SURFACE WATER, SEDIMENT, AND STORMWATER SAMPLING SUMMARY REPORT

UNIVERSITY OF CALIFORNIA, BERKELEY RICHMOND FIELD STATION RICHMOND, CALIFORNIA

Prepared for
Office of Environment, Health and Safety
University of California, Berkeley
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December 18, 2006

Prepared by

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RFS.00381.D.008.2-A

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ACRONYMS AND ABBREVIATIONS

C&T	Curtis and Thompkins Laboratory
DTSC	Department of Toxic Substances Control
EPTC	S-Ethyl dipropylthiocarbamate
RFS	Richmond Field Station
Tetra Tech	Tetra Tech EM Inc.
UC	University of California

1.0 INTRODUCTION

The California Environmental Protection Agency's Department of Toxic Substances Control (DTSC) requested the University of California (UC) Berkeley to implement semiannual monitoring at Richmond Field Station (RFS) in Richmond, California. This semiannual monitoring will continue for a minimum of 5 years, depending on the results of the 5-year review. As part of this monitoring, UC Berkeley tasked Tetra Tech EM Inc. (Tetra Tech) to collect and analyze surface water, sediment, and stormwater samples in Stege Marsh. This report summarizes the field activities and analytical results for the surface water, sediment, and stormwater samples collected at the Western Stege Marsh as part of the semiannual monitoring at RFS.

This report is organized as follows:

- Section 2.0 – Site Background, summarizes the background of RFS and Western Stege Marsh, as well as the historical uses and investigation activities previous conducted.
- Section 3.0 – Summary of Field Activities, describes the field activities performed as part of the semiannual monitoring at RFS.
- Section 4.0 – Sampling Analytical Results, presents the analytical results for surface water, sediment, and stormwater samples collected at RFS during the field activities.
- Section 5.0 – References, lists the references used to prepare this report.

Figures, tables, and appendices are presented following Section 5.0.

2.0 SITE BACKGROUND

Stege Marsh comprises the tidal marsh areas that extend across the southern portion of RFS and adjacent properties. The western portion of Stege Marsh (Western Stege Marsh) is located on the RFS (see Figure 1). Historical industrial use along the Richmond shoreline, dating back to the 1870s, resulted in contaminated sediments in the Western Stege Marsh. As a result, remediation and restoration activities were conducted at the Western Stege Marsh (Blasland, Bouck & Lee, Inc. 2004). DTSC requested additional monitoring to continue to assess post-remediation conditions at the Western Stege Marsh.

3.0 SUMMARY OF FIELD ACTIVITIES

Based on the request from DTSC for additional monitoring of the Western Stege Marsh, UC Berkeley requested that Tetra Tech collect surface water, sediment, and stormwater samples for analysis to determine if contamination was still present at the Western Stege Marsh. The

sections below summarize the field activities performed by Tetra Tech during the sampling event.

3.1 SURFACE WATER AND SEDIMENT SAMPLING

Tetra Tech collected four grab surface water and three sediment samples from Western Stege Marsh on October 30, 2006. Figure 2 shows the locations where samples were collected. Grab surface water samples were collected using a clean dipper in an upstream direction. The dipper was submerged carefully into the surface water to minimize sediment disturbance. The surface water samples were then transferred into clean sample containers provided by Curtis and Thompkins Laboratory (C&T). The sample containers were pre-labeled properly according to the field implementation plan (Tetra Tech 2006). The samples were recorded on the chain-of-custody records (see Appendix A). All samples were maintained in a cooler filled with ice and delivered to the laboratory at the end of the sampling activity.

Sediment samples were collected after surface water samples were collected. Sediment samples were collected by pushing a 6-inch-long by 2-inch-diameter brass liner to a depth of 6 inches below ground surface. The liner was extracted with an intact core and capped with Teflon® sheeting and plastic end caps. Each sample core was properly labeled and recorded on the chain-of-custody records (see Appendix A). All samples were maintained in a cooler filled with ice and delivered to the laboratory at the end of the sampling activity.

All surface water and sediment samples were analyzed for dissolved metals, pesticides, polychlorinated biphenyls, total dissolved solids, nitrate, total nitrogen, phosphorus, and pH. Table 1 shows the analysis performed for each sample. Pesticide analysis was conducted by Columbia Analytical. The pesticides analyzed were proprietary pesticides that included S-Ethyl dipropylthiocarbamate (EPTC), butylate, vernolate, pebulate, molinate, cycloate, fonofos, napropamide, nitrobenzene-ds, alpha-fluorobiphenyl, and terphenyl-d14. All other sample analyses were conducted by C&T.

3.2 STORMWATER SAMPLING ACTIVITIES

Tetra Tech monitored the weather forecast for RFS before mobilizing at the site to ensure samples could be collected during a rain or storm event. Tetra Tech collected stormwater samples on November 2, 2006. The sampling day was preceded by at least 72 hours of dry weather (see Appendix B). Five stormwater samples were collected from the sampling locations or outfalls shown on Figure 2. The sampling locations were ideally located at the lowest point in the drainage area where a conveyance discharges stormwater to the San Francisco Bay or to a municipal storm sewer system.

Stormwater samples were collected during normal hours of operation for the RFS when the depth of rainfall or precipitation was greater than 0.1 inch (see Appendix B). Grab stormwater samples were collected using a clean dipper in an upstream direction. The dipper was submerged carefully into the stormwater to minimize inclusion of debris. The stormwater samples were

then transferred into clean sample containers provided by C&T. The sample containers were pre-labeled in accordance with the field implementation plan (Tetra Tech 2006). The samples were recorded on the chain-of-custody records (see Appendix A). All samples were maintained in a cooler filled with ice and delivered to C&T at the end of the sampling activity.

The stormwater samples were analyzed for dissolved metals, polychlorinated biphenyls, and pH by C&T. Table 1 shows the analysis performed for each sample.

4.0 SAMPLING ANALYTICAL RESULTS

The sampling analytical results are summarized in the following sections.

4.1 SURFACE WATER AND SEDIMENT SAMPLING

Results of the surface water sampling indicated arsenic, barium, beryllium, copper, manganese and zinc were detected in samples (see Table C1). Additionally, essential nutrients (calcium, iron, magnesium, potassium and sodium) were detected in surface water samples. Results for pesticides and Aroclors were all nondetect.

Results of the sediment sampling indicated metals and essential (calcium, iron, magnesium, potassium and sodium) were detected in all three samples collected (see Table C2). Aroclors were not detected in any sediment samples. Compounds of dichlordiphenyltrichloethane (DDT) were detected in one sample. All other pesticides including the proprietary pesticides, were not detected.

4.2 STORMWATER SAMPLING

Results of the stormwater sampling indicated aluminum, arsenic, barium, chromium, cobalt, copper, lead, manganese, mercury, molybdenum, nickel, silver thallium, vanadium, and zinc were detected in samples (see Table C3). Additionally, essential nutrients (calcium, iron, magnesium, potassium and sodium) were detected in stormwater samples. Aroclors were not detected in any stormwater samples.

5.0 REFERENCES

Blasland, Bouck & Lee, Inc. 2004. "Final Report, Groundwater, Surface Water, and Sediment Monitoring Plan, Subunit 2, Meade Street Operable Unit, University of California, Berkeley Richmond Field Station Richmond, California (Tasks 2b, 3b, 4a, and 5a of RWQCB Order No. 01-102." December 3.

State Water Resources Control Board (State Water Board). 1997. State Water Resources Control Board (State Water Board) Water Quality Order No. 97-03-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000001 (General Permit), Waste Discharge Requirements (WDRS) for Discharges of Stormwater Associated with Industrial Activities Excluding Construction Activities.

Tetra Tech EM Inc. 2006. "Field Implementation Plan for Surface Water, Stormwater and Sediment Monitoring, University Of California, Berkeley, Richmond Field Station, Richmond, California." RFS.00381.D.008-A. November 2.

U.S. Environmental Protection Agency (EPA). 1992. "NPDES Stormwater Sampling Guidance Document." Office of Water. EPA 833-8-92-001. July.

FIGURES

0 600

Feet

Property Boundaries

UCB - Richmond Field Station

Zeneca

Note: Aerial photograph date is February 27, 2004.
Courtesy of the U.S. Geological Survey (USGS).

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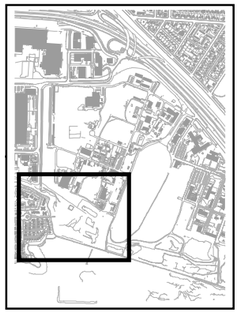
Richmond Field Station
University of California, Berkeley

FIGURE 1
SITE LOCATION MAP

2006-12-19 V:\Misc_GIS\Richmond_Field_Station\Projects\Site_Location.mxd TtEMI-SF Aleksandr Zhuk



Surface Water Samples	SW101 SW102 SW103 SW104
Stormwater Samples	STW105 STW106 STW107 STW108
Sediment Samples	SED101 SED102 SED103

150 0 150

Feet

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Richmond Field Station
University of California, Berkeley

FIGURE 2
SURFACE WATER, SEDIMENT, AND STORMWATER SAMPLING LOCATIONS

2006-11-01 V:\Misc_GIS\Richmond_Field_Station\Projects\Surf_Wtr_Sed_Monit\Surf_Wtr_Sed_Monit_Locs.mxd TtEMI-SF Aleksandr Zhuk

TABLES

TABLE 1: SAMPLE LOCATIONS, MEDIA, AND ANALYSES
Surface Water, Sediment and Stormwater Sampling Report, Richmond Field Station, Richmond, California

Sample Location	Sample Identification No.[c]	Area	Media	Analysis
SED101[a]	RFSSED001	Marsh Portion of Subunit 2A	Sediment	Metals, pesticides[d,e], PCBs, and pH
SED102[a]	RFSSED002	Marsh Portion of Subunit 2A	Sediment	Metals, pesticidesc[d,e], PCBs, and pH
SED103[a]	RFSSED003	Marsh Portion of Subunit 2A	Sediment	Metals, pesticides[d,e], PCBs, and pH
SW101[a]	RFSSW001	Marsh Portion of Subunit 2A	Surface Water	Metals[f] (including iron and potassium), pesticides[d,e] PCBs, pH, nitrogen, nitrate, phosphorus, total dissolved solids
SW102[a]	RFSSW002	Marsh Portion of Subunit 2A	Surface Water	Metals[e] (including iron and potassium), pesticides[d,e], PCBs, pH, nitrogen, nitrate, phosphorus, and total dissolved solids
SW103[a]	RFSSW003	Marsh Portion of Subunit 2A	Surface Water	Metals[f] (including iron and potassium), pesticides[d,e], PCBs, pH, nitrogen, nitrate, phosphorus, and total dissolved solids
SW104[a]	RFSSW004	Meeker Slough at Bay Trail	Surface Water	Metals[f], pesticides[d,e], PCBs, and pH
SW104[b]	RFSSTW009	Meeker Slough at Bay Trail	Stormwater	Metals[f], PCBs, and pH
STW105[b]	RFSSTW005	East Upland Storm Drain Outfall	Stormwater	Metals[f], PCBs, and pH
STW106[b]	RFSSTW006	West Upland Storm Drain Outfall	Stormwater	Metals[f], PCBs, and pH
STW107[b]	RFSSTW007	Concrete Drainage Outfall	Stormwater	Metals[f], PCBs, and pH
STW108[b]	RFSSTW008	Concrete Drainage Outfall	Stormwater	Metals[f], PCBs, and pH

Notes:

a Samples to be collected during an outgoing tide.

b Samples to be collected during the first fall rainfall event.

c Sequential numbers will be used for next rounds of sampling.

Notes (CONTINUED):

d If pesticides are not detected during the first round of sampling, they will be eliminated from future monitoring events.

e Pesticides include s-ethyl dipropylthiocarbamate (EPTC), butylate, vernolate, pebulate, molinate, cycloate, fonofos, napropamide, nitrobenzene-ds, 2-fluorobiphenyl and terphenyl-d14.

f Metals samples to be filtered in the laboratory.

PCB Polychlorinated biphenyl

APPENDIX A
CHAIN OF CUSTODY RECORDS

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Chain of Custody Record No. 8183

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Lab PO#: 065F31 to follow — Lab: Columbia Analytical

Project name: QAB-RFS Surface Water Mon — TtEMI technical contact: Sara Woolley — Field samplers: Audrey Lin, Arleen Mendoza

Project (CTO) number: 51518.003.8108.01 — TtEMI project manager: Leslie Lundgren — Field samplers' signatures:

Sample ID	Sample Location (Pt. ID)	Date	Time	Matrix	MS / MSD	No./Container Types: 40 ml VOA	1 liter Amber	500 ml Poly	Sleeve	Glass Jar	Preservative Added	Analysis Required: VOA	SVOA	PCBs/PCBs	Metals	TPH Purgeables	TPH Extractables	pesticides	DHT
RFSSED001	SED1Ø1 - Ø.Ø - Ø.5'	1Ø/3Ø/Ø6	Ø945	sediment					X					X	X			X	X
↓ ØØ2	SED1Ø2 - Ø.Ø - Ø.5'		1Ø3Ø	↓					X					X	X			X	X
↓ ØØ3	SED1Ø3 - Ø.Ø - Ø.5'	↓	Ø93Ø	surface water					X					X	X			X	X
RFSSWØØ1	SW1Ø1		Ø913				2											X	X
RFSSWØØ2	SW1Ø2		1Ø15				2											X	X
RFSSWØØ3	SW1Ø3		Ø945				2											X	X
RFSSWØØ4	SW1Ø4	↓	↓	↓			2											X	X

	Name (print)	Company Name	Date	Time
Relinquished by: Sara Woolley	Sara Woolley	TtEMI	1Ø/3Ø/Ø6	1345
Received by:				
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Turnaround time/remarks:
Pesticides to include EPTC, butylate, vernolate, pebulate, molinate, cycloate, Sonalan, napropamide, nitrobenzene-d5, 2-fluorobiphenyl, terphenyl-d14

Fed Ex #:

WHITE-Laboratory Copy YELLOW-Sample Tracker PINK-File Copy

02

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San Francisco Office

Chain of Custody Record No. 8184

Page 1 of 1

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Sara 14.1.06

Lab PO#: 065F30 ~~to follow~~

Lab: C+T

Project name: UCB – RFS Surface waters rcn

TtEMI technical contact: Sara Woolley

Field samplers: Audrey Lin, Aileen Mendoza

Project (CTO) number: 51518.003.8108

TtEMI project manager: Leslie Lundgren

Field samplers' signatures:

Sample ID	Sample Location (Pt. ID)	Date	Time	Matrix	MS / MSD	No./Container Types: 40 ml VOA	1 liter Amber	500 ml Poly	Sleeve	Glass Jar	Analysis Required: VOA	SVOA	Pest/PCBs	Metals – diss *	TPH Purgeables	TPH Extractables	Preservative Added: HCl	H2SO4	HNO3
RFSSW0001	SW101	10/31/06	0930	Surface Water									X	X		X	X	X	X
RFSSW0002	SW102		0945										X	X		X	X	X	X
RFSSW0003	SW103		1015										X	X		X	X	X	X
~~RFSSW0004~~	~~SW104~~																		
RFSSW0004	SW104		1015										X	X		X	X	X	X

	Name (print)	Company Name	Date	Time
Relinquished by: Sara Woolley	Sara Woolley	TtEMI	10/30/06	13:30
Received by: LaVanna Curtis	LaVanna Curtis	C+T	10/30/06	1:39pm
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Turnaround time/remarks:
* metals to be filtered in the lab

Fed Ex #: RCD Intact on ice

WHITE-Laboratory Copy YELLOW-Sample Tracker PINK-File Copy

9B.

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Chain of Custody Record No. 8218

Page 1 of 1

Lab PO#: 065830

Lab: C+T

Project name: UCB-RFS storm water

TtEMI technical contact: Sara Woolley

Field samplers: Aileen Mendoza (AM) Andrey Lin (AL)

Project (CTO) number: 5518.003. 81.98.01

TtEMI project manager: Leslie Lundgren

Field samplers' signatures:

Sample ID	Sample Location (Pt. ID)	Date	Time	Matrix	MS / MSD
RFSSTW001	STW105	11/02/06	1150	storm water	
002	STW106		1210		
003	STW107		1030		
004	STW108		1050		
005	STW104		1105		

No./Container Types

40 ml VOA	1 liter Amber	500 ml Poly	Sleeve	Glass Jar	250 mL poly
1	1	1			1
1	1	1			1
1	1	1			1
1	1	1			1
1	1				1

Preservative Added: None, None, None

Analysis Required

VOA	SVOA	Pest/PCBs	Metals	TPH Purgeables	TPH Extractables	O+G
	X	X	Diss*	X	X	X
	X	X		X	X	
	X	X		X	X	
	X	X		X	X	
	X	X		X	X	

	Name (print)	Company Name	Date	Time
Relinquished by:	A MENDOZA	TtEMI	11/2/06	1310
Received by:	Jack Lagram	C+T	11/02/06	1310
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Turnaround time/remarks: *Filter Metals in the Lab

RFSSTW003 pH SAMPLE IN A BLUE POLY

Fed Ex #: ONICE Intact

WHITE-Laboratory Copy YELLOW-Sample Tracker PINK-File Copy

APPENDIX B
WEATHER DATA

APPENDIX B: WEATHER DATA

Surface Water, Sediment and Stormwater Sampling Report, Richmond Field Station, Richmond, California

Date	Precipitation (inches)	Highest Temperature (^{o}F)	Lowest Temperature (^{o}F)
October 29, 2006	0.00	61	47
October 30, 2006	0.00	61	52
October 31, 2006	0.00	60	48
November 1, 2006	0.01	65	46
November 2, 2006	0.11	66	55

Note:

Weather data was obtained from “Monthly Local Weather Forecast for Richmond, CA (94804)” available online at weather.com .

APPENDIX C
LABORATORY ANALYTICAL RESULTS

TABLE C1: SUMMARY OF COMPLETE ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES

Richmond Field Station, Richmond, California

Sample Location ID	**SW101**	**SW102**	**SW103**	**SW104**
Sample ID	SW001	SW002	SW003	SW004
Sample Date	10/30/2006	10/30/2006	10/30/2006	10/30/2006
Matrix	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER
DISSOLVED METALS (ug/L)				
ALUMINUM	100 U	100 U	100 U	100 U
ANTIMONY	60.0 U	60.0 U	60.0 U	60.0 U
ARSENIC	15.0	15.0	18.0	9.1
BARIUM	38.0	54.0	41.0	43.0
BERYLLIUM	1.0 J	2.0 U	2.0 U	2.0 U
CADMIUM	5.0 U	5.0 U	5.0 U	5.0 U
CALCIUM	310,000	290,000	310,000	220,000
CHROMIUM	10.0 U	10.0 U	10.0 U	10.0 U
COBALT	20.0 U	20.0 U	20.0 U	20.0 U
COPPER	6.1 J	10.0 U	10.0 U	7.4 J
IRON	100 U	100 U	100 U	100 U
LEAD	3.0 U	2.7 UJ	3.0 U	3.0 U
MAGNESIUM	940,000	880,000	980,000	650,000
MANGANESE	930 J	2,600 J	1,200 J	86.0 J
MERCURY	0.13 UJ	0.20 U	0.20 U	0.20 U
MOLYBDENUM	20.0 U	20.0 U	20.0 U	20.0 U
NICKEL	20.0 U	20.0 U	20.0 U	20.0 U
POTASSIUM	320,000	230,000	260,000	180,000
SELENIUM	5.0 U	5.0 U	5.0 U	5.0 U
SILVER	3.2 J	5.0 U	5.0 U	5.0 U
SODIUM	7,000,000	6,900,000	7,900,000	5,100,000
THALLIUM	9.4 UJ	8.4 UJ	7.3 UJ	4.8 UJ
VANADIUM	10.0 U	10.0 U	10.0 U	10.0 U
ZINC	20.0 U	12.0 J	20.0 U	13.0 J
PESTICIDES (ug/L)				
4,4'-DDD	0.0008 U	0.0008 U	0.0008 U	0.0008 U
4,4'-DDE	0.0007 U	0.0007 U	0.0007 U	0.0007 U
4,4'-DDT	0.008 U	0.02 U	0.02 U	0.008 U
ALDRIN	0.0006 U	0.0006 U	0.0006 U	0.0006 U
ALPHA-BHC	0.0005 U	0.0005 U	0.0005 U	0.0005 U

Notes to table on page 4

TABLE C1: SUMMARY OF COMPLETE ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES (Continued)

Richmond Field Station, Richmond, California

Sample Location ID	**SW101**	**SW102**	**SW103**	**SW104**
Sample ID	SW001	SW002	SW003	SW004
Sample Date	10/30/2006	10/30/2006	10/30/2006	10/30/2006
Matrix	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER
PESTICIDES (ug/L)				
ALPHA-CHLORDANE	0.0006 U	0.0006 U	0.0006 U	0.0006 U
BETA-BHC	0.0008 U	0.0008 U	0.0008 U	0.0008 U
BUTYLATE	0.009 U	0.009 U	0.009 U	0.009 U
CHLORDANE	0.002 U	0.002 U	0.002 U	0.002 U
CYCLOATE	0.006 U	0.006 U	0.006 U	0.006 U
DELTA-BHC	0.0007 U	0.0007 U	0.0007 U	0.0007 U
DIELDRIN	0.0006 U	0.0006 U	0.0006 U	0.0006 U
ENDOSULFAN I	0.0008 U	0.0008 U	0.0008 U	0.0008 U
ENDOSULFAN II	0.0009 U	0.0009 U	0.0009 U	0.0009 U
ENDOSULFAN SULFATE	0.0006 U	0.0006 U	0.0006 U	0.0006 U
ENDRIN	0.003 U	0.003 U	0.003 U	0.003 U
ENDRIN ALDEHYDE	0.0009 U	0.0009 U	0.0009 U	0.0009 U
ENDRIN KETONE	0.005 U	0.005 U	0.005 U	0.005 U
EPTC	0.02 U	0.02 U	0.02 U	0.02 U
FONOFOS	0.5 U	0.5 U	0.5 U	0.5 U
GAMMA-BHC (LINDANE)	0.0008 U	0.0008 U	0.0008 U	0.0008 U
GAMMA-CHLORDANE	0.0008 U	0.0008 U	0.0008 U	0.0008 U
HEPTACHLOR	0.0005 U	0.0005 U	0.0005 U	0.0005 U
HEPTACHLOR EPOXIDE	0.0006 U	0.0006 U	0.0006 U	0.0006 U
METHOXYCHLOR	0.001 U	0.001 U	0.001 U	0.001 U
MOLINATE	0.01 U	0.01 U	0.01 U	0.01 U
NAPROPAMIDE	0.02 U	0.04 U	0.04 U	0.02 U
PEBULATE	0.008 U	0.008 U	0.008 U	0.008 U
TOXAPHENE	0.03 U	0.03 U	0.03 U	0.03 U
VERNOLATE	0.02 U	0.02 U	0.02 U	0.02 U
PCBs (ug/L)				
AROCLOR-1016	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR-1221	1 U	1 U	0.9 U	1 U
AROCLOR-1232	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR-1242	0.5 U	0.5 U	0.5 U	0.5 U

Notes to table on page 4

TABLE C1: SUMMARY OF COMPLETE ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES (Continued)

Richmond Field Station, Richmond, California

Sample Location ID	**SW101**	**SW102**	**SW103**	**SW104**
Sample ID	SW001	SW002	SW003	SW004
Sample Date	10/30/2006	10/30/2006	10/30/2006	10/30/2006
Matrix	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER
PCBs (ug/L)				
AROCLOR-1248	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR-1254	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR-1260	0.5 U	0.5 U	0.5 U	0.5 U
TOTAL PCBS	0 U	0 U	0 U	0 U
ANIONS AND SOLIDS (mg/L)				
NITRATE (AS N)	0.50 U	0.50 U	0.50 U	NA
NITRITE (AS N)	5.0 U	5.0 U	5.0 U	NA
pH				
PH	8.0	8.1	8.3	7.9
ANIONS AND SOLIDS (mg/L)				
TOTAL DISSOLVED SOLIDS	25,000	25,000	29,000	NA
TOTAL KJELDAHL NITROGEN (mg/L)				
TOTAL KJELDAHL NITROGEN	0.6	3	1	NA
PHOSPHORUS (mg/L)				
PHOSPHORUS	0.3	0.7	0.6	NA

Notes to table on page 4

TABLE C1: SUMMARY OF COMPLETE ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES (Continued)

Richmond Field Station, Richmond, California

Notes:	Inorganic results less than 10 are reported to two significant figures, and results greater than 10 are reported to three significant figures.
	Organic results less than 10 are reported to one significant figure, and results greater than 10 are reported to two significant figures.
ug/L	Micrograms per liter
BHC	Hexachlorocyclohexane
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethene
DDT	Dichlorodiphenyltrichloroethane
ID	Identification
J	Estimated value
mg/L	Milligrams per liter
NA	Not analyzed
PCB	Polychlorinated biphenyl
U	Not detected at given detection limit

TABLE C2: SUMMARY OF COMPLETE ANALYTICAL RESULTS FOR SEDIMENT SAMPLES
Richmond Field Station, Richmond, California

Sample Location ID	**SED101**	**SED102**	**SED103**
Sample Depth (feet bgs)	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5
Sample Date	10/30/2006	10/30/2006	10/30/2006
Matrix	SEDIMENT	SEDIMENT	SEDIMENT
METALS (mg/kg)			
ALUMINUM	30,300	33,900	28,100
ANTIMONY	0.47	0.23	0.26
ARSENIC	36.6	11.2	19.8
BARIUM	125	73.8	70.9
BERYLLIUM	0.56	0.70	0.64
CADMIUM	0.75	0.45	0.79
CALCIUM	4,930	3,900	3,270
CHROMIUM	87.4	103	90.5
COBALT	14.5	18.7	16.4
COPPER	148	94.2	133
IRON	47,200	48,800	42,900
LEAD	45.8	32.6	45.6
MAGNESIUM	13,200	15,800	13,600
MANGANESE	470	877	519
MERCURY	2.3	0.51	1.6
MOLYBDENUM	0.92	0.56	0.80
NICKEL	79.6	107	91.6
POTASSIUM	4,740	4,500	3,810
SELENIUM	2.0	1.2	2.0
SILVER	0.38	0.33	0.43
SODIUM	11,500	9,570	9,510
THALLIUM	0.22	0.18	0.21
VANADIUM	83.2	92.3	80.2
ZINC	265	167	225
PESTICIDES (mg/kg)			
4,4'-DDD	0.002 U	0.002 U	0.002 U
4,4'-DDE	0.008	0.0007 U	0.0007 U
4,4'-DDT	0.007	0.002 U	0.002 U
ALDRIN	0.002 U	0.001 U	0.001 U
ALPHA-BHC	0.0004 U	0.0004 U	0.0004 U

Notes to table on page 4

TABLE C2: SUMMARY OF COMPLETE ANALYTICAL RESULTS FOR SEDIMENT SAMPLES (Continued)
Richmond Field Station, Richmond, California

Sample Location ID	**SED101**	**SED102**	**SED103**
Sample Depth (feet bgs)	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5
Sample Date	10/30/2006	10/30/2006	10/30/2006
Matrix	SEDIMENT	SEDIMENT	SEDIMENT
PESTICIDES (mg/kg)			
ALPHA-CHLORDANE	0.002 U	0.002 U	0.002 U
BETA-BHC	0.002 U	0.002 U	0.002 U
BUTYLATE	0.005 U	0.005 U	0.005 U
CHLORDANE	0.02 U	0.02 U	0.02 U
CYCLOATE	0.005 U	0.005 U	0.005 U
DELTA-BHC	0.002 U	0.002 U	0.002 U
DIELDRIN	0.0003 U	0.0003 U	0.0003 U
ENDOSULFAN I	0.0004 U	0.0004 U	0.0004 U
ENDOSULFAN II	0.0005 U	0.0005 U	0.0005 U
ENDOSULFAN SULFATE	0.0007 U	0.0007 U	0.0007 U
ENDRIN	0.0004 U	0.0004 U	0.0004 U
ENDRIN ALDEHYDE	0.0005 U	0.0005 U	0.0005 U
ENDRIN KETONE	0.0004 U	0.0004 U	0.0004 U
EPTC	0.005 U	0.005 U	0.005 U
FONOFOS	0.03 U	0.03 U	0.03 U
GAMMA-BHC (LINDANE)	0.001 U	0.001 U	0.001 U
GAMMA-CHLORDANE	0.0005 U	0.0005 U	0.0005 U
HEPTACHLOR	0.0005 U	0.0004 U	0.0004 U
HEPTACHLOR EPOXIDE	0.0008 U	0.0008 U	0.0008 U
METHOXYCHLOR	0.002 U	0.002 U	0.002 U
MIREX	0.0004 U	0.0004 U	0.0004 U
MOLINATE	0.005 U	0.005 U	0.005 U
NAPROPAMIDE	0.005 U	0.005 U	0.005 U
PEBULATE	0.005 U	0.005 U	0.005 U
TOXAPHENE	0.04 U	0.04 U	0.04 U
VERNOLATE	0.005 U	0.005 U	0.005 U
PCBs (mg/kg)			
AROCLOR-1016	0.01 U	0.01 U	0.01 U
AROCLOR-1221	0.03 U	0.03 U	0.03 U
AROCLOR-1232	0.02 U	0.02 U	0.02 U

Notes to table on page 4

TABLE C2: SUMMARY OF COMPLETE ANALYTICAL RESULTS FOR SEDIMENT SAMPLES (Continued)
Richmond Field Station, Richmond, California

Sample Location ID	**SED101**	**SED102**	**SED103**
Sample Depth (feet bgs)	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5
Sample Date	10/30/2006	10/30/2006	10/30/2006
Matrix	SEDIMENT	SEDIMENT	SEDIMENT
PCBs (mg/kg)			
AROCLOR-1242	0.007 U	0.007 U	0.007 U
AROCLOR-1248	0.04 U	0.04 U	0.04 U
AROCLOR-1254	0.009 U	0.009 U	0.009 U
AROCLOR-1260	0.01 U	0.01 U	0.01 U
pH			
PH	7.4	7.3	7.3

Notes to table on page 4

TABLE C2: SUMMARY OF COMPLETE ANALYTICAL RESULTS FOR SEDIMENT SAMPLES (Continued)

Richmond Field Station, Richmond, California

Notes:	Inorganic results less than 10 are reported to two significant figures, and results greater than 10 are reported to three significant figures.
	Organic results less than 10 are reported to one significant figure, and results greater than 10 are reported to two significant figures.
bgs	Below ground surface
BHC	Hexachlorocyclohexane
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethene
DDT	Dichlorodiphenyltrichloroethane
ID	Identification
J	Estimated value
mg/kg	Milligrams per kilogram
PCB	Polychlorinated biphenyl
U	Not detected at given detection limit

TABLE C3: SUMMARY OF COMPLETE ANALYTICAL RESULTS FOR STORMWATER SAMPLES

Richmond Field Station, Richmond, California

Sample Location ID	**STW104**	**STW105**	**STW106**	**STW107**	**STW108**
Sample ID	STW005	STW001	STW002	STW003	STW004
Sample Date	11/02/2006	11/02/2006	11/02/2006	11/02/2006	11/02/2006
Matrix	STORMWATER	STORMWATER	STORMWATER	STORMWATER	STORMWATER
DISSOLVED METALS (ug/L)					
ALUMINUM	100 U	420	33.0 J	100 U	100 U
ANTIMONY	60.0 U	60.0 U	60.0 U	60.0 U	60.0 U
ARSENIC	6.3	1.2 J	5.0 U	5.0 U	3.3 J
BARIUM	32.0	82.0	17.0	22.0	38.0
BERYLLIUM	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
CADMIUM	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
CALCIUM	180,000	15,000	11,000	11,000	76,000
CHROMIUM	10.0 U	3.4 J	10.0 U	10.0 U	10.0 U
COBALT	20.0 U	2.3 J	20.0 U	20.0 U	20.0 U
COPPER	9.9 J	23.0	58.0	13.0	14.0
IRON	40.0 J	730	89.0 J	64.0 J	66.0 J
LEAD	3.0 U	2.6 J	3.0 U	3.0 U	3.0 U
MAGNESIUM	550,000	3,800	12,000	8,300	220,000
MANGANESE	88.0	590	64.0	25.0	75.0
MERCURY	0.08 J	0.26	0.03 J	0.20 U	0.03 J
MOLYBDENUM	4.6 J	20.0 U	24.0	2.2 J	3.6 J
NICKEL	4.7 J	13.0 J	4.1 J	3.5 J	6.8 J
POTASSIUM	170,000	5,400	5,200	3,800	71,000
SELENIUM	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
SILVER	1.5 J	5.0 U	5.0 U	5.0 U	5.0 U
SODIUM	4,300,000	13,000	110,000	50,000	1,700,000
THALLIUM	7.7	5.0 U	5.0 U	5.0 U	6.0
VANADIUM	10.0 U	4.8 J	10.0 U	3.2 J	2.6 J
ZINC	38.0	470	240	60.0	87.0
PCBs (ug/L)					
AROCLOR-1016	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR-1221	1 U	1 U	1 U	1 U	1 U
AROCLOR-1232	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR-1242	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR-1248	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Notes to table on page 3

TABLE C3: SUMMARY OF COMPLETE ANALYTICAL RESULTS FOR STORM WATER SAMPLES (Continued)

Richmond Field Station, Richmond, California

Sample Location ID	**STW104**	**STW105**	**STW106**	**STW107**	**STW108**
Sample ID	STW005	STW001	STW002	STW003	STW004
Sample Date	11/02/2006	11/02/2006	11/02/2006	11/02/2006	11/02/2006
Matrix	STORMWATER	STORMWATER	STORMWATER	STORMWATER	STORMWATER
PCBs (ug/L)					
AROCLOR-1254	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR-1260	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TOTAL PCBS	0 U	0 U	0 U	0 U	0 U
pH					
PH	7.7	6.5	6.9	7.1	7.5

Notes to table on page 3

TABLE C3: SUMMARY OF COMPLETE ANALYTICAL RESULTS FOR STORM WATER SAMPLES (Continued)

Richmond Field Station, Richmond, California

Notes:	Inorganic results less than 10 are reported to two significant figures, and results greater than 10 are reported to three significant figures.
	Organic results less than 10 are reported to one significant figure, and results greater than 10 are reported to two significant figures.
ug/L	Micrograms per liter
bgs	Below ground surface
ID	Identification
J	Estimated value
PCB	Polychlorinated biphenyl
U	Not detected at given detection limit