

Stormwater Quality Monitoring Report  
Extended Detention Basin at Grant Ranch  
Denver, Colorado  
2001-2011

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## **I. Introduction**

### **UDFCD and Stormwater Quality**

The Urban Drainage and Flood Control District (UDFCD) was established by the Colorado legislature in 1969 for the purpose of assisting local governments in the Denver metropolitan area with multi-jurisdictional drainage and flood control problems. UDFCD monitors a number of stormwater Best Management Practice (BMP) sites in the Denver metropolitan area and plays a large role in stormwater quality improvement by way of research and promulgation of criteria. UDFCD samples inflow and outflow and collects data on rainfall and runoff at several BMP sites.

UDFCD's primary objectives are to:

- Determine the Event Mean Concentration (EMC) of different constituents that affect stormwater runoff.
- Assess the longer term performance of each BMP with regard to stormwater quality and runoff volume reduction.

### **Extended Detention Basin Design**

At Grant Ranch, an Extended Detention Basin (EDB) is the first step in a treatment train approach used to treat stormwater from this residential development. An EDB is a sedimentation basin that was adapted from a detention basin used for flood control. EDBs are designed to intercept and slowly release stormwater runoff to improve water quality and reduce peak runoff rates. The primary difference between an EDB and a flood control detention basin is the design of the outlet: the extended detention basin uses a much smaller outlet that extends the emptying time of more frequently-occurring runoff events to facilitate pollutant removal. UDFCD recommends a 40-hour drain time for the water quality capture volume (WQCV) to remove a significant portion of suspended pollutants found in urban stormwater runoff. EDBs are sometimes referred to as "dry ponds" because they are designed to drain most of the water between storm runoff events. The Grant Ranch EDB has a 2.5-foot deep micropool at the outlet that provides some biological treatment and facilitates maintenance by reducing clogging of the outlet well screen. This micropool complies with UDFCD criteria for EDBs. The Grant Ranch EDB is shown in Photograph 1.



**Photograph 1.** Grant Ranch EDB with inflow sampler box shown in the foreground.

## **II. Site Description**

### **Location**

The Grant Ranch EDB is located within the Grant Ranch subdivision in Denver, Colorado. The basin is upstream of a constructed wetland pond that provides additional water quality treatment prior to discharge into Bowmar Lake, which is used for recreational activities including fishing and boating. The general vicinity and location of Grant Ranch and the EDB are shown in Figures 1 and 2, respectively.

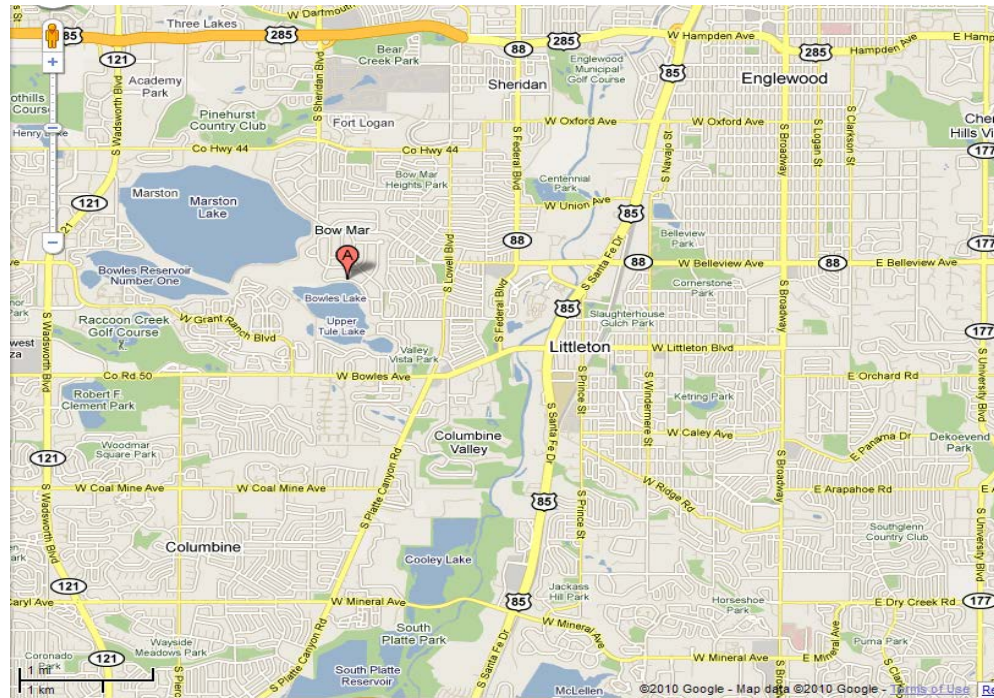


Figure 1. Vicinity Map



Figure 2. Location Map

## **Hydrology**

### **Flow Characteristics:**

The area of the watershed is 18.7 acres with total site imperviousness of 51% and NRCS Hydrologic Soil Group C. It contains single-family residential homes, paved roads and open space. The sidewalks are detached and the downspouts are taken underground. It is assumed that the downspouts go into a perforated drain pipe and are at least partially detached. The detached sidewalks and partially detached downspouts make this development MDCIA level 1 as described in Volume 3 of the USDCM.

According to Figure 3-7 in Volume 3 of the USDCM an effective impervious value of 42%, 45%, and 47% can be assumed for the 2-year, 10-year, and 100-year storm events. See Figure 3 for the basin delineation. The watershed slope from northwest to southeast is between 1.5 and 3%. The watershed is completely built out and vegetated areas have been established. Runoff from each lot generally flows into the gutter and storm sewer system. The storm sewer collects runoff from approximately 11 acres and outlets it directly into the forebay of the EDB. The remainder of the watershed runoff enters the EDB as surface flow.



**LEGEND**

- ▣ BASIN BOUNDARY - 812,393 SQUARE FEET
- ROADWAYS - 116,016 SQUARE FEET; 14.3%
- SIDEWALKS - 40,677 SQUARE FEET; 5.0%
- ROOFTOPS - 126,407 SQUARE FEET; 15.6%
- DRIVEWAYS - 49,579 SQUARE FEET; 6.1%

**Figure 3. Watershed Delineation**

**Peak Inflow:**

Based on the rational method, the peak runoff from the WQCV event is 4 cubic feet per second (cfs), 2-year peak inflow to the EDB is 11 cfs, the 10-year peak inflow is 29 cfs, and the 100-year peak is 60 cfs. Table 1 provides peak inflow calculations.



**Table 1. Peak Inflow Calculations**

Parameters		Equation 1			
$C_{WQCV}$	0.17				
$C_2$	0.29	RO-3	$t_i=0.395(1.1-C_5)L_i^{0.5}/S_i^{0.33}$	8.3	min
$C_5$	0.36	RO-4	$V_{travel} =$	3.3	ft/s
$C_{10}$	0.46		$t_t =$	9.1	min
$C_{100}$	0.59	RO-2	$T_c = T_i + t_t$	17	min
A	18.65	RO-5	$T_c = L/180 + 10$	20	min
$L_i$	80				
$S_i$	0.030	RA-3	$I = 28.5P_i / (10 + T_c)^{.786}$		
L	1800		$I_{WQCV}$	1.3	in/hr
$S_i$	0.027		$I_{2\text{-year}}$	2.0	in/hr
$C_v$	20		$I_{10\text{-year}}$	3.4	in/hr
			$I_{100\text{-year}}$	5.4	in/hr
$P_1(WQCV)$	0.60		$Q_{WQCV} =$	<b>4</b>	<b>ft<sup>3</sup>/s</b>
$P_1(2\text{-yr})$	0.95		$Q_{2\text{-year}} =$	<b>11</b>	<b>ft<sup>3</sup>/s</b>
$P_1(10\text{-yr})$	1.60		$Q_{10\text{-year}} =$	<b>29</b>	<b>ft<sup>3</sup>/s</b>
$P_1(100\text{-yr})$	2.57		$Q_{100\text{-year}} =$	<b>60</b>	<b>ft<sup>3</sup>/s</b>

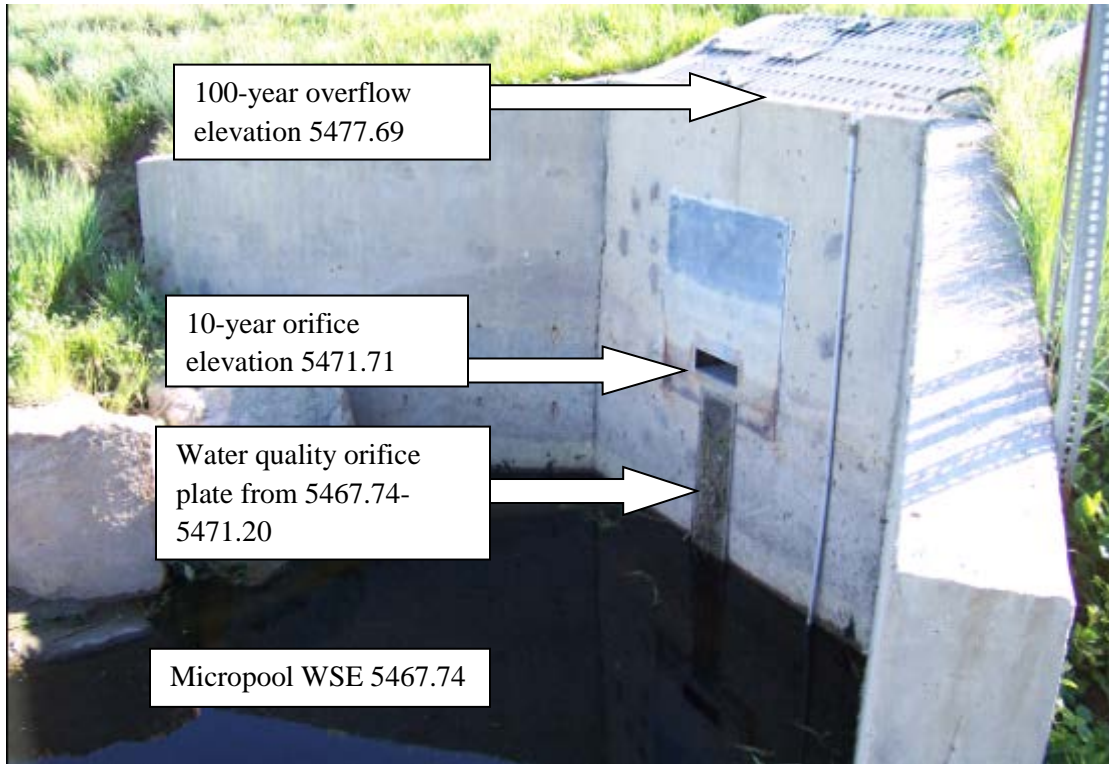
<sup>1</sup> Urban Storm Drainage Criteria Manual, Volume 1

### III. Methods and Materials

#### EDB Components and WQCV

The EDB is designed to treat the WQCV. The WQCV in the Denver area is the runoff resulting from a precipitation event of 0.6 inches, which corresponds to the 80<sup>th</sup> percentile storm event. Assuming 0.1 inches of depression storage for impermeable areas, the required maximum capture volume is roughly 0.5 inches over impervious watershed area. However, the actual WQCV varies for each watershed based on the impermeability of the watershed and drain time of the BMP. Urbonas et al. (1989) found that stormwater quality can be enhanced significantly if the WQCV is effectively stored and treated. At Grant Ranch, this volume is contained between the lowest orifice, at elevation 5467.74, and the bottom of the rectangular 10-year vertical

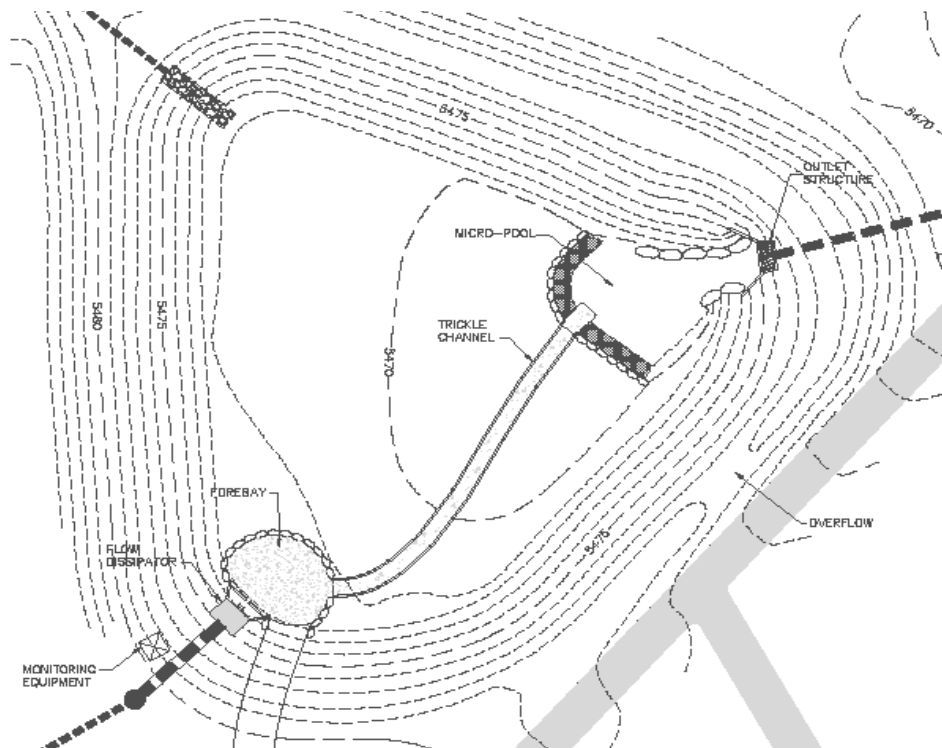
orifice, at elevation 5471.20. The 10-year water surface elevation is 5471.71 and the 100-year water surface elevation is at elevation 5477.69. This information is provided with a picture of the EDB in Photograph 2.



**Photograph 2.** Outlet Structure with Micropool

A plan view of the Grant Ranch EDB is provided in Figure 4. The primary components of an EDB designed per UDFCD criteria include a forebay, trickle channel, initial surcharge volume, micropool, and outlet structure. The forebay allows larger particles to settle out in an area that can be easily maintained at the inlet of the basin. The trickle channel conveys low flows from the forebay to the micropool. The initial surcharge volume is designed to reduce the frequency of shallow ponding and resulting sedimentation in the turf area by providing volume above the micropool. The micropool is a permanent pool of water directly in front of the outlet orifice plate in the outlet structure of the EDB. Its purpose is to provide additional settling of pollutants, provide some biological uptake, and facilitate maintenance of the well screen. Micropools can also minimize mosquito production when properly designed (M. Deatrich and Brown, 2004). The well screen (trash rack) in front of the orifice plate extends to the bottom of the micropool to allow flow through the well screen below the elevation of the lowest orifice as the portion of the well screen above the micropool is more likely to clog. Extending the well screen to the bottom

of the micropool allows the orifice plate to control outflow even if the well screen is clogged above the permanent pool elevation.



**Figure 4. Plan View of the Grant Ranch EDB**

The basin is made up of the following components:

- An inlet structure with energy dissipation.
- A forebay for larger debris and coarse sediment.
- A trickle channel for small flows, shown in Photograph 3.
- A micropool, which reduces clogging of the well screen and provides some biological treatment.



**Photograph 3.** Energy dissipater, forebay, and trickle channel

Flow through the outlet structure is controlled by the following:

- An orifice plate for slow release of the WQCV,
- A rectangular vertical orifice to controlled release of the 10-year volume,
- A sloping overflow weir for release of volume in excess of the 10-year event, and
- A 12-inch diameter outlet pipe with restrictor plate for release of the 100-year volume.

### **Data Collection**

UDFCD has been collecting data on water quality and flow from the Grant Ranch EDB since 2001. Automatic samplers (ISCO Models 6700 and 6712) are used to record inflow and outflow data throughout the runoff event. Rainfall is measured to 0.01 inches by an ISCO 674 tipping bucket rain gauge. Rainfall events are only monitored if they are separated by six or more hours of no precipitation, and samples are taken when flow is detected and the rain gauge indicates at least 0.8 inches of rainfall in two hours. A Palmer Bowlus flume is used to measure flow into the pond. A bubbler is used to measure head on the outlet orifice. Outlet flow is calculated based on the recorded head. All samples are tested for the following:

**Table 2. Constituents tested for**

Category	Constituent	Units of Measurement	Detection Limit <sup>1</sup>
Bacteria:	E. Coli	#/100 mL	
Chemical:	Alkalinity	mg/L	20
	Chloride	mg/L	1
	Chemical Oxygen Demand	mg/L	20
	Conductivity		0.1
	Hardness	mg/L	10
	pH		0.1
	Total Organic Carbon	mg/L	1
	Metals:	Dissolved Calcium	mg/L
Dissolved Iron		mg/L	0.05
Dissolved Magnesium		mg/L	0.1
Dissolved Sodium		µg/L	1
Dissolved Chromium		µg/L	1
Dissolved Manganese		µg/L	1
Dissolved Nickel		µg/L	1
Dissolved Copper		µg/L	2
Dissolved Zinc		µg/L	5
Dissolved Selenium		µg/L	1
Dissolved Silver		µg/L	0.2
Dissolved Cadmium		µg/L	0.1
Dissolved Lead		µg/L	1
Total Beryllium		µg/L	1
Total Chromium		µg/L	5
Total Manganese		µg/L	2.5
Total Nickel		µg/L	2.5
Total Copper		µg/L	2.5
Total Zinc		µg/L	20
Total Arsenic		µg/L	5
Total Selenium		µg/L	2.5
Total Molybdenum		µg/L	5
Total Silver		µg/L	1
Total Cadmium		µg/L	0.5
Total Antimony		µg/L	2.5
Total Lead		µg/L	5
Nutrients:		Dissolved Phosphorus	mg/L
	Dissolved Potassium	mg/L	1
	Nitrite+Nitrate	mg/L	0.02
	Total Kjeldahl Nitrogen	mg/L	0.3
	Ortho-Phosphorus	mg/L	0.005
	Total Phosphorus	mg/L	0.03
Physical	Total Suspended Solids	mg/L	1

1. Detection limits based off of 2010 and 2011 data and may fluctuate from year to year.

## **Inflow Monitoring and Sampling**

The inlet monitoring station consists of an ISCO 6700 automated sampler which is connected to an ISCO 674 tipping bucket rain gauge, and an ISCO 730 bubbler module. Inflow is introduced to the EDB through a 24" diameter pipe which contains a Palmer Bowlus type flume (see Photograph 4). The water level upstream of the flume control section is measured using the bubbler module and this data is received by the sampler. When the level is above the crest of the Palmer Bowlus, the sampler starts recording data and converts head to flow using a series of programmed equations. The sampler takes a sample when the rain gauge detects over 0.8 inches of rainfall in two hours and 200 cubic feet of flow. The sampler continues to collect samples every 200 cubic feet and stops after the depth and flow criteria are no longer met.

The sampler tubing is connected to the automated sampler which collects up to 19 samples (500mL each) in one 20 liter bottle. Samples are pulled from a pooling cavity located in a manhole upstream from the Palmer Bowlus.



**Photograph 4.** Palmer Bowlus in 24" inflow pipe.

## **Outflow Monitoring and Sampling**

The outlet monitoring station, shown in Photograph 4, consists of an ISCO 6712 automated sampler which is connected to an ISCO 730 bubbler module. Outflow leaves the EDB through an orifice plate which consists of a series of 10 0.69-inch diameter orifices placed 4 inches on center vertically. A well screen that extends 2.5 feet below the surface of the micropool protects the orifice pool from clogging. The orifice plate is designed to drain the WQCV in approximately 40 hours. The water level in front of the orifice plate is measured using the bubbler module and this data is received by the sampler. The sampler collects data on the water level when it surpasses the lowest orifice, and converts this data to flow through a series of programmed data points. When the bubbler module detects a rise in water level greater than 0.166 ft, the sampler collects a sample after 200 cubic feet of flow has passed. The sampler continues to collect samples with 200 cubic feet of flow occurring between samples, and stops after the level drops below the original sample enabling value.

The sampler tubing is connected to the automated sampler which collects up to 19 samples (500 mL each) into one 20 liter bottle. The tubing runs from the sampler down the face of the outlet structure and draws samples from a location downstream of the orifice plate.

## **IV. Results and Discussion**

### **Flow Analysis**

Flow data from 2001-2011 was analyzed, but not included in this report. In review of inflow and outflow data, measured inflow and outflow were inconsistent with approximately half of the data sets showing higher volumes out compared to what was measured coming into the basin.

UDFCD considered the following as potentially contributing to error in volume measurements:

- Debris/algae/duckweed at the outlet screen causing clogging and increased head on the bubbler,
- Debris behind the Palmer Bowlus which can affect the accuracy of the inflow bubbler,
- Runoff from the portion of the watershed (37 percent) that does not enter the EDB through the inflow pipe where inflow is measured.

All of these issues may be contributing to errors in volume measurements. Additionally, it was found after the end of the 2012 season that the bubbler used at the outlet was faulty, taking up to 5 minutes to register the correct head.

## **Impact on Water Quality**

Analysis of the data revealed that there were statistically significant reductions in nutrients and total and dissolved metals and that these reductions are consistent over multiple years of the study. Constituents with statistically significant reductions include Nitrite and Nitrate, Total Kjeldahl Nitrogen, and Phosphorus as well as Copper, Nickel, and Zinc (total and dissolved). Total Suspended solids also showed statistically significant reduction for the 2010 data set and for the all years combined data set. Table 3 shows constituents showing statistically significant differences between inlet and outlet for each year as well as combined year data sets. Box-and-whisker plots comparing inflows and outflows for each constituent are provided within this report.

To conduct the analysis, paired t-tests were performed that compared inflow and outflow data for each constituent. In most cases, the data did not seem to fit a normal distribution, which is not unusual for small sample sizes, so a non-parametric Wilcoxon signed-rank test was performed in addition to parametric paired t-tests and two sample t-tests. Some of the constituents (Dissolved Iron, Dissolved Nickel, Dissolved Selenium, Total Selenium, Total Cadmium, Total Manganese, and Ortho-Phosphorous) were not analyzed because they were all non-detects or had values of 0. The p-values generated for each of the constituents ( $\alpha=0.05$ ) is shown in Table 3. The values that were significant, below the alpha level of 0.05, are highlighted in bold for each year on Tables A1-A10 and combined data on Table A-11. Tables 4-14 show water quality data for each constituent each year. Tables 15-47 summarize the median values for each constituent by storm.



**Table 3. Constituents Showing Statistically Significant Differences between Inlet and Outlet**

Constituent	Data set with Higher Concentration at the Inlet	Data Set with Higher Concentration at the Outlet	CY Inlet Site Median	CY Outlet Site Median	Units
Alkalinity		2002, 2005, CY	39.5	58	mg/L
Chemical Oxygen Demand	2002, CY		96	71	mg/L
Chloride		2001, 2002, 2003, 2005, 2007, 2010, 2011, CY	6	14	mg/L
Conductivity		2002, 2005, 2008, CY	139	245	umho/cm
E-Coli		CY	240	300	#/100 mL
Hardness		2008, 2011, CY	66	85	mg/L
Total Organic Carbon	CY		16	17	mg/L
pH		2001	7	7.2	
Dissolved Calcium		2010, 2011, CY	12	24	mg/L
Dissolved Iron			0.07	0.07	mg/L
Dissolved Magnesium		2010, 2011, CY	1.6	3.7	mg/L
Dissolved Sodium		2010, 2011, CY	7	21	mg/L
Dissolved Chromium	2007, CY		0	0	µg/L
Dissolved Manganese		2011, CY	9.65	20.75	µg/L
Dissolved Nickel			1.85	1.5	µg/L
Dissolved Copper	2007, 2008, 2010, CY		7	4	µg/L
Dissolved Zinc	2010, CY		14	9.8	µg/L
Dissolved Selenium			ND	ND	µg/L
Total Chromium	CY		0	0	µg/L
Total Nickel	2007, 2010, 2011, CY		2.3	1.3	µg/L
Total Zinc	2003, 2007, 2010, CY		47.65	20	µg/L
Total Selenium			ND	ND	µg/L
Total Cadmium			0	0	µg/L
Total Lead	CY		0	0	µg/L
Total Manganese			43.6	57.2	mg/L
Total Copper	2001, 2007, 2009, 2010, 2011, CY		11.35	6	mg/L
Dissolved Potassium		2010, CY	3	4	mg/L
Nitrite+Nitrate	2009, 2010, CY		0.85	0.598	mg/L
Ortho-Phosphorus			ND	ND	mg/L
Total Kjeldahl Nitrogen <sup>1</sup>	2006, 2007, 2009, CY		3.1	2.3	mg/L
Total Phosphorus	2006, 2007, 2010, CY		0.365	0.32	mg/L
Total Suspended Solids	2010, CY		75	22	mg/L

CY = Combined Years Data, ND = Below Detection Limits

<sup>1</sup> 2009 data consists of Total Nitrogen Values.

Note: Insufficient data collected in 2004 for T-tests.

**Table 4. Comparison of Water Quality Constituents for Grant Ranch and International BMP Database**

	Grant Ranch				International BMP Database			
	Number of Inlet Samples	Inlet Median Value	Number of Outlet Samples	Outlet Median Value	Number of Inlet Sites in Study	Inlet Median Value	Number of Outlet Sites in Study	Outlet Median Value
Total Phosphorus (mg/L)	10	0.738	10	0.602	17	0.2	18	0.2
Dissolved Phosphorus (mg/L)	10	0.365	10	0.265	**	**	**	**
Total Ortho-Phosphorus (mg/L)	9	0.403	9	0.294	NC	NC	NC	NC
Dissolved Ortho-Phosphorus (mg/L)	9	0.344	9	0.211	**	**	**	**
Total Nitrogen (mg/L)	10	3.882	10	2.233	3	1.05	3	2.54
Nitrite+Nitrate (mg/L)	10	0.991	10	0.568	5	0.23	6	0.17
Dissolved Cadmium (mg/L)	10	ND	10	ND	8	0.3	9	0.3
Total Cadmium (mg/L)	10	ND	10	ND	11	0.6	12	0.4
Dissolved Copper (mg/L)	10	14.6	10	10.3	8	5.8	9	9.0
Total Copper (mg/L)	10	11.1	10	6.73	11	10.0	12	11.0
Dissolved Lead (mg/L)	10	ND	10	ND	8	1.0	9	1.0
Total Lead (mg/L)	10	ND	10	ND	11	10.0	12	9.5
Dissolved Zinc (mg/L)	10	ND	10	ND	8	16.4	9	19.0
Total Zinc (mg/L)	10	ND	10	ND	11	125	13	48.5
TSS (mg/L)	10	35.2	10	37	18	59.5	20	22
Alkalinity (mg/L)	9	67	9	54	**	**	**	**
Hardness (mg/L)	9	79	9	64	**	**	**	**
pH	9	7.32	9	7.205	**	**	**	**
Total Organic Carbon (mg/L)	9	23.65	9	14.7	**	**	**	**

ND=Not Detected

NC= Not Calculated

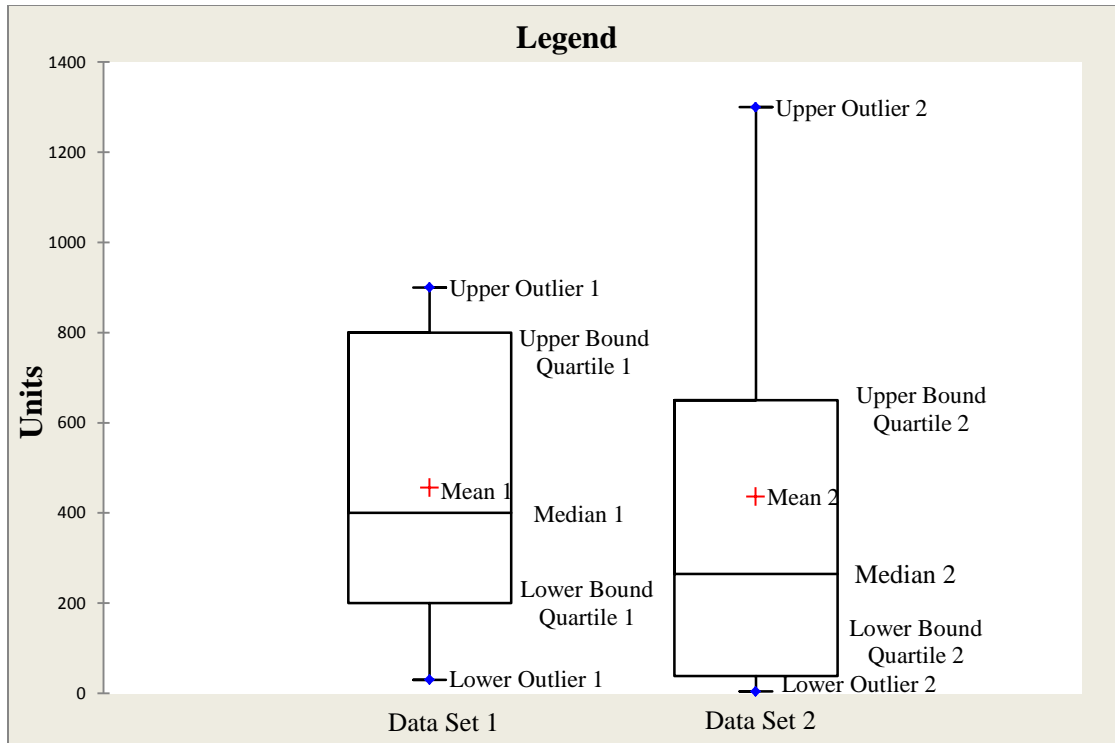
\*\*= No Data

The inlet data can also be compared to runoff data from the Denver Regional Urban Runoff Program (DRURP), as summarized in Table 49. This provides another way to compare the data from this study to an outside source. The mean values for Total Organic Carbon, TSS, and Copper were much lower at Grant Ranch compared to the mean values from DRURP data. However, mean concentrations of Nitrate+Nitrite, total lead, and total zinc were higher for Grant Ranch than for DRURP data.

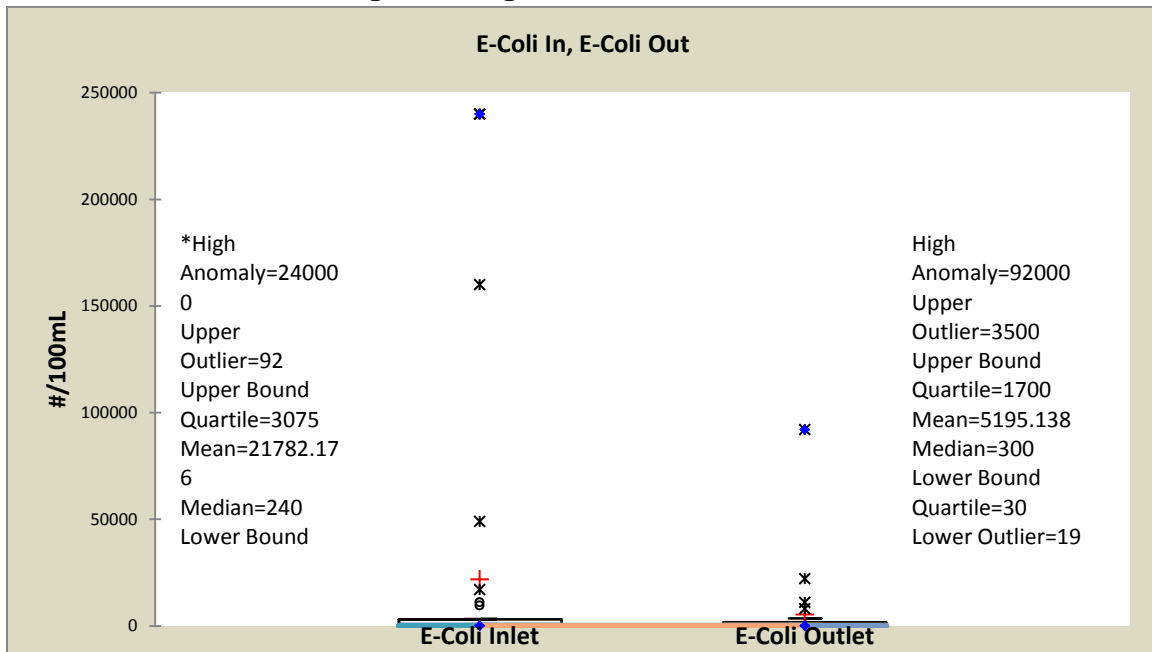
**Table 5. Event Mean Concentration of Constituent Runoff Values: Residential Metropolitan Denver and Grant Ranch**

Constituent	EMC DRURP Residential Concentration	EMC Grant Ranch Concentration
Total Phosphorus (mg/L)	0.65	0.44
Total Ortho-Phosphate (mg/L)	0.22	ND
Total Nitrogen (mg/L)	3.4	2.41
Nitrate+Nitrite (mg/L)	0.65	1.07
Total Lead (mg/L)	0.053	2.10
Total Zinc (mg/L)	0.18	56.3
Total Copper (µg/L)	29.0	14
Total Cadmium (mg/L)	ND	0.12
Total Organic Carbon (mg/L)	72	22.7
TSS (mg/L)	240	153

ND=Not Detected

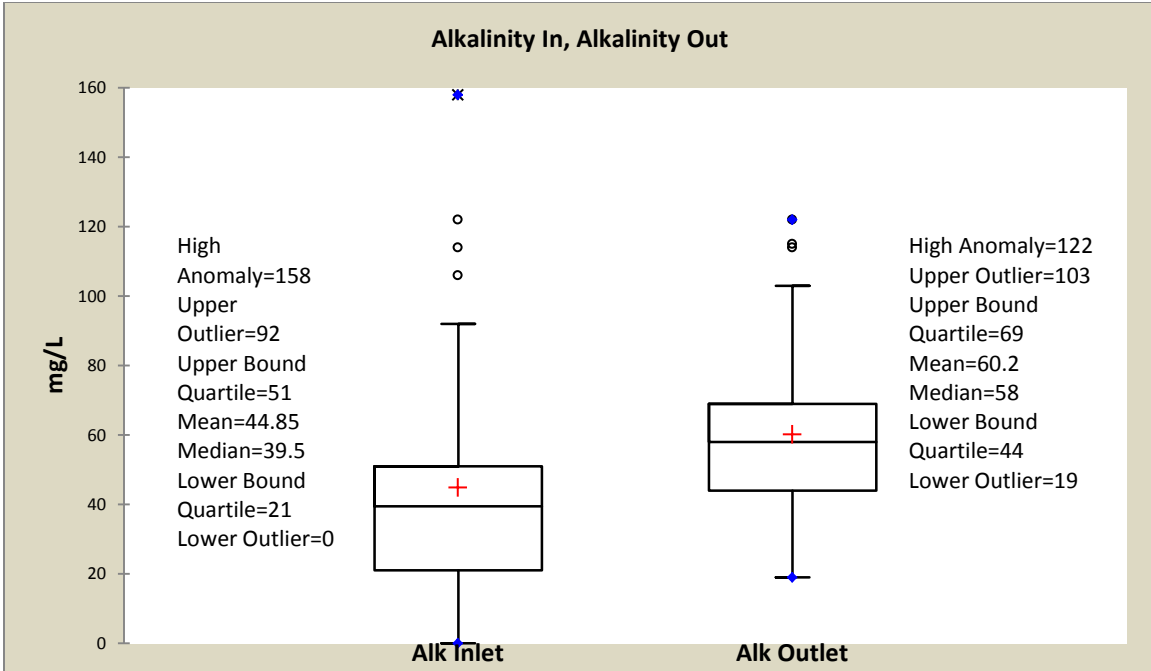


**Figure 5. Legend for Box –and-Whisker Plots**

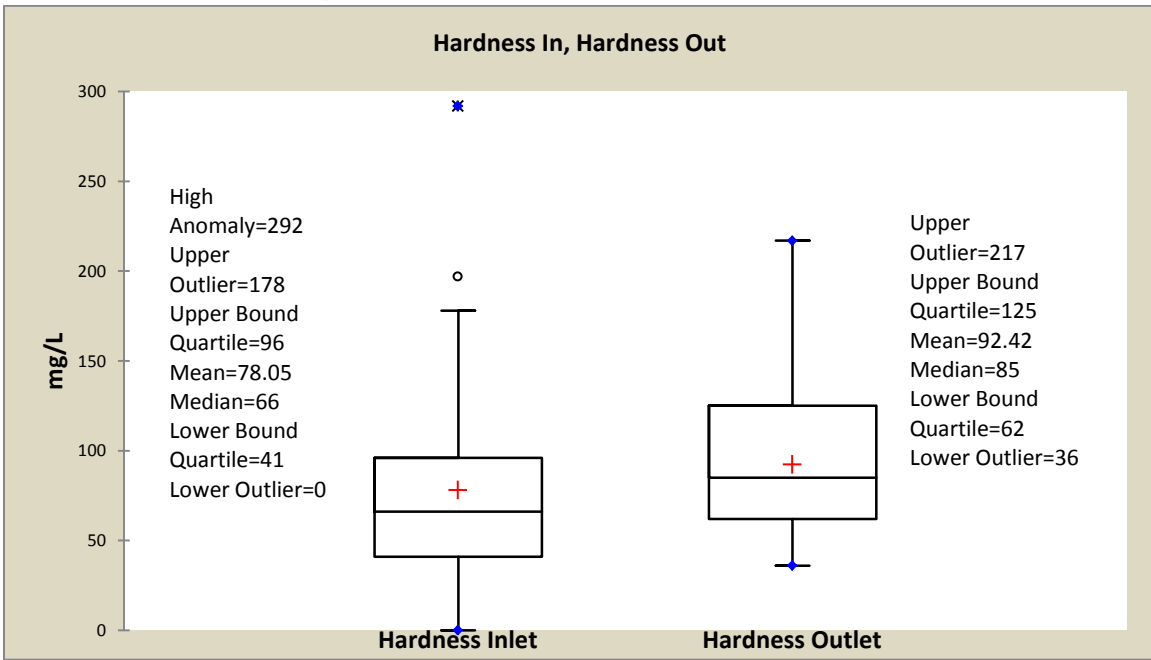


\*Some events gave a reading of greater than 240000 however for statistical purposes the values were maxed at 240000/100 mg/L.

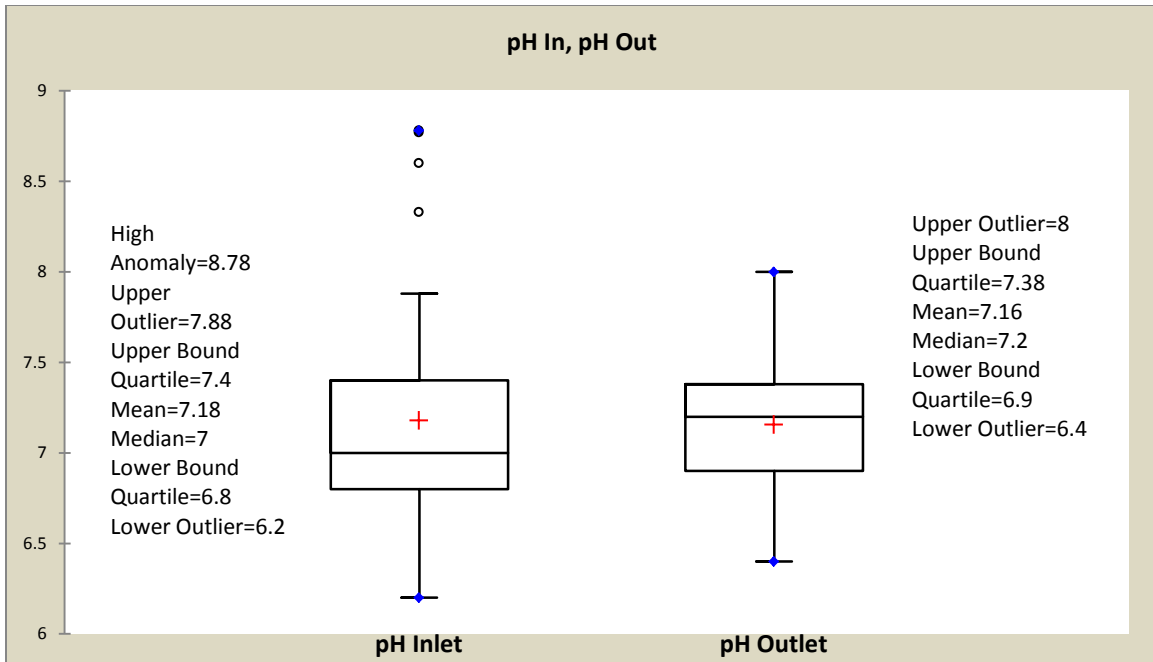
**Figure 6. Inflows and Outflows of E. Coli**



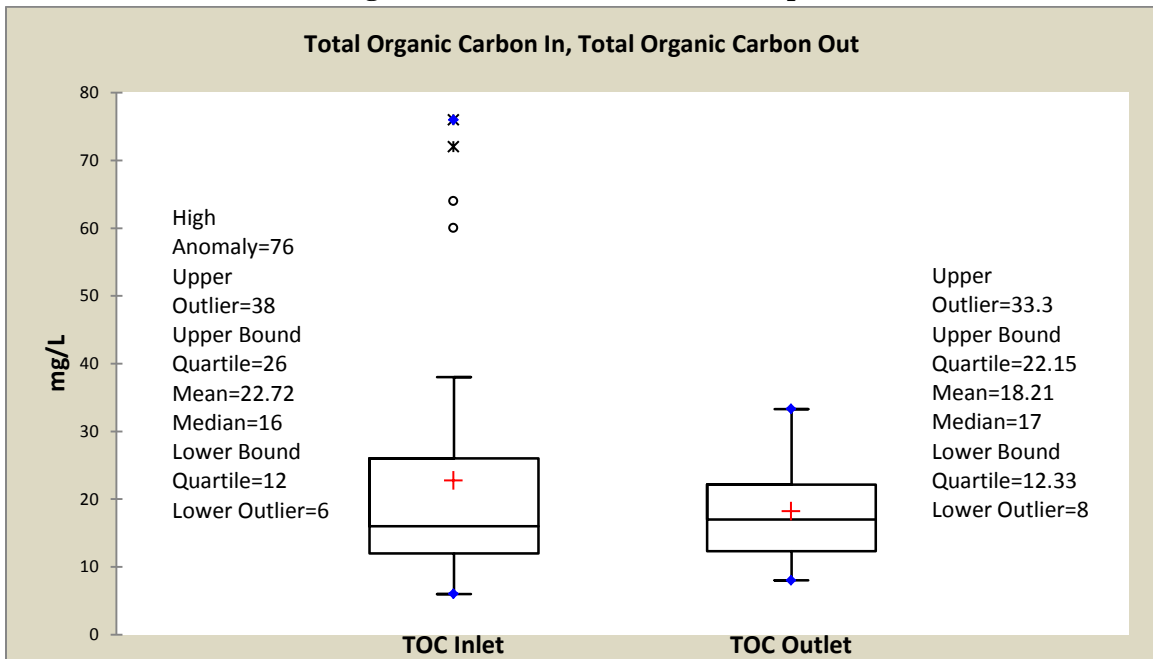
**Figure 7. Inflows and Outflows for Alkalinity**



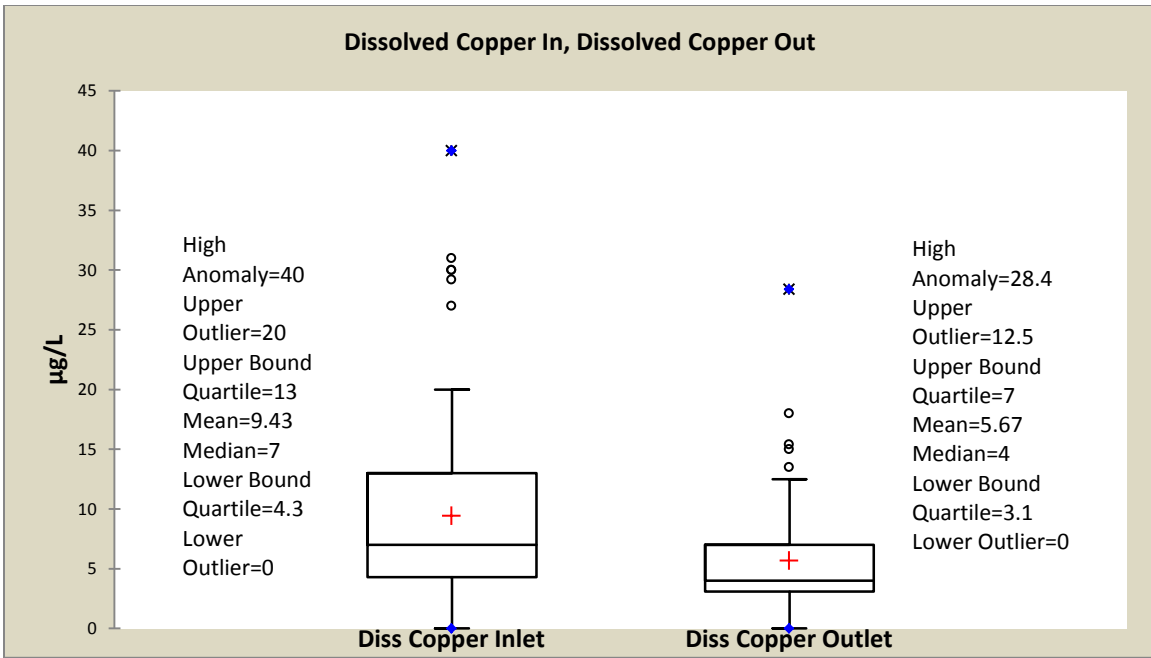
**Figure 8. Inflows and Outflows for Hardness**



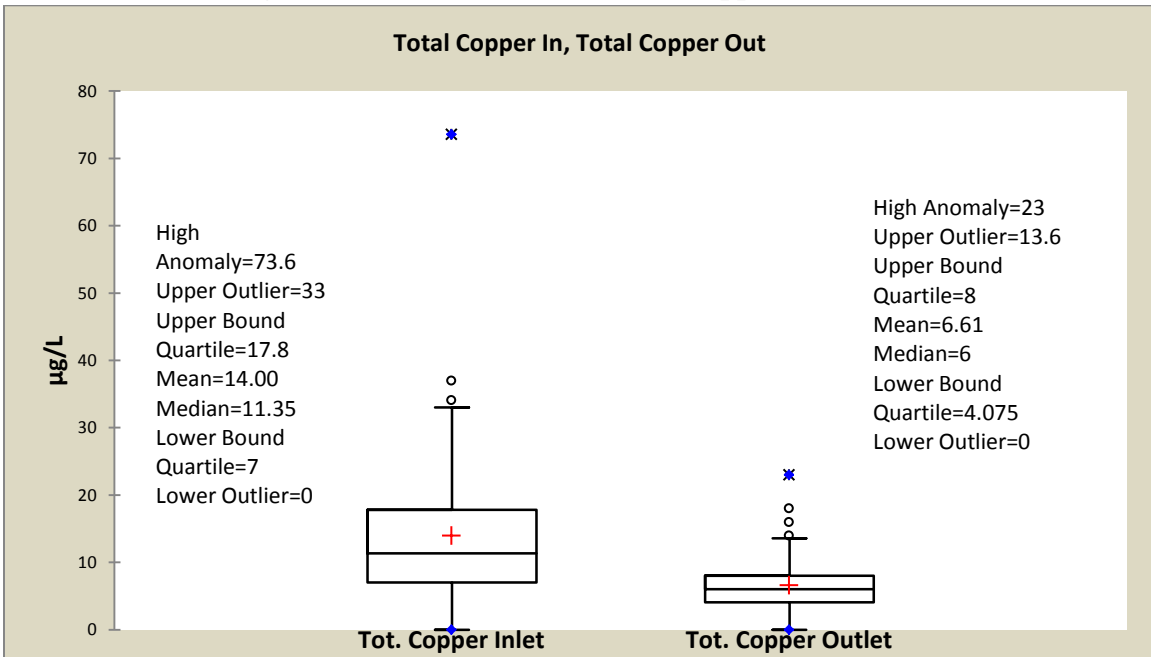
**Figure 9. Inflows and Outflows for pH**



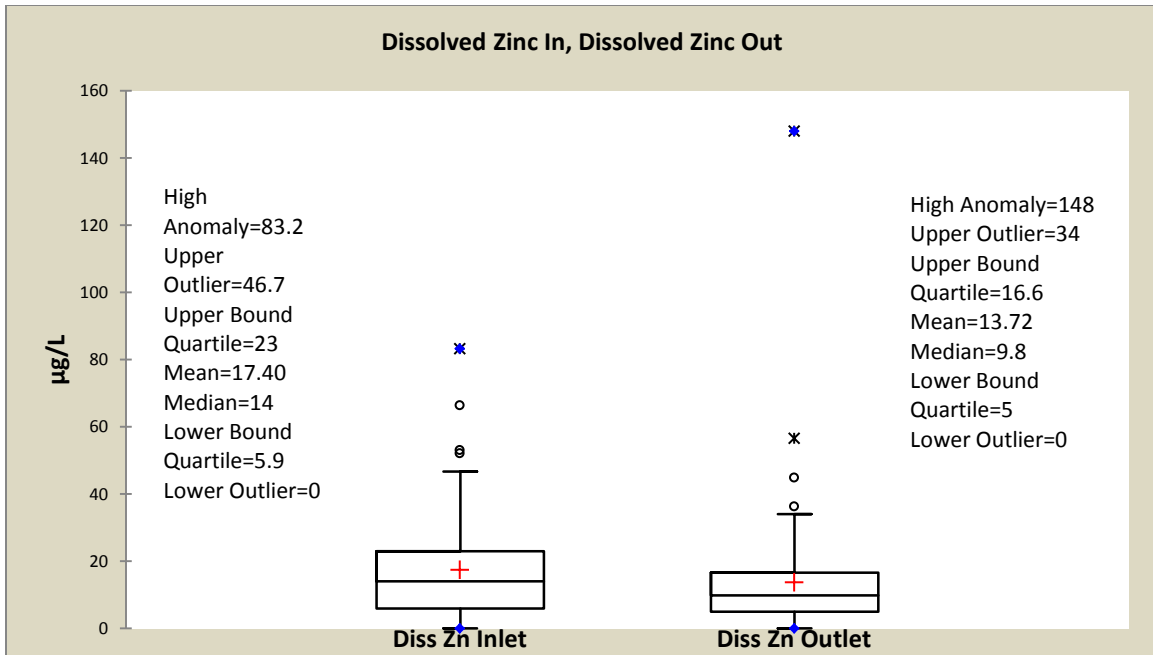
**Figure 10. Inflows and Outflows of Total Organic Carbon**



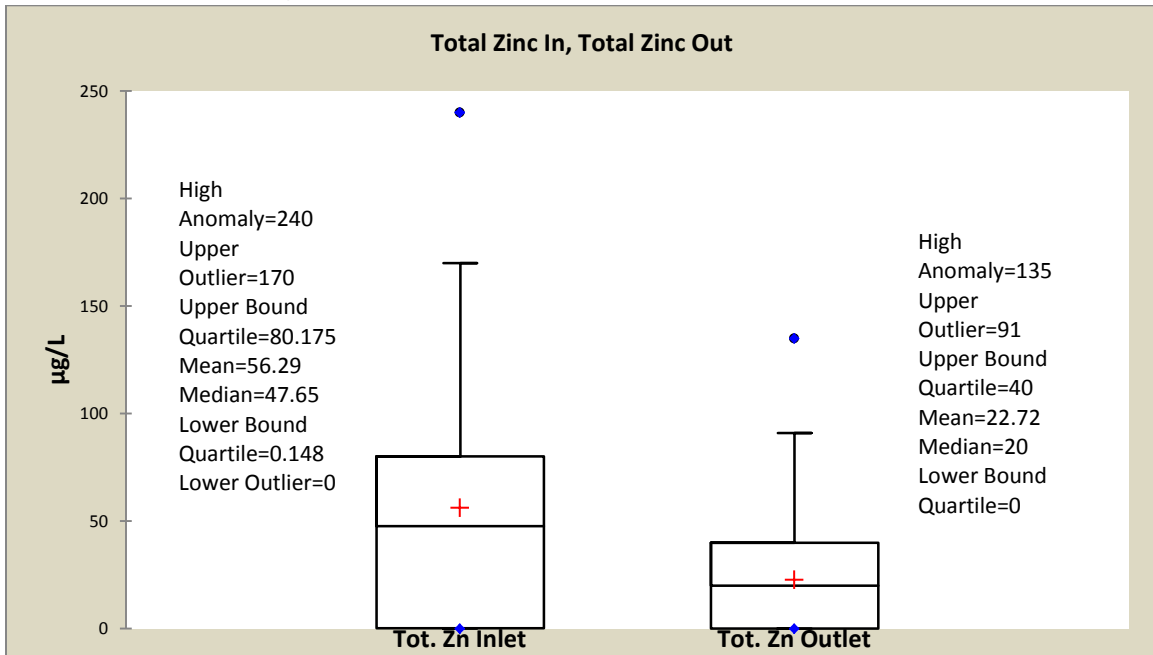
**Figure 11. Inflows and Outflows of Copper (Dissolved)**



**Figure 12. Inflows and Outflows of Copper (Total)**

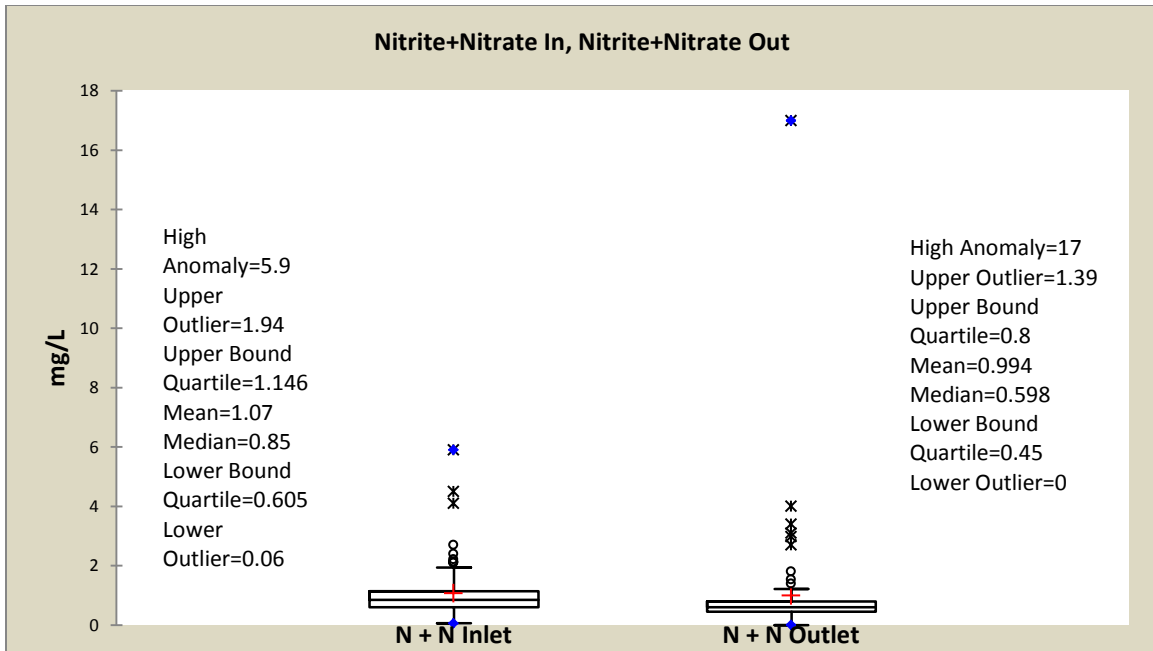


**Figure 13. Inflows and Outflows of Zinc (Dissolved)**

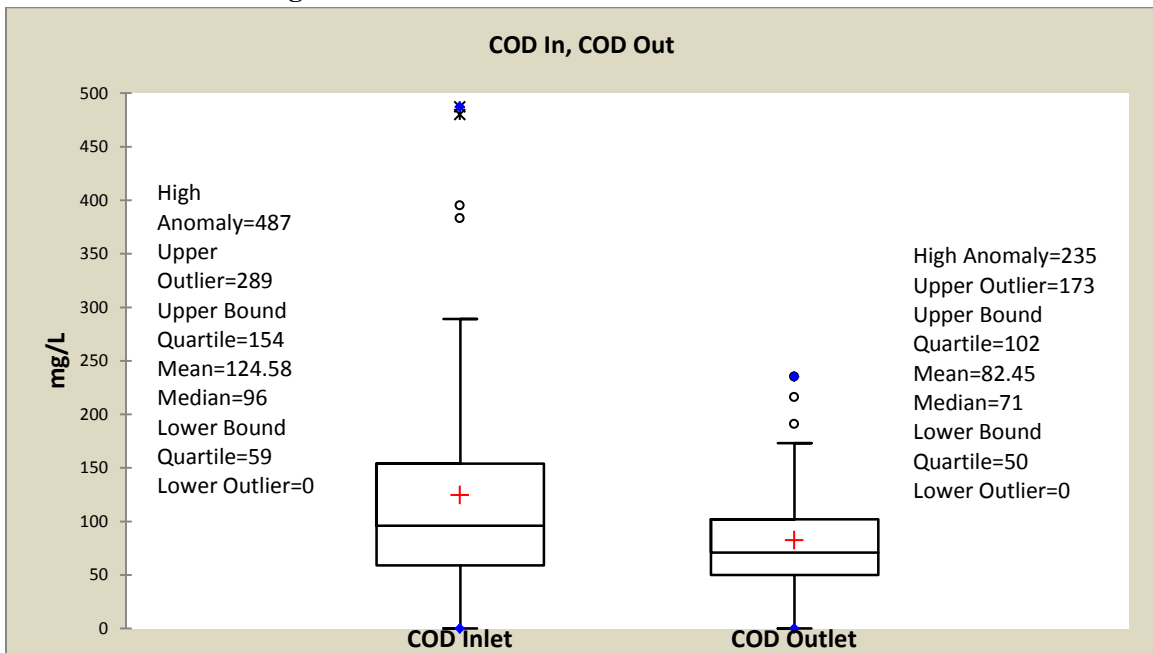


**Figure 14. Inflows and Outflows of Zinc (Total)**

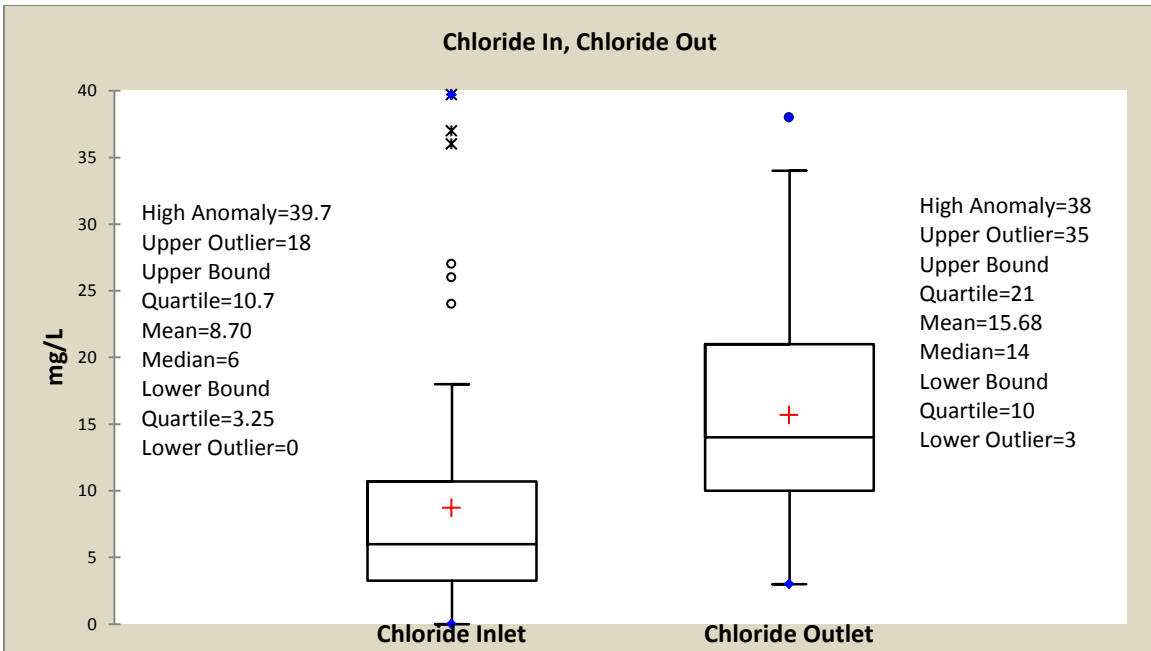




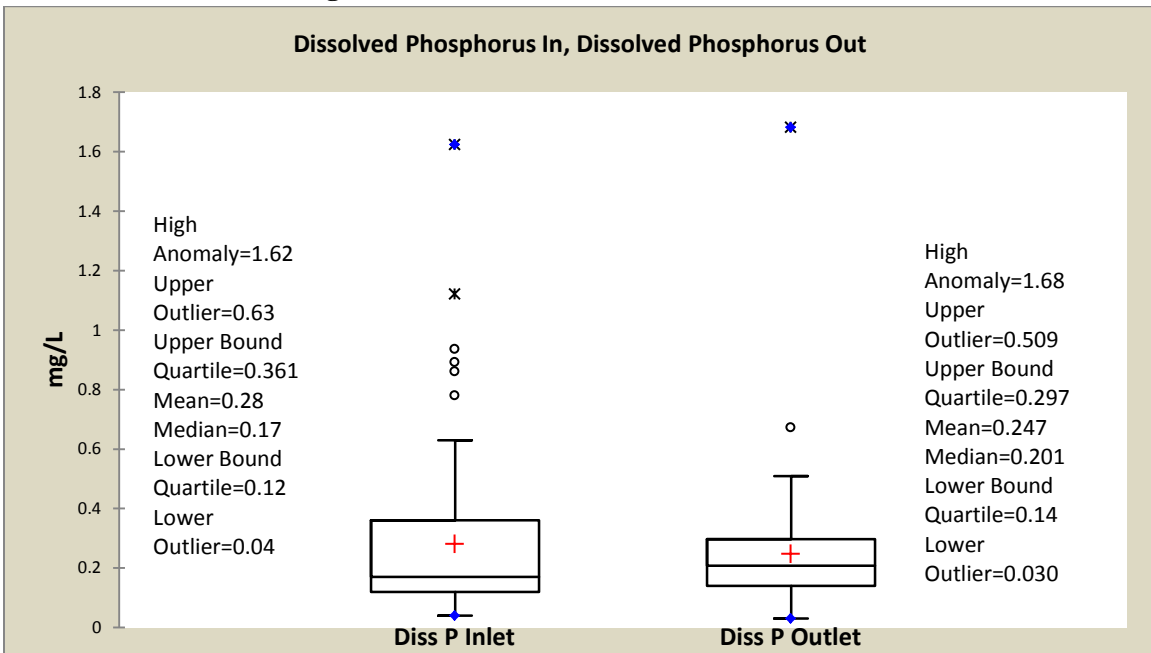
**Figure 15. Inflows and Outflows of Nitrite+Nitrate**



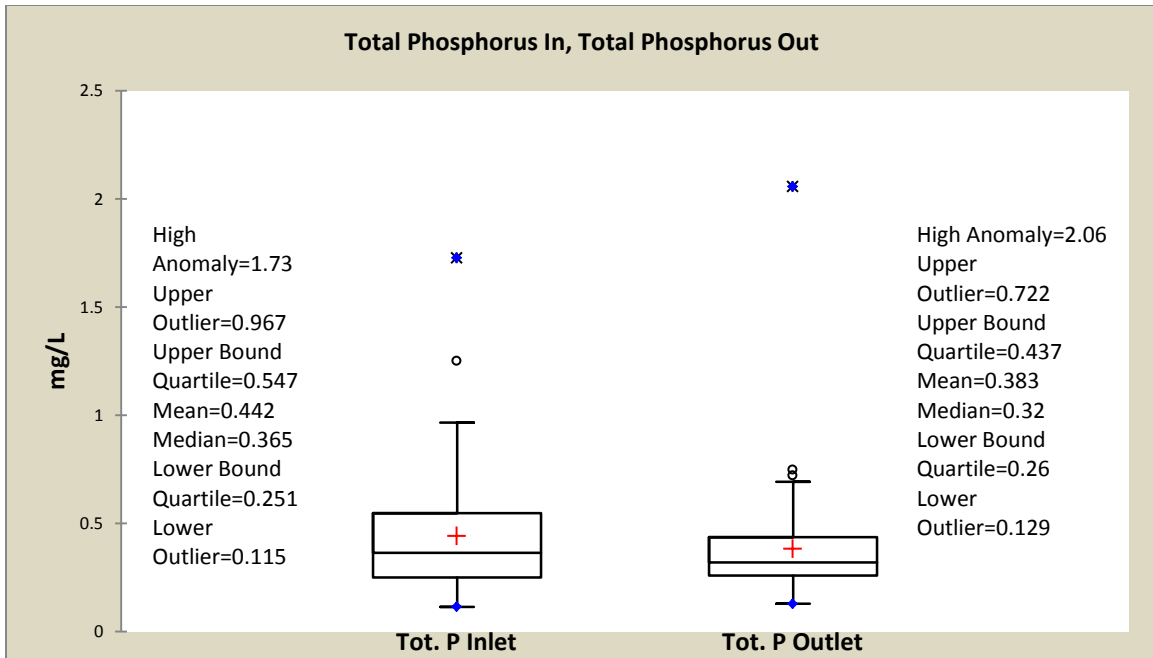
**Figure 16. Inflows and Outflows of COD**



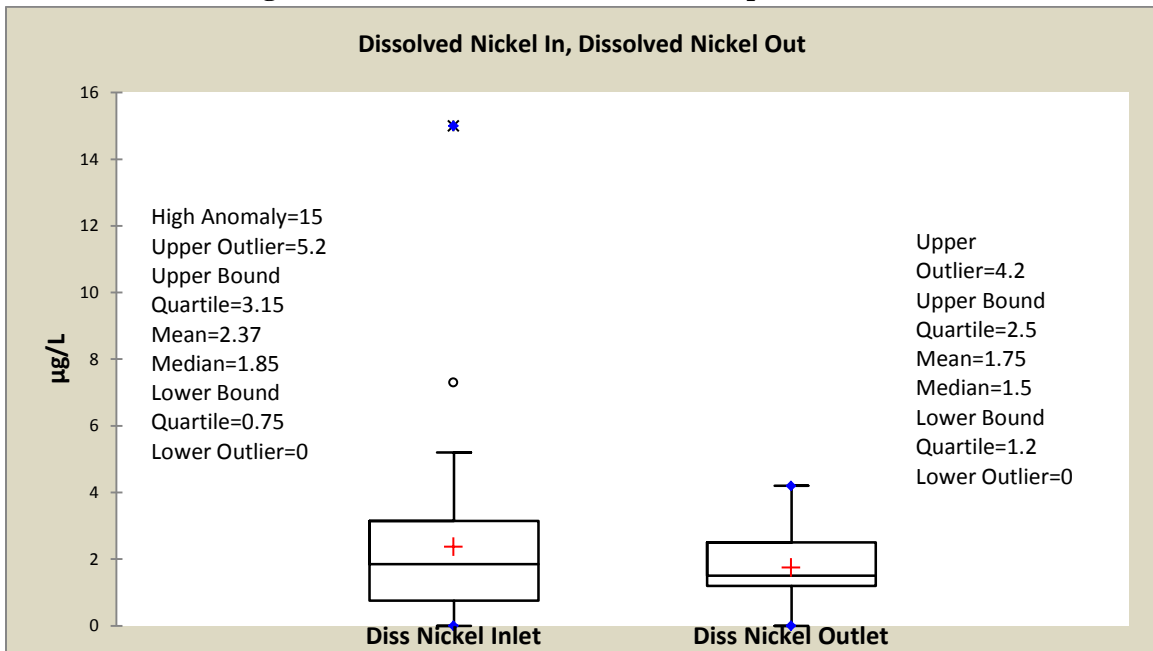
**Figure 17. Inflows and Outflows of Chloride**



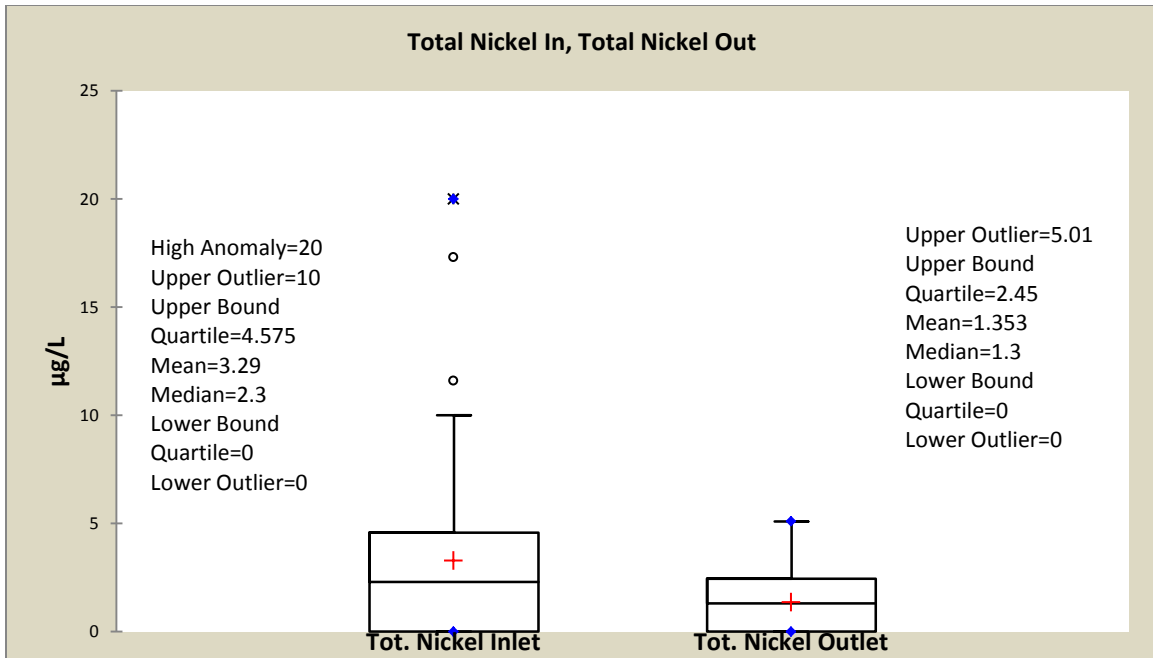
**Figure 18. Inflows and Outflows of Phosphorus (Dissolved)**



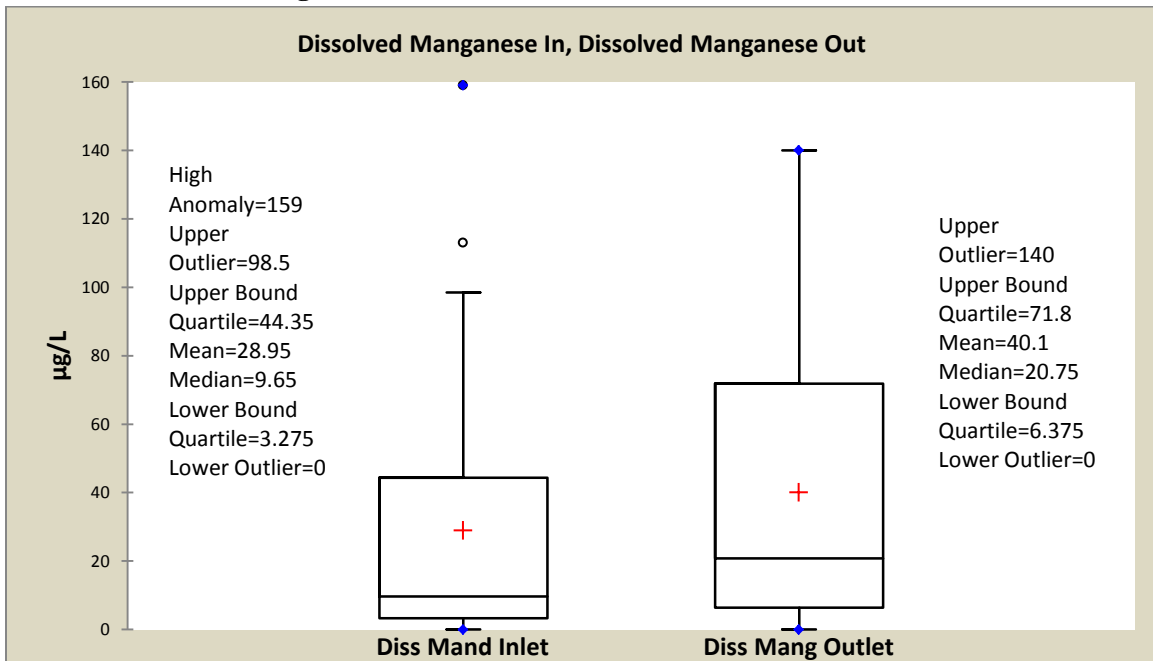
**Figure 19. Inflows and Outflows of Phosphorus (Total)**



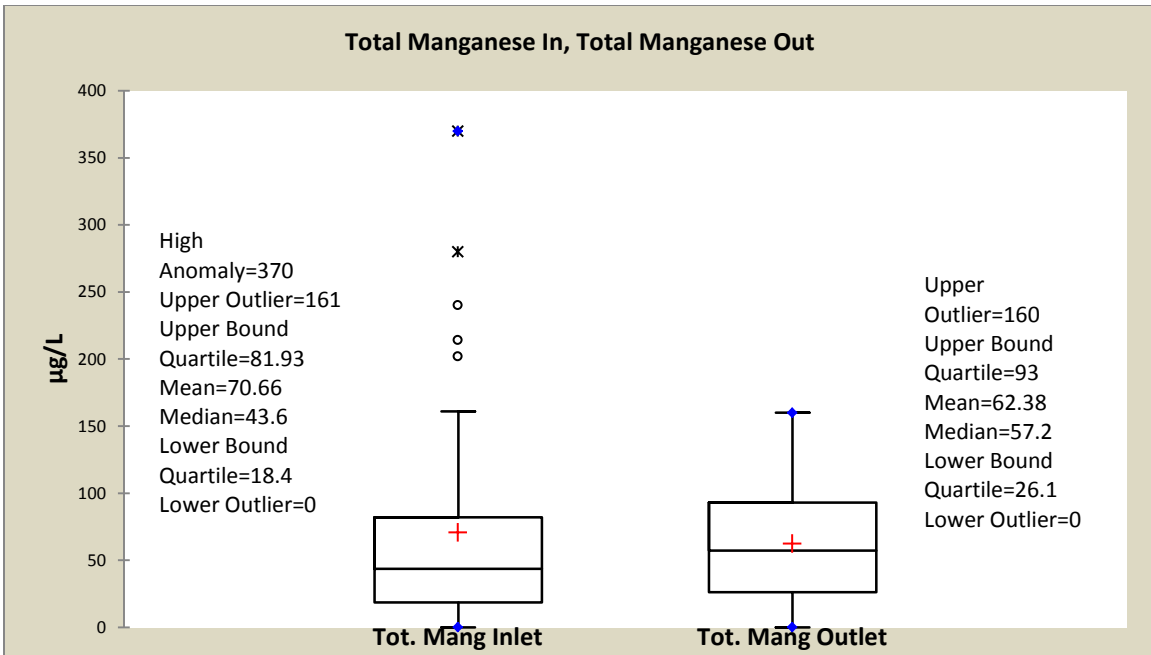
**Figure 20. Inflows and Outflows of Nickel (Dissolved)**



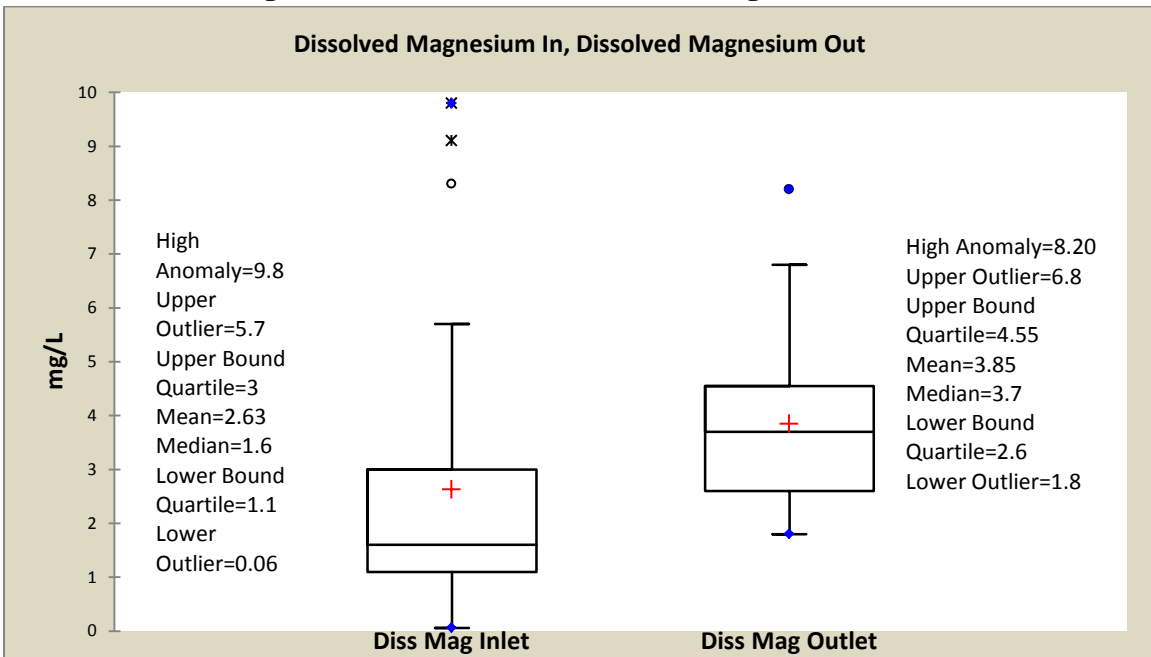
**Figure 21. Inflows and Outflows of Nickel (Total)**



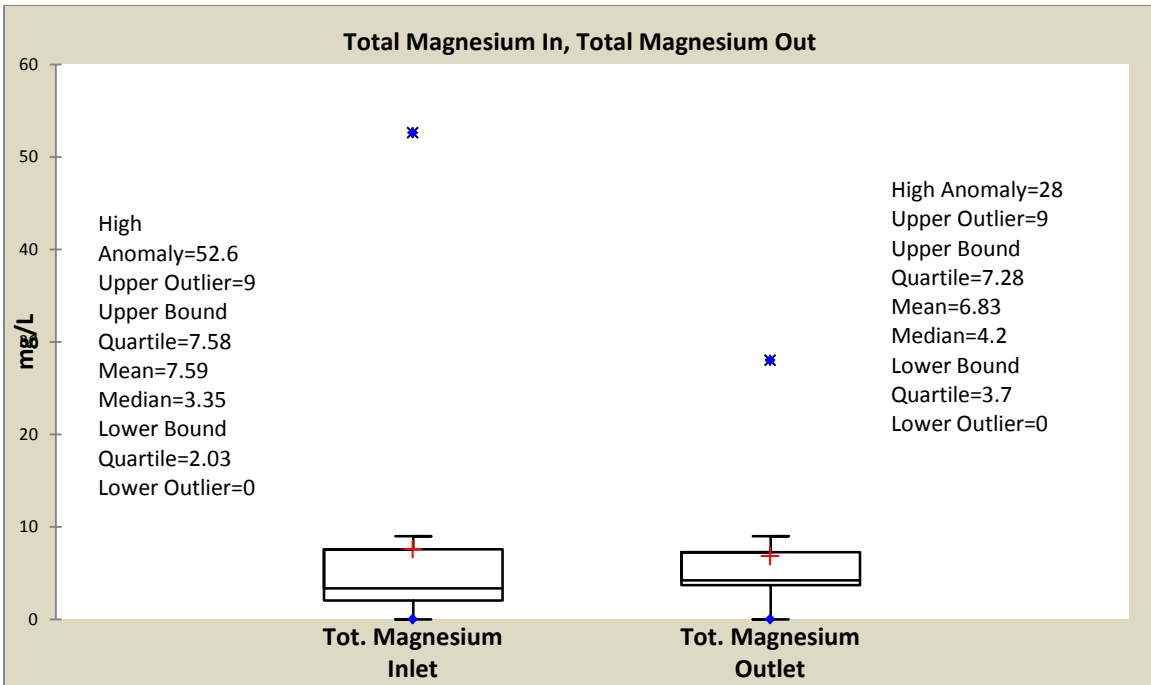
**Figure 22. Inflows and Outflows of Manganese (Dissolved)**



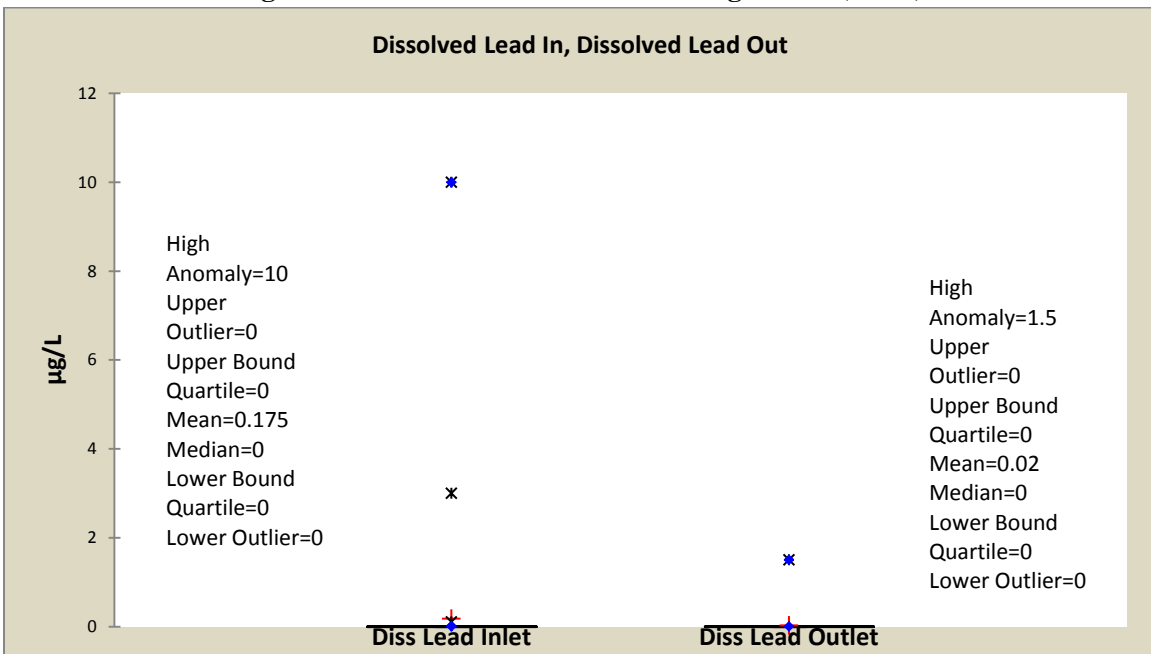
**Figure 23. Inflows and Outflows of Manganese (Total)**



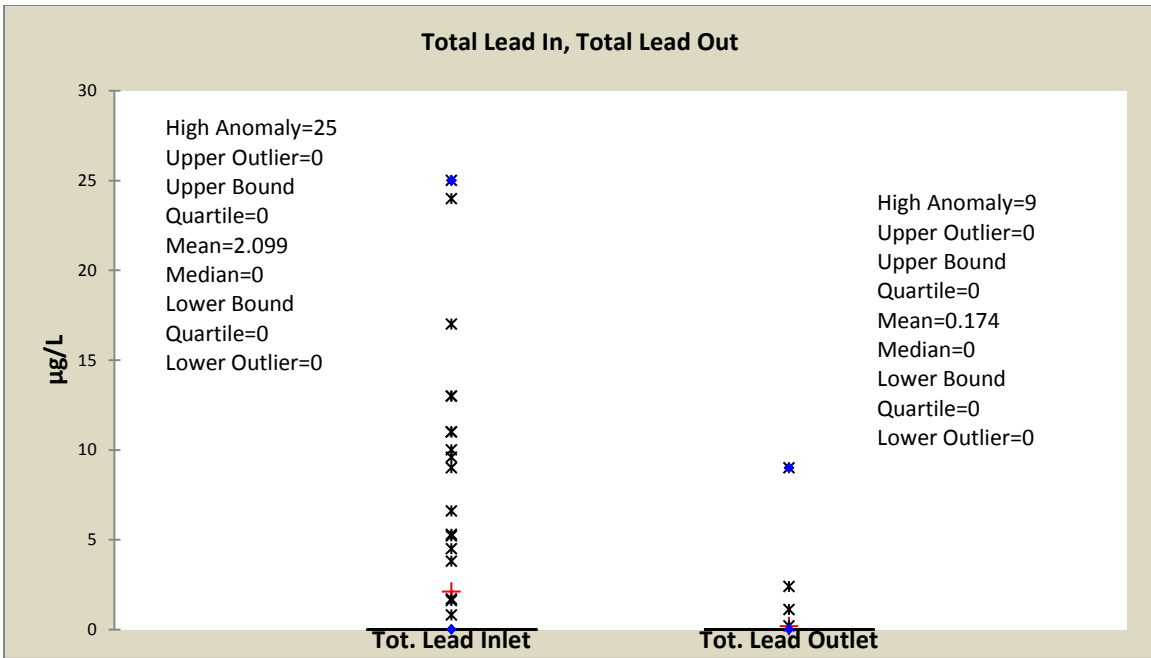
**Figure 24. Inflows and Outflows of Magnesium (Dissolved)**



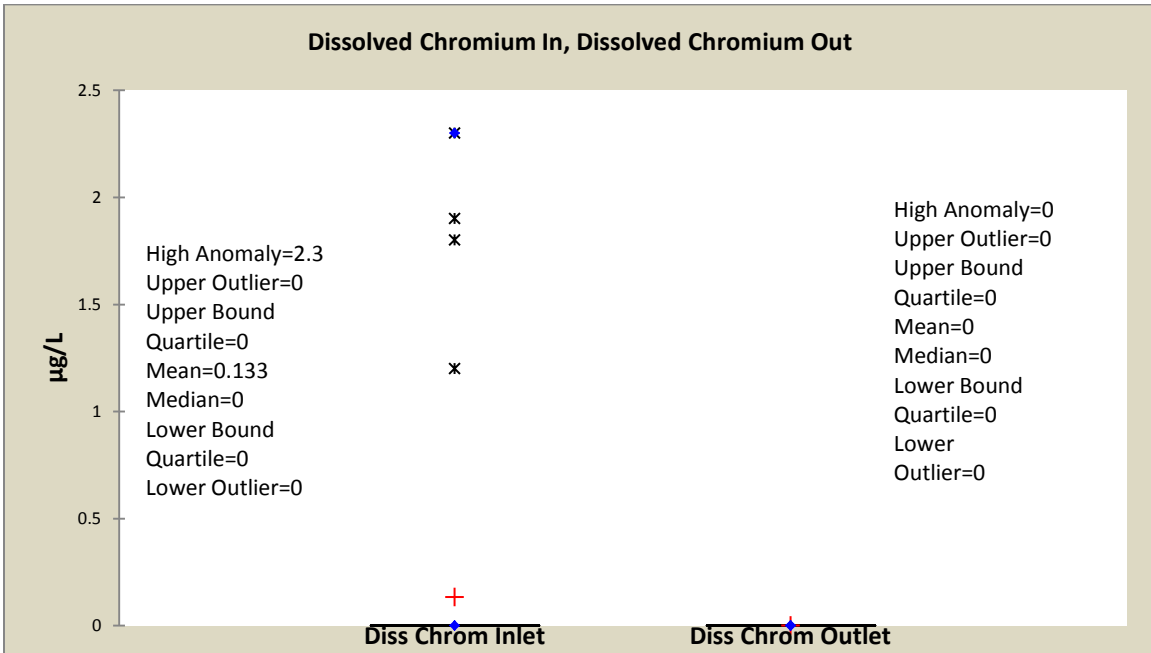
**Figure 25. Inflows and Outflows of Magnesium (Total)**



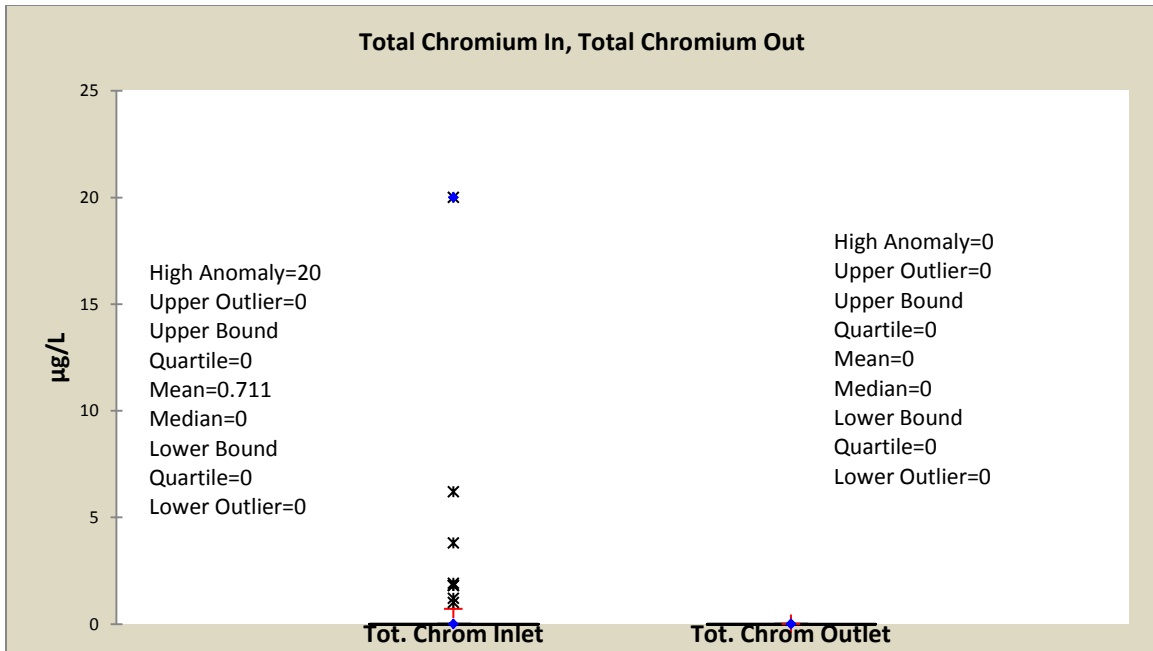
**Figure 26. Inflows and Outflows of Lead (Dissolved)**



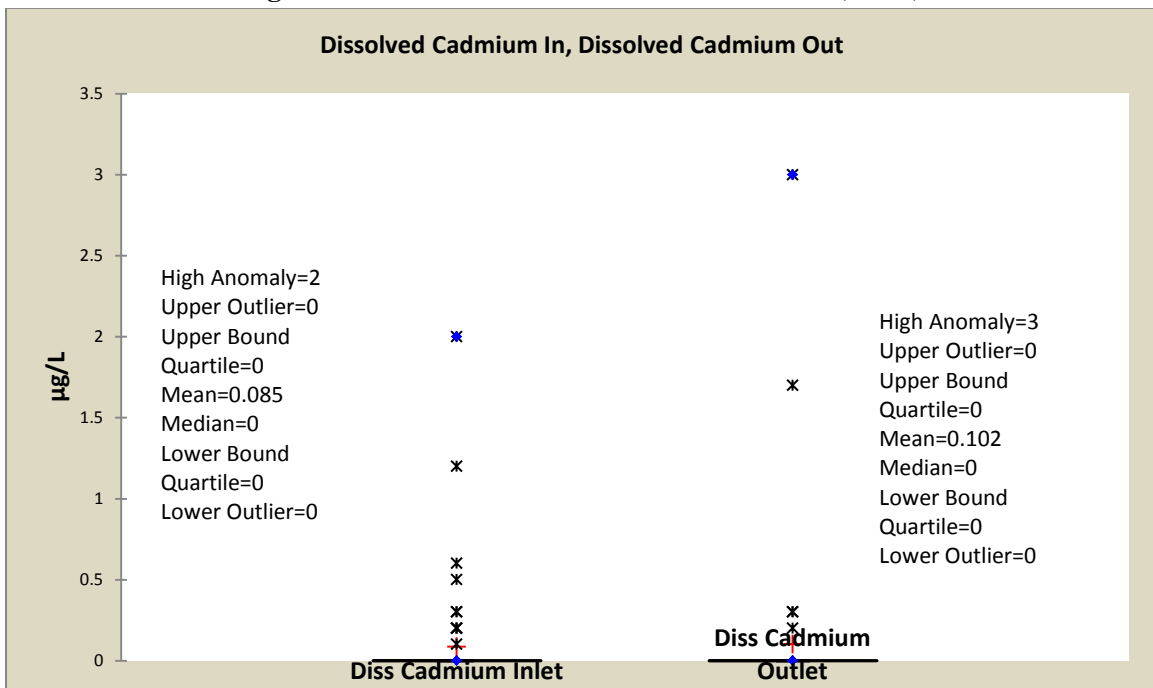
**Figure 27. Inflows and Outflows of Lead (Total)**



**Figure 28. Inflows and Outflows of Chromium (Dissolved)**

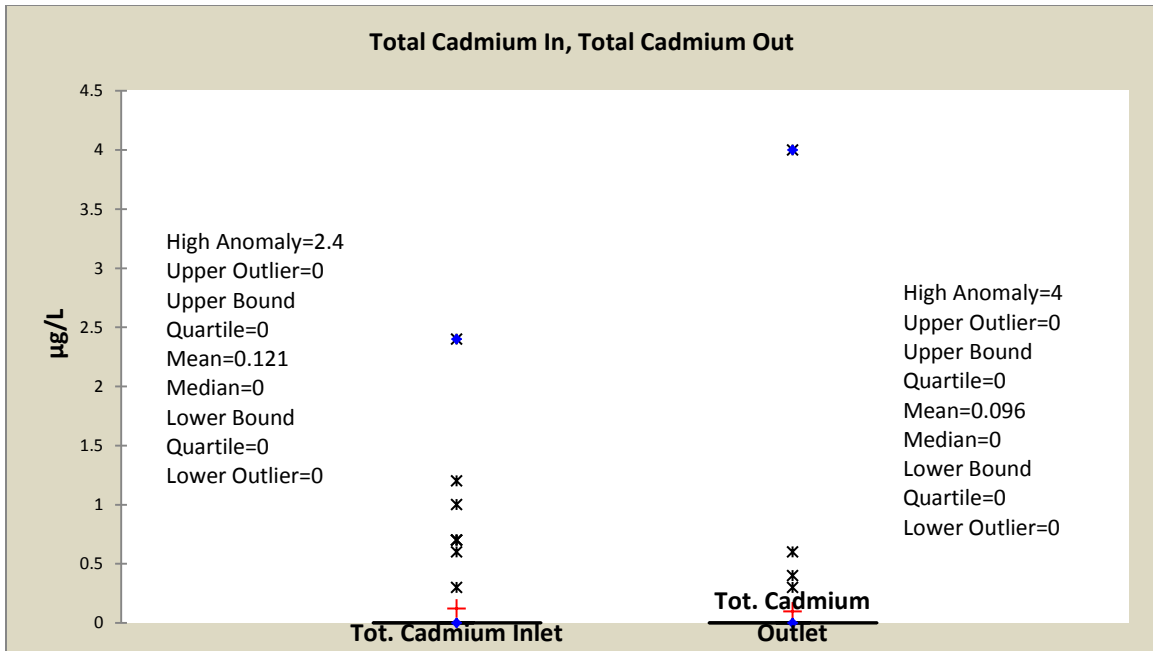


**Figure 29. Inflows and Outflows of Chromium (Total)**

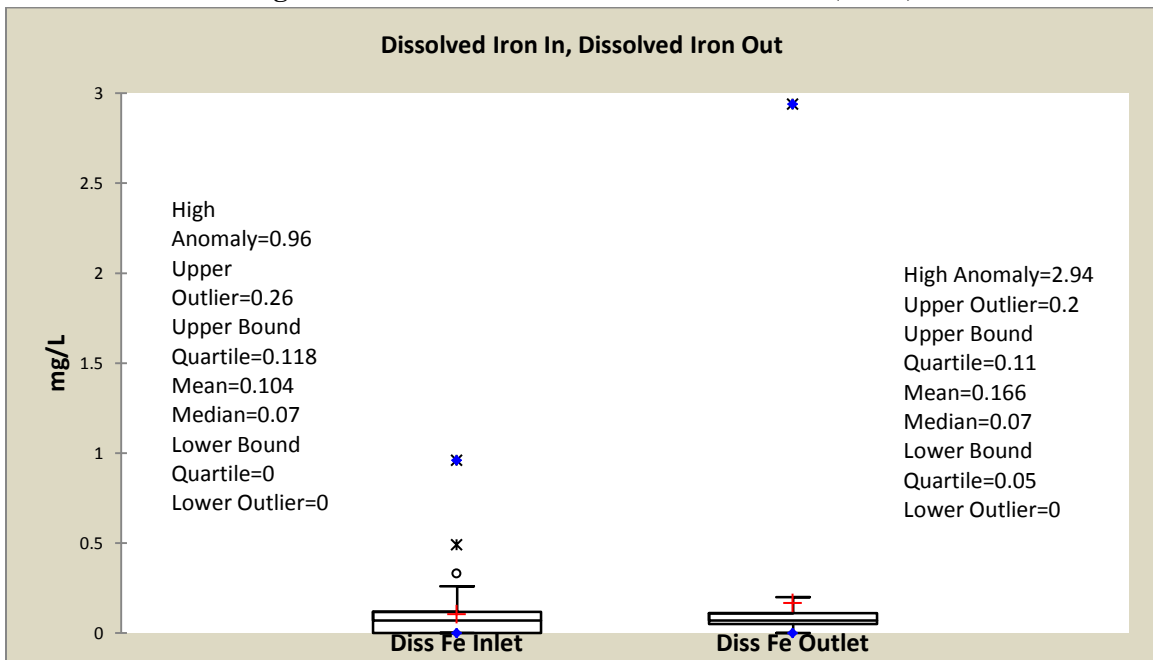


**Figure 30. Inflows and Outflows of Cadmium (Dissolved)**

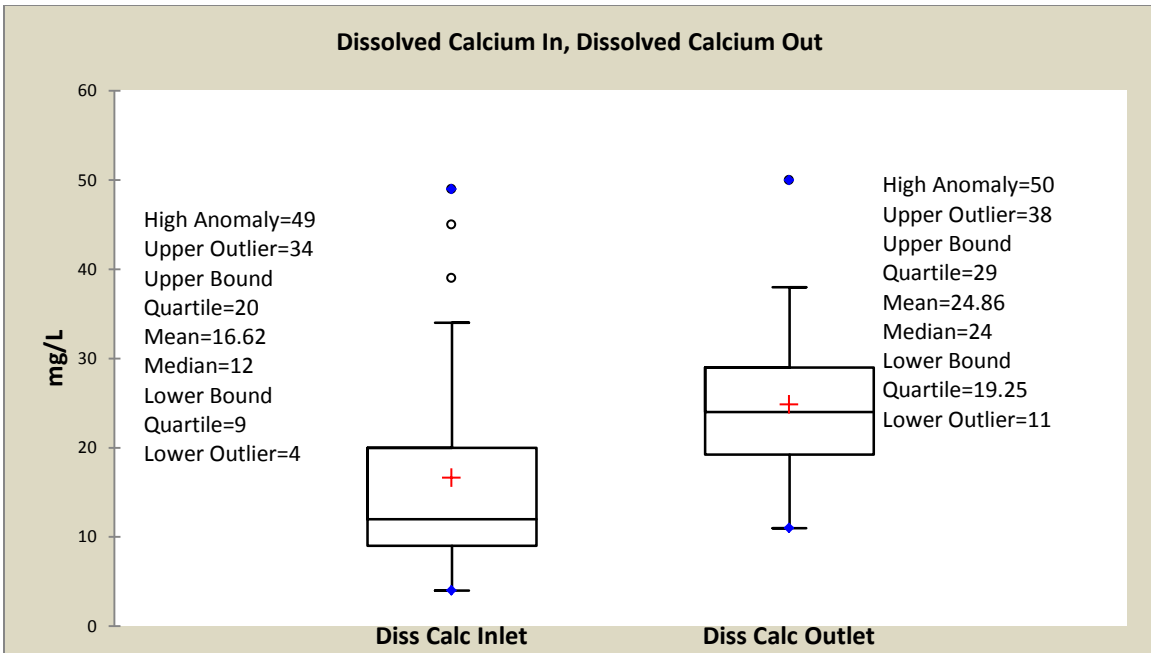




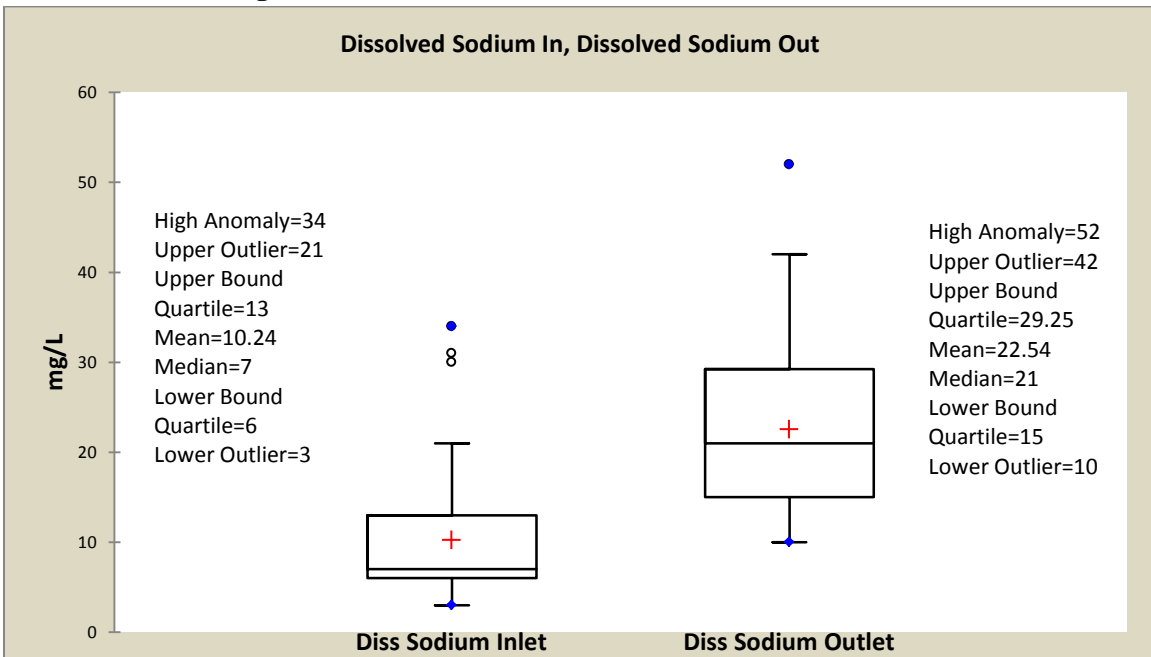
**Figure 31. Inflows and Outflows of Cadmium (Total)**



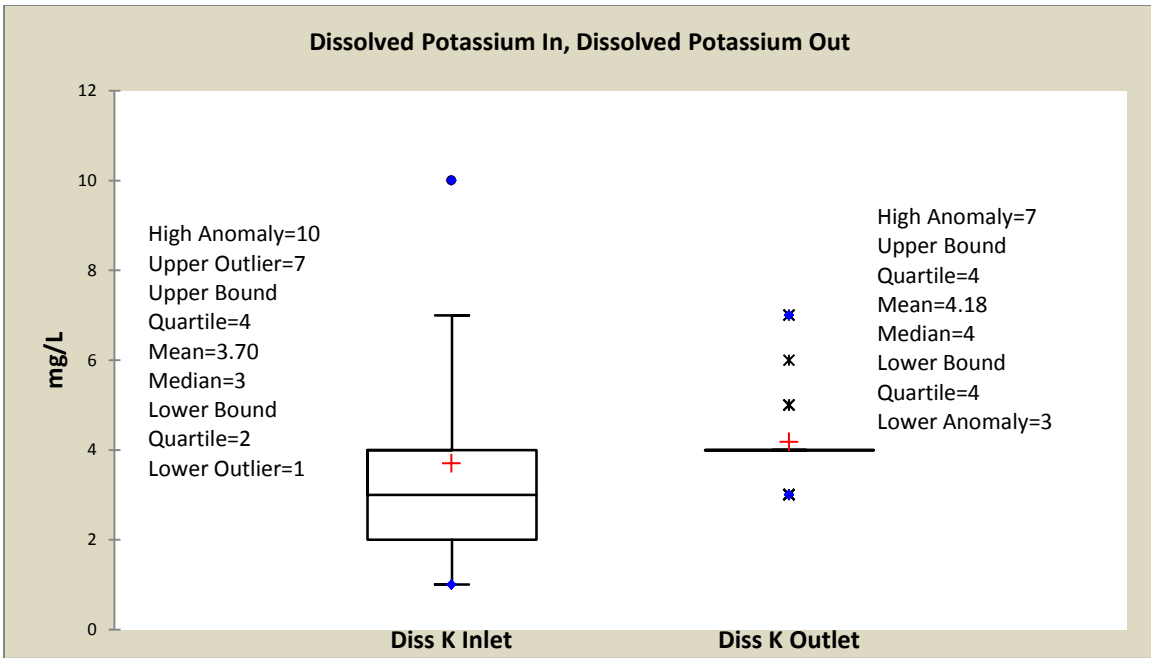
**Figure 32. Inflows and Outflows of Iron (Dissolved)**



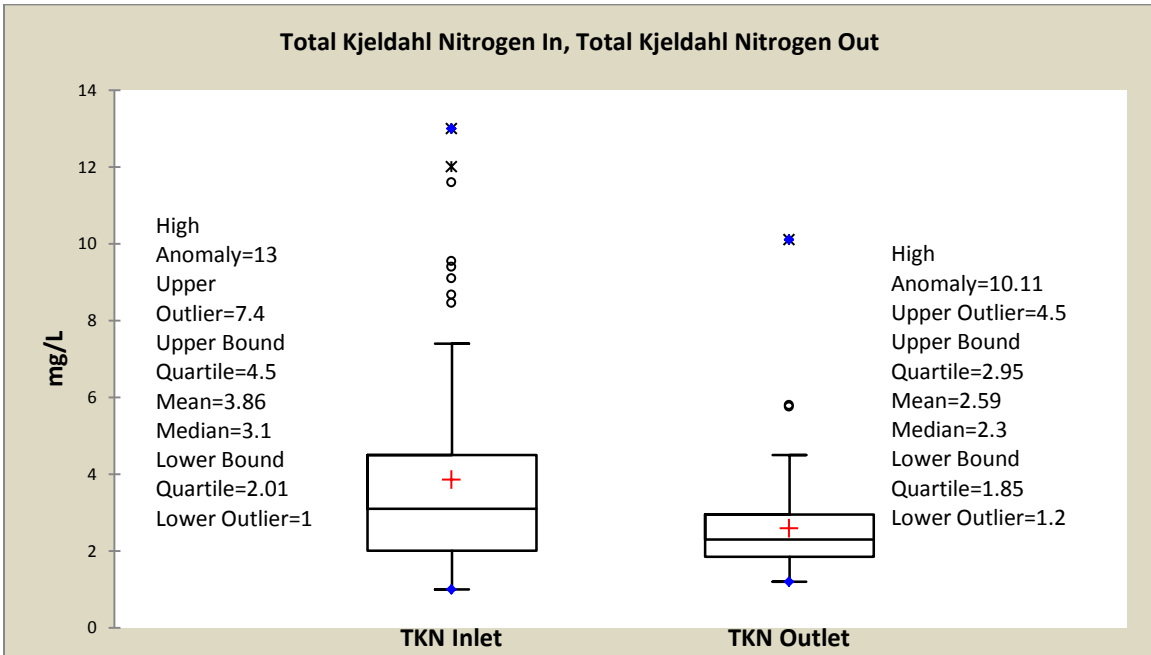
**Figure 33. Inflows and Outflows of Calcium (Dissolved)**



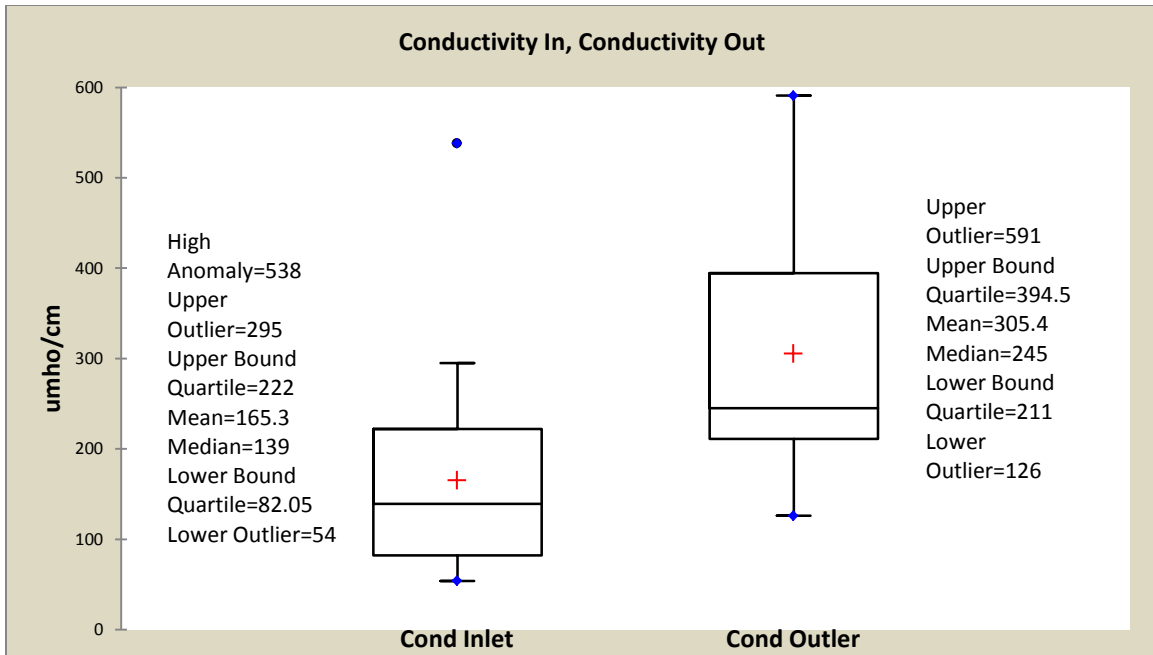
**Figure 34. Inflows and Outflows of Sodium (Dissolved)**



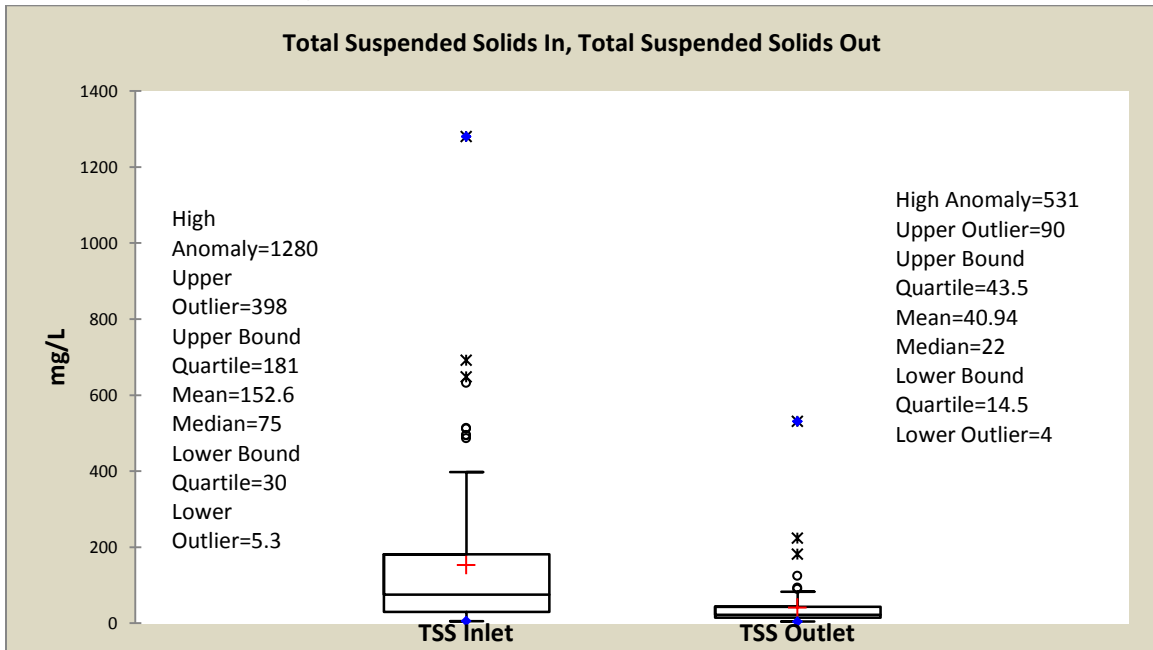
**Figure 35. Inflows and Outflows of Potassium (Dissolved)**



**Figure 36. Inflows and Outflows of Total Kjeldahl Nitrogen**



**Figure 37. Inflows and Outflows of Conductivity**



**Figure 38. Inflows and Outflows of Total Suspended Solids**

## **V. Conclusion**

Measurement of flow rates for both inflow and outflow has been difficult at this site. The outlet should be closely monitored and debris removed following each event for outflow measurement to be effective. The well screen at the outlet should be cleaned frequently to ensure flow through the orifice plate is accurately calculated. Alternatively, a second trash rack could be constructed to reduce debris on the well screen, which would improve confidence in the values for outflow duration, volume, and peak. The Palmer Bowlus should also be cleaned out after every storm event to ensure that inflow can be accurately measured. Alternate means of measuring flow into the EDB should be investigated.

Water quality constituent concentrations can be compared with other EDB studies found in the International Stormwater BMP database, as summarized in Table 48, which is adapted from Table 2-2 in Volume 3 of the Urban Storm Drainage Criteria Manual (USDCM). Database values are generally consistent with those produced by this study. There were higher median phosphorus inflow and outflow concentrations in the Grant Ranch data compared to median values in the Stormwater BMP database. Inflows of total Nitrogen were also much higher at Grant Ranch but outflow nitrogen was below International BMP database levels. Nitrite+Nitrate median concentrations were much higher in inflow and outflow at Grant Ranch.

## VI. References

Deatrich, Monte and Brown, Warren S., Tri-County Health Department, 2004. Stormwater Best Management Practices, Mosquitoes, and West Nile Virus

Geosyntec Consultants, Inc., and Wright Water Engineers, Inc. 2010. *International Stormwater Best Management Practices (BMP) Database Pollutant Category Summary: Nutrients*. <http://bmpdatabase.org/Docs/BMP%20Database%20Nutrients%20Paper%20December%202010%20Final.pdf>. (June 14, 2011).

International Stormwater Best Management Practices (BMP) data base: [www.bmpdatabase.org](http://www.bmpdatabase.org). (June 14, 2011).

Urban Drainage and Flood Control District (UDFCD). 2001. *Urban Storm Drainage Criteria Manual – Volume 1 and 2*. Updated and maintained by UDFCD. Denver, Colorado

Urban Drainage and Flood Control District (UDFCD). 2010. *Urban Storm Drainage Criteria Manual – Volume 3*. Updated and maintained by UDFCD. Denver, Colorado

## Appendix A: Annual Water Quality Data

Table A-1. Water Quality Data for 2001

Water Quality Constituent	Storm 1		Storm 2		Storm 3	
	2001		14-Sep		17-Sep	
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
Alkalinity (mg/L)	64	78	43	103	50	122
Chloride (mg/L)	9	18	6	24	8	26
Chemical Oxygen Demand (mg/L)	96	86	55	41	209	55
Conductivity (umho/cm)	240	369	172	474	214	525
E Coli (#/100 mL)	**	**	**	**	**	**
Hardness (mg/L)	115	118	75	158	72	158
pH	7	7.5	7.4	8	7.5	8
Total Organic Carbon (mg/L)	20	20	14	13	26	19
Dissolved Calcium (mg/L)	**	**	**	**	**	**
Dissolved Iron (mg/L)	0.96	2.94	**	**	**	**
Dissolved Magnesium (mg/L)	**	**	**	**	**	**
Dissolved Sodium (mg/L)	**	**	**	**	**	**
Dissolved Chromium (µg/L)	0	0	**	**	**	**
Dissolved Manganese (µg/L)	20	**	**	**	**	**
Dissolved Nickel (µg/L)	0	**	**	**	**	**
Dissolved Copper (µg/L)	10	15	6	6	11	6
Dissolved Zinc (µg/L)	29.4	44.8	23	0	23	16
Dissolved Selenium (µg/L)	**	**	**	**	**	**
Dissolved Silver (µg/L)	**	**	**	**	**	**
Dissolved Cadmium (µg/L)	**	**	**	**	**	**
Dissolved Lead (µg/L)	0	0	0	0	0	0
Total Beryllium (µg/L)	**	**	**	**	**	**
Total Chromium (µg/L)	**	**	**	**	**	**
Total Manganese (µg/L)	**	**	**	**	**	**
Total Magnesium (mg/L)	**	**	**	**	**	**
Total Nickel (µg/L)	**	**	**	**	**	**
Total Copper (µg/L)	25	18	10	6	14	7
Total Zinc (µg/L)	126	50.8	37.7	19.6	61.5	14.8
Total Arsenic (µg/L)	**	**	**	**	**	**
Total Selenium (µg/L)	**	**	**	**	**	**
Total Molybdenum (µg/L)	**	**	**	**	**	**
Total Silver (µg/L)	**	**	**	**	**	**
Total Cadmium (µg/L)	**	**	**	**	**	**
Total Antimony (µg/L)	**	**	**	**	**	**
Total Lead (µg/L)	13	0	0	0	0	0
Nitrite+Nitrate (mg/L)	0.85	0.74	1.17	0.56	1.28	0.42
Dissolved Phosphorus (mg/L)	0.61	0.4	0.164	0.467	0.324	0.672
Dissolved Potassium (mg/L)	**	**	**	**	**	**
Total Phosphorus (mg/L)	0.584	0.389	0.154	0.496	0.508	0.748
Total Kjeldahl Nitrogen (mg/L)	2.8	2.1	3.4	1.9	2.4	1.7
Total Suspended Solids (mg/L)	398	182	98	14	124	19

\*\*No Data

Note: 0 values indicate a level below the detection limit.

**Table A-2. Water Quality Data for 2002**

Water Quality Constituent	Storm 1		Storm 2		Storm 3		Storm 4		Storm 5	
	2002		4-Jun		16-Jun		3-Jul		13-Sep	
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
Alkalinity (mg/L)	41	76	48	81	50	69	20	19	19	43
Chloride (mg/L)	9	20	4	16	9	17	6	12	3	10
Chemical Oxygen Demand (mg/L)	120	81	74	62	139	90	45	45	87	42
Conductivity (umho/cm)	228	434	162	367	232	373	116	209	81.1	232
E Coli (#/100 mL)	**	**	**	**	**	**	**	**	**	**
Hardness (mg/L)	88	126	197	125	89	125	96	64	127	130
pH	7.3	7.4	7.2	7.3	6.7	7.3	6.4	6.5	7	7.3
Total Organic Carbon (mg/L)	23	23	20	20	38	29	16	20	14	13
Dissolved Calcium (mg/L)	**	**	**	**	**	**	**	**	**	**
Dissolved Iron (mg/L)	**	**	**	**	**	**	**	**	**	**
Dissolved Magnesium (mg/L)	**	**	**	**	**	**	**	**	**	**
Dissolved Sodium (mg/L)	**	**	**	**	**	**	**	**	**	**
Dissolved Chromium (µg/L)	0	0	0	0	**	**	**	**	**	**
Dissolved Manganese (µg/L)	**	**	**	**	**	**	**	**	**	**
Dissolved Nickel (µg/L)	**	**	**	**	**	**	**	**	**	**
Dissolved Copper (µg/L)	7	7	5	5	8	4	8	9	9	7
Dissolved Zinc (µg/L)	14.7	18.4	19	31.5	22	21.6	27.4	13.6	**	**
Dissolved Selenium (µg/L)	**	**	**	**	**	**	**	**	**	**
Dissolved Silver (µg/L)	**	**	**	**	**	**	**	**	**	**
Dissolved Cadmium (µg/L)	**	**	**	**	**	**	**	**	**	**
Dissolved Lead (µg/L)	0	0	0	0	0	0	0	0	0	0
Total Beryllium (µg/L)	**	**	**	**	**	**	**	**	**	**
Total Chromium (µg/L)	**	**	**	**	**	**	**	**	**	**
Total Manganese (µg/L)	**	**	**	**	**	**	**	**	**	**
Total Magnesium (mg/L)	5	7	6	7	**	**	**	**	**	**
Total Nickel (µg/L)	**	**	**	**	**	**	**	**	**	**
Total Copper (µg/L)	15	9	24	16	13	12	5	5	16	8
Total Zinc (µg/L)	56.7	24.3	157	46.6	68.4	62.1	38	25.5	59.4	21.5
Total Arsenic (µg/L)	**	**	**	**	**	**	**	**	**	**
Total Selenium (µg/L)	**	**	**	**	**	**	**	**	**	**
Total Molybdenum (µg/L)	**	**	**	**	**	**	**	**	**	**
Total Silver (µg/L)	**	**	**	**	**	**	**	**	**	**
Total Cadmium (µg/L)	0	0	0.7	0	**	**	**	**	**	**
Total Antimony (µg/L)	**	**	**	**	**	**	**	**	**	**
Total Lead (µg/L)	0	0	17	0	0	0	0	0	0	0
Nitrite+Nitrate (mg/L)	1.55	1.24	0.78	0.8	1.6	0.89	1.06	2.43	0.99	0.72
Dissolved Phosphorus (mg/L)	0.298	0.391	0.25	0.427	0.559	0.441	0.317	0.319	0.143	0.264
Dissolved Potassium (mg/L)	**	**	**	**	**	**	**	**	**	**
Total Phosphorus (mg/L)	0.498	0.49	0.729	0.514	0.543	0.447	0.45	0.399	0.304	0.335
Total Kjeldahl Nitrogen (mg/L)	5.9	4	3.1	2.7	4.5	3.4	2.1	3.1	2.4	1.8
Total Suspended Solids (mg/L)	132	22	495	26	67	63	85	22	209	44

\*\*No Data

Note: 0 values indicate a level below the detection limit.



**Table A-3. Water Quality Data for 2003**

Water Quality Constituent	Storm 1		Storm 2		Storm 3		Storm 4	
	2003		18-Jun		28-Jul		30-Jul	
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
Alkalinity (mg/L)	**	**	18	49	27	49	21	33
Chloride (mg/L)	6	**	0	4	2	6	2	4
Chemical Oxygen Demand (mg/L)	278	**	60	73	126	102	112	80
Conductivity (umho/cm)	**	**	84.4	227	120	245	125	152
E Coli (#/100 mL)	**	**	**	**	**	**	**	**
Hardness (mg/L)	**	**	94	67	55	88	62	51
pH	**	**	7	7	6.5	6.6	6.9	6.8
Total Organic Carbon (mg/L)	**	**	21	19	25	33	9	17
Dissolved Calcium (mg/L)	**	**	**	**	**	**	**	**
Dissolved Iron (mg/L)	**	**	**	**	**	**	**	**
Dissolved Magnesium (mg/L)	**	**	**	**	**	**	**	**
Dissolved Sodium (mg/L)	**	**	**	**	**	**	**	**
Dissolved Chromium (µg/L)	0	**	0	0	0	0		
Dissolved Manganese (µg/L)	**	**	**	**	**	**	**	**
Dissolved Nickel (µg/L)	**	**	**	**	**	**	**	**
Dissolved Copper (µg/L)	**	**	4	10	6	7	3	5
Dissolved Zinc (µg/L)	**	**	9	13.4	16	15.9	12.3	7.6
Dissolved Selenium (µg/L)	**	**	**	**	**	**	**	**
Dissolved Silver (µg/L)	**	**	**	**	**	**	**	**
Dissolved Cadmium (µg/L)	**	**	**	**	**	**	**	**
Dissolved Lead (µg/L)	**	**	0	0	0	0	10	0
Total Beryllium (µg/L)	**	**	**	**	**	**	**	**
Total Chromium (µg/L)	0	**	0	0	0	0	20	0
Total Manganese (µg/L)	370	**	40	120	160	90	240	60
Total Magnesium (mg/L)	9	**	1	4	52.6	4.3		
Total Nickel (µg/L)	0	**	0	0	0	0	20	0
Total Copper (µg/L)	37	**	7	10	20	14	19	8
Total Zinc (µg/L)	240	**	128	63.8	140	70	140	40
Total Arsenic (µg/L)	**	**	**	**	**	**	**	**
Total Selenium (µg/L)	**	**	**	**	**	**	**	**
Total Molybdenum (µg/L)	**	**	**	**	**	**	**	**
Total Silver (µg/L)	**	**	**	**	**	**	**	**
Total Cadmium (µg/L)	1.2	**	0	0	0.7	0.6		
Total Antimony (µg/L)	**	**	**	**	**	**	**	**
Total Lead (µg/L)	24	**	0	0	11	0	13	0
Nitrite+Nitrate (mg/L)	1.52	**	0.91	0.8	1.59	1.22	1.02	1.54
Dissolved Phosphorus (mg/L)	0.266	**	0.385	0.435	0.151	0.09	0.166	0.361
Dissolved Potassium (mg/L)	**	**	**	**	**	**	**	**
Total Phosphorus (mg/L)	0.904	**	0.398	0.434	0.56	0.34	0.309	0.636
Total Kjeldahl Nitrogen (mg/L)	5.3	**	2.8	3.7	4.1	2.9	2.92	2.8
Total Suspended Solids (mg/L)	692	**	216	35	486	90	632	124

\*\*No Data

Note: 0 values indicate a level below the detection limit.

**Table A-4. Water Quality Data for 2004**

Water Quality Constituent	Storm 1		Storm 2		Storm 3		Storm 4		Storm 5	
	2004		2004		2004		2004		2004	
	5/13/2004		6/1/2004		6/26/2004		8/27/2004		6/28/2004	
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
Alkalinity (mg/L)	**	**	**	**	**	**	**	**	**	**
Chloride (mg/L)	3	**	4	**	14	**	4	**	12	**
Chemical Oxygen Demand (mg/L)	120	**	383	**	190	**	51	**	21	**
Conductivity (umho/cm)	54	188	**	**	**	**	**	**	**	**
E Coli (#/100 mL)	54	**	23	**	**	**	13	**	0	**
Hardness (mg/L)	**	**	**	**	**	**	**	**	**	**
pH	**	**	**	**	**	**	**	**	**	**
Total Organic Carbon (mg/L)	**	**	**	**	**	**	**	**	**	**
Dissolved Calcium (mg/L)	**	**	**	**	**	**	**	**	**	**
Dissolved Iron (mg/L)	**	**	**	**	**	**	**	**	**	**
Dissolved Magnesium (mg/L)	**	**	**	**	**	**	**	**	**	**
Dissolved Sodium (mg/L)	**	**	**	**	**	**	**	**	**	**
Dissolved Chromium (µg/L)	**	**	**	**	**	**	**	**	**	**
Dissolved Manganese (µg/L)	**	**	**	**	**	**	**	**	**	**
Dissolved Nickel (µg/L)	**	**	**	**	**	**	**	**	**	**
Dissolved Copper (µg/L)	5	5	**	**	**	**	**	**	**	**
Dissolved Zinc (µg/L)	**	**	**	**	**	**	**	**	**	**
Dissolved Selenium (µg/L)	**	**	**	**	**	**	**	**	**	**
Dissolved Silver (µg/L)	**	**	**	**	**	**	**	**	**	**
Dissolved Cadmium (µg/L)	**	**	**	**	**	**	**	**	**	**
Dissolved Lead (µg/L)	**	**	**	**	**	**	**	**	**	**
Total Beryllium (µg/L)	**	**	**	**	**	**	**	**	**	**
Total Chromium (µg/L)	**	**	**	**	**	**	**	**	**	**
Total Manganese (µg/L)	**	**	**	**	0.17	**	0.22	**	0.16	**
Total Magnesium (mg/L)	**	**	**	**	**	**	**	**	**	**
Total Nickel (µg/L)	**	**	**	**	**	**	**	**	**	**
Total Copper (µg/L)	17	**	27	**	15	**	17	**	7	6
Total Zinc (µg/L)	0.11	**	0.28	**	0.16	**	0.07	**	0.11	**
Total Arsenic (µg/L)	**	**	**	**	**	**	**	**	**	**
Total Selenium (µg/L)	**	**	**	**	**	**	**	**	**	**
Total Molybdenum (µg/L)	**	**	**	**	**	**	**	**	**	**
Total Silver (µg/L)	**	**	**	**	**	**	**	**	**	**
Total Cadmium (µg/L)	**	**	**	**	**	**	**	**	**	**
Total Antimony (µg/L)	**	**	**	**	**	**	**	**	**	**
Total Lead (µg/L)	**	**	25	**	**	**	**	**	10	**
Nitrite+Nitrate (mg/L)	0.76	**	**	**	1.76	**	0.88	**	1.02	**
Dissolved Phosphorus (mg/L)	0.188	**	1.121	**	0.936	**	0.521	**	0.533	**
Dissolved Potassium (mg/L)	**	**	**	**	**	**	**	**	**	**
Total Phosphate (mg/L)	0.479	**	0.117	**	0.226	**	0.184	**	0.193	**
Total Nitrogen (mg/L)	4.66	**	6.35	**	8.46	**	3.68	**	4.42	**
Total Suspended Solids (mg/L)	513	**	1280	**	252	**	320	**	337	**

\*\*No Data

Note: 0 values indicate a level below the detection limit.

**Table A-5. Water Quality Data for 2005**

Water Quality Constituent	Storm 1		Storm 2		Storm 3		Storm 4		Storm 5		Storm 6	
	2005		11-Jun		26-Jul		4-Aug		5-Aug		15-Sep	
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
Alkalinity (mg/L)	**	**	21	58	16	50	28	48	37	60	43	44
Chloride (mg/L)	5	**	2	8	2	10	5	11	5	10	4	15
Chemical Oxygen Demand (mg/L)	28	**	32	35	80	61	207	61	27	48	95	59
Conductivity (umho/cm)	**	**	67.9	224	70	216	141	215	129	241	54	188
E Coli (#/100 mL)	**	**	**	**	**	**	>240000	22000	3300	11000	17000	7900
Hardness (mg/L)	**	**	72	80	0	85	95	98	52	42	0	75
pH	**	**	6.6	7.4	6.8	6.7	7	7.2	7.7	7.5	6.4	6.4
Total Organic Carbon (mg/L)	**	**	8	11	16	17	60	18	7	10	14	19
Dissolved Calcium (mg/L)	**	**	**	**	**	**	**	**	**	**	**	**
Dissolved Iron (mg/L)	**	**	**	**	**	**	**	**	**	**	**	**
Dissolved Magnesium (mg/L)	**	**	**	**	**	**	**	**	**	**	**	**
Dissolved Sodium (mg/L)	**	**	**	**	**	**	**	**	**	**	**	**
Dissolved Chromium (µg/L)	0	**	**	**	0	0	0	0	**	**	0	0
Dissolved Manganese (µg/L)	**	**	**	**	**	**	**	**	**	**	**	**
Dissolved Nickel (µg/L)	**	**	**	**	**	**	**	**	**	**	**	**
Dissolved Copper (µg/L)	**	**	0	1	5	4	13	18	4	5	5	5
Dissolved Zinc (µg/L)	**	**	14.6	7.4	15	9.8	46.7	10.9	7.4	5.4	18.6	148
Dissolved Selenium (µg/L)	**	**	**	**	**	**	**	**	**	**	**	**
Dissolved Silver (µg/L)	**	**	**	**	**	**	**	**	**	**	**	**
Dissolved Cadmium (µg/L)	0.2	**	**	**	0	0	0	0	**	**	0	0
Dissolved Lead (µg/L)	**	**	0	0	0	0	0	0	0	0	0	0
Total Beryllium (µg/L)	**	**	**	**	**	**	**	**	**	**	**	**
Total Chromium (µg/L)	**	**	0	0	0	0	0	0	0	0	**	0
Total Manganese (µg/L)	30	**	40	10	90	160	130	40	0	0	60	40
Total Magnesium (mg/L)	**	**	**	**	2	3.4	2.9	3.2	**	**	2.1	4.1
Total Nickel (µg/L)	**	**	0	0	0	0	0	0	0	0	0	0
Total Copper (µg/L)	9	**	7	6	20	**	25	6	3	5	16	7
Total Zinc (µg/L)	50	**	60	40	120	50	130	40	30	40	70	20
Total Arsenic (µg/L)	**	**	**	**	**	**	**	**	**	**	**	**
Total Selenium (µg/L)	**	**	**	**	**	**	**	**	**	**	**	**
Total Molybdenum (µg/L)	**	**	**	**	**	**	**	**	**	**	**	**
Total Silver (µg/L)	**	**	**	**	**	**	**	**	**	**	**	**
Total Cadmium (µg/L)	**	**	**	**	**	**	**	**	**	**	**	**
Total Antimony (µg/L)	**	**	**	**	**	**	**	**	**	**	**	**
Total Lead (µg/L)	0	**	0	0	0	0	0	0	0	0	0	0
Nitrite+Nitrate (mg/L)	0.61	**	0.6	0.73	0.72	0.57	0.199	0.55	0.37	0.51	0.99	0.99
Dissolved Phosphorus (mg/L)	0.169	**	0.154	0.27	0.103	0.22	0.157	0.346	0.237	0.375	0.483	0.181
Dissolved Potassium (mg/L)	**	**	**	**	**	**	**	**	**	**	**	**
Total Phosphorus (mg/L)	0.204	**	0.209	0.307	0.194	0.295	0.51	0.396	0.251	0.425	0.323	0.272
Total Kjeldahl Nitrogen (mg/L)	**	**	1.3	3.4	2.4	2.2	5.8	1.9	1.9	1.7	2.4	2.7
Total Suspended Solids (mg/L)	35	**	26	62	64	14	152	12	9	7	107	10

\*\*No Data

Note: 0 values indicate a level below the detection limit.



Table A-7. Water Quality Data for 2007

Water Quality Constituent	Storm 1 17-Apr		Storm 2 2-May		Storm 3 25-May		Storm 4 31-May		Storm 5 7-Jun		Storm 6 7-Aug		Storm 7 15-Aug		Storm 8 23-Aug	
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
2007																
Alkalinity (mg/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Chloride (mg/L)	8	13	7	**	**	**	**	**	9	21	18	28	13	34	5	21
Chemical Oxygen Demand (mg/L)	**	**	**	**	**	**	**	**	**	**	150	71	289	105	174	79
Conductivity (umho/cm)	**	**	**	**	**	**	**	**	**	**	295	**	235	467	80.6	286
E. coli (#/100 mL)	230	**	>240000	92000	**	3500	49000	**	160000	230	**	**	9400	1700	11000	3300
Hardness (mg/L)	**	**	**	**	**	**	**	**	**	**	113	**	79	135	41	87
pH	**	**	**	**	**	**	**	**	**	**	6.8	**	6.8	7.1	6.8	7.1
Total Organic Carbon (mg/L)	**	**	**	**	**	**	**	**	**	**	**	**	76	30	33	12
Dissolved Calcium (mg/L)	**	**	**	**	**	**	**	**	18	**	32	34	**	**	**	**
Dissolved Iron (mg/L)	**	**	**	**	**	**	**	0.07	0.16	**	0	0	**	**	**	**
Dissolved Magnesium (mg/L)	**	**	**	**	**	**	**	2.4	2.1	**	5.7	6.4	**	**	**	**
Dissolved Sodium (mg/L)	**	**	**	**	**	**	**	10	12	**	21	29	**	**	**	**
Dissolved Chromium (µg/L)	0	0	**	**	**	**	**	1.8	0	2	0	1.4	0	1.9	0	0
Dissolved Manganese (µg/L)	**	**	**	**	**	**	**	90.1	10.5	62	**	7.2	6.3	98.5	93.6	9
Dissolved Nickel (µg/L)	**	**	**	**	**	**	**	2.7	1.4	3	**	3.5	2	3.4	4.2	1.1
Dissolved Copper (µg/L)	**	**	**	**	**	**	**	10.5	5.2	17	4	14.4	6.3	23.2	7.8	6.6
Dissolved Zinc (µg/L)	**	**	**	**	**	**	**	38.2	11.2	43	**	15.6	9.8	52.1	56.6	8.4
Dissolved Selenium (µg/L)	**	**	**	**	**	**	**	**	0	**	**	1.3	0	0	0	0
Dissolved Silver (µg/L)	**	**	**	**	**	**	**	**	0	**	**	0	0	0	0	0
Dissolved Cadmium (µg/L)	0	0	0.2	**	**	**	0.1	0	0	**	0	0	0	1.7	0	0
Dissolved Lead (µg/L)	**	**	**	**	**	**	**	**	0	0	0	0	0	0	0	0
Total Beryllium (µg/L)	**	**	**	**	**	**	**	**	0	0	0	0	0	0	0	0
Total Chromium (µg/L)	0	0	**	**	**	**	**	1.8	0	0	0	0	1.9	0	0	0
Total Manganese (µg/L)	0.04	0	0.08	**	**	**	**	**	**	**	11	15	149	114	51	39
Total Magnesium (mg/L)	2	28	2.8	**	**	**	**	**	**	**	**	**	**	**	**	**
Total Nickel (µg/L)	0	**	0	**	**	**	**	**	**	**	**	**	**	**	**	**
Total Copper (µg/L)	6	4	8	**	**	**	**	20	0	31	4	15	8	30	12.5	13
Total Zinc (µg/L)	**	**	0	**	**	**	**	80	0	80	0	0	113	91	57	9.8
Total Arsenic (µg/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Total Selenium (µg/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Total Molybdenum (µg/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Total Silver (µg/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Total Cadmium (µg/L)	**	**	0	**	**	**	**	0	0	0	0	0	0	4	0	0
Total Antimony (µg/L)	**	**	0	**	**	**	**	0	0	0	0	0	0	0	0	0
Total Lead (µg/L)	0	0	0	**	**	**	**	0	0	0	0	0	0	0	0	0
Nitrite-Nitrate (mg/L)	1.05	0.99	0.58	0.39	**	0.66	0.16	0.56	0.8	**	2.12	0.33	2.21	2.98	0.88	0.45
Dissolved Phosphorus (mg/L)	0.163	0.083	0.117	0.102	**	**	0.089	0.173	0.154	0.22	0.357	0.158	0.892	0.478	0.156	0.232
Dissolved Potassium (mg/L)	**	**	**	**	**	**	5	3	6	**	6	5	**	**	**	**
Total Phosphate (mg/L)	0.231	0.232	0.289	0.271	**	**	0.938	0.348	0.616	0.482	0.349	0.196	0.899	0.488	0.39	0.339
Total Kjeldahl Nitrogen (mg/L)	3	3.3	2.8	2.79	**	3.2	11.6	2	7.3	4.4	4.6	1.6	7.12	3.5	3.1	1.3
Total Suspended Solids (mg/L)	28	34	26	**	**	12	494	19	103	83	8	5	138	30	648	19

\*\*No Data

Table A-8. Water Quality Data for 2008

Water Quality Constituent	Storm 1		Storm 2		Storm 3		Storm 4		Storm 5		Storm 6		Storm 7		Storm 8	
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
2008																
Alkalinity (mg/L)	**	**	54	76	70	64	64	68	20	32	**	**	20	58	20	60
Chloride (mg/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Chemical Oxygen Demand (mg/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Conductivity (umho/cm)	**	**	139	591	216	558	290	438	83	161	**	**	80	315	**	**
E.Coli (#/100 mL)	50	8	0	0	0	0	4	23	130	50	30	30	500	30	240	900
Hardness (mg/L)	**	**	48	130	66	110	112	110	22	48	**	**	26	76	30	88
pH	**	**	8.78	7.85	8.33	7.38	7.46	7.4	7.24	7.08	**	**	6.6	7.1	6.71	7.09
Total Organic Carbon (mg/L)	**	**	6	11	15	9	72	19	10	13	9	9	12	17	32	30
Dissolved Calcium (mg/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Dissolved Iron (mg/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Dissolved Magnesium (mg/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Dissolved Sodium (mg/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Dissolved Chromium (ug/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Dissolved Manganese (ug/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Dissolved Nickel (ug/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Dissolved Copper (ug/L)	11.4	10.2	8.5	8.1	9.8	9.4	30	0	0	0	10	10	10	0	13.5	7.3
Dissolved Zinc (ug/L)	14	5	4	4	3	6	0	0	0	0	0	0	20	0	16	33
Dissolved Selenium (ug/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Dissolved Silver (ug/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Dissolved Lead (ug/L)	0	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0
Total Beryllium (ug/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Total Chromium (ug/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Total Manganese (ug/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Total Magnesium (mg/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Total Nickel (ug/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Total Copper (ug/L)	**	**	4.8	4.5	73.6	13.6	**	**	10	0	0	0	20	0	26.2	13.1
Total Zinc (ug/L)	**	**	18	14	12	35	70	50	70	20	20	10	140	50	150	12
Total Arsenic (ug/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Total Selenium (ug/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Total Molybdenum (ug/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Total Silver (ug/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Total Cadmium (ug/L)	**	**	1	0	0	0	0	0	0	0	0	0	0	0	0.3	0.4
Total Antimony (ug/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Total Lead (ug/L)	**	**	9	9	0.8	2.4	0	0	0	0	0	0	0	0	9.6	0.2
Nitrate-Nitrate (mg/L)	1.105	0.823	0.768	0.699	1.141	0.661	2.703	0.447	0.617	0.925	0.662	0.664	0.771	0.533	1.101	0.772
Ortho-Phosphate (mg/L)	**	**	0.08	0.044	0.154	0.096	0.255	0.25	0.164	0.264	0.181	0.191	0.062	0.04	**	**
Dissolved Phosphorus (mg/L)	0.155	0.14	0.082	0.06	0.17	0.117	0.394	0.279	0.175	0.291	0.17	0.175	0.07	0.074	0.093	0.176
Dissolved Potassium (mg/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Total Ortho-Phosphate (mg/L)	**	**	0.112	0.074	0.175	0.175	1.053	0.354	0.258	0.255	0.185	0.182	**	**	0.045	0.161
Total Phosphorus (mg/L)	0.239	0.234	0.115	0.165	0.21	0.243	1.252	0.49	0.289	0.286	0.229	0.205	0.305	0.296	0.477	0.377
Total Kjeldahl Nitrogen (mg/L)	**	**	1.653	1.983	2.01	2.19	**	**	**	**	**	**	**	**	**	**
Total Nitrogen (mg/L)	2.813	2.841	1.76	2.429	2.183	2.365	5.503	3.457	2.4	5.416	2.019	2.068	2.105	2.002	3.195	3.244
Total Suspended Solids (mg/L)	24	18	23.4	21.8	9.2	38.8	512	93	71	15	34.2	30.2	266	66	123.8	35.8

Note: 0 values indicate a level below the detection limit.  
 \*\*No Data

Table A-9. Water Quality Data for 2009

Water Quality Constituent	Storm Event 1		Storm Event 2		Storm Event 3		Storm Event 5		Storm Event 7		Storm Event 8		Storm Event 9		Storm Event 10		Storm Event 11		Storm Event 12	
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
2009	4/16/2009		4/26/2009		5/9/2009		6/1/2009		6/23/2009		6/25/2009		7/14/2009		7/21/2009		7/27/2009		7/28/2009	
Total Phosphorus (mg/L)	0.309	0.668	0.25	0.21	0.765	0.261	0.953	0.416	1.728	2.058	0.443	0.722	0.382	0.616	0.967	0.574	0.738	0.602	0.366	0.659
Dissolved Phosphorus (mg/L)	0.163	0.437	0.13	0.14	0.414	0.077	0.365	0.265	1.623	1.682	0.3	0.59	0.159	0.223	0.86	0.199	0.541	0.357	0.161	0.453
Total Ortho-Phosphate (mg/L)	0.212	0.472	0.17	0.15	0.483	0.091	0.282	0.271	1.82	1.868	0.322	0.613	0.145	0.317	0.845	0.203	0.489	0.4	N/A	N/A
Dissolved Ortho-Phosphate (mg/L)	0.138	0.357	0.11	0.12	0.38	0.055	0.308	0.239	1.665	1.839	0.267	0.514	0.124	0.182	0.794	0.162	0.49	0.303	N/A	N/A
Total Nitrogen (mg/L)	4.027	2.22	7.4	1.8	8.675	2.302	9.547	3.191	12.01	10.11	3.029	5.758	3.882	2.104	3.205	2.233	1.989	1.538	1.745	1.706
Nitrite+Nitrate (mg/L)	0.506	0.54	1.5	0.7	1.122	0.453	1.066	0.568	0.991	0.288	0.785	1.036	0.185	0.605	1.023	0.289	0.265	0.017	0.793	17
Dissolved Cadmium (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Cadmium (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dissolved Copper (mg/L)	0.006	0.006	0.013	0.005	0.02	0.015	0.04	0.014	0.02	0.028	0.016	0.01	0.014	0.008	0.015	0.007	0.006	ND	0.015	0.012
Total Copper (mg/L)	0.012	0.01	0.012	0.01	0.017	ND	0.031	0.007	0.009	0.007	0.016	0.01	0.008	0.009	0.008	0.008	0.011	0.006	0.006	0.006
Dissolved Lead (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Lead (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dissolved Zinc (mg/L)	0.039	0.036	ND	ND	ND	ND	0.045	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Zinc (mg/L)	0.052	0.042	0.063	0	0.062	ND	0.17	0.053	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TSS (mg/L)	90.6	49.4	72	15	75	23.2	208	44	5.3	6.5	49	15.3	27	75.3	17.4	224	34.5	40.5	35.2	37
Alkalinity (mg/L)	36	44	22	40	42	42	38	60	106	114	N/A	N/A	158	64	114	34	92	48	22	62
Hardness (mg/L)	32	52	22	217	48	54	52	66	172	128	N/A	N/A	292	66	144	38	106	62	20	62
pH	7.49	7.31	7.3	7.2	7.03	7.22	6.85	7.19	8.77	7.52	N/A	N/A	8.6	7.21	7.88	7.25	7.34	6.76	6.83	7.04
Total Organic Carbon (mg/L)	7.5	20.5	15.5	9.4	25.8	12.1	N/A	N/A	27.2	22.7	9.98	15.5	15.2	13.2	22.2	13.9	27.9	33	25.1	26
E Coli (#/100mL)	0	0	900	4	80	50	500	1300	30	4	240	300	300	230	800	1100	N/A	N/A	800	500

ND = Not Detectable





Table A-11. Water Quality Data for 2011

Water Quality Constituent	Storm 1		Storm 2		Storm 3		Storm 5		Storm 6		Storm 7		Storm 8		Storm 9		Storm 10	
	28-Apr		27-Apr		11-May		18-May		20-Jun		7-Jul		8-Jul		13-Jul		15-Sep	
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
2011																		
Alkalinity (mg/L)	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Chloride (mg/L)	3.2	23.2	14.7	24.9	4.4	12.7	3.6	10.3	10.4	8.8	7.9	10.8	5.3	11.6	0	7.1	3	15.2
Chemical Oxygen Demand (mg/L)	85	151	108	54	98	62	68	50	44	39	133	102	59	71	27	48	59	41
Hardness	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
pH	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Total Organic Carbon	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Dissolved Calcium (mg/L)	8	22	22	38	9	20	10	24	19	17	14	21	11	21	4	15	6	23
Dissolved Iron (mg/L)	0.11	0.08	0.07	0.06	0.05	0.06	0.07	0.06	0	0	0.12	0.1	0	0.06	0	0.2	0	0
Dissolved Magnesium (mg/L)	0.8	2.9	4.2	6.8	1.2	3.2	1.4	3.7	2.8	2.6	2.3	3.2	1.6	3.4	0.7	2.6	1	3.9
Dissolved Sodium (mg/L)	6	31	16	32	6	17	6	20	12	12	7	15	6	15	3	11	4	17
Dissolved Chromium (µg/L)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dissolved Manganese (µg/L)	8.4	17.7	10.3	14.7	14.5	18.7	2.5	3.8	1.1	1	34.8	81.3	11.6	42.6	2.5	15.4	5.8	6.3
Dissolved Nickel (µg/L)	2	2.1	1.8	1.6	1.7	1.4	0	1.2	0	0	2.7	2.1	1	1.4	0	1.2	0	0
Dissolved Copper (µg/L)	7.1	5.2	4.1	3.1	6	3.7	2.8	3.7	3.7	3.4	5.2	4.4	3.5	2.6	2.2	3	0	2.2
Dissolved Zinc (µg/L)	24.3	11	17.3	8.8	19.7	21.6	6.7	7.4	6.6	5.4	14.4	12	9.3	9.3	9.5	14.7	9.2	6
Dissolved Selenium (µg/L)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dissolved Silver (µg/L)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dissolved Cadmium (µg/L)	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dissolved Lead (µg/L)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Beryllium (µg/L)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Chromium (µg/L)	1.8	0	3.8	0	1.2	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Manganese (µg/L)	32.5	63.2	76.9	44.1	29.9	106	26.5	24.5	8.4	12.2	74.2	93.4	65.3	60.8	14.7	31.8	41.1	18.6
Total Nickel (µg/L)	3	2.7	5.6	2.4	2.6	1.8	2	1.7	1.2	0	4.6	2.7	4	0	0	0	0	0
Total Copper (µg/L)	9	6	13.3	5.3	26.7	11.8	5.2	4.4	5.2	4.1	10	4.7	9.7	4.9	0	2.7	4.5	0
Total Zinc (µg/L)	40.4	19.2	70.2	19.6	34.8	21.7	23.5	16.8	0	0	0	0	52.7	0	0	0	0	0
Total Arsenic (µg/L)	0	1.3	1.6	1.2	0	1.6	0	1.7	0	0	0	0	0	0	0	0	0	0
Total Selenium (µg/L)	0	0.8	0	0	0	0.5	0	0.5	0	0	0	0	0	0	0	0	0	0
Total Molybdenum (µg/L)	0	3.6	6.5	10.7	1.4	3.2	1.5	3.6	3.9	3.1	0	0	0	0	0	0	0	0
Total Silver (µg/L)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Cadmium (µg/L)	0	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Antimony (µg/L)	0.5	0	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Lead (µg/L)	1.7	0	4.5	1.1	3.8	0	1.6	0	0	0	0	0	0	0	0	0	0	0
Nitrate+Nitrate (mg/L)	1.14	1.08	0.48	0.35	0.55	0.71	0.65	0.67	0.7	0.5	0.26	0.3	0.48	0.3	1.03	0.86	0.42	0.52
Dissolved Phosphorus (mg/L)	0.26	0.14	0.36	0.27	0.3	0.25	0.18	0.18	0.23	0.18	0.06	0.03	0.08	0.14	0.12	0.27	0.17	0.27
Dissolved Potassium (mg/L)	3	7	6	7	3	4	2	4	4	4	4	4	3	4	2	4	2	4
Total Phosphorus (mg/L)	0.37	0.21	0.63	0.31	0.41	0.32	0.22	0.25	0.31	0.3	0.41	0.23	0.43	0.39	0.19	0.39	0.27	0.32
Total Kjeldahl Nitrogen (mg/L)	2.7	2.4	3.9	2	2.9	1.9	1.8	1.7	1.6	1.2	3.2	1.8	1.4	1.7	1.1	1.7	1.7	1.2
Total Suspended Solids (mg/L)	52	20	176	27	40	531	58	23	7	6	103	26	180	47	18	22	52	12

\*\*No Data

Note: 0 values indicate a level below the detection threshold.

## Appendix B: Descriptive Statistics

**Table B-1. Descriptive Statistics for Alkalinity**

Statistic	Inlet 01-11	Outlet 01-11	Inlet 2001	Outlet 2001	Inlet 2002	Outlet 2002	Inlet 2003	Outlet 2003	Inlet 2005	Outlet 2005	Inlet 2006	Outlet 2006	Inlet 2007	Outlet 2007	Inlet 2008	Outlet 2008	Inlet 2009	Outlet 2009	Inlet 2011	Outlet 2011
No. of observations	41.0	46.0	3.0	3.0	5.0	5.0	4.0	4.0	6.0	6.0	10.0	10.0	8.0	8.0	8.0	8.0	10.0	10.0	10.0	10.0
Minimum	0.0	19.0	43.0	78.0	19.0	19.0	18.0	33.0	16.0	44.0	122.0	51.0	28.0	32.0	20.0	32.0	22.0	34.0	0.0	42.0
Maximum	158.0	122.0	64.0	122.0	50.0	81.0	27.0	49.0	43.0	60.0	122.0	115.0	56.0	89.0	70.0	76.0	158.0	114.0	46.0	62.0
Range	158.0	103.0	21.0	44.0	31.0	62.0	9.0	16.0	27.0	16.0	0.0	64.0	28.0	57.0	50.0	44.0	136.0	80.0	46.0	20.0
1st Quartile	21.0	44.0	46.5	90.5	20.0	43.0	19.5	41.0	21.0	48.0	122.0	53.0	35.0	41.0	20.0	58.5	36.0	42.0	0.0	45.0
Median	39.5	58.0	50.0	103.0	41.0	69.0	21.0	49.0	28.0	50.0	122.0	79.0	42.0	52.5	37.0	62.0	42.0	48.0	33.0	53.0
3rd Quartile	51.0	69.0	57.0	112.5	48.0	76.0	24.0	49.0	37.0	58.0	122.0	81.0	49.0	68.0	61.5	67.0	106.0	62.0	43.0	54.0
Mean	44.9	60.2	52.3	101.0	35.6	57.6	22.0	43.7	29.0	52.0	122.0	75.8	42.0	56.5	41.3	59.7	70.0	56.4	24.4	51.2
Standard deviation (n)	32.9	22.4	8.7	18.0	13.5	23.3	3.7	7.5	9.9	6.1	0.0	23.3	11.4	21.4	21.8	13.7	46.0	22.7	20.4	7.1

**Table B-2. Descriptive Statistics for Chemical Oxygen Demand**

Statistic	Inlet 01-11	Outlet 01-11	Inlet 2001	Outlet 2001	Inlet 2002	Outlet 2002	Inlet 2003	Outlet 2003	Inlet 2004	Inlet 2005	Outlet 2005	Inlet 2006	Outlet 2006	Inlet 2007	Outlet 2007	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	65.0	53.0	3.0	3.0	5.0	5.0	4.0	4.0	5.0	6.0	6.0	10.0	10.0	8.0	8.0	24.0	24.0	10.0	10.0
Minimum	0.0	0.0	55.0	41.0	45.0	42.0	60.0	73.0	21.0	27.0	35.0	34.0	50.0	150.0	71.0	0.0	0.0	27.0	39.0
Maximum	487.0	235.0	209.0	86.0	139.0	90.0	278.0	102.0	383.0	207.0	61.0	245.0	235.0	289.0	105.0	487.0	216.0	133.0	151.0
Range	487.0	235.0	154.0	45.0	94.0	48.0	218.0	29.0	362.0	180.0	26.0	211.0	185.0	139.0	34.0	487.0	216.0	106.0	112.0
1st Quartile	59.0	50.0	75.5	48.0	74.0	45.0	99.0	76.5	51.0	29.0	48.0	64.5	69.0	162.0	75.0	71.0	47.0	47.8	48.0
Median	96.0	71.0	96.0	55.0	87.0	62.0	119.0	80.0	120.0	56.0	59.0	76.0	73.0	174.0	79.0	108.0	104.5	63.5	54.0
3rd Quartile	154.0	102.0	152.5	70.5	120.0	81.0	164.0	91.0	190.0	91.3	61.0	106.3	95.0	231.5	92.0	173.0	133.5	94.8	71.0
Mean	124.6	82.5	120.0	60.7	93.0	64.0	144.0	85.0	153.0	78.2	52.8	101.3	97.4	204.3	85.0	153.3	99.9	71.6	68.7
Standard deviation (n)	102.5	46.8	65.1	18.8	33.3	19.0	81.2	12.4	129.0	63.4	10.1	68.6	54.7	60.7	14.5	129.9	60.1	32.2	34.3

**Table B-3. Descriptive Statistics for Chloride**

Statistic	Inlet 01-11	Outlet 01-11	Inlet 2001	Outlet 2001	Inlet 2002	Outlet 2002	Inlet 2003	Outlet 2003	Inlet 2004	Inlet 2005	Outlet 2005	Inlet 2006	Outlet 2006	Inlet 2007	Outlet 2007	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	67.0	56.0	3.0	3.0	5.0	5.0	4.0	4.0	5.0	6.0	6.0	10.0	10.0	8.0	8.0	24.0	24.0	10.0	10.0
Minimum	0.0	3.0	6.0	18.0	3.0	10.0	0.0	4.0	3.0	2.0	8.0	13.0	9.0	5.0	3.0	0.0	5.0	0.0	7.1
Maximum	39.7	38.0	9.0	26.0	9.0	20.0	6.0	6.0	14.0	5.0	15.0	27.0	30.0	18.0	34.0	39.7	38.0	14.7	24.9
Range	39.7	35.0	3.0	8.0	6.0	10.0	6.0	2.0	11.0	3.0	7.0	14.0	21.0	13.0	31.0	39.7	33.0	14.7	17.8
1st Quartile	3.3	10.0	7.0	21.0	4.0	12.0	1.5	4.0	4.0	2.5	10.0	21.3	12.5	7.3	9.0	3.2	11.3	3.1	10.3
Median	6.0	14.0	8.0	24.0	6.0	16.0	2.0	4.0	4.0	4.5	10.0	25.0	20.0	8.5	21.0	6.0	15.1	4.0	11.6
3rd Quartile	10.7	21.0	8.5	25.0	9.0	17.0	3.0	5.0	12.0	5.0	11.0	26.3	22.5	12.0	24.5	12.3	19.4	7.3	15.2
Mean	8.7	15.7	7.7	22.7	6.2	15.0	2.5	4.7	7.4	3.8	10.8	22.5	18.4	10.0	17.9	10.6	17.0	5.6	13.8
Standard deviation (n)	8.5	8.1	1.2	3.4	2.5	3.6	2.2	0.9	4.6	1.3	2.3	5.6	6.9	4.3	10.6	11.2	8.7	4.1	5.9

**Table B-4. Descriptive Statistics for Conductivity**

Statistic	Inlet 01-08	Outlet 01-08	Inlet 2001	Outlet 2001	Inlet 2002	Outlet 2002	Inlet 2003	Outlet 2003	Inlet 2004	Outlet 2004	Inlet 2005	Outlet 2005	Inlet 2006	Outlet 2006	Inlet 2007	Outlet 2007	Inlet 2008	Outlet 2008
No. of observations	27.0	31.0	3.0	3.0	5.0	5.0	4.0	4.0	5.0	5.0	6.0	6.0	10.0	10.0	8.0	8.0	8.0	8.0
Minimum	54.0	126.0	172.0	369.0	81.1	209.0	84.4	152.0	54.0	188.0	54.0	188.0	538.0	200.0	80.6	126.0	80.0	161.0
Maximum	538.0	591.0	240.0	525.0	232.0	434.0	125.0	245.0	54.0	188.0	141.0	241.0	538.0	416.0	295.0	467.0	290.0	591.0
Range	484.0	465.0	68.0	156.0	150.9	225.0	40.6	93.0	0.0	0.0	87.0	53.0	0.0	216.0	214.4	341.0	210.0	430.0
1st Quartile	82.1	211.0	193.0	421.5	116.0	232.0	102.2	189.5	54.0	188.0	67.9	215.0	538.0	213.0	181.4	165.0	83.0	315.0
Median	139.0	245.0	214.0	474.0	162.0	367.0	120.0	227.0	54.0	188.0	70.0	216.0	538.0	300.0	225.0	232.0	139.0	438.0
3rd Quartile	222.0	394.5	227.0	499.5	228.0	373.0	122.5	236.0	54.0	188.0	129.0	224.0	538.0	339.0	250.0	331.3	216.0	558.0
Mean	165.3	305.4	208.7	456.0	163.8	323.0	109.8	208.0	54.0	188.0	92.4	216.8	538.0	293.6	206.4	264.3	161.6	412.6
Standard deviation (n)	102.6	127.0	28.0	64.9	59.8	87.2	18.1	40.3	0.0	0.0	35.4	17.2	0.0	80.4	78.4	130.5	81.0	159.0

**Table B-5. Descriptive Statistics for Hardness**

Statistic	Inlet 01-11	Outlet 01-11	Inlet 2001	Outlet 2001	Inlet 2002	Outlet 2002	Inlet 2003	Outlet 2003	Inlet 2005	Outlet 2005	Inlet 2006	Outlet 2006	Inlet 2007	Outlet 2007	Inlet 2008	Outlet 2008	Inlet 2009	Outlet 2009	Inlet 2011	Outlet 2011
No. of observations	41.0	45.0	3.0	3.0	5.0	5.0	4.0	4.0	6.0	6.0	10.0	10.0	8.0	8.0	8.0	8.0	10.0	10.0	10.0	10.0
Minimum	0.0	36.0	72.0	118.0	88.0	64.0	55.0	51.0	0.0	42.0	178.0	82.0	41.0	36.0	22.0	48.0	20.0	38.0	23.0	54.0
Maximum	292.0	217.0	115.0	158.0	197.0	130.0	94.0	88.0	95.0	98.0	178.0	168.0	113.0	135.0	112.0	130.0	292.0	217.0	61.0	89.0
Range	292.0	181.0	43.0	40.0	109.0	66.0	39.0	37.0	95.0	56.0	0.0	86.0	72.0	99.0	90.0	82.0	272.0	179.0	38.0	35.0
1st Quartile	41.0	62.0	73.5	138.0	89.0	125.0	58.5	59.0	0.0	75.0	178.0	92.0	69.5	47.3	27.0	79.0	32.0	54.0	33.0	61.0
Median	66.0	85.0	75.0	158.0	96.0	125.0	62.0	67.0	52.0	80.0	178.0	101.0	79.0	69.0	39.0	99.0	52.0	62.0	56.0	77.0
3rd Quartile	96.0	125.0	95.0	158.0	127.0	126.0	78.0	77.5	72.0	85.0	178.0	145.0	87.5	99.0	61.5	110.0	144.0	66.0	56.0	84.0
Mean	78.0	92.4	87.3	144.7	119.4	114.0	70.3	68.7	43.8	76.0	178.0	117.6	78.0	77.3	50.7	93.7	98.7	82.8	45.8	73.0
Standard deviation (n)	56.7	39.1	19.6	18.9	41.3	25.1	17.0	15.2	38.3	18.6	0.0	33.1	25.5	38.1	31.3	26.7	85.7	53.0	15.0	13.4

**Table B-6. Descriptive Statistics for pH**

Statistic	Inlet 01-11	Outlet 01-11	Inlet 2001	Outlet 2001	Inlet 2002	Outlet 2002	Inlet 2003	Outlet 2003	Inlet 2005	Outlet 2005	Inlet 2006	Outlet 2006	Inlet 2007	Outlet 2007	Inlet 2008	Outlet 2008	Inlet 2009	Outlet 2009	Inlet 2011	Outlet 2011
No. of observations	41.0	45.0	3.0	3.0	5.0	5.0	4.0	4.0	6.0	6.0	10.0	10.0	8.0	8.0	8.0	8.0	10.0	10.0	10.0	10.0
Minimum	6.2	6.4	7.0	7.5	6.4	6.5	6.5	6.6	6.4	6.4	7.4	6.7	6.2	6.4	6.6	7.1	6.8	6.8	6.8	7.0
Maximum	8.8	8.0	7.5	8.0	7.3	7.4	7.0	7.0	7.7	7.5	7.4	6.9	6.8	7.1	8.8	7.9	8.8	7.5	7.7	7.6
Range	2.6	1.6	0.5	0.5	0.9	0.9	0.5	0.4	1.3	1.1	0.0	0.2	0.6	0.7	2.2	0.8	1.9	0.8	0.9	0.6
1st Quartile	6.8	6.9	7.2	7.8	6.7	7.3	6.7	6.7	6.6	6.7	7.4	6.9	6.5	6.9	6.8	7.1	7.0	7.2	7.0	7.2
Median	7.0	7.2	7.4	8.0	7.0	7.3	6.9	6.8	6.8	7.2	7.4	6.9	6.7	7.1	7.4	7.2	7.3	7.2	7.0	7.2
3rd Quartile	7.4	7.4	7.5	8.0	7.2	7.3	7.0	6.9	7.0	7.4	7.4	6.9	6.8	7.1	8.1	7.4	7.9	7.3	7.4	7.5
Mean	7.2	7.2	7.3	7.8	6.9	7.2	6.8	6.8	6.9	7.0	7.4	6.9	6.6	6.9	7.5	7.3	7.6	7.2	7.2	7.3
Standard deviation (n)	0.6	0.4	0.2	0.2	0.3	0.3	0.2	0.2	0.4	0.4	0.0	0.1	0.2	0.3	0.8	0.3	0.7	0.2	0.3	0.2

**Table B-7. Descriptive Statistics for Total Organic Carbon**

Statistic	Inlet 01-11	Outlet 01-11	Inlet 2001	Outlet 2001	Inlet 2002	Outlet 2002	Inlet 2003	Outlet 2003	Inlet 2005	Outlet 2005	Inlet 2006	Outlet 2006	Inlet 2007	Outlet 2007	Inlet 2008	Outlet 2008	Inlet 2009	Outlet 2009	Inlet 2011	Outlet 2011
No. of observations	41.0	46.0	3.0	3.0	5.0	5.0	4.0	4.0	6.0	6.0	10.0	10.0	8.0	8.0	8.0	8.0	10.0	10.0	10.0	10.0
Minimum	6.0	8.0	14.0	13.0	14.0	13.0	9.0	17.0	7.0	10.0	18.0	14.0	33.0	8.0	6.0	9.0	7.5	9.4	9.0	10.0
Maximum	76.0	33.3	26.0	20.0	38.0	29.0	25.0	33.0	60.0	19.0	18.0	33.3	76.0	31.0	72.0	30.0	27.9	33.0	32.0	28.0
Range	70.0	25.3	12.0	7.0	24.0	16.0	16.0	16.0	53.0	9.0	0.0	19.3	43.0	23.0	66.0	21.0	20.4	23.6	23.0	18.0
1st Quartile	12.0	12.3	17.0	16.0	16.0	20.0	15.0	18.0	8.0	11.0	18.0	14.0	48.5	11.0	9.5	10.0	15.2	13.2	10.0	11.0
Median	16.0	17.0	20.0	19.0	20.0	20.0	21.0	19.0	14.0	17.0	18.0	14.0	64.0	21.0	12.0	13.0	22.2	15.5	12.0	12.0
3rd Quartile	26.0	22.2	23.0	19.5	23.0	23.0	23.0	26.0	16.0	18.0	18.0	32.0	70.0	30.3	23.5	18.0	25.8	22.7	14.0	13.0
Mean	22.7	18.2	20.0	17.3	22.2	21.0	18.3	23.0	21.0	15.0	18.0	21.5	57.7	20.3	22.3	15.4	19.6	18.5	15.4	14.8
Standard deviation (n)	17.0	7.5	4.9	3.1	8.5	5.2	6.8	7.1	19.8	3.7	0.0	9.1	18.1	10.4	21.8	6.9	7.3	7.2	8.5	6.7

**Table B-8. Descriptive Statistics for Dissolved Calcium**

Statistic	Inlet 07-11	Outlet 07-11	Inlet 2007	Outlet 2007	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	37.0	28.0	8.0	8.0	24.0	24.0	10.0	10.0
Minimum	4.0	11.0	18.0	16.0	4.0	11.0	4.0	15.0
Maximum	49.0	50.0	32.0	34.0	49.0	50.0	22.0	38.0
Range	45.0	39.0	14.0	18.0	45.0	39.0	18.0	23.0
1st Quartile	9.0	19.3	19.0	20.5	10.0	20.0	8.3	20.0
Median	12.0	24.0	20.0	25.0	12.0	26.0	9.5	21.0
3rd Quartile	20.0	29.0	26.0	29.5	22.5	32.0	13.3	23.0
Mean	16.6	24.9	23.3	25.0	18.0	26.2	11.2	22.2
Standard deviation (n)	11.0	9.0	6.2	9.0	12.3	9.9	5.3	6.2

**Table B-90. Descriptive Statistics for Dissolved Iron**

Statistic	Inlet 01-11	Outlet 01-11	Inlet 2001	Outlet 2001	Outlet 2006	Inlet 2007	Outlet 2007	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	38.0	31.0	3.0	3.0	10.0	8.0	8.0	24.0	24.0	10.0	10.0
Minimum	0.0	0.0	1.0	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	1.0	2.9	1.0	2.9	0.1	0.1	0.2	0.5	0.2	0.1	0.2
Range	1.0	2.9	0.0	0.0	0.0	0.1	0.2	0.5	0.2	0.1	0.2
1st Quartile	0.0	0.1	1.0	2.9	0.0	0.0	0.0	0.0	0.1	0.0	0.1
Median	0.1	0.1	1.0	2.9	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3rd Quartile	0.1	0.1	1.0	2.9	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Mean	0.1	0.2	1.0	2.9	0.1	0.1	0.1	0.1	0.1	0.0	0.1
Standard deviation (n)	0.2	0.5	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1

**Table B-10. Descriptive Statistics for Dissolved Magnesium**

Statistic	Inlet 07-11	Outlet 07-11	Inlet 2007	Outlet 2007	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	37.0	28.0	8.0	8.0	24.0	24.0	10.0	10.0
Minimum	0.1	1.8	2.1	2.1	0.1	1.8	0.7	2.6
Maximum	9.8	8.2	5.7	6.4	9.8	8.2	4.2	6.8
Range	9.7	6.4	3.6	4.3	9.7	6.4	3.5	4.2
1st Quartile	1.1	2.6	2.3	3.2	1.1	2.6	1.0	2.9
Median	1.6	3.7	2.4	4.3	1.8	3.9	1.3	3.2
3rd Quartile	3.0	4.6	4.1	5.3	3.6	4.7	2.1	3.7
Mean	2.6	3.8	3.4	4.3	2.9	3.9	1.7	3.6
Standard deviation (n)	2.3	1.5	1.6	2.2	2.7	1.6	1.0	1.2

**Table B-11. Descriptive Statistics for Dissolved Sodium**

Statistic	Inlet 07-11	Outlet 07-11	Inlet 2007	Outlet 2007	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	37.0	28.0	8.0	8.0	24.0	24.0	10.0	10.0
Minimum	3.0	10.0	9.0	12.0	4.0	10.0	3.0	11.0
Maximum	34.0	52.0	21.0	29.0	34.0	52.0	16.0	32.0
Range	31.0	42.0	12.0	17.0	30.0	42.0	13.0	21.0
1st Quartile	6.0	15.0	9.5	16.3	5.0	19.0	6.0	15.0
Median	7.0	21.0	10.0	20.5	7.0	21.0	6.0	17.0
3rd Quartile	13.0	29.3	15.5	24.8	13.8	30.0	6.8	20.0
Mean	10.2	22.5	13.3	20.5	11.1	24.7	7.2	18.9
Standard deviation (n)	7.8	10.0	5.4	8.5	8.8	10.8	3.7	7.2

**Table B-12. Descriptive Statistics for Dissolved Chromium**

Statistic	Inlet 07-10	Outlet 07-10	Inlet 2007	Outlet 2007	Inlet 2010	Outlet 2010
No. of observations	54.0	45.0	8.0	8.0	24.0	24.0
Minimum	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	2.3	0.0	1.9	0.0	2.3	0.0
Range	2.3	0.0	1.9	0.0	2.3	0.0
1st Quartile	0.0	0.0	0.0	0.0	0.0	0.0
Median	0.0	0.0	0.0	0.0	0.0	0.0
3rd Quartile	0.0	0.0	0.9	0.0	0.0	0.0
Mean	0.1	0.0	0.5	0.0	0.1	0.0
Standard deviation (n)	0.5	0.0	0.8	0.0	0.5	0.0

**Table B-13. Descriptive Statistics for Dissolved Manganese**

Statistic	Inlet 01-11	Outlet 01-11	Inlet 2001	Outlet 2006	Inlet 2007	Outlet 2007	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	40.0	32.0	3.0	10.0	8.0	8.0	24.0	24.0	10.0	10.0
Minimum	0.0	0.0	20.0	0.0	7.2	6.3	0.0	0.0	1.1	1.0
Maximum	159.0	140.0	20.0	100.0	98.5	93.6	159.0	140.0	34.8	81.3
Range	159.0	140.0	0.0	100.0	91.3	87.3	159.0	140.0	33.7	80.3
1st Quartile	3.3	6.4	20.0	25.0	9.0	9.5	2.8	7.8	2.7	6.3
Median	9.7	20.8	20.0	50.0	62.0	13.5	11.3	45.2	7.1	15.4
3rd Quartile	44.4	71.8	20.0	75.0	90.1	35.8	52.7	72.1	11.3	18.7
Mean	28.9	40.1	20.0	50.0	53.4	31.7	32.3	50.3	9.5	22.4
Standard deviation (n)	37.0	38.5	0.0	50.0	38.9	35.9	40.3	40.0	9.4	23.8

**Table B-14. Descriptive Statistics for Dissolved Nickel**

Statistic	Inlet 07-11	Outlet 07-11	Inlet 2007	Outlet 2007	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	40.0	32.0	8.0	8.0	23.0	23.0	10.0	10.0
Minimum	0.0	0.0	1.1	1.4	0.0	0.0	0.0	0.0
Maximum	15.0	4.2	3.5	4.2	15.0	4.1	2.7	2.1
Range	15.0	4.2	2.4	2.8	15.0	4.1	2.7	2.1
1st Quartile	0.8	1.2	2.7	1.4	1.4	1.2	0.0	1.2
Median	1.9	1.5	3.0	1.7	2.3	2.5	0.5	1.4
3rd Quartile	3.2	2.5	3.4	2.6	3.8	2.9	1.8	1.6
Mean	2.4	1.8	2.7	2.3	3.0	2.1	0.9	1.2
Standard deviation (n)	2.6	1.2	0.9	1.2	3.1	1.2	1.0	0.7

**Table B-15. Descriptive Statistics for Dissolved Copper**

Statistic	Inlet 01-11	Outlet 01-11	Inlet 2001	Outlet 2001	Inlet 2002	Outlet 2002	Inlet 2003	Outlet 2003	Inlet 2004	Outlet 2004	Inlet 2005	Outlet 2005	Inlet 2006	Outlet 2006	Inlet 2007	Outlet 2007	Inlet 2008	Outlet 2008	Inlet 2009	Outlet 2009	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	81.0	73.0	3.0	3.0	5.0	5.0	4.0	4.0	5.0	5.0	6.0	6.0	10.0	10.0	8.0	8.0	8.0	8.0	10.0	10.0	24.0	24.0	10.0	10.0
Minimum	0.0	0.0	6.0	6.0	5.0	4.0	3.0	5.0	7.0	6.0	0.0	1.0	5.0	2.0	6.0	0.0	0.0	0.0	5.9	0.0	0.0	2.3	0.0	2.2
Maximum	40.0	28.4	11.0	15.0	9.0	9.0	6.0	10.0	27.0	6.0	13.0	18.0	5.0	8.0	31.0	12.5	30.0	10.2	40.0	28.4	29.2	5.4	7.1	5.2
Range	40.0	28.4	5.0	9.0	4.0	5.0	3.0	5.0	20.0	0.0	13.0	17.0	0.0	6.0	25.0	12.5	30.0	10.2	34.1	28.4	29.2	3.1	7.1	3.0
1st Quartile	4.3	3.1	8.0	6.0	7.0	5.0	3.5	6.0	15.0	6.0	4.0	4.0	5.0	3.0	10.5	2.0	9.5	0.0	13.2	6.3	3.8	2.8	3.0	3.0
Median	7.0	4.0	10.0	6.0	8.0	7.0	4.0	7.0	17.0	6.0	5.0	5.0	5.0	4.0	15.0	4.0	10.0	7.7	14.6	9.3	5.4	3.4	3.9	3.4
3rd Quartile	13.0	7.0	10.5	10.5	8.0	7.0	5.0	8.5	17.0	6.0	5.0	5.0	5.0	5.0	25.0	6.0	11.9	9.6	18.7	13.2	7.4	3.6	4.9	3.7
Mean	9.4	5.7	9.0	9.0	7.4	6.4	4.3	7.3	16.6	6.0	5.4	6.6	5.0	4.4	17.6	4.6	11.7	5.6	16.3	10.6	6.4	3.3	3.9	3.5
Standard deviation (n)	7.8	4.6	2.2	4.2	1.4	1.7	1.2	2.1	6.4	6.4	4.2	5.9	0.0	2.1	9.2	4.1	7.9	4.4	9.1	7.3	5.4	0.7	1.9	0.9

**Table B-16. Descriptive Statistics for Dissolved Zinc**

Statistic	Inlet 01-11	Outlet 01-11	Inlet 2001	Outlet 2001	Inlet 2002	Outlet 2002	Inlet 2003	Outlet 2003	Inlet 2004	Outlet 2005	Inlet 2005	Outlet 2007	Inlet 2007	Outlet 2008	Inlet 2008	Outlet 2008	Inlet 2009	Outlet 2009	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	77.0	65.0	3.0	3.0	5.0	5.0	4.0	4.0	5.0	6.0	6.0	8.0	8.0	8.0	8.0	10.0	10.0	24.0	24.0	10.0	10.0	
Minimum	0.0	0.0	23.0	0.0	14.7	13.6	9.0	7.6	0.1	7.4	5.4	8.4	9.8	0.0	0.0	0.0	0.0	0.0	5.3	5.6	6.6	5.4
Maximum	83.2	148.0	29.4	44.8	27.4	31.5	16.0	15.9	0.3	46.7	148.0	52.1	56.6	20.0	33.0	45.4	36.3	83.2	25.4	24.3	21.6	
Range	83.2	148.0	6.4	44.8	12.7	17.9	7.0	8.3	0.2	39.3	142.6	43.7	46.8	20.0	33.0	45.4	36.3	77.9	19.8	17.7	16.2	
1st Quartile	5.9	5.0	23.0	8.0	17.9	17.2	10.7	10.5	0.1	14.6	7.4	15.6	9.8	0.0	0.0	0.0	0.0	8.9	8.5	7.6	7.4	
Median	14.0	9.8	23.0	16.0	20.5	20.0	12.3	13.4	0.1	15.0	9.8	38.2	10.5	3.5	2.0	0.0	0.0	20.8	12.3	9.4	9.3	
3rd Quartile	23.0	16.6	26.2	30.4	23.4	24.1	14.2	14.7	0.2	18.6	10.9	43.0	22.6	14.5	5.3	0.0	0.0	35.7	18.0	16.6	12.0	
Mean	17.4	13.7	25.1	20.3	20.8	21.3	12.4	12.3	0.1	20.5	36.3	31.5	21.9	7.1	6.0	8.4	7.0	25.8	13.3	12.4	10.7	
Standard deviation (n)	17.1	20.2	3.0	18.5	4.6	6.6	2.9	3.5	0.1	13.6	55.9	16.7	20.1	7.7	10.5	16.9	14.1	20.5	5.7	5.9	4.8	

**Table B-17. Descriptive Statistics for Dissolved Cadmium**

Statistic	Inlet 05-11	Outlet 05-11	Inlet 2005	Outlet 2005	Inlet 2006	Outlet 2006	Inlet 2007	Outlet 2007	Inlet 2008	Outlet 2008	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	66.00	54.00	6.00	6.00	10.00	10.00	8.00	8.00	8.00	8.00	24.00	24.00	10.00	10.00
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	2.00	3.00	0.20	0.00	0.60	0.00	0.20	1.70	2.00	3.00	1.20	0.30	0.00	0.20
Range	2.00	3.00	0.20	0.00	0.60	0.00	0.20	1.70	2.00	3.00	1.20	0.30	0.00	0.20
1st Quartile	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Median	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3rd Quartile	0.00	0.00	0.05	0.00	0.40	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mean	0.08	0.10	0.05	0.00	0.27	0.00	0.04	0.34	0.25	0.38	0.10	0.04	0.00	0.02
Standard deviation (n)	0.30	0.46	0.09	0.00	0.25	0.00	0.07	0.68	0.66	0.99	0.26	0.10	0.00	0.06

**Table B-18. Descriptive Statistics for Dissolved Lead**

Statistic	Inlet 03-08	Outlet 03-08	Inlet 2003	Outlet 2003	Inlet 2008	Outlet 2008
No. of observations	75.00	74.00	4.00	4.00	8.00	8.00
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	10.00	1.50	10.00	0.00	3.00	1.50
Range	10.00	1.50	10.00	0.00	3.00	1.50
1st Quartile	0.00	0.00	0.00	0.00	0.00	0.00
Median	0.00	0.00	0.00	0.00	0.00	0.00
3rd Quartile	0.00	0.00	5.00	0.00	0.03	0.00
Mean	0.17	0.02	3.33	0.00	0.39	0.19
Standard deviation (n)	1.19	0.17	4.71	0.00	0.99	0.50



**Table B-19. Descriptive Statistics for Total Chromium**

Statistic	Inlet 03-11	Outlet 03-11	Inlet 2003	Outlet 2003	Inlet 2007	Outlet 2007	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	53.0	49.0	4.0	4.0	8.0	8.0	24.0	24.0	10.0	10.0
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	20.0	0.0	20.0	0.0	1.9	0.0	6.2	0.0	3.8	0.0
Range	20.0	0.0	20.0	0.0	1.9	0.0	6.2	0.0	3.8	0.0
1st Quartile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Median	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd Quartile	0.0	0.0	5.0	0.0	0.9	0.0	0.0	0.0	1.2	0.0
Mean	0.7	0.0	5.0	0.0	0.5	0.0	0.3	0.0	0.8	0.0
Standard deviation (n)	2.9	0.0	8.7	0.0	0.8	0.0	1.2	0.0	1.2	0.0

**Table B-20. Descriptive Statistics for Total Manganese**

Statistic	Inlet 03-11	Outlet 03-11	Inlet 2003	Outlet 2003	Inlet 2004	Inlet 2005	Outlet 2005	Inlet 2006	Outlet 2006	Inlet 2007	Outlet 2007	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	56.0	45.0	4.0	4.0	5.0	6.0	6.0	10.0	10.0	8.0	8.0	24.0	24.0	10.0	10.0
Minimum	0.0	0.0	40.0	60.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	11.5	5.9	8.4	12.2
Maximum	370.0	160.0	370.0	120.0	0.2	130.0	160.0	280.0	150.0	149.0	114.0	214.0	158.0	76.9	106.0
Range	370.0	160.0	330.0	60.0	0.1	130.0	160.0	280.0	150.0	149.0	114.0	202.5	152.1	68.5	93.8
1st Quartile	18.4	26.1	130.0	75.0	0.2	32.5	10.0	45.0	45.0	0.1	11.3	24.7	33.0	20.7	24.5
Median	43.6	57.2	200.0	90.0	0.2	50.0	40.0	95.0	60.0	11.0	27.0	59.9	62.0	31.2	44.1
3rd Quartile	81.9	93.0	272.5	105.0	0.2	82.5	40.0	167.5	90.0	51.0	57.8	81.9	93.0	59.3	63.2
Mean	70.7	62.4	202.5	90.0	0.2	58.3	50.0	117.5	68.6	42.2	42.0	72.0	69.7	38.8	50.5
Standard deviation (n)	75.9	43.9	120.1	24.5	0.0	42.2	57.3	104.5	46.7	56.6	43.8	58.1	41.9	23.6	31.2

**Table B-21. Descriptive Statistics for Total Magnesium**

Statistic	Inlet 02-07	Outlet 02-07	Inlet 2002	Outlet 2002	Inlet 2003	Outlet 2003	Inlet 2005	Outlet 2005	Inlet 2006	Outlet 2006	Inlet 2007	Outlet 2007
No. of observations	14.0	12.0	5.0	5.0	4.0	4.0	6.0	6.0	10.0	10.0	8.0	8.0
Minimum	0.0	0.0	5.0	7.0	0.0	0.0	2.0	3.2	3.8	3.8	2.0	28.0
Maximum	52.6	28.0	6.0	7.0	52.6	4.3	2.9	4.1	9.0	9.0	2.8	28.0
Range	52.6	28.0	1.0	0.0	52.6	4.3	0.9	0.9	5.2	5.2	0.8	0.0
1st Quartile	2.0	3.7	5.3	7.0	0.8	2.0	2.1	3.3	6.0	6.0	2.2	28.0
Median	3.4	4.2	5.5	7.0	5.0	4.0	2.1	3.4	8.1	8.1	2.4	28.0
3rd Quartile	7.6	7.3	5.8	7.0	19.9	4.2	2.5	3.8	8.6	8.6	2.6	28.0
Mean	7.6	6.8	5.5	7.0	15.7	2.8	2.3	3.6	7.0	7.0	2.4	28.0
Standard deviation (n)	12.8	6.8	0.5	0.0	21.6	2.0	0.4	0.4	2.3	2.3	0.4	0.4

**Table B-22. Descriptive Statistics for Total Nickel**

Statistic	Inlet 03-11	Outlet 03-11	Inlet 2003	Outlet 2003	Inlet 2007	Outlet 2007	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	54.0	47.0	4.0	4.0	8.0	8.0	24.0	24.0	10.0	10.0
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	20.0	5.1	20.0	0.0	6.0	4.5	17.3	5.1	5.6	2.7
Range	20.0	5.1	20.0	0.0	6.0	4.5	17.3	5.1	5.6	2.7
1st Quartile	0.0	0.0	0.0	0.0	0.0	0.0	2.4	1.6	1.3	0.0
Median	2.3	1.3	0.0	0.0	0.0	0.7	4.3	2.5	2.3	1.7
3rd Quartile	4.6	2.5	5.0	0.0	3.5	1.9	5.8	3.3	3.8	2.4
Mean	3.3	1.4	5.0	0.0	1.9	1.3	5.0	2.6	2.5	1.3
Standard deviation (n)	4.1	1.5	8.7	0.0	2.3	1.6	3.8	1.3	1.8	1.2

**Table B-23. Descriptive Statistics for Total Copper**

Statistic	Inlet 01-11	Outlet 01-11	Inlet 2001	Outlet 2001	Inlet 2002	Outlet 2002	Inlet 2003	Outlet 2003	Inlet 2004	Outlet 2004	Inlet 2005	Outlet 2005	Inlet 2006	Outlet 2006	Inlet 2007	Outlet 2007	Inlet 2008	Outlet 2008	Inlet 2009	Outlet 2009	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	84.0	72.0	3.0	3.0	5.0	5.0	4.0	4.0	5.0	5.0	6.0	6.0	10.0	10.0	8.0	8.0	8.0	8.0	10.0	10.0	24.0	24.0	10.0	10.0
Minimum	0.0	0.0	10.0	6.0	5.0	5.0	7.0	8.0	7.0	6.0	3.0	5.0	6.0	6.0	6.0	0.0	0.0	0.0	5.8	0.0	3.1	3.1	0.0	0.0
Maximum	73.6	23.0	25.0	18.0	24.0	16.0	37.0	14.0	27.0	6.0	25.0	7.0	33.0	23.0	31.0	12.5	73.6	13.6	30.6	10.1	34.1	7.8	26.7	11.8
Range	73.6	23.0	15.0	12.0	19.0	11.0	30.0	6.0	20.0	0.0	22.0	2.0	27.0	17.0	25.0	12.5	73.6	13.6	24.8	10.1	31.0	4.7	26.7	11.8
1st Quartile	7.0	4.1	12.0	6.5	13.0	8.0	16.0	9.0	15.0	6.0	7.5	5.8	7.5	6.0	10.5	2.0	6.1	0.0	8.6	6.3	5.5	3.7	5.2	4.1
Median	11.4	6.0	14.0	7.0	15.0	9.0	19.5	10.0	17.0	6.0	12.5	6.0	11.0	8.0	15.0	4.0	15.0	2.3	11.4	7.2	9.1	5.0	7.1	4.7
3rd Quartile	17.8	8.0	19.5	12.5	16.0	12.0	24.3	12.0	17.0	6.0	19.0	6.3	18.8	9.5	25.0	6.0	24.7	11.0	14.7	9.7	13.3	5.9	9.9	5.3
Mean	14.0	6.6	16.3	10.3	14.6	10.0	20.8	10.7	16.6	6.0	13.3	6.0	15.3	9.7	17.6	4.6	22.4	5.2	12.9	7.2	11.3	5.0	8.9	4.9
Standard deviation (n)	10.6	4.2	6.3	5.4	6.1	3.7	10.7	2.5	6.4	6.4	7.7	0.7	10.7	5.6	9.2	4.1	24.5	6.0	6.8	2.9	7.4	1.5	6.9	3.0

**Table B-24. Descriptive Statistics for Total Zinc**

Statistic	Inlet 01-11	Outlet 01-11	Inlet 2001	Outlet 2001	Inlet 2002	Outlet 2002	Inlet 2003	Outlet 2003	Inlet 2004	Outlet 2004	Inlet 2005	Outlet 2005	Inlet 2006	Outlet 2006	Inlet 2007	Outlet 2007	Inlet 2008	Outlet 2008	Inlet 2009	Outlet 2009	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	84.0	73.0	3.0	3.0	5.0	5.0	4.0	4.0	5.0	6.0	6.0	10.0	10.0	8.0	8.0	8.0	8.0	10.0	10.0	24.0	24.0	10.0	10.0	
Minimum	0.0	0.0	37.7	14.8	38.0	21.5	128.0	40.0	0.1	30.0	20.0	30.0	0.0	0.0	0.0	12.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	240.0	135.0	126.0	50.8	157.0	62.1	240.0	70.0	0.3	130.0	50.0	130.0	40.0	113.0	91.0	150.0	50.0	170.0	135.0	154.0	45.2	70.2	21.7	
Range	240.0	135.0	88.3	36.0	119.0	40.6	112.0	30.0	0.2	100.0	30.0	100.0	40.0	113.0	91.0	138.0	40.0	170.0	135.0	154.0	45.2	70.2	21.7	
1st Quartile	0.1	0.0	49.6	17.2	56.7	24.3	137.0	51.9	0.1	52.5	40.0	37.5	20.0	14.3	0.0	19.0	13.0	0.0	0.0	19.5	0.0	0.0	0.0	
Median	47.7	20.0	61.5	19.6	59.4	25.5	140.0	63.8	0.1	65.0	40.0	60.0	30.0	68.5	0.0	70.0	20.0	0.0	0.0	41.2	0.0	27.3	0.0	
3rd Quartile	80.2	40.0	93.8	35.2	68.4	46.6	165.0	66.9	0.2	107.5	40.0	92.5	35.0	80.0	4.9	105.0	42.5	59.5	31.2	82.0	25.5	39.0	19.2	
Mean	56.3	22.7	75.1	28.4	75.9	36.0	162.0	57.9	0.1	76.7	38.0	70.0	25.7	55.0	14.4	68.6	27.3	34.7	22.9	55.2	14.8	25.3	8.6	
Standard deviation (n)	52.7	24.9	37.3	16.0	41.7	15.8	45.3	12.9	0.1	36.4	9.8	39.4	12.9	42.2	31.5	53.3	16.3	52.3	41.8	46.8	16.7	23.8	9.7	

**Table B-25. Descriptive Statistics for Total Cadmium**

Statistic	Inlet 02-11	Outlet 02-11	Inlet 2002	Outlet 2002	Inlet 2003	Outlet 2003	Inlet 2007	Outlet 2007	Inlet 2008	Outlet 2008	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	63	55	5	5	4	4	8	8	8	8	24	24	10	10
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	2.40	4.00	0.70	0.00	1.20	0.60	0.00	4.00	1.00	0.40	2.40	0.00	0.00	0.30
Range	2.40	4.00	0.70	0.00	1.20	0.60	0.00	4.00	1.00	0.40	2.40	0.00	0.00	0.30
1st Quartile	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Median	0.00	0.00	0.35	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3rd Quartile	0.00	0.00	0.53	0.00	0.83	0.30	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00
Mean	0.12	0.10	0.35	0.00	0.48	0.20	0.00	0.57	0.19	0.06	0.15	0.00	0.00	0.03
Standard deviation (n)	0.38	0.54	0.35	0.00	0.51	0.28	0.00	1.40	0.35	0.14	0.50	0.00	0.00	0.09

**Table B-26. Descriptive Statistics for Total Lead**

Statistic	Inlet 01-11	Outlet 01-11	Inlet 2001	Outlet 2001	Inlet 2002	Outlet 2002	Inlet 2003	Outlet 2003	Inlet 2004	Inlet 2006	Outlet 2006	Inlet 2008	Outlet 2008	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	82	73	3	3	5	5	4	4	5	10	10	8	8	24	24	10	10
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	25.00	9.00	13.00	0.00	17.00	0.00	24.00	0.00	25.00	11.00	0.00	9.60	9.00	6.60	0.00	4.50	1.10
Range	25.00	9.00	13.00	0.00	17.00	0.00	24.00	0.00	15.00	11.00	0.00	9.60	9.00	6.60	0.00	4.50	1.10
1st Quartile	0.00	0.00	0.00	0.00	0.00	0.00	8.25	0.00	13.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Median	0.00	0.00	0.00	0.00	0.00	0.00	12.00	0.00	17.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3rd Quartile	0.00	0.00	6.50	0.00	0.00	0.00	15.75	0.00	21.25	2.75	0.00	4.90	1.30	0.00	0.00	1.68	0.00
Mean	2.10	0.17	4.33	0.00	3.40	0.00	12.00	0.00	17.50	2.75	0.00	2.77	1.66	0.71	0.00	1.16	0.12
Standard deviation (n)	5.09	1.08	6.13	0.00	6.80	0.00	8.51	0.00	7.50	4.76	0.00	4.14	3.11	1.90	0.00	1.63	0.35

**Table B-27. Descriptive Statistics for Dissolved Phosphorus**

Statistic	Inlet 01-11	Outlet 01-11	Inlet 2001	Outlet 2001	Inlet 2002	Outlet 2002	Inlet 2003	Outlet 2003	Inlet 2004	Inlet 2005	Outlet 2005	Inlet 2006	Outlet 2006	Inlet 2007	Outlet 2007	Inlet 2008	Outlet 2008	Inlet 2009	Outlet 2009	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	88	76	3	3	5	5	4	4	5	6	6	10	10	8	8	8	8	10	10	24	24	10	10
Minimum	0.04	0.03	0.16	0.40	0.14	0.26	0.15	0.09	0.19	0.10	0.18	0.12	0.08	0.09	0.08	0.07	0.06	0.13	0.08	0.04	0.03	0.06	0.03
Maximum	1.62	1.68	0.61	0.67	0.56	0.44	0.39	0.44	1.12	0.48	0.38	0.53	0.30	0.89	0.48	0.39	0.29	1.62	1.68	0.78	0.34	0.36	0.27
Range	1.58	1.65	0.45	0.27	0.42	0.18	0.23	0.35	0.93	0.38	0.19	0.41	0.22	0.80	0.40	0.32	0.23	1.49	1.61	0.74	0.31	0.30	0.24
1st Quartile	0.12	0.14	0.24	0.43	0.25	0.32	0.16	0.23	0.52	0.15	0.22	0.18	0.17	0.14	0.13	0.09	0.11	0.16	0.21	0.08	0.10	0.10	0.14
Median	0.17	0.21	0.32	0.47	0.30	0.39	0.22	0.36	0.53	0.16	0.27	0.24	0.18	0.16	0.17	0.16	0.16	0.33	0.31	0.13	0.14	0.15	0.18
3rd Quartile	0.36	0.30	0.47	0.57	0.32	0.43	0.30	0.40	0.94	0.22	0.35	0.42	0.23	0.26	0.23	0.17	0.20	0.51	0.45	0.22	0.17	0.25	0.27
Mean	0.28	0.25	0.37	0.51	0.31	0.37	0.24	0.30	0.66	0.22	0.28	0.29	0.19	0.28	0.21	0.16	0.16	0.47	0.43	0.21	0.15	0.18	0.19
Standard deviation (n)	0.26	0.21	0.18	0.12	0.14	0.07	0.09	0.15	0.33	0.13	0.07	0.15	0.06	0.26	0.12	0.10	0.08	0.44	0.44	0.20	0.08	0.10	0.08

**Table B-28. Descriptive Statistics for Dissolved Potassium**

Statistic	Inlet 07-11	Outlet 07-11	Inlet 2007	Outlet 2007	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	37	28	8	8	24	24	10	10
Minimum	1.00	3.00	5.00	3.00	1.00	3.00	2.00	4.00
Maximum	10.00	7.00	6.00	5.00	10.00	6.00	6.00	7.00
Range	9.00	4.00	1.00	2.00	9.00	3.00	4.00	3.00
1st Quartile	2.00	4.00	5.50	3.50	2.00	3.00	2.00	4.00
Median	3.00	4.00	6.00	4.00	3.00	4.00	3.00	4.00
3rd Quartile	4.00	4.00	6.00	4.50	4.00	4.00	3.75	4.00
Mean	3.70	4.18	5.67	4.00	3.71	3.94	3.10	4.67
Standard deviation (n)	1.89	1.04	0.47	1.00	2.05	0.80	1.22	1.25

**Table B-29. Descriptive Statistics for Nitrite + Nitrate**

Statistic	Inlet 01-11	Outlet 01-11	Inlet 2001	Outlet 2001	Inlet 2002	Outlet 2002	Inlet 2003	Outlet 2003	Inlet 2004	Inlet 2005	Outlet 2005	Inlet 2006	Outlet 2006	Inlet 2007	Outlet 2007	Inlet 2008	Outlet 2008	Inlet 2009	Outlet 2009	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	87	76	3	3	5	5	4	4	5	6	6	10	10	8	8	8	8	10	10	24	24	10	10
Minimum	0.06	0.00	0.85	0.42	2.10	1.80	0.91	0.80	0.76	0.20	0.51	0.31	0.38	0.16	0.33	0.62	0.45	0.19	0.02	0.06	0.00	0.26	0.30
Maximum	5.90	17.00	1.28	0.74	5.90	4.00	1.59	1.54	1.76	0.99	0.99	2.13	1.39	2.21	2.98	2.70	0.93	1.50	17.00	2.13	0.90	1.14	1.08
Range	5.84	17.00	0.43	0.32	3.80	2.20	0.68	0.74	1.00	0.79	0.48	1.82	1.01	2.05	2.65	2.09	0.48	1.32	16.98	2.07	0.90	0.88	0.78
1st Quartile	0.61	0.45	1.01	0.49	2.40	2.70	0.99	1.01	0.85	0.43	0.55	0.61	0.46	0.69	0.42	0.74	0.63	0.58	0.33	0.60	0.22	0.48	0.35
Median	0.85	0.60	1.17	0.56	4.10	3.10	1.27	1.22	0.95	0.61	0.57	0.81	0.56	0.88	0.56	0.94	0.68	0.89	0.55	0.76	0.54	0.59	0.52
3rd Quartile	1.15	0.80	1.23	0.65	4.50	3.40	1.54	1.38	1.21	0.69	0.73	1.07	0.61	1.59	0.83	1.11	0.78	1.06	0.68	1.11	0.66	0.69	0.71
Mean	1.07	0.99	1.10	0.57	3.80	3.00	1.26	1.19	1.11	0.58	0.67	0.96	0.63	1.11	0.91	1.11	0.69	0.82	2.15	0.87	0.44	0.63	0.59
Standard deviation (n)	0.90	1.99	0.18	0.13	1.40	0.73	0.30	0.30	0.39	0.25	0.18	0.58	0.28	0.71	0.87	0.63	0.14	0.39	4.96	0.49	0.28	0.26	0.25

**Table B-30. Descriptive Statistics for Total Kjehldahl Nitrogen**

Statistic	Inlet 01-11	Outlet 01-11	Inlet 2001	Outlet 2001	Inlet 2002	Outlet 2002	Inlet 2003	Outlet 2003	Inlet 2004	Inlet 2005	Outlet 2005	Inlet 2006	Outlet 2006	Inlet 2007	Outlet 2007	Inlet 2008	Outlet 2008	Inlet 2009	Outlet 2009	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	81	71	3	3	5	5	4	4	5	6	6	10	10	8	8	8	8	10	10	24	24	10	10
Minimum	1.00	1.20	2.40	1.70	2.10	1.80	2.80	2.80	3.68	1.30	1.70	1.10	2.00	2.80	1.30	1.65	1.98	1.75	1.54	1.00	1.20	1.10	1.20
Maximum	13.00	10.11	3.40	2.10	5.90	4.00	5.30	3.70	8.46	5.80	3.40	4.80	4.20	11.60	4.40	2.01	2.19	12.01	10.11	13.00	5.80	3.90	2.40
Range	12.00	8.91	1.00	0.40	3.80	2.20	2.50	0.90	4.78	4.50	1.70	3.70	2.20	8.80	3.10	0.36	0.21	10.26	8.57	12.00	4.60	2.80	1.20
1st Quartile	2.01	1.85	2.60	1.80	2.40	2.70	2.89	2.85	4.42	1.90	1.90	2.93	2.40	3.05	1.90	1.74	2.03	3.07	1.88	1.58	1.90	1.45	1.70
Median	3.10	2.30	2.80	1.90	3.10	3.10	3.51	2.90	4.66	2.40	2.20	3.60	2.40	4.60	3.00	1.83	2.09	3.95	2.23	2.90	2.40	1.75	1.70
3rd Quartile	4.50	2.95	3.10	2.00	4.50	3.40	4.40	3.30	6.35	2.40	2.70	3.60	2.80	7.21	3.35	1.92	2.14	8.36	2.97	3.85	2.80	2.85	1.90
Mean	3.86	2.59	2.87	1.90	3.60	3.00	3.78	3.13	5.51	2.76	2.38	3.23	2.64	5.65	2.76	1.83	2.09	5.55	3.30	3.74	2.55	2.17	1.73
Standard deviation (n)	2.63	1.30	0.41	0.16	1.42	0.73	1.01	0.40	1.71	1.57	0.61	1.13	0.63	3.00	0.99	0.18	0.10	3.39	2.55	2.96	1.15	0.89	0.35

**Table B-31. Descriptive Statistics for Total Phosphorous**

Statistic	Inlet 01-11	Outlet 01-11	Inlet 2001	Outlet 2001	Inlet 2002	Outlet 2002	Inlet 2003	Outlet 2003	Inlet 2004	Inlet 2005	Outlet 2005	Inlet 2006	Outlet 2006	Inlet 2007	Outlet 2007	Inlet 2008	Outlet 2008	Inlet 2009	Outlet 2009	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	88	76	3	3	5	5	4	4	5	6	6	10	10	8	8	8	8	10	10	24	24	10	10
Minimum	0.12	0.13	0.15	0.39	0.30	0.34	0.31	0.34	0.12	0.19	0.27	0.25	0.13	0.23	0.20	0.12	0.17	0.25	0.21	0.14	0.16	0.19	0.21
Maximum	1.73	2.06	0.58	0.75	0.73	0.51	0.90	0.64	0.48	0.51	0.43	0.65	0.69	0.94	0.49	1.25	0.49	1.73	2.06	0.89	0.48	0.63	0.39
Range	1.61	1.93	0.43	0.36	0.43	0.18	0.60	0.30	0.36	0.32	0.15	0.39	0.56	0.71	0.29	1.14	0.33	1.48	1.85	0.75	0.32	0.44	0.18
1st Quartile	0.25	0.26	0.33	0.44	0.45	0.40	0.38	0.39	0.18	0.21	0.30	0.34	0.28	0.32	0.25	0.22	0.23	0.37	0.46	0.27	0.25	0.23	0.25
Median	0.37	0.32	0.51	0.50	0.50	0.45	0.48	0.43	0.19	0.23	0.31	0.44	0.29	0.39	0.34	0.26	0.26	0.59	0.61	0.34	0.30	0.34	0.31
3rd Quartile	0.55	0.44	0.55	0.62	0.54	0.49	0.65	0.54	0.23	0.31	0.40	0.57	0.34	0.76	0.42	0.35	0.32	0.91	0.67	0.56	0.35	0.41	0.32
Mean	0.44	0.38	0.42	0.54	0.50	0.44	0.54	0.47	0.24	0.28	0.34	0.45	0.33	0.53	0.34	0.39	0.29	0.69	0.68	0.42	0.30	0.34	0.30
Standard deviation (n)	0.27	0.24	0.19	0.15	0.14	0.06	0.23	0.12	0.12	0.11	0.06	0.14	0.15	0.27	0.11	0.34	0.10	0.43	0.49	0.23	0.08	0.13	0.06

**Table B-32. Descriptive Statistics for Total Suspended Solids**

Statistic	Inlet 01-11	Outlet 01-11	Inlet 2001	Outlet 2001	Inlet 2002	Outlet 2002	Inlet 2003	Outlet 2003	Inlet 2004	Inlet 2005	Outlet 2005	Inlet 2006	Outlet 2006	Inlet 2007	Outlet 2007	Inlet 2008	Outlet 2008	Inlet 2009	Outlet 2009	Inlet 2010	Outlet 2010	Inlet 2011	Outlet 2011
No. of observations	87	75	3	3	5	5	4	4	5	6	6	10	10	8	8	8	8	10	10	24	24	10	10
Minimum	5.30	4.00	98.00	14.00	67.00	22.00	216.00	35.00	252.00	9.00	7.00	8.00	4.00	8.00	5.00	9.20	15.00	5.30	6.50	9.00	7.00	7.00	6.00
Maximum	1280.00	531.00	398.00	182.00	495.00	63.00	692.00	124.00	1280.00	152.00	62.00	128.00	42.00	648.00	83.00	512.00	93.00	208.00	224.00	342.00	47.00	180.00	531.00
Range	1274.70	527.00	300.00	168.00	428.00	41.00	476.00	89.00	1028.00	143.00	55.00	120.00	38.00	640.00	78.00	502.80	78.00	202.70	217.50	333.00	40.00	173.00	525.00
1st Quartile	30.00	14.50	111.00	16.50	85.00	22.00	418.50	62.50	320.00	28.25	10.00	12.00	10.75	27.00	15.50	23.85	20.85	28.88	17.28	30.50	12.00	39.25	20.00
Median	75.00	22.00	124.00	19.00	132.00	26.00	559.00	90.00	337.00	49.50	12.00	19.00	17.50	103.00	19.00	52.60	33.00	42.10	38.75	76.00	16.00	52.00	23.00
3rd Quartile	181.00	43.50	261.00	100.50	209.00	44.00	647.00	107.00	513.00	96.25	14.00	67.00	25.25	316.00	32.00	159.35	45.60	74.25	48.05	141.00	43.00	91.75	27.00
Mean	152.64	40.94	206.67	71.67	197.60	35.40	506.50	83.00	540.40	65.50	21.00	46.80	19.13	206.43	28.86	132.95	39.83	61.40	53.02	102.88	23.94	72.50	79.33
Standard deviation (n)	202.10	67.43	135.71	78.04	156.60	16.02	183.69	36.67	379.71	49.82	20.63	45.81	11.25	238.10	23.93	163.65	25.10	55.20	60.13	94.86	14.87	58.04	160.04

**Table B-33. Descriptive Statistics for E-Coli**

Statistic	Inlet 04-09	Outlet 04-09	Inlet 2004	Inlet 2005	Outlet 2005	Inlet 2006	Outlet 2006	Inlet 2007	Outlet 2007	Inlet 2008	Outlet 2008	Inlet 2009	Outlet 2009
No. of observations	34	29	5	6	6	10	10	8	8	8	8	10	10
Minimum	0	0	0	3300	7900	20	80	230	230	0	0	0	0
Maximum	240000	92000	54	240000	22000	3300	3300	240000	92000	500	900	900	1300
Range	240000	92000	54	236700	14100	3280	3220	239770	91770	500	900	900	1300
1st Quartile	35	30	10	10150	9450	178	268	9800	1700	3	6	80	4
Median	240	300	18	17000	11000	1315	560	30000	3300	50	27	300	230
3rd Quartile	3075	1700	31	128500	16500	2625	1418	132250	3500	158	35	800	500
Mean	21782	5195	23	86767	13633	1488	1125	78272	20146	122	130	406	388
Standard deviation (n)	61261	17010	20	108497	6050	1401	1281	90417	35947	162	291	336	465

## Appendix C: Statistical Test Results

**Table C-1. Significance of Differences of Constituent Concentrations at Inlet and Outlet (2001)**

Water Quality Constituent	Wilcoxon Signed-Rank Test	Paired T-Test
Alkalinity (mg/L)	0.25	0.1105
Chloride (mg/L)	0.1736	<b>0.03775</b>
Chemical Oxygen Demand (mg/L)	0.25	0.3368
Conductivity (umho/cm)	0.25	0.05283
Hardness (mg/L)	0.25	0.1694
pH	0.1736	<b>0.003884</b>
Total Organic Carbon (mg/L)	0.3711	0.3468
Dissolved Copper (µg/L)	1	1
Dissolved Zinc (µg/L)	0.75	0.7048
Dissolved Lead (µg/L)	NA	NA
Total Copper (µg/L)	0.1736	<b>0.02667</b>
Total Zinc (µg/L)	0.25	0.1054
Total Lead (µg/L)	1	0.4226
Nitrite+Nitrate (mg/L)	0.25	0.1395
Dissolved Phosphorus (mg/L)	0.5	0.4978
Total Phosphorus (mg/L)	0.5	0.5154
Total Kjeldahl Nitrogen (mg/L)	0.25	0.06839
Total Suspended Solids (mg/L)	0.25	0.081

**Table C-2. Significance of Differences of Constituent Concentrations at Inlet and Outlet (2002)**

Water Quality Constituent	Wilcoxon-Signed Rank Test	Paired T-Test
Alkalinity (mg/L)	0.125	<b>0.027</b>
Chloride (mg/L)	0.0625	<b>0.001607</b>
Chemical Oxygen Demand (mg/L)	0.1003	<b>0.04048</b>
Conductivity (umho/cm)	0.0625	<b>0.001713</b>
Hardness (mg/L)	1	0.8097
pH	0.05791	0.07048
Total Organic Carbon (mg/L)	0.7893	0.6034
Dissolved Copper (µg/L)	0.4227	0.3262
Dissolved Zinc (µg/L)	1	0.933
Total Copper (µg/L)	0.09751	0.05559
Total Zinc (µg/L)	0.0625	0.09836
Total Lead (µg/L)	1	0.3739
Nitrite+Nitrate (mg/L)	0.8125	0.958
Dissolved Phosphorus (mg/L)	0.3125	0.3472
Total Phosphorus (mg/L)	0.1875	0.1857
Total Kjeldahl Nitrogen (mg/L)	0.3125	0.2764
Total Suspended Solids (mg/L)	0.0625	0.1163

**Table C-3. Significance of Differences of Constituent Concentrations at Inlet and Outlet (2003)**

Water Quality Constituent	Wilcoxon Signed-Rank Test	Paired T-Test
Alkalinity (mg/L)	0.25	0.05856
Chloride (mg/L)	0.1736	<b>0.03775</b>
Chemical Oxygen Demand (mg/L)	0.5	0.4097
Conductivity (umho/cm)	0.25	0.112
Hardness (mg/L)	1	0.9344
pH	1	1
Total Organic Carbon (mg/L)	0.4142	0.2965
Dissolved Copper (µg/L)	0.25	0.1885
Dissolved Zinc (µg/L)	0.75	0.9641
Dissolved Lead (µg/L)	1	0.4226
Total Chromium (µg/L)	1	0.4226
Total Manganese (µg/L)	0.75	0.5305
Total Nickel (µg/L)	1	0.4226
Total Copper (µg/L)	0.5	0.3726
Total Zinc (µg/L)	0.25	<b>0.0196</b>
Total Lead (µg/L)	0.3711	0.1863
Nitrite+Nitrate (mg/L)	1	0.9643
Dissolved Phosphorus (mg/L)	0.75	0.495
Total Phosphorus (mg/L)	0.75	0.7914
Total Kjeldahl Nitrogen (mg/L)	0.75	0.8389
Total Suspended Solids (mg/L)	0.25	0.06372

**Table C-4. Significance of Differences of Constituent Concentrations at Inlet and Outlet (2005)**

Constituent	Wilcoxon Signed-Rank Test	Paired T-Test
Alkalinity (mg/L)	0.0625	<b>0.02247</b>
Chloride (mg/L)	0.05791	<b>0.002521</b>
Chemical Oxygen Demand (mg/L)	0.4375	0.2934
Conductivity (umho/cm)	0.0625	<b>0.001038</b>
Hardness (mg/L)	0.3125	0.1792
pH	0.7127	0.475
Total Organic Carbon (mg/L)	0.5879	0.5424
Dissolved Chromium (µg/L)	NA	NA
Dissolved Copper (µg/L)	0.3447	0.3046
Dissolved Zinc (µg/L)	0.625	0.6143
Dissolved Cadmium (µg/L)	NA	NA
Dissolved Lead (µg/L)	NA	NA
Total Chromium (µg/L)	NA	NA
Total Manganese (µg/L)	0.8551	0.6293
Total Magnesium (mg/L)	0.25	0.1315
Total Nickel (µg/L)	NA	NA
Total Copper (µg/L)	0.375	0.2462
Total Zinc (µg/L)	0.125	0.06856
Total Lead (µg/L)	NA	NA
Nitrite+Nitrate (mg/L)	0.5839	0.1399
Dissolved Phosphorus (mg/L)	0.625	0.5947
Total Phosphorus (mg/L)	0.625	0.4795
Total Kjeldahl Nitrogen (mg/L)	1	0.717
Total Suspended Solids (mg/L)	0.1875	0.1849



**Table C-5. Significance of Differences of Constituent Concentrations at Inlet and Outlet (2006)**

Constituent	Wilcoxon Signed-Rank Test	Paired T-Test
Chloride (mg/L)	0.5	0.3917
Chemical Oxygen Demand (mg/L)	0.8215	0.4259
E Coli (#/100 mL)	1	0.5042
Total Chromium (µg/L)	NA	NA
Total Manganese (µg/L)	0.5862	0.4613
Total Nickel (µg/L)	NA	NA
Total Copper (µg/L)	1	0.483
Total Zinc (µg/L)	0.3711	0.3416
Total Lead (µg/L)	1	0.4226
Nitrite+Nitrate (mg/L)	0.1875	0.1355
Dissolved Phosphorus (mg/L)	0.3125	0.1954
Total Phosphate (mg/L)	0.0625	<b>0.005588</b>
Total Kjeldahl Nitrogen (mg/L)	0.05791	<b>0.04873</b>
Total Suspended Solids (mg/L)	0.375	0.2193

**Table C-6. Significance of Differences of Constituent Concentrations at Inlet and Outlet (2007)**

Constituent	Wilcoxon Signed Rank Test	Paired T-Test
Chloride (mg/L)	0.0625	<b>0.00914</b>
Dissolved Chromium (µg/L)	0.1003	<b>0.02725</b>
Dissolved Manganese (µg/L)	0.625	0.4063
Dissolved Nickel (µg/L)	0.625	0.5124
Dissolved Copper (µg/L)	0.0625	<b>0.03298</b>
Dissolved Zinc (µg/L)	0.625	0.4131
Dissolved Selenium (µg/L)	N/A	N/A
Dissolved Silver (µg/L)	N/A	N/A
Dissolved Cadmium (µg/L)	1	0.4068
Dissolved Lead (µg/L)	N/A	N/A
Total Beryllium (µg/L)	N/A	N/A
Total Chromium (µg/L)	0.1003	0.132
Total Manganese (µg/L)	0.375	0.3071
Total Nickel (µg/L)	0.0625	<b>0.003404</b>
Total Copper (µg/L)	<b>0.03125</b>	<b>0.01618</b>
Total Zinc (µg/L)	0.625	<b>0.03224</b>
Total Cadmium (µg/L)	1	0.3876
Total Antimony (µg/L)	N/A	N/A
Total Lead (µg/L)	N/A	N/A
Nitrite+Nitrate (mg/L)	0.6875	0.5741
Dissolved Phosphorus (mg/L)	0.5781	0.3587
Total Phosphorus (mg/L)	<b>0.03125</b>	0.06133
Total Kjeldahl Nitrogen (mg/L)	<b>0.04668</b>	0.05588
Total Suspended Solids (mg/L)	0.09375	0.1291

**Table C-7. Significance of Differences of Constituent Concentrations at Inlet and Outlet (2008)**

Water Quality Constituent	Wilcoxon Signed-Rank Test	Paired T-Test
Alkalinity (mg/L)	0.09375	0.05937
Conductivity (umho/cm)	0.0625	<b>0.0199</b>
E Coli (#/100 mL)	0.3621	0.9444
Hardness (mg/L)	0.0625	<b>0.01439</b>
pH	0.5625	0.4605
Total Organic Carbon (mg/L)	0.8335	0.4152
Dissolved Copper (µg/L)	<b>0.03552</b>	0.1436
Dissolved Zinc (µg/L)	0.8551	0.7702
Dissolved Cadmium (µg/L)	1	0.3506
Dissolved Lead (µg/L)	1	0.6603
Total Copper (µg/L)	0.05906	0.1171
Total Zinc (µg/L)	0.1094	0.09856
Total Cadmium (µg/L)	1	0.4122
Total Lead (µg/L)	1	0.4562
Nitrite+Nitrate (mg/L)	0.1094	0.1737
Ortho-Phosphate (mg/L)	0.6875	0.9383
Dissolved Phosphorus (mg/L)	0.9453	0.9888
Total Ortho-Phosphate (mg/L)	0.4164	0.4267
Total Phosphorus (mg/L)	0.3828	0.3188
Total Nitrogen (mg/L)	0.3828	0.6513
Total Suspended Solids (mg/L)	0.123	0.05469

**Table C-8. Significance of Differences of Constituent Concentrations at Inlet and Outlet (2009)**

Constituent	Wilcoxon Signed Rank Test	Paired T-Test	Two Sample T-Test
E. Coli	0.7792	0.9077	0.9304
Alkalinity	0.726	0.4169	0.4693
Hardness	0.6353	0.6874	0.6628
pH	0.25	0.113	0.1618
Total Organic Carbon	0.6523	0.6914	0.7615
Dissolved Copper	0.08398	0.07173	0.163
Total Copper	<b>0.009766</b>	0.05639	<b>0.0366</b>
Dissolved Zinc	0.7893	0.8223	0.8528
Total Zinc	0.4185	0.343	0.3428
Nitrite+Nitrate	<b>0.04883</b>	<b>0.03012</b>	<b>0.03508</b>
Total Nitrogen	<b>0.03711</b>	<b>0.04063</b>	0.1296
Dissolved Ortho-Phosphate	0.8685	0.5738	0.8231
Dissolved Phosphorus	1	0.6994	0.8584
Total Ortho-Phosphate	0.9102	0.6861	0.6861
Total Phosphorus	0.8457	0.9219	0.9582
Total Suspended Solids	0.625	0.785	0.7617

**Table C-9. Significance of Differences of Constituent Concentrations at Inlet and Outlet (2010)**

Constituent	Wilcoxon Signed Rank Test	Paired T-Test
Dissolved Calcium (mg/L)	<b>0.0003198</b>	<b>1.19 E-5</b>
Dissolved Iron (mg/L)	0.6237	0.6183
Dissolved Magnesium (mg/L)	<b>3.052 E-5</b>	<b>7.99 E-6</b>
Dissolved Sodium (mg/L)	<b>0.0003173</b>	<b>1.523 E-5</b>
Dissolved Chromium ( $\mu\text{g/L}$ )	1	0.3322
Dissolved Manganese ( $\mu\text{g/L}$ )	0.05907	0.05567
Dissolved Nickel ( $\mu\text{g/L}$ )	0.2442	0.2740
Dissolved Copper ( $\mu\text{g/L}$ )	<b>0.001513</b>	<b>0.0009178</b>
Dissolved Zinc ( $\mu\text{g/L}$ )	<b>0.00209</b>	<b>0.003322</b>
Dissolved Selenium ( $\mu\text{g/L}$ )	NA	NA
Dissolved Silver ( $\mu\text{g/L}$ )	NA	NA
Dissolved Cadmium ( $\mu\text{g/L}$ )	0.2693	0.224
Dissolved Lead ( $\mu\text{g/L}$ )	NA	NA
Total Beryllium ( $\mu\text{g/L}$ )	NA	NA
Total Chromium ( $\mu\text{g/L}$ )	1	0.3322
Total Manganese ( $\mu\text{g/L}$ )	0.7819	0.7054
Total Nickel ( $\mu\text{g/L}$ )	<b>0.002699</b>	<b>0.002175</b>
Total Copper ( $\mu\text{g/L}$ )	<b>1.526 E-5</b>	<b>0.0002130</b>
Total Zinc ( $\mu\text{g/L}$ )	<b>0.001367</b>	<b>0.0003071</b>
Total Arsenic ( $\mu\text{g/L}$ )	NA	NA
Total Selenium ( $\mu\text{g/L}$ )	1	0.3322
Total Molybdenum ( $\mu\text{g/L}$ )	1	0.3322
Total Silver ( $\mu\text{g/L}$ )	NA	NA
Total Cadmium ( $\mu\text{g/L}$ )	0.1814	0.1557
Total Antimony ( $\mu\text{g/L}$ )	0.3711	0.1662
Total Lead ( $\mu\text{g/L}$ )	NA	NA
Chloride (mg/L)	<b>0.0004592</b>	<b>0.0001598</b>
Chemical Oxygen Demand (mg/L)	0.06084	0.08589
Nitrite+Nitrate (mg/L)	<b>0.01099</b>	<b>0.005338</b>
Dissolved Phosphorus (mg/L)	0.2142	0.8271
Dissolved Potassium (mg/L)	<b>0.001496</b>	<b>8.382 E -5</b>
Total Phosphorus (mg/L)	<b>0.04081</b>	<b>0.0386</b>
Total Kjeldahl Nitrogen (mg/L)	0.0831	0.05772
Total Suspended Solids (mg/L)	<b>0.0002136</b>	<b>0.002441</b>

**Table C-10. Significance of Differences of Constituent Concentrations at Inlet and Outlet (2011)**

Constituent	Wilcoxon Signed Rank Test	Paired T-Test
Alkalinity (mg/L)	0.125	0.06376
Chloride (mg/L)	<b>0.007812</b>	<b>0.004001</b>
Chemical Oxygen Demand (mg/L)	0.4768	0.5753
Hardness	0.125	<b>0.04177</b>
pH	0.1696	0.1087
Total Organic Carbon	0.5807	0.6213
Dissolved Calcium (mg/L)	<b>0.01269</b>	<b>0.0005543</b>
Dissolved Iron (mg/L)	1	0.3776
Dissolved Magnesium (mg/L)	<b>0.007812</b>	<b>0.0004106</b>
Dissolved Sodium (mg/L)	<b>0.01415</b>	<b>0.0009666</b>
Dissolved Chromium (µg/L)	NA	NA
Dissolved Manganese (µg/L)	<b>0.007812</b>	0.05214
Dissolved Nickel (µg/L)	0.5534	0.3691
Dissolved Copper (µg/L)	0.4409	0.466
Dissolved Zinc (µg/L)	0.2936	0.2497
Dissolved Selenium (µg/L)	1	0.3466
Dissolved Silver (µg/L)	NA	NA
Dissolved Cadmium (µg/L)	1	0.3466
Dissolved Lead (µg/L)	NA	NA
Total Beryllium (µg/L)	NA	NA
Total Chromium (µg/L)	0.1814	0.1248
Total Manganese (µg/L)	0.6523	0.4017
Total Nickel (µg/L)	<b>0.02249</b>	<b>0.02778</b>
Total Copper (µg/L)	<b>0.01953</b>	<b>0.02953</b>
Total Zinc (µg/L)	0.05906	0.05546
Total Arsenic (µg/L)	0.2012	0.125
Total Selenium (µg/L)	0.1736	0.0909
Total Molybdenum (µg/L)	0.1056	0.07715
Total Silver (µg/L)	NA	NA
Total Cadmium (µg/L)	1	0.3466
Total Antimony (µg/L)	0.3711	0.1817
Total Lead (µg/L)	0.1003	0.05379
Nitrite+Nitrate (mg/L)	0.3008	0.3205
Dissolved Phosphorus (mg/L)	0.8203	0.9163
Dissolved Potassium (mg/L)	0.0206	0.00801
Total Phosphorus (mg/L)	0.3594	0.2856
Total Kjeldahl Nitrogen (mg/L)	0.09766	0.08475
Total Suspended Solids (mg/L)	0.2031	0.9621

**Table C-11. Significance of Differences of Constituent Concentrations at Inlet and Outlet (Combined Years Data)**

Constituent	Wilcoxon Signed Rank Test	Paired T-Test
Alkalinity (mg/L)	<b>0.001648</b>	<b>0.01526</b>
Chloride (mg/L)	<b>1.036 E-7</b>	<b>1.162 E-9</b>
Chemical Oxygen Demand (mg/L)	<b>0.0001794</b>	<b>0.000862</b>
Conductivity (umho/cm)	<b>0.000154</b>	<b>1.108 E-5</b>
E Coli (#/100 mL)	<b>0.04798</b>	0.07697
Hardness (mg/L)	<b>0.0019</b>	<b>0.003036</b>
pH	0.3095	0.8328
Total Organic Carbon (mg/L)	0.1893	<b>0.04072</b>
Dissolved Calcium (mg/L)	<b>9.384E-6</b>	<b>7.12 E-8</b>
Dissolved Iron (mg/L)	0.2419	0.3163
Dissolved Magnesium (mg/L)	<b>8.058 E-6</b>	<b>1.437 E-8</b>
Dissolved Sodium (mg/L)	<b>5.812 E-6</b>	<b>5.452 E-8</b>
Dissolved Chromium (µg/L)	<b>0.02599</b>	0.05906
Dissolved Manganese (µg/L)	<b>0.02318</b>	0.07273
Dissolved Nickel (µg/L)	0.4162	0.3575
Dissolved Copper (µg/L)	<b>4.79 E-5</b>	<b>0.000429</b>
Dissolved Zinc (µg/L)	<b>0.004851</b>	0.2528
Dissolved Selenium (µg/L)	1	0.9088
Dissolved Silver (µg/L)	NA	NA
Dissolved Cadmium (µg/L)	0.8383	0.9055
Dissolved Lead (µg/L)	0.4227	0.2741
Total Beryllium (µg/L)	NA	NA
Total Chromium (µg/L)	<b>0.02225</b>	0.08867
Total Manganese (µg/L)	0.4046	0.1857
Total Magnesium (mg/L)	0.4922	0.7769
Total Nickel (µg/L)	<b>2.907 E-5</b>	<b>0.002757</b>
Total Copper (µg/L)	<b>2.96 E-10</b>	<b>5.206 E-8</b>
Total Zinc (µg/L)	<b>1.889 E-8</b>	<b>6.155 E-9</b>
Total Arsenic (µg/L)	0.2012	0.1219
Total Selenium (µg/L)	0.09751	0.06042
Total Molybdenum (µg/L)	0.05917	<b>0.04454</b>
Total Silver (µg/L)	NA	NA
Total Cadmium (µg/L)	0.3428	0.8256
Total Antimony (µg/L)	0.3711	0.172
Total Lead (µg/L)	<b>0.002092</b>	<b>0.002837</b>
Nitrite+Nitrate (mg/L)	<b>0.0001122</b>	<b>0.0002296</b>
Dissolved Phosphorus (mg/L)	0.4175	0.9672
Dissolved Potassium (mg/L)	<b>0.001082</b>	<b>0.0002828</b>
Total Phosphorus (mg/L)	0.1085	0.1022
Total Kjeldahl Nitrogen (mg/L)	<b>0.0001513</b>	<b>0.0004943</b>
Total Suspended Solids (mg/L)	<b>2.172 E-8</b>	<b>2.1 E-5</b>
Total Phosphate (mg/L)	<b>0.0009766</b>	<b>0.002016</b>
Total Nitrogen (mg/L)	0.1415	0.08496
Ortho-Phosphate (mg/L)	0.8202	0.5566
Total Ortho-Phosphate (mg/L)	0.6154	0.387

**Table C-12. Constituent for ANOVA and Tukey Tests at In**

Year	Alkalinity (mg/L)	Chloride (mg/L)	Chemical Oxygen Demand (mg/L)	Conductivity (umho/cm)	E Coli (#/100 mL)	Hardness (mg/L)	pH	Total Organic Carbon (mg/L)	Dissolved Calcium (mg/L)	Dissolved Iron (mg/L)
ANOVA P-Val	0.09498	<b>0.01528</b>	0.3753	0.1188	<b>0.03538</b>	<b>0.01811</b>	0.08715	<b>0.392</b>	0.1486	0.3786
Ref. 2002-2001	0.9920461	0.9999993	0.9999905	0.9367895	**	0.9269107	0.9831078	0.999993	**	**
Ref. 2003-2001	0.8946449	0.9939295	0.9999973	0.4819004	**	0.9945062	0.9588446	1	**	**
Ref. 2004-2001	**	1	0.9999552	**	**	**	**	**	**	**
Ref. 2005-2001	0.9493103	0.9986963	0.9996591	0.2114235	**	0.7322258	0.9774683	1	**	**
Ref. 2006-2001	**	0.2598652	0.9999993	**	**	**	**	**	**	**
Ref. 2007-2001	0.9999984	0.9999919	0.9837139	1	**	0.9999725	0.7472801	0.0895395	**	**
Ref. 2008-2001	0.999295	**	**	0.9236537	**	0.8443261	0.9992843	0.9999987	**	**
Ref. 2009-2001	0.9814985	**	**	**	**	0.9616748	0.9965589	1	**	**
Ref. 2010-2001	**	0.9995109	0.9998212	**	**	**	**	**	**	**
Ref. 2011-2001	0.8798242	0.9999745	0.9983492	**	**	0.7747378	0.9999901	0.9998938	**	**
Ref. 2003-2002	0.9977703	0.9985252	0.997909	0.8726174	**	0.9999549	0.9999901	0.9999671	**	**
Ref. 2004-2002	**	0.9999996	0.9905678	**	**	**	**	**	**	**
Ref. 2005-2002	0.9999505	0.9998831	0.9999996	0.5539088	**	<b>0.0477925</b>	1	1	**	**
Ref. 2006-2002	**	0.066104	1	**	**	**	**	**	**	**
Ref. 2007-2002	0.9983601	0.9980002	0.8573592	0.9280304	**	0.6978931	0.9897756	0.0632356	**	**
Ref. 2008-2002	0.9999744	**	**	0.9999999	**	0.0695708	0.6692983	1	**	**
Ref. 2009-2002	0.4083804	**	**	**	**	0.1235203	0.4853749	0.9999861	**	**
Ref. 2010-2002	**	0.9659	0.9551572	**	**	**	**	**	**	**
Ref. 2011-2002	0.998378	1	0.9999854	**	**	0.0583191	0.9958199	0.9965759	**	**
Ref. 2004-2003	**	0.98991	1	**	**	**	**	**	**	**
Ref. 2005-2003	0.9999722	0.9999992	0.984965	0.9991073	**	0.2469328	0.9999972	0.9999974	**	**
Ref. 2006-2003	**	<b>0.0165567</b>	0.9992313	**	**	**	**	**	**	**
Ref. 2007-2003	0.9367292	0.8757234	0.9972662	0.4359944	**	0.9438381	0.9997695	0.066946	**	**
Ref. 2008-2003	0.977958	**	**	0.8905201	**	0.3349538	0.6393486	0.999944	**	**
Ref. 2009-2003	0.228867	**	**	**	**	0.5145375	0.4952005	1	**	**
Ref. 2010-2003	**	0.6085231	1	**	**	**	**	**	**	**
Ref. 2011-2003	1	0.99907	0.9548103	**	**	0.2805869	0.9831078	0.999995	**	**
Ref. 2005-2004	**	0.9976539	0.9522196	**	**	**	**	**	**	**
Ref. 2006-2004	**	0.1144413	0.9953526	**	0.999991	**	**	**	**	**
Ref. 2007-2004	**	0.9999214	0.9988021	**	0.1062679	**	**	**	**	**
Ref. 2008-2004	**	**	**	**	1	**	**	**	**	**
Ref. 2009-2004	**	**	**	**	0.999999	**	**	**	**	**
Ref. 2010-2004	**	0.9956421	1	**	**	**	**	**	**	**
Ref. 2011-2004	**	0.999963	0.8736896	**	**	**	**	**	**	**
Ref. 2006-2005	**	<b>0.0130494</b>	0.999982	**	**	**	**	**	**	**
Ref. 2007-2005	0.976877	0.9212188	0.7203306	0.1607886	**	0.8551375	0.9930295	<b>0.0495694</b>	**	**
Ref. 2008-2005	0.9961045	**	**	0.5855872	**	0.9999835	0.6330996	0.9999999	**	**
Ref. 2009-2005	0.2081318	**	**	**	**	0.9869599	0.4470461	0.9999998	**	**
Ref. 2010-2005	**	0.6242366	0.8021362	**	**	**	**	**	**	**
Ref. 2011-2005	0.9999958	0.9999643	1	**	**	1	0.9934399	0.9989973	**	**
Ref. 2007-2006	**	0.1926144	0.8854873	**	0.124737	**	**	**	**	**
Ref. 2008-2006	**	**	**	**	0.999988	**	**	**	**	**
Ref. 2009-2006	**	**	**	**	0.9999949	**	**	**	**	**
Ref. 2010-2006	**	0.128978	0.9711159	**	**	**	**	**	**	**
Ref. 2011-2006	**	<b>0.0145282</b>	0.9997213	**	**	**	**	**	**	**
Ref. 2008-2007	0.9999728	**	**	0.9125183	<b>0.0415287</b>	0.9388746	0.2371056	<b>0.0421954</b>	**	**
Ref. 2009-2007	0.890821	**	**	**	<b>0.0373744</b>	0.9946865	0.1296296	<b>0.0167477</b>	**	**
Ref. 2010-2007	**	0.9999979	0.9961105	**	**	**	**	**	0.7089773	0.716109
Ref. 2011-2007	0.9263544	0.9798983	0.5732053	**	**	0.8889107	0.7972522	<b>0.0147497</b>	0.2219547	0.9998749
Ref. 2009-2008	0.5648021	**	**	**	0.999999	0.9990916	0.999999	0.9999654	**	**
Ref. 2010-2008	**	**	**	**	**	**	**	**	**	**
Ref. 2011-2008	0.9750318	**	**	**	**	0.9999985	0.9741591	0.9940736	**	**
Ref. 2010-2009	**	**	**	**	**	**	**	**	**	**
Ref. 2011-2009	0.1187447	**	**	**	**	0.9935622	0.9241841	0.9996526	**	**
Ref. 2011-2010	**	0.7424639	0.4823447	**	**	**	**	**	0.2308688	0.4051456

\*\*No Data

**Table C-12 (Cont'd). Constituent for ANOVA and Tukey Tests at Inlet**

Year	Dissolved Magnesium (mg/L)	Dissolved Sodium (mg/L)	Dissolved Chromium (µg/L)	Dissolved Manganese (µg/L)	Dissolved Nickel (µg/L)	Dissolved Copper (µg/L)	Dissolved Zinc (µg/L)	Dissolved Selenium (µg/L)	Dissolved Silver (µg/L)	Dissolved Cadmium (µg/L)
ANOVA P-Vah	0.3404	0.3328	<b>0.002464</b>	0.08306	0.1156	<b>0.0002124</b>	<b>0.02816</b>	<b>0.02875</b>	N/A	<b>0.5247</b>
Ref, 2002-2001	**	**	**	**	**	0.99999	0.9999914	**	**	**
Ref, 2003-2001	**	**	**	**	**	0.9889733	0.9871734	**	**	**
Ref, 2004-2001	**	**	**	**	**	**	**	**	**	**
Ref, 2005-2001	**	**	**	**	**	0.995894	0.9999792	**	**	**
Ref, 2006-2001	**	**	**	**	**	**	**	**	**	**
Ref, 2007-2001	**	**	**	**	**	0.9504355	0.9997917	**	**	**
Ref, 2008-2001	**	**	**	**	**	0.9991954	0.7671119	**	**	**
Ref, 2009-2001	**	**	**	**	**	0.6216678	0.8079356	**	**	**
Ref, 2010-2001	**	**	**	**	**	0.998652	1	**	**	**
Ref, 2011-2001	**	**	**	**	**	0.9295125	0.9520295	**	**	**
Ref, 2003-2002	**	**	**	**	**	0.9986652	0.9988584	**	**	**
Ref, 2004-2002	**	**	**	**	**	**	**	**	**	**
Ref, 2005-2002	**	**	**	**	**	0.9998338	1	**	**	**
Ref, 2006-2002	**	**	**	**	**	**	**	**	**	**
Ref, 2007-2002	**	**	**	**	**	0.6676683	0.9850712	**	**	**
Ref, 2008-2002	**	**	**	**	**	0.9447391	0.8967201	**	**	**
Ref, 2009-2002	**	**	**	**	**	0.1485671	0.9258067	**	**	**
Ref, 2010-2002	**	**	**	**	**	0.9999954	0.9996605	**	**	**
Ref, 2011-2002	**	**	**	**	**	0.9764648	0.9931333	**	**	**
Ref, 2004-2003	**	**	**	**	**	**	**	**	**	**
Ref, 2005-2003	**	**	1	**	**	0.9999996	0.9988055	**	**	**
Ref, 2006-2003	**	**	**	**	**	**	**	**	**	**
Ref, 2007-2003	**	**	0.0555545	**	**	0.3722041	0.7864612	**	**	**
Ref, 2008-2003	**	**	**	**	**	0.685442	0.9999016	**	**	**
Ref, 2009-2003	**	**	**	**	**	0.0718115	0.9999851	**	**	**
Ref, 2010-2003	**	**	0.9909173	**	**	0.9997043	0.9082472	**	**	**
Ref, 2011-2003	**	**	1	**	**	1	1	**	**	**
Ref, 2005-2004	**	**	**	**	**	**	**	**	**	**
Ref, 2006-2004	**	**	**	**	**	**	**	**	**	**
Ref, 2007-2004	**	**	**	**	**	**	**	**	**	**
Ref, 2008-2004	**	**	**	**	**	**	**	**	**	**
Ref, 2009-2004	**	**	**	**	**	**	**	**	**	**
Ref, 2010-2004	**	**	**	**	**	**	**	**	**	**
Ref, 2011-2004	**	**	**	**	**	**	**	**	**	**
Ref, 2006-2005	**	**	**	**	**	**	**	**	**	0.966628
Ref, 2007-2005	**	**	<b>0.0277441</b>	**	**	0.330662	0.9742115	**	**	1
Ref, 2008-2005	**	**	**	**	**	0.6687349	0.8689734	**	**	0.9350798
Ref, 2009-2005	**	**	**	**	**	<b>0.0329549</b>	0.9029678	**	**	0.9999604
Ref, 2010-2005	**	**	1	**	**	0.9999932	0.9989446	**	**	0.9998916
Ref, 2011-2005	**	**	<b>0.0033402</b>	**	**	0.9999349	0.9911265	**	**	0.9999604
Ref, 2007-2006	**	**	**	**	**	**	**	**	**	0.9371119
Ref, 2008-2006	**	**	**	**	**	**	**	**	**	1
Ref, 2009-2006	**	**	**	**	**	**	**	**	**	0.8379775
Ref, 2010-2006	**	**	**	**	**	**	**	**	**	0.9760137
Ref, 2011-2006	**	**	**	**	**	**	**	**	**	0.8379775
Ref, 2008-2007	**	**	**	**	**	0.996963	0.1815058	**	**	0.8454708
Ref, 2009-2007	**	**	**	**	**	0.9991507	0.1956415	**	**	0.9999531
Ref, 2010-2007	0.9398412	0.8904522	<b>0.0033402</b>	0.4742318	0.9762531	0.1782376	0.9982742	<b>0.0257978</b>	N/A	0.9991667
Ref, 2011-2007	0.5236697	0.4685718	<b>0.0027221</b>	0.083871	0.4201675	0.0549499	0.43611	<b>0.0494215</b>	N/A	0.9999531
Ref, 2009-2008	**	**	**	**	**	0.7455637	1	**	**	0.6040627
Ref, 2010-2008	**	**	**	**	**	0.4660187	0.1209392	**	**	0.903404
Ref, 2011-2008	**	**	**	**	**	0.1603521	0.998683	**	**	0.6040627
Ref, 2010-2009	**	**	**	**	**	<b>0.0011264</b>	0.1129271	**	**	0.9704398
Ref, 2011-2009	**	**	**	**	**	<b>0.0004797</b>	0.9997306	**	**	1
Ref, 2011-2010	0.3682717	0.3891674	0.9461195	0.2298689	0.0992974	0.9678064	0.4079789	1	N/A	0.9704398

\*\*No Data

**Table C-12 (Cont'd). Constituent for ANOVA and Tukey Tests at Inlet**

Year	Dissolved Lead (µg/L)	Total Beryllium (µg/L)	Total Chromium (µg/L)	Total Manganese (µg/L)	Total Magnesium (mg/L)	Total Nickel (µg/L)	Total Copper (µg/L)	Total Zinc (µg/L)	Total Arsenic (µg/L)	Total Selenium (µg/L)
ANOVA P-Val	<b>0.001964</b>	N/A	0.07852	<b>0.0008692</b>	0.3992	<b>0.04015</b>	0.3944	<b>0.0001522</b>	0.2657	<b>0.001617</b>
Ref, 2002-2001	1	**	**	**	**	**	1	1	**	**
Ref, 2003-2001	<b>0.0087745</b>	**	**	**	**	**	0.9999766	0.434366	**	**
Ref, 2004-2001	**	**	**	**	**	**	1	0.665167	**	**
Ref, 2005-2001	1	**	**	**	**	**	0.9999988	1	**	**
Ref, 2006-2001	**	**	**	**	**	**	1	1	**	**
Ref, 2007-2001	1	**	**	**	**	**	1	0.999989	**	**
Ref, 2008-2001	0.9998099	**	**	**	**	**	0.9991334	1	**	**
Ref, 2009-2001	1	**	**	**	**	**	0.9999933	0.9743345	**	**
Ref, 2010-2001	1	**	**	**	**	**	0.9994137	0.9998626	**	**
Ref, 2011-2001	1	**	**	**	**	**	0.9919376	0.9011568	**	**
Ref, 2003-2002	<b>0.0020486</b>	**	**	**	**	**	0.9985435	0.2620156	**	**
Ref, 2004-2002	**	**	**	**	**	**	0.9999999	0.4746273	**	**
Ref, 2005-2002	1	**	**	**	**	**	1	1	**	**
Ref, 2006-2002	**	**	**	**	**	**	1	1	**	**
Ref, 2007-2002	1	**	**	**	**	**	0.9999932	0.9999279	**	**
Ref, 2008-2002	0.9993222	**	**	**	**	**	0.9782904	1	**	**
Ref, 2009-2002	1	**	**	**	**	**	1	0.9044499	**	**
Ref, 2010-2002	1	**	**	**	**	**	0.9999026	0.9986397	**	**
Ref, 2011-2002	1	**	**	**	**	**	0.9957358	0.726912	**	**
Ref, 2004-2003	**	**	**	0.9997319	**	**	0.9999561	0.9999921	**	**
Ref, 2005-2003	<b>0.0020486</b>	**	0.168189	<b>0.0214824</b>	0.394842	0.3903639	0.9909738	0.2247329	**	**
Ref, 2006-2003	**	**	0.168189	0.5357084	0.5721983	0.4495426	0.9996495	0.2445147	**	**
Ref, 2007-2003	<b>0.0012746</b>	**	0.5305212	<b>0.0478881</b>	**	0.9258437	0.9999932	0.0544259	**	**
Ref, 2008-2003	<b>0.0039548</b>	**	**	**	**	**	1	0.1050124	**	**
Ref, 2009-2003	<b>0.000406</b>	**	**	**	**	**	0.9762667	<b>0.0018375</b>	**	**
Ref, 2010-2003	<b>0.0001117</b>	**	<b>0.0450535</b>	<b>0.0098177</b>	**	1	0.854372	<b>0.0060875</b>	**	**
Ref, 2011-2003	<b>0.000406</b>	**	0.1611841	<b>0.0019781</b>	**	0.8713562	0.721453	<b>0.0005769</b>	**	**
Ref, 2005-2004	**	**	**	0.1226742	**	**	0.9999878	0.4253943	**	**
Ref, 2006-2004	**	**	**	0.8433459	**	**	1	0.4414069	**	**
Ref, 2007-2004	**	**	**	0.2043328	**	**	1	0.1218578	**	**
Ref, 2008-2004	**	**	**	**	**	**	0.9977946	0.2243963	**	**
Ref, 2009-2004	**	**	**	**	**	**	0.9999233	<b>0.0042185</b>	**	**
Ref, 2010-2004	**	**	**	0.1034347	**	**	0.9943649	<b>0.0141409</b>	**	**
Ref, 2011-2004	**	**	**	<b>0.0251364</b>	**	**	0.9607536	<b>0.0012614</b>	**	**
Ref, 2006-2005	**	**	1	0.8020295	0.9346697	1	1	1	**	**
Ref, 2007-2005	1	**	0.9073325	0.9999944	**	0.8401463	0.9997087	0.9998383	**	**
Ref, 2008-2005	0.9993222	**	**	**	**	**	0.9201902	0.9999999	**	**
Ref, 2009-2005	1	**	**	**	**	**	1	0.8532057	**	**
Ref, 2010-2005	1	**	0.9999823	0.9992712	**	0.1060729	0.9999979	0.9965919	**	**
Ref, 2011-2005	1	**	0.9974678	0.9972641	**	0.8487311	0.9991359	0.6319799	**	**
Ref, 2007-2006	**	**	0.9073325	0.9042459	**	0.8747487	0.9999997	0.9999999	**	**
Ref, 2008-2006	**	**	**	**	**	**	0.9929495	1	**	**
Ref, 2009-2006	**	**	**	**	**	**	0.9999996	0.9788472	**	**
Ref, 2010-2006	**	**	0.9999823	0.8564082	**	0.1740929	0.9997898	0.9999709	**	**
Ref, 2011-2006	**	**	0.9974678	0.4137933	**	0.8856705	0.9945591	0.9014384	**	**
Ref, 2008-2007	0.9989964	**	**	**	**	**	0.9990315	0.9999987	**	**
Ref, 2009-2007	1	**	**	**	**	**	0.9983917	0.9978952	**	**
Ref, 2010-2007	1	N/A	0.7896843	0.999997	**	0.7226222	0.9496781	1	1	<b>0.0012679</b>
Ref, 2011-2007	1	N/A	0.9728238	0.9876249	**	0.9999974	0.8495869	0.9702895	6.230677	<b>0.0026877</b>
Ref, 2009-2008	0.997476	**	**	**	**	**	0.8198875	0.9448872	**	**
Ref, 2010-2008	0.9929579	**	**	**	**	**	0.4441972	0.9999058	**	**
Ref, 2011-2008	0.997476	**	**	**	**	**	0.3375632	0.7828186	**	**
Ref, 2010-2009	1	**	**	**	**	**	0.9999975	0.9891723	**	**
Ref, 2011-2009	1	**	**	**	**	**	0.9984824	0.9999975	**	**
Ref, 2011-2010	1	N/A	0.9967909	0.8300269	**	0.5053877	0.9999412	0.8690304	0.245883	1

\*\*No Data



**Table C-12 (Cont'd). Constituent for ANOVA and Tukey Tests at Inlet**

Year	Total Molybdenum (µg/L)	Total Silver (µg/L)	Total Cadmium (µg/L)	Total Antimony (µg/L)	Total Lead (µg/L)	Nitrite+Nitrate (mg/L)	Dissolved Ortho-Phosphate (mg/L)	Dissolved Phosphorus (mg/L)	Dissolved Potassium (mg/L)	Total Ortho-Phosphate (mg/L)
ANOVA P-Val	0.5758	N/A	0.1636	<b>0.04999</b>	<b>8.977 E-5</b>	0.228	0.1384	<b>0.01143</b>	0.1243	0.3861
Ref, 2002-2001	**	**	**	**	0.9999986	1	**	0.9999999	**	**
Ref, 2003-2001	**	**	**	**	0.1885939	0.999998	**	0.9998526	**	**
Ref, 2004-2001	**	**	**	**		1	**	0.8551258	**	**
Ref, 2005-2001	**	**	**	**	0.8151184	0.9235994	**	0.9985596	**	**
Ref, 2006-2001	**	**	**	**	0.9999094	0.9999987	**	0.999998	**	**
Ref, 2007-2001	**	**	**	**	0.7930214	1	**	0.9999793	**	**
Ref, 2008-2001	**	**	**	**	0.9998117	1	**	0.9774358	**	**
Ref, 2009-2001	**	**	**	**	0.7453955	0.9988046	**	0.9998678	**	**
Ref, 2010-2001	**	**	**	**	0.8444185	0.9995449	**	0.99128	**	**
Ref, 2011-2001	**	**	**	**	0.9496617	0.9376867	**	0.9843899	**	**
Ref, 2003-2002	**	**	**	**	0.0289374	1	**	0.9999972	**	**
Ref, 2004-2002	**	**	**	**		1	**	0.4800906	**	**
Ref, 2005-2002	**	**	**	**	0.8804218	0.6215935	**	0.9998785	**	**
Ref, 2006-2002	**	**	**	**	0.9999999	0.9993311	**	1	**	**
Ref, 2007-2002	**	**	**	**	0.8578694	1	**	1	**	**
Ref, 2008-2002	**	**	**	**	0.9999997	0.9999999	**	0.9913281	**	**
Ref, 2009-2002	**	**	**	**	0.8036944	0.9525122	**	0.9823739	**	**
Ref, 2010-2002	**	**	**	**	0.89628	0.9597134	**	0.9978718	**	**
Ref, 2011-2002	**	**	**	**	0.9825684	0.6035419	**	0.9949184	**	**
Ref, 2004-2003	**	**	**	**	**	0.9999969	**	0.2906366	**	**
Ref, 2005-2003	**	**	**	**	**	0.5712993	**	1	**	**
Ref, 2006-2003	**	**	**	**	**	0.9970734	**	0.9999998	**	**
Ref, 2007-2003	**	**	0.2584655	**	**	0.9999945	**	1	**	**
Ref, 2008-2003	**	**	0.5228032	**	**	0.9999901	**	0.9999836	**	**
Ref, 2009-2003	**	**	0.1262893	**	**	0.9207991	**	0.880853	**	**
Ref, 2010-2003	**	**	0.3135461	**	**	0.9304158	**	1	**	**
Ref, 2011-2003	**	**	0.1262893	**	**	0.5592117	**	0.9999971	**	**
Ref, 2005-2004	**	**	**	**	<b>0.0001532</b>	0.8638708	**	0.1131404	**	**
Ref, 2006-2004	**	**	**	**	<b>0.023613</b>	0.9999956	**	0.3308895	**	**
Ref, 2007-2004	**	**	**	**	<b>0.000869</b>	1	**	0.2225582	**	**
Ref, 2008-2004	**	**	**	**	<b>0.0060331</b>	1	**	<b>0.0243774</b>	**	**
Ref, 2009-2004	**	**	**	**	<b>0.0000265</b>	0.9966203	**	0.942341	**	**
Ref, 2010-2004	**	**	**	**	<b>0.0000138</b>	0.9983829	**	<b>0.0122935</b>	**	**
Ref, 2011-2004	**	**	**	**	<b>0.0002007</b>	0.8754948	**	<b>0.0222601</b>	**	**
Ref, 2006-2005	**	**	**	**	0.9770629	0.9637829	**	0.9999782	**	**
Ref, 2007-2005	**	**	**	**	1	0.6985467	**	0.9999976	**	**
Ref, 2008-2005	**	**	**	**	0.9387245	0.674544	**	0.9999986	**	**
Ref, 2009-2005	**	**	**	**	1	0.9969964	**	0.6350967	**	**
Ref, 2010-2005	**	**	**	**	0.9999919	0.9709174	**	1	**	**
Ref, 2011-2005	**	**	**	**	0.9998231	1	**	0.9999999	**	**
Ref, 2007-2006	**	**	**	**	0.9721715	0.999968	**	1	**	**
Ref, 2008-2006	**	**	**	**	1	0.9999704	**	0.9957192	**	**
Ref, 2009-2006	**	**	**	**	0.9597733	0.9999837	**	0.9406126	**	**
Ref, 2010-2006	**	**	**	**	0.990047	0.9999991	**	0.9992988	**	**
Ref, 2011-2006	**	**	**	**	0.9992387	0.9715697	**	0.9977986	**	**
Ref, 2008-2007	**	**	0.9866517		0.9227031	1	**	0.9982071	**	**
Ref, 2009-2007	**	**	0.9998378		1	0.9821888	**	0.8630927	**	**
Ref, 2010-2007	0.8083673	**	0.9901357	1	0.9999864	0.9863848	**	0.9998389	0.2098061	**
Ref, 2011-2007	0.5836974	**	0.9998378	0.1824925	0.9997399	0.6734624	**	0.9992285	0.1035837	**
Ref, 2009-2008	**	**	0.9155241	**	0.8794288	0.9797049	0.1384359	0.236087	**	0.3861299
Ref, 2010-2008	**	**	0.9999586	**	0.9513879	0.9833962	**	0.9999982	**	**
Ref, 2011-2008	**	**	0.9155241	**	0.9965064	0.6385574	**	1	**	**
Ref, 2010-2009	**	**	0.8839509	**	0.9999579	1	**	0.1406312	**	**
Ref, 2011-2009	**	**	1	**	0.9994273	0.998643	**	0.2265868	**	**
Ref, 2011-2010	0.7477513	N/A	0.8839509	<b>0.0464365</b>	0.9999992	0.9716738	**	1	0.6607077	**

\*\*No Data

**Table C-12 (Cont'd). Constituent for ANOVA and Tukey Tests at Inlet**

Year	Total Phosphorus (mg/L)	Total Phosphate (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Nitrogen (mg/L)	Total Suspended Solids (mg/L)
ANOVA P-Val	0.097	0.1017	0.1203	0.0779	<b>6.61 E -7</b>
Ref, 2002-2001	0.9998162	**	0.9999643	**	1
Ref, 2003-2001	0.9986063	**	0.9998654	**	0.3498212
Ref, 2004-2001	**	**	0.8291546	**	0.1586929
Ref, 2005-2001	0.9969462	**	1	**	0.9746715
Ref, 2006-2001	**	**	0.9999998	**	0.9527135
Ref, 2007-2001	**	**	0.7337218	**	1
Ref, 2008-2001	0.9999999	**	**	**	0.9998223
Ref, 2009-2001	0.7890047	**	**	**	0.9501738
Ref, 2010-2001	1	**	0.999511	**	0.9924668
Ref, 2011-2001	0.9999194	**	0.9999467	**	0.9707434
Ref, 2003-2002	0.9999991	**	1	**	0.1511428
Ref, 2004-2002	**	**	0.9303191	**	<b>0.0418359</b>
Ref, 2005-2002	0.8762053	**	0.9997048	**	0.9537623
Ref, 2006-2002	**	**	0.9999993	**	0.9192172
Ref, 2007-2002	**	**	0.85587	**	1
Ref, 2008-2002	0.9953179	**	**	**	0.999744
Ref, 2009-2002	0.9167997	**	**	**	0.8966345
Ref, 2010-2002	0.9987911	**	1	**	0.9803127
Ref, 2011-2002	0.9596099	**	0.9699557	**	0.9379575
Ref, 2004-2003	**	**	0.9717002	**	0.9999999
Ref, 2005-2003	0.8147025	**	0.9992027	**	<b>0.0026349</b>
Ref, 2006-2003	**	**	0.9999904	**	<b>0.0025191</b>
Ref, 2007-2003	**	**	0.9363052	**	0.1161202
Ref, 2008-2003	0.9833291	**	**	**	<b>0.0118863</b>
Ref, 2009-2003	0.9837795	**	**	**	<b>0.0005645</b>
Ref, 2010-2003	0.9924403	**	1	**	<b>0.000633</b>
Ref, 2011-2003	0.9195869	**	0.9616187	**	<b>0.0008659</b>
Ref, 2005-2004	**	**	0.6450346	**	<b>0.0002686</b>
Ref, 2006-2004	**	0.2770636	0.7977782	**	<b>0.0002938</b>
Ref, 2007-2004	**	0.0896685	1	**	<b>0.025217</b>
Ref, 2008-2004	**	**	**	**	<b>0.0013223</b>
Ref, 2009-2004	**	**	**	**	<b>0.00003</b>
Ref, 2010-2004	**	**	0.8315423	**	<b>0.0000204</b>
Ref, 2011-2004	**	**	0.2071	**	<b>0.0000496</b>
Ref, 2006-2005	**	**	0.9999949	**	1
Ref, 2007-2005	**	**	0.482149	**	0.8852061
Ref, 2008-2005	0.9957156	**	**	**	0.9993996
Ref, 2009-2005	0.0910175	**	**	**	1
Ref, 2010-2005	0.9437877	**	0.9947426	**	0.9999872
Ref, 2011-2005	0.9998365	**	0.999939	**	1
Ref, 2007-2006	**	0.7884467	0.6501775	**	0.8299421
Ref, 2008-2006	**	**	**	**	0.9969845
Ref, 2009-2006	**	**	**	**	1
Ref, 2010-2006	**	**	0.9999262	**	0.9997303
Ref, 2011-2006	**	**	0.9933499	**	0.9999999
Ref, 2008-2007	**	**	**	**	0.9982017
Ref, 2009-2007	**	**	**	**	0.754377
Ref, 2010-2007	**	**	0.6202749	**	0.9137471
Ref, 2011-2007	**	**	0.0847903	**	0.8326292
Ref, 2009-2008	0.299119	**	**	0.0893948	0.9970293
Ref, 2010-2008	0.9999833	**	**	**	0.9999953
Ref, 2011-2008	0.9999647	**	**	**	0.9992843
Ref, 2010-2009	0.1816497	**	**	**	0.9998021
Ref, 2011-2009	0.105047	**	**	**	1
Ref, 2011-2010	0.9933706	**	0.6973692	**	0.9999889

\*\*No Data

**Table C-13. Constituent for ANOVA and Tukey Tests at Outlet**

Year	Alkalinity (mg/L)	Chloride (mg/L)	Chemical Oxygen Demand (mg/L)	Conductivity (umho/cm)	E Coli (#/100 mL)	Hardness (mg/L)	pH	Total Organic Carbon (mg/L)	Dissolved Calcium (mg/L)	Dissolved Iron (mg/L)
ANOVA P-Value	<b>0.03054</b>	0.09805	0.4161	<b>0.03788</b>	<b>0.0007853</b>	0.1807	<b>0.001894</b>	0.6861	0.2988	0.7114
BMP, 2002-2001	0.1095816	0.8710987	1	0.6600377	**	0.9924701	0.073212	0.9991863	**	**
BMP, 2003-2001	<b>0.0312928</b>	0.1059785	0.9981929	0.134286	**	0.5784277	<b>0.0035272</b>	0.9923258	**	**
BMP, 2004-2001	**	**	**	**	**	**	**	**	**	**
BMP, 2005-2001	<b>0.0458288</b>	0.428079	0.9999981	0.0884372	**	0.5655	<b>0.0185725</b>	0.9999723	**	**
BMP, 2006-2001	0.7341085	0.9926339	0.9360098	0.4402345	**	0.9992707	<b>0.0018355</b>	0.9981103	**	**
BMP, 2007-2001	0.1239309	0.984487	0.9981929	0.3044485	**	0.7829269	<b>0.0072705</b>	0.9998925	**	**
BMP, 2008-2001	0.1214882	**	**	0.9979688	**	0.6135529	0.273196	0.9999911	**	**
BMP, 2009-2001	<b>0.0472931</b>	**	**	**	**	0.9998569	0.0513511	0.9999998	**	**
BMP, 2010-2001	**	0.9342928	0.884481	**	**	**	**	**	**	**
BMP, 2011-2001	<b>0.040151</b>	0.6794784	0.9999959	**	**	0.5096423	0.2738066	0.9999481	**	**
BMP, 2003-2002	0.9882225	0.6030368	0.9985613	0.7872918	**	0.9224293	0.7566661	0.9999916	**	**
BMP, 2004-2002	**	**	**	**	**	**	**	**	**	**
BMP, 2005-2002	0.9999512	0.9882839	0.9999416	0.7356081	**	0.9347331	0.9991572	0.9482636	**	**
BMP, 2006-2002	0.8787762	0.9944827	0.9040752	0.9994924	**	0.9999995	0.7918851	1	**	**
BMP, 2007-2002	1	0.9982304	0.9985613	0.9838712	**	0.9948742	0.953364	1	**	**
BMP, 2008-2002	1	**	**	0.8561716	**	0.9598399	0.9927614	0.9474054	**	**
BMP, 2009-2002	1	**	**	**	**	0.9997971	1	0.9996208	**	**
BMP, 2010-2002	**	0.9996119	0.809189	**	**	**	**	**	**	**
BMP, 2011-2002	0.9998658	0.9999943	0.9999997	**	**	0.9031252	0.997487	0.9380748	**	**
BMP, 2004-2003	**	**	**	**	**	**	**	**	**	**
BMP, 2005-2003	0.9996715	0.9565907	0.9807074	0.9999998	**	0.9999998	0.967691	0.8900961	**	**
BMP, 2006-2003	0.4355881	0.1884355	0.9999166	0.9348762	**	0.8641537	0.9999986	0.9999989	**	**
BMP, 2007-2003	0.9948873	0.2316068	1	0.9934602	**	0.9992411	0.9997142	0.9999311	**	**
BMP, 2008-2003	0.9664825	**	**	0.1976212	**	0.9999901	0.273196	0.889228	**	**
BMP, 2009-2003	0.9878723	**	**	**	**	0.6449364	0.5643215	0.9934022	**	**
BMP, 2010-2003	**	0.2035716	0.9995855	**	**	**	**	**	**	**
BMP, 2011-2003	0.999845	0.6353026	0.9994905	**	**	1	0.3533764	0.8761233	**	**
BMP, 2005-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2006-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2007-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2008-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2009-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2010-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2011-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2006-2005	0.6376991	0.6961079	0.6878312	0.9238966	<b>0.003966</b>	0.8757796	0.9865835	0.9229345	**	**
BMP, 2007-2005	0.9999943	0.771228	0.9807074	0.9947319	<b>0.0026095</b>	0.9998941	0.9995975	0.9834109	**	**
BMP, 2008-2005	0.9992969	**	**	0.1214738	<b>0.0005984</b>	1	0.8226712	1	**	**
BMP, 2009-2005	0.9999782	**	**	**	<b>0.000536</b>	0.5949601	0.9911155	0.9962608	**	**
BMP, 2010-2005	**	0.7664678	0.5236508	**	**	**	**	**	**	**
BMP, 2011-2005	1	0.9964194	0.9986574	**	**	1	0.8914851	1	**	**
BMP, 2007-2006	0.8788972	0.9999999	0.9999166	0.9996415	1	0.979399	0.9999948	0.9999997	**	**
BMP, 2008-2006	0.9174505	**	**	0.6267973	0.9986664	0.9117392	0.2372323	0.9194709	**	**
BMP, 2009-2006	0.7283436	**	**	**	0.9991307	0.9999997	0.5504081	0.9987224	**	**
BMP, 2010-2006	**	0.9998744	1	**	**	**	**	**	**	**
BMP, 2011-2006	0.5971204	0.9346152	0.8956854	**	**	0.8334646	0.3330085	0.9097908	**	**
BMP, 2008-2007	0.9999995	**	**	0.4466126	0.9977765	0.9999932	0.5128928	0.9851114	**	**
BMP, 2009-2007	1	**	**	**	0.9984846	0.8495208	0.8515314	0.9999851	**	**
BMP, 2010-2007	**	0.9999957	0.9995855	**	**	**	**	**	**	**
BMP, 2011-2007	0.9999796	0.9673401	0.9994905	**	**	0.9995508	0.617922	0.979098	**	**
BMP, 2009-2008	0.9999972	**	**	**	0.9999993	0.6430001	0.9953113	0.9969577	**	**
BMP, 2010-2008	**	**	**	**	**	**	**	**	**	**
BMP, 2011-2008	0.9985667	**	**	**	**	0.999999	1	1	**	**
BMP, 2010-2009	**	**	**	**	**	**	**	**	**	**
BMP, 2011-2009	0.999929	**	**	**	**	0.5231498	0.9988047	0.9945398	**	**
BMP, 2011-2010	**	0.9752615	0.7518388	**	**	**	**	**	0.2987997	0.711377

\*\*No Data

**Table C-13 (Cont'd). Constituent for ANOVA and Tukey Tests at Outlet**

Year	Dissolved Magnesium (mg/L)	Dissolved Sodium (mg/L)	Dissolved Chromium (µg/L)	Dissolved Manganese (µg/L)	Dissolved Nickel (µg/L)	Dissolved Copper (µg/L)	Dissolved Zinc (µg/L)	Dissolved Selenium (µg/L)	Dissolved Silver (µg/L)	Dissolved Cadmium (µg/L)
ANOVA P-Value	0.587	0.175	N/A	0.1929	0.1367	<b>0.007118</b>	0.2743	0.3223	N/A	0.419
BMP, 2002-2001	**	**	**	**	**	0.99664	1	**	**	**
BMP, 2003-2001	**	**	**	**	**	0.9999626	0.9999095	**	**	**
BMP, 2004-2001	**	**	**	**	**	**	**	**	**	**
BMP, 2005-2001	**	**	**	**	**	0.9981761	0.9738681	**	**	**
BMP, 2006-2001	**	**	**	**	**	0.8654775	**	**	**	**
BMP, 2007-2001	**	**	**	**	**	0.9970307	1	**	**	**
BMP, 2008-2001	**	**	**	**	**	0.9647988	0.9796607	**	**	**
BMP, 2009-2001	**	**	**	**	**	0.9999055	0.9846146	**	**	**
BMP, 2010-2001	**	**	**	**	**	0.4536376	0.9997543	**	**	**
BMP, 2011-2001	**	**	**	**	**	0.5758104	0.9984342	**	**	**
BMP, 2003-2002	**	**	**	**	**	0.9999994	0.9996357	**	**	**
BMP, 2004-2002	**	**	**	**	**	**	**	**	**	**
BMP, 2005-2002	**	**	**	**	**	1	0.9705294	**	**	**
BMP, 2006-2002	**	**	**	**	**	0.9986478	**	**	**	**
BMP, 2007-2002	**	**	**	**	**	1	1	**	**	**
BMP, 2008-2002	**	**	**	**	**	0.9999989	0.9451079	**	**	**
BMP, 2009-2002	**	**	**	**	**	0.7056732	0.9544738	**	**	**
BMP, 2010-2002	**	**	**	**	**	0.8955761	0.9984301	**	**	**
BMP, 2011-2002	**	**	**	**	**	0.9520867	0.9935945	**	**	**
BMP, 2004-2003	**	**	**	**	**	**	**	**	**	**
BMP, 2005-2003	**	**	**	**	**	0.9999999	0.7865804	**	**	**
BMP, 2006-2003	**	**	**	**	**	0.9918415	**	**	**	**
BMP, 2007-2003	**	**	**	**	**	0.9999991	0.9994249	**	**	**
BMP, 2008-2003	**	**	**	**	**	0.9997797	0.9999368	**	**	**
BMP, 2009-2003	**	**	**	**	**	0.9719863	0.9999792	**	**	**
BMP, 2010-2003	**	**	**	**	**	0.8581183	1	**	**	**
BMP, 2011-2003	**	**	**	**	**	0.9146861	1	**	**	**
BMP, 2005-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2006-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2007-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2008-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2009-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2010-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2011-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2006-2005	**	**	N/A	**	**	0.9971808	**	**	**	**
BMP, 2007-2005	**	**	N/A	**	**	1	0.9767228	**	**	0.9219772
BMP, 2008-2005	**	**	**	**	**	0.9999918	0.198935	**	**	0.8504472
BMP, 2009-2005	**	**	**	**	**	0.7606423	0.1922555	**	**	1
BMP, 2010-2005	**	**	N/A	**	**	0.8549146	0.3973259	**	**	0.9999965
BMP, 2011-2005	**	**	N/A	**	**	0.929085	0.3770439	**	**	0.9999997
BMP, 2007-2006	**	**	N/A	**	**	0.9993735	**	**	**	**
BMP, 2008-2006	**	**	**	**	**	0.9999423	**	**	**	**
BMP, 2009-2006	**	**	**	**	**	0.1812936	**	**	**	**
BMP, 2010-2006	**	**	N/A	**	**	0.999958	**	**	**	**
BMP, 2011-2006	**	**	N/A	**	**	0.9999939	**	**	**	**
BMP, 2008-2007	**	**	**	**	**	0.9999998	0.9327673	**	**	0.9999946
BMP, 2009-2007	**	**	**	**	**	0.7697336	0.9431605	**	**	0.7798645
BMP, 2010-2007	**	**	N/A	0.6468849	0.977791	0.9450949	0.9974385	1	N/A	0.8042861
BMP, 2011-2007	**	**	N/A	0.9088698	0.298773	0.9746229	0.9909078	0.5714939	N/A	0.8349244
BMP, 2009-2008	**	**	**	**	**	0.2743507	1	**	**	0.561697
BMP, 2010-2008	**	**	**	**	**	0.9478439	0.9949619	**	**	0.5593358
BMP, 2011-2008	**	**	**	**	**	0.9840825	0.9999168	**	**	0.648272
BMP, 2010-2009	**	**	**	**	**	0.0016505	0.9969761	**	**	0.9999666
BMP, 2011-2009	**	**	**	**	**	0.0131866	0.9999796	**	**	0.9999984
BMP, 2011-2010	0.5870166	0.1750054	N/A	0.1831336	0.1469908	1	0.9999969	0.3135123	N/A	0.9999998

\*\*No Data

**Table C-13 (Cont'd). Constituent for ANOVA and Tukey Tests at Outlet**

Year	Dissolved Lead (µg/L)	Total Beryllium (µg/L)	Total Chromium (µg/L)	Total Manganese (µg/L)	Total Nickel (µg/L)	Total Copper (µg/L)	Total Zinc (µg/L)	Total Arsenic (µg/L)	Total Selenium (µg/L)	Total Molybdenum (µg/L)
ANOVA P-Value	0.5932	N/A	N/A	0.6267	<b>1.581 E -5</b>	<b>0.02615</b>	0.08655	<b>0.003893</b>	0.4523	<b>0.02906</b>
BMP, 2002-2001	1	**	**	**	**	1	0.9999887	**	**	**
BMP, 2003-2001	1	**	**	**	**	1	0.8781877	**	**	**
BMP, 2004-2001	**	**	**	**	**	**	**	**	**	**
BMP, 2005-2001	1	**	**	**	**	0.8970196	0.9999172	**	**	**
BMP, 2006-2001	1	**	**	**	**	1	1	**	**	**
BMP, 2007-2001	1	**	**	**	**	0.759485	0.9995928	**	**	**
BMP, 2008-2001	0.8802661	**	**	**	**	0.6779894	1	**	**	**
BMP, 2009-2001	1	**	**	**	**	0.9700617	0.9999986	**	**	**
BMP, 2010-2001	1	**	**	**	**	0.46918	0.9954562	**	**	**
BMP, 2011-2001	1	**	**	**	**	0.5170269	0.9606622	**	**	**
BMP, 2003-2002	1	**	**	**	**	0.9999999	0.9579777	**	**	**
BMP, 2004-2002	**	**	**	**	**	**	**	**	**	**
BMP, 2005-2002	1	**	**	**	**	0.8663465	1	**	**	**
BMP, 2006-2002	1	**	**	**	**	1	0.999112	**	**	**
BMP, 2007-2002	1	**	**	**	**	0.6553676	0.9409578	**	**	**
BMP, 2008-2002	0.7321716	**	**	**	**	0.5620091	0.9997677	**	**	**
BMP, 2009-2002	1	**	**	**	**	0.9542464	0.99132	**	**	**
BMP, 2010-2002	1	**	**	**	**	0.2711023	0.7606621	**	**	**
BMP, 2011-2002	1	**	**	**	**	0.3521386	0.5561818	**	**	**
BMP, 2004-2003	**	**	**	**	**	**	**	**	**	**
BMP, 2005-2003	1	**	N/A	0.8286564	1	0.8489234	0.9772489	**	**	**
BMP, 2006-2003	1	**	N/A	0.982394	1	0.999998	0.6260461	**	**	**
BMP, 2007-2003	1	**	N/A	0.7325915	0.5513265	0.6815051	0.3035991	**	**	**
BMP, 2008-2003	0.8802661	**	**	**	**	0.596469	0.6892556	**	**	**
BMP, 2009-2003	1	**	**	**	**	0.9428547	0.4460828	**	**	**
BMP, 2010-2003	1	**	N/A	0.9785529	<b>0.0089912</b>	0.381588	0.1277961	**	**	**
BMP, 2011-2003	1	**	N/A	0.7777399	0.5746589	0.4316293	0.076362	**	**	**
BMP, 2005-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2006-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2007-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2008-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2009-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2010-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2011-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2006-2005	1	**	N/A	0.9806658	1	0.870524	0.9964876	**	**	**
BMP, 2007-2005	1	**	N/A	0.9998121	0.3697583	1	0.894817	**	**	**
BMP, 2008-2005	0.7321716	**	**	**	**	0.9999992	0.9987743	**	**	**
BMP, 2009-2005	1	**	**	**	**	0.9998914	0.9767407	**	**	**
BMP, 2010-2005	1	**	N/A	0.954813	<b>0.0007501</b>	0.9999853	0.6565484	**	**	**
BMP, 2011-2005	1	**	N/A	1	0.3785277	0.9999725	0.4553244	**	**	**
BMP, 2007-2006	1	**	N/A	0.9341431	0.2728554	0.6257805	0.9996664	**	**	**
BMP, 2008-2006	0.7321716	**	**	**	**	0.5291266	1	**	**	**
BMP, 2009-2006	1	**	**	**	**	0.9559551	1	**	**	**
BMP, 2010-2006	1	**	N/A	0.9999999	<b>0.0001147</b>	0.1941011	0.9897299	**	**	**
BMP, 2011-2006	1	**	N/A	0.9671377	0.270467	0.292597	0.9129903	**	**	**
BMP, 2008-2007	0.8039798	**	**	**	**	1	0.9986673	**	**	**
BMP, 2009-2007	1	**	**	**	**	0.9971407	0.9999759	**	**	**
BMP, 2010-2007	1	N/A	N/A	0.8779555	0.1487374	0.9999975	0.9999999	1	0.918523	0.9737462
BMP, 2011-2007	1	N/A	N/A	0.9995639	0.9999951	0.9999936	0.9991445	0.083095	0.5547662	0.1623845
BMP, 2009-2008	0.4921082	**	**	**	**	0.9870402	0.9999976	**	**	**
BMP, 2010-2008	0.348049	**	**	**	**	1	0.9743141	**	**	**
BMP, 2011-2008	0.5265491	**	**	**	**	1	0.8612382	**	**	**
BMP, 2010-2009	1	**	**	**	**	0.8961339	0.9969691	**	**	**
BMP, 2011-2009	1	**	**	**	**	0.9317199	0.9452593	**	**	**
BMP, 2011-2010	1	N/A	N/A	0.9057426	0.0652448	1	0.999743	<b>0.0034373</b>	0.5253448	<b>0.0299585</b>

\*\*No Data

**Table C-13 (Cont'd). Constituent for ANOVA and Tukey Tests at Outlet**

Year	Total Silver (µg/L)	Total Cadmium (µg/L)	Total Antimony (µg/L)	Total Lead (µg/L)	Nitrite+Nitrate (mg/L)	Dissolved Ortho-Phosphate (mg/L)	Dissolved Phosphorus (mg/L)	Dissolved Potassium (mg/L)	Total Ortho-Phosphate (mg/L)	Total Phosphorus (mg/L)
ANOVA P-Value	N/A	0.2012	N/A	0.09652	<b>0.01157</b>	0.2585	<b>0.006157</b>	0.09713	0.2274	<b>0.005443</b>
BMP, 2002-2001	**	**	**	1	0.5285704	**	0.9893452	**	**	0.9981546
BMP, 2003-2001	**	**	**	1	0.7330185	**	0.9275216	**	**	0.9999211
BMP, 2004-2001	**	**	**	**	**	**	**	**	**	**
BMP, 2005-2001	**	**	**	1	0.9999993	**	0.8082711	**	**	0.9229659
BMP, 2006-2001	**	**	**	1	1	**	0.2858621	**	**	**
BMP, 2007-2001	**	**	**	1	0.9752835	**	0.3983525	**	**	**
BMP, 2008-2001	**	**	**	0.4032307	0.999993	**	0.2039925	**	**	0.7204882
BMP, 2009-2001	**	**	**	1	0.9999873	**	0.9999116	**	**	0.9863356
BMP, 2010-2001	**	**	**	1	0.999967	**	0.0960404	**	**	0.6935839
BMP, 2011-2001	**	**	**	1	1	**	0.2876668	**	**	0.7638429
BMP, 2003-2002	**	**	**	1	1	**	0.9999514	**	**	0.9999994
BMP, 2004-2002	**	**	**	**	**	**	**	**	**	**
BMP, 2005-2002	**	**	**	1	0.5557325	**	0.9991166	**	**	0.997422
BMP, 2006-2002	**	**	**	1	0.2838781	**	0.8207775	**	**	**
BMP, 2007-2002	**	**	**	1	0.959346	**	0.9111361	**	**	**
BMP, 2008-2002	**	**	**	0.1917714	0.4616857	**	0.6930908	**	**	0.9447385
BMP, 2009-2002	**	**	**	1	<b>0.0413696</b>	**	0.9994229	**	**	0.55033
BMP, 2010-2002	**	**	**	1	<b>0.0180133</b>	**	0.4432645	**	**	0.9378297
BMP, 2011-2002	**	**	**	1	0.1959093	**	0.8229087	**	**	0.9646718
BMP, 2004-2003	**	**	**	**	**	**	**	**	**	**
BMP, 2005-2003	**	**	**	1	0.7942812	**	1	**	**	0.9936289
BMP, 2006-2003	**	**	**	1	0.6072191	**	0.9982427	**	**	**
BMP, 2007-2003	**	**	**	1	0.9932396	**	0.9996078	**	**	**
BMP, 2008-2003	**	**	**	0.4032307	0.7594583	**	0.9907833	**	**	0.936635
BMP, 2009-2003	**	**	**	1	0.2049464	**	0.9758118	**	**	0.8654179
BMP, 2010-2003	**	**	**	1	0.1436923	**	0.968056	**	**	0.9352583
BMP, 2011-2003	**	**	**	1	0.4989868	**	0.9983004	**	**	0.9561346
BMP, 2005-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2006-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2007-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2008-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2009-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2010-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2011-2004	**	**	**	**	**	**	**	**	**	**
BMP, 2006-2005	**	**	**	1	1	**	0.9982456	**	**	**
BMP, 2007-2005	**	**	**	1	0.992681	**	0.9997337	**	**	**
BMP, 2008-2005	**	**	**	0.1917714	1	**	0.9882936	**	**	**
BMP, 2009-2005	**	**	**	1	0.9936795	**	0.8643019	**	**	**
BMP, 2010-2005	**	**	**	1	0.9863026	**	0.9460383	**	**	**
BMP, 2011-2005	**	**	**	1	0.9999983	**	0.9983143	**	**	**
BMP, 2007-2006	**	**	**	1	0.946935	**	1	**	**	**
BMP, 2008-2006	**	**	**	0.1083412	0.9999997	**	0.9999996	**	**	**
BMP, 2009-2006	**	**	**	1	0.9942919	**	0.1468906	**	**	**
BMP, 2010-2006	**	**	**	1	0.9834115	**	0.999939	**	**	**
BMP, 2011-2006	**	**	**	1	1	**	1	**	**	**
BMP, 2008-2007	**	0.4240323	**	0.1083412	0.9906872	**	0.9999909	**	**	0.9999201
BMP, 2009-2007	**	0.2421974	**	1	0.4521112	**	0.2953958	**	**	0.1503546
BMP, 2010-2007	**	0.1659278	N/A	1	0.2978494	**	0.99964	**	**	0.9999754
BMP, 2011-2007	**	0.2624425	N/A	1	0.8771858	**	1	**	**	0.9999912
BMP, 2009-2008	**	0.9995584	**	0.0582329	0.9685008	0.2584642	0.0889296	**	0.2274046	<b>0.0162585</b>
BMP, 2010-2008	**	0.9993625	**	<b>0.0247919</b>	0.9290649	**	1	**	**	1
BMP, 2011-2008	**	0.9995958	**	0.1222722	0.999961	**	0.9999996	**	**	0.9999999
BMP, 2010-2009	**	1	**	1	1	**	<b>0.0104267</b>	**	**	<b>0.0032568</b>
BMP, 2011-2009	**	1	**	0.9999999	0.9993493	**	0.1485317	**	**	<b>0.0175823</b>
BMP, 2011-2010	N/A	1	N/A	0.9999997	0.9976459	**	0.9999334	0.0971308	**	1

\*\*No Data

**Table C-13 (Cont'd). Constituent for ANOVA and Tukey Tests at Outlet**

Year	Total Phosphate (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Nitrogen (mg/L)	Total Suspended Solids (mg/L)
ANOVA P-Value	0.914	0.1156	0.7586	0.6001
BMP, 2002-2001	**	0.6858377	**	0.9992549
BMP, 2003-2001	**	0.6827884	**	1
BMP, 2004-2001	**	**	**	**
BMP, 2005-2001	**	0.9951459	**	0.99058
BMP, 2006-2001	**	0.9084224	**	0.9795627
BMP, 2007-2001	**	0.835409	**	0.9958316
BMP, 2008-2001	**	**	**	0.9995185
BMP, 2009-2001	**	**	**	0.9999932
BMP, 2010-2001	**	0.9373888	**	0.9819158
BMP, 2011-2001	**	0.9999918	**	1
BMP, 2003-2002	**	0.9999991	**	0.9939957
BMP, 2004-2002	**	**	**	**
BMP, 2005-2002	**	0.9521814	**	0.999999
BMP, 2006-2002	**	0.9959801	**	0.9999928
BMP, 2007-2002	**	0.9997313	**	1
BMP, 2008-2002	**	**	**	1
BMP, 2009-2002	**	**	**	0.9999798
BMP, 2010-2002	**	0.9714376	**	0.9999991
BMP, 2011-2002	**	0.1923315	**	0.9774457
BMP, 2004-2003	**	**	**	**
BMP, 2005-2003	**	0.937914	**	0.9633582
BMP, 2006-2003	**	0.9905935	**	0.9305793
BMP, 2007-2003	**	0.9984182	**	0.9780197
BMP, 2008-2003	**	**	**	0.994884
BMP, 2009-2003	**	**	**	0.9996292
BMP, 2010-2003	**	0.9624949	**	0.9307505
BMP, 2011-2003	**	0.2764306	**	1
BMP, 2005-2004	**	**	**	**
BMP, 2006-2004	**	**	**	**
BMP, 2007-2004	**	**	**	**
BMP, 2008-2004	**	**	**	**
BMP, 2009-2004	**	**	**	**
BMP, 2010-2004	**	**	**	**
BMP, 2011-2004	**	**	**	**
BMP, 2006-2005	**	0.9993915	**	1
BMP, 2007-2005	**	0.9946026	**	1
BMP, 2008-2005	**	**	**	0.9999747
BMP, 2009-2005	**	**	**	0.9973361
BMP, 2010-2005	**	0.9999475	**	1
BMP, 2011-2005	**	0.8908163	**	0.8776462
BMP, 2007-2006	0.9139307	0.9999938	**	0.9999998
BMP, 2008-2006	**	**	**	0.9998306
BMP, 2009-2006	**	**	**	0.9883971
BMP, 2010-2006	**	0.9999945	**	1
BMP, 2011-2006	**	0.3781853	**	0.7294826
BMP, 2008-2007	**	**	**	0.9999995
BMP, 2009-2007	**	**	**	0.9993271
BMP, 2010-2007	**	0.9991444	**	1
BMP, 2011-2007	**	0.267981	**	0.9028365
BMP, 2009-2008	**	**	0.7585896	0.9999942
BMP, 2010-2008	**	**	**	0.999933
BMP, 2011-2008	**	**	**	0.9722145
BMP, 2010-2009	**	**	**	0.9865779
BMP, 2011-2009	**	**	**	0.997724
BMP, 2011-2010	**	0.3514819	**	0.6306447

\*\*No Data