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Summary of University of Kentucky Surface Water Metal Data Collection Efforts Relating to Total Maximum Daily Load Development for Little Bayou and Bayou Creeks at the Paducah Gaseous Diffusion Plant 2007-2008

June 24, 2010

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Summary of University of Kentucky
Metal Data Collection Efforts at the Paducah Gaseous Diffusion Plant
2007-2008

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ACKNOWLEDGEMENTS

This research was supported by Andy Kellie and Mike Kemp at Murray State University, Steve Meiners from Tricord Inc., and McCoy and McCoy Laboratories in Madisonville, Kentucky. Funding for the project was provided by DOE-KRCEE (DOE Grant Number DE-FG05-03OR2302).

EXECUTIVE SUMMARY

Total Maximum Daily Load (TMDL) is a term used to describe the maximum amount of material (i.e. chemical, physical, or biological) a waterway can assimilate without violating an associated Water Quality Standard (WQS). When a chemical exceeds a WQS in a stream, the stream is placed on a list of impaired waters because the impairment precludes the stream from meeting its designated use. Section 303(d) of the Clean Water Act and the Environmental Protection Agency's (EPA's) Water Quality Planning and Management Regulations (40 CFR Part 130) require that states develop TMDLs for those water bodies that are not meeting their designated uses.

The Kentucky Division of Water (KDOW) first placed Bayou and Little Bayou Creeks on their 303(d) list of impaired waters in 1998. The listing was based upon potential impacts of the concentrations of one or more of four (4) chemicals: 1) Copper; 2) Mercury; 3) Lead; and 4) Iron. A list of the impacted LBC and BBC stream segments and associated chemicals is provided in Table ES1.

Table ES.1. Impacted segments of Little Bayou and (Big) Bayou Creeks in the Vicinity of the PGDP

Stream Name	River Miles	Chemical
(Big) Bayou Creek into Ohio River	0.5 to 11.9	Copper
(Big) Bayou Creek into Ohio River	0.5 to 11.9	Mercury
(Big) Bayou Creek into Ohio River	0.5 to 11.9	Lead
Little Bayou Creek into Bayou Creek	0.0 to 7.2	Copper
Little Bayou Creek into Bayou Creek	0.0 to 7.2	Lead

The EPA provides guidelines for developing TMDLs for impaired waters (USEPA, 1991) and at http://www.epa.gov./owow/tmdl/. The major components of the TMDL development process are: 1) data collection and analysis, 2) determination of the TMDL, 3) determination of the existing load, and 4) determination of the load reduction. The final TMDL and associated load reductions are typically allocated among both point and nonpoint sources as well as a margin of safety. In recent years, USEPA (2007) has developed a load duration curve approach for determining the TMDL and associated load allocations. Such an approach has been employed in the current study.

In order to evaluate the need for Cu, Hg, Pb and Fe TMDLs for LBC and BBC, KRCEE developed a workplan for collection and assessment of surface water metals data and implemented the workplan in 2007. Historical KRCEE TMDL development activities are documented in reports for KRCEE Project 6: Surface Water Assessment and Management of the PGDP Facility and the Surrounding Wildlife Management Area http://www.uky.edu/krcee/Reports.html.

Based on historical KRCEE project results and ensuing discussions with the KDOW this project's supplemental data collection and assessment was undertaken to determine the need for specific LBC and BBC TMDLs. This project addressed: 1) collection of flow and metals concentration data over a 1 year period on LBC and BBC; 2) data quality assessment; and 3) comparative assessment of the collected data relative to the need for TMDL development. Comparative assessment included comparison of data from each site and analyte to: 1) WQS; 2) Background concentrations; 3) Uprgadient/downgradient location relative to discharges from the PGDP; and 4) reference concentrations.

Summarily,

Evaluation of mercury data does not support a conclusion that either Big Bayou or Little Bayou Creeks should be listed for mercury impairment.

Based on a 100% compliance level, six (6) of the nine (9) monitored stations failed to satisfy either the chronic or acute standards for copper (text conversation qualifies this statement)

Five (5) of nine (9) stations failed to satisfy either the chronic or acute standards for lead.

> Sites BC2 and LBC2 exceeded both acute and chronic lead concentrations.
>
> Sites BC2 and LBC2 had mean lead concentrations statistically higher than the upstream/background lead concentrations.
>
> Mean lead concentrations down gradient of BC2 do not exceed water quality standards.

All of the monitoring stations failed to satisfy either the chronic or acute standards for iron using a 100% compliance level,

> Only site BC4 exceeded both chronic and acute copper standards and exhibited a mean copper concentration statistically higher than the upstream/background copper concentration.
>
> Mean iron concentrations at BBC and LBC downstream sample sites were not statistically different than their respective mean upstream/background concentrations.

Thus any conclusion about the potential source of excessive iron coming from discharges from the PGDP is unsupported.

1.0 INTRODUCTION

Section 303(d) of the Clean Water Act and the Environmental Protection Agency (EPA) Water Quality Planning and Management Regulations (40 CFR Part 130) require that states develop Total Maximum Daily Loads (TMDLs) for most water bodies that are not meeting designated uses. For regulated metals, the TMDL is a term used to describe the maximum amount of a metal a stream can assimilate without violating a metal-specific Water Quality Standard (WQS). The units of load measurement are typically mass of metal per unit time (e.g., mg/hr, lbs/day).

The TMDL process establishes the allowable loadings of metals or other quantifiable parameters for a waterbody based on the relationship between pollution sources and instream water quality, and flow conditions. This method exists so that states can establish water quality-based controls to reduce pollution from both point and nonpoint sources and restore and maintain the quality of their water resources. This report summarizes data collected in support of the development of metals TMDLs for both the (Big) Bayou Creek (BBC) and Little Bayou Creek (LBC) which bracket the DOE Paducah Gaseous Diffusion Plant in McCracken County, Kentucky.

1.1 The Paducah Gaseous Diffusion Plant

The Paducah Gaseous Diffusion Plant (PGDP) is an active uranium enrichment facility located approximately 10 miles west of Paducah, Kentucky, and 3.5 miles south of the Ohio River in the western part of McCracken County (Figure 1). The plant is on a U.S. Department of Energy (DOE) reservation; the total acreage is divided as follows:

- 748 acres-within a restricted area that encompasses plant industrial operations;
- Approximately 822 acres uninhabited buffer zone surrounding the restricted area; and
- 1986 acres - leased to Commonwealth of Kentucky as part of West Kentucky Wildlife Management Area. (WKWMA).

Bordering the PGDP reservation to the northeast, between the plant and the Ohio River, is a Tennessee Valley Authority (TVA) reservation occupied by the Shawnee Steam Plant. Several private properties (both agricultural and rural residential) border the DOE reservation to the east and west (Figure 2). As can be seen from the figure, Bayou Creek lies to the west of the PGDP while Little Bayou Creek lies to the east of the PGDP. In addition to natural drainage from the surrounding area, both creeks receive direct runoff from the PGDP through a series of drainage ditches and outfalls as shown in Figures 3 and 4.

1.2 Water Quality Assessment

Beginning in 1998, the Kentucky Division of Water (KDOW) placed Bayou and Little Bayou Creek on their 303(d) list of impaired waters. (Note: Bayou Creek is frequently referred to as Big Bayou Creek, a convention which will be used in the rest of this report). The listing was based on historical collection and assessment of surface water data collected by the DOE, KDOW, and the University of Kentucky Department of Biological Sciences through KDOW funding. A list of the impacted stream segments and the associated metal is provided in Table 1.

Table 1. Impaired Stream Segments for (Big) Bayou and Little Bayou Creeks (2008)

Stream Name	River Miles	Metal
(Big) Bayou Creek into Ohio River	0.5 to 11.9	Copper
(Big) Bayou Creek into Ohio River	0.5 to 11.9	Mercury
(Big) Bayou Creek into Ohio River	0.5 to 11.9	Lead
Little Bayou Creek into Bayou Creek	0.0 to 7.2	Copper
Little Bayou Creek into Bayou Creek	0.0 to 7.2	Lead

1.3 Historic Data Collection and Analysis

The Department of Energy and the University of Kentucky Department of Biological Sciences have been collecting metals data from Bayou and Little Bayou Creeks and PGDP outfalls since 1987.

1.3.1 University of Kentucky/Division of Water Sampling Sites

The UK/KDOW sampling sites are shown in Figures 3 and 4 as well as a schematic of the streams and outlets (Figure 5). Figure 3 is an illustration of the Bayou Creek system superimposed over a topographical map of the area and Figure 4 is an enlargement of the PGDP sector of Figure 3. Figure 5 shows the major collecting sites, as well as the intermittent (003, 013, 014, 015, 016, 017) and continuously flowing PGDP effluent discharge points.

Historical sampling sites on Big Bayou Creek, in downstream order, include BB1A, BB1, BB3, BB4, BB5, BB6, BB7, BB8, BB9, CF1, and CF3. Stations BB2 and BB2A are situated on the unnamed tributary that enters Big Bayou Creek just upstream of station BB3 (Figure 5). Stations CF1 and CF2 are upstream of the juncture of Big and Little Bayou Creeks and CF3 is below this confluence and near the Ohio River. Locations of these stations and the position of the continuously flowing effluent discharge points are given in Table 2 in stream kilometers (km) measured upstream from the Ohio River. The intermittent effluent discharges of outfall 003 and the north/south diversion ditch (NSDD) are illustrated in Figures 3 and 4. The N-S ditch enters Little Bayou Creek about 1 km upstream of station LB4. Figures 3 and 4 also show intermittent effluent ditches 013 on Little Bayou Creek, as well as 017 and 014 on Big Bayou Creek. Intermittent effluents 016 and 015 are not shown in Figures 3 and 4. They enter Big Bayou Creek just below station BB3 and upstream of BB4, respectively (Figure 5). The continuous effluent flows originate from plant operations, whereas the intermittent effluent flows are primarily generated from “runoff” from the plant during periods of moderate to high rainfall.

In addition to stream sampling sites, the University of Kentucky also analyzed fish tissues for PCB concentrations for fish collected from Little Bayou Creek. These results, along with soil and sediment samples were used to develop a PCB TMDL for Little Bayou Creek (Vick, et al, 2001)

1.3.2 KRCEE/Murray State University Analysis of Historical Data

The Kentucky Research Consortium for Energy and Environment (KRCEE) was created at the University of Kentucky in 2003 to support cleanup efforts associated with the Paducah Gaseous Diffusion Plant. As part of their research efforts, Murray State University was contracted to perform an analysis of historic metals data obtained from sampling Bayou and Little Bayou Creeks for the period of 1993 through 2003. The purpose of this analysis was to determine whether TMDLs were necessary for selected metals (i.e. copper, iron, mercury, lead) and if so whether there was sufficient historical data for such analyses.

As part of the study, Murray State collected chemical and flow data from three different sources: 1) Oak Ridge Environmental Information Systems (OREIS), 2) Department of Energy (DOE) Annual Environmental Reports, and 3) additional reports collected and archived by KRCEE. The OREIS database served as the primary data source for the analysis. The database was searched for outfall surface water discharge (i.e. K sites) and in-stream sampling data (i.e. L sites). The specific location of these sites is provided in Figures 6-8 and Tables 3 and 4. Mean values for all of sites for the period of 1993 to 2003 are provided in Tables 5-8.

All available metals and hardness data for these sites for the period of 1993 to 2003 were collected and sorted. The hardness data were used in determining compliance of the lead and copper values with the water quality standards. Following an analysis of the entire data set, the following conclusions were reached (Kemp and Kellie, 2006):

“Based on the historical data, TMDLs are warranted for lead in Bayou Creek and Little Bayou Creek. A TMDL for copper is warranted for Bayou Creek, but the data are inconclusive for Little Bayou Creek. Additional monitoring is advisable to confirm the copper level in Little Bayou Creek. Although some discrete data have shown iron concentrations above the water quality limits, annual and overall average iron concentrations in both creeks are below the limit of 1.0 mg/L. A TMDL for iron does not appear to be necessary, but additional monitoring is advisable to confirm the level of iron in both creeks.”

“Mercury data are sparse, but the measured concentrations are well below the water quality limits. Data from national atmospheric monitoring indicates that atmospheric deposition could easily be the primary source of mercury in Bayou Creek and Little

Bayou Creek. The background level of mercury in both creeks appears to be substantially higher than the level of mercury contributed by the PGDP outfalls. Additional monitoring is needed to confirm mercury levels and to determine whether or not TMDL is required."

Based on the results of this study, the Kentucky Division of Water requested that additional sampling be conducted to provide more up-to-date data for use in either delisting the associated stream segments or for use in developing TMDLs.

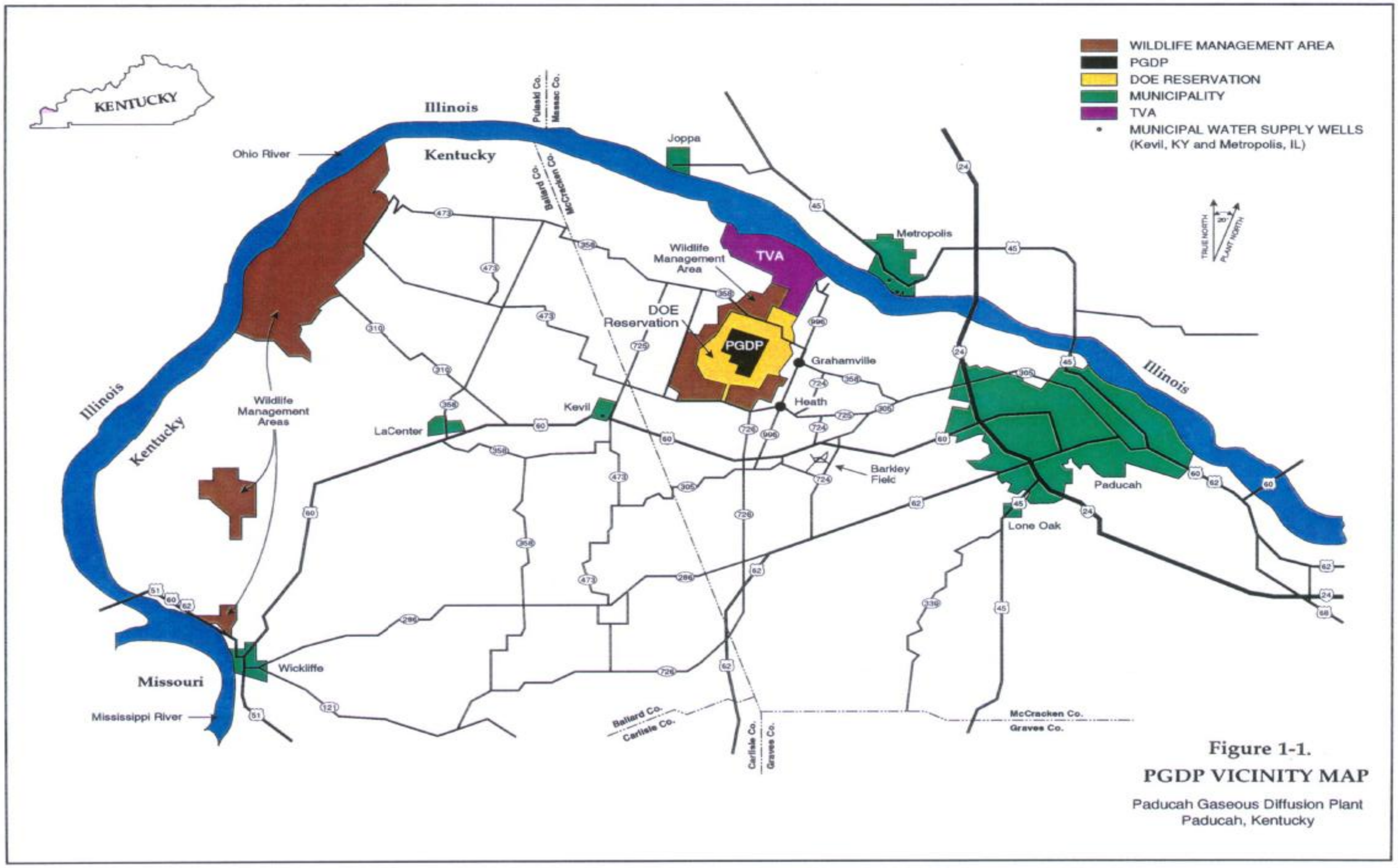

Figure 1. PGDP Vicinity Map (DOE, 2001)

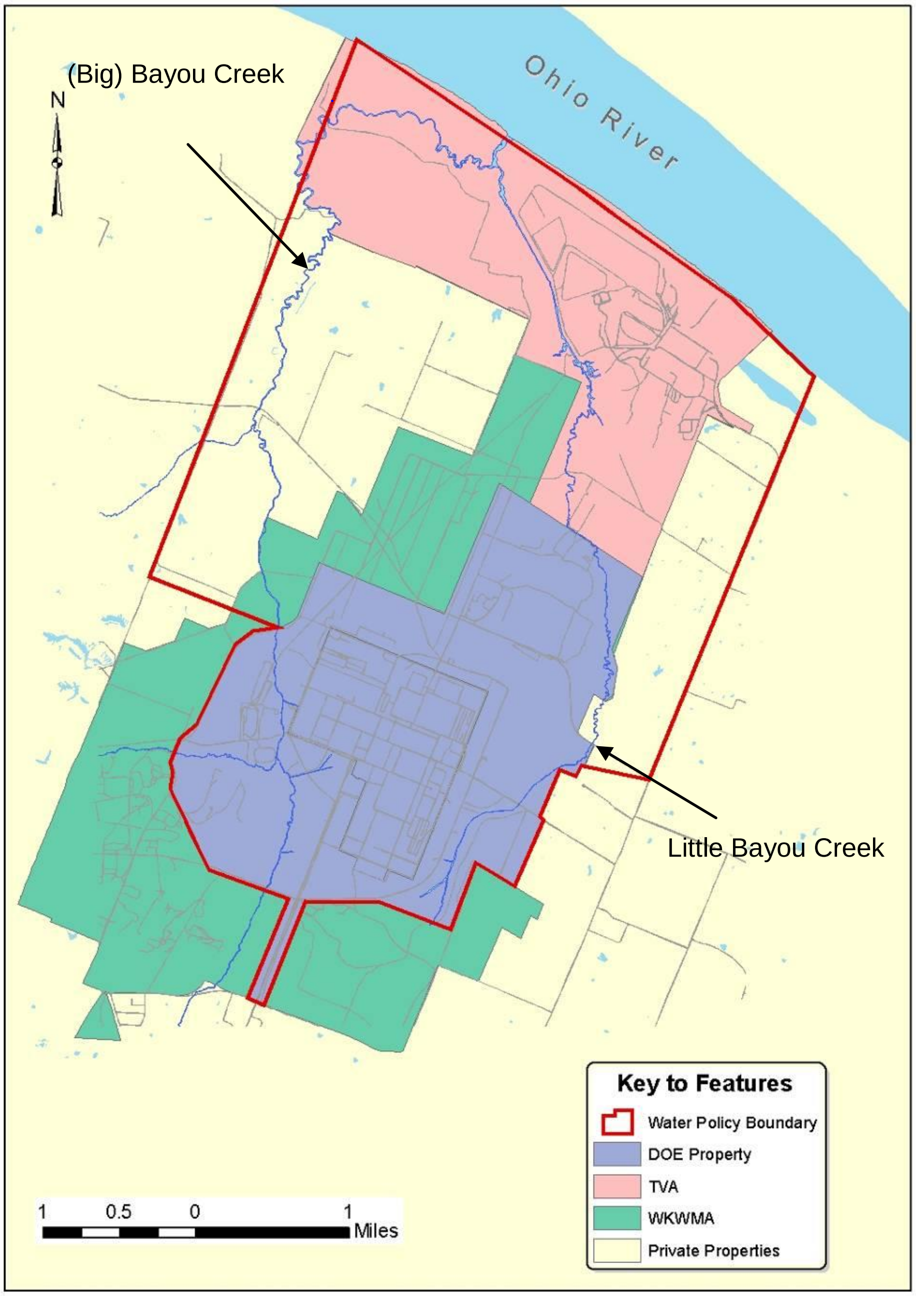

Figure 2. PGDP Site Location and Adjacent Properties (KRCEE, 2007)

Table 2. Location of UK/KDOW Stream Sampling Stations and Effluent Discharge Points to Big Bayou (BB) and Little Bayou (LB) Creeks (Birge and Price, 2001)

Effluent Ditch	Stream Location	Stream Kilometer[1]
	BB1 (upstream reference)	13.5
009______		12.1
	BB2 (tributary)[2], BB2A	11.5
	BB3	11.7
008______		11.2
	BB4A	11.0
	BB4	10.8
006______		10.6
	BB5	10.5
001______		10.4
	BB6	10.2
	BB7	9.5
	BB8	7.4
	BB9	2.8
	CF1	1.0
	CF3	0.2
	LB1 (upstream reference)	11.4
012______		9.8
011______		9.4
	LB2A	9.2
010______		9.1
	LB2	9.0
002 ______		8.6
	LB3	7.8
	LB4	4.3
	CF2	1.0

[1] Measured as upstream distance from confluence with the Ohio River.
[2] Collecting stations BB2 located on a tributary 1.5 Km upstream of its confluence with Big Bayou Creek and BB2A located near the confluence.
[3] Collecting stations BB1A and BB1AA (not shown) are located 200 and 400 m upstream of station BB1.

Figure 3. UK/KDOW Sampling Sites (1997-2007)
(Birge and Price, 2001) **(red lines = effluent ditches; red dots are UK/KDOW sample locations)**

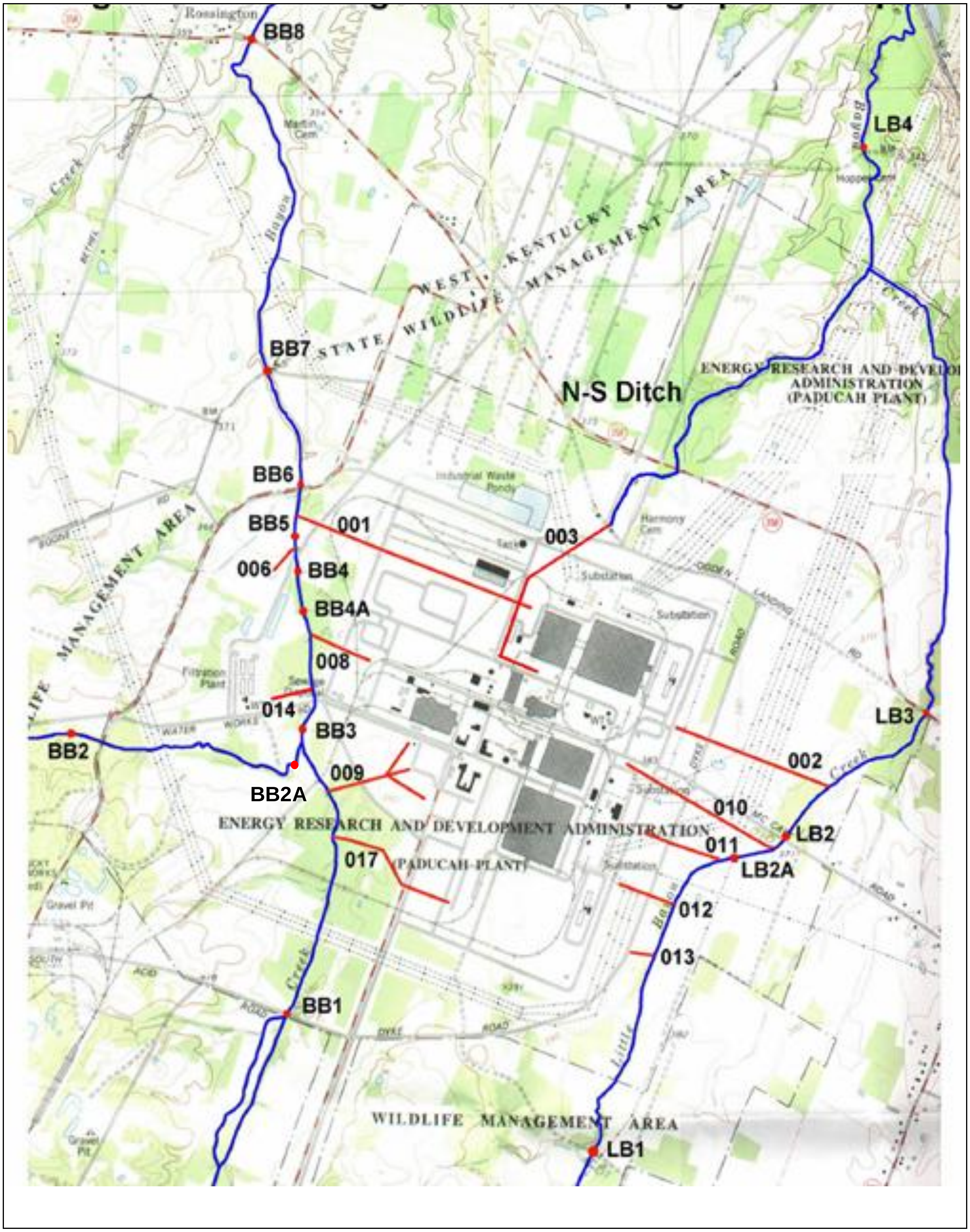

Figure 4. Close-up of UK/KDOW Sampling Sites (1997-2007)
(Birge and Price, 2001) **(red lines = effluent ditches; red dots are UK/KDOW sample locations)**

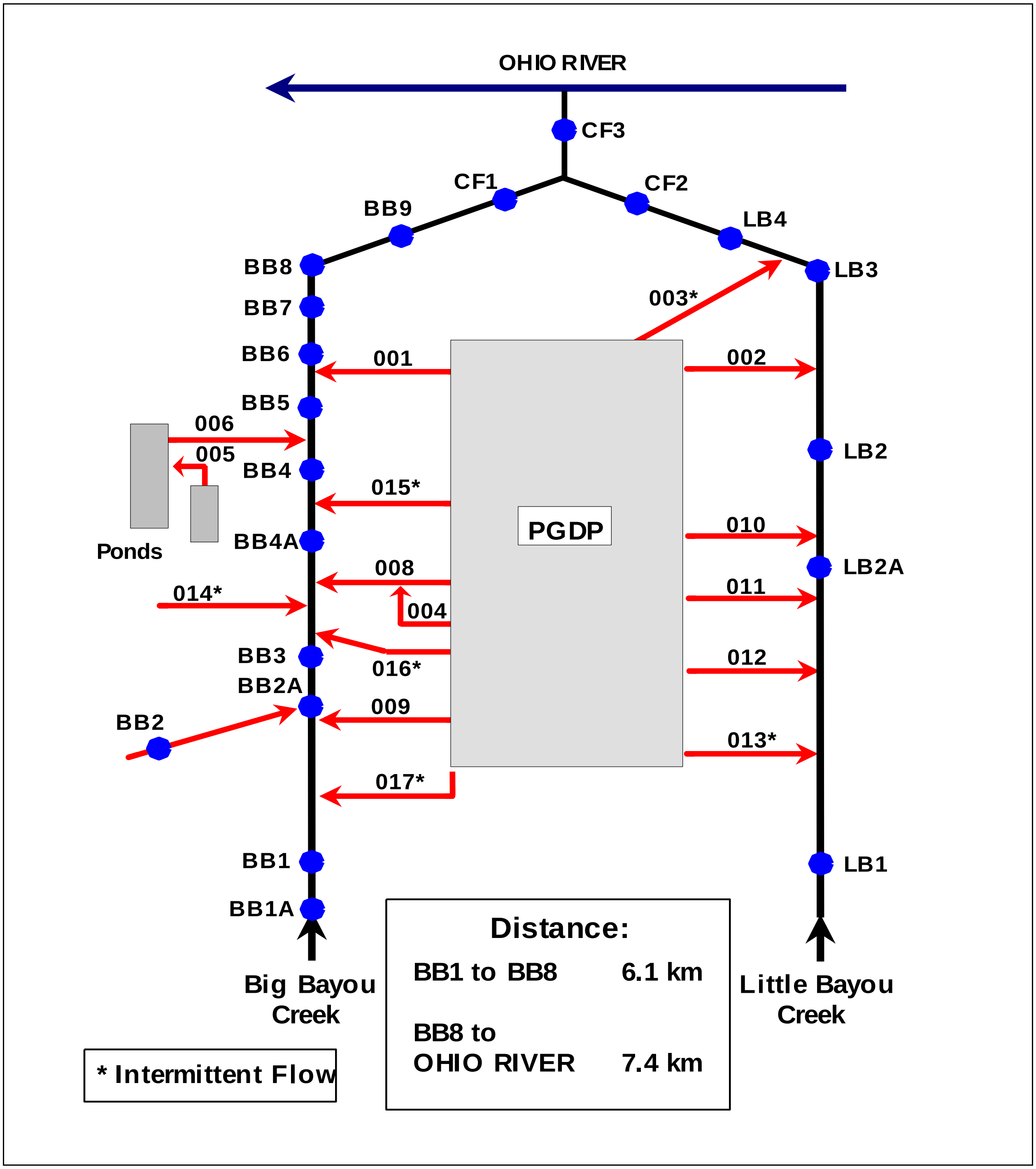

Figure 5. Schematic Map of PGDP Study Area
(Birge and Price, 2001)

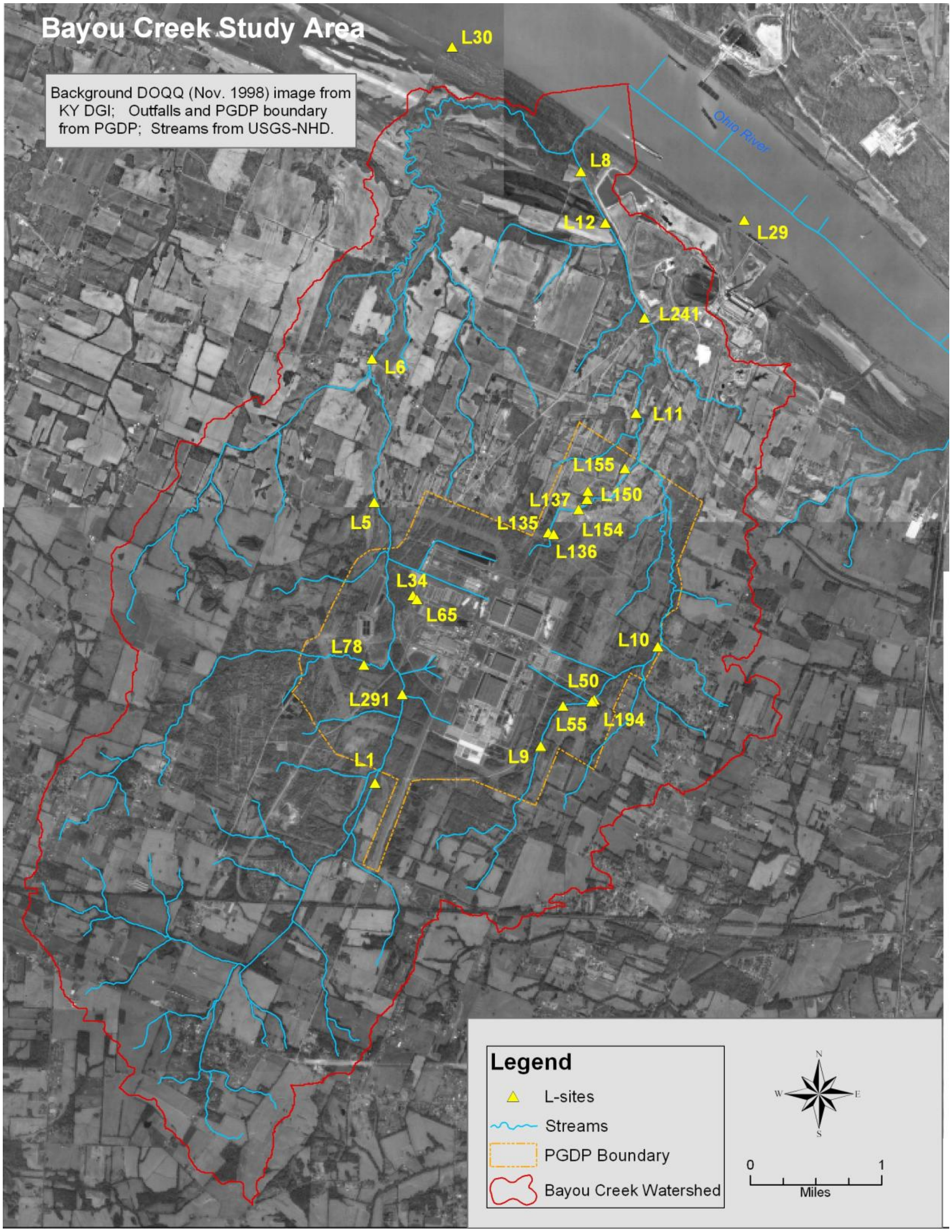

Figure 6. Location of Stream Sampling Sites (Kemp and Kellie, 2006)

Table 3. Description of Stream Sampling Locations, Bayou and Little Bayou Creeks (Kemp and Kellie, 2006)

Location	Description
L1	Upstream of plant effluents in Bayou creek
L5	Downstream of plant effluents in Bayou Creek
L6	Downstream of plant effluents in Bayou Creek
L8	Mouth of Bayou and Little Bayou Creeks
L10	Downstream of plant effluents in Little Bayou Creek
L11	Downstream of plant effluents in Little Bayou Creek
L12	Downstream of plant effluents in Little Bayou Creek
L29	Ohio River upstream of confluence with Bayou and Little Bayou Creeks
L30	Ohio River downstream of confluence with Bayou and Little Bayou Creeks
L55	Little Bayou Creek at confluence with Outfall 011
L56	Little Bayou Creek at confluence with Outfall 013
L64	Massac Creek background location
L135	Upstream of C-746-S&T Landfill, surface runoff
L136	At C-746-S&T Landfill, surface runoff
L137	Downstream of C-746-S&T Landfill, surface runoff
L150	At C-746-U Landfill, surface runoff
L154	Upstream C-746-U Landfill, surface runoff
L155	At C-746-S&T Landfill, surface runoff
L194	Little Bayou Creek downstream of Outfall 010
L241	Downstream of plant effluents in Little Bayou Creek
L291	Upstream of plant effluents in Bayou creek
L306	Ohio River at Cairo, Illinois

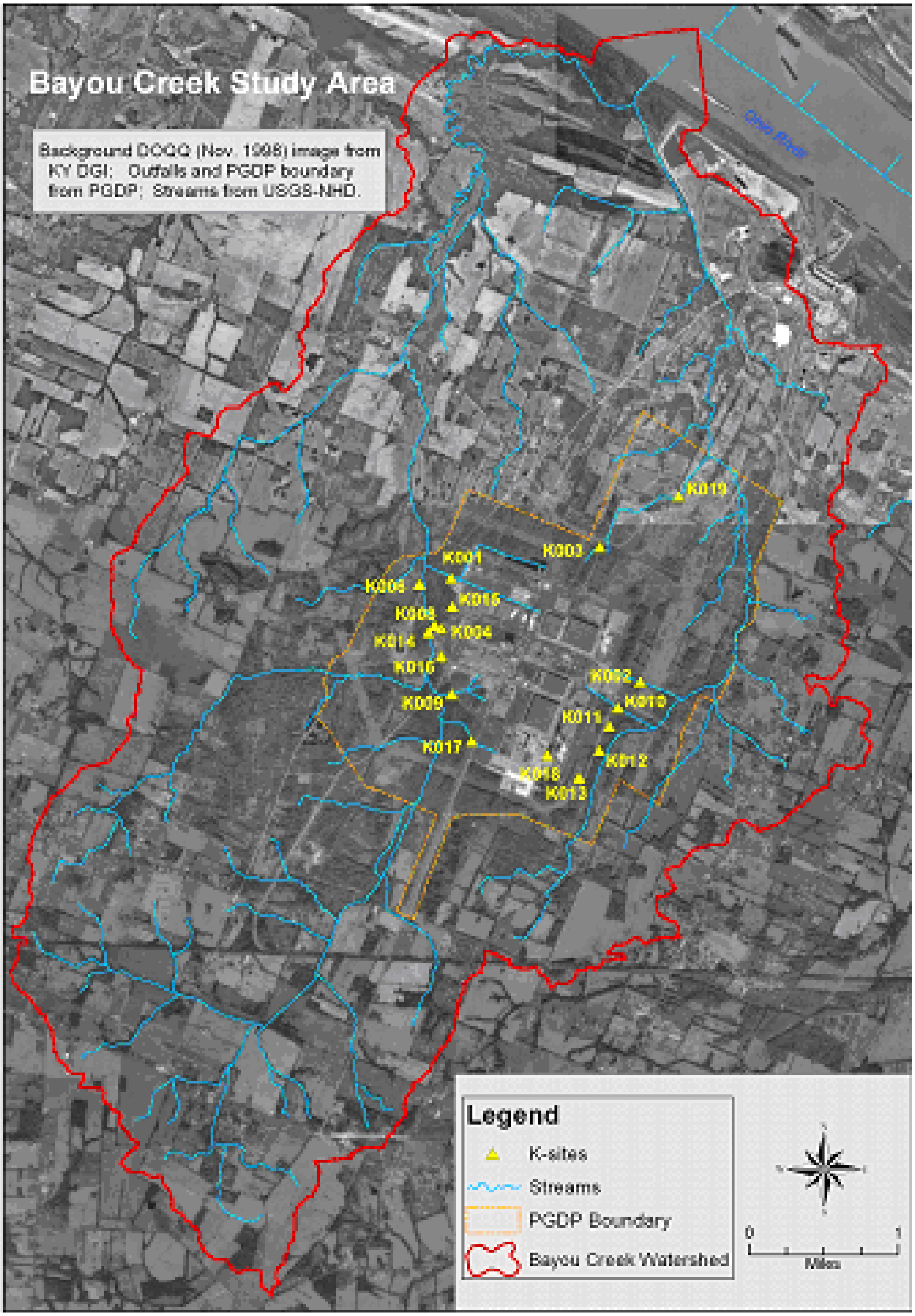

Figure 7. Location of Outfall Sampling Sites (Kemp and Kellie, 2006)

Table 4. Description of Outfall Sampling Locations, Bayou and Little Bayou Creeks (Kemp and Kellie, 2006)

Table of Outfalls/Sampling Locations at PGDP		
Location	**Drainage Source**	**Contributing Processes**
K001	C-616, C-335, C-535, C-537, C-337A	RCW in blowdown treatment, C-337A vaporizer condensate, C-335 air plant, switch yards, scrap yards, C-335 roof
K002	C-337, C-360, C-637	C-337 roof, C-360 autoclave condensate, C-637 windage
K003	North edge of plant	Storm water overflow of diversion ditch, transformer oil filtration
K004	Sewage treatment plant	Sewage treatment liquid effluent
K005	C-611 primary sludge lagoon	Process and sanitary water treatment (water supply)
K006	C-611 secondary lagoon	Process and sanitary water treatment (water supply)
K007	Outfall eliminated	
K008	Main central plant sewer and sewage treatment plant	C-600 air plant, paint shop, sewage plant, motor cleaning, roof drains, degreasers
K009	C-720, C-710, C-100 area, C-200, C-333	Maintenance shops, laboratory, roof drains, cascade
K010	C-331, C-531, Kellogg pad (storage area)	Cascade, switchyard storage
K011	C-620 air plant, C-315, C-340, C-333, C-533, C-540	Cascade, switchyard, metals plant (inactive) transformer oil filtration
K012	C-333, C-333A, C-533, C-633	Cascade, switchyard, C-333A vaporizer condensate, cooling tower windage
K013	Southeast corner of plant	Surface drainage, cylinder storage areas
K014	C-611 U-shaped sludge lagoon	Sanitary water sand filter backwash
K015	West central plant areas, C-749, C-404	Surface drainage from closed radioactive waste disposal areas
K016	Small area south of C-615	Surface drainage only
K017	Southwest corner of plant	Surface drainage, cylinder storage yards
K018	Cylinder Yard	Surface drainage, cylinder storage yards
K019	North South Diversion Ditch	Plant discharges

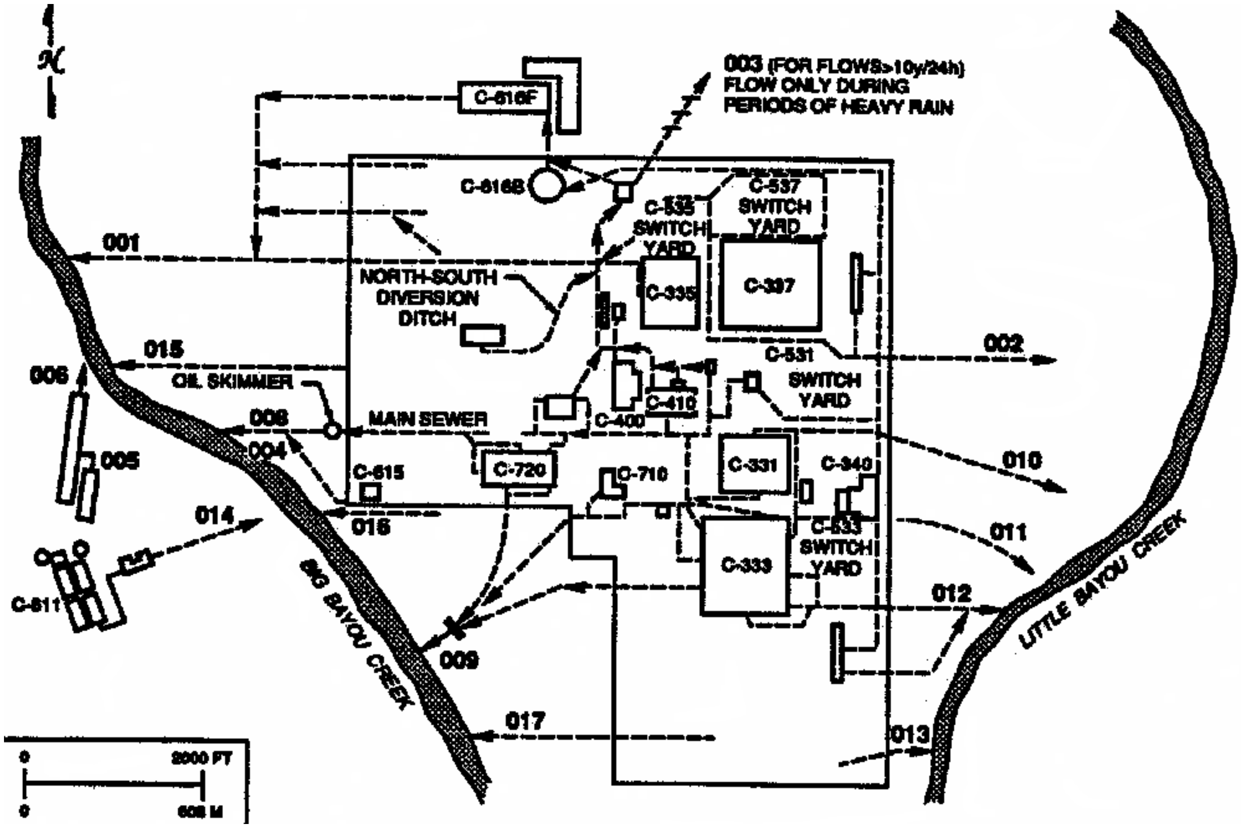

Figure 8. Approximate Outfall Locations
(Kemp and Kellie, 2006)

Table 5. Bayou Creek L Site Average Annual Concentration, mg/L 1993-2003 (Kemp and Kellie, 2006).

L-Site	Cu mg/l	Fe mg/l	Hg mg/l	Pb mg/l
1	0.03	1.13	2.3E-04	0.10
291	0	0.56	NA	0
5	0.03	0.47	NA	0.13
6	0.02	0.49	2.0E-04	0.12

NA – Not Available

Table 6. Bayou Creek Outfalls Average Metals Concentration, mg/L, 1993-2003 (Kemp and Kellie, 2006).

Outfall	Cu mg/l	Fe mg/l	Hg mg/l	Pb mg/l
1	0.02	0.49	1.6E-04	0.10
4	0.02	0.32	8.0E-05	0.15
6	0.01	0.67	1.5E-04	0.07
8	0.01	0.25	1.6E-04	0.09
9	0.01	0.57	1.0E-04	0.10
15	0.02	1.32	1.5E-04	0.15
16	0.01	0.69	1.3E-04	0.09
17	0.02	1.00	1.2E-04	0.12

Table 7. Little Bayou Creek L Site Average Metals Concentration 1993-2003 (Kemp and Kellie, 2006).

L-Site	Cu mg/l	Fe mg/l	Pb mg/l
194	0.02	0.79	0.14
10	0.002	0.55	0.001
136	NA	0.68	NA
135	NA	1.68	NA
154	NA	2.57	NA
137	NA	2.38	NA
150	NA	5.42	NA
155	NA	3.36	NA
11	0.007	0.93	0.001
8	0.021	1.10	0.10

NA – Not Available

Table 8. Little Bayou Creek Outfalls Average Metals Concentration 1993-2003 (Kemp and Kellie).

Outfall	Cu mg/l	Fe mg/l	Pb mg/l
2	0.03	0.99	0.12
10	0.01	0.61	0.08
11	0.02	0.78	0.10
12	0.02	1.23	0.10
13	0.02	1.55	0.10
18	0.01	3.10	0.03
19	0.03	0.72	0.14

1.4 UK/KRCEE LBC and BBC SW Sampling 2007-2008

Based on the recommendations of the Kentucky Division of Water, KRCEE and its contractors collected metals and flow data from Bayou and Little Bayou Creeks during the Fall of 2007 and the winter and spring of 2008. After collection, the samples were transported to McCoy and McCoy Laboratories Inc. in Madisonville, Kentucky for analysis.

The locations of the sites sampled in the KRCEE study are shown in Figures 9 and 10. These sites were selected so as to bracket discharges from the PGDP into both Big Bayou and Little Bayou Creeks as well as to coincide with sites previously sampled as part of the UK/KDOW sampling efforts. The relationships between the sampling sites in the UK/KDOW studies the KRCEE study are summarized in Table 9. These sample sites provided a baseline for the study. The locations included five on (Big) Bayou Creek (i.e. BC1 – BC5), three on Little Bayou Creek (i.e. LB1 – LB3), and one on Massac Creek (MC1). As can be seen from Figures 6 and 7, sampling sites BC1, BC5, LB3, and MC1 also correspond to the location of existing USGS streamflow stations 03611800, 03611850, 03611900, and 03611260 respectively.

Table 9. Relationship of UK/KDOW and UK/KRCEE Sampling Sites

UK/KRCEE Station ID	UK/KDOW Station ID
BC1	BB1
BC2	BB3
BC3	BB5
BC4	BB6
BC5	BB8
LBC1	LB1
LBC2	LB3
LBC3	LB4
MC1	NA

1.5 Laboratory Analysis

All of the samples collected as part of the UK/KRCEE study and sampling program were analyzed by McCoy and McCoy, LLC located in Madisonville, Kentucky. In addition to metals analyses, the laboratory also determined the hardness of the water for each sample. Hardness values were determined because the amount of "free" metals in the water column will be dependent upon the hardness of the water. As a consequence, the water quality standards for many metals (e.g. copper, lead) are expressed as a function of the hardness (see Table 10).

Table 10. Water Quality Standards for Selected Metals (401 KAR 5:031)

Chemical	Domestic Water Supply Human Health Criteria in μg/L	Warm Water Aquatic Habitat Criteria in μg/L[1]	
		Acute	Chronic
Copper		e(0.9422 (ln Hard*)-1.700)	e(0.8545 (ln Hard*)-1.702)
Lead		e(1.273 (ln Hard*)-1.460)	e(1.273 (ln Hard*)-4.705)
Iron		4,000	1,000
Mercury	2.0	1.4	0.77

[1]The chronic criterion for iron shall not exceed three and five tenths (3.5) mg/l if aquatic life has not been shown to be adversely affected. *Hard = Hardness as mg/l $CaCO_3$.

1.6 Flow Data

Flow data associated with each sample was obtained using one of the four USGS gauging stations located in the study area or by using a proportional area method for those sites not associated with a USGS gauging station. The later values were then field validated using cross-sectional data and measured stream velocities. Cross sectional data was obtained through a contract with Murray State University while flow velocities values were obtained through a contract with Tricord, Inc.

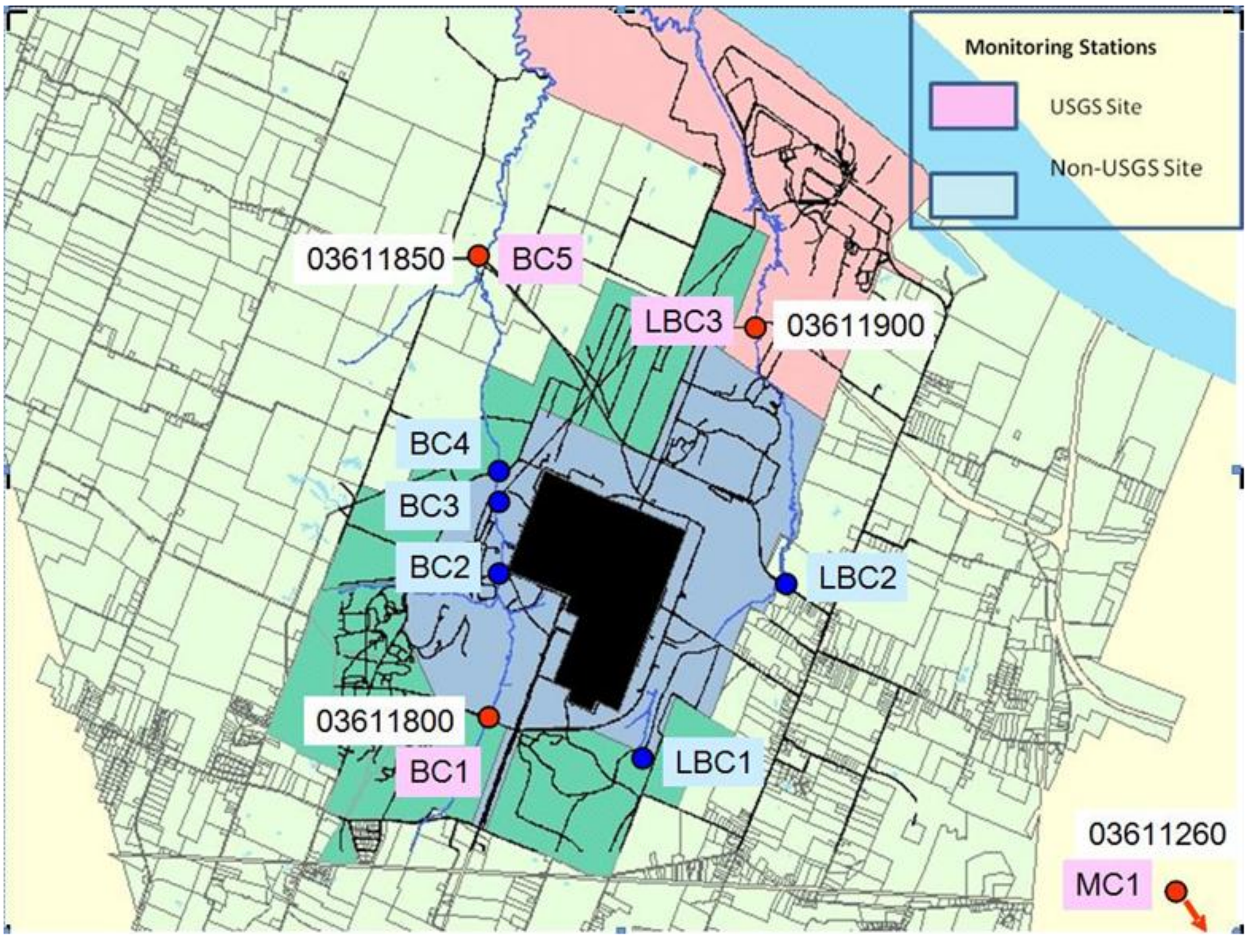

Figure 9. KRCEE Sampling Stations 2007-2008

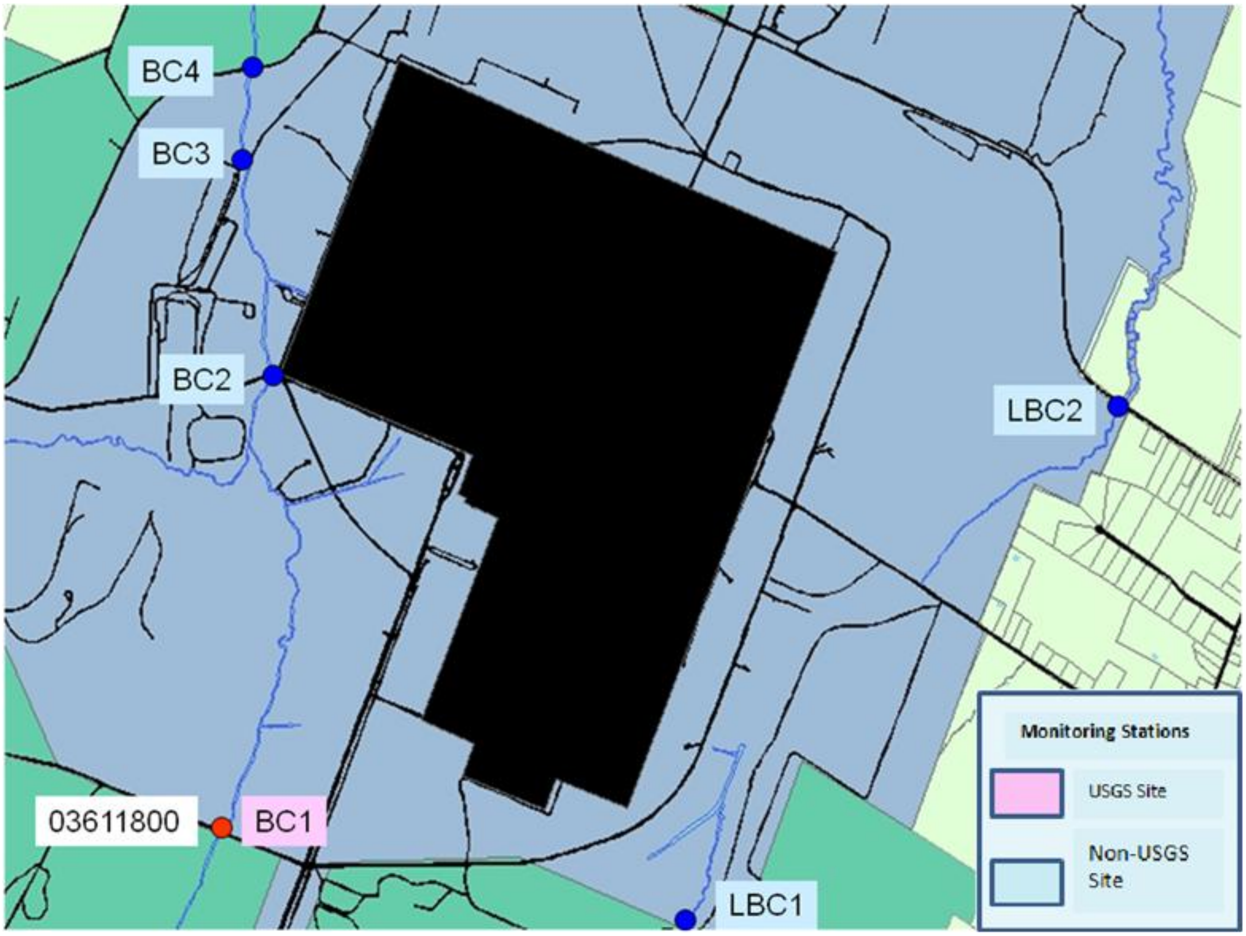

Figure 10. Close-up of KRCEE Sampling Stations 2007-2008

1.7 Quality Assurance Results

All samples were collected using Kentucky Division of Water Standard Operating Procedures for collection of water quality data (KDOW, 2010). This included the collection of both blank and duplicate samples for quality control and quality assurance. All samples were assigned a random sample ID prior to submittal to the water quality lab. An index of the assigned sample IDs and the actual corresponding sample location and sample status (i.e. regular, duplicate, or blank) was then transmitted separately to the quality assurance officer at the University of Kentucky.

The USEPA (2008) recommends a protocol for duplicate analysis that relies on a maximum Relative Percent Difference (RPD) of 20% for all samples (original and duplicate) that are at least five times greater than the Contract Required Quantification Limit (CRQL). When the result concentrations are less than 5*CRQL, the protocol recommends that the maximum relative difference be less than or equal to the CRQL. The CRQL is dependent upon both the analyte and the analytical detection method (EPA, 2005). Duplicate analyses for all four analytes (i.e. copper, iron, lead, and mercury) and all the sample collection dates is summarized in Tables 11-14.

The tables indicate that 89% of the copper duplicates, 78% of the iron samples, 100% of the lead samples, and 100% of the mercury samples meet the EPA duplicate criteria. Iron duplicate sample results were slightly below the optimal target of 90% and the other three analytes essentially met the 90% criteria. It should be noted that 3 of the 4 iron duplicates that failed to satisfy the 20% RPD target, were all less than 30%. As a result, the results were deemed acceptable.

Comparisons of sample results to blank samples prepared at the time of collection (for each analyte) are provided in Tables 15-18. In each case the measured value was compared to the expected value (e.g. 0.0). Since none of the minimum detection limits (MDLs) for the analytical analyses were zero, the associated chemical-specific MDL was used instead. In addition to a visual inspection/comparison, a statistical t-test comparing the mean of the sample results with the MDL was also performed. In each case, using a 90% confidence limit, the mean of the sample results was found to be not statistically different than the MDL. Sample sets collected in the first several months of the study had associated sample blank results essentially equal to the MDL. Occasionally the copper and iron values were slightly above that value. As part of the normal QA/QC review it was discovered that distilled water was being used for the blanks instead of de-ionized water. Following the 11/15/2007 sampling event, de-ionized water was used for all blanks. The results for deionized blanks were identical to the MDL for all subsequent analyses.

2.0 ANALYSIS

A summary of the mean metals concentrations for each station is provided in Table 19 and Figures 11 – 18. The maximum and minimum observed values for each station are displayed in each figure by a circle and a triangle, respectively. In each figure, the results associated with each station are displayed from left to right in the order from upstream to downstream. The mean values of the same metals measured at Massac Creek are also provided in the figures to provide a basis for making a baseline (or background) comparison.

Table 11. Duplicate Data Verification for Copper Samples

Date	Original Data	Duplicate	CRQL (mg/L)	Below CRQL Limit	RPD (%)	Within EPA Criteria
8/16/2007	0.004	0.003	0.005	Yes	N/A	Yes
8/23/2007	0.003	0.002	0.005	Yes	N/A	Yes
8/29/2007	0.004	0.006	0.005	Yes	N/A	Yes
9/7/2007	0.014	0.01	0.005	Yes	N/A	Yes
9/11/2007	0.002	0.011	0.005	Yes	138.4615	No
9/19/2007	0.007	0.006	0.005	Yes	N/A	Yes
9/25/2007	0.004	0.004	0.005	Yes	N/A	Yes
10/4/2007	0.01	0.008	0.005	Yes	N/A	Yes
10/8/2007	0.003	0.004	0.005	Yes	N/A	Yes
10/16/2007	0.017	0.011	0.005	Yes	42.85714	No
10/24/2007	0.002	0.002	0.005	Yes	N/A	Yes
11/1/2007	0.004	0.003	0.005	Yes	N/A	Yes
11/15/2007	0.004	0.003	0.005	Yes	N/A	Yes
11/26/2007	0.006	0.004	0.005	Yes	N/A	Yes
12/11/2007	0.004	0.004	0.005	Yes	N/A	Yes
1/9/2008	0.002	0.002	0.005	Yes	N/A	Yes
2/6/2008	0.002	0.002	0.005	Yes	N/A	Yes
3/4/2008	0.003	0.002	0.005	Yes	N/A	Yes
3/20/2008	0.003	0.004	0.005	Yes	N/A	Yes

Table 12. Duplicate Data Verification for Iron Samples

Date	Original Data	Duplicate	CRQL (mg/L)	Below CRQL Limit	RPD (%)	Within EPA Criteria
8/16/2007	0.715	0.745	0.2	YES	N/A	YES
8/23/2007	0.23	0.193	0.2	YES	N/A	YES
8/29/2007	0.238	0.269	0.2	YES	N/A	YES
9/7/2007	0.283	0.249	0.2	YES	N/A	YES
9/11/2007	1.42	1.08	0.2	NO	27.2	NO
9/19/2007	0.201	0.169	0.2	YES	N/A	YES
9/25/2007	0.347	0.408	0.2	YES	N/A	YES
10/4/2007	0.063	0.073	0.2	YES	N/A	YES
10/8/2007	0.56	0.55	0.2	YES	N/A	YES
10/16/2007	0.29	0.31	0.2	YES	N/A	YES
10/24/2007	0.76	0.73	0.2	YES	N/A	YES
11/1/2007	0.27	0.26	0.2	YES	N/A	YES
11/15/2007	0.54	0.61	0.2	YES	N/A	YES
11/26/2007	0.76	0.85	0.2	YES	N/A	YES
12/11/2007	1.12	1.07	0.2	NO	4.56621	YES
1/9/2008	1.89	2.06	0.2	NO	8.607595	YES
2/6/2008	2.78	2.13	0.2	NO	26.47658	NO
3/4/2008	2.06	2.68	0.2	NO	26.16034	NO
3/20/2008	1.37	2.07	0.2	NO	40.69767	NO

Table 13. Duplicate Data Verification for Lead Samples

Date	Original Data	Duplicate	CRQL (mg/L)	Below CRQL Limit	RPD (%)	Within EPA Criteria
8/16/2007	0.002	0.002	0.001	YES	N/A	YES
8/23/2007	0.002	0.002	0.001	YES	N/A	YES
8/29/2007	0.004	0.002	0.001	YES	N/A	YES
9/7/2007	0.002	0.002	0.001	YES	N/A	YES
9/11/2007	0.002	0.002	0.001	YES	N/A	YES
9/19/2007	0.002	0.002	0.001	YES	N/A	YES
9/25/2007	0.002	0.002	0.001	YES	N/A	YES
10/4/2007	0.002	0.002	0.001	YES	N/A	YES
10/8/2007	0.002	0.002	0.001	YES	N/A	YES
10/16/2007	0.002	0.002	0.001	YES	N/A	YES
10/24/2007	0.002	0.002	0.001	YES	N/A	YES
11/1/2007	0.002	0.002	0.001	YES	N/A	YES
11/15/2007	0.002	0.002	0.001	YES	N/A	YES
11/26/2007	0.002	0.002	0.001	YES	N/A	YES
12/11/2007	0.002	0.002	0.001	YES	N/A	YES
1/9/2008	0.002	0.002	0.001	YES	N/A	YES
2/6/2008	0.002	0.002	0.001	YES	N/A	YES
3/4/2008	0.002	0.002	0.001	YES	N/A	YES
3/20/2008	0.002	0.003	0.001	YES	N/A	YES

Table 14. Duplicate Data Verification for Mercury Samples

Date	Original Data	Duplicate	CRQL (mg/L)	Below CRQL Limit	RPD (%)	Within EPA Criteria
8/16/2007						
8/23/2007	0.0002	0.0002	0.0005	YES	N/A	YES
8/29/2007						
9/7/2007	0.0004	0.0002	0.0005	YES	N/A	YES
9/11/2007						
9/19/2007	0.0002	0.0002	0.0005	YES	N/A	YES
9/25/2007						
10/4/2007	0.0002	0.0002	0.0005	YES	N/A	YES
10/8/2007						
10/16/2007	0.0002	0.0002	0.0005	YES	N/A	YES
10/24/2007						
11/1/2007	0.0002	0.0002	0.0005	YES	N/A	YES
11/15/2007	0.0002	0.0002	0.0005	YES	N/A	YES
11/26/2007	0.0002	0.0002	0.0005	YES	N/A	YES
12/11/2007	0.0002	0.0002	0.0005	YES	N/A	YES
1/9/2008	0.0002	0.0002	0.0005	YES	N/A	YES
2/6/2008	0.0002					
3/4/2008						
3/20/2008						

Table 15. Blank Analysis and T-Test for Copper Samples

Date	Measured	MDL
8/16/2007	0.002	0.002
8/23/2007	0.002	0.002
8/29/2007	0.003	0.002
9/7/2007	0.009	0.002
9/11/2007	0.002	0.002
9/19/2007	0.002	0.002
9/25/2007	0.002	0.002
10/4/2007	0.002	0.002
10/8/2007	0.002	0.002
10/16/2007	0.003	0.002
10/24/2007	0.002	0.002
11/1/2007	0.002	0.002
11/15/2007	0.004	0.002
11/26/2007	0.002	0.002
12/11/2007	0.002	0.002
1/9/2008	0.002	0.002
2/6/2008	0.002	0.002
3/4/2008	0.002	0.002
3/20/2008	0.002	0.002
Mean	0.00257895	0.002

T-test analysis	
DF:	36
p-value:	0.13345

We cannot conclude the average of the measurements is not equal to MDL

Table 16. Blank Analysis and T-Test for Iron Samples

Date	Measured	MDL
8/16/2007	0.02	0.02
8/23/2007	0.022	0.02
8/29/2007	0.02	0.02
9/7/2007	0.023	0.02
9/11/2007	0.02	0.02
9/19/2007	0.022	0.02
9/25/2007	0.02	0.02
10/4/2007	0.02	0.02
10/8/2007	0.02	0.02
10/16/2007	0.02	0.02
10/24/2007	0.02	0.02
11/1/2007	0.02	0.02
11/15/2007	0.09	0.02
11/26/2007	0.02	0.02
12/11/2007	0.02	0.02
1/9/2008	0.02	0.02
2/6/2008	0.02	0.02
3/4/2008	0.02	0.02
3/20/2008	0.02	0.02
Mean	0.024053	0.02

T-test analysis	
DF:	36
p-value:	0.2767

We cannot conclude the average of the measurements is not equal to MDL

Table 17. Blank Analysis and T-Test for Lead Samples

Date	Measured	MDL
8/16/2007	0.002	0.002
8/23/2007	0.002	0.002
8/29/2007	0.002	0.002
9/7/2007	0.002	0.002
9/11/2007	0.002	0.002
9/19/2007	0.002	0.002
9/25/2007	0.002	0.002
10/4/2007	0.002	0.002
10/8/2007	0.002	0.002
10/16/2007	0.002	0.002
10/24/2007	0.002	0.002
11/1/2007	0.002	0.002
11/15/2007	0.002	0.002
11/26/2007	0.002	0.002
12/11/2007	0.002	0.002
1/9/2008	0.002	0.002
2/6/2008	0.002	0.002
3/4/2008	0.002	0.002
3/20/2008	0.002	0.002
Mean	0.002	0.002

T-test analysis

DF:	36
p-value:	1

We cannot conclude the average of the measurements is not equal to MDL

Table 18. Blank Analysis and T-Test for Mercury Samples

Date	Measured	MDL
8/16/2007		
8/23/2007		
8/29/2007		
9/7/2007		
9/11/2007		
9/19/2007		
9/25/2007		
10/4/2007		
10/8/2007		
10/16/2007		
10/24/2007		
11/1/2007	0.0002	0.0002
11/15/2007	0.0002	0.0002
11/26/2007	0.0002	0.0002
12/11/2007	0.0002	0.0002
1/9/2008		
2/6/2008	0.0002	0.0002
3/4/2008		
3/20/2008		
Mean	0.0002	0.0002

T-test analysis	
DF:	10
p-value:	1

We cannot conclude the average of the measurements is not equal to MDL

(note: mercury samples at Big Bayou sites were collected every other week while mercury samples were not collected at Little Bayou Sites or Massac Creek Sites before 11/1/2007. Before that date, random blanks were always associated with Little Bayou and Massac Creek sites, thus no mercury results associated with blanks were available prior to that date. No additional mercury analyses were done after 2/6/2008).

Table 19. Mean Values of Metals at each of the Monitoring Stations (mg/L)

	Cu	Pb	Fe	Hg
BC1	0.00311	0.00211	0.86211	0.00021
BC2	0.00374	0.00200	0.71047	0.00020
BC3	0.00405	0.00200	0.56789	0.00020
BC4	0.00879	0.00200	0.56747	0.00022
BC5	0.00632	0.00200	0.73647	0.00022
LBC1	0.00361	0.00242	1.01267	0.00020
LBC2	0.00435	0.00200	0.83553	0.00020
LBC3	0.00526	0.00253	1.07000	0.00020
MC1	0.00347	0.00221	1.88268	0.00020

Detailed analyses of sample results for each sampling site are contained Appendices A – I. Each appendix includes the following items: 1) flow duration curve for the site based on flows from 1997-2008; 2) summary table of the data collected for that site by date and parameters including. water hardness, Cu, Pb, Fe, Hg concentrations, and instantaneous discharge; 3) table of water quality calculations for both acute and chronic aquatic life water limits; and 4) load duration curves for both acute and chronic conditions.

For those metals whose water quality conditions are dependent upon water hardness (i.e. Cu and Pb), two sets of load duration curves were developed: a maximum and minimum curve which were derived using the maximum and minimum observed hardness for that site. Laboratory results that failed to identify concentrations above the MDL are identified in the results tables by bolded numbers (e.g. **0.002**) and in the graphs by a triangle symbol. Laboratory results that were determined to be in excess of the acute or chronic water quality standard are highlighted in yellow in the results tables. In some cases, , the resulting laboratory detection limit was actually above either the acute or chronic water quality conditions due to the low hardness values. For those analyses the results were inconclusive relative to compliance with water quality standards. Inconclusive results are indicated by underlined values.

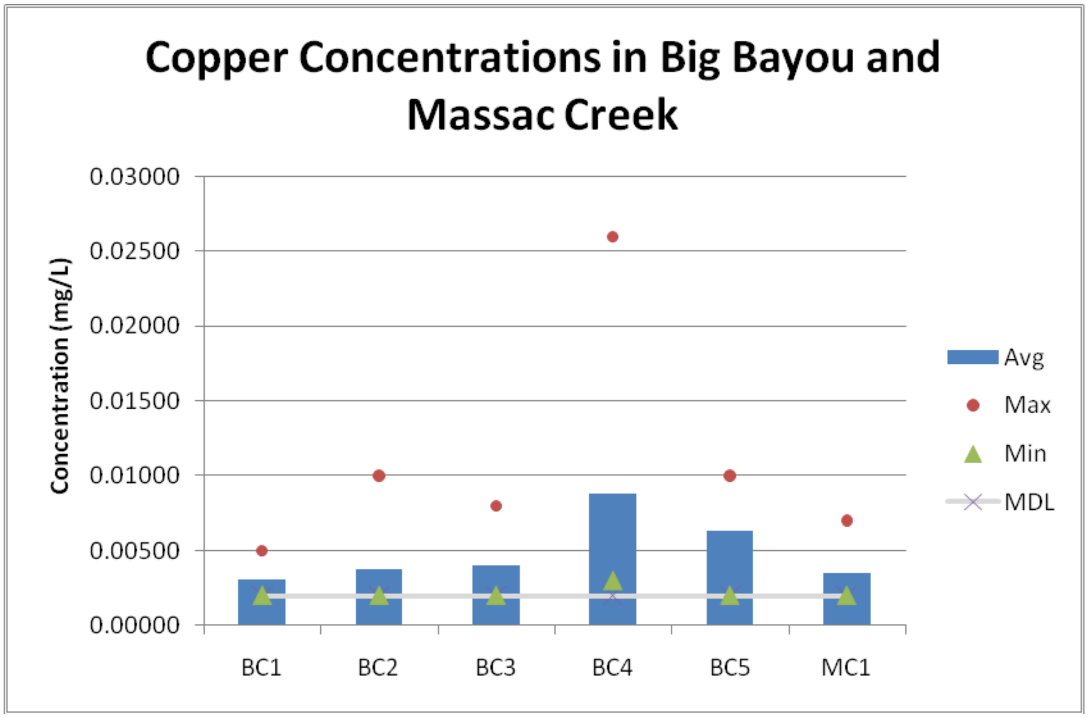

Figure 11. Average Copper Concentrations in Big Bayou Creek and Massac Creek

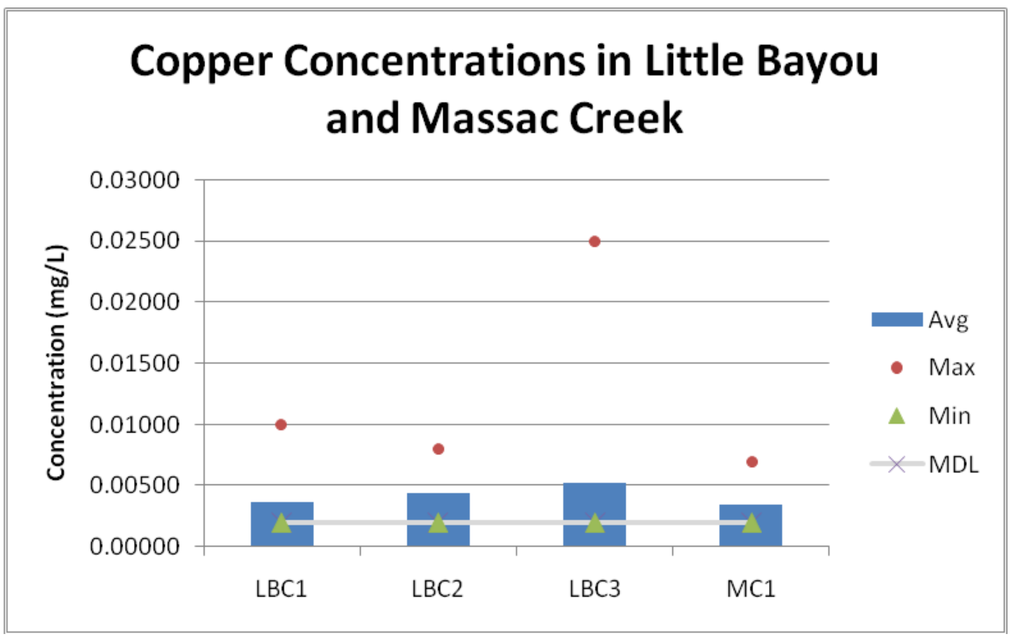

Figure 12. Average Copper Concentrations in Little Bayou Creek and Massac Creek

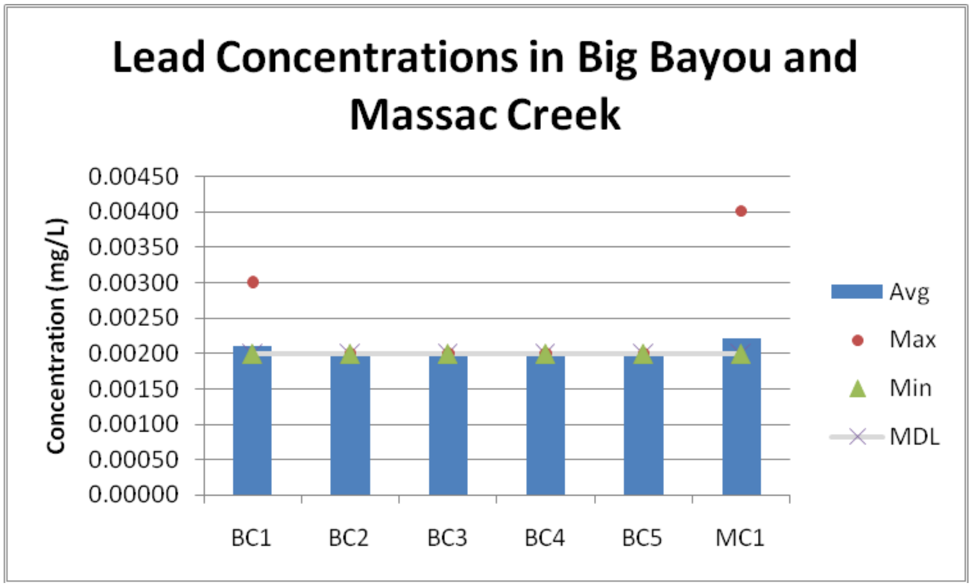

Figure 13. Average Lead Concentrations in Big Bayou Creek and Massac Creek

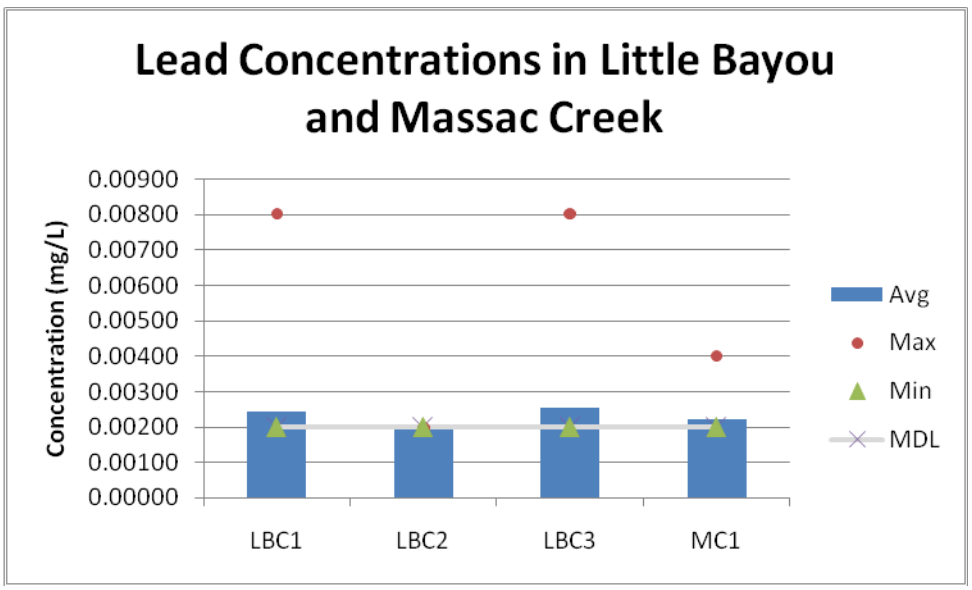

Figure 14. Average Lead Concentrations in Little Bayou Creek and Massac Creek

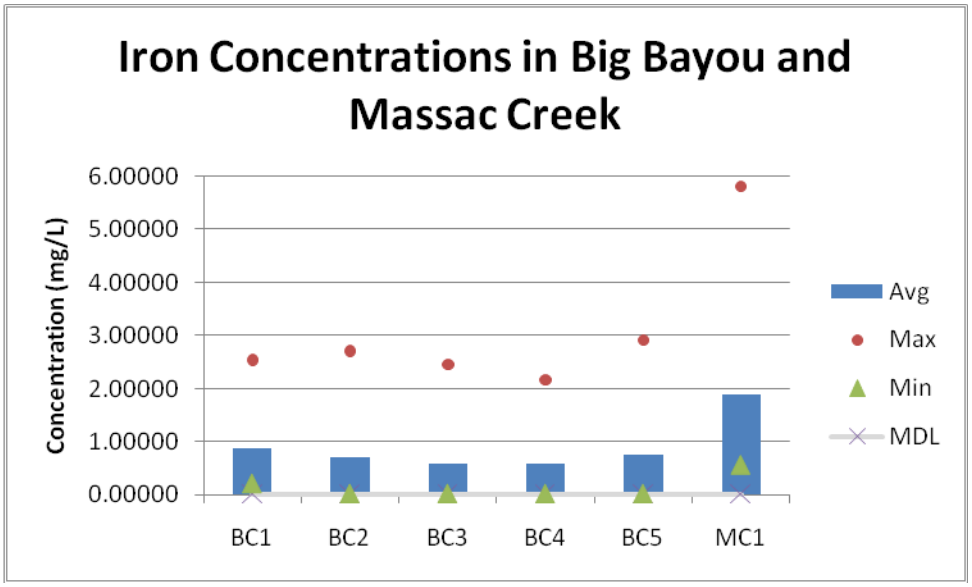

Figure 15. Average Iron Concentrations in Big Bayou Creek and Massac Creek

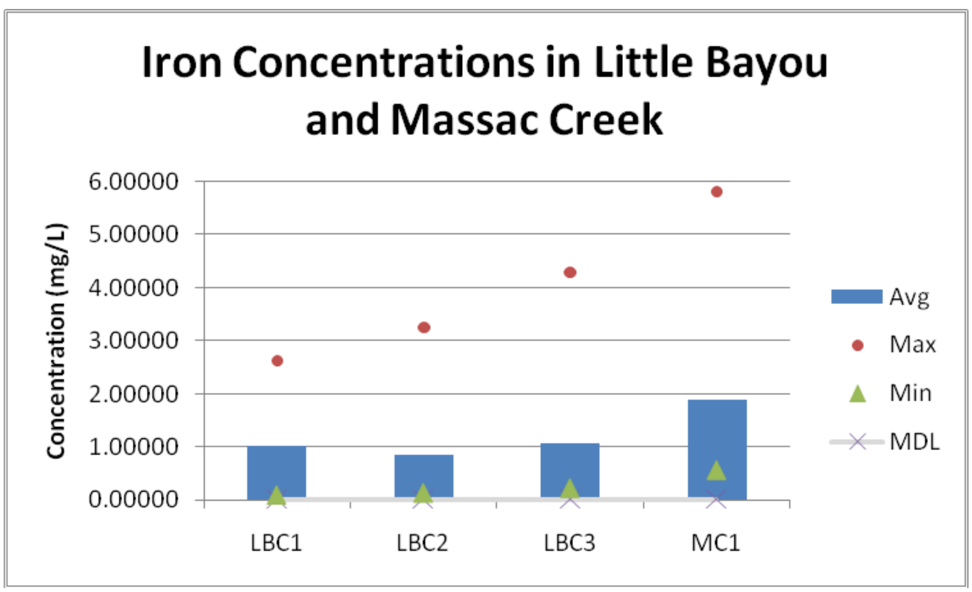

Figure 16. Average Iron Concentrations in Little Bayou Creek and Massac Creek

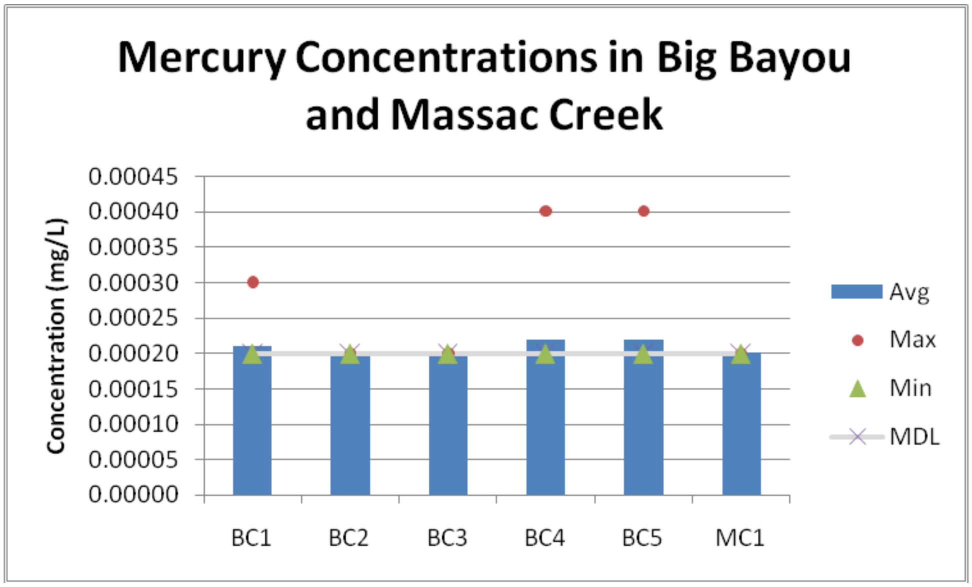

Figure 17. Average Mercury Concentrations in Big Bayou Creek and Massac Creek

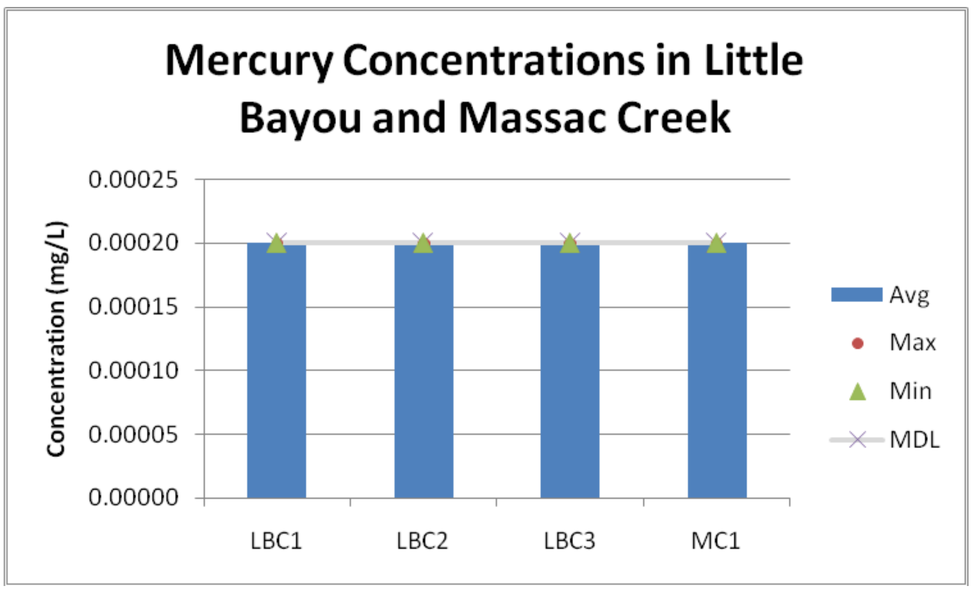

Figure 18. Average Mercury Concentrations in Little Bayou Creek and Massac Creek

2.1 Copper Results

Mean BBC and LBC copper concentrations are provided in Table 19 and in Figures 11 and 12 respectively. The table and figures show a slight increase (although not statistically significant) in mean values for sites BC1-BC3, with a significant increase at station BC4. It is hypothesized that the increase at BC4 is due to discharges from outfall 001, which receives runoff from the PGDP scrap yards and the sediment control structure on the west side of the PGDP as well as discharge from the C-616 lagoon complex and the northwest plume groundwater pump and treat facility. The table and figures show a slight increase (although not statically significant) in mean values for sites LBC1-LBC3.

2.2 Lead Results

Mean lead concentrations in Big Bayou and Little Bayou creeks are provided in Table 19 and Figures 13 and 14 respectively. As the table and figures indicate, the mean lead concentrations do not appear to change statistically as one travels downstream/downgradient in Big Bayou Creek. Mean lead concentrations in Little Bayou Creek decrease slightly between stations LBC1 and LBC2. The LBC reach between Stations LBC1 and LBC2 receives discharges from the east side of PGDP. LBC lead concentrations slightly increase from station LBC2 to station LBC3. However, the concentrations between LBC1 and LBC3 are not statistically different. It is hypothesized that any increase in lead concentrations between LBC2 and LBC3 may be due to historic discharges from the North-South diversion ditch (i.e. outfall 3).

2.3 Iron Results

Mean BBC and LBC iron concentrations are provided in Figures 15 and 16, respectively. Iron concentrations decrease slightly from BC1 to BC4 and then increase slightly at site BC5. None of the sites downstream of the PGDP show any statistical increase when compared to site BC1. It is interesting to note that iron concentrations in Massac Creek appear to be statistically higher than those in Bayou Creek.

Mean LBC iron concentrations decrease slightly from station LBC1 to LBC2. This reach of LBC receives influent discharges from the east side of PGDP. LBC iron concentrations increase from station LBC2 to LBC3 although the concentrations between LBC1 and LBC3 are not statistically different. It is hypothesized that any increase in iron concentrations between LBC2 and LBC3 may be due to historic discharges from the North-South diversion ditch (i.e. outfall 3). Once again, the iron concentrations in Massac Creek appear to be significantly higher than those in Little Bayou Creek.

Closer examination of iron data is provided in more detail in Appendices A-I. Iron concentrations for samples taken from November 26, 2007 to March 20, 2008, were generally higher than iron concentrations in samples taken from August 16, 2007 to November 15, 2007. The increase in iron concentrations was observed at all nine stations with minor exceptions.

Because the change in iron concentrations seemed so significant and occurred uniformly across all the stations, there was a concern that the difference may have been caused by a change in lab procedures or personnel. However, a review of the raw data and the associated quality assurance data along with inquires to the lab failed to substantiate any such suspicions. Nevertheless, three independent sites located in western Kentucky were analyzed to see if the same phenomena could be found in other water quality data for iron. One of these sites belongs to the USGS and two belong to KDOW (see Table 20 and Figure 19).

It can be hypothesized that the increased iron concentration is accounted for by seasonal effects (rainfall, etc.). Therefore, for each site, the iron data was split into two seasonal groups, a Fall-Winter group and a Winter-Spring group, for the purpose of observing if a difference exists between the two groups, and determining if that difference is statistically significant. Because large iron concentrations occurring in May and June heavily weight one group or the other and the present purpose is to corroborate a phenomenon observed between the months of August and March, only iron data collected between August and March were included in the independent site analysis. Furthermore, since the data collected in this report spans less than one year, no exact one date should be fixed to divide the two seasonal groups; instead it would be reasonable to look for a seasonal transition point within each year. This point varied slightly from year to year, and each year's transition point was used to divide that year's data as belonging to the first seasonal group or to the second seasonal group. In each case, an attempt was made to not let the date variance be too great. As a result, August to October was always assigned to the Fall-Winter group and January to March was always assigned to the Winter-Spring group; the seasonal transition point occurred between November and December.

After the data were divided into two different groups, t-tests were performed to evaluate whether the differences were statistically significant. For the three independent sites, the means of the iron concentrations for the Fall-Winter group were greater than the means of the Winter-Spring group, and this difference was statistically significant at a 95% confidence interval. A one-tailed test was used due to the *a priori* reasonability of seasonal effects. These results corroborate the observed seasonal differences between the iron results in this study and lead to the conclusion that there is a statistical difference between iron values in the Fall-Winter periods and the Winter-Spring periods, with higher values being observed during the Winter-Spring period. However, since the water quality standards for aquatic life are enforced year-round, this does not have any explicit impact on the associated TMDL evaluation.

Table 20. Independent Water Quality Sampling Sites with Iron Data

Agency	Site ID	Site Name	County	Latitude	Longitude
KDOW	PRI 106	Clark's River at Bryant's Ford	McCracken	36.96130	-88.49322
KDOW	PRI 109	Bayou de Chien near Cayce	Hickman	36.61543	-89.03025
USGS	03383000	Tradewater River at Olney	Caldwell/Hopkins	37.22389	-87.78139

2.4 Mercury Results

Mercury samples on Big Bayou Creek were initially collected every other sampling event until 11/1/2007 at which time mercury samples were then collected at all sites until 2/6/2008. Mean

BBC and LBC mercury concentrations in are provided in Figures 17 and 18 respectively. As can be seen from the figures, the mercury concentrations appear to slightly decrease downstream of BC1 and then slightly increase at BC4 and BC5. This trend follows that of the maximum observed values as well. Nonetheless, none of the mean values appear to be statistically different from each other or statistically greater than the most upstream background site (i.e. BC1). Mean mercury concentrations for LBC sample locations were all at the minimum detection limit and thus did not show any variations. This was also true of the observed mercury concentrations for Massac Creek.

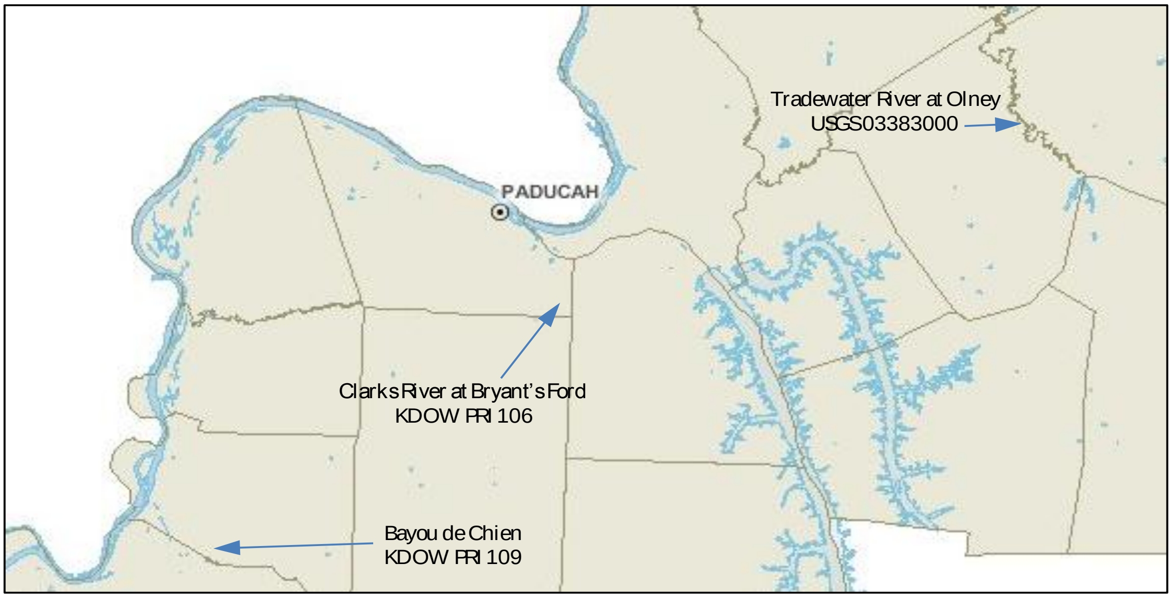

Figure 19. Locations of Independent Water Quality Sampling Sites with Iron Data

2.5 Water Quality Standard Compliance

As indicated previously, each sample was evaluated with regard to whether or not the result was in compliance with both acute and chronic warm water aquatic life standards for Kentucky (see Table 10). This analysis was complicated for copper and lead, since these standards are dependent upon the water hardness as well. A summary of the percent of samples from each sample location and that were compliant with the acute or chronic aquatic life water quality standards for each of the monitoring stations and water quality parameters is provided in Table 21.

In addition to an evaluation of water quality standard compliance for each monitoring station, an attempt was made to try to assess whether or not discharges from the PGDP might be contributing to exceedances of the water quality standards. This assessment was accomplished by statistically comparing the water quality standard analytical results from stations upstream of the plant (i.e. BC1 and LBC1) to those from stations downstream of the plant.

A separate reference evaluation compared water quality standard results from the LBC and BBC upstream/background stations and Massac Creek (i.e. MC1),

Table 21. Summary of Percent Compliance of Aquatic Life Water Quality Standards

STA	Cu Acute	Cu Chronic	Pb Acute	Pb Chronic	Fe Acute	Fe Chronic	Hg Acute	Hg Chronic
BC1	100.0%	94.7%	100.0%	79.9%	100.0%	68.4%	100.0%	100.0%
BC2	100.0%	94.7%	100.0%	94.7%	100.0%	73.7%	100.0%	100.0%
BC3	100.0%	100.0%	100.0%	100.0%	100.0%	73.7%	100.0%	100.0%
BC4	94.7%	94.7%	100.0%	100.0%	100.0%	84.2%	100.0%	100.0%
BC5	100.0%	100.0%	100.0%	100.0%	100.0%	68.4%	100.0%	100.0%
LBC1	94.7%	94.7%	100.0%	89.5%	100.0%	55.6%	100.0%	100.0%
LBC2	100.0%	88.9%	100.0%	100.0%	100.0%	83.3%	100.0%	100.0%
LBC3	94.7%	94.7%	100.0%	89.5%	94.7%	68.4%	100.0%	100.0%
MC1	100.0%	100.0%	100.0%	78.9%	84.2%	57.9%	100.0%	100.0%

The upstream/downstream water quality comparison was made both qualitatively and quantitatively. A qualitative comparison was made by plotting the upstream (assumed background) station with one of the downstream stations (see Appendix J). A quantitative comparison was made by conducting a t-test to determine whether or not the mean values associated with those stations downstream of the PGDP were statistically different (greater) than those values associated with those sites upstream of the PGDP (i.e. BC1 and LBC1).

A separate set of t-tests was used to evaluate whether or not the background values associated with sites BC1 and LBC1 were statistically different (not equal to) than the reference values associated with Massac Creek (i.e. MC1). In each case, a 95% confidence level was assumed. A summary of the results are provided in Table 22.

Table 22. Summary of Hypothesis Tests for Stations

Hypothesis	Cu	Pb	Fe	Hg
BC1 < BC2	FALSE	FALSE	FALSE	FALSE
BC1 < BC3	FALSE	FALSE	FALSE	FALSE
BC1 < BC4	TRUE	FALSE	FALSE	FALSE
BC1 < BC5	TRUE	FALSE	FALSE	FALSE
LBC1 < LBC2	FALSE	FALSE	FALSE	FALSE
LBC1 < LBC3	FALSE	FALSE	FALSE	FALSE
BC1 = MC1	TRUE	TRUE	FALSE	TRUE
LBC1 = MC1	TRUE	TRUE	FALSE	TRUE

While it is possible that a particular station may be in violation of the associated water quality standard for a particular metal, if the concentrations at that station are statistically lower than the upstream/background level it is difficult to support a hypothesis that the violation is being caused due to PGDP-related discharges between the two stations. To summarize this potential situation, tables were assembled that jointly display those stations that are in violation of the Kentucky water quality standards (i.e. 10% or more of the samples were greater than either the acute or chronic standard – the criteria used for listing of impaired stream segments) but whose mean concentrations levels are not statistically higher than the levels associated with the assumed background concentrations (i.e. those associated with stations BC1 or LBC1). These results are summarized in Tables 23 and 24.

Table 23. Joint Display of Monitoring Station Compliance and Comparison With BC1 (90% Compliance)

STA	Cu >90%	Cu > BC1	Pb > 90%	Pb > BC1	Fe >90%	Fe > BC1	Hg >90%	Hg >BC1
BC1	Yes	-	No	-	No	-	Yes	-
BC2	Yes	No	Yes	No	No	No	Yes	No
BC3	Yes	No	Yes	No	No	No	Yes	No
BC4	Yes	Yes	Yes	No	No	No	Yes	No
BC5	Yes	Yes	Yes	No	No	No	Yes	No

Table 24. Joint Display of Monitoring Station Compliance and Comparison With LBC1 (90% Compliance)

STA	Cu >90%	Cu > LBC1	Pb > 90%	Pb > LBC1	Fe >90%	Fe > LBC1	Hg >90%	Hg >LBC1
LBC1	Yes	-	No	-	No	-	Yes	-
LBC2	No	No	Yes	No	No	No	Yes	No
LBC3	Yes	No	No	No	No	No	Yes	No

None of the sites had greater than 10% violations for mercury. Likewise, except for station LBC2, none of the sites had greater than 10% violations for copper. Only one site, BC1 which is upstream of the PGDP, had significantly greater than 10% violations for lead (i.e. 20.1%) while two stations, LBC1 and LBC3 had violations of only 0.5%. It is also interesting to note, that the number of violations for site BC1 were essentially the same as for MC1 (i.e. 21.1%) Finally, all of the sites had greater than 10% violations for iron, however, none of the sites downstream of any of the PGDP outfalls had concentrations statistically greater than the associated background sites (i.e. BC1 and LBC1). Finally, while station MC1 was not found to be statistically different than station BC1 relative to mean iron concentrations, MC1 did have a higher mean that BC1. Station MC1 was also found to be statistically different and greater than LBC1.

In the event that 100% compliance of the water quality standards is required, tables can be constructed to illustrate the relationship of 1) background sample concentrations to concentrations at and down gradient of the PGDP facility and 2) compliance with WQS (Tables 25 and 26).

Table 25. Joint Display of Monitoring Station Compliance and Comparison With BC1 (100% Compliance)

STA	Cu =100%	Cu > BC1	Pb =100%	Pb > BC1	Fe =100%	Fe > BC1	Hg =100%	Hg >BC1
BC1	No	-	No	-	No	-	Yes	-
BC2	No	No	No	No	No	No	Yes	No
BC3	Yes	No	Yes	No	No	No	Yes	No
BC4	No	Yes	Yes	No	No	No	Yes	No
BC5	Yes	Yes	Yes	No	No	No	Yes	No

Table 26. Joint Display of Monitoring Station Compliance and Comparison With LBC1 (100% Compliance)

STA	Cu =100%	Cu > LBC1	Pb =100%	Pb > LBC1	Fe =100%	Fe > LBC1	Hg =100%	Hg >LBC1
LBC1	No	-	No	-	No	-	Yes	-
LBC2	No	No	Yes	No	No	No	Yes	No
LBC3	No	No	No	No	No	No	Yes	No

When a 100% compliance level is enforced, only mercury is found to satisfy the water quality standards at all stations. However, while copper fails to satisfy the water quality standards at stations BC1, BC2 BC4, LBC1, LBC2, and LBC3, only station BC4 shows a violation with a concentration statistically greater than the background values at site BC1. Thus, while site BC2 has some samples higher than the water quality standard, it cannot be statistically confirmed that the increase is due to discharges from the PGDP. A similar situation exists for both stations LBC2 and LBC3 with respect to the background concentrations at site LBC1.

Lead concentrations at site BC2 exceed the water quality standard (using a 100% compliance level) and were found to be statistically higher than the background values at site BC1, thus supporting the hypothesis that the violation was being caused due to discharges from the PGDP. However, concentrations at the remaining sites on Big Bayou Creek (i.e. BC3-BC5) all met the water quality standards. Similar to BC2, site LBC2 was found to exceed the water quality standard and was found to be statistically greater than the background values at site LBC1, thus supporting the hypothesis that the violations at LBC1 were also being caused due to discharges from the PGDP. However, while site LBC3 also showed violations, this station was not statistically different that the results from the background values at site LBC1.

Iron concentrations at all sites on Big Bayou and Little Bayou showed violations of the water quality standards. However, unlike BC2 and LBC2 for lead, none of the stations showed statistically higher concentrations than the associated background sites (i.e. BC1 and LBC1). As indicated previously, the mean iron values at all site in Big Bayou and Little Bayou creeks were statistically less than the values observed at Massac Creek.

3.0 SUMMARY AND CONCLUSIONS

Evaluation of mercury data does not support a conclusion that either Big Bayou or Little Bayou Creeks should be listed for mercury impairment. If a 90% compliance level is used for all sites downstream of the PGDP, then the water quality standards for both copper and lead are satisfied, with the exception of site LBC2 for which an 88.9% compliance is observed. None of the site satisfy the chronic water quality criteria for lead, however the sites on Big Bayou and Little Bayou Creeks were not statistically greater than the values at MC1. In fact, most of the sites had lead values higher than MC1. Also, none of the downstream sites showed statistically higher values than the background sites (i.e. BC1 and LBC1).

Based on a 100% compliance level, six (6) of the nine (9) monitored stations failed to satisfy either the chronic or acute standards for copper and five (5) of nine (9) stations failed to satisfy either the chronic or acute standards for lead. All of the monitoring stations failed to satisfy either the chronic or acute standards for iron using a 100% compliance level. However, only site BC4 exceeded both chronic and acute copper standards **and** exhibited a mean copper concentration statistically higher than the upstream/background copper concentration. While both sites BC2 and LBC3 exceeded the chronic lead concentrations, neither site has mean lead concentrations statistically higher than the upstream/background lead concentrations. Finally, iron results from all stations exceeded either the acute or chronic iron concentrations. However, mean iron concentrations at BBC and LBC downstream sample sites **were not** statistically different than their respective mean upstream/background concentrations. Thus any conclusion about the potential source of excessive iron coming from discharges from the PGDP is unsupported.

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APPENDIX A: RESULTS FOR STATION BC1

Table A.1. Metal Results for Station BC1

Date	Hd (mg/L as CaCO3)	Cu (mg/L)	Pb (mg/L)	Fe (mg/L)	Hg (mg/L)	Flow (cfs)
8/16/2007	68	0.002	0.003	0.219		0.35
8/23/2007	86	**0.002**	**0.002**	0.264	**0.0002**	0.41
8/29/2007	50	0.004	**0.002**	0.435		0.24
9/7/2007	80	0.004	0.002	0.224	0.0003	0.30
9/11/2007	70	**0.040***	**0.002**	0.286		0.24
9/19/2007	100	0.002	**0.002**	0.308	**0.0002**	0.30
9/25/2007	68	0.003	**0.002**	0.284		0.41
10/4/2007	84	**0.002**	**0.002**	0.160	**0.0002**	0.30
10/8/2007	110	0.005	0.003	0.81		0.35
10/16/2007	50	0.005	**0.002**	0.63	**0.0002**	0.41
10/24/2007	66	0.003	**0.002**	0.98		0.85
11/1/2007	86	**0.002**	**0.002**	0.21	**0.0002**	0.07
11/15/2007	120	**0.002**	**0.002**	0.79	**0.0002**	0.19
11/26/2007	50	0.004	**0.002**	1.30	**0.0002**	2.20
12/11/2007	120	0.004	**0.002**	1.12	**0.0002**	4.40
1/9/2008	60	**0.002**	**0.002**	2.04	**0.0002**	8.30
2/6/2008	110	0.005	**0.002**	2.54	**0.0002**	20.00
3/4/2008	90	**0.002**	**0.002**	2.44		37.00
3/20/2008	200	0.003	0.002	1.34		13.00

*Note: 0.040 was assumed to be an outlier in the data set and was excluded from determining the average and maximum concentrations in Appendix J

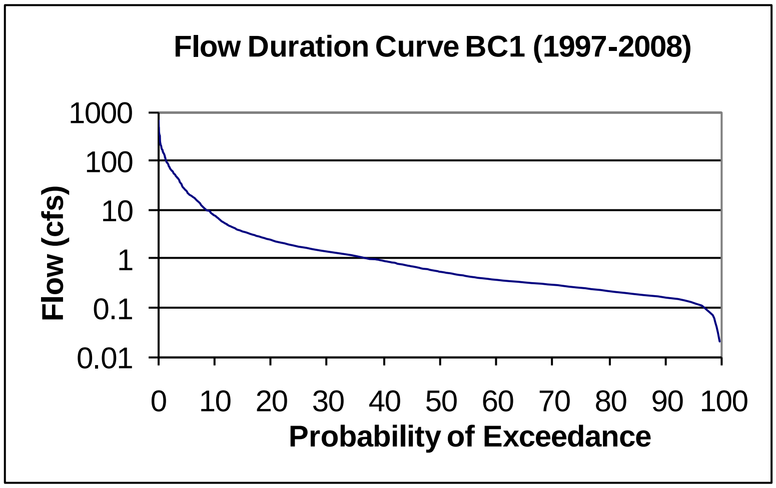

Figure A.1. Flow Duration Curve for Station BC1

Table A.2. Copper Sampling Results for BC1

Date	Hardness (mg CaCO3/L)	Copper (mg/L)	Acute Hardness (mg/L) e(0.9422(ln Hardness) - 1.700)/1000	Chronic Hardness (mg/L) e(0.8545(ln Hardness) - 1.7020)/1000	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	68	0.002	0.010	0.007	0.35	62.38	1.63E+06
8/23/2007	86	**0.002**	0.012	0.008	0.41	56.69	1.91E+06
8/29/2007	50	0.004	0.007	0.005	0.24	76.86	2.24E+06
9/7/2007	80	0.004	0.011	0.008	0.30	69.12	2.80E+06
9/11/2007	70	0.040*	0.010	0.007	0.24	76.86	2.24E+07
9/19/2007	100	0.002	0.014	0.009	0.30	69.12	1.40E+06
9/25/2007	68	0.003	0.010	0.007	0.41	56.69	2.87E+06
10/4/2007	84	**0.002**	0.012	0.008	0.30	69.12	1.40E+06
10/8/2007	110	0.005	0.015	0.010	0.35	62.38	4.08E+06
10/16/2007	50	0.005	0.007	0.005	0.41	56.69	4.78E+06
10/24/2007	66	0.003	0.009	0.007	0.85	41.38	5.95E+06
11/1/2007	86	**0.002**	0.012	0.008	0.07	98.44	3.27E+05
11/15/2007	120	**0.002**	0.017	0.011	0.19	84.47	8.86E+05
11/26/2007	50	0.004	0.007	0.005	2.20	21.53	2.05E+07
12/11/2007	120	0.004	0.017	0.011	4.40	13.38	4.11E+07
1/9/2008	60	**0.002**	0.009	0.006	8.30	9.67	3.87E+07
2/6/2008	110	0.005	0.015	0.010	20.00	5.86	2.33E+08
¾/2008	90	**0.002**	0.013	0.009	37.00	3.91	1.73E+08
3/20/2008	200	0.003	0.027	0.017	13.00	7.54	9.10E+07

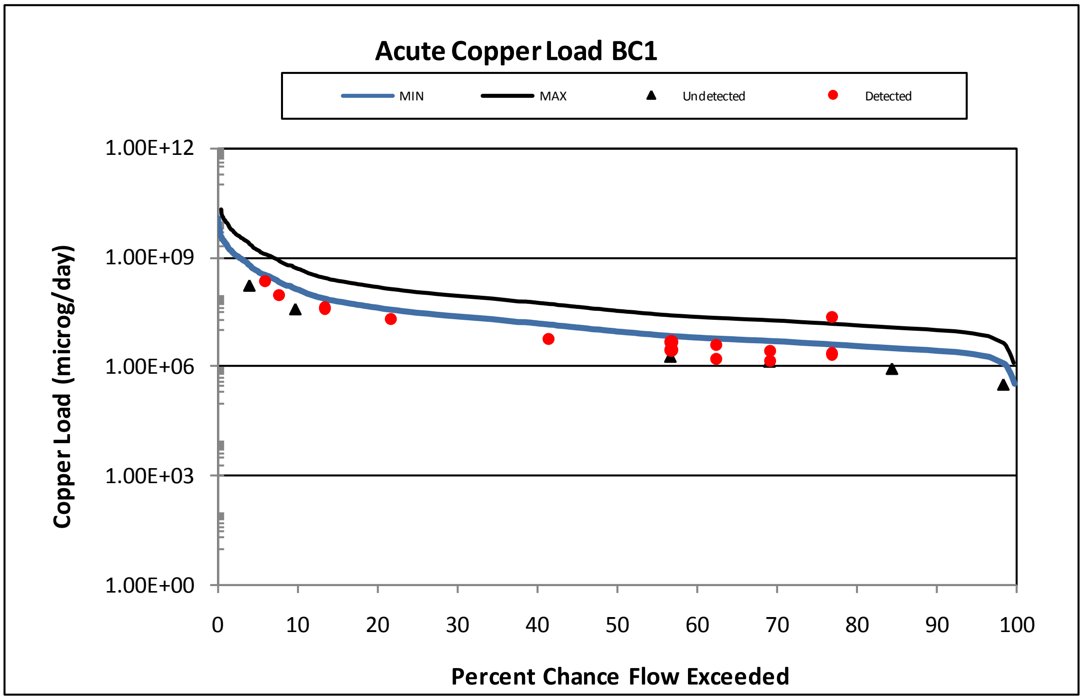

Figure A.2. Acute Copper Mass Load Curves for Station BC1

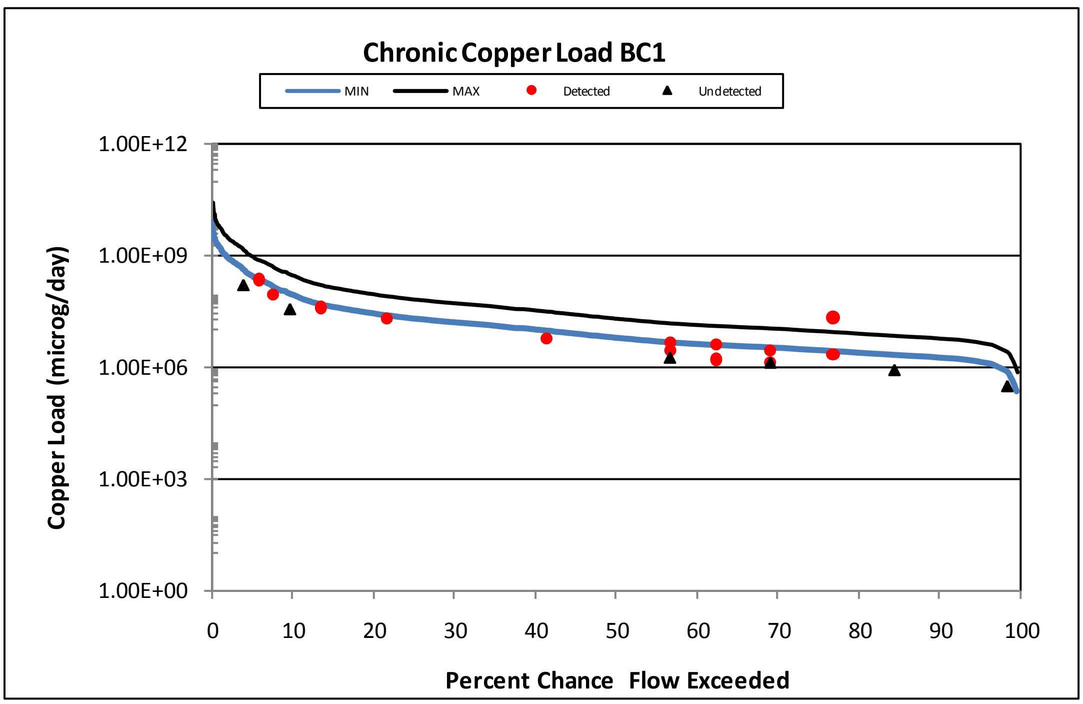

Figure A.3. Chronic Copper Mass Load Curves for Station BC1

Table A.3. Lead Sampling Results for BC1

Date	Hardness (mg CaCO3/L)	Lead (mg/L)	Acute Hardness (mg/L) e(1.273(ln Hardness) – 1.460)/1000	Chronic Hardness (mg/L) e(1.273(ln Hardness) – 4.705)/1000	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	68	0.003	0.050	0.002	0.35	62.38	2.45E+06
8/23/2007	86	**0.002**	0.067	0.003	0.41	56.69	1.91E+06
8/29/2007	50	**0.002**	0.034	0.001	0.24	76.86	1.12E+06
9/7/2007	80	0.002	0.061	0.002	0.30	69.12	1.40E+06
9/11/2007	70	**0.002**	0.052	0.002	0.24	76.86	1.12E+06
9/19/2007	100	**0.002**	0.082	0.003	0.30	69.12	1.40E+06
9/25/2007	68	**0.002**	0.050	0.002	0.41	56.69	1.91E+06
10/4/2007	84	**0.002**	0.065	0.003	0.30	69.12	1.40E+06
10/8/2007	110	0.003	0.092	0.004	0.35	62.38	2.45E+06
10/16/2007	50	**0.002**	0.034	0.001	0.41	56.69	1.91E+06
10/24/2007	66	**0.002**	0.048	0.002	0.85	41.38	3.97E+06
11/1/2007	86	**0.002**	0.067	0.003	0.07	98.44	3.27E+05
11/15/2007	120	**0.002**	0.103	0.004	0.19	84.47	8.86E+05
11/26/2007	50	**0.002**	0.034	0.001	2.20	21.53	1.03E+07
12/11/2007	120	**0.002**	0.103	0.004	4.40	13.38	2.05E+07
1/9/2007	60	**0.002**	0.043	0.002	8.30	9.67	3.87E+07
2/6/2008	110	**0.002**	0.092	0.004	20.00	5.86	9.33E+07
¾/2008	90	**0.002**	0.071	0.003	37.00	3.91	1.73E+08
3/20/2008	200	0.002	0.197	0.008	13.00	7.54	6.07E+07

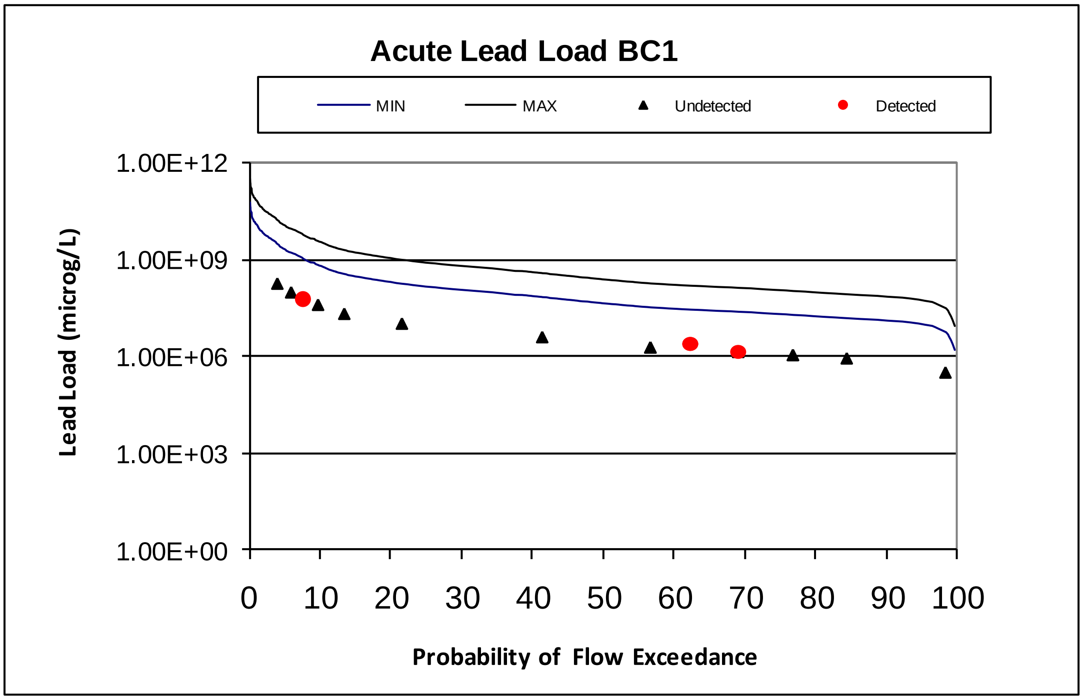

Figure A.4. Acute Lead Mass Load Curves for Station BC1

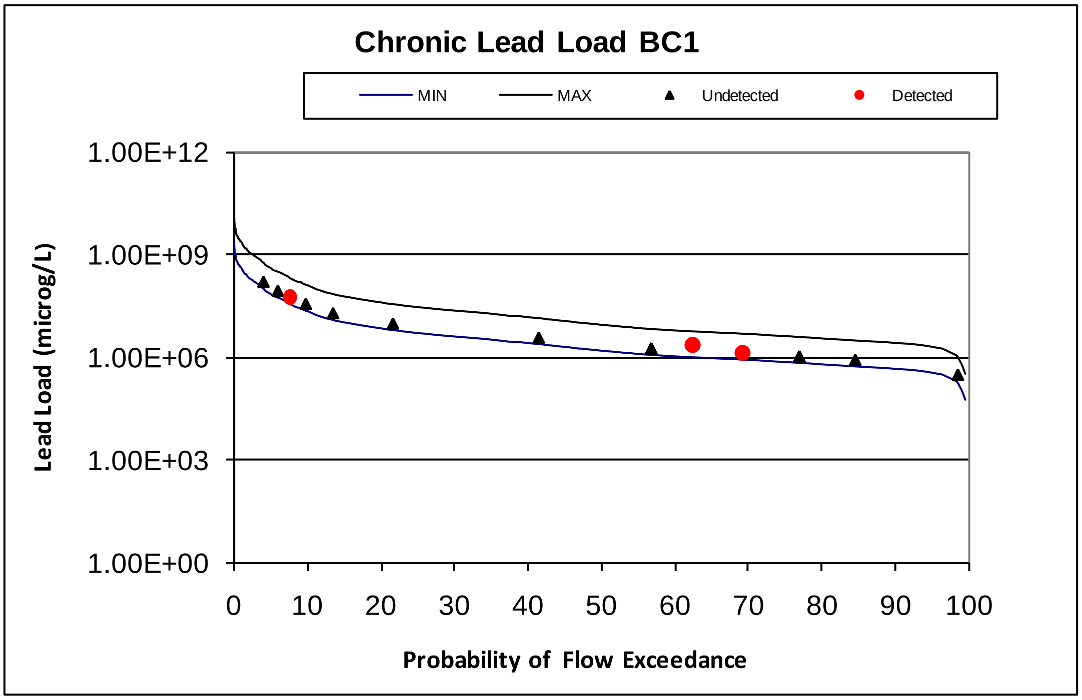

Figure A.5. Chronic Lead Mass Load Curves for Station BC1

Table A.4. Iron Sampling Results for BC1

Date	Hardness (mg/L CaCO3)	Iron (mg/L)	Acute Standard (mg/L)	Chronic Standard (mg/L)	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	68	0.219	4.000	1.000	0.35	62.38	1.79E+08
8/23/2007	86	0.264	4.000	1.000	0.41	56.69	2.53E+08
8/29/2007	50	0.435	4.000	1.000	0.24	76.86	2.44E+08
9/7/2007	80	0.224	4.000	1.000	0.30	69.12	1.57E+08
9/11/2007	70	0.286	4.000	1.000	0.24	76.86	1.60E+08
9/19/2007	100	0.308	4.000	1.000	0.30	69.12	2.16E+08
9/25/2007	68	0.284	4.000	1.000	0.41	56.69	2.72E+08
10/4/2007	68	0.160	4.000	1.000	0.30	69.12	1.12E+08
10/8/2007	110	0.81	4.000	1.000	0.35	62.38	6.61E+08
10/16/2007	50	0.63	4.000	1.000	0.41	56.69	6.03E+08
10/24/2007	66	0.98	4.000	1.000	0.85	41.38	1.94E+09
11/1/2007	86	0.21	4.000	1.000	0.07	98.44	3.43E+07
11/15/2007	120	0.79	4.000	1.000	0.19	84.47	3.50E+08
11/26/2007	50	1.30	4.000	1.000	2.20	21.53	6.67E+09
12/11/2007	120	1.12	4.000	1.000	4.40	13.38	1.15E+10
1/9/2008	60	2.04	4.000	1.000	8.30	9.67	3.95E+10
2/6/2008	110	2.54	4.000	1.000	20.00	5.86	1.19E+11
¾/2008	90	2.44	4.000	1.000	37.00	3.91	2.11E+11
3/20/2008	200	1.34	4.000	1.000	13.00	7.54	4.06E+10

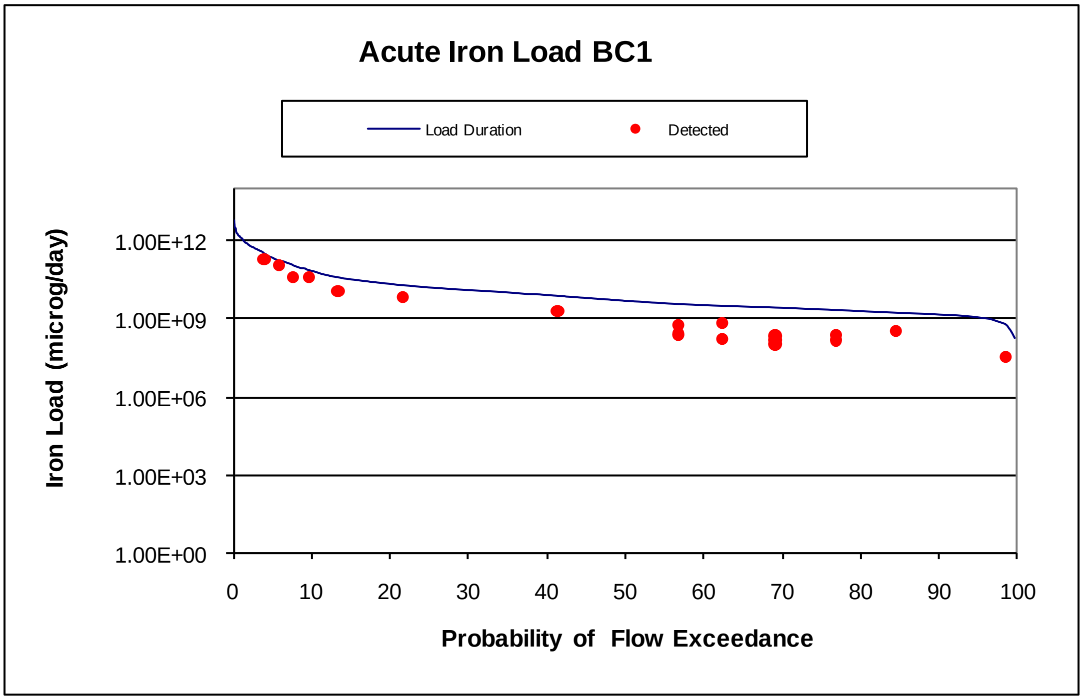

Figure A.6. Acute Iron Mass Load Curves for Station BC1

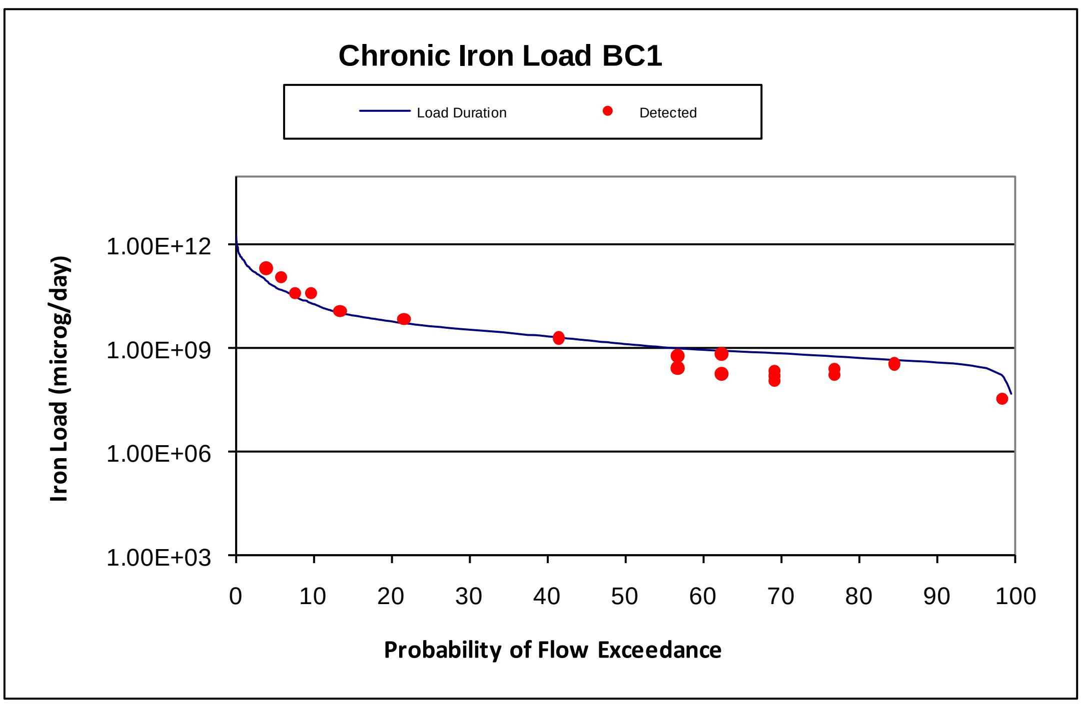

Figure A.7. Chronic Iron Mass Load Curves for Station BC1

Table A.5. Mercury Sampling Results for BC1

Date	Hardness (mg/L CaCO3)	Mercury (mg/L)	Acute Standard (mg/L)	Chronic Standard (mg/L)	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	68		0.0014	0.00077	0.35	62.38	
8/23/2007	86	**0.0002**	0.0014	0.00077	0.41	56.69	1.91E+05
8/29/2007	50		0.0014	0.00077	0.24	76.86	
9/7/2007	80	0.0003	0.0014	0.00077	0.30	69.12	2.10E+05
9/11/2007	70		0.0014	0.00077	0.24	76.86	
9/19/2007	100	**0.0002**	0.0014	0.00077	0.30	69.12	1.40E+05
9/25/2007	68		0.0014	0.00077	0.41	56.69	
10/4/2007	84	**0.0002**	0.0014	0.00077	0.30	69.12	1.40E+05
10/8/2007	110		0.0014	0.00077	0.35	62.38	
10/16/2007	50	**0.0002**	0.0014	0.00077	0.41	56.69	1.91E+05
10/24/2007	66		0.0014	0.00077	0.85	41.38	
11/1/2007	86	**0.0002**	0.0014	0.00077	0.07	98.44	3.27E+04
11/15/2007	120	**0.0002**	0.0014	0.00077	0.19	84.47	8.86E+04
11/26/2007	50	**0.0002**	0.0014	0.00077	2.20	21.53	1.03E+06
12/11/2007	120	**0.0002**	0.0014	0.00077	4.40	13.38	2.05E+06
1/9/2008	60	**0.0002**	0.0014	0.00077	8.30	9.67	3.87E+06
2/6/2008	110	**0.0002**	0.0014	0.00077	20.00	5.86	9.33E+06
¾/2008	90		0.0014	0.00077	37.00	3.91	
3/20/2008	200		0.0014	0.00077	13.00	7.54	

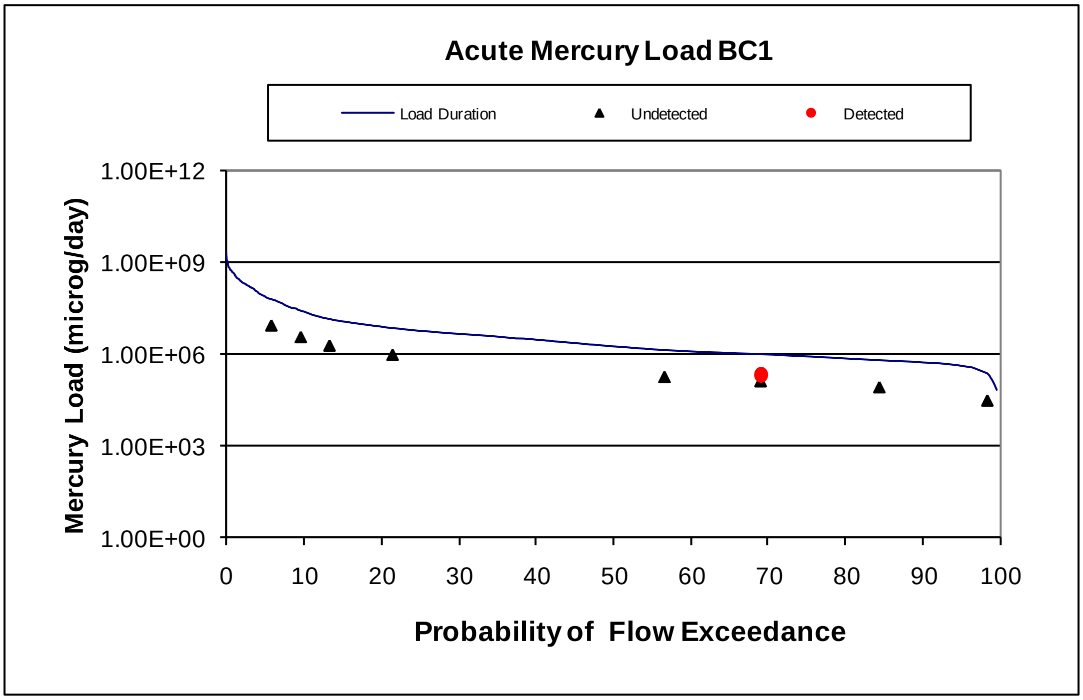

Figure A.8. Acute Mercury Mass Load Curves for Station BC1

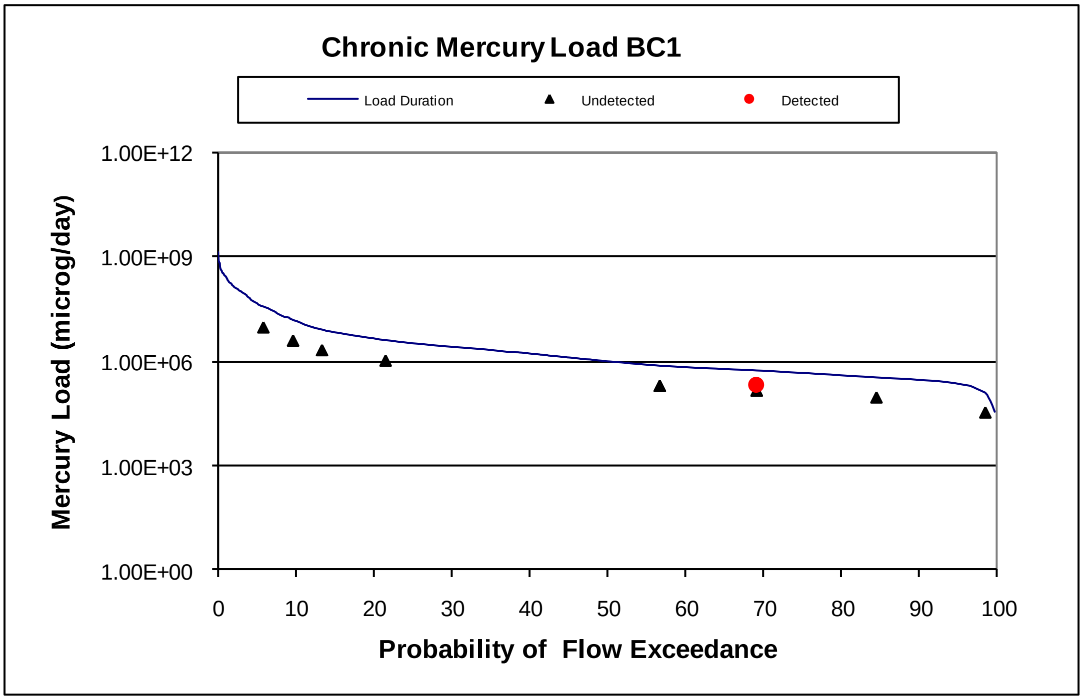

Figure A.9. Chronic Mercury Mass Load Curves for Station BC1

APPENDIX B: RESULTS FOR STATION BC2

Table B.1. Metal Results for Station BC2

Date	Hd (mg/L as CaCO3)	Cu (mg/L)	Pb (mg/L)	Fe (mg/L)	Hg (mg/L)	Flow (cfs)
8/16/2007	46	0.003	0.002	0.173		3.82
8/23/2007	74	**0.002**	**0.002**	0.157	**0.0002**	3.41
8/29/2007	80	0.003	**0.002**	0.218		3.02
9/7/2007	74	0.004	**0.002**	0.159	**0.0002**	2.57
9/11/2007	88	0.010	**0.002**	0.206		2.62
9/19/2007	120	**0.002**	**0.002**	0.116	**0.0002**	2.13
9/25/2007	106	0.004	**0.002**	0.138		2.16
10/4/2007	240	0.004	**0.002**	0.392	**0.0002**	2.16
10/8/2007	84	0.003	**0.002**	**0.02**		2.19
10/16/2007	70	0.005	**0.002**	0.17	**0.0002**	2.64
10/24/2007	74	0.002	**0.002**	0.70		8.21
11/1/2007	80	**0.002**	**0.002**	0.31	**0.0002**	2.51
11/15/2007	130	0.005	**0.002**	0.36	**0.0002**	2.50
11/26/2007	170	0.003	**0.002**	1.40	**0.0002**	10.23
12/11/2007	80	0.005	**0.002**	1.32	**0.0002**	18.83
1/9/2008	72	**0.002**	**0.002**	1.89	**0.0002**	21.15
2/6/2008	110	0.006	0.002	2.71		50.40
¾/2008	100	0.003	**0.002**	2.06		92.10
3/20/2008	100	0.003	**0.002**	1.00		42.19

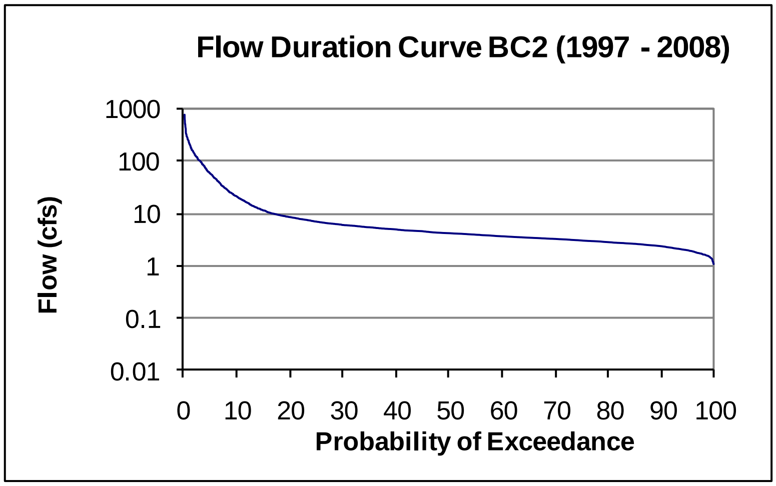

Figure B.1. Flow Duration Curve for Station BC2

Table B.2. Copper Sampling Results for BC2

Date	Hardness (mg CaCO3/L)	Copper (mg/L)	Acute Hardness (mg/L) e(0.9422(ln Hardness) – 1.700)/1000	Chronic Hardness (mg/L) e(0.8545(ln Hardness) – 1.7020)/1000	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	46	0.003	0.007	0.005	3.82	56.13	2.67E+07
8/23/2007	74	**0.002**	0.011	0.007	3.41	64.84	1.59E+07
8/29/2007	80	0.003	0.011	0.008	3.02	74.78	2.11E+07
9/7/2007	74	0.004	0.011	0.007	2.57	85.52	2.40E+07
9/11/2007	88	0.010	0.012	0.008	2.62	84.38	6.11E+07
9/19/2007	120	**0.002**	0.017	0.011	2.13	92.53	9.94E+06
9/25/2007	106	0.004	0.015	0.010	2.16	92.19	2.02E+07
10/4/2007	240	0.004	0.032	0.020	2.16	92.19	2.02E+07
10/8/2007	84	0.003	0.012	0.008	2.19	91.87	1.53E+07
10/16/2007	70	0.005	0.010	0.007	2.64	83.76	3.08E+07
10/24/2007	74	0.002	0.011	0.007	8.21	20.73	3.83E+07
11/1/2007	80	**0.002**	0.011	0.008	2.51	86.72	1.17E+07
11/15/2007	130	0.005	0.018	0.012	2.50	86.82	2.92E+07
11/26/2007	170	0.003	0.023	0.015	10.23	16.24	7.16E+07
12/11/2007	80	0.005	0.011	0.008	18.83	10.69	2.20E+08
1/9/2008	72	**0.002**	0.010	0.007	21.15	9.89	9.87E+07
2/6/2008	110	0.006	0.015	0.010	50.40	5.49	7.05E+08
¾/2008	100	0.003	0.014	0.009	92.10	3.30	6.45E+08
3/20/2008	100	0.003	0.014	0.009	42.19	6.25	2.95E+08

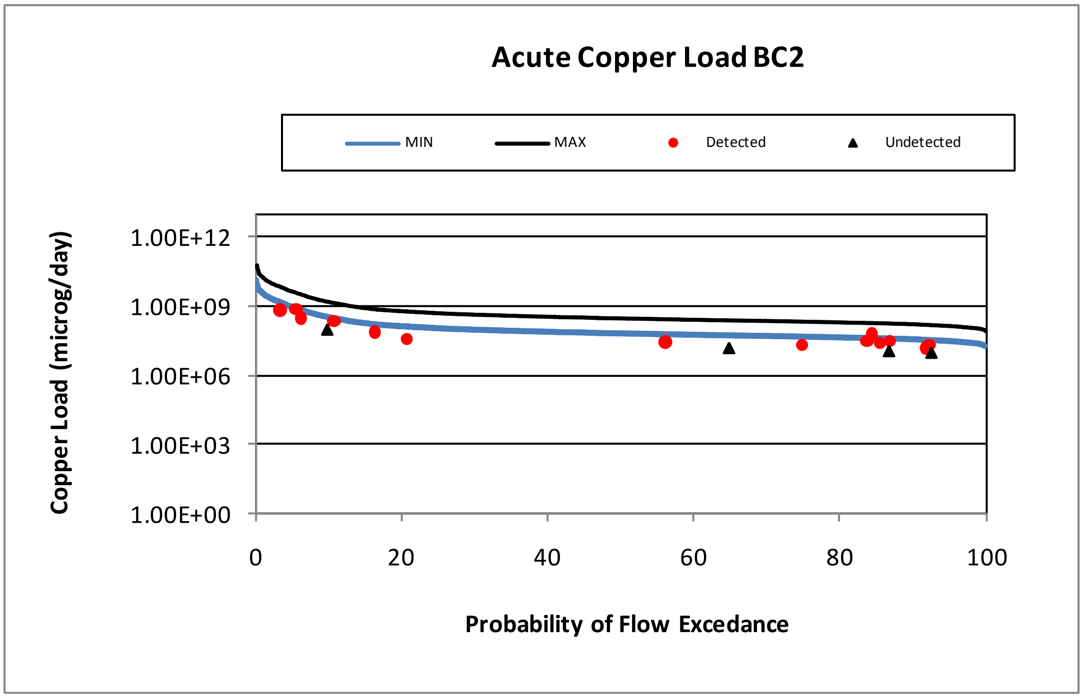

Figure B.2. Acute Copper Mass Load Curves for Station BC2

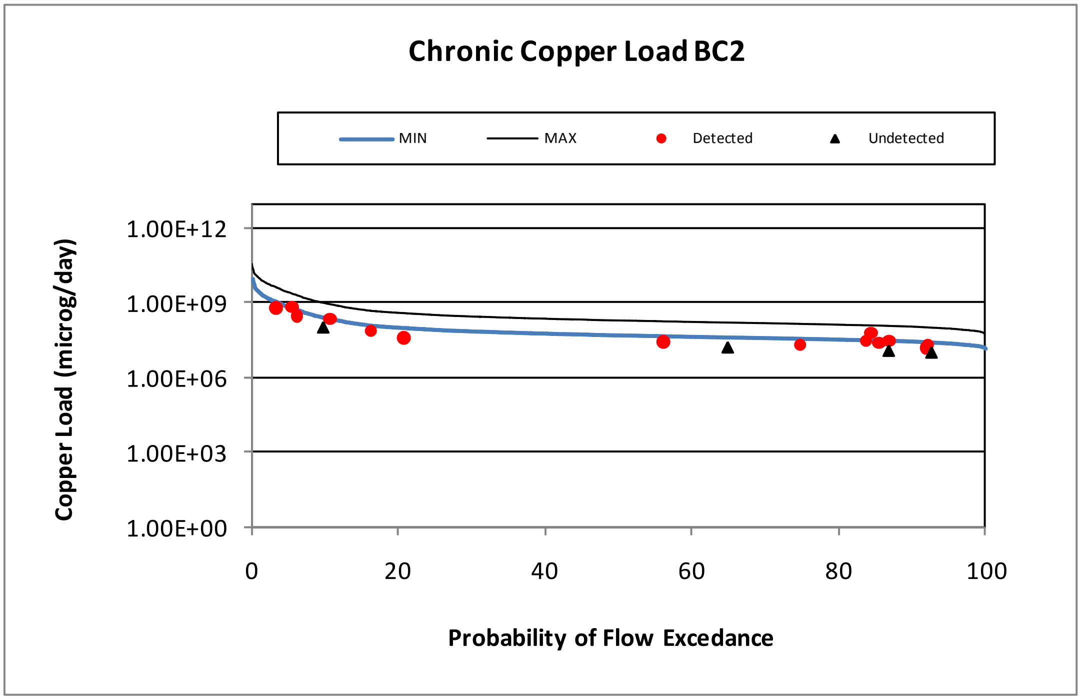

Figure B.3. Chronic Copper Mass Load Curves for Station BC2

Table B.3. Lead Sampling Results for BC2

Date	Hardness (mg CaCO3/L)	Lead (mg/L)	Acute Hardness (mg/L) e(1.273(ln Hardness) – 1.460)/1000	Chronic Hardness (mg/L) e(1.273(ln Hardness) – 4.705)/1000	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	46	0.002	0.030	0.001	3.82	56.13	1.78E+07
8/23/2007	74	**0.002**	0.056	0.002	3.41	64.84	1.59E+07
8/29/2007	80	**0.002**	0.061	0.002	3.02	74.78	1.41E+07
9/7/2007	74	**0.002**	0.056	0.002	2.57	85.52	1.20E+07
9/11/2007	88	**0.002**	0.069	0.003	2.62	84.38	1.22E+07
9/19/2007	120	**0.002**	0.103	0.004	2.13	92.53	9.94E+06
9/25/2007	106	**0.002**	0.088	0.003	2.16	92.19	1.01E+07
10/4/2007	240	**0.002**	0.249	0.010	2.16	92.19	1.01E+07
10/8/2007	84	**0.002**	0.065	0.003	2.19	91.87	1.02E+07
10/16/2007	70	**0.002**	0.052	0.002	2.64	83.76	1.23E+07
10/24/2007	74	**0.002**	0.056	0.002	8.21	20.73	3.83E+07
11/1/2007	80	**0.002**	0.061	0.002	2.51	86.72	1.17E+07
11/15/2007	130	**0.002**	0.114	0.004	2.50	86.82	1.17E+07
11/26/2007	170	**0.002**	0.160	0.006	10.23	16.24	4.77E+07
12/11/2007	80	**0.002**	0.061	0.002	18.83	10.69	8.79E+07
1/9/2008	72	**0.002**	0.054	0.002	21.15	9.89	9.87E+07
2/6/2008	110	0.002	0.092	0.004	50.40	5.49	2.35E+08
¾/2008	100	**0.002**	0.082	0.003	92.10	3.30	4.30E+08
3/20/2008	100	**0.002**	0.082	0.003	42.19	6.25	1.97E+08

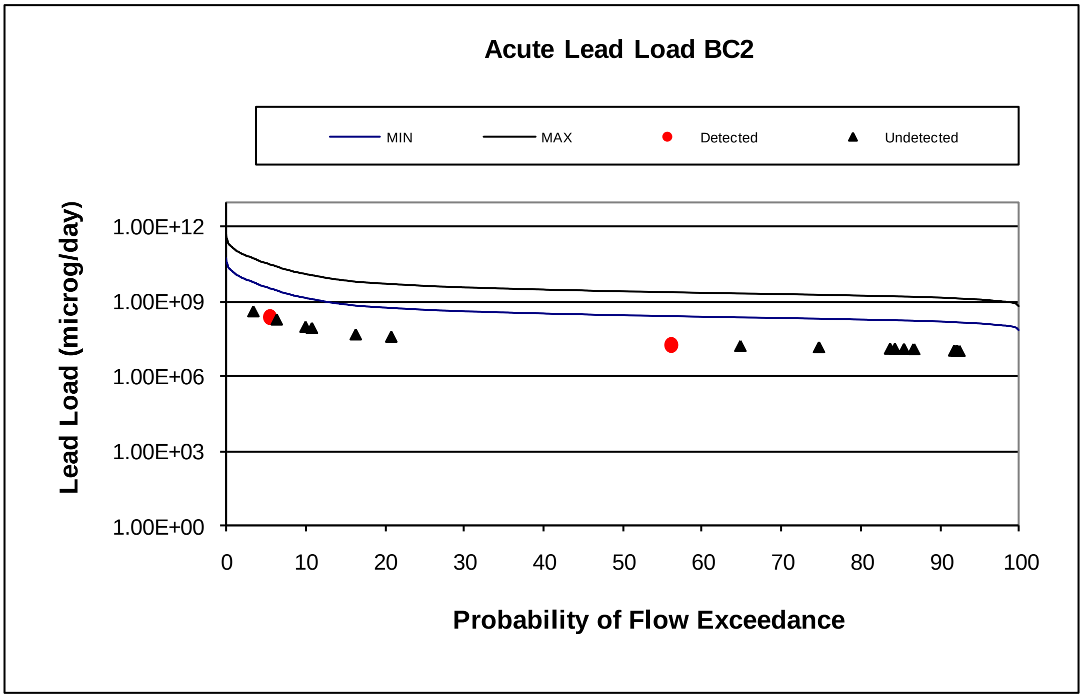

Figure B.4. Acute Lead Mass Load Curves for Station BC2

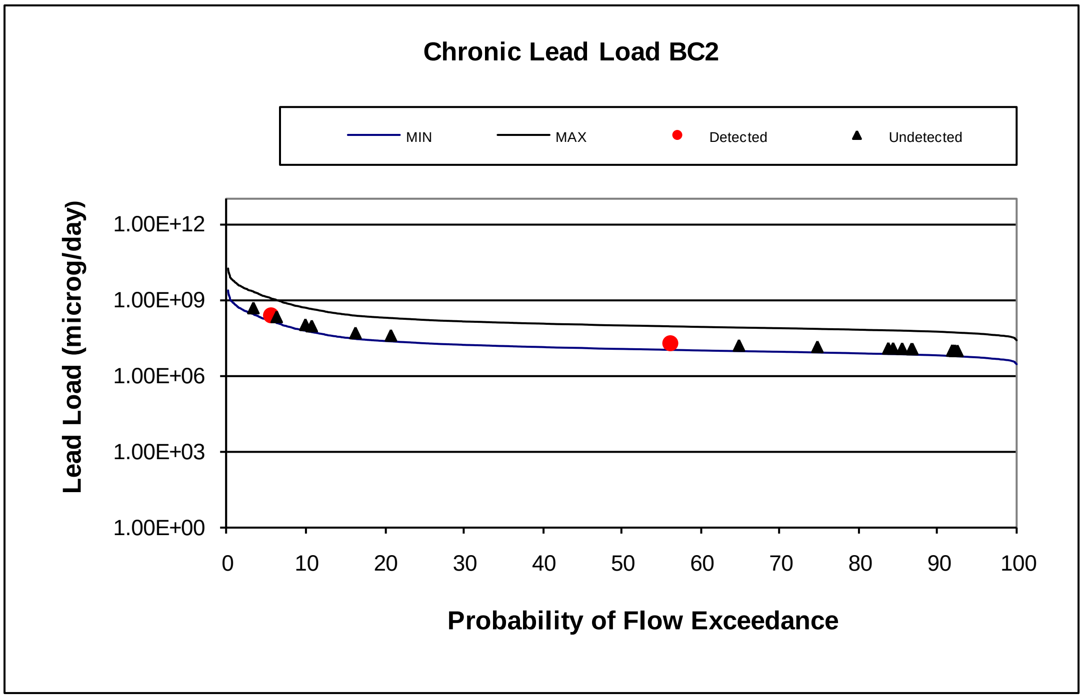

Figure B.5. Chronic Lead Mass Load Curves for Station BC2

Table B.4. Iron Sampling Results for BC2

Date	Hardness (mg/L CaCO3)	Iron (mg/L)	Acute Standard (mg/L)	Chronic Standard (mg/L)	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	46	0.173	4.000	1.000	3.82	56.13	1.54E+09
8/23/2007	74	0.157	4.000	1.000	3.41	64.84	1.25E+09
8/29/2007	80	0.218	4.000	1.000	3.02	74.78	1.54E+09
9/7/2007	74	0.159	4.000	1.000	2.57	85.52	9.53E+08
9/11/2007	88	0.206	4.000	1.000	2.62	84.38	1.26E+09
9/19/2007	120	0.116	4.000	1.000	2.13	92.53	5.76E+08
9/25/2007	106	0.138	4.000	1.000	2.16	92.19	6.95E+08
10/4/2007	240	0.392	4.000	1.000	2.16	92.19	1.98E+09
10/8/2007	84	**0.02**	4.000	1.000	2.19	91.87	1.02E+08
10/16/2007	70	0.17	4.000	1.000	2.64	83.76	1.05E+09
10/24/2007	74	0.70	4.000	1.000	8.21	20.73	1.34E+10
11/1/2007	80	0.31	4.000	1.000	2.51	86.72	1.82E+09
11/15/2007	130	0.36	4.000	1.000	2.50	86.82	2.10E+09
11/26/2007	170	1.40	4.000	1.000	10.23	16.24	3.34E+10
12/11/2007	80	1.32	4.000	1.000	18.83	10.69	5.80E+10
1/9/2008	72	1.89	4.000	1.000	21.15	9.89	9.33E+10
2/6/2008	110	2.71	4.000	1.000	50.40	5.49	3.19E+11
¾/2008	100	2.06	4.000	1.000	92.10	3.30	4.43E+11
3/20/2008	100	1.00	4.000	1.000	42.19	6.25	9.84E+10

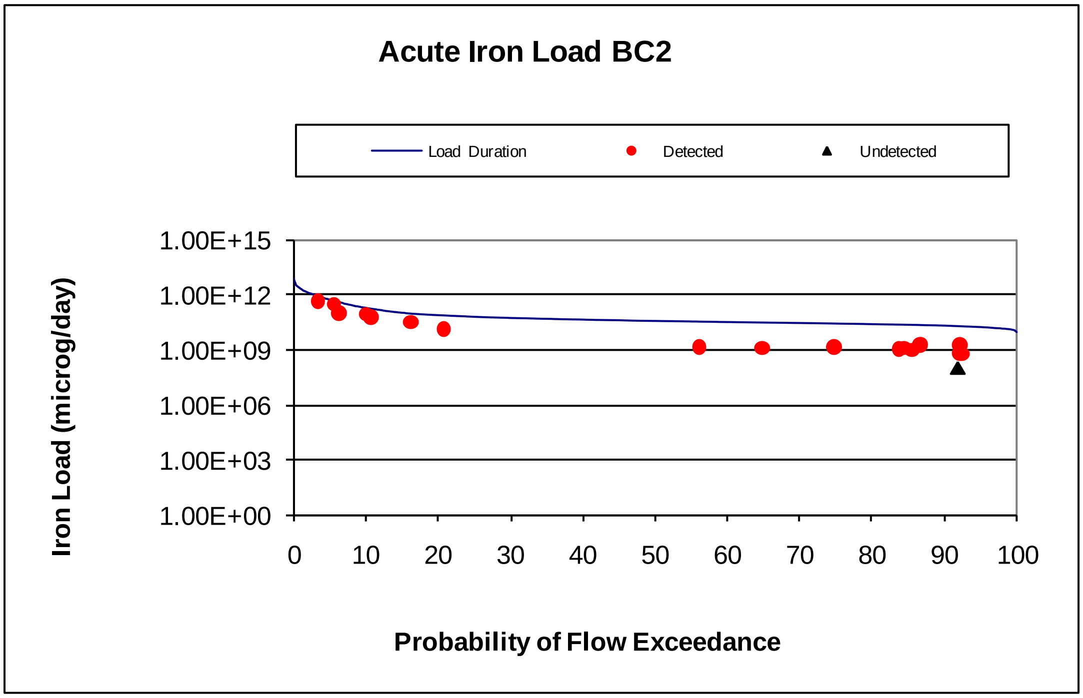

Figure B.6. Acute Iron Mass Load Curves for Station BC2

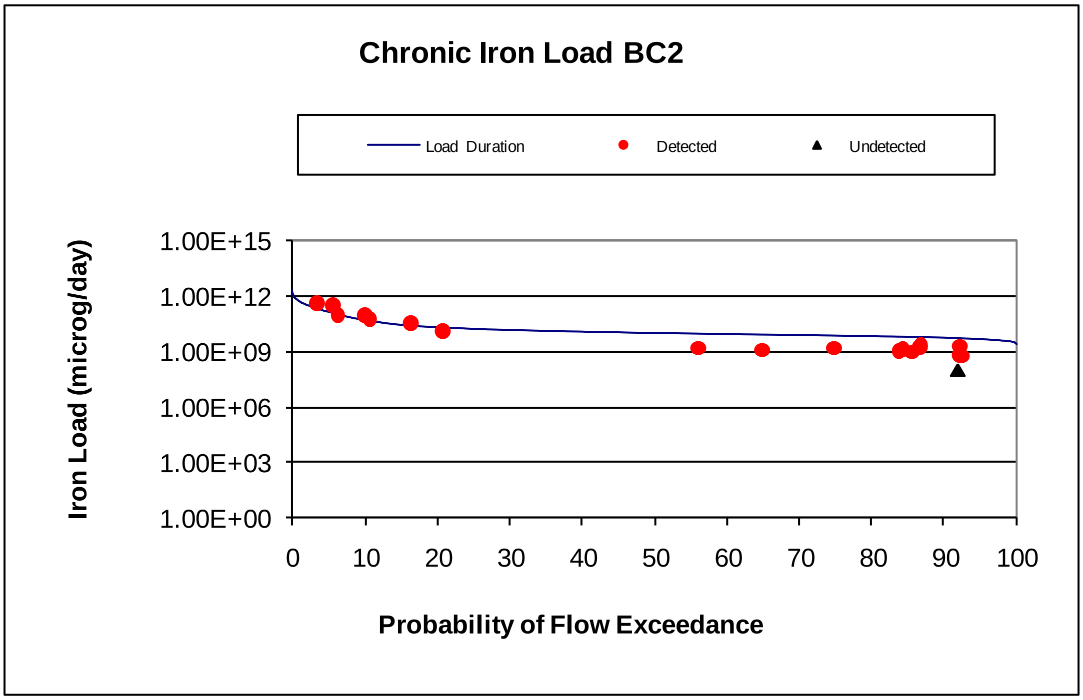

Figure B.7. Chronic Iron Mass Load Curves for Station BC2

Table B.5. Mercury Sampling Results for BC2

Date	Hardness (mg/L CaCO3)	Mercury (mg/L)	Acute Standard (mg/L)	Chronic Standard (mg/L)	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	46		0.0014	0.00077	3.82	56.13	
8/23/2007	74	**0.0002**	0.0014	0.00077	3.41	64.84	1.59E+06
8/29/2007	80		0.0014	0.00077	3.02	74.78	
9/7/2007	74	**0.0002**	0.0014	0.00077	2.57	85.52	1.20E+06
9/11/2007	88		0.0014	0.00077	2.62	84.38	
9/19/2007	120	**0.0002**	0.0014	0.00077	2.13	92.53	9.94E+05
9/25/2007	106		0.0014	0.00077	2.16	92.19	
10/4/2007	240	**0.0002**	0.0014	0.00077	2.16	92.19	1.01E+06
10/8/2007	84		0.0014	0.00077	2.19	91.87	
10/16/2007	70	**0.0002**	0.0014	0.00077	2.64	83.76	1.23E+06
10/24/2007	74		0.0014	0.00077	8.21	20.73	
11/1/2007	80	**0.0002**	0.0014	0.00077	2.51	86.72	1.17E+06
11/15/2007	130	**0.0002**	0.0014	0.00077	2.50	86.82	1.17E+06
11/26/2007	170	**0.0002**	0.0014	0.00077	10.23	16.24	4.77E+06
12/11/2007	80	**0.0002**	0.0014	0.00077	18.83	10.69	8.79E+06
1/9/2008	72	**0.0002**	0.0014	0.00077	21.15	9.89	9.87E+06
2/6/2008	110		0.0014	0.00077	50.40	5.49	
3/4/2008	100		0.0014	0.00077	92.10	3.30	
3/20/2008	100		0.0014	0.00077	42.19	6.25	

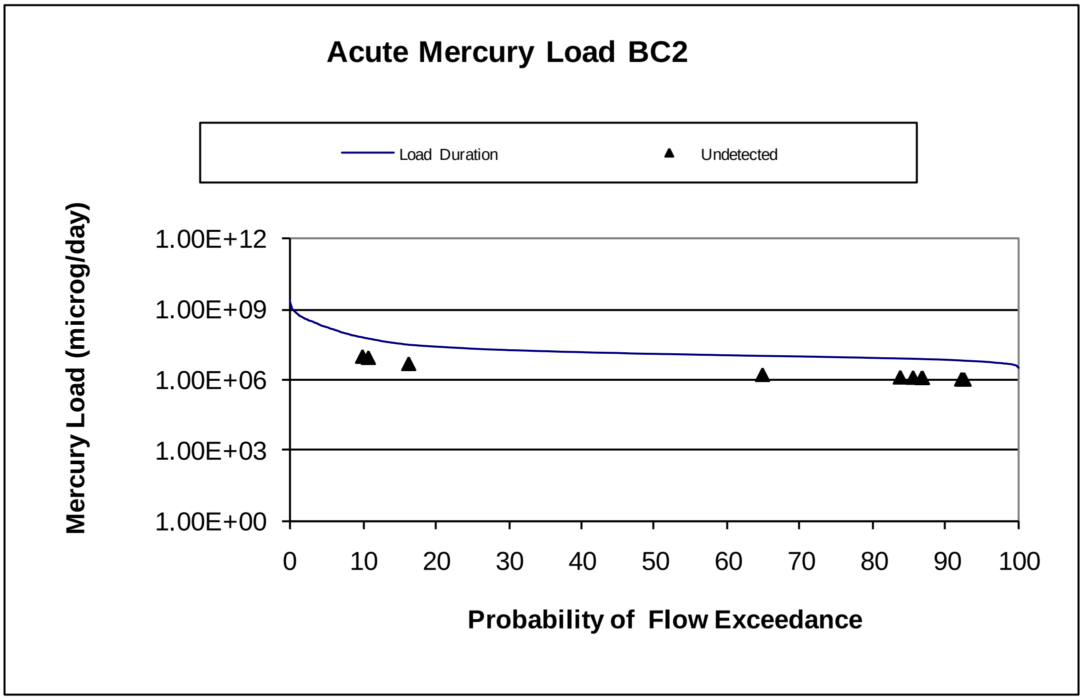

Figure B.8. Acute Mercury Mass Load Curves for Station BC2

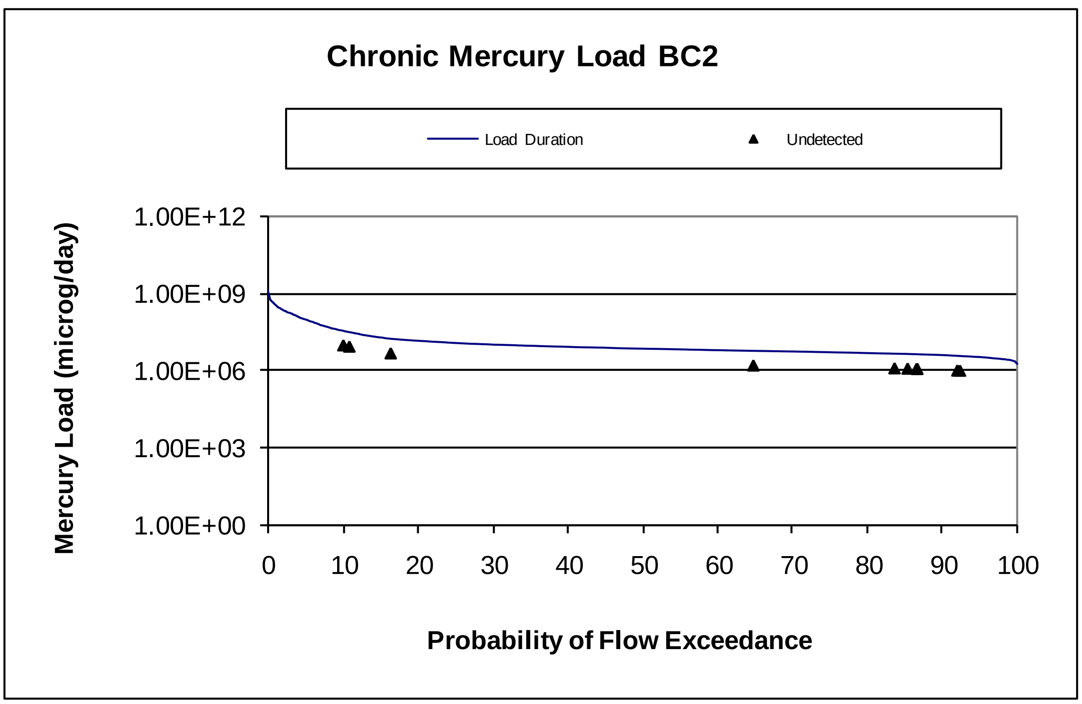

Figure B.9. Chronic Mercury Mass Load Curves for Station BC2

APPENDIX C: RESULTS FOR STATION BC3

Table C.1. Metal Results for Station BC3

Date	Hd (mg/L as CaCO3)	Cu (mg/L)	Pb (mg/L)	Fe (mg/L)	Hg (mg/L)	Flow (cfs)
8/16/2007	68	0.004	0.002	0.098		3.98
8/23/2007	56	0.004	**0.002**	0.085	**0.0002**	3.66
8/29/2007	74	0.002	**0.002**	0.096		3.26
9/7/2007	80	0.008	**0.002**	0.063	**0.0002**	2.73
9/11/2007	70	0.004	**0.002**	0.083		2.82
9/19/2007	80	0.004	**0.002**	0.081	**0.0002**	2.29
9/25/2007	90	0.004	**0.002**	0.071		2.33
10/4/2007	100	0.004	**0.002**	0.043	**0.0002**	2.33
10/8/2007	70	0.005	**0.002**	**0.02**		2.35
10/16/2007	65	0.006	**0.002**	0.11	**0.0002**	2.83
10/24/2007	100	0.002	**0.002**	0.51		9.28
11/1/2007	88	0.004	**0.002**	0.13	**0.0002**	2.72
11/15/2007	96	0.006	**0.002**	0.15	**0.0002**	2.70
11/26/2007	100	0.004	**0.002**	1.10	**0.0002**	11.80
12/11/2007	92	0.004	**0.002**	1.10	**0.0002**	20.07
1/9/2008	56	**0.002**	**0.002**	1.73	**0.0002**	21.38
2/6/2008	120	0.004	**0.002**	2.45	**0.0002**	53.46
¾/2008	65	**0.002**	**0.002**	1.98		97.56
3/20/2008	88	0.004	**0.002**	0.89		45.14

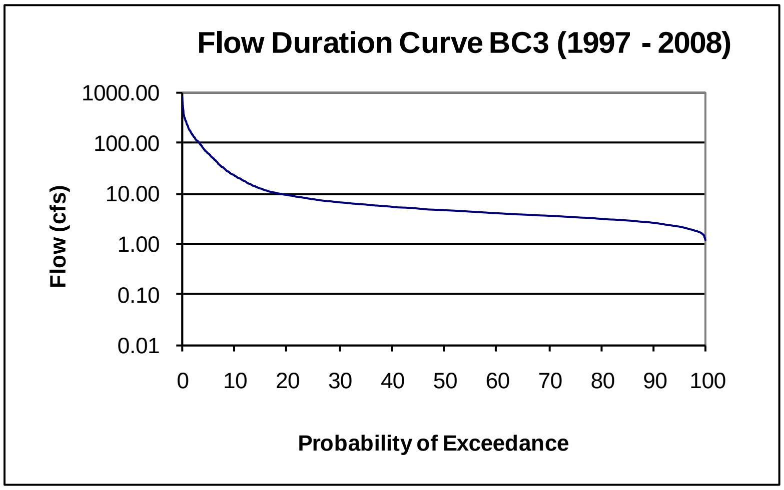

Figure C.1. Flow Duration Curve for Station BC3

Table C.2. Copper Sampling Results for BC3

Date	Hardness (mg CaCO3/L)	Copper (mg/L)	Acute Hardness (mg/L) e(0.9422(ln Hardness) – 1.700)/1000	Chronic Hardness (mg/L) e(0.8545(ln Hardness) – 1.7020)/1000	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	68	0.004	0.010	0.007	3.98	58.42	3.71E+07
8/23/2007	56	0.004	0.008	0.006	3.66	64.97	3.42E+07
8/29/2007	74	0.002	0.011	0.007	3.26	74.49	1.52E+07
9/7/2007	80	0.008	0.011	0.008	2.73	86.21	5.09E+07
9/11/2007	70	0.004	0.010	0.007	2.82	84.28	2.63E+07
9/19/2007	80	0.004	0.011	0.008	2.29	92.58	2.14E+07
9/25/2007	90	0.004	0.013	0.009	2.33	92.11	2.17E+07
10/4/2007	100	0.004	0.014	0.009	2.33	99.90	2.17E+07
10/8/2007	70	0.005	0.010	0.007	2.35	92.02	2.74E+07
10/16/2007	65	0.006	0.009	0.006	2.83	84.03	3.96E+07
10/24/2007	100	0.002	0.014	0.009	9.28	19.09	4.33E+07
11/1/2007	88	0.004	0.012	0.008	2.72	86.40	2.54E+07
11/15/2007	96	0.006	0.013	0.009	2.70	86.65	3.78E+07
11/26/2007	100	0.004	0.014	0.009	11.80	15.31	1.10E+08
12/11/2007	92	0.004	0.013	0.009	20.07	10.52	1.87E+08
1/9/2008	56	**0.002**	0.008	0.006	21.38	10.13	9.98E+07
2/6/2008	120	0.004	0.017	0.011	53.46	5.44	4.99E+08
¾/2008	65	**0.002**	0.009	0.006	97.56	3.25	4.55E+08
3/20/2008	88	0.004	0.012	0.008	45.14	6.18	4.21E+08

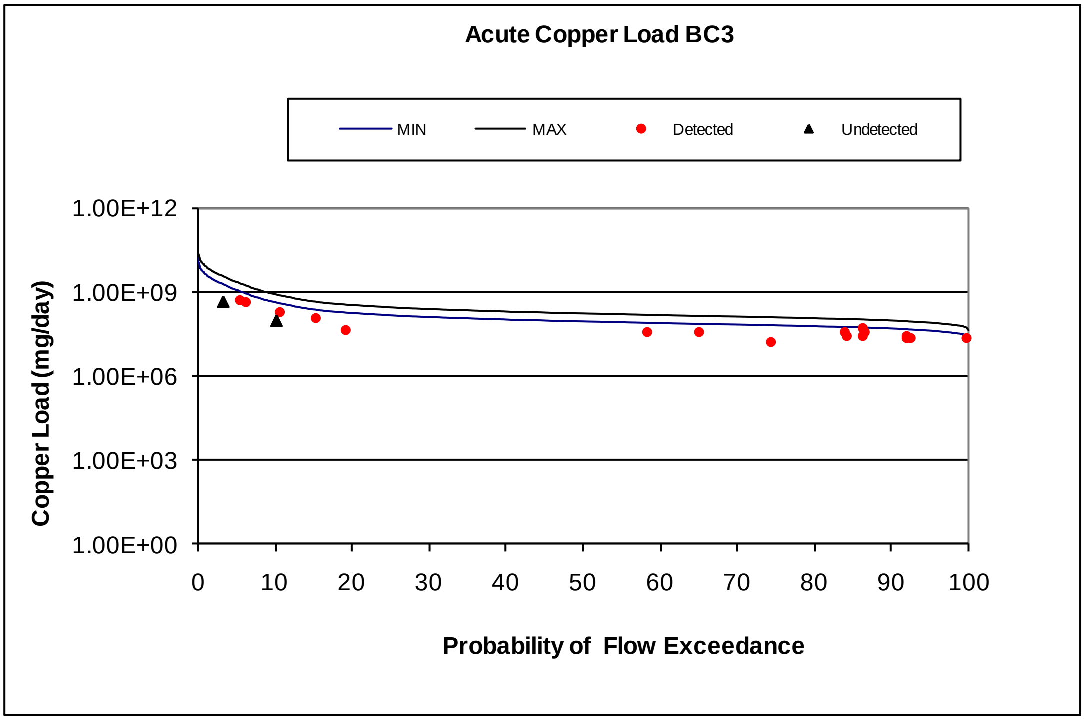

Figure C.2. Acute Copper Mass Load Curves for Station BC3

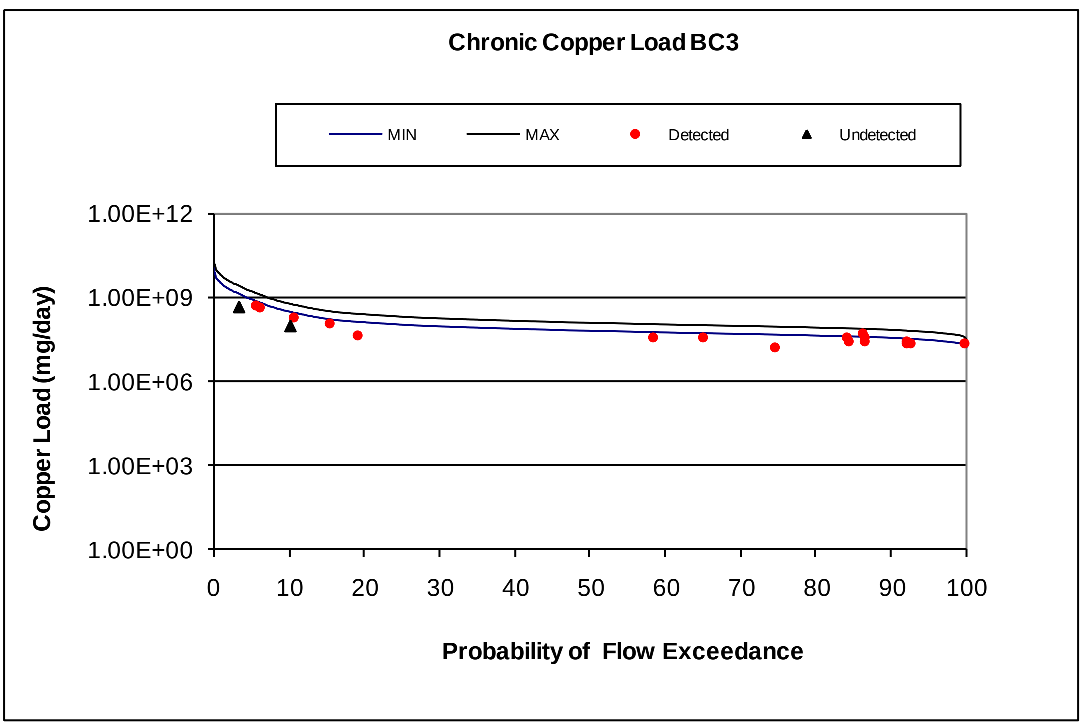

Figure C.3. Chronic Copper Mass Load Curves for Station BC3

Table C.3. Lead Sampling Results for BC3

Date	Hardness (mg CaCO3/L)	Lead (mg/L)	Acute Hardness (mg/L) e(1.273(ln Hardness) – 1.460)/1000	Chronic Hardness (mg/L) e(1.273(ln Hardness) – 4.705)/1000	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	68	0.002	0.050	0.002	3.98	58.42	1.86E+07
8/23/2007	56	**0.002**	0.039	0.002	3.66	64.97	1.71E+07
8/29/2007	74	**0.002**	0.056	0.002	3.26	74.49	1.52E+07
9/7/2007	80	**0.002**	0.061	0.002	2.73	86.21	1.27E+07
9/11/2007	70	**0.002**	0.052	0.002	2.82	84.28	1.32E+07
9/19/2007	80	**0.002**	0.061	0.002	2.29	92.58	1.07E+07
9/25/2007	90	**0.002**	0.071	0.003	2.33	92.11	1.09E+07
10/4/2007	100	**0.002**	0.082	0.003	2.33	99.90	1.09E+07
10/8/2007	70	**0.002**	0.052	0.002	2.35	92.02	1.10E+07
10/16/2007	65	**0.002**	0.047	0.002	2.83	84.03	1.32E+07
10/24/2007	86	**0.002**	0.067	0.003	9.28	19.09	4.33E+07
11/1/2007	88	**0.002**	0.069	0.003	2.72	86.40	1.27E+07
11/15/2007	96	**0.002**	0.078	0.003	2.70	86.65	1.26E+07
11/26/2007	100	**0.002**	0.082	0.003	11.80	15.31	5.51E+07
12/11/2007	92	**0.002**	0.073	0.003	20.07	10.52	9.36E+07
1/9/2008	56	**0.002**	0.039	0.002	21.38	10.13	9.98E+07
2/6/2008	120	**0.002**	0.103	0.004	53.46	5.44	2.49E+08
¾/2008	65	**0.002**	0.047	0.002	97.56	3.25	4.55E+08
3/20/2008	88	**0.002**	0.069	0.003	45.14	6.18	2.11E+08

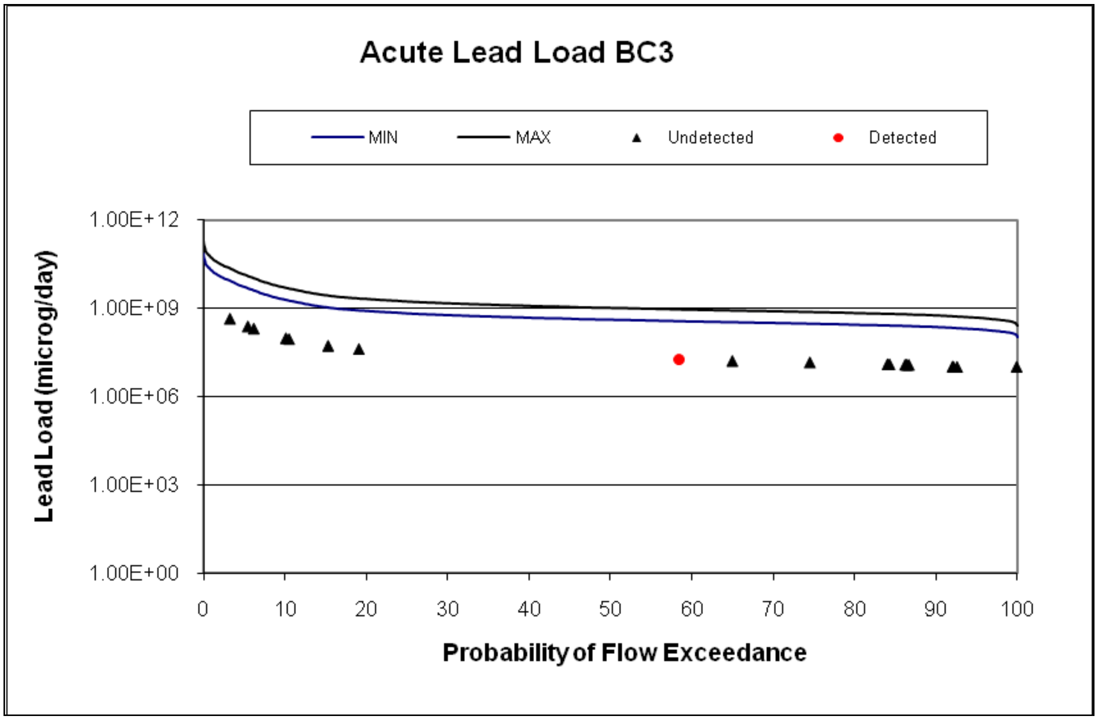

Figure C.4. Acute Lead Mass Load Curves for Station BC3

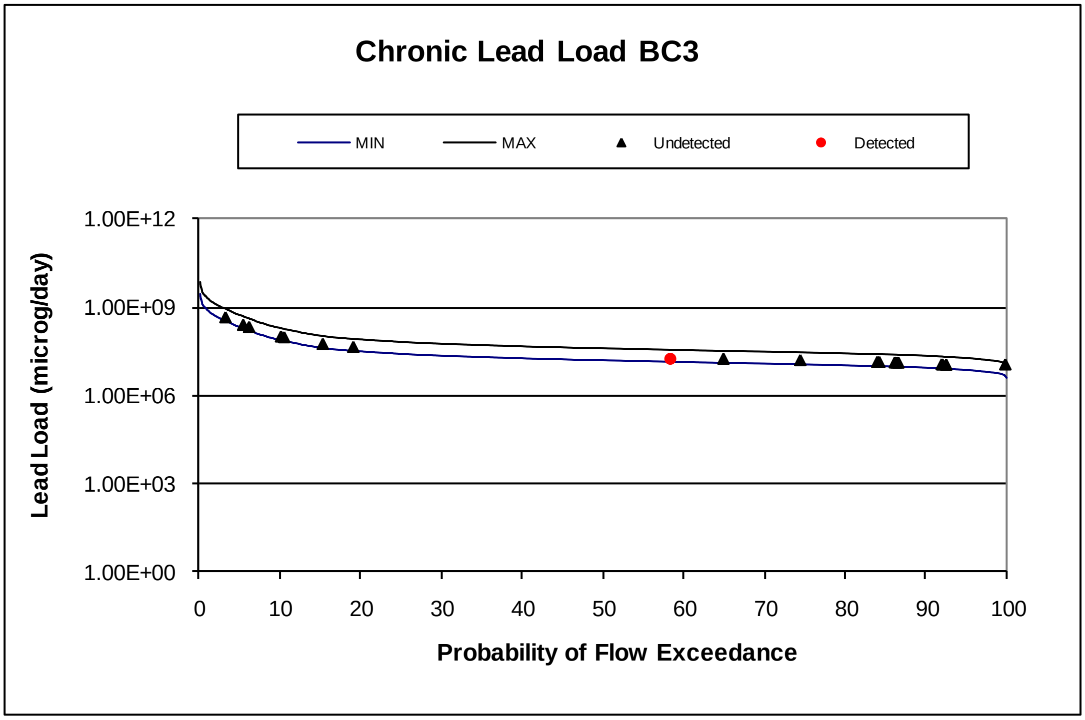

Figure C.5. Chronic Lead Mass Load Curves for Station BC3

Table C.4. Iron Sampling Results for BC3

Date	Hardness (mg/L CaCO3)	Iron (mg/L)	Acute Standard (mg/L)	Chronic Standard (mg/L)	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	68	0.098	4.000	1.000	3.98	58.42	9.10E+08
8/23/2007	56	0.085	4.000	1.000	3.66	64.97	7.26E+08
8/29/2007	74	0.096	4.000	1.000	3.26	74.49	7.30E+08
9/7/2007	80	0.063	4.000	1.000	2.73	86.21	4.01E+08
9/11/2007	70	0.083	4.000	1.000	2.82	84.28	5.46E+08
9/19/2007	80	0.081	4.000	1.000	2.29	92.58	4.33E+08
9/25/2007	90	0.071	4.000	1.000	2.33	92.11	3.86E+08
10/4/2007	100	0.043	4.000	1.000	2.33	99.90	2.34E+08
10/8/2007	70	**0.02**	4.000	1.000	2.35	92.02	1.10E+08
10/16/2007	65	0.11	4.000	1.000	2.83	84.03	7.26E+08
10/24/2007	86	0.51	4.000	1.000	9.28	19.09	1.10E+10
11/1/2007	88	0.13	4.000	1.000	2.72	86.40	8.25E+08
11/15/2007	96	0.15	4.000	1.000	2.70	86.65	9.45E+08
11/26/2007	100	1.10	4.000	1.000	11.80	15.31	3.03E+10
12/11/2007	92	1.10	4.000	1.000	20.07	10.52	5.15E+10
1/9/2008	56	1.73	4.000	1.000	21.38	10.13	8.63E+10
2/6/2008	120	2.45	4.000	1.000	53.46	5.44	3.06E+11
¾/2008	65	1.98	4.000	1.000	97.56	3.25	4.51E+11
3/20/2008	88	0.89	4.000	1.000	45.14	6.18	9.37E+10

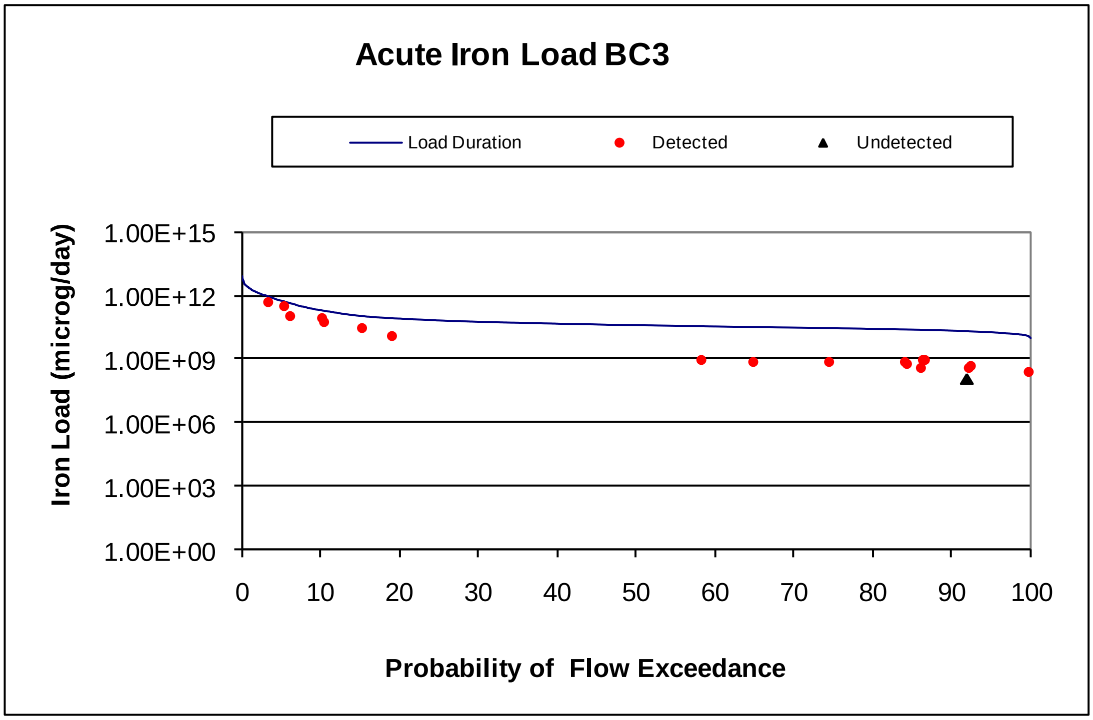

Figure C.6. Acute Iron Mass Load Curves for Station BC3

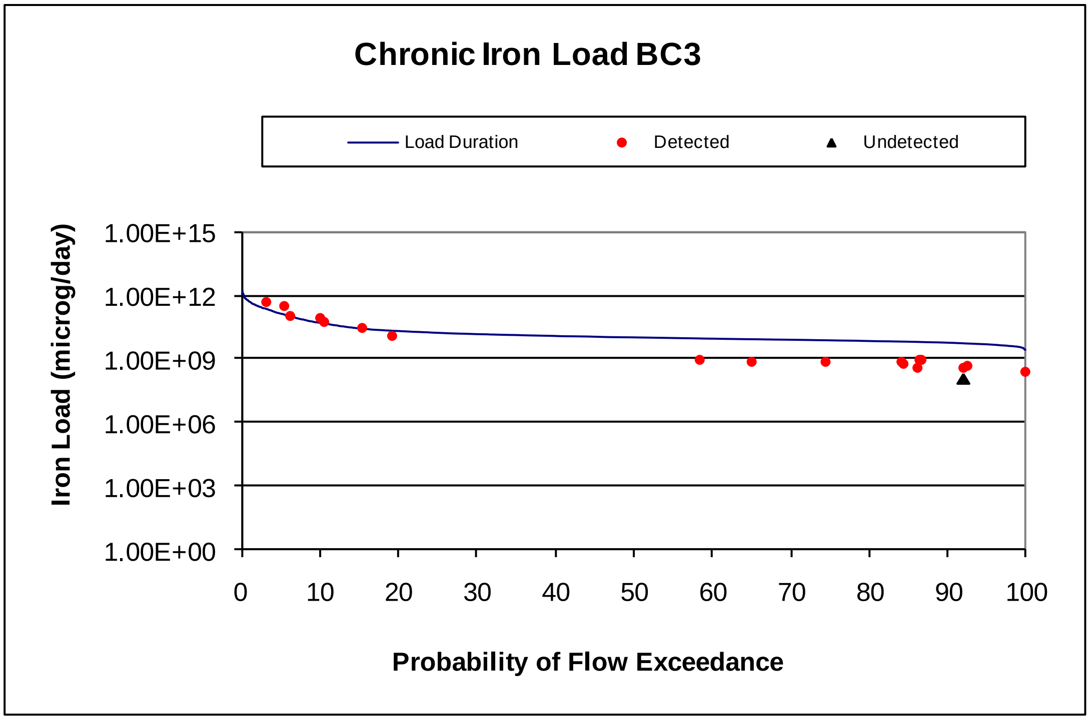

Figure C.7. Chronic Iron Mass Load Curves for Station BC3

Table C.5. Mercury Sampling Results for BC3

Date	Hardness (mg/L CaCO3)	Mercury (mg/L)	Acute Standard (mg/L)	Chronic Standard (mg/L)	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	68		0.0014	0.00077	3.98	58.42	
8/23/2007	56	**0.0002**	0.0014	0.00077	3.66	64.97	1.71E+06
8/29/2007	74		0.0014	0.00077	3.26	74.49	
9/7/2007	80	**0.0002**	0.0014	0.00077	2.73	86.21	1.27E+06
9/11/2007	70		0.0014	0.00077	2.82	84.28	
9/19/2007	80	**0.0002**	0.0014	0.00077	2.29	92.58	1.07E+06
9/25/2007	90		0.0014	0.00077	2.33	92.11	
10/4/2007	100	**0.0002**	0.0014	0.00077	2.33	99.90	1.09E+06
10/8/2007	70		0.0014	0.00077	2.35	92.02	
10/16/2007	65	**0.0002**	0.0014	0.00077	2.83	84.03	1.32E+06
10/24/2007	86		0.0014	0.00077	9.28	19.09	
11/1/2007	88	**0.0002**	0.0014	0.00077	2.72	86.40	1.27E+06
11/15/2007	96	**0.0002**	0.0014	0.00077	2.70	86.65	1.26E+06
11/26/2007	100	**0.0002**	0.0014	0.00077	11.80	15.31	5.51E+06
12/11/2007	92	**0.0002**	0.0014	0.00077	20.07	10.52	9.36E+06
1/9/2008	56	**0.0002**	0.0014	0.00077	21.38	10.13	9.98E+06
2/6/2008	120	**0.0002**	0.0014	0.00077	53.46	5.44	2.49E+07
¾/2008	65		0.0014	0.00077	97.56	3.25	
3/20/2008	88		0.0014	0.00077	45.14	6.18	

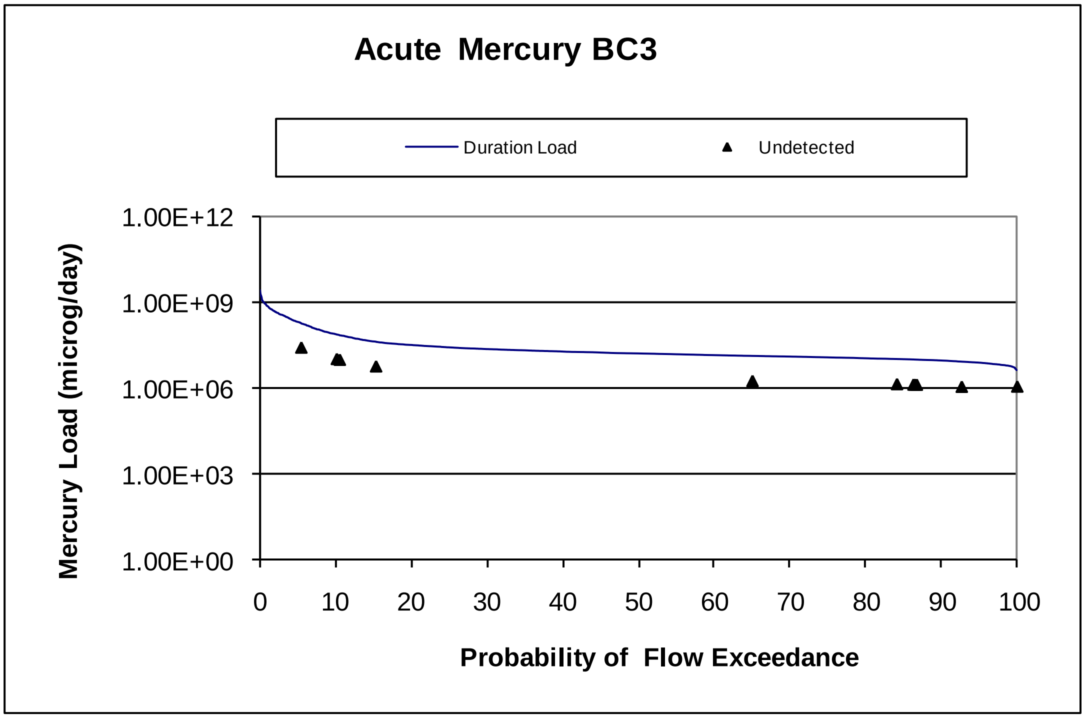

Figure C.8. Acute Mercury Mass Load Curves for Station BC3

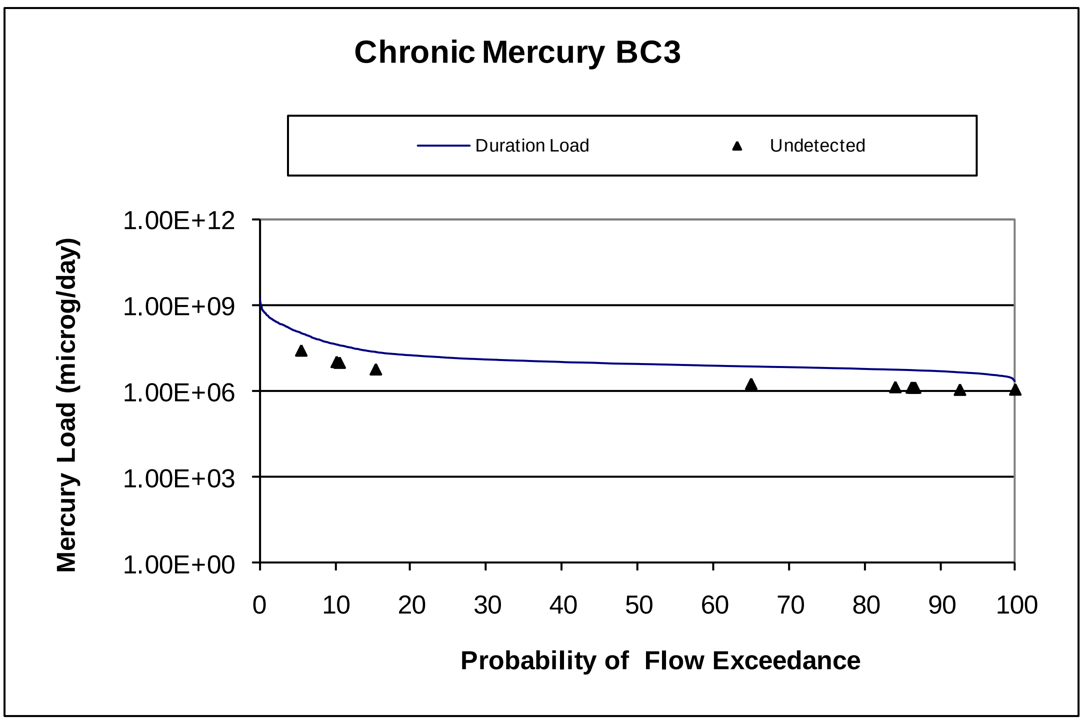

Figure C.9. Chronic Mercury Mass Load Curves for Station BC3

APPENDIX D: RESULTS FOR STATION BC4

Table D.1. Metal Results for Station BC4

Date	Hd (mg/L as CaCO3)	Cu (mg/L)	Pb (mg/L)	Fe (mg/L)	Hg (mg/L)	Flow (cfs)
8/16/2007	110	0.006	0.002	0.253		4.89
8/23/2007	150	0.004	**0.002**	0.337	**0.0002**	4.64
8/29/2007	116	0.004	**0.002**	0.338		4.13
9/7/2007	160	0.014	0.002	0.283	0.0004	3.38
9/11/2007	180	0.010	**0.002**	0.193		3.46
9/19/2007	210	0.008	**0.002**	0.243	**0.0002**	2.83
9/25/2007	265	0.019	**0.002**	0.232		2.94
10/4/2007	360	0.010	**0.002**	0.063	**0.0002**	2.83
10/8/2007	280	0.014	**0.002**	**0.02**		2.88
10/16/2007	270	0.013	**0.002**	0.25	**0.0002**	3.46
10/24/2007	220	0.004	**0.002**	0.40		13.79
11/1/2007	280	0.006	**0.002**	0.20	**0.0002**	3.39
11/15/2007	320	0.004	**0.002**	0.21	**0.0002**	3.33
11/26/2007	170	0.006	**0.002**	0.76	**0.0002**	12.50
12/11/2007	150	0.005	**0.002**	0.54	**0.0002**	22.25
1/9/2008	100	0.003	**0.002**	1.51	**0.0002**	29.32
2/6/2008	110	0.006	**0.002**	2.17	**0.0002**	68.78
¾/2008	65	0.026	**0.002**	1.98		124.80
3/20/2008	86	0.005	**0.002**	0.80		45.02

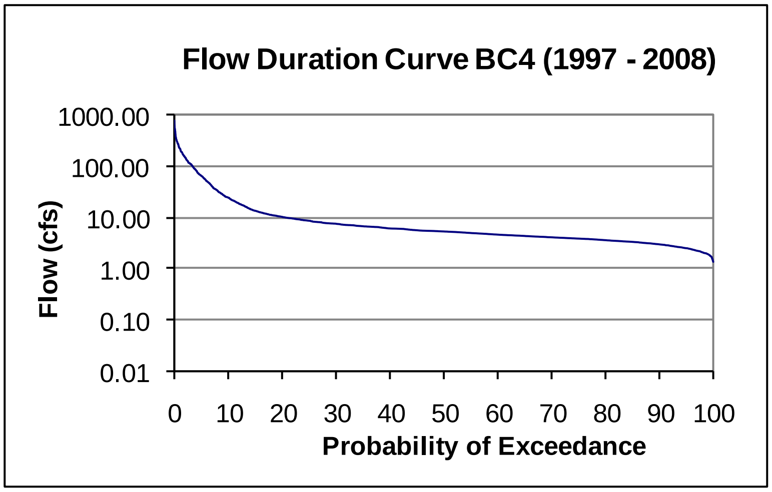

Figure D.1. Flow Duration Curve for Station BC4

Table D.2. Copper Sampling Results for BC4

Date	Hardness (mg CaCO3/L)	Copper (mg/L)	Acute Hardness (mg/L) e(0.9422(ln Hardness) – 1.700)/1000	Chronic Hardness (mg/L) e(0.8545(ln Hardness) – 1.7020)/1000	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	110	0.006	0.015	0.010	4.89	57.91	6.84E+07
8/23/2007	150	0.004	0.021	0.013	4.64	61.47	4.33E+07
8/29/2007	116	0.004	0.016	0.011	4.13	71.09	3.85E+07
9/7/2007	160	0.014	0.022	0.014	3.38	85.33	1.10E+08
9/11/2007	180	0.010	0.024	0.015	3.46	83.79	8.07E+07
9/19/2007	210	0.008	0.028	0.018	2.83	92.26	5.28E+07
9/25/2007	265	0.019	0.035	0.021	2.94	91.09	1.30E+08
10/4/2007	360	0.010	0.047	0.028	2.83	92.26	6.60E+07
10/8/2007	280	0.014	0.037	0.023	2.88	91.89	9.41E+07
10/16/2007	270	0.013	0.036	0.022	3.46	83.79	1.05E+08
10/24/2007	220	0.004	0.029	0.018	13.79	15.19	1.29E+08
11/1/2007	280	0.006	0.037	0.023	3.39	85.28	4.74E+07
11/15/2007	320	0.004	0.042	0.025	3.33	86.18	3.11E+07
11/26/2007	170	0.006	0.023	0.015	12.50	16.55	1.75E+08
12/11/2007	150	0.005	0.021	0.013	22.25	10.86	2.60E+08
1/9/2008	100	0.003	0.014	0.009	29.32	8.96	2.05E+08
2/6/2008	110	0.006	0.015	0.010	68.78	4.93	9.63E+08
¾/2008	65	0.026	0.009	0.006	124.80	2.61	7.57E+09
3/20/2008	86	0.005	0.012	0.008	45.02	6.84	5.25E+08

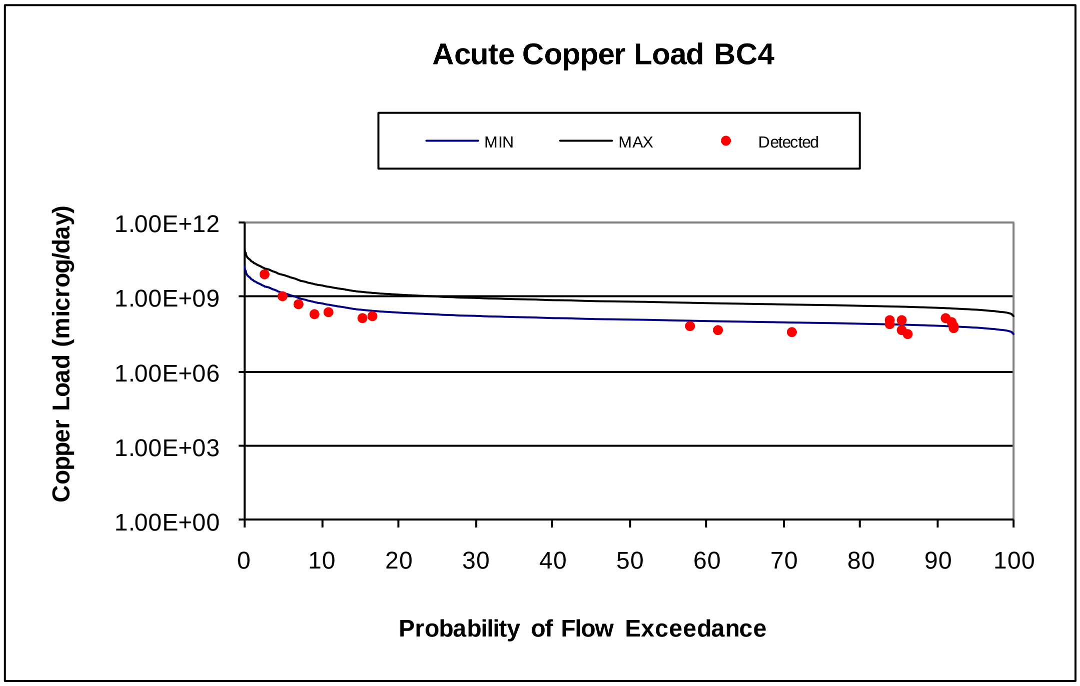

Figure D.2. Acute Copper Mass Load Curves for Station BC4

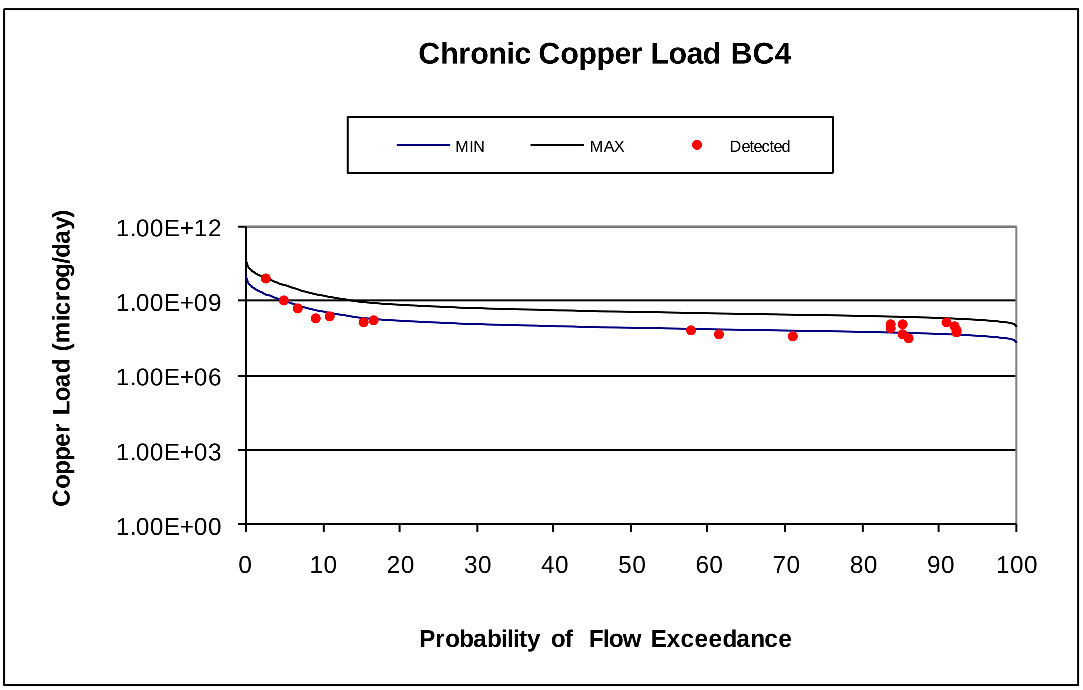

Figure D.3. Chronic Copper Mass Load Curves for Station BC4

Table D.3. Lead Sampling Results for BC4

Date	Hardness (mg CaCO3/L)	Lead (mg/L)	Acute Hardness (mg/L) e(1.273(ln Hardness) – 1.460)/1000	Chronic Hardness (mg/L) e(1.273(ln Hardness) – 4.705)/1000	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	110	0.002	0.092	0.004	4.89	57.91	2.28E+07
8/23/2007	150	**0.002**	0.137	0.005	4.64	61.47	2.16E+07
8/29/2007	116	**0.002**	0.099	0.004	4.13	71.09	1.93E+07
9/7/2007	160	0.002	0.149	0.006	3.38	85.33	1.58E+07
9/11/2007	180	**0.002**	0.173	0.007	3.46	83.79	1.61E+07
9/19/2007	210	**0.002**	0.210	0.008	2.83	92.26	1.32E+07
9/25/2007	265	**0.002**	0.282	0.011	2.94	91.09	1.37E+07
10/4/2007	360	**0.002**	0.417	0.016	2.83	92.26	1.32E+07
10/8/2007	280	**0.002**	0.303	0.012	2.88	91.89	1.34E+07
10/16/2007	270	**0.002**	0.289	0.011	3.46	83.79	1.61E+07
10/24/2007	220	**0.002**	0.223	0.009	13.79	15.19	6.43E+07
11/1/2007	280	**0.002**	0.303	0.012	3.39	85.28	1.58E+07
11/15/2007	320	**0.002**	0.359	0.014	3.33	86.18	1.55E+07
11/26/2007	170	**0.002**	0.160	0.006	12.50	16.55	5.83E+07
12/11/2007	150	**0.002**	0.137	0.005	22.25	10.86	1.04E+08
1/9/2008	100	**0.002**	0.082	0.003	29.32	8.96	1.37E+08
2/6/2008	110	**0.002**	0.092	0.004	68.78	4.93	3.21E+08
¾/2008	65	**0.002**	0.047	0.002	124.80	2.61	5.82E+08
3/20/2008	86	**0.002**	0.067	0.003	45.02	6.84	2.10E+08

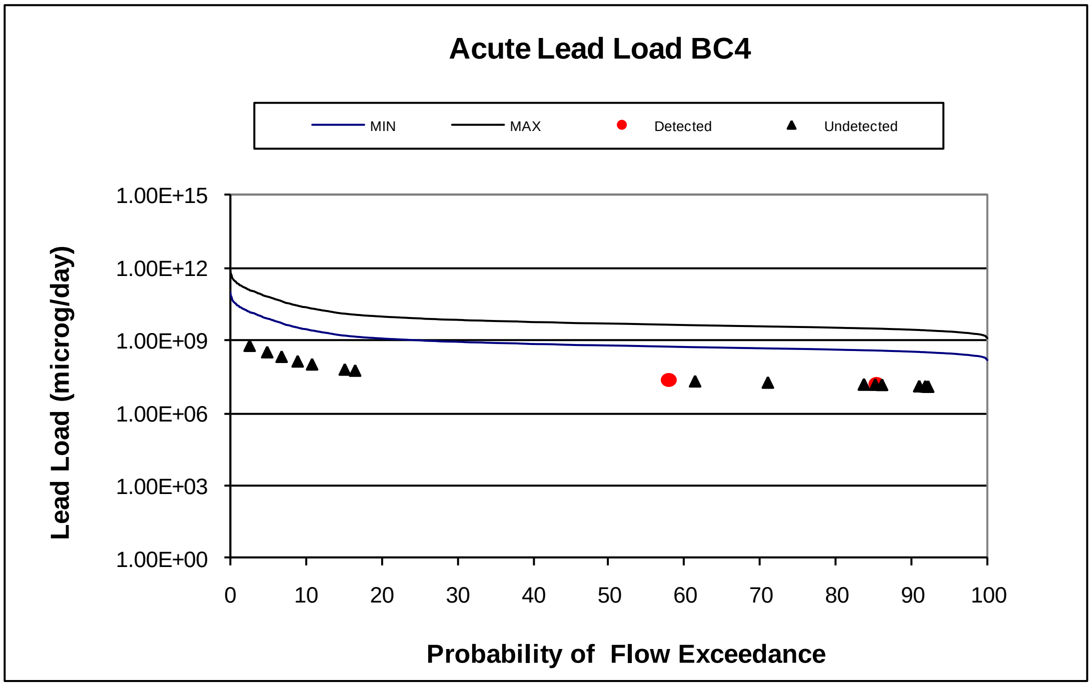

Figure D.4. Acute Lead Mass Load Curves for Station BC4

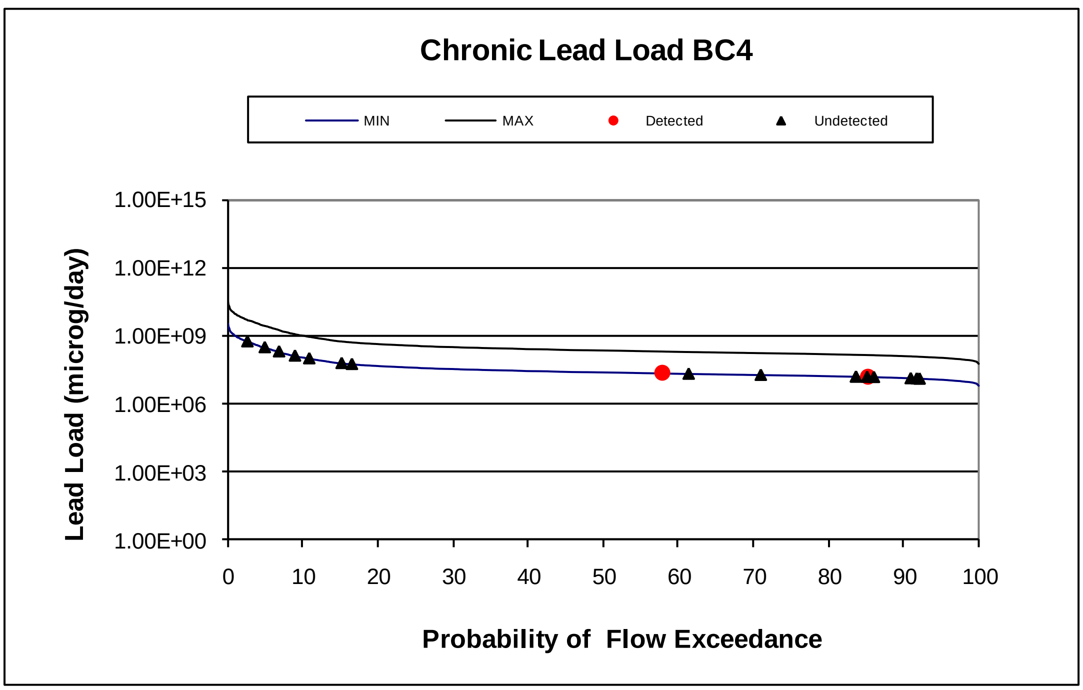

Figure D.5. Chronic Lead Mass Load Curves for Station BC4

Table D.4. Iron Sampling Results for BC4

Date	Hardness (mg/L CaCO3)	Iron (mg/L)	Acute Standard (mg/L)	Chronic Standard (mg/L)	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	110	0.253	4.000	1.000	4.89	57.91	2.89E+09
8/23/2007	150	0.337	4.000	1.000	4.64	61.47	3.65E+09
8/29/2007	116	0.338	4.000	1.000	4.13	71.09	3.26E+09
9/7/2007	160	0.283	4.000	1.000	3.38	85.33	2.23E+09
9/11/2007	180	0.193	4.000	1.000	3.46	83.79	1.56E+09
9/19/2007	210	0.243	4.000	1.000	2.83	92.26	1.60E+09
9/25/2007	265	0.232	4.000	1.000	2.94	91.09	1.59E+09
10/4/2007	360	0.063	4.000	1.000	2.83	92.26	4.16E+08
10/8/2007	280	**0.02**	4.000	1.000	2.88	91.89	1.34E+08
10/16/2007	270	0.25	4.000	1.000	3.46	83.79	2.02E+09
10/24/2007	220	0.40	4.000	1.000	13.79	15.19	1.29E+10
11/1/2007	280	0.20	4.000	1.000	3.39	85.28	1.58E+09
11/15/2007	320	0.21	4.000	1.000	3.33	86.18	1.63E+09
11/26/2007	170	0.76	4.000	1.000	12.50	16.55	2.22E+10
12/11/2007	150	0.54	4.000	1.000	22.25	10.86	2.80E+10
1/9/2008	100	1.51	4.000	1.000	29.32	8.96	1.03E+11
2/6/2008	110	2.17	4.000	1.000	68.78	4.93	3.48E+11
¾/2008	65	1.98	4.000	1.000	124.80	2.61	5.76E+11
3/20/2008	86	0.80	4.000	1.000	45.02	6.84	8.40E+10

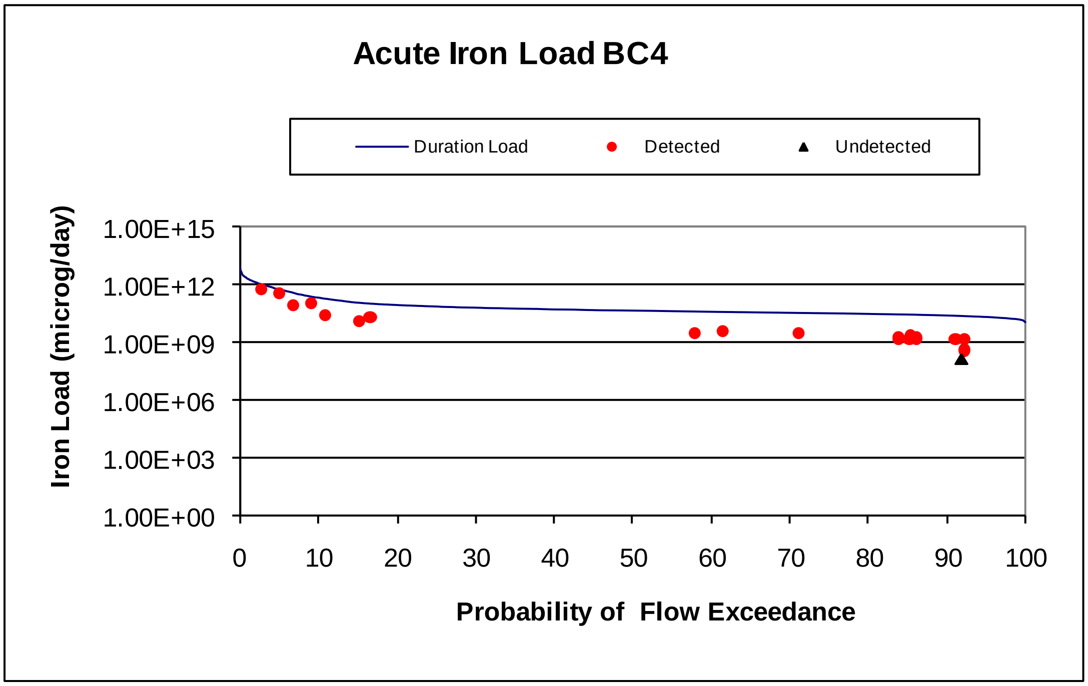

Figure D.6. Acute Iron Mass Load Curves for Station BC4

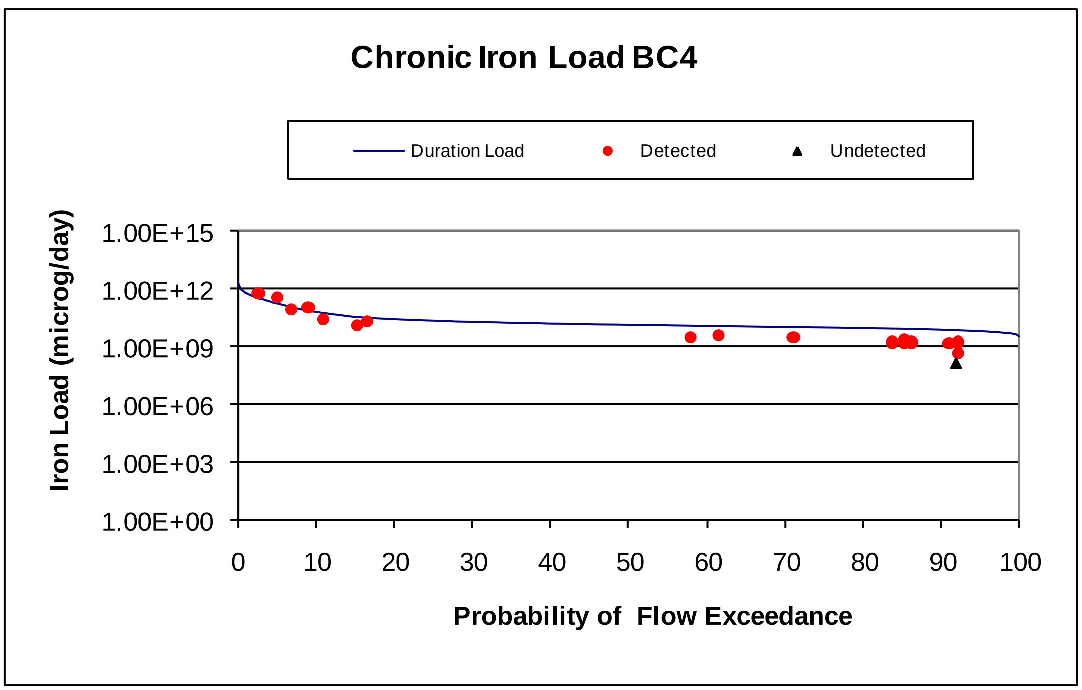

Figure D.7. Chronic Iron Mass Load Curves for Station BC4

Table D.5. Mercury Sampling Results for BC4

Date	Hardness (mg/L CaCO3)	Mercury (mg/L)	Acute Standard (mg/L)	Chronic Standard (mg/L)	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	110		0.0014	0.00077	4.89	57.91	
8/23/2007	150	**0.0002**	0.0014	0.00077	4.64	61.47	2.16E+06
8/29/2007	116		0.0014	0.00077	4.13	71.09	
9/7/2007	160	0.0004	0.0014	0.00077	3.38	85.33	3.15E+06
9/11/2007	180		0.0014	0.00077	3.46	83.79	
9/19/2007	210	**0.0002**	0.0014	0.00077	2.83	92.26	1.32E+06
9/25/2007	265		0.0014	0.00077	2.94	91.09	
10/4/2007	360	**0.0002**	0.0014	0.00077	2.83	92.26	1.32E+06
10/8/2007	280		0.0014	0.00077	2.88	91.89	
10/16/2007	270	**0.0002**	0.0014	0.00077	3.46	83.79	1.61E+06
10/24/2007	220		0.0014	0.00077	13.79	15.19	
11/1/2007	280	**0.0002**	0.0014	0.00077	3.39	85.28	1.58E+06
11/15/2007	320	**0.0002**	0.0014	0.00077	3.33	86.18	1.55E+06
11/26/2007	170	**0.0002**	0.0014	0.00077	12.50	16.55	5.83E+06
12/11/2007	150	**0.0002**	0.0014	0.00077	22.25	10.86	1.04E+07
1/9/2008	100	**0.0002**	0.0014	0.00077	29.32	8.96	1.37E+07
2/6/2008	110	**0.0002**	0.0014	0.00077	68.78	4.93	3.21E+07
¾/2008	65		0.0014	0.00077	124.80	2.61	
3/20/2008	86		0.0014	0.00077	45.02	6.84	

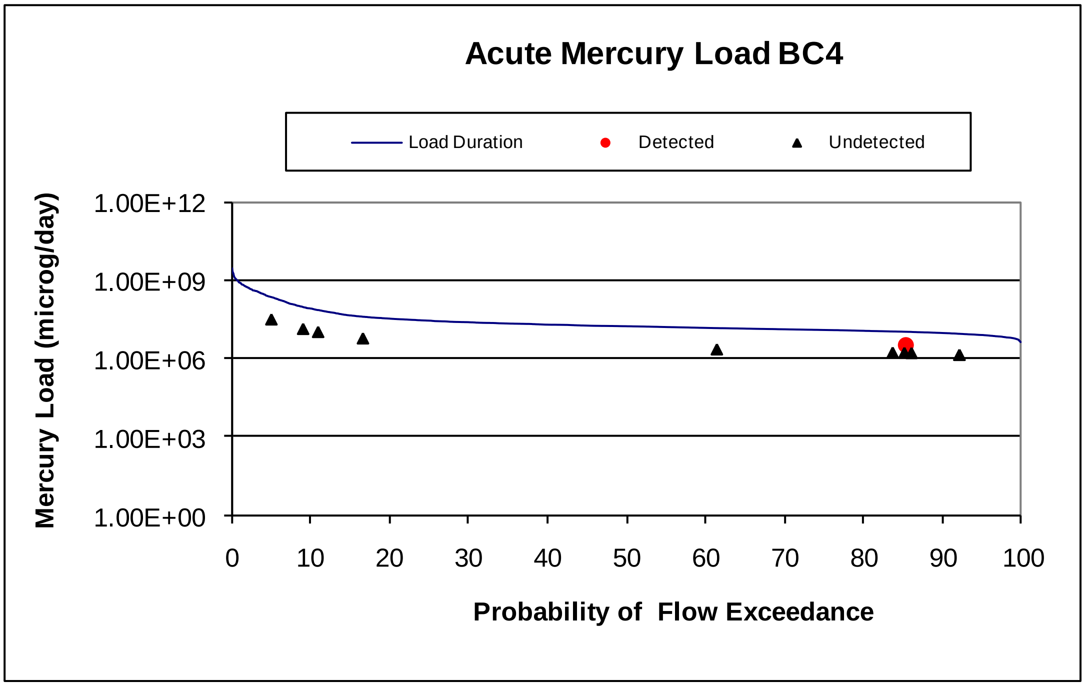

Figure D.8. Acute Mercury Mass Load Curves for Station BC4

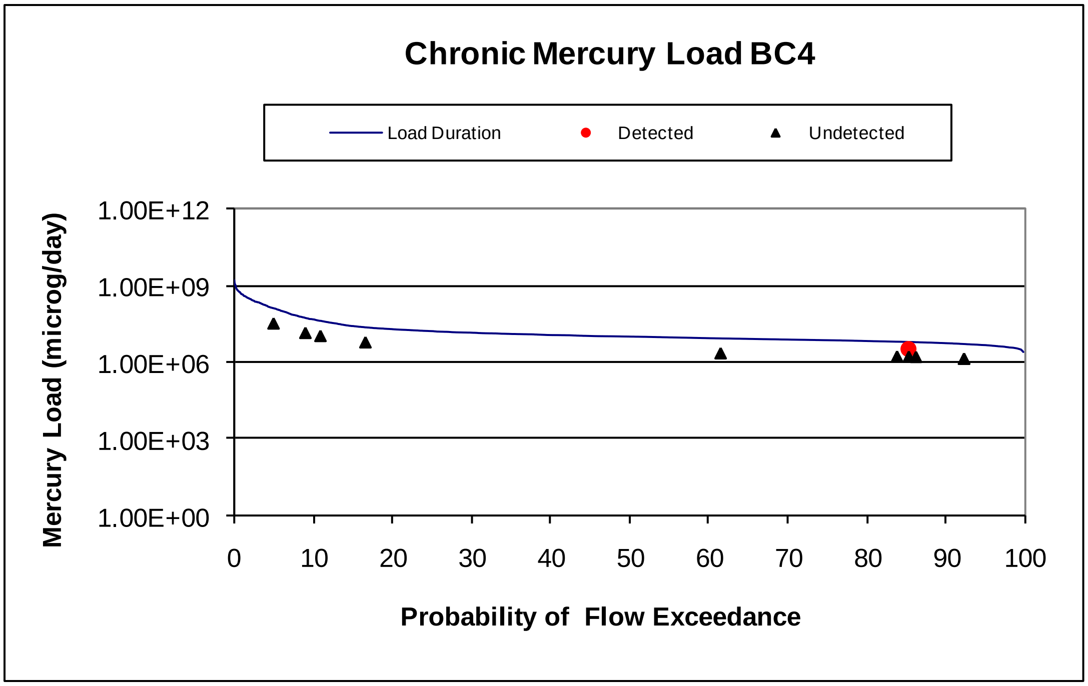

Figure D.9. Chronic Mercury Mass Load Curves for Station BC4

APPENDIX E: RESULTS FOR STATION BC5

Table E.1. Metal Results for Station BC5

Date	Hd (mg/L as CaCO3)	Cu (mg/L)	Pb (mg/L)	Fe (mg/L)	Hg (mg/L)	Flow (cfs)
8/16/2007	120	0.007	0.002	0.188		8.6
8/23/2007	175	0.003	**0.002**	0.230	**0.0002**	8.1
8/29/2007	96	0.003	**0.002**	0.330		7.3
9/7/2007	190	0.010	**0.002**	0.227	0.0004	5.9
9/11/2007	150	0.006	**0.002**	0.221		6.1
9/19/2007	225	0.007	**0.002**	0.201	**0.0002**	4.9
9/25/2007	270	0.006	**0.002**	0.162		5.1
10/4/2007	280	0.010	**0.002**	0.044	**0.0002**	5.1
10/8/2007	340	0.012	**0.002**	**0.02**		4.9
10/16/2007	240	0.017	**0.002**	0.29	**0.0002**	5.9
10/24/2007	130	0.003	**0.002**	0.68		24.0
11/1/2007	250	0.005	**0.002**	0.18	**0.0002**	6.1
11/15/2007	290	0.003	**0.002**	0.41	**0.0002**	5.9
11/26/2007	140	0.005	**0.002**	1.05	**0.0002**	22.0
12/11/2007	120	0.005	**0.002**	1.01	**0.0002**	37.0
1/9/2008	120	**0.002**	**0.002**	2.13	**0.0002**	46.0
2/6/2008	92	0.007	0.002	2.60	**0.0002**	110.0
¾/2008	95	**0.002**	**0.002**	2.92		187.0
3/20/2008	160	0.007	**0.002**	1.10		72.0

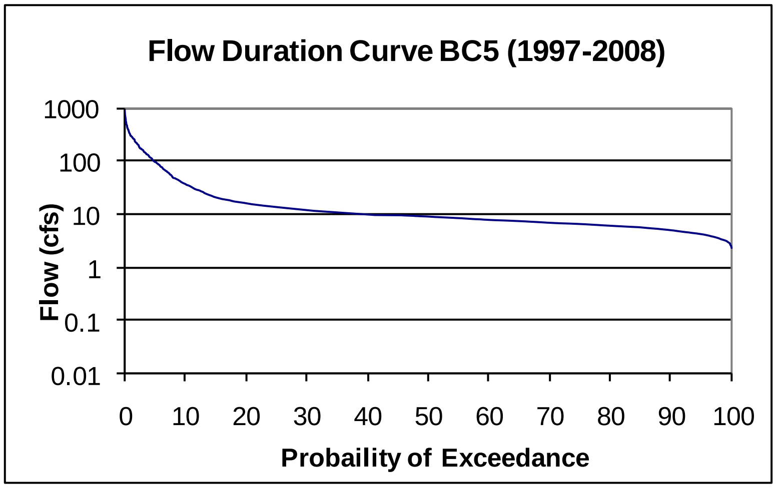

Figure E.1. Flow Duration Curve for Station BC5

Table E.2. Copper Sampling Results for BC5

Date	Hardness (mg CaCO3/L)	Copper (mg/L)	Acute Hardness (mg/L) e(0.9422(ln Hardness) – 1.700)/1000	Chronic Hardness (mg/L) e(0.8545(ln Hardness) – 1.7020)/1000	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	120	0.007	0.017	0.011	8.6	56.13	1.40E+08
8/23/2007	175	0.003	0.024	0.015	8.1	60.06	5.67E+07
8/29/2007	96	0.003	0.013	0.009	7.3	68.63	5.11E+07
9/7/2007	190	0.010	0.026	0.016	5.9	84.69	1.38E+08
9/11/2007	150	0.006	0.021	0.013	6.1	82.13	8.54E+07
9/19/2007	225	0.007	0.030	0.019	4.9	91.58	8.00E+07
9/25/2007	270	0.006	0.036	0.022	5.1	90.50	7.14E+07
10/4/2007	280	0.010	0.037	0.023	5.1	90.50	1.19E+08
10/8/2007	340	0.012	0.044	0.027	4.9	91.58	1.37E+08
10/16/2007	240	0.017	0.032	0.020	5.9	84.69	2.34E+08
10/24/2007	130	0.003	0.018	0.012	24.0	13.87	1.68E+08
11/1/2007	250	0.005	0.033	0.020	6.1	82.13	7.12E+07
11/15/2007	290	0.003	0.038	0.023	5.9	84.69	4.13E+07
11/26/2007	140	0.005	0.019	0.012	22.0	14.72	2.57E+08
12/11/2007	120	0.005	0.017	0.011	37.0	10.21	4.32E+08
1/9/2008	120	**0.002**	0.017	0.011	46.0	8.81	2.15E+08
2/6/2008	92	0.007	0.013	0.009	110.0	4.59	1.80E+09
¾/2008	95	**0.002**	0.013	0.009	187.0	2.47	8.72E+08
3/20/2008	160	0.007	0.022	0.014	72.0	6.49	1.18E+09

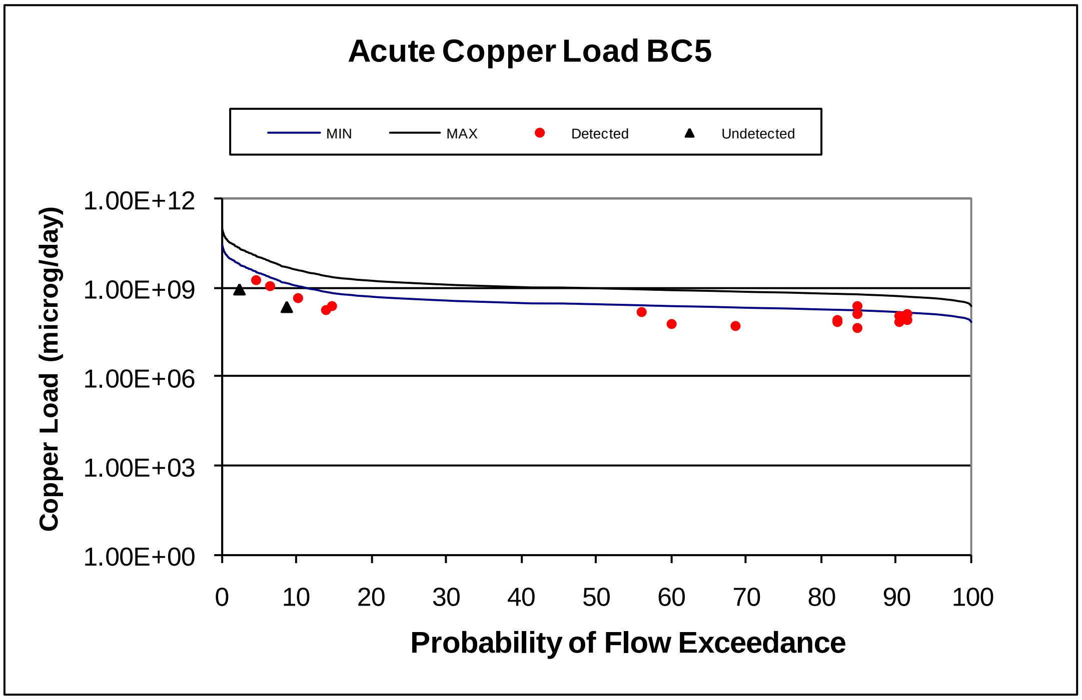

Figure E.2. Acute Copper Mass Load Curves for Station BC5

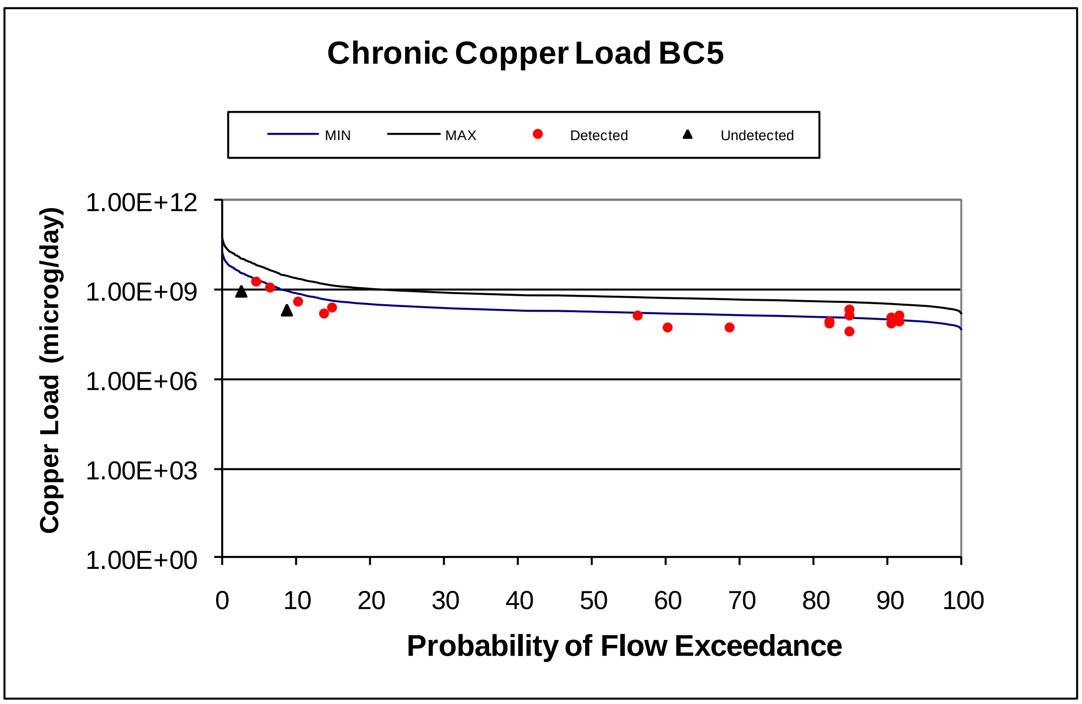

Figure E.3. Chronic Copper Mass Load Curves for Station BC5

Table E.3. Lead Sampling Results for BC5

Date	Hardness (mg CaCO3/L)	Lead (mg/L)	Acute Hardness (mg/L) e(1.273(ln Hardness) – 1.460)/1000	Chronic Hardness (mg/L) e(1.273(ln Hardness) – 4.705)/1000	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	120	0.002	0.103	0.004	8.6	56.13	4.01E+07
8/23/2007	175	**0.002**	0.166	0.006	8.1	60.06	3.78E+07
8/29/2007	96	**0.002**	0.078	0.003	7.3	68.63	3.41E+07
9/7/2007	190	**0.002**	0.185	0.007	5.9	84.69	2.75E+07
9/11/2007	150	**0.002**	0.137	0.005	6.1	82.13	2.85E+07
9/19/2007	225	**0.002**	0.229	0.009	4.9	91.58	2.29E+07
9/25/2007	270	**0.002**	0.289	0.011	5.1	90.50	2.38E+07
10/4/2007	280	**0.002**	0.303	0.012	5.1	90.50	2.38E+07
10/8/2007	340	**0.002**	0.388	0.015	4.9	91.58	2.29E+07
10/16/2007	240	**0.002**	0.249	0.010	5.9	84.69	2.75E+07
10/24/2007	130	**0.002**	0.114	0.004	24.0	13.87	1.12E+08
11/1/2007	250	**0.002**	0.262	0.010	6.1	82.13	2.85E+07
11/15/2007	290	**0.002**	0.317	0.012	5.9	84.69	2.75E+07
11/26/2007	140	**0.002**	0.125	0.005	22.0	14.72	1.03E+08
12/11/2007	120	**0.002**	0.103	0.004	37.0	10.21	1.73E+08
1/9/2008	120	**0.002**	0.103	0.004	46.0	8.81	2.15E+08
2/6/2008	92	0.002	0.073	0.003	110.0	4.59	5.13E+08
¾/2008	95	**0.002**	0.076	0.003	187.0	2.47	8.72E+08
3/20/2008	160	**0.002**	0.149	0.006	72.0	6.49	3.36E+08

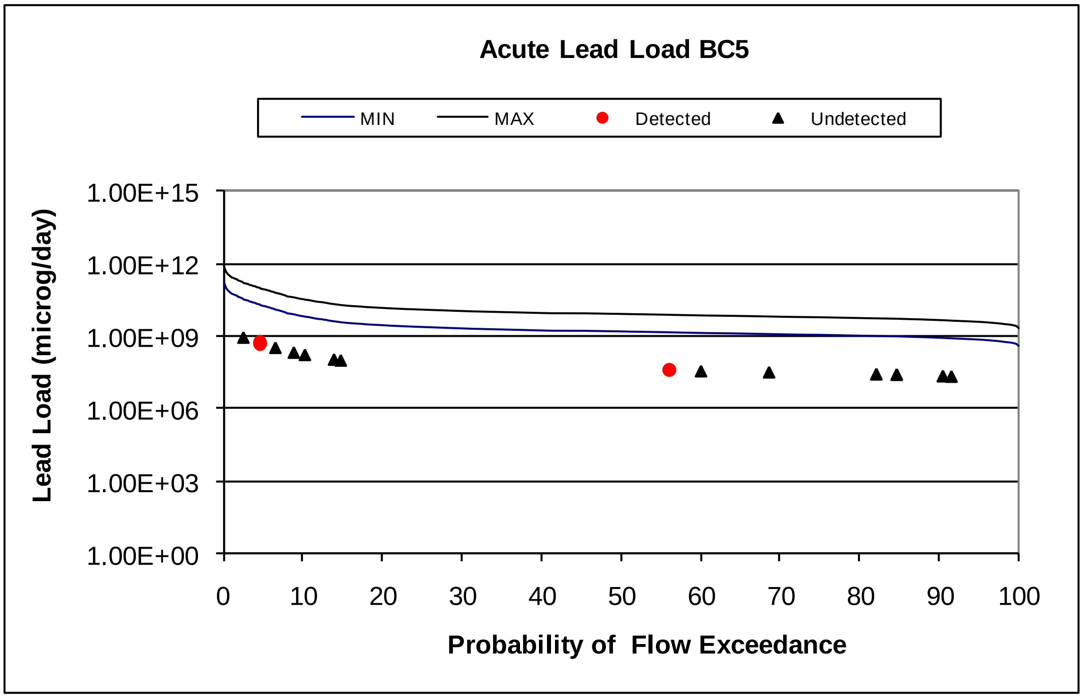

Figure E.4. Acute Lead Mass Load Curves for Station BC5

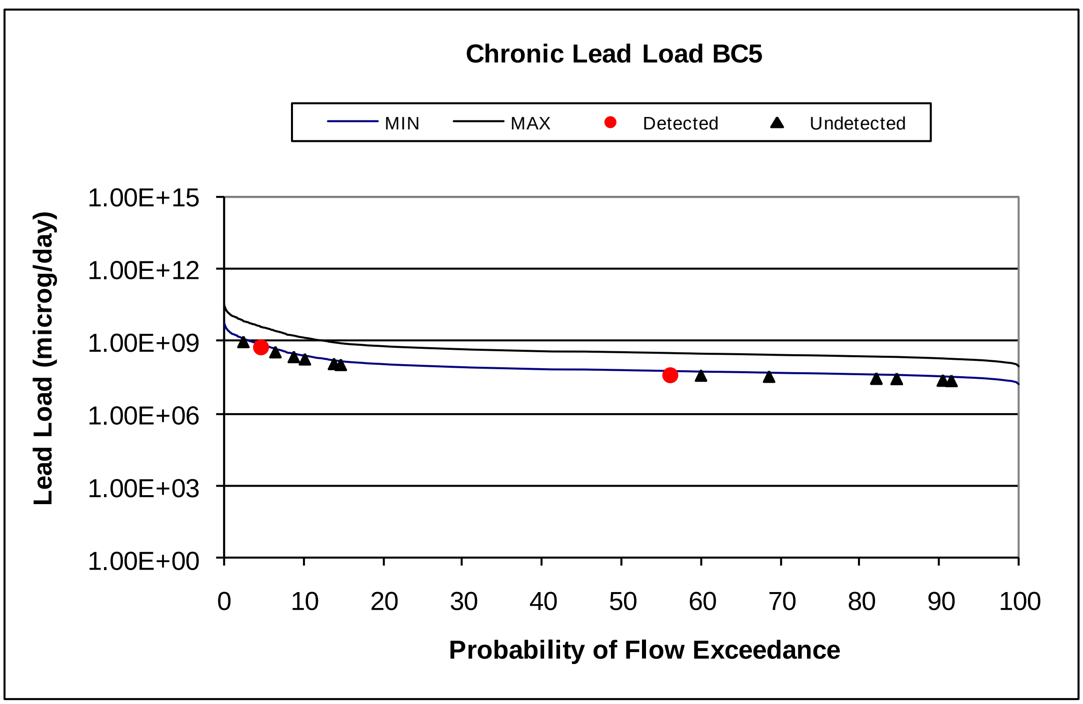

Figure E.5. Chronic Lead Mass Load Curves for Station BC5

Table E.4. Iron Sampling Results for BC5

Date	Hardness (mg/L CaCO3)	Iron (mg/L)	Acute Standard (mg/L)	Chronic Standard (mg/L)	Flow (cfs)	Probability of Exceedance	Load Points (microg/day)
8/16/2007	120	0.188	4.000	1.000	8.6	56.13	3.77E+09
8/23/2007	175	0.230	4.000	1.000	8.1	60.06	4.35E+09
8/29/2007	96	0.330	4.000	1.000	7.3	68.63	5.62E+09
9/7/2007	190	0.227	4.000	1.000	5.9	84.69	3.12E+09
9/11/2007	150	0.221	4.000	1.000	6.1	82.13	3.14E+09
9/19/2007	225	0.201	4.000	1.000	4.9	91.58	2.30E+09
9/25/2007	270	0.162	4.000	1.000	5.1	90.50	1.93E+09
10/4/2007	280	0.044	4.000	1.000	5.1	90.50	5.23E+08
10/8/2007	340	**0.02**	4.000	1.000	4.9	91.58	2.29E+08
10/16/2007	240	0.29	4.000	1.000	5.9	84.69	3.99E+09
10/24/2007	130	0.68	4.000	1.000	24.0	13.87	3.81E+10
11/1/2007	250	0.18	4.000	1.000	6.1	82.13	2.56E+09
11/15/2007	290	0.41	4.000	1.000	5.9	84.69	5.64E+09
11/26/2007	140	1.05	4.000	1.000	22.0	14.72	5.39E+10
12/11/2007	120	1.01	4.000	1.000	37.0	10.21	8.72E+10
1/9/2008	120	2.13	4.000	1.000	46.0	8.81	2.29E+11
2/6/2008	92	2.60	4.000	1.000	110.0	4.59	6.67E+11
¾/2008	95	2.92	4.000	1.000	187.0	2.47	1.27E+12
3/20/2008	160	1.10	4.000	1.000	72.0	6.49	1.85E+11

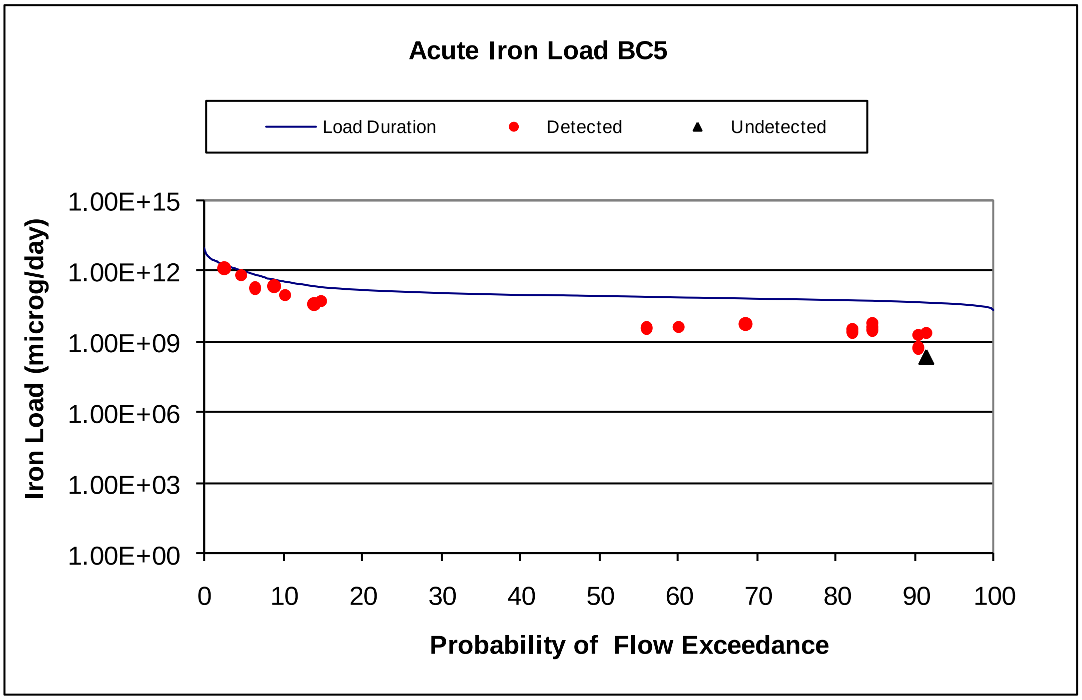

Figure E.6. Acute Iron Mass Load Curves for Station BC5

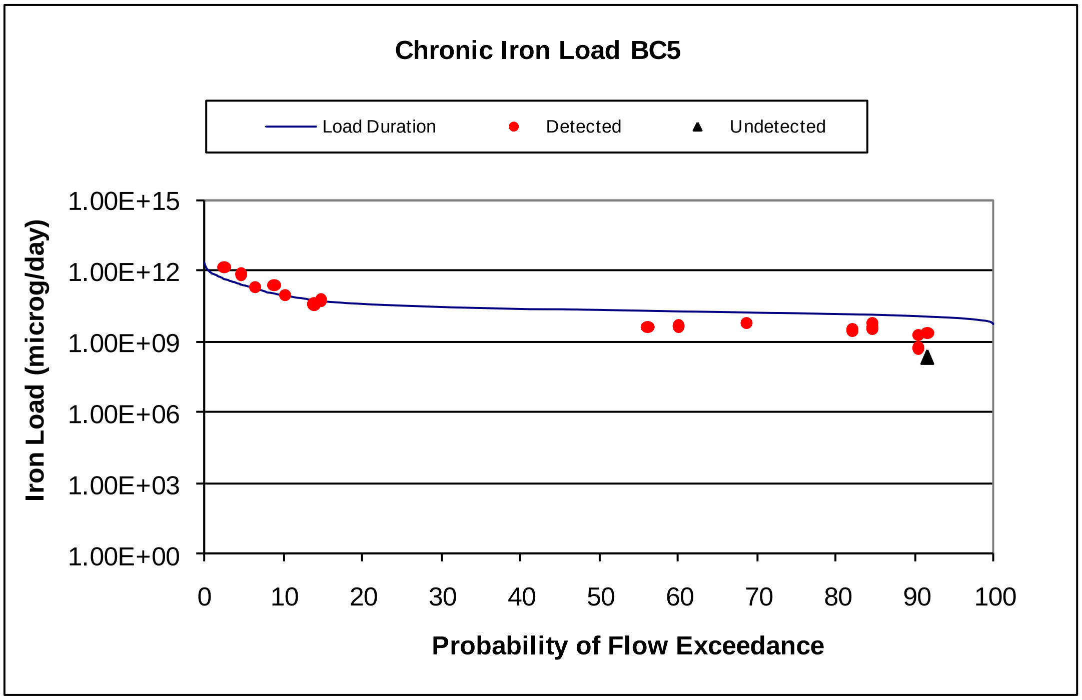

Figure E.7. Chronic Iron Mass Load Curves for Station BC5

Table E.5. Mercury Sampling Results for BC5

Date	Hardness (mg/L CaCO3)	Mercury (mg/L)	Acute Standard (mg/L)	Chronic Standard (mg/L)	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	120		0.0014	0.00077	8.6	56.13	
8/23/2007	175	**0.0002**	0.0014	0.00077	8.1	60.06	3.78E+06
8/29/2007	96		0.0014	0.00077	7.3	68.63	
9/7/2007	190	0.0004	0.0014	0.00077	5.9	84.69	5.51E+06
9/11/2007	150		0.0014	0.00077	6.1	82.13	
9/19/2007	225	**0.0002**	0.0014	0.00077	4.9	91.58	2.29E+06
9/25/2007	270		0.0014	0.00077	5.1	90.50	
10/4/2007	280	**0.0002**	0.0014	0.00077	5.1	90.50	2.38E+06
10/8/2007	340		0.0014	0.00077	4.9	91.58	
10/16/2007	240	**0.0002**	0.0014	0.00077	5.9	84.69	2.75E+06
10/24/2007	130		0.0014	0.00077	24.0	13.87	
11/1/2007	250	**0.0002**	0.0014	0.00077	6.1	82.13	2.85E+06
11/15/2007	290	**0.0002**	0.0014	0.00077	5.9	84.69	2.75E+06
11/26/2007	140	**0.0002**	0.0014	0.00077	22.0	14.72	1.03E+07
12/11/2007	120	**0.0002**	0.0014	0.00077	37.0	10.21	1.73E+07
1/9/2008	120	**0.0002**	0.0014	0.00077	46.0	8.81	2.15E+07
2/6/2008	92	**0.0002**	0.0014	0.00077	110.0	4.59	5.13E+07
¾/2008	95		0.0014	0.00077	187.0	2.47	
3/20/2008	160		0.0014	0.00077	72.0	6.49	

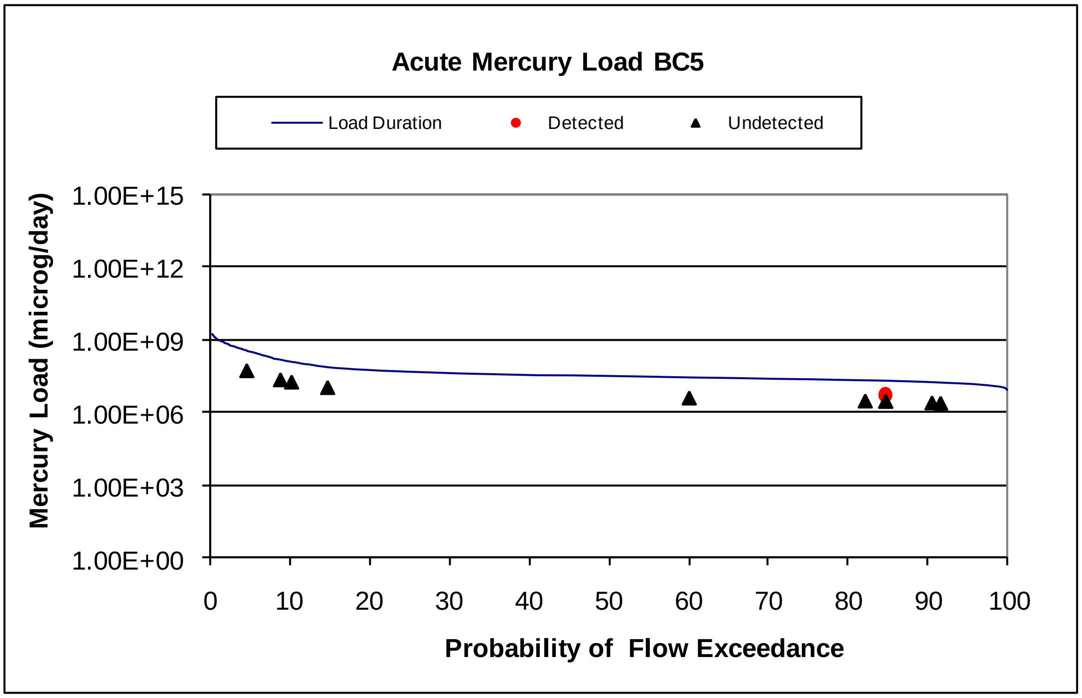

Figure E.8. Acute Mercury Mass Load Curves for Station BC5

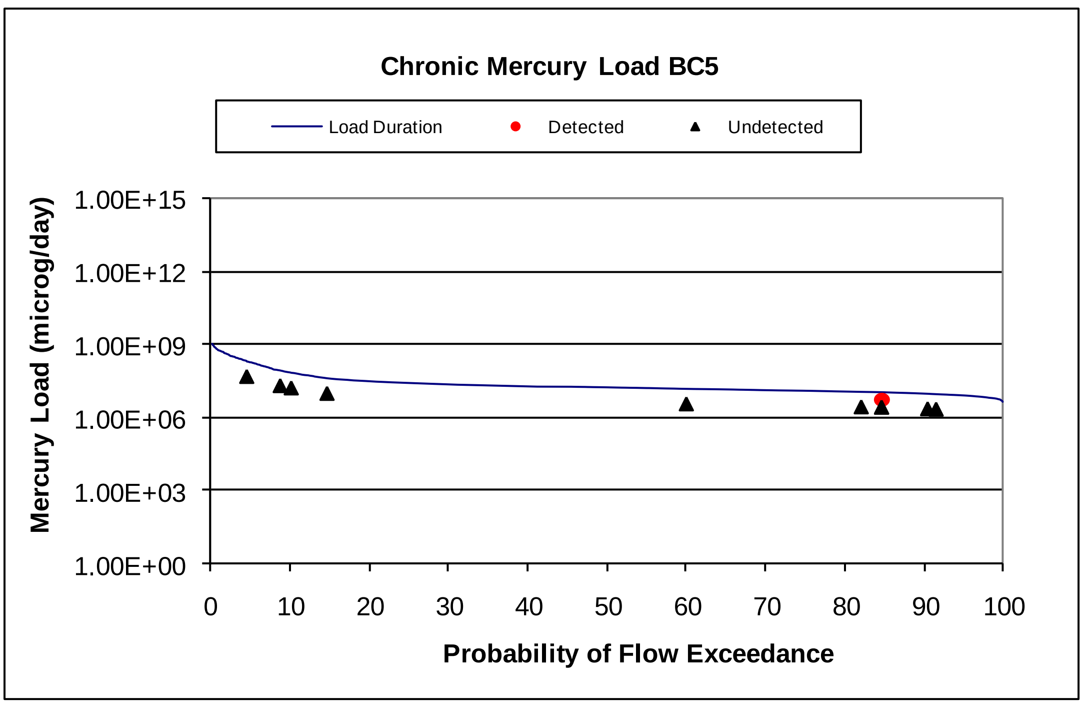

Figure E.9. Chronic Mercury Mass Load Curves for Station BC5

APPENDIX F: RESULTS FOR STATION LBC1

Table F.1. Metal Results for Station LBC1

Date	Hd (mg/L as CaCO3)	Cu (mg/L)	Pb (mg/L)	Fe (mg/L)	Hg (mg/L)	Flow (cfs)
8/16/2007	88	0.003	0.002	0.298		0.17
8/23/2007	110	**0.002**	**0.002**	0.318		0.21
8/29/2007	90	0.002	**0.002**	0.828		0.21
9/7/2007	110	0.004	**0.002**	0.250		0.13
9/11/2007	100	0.002	0.002	1.08		0.11
9/19/2007	90	0.110	0.004	0.293		0.13
9/25/2007	160	0.010	0.008	14.5*		0.77
10/4/2007	110	0.002	**0.002**	0.401		0.13
10/8/2007	84	0.004	**0.002**	0.09		0.13
10/16/2007	85	0.006	**0.002**	0.43		0.13
10/24/2007	170	0.003	**0.002**	1.33		0.58
11/1/2007	80	0.002	**0.002**	0.59	**0.0002**	0.14
11/15/2007	130	0.005	**0.002**	0.72	**0.0002**	0.16
11/26/2007	260	0.006	**0.002**	2.63	**0.0002**	0.92
12/11/2007	150	0.003	**0.002**	1.22	**0.0002**	1.84
1/9/2008	74	**0.002**	**0.002**	1.97		2.41
2/6/2008	100	0.004	**0.002**	2.41	**0.0002**	5.39
3/4/2008	100	**0.002**	**0.002**	2.28		11.49
3/20/2008	100	0.003	**0.002**	1.09		3.12

* Note: 14.5 was assumed to be an outlier in the data set and was excluded from determining the average and maximum concentrations in Appendix J.

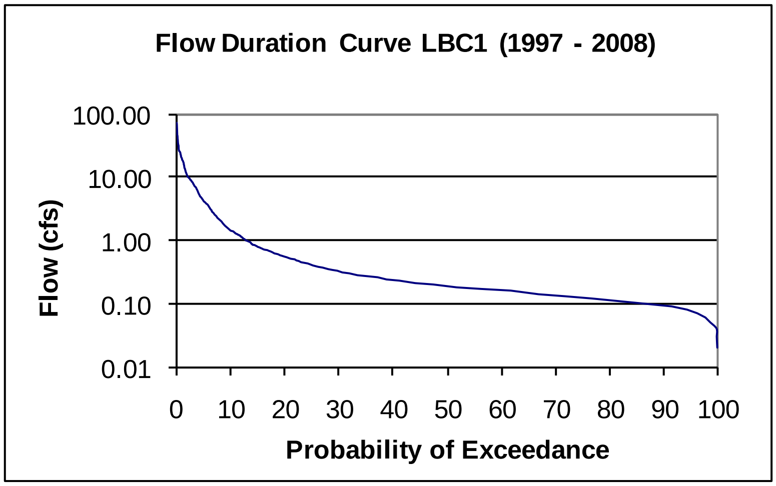

Figure F.1. Flow Duration Curve for Station LBC1

Table F.2. Copper Sampling Results for LBC1

Date	Hardness (mg/L CaCO3)	Copper (mg/L)	Acute Hardness (mg/L) e(0.9422(ln Hardness) - 1.700)/1000	Chronic Hardness (mg/L) e(0.8545(ln Hardness) - 1.7020)/1000	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	88	0.003	0.012	0.008	0.17	56.23	1.19E+06
8/23/2007	110	**0.002**	0.015	0.010	0.21	44.11	9.80E+05
8/29/2007	90	0.002	0.013	0.009	0.21	44.11	9.80E+05
9/7/2007	110	0.004	0.015	0.010	0.13	71.83	1.21E+06
9/11/2007	100	0.002	0.014	0.009	0.11	81.22	5.13E+05
9/19/2007	90	0.110	0.013	0.009	0.13	71.83	3.34E+07
9/25/2007	160	0.010	0.022	0.014	0.77	15.36	1.80E+07
10/4/2007	110	0.002	0.015	0.010	0.13	71.83	6.07E+05
10/8/2007	84	0.004	0.012	0.008	0.13	71.83	1.21E+06
10/16/2007	85	0.006	0.012	0.008	0.13	71.83	1.82E+06
10/24/2007	170	0.003	0.023	0.015	0.58	19.13	4.06E+06
11/1/2007	80	0.002	0.011	0.008	0.14	66.88	6.53E+05
11/15/2007	130	0.005	0.018	0.012	0.16	61.75	1.87E+06
11/26/2007	260	0.006	0.034	0.021	0.92	13.71	1.29E+07
12/11/2007	150	0.003	0.021	0.013	1.84	8.60	1.29E+07
1/9/2008	74	**0.002**	0.011	0.007	2.41	7.36	1.12E+07
2/6/2008	100	0.004	0.014	0.009	5.39	4.16	5.03E+07
3/4/2008	100	**0.002**	0.014	0.009	11.49	1.85	5.36E+07
3/20/2008	100	0.003	0.014	0.009	3.12	6.27	2.18E+07

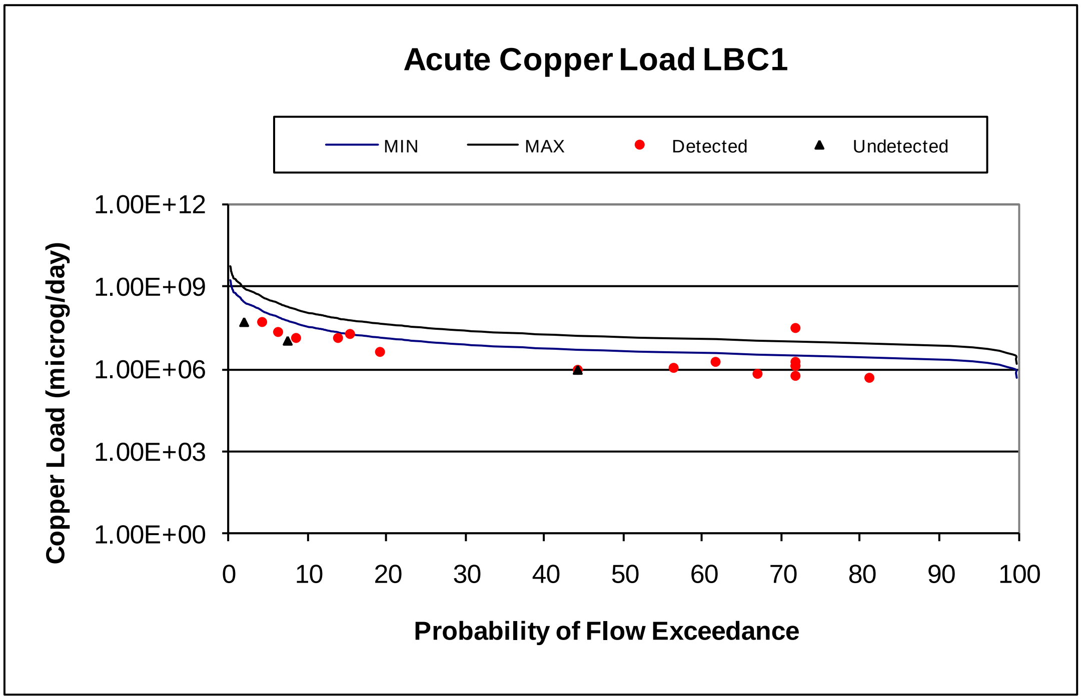

Figure F.2. Acute Copper Mass Load Curves for Station LBC1

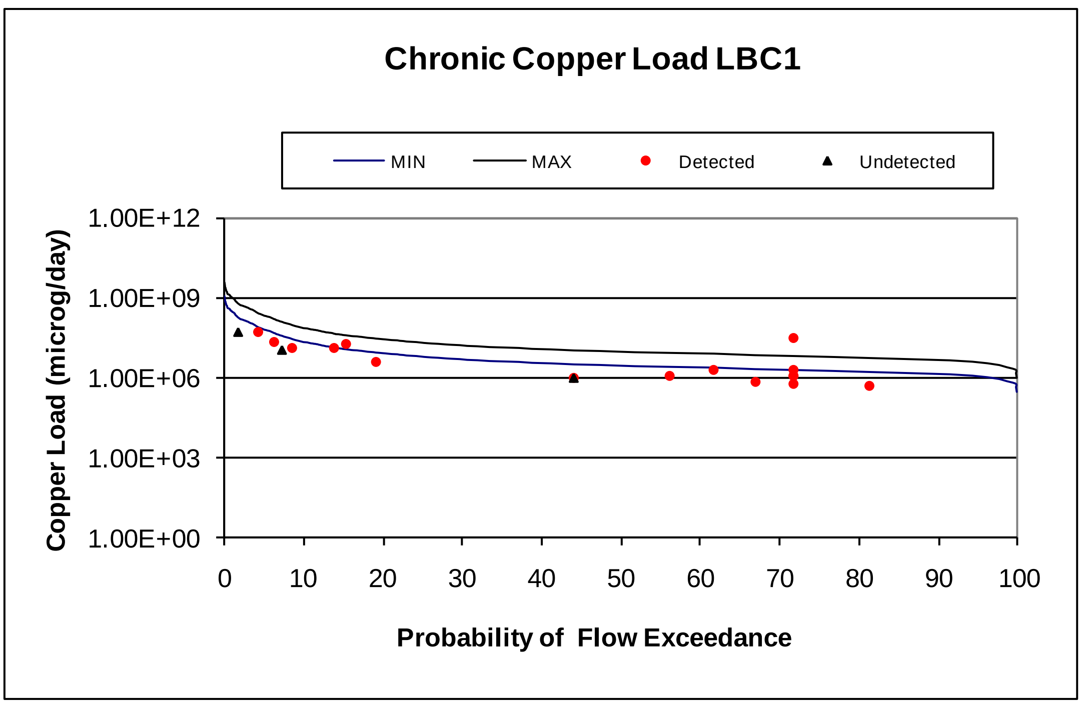

Figure F.3. Chronic Copper Mass Load Curves for Station LBC1

Table F.3. Lead Sampling Results for LBC1

Date	Hardness (mg/L CaCO3)	Lead (mg/L)	Acute Hardness (mg/L) e(1.273(ln Hardness) - 1.460)/1000	Chronic Hardness (mg/L) e(1.273(ln Hardness) - 4.705)/1000	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	88	0.002	0.069	0.003	0.17	56.23	7.94E+05
8/23/2007	110	**0.002**	0.092	0.004	0.21	44.11	9.93E+05
8/29/2007	90	**0.002**	0.071	0.003	0.21	44.11	9.93E+05
9/7/2007	110	**0.002**	0.092	0.004	0.13	71.83	5.89E+05
9/11/2007	100	0.002	0.082	0.003	0.11	81.22	5.23E+05
9/19/2007	90	0.004	0.071	0.003	0.13	71.83	1.23E+06
9/25/2007	160	0.008	0.149	0.006	0.77	15.36	1.44E+07
10/4/2007	110	**0.002**	0.092	0.004	0.13	71.83	6.29E+05
10/8/2007	84	**0.002**	0.065	0.003	0.13	71.83	6.29E+05
10/16/2007	85	**0.002**	0.066	0.003	0.13	71.83	6.29E+05
10/24/2007	170	**0.002**	0.160	0.006	0.58	19.13	2.71E+06
11/1/2007	80	**0.002**	0.061	0.002	0.14	66.88	6.62E+05
11/15/2007	130	**0.002**	0.114	0.004	0.16	61.75	7.28E+05
11/26/2007	260	**0.002**	0.276	0.011	0.92	13.71	4.30E+06
12/11/2007	150	**0.002**	0.137	0.005	1.84	8.60	8.60E+06
1/9/2008	74	**0.002**	0.056	0.002	2.41	7.36	1.13E+07
2/6/2008	100	**0.002**	0.082	0.003	5.39	4.16	2.52E+07
3/4/2008	100	**0.002**	0.082	0.003	11.49	1.85	5.36E+07
3/20/2008	100	**0.002**	0.082	0.003	3.12	6.27	1.46E+07

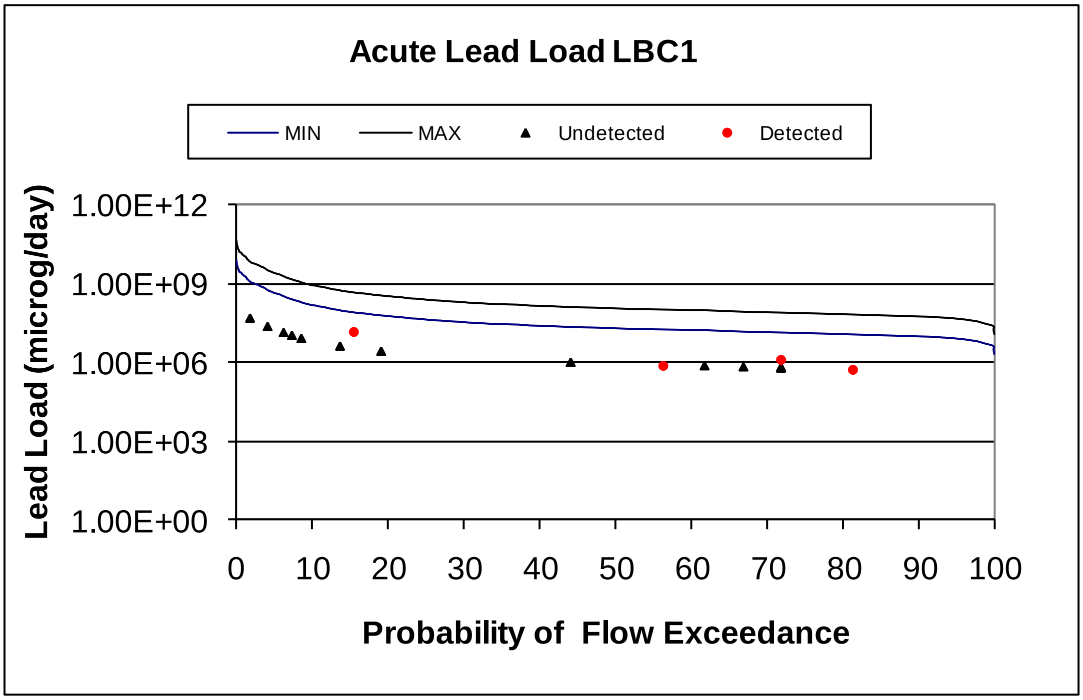

Figure F.4. Acute Lead Mass Load Curves for Station LBC1

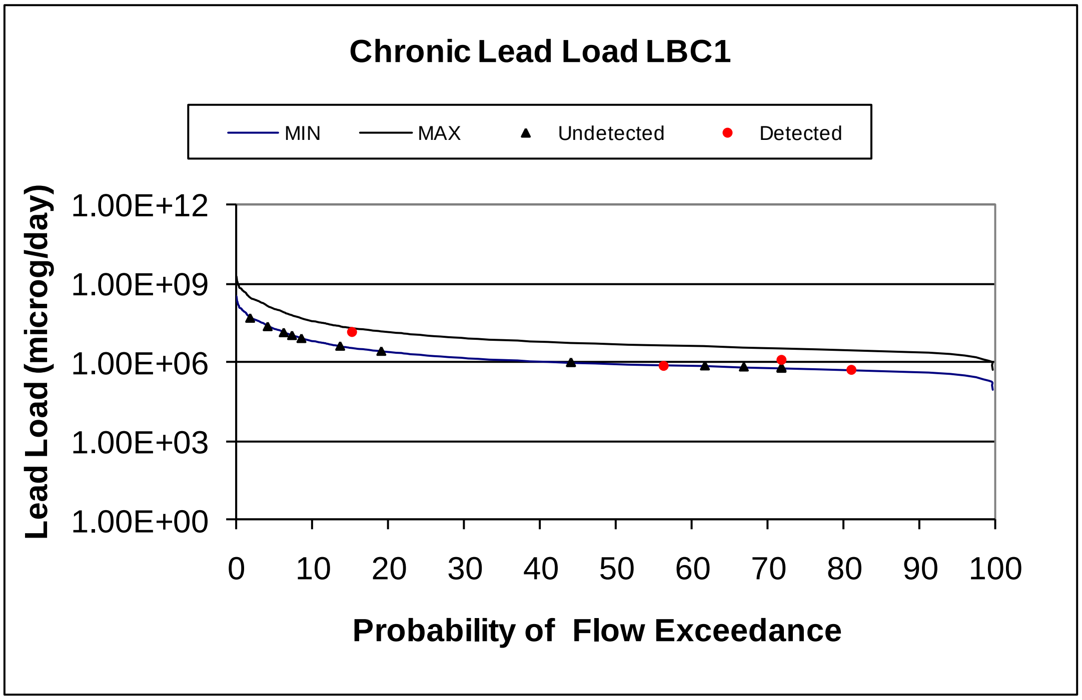

Figure F.5. Chronic Lead Mass Load Curves for Station LBC1

Table F.4. Iron Sampling Results for LBC1

Date	Hardness (mg/L CaCO3)	Iron (mg/L)	Acute Standard (mg/L)	Chronic Standard (mg/L)	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	88	0.298	4.000	1.000	0.17	56.23	1.18E+08
8/23/2007	110	0.318	4.000	1.000	0.21	44.11	1.58E+08
8/29/2007	90	0.828	4.000	1.000	0.21	44.11	4.11E+08
9/7/2007	110	0.250	4.000	1.000	0.13	71.83	7.36E+07
9/11/2007	100	1.08	4.000	1.000	0.11	81.22	2.82E+08
9/19/2007	90	0.293	4.000	1.000	0.13	71.83	9.02E+07
9/25/2007	160	***14.5****	4.000	1.000	0.77	15.36	2.61E+10
10/4/2007	110	0.401	4.000	1.000	0.13	71.83	1.26E+08
10/8/2007	84	0.09	4.000	1.000	0.13	71.83	2.83E+07
10/16/2007	85	0.43	4.000	1.000	0.13	71.83	1.35E+08
10/24/2007	170	1.33	4.000	1.000	0.58	19.13	1.80E+09
11/1/2007	80	0.59	4.000	1.000	0.14	66.88	1.95E+08
11/15/2007	130	0.72	4.000	1.000	0.16	61.75	2.62E+08
11/26/2007	260	2.63	4.000	1.000	0.92	13.71	5.66E+09
12/11/2007	150	1.22	4.000	1.000	1.84	8.60	5.25E+09
1/9/2008	74	1.97	4.000	1.000	2.41	7.36	1.11E+10
2/6/2008	100	2.41	4.000	1.000	5.39	4.16	3.03E+10
3/4/2008	100	2.28	4.000	1.000	11.49	1.85	6.11E+10
3/20/2008	100	1.09	4.000	1.000	3.12	6.27	7.94E+09

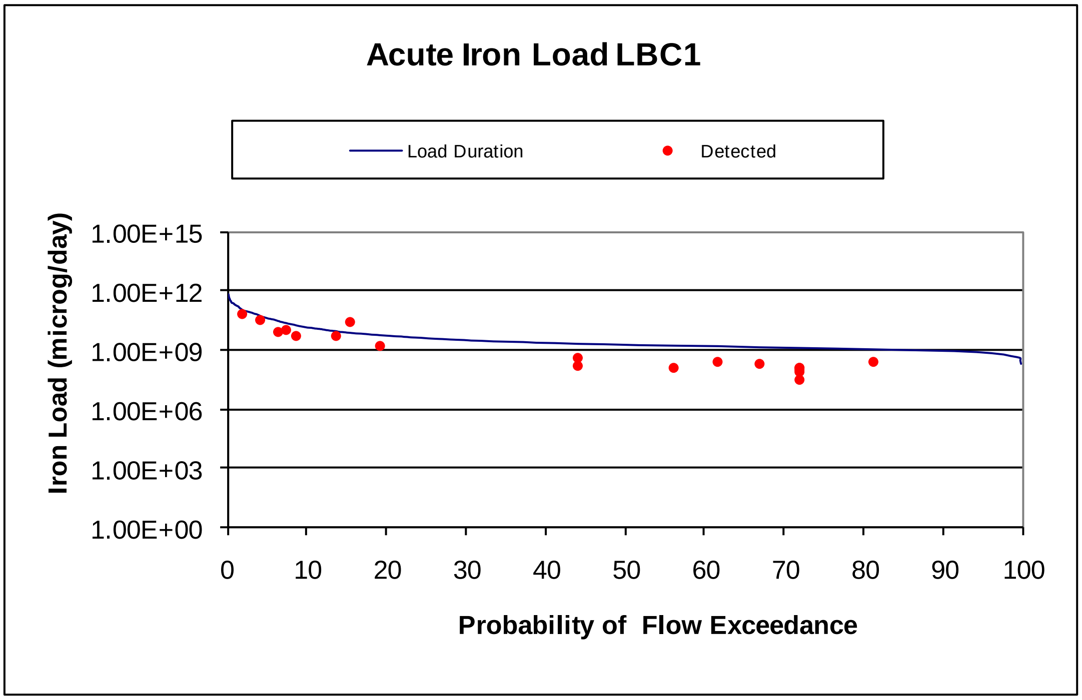

Figure F.6. Acute Iron Mass Load Curves for Station LBC1

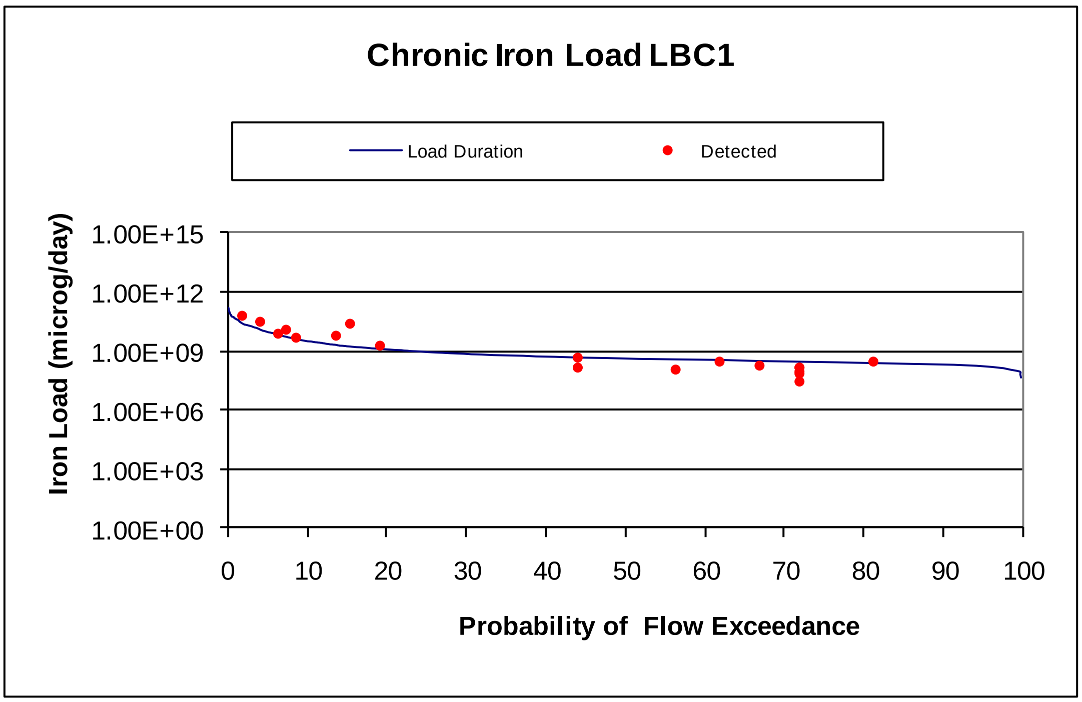

Figure F.7. Chronic Iron Mass Load Curves for Station LBC1

Table F.5. Mercury Sampling Results for LBC1

Date	Hardness (mg/L CaCO3)	Mercury (mg/L)	Acute Standard (mg/L)	Chronic Standard (mg/L)	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	88		0.0014	0.00077	0.17	56.23	
8/23/2007	110		0.0014	0.00077	0.21	44.11	
8/29/2007	90		0.0014	0.00077	0.21	44.11	
9/7/2007	110		0.0014	0.00077	0.13	71.83	
9/11/2007	100		0.0014	0.00077	0.11	81.22	
9/19/2007	90		0.0014	0.00077	0.13	71.83	
9/25/2007	160		0.0014	0.00077	0.77	15.36	
10/4/2007	110		0.0014	0.00077	0.13	71.83	
10/8/2007	84		0.0014	0.00077	0.13	71.83	
10/16/2007	85		0.0014	0.00077	0.13	71.83	
10/24/2007	170		0.0014	0.00077	0.58	19.13	
11/1/2007	80	**0.0002**	0.0014	0.00077	0.14	66.88	6.62E+04
11/15/2007	130	**0.0002**	0.0014	0.00077	0.16	61.75	7.28E+04
11/26/2007	260	**0.0002**	0.0014	0.00077	0.92	13.71	4.30E+05
12/11/2007	150	**0.0002**	0.0014	0.00077	1.84	8.60	8.60E+05
1/9/2008	74		0.0014	0.00077	2.41	7.36	
2/6/2008	100	**0.0002**	0.0014	0.00077	5.39	4.16	2.52E+06
3/4/2008	100		0.0014	0.00077	11.49	1.85	
3/20/2008	100		0.0014	0.00077	3.12	6.27	

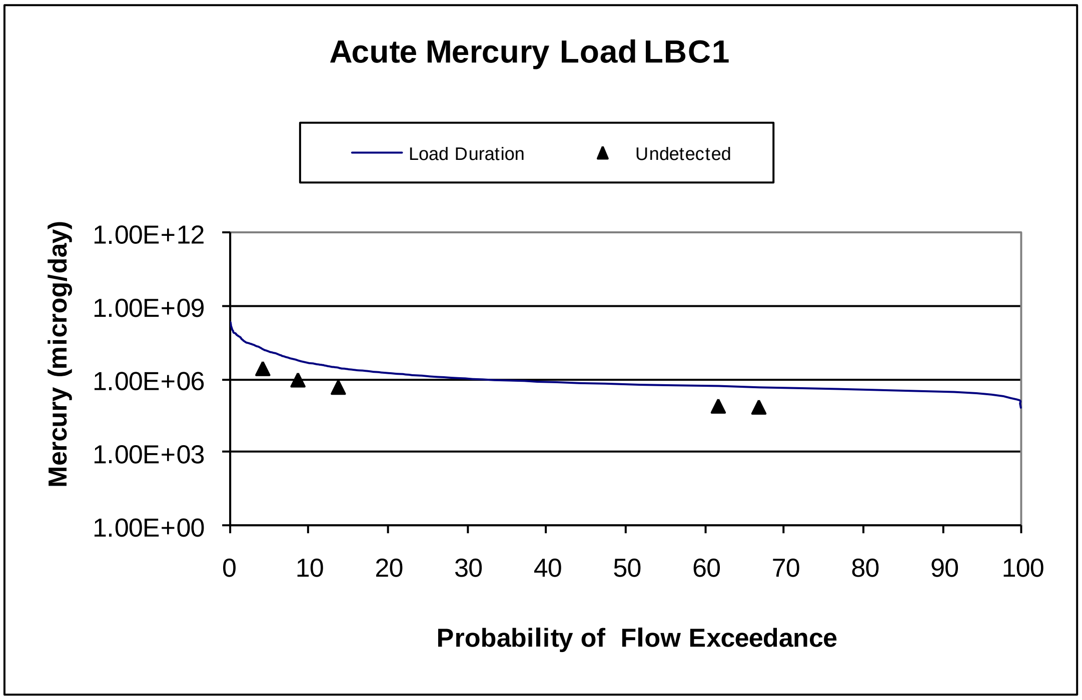

Figure F.8. Acute Mercury Mass Load Curves for Station LBC1

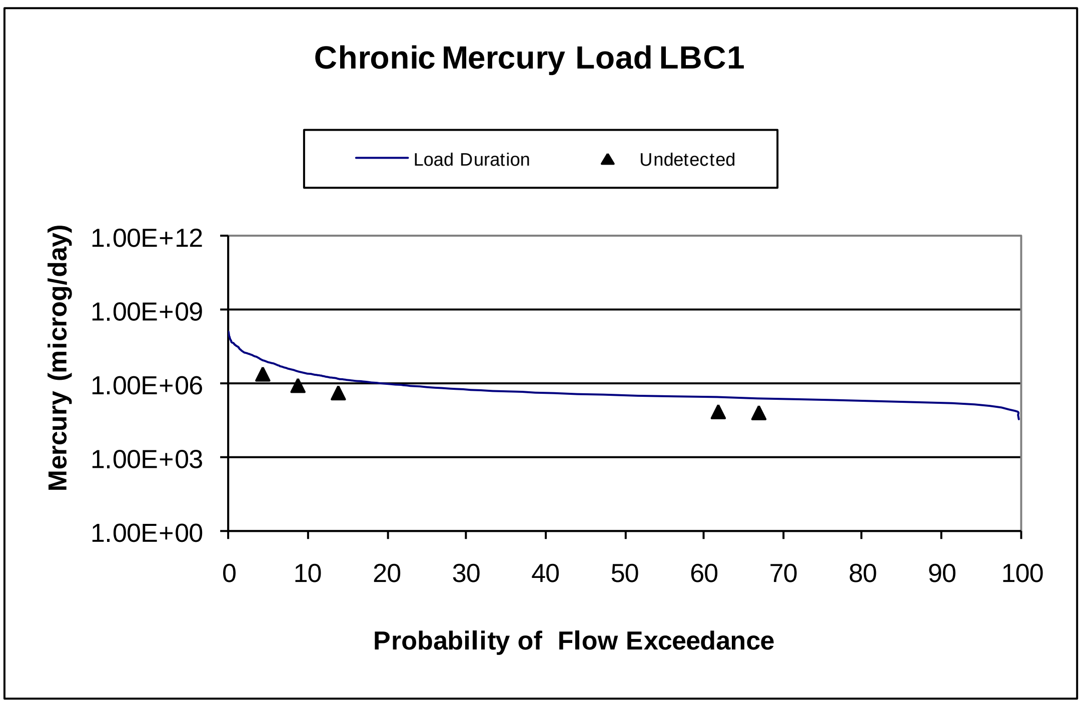

Figure F.9. Chronic Mercury Mass Load Curves for Station LBC1

APPENDIX G: RESULTS FOR STATION LBC2

Table G.1. Metal Results for Station LBC2

Date	Hd (mg/L as CaCO3)	Cu (mg/L)	Pb (mg/L)	Fe (mg/L)	Hg (mg/L)	Flow (cfs)
8/16/2007	70	0.008	0.002	0.295		0.67
8/23/2007	76	**0.002**	**0.002**	0.302		0.78
8/29/2007	70	0.004	**0.002**	0.238		0.84
9/7/2007	No sample					
9/11/2007	90	0.003	**0.002**	0.272		0.50
9/19/2007	84	0.004	**0.002**	0.513		0.52
9/25/2007	110	0.004	**0.002**	0.258		1.06
10/4/2007	100	0.004	**0.002**	0.166		0.53
10/8/2007	96	0.008	**0.002**	0.13		0.53
10/16/2007	75	0.008	**0.002**	0.26		0.53
10/24/2007	96	**0.002**	**0.002**	0.44		2.73
11/1/2007	100	0.004	**0.002**	0.27	**0.0002**	0.56
11/15/2007	130	0.004	**0.002**	0.27	**0.0002**	0.67
11/26/2007	80	0.004	**0.002**	0.75	**0.0002**	3.73
12/11/2007	120	0.006	**0.002**	1.39	**0.0002**	6.69
1/9/2008	85	**0.002**	**0.002**	3.25		10.58
2/6/2008	110	0.005	**0.002**	2.57		23.40
3/4/2008	60	**0.002**	**0.002**	2.83		48.47
3/20/2008	No sample					

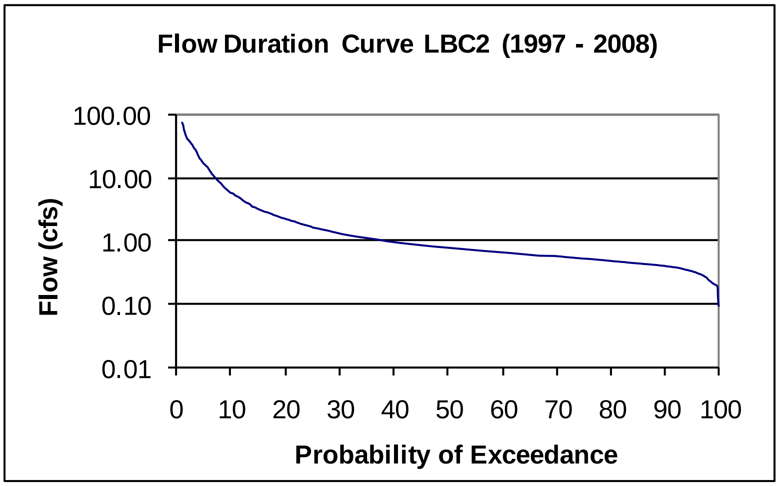

Figure G.1. Flow Duration Curve for Station LBC2

Table G.2. Copper Sampling Results for LBC2

Date	Hardness (mg/L CaCO3)	Copper (mg/L)	Acute Hardness (mg/L) e(0.9422(ln Hardness) - 1.700)/1000	Chronic Hardness (mg/L) e(0.8545(ln Hardness) - 1.7020)/1000	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	70	0.008	0.010	0.007	0.67	56.23	1.25E+07
8/23/2007	76	**0.002**	0.011	0.007	0.78	47.41	3.64E+06
8/29/2007	70	0.004	0.010	0.007	0.84	44.11	7.80E+06
9/7/2007	No sample						
9/11/2007	90	0.003	0.013	0.009	0.50	76.04	3.47E+06
9/19/2007	84	0.004	0.012	0.008	0.52	73.15	4.83E+06
9/25/2007	110	0.004	0.015	0.010	1.06	35.31	9.91E+06
10/4/2007	96	0.004	0.013	0.009	0.53	71.83	4.94E+06
10/8/2007	96	0.008	0.013	0.009	0.53	71.83	9.88E+06
10/16/2007	75	0.008	0.011	0.007	0.53	71.83	9.88E+06
10/24/2007	96	**0.002**	0.013	0.009	2.73	16.77	1.27E+07
11/1/2007	100	0.004	0.014	0.009	0.56	66.88	5.20E+06
11/15/2007	130	0.004	0.018	0.012	0.67	56.23	6.24E+06
11/26/2007	80	0.004	0.011	0.008	3.73	13.46	3.48E+07
12/11/2007	120	0.006	0.017	0.011	6.69	8.97	9.36E+07
1/9/2008	85	**0.002**	0.012	0.008	10.58	6.85	4.94E+07
2/6/2008	110	0.005	0.015	0.010	23.40	3.94	2.73E+08
3/4/2008	60	**0.002**	0.009	0.006	48.47	1.70	2.26E+08
3/20/2008	No sample						

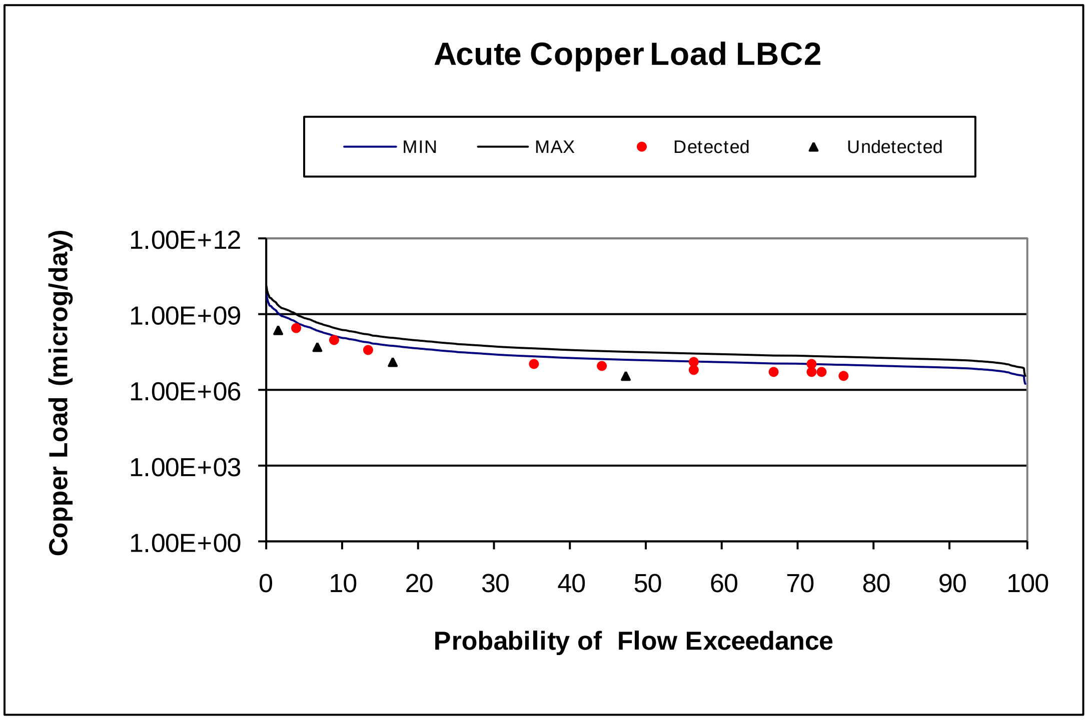

Figure G.2. Acute Copper Mass Load Curves for Station LBC2

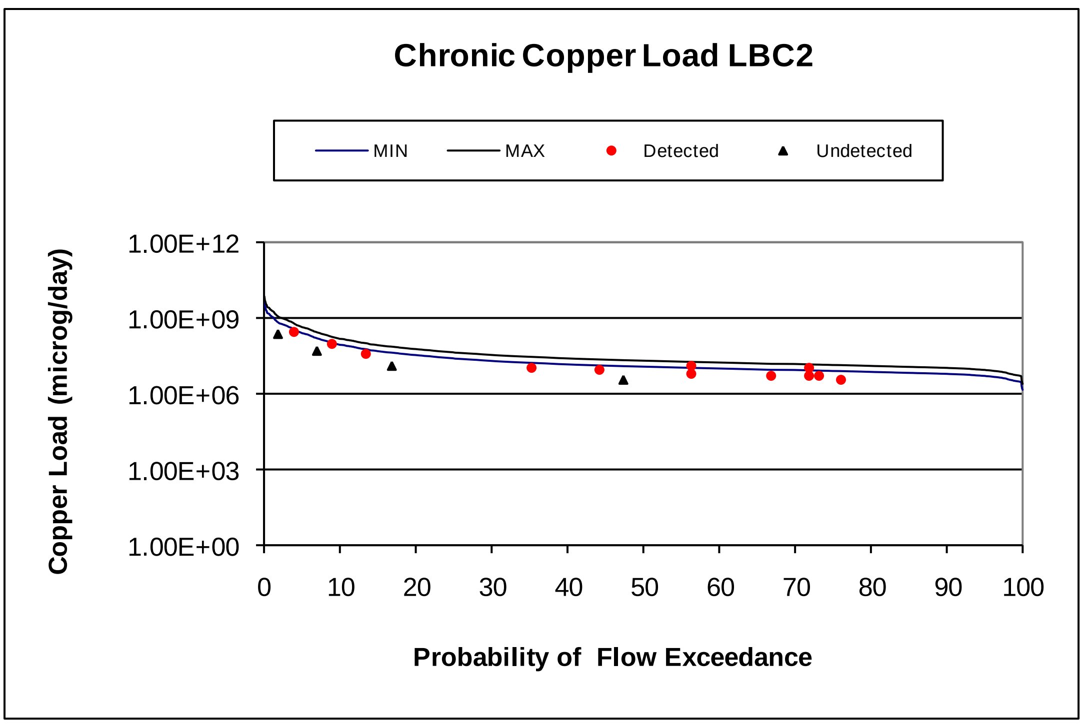

Figure G.3. Chronic Copper Mass Load Curves for Station LBC2

Table G.3. Lead Sampling Results for LBC2

Date	Hardness (mg/L CaCO3)	Lead (mg/L)	Acute Hardness (mg/L) e(1.273(ln Hardness) - 1.460)/1000	Chronic Hardness (mg/L) e(1.273(ln Hardness) - 4.705)/1000	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	70	0.002	0.052	0.002	0.67	56.23	3.12E+06
8/23/2007	76	**0.002**	0.058	0.002	0.78	47.41	3.64E+06
8/29/2007	70	**0.002**	0.052	0.002	0.84	44.11	3.90E+06
9/7/2007	No sample						
9/11/2007	90	**0.002**	0.071	0.003	0.50	76.04	2.31E+06
9/19/2007	84	**0.002**	0.065	0.003	0.52	73.15	2.42E+06
9/25/2007	110	**0.002**	0.092	0.004	1.06	35.31	4.95E+06
10/4/2007	100	**0.002**	0.082	0.003	0.53	71.83	2.47E+06
10/8/2007	96	**0.002**	0.078	0.003	0.53	71.83	2.47E+06
10/16/2007	75	**0.002**	0.057	0.002	0.53	71.83	2.47E+06
10/24/2007	96	**0.002**	0.078	0.003	2.73	16.77	1.27E+07
11/1/2007	100	**0.002**	0.082	0.003	0.56	66.88	2.60E+06
11/15/2007	130	**0.002**	0.114	0.004	0.67	56.23	3.12E+06
11/26/2007	80	**0.002**	0.061	0.002	3.73	13.46	1.74E+07
12/11/2007	120	**0.002**	0.103	0.004	6.69	8.97	3.12E+07
1/9/2008	85	**0.002**	0.066	0.003	10.58	6.85	4.94E+07
2/6/2008	110	**0.002**	0.092	0.004	23.40	3.94	1.09E+08
3/4/2008	60	**0.002**	0.043	0.002	48.47	1.70	2.26E+08
3/20/2008	No Sample						

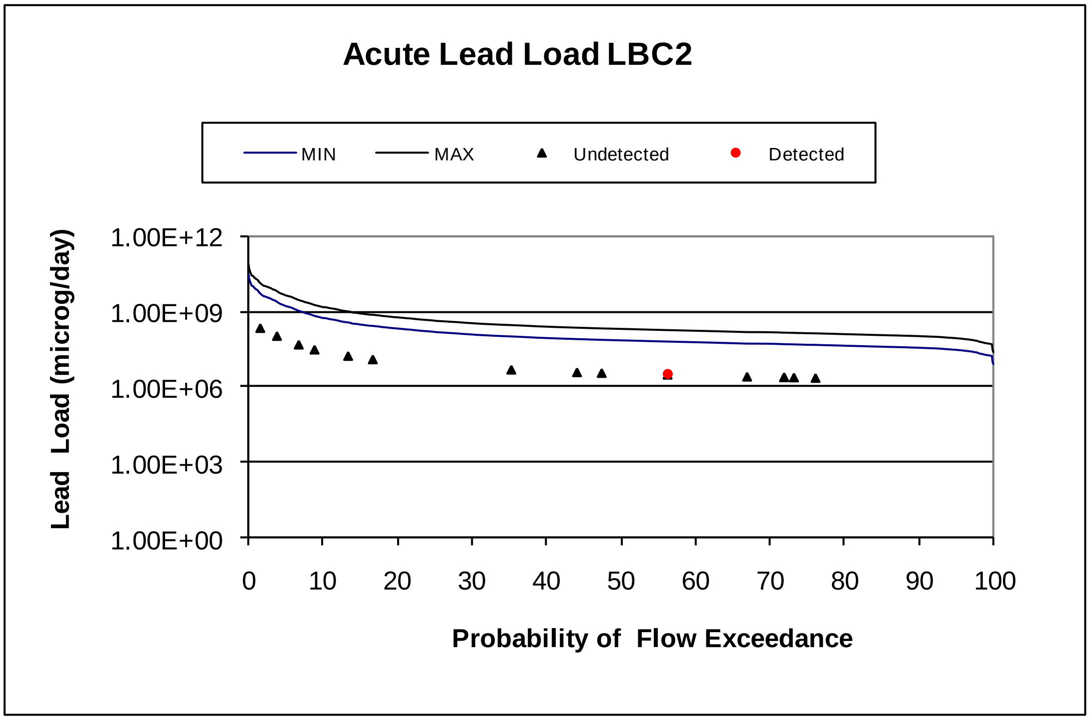

Figure G.4. Acute Lead Mass Load Curves for Station LBC2

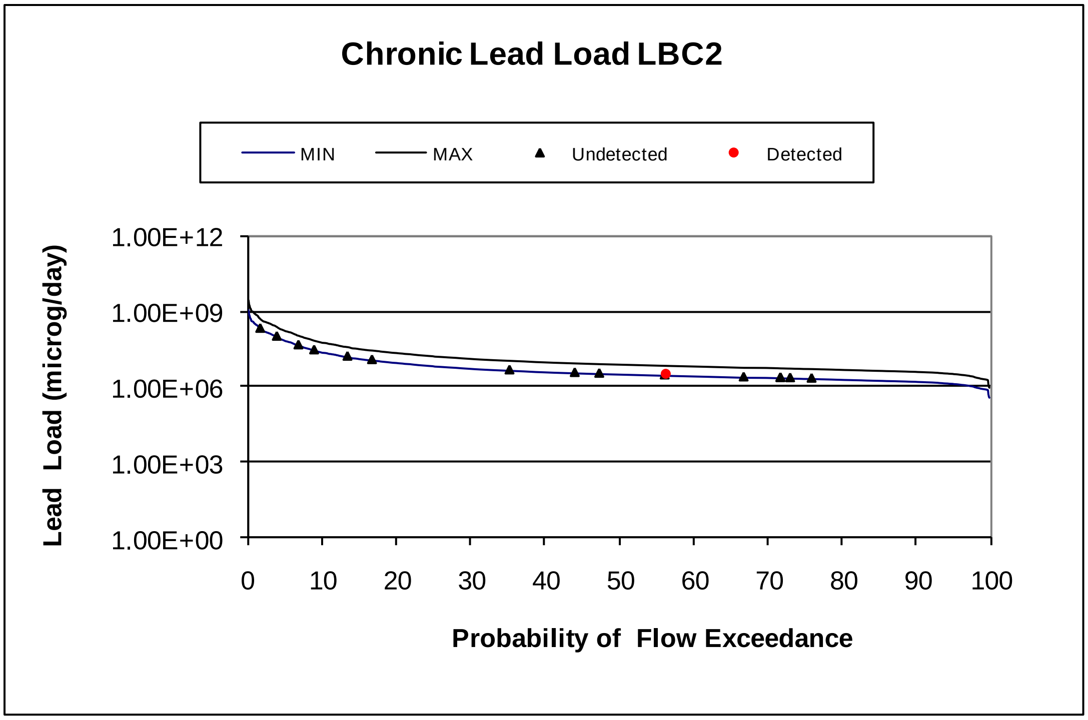

Figure G.5. Chronic Lead Mass Load Curves for Station LBC2

Table G.4. Iron Sampling Results for LBC2

Date	Hardness (mg/L CaCO3)	Iron (mg/L)	Acute Standard (mg/L)	Chronic Standard (mg/L)	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	70	0.295	4.000	1.000	0.67	56.23	4.60E+08
8/23/2007	76	0.302	4.000	1.000	0.78	47.41	5.49E+08
8/29/2007	70	0.238	4.000	1.000	0.84	44.11	4.64E+08
9/7/2007	No sample		4.000	1.000			
9/11/2007	90	0.272	4.000	1.000	0.50	76.04	3.15E+08
9/19/2007	84	0.513	4.000	1.000	0.52	73.15	6.20E+08
9/25/2007	110	0.258	4.000	1.000	1.06	35.31	6.39E+08
10/4/2007	100	0.166	4.000	1.000	0.53	71.83	2.05E+08
10/8/2007	96	0.13	4.000	1.000	0.53	71.83	1.60E+08
10/16/2007	75	0.26	4.000	1.000	0.53	71.83	3.21E+08
10/24/2007	96	0.44	4.000	1.000	2.73	16.77	2.80E+09
11/1/2007	100	0.27	4.000	1.000	0.56	66.88	3.51E+08
11/15/2007	130	0.27	4.000	1.000	0.67	56.23	4.21E+08
11/26/2007	80	0.75	4.000	1.000	3.73	13.46	6.53E+09
12/11/2007	120	1.39	4.000	1.000	6.69	8.97	2.17E+10
1/9/2008	85	3.25	4.000	1.000	10.58	6.85	8.02E+10
2/6/2008	110	2.57	4.000	1.000	23.40	3.94	1.40E+11
3/4/2008	60	2.83	4.000	1.000	48.47	1.70	3.20E+11
3/20/2008	No sample		4.000	1.000			

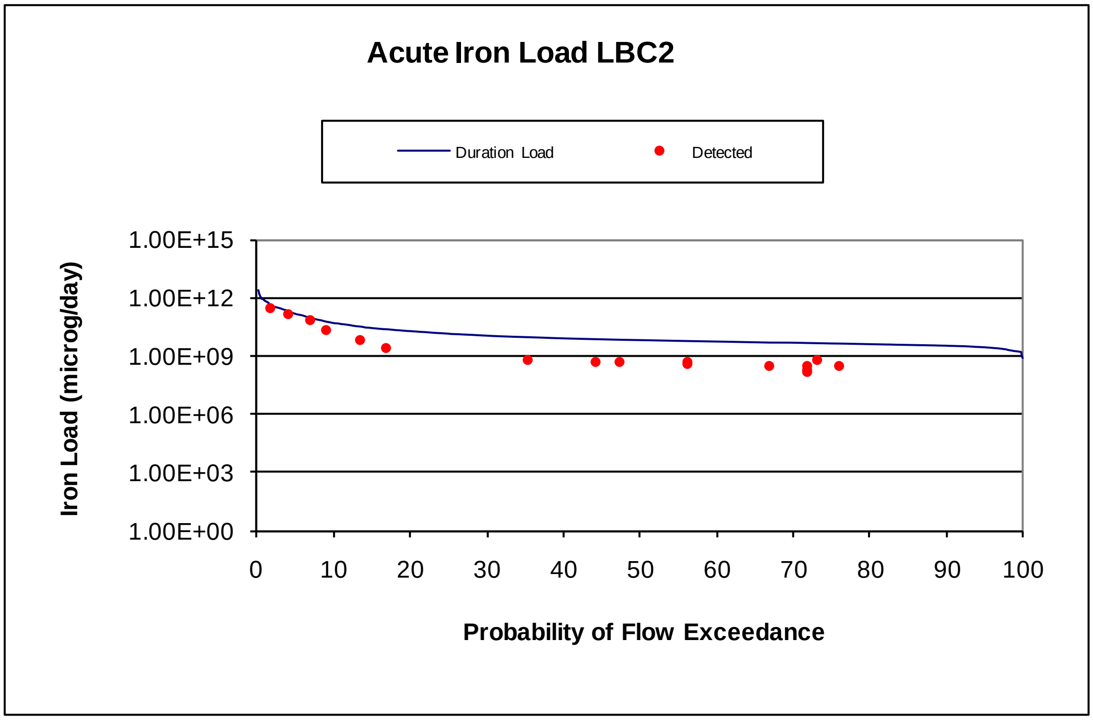

Figure G.6. Acute Iron Mass Load Curves for Station LBC2

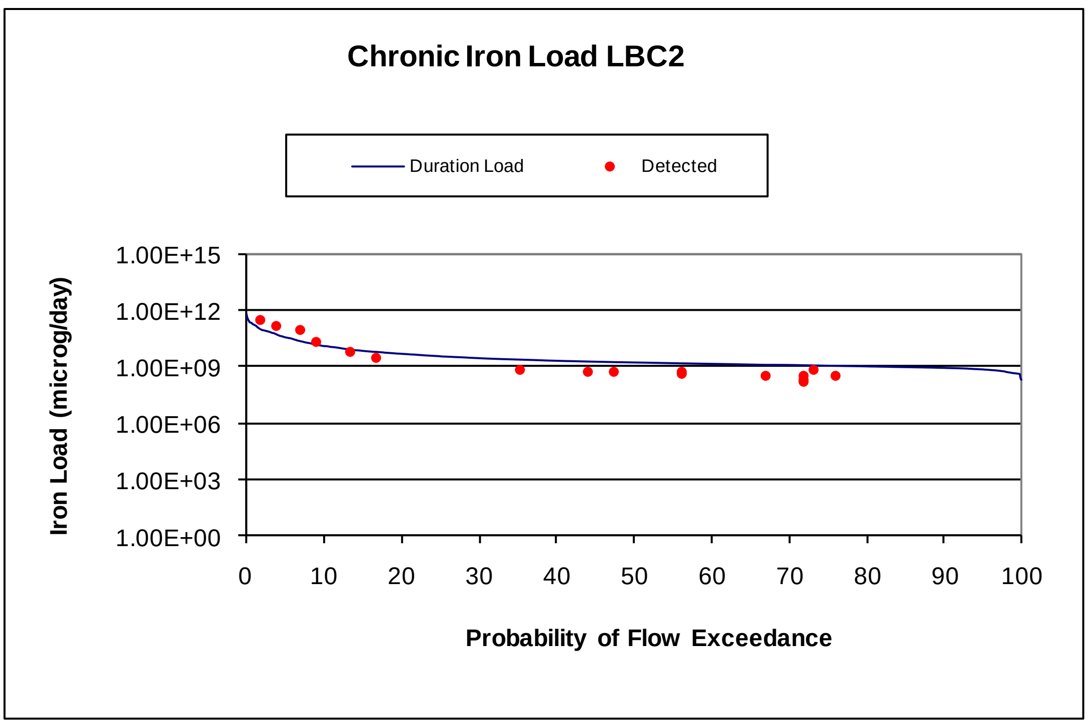

Figure G.7. Chronic Iron Mass Load Curves for Station LBC2

Table G.5. Mercury Sampling Results for LBC2

Date	Hardness (mg/L CaCO3)	Mercury (mg/L)	Acute Standard (mg/L)	Chronic Standard (mg/L)	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	70		0.0014	0.00077	0.67	56.23	
8/23/2007	76		0.0014	0.00077	0.78	47.41	
8/29/2007	70		0.0014	0.00077	0.84	44.11	
9/7/2007	No sample		0.0014	0.00077			
9/11/2007	90		0.0014	0.00077	0.50	76.04	
9/19/2007	84		0.0014	0.00077	0.52	73.15	
9/25/2007	110		0.0014	0.00077	1.06	35.31	
10/4/2007	100		0.0014	0.00077	0.53	71.83	
10/8/2007	96		0.0014	0.00077	0.53	71.83	
10/16/2007	75		0.0014	0.00077	0.53	71.83	
10/24/2007	96		0.0014	0.00077	2.73	16.77	
11/1/2007	100	**0.0002**	0.0014	0.00077	0.56	66.88	2.60E+05
11/15/2007	130	**0.0002**	0.0014	0.00077	0.67	56.23	3.12E+05
11/26/2007	80	**0.0002**	0.0014	0.00077	3.73	13.46	1.74E+06
12/11/2007	120	**0.0002**	0.0014	0.00077	6.69	8.97	3.12E+06
1/9/2008	85		0.0014	0.00077	10.58	6.85	
2/6/2008	110		0.0014	0.00077	23.40	3.94	
3/4/2008	60		0.0014	0.00077	48.47	1.70	
3/20/2008	No sample		0.0014	0.00077			

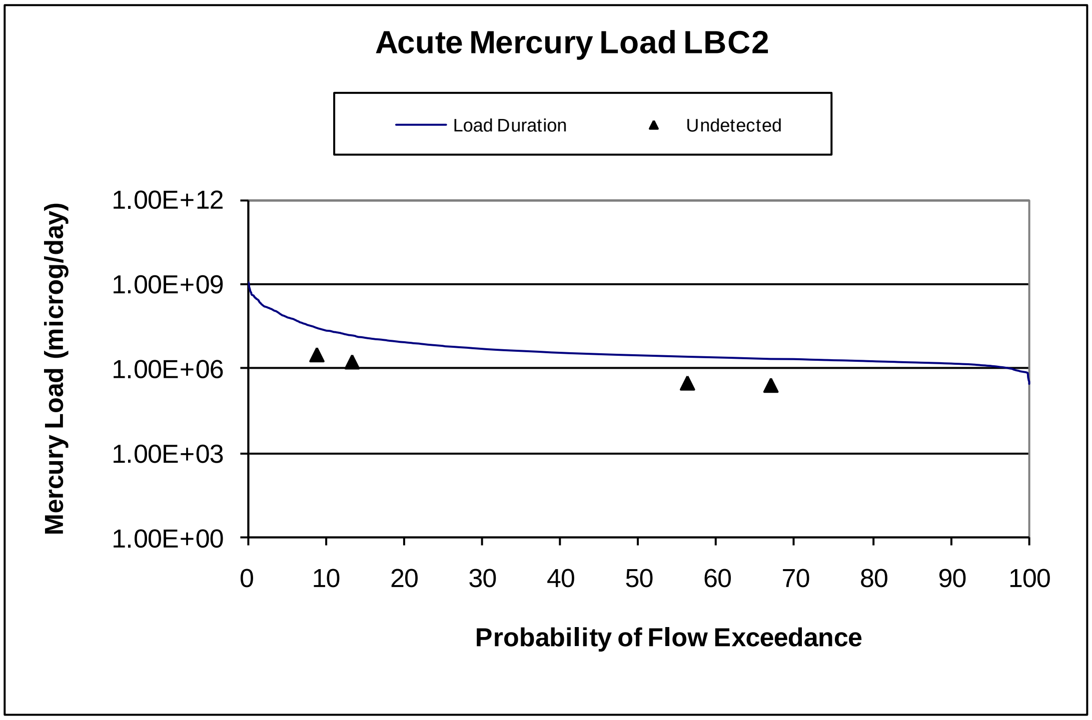

Figure G.8. Acute Mercury Mass Load Curves for Station LBC2

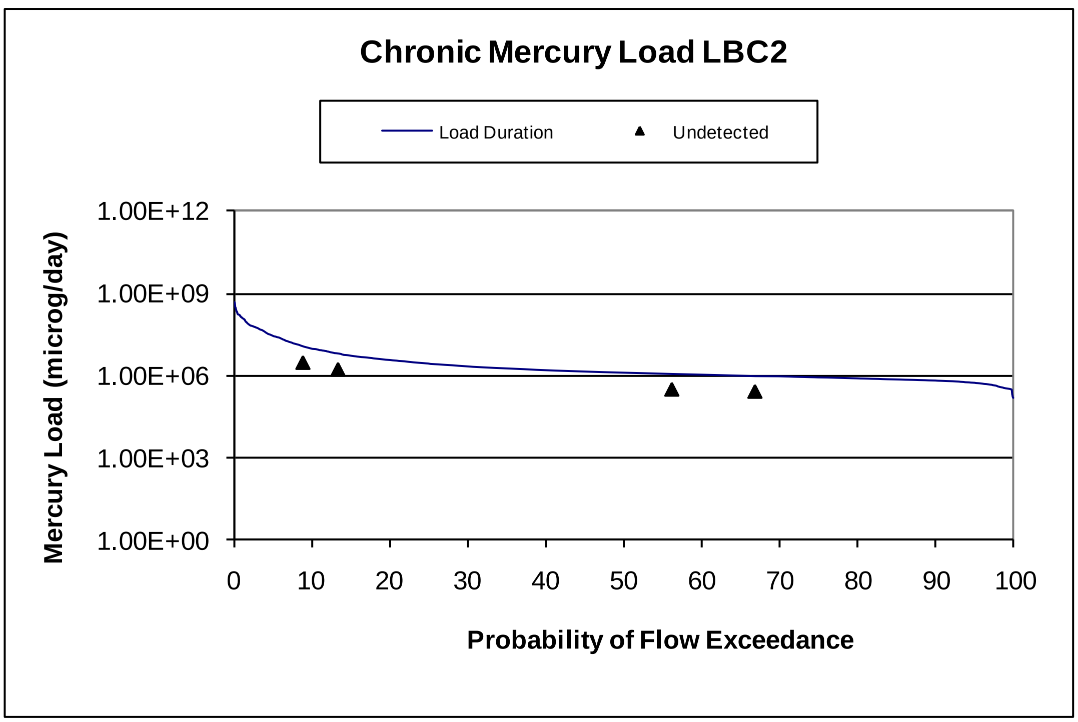

Figure G.9. Chronic Mercury Mass Load Curves for Station LBC2

APPENDIX H: RESULTS FOR STATION LBC3

Table H.1. Metal Results for Station LBC3

Date	Hd (mg/L as CaCO3)	Cu (mg/L)	Pb (mg/L)	Fe (mg/L)	Hg (mg/L)	Flow (cfs)
8/16/2007	68	0.005	0.002	0.327		1.20
8/23/2007	72	**0.002**	**0.002**	0.406		1.40
8/29/2007	68	0.004	0.004	0.238		1.60
9/7/2007	96	0.025	0.008	0.286		0.89
9/11/2007	70	0.004	**0.002**	0.377		0.67
9/19/2007	84	0.003	**0.002**	0.376		0.93
9/25/2007	86	0.004	**0.002**	0.347		1.90
10/4/2007	96	0.004	**0.002**	0.313		0.95
10/8/2007	200	0.007	**0.002**	0.22		0.95
10/16/2007	80	0.008	**0.002**	0.43		0.95
10/24/2007	80	**0.002**	**0.002**	0.76		4.90
11/1/2007	86	0.003	**0.002**	0.42	**0.0002**	1.00
11/15/2007	160	0.004	**0.002**	0.54	**0.0002**	1.20
11/26/2007	150	0.004	**0.002**	1.28	**0.0002**	6.40
12/11/2007	110	0.006	**0.002**	1.69	**0.0002**	12.00
1/9/2008	64	**0.002**	**0.002**	2.78		19.00
2/6/2008	100	0.006	0.003	3.67		43.00
3/4/2008	90	0.003	0.003	4.29		95.00
3/20/2008	150	0.004	**0.002**	1.58		21.00

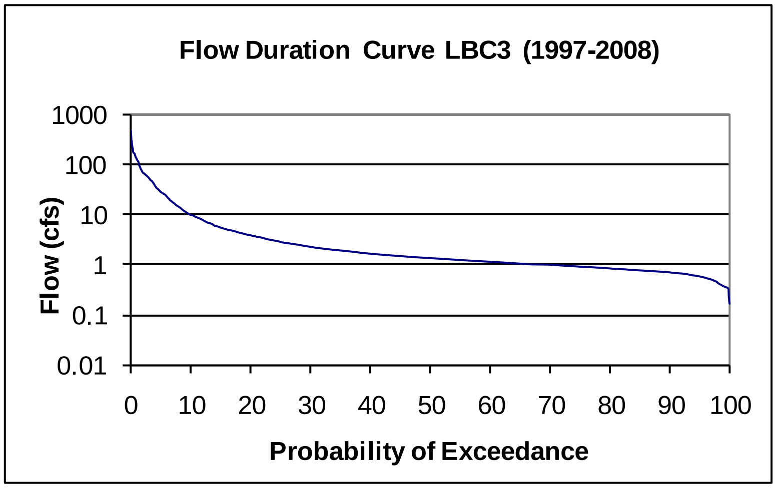

Figure H.1. Flow Duration Curve for Station LBC3

Table H.2. Copper Sampling Results for LBC3

Date	Hardness (mg/L CaCO3)	Copper (mg/L)	Acute Hardness (mg/L) e(0.9422(ln Hardness) - 1.700)/1000	Chronic Hardness (mg/L) e(0.8545(ln Hardness) - 1.7020)/1000	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	68	0.005	0.010	0.007	1.20	56.23	1.40E+07
8/23/2007	72	**0.002**	0.010	0.007	1.40	47.41	6.53E+06
8/29/2007	68	0.004	0.010	0.007	1.60	41.17	1.49E+07
9/7/2007	96	0.025	0.013	0.009	0.89	76.04	5.19E+07
9/11/2007	70	0.004	0.010	0.007	0.67	90.98	6.25E+06
9/19/2007	84	0.003	0.012	0.008	0.93	73.15	6.51E+06
9/25/2007	86	0.004	0.012	0.008	1.90	35.31	1.77E+07
10/4/2007	100	0.004	0.014	0.009	0.95	71.83	8.86E+06
10/8/2007	200	0.007	0.027	0.017	0.95	71.83	1.55E+07
10/16/2007	80	0.008	0.011	0.008	0.95	71.83	1.77E+07
10/24/2007	80	**0.002**	0.011	0.008	4.90	16.77	2.29E+07
11/1/2007	86	0.003	0.012	0.008	1.00	66.88	7.00E+06
11/15/2007	160	0.004	0.022	0.014	1.20	56.23	1.12E+07
11/26/2007	150	0.004	0.021	0.013	6.40	13.75	5.97E+07
12/11/2007	110	0.006	0.015	0.010	12.00	8.97	1.68E+08
1/9/2008	64	**0.002**	0.009	0.006	19.00	6.85	8.86E+07
2/6/2008	100	0.006	0.014	0.009	43.00	3.89	6.02E+08
3/4/2008	90	0.003	0.013	0.009	95.00	1.58	6.65E+08
3/20/2008	150	0.004	0.021	0.013	21.00	6.49	1.96E+08

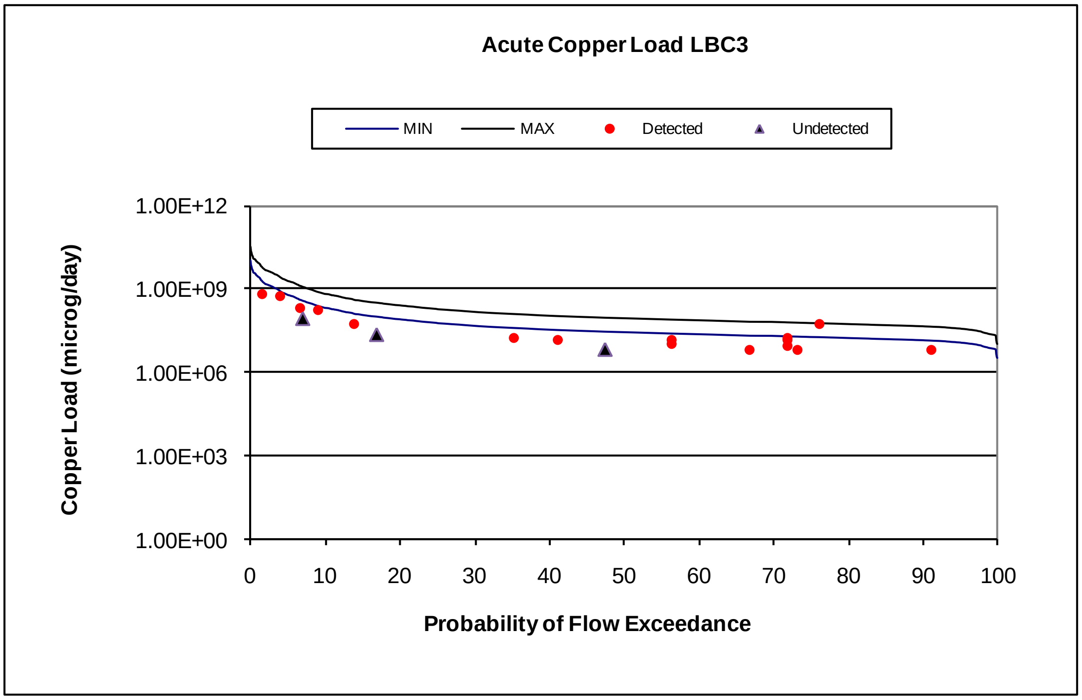

Figure H.2. Acute Copper Mass Load Curves for Station LBC3

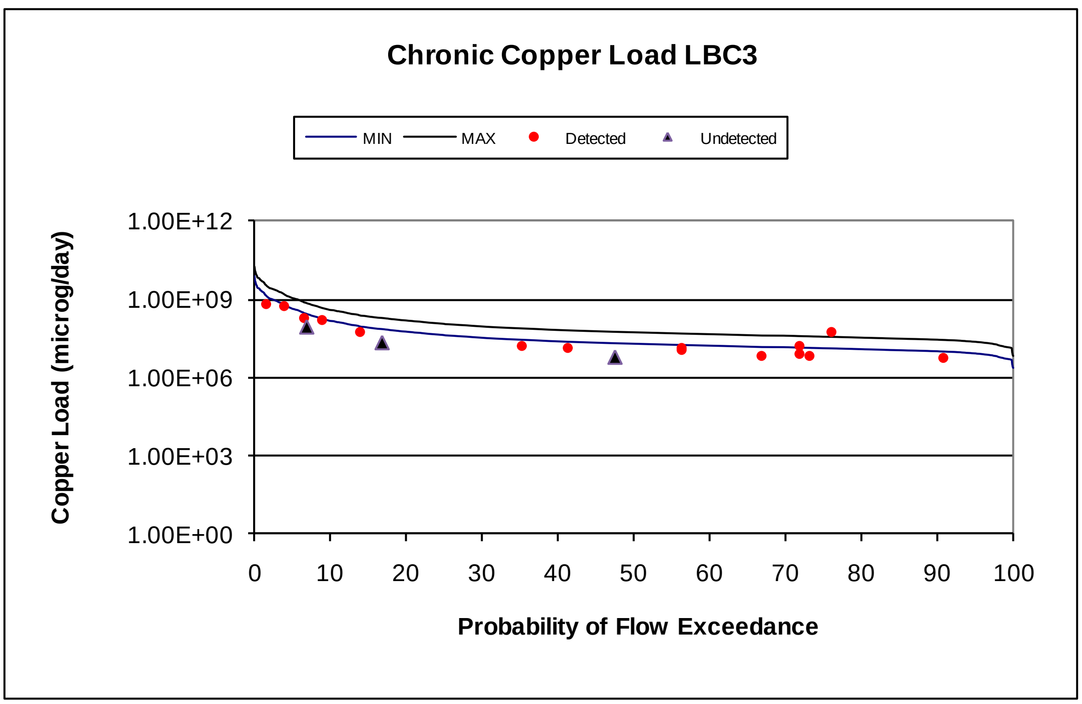

Figure H.3. Chronic Copper Mass Load Curves for Station LBC3

Table H.3. Lead Sampling Results for LBC3

Date	Hardness (mg/L CaCO3)	Lead (mg/L)	Acute Hardness (mg/L) e(1.273(ln Hardness) - 1.460)/1000	Chronic Hardness (mg/L) e(1.273(ln Hardness) - 4.705)/1000	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	68	0.002	0.050	0.002	1.20	56.23	5.60E+06
8/23/2007	72	**0.002**	0.054	0.002	1.40	47.41	6.53E+06
8/29/2007	68	0.004	0.050	0.002	1.60	41.17	1.49E+07
9/7/2007	96	0.008	0.078	0.003	0.89	76.04	1.66E+07
9/11/2007	70	**0.002**	0.052	0.002	0.67	90.98	3.13E+06
9/19/2007	84	**0.002**	0.065	0.003	0.93	73.15	4.34E+06
9/25/2007	86	**0.002**	0.067	0.003	1.90	35.31	8.86E+06
10/4/2007	100	**0.002**	0.082	0.003	0.95	71.83	4.43E+06
10/8/2007	200	**0.002**	0.197	0.008	0.95	71.83	4.43E+06
10/16/2007	80	**0.002**	0.061	0.002	0.95	71.83	4.43E+06
10/24/2007	80	**0.002**	0.061	0.002	4.90	16.77	2.29E+07
11/1/2007	86	**0.002**	0.067	0.003	1.00	66.88	4.67E+06
11/15/2007	160	**0.002**	0.149	0.006	1.20	56.23	5.60E+06
11/26/2007	150	**0.002**	0.137	0.005	6.40	13.75	2.99E+07
12/11/2007	110	**0.002**	0.092	0.004	12.00	8.97	5.60E+07
1/9/2008	64	**0.002**	0.046	0.002	19.00	6.85	8.86E+07
2/6/2008	100	0.003	0.082	0.003	43.00	3.89	3.01E+08
3/4/2008	90	0.003	0.071	0.003	95.00	1.58	6.65E+08
3/20/2008	150	**0.002**	0.137	0.005	21.00	6.49	9.80E+07

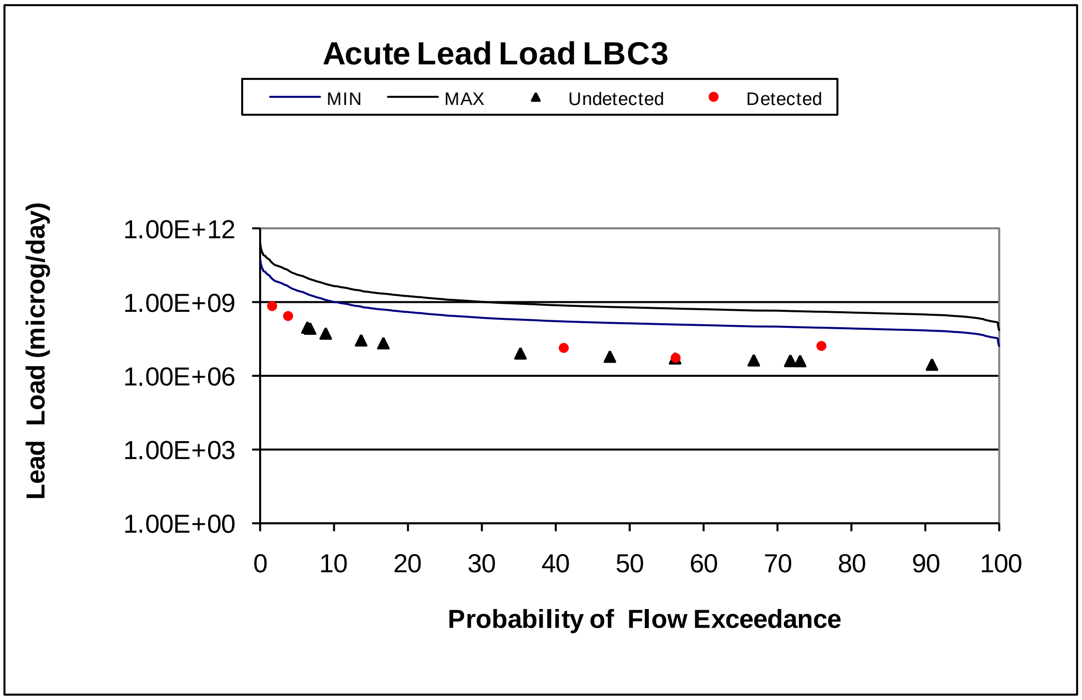

Figure H.4. Acute Lead Mass Load Curves for Station LBC3

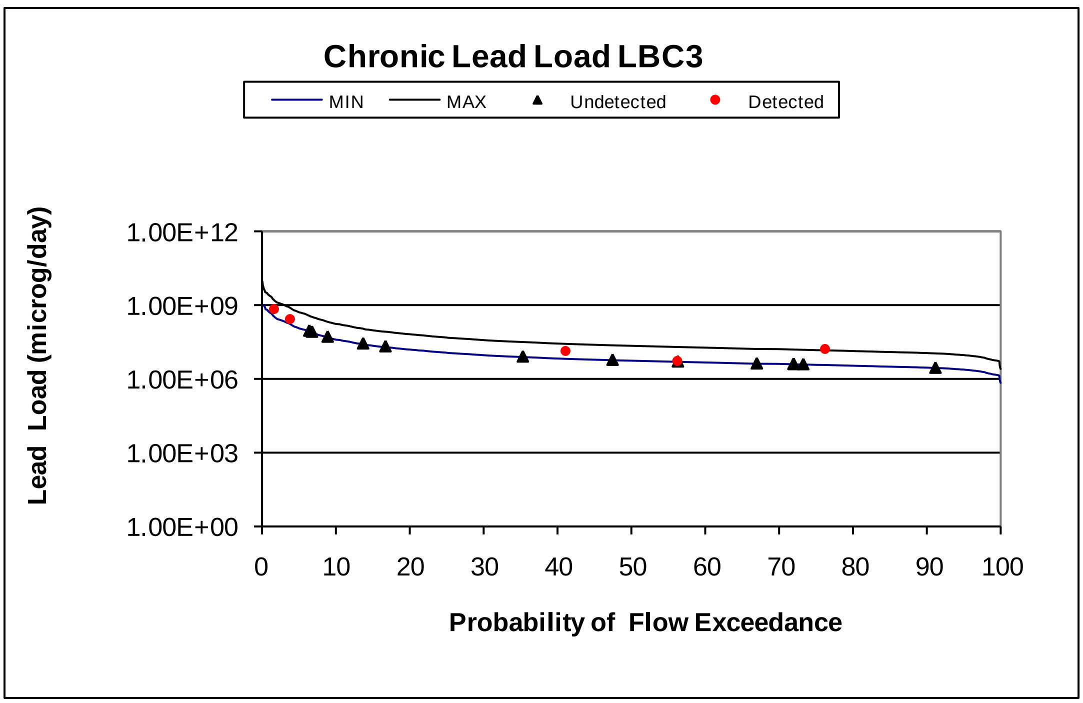

Figure H.5. Chronic Lead Mass Load Curves for Station LBC3

Table H.4. Iron Sampling Results for LBC3

Date	Hardness (mg/L CaCO3)	Iron (mg/L)	Acute Standard (mg/L)	Chronic Standard (mg/L)	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	68	0.327	4.000	1.000	1.20	56.23	9.15E+08
8/23/2007	72	0.406	4.000	1.000	1.40	47.41	1.33E+09
8/29/2007	68	0.238	4.000	1.000	1.60	41.17	8.88E+08
9/7/2007	96	0.286	4.000	1.000	0.89	76.04	5.94E+08
9/11/2007	70	0.377	4.000	1.000	0.67	90.98	5.89E+08
9/19/2007	84	0.376	4.000	1.000	0.93	73.15	8.16E+08
9/25/2007	86	0.347	4.000	1.000	1.90	35.31	1.54E+09
10/4/2007	100	0.313	4.000	1.000	0.95	71.83	6.94E+08
10/8/2007	200	0.22	4.000	1.000	0.95	71.83	4.88E+08
10/16/2007	80	0.43	4.000	1.000	0.95	71.83	9.53E+08
10/24/2007	80	0.76	4.000	1.000	4.90	16.77	8.69E+09
11/1/2007	86	0.42	4.000	1.000	1.00	66.88	9.80E+08
11/15/2007	160	0.54	4.000	1.000	1.20	56.23	1.51E+09
11/26/2007	150	1.28	4.000	1.000	6.40	13.75	1.91E+10
12/11/2007	110	1.69	4.000	1.000	12.00	8.97	4.73E+10
1/9/2008	64	2.78	4.000	1.000	19.00	6.85	1.23E+11
2/6/2008	100	3.67	4.000	1.000	43.00	3.89	3.68E+11
3/4/2008	90	4.29	4.000	1.000	95.00	1.58	9.51E+11
3/20/2008	150	1.58	4.000	1.000	21.00	6.49	7.74E+10

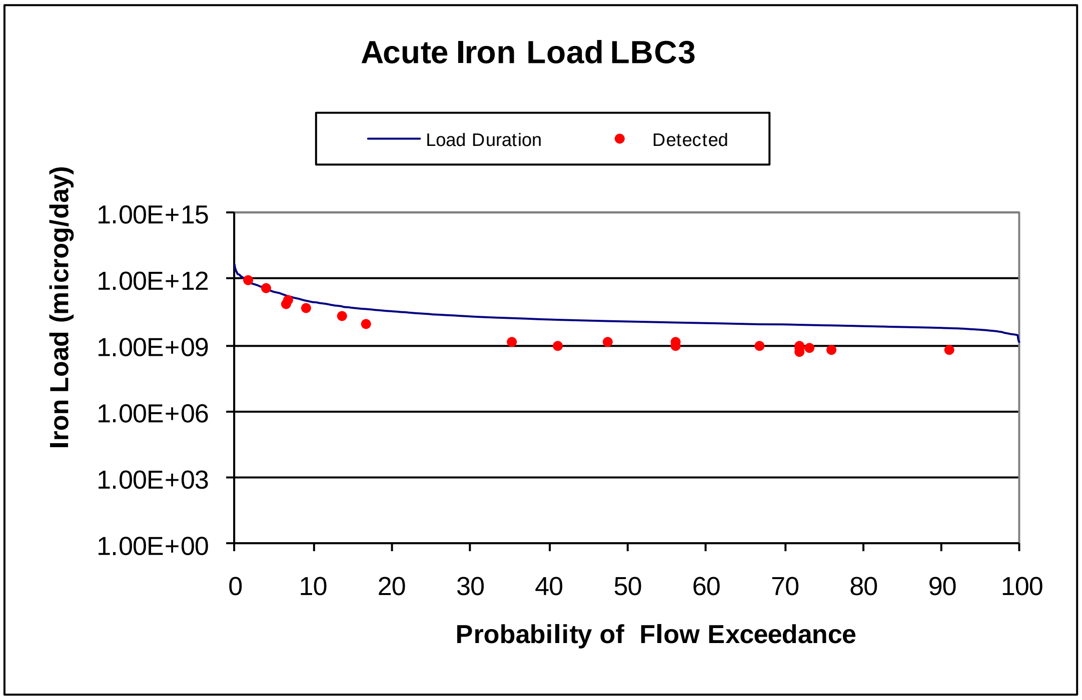

Figure H.6. Acute Iron Mass Load Curves for Station LBC3

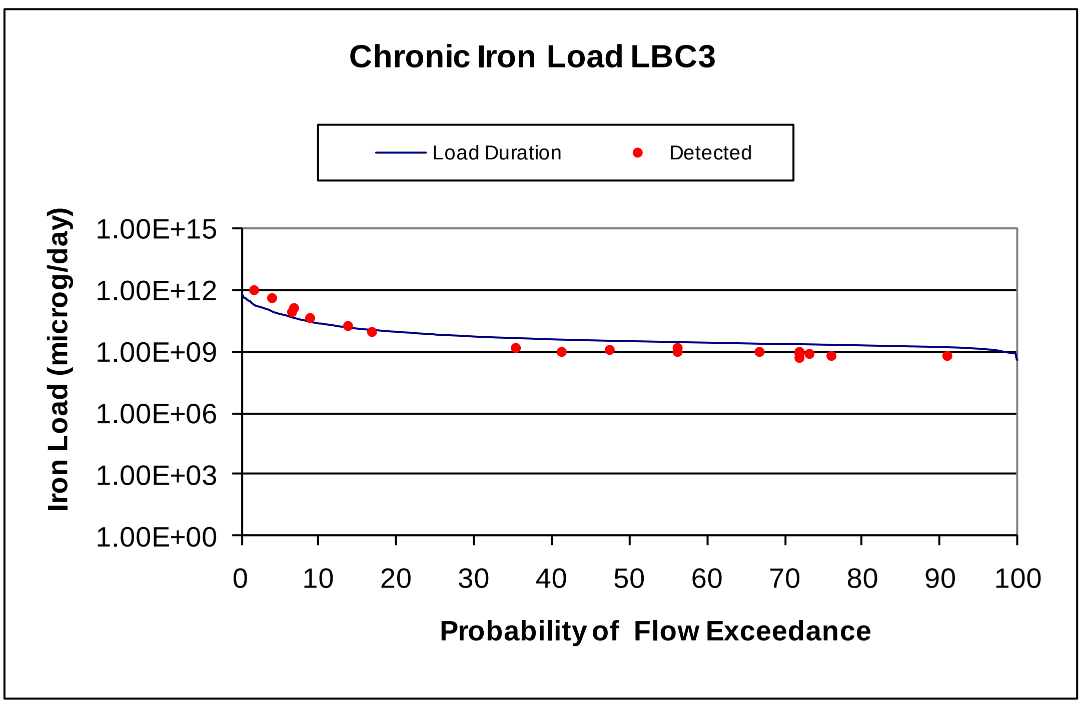

Figure H.7. Chronic Iron Mass Load Curves for Station LBC3

Table H.5. Mercury Sampling Results for LBC3

Date	Hardness (mg/L CaCO3)	Mercury (mg/L)	Acute Standard (mg/L)	Chronic Standard (mg/L)	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	68		0.0014	0.00077	1.20	56.23	
8/23/2007	72		0.0014	0.00077	1.40	47.41	
8/29/2007	68		0.0014	0.00077	1.60	41.17	
9/7/2007	96		0.0014	0.00077	0.89	76.04	
9/11/2007	70		0.0014	0.00077	0.67	90.98	
9/19/2007	84		0.0014	0.00077	0.93	73.15	
9/25/2007	86		0.0014	0.00077	1.90	35.31	
10/4/2007	96		0.0014	0.00077	0.95	71.83	
10/8/2007	200		0.0014	0.00077	0.95	71.83	
10/16/2007	80		0.0014	0.00077	0.95	71.83	
10/24/2007	80		0.0014	0.00077	4.90	16.77	
11/1/2007	86	**0.0002**	0.0014	0.00077	1.00	66.88	4.67E+05
11/15/2007	160	**0.0002**	0.0014	0.00077	1.20	56.23	5.60E+05
11/26/2007	150	**0.0002**	0.0014	0.00077	6.40	13.75	2.99E+06
12/11/2007	110	**0.0002**	0.0014	0.00077	12.00	8.97	5.60E+06
1/9/2008	64		0.0014	0.00077	19.00	6.85	
2/6/2008	100		0.0014	0.00077	43.00	3.89	
3/4/2008	90		0.0014	0.00077	95.00	1.58	
3/20/2008	150		0.0014	0.00077	21.00	6.49	

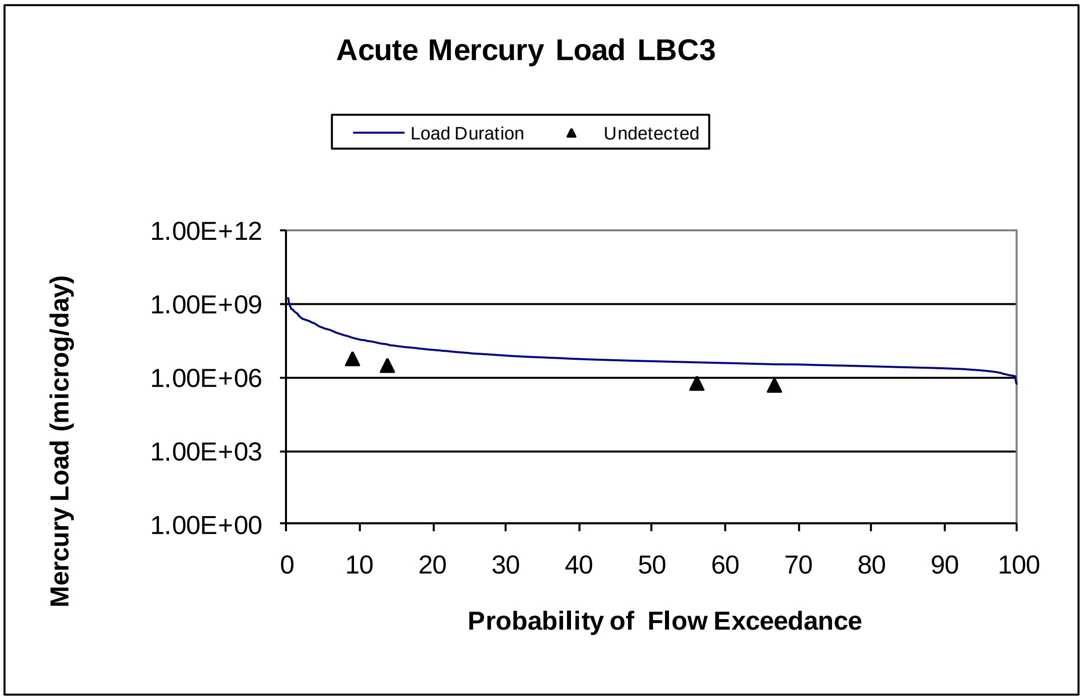

Figure H.8. Acute Mercury Mass Load Curves for Station LBC3

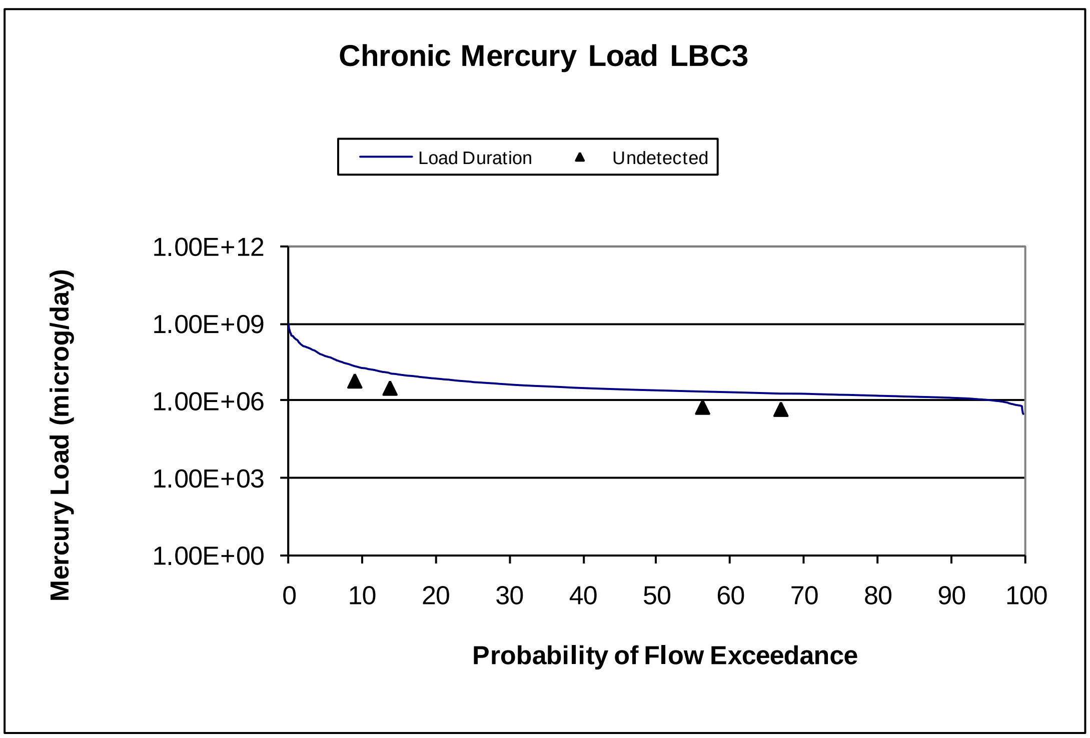

Figure H.9. Chronic Mercury Mass Load Curves for Station LBC3

APPENDIX I: RESULTS FOR STATION MC1

Table I.1. Metal Results for Station MC1

Date	Hd (mg/L as CaCO3)	Cu (mg/L)	Pb (mg/L)	Fe (mg/L)	Hg (mg/L)	Flow (cfs)
8/16/2007	48	0.004	0.002	0.715		0.56
8/23/2007	70	**0.002**	**0.002**	0.610		0.56
8/29/2007	56	0.003	**0.002**	0.735		0.56
9/7/2007	50	0.002	**0.002**	0.946		0.63
9/11/2007	60	0.002	**0.002**	0.793		0.79
9/19/2007	72	**0.002**	**0.002**	0.824		0.70
9/25/2007	68	0.004	**0.002**	0.978		2.20
10/4/2007	80	**0.002**	**0.002**	0.66		0.70
10/8/2007	64	0.003	**0.002**	0.56		0.98
10/16/2007	25	0.007	**0.002**	0.60		0.88
10/24/2007	96	0.007	0.003	4.48		14.00
11/1/2007	60	**0.002**	**0.002**	1.23	**0.0002**	0.88
11/15/2007	180	0.002	**0.002**	0.71	**0.0002**	1.50
11/26/2007	170	0.006	**0.002**	2.56	**0.0002**	17.00
12/11/2007	110	0.005	**0.002**	2.77	**0.0002**	39.00
1/9/2008	100	**0.002**	0.002	3.89		23.00
2/6/2008	100	0.006	0.004	5.81	**0.0002**	129.00
3/4/2008	120	**0.002**	0.003	4.65		175.00
3/20/2008	220	0.003	0.002	2.25		77.0

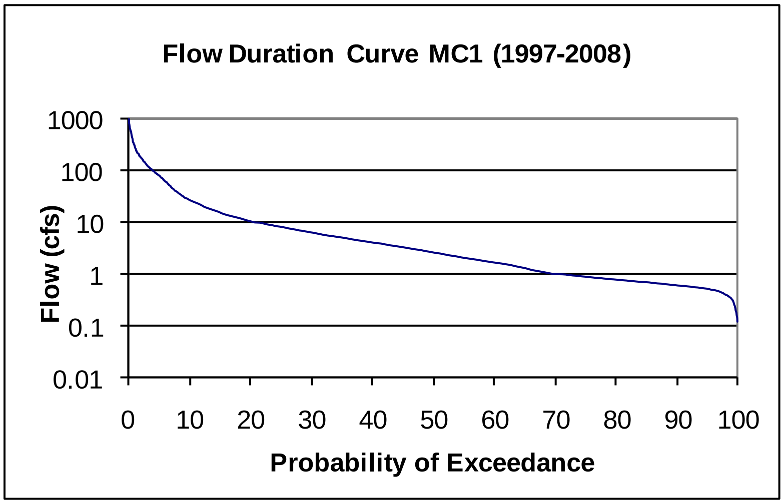

Figure I.1. Flow Duration Curve for Station MC1

Table I.2. Copper Sampling Results for MC1

Date	Hardness (mg/L CaCO3)	Copper (mg/L)	Acute Hardness (mg/L) e(0.9422(ln Hardness) - 1.700)/1000	Chronic Hardness (mg/L) e(0.8545(ln Hardness) - 1.7020)/1000	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	48	0.004	0.007	0.005	0.56	92.57	5.23E+06
8/23/2007	70	**0.002**	0.010	0.007	0.56	92.57	2.61E+06
8/29/2007	56	0.003	0.008	0.006	0.56	92.57	3.92E+06
9/7/2007	50	0.002	0.007	0.005	0.63	88.58	2.94E+06
9/11/2007	60	0.002	0.009	0.006	0.79	79.62	3.69E+06
9/19/2007	72	**0.002**	0.010	0.007	0.70	84.73	3.27E+06
9/25/2007	68	0.004	0.010	0.007	2.20	53.86	2.05E+07
10/4/2007	80	**0.002**	0.011	0.008	0.70	84.73	3.27E+06
10/8/2007	64	0.003	0.009	0.006	0.98	71.78	6.86E+06
10/16/2007	25	0.007	0.004	0.003	0.88	75.36	1.44E+07
10/24/2007	96	0.007	0.013	0.009	14.00	16.12	2.29E+08
11/1/2007	60	**0.002**	0.009	0.006	0.88	75.36	4.11E+06
11/15/2007	180	0.002	0.024	0.015	1.50	62.72	7.00E+06
11/26/2007	170	0.006	0.023	0.015	17.00	14.22	2.38E+08
12/11/2007	110	0.005	0.015	0.010	39.00	8.04	4.55E+08
1/9/2008	100	**0.002**	0.014	0.009	23.00	11.54	1.07E+08
2/6/2008	100	0.006	0.014	0.009	129.00	3.07	1.81E+09
3/4/2008	120	**0.002**	0.017	0.011	175.00	2.17	8.16E+08
3/20/2008	220	0.003	0.029	0.018	77.0	5.28	5.39E+08

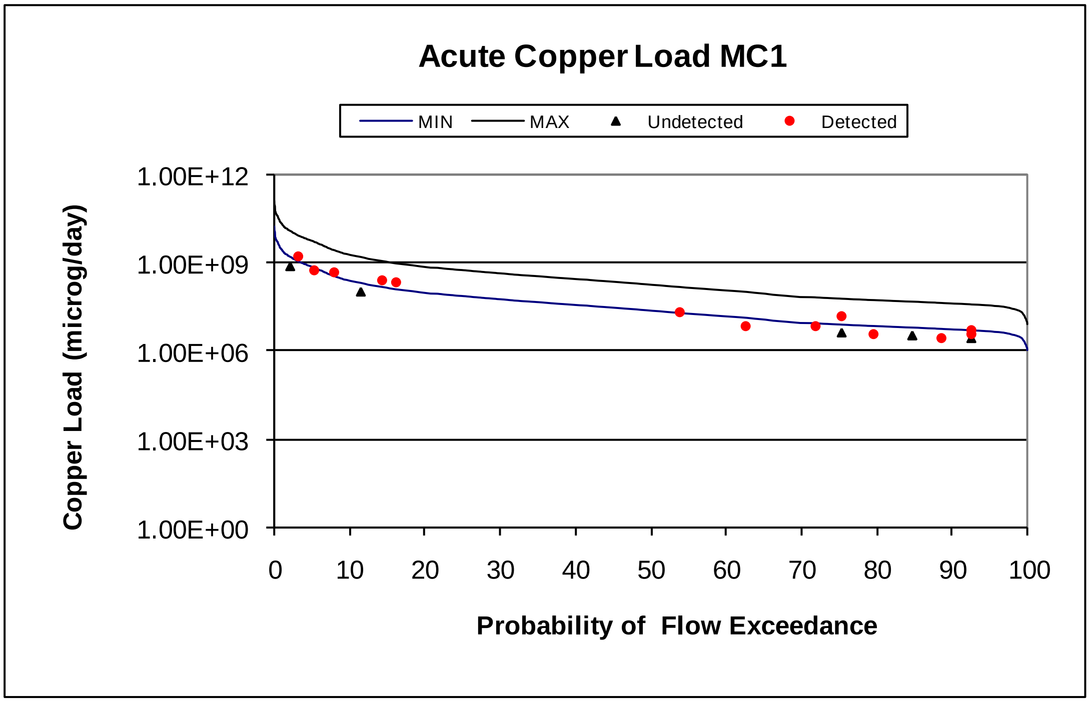

Figure I.2. Acute Copper Mass Load Curves for Station MC1

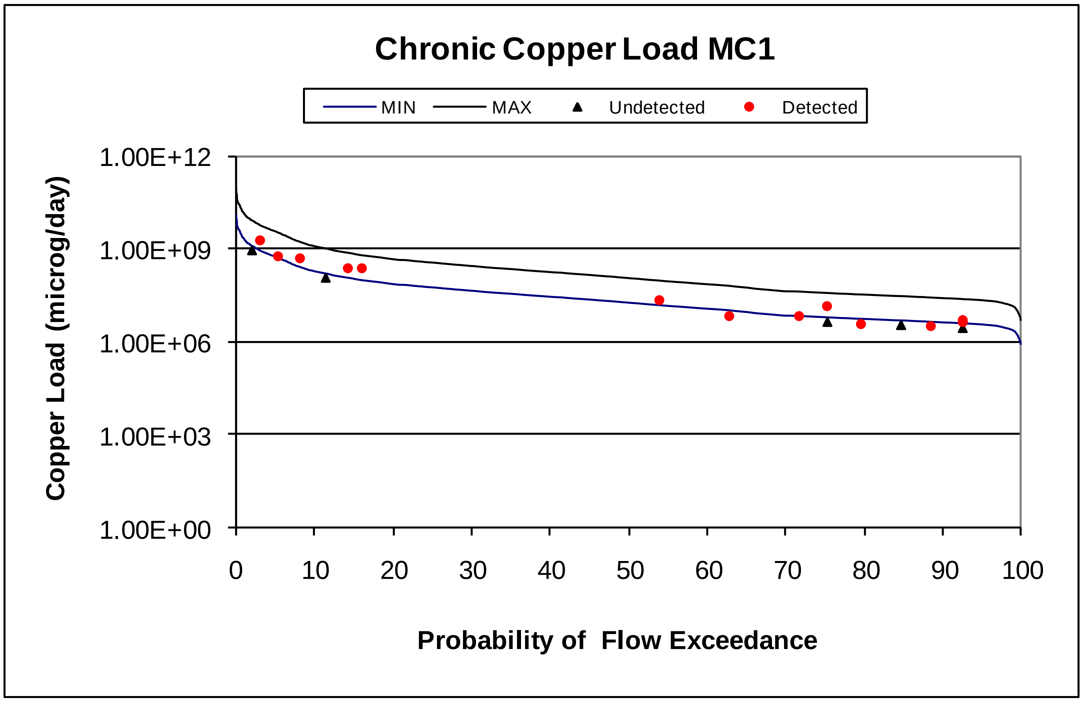

Figure I.3. Chronic Copper Mass Load Curves for Station MC1

Table I.3. Lead Sampling Results for MC1

Date	Hardness (mg/L CaCO3)	Lead (mg/L)	Acute Hardness (mg/L) e(1.273(ln Hardness) - 1.460)/1000	Chronic Hardness (mg/L) e(1.273(ln Hardness) - 4.705)/1000	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	48	0.002	0.032	0.001	0.56	92.57	2.61E+06
8/23/2007	70	**0.002**	0.052	0.002	0.56	92.57	2.61E+06
8/29/2007	56	**0.002**	0.039	0.002	0.56	92.57	2.61E+06
9/7/2007	50	**0.002**	0.034	0.001	0.63	88.58	2.94E+06
9/11/2007	60	**0.002**	0.043	0.002	0.79	79.62	3.69E+06
9/19/2007	72	**0.002**	0.054	0.002	0.70	84.73	3.27E+06
9/25/2007	68	**0.002**	0.050	0.002	2.20	53.86	1.03E+07
10/4/2007	80	**0.002**	0.061	0.002	0.70	84.73	3.27E+06
10/8/2007	64	**0.002**	0.046	0.002	0.98	71.78	4.57E+06
10/16/2007	25	**0.002**	0.014	0.001	0.88	75.36	4.11E+06
10/24/2007	96	0.003	0.078	0.003	14.00	16.12	9.80E+07
11/1/2007	60	**0.002**	0.043	0.002	0.88	75.36	4.11E+06
11/15/2007	180	**0.002**	0.173	0.007	1.50	62.72	7.00E+06
11/26/2007	170	**0.002**	0.160	0.006	17.00	14.22	7.93E+07
12/11/2007	110	**0.002**	0.092	0.004	39.00	8.04	1.82E+08
1/9/2008	100	0.002	0.082	0.003	23.00	11.54	1.07E+08
2/6/2008	100	0.004	0.082	0.003	129.00	3.07	1.20E+09
3/4/2008	120	0.003	0.103	0.004	175.00	2.17	1.22E+09
3/20/2008	220	0.002	0.223	0.009	77.0	5.28	3.59E+08

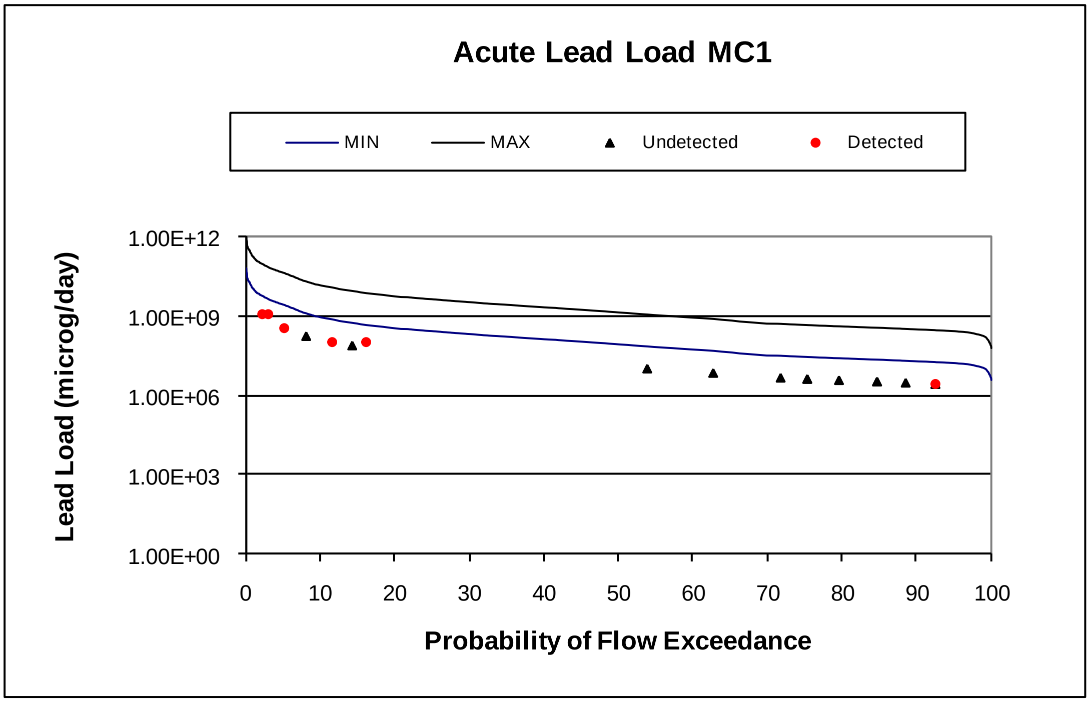

Figure I.4. Acute Lead Mass Load Curves for Station MC1

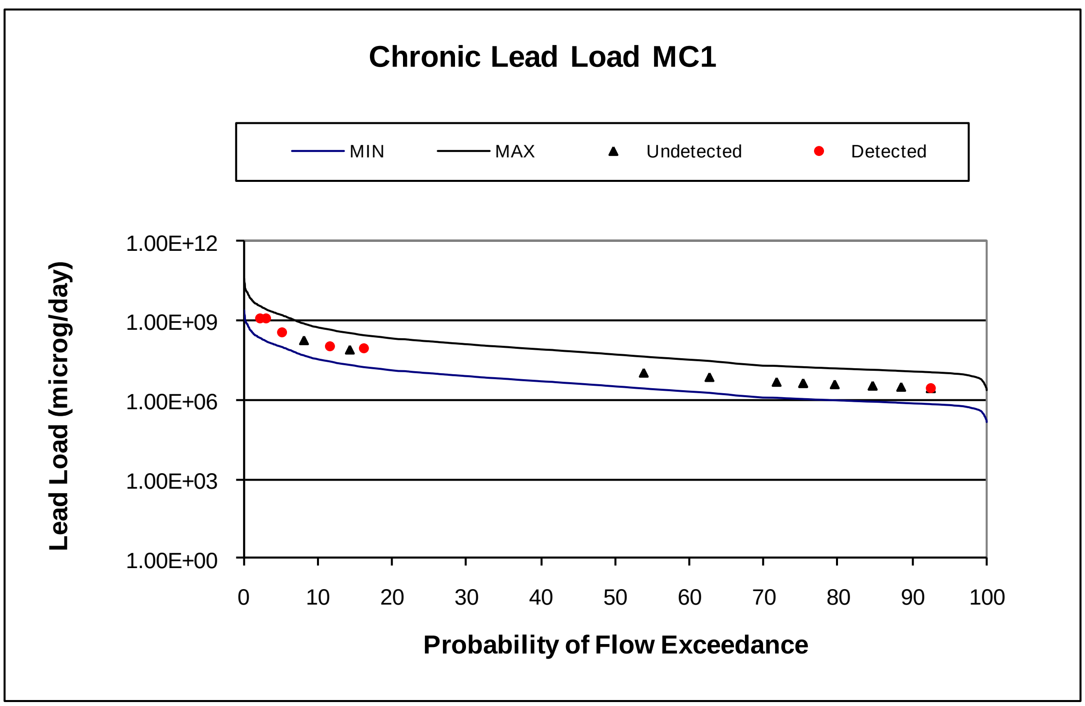

Figure I.5. Chronic Lead Mass Load Curves for Station MC1

Table I.4. Iron Sampling Results for MC1

Date	Hardness (mg/L CaCO3)	Iron (mg/L)	Acute Standard (mg/L)	Chronic Standard (mg/L)	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	48	0.715	4.000	1.000	0.56	92.57	9.34E+08
8/23/2007	70	0.610	4.000	1.000	0.56	92.57	7.97E+08
8/29/2007	56	0.735	4.000	1.000	0.56	92.57	9.60E+08
9/7/2007	50	0.946	4.000	1.000	0.63	88.58	1.39E+09
9/11/2007	60	0.793	4.000	1.000	0.79	79.62	1.46E+09
9/19/2007	72	0.824	4.000	1.000	0.70	84.73	1.35E+09
9/25/2007	68	0.978	4.000	1.000	2.20	53.86	5.02E+09
10/4/2007	80	0.66	4.000	1.000	0.70	84.73	1.08E+09
10/8/2007	64	0.56	4.000	1.000	0.98	71.78	1.28E+09
10/16/2007	25	0.60	4.000	1.000	0.88	75.36	1.23E+09
10/24/2007	96	4.48	4.000	1.000	14.00	16.12	1.46E+11
11/1/2007	60	1.23	4.000	1.000	0.88	75.36	2.53E+09
11/15/2007	180	0.71	4.000	1.000	1.50	62.72	2.48E+09
11/26/2007	170	2.56	4.000	1.000	17.00	14.22	1.02E+11
12/11/2007	110	2.77	4.000	1.000	39.00	8.04	2.52E+11
1/9/2008	100	3.89	4.000	1.000	23.00	11.54	2.09E+11
2/6/2008	100	5.81	4.000	1.000	129.00	3.07	1.75E+12
3/4/2008	120	4.65	4.000	1.000	175.00	2.17	1.90E+12
3/20/2008	220	2.25	4.000	1.000	77.0	5.28	4.04E+11

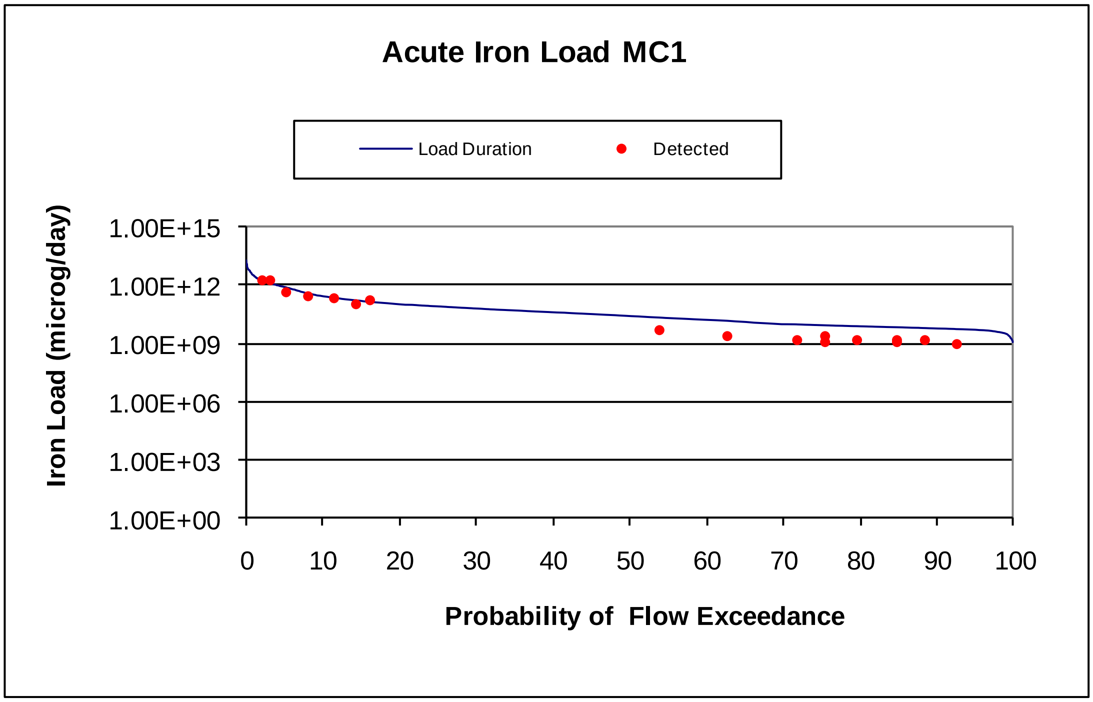

Figure I.6. Acute Iron Mass Load Curves for Station MC1

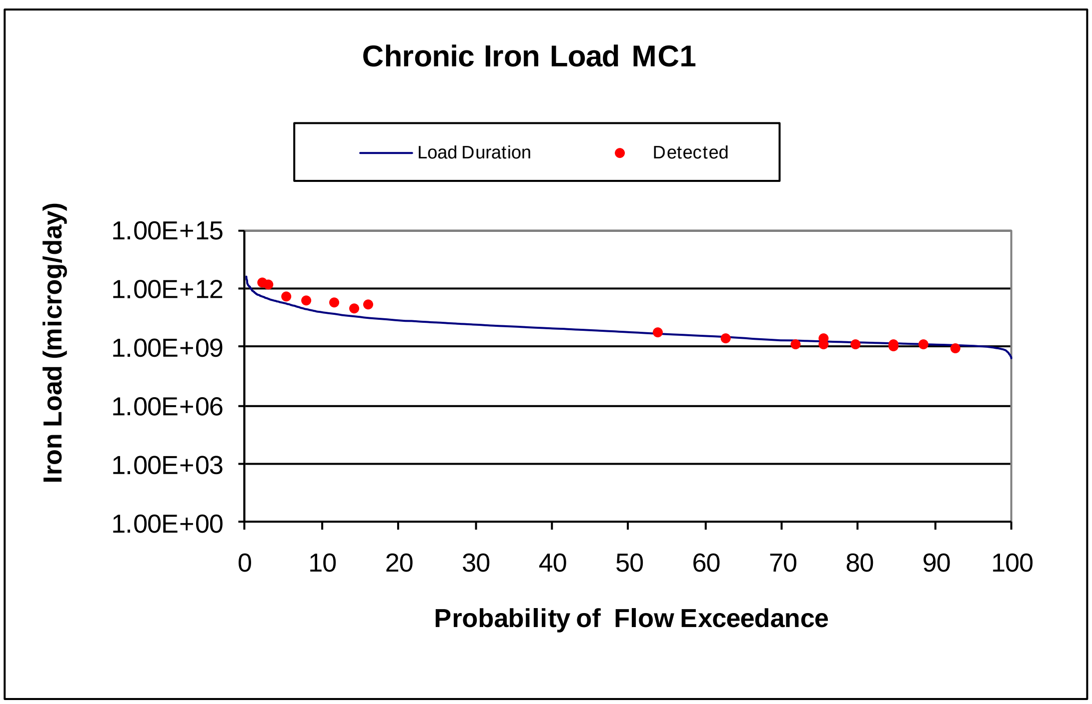

Figure I.7. Chronic Iron Mass Load Curves for Station MC1

Table I.5. Mercury Sampling Results for MC1

Date	Hardness (mg/L CaCO3)	Mercury (mg/L)	Acute Standard (mg/L)	Chronic Standard (mg/L)	Flow (cfs)	Probability of Flow Exceedance	Load Points (microg/day)
8/16/2007	48		0.0014	0.00077	0.56	92.57	
8/23/2007	70		0.0014	0.00077	0.56	92.57	
8/29/2007	56		0.0014	0.00077	0.56	92.57	
9/7/2007	50		0.0014	0.00077	0.63	88.58	
9/11/2007	60		0.0014	0.00077	0.79	79.62	
9/19/2007	72		0.0014	0.00077	0.70	84.73	
9/25/2007	68		0.0014	0.00077	2.20	53.86	
10/4/2007	80		0.0014	0.00077	0.70	84.73	
10/8/2007	64		0.0014	0.00077	0.98	71.78	
10/16/2007	25		0.0014	0.00077	0.88	75.36	
10/24/2007	96		0.0014	0.00077	14.00	16.12	
11/1/2007	60	**0.0002**	0.0014	0.00077	0.88	75.36	4.11E+05
11/15/2007	180	**0.0002**	0.0014	0.00077	1.50	62.72	7.00E+05
11/26/2007	170	**0.0002**	0.0014	0.00077	17.00	14.22	7.93E+06
12/11/2007	110	**0.0002**	0.0014	0.00077	39.00	8.04	1.82E+07
1/9/2008	100		0.0014	0.00077	23.00	11.54	
2/6/2008	100	**0.0002**	0.0014	0.00077	129.00	3.07	6.02E+07
3/4/2008	120		0.0014	0.00077	175.00	2.17	
3/20/2008	220		0.0014	0.00077	77.0	5.28	

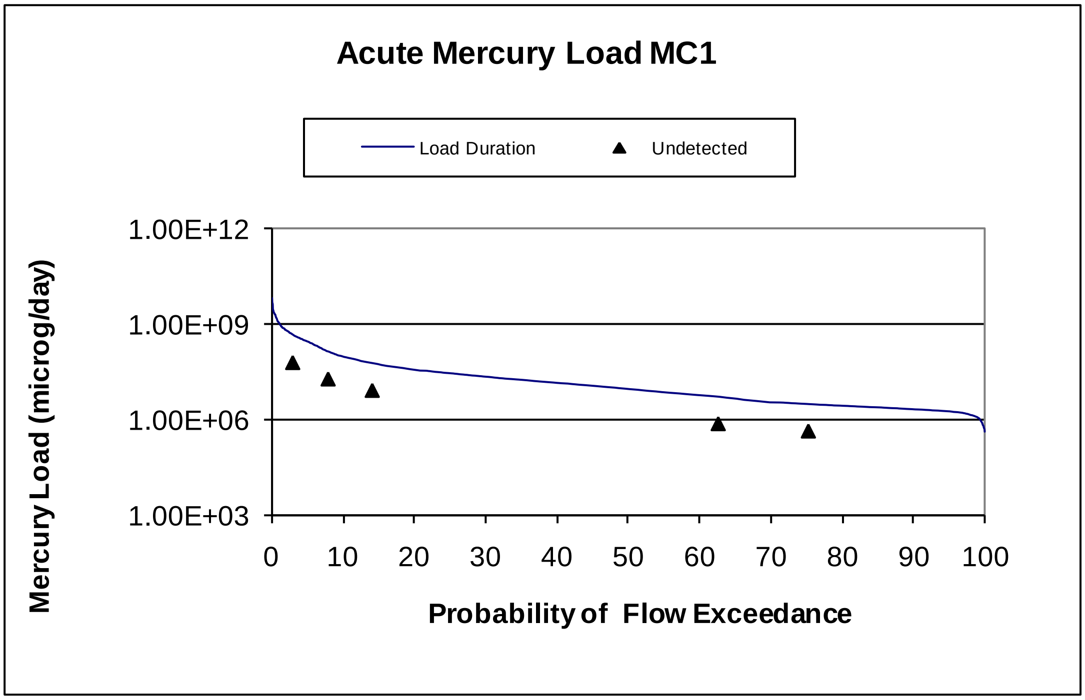

Figure I.8. Acute Mercury Mass Load Curves for Station MC1

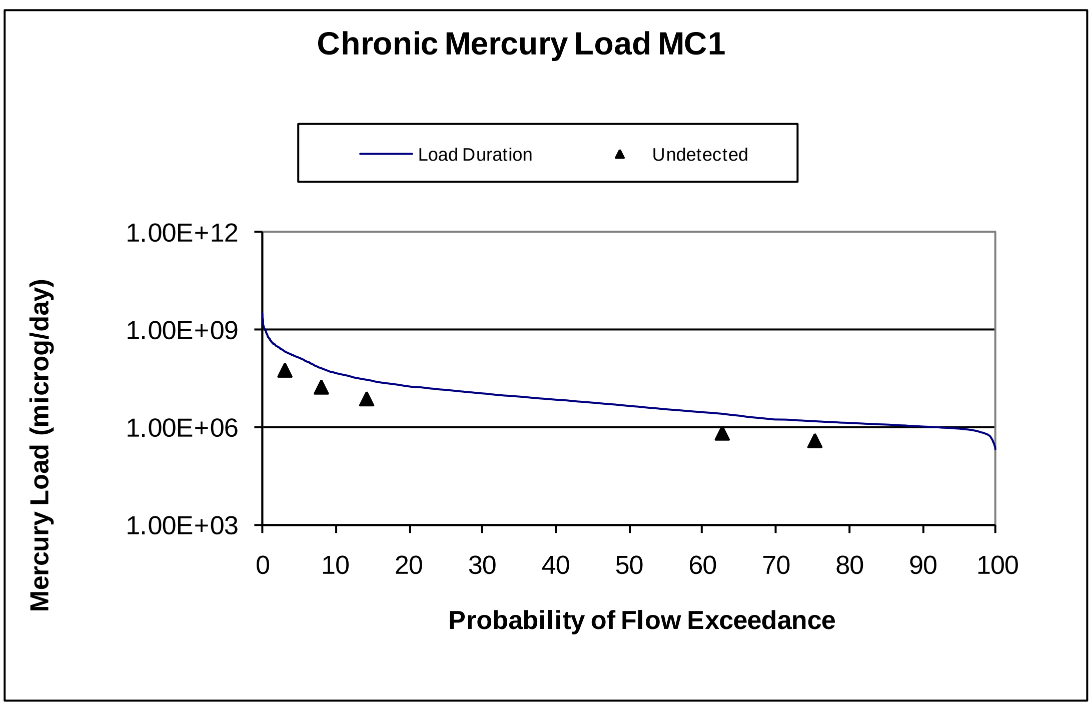

Figure I.9. Chronic Mercury Mass Load Curves for Station MC 1

APPENDIX J: METAL CONCENTRATIONS FOR SAMPLING DATES

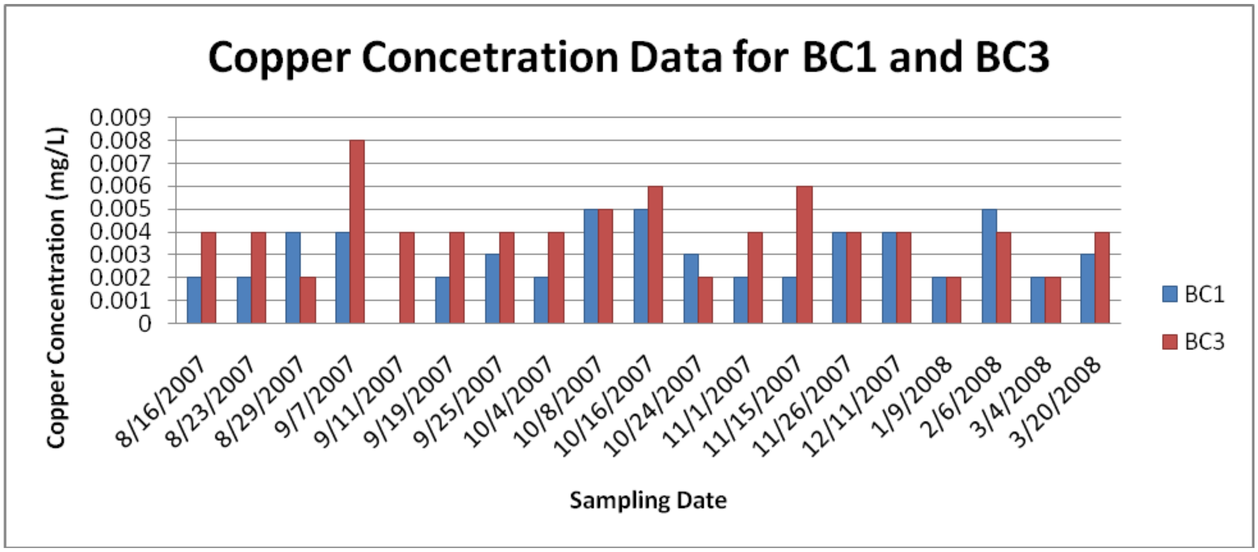

Figure J.1. Daily Copper Concentrations for Big Bayou Creek sampling sites 1 and 3.

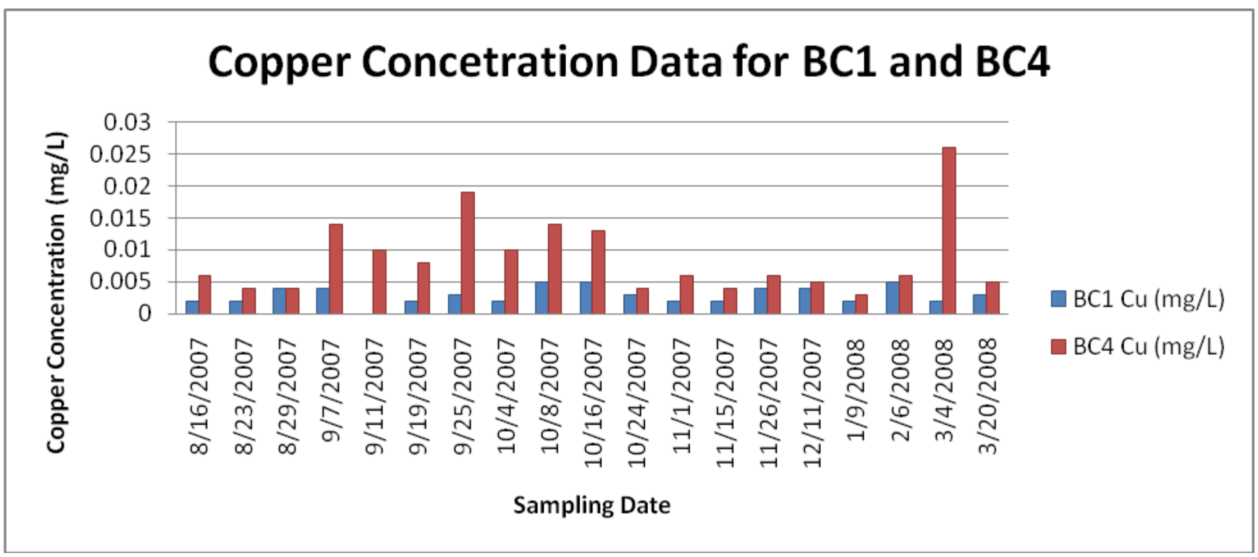

Figure J.2. Daily Copper Concentrations for Big Bayou Creek sampling sites 1 and 4.

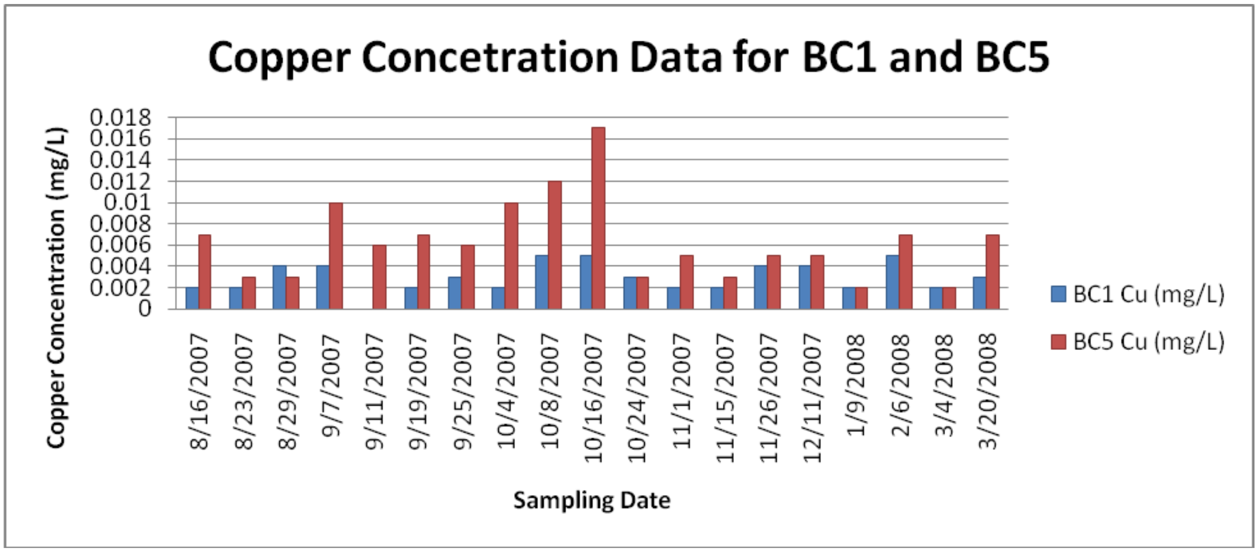

Figure J.3. Daily Copper Concentrations for Big Bayou Creek sampling sites 1 and 5.

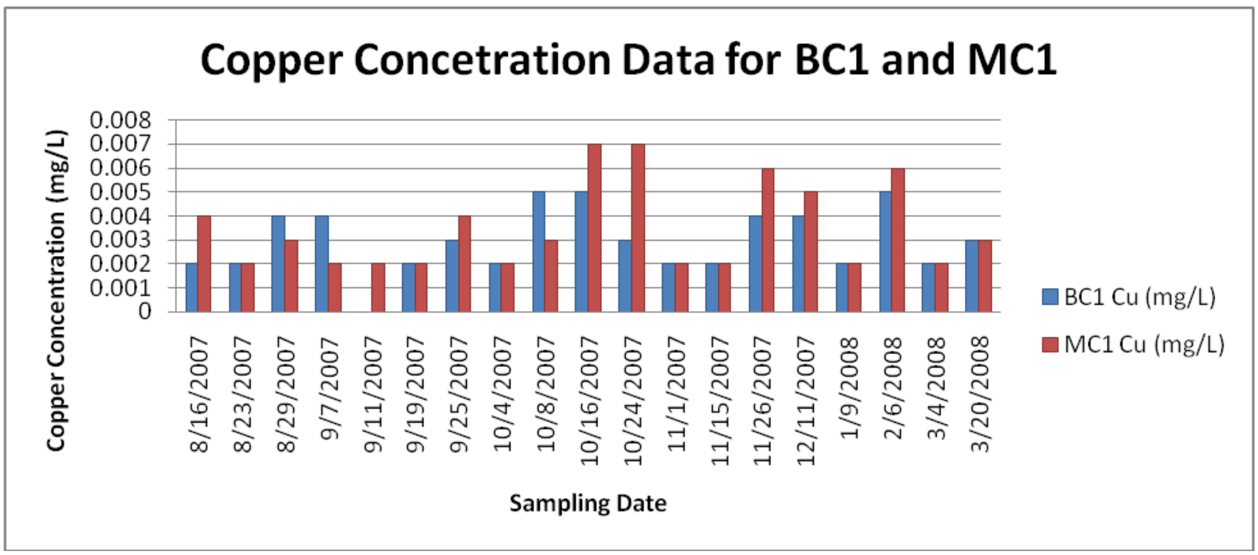

Figure J.4. Daily Copper Concentrations for Big Bayou Creek and Massac Creek sampling site 1.

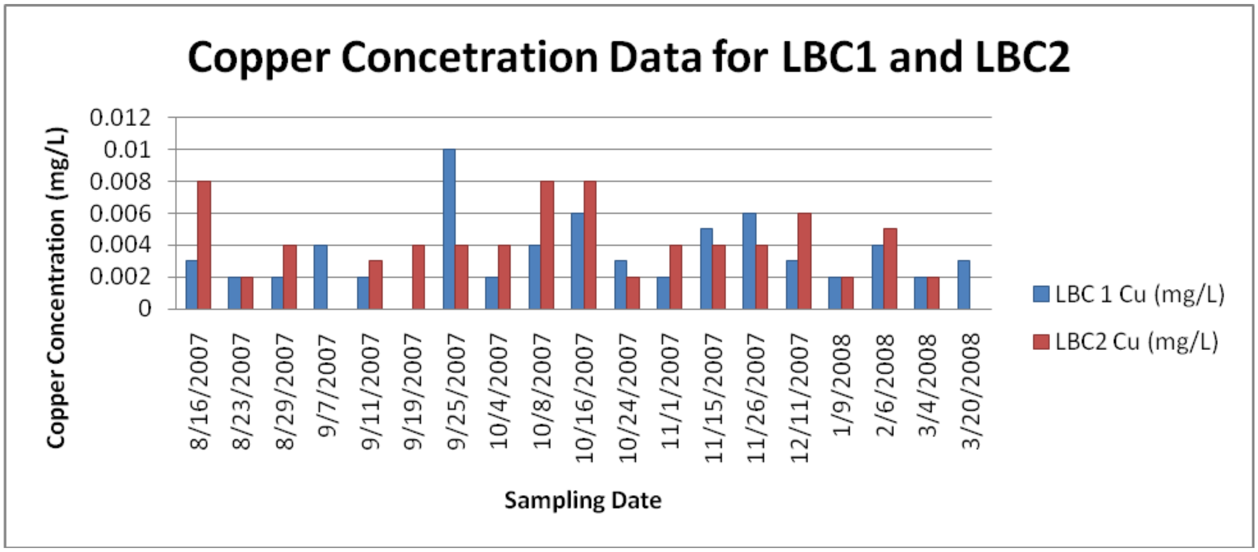

Figure J.5. Daily Copper Concentrations for Little Bayou Creek sampling sites 1 and 2.

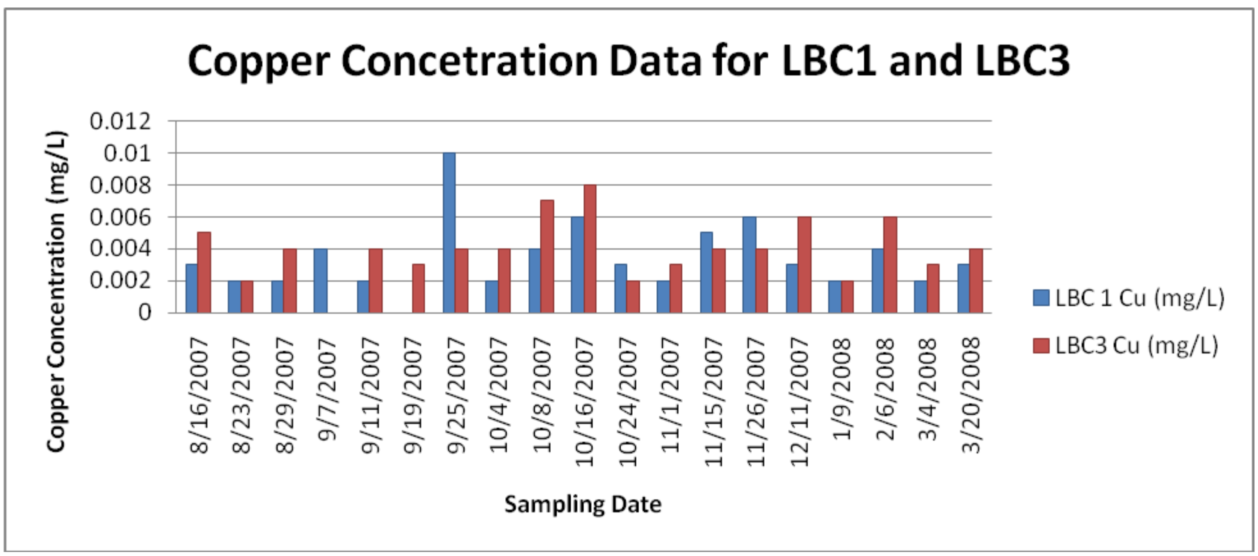

Figure J.6. Daily Copper Concentrations for Little Bayou Creek sampling sites 1 and 3.

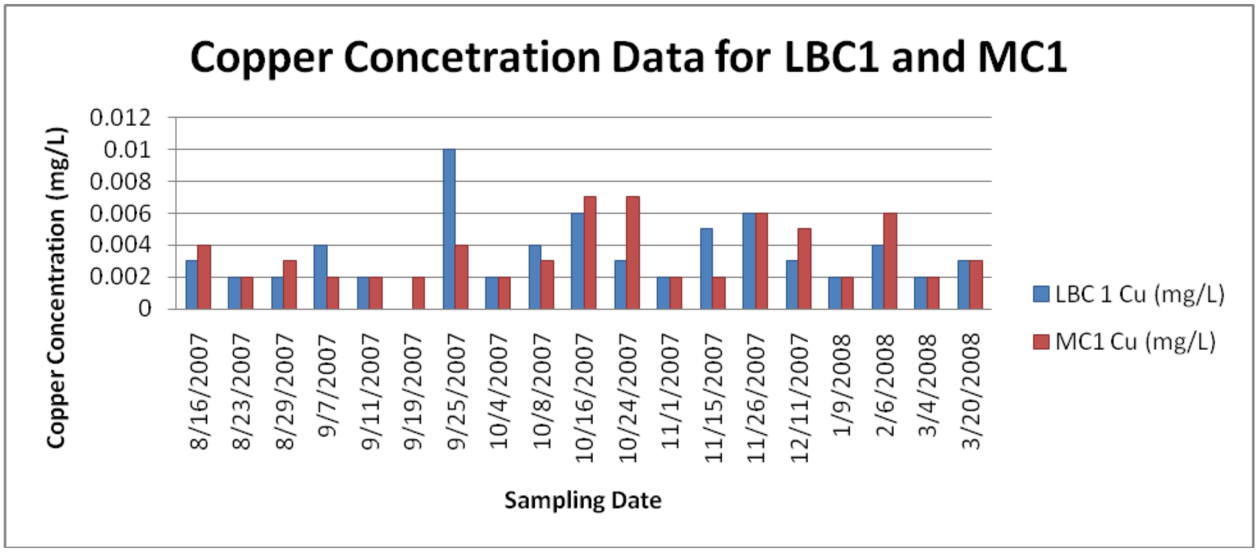

Figure J.7. Daily Copper Concentrations for Little Bayou Creek and Massac Creek sampling site 1.

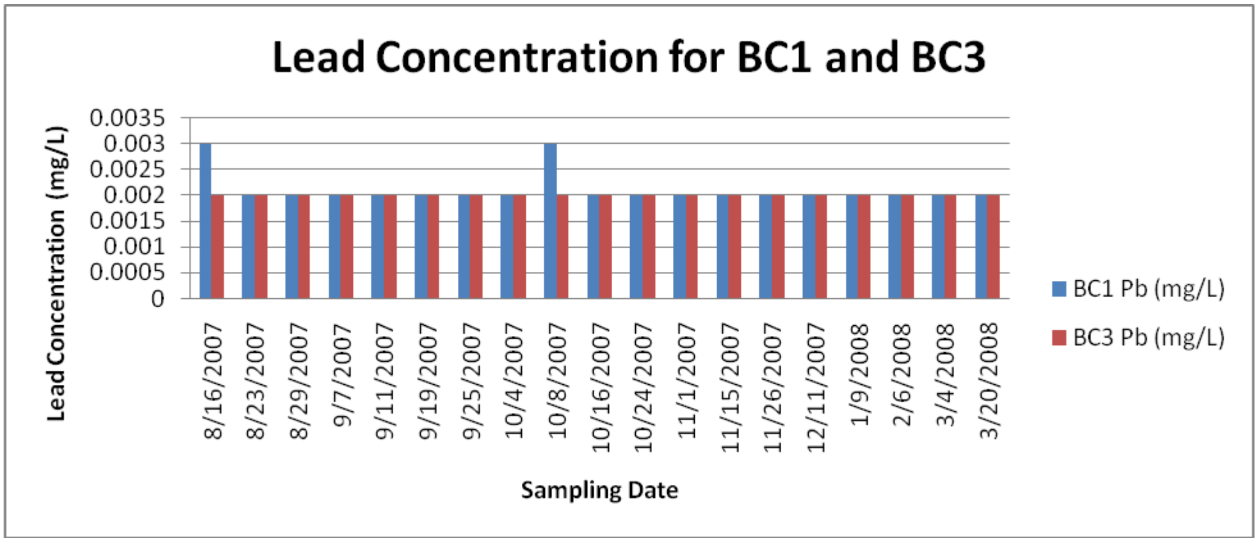

Figure J.8. Daily Lead Concentrations for Big Bayou Creek sampling sites 1 and 3.

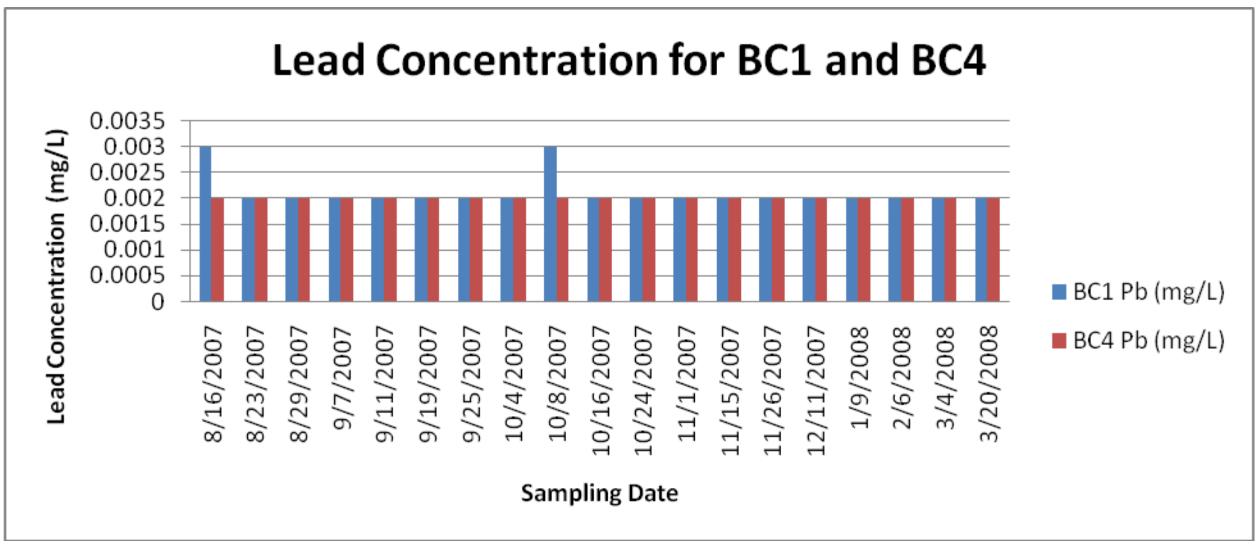

Figure J.9. Daily Lead Concentrations for Big Bayou Creek sampling sites 1 and 4.

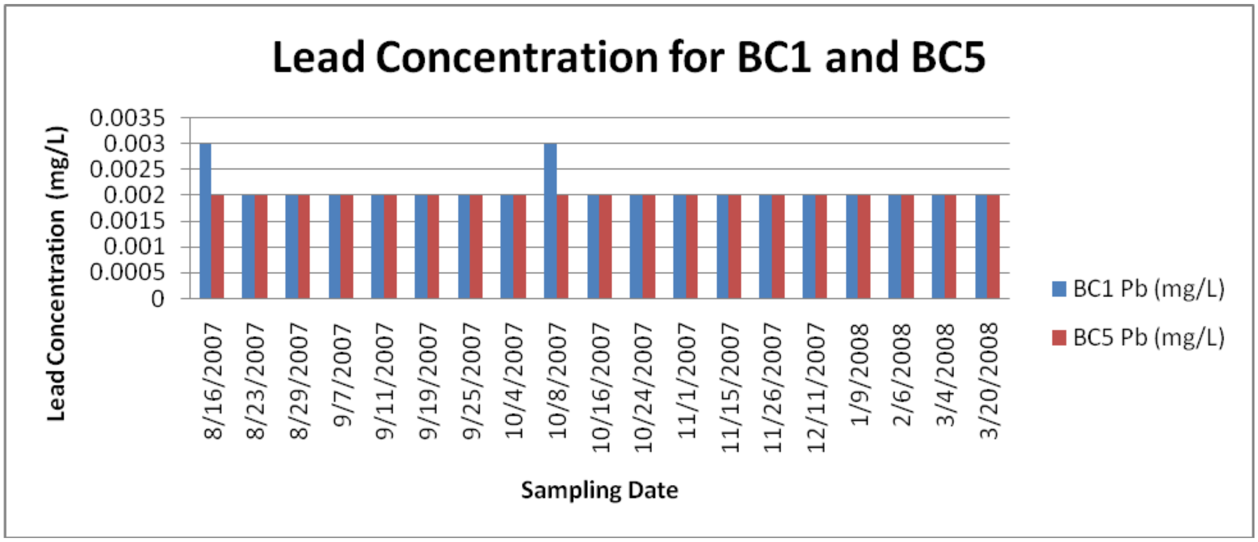

Figure J.10. Daily Lead Concentrations for Big Bayou Creek sampling sites 1 and 5.

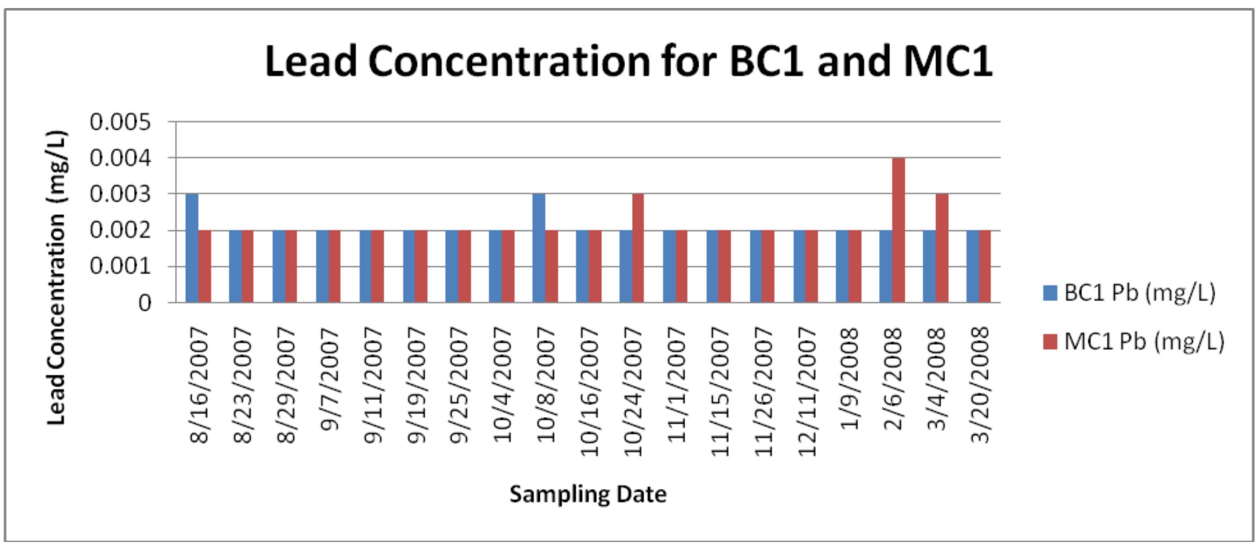

Figure J.11. Daily Lead Concentrations for Big Bayou Creek and Massac Creek sampling site 1.

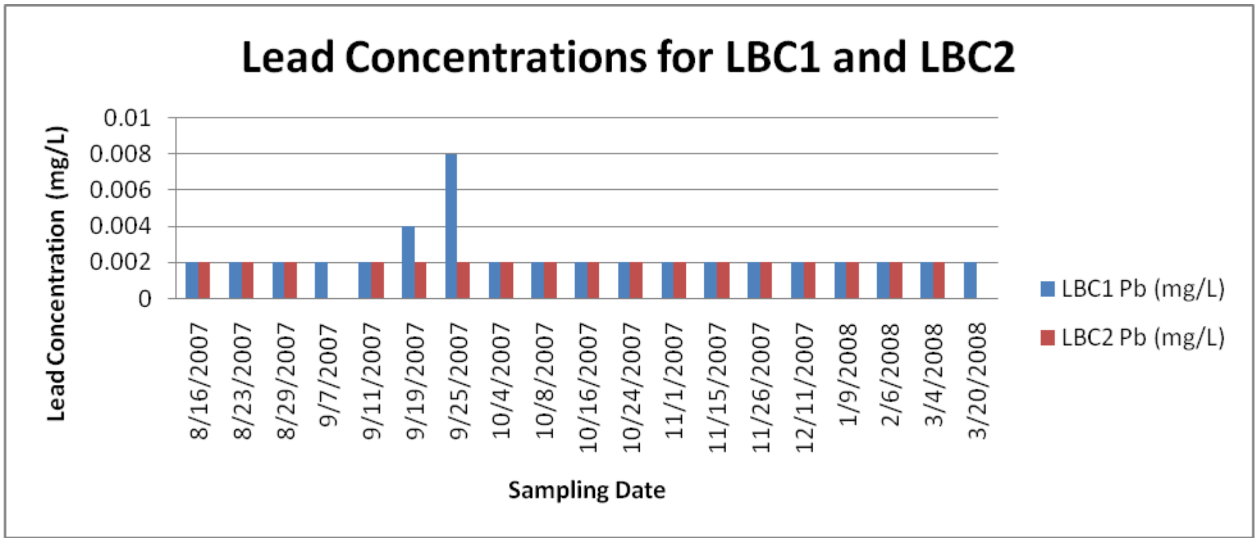

Figure J.12. Daily Lead Concentrations for Little Bayou Creek sampling sites 1 and 2.

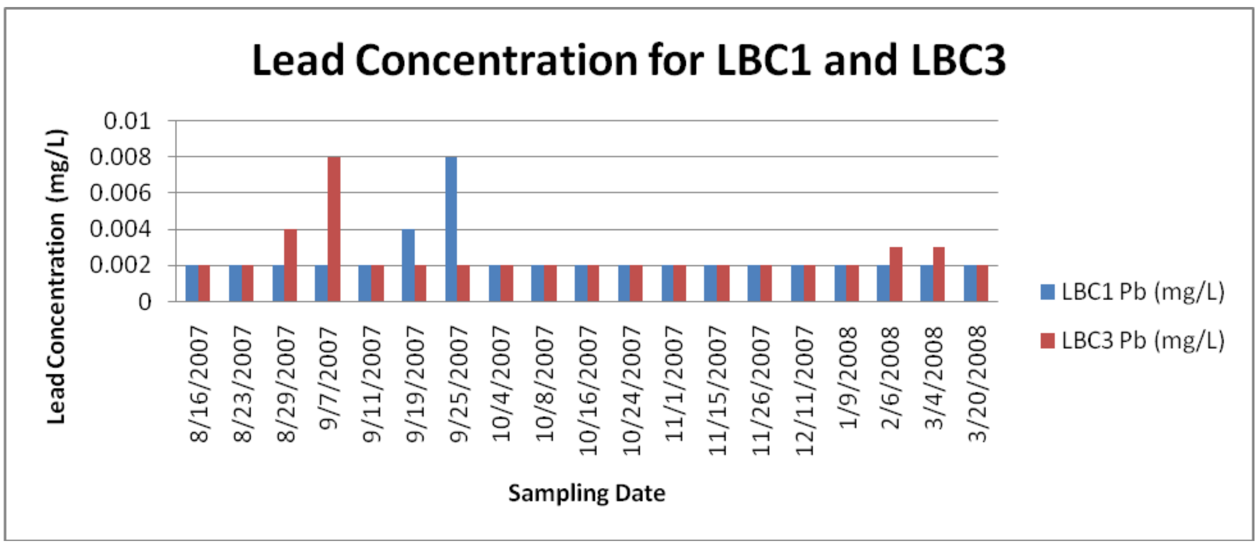

Figure J.13. Daily Lead Concentrations for Little Bayou Creek sampling sites 1 and 3.

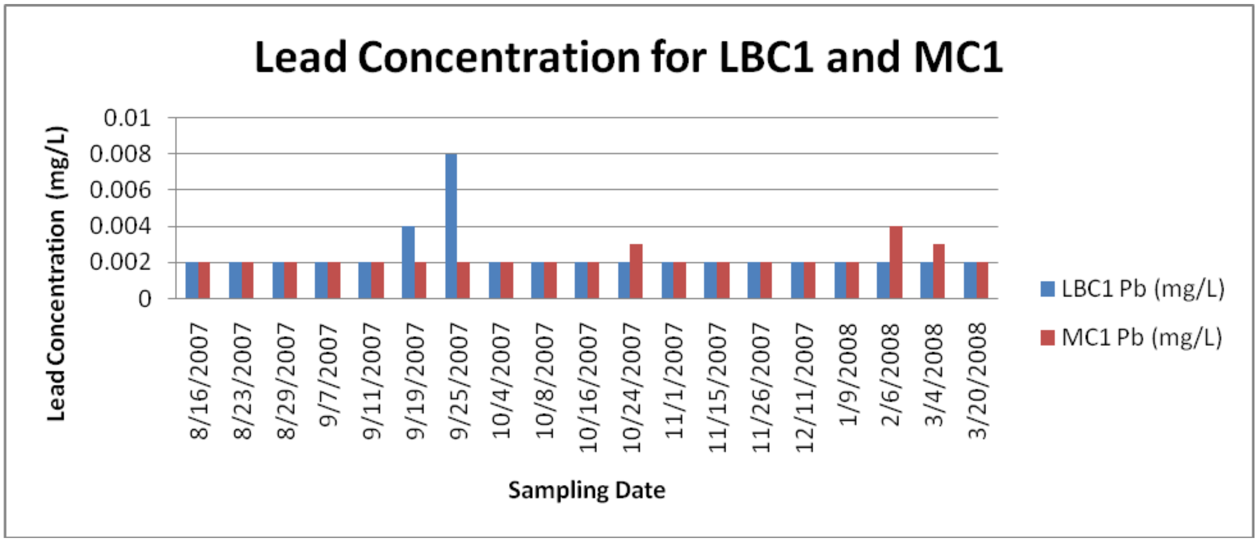

Figure J.14. Daily Lead Concentrations for Little Bayou Creek and Massac Creek sampling site 1.

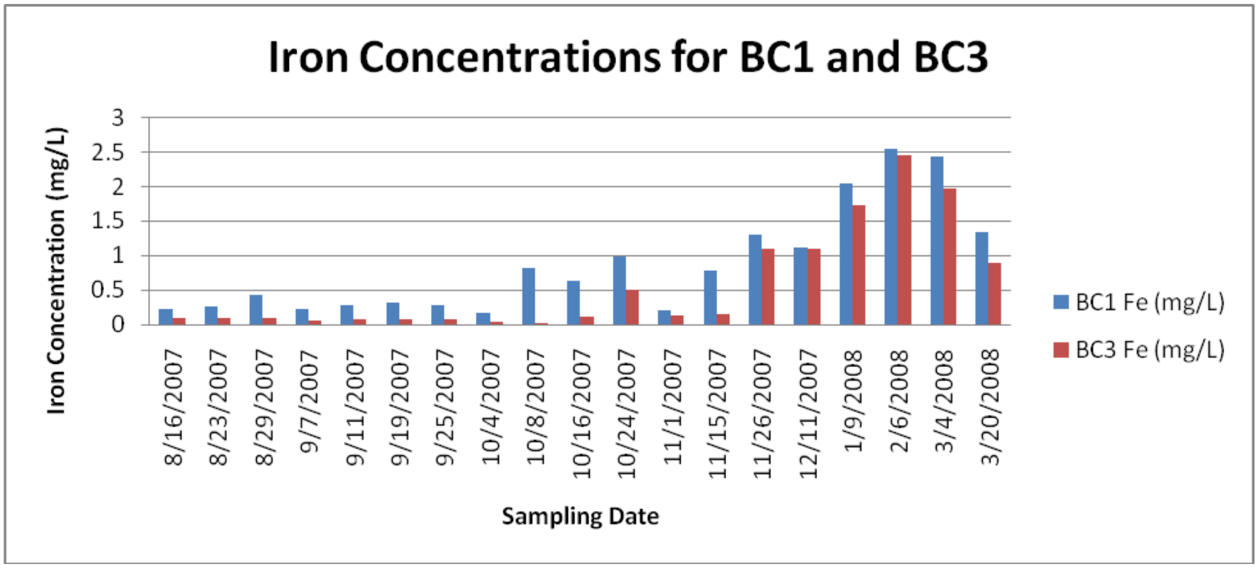

Figure J.15. Daily Iron Concentrations for Big Bayou Creek sampling sites 1 and 3.

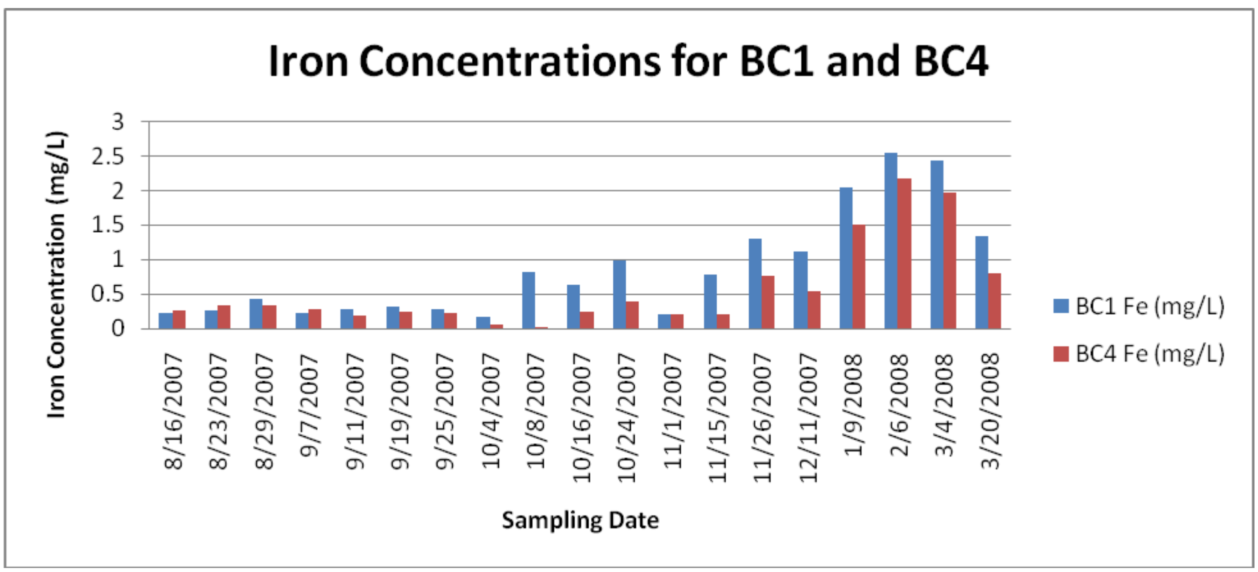

Figure J.16. Daily Iron Concentrations for Big Bayou Creek sampling sites 1 and 4.

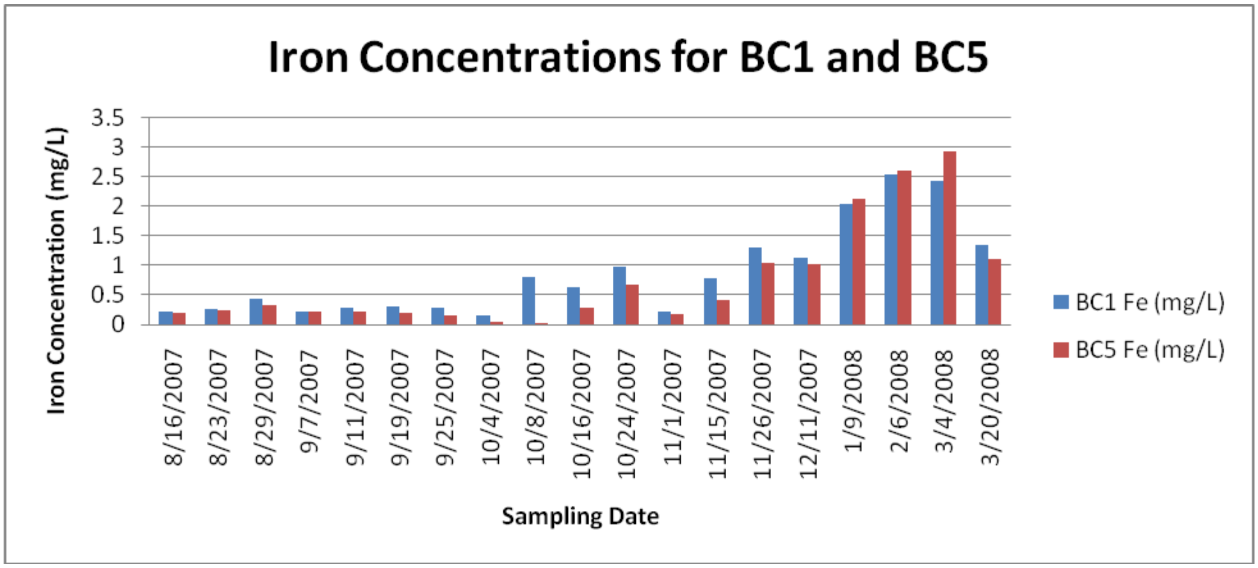

Figure J.17. Daily Iron Concentrations for Big Bayou Creek sampling sites 1 and 5.

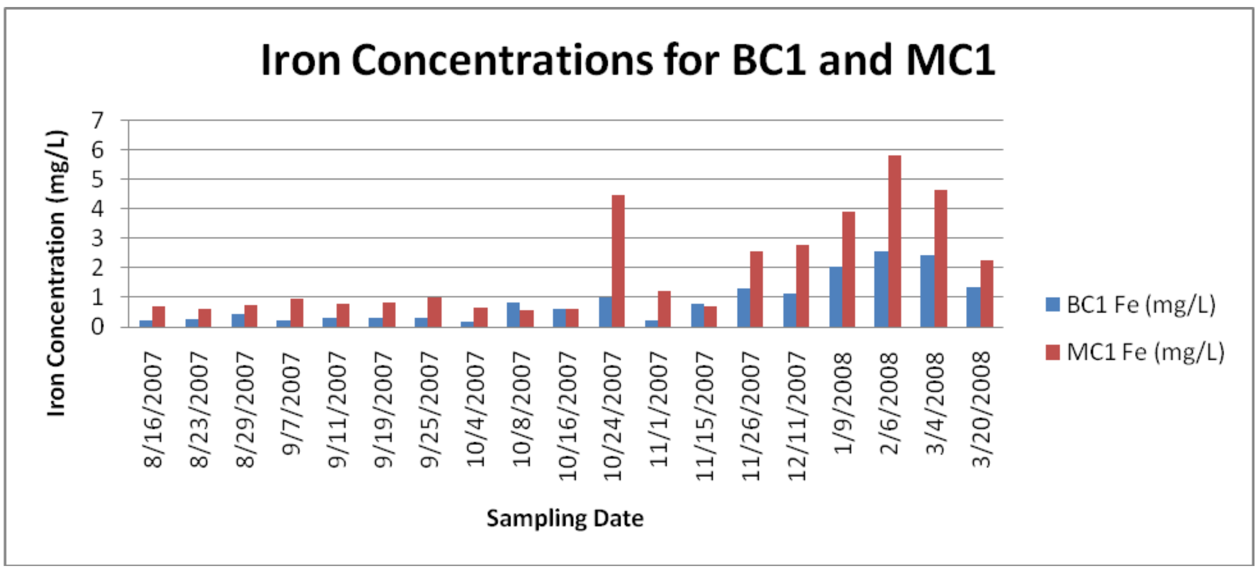

Figure J.18. Daily Iron Concentrations for Big Bayou Creek and Massac Creek sampling site 1.

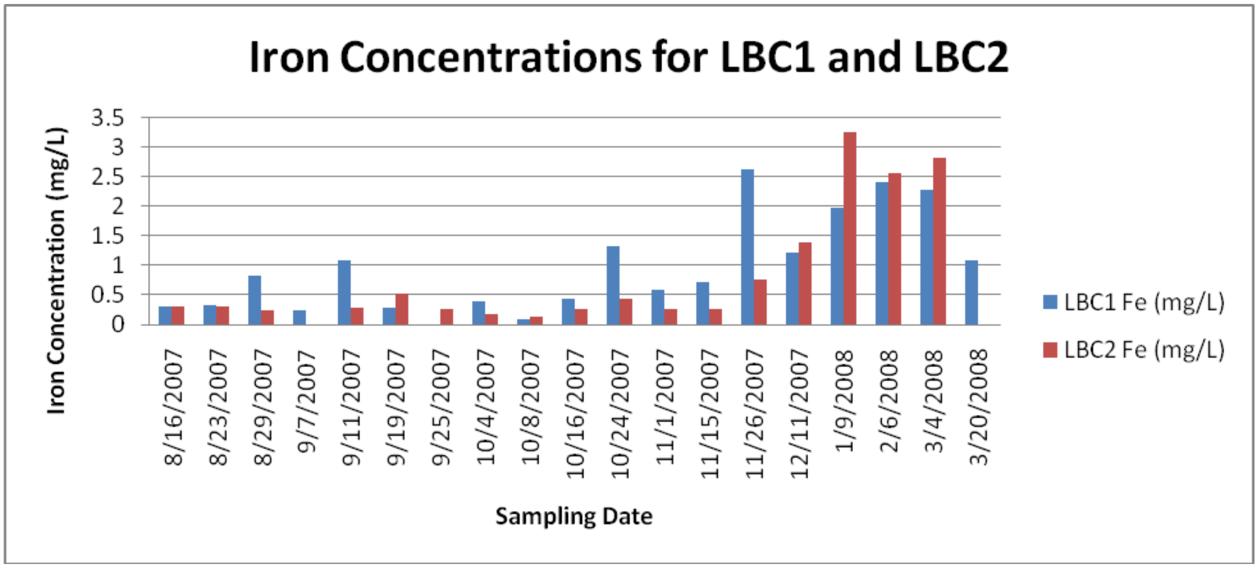

Figure J.19. Daily Iron Concentrations for Little Bayou Creek sampling sites 1 and 2.

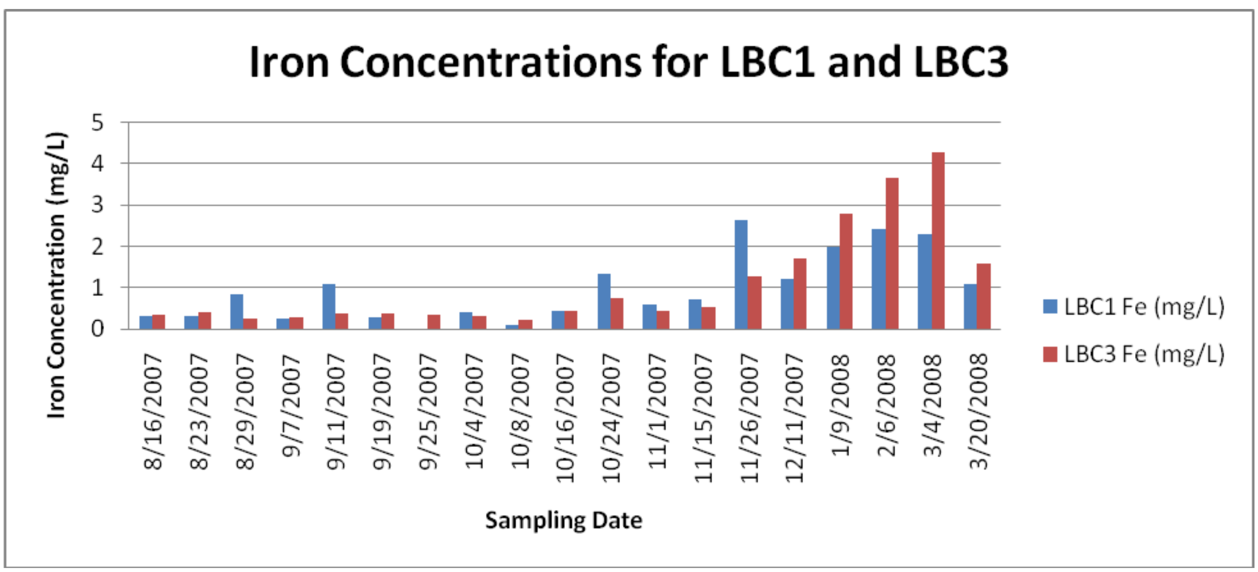

Figure J.20. Daily Iron Concentrations for Little Bayou Creek sampling sites 1 and 3.

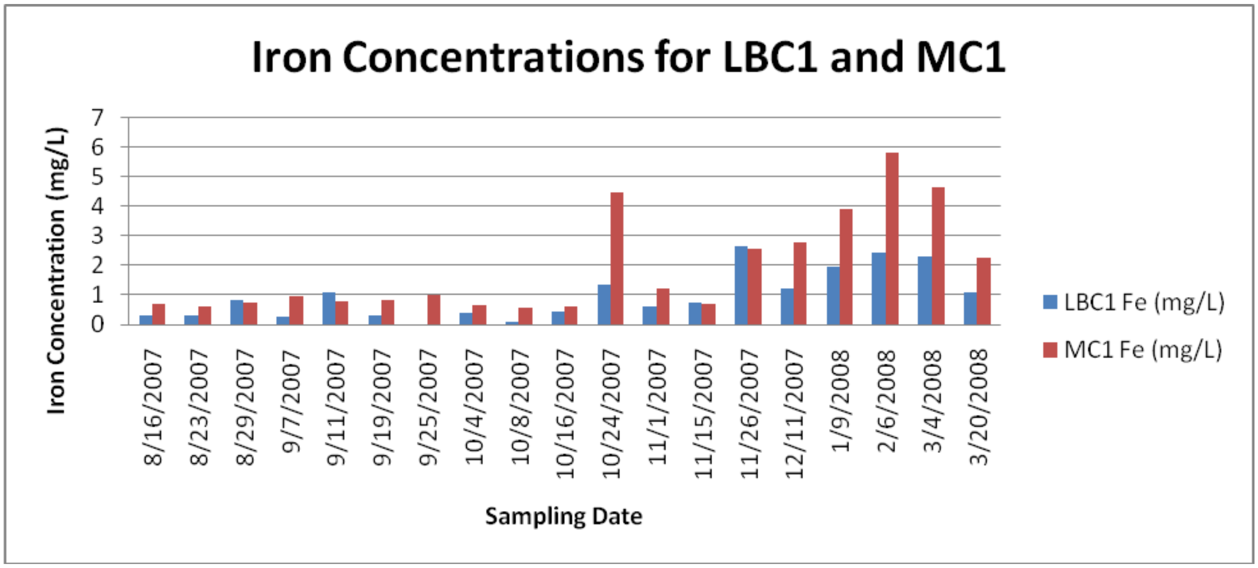

Figure J.21. Daily Iron Concentrations for Little Bayou Creek and Massac Creek sampling site 1.

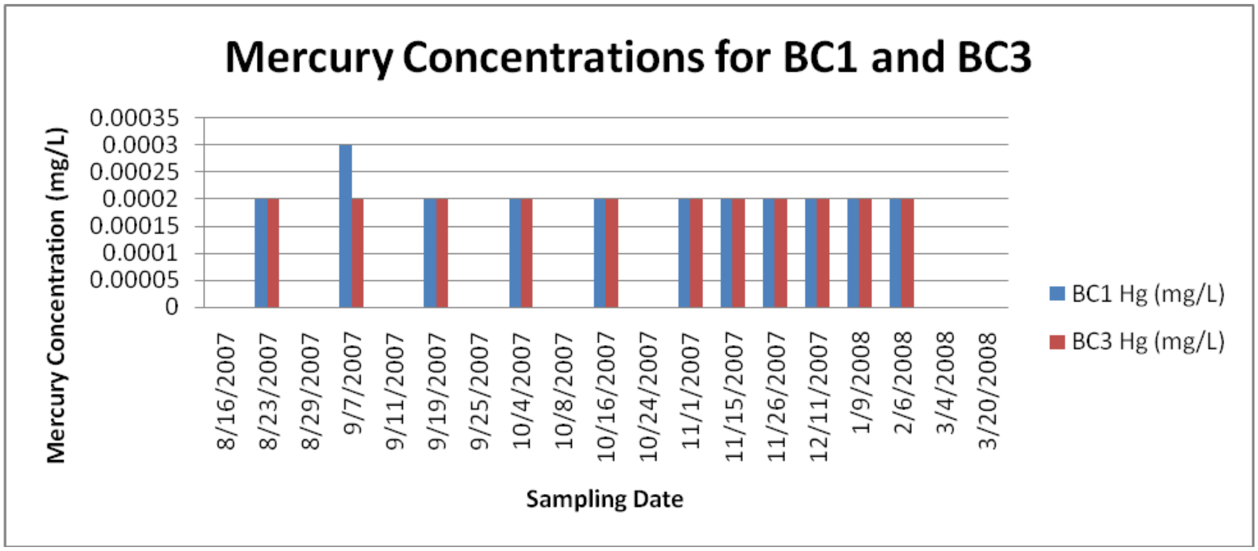

Figure J.22. Daily Mercury Concentrations for Big Bayou Creek sampling sites 1 and 3.

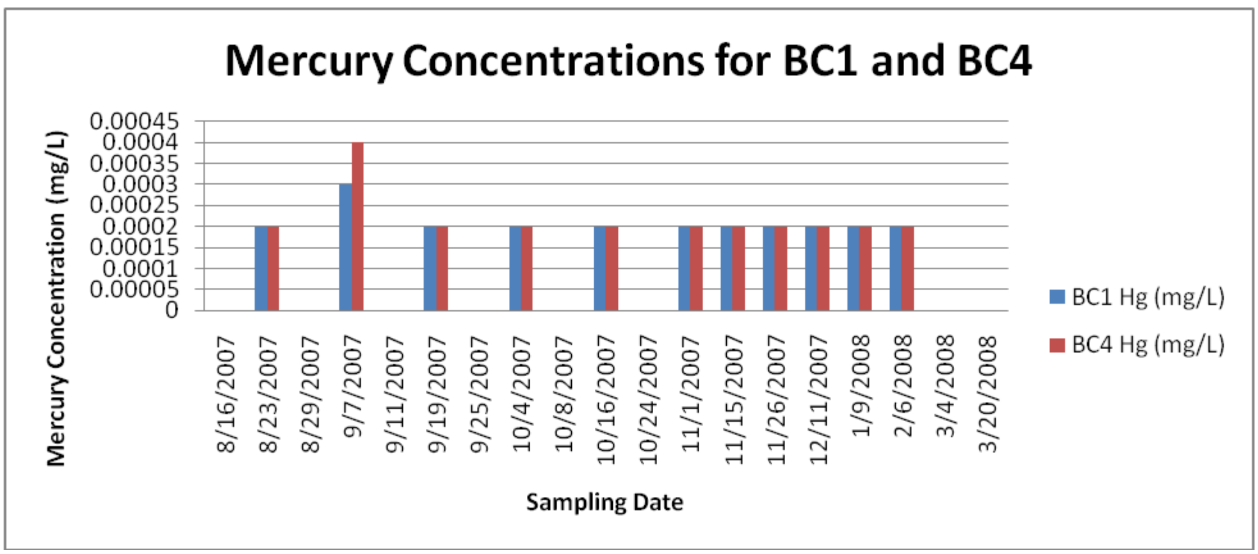

Figure J.23. Daily Mercury Concentrations for Big Bayou Creek sampling sites 1 and 4.

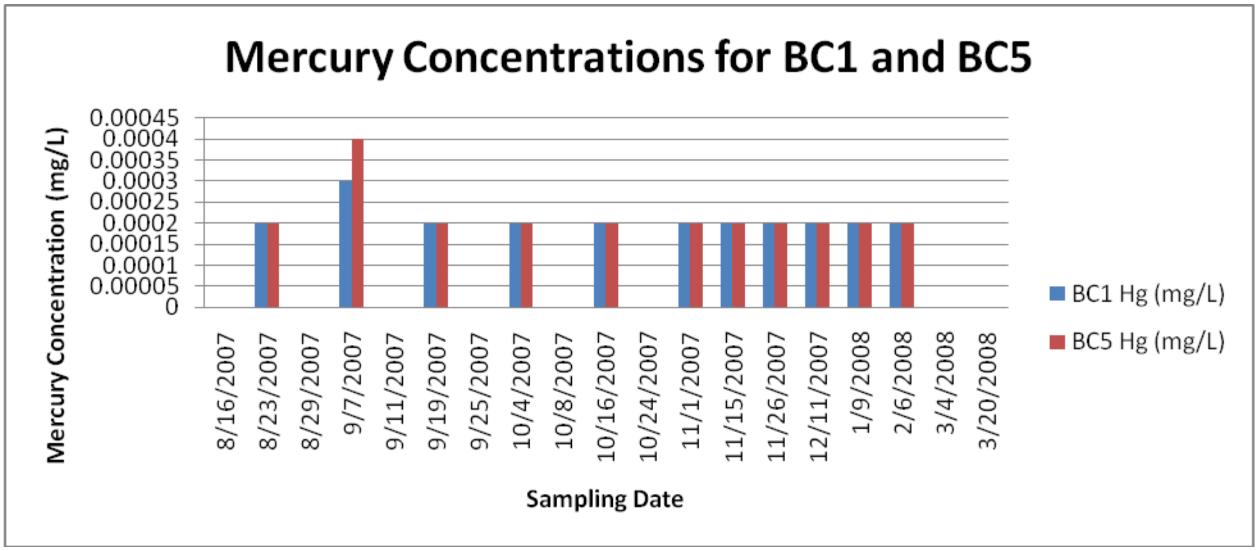

Figure J. 24. Daily Mercury Concentrations for Big Bayou Creek sampling sites 1 and 5.

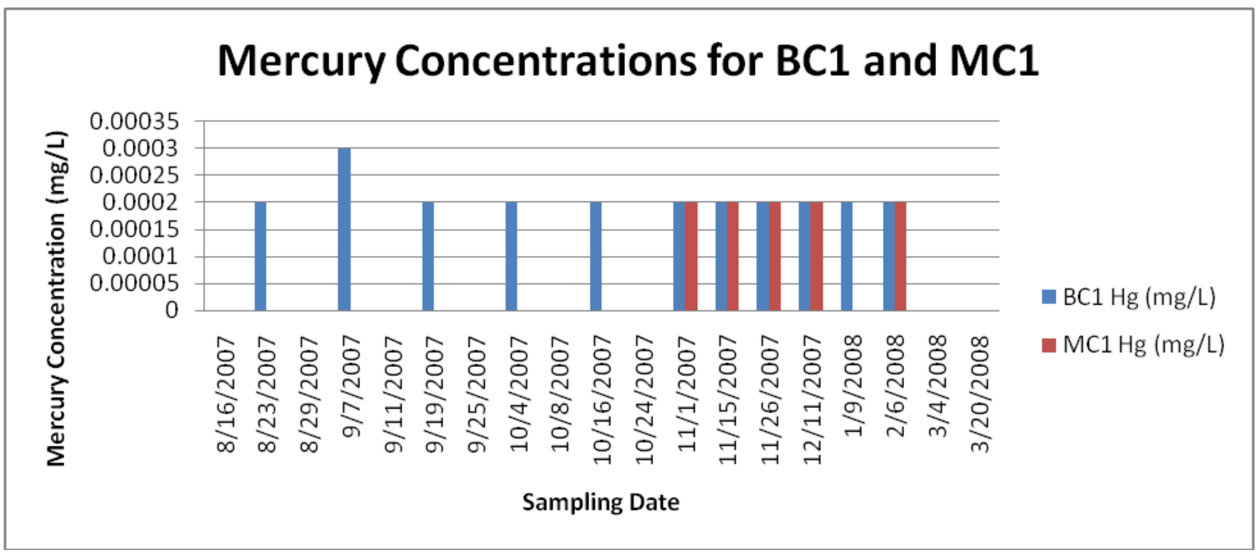

Figure J.25. Daily Mercury Concentrations for Big Bayou Creek and Massac Creek sampling site 1.

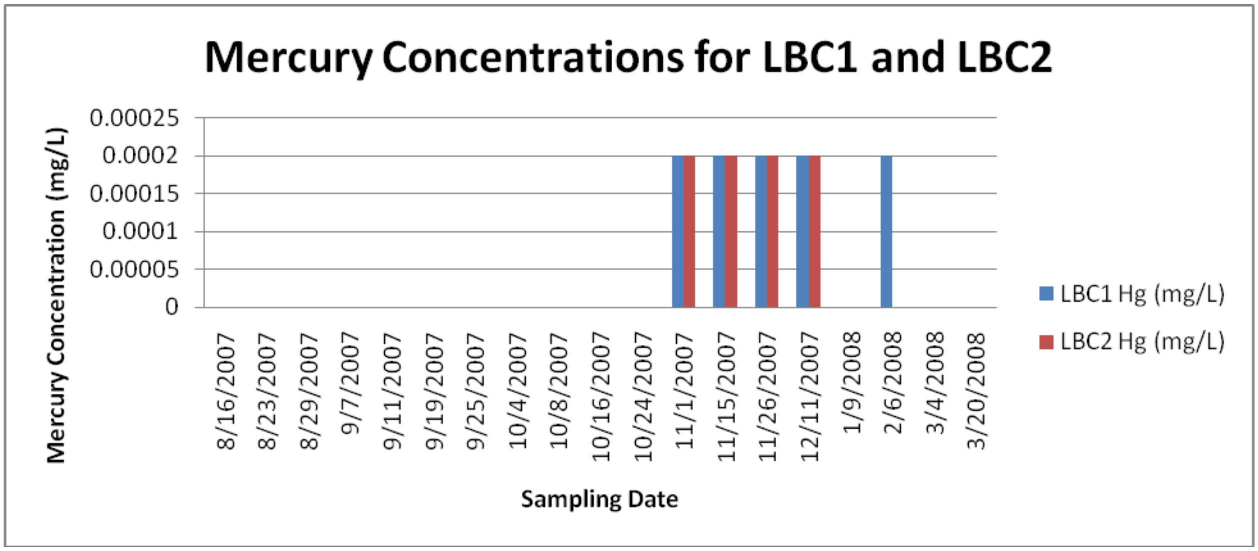

Figure J.26. Daily Mercury Concentrations for Little Bayou Creek sampling sites 1 and 2.

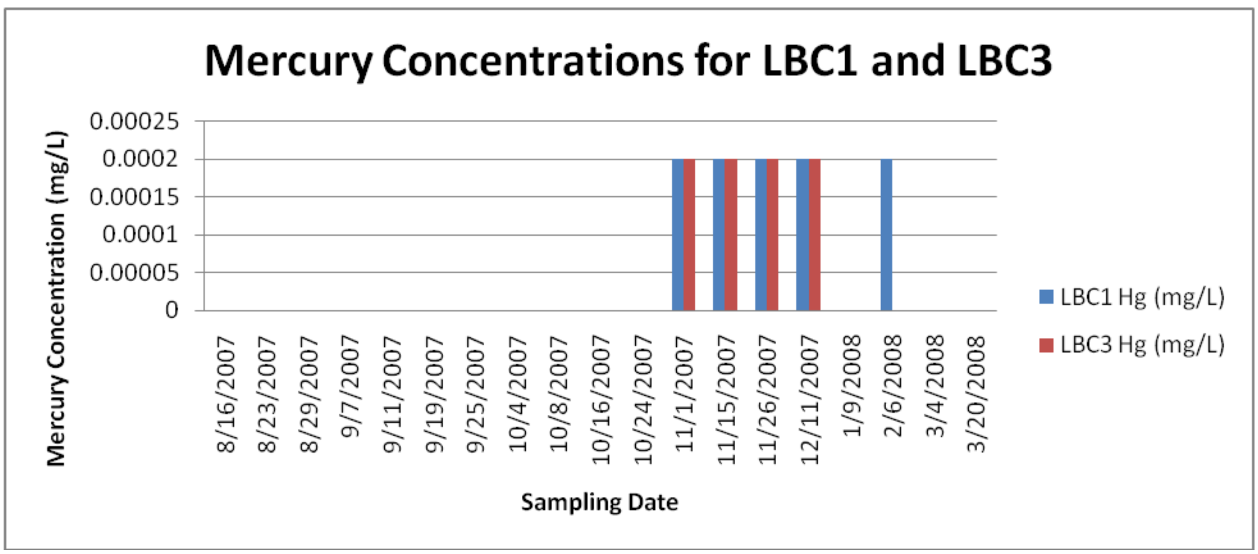

Figure J.27. Daily Mercury Concentrations for Little Bayou Creek sampling sites 1 and 3.

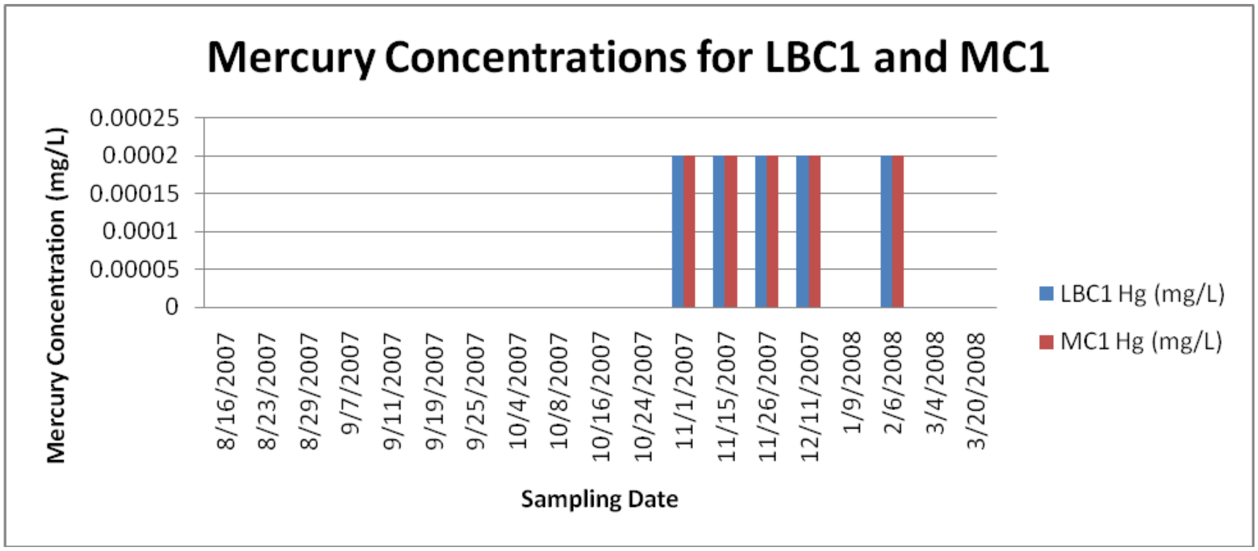

Figure J.28. Daily Mercury Concentrations for Little Bayou Creek and Massac Creek sampling site 1.