davis Point site (BD40).
	0915–1102	Sampled at Davis Point, departed for Pinole Point site (BD30).
	1233–1348	Sampled at Pinole Point, departed for San Pablo Bay site (BD20).
	1331–1518	Sampled at San Pablo Bay, departed for Petaluma River site (BD15).
	1605–1721	Sampled at Petaluma River, departed for Benicia Marina.
	1916–1925	Arrived at Benicia marina, demobilized gear off vessel, departed for motel.
April 20, 1999	0645–0711	Departed from motel, mobilized gear onto vessel, departed for Honker Bay site (BF40).
	0829–0928	Sampled at Honker Bay, departed for Pacheco Creek site (BF10).
	1046–1146	Sampled at Pacheco Creek, departed for Napa River site (BD50).
	1246–1403	Sampled at Napa River, departed for Benicia marina.
	1457–1500	Arrived at Benicia marina, demobilized gear off vessel, departed for motel.

## 2.3 Sampling Activities (cont.)

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Date	Time	Activity
April 21, 1999	0715–0745	Departed from motel, mobilized gear onto vessel, conducted safety briefing, departed for Grizzly Bay site (BF20).
	0839–0946	Sampled at Grizzly Bay, departed for Sacramento River site (BG20).
	1119–1238	Sampled at Sacramento River site, departed for San Joaquin River site (BG30).
	1342–1507	Sampled at San Joaquin River site, departed for Benicia marina.
	1626–1900	Arrived at Pittsburg marina, demobilized gear off vessel, departed for motel and home.
April 22, 1999	0700–0957	Sampled at Standish Dam (BW10), departed for Guadalupe River site (BW15).
	1025–1240	Sampled at Guadalupe River (South Bay Yacht Club), departed for home.

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## 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, with the exception of foraminiferan samples from Golden Gate and Pacheco Creek sites. Sampling was attempted at these sites, but samples were not acquired there due to excessive depth at Golden Gate, and excessive sediment compaction at Pacheco Creek.

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° 27.609'	121° 58.515'	2.7	Just W of railroad bridge in Coyote Creek
Sunnyvale/C-1-3	37° 26.051'	122° 00.570'	2	Approximately 2.23 nmi up Guadalupe Slough from channel marker "1"
Coyote Creek/BA10	37° 28.119'	122° 03.768'	6.2	75 m S of channel marker "18"
South Bay/BA20	37° 29.591'	122° 05.251'	3.2	200 m W of channel marker "16"
Dumbarton Bridge/BA30	37° 30.828'	122° 08.059'	7.3	20 m E of channel marker "14"
Redwood Creek/BA40	37° 33.536'	122° 12.577'	3.3	50 m W of channel marker "12"
San Bruno Shoal/BB15	37° 36.957'	122° 16.971'	12.4	1 nmi NE of channel marker "8"
Oyster Point/BB30	37° 40.168'	122° 19.763'	9.8	50 m W of channel marker "4"
Alameda/BB70	37° 44.655'	122° 19.361'	8	20 m SSE of Buoy "A"
Yerba Buena Island/BC10	37° 49.302'	122° 20.957'	7	0.25 nmi N of Bay Bridge between bridge supports K and L
Golden Gate/BC20	37° 46.630'	122° 40.504'	30.8	near the shipping channel
Richardson Bay/BC30	37° 51.705'	122° 28.736'	3.7	30 m NW of channel marker "4"
Point Isabel/BC41	37° 53.255'	122° 20.563'	1.7	0.61 nmi from Brooks Island and 0.81 nmi from Fleming Point
Red Rock/BC60	37° 55.001'	122° 26.089'	10.6	0.7 nmi SW of Red Rock
Petaluma River/BD15	38° 06.642'	122° 29.200'	4.6	50 m W of channel marker "19"
San Pablo Bay/BD20	38° 02.861'	122° 25.312'	3.2	100 m S of channel marker "2"
Pinole Point/BD30	38° 01.500'	122° 21.733'	5.3	0.5 nmi from marker off end of pier and 0.7 nmi from channel marker "7"
Davis Point/BD40	38° 03.028'	122° 16.715'	5	0.2 nmi SW from W end of barge pier
Napa River/BD50	38° 05.812'	122° 15.637'	.7	50 m off concrete seawall and E of NE corner of Mare Island Naval Shipyard building
Pacheco Creek/BF10	38° 03.051'	122° 06.017'	9.9	0.2 nmi N of buoy "7"
Grizzly Bay/BF20	38° 06.919'	122° 02.375'	1.7	100 m S of dolphin
Honker Bay/BF40	38° 04.019'	121° 56.090'	1.9	0.65 nmi N of Simmons Point
Sacramento River/BG20	38° 03.568'	121° 48.633'	9.1	0.1 nmi W of channel marker "8"
San Joaquin River/BG30	38° 01.218'	121° 48.305'	10.6	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	•	•	•5	•	•	•		•2	•
San Bruno Shoal	1	•	•	•	•	•	•		•2	•
Coyote Creek	1	•3	•	•	•	•	•	•	•2	•
Redwood Creek	1	•	•	•	•	•	•	•	•2	•
Dumbarton Bridge	2	•3	•	•	•	•	•	•	•2	•
Sunnyvale	2	•	•	•	•1	•	•		•2	•
San Jose	2	•3	•	•5	•1	•	•	•	•2	•
South Bay	2	•3	•	•5	•1	•	•		•2	•
Golden Gate	3	•	•	•5	•	•	•	•	•2	•
Richardson Bay	3	•	•	•4	•	•	•		•2	•
Red Rock	3	•	•	•	•	•	•	•	•2	•
Point Isabel	4	•	•	•	•	•	•	•	•2	•
Alameda	4	•	•	•4	•	•	•	•	•2	•
Yerba Buena Island	4	•	•	•4	•	•	•	•	•2	•
Petaluma River	6	•	•	•5	•1	•	•	•	•2	•
San Pablo Bay	6	•	•	•5	•1	•	•	•	•2	•
Pinole Point	6	•	•	•	•1	•	•	•	•2	•
Davis Point	6	•	•	•	•1	•	•	•	•2	•
Honker Bay	7	•	•	•	•1	•	•		•2	•
Grizzly Bay	7	•	•	•5	•1	•	•	•	•2	•
Napa River	7	•	•	•	•1	•	•	•	•2	•
Pacheco Creek	8	•	•	•	•1	•	•		•2	•
Sacramento River	8	•	•	•5	•1	•	•	•	•2	•
San Joaquin River	8	•	•	•5	•1	•	•	•	•2	•
Standish Dam	9	•	•	•5	•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 = TSS, Hg, and TM samples taken for the city of San Jose.
- 4 = Samples were collected for Hg intercalibration.
- 5 = Samples were collected for methyl mercury analysis.