

**Analysis of Metals in Water, Stream Sediments and Floodplain Soils
Collected June 3-4, 2002 from the Bayou Creek System**

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INTRODUCTION

Water, stream sediments, and floodplain soils were collected for metal analyses from Big and Little Bayou Creeks on June 3-4, 2002. The reference station at the west fork of Massac Creek (MC) also was sampled. Water samples were taken from 12 stations on Big Bayou Creek, which included a new station (BBU) located upstream of BB1A; five stations from Little Bayou Creek; and effluents 006 and 010+011. Stream sediments and floodplain soils were taken from Massac creek, 11 sites on Big Bayou Creek (stations BB1A through BB9) and 5 sites from Little Bayou Creek (stations LB2A through LB4). Two sediment samples per station were collected for metal assays. A total of 28 metals (*i.e.* Ag, Al, As, B, Ba, Be, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Se, Sn, Sr, Ti, Tl, V, and Zn) were determined for these samples.

METHODS

Water Collection

Samples for water quality measurements were collected in 1-L "Cubitainer" receptacles and were placed on ice until delivery to the laboratory. Water samples for metal assays were collected in acid-cleaned 250-mL polyethylene bottles. Samples were preserved with concentrated HNO₃ upon collection and analyzed for total recoverable (TR) metals.

Sediments and Floodplain Soils Collection

Stream sediment samples were restricted to the upper 5-10 cm of sediment soil, including depositional areas when found. Floodplain soils were collected within 10 m of the shoreline (5-10 cm deep) in areas where flood debris was present. Any surface vegetation

was removed prior to sampling floodplain soils. All sediment and floodplain samples were collected in acetone-rinsed 0.47 L glass jars with Teflon-lined lids. Stainless steel spoons and scoops used for collections were acetone-rinsed between sampling stations.

Water Quality

On-site water quality measurements, which included temperature, pH, dissolved oxygen, and conductivity, were taken with a YSI 650 MDS meter and a YSI 600 QS multi-parameter sonde. Alkalinity and hardness was measured according to procedures described by APHA (1995), for bromocresol green-methyl red titrimetric and EDTA titrimetric procedures, respectively.

Metal Digestions and Determinations

Acidified water samples were analyzed directly for total recoverable (TR) metals. Sediment and floodplain soil samples were digested according to procedures described in EPA Method 3050B and ASTM Method D 3974-81 (U.S. EPA, 1997 and ASTM, 1989) and previously described by Birge and Price (2002). Metal analysis was performed using a Varian Vista-MPX simultaneous Inductively Coupled Plasma-Optical Emission Spectrophotometer (ICP-OES) and a Varian Model Spectra AA-20 graphite furnace Atomic Absorption Spectrophotometer (AAS) as described by U.S. EPA (1997). All gases used were ultra pure carrier grade. Calibration curves were based on at least five standards. Instrument blanks (0.5 % HNO₃) and check standards were processed with all samples. Sample concentrations were then corrected for deviations from the standards and sample weights were factored into the calculations of final values.

Quality Assurance

Permanent bench records were kept of all assays and annotated as required under Good Laboratory Practices (*Federal Register*, 1989). All printouts and graphic recordings were filed and are open for inspection. These bench records will be archived within two years after the close of the project but retrievable upon request. Chain of Custody was maintained for all samples collected.

RESULTS

General Water Quality

The results for general water quality parameters are given in Table 1. Overall, pH values were within the preferred range of 6.5-8.5. Conductivity ranged from 137.5 to 1011.0 $\mu\text{S}/\text{cm}$ and was highest at BB6 and BB7. The latter was attributed to electrolytes contained in the 001 effluent. Alkalinity was in the "moderate" range and varied from 20 to 32 mg CaCO_3/L in Big Bayou Creek and 28 to 36 mg CaCO_3/L in Little Bayou Creek. Hardness ranged from 48 to 244 mg CaCO_3/L and 92 to 124 mg CaCO_3/L for Big and Little Bayou Creeks, respectively. Hardness levels were highest for stations BB6, BB7 and BB8.

Metals in Big Bayou Creek

Metal concentrations in water samples from Big Bayou Creek are presented in Table 2. Results for metal concentrations of individual assays of sediment and floodplain samples are given in Tables A1 and A2, whereas mean metal concentrations are given in Tables 3 and 4. Comparisons between water, sediment, and floodplain soil concentrations are represented graphically in Figures 1 through 16.

Silver was not detected in water samples from Big Bayou Creek at sites upstream of

BB5 (Table 2; Fig. 1 and 2). Downstream of BB5, Ag in water decreased from 1.28 to 0.40 µg/L. Mean sediment Ag values were highest at station BB4 (0.097 µg/g), then decreased downstream, but were second highest at BB9 (0.081 µg/g) (Table 3; Fig. 1). Mean concentrations of Ag in the floodplain samples ranged from 0.025 to 0.082 µg/L and did not vary considerably throughout Big Bayou Creek (Table 4; Fig. 2).

Mean concentrations of Al in water were highest for station BBU, BB2, and BB9. Stations BB6 and BB9 had the highest sediment Al concentrations at 3.85 and 5.51 µg/L, respectively. Aluminum values ranged from 0.84 to 5.51 µg/g in the sediments and from 2.24 to 5.64 in the floodplain soils. Levels of Be were observed at BB4 and stations downstream of BB5. The highest Be in water was at station BB6 (2.40 µg/L), however, Be was not detected in sediments and floodplain soils in Big Bayou Creek. As with Ag and Be, concentrations of Cd, Cu, K, and Pb in water were elevated at BB6. Sediment Cd levels ranged from 0.40 to 1.26 µg/g, and were highest at BB4 (Fig. 3). Floodplain Cd levels remained fairly constant and ranged from 0.41 to 1.98 µg/g (Fig. 4).

Concentrations of Cu in the water increased steadily downstream of station BB2, with the highest level occurring at station BB6 (6.54 µg/L). Sediment Cu peaked at stations BB6 and BB9, with concentrations of 4.66 and 5.35 µg/g, respectively (Tables 2 and 3; Fig. 5). Cu in floodplain soils was highest at MC and BB3 with values of 27.27 and 18.22 µg/g. Values at all other stations ranged from 6.01 to 9.05 and did not vary considerably (Table 4; Fig. 6). Cr was not detected in any of the water samples, however Cr was detected in the sediment and floodplain samples. In sediments, Cr ranged from 4.20 to 32.18 µg/g where it peaked at station BB4 (Fig. 7). As with Cu and Cr, concentrations in floodplain soils peaked at station MC and BB3, but otherwise were constant throughout the stream

(Fig. 8).

Concentration of Fe in water peaked at station BB2A (1.66 $\mu\text{g}/\text{mL}$), which may be due to runoff from the landfill. Sediment Fe ranged from 3.91 to 11.69 $\mu\text{g}/\text{Kg}$ with station BB4 being the highest (Fig. 9). Floodplain Fe concentrations ranged from 1.27 to 5.35 $\mu\text{g}/\text{Kg}$ and station BB2 had the highest levels (Fig. 10). Ni concentrations in water were not detected at stations upstream of BB5, however, Ni was found in the water downstream of BB5, with stations BB6 and BB7 having the highest Ni levels (18.29 and 18.33 $\mu\text{g}/\text{L}$). Ni in the sediments ranged from 1.34 to 5.57 $\mu\text{g}/\text{g}$ and was highest for BB9 (Fig. 11), whereas Ni in floodplain soils ranged from 1.48 to 6.14 $\mu\text{g}/\text{g}$ and was highest at MC and BB2 (6.14 and 5.03 $\mu\text{g}/\text{g}$) (Fig. 12).

Water and sediment Pb concentrations were highest at BB6, at 2.62 $\mu\text{g}/\text{L}$ and 9.31 $\mu\text{g}/\text{g}$, respectively (Table 2 and 3; Fig. 13). Sediment Pb levels were second highest for station BB4 (8.22 $\mu\text{g}/\text{g}$). Floodplain concentrations of Pb ranged from 4.12 to 9.80 $\mu\text{g}/\text{g}$ and were fairly constant as compared to the reference stations (Fig. 14). Water concentrations of Zn demonstrated an increasing downstream trend that peaked at station BB7 (7.98 $\mu\text{g}/\text{L}$) (Fig. 15). Sediment Zn was highest at BB9 (25.88 $\mu\text{g}/\text{g}$) and second highest at BB6 (15.20 $\mu\text{g}/\text{g}$) (Table 3; Fig. 15). Floodplain concentrations of Zn were fairly constant with the exception of BB2, which had concentrations of 35.02 $\mu\text{g}/\text{g}$ (Table 4; Fig. 16).

Overall, concentrations of metals at station BB5 were suppressed. In several cases, BB4 contained the highest metal levels which was followed by a decrease at BB5, and increases at downstream stations. This may be due to increased outfall from effluent 006 that caused a dilution at station BB5.

Metals in Little Bayou Creek

Results for mean metal concentrations in water, sediments, and floodplain soils are given in Tables 5, 6, and 7, respectively. Individual metal assays for sediments and floodplain soils are presented in Tables A3 and A4. The metals Ag, As, Co, Li, Mo, Sb, Se, Sn, Tl, and V were not detected in the water samples at any of the Little Bayou Creek stations (Table 5). Sediment Ag ranged from 0.023 to 0.073 $\mu\text{g/g}$ and was highest at LB2A. Be was detected in the water, ranging from 1.07 to 1.65 $\mu\text{g/L}$. However, Be was not found in any of the sediment or floodplain soil samples. Water Cd ranged from 0.63 to 1.04 $\mu\text{g/L}$ and was highest at station LB2A. Cd concentrations were highest at LB3 for sediments and floodplain soil samples, at 1.98 and 0.84 $\mu\text{g/g}$, respectively. Water Cr was only detected at stations LB4 and effluent 010+011 at 2.41 and 1.43 $\mu\text{g/L}$, respectively. Sediment Cr levels increased downstream of LB2 and peaked at station LB4 (80.24 $\mu\text{g/L}$). Floodplain Cr levels were highest at station LB2A (93.59 $\mu\text{g/L}$) which may represent a possible reservoir for this metal.

Water Cu levels ranged from 1.33 to 2.06 $\mu\text{g/L}$ but did not vary considerably. Sediment Cu levels ranged from 2.79 to 6.66 $\mu\text{g/g}$ with station LB3 having the highest contamination. Overall floodplain concentrations were higher than those for sediments. Floodplain soil Cu ranged from 5.38 to 95.55 $\mu\text{g/g}$, with station LB2A having the highest value. Ni concentrations in water ranged from 2.82 to 9.36 $\mu\text{g/L}$. The levels of Ni were highest at station LB2A for water and sediment samples. Floodplain Ni concentrations ranged from 3.44 to 5.38 $\mu\text{g/g}$. The levels of Pb in water did vary considerably and ranged from 1.50 to 1.85 $\mu\text{g/L}$, with effluent 010+011 having the highest concentrations. As with Ni, sediment Pb values were highest at LB2A and LB3 (18.82 and 12.96 $\mu\text{g/g}$) and also were elevated at LB3 for floodplain soils (9.54 $\mu\text{g/g}$).

Water levels of Zn were very high at station LB1 (698.45 µg/L). This sample was retested with similar results. Previous studies by Birge and Price (2001) did not demonstrate this high result, which indicated a possible problem with the sample. Additional sampling will be undertaken during the next collection. Zn was second highest at effluent 010+011 for both water (3.18 µg/L) and sediments (33.00 µg/g), indicating that there is inflow of Zn from these combined effluents. The floodplain Zn concentrations were somewhat elevated as compared to the reference site and were highest at station LB2A (37.96 µg/g).

CONCLUSIONS

Results presented in this study support the conclusion that metal contamination is widespread in the Bayou Creek system. In some cases, water concentrations of certain metals may be sufficient to exert toxicity to aquatic biota. One example is Ag, which occurred at concentrations of 0.40 to 1.28 µg/L at and below BB6 (Table 2). The chronic toxicity threshold for Ag has been reported to be as low as 0.20 µg/L in freshwater (Wood *et al.*, 2002). Other metals of possible concern include Cd, Cu, Ni, and Pb (Figures 1, 3, 5, 11, and 13). These and other metals generally were at highest concentrations at station BB6 and BB7, presumably due to outfall from effluent 001.

Comparisons between earlier years and June 2002 for six important metals analyzed at station BB6 on Big Bayou Creek are given in Table 8. Mean values for Cd, Cu, Ni, and Pb were about 2 to 4 times less in 1987-91 than reported for June 2002. These and other data indicate significant increases in metal pollution in 1997 and June 2002, compared with the early studies. It should be noted that significant ecological

impact was observed at station BB6 in the early studies (Birge *et al.*, 1992). Moreover, chronic toxicity tests performed on effluent 001, which discharges into Big Bayou Creek just upstream from station BB6, was found to produce statistically significant chronic toxicity in 6 of 19 tests (Birge *et al.*, 1992, page 83). In addition to these metals, there is concern for Ag, as noted above, and possibly for such elements as Boron (B) and Lithium (Li) which are known to be toxic and teratogenic to early life stages. Values reported in Table 2 for B and Li ($\mu\text{g/L}$) were 497.0 and 12.9 at station BB6.

Despite elevated water hardness at BB6 effects on aquatic biota are possible. This is most likely to result from the combined effects of metal mixtures, as noted by Birge *et al.* (2000). It is recommended that State personnel compare the reported results against their standards for water quality and other information. Use of a metal additivity model may be appropriate. We look forward to discussing this report at our next meeting. As noted above, result of individual assays are given in the Appendix.

Table 1. Water quality results for stream water samples from the Bayou Creek system collected June 3-4, 2002.

Station	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (mg/L)	Alkalinity (mg CaCO ₃ /L)	Hardness (mg CaCO ₃ /L)
MC	25.69	6.79	137.5	8.8	20	48
BB1A	25.24	7.34	241.4	7.7	32	60
BB1	24.28	7.45	242.5	8.2	28	56
BB2	23.50	7.13	230.0	7.8	28	60
BB2A	28.74	7.44	273.8	9.0	28	72
BB3	29.68	7.53	276.0	8.6	28	80
BB4	28.89	7.49	308.0	8.0	24	80
BB5	29.74	7.57	279.1	7.6	28	96
BB6	30.07	7.54	1007.0	8.6	24	240
BB7	29.87	7.40	1011.0	8.4	28	232
BB8	29.26	7.40	289.0	8.5	28	244
BB9	27.01	7.12	690.8	8.4	28	172
LB1	23.17	7.52	269.0	8.7	36	124
LB2	26.38	7.34	360.8	8.8	28	96
LB3	25.24	7.53	377.3	8.0	32	104
LB4	27.33	7.47	373.1	8.4	32	92

Table 2. Metal concentrations in water samples from Massac Creek (MC) and Big Bayou Creek collected June 3-4, 2002.

Station	Date	Sample	Water Metal Conc. (µg/L)							
			Ag	Al	As	B	Ba	Be	Ca	Cd
MC	06/03/02	MWS1	<0.25	79.92	<10.00	352.19	45.24	<0.25	9490.95	<0.25
BBU ¹	06/03/02	MWS1	<0.25	930.22	<10.00	310.58	183.96	0.79	16871.50	0.28
BB1A	06/03/02	MWS1	<0.25	90.78	<10.00	309.75	46.99	<0.25	13097.92	<0.25
BB1	06/03/02	MWS1	<0.25	97.94	<10.00	308.39	48.55	<0.25	13536.25	<0.25
BB2	06/03/02	MWS1	<0.25	395.39	<10.00	439.67	69.69	<0.25	13549.27	<0.25
BB2A	06/03/02	MWS1	<0.25	198.05	<10.00	662.78	40.88	<0.25	20227.89	<0.25
BB3	06/03/02	MWS1	<0.25	172.65	<10.00	499.38	40.86	<0.25	19639.98	<0.25
BB4	06/03/02	MWS1	<0.25	230.85	<10.00	596.98	35.42	0.31	19427.74	<0.25
006	06/03/02	MWS1	<0.25	<50.00	<10.00	285.43	17.12	0.45	20437.49	0.27
BB5	06/03/02	MWS1	<0.25	300.80	<10.00	547.32	22.19	<0.25	20391.20	<0.25
BB6	06/03/02	MWS1	1.28	273.57	<10.00	497.02	27.76	2.40	34235.84	0.67
BB7	06/03/02	MWS1	1.17	287.66	<10.00	701.73	37.11	2.35	40871.41	0.71
BB8	06/03/02	MWS1	0.95	179.48	<10.00	589.26	62.89	1.91	41043.82	0.69
BB9	06/03/02	MWS1	0.40	371.39	<10.00	495.43	78.42	1.28	32935.91	0.42

¹ Station BBU was collected upstream of station BB1A.

Table 2, continued. Metal concentrations in water samples from Massac Creek (MC) and Big Bayou Creek collected June 3-4, 2002.

Station	Date	Sample	Water Metal Conc. (µg/L)							
			Co	Cr	Cu	Fe	K	Li	Mg	Mn
MC	06/03/02	MWS1	<10.00	<1.00	<1.00	41.91	3447.58	<10.00	2549.39	16.59
BBU ¹	06/03/02	MWS1	<10.00	<1.00	3.57	1655.90	3500.89	<10.00	3738.59	922.85
BB1A	06/03/02	MWS1	<10.00	<1.00	<1.00	175.89	3873.78	<10.00	3108.94	130.93
BB1	06/03/02	MWS1	<10.00	<1.00	<1.00	256.96	3985.50	<10.00	3150.15	159.13
BB2	06/03/02	MWS1	<10.00	<1.00	1.19	560.23	3854.56	<10.00	3101.24	278.08
BB2A	06/03/02	MWS1	<10.00	<1.00	0.97	1655.82	4508.01	9.54	4711.90	232.76
BB3	06/03/02	MWS1	<10.00	<1.00	1.00	577.07	4209.16	<10.00	4393.92	79.61
BB4	06/03/02	MWS1	<10.00	<1.00	2.16	139.45	3928.65	<10.00	4977.24	28.78
006	06/03/02	MWS1	<10.00	<1.00	1.52	<10.00	3135.41	<10.00	6409.01	<10.00
BB5	06/03/02	MWS1	<10.00	<1.00	1.92	311.31	3403.02	<10.00	6210.05	36.20
BB6	06/03/02	MWS1	<10.00	<1.00	6.54	215.97	15489.23	12.89	11274.50	50.40
BB7	06/03/02	MWS1	<10.00	<1.00	5.94	110.20	22617.68	12.55	13139.43	24.09
BB8	06/03/02	MWS1	<10.00	<1.00	5.04	162.87	21715.78	11.80	12999.62	84.65
BB9	06/03/02	MWS1	<10.00	<1.00	3.03	1161.45	13582.55	<10.00	10295.75	663.22

¹ Station BBU was collected upstream of station BB1A.

Table 2, continued. Metal concentrations in water samples from Massac Creek (MC) and Big Bayou Creek collected June 3-4, 2002.

Station	Date	Sample	Water Metal Conc. (µg/L)							
			Mo	Na	Ni	P	Pb	Sb	Se	Sn
MC	06/03/02	MWS1	<10.00	7396.33	<3.00	<50.00	<1.00	<10.00	<10.00	<10.00
BBU ¹	06/03/02	MWS1	<10.00	37648.43	7.04	178.06	3.00	<10.00	<10.00	<10.00
BB1A	06/03/02	MWS1	<10.00	24892.37	<3.00	56.45	<1.00	<10.00	<10.00	<10.00
BB1	06/03/02	MWS1	<10.00	24355.80	<3.00	51.21	<1.00	<10.00	<10.00	<10.00
BB2	06/03/02	MWS1	<10.00	21369.96	<3.00	68.85	<1.00	<10.00	<10.00	<10.00
BB2A	06/03/02	MWS1	<10.00	19856.34	<3.00	63.71	<1.00	<10.00	<10.00	<10.00
BB3	06/03/02	MWS1	<10.00	19339.68	<3.00	51.27	<1.00	<10.00	<10.00	<10.00
BB4	06/03/02	MWS1	<10.00	24736.38	<3.00	195.76	<1.00	<10.00	<10.00	<10.00
006	06/03/02	MWS1	<10.00	15209.41	<3.00	<50.00	<1.00	<10.00	<10.00	<10.00
BB5	06/03/02	MWS1	<10.00	16151.54	<3.00	<50.00	<1.00	<10.00	<10.00	<10.00
BB6	06/03/02	MWS1	<10.00	67938.14	18.29	124.49	2.62	<10.00	<10.00	<10.00
BB7	06/03/02	MWS1	<10.00	92014.29	18.33	153.44	2.13	<10.00	<10.00	<10.00
BB8	06/03/02	MWS1	<10.00	90028.02	17.55	102.14	2.43	<10.00	<10.00	<10.00
BB9	06/03/02	MWS1	<10.00	60559.13	6.07	101.28	1.99	<10.00	<10.00	<10.00

¹ Station BBU was collected upstream of station BB1A.

Table 2, continued. Metal concentrations in water samples from Massac Creek (MC) and Big Bayou Creek collected June 3-4, 2002.

Station	Date	Sample	Water Metal Conc. (µg/L)				
			Sr	Ti	Tl	V	Zn
MC	06/03/02	MWS1	72.75	<10.00	<10.00	<10.00	1.47
BBU ¹	06/03/02	MWS1	132.04	<10.00	<10.00	<10.00	16.26
BB1A	06/03/02	MWS1	90.81	<10.00	<10.00	<10.00	0.37
BB1	06/03/02	MWS1	96.15	<10.00	<10.00	<10.00	1.29
BB2	06/03/02	MWS1	160.45	<10.00	<10.00	<10.00	3.87
BB2A	06/03/02	MWS1	201.69	<10.00	<10.00	<10.00	1.75
BB3	06/03/02	MWS1	213.21	<10.00	<10.00	<10.00	6.15
BB4	06/03/02	MWS1	199.31	<10.00	<10.00	<10.00	2.20
006	06/03/02	MWS1	123.31	<10.00	<10.00	<10.00	<1.00
BB5	06/03/02	MWS1	132.75	<10.00	<10.00	<10.00	4.85
BB6	06/03/02	MWS1	178.23	<10.00	<10.00	<10.00	6.07
BB7	06/03/02	MWS1	231.99	<10.00	<10.00	<10.00	7.98
BB8	06/03/02	MWS1	246.73	<10.00	<10.00	<10.00	2.61
BB9	06/03/02	MWS1	190.18	<10.00	<10.00	<10.00	4.25

¹ Station BBU was collected upstream of station BB1A.

Table 3. Mean metal values in sediments from Massac Creek (MC) and Big Bayou Creek collected June 3-4, 2002.

Station	Sediment Metal Conc. (µg/g)													
	Ag	Al	As	B	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	K	Li
MC	0.061	1197.47	3.42	24.44	24.48	N.D.	82.16	0.64	3.65	9.91	1.41	7398.46	61.13	0.20
BB1A	0.033	1232.88	N.D.	22.94	16.12	N.D.	114.43	0.40	2.39	5.75	1.15	5293.92	63.70	0.26
BB1	0.022	1153.09	N.D.	28.17	16.15	N.D.	225.74	0.28	N.D.	4.20	1.00	3913.94	63.36	0.28
BB2	0.047	1646.54	3.63	31.22	18.38	N.D.	241.13	0.82	3.51	14.54	1.90	9482.97	81.06	0.27
BB2A	0.049	1092.81	2.79	32.06	17.23	N.D.	184.78	0.56	2.86	9.07	1.33	6986.58	51.54	0.03
BB3	0.048	1412.78	N.D.	30.69	18.97	N.D.	162.90	0.68	3.16	8.84	1.48	7850.89	56.59	0.39
BB4	0.097	1487.04	4.88	28.63	32.63	N.D.	177.69	1.26	7.64	32.18	2.25	11692.51	63.00	0.26
BB5	0.036	857.35	2.94	22.69	9.86	N.D.	116.43	0.47	1.87	9.55	1.12	5673.91	38.51	0.13
BB6	0.066	3846.35	2.98	33.44	28.73	N.D.	690.34	0.75	3.42	13.62	4.66	8783.47	230.12	2.38
BB7	0.046	1426.39	3.24	32.14	13.61	N.D.	178.43	1.02	2.83	24.75	2.07	10966.41	62.37	0.15
BB8	0.037	838.30	4.29	26.83	10.65	N.D.	58.90	0.64	2.36	16.82	1.43	7331.90	44.53	N.D.
BB9	0.081	5512.20	N.D.	29.55	49.67	N.D.	1465.48	0.81	5.04	8.94	5.35	8821.55	518.03	6.94



Table 3, continued. Mean metal values in sediments from Massac Creek (MC) and Big Bayou Creek collected June 3-4, 2002.

Station	Sediment Metal Conc. ($\mu\text{g/g}$)													
	Mn	Mo	Na	Ni	P	Pb	Sb	Se	Sn	Sr	Ti	Tl	V	Zn
MC	387.35	0.25	N.D.	1.81	137.74	5.10	N.D.	N.D.	0.23	1.15	27.24	N.D.	12.35	5.09
BB1A	81.20	N.D.	55.89	1.34	92.81	3.72	N.D.	N.D.	N.D.	1.32	23.06	N.D.	9.34	4.85
BB1	N.D.	N.D.	72.51	1.20	47.95	2.96	N.D.	N.D.	N.D.	1.64	21.79	N.D.	7.00	3.88
BB2	N.D.	N.D.	95.64	2.41	191.61	5.48	N.D.	N.D.	0.27	1.92	28.16	N.D.	18.49	8.28
BB2A	97.09	N.D.	66.68	1.71	119.63	4.32	N.D.	N.D.	0.27	1.77	21.15	N.D.	12.64	5.97
BB3	206.26	N.D.	53.96	1.90	94.81	3.47	N.D.	N.D.	0.21	2.20	18.44	N.D.	11.21	7.48
BB4	632.89	0.37	61.61	3.25	288.53	8.22	N.D.	N.D.	0.27	2.47	22.14	0.54	23.59	10.67
BB5	N.D.	0.22	58.18	1.49	95.97	2.71	N.D.	N.D.	0.18	1.48	15.40	N.D.	10.10	5.47
BB6	151.98	N.D.	62.08	3.61	156.26	9.31	N.D.	N.D.	N.D.	4.52	15.78	N.D.	13.71	15.20
BB7	N.D.	0.30	58.96	3.08	172.28	4.60	N.D.	N.D.	0.33	1.76	22.87	N.D.	20.82	10.69
BB8	50.27	0.27	55.26	1.68	126.37	4.79	N.D.	N.D.	0.25	1.04	14.98	N.D.	15.00	5.11
BB9	863.17	N.D.	81.21	5.57	287.47	7.13	N.D.	N.D.	0.25	6.92	18.81	0.39	11.44	25.88

Table 4. Mean metal values in floodplain soils from Massac Creek (MC) and Big Bayou Creek collected June 3-4, 2002.

Station	Floodplain Metal Conc. ($\mu\text{g/g}$)													
	Ag	Al	As	B	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	K	Li
MC	0.082	4180.75	5.75	25.56	33.72	0.61	398.94	1.98	3.87	27.58	27.27	4895.42	339.27	2.21
BB1A	0.038	4953.86	1.88	22.74	35.47	N.D.	1203.64	0.71	2.86	6.08	6.01	4761.84	401.19	4.30
BB1	0.026	1976.70	1.42	19.45	18.64	N.D.	1023.78	0.42	1.49	6.07	6.01	1586.01	212.95	1.28
BB2	0.046	5634.56	2.28	20.32	42.55	N.D.	16124.60	0.91	2.99	7.33	7.25	5349.56	754.45	8.95
BB3	0.037	3084.88	2.27	17.01	16.79	N.D.	618.84	0.93	2.16	18.42	18.22	2783.68	214.60	1.74
BB4	0.043	5178.53	1.93	29.07	30.03	N.D.	4892.78	0.72	2.76	6.97	6.89	4437.95	532.61	4.17
BB5	0.037	2237.60	2.38	21.92	20.48	N.D.	469.92	0.66	2.21	8.74	8.64	2259.54	176.41	1.31
BB6	0.046	4047.94	2.09	25.99	25.33	N.D.	781.82	0.70	2.23	9.15	9.05	3842.89	322.07	2.79
BB7	0.028	N.D.	1.26	23.41	11.63	N.D.	353.20	0.41	1.50	6.64	6.57	1265.26	94.35	0.71
BB8	0.037	3130.03	1.48	27.20	28.38	N.D.	599.41	0.48	1.75	7.65	7.57	2935.70	286.72	2.04
BB9	0.025	4709.60	1.35	24.94	28.46	N.D.	2670.87	0.59	1.98	8.19	8.10	4808.98	468.96	4.30

Table 4, continued. Mean metal values in floodplain soils from Massac Creek (MC) and Big Bayou Creek collected June 3-4, 2002.

Station	Floodplain Metal Conc. (µg/g)														
	Mg	Mn	Mo	Na	Ni	P	Pb	Sb	Se	Sn	Sr	Ti	Tl	V	Zn
MC	407.18	814.38	0.56	135.25	6.14	451.30	9.80	1.30	N.D.	0.46	2.27	30.96	1.00	31.67	15.38
BB1	239.11	262.80	N.D.	94.22	1.87	114.21	4.12	0.35	N.D.	0.21	1.91	16.77	N.D.	9.60	5.96
BB1A	685.84	503.84	N.D.	127.48	4.64	243.15	7.79	0.50	0.11	0.33	7.00	15.37	0.68	12.87	16.40
BB2	1454.35	346.52	N.D.	197.71	5.03	208.75	7.18	0.57	0.16	0.26	56.64	10.89	N.D.	12.98	35.02
BB3	297.15	303.69	N.D.	80.95	3.39	198.55	6.25	0.64	N.D.	0.20	3.01	14.01	N.D.	18.85	9.34
BB4	694.77	427.44	N.D.	151.57	4.32	222.16	7.27	0.56	0.13	0.28	10.60	13.02	N.D.	13.06	15.59
BB5	225.78	301.43	N.D.	108.33	2.39	160.43	5.56	0.52	N.D.	0.20	2.89	13.48	N.D.	12.82	8.98
BB6	434.44	341.54	N.D.	132.17	4.06	147.38	6.71	0.45	N.D.	0.26	3.70	14.65	N.D.	12.79	14.12
BB7	98.30	154.55	N.D.	100.24	1.48	88.46	4.56	0.35	N.D.	0.29	1.19	14.86	N.D.	9.22	5.59
BB8	384.82	233.24	N.D.	160.75	2.98	141.57	5.58	0.44	N.D.	0.17	3.99	14.89	N.D.	9.89	10.95
BB9	694.32	235.76	N.D.	146.16	4.72	214.07	5.67	0.43	0.15	0.26	6.65	14.65	N.D.	9.93	16.93

Table 5. Metal concentrations in water samples from Little Bayou Creek collected June 3-4, 2002.

Station	Date	Sample	Water Metal Conc. (µg/L)							
			Ag	Al	As	B	Ba	Be	Ca	Cd
LB1	06/03/02	MWS1	<0.25	389.86	<10.00	366.59	75.01	<0.25	29422.96	<0.25
LB2A	06/04/02	MWS1	<0.25	<50.00	<10.00	326.73	89.76	1.65	20217.97	1.04
010+011	06/04/02	MWS1	<0.25	546.15	<10.00	245.19	23.59	1.29	16106.57	0.63
LB2	06/04/02	MWS1	<0.25	<50.00	<10.00	279.47	40.79	1.07	17406.02	0.79
LB3	06/04/02	MWS1	<0.25	72.73	<10.00	273.15	49.93	1.24	17884.75	0.92
LB4	06/03/02	MWS1	<0.25	196.84	<10.00	333.33	63.13	<0.25	18682.13	<0.25

Table 5, continued. Metal concentrations in water samples from Little Bayou Creek collected June 3-4, 2002.

Station	Date	Sample	Water Metal Conc. (µg/L)							
			Co	Cr	Cu	Fe	K	Li	Mg	Mn
LB1	06/03/02	MWS1	<10.00	<1.00	1.92	407.93	3672.03	<10.00	4140.96	188.45
LB2A	06/04/02	MWS1	<10.00	<1.00	<1.00	<10.00	2421.87	<10.00	6074.29	<10.00
010+011	06/04/02	MWS1	<10.00	2.41	2.06	454.14	4527.33	<10.00	5873.07	<10.00
LB2	06/04/02	MWS1	<10.00	<1.00	1.35	79.79	3813.04	<10.00	5890.03	<10.00
LB3	06/04/02	MWS1	<10.00	<1.00	1.33	93.40	3694.05	<10.00	5958.35	<10.00
LB4	06/03/02	MWS1	<10.00	1.43	1.96	546.05	3970.24	<10.00	5484.11	120.02

Table 5, continued. Metal concentrations in water samples from Little Bayou Creek collected June 3-4, 2002.

Station	Date	Sample	Water Metal Conc. (µg/L)							
			Mo	Na	Ni	P	Pb	Sb	Se	Sn
LB1	06/03/02	MWS1	<10.00	2992.11	<3.00	58.51	<1.00	<10.00	<10.00	<10.00
LB2A	06/04/02	MWS1	<10.00	48051.26	9.36	58.17	1.57	<10.00	<10.00	<10.00
010+011	06/04/02	MWS1	<10.00	29771.09	5.76	255.73	1.85	<10.00	<10.00	<10.00
LB2	06/04/02	MWS1	<10.00	36002.48	2.82	171.87	1.50	<10.00	<10.00	<10.00
LB3	06/04/02	MWS1	<10.00	39703.97	6.89	146.95	1.60	<10.00	<10.00	<10.00
LB4	06/03/02	MWS1	<10.00	37736.39	<3.00	98.61	<1.00	<10.00	<10.00	<10.00

Table 5, continued. Metal concentrations in water samples from Little Bayou Creek collected June 3-4, 2002.

Station	Date	Sample	Water Metal Conc. (µg/L)				
			Sr	Ti	Tl	V	Zn
LB1	06/03/02	MWS1	302.83	<10.00	<10.00	<10.00	698.45
LB2A	06/04/02	MWS1	260.06	<10.00	<10.00	<10.00	3.07
010+011	06/04/02	MWS1	119.82	14.92	<10.00	<10.00	3.18
LB2	06/04/02	MWS1	214.96	<10.00	<10.00	<10.00	1.38
LB3	06/04/02	MWS1	228.89	<10.00	<10.00	<10.00	0.99
LB4	06/03/02	MWS1	180.24	<10.00	<10.00	<10.00	2.95

Table 6. Mean metal values in sediments from Little Bayou Creek collected June 3-4, 2002.

Station	Sediment Metal Conc. ($\mu\text{g/g}$)													
	Ag	Al	As	B	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	K	Li
LB1	0.038	6839.49	3.05	34.38	38.06	N.D.	1033.19	0.83	4.47	7.76	5.72	9382.15	544.49	7.46
010 +011	0.023	3983.39	N.D.	31.26	36.03	N.D.	1021.31	0.62	3.14	17.94	4.74	6678.71	219.90	2.64
LB2	0.025	5970.62	N.D.	29.79	50.42	N.D.	1238.77	0.75	3.87	5.84	2.57	8778.01	310.52	4.31
LB2A	0.073	3366.25	12.32	31.97	79.72	N.D.	892.83	1.73	10.05	22.42	5.78	14532.95	173.06	1.87
LB3	0.041	5962.50	10.89	33.06	49.02	N.D.	591.33	1.98	6.17	37.53	6.66	14813.18	311.97	4.95
LB4	0.033	764.63	2.76	28.90	12.86	N.D.	134.94	0.40	N.D.	80.24	2.79	5341.73	N.D.	N.D.

Table 6, continued. Mean metal values in sediments from Little Bayou Creek collected June 3-4, 2002.

Station	Sediment Metal Conc. ($\mu\text{g/g}$)													
	Mn	Mo	Na	Ni	P	Pb	Sb	Se	Sn	Sr	Ti	Tl	V	Zn
LB1	367.72	N.D.	90.55	4.77	212.96	7.40	N.D.	N.D.	N.D.	5.69	34.89	N.D.	15.85	19.60
010 +011	N.D.	N.D.	92.04	3.49	139.71	5.49	N.D.	N.D.	N.D.	6.61	3.86	N.D.	10.03	33.00
LB2	75.10	N.D.	65.91	2.68	N.D.	3.91	N.D.	N.D.	N.D.	14.42	N.D.	N.D.	12.69	8.60
LB2A	1118.39	0.45	52.65	6.29	519.08	18.82	N.D.	N.D.	0.31	10.01	18.86	0.41	36.97	21.57
LB3	394.27	0.35	61.52	6.02	545.94	12.96	N.D.	N.D.	0.26	6.36	18.24	N.D.	31.09	31.32
LB4	N.D.	N.D.	78.88	1.34	140.27	3.52	N.D.	N.D.	0.24	2.77	11.03	N.D.	9.58	16.05

Table 7. Mean metal values in floodplain soils Little Bayou Creek collected June 3-4, 2002.

Station	Floodplain Metal Conc. ($\mu\text{g/g}$)													
	Ag	Al	As	B	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	K	Li
LB1	0.024	5651.73	1.41	27.95	37.31	N.D.	359.61	0.50	3.70	5.44	5.38	4386.19	418.29	5.04
LB2	0.035	4097.28	1.26	24.31	41.67	N.D.	1503.06	0.58	2.36	14.50	14.34	4263.47	288.82	2.84
LB2A	0.041	4951.38	1.43	21.27	29.45	N.D.	918.59	0.63	2.28	93.59	92.55	8195.12	360.83	4.90
LB3	0.047	5303.07	2.65	25.64	36.96	N.D.	3393.48	0.84	3.32	24.28	24.01	5256.50	393.58	3.83
LB4	0.047	3474.65	0.91	25.63	26.20	N.D.	838.09	0.44	1.54	26.44	26.15	4933.33	289.91	2.50

Table 7, continued. Mean metal values in floodplain soils from Little Bayou Creek collected June 3-4, 2002.

Station	Floodplain Metal Conc. ($\mu\text{g/g}$)														
	Mg	Mn	Mo	Na	Ni	P	Pb	Sb	Se	Sn	Sr	Ti	Tl	V	Zn
LB1	818.52	371.82	N.D.	132.41	5.38	214.77	7.92	0.56	0.18	0.27	3.98	9.37	N.D.	10.12	18.89
LB2	571.85	199.23	N.D.	138.85	3.96	140.74	5.80	0.46	N.D.	0.21	10.12	3.22	N.D.	11.22	33.74
LB2A	758.08	337.57	N.D.	115.68	4.55	176.41	7.51	0.97	0.07	0.19	6.65	12.17	0.38	11.44	37.96
LB3	640.34	491.75	N.D.	150.24	4.69	243.28	9.54	0.73	0.15	0.28	11.01	6.80	0.63	15.79	27.84
LB4	458.43	286.56	N.D.	135.82	3.44	164.15	5.52	0.50	0.08	0.16	7.02	5.43	N.D.	8.78	34.81

Table 8. Mean water metal concentrations for station BB6 on Big Bayou Creek.

Year	Metal Concentrations ($\mu\text{g/L}$)					
	Cd	Cu	Cr	Pb	Ni	Zn
1987-91 ^a	0.29	3.7	4.1	1.5	4.7	6.7
1997 ^b	0.84	7.3	1.9	3.0	24.1	15.1
2002 (June)	0.68	6.5	<1.0	2.6	18.3	<1.0
	+	+	-	+	+	-

^a Birge *et al.*, 1992.

^b Birge and Price, December 8, 1997.

Figure 1. Silver Mean Metal Concentrations in Water and Sediments from Big Bayou Creek Collected June 3-4, 2002.

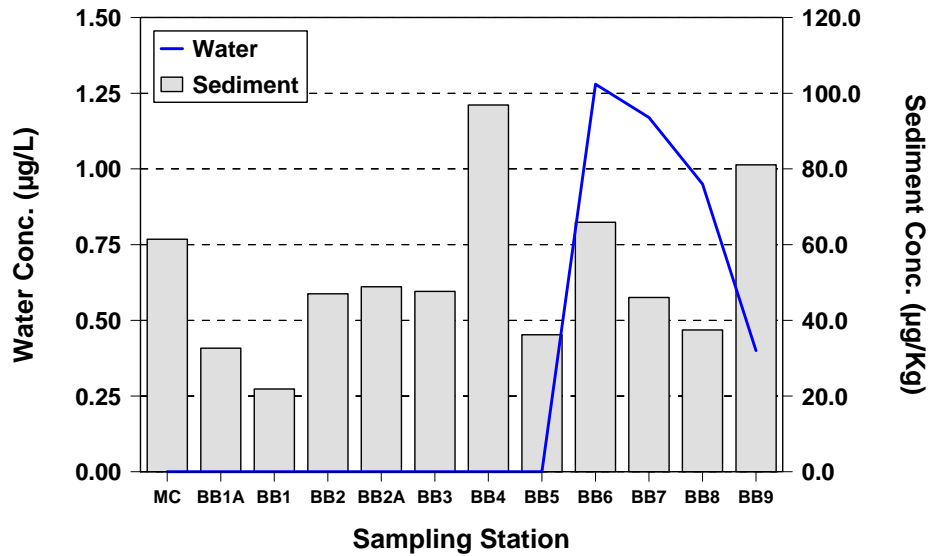


Figure 2. Silver Mean Metal Concentrations in Water and Floodplain Soils from Big Bayou Creek Collected June 3-4, 2002.

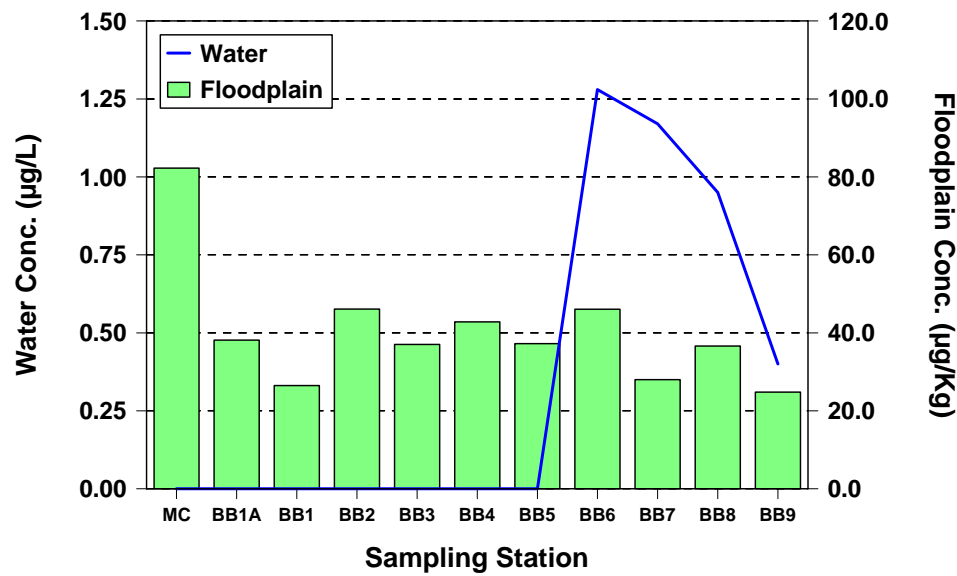


Figure 3. Cadmium Mean Metal Concentrations in Water and Sediments from Big Bayou Creek Collected June 3-4, 2002.

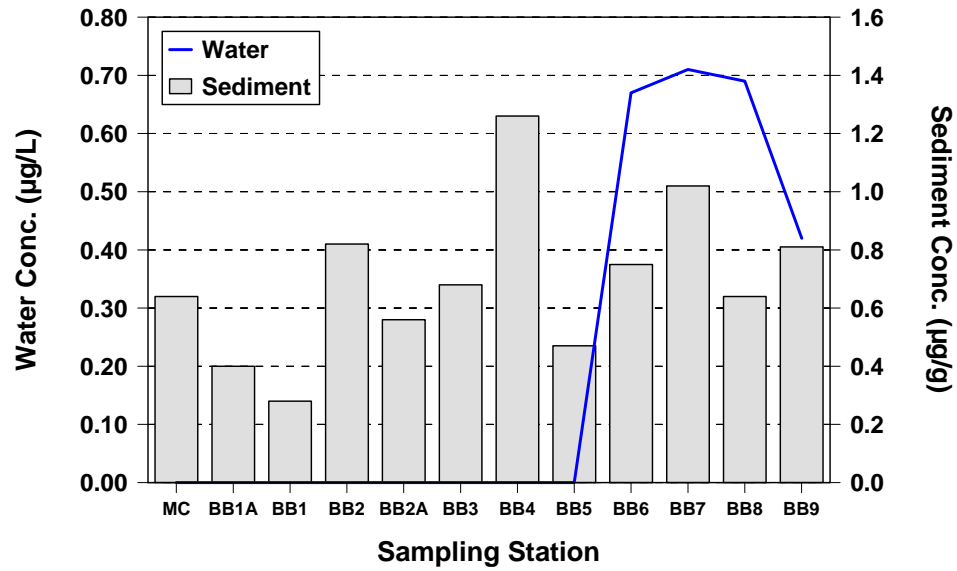


Figure 4. Cadmium Mean Metal Concentrations in Water and Floodplain Soils from Big Bayou Creek Collected June 3-4, 2002.

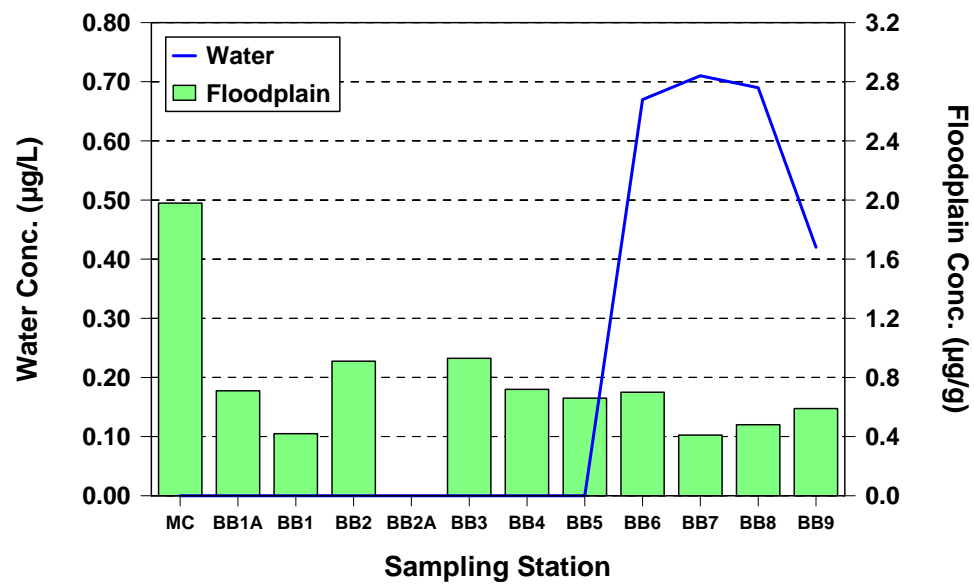


Figure 5. Copper Mean Metal Concentrations in Water and Sediments from Big Bayou Creek Collected June 3-4, 2002.

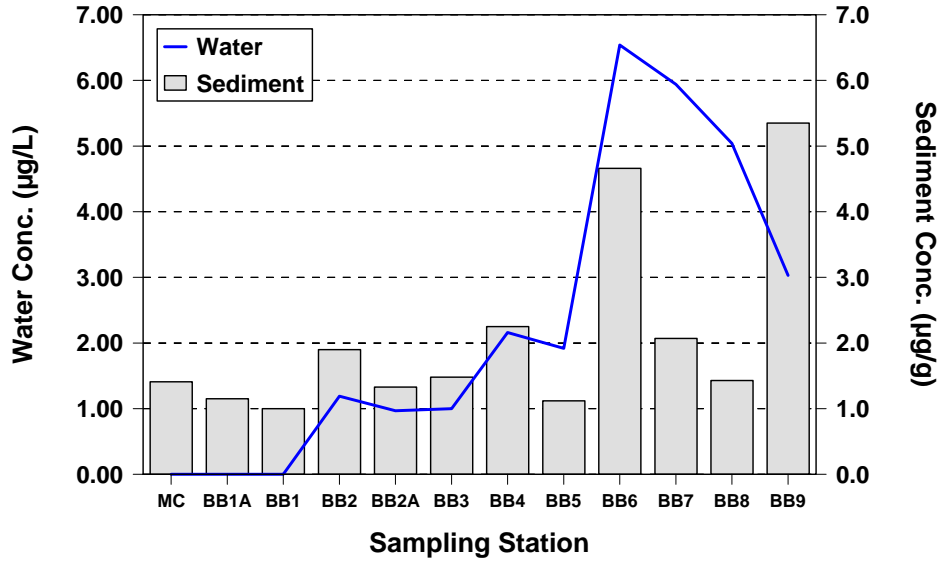


Figure 6. Copper Mean Metal Concentrations in Water and Floodplain Soils from Big Bayou Creek Collected June 3-4, 2002.

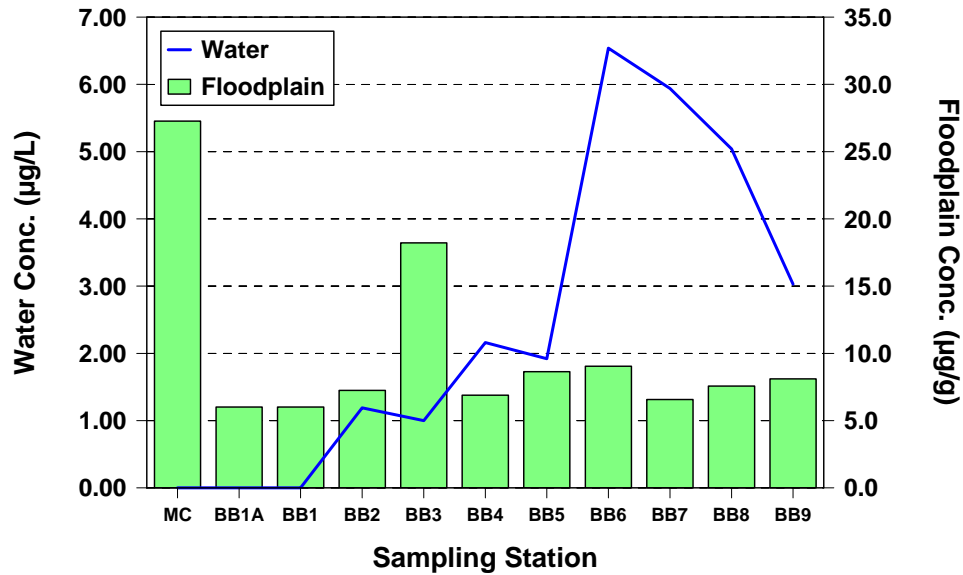


Figure 7. Chromium Mean Metal Concentrations in Sediments from Big Bayou Creek Collected June 3-4, 2002.

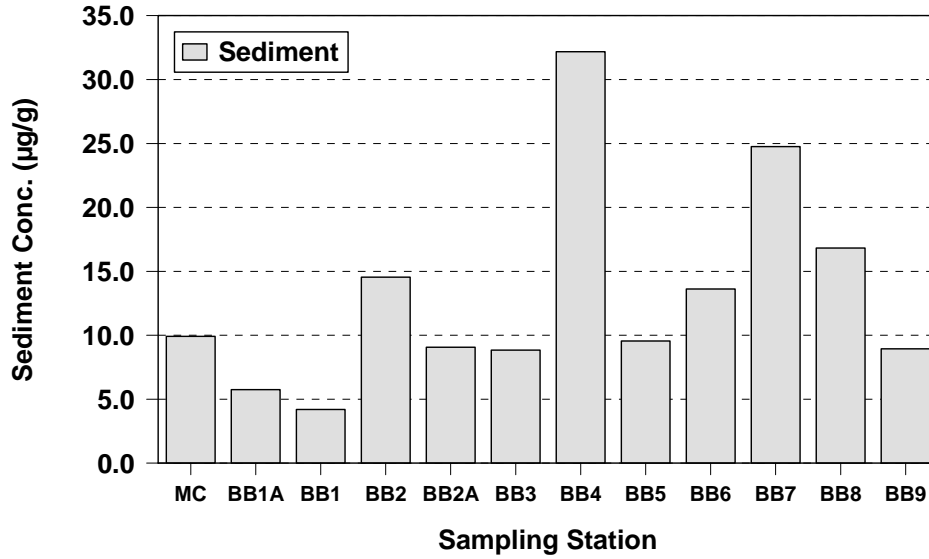


Figure 8. Chromium Mean Metal Concentrations in Floodplain Soils from Big Bayou Creek Collected June 3-4, 2002.

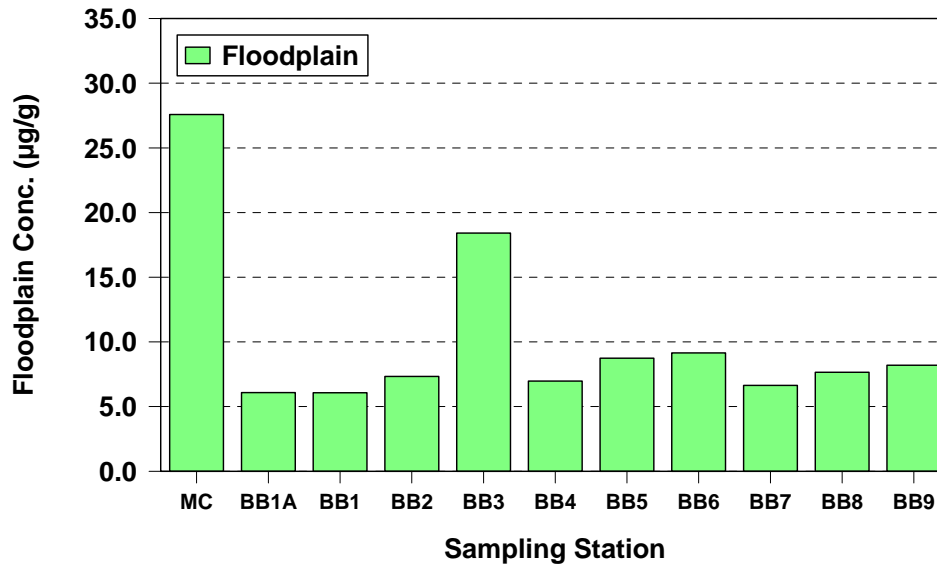


Figure 9. Iron Mean Metal Concentrations in Water and Sediments from Big Bayou Creek Collected June 3-4, 2002.

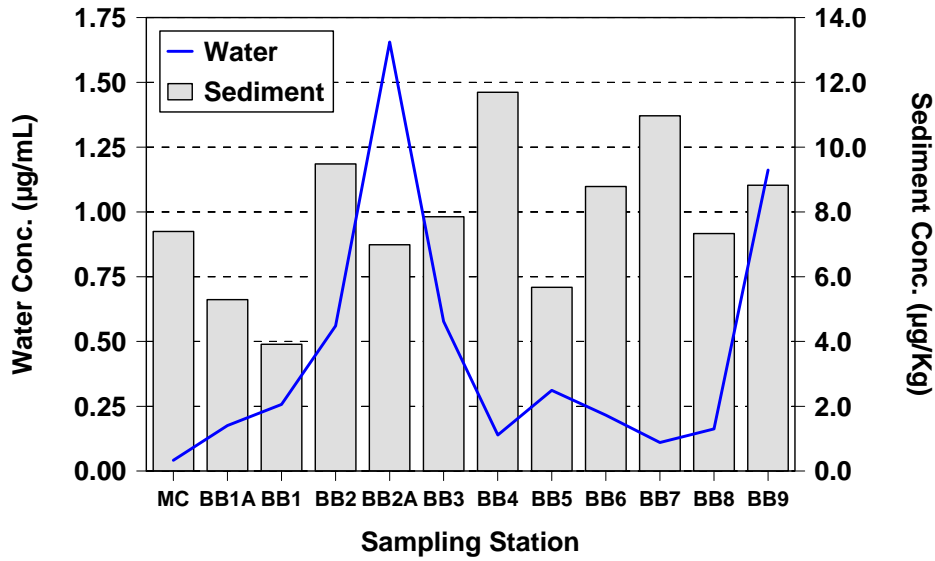


Figure 10. Iron Mean Metal Concentrations in Water and Floodplain Soils from Big Bayou Creek Collected June 3-4, 2002.

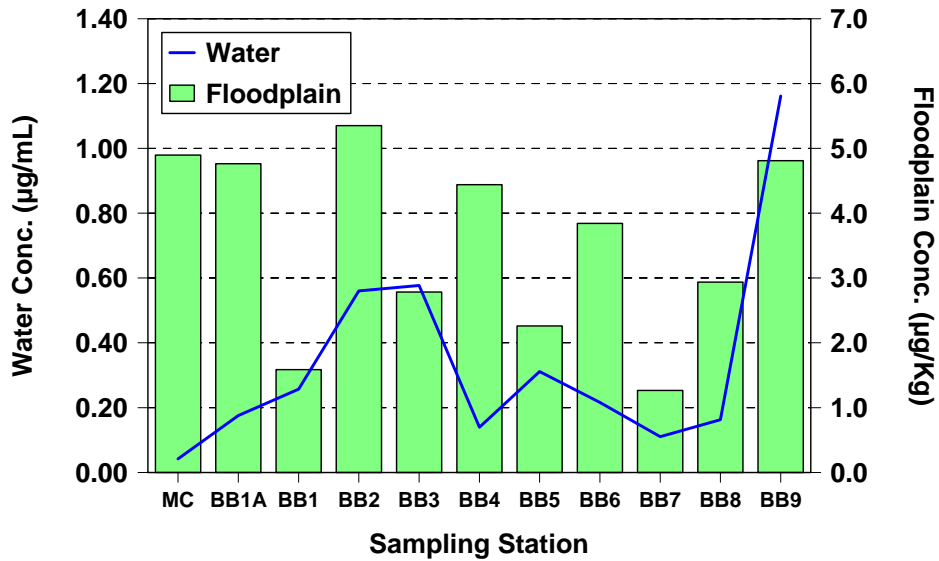


Figure 11. Nickel Mean Metal Concentrations in Water and Sediments from Big Bayou Creek Collected June 3-4, 2002.

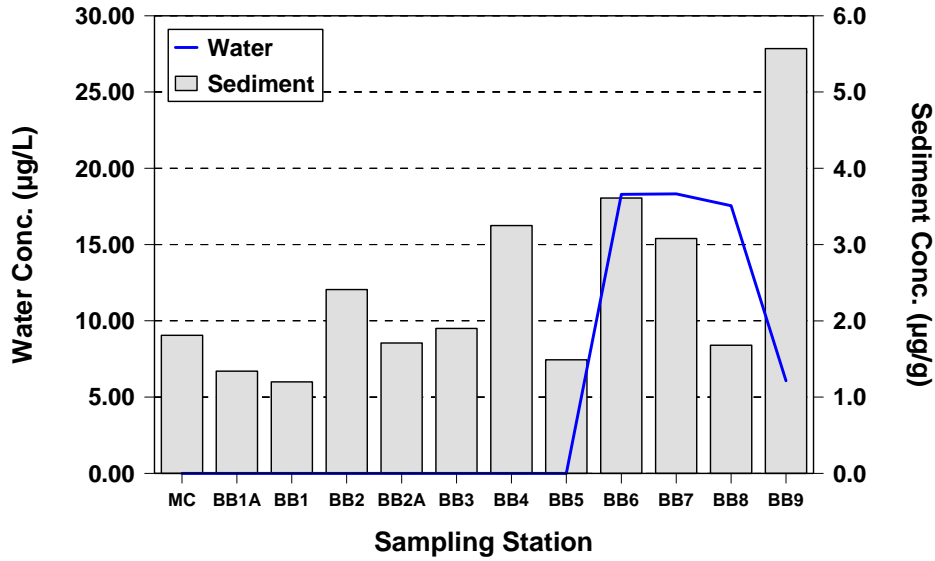


Figure 12. Nickel Mean Metal Concentrations in Water and Floodplain Soils from Big Bayou Creek Collected June 3-4, 2002.

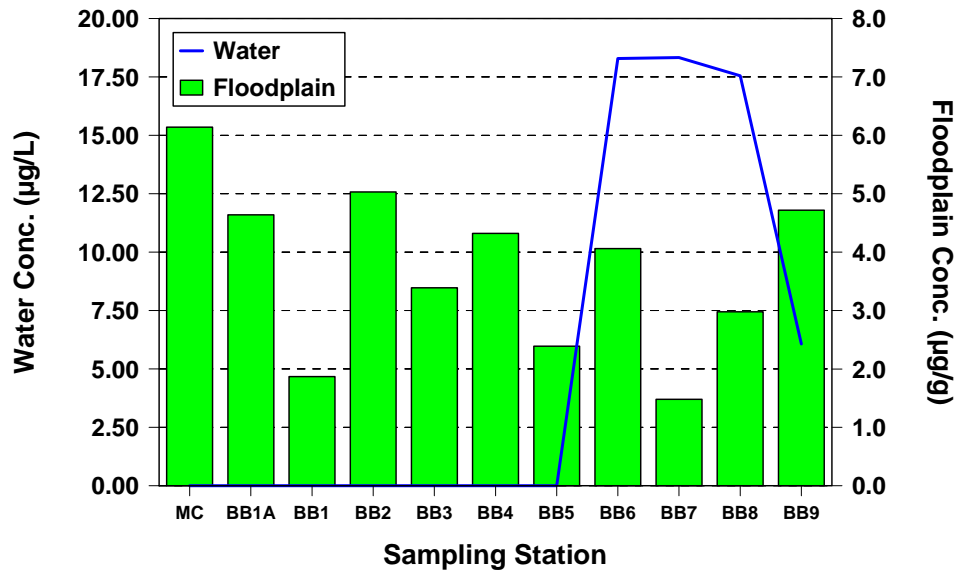


Figure 13. Lead Mean Metal Concentrations in Water and Sediments from Big Bayou Creek Collected June 3-4, 2002.

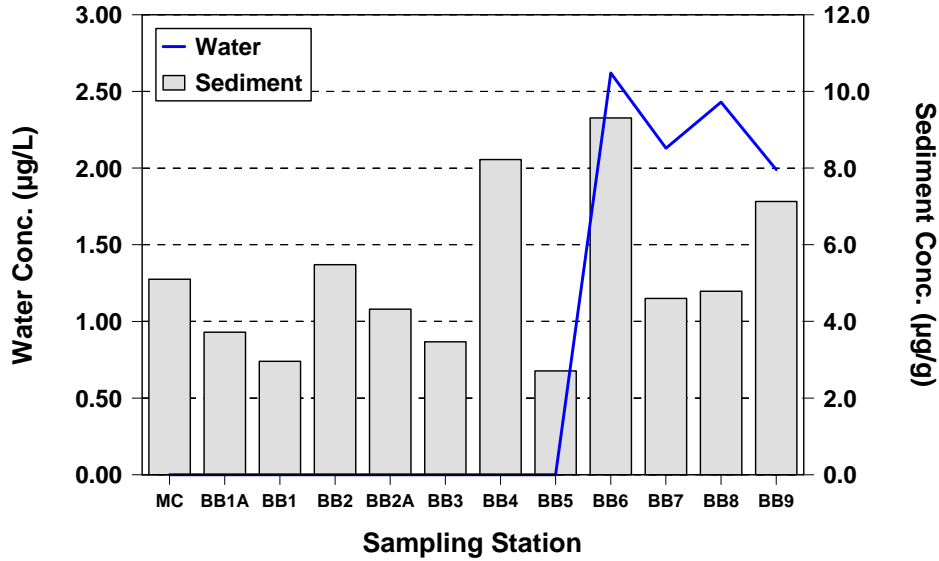


Figure 14. Lead Mean Metal Concentrations in Water and Floodplain Soils from Big Bayou Creek Collected June 3-4, 2002.

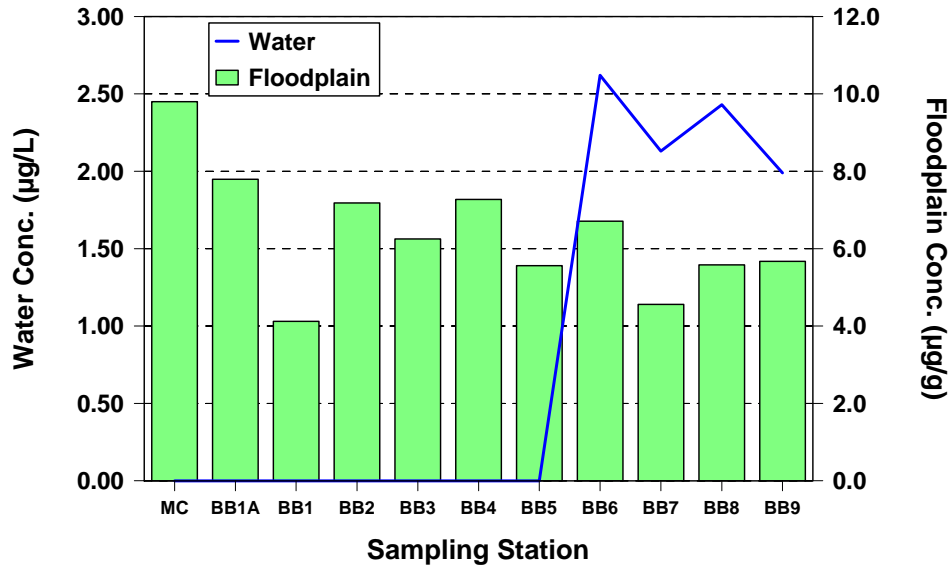


Figure 15. Zinc Mean Metal Concentrations in Water and Sediments from Big Bayou Creek Collected June 3-4, 2002.

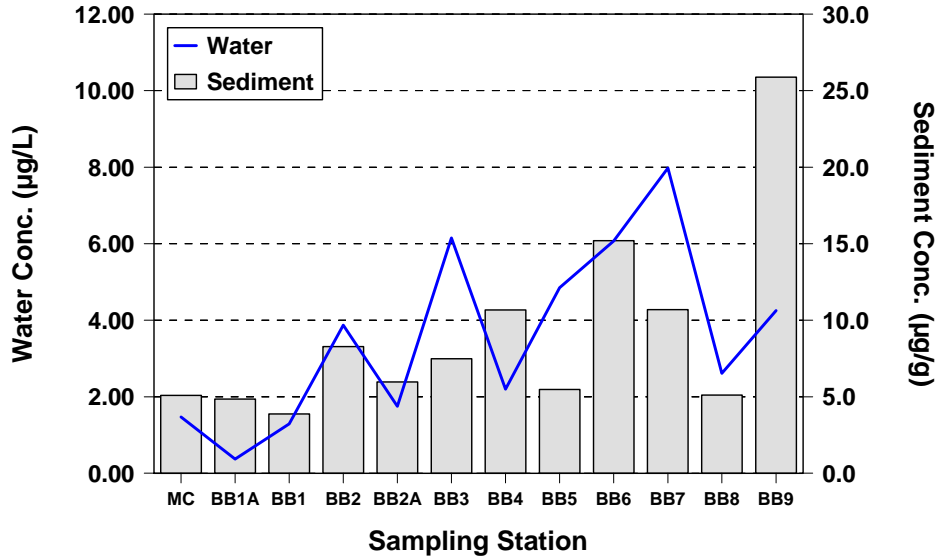
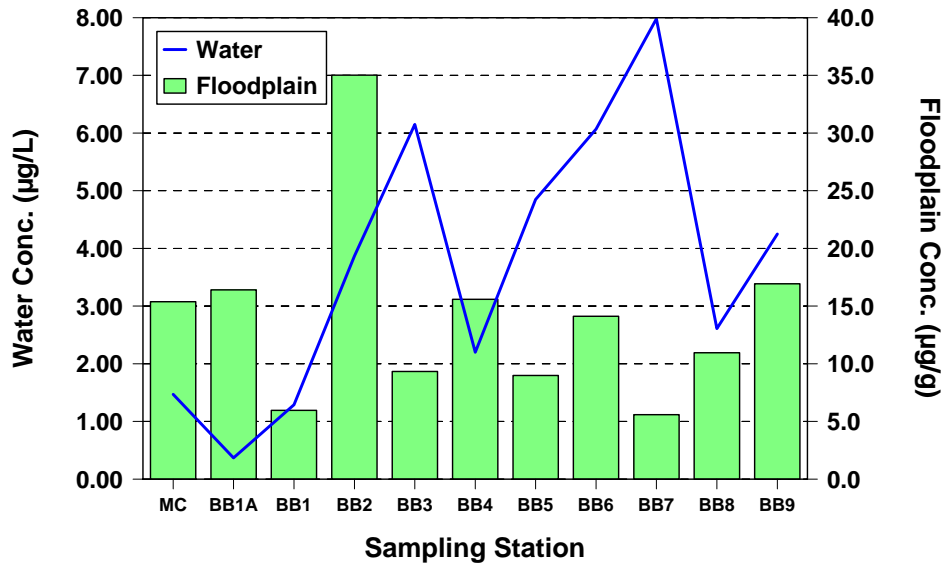


Figure 16. Zinc Mean Metal Concentrations in Water and Floodplain Soils from Big Bayou Creek Collected June 3-4, 2002.



APPENDIX

Table A1. Metal concentrations in sediments from Massac Creek (MC) and Big Bayou Creek collected June 3-4, 2002.

Station	Date	Sample ¹	Sediment Metal Conc. (µg/g)									
			Ag	Al	As	B	Ba	Be	Ca	Cd	Co	Cr
MC	06/03/02	MSED1	0.060	1077.37	2.84	26.59	20.93	<24.05	<48.10	0.52	3.12	7.94
MC	06/03/02	MSED2	0.063	1317.57	4.01	22.29	28.03	<18.86	82.16	0.76	4.18	11.89
BB1A	06/03/02	MSED1	0.027	1005.48	<1.96	22.36	14.12	<19.59	79.88	0.35	<19.59	4.84
BB1A	06/03/02	MSED2	0.038	1460.28	<2.23	23.51	18.11	<22.30	148.99	0.46	2.39	6.66
BB1	06/03/02	MSED1	0.022	1288.12	<2.17	30.85	17.97	<21.75	244.57	0.31	<21.75	4.42
BB1	06/03/02	MSED2	0.022	1018.07	<1.95	25.49	14.32	<19.45	206.91	0.24	<1.95	3.98
BB2A	06/03/02	MSED1	0.050	1084.07	2.69	35.14	20.43	<24.17	189.11	0.52	3.32	9.21
BB2A	06/03/02	MSED2	0.047	1101.55	2.90	28.98	14.02	<22.51	180.44	0.59	2.39	8.94
BB2	06/03/02	MSED1	0.040	1353.24	2.49	25.44	16.95	<23.28	183.16	0.58	<23.28	9.08
BB2	06/03/02	MSED2	0.054	1939.83	4.76	37.01	19.81	<28.15	299.11	1.05	3.51	19.99
BB3	06/03/02	MSED1	0.055	1831.32	<2.19	31.67	25.12	<21.90	179.77	0.97	3.16	11.27
BB3	06/03/02	MSED2	0.040	994.23	<2.59	29.71	12.82	<25.87	146.04	0.38	<25.87	6.42
BB4	06/03/02	MSED1	0.051	1384.50	3.15	30.56	16.08	<21.85	123.48	1.03	2.86	36.84
BB4	06/03/02	MSED2	0.143	1589.58	6.62	26.70	49.17	<19.16	231.90	1.49	12.42	27.51
BB5	06/03/02	MSED1	0.037	987.44	2.94	23.96	11.56	<17.89	114.31	0.57	1.87	11.23
BB5	06/03/02	MSED2	0.036	727.26	<1.75	21.43	8.16	<17.53	118.55	0.36	<17.53	7.87
BB6	06/03/02	MSED1	0.062	4281.79	2.52	31.44	32.61	<24.57	773.41	0.76	3.66	15.19
BB6	06/03/02	MSED2	0.069	3410.90	3.43	35.44	24.84	<27.40	607.28	0.75	3.18	12.05
BB7	06/03/02	MSED1	0.043	1389.92	3.17	29.47	11.91	<22.72	168.56	0.94	2.44	24.98
BB7	06/03/02	MSED2	0.050	1462.86	3.30	34.80	15.30	<25.54	188.30	1.11	3.23	24.52
BB8	06/03/02	MSED1	0.052	1012.02	4.29	27.08	14.86	<20.82	78.66	0.79	2.36	21.09
BB8	06/03/02	MSED2	0.022	664.58	<1.92	26.59	6.44	<19.23	39.14	0.48	<19.23	12.55
BB9	06/03/02	MSED1	0.067	5732.77	<2.17	28.63	43.64	<21.70	1562.98	0.80	4.08	8.88
BB9	06/03/02	MSED2	0.096	5291.64	<2.78	30.48	55.70	<27.84	1367.97	0.81	6.01	9.01

¹ MSED1 and MSED2 are duplicates from the same sample.

Table A1, continued. Metal concentrations in sediments from Massac Creek (MC) and Big Bayou Creek collected June 3-4, 2002.

Station	Date	Sample ¹	Sediment Metal Conc. (µg/g)								
			Cu	Fe	K	Li	Mn	Mo	Na	Ni	P
MC	06/03/02	MSED1	1.18	6689.52	52.21	<24.05	274.19	<24.05	<48.10	1.60	95.46
MC	06/03/02	MSED2	1.65	8107.39	70.04	0.20	500.50	0.25	<37.72	2.03	180.03
BB1A	06/03/02	MSED1	0.96	4636.71	47.75	0.12	45.90	<19.59	<39.18	1.14	75.93
BB1A	06/03/02	MSED2	1.33	5951.13	79.65	0.41	116.50	<22.30	55.89	1.53	109.70
BB1	06/03/02	MSED1	1.13	4361.66	72.99	0.37	<43.50	<21.75	88.12	1.38	55.93
BB1	06/03/02	MSED2	0.86	3466.21	53.73	0.20	<38.91	<19.45	56.90	1.02	39.98
BB2A	06/03/02	MSED1	1.33	6775.10	53.26	<24.17	123.27	<24.17	80.45	1.77	113.23
BB2A	06/03/02	MSED2	1.33	7198.06	49.82	0.03	70.90	<22.51	52.92	1.66	126.03
BB2	06/03/02	MSED1	1.44	7130.17	68.69	0.24	<46.55	<23.28	<46.55	1.73	128.43
BB2	06/03/02	MSED2	2.37	11835.77	93.43	0.30	<56.31	<28.15	95.64	3.08	254.79
BB3	06/03/02	MSED1	1.86	10349.68	65.65	0.39	206.26	<21.90	56.71	2.53	121.86
BB3	06/03/02	MSED2	1.10	5352.11	47.53	<25.87	<51.73	<25.87	51.21	1.27	67.77
BB4	06/03/02	MSED1	1.81	10688.47	49.20	<21.85	56.33	0.27	51.25	3.17	231.22
BB4	06/03/02	MSED2	2.69	12696.54	76.81	0.26	1209.44	0.48	71.98	3.33	345.84
BB5	06/03/02	MSED1	1.37	6681.31	46.23	0.13	<35.78	0.22	49.14	1.85	125.76
BB5	06/03/02	MSED2	0.87	4666.50	30.79	<17.53	<35.06	<17.53	67.21	1.14	66.18
BB6	06/03/02	MSED1	5.59	8708.26	265.11	2.90	208.52	<24.57	62.82	4.10	154.86
BB6	06/03/02	MSED2	3.74	8858.68	195.13	1.85	95.43	<27.40	61.35	3.12	157.66
BB7	06/03/02	MSED1	1.98	10241.06	64.38	0.22	<45.43	0.26	55.41	2.83	165.24
BB7	06/03/02	MSED2	2.16	11691.76	60.36	0.09	<51.07	0.34	62.51	3.33	179.31
BB8	06/03/02	MSED1	1.74	8727.89	44.53	<20.82	50.27	0.27	53.09	2.14	184.19
BB8	06/03/02	MSED2	1.12	5935.92	<38.46	<19.23	<38.46	<19.23	57.42	1.22	68.55
BB9	06/03/02	MSED1	5.43	8391.16	473.70	7.60	699.26	<21.70	88.64	5.64	288.44
BB9	06/03/02	MSED2	5.27	9251.94	562.36	6.27	1027.09	<27.84	73.78	5.51	286.49

¹ MSED1 and MSED2 are duplicates from the same sample.

Table A1, continued. Metal concentrations in sediments from Massac Creek (MC) and Big Bayou Creek collected June 3-4, 2002.

Station	Date	Sample ¹	Sediment Metal Conc. (µg/g)								
			Pb	Sb	Se	Sn	Sr	Ti	Tl	V	Zn
MC	06/03/02	MSED1	4.35	<24.05	<24.05	0.24	0.98	26.23	<24.05	10.69	3.87
MC	06/03/02	MSED2	5.85	<18.86	<18.86	0.21	1.33	28.25	<18.86	14.00	6.31
BB1A	06/03/02	MSED1	3.39	<19.59	<19.59	<19.59	1.02	21.44	<19.59	8.39	4.17
BB1A	06/03/02	MSED2	4.04	<22.30	<22.30	<22.30	1.61	24.67	<22.30	10.30	5.53
BB1	06/03/02	MSED1	3.27	<21.75	<21.75	<21.75	1.79	22.36	<21.75	7.62	4.43
BB1	06/03/02	MSED2	2.65	<19.45	<19.45	<19.45	1.49	21.21	<19.45	6.37	3.33
BB2A	06/03/02	MSED1	4.31	<24.17	<24.17	0.27	1.77	21.16	<24.17	12.32	5.83
BB2A	06/03/02	MSED2	4.33	<22.51	<22.51	<22.51	1.78	21.14	<22.51	12.97	6.11
BB2	06/03/02	MSED1	4.39	<23.28	<23.28	0.25	1.56	25.36	<23.28	13.29	6.38
BB2	06/03/02	MSED2	6.56	<28.15	<28.15	0.30	2.29	30.97	<28.15	23.70	10.18
BB3	06/03/02	MSED1	3.67	<21.90	<21.90	0.21	2.32	20.40	<21.90	13.32	8.66
BB3	06/03/02	MSED2	3.26	<25.87	<25.87	<25.87	2.08	16.48	<25.87	9.11	6.31
BB4	06/03/02	MSED1	6.74	<21.85	<21.85	0.27	1.82	22.93	<21.85	22.61	9.52
BB4	06/03/02	MSED2	9.71	<19.16	<19.16	0.28	3.12	21.36	0.54	24.57	11.82
BB5	06/03/02	MSED1	3.33	<17.89	<17.89	0.19	1.61	16.60	<17.89	12.04	6.48
BB5	06/03/02	MSED2	2.10	<17.53	<17.53	0.17	1.36	14.20	<17.53	8.17	4.47
BB6	06/03/02	MSED1	12.55	<24.57	<24.57	<24.57	4.22	14.40	<24.57	13.59	16.89
BB6	06/03/02	MSED2	6.08	<27.40	<27.40	<27.40	4.82	17.15	<27.40	13.83	13.50
BB7	06/03/02	MSED1	4.15	<22.72	<22.72	<22.72	1.73	23.29	<22.72	19.54	9.41
BB7	06/03/02	MSED2	5.05	<25.54	<25.54	0.33	1.79	22.46	<25.54	22.11	11.97
BB8	06/03/02	MSED1	5.94	<20.82	<20.82	0.25	1.42	22.07	<20.82	20.35	6.56
BB8	06/03/02	MSED2	3.64	<19.23	<19.23	<19.23	0.66	7.89	<19.23	9.66	3.67
BB9	06/03/02	MSED1	6.74	<21.70	<21.70	0.24	6.81	12.53	0.37	11.24	30.17
BB9	06/03/02	MSED2	7.52	<27.84	<27.84	0.27	7.02	25.09	0.41	11.64	21.58

¹ MSED1 and MSED2 are duplicates from the same sample.

Table A2. Metal concentrations in floodplain soils from Massac Creek (MC) and Big Bayou Creek collected June 3-4, 2002.

Station	Date	Sample ¹	Floodplain Metal Conc. (µg/g)									
			Ag	Al	As	B	Ba	Be	Ca	Cd	Co	Cr
MC	06/03/02	MFP1	0.070	4320.07	4.53	26.35	30.88	0.555	438.41	1.64	3.63	20.49
MC	06/03/02	MFP2	0.095	4041.44	6.97	24.78	36.56	0.663	359.47	2.31	4.10	34.67
BB1A	06/03/02	MFP1	0.037	5251.46	1.96	24.81	34.02	<0.469	1027.42	0.71	2.99	6.04
BB1A	06/03/02	MFP2	0.039	4656.27	1.80	20.67	36.92	<0.385	1379.87	0.72	2.73	6.13
BB1	06/03/02	MFP1	0.026	1976.70	1.42	19.45	18.64	<0.366	1023.78	0.42	1.49	6.07
BB2	06/03/02	MFP1	0.054	5523.03	2.25	19.22	43.43	<0.441	16616.50	0.90	3.02	7.26
BB2	06/03/02	MFP2	0.038	5746.09	2.32	21.43	41.68	<0.430	15632.69	0.93	2.95	7.40
BB2A	06/03/02	MFP1	0.015	<1755.00	0.39	18.36	9.14	<0.351	204.58	0.26	0.86	5.02
BB3	06/03/02	MFP1	0.037	3084.88	2.27	17.01	16.79	<0.380	618.84	0.93	2.16	18.42
BB4	06/03/02	MFP1	0.039	5341.72	1.92	24.62	32.41	<0.526	3650.89	0.73	2.86	6.98
BB4	06/03/02	MFP2	0.047	5015.34	1.95	33.52	27.65	<0.526	6134.67	0.71	2.66	6.96
BB5	06/03/02	MFP1	0.050	2510.12	2.90	24.40	24.68	<0.477	558.59	0.77	2.90	9.60
BB5	06/03/02	MFP2	0.025	1965.07	1.87	19.45	16.27	<0.389	381.24	0.55	1.52	7.88
BB6	06/03/02	MFP1	0.044	4061.44	2.18	29.61	28.52	<0.513	751.05	0.70	2.20	9.12
BB6	06/03/02	MFP2	0.048	4034.45	2.00	22.38	22.13	<0.453	812.60	0.71	2.25	9.19
BB7	06/03/02	MFP1	0.027	<2141.61	1.30	23.10	9.20	<0.430	292.47	0.40	1.76	6.52
BB7	06/03/02	MFP2	0.029	<2483.85	1.21	23.71	14.07	<0.497	413.92	0.42	1.24	6.76
BB8	06/03/02	MFP1	0.035	<2669.51	1.45	28.56	25.99	<0.534	560.01	0.48	1.81	7.72
BB8	06/03/02	MFP2	0.038	3130.03	1.51	25.83	30.78	<0.483	638.80	0.49	1.69	7.58
BB9	06/03/02	MFP1	0.019	4718.29	1.45	21.95	28.82	<0.496	2908.78	0.59	1.99	8.18
BB9	06/03/02	MFP2	0.030	4700.90	1.24	27.93	28.10	<0.464	2432.96	0.58	1.97	8.20

¹ MFP1 and MFP2 are duplicates from the same sample.

Table A2, continued. Metal concentrations in floodplain soils from Massac Creek (MC) and Big Bayou Creek collected June 3-4, 2002.

Station	Date	Sample ¹	Floodplain Metal Conc. (µg/g)									
			Cu	Fe	K	Li	Mg	Mn	Mo	Na	Ni	P
MC	06/03/02	MFP1	20.26	4667.03	366.68	2.46	458.80	684.60	<0.52	136.43	5.90	375.27
MC	06/03/02	MFP2	34.28	5123.80	311.86	1.95	355.56	944.16	0.56	134.08	6.37	527.32
BB1A	06/03/02	MFP1	5.97	4630.61	379.67	4.09	680.00	491.17	<0.47	145.81	4.51	234.13
BB1A	06/03/02	MFP2	6.06	4893.07	422.71	4.52	691.69	516.51	<0.38	109.14	4.77	252.17
BB1	06/03/02	MFP1	6.01	1586.01	212.95	1.28	239.11	262.80	<0.37	94.22	1.87	114.21
BB2	06/03/02	MFP1	7.18	5344.04	741.92	8.87	1456.13	356.84	<0.44	197.03	5.09	206.63
BB2	06/03/02	MFP2	7.31	5355.08	766.97	9.03	1452.56	336.21	<0.43	198.39	4.96	210.87
BB2A	06/03/02	MFP1	4.96	899.38	77.34	0.56	73.91	112.81	<0.35	53.29	1.03	63.25
BB3	06/03/02	MFP1	18.22	2783.68	214.60	1.74	297.15	303.69	<0.38	80.95	3.39	198.55
BB4	06/03/02	MFP1	6.90	4661.29	552.10	4.23	691.17	444.89	<0.53	131.97	4.43	217.72
BB4	06/03/02	MFP2	6.88	4214.60	513.12	4.12	698.37	409.99	<0.53	171.17	4.22	226.60
BB5	06/03/02	MFP1	9.49	2665.87	205.40	1.48	261.04	387.57	<0.48	125.05	2.77	190.79
BB5	06/03/02	MFP2	7.79	1853.22	147.41	1.15	190.52	215.29	<0.39	91.61	2.01	130.06
BB6	06/03/02	MFP1	9.01	3754.32	322.79	2.85	441.83	330.56	<0.51	153.70	4.05	146.23
BB6	06/03/02	MFP2	9.09	3931.47	321.36	2.72	427.05	352.51	<0.45	110.63	4.07	148.53
BB7	06/03/02	MFP1	6.45	1215.68	85.57	0.64	89.35	147.09	<0.43	99.27	1.42	89.41
BB7	06/03/02	MFP2	6.68	1314.85	103.13	0.78	107.26	162.01	<0.50	101.20	1.54	87.51
BB8	06/03/02	MFP1	7.64	2752.78	255.55	1.80	345.50	234.54	<0.53	152.73	2.87	136.35
BB8	06/03/02	MFP2	7.50	3118.62	317.89	2.28	424.14	231.93	<0.48	168.76	3.08	146.78
BB9	06/03/02	MFP1	8.09	4813.79	465.46	4.29	698.46	260.11	<0.50	147.68	4.99	214.98
BB9	06/03/02	MFP2	8.10	4804.17	472.46	4.31	690.17	211.40	<0.46	144.64	4.46	213.15

¹ MFP1 and MFP2 are duplicates from the same sample.

Table A2, continued. Metal concentrations in floodplain soils from Massac Creek (MC) and Big Bayou Creek collected June 3-4, 2002.

Station	Date	Sample ¹	Floodplain Metal Conc. (µg/g)								
			Pb	Sb	Se	Sn	Sr	Ti	Tl	V	Zn
MC	06/03/02	MFP1	9.02	1.17	<0.52	0.48	2.53	31.06	<0.52	28.47	15.26
MC	06/03/02	MFP2	10.58	1.42	<0.45	0.45	2.00	30.85	1.00	34.86	15.49
BB1A	06/03/02	MFP1	7.74	0.50	<0.47	0.33	6.03	15.66	<0.47	12.86	15.99
BB1A	06/03/02	MFP2	7.84	0.49	0.11	0.34	7.98	15.08	0.68	12.89	16.81
BB1	06/03/02	MFP1	4.12	0.35	<0.37	0.21	1.91	16.77	<0.37	9.60	5.96
BB2	06/03/02	MFP1	7.13	0.53	<0.44	0.29	57.19	10.97	<0.44	12.57	34.02
BB2	06/03/02	MFP2	7.24	0.60	0.16	0.23	56.10	10.81	<0.43	13.39	36.01
BB2A	06/03/02	MFP1	2.97	0.23	<0.35	0.18	0.57	21.53	<0.35	6.76	3.71
BB3	06/03/02	MFP1	6.25	0.64	<0.38	0.20	3.01	14.01	<0.38	18.85	9.34
BB4	06/03/02	MFP1	7.52	0.58	<0.53	0.28	11.85	13.23	<0.53	13.23	15.74
BB4	06/03/02	MFP2	7.01	0.53	0.13	0.28	9.35	12.82	<0.53	12.89	15.43
BB5	06/03/02	MFP1	6.67	0.56	<0.48	0.14	4.03	12.89	<0.48	14.67	10.56
BB5	06/03/02	MFP2	4.45	0.48	<0.39	0.26	1.74	14.07	<0.39	10.97	7.39
BB6	06/03/02	MFP1	6.60	0.46	<0.51	0.29	3.60	14.80	<0.51	12.88	14.68
BB6	06/03/02	MFP2	6.82	0.43	<0.45	0.22	3.80	14.50	<0.45	12.70	13.56
BB7	06/03/02	MFP1	5.36	0.31	<0.43	0.24	0.83	13.44	<0.43	9.15	5.44
BB7	06/03/02	MFP2	3.76	0.39	<0.50	0.34	1.54	16.27	<0.50	9.29	5.74
BB8	06/03/02	MFP1	5.46	0.42	<0.53	0.16	3.53	15.03	<0.53	9.82	10.34
BB8	06/03/02	MFP2	5.70	0.47	<0.48	0.18	4.44	14.76	<0.48	9.96	11.56
BB9	06/03/02	MFP1	5.71	0.35	0.15	0.33	6.81	15.10	<0.50	10.07	16.91
BB9	06/03/02	MFP2	5.63	0.50	<0.46	0.19	6.49	14.20	<0.46	9.79	16.95

¹ MFP1 and MFP2 are duplicates from the same sample.

Table A3. Metal concentrations in sediments from Little Bayou Creek collected June 3-4, 2002.

Station	Date	Sample ¹	Sediment Metal Conc. (µg/g)									
			Ag	Al	As	B	Ba	Be	Ca	Cd	Co	Cr
LB1	06/03/02	MSED1	0.035	7171.04	<2.89	39.33	35.56	<28.90	900.28	0.77	3.78	7.43
LB1	06/03/02	MSED2	0.041	6507.94	3.05	29.43	40.56	<20.35	1166.11	0.89	5.16	8.08
LB2A	06/04/02	MSED1	0.069	3588.14	11.91	29.03	76.77	<17.71	1069.25	1.70	10.91	19.99
LB2A	06/04/02	MSED2	0.078	3144.36	12.73	34.91	82.67	<27.40	716.42	1.77	9.18	24.85
010+011	06/04/02	MSED1	0.024	3945.20	<2.57	34.04	29.66	<25.73	1037.47	0.71	3.25	18.99
010+011	06/04/02	MSED2	0.023	4021.58	<2.70	28.47	42.41	<27.03	1005.15	0.53	3.02	16.88
LB2	06/03/02	MSED1	0.025	5915.90	<2.43	30.13	50.01	<24.31	1236.29	0.61	3.39	5.66
LB2	06/04/02	MSED2	0.025	6025.35	<2.42	29.45	50.83	<24.22	1241.25	0.90	4.34	6.03
LB3	06/04/02	MSED1	0.028	5624.23	9.14	25.65	56.18	<15.64	584.52	1.63	5.00	52.12
LB3	06/04/02	MSED2	0.053	6300.77	12.64	40.47	41.86	<24.15	598.14	2.34	7.34	22.94
LB4	06/04/02	MSED1	0.032	758.13	2.76	23.52	16.09	<21.79	176.06	0.46	<21.79	106.69
LB4	06/04/02	MSED2	0.034	771.13	<2.65	34.27	9.62	<26.53	93.83	0.33	<26.53	53.80

¹ MSED1 and MSED2 are duplicates from the same sample.

Table A3, continued. Metal concentrations in sediments from Little Bayou Creek collected June 3-4, 2002.

Station	Date	Sample ¹	Sediment Metal Conc. (µg/g)								
			Cu	Fe	K	Li	Mn	Mo	Na	Ni	P
LB1	06/03/02	MSED1	5.47	9391.88	578.42	6.68	246.50	<28.90	125.26	4.59	163.49
LB1	06/03/02	MSED2	5.98	9372.42	510.56	8.23	488.94	<20.35	55.84	4.96	262.44
LB2A	06/04/02	MSED1	5.93	12912.11	188.46	2.28	1212.26	0.38	52.65	6.37	531.72
LB2A	06/04/02	MSED2	5.62	16153.79	157.67	1.46	1024.51	0.52	<54.79	6.20	506.43
010+011	06/04/02	MSED1	4.98	6808.28	222.18	2.73	<51.47	<25.73	68.14	3.57	154.32
010+011	06/04/02	MSED2	4.50	6549.14	217.62	2.55	<54.05	<27.03	115.94	3.40	125.10
LB2	06/03/02	MSED1	2.51	7513.39	305.57	4.35	<48.61	<24.31	68.59	2.59	<48.61
LB2	06/04/02	MSED2	2.63	10042.63	315.46	4.27	75.10	<24.22	63.24	2.77	<48.45
LB3	06/04/02	MSED1	6.35	11838.23	285.61	5.44	235.33	0.23	71.76	5.12	496.82
LB3	06/04/02	MSED2	6.97	17788.13	338.34	4.46	553.20	0.48	51.28	6.92	595.05
LB4	06/04/02	MSED1	3.70	5921.52	<43.57	<21.79	<43.57	<21.79	<43.57	1.52	190.32
LB4	06/04/02	MSED2	1.87	4761.94	<53.05	<26.53	<53.05	<26.53	78.88	1.16	90.22

¹ MSED1 and MSED2 are duplicates from the same sample.

Table A3, continued. Metal concentrations in sediments from Little Bayou Creek collected June 3-4, 2002.

Station	Date	Sample ¹	Sediment Metal Conc. (µg/g)								
			Pb	Sb	Se	Sn	Sr	Ti	Tl	V	Zn
LB1	06/03/02	MSED1	7.23	<28.90	<28.90	<28.90	5.25	28.34	<28.90	15.03	18.13
LB1	06/03/02	MSED2	7.58	<20.35	<20.35	<20.35	6.13	41.43	<20.35	16.67	21.07
LB2A	06/04/02	MSED1	17.74	<17.71	<17.71	0.25	10.92	15.04	0.45	35.41	20.53
LB2A	06/04/02	MSED2	19.90	<27.40	<27.40	0.38	9.11	22.68	0.37	38.53	22.62
010+011	06/04/02	MSED1	5.38	<25.73	<25.73	<25.73	6.88	3.99	<25.73	9.93	35.57
010+011	06/04/02	MSED2	5.60	<27.03	<27.03	<27.03	6.33	3.74	<27.03	10.14	30.44
LB2	06/03/02	MSED1	3.18	<24.31	<24.31	<24.31	14.29	<24.31	<24.31	10.77	8.79
LB2	06/04/02	MSED2	4.65	<24.22	<24.22	<24.22	14.55	<24.22	<24.22	14.61	8.40
LB3	06/04/02	MSED1	12.90	<15.64	<15.64	0.20	6.25	13.28	<15.64	30.08	35.51
LB3	06/04/02	MSED2	13.02	<24.15	<24.15	0.33	6.46	23.20	<24.15	32.11	27.13
LB4	06/04/02	MSED1	4.05	<21.79	<21.79	0.22	3.47	11.94	<21.79	10.42	18.48
LB4	06/04/02	MSED2	3.00	<26.53	<26.53	0.27	2.06	10.12	<26.53	8.74	13.62

¹ MSED1 and MSED2 are duplicates from the same sample.

Table A4. Metal concentrations in floodplain soils from Little Bayou Creek collected June 3-4, 2002.

Station	Date	Sample ¹	Floodplain Metal Conc. (µg/g)									
			Ag	Al	As	B	Ba	Be	Ca	Cd	Co	Cr
LB1	06/03/02	MFP1	0.024	5651.73	1.41	27.95	37.31	<0.499	359.61	0.50	3.70	5.44
LB2A	06/04/02	MFP1	0.044	4657.82	1.47	19.23	28.47	<0.386	812.98	0.65	2.28	102.72
LB2A	06/04/02	MFP2	0.038	5244.94	1.39	23.32	30.43	<0.475	1024.19	0.62	2.28	84.46
LB2	06/04/02	MFP1	0.042	4317.92	1.28	27.03	51.38	<0.517	1545.71	0.60	2.36	14.69
LB2	06/04/02	MFP2	0.028	3876.64	1.24	21.60	31.97	<0.436	1460.41	0.55	2.37	14.31
LB3	06/04/02	MFP1	0.044	5085.86	2.57	18.94	36.11	<0.375	3338.09	0.81	3.20	26.67
LB3	06/04/02	MFP2	0.049	5520.28	2.73	32.34	37.82	<0.476	3448.88	0.87	3.44	21.90
LB4	06/05/02	MFP1	0.048	3554.04	0.85	27.49	27.15	<0.498	885.26	0.44	1.65	26.99
LB4	06/05/02	MFP2	0.047	3395.25	0.97	23.78	25.26	<0.481	790.91	0.44	1.44	25.90

¹ MFP1 and MFP2 are duplicates from the same sample.

Table A4, continued. Metal concentrations in floodplain soils from Little Bayou Creek collected June 3-4, 2002.

Station	Date	Sample ¹	Floodplain Metal Conc. (µg/g)									
			Cu	Fe	K	Li	Mg	Mn	Mo	Na	Ni	P
LB1	06/03/02	MFP1	5.38	4386.19	418.29	5.04	818.52	371.82	<0.50	132.41	5.38	214.77
LB2A	06/04/02	MFP1	101.58	8584.52	305.92	5.06	747.57	321.17	<0.39	103.31	4.48	175.39
LB2A	06/04/02	MFP2	83.52	7805.73	415.74	4.73	768.60	353.97	<0.47	128.05	4.61	177.43
LB2	06/04/02	MFP1	14.52	4308.06	310.51	2.98	633.20	198.63	<0.52	183.98	4.30	138.92
LB2	06/04/02	MFP2	14.16	4218.88	267.13	2.70	510.50	199.83	<0.44	93.73	3.62	142.56
LB3	06/04/02	MFP1	26.37	5056.47	314.85	3.69	607.35	472.57	<0.38	91.91	4.46	237.50
LB3	06/04/02	MFP2	21.66	5456.53	472.31	3.96	673.32	510.94	<0.48	208.57	4.91	249.05
LB4	06/05/02	MFP1	26.69	5186.30	306.60	2.55	478.46	317.93	<0.50	140.17	3.74	174.58
LB4	06/05/02	MFP2	25.61	4680.37	273.21	2.44	438.41	255.18	<0.48	131.47	3.13	153.72

¹ MFP1 and MFP2 are duplicates from the same sample.

Table A4, continued. Metal concentrations in floodplain soils from Little Bayou Creek collected June 3-4, 2002.

Station	Date	Sample ¹	Floodplain Metal Conc. (µg/g)								
			Pb	Sb	Se	Sn	Sr	Ti	Tl	V	Zn
LB1	06/03/02	MFP1	7.92	0.56	0.18	0.27	3.98	9.37	<0.50	10.12	18.89
LB2A	06/04/02	MFP1	7.76	1.08	<0.39	<0.39	6.21	11.25	0.38	11.83	37.08
LB2A	06/04/02	MFP2	7.25	0.87	0.07	0.19	7.10	13.08	<0.47	11.05	38.83
LB2	06/04/02	MFP1	5.87	0.47	<0.52	0.31	10.22	3.11	<0.52	11.57	45.51
LB2	06/04/02	MFP2	5.72	0.46	<0.44	0.12	10.01	3.32	<0.44	10.88	21.97
LB3	06/04/02	MFP1	9.32	0.72	0.15	0.23	10.91	6.62	0.64	15.31	27.30
LB3	06/04/02	MFP2	9.77	0.73	<0.48	0.33	11.12	6.98	0.61	16.28	28.37
LB4	06/05/02	MFP1	5.66	0.52	<0.50	0.17	7.47	6.00	<0.50	8.69	39.84
LB4	06/05/02	MFP2	5.37	0.49	0.08	0.14	6.57	4.86	<0.48	8.88	29.77

¹ MFP1 and MFP2 are duplicates from the same sample.

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