EPA FINALIZED TMDL

Enoree River Basin (Hydrological Unit Code: 03050108): Stations: B-035, B-037, B-038, B-041, B-053, B-054, B-072, B-097, B-150, B-186, B-192, B-231, B-241, B-246, BE-001, BE-007, BE-015, BE-017, BE-018, BE-020, BE-024, BE-039, BE-040 Fecal Coliform Bacteria

September 29, 2004

D H E C

PROMOTE PROTECT PROSPER

South Carolina Department of Health and Environmental Control

Bureau of Water
2600 Bull Street
Columbia, SC 29201

In compliance with the provisions of the Federal Clean Water Act, 33 U.S.C §1251 et.seq., as amended by the Water Quality Act of 1987, P.L. 400-4, the U.S Environmental Protection Agency is hereby establishing a Total Maximum Daily Load (TMDL) for fecal coliform bacteria in the Enoree Basin. Subsequent actions must be consistent with this TMDL.

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James D. Giattina, Director Date
Water Management Division

Abstract

The Enoree River basin (8-digit HUC 03050108) is located in parts of Union, Spartanburg, Newberry, Laurens, and Greenville counties encompassing 24 14-digit HUCs (Figure 1-1) in the Broad River basin. Twenty-three water quality monitoring stations in the watershed have been placed on the South Carolina §303(d) list of impaired waters for violations of the fecal coliform bacteria standard, as shown in Table 1-1. The 730 square mile basin is composed of mostly forest (70%) with some pastureland (10%) and cropland (10%). The basin has several municipalities that have or may receive Municipal Separate Storm Sewer System (MS4) permits. There are 10 active continuous point sources discharging fecal coliform bacteria in the Enoree River basin of South Carolina.

The load-duration curve methodology was used to establish allowable fecal coliform bacteria loads in the watershed. The existing load was determined by applying a power trend line to measured data in violation of the instantaneous standard. The existing load and allowable total maximum daily load (TMDL) for stations on the 2002-§303(d) list is presented in Table I. To achieve the TMDL target, reductions of fecal coliform bacteria loads will be necessary; this is shown in Table I on the next page.

Table I Total Maximum Daily Loads for Impaired Water Quality Monitoring Stations in the Enoree River Basin (03050108)

Station ID	Existing Waste Load	TMDL WLA		Existing Load	TMDL LA	MOS	TMDL[3]	Percent Re-duction[4]
	Continuous (counts/ day)	Continuous[1] (counts/ day)	MS4[2]	(counts/day)	(counts/day)	(counts/day)	(counts/day)	
B-035	NA	NA	66%	1.45E+11	4.68E+10	2.60E+09	4.94E+10	66%
B-037	3.50E+11	3.50E+11	NA	8.05E+12	2.13E+12	1.38E+11	2.61E+12	68%
B-038	NA	NA	NA	3.15E+11	3.53E+10	1.96E+09	3.72E+10	88%
B-041	4.14E+11	4.14E+11	NA	4.34E+12	2.21E+12	1.46E+11	2.77E+12	36%
B-053	4.14E+11	4.14E+11	NA	5.35E+12	3.19E+12	2.00E+11	3.80E+12	29%
B-054	4.29E+11	4.29E+11	NA	1.62E+13	5.76E+12	3.44E+11	6.54E+12	60%
B-072	1.51E+10	1.51E+10	NA	3.29E+12	1.00E+12	5.65E+10	1.07E+12	67%
B-097	NA	NA	67%	3.27E+11	1.03E+11	5.72E+09	1.09E+11	67%
B-150	NA	NA	NA	6.60E+11	2.04E+11	1.13E+10	2.15E+11	67%
B-186	NA	NA	75%	6.23E+11	1.46E+11	8.12E+09	1.54E+11	75%
B-192	NA	NA	60%	2.60E+10	9.97E+09	5.54E+08	1.05E+10	60%
B-231	NA	NA	NA	2.36E+11	1.18E+11	6.55E+09	1.25E+11	47%
B-241	NA	NA	69%	6.93E+11	2.02E+11	1.12E+10	2.13E+11	69%
B-246	NA	NA	NA	2.21E+11	1.44E+11	7.98E+09	1.52E+11	31%
BE-001	NA	NA	72%	2.06E+11	5.36E+10	2.98E+09	5.66E+10	72%
BE-007	NA	NA	81%	9.98E+11	1.78E+11	9.91E+09	1.88E+11	81%
BE-015	1.15E+11	1.15E+11	69%	2.99E+12	7.54E+11	4.83E+10	9.17E+11	69%
BE-017	2.29E+11	2.29E+11	81%	8.76E+12	1.36E+12	8.82E+10	1.68E+12	81%
BE-018	3.50E+11	3.50E+11	72%	8.42E+12	1.92E+12	1.26E+11	2.39E+12	72%
BE-020	3.50E+11	3.50E+11	65%	1.26E+12	7.18E+10	2.34E+10	4.45E+11	65%
BE-024	4.13E+11	4.13E+11	35%	4.95E+12	2.65E+12	1.70E+11	3.24E+12	35%
BE-039	NA	NA	79%	1.18E+11	2.31E+10	1.28E+09	2.44E+10	79%
BE-040	NA	NA	78%	7.12E+11	1.47E+11	8.14E+09	1.55E+11	78%

Table Notes:

1. Total monthly wasteload cannot exceed loads (counts/30-days) listed in Table 3-3.
2. MS4 expressed as percent reduction equal to LA reduction.
3. TMDLs expressed as monthly load by station are listed in Table B-1 of Appendix B.
4. Percent reduction applies to LA and MS4 components when an MS4 is in the watershed.

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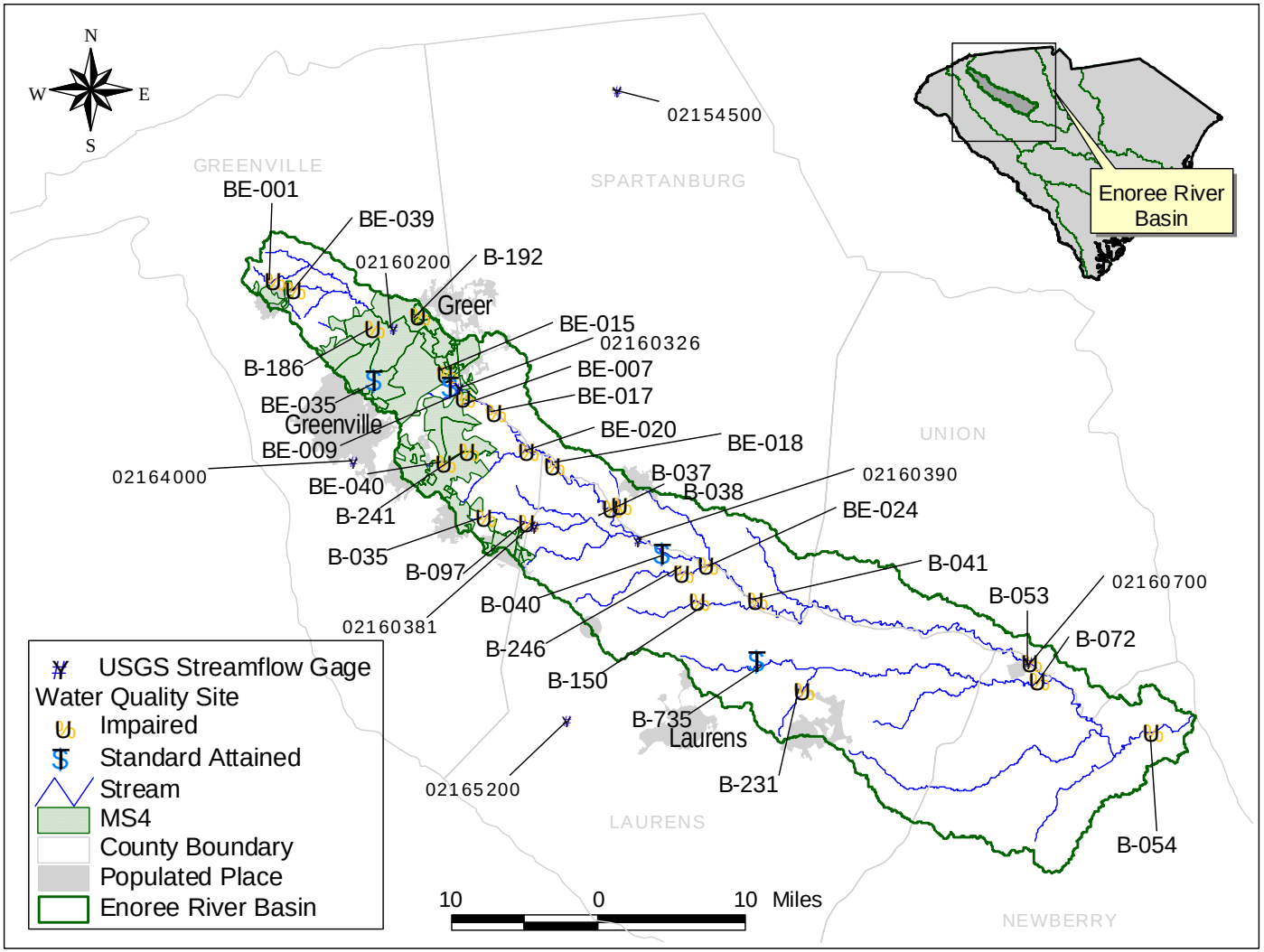

Figure 1-1 Enoree River Basin (03050108)

1.0 INTRODUCTION

1.1 Background

Levels of fecal coliform bacteria can be elevated in waterbodies as the result of both point and nonpoint sources of pollution. Section §303(d) of the Clean Water Act and EPA's Water Quality Planning and Management Regulations (40 CFR Part 130) require states to develop total maximum daily loads (TMDLs) for waterbodies that are not meeting designated uses under technology-based pollution controls. The TMDL process establishes the allowable loadings of pollutants or other quantifiable parameters for a waterbody based on the relationship between pollution sources and instream water quality conditions so that states can establish water quality-based controls to reduce pollution and restore and maintain the quality of water resources (USEPA, 1991).

The State of South Carolina has placed 23 water quality monitoring stations in the Enoree River basin (8-digit HUC 03050108) on South Carolina's 2002 Section §303(d) list for impairment due to fecal coliform bacteria. These stations are identified in Table 1-1.

Table 1-1 Water Quality Monitoring Stations Impaired by Fecal coliform bacteria in the Enoree River Basin (03050108)

Waterbody Name	Waterbody ID	Waterbody Location
Durbin Creek	B-035	DURBIN CREEK ON S-23-160 3 MI E OF SIMPSONVILLE
Enoree River	B-037	ENOREE RIVER AT S-42-118 SW OF WOODRUFF
Lick Creek	B-038	LICK CREEK AT S-42-118 1 1/4 MI SW WOODRUFF
Enoree River	B-041	ENOREE RIVER AT SC 49 SE OF WOODRUFF
Enoree River	B-053	ENOREE RIVER AT SC 72, 121, & US 176, 1 MI NE WHITMIRE
Enoree River	B-054	ENOREE RIVER AT S-36-45 3.5 MI AB JCT WITH BROAD RIVER
Duncan Creek	B-072	DUNCAN CREEK AT US 176 1.5 MI SE OF WHITMIRE
Durbin Creek	B-097	DURBIN CREEK AT SC 418
Warrior Creek	B-150	WARRIOR CREEK AT US 221, 8 MI NNE OF LAURENS
Mountain Creek	B-186	MOUNTAIN CREEK AT S-23-335
Princess Creek	B-192	PRINCESS CREEK AT SUBER MILL RD, SECOND RD S OF US 29 OFF S-23-540
Beards Fork	B-231	BEARDS FORK CREEK AT US 276 (I-385) 3.7 MI NNE OF CLINTON
Gilder Creek	B-241	GILDER CREEK AT S-23-142 2.75 MI ENE OF MAULDIN
Beaverdam Creek	B-246	BEAVERDAM CREEK AT S-30-97, 7 MI NE OF GRAY COURT
Enoree River	BE-001	ENOREE RIVER AT UNNUM RD W US 25 N TRAVELERS REST
Rocky Creek	BE-007	ROCKY CREEK AT BRDG IN BATESVILLE 1 MI AB JCT WITH ENOREE
Enoree River	BE-015	ENOREE RIVER AT CO RD 164
Enoree River	BE-017	ENOREE RIVER AT SC 296, 7.5 MI NE OF MAULDIN
Enoree River	BE-018	ENOREE RIVER AT S-30-75
Gilder Creek	BE-020	GILDER CREEK AT S-23-143 1/4 MI AB JCT WITH ENOREE RIVER
Enoree River	BE-024	ENOREE RIVER AT US 221
Beaverdam Creek	BE-039	BEAVERDAM CREEK AT RD 1967
Gilder Creek	BE-040	GILDER CREEK AT SC 14-AB GILDERS CREEK PT

1.2 Watershed Description

The Enoree River Basin (8-digit HUC 03050108) (Figure 1-1) is located in portions of Union, Spartanburg, Newberry, Laurens, and Greenville counties encompassing 24 14-digit HUCs (Figure 1-1) in the Broad River basin. Enoree River extends nearly 107 miles before discharging into the Broad River. The total drainage area covers 730 square miles in the Piedmont region of South Carolina. Segments in the Enoree River basin discussed in this report are classified as a freshwater stream for recreational use.

Based on 1996 USGS Multi-Resolution Land Characteristic (MRLC) land use data, 71 percent of the watershed is forested. The remaining 30 percent is composed of pastureland (10%), cropland (10%), urban area (6%), and a small mix of water and barren land uses (3%). The majority of urban land is located in the upper portion of the basin between Greenville and Greer, north to Travelers Rest and south to Fountain Inn. Table 1-2 presents the percentage of total watershed area for each aggregated land use. Table A-1 (Appendix A) presents the percentage of land use area in each monitoring station and USGS streamflow station drainage area. The areas are also listed in miles squared in Table A-2. Figure 1-2 illustrates land use for the Enoree River basin.

Table 1-2 MRLC Aggregated Land Use for the Enoree River Basin (03050108)

Aggregated Land Use	Percent of Total Area	Total Area (miles^2)
Urban	6.4%	47
Barren	2.9%	21
Row Crops	9.5%	69
Pasture	9.7%	71
Forest	71.1%	520
Water	0.4%	2.7

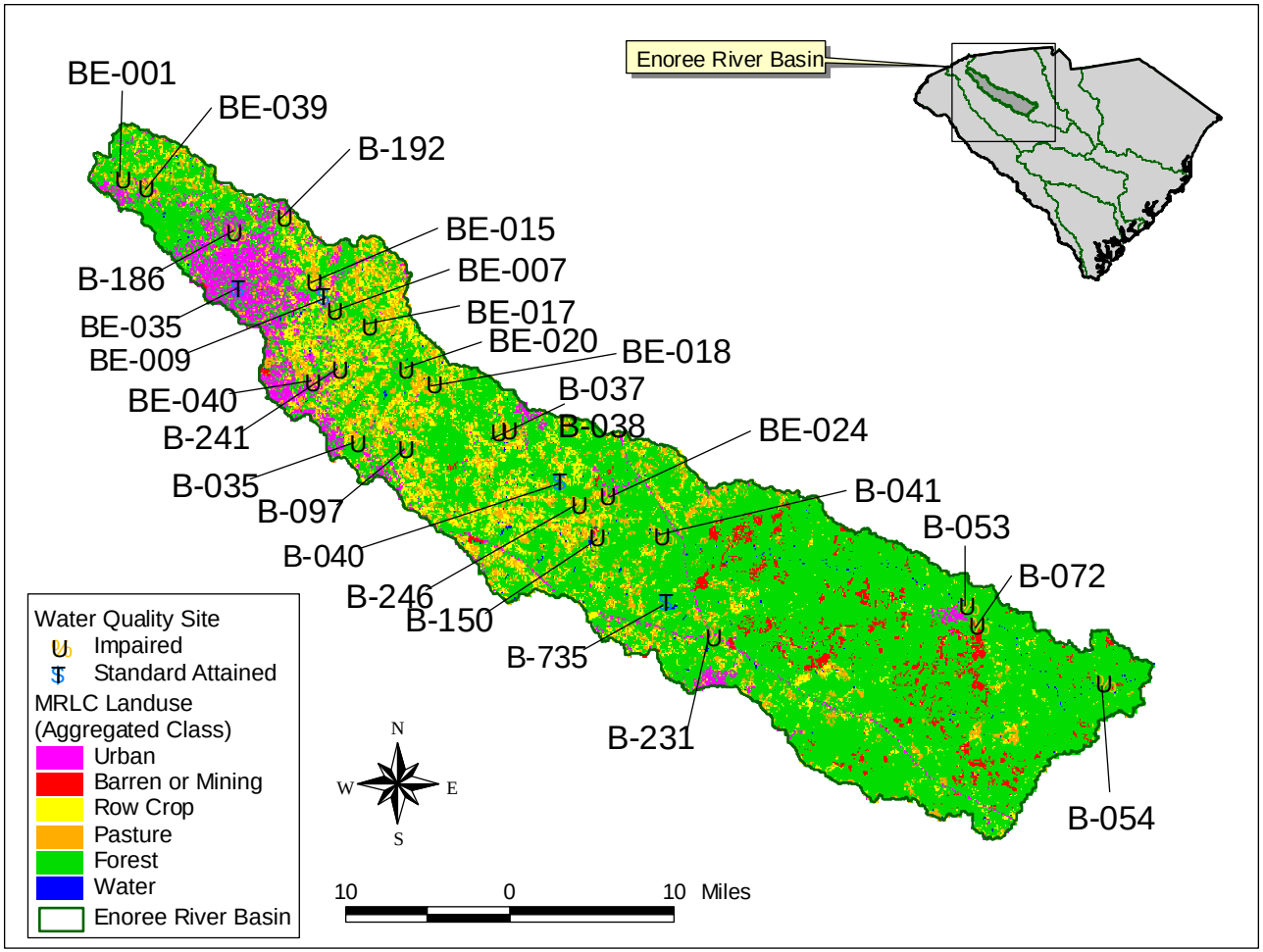

Figure 1-2 Enoree River Basin Land Use

1.3 Water Quality Standard

The impaired stream segments of the Enoree River basin are designated as Class Freshwater. Waters of this class are described as:

> "Freshwaters suitable for primary and secondary contact recreation and as a source for drinking water supply after conventional treatment in accordance with the requirements of the Department. Suitable for fishing and the survival and propagation of a balanced indigenous aquatic community of fauna and flora. Suitable also for industrial and agricultural uses." (R.61-68)

South Carolina's standard for fecal coliform bacteria in freshwater is:

> "Not to exceed a geometric mean of 200/100 mL, based on five consecutive samples during any 30 day period; nor shall more than 10 percent of the total samples during any 30 day period exceed 400/100 mL." (R.61-68).

2.0 WATER QUALITY ASSESSMENT

Fecal coliform bacteria data collected in the Enoree River basin from 1990 through 2001 were assessed to determine impairment of standards for recreational use. The State of South Carolina monitors fecal coliform bacteria at 27 stations in the watershed. Figure 1-1 shows the location of water quality monitoring stations in the watershed.

Twenty-three water quality monitoring stations in the basin have been identified on the State of South Carolina's Section §303(d) list for 2002 as impaired (Table 1-1). The fecal coliform bacteria data collected at impaired water quality monitoring stations is presented in Appendix A (Table A-3). Waters in which no more than 10 percent of the samples collected over a five year period are greater than 400 fecal coliform counts per 100 mL are considered to comply with the South Carolina water quality standard for fecal coliform bacteria. Waters with more than 10 percent of samples greater than 400 counts per 100 mL are considered impaired and were listed for fecal coliform bacteria on the State of South Carolina's Section §303(d) list. Statistical information supporting the listing of impaired water quality monitoring sites in the watershed is presented in Table 2-1.

Table 2-1 Statistical Assessment of Observed Fecal Coliform Bacteria Collected from 1996 - 2000

Station	Total Number of Samples	Total Number of Samples >400 #/100 mL	Percent of Samples >400 #/100 mL
B-035	31	23	74%
B-037	30	9	30%
B-038	30	18	60%
B-041	59	12	20%
B-053	10	3	30%
B-054	59	16	27%
B-072	61	35	57%
B-097	60	45	75%
B-150	12	3	25%
B-186	27	11	41%
B-192	59	19	32%
B-231	30	6	20%
B-241	30	21	70%
B-246	12	7	58%
BE-001	59	25	42%
BE-007	31	10	32%
BE-015	30	12	40%
BE-017	58	20	34%
BE-018	28	11	39%
BE-020	30	14	47%
BE-024*	NA	NA	NA
BE-039	28	19	68%
BE-040	30	26	87%

*Note: Water quality monitoring station BE-024 was inactive after 1994.

The timeframe, both annually and seasonally, of water quality monitoring at each station varies greatly. The statistical assessment presented in Table 2-1 was based on data collected over the five-year period from 1996 through 2000. Data collected at BE-024, the Enoree River at US Hwy 221, was collected from 1990 through 1994 and therefore is not included in Table 2-1. Data collected from 1990 through 1994 at BE-024 is in violation of the State's instantaneous standard and therefore remains on the South Carolina §303(d) list of impaired waters.

After determining compliance with water quality standards, observed violations were assessed to determine conditions critical to impairment. Data were compared with estimated streamflows to establish a relationship between instream concentrations and hydrologic conditions. Due to limited streamflow data in the watershed, observed data were plotted with the load-duration curves generated based on area-weighted flows. The development of load-duration curves is discussed further in Section 4.0 of this report. Load-duration curves plotted for each station in Figures B-1 through B-22, and in Figure

2-1 (for B-035) are equal to the TMDL target based on the criteria for instantaneous events. The observed fecal coliform bacteria data were also converted from counts per 100 mL to loads in counts per day to assess hydrologic conditions when the standard is not attained.

The percent of flow exceeded in Figure 2-1 and Figure B-1 through B-22 represent flow conditions at each monitoring station. Hydrologic conditions for very dry events, likely to be exceeded in 99.99 percent of measured events, are represented as 99.99 percent. Extremely wet events that occur rarely are represented as 0.01 percent. Data collected at all impaired stations in the basin have violations during all flow conditions. Violations during various flow events suggest a combination of overland, instream, and continuous sources of fecal coliform bacteria.

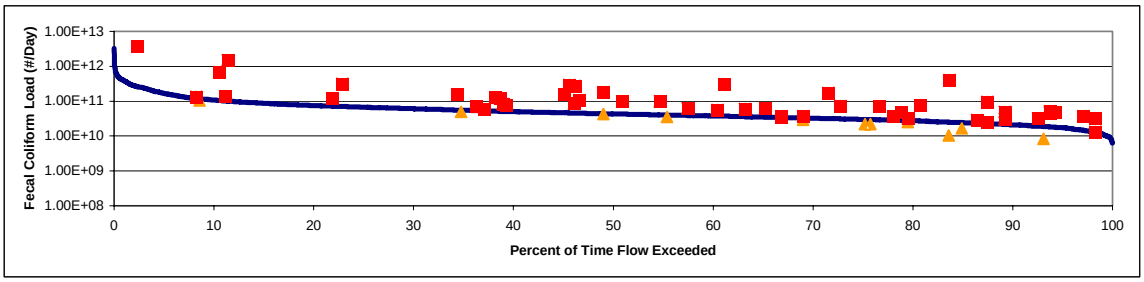

Figure 2-1 Fecal Coliform Bacteria Load-Duration Curve for Station B-035 Illustrating Observed Fecal Coliform Bacteria Loads Over Various Hydrologic Conditions

Given that all impaired stations in the basin have violations during all flow conditions, some stations may have more violations during dry periods than during wet periods. As in Figure 2-1, fecal coliform bacteria data is in violation at all flow regimes but there are more violations during low and average flows periods. Figure B-12 (Appendix B) represents conditions at BE-024 where few violating samples have been collected. The violations that do occur at the station were measured during average to high flow conditions. Looking to all the samples collected at BE-024 it can be observed that concentrations of fecal coliform bacteria remain consistently high, following the TMDL target line, though not in violation of the standard.

3.0 SOURCE ASSESSMENT AND LOAD ALLOCATION

Fecal coliform bacteria enter surface waters of the Enoree River basin from both point and nonpoint sources. Point sources are facilities that discharge at a specific location through pipes, outfalls, and/or conveyance channels. All point sources must have a National Pollutant Discharge Elimination System (NPDES) permit and are often municipal wastewater treatment plants or industrial waste treatment facilities. Nonpoint sources are diffuse sources that have multiple routes of entry into surface waters. Some nonpoint sources are related to land use activities that accumulate fecal coliform bacteria on the land surface (i.e. pastureland) and runoff during storm events.

3.1 Point Sources

There are 10 active continuous point sources discharging fecal coliform bacteria in the Enoree River basin and Municipal Separate Storm Sewer (MS4) permits for unincorporated Greenville, Laurens, and Spartanburg counties and the Cities of Fountain Inn, Greenville, Greer, Mauldin, Simpsonville, and Travelers Rest.

3.1.1 Continuous Point Sources

Facilities with continuous discharges of fecal coliform bacteria are listed in Table 3-1 and illustrated in Figure 3-1. In South Carolina, NPDES permittees that discharge sanitary wastewater must meet the State criteria for fecal coliform bacteria at the point of discharge (i.e. a daily maximum concentration of 400 counts per 100 mL, and a 30-day geometric mean of 200 counts per 100 mL).

Table 3-1 Permitted Facilities Discharging Fecal Coliform Bacteria into Waterbodies of the Enoree River Basin

Facility Name	NPDES No.	Flow * (MGD)	Receiving Stream
INMAN MILLS/RAMEY PLANT	SC0002496	0.113**	ENOREE RIVER
TOWN OF WHITMIRE	SC0022390	1.000	DUNCAN CREEK
WCRSA/TAYLORS AREA PLANT	SC0024309	7.500	ENOREE RIVER
BUCK-A-ROO RANCH INC	SC0026662	0.010	TRIBUTARY TO ENOREE RIVER
WCRSA/PELHAM WWTF	SC0033804	7.500	ENOREE RIVER
ALTAMONT FOREST SD	SC0034398	0.124	ENOREE RIVER
RIVERDALE MILLS W & S DISTRICT	SC0035734	0.090	ENOREE RIVER
WCRSA/DURBIN CREEK	SC0040002	3.300	DURBIN CREEK
WCRSA/GILDER CREEK	SC0040525	8.000	GILDER CREEK
WOODRUFF/ENOREE RIVER	SC0045802	0.700	ENOREE RIVER

* Note: Flow limits are either permit limits or design limits.
**Long Term Averaged Flow

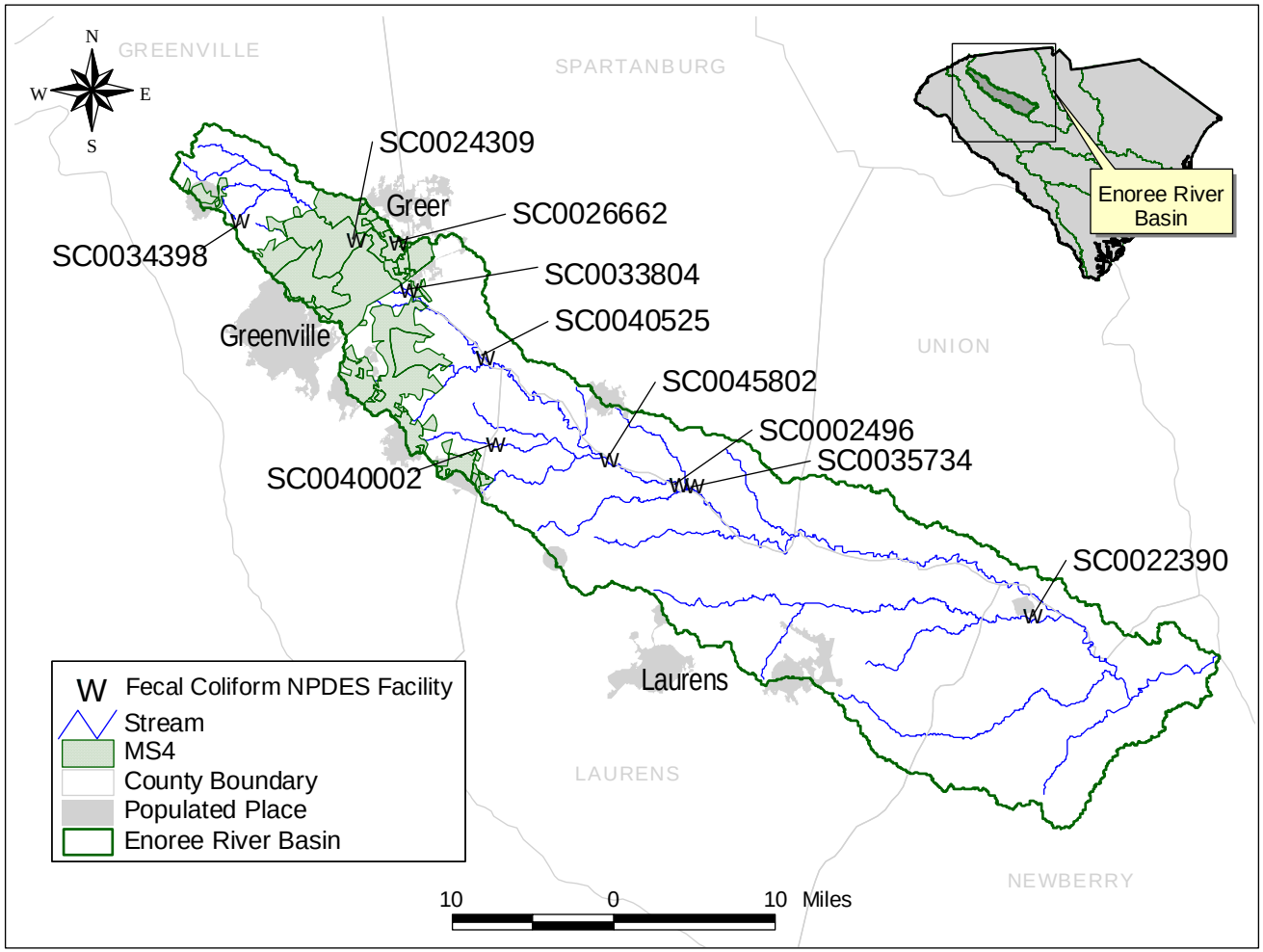

Figure 3-1 Active Fecal Coliform Bacteria Discharging NPDES Facilities

Table 3-2 Impaired Water Quality Monitoring Stations Draining NPDES Facilities in the Enoree River Basin

B-054	B-053	B-041	BE-024	BE-020	BE-018	B-037	BE-017	BE-015	B-072
SC0002496	SC0002496	SC0002496	SC0002496						
SC0022390									SC0022390
SC0024309	SC0024309	SC0024309	SC0024309	SC0024309	SC0024309	SC0024309	SC0024309	SC0024309	
SC0026662	SC0026662	SC0026662	SC0026662	SC0026662	SC0026662	SC0026662	SC0026662		
SC0033804	SC0033804	SC0033804	SC0033804	SC0033804	SC0033804	SC0033804	SC0033804		
SC0034398	SC0034398	SC0034398	SC0034398	SC0034398	SC0034398	SC0034398	SC0034398	SC0034398	
SC0035734	SC0035734	SC0035734							
SC0040002	SC0040002	SC0040002	SC0040002						
SC0040525	SC0040525	SC0040525	SC0040525	SC0040525	SC0040525	SC0040525			
SC0045802	SC0045802	SC0045802	SC0045802						

The TMDLs presented in this report were developed using permitted flows, or design flows when there is no permitted flow, and permitted concentrations for fecal coliform bacteria. Limited information was available to determine the survival rate of fecal coliform bacteria discharging from permitted facilities to establish the impact downstream. Therefore, for the purpose of fecal coliform bacteria TMDL development in the Enoree River basin, wasteloads for continuous discharges are cumulative for a given drainage area. Table 3-3 lists estimated existing loads and the permitted geometric mean concentration of 200 counts per 100 mL and instantaneous concentration of 400 counts per 100 mL.

Table 3-3 Estimated Existing Fecal Coliform Bacteria Loads for Facilities in the Enoree River Basin

NPDES Facility	Flow (MGD)*	Existing Loading (counts/days)	Existing Loading (counts/30days)
SC0002496	0.113**	1.71E+09	2.57E+10
SC0022390	1.000	1.51E+10	2.27E+11
SC0024309	7.500	1.14E+11	1.70E+12
SC0026662	0.010	1.51E+08	2.27E+09
SC0033804	7.500	1.14E+11	1.70E+12
SC0034398	0.124	1.88E+09	2.82E+10
SC0035734	0.090	1.36E+09	2.04E+10
SC0040002	3.300	5.00E+10	7.50E+11
SC0040525	8.000	1.21E+11	1.82E+12
SC0045802	0.700	1.06E+10	1.59E+11

* Note: Flow limits are either permit limits or design limits.
**Long Term Averaged Flow

The collection systems for these wastewater treatment facilities are also potential sources of fecal coliform bacteria. Sewage collection systems typically are placed adjacent to waterways. At these locations, there is a potential for collection system leaks which could result in elevated instream concentrations of fecal coliform bacteria. Sanitary sewer overflows (SSOs) are also a potential source, particularly after periods of intense rainfall. This source is associated with infrequent events, limited in duration and likely to have an insignificant long-term impact instream. Identified collection system and/or SSO problems are addressed by SCDHEC through compliance and enforcement mechanisms. Sewer lines are adjacent to Gilder and Rocky Creeks and the Enoree River in Greenville.

3.1.2 Municipal Separate Storm System (NPDES)

Greenville, Laurens, and Spartanburg Counties and the cities of Fountain Inn, Greer, Mauldin, Simpsonville, and Travelers Rest have or will have NPDES MS4 (Municipal Separate Storm Sewer System) permits (Figure 1-1). These permitted sewer systems will

be treated as point sources in the TMDL calculations below. However for modeling purposes all urban areas will be evaluated together as urban nonpoint sources.

In 1990, EPA developed rules establishing Phase I of the National Pollutant Discharge Elimination System (NPDES) storm water program, designed to prevent harmful pollutants from being washed by storm water runoff into Municipal Separate Storm Sewer Systems (MS4s) (or from being dumped directly into the MS4) and then discharged into local waterbodies (SCDHEC, 2002). Phase I of the program required operators of medium and large MS4s (those generally serving populations of 100,000 or greater) to implement a storm water management program as a means to control polluted discharges from MS4s.

Phase II of the rule extends coverage of the NPDES storm water program to certain small MS4s. Small MS4s are defined as any MS4 that is not a medium or large MS4 covered by Phase I of the NPDES Storm Water Program. Phase II requires operators of regulated small MS4s to obtain NPDES permits and develop a storm water management program. Programs are to be designed to reduce discharges of pollutants to the "maximum extent practicable", protect water quality, and satisfy appropriate water quality requirements of the Clean Water Act.

3.2 Nonpoint Sources

The land use distribution of the Enoree River basin provides insight into determining nonpoint sources of fecal coliform bacteria (Figure 1-2). In the watershed, more than 70 percent of the land area is classified forested, nearly 20 percent is cropland or pastureland. Key nonpoint sources identified in the watershed include livestock, manure application, failing septic systems, illicit discharges (including leaking and overflowing sewers), overland contributions from impervious surfaces, and natural sources.

3.2.1 Wildlife

Fecal coliform bacteria are found in forested areas, pastureland, and cropland due to the presence of wild animal sources such as deer, raccoons, wild turkeys and waterfowl. The Department of Natural Resources in South Carolina estimates the deer habitat in the basin at a density from 15 to 45 deer per square mile in the upper portion and more than 45 deer per square mile in the lower basin in Laurens, Union and Newberry counties (SC Deer Density 2000 map). Wildlife waste is transported over land surfaces during rainfall events or may be directly deposited by animals into streams. The high percentage of permeable surfaces in forested areas increases the infiltration rate over the watershed area. This process ultimately reduces the runoff reaching streams by overland flow and reduces the significance of fecal coliform bacteria contributions transported over land.

3.2.2 Agricultural Activities and Grazing Animals

Agricultural land can be a source of fecal coliform bacteria. Runoff from grazing pastures, improper land application of animal wastes, livestock operations, and livestock

with access to waterbodies are all agricultural sources of fecal coliform bacteria. Agricultural best management practices (BMPs) such as buffer strips, alternative watering sources, limiting livestock access to streams, and the proper land application of animal wastes reduce fecal coliform bacteria loading to waterbodies.

The number of animals in the watershed (Table 3-4) was estimated by area-weighting the 1997 USDA census data over the watershed area for Greenville, Spartanburg, Laurens, Union, and Newberry counties. Census data show that grazing cattle are of more relevance in the Enoree River basin than confined animal operations. Livestock, except for dairy cattle, are not usually confined and are typically grazing in the pastures where deposited manure is a source of nonpoint pollution. The time that cattle spend in streams is assumed to be 0.15 percent of their total gazing time. Hogs are anticipated to be generally confined, where as sheep are expected to spend all of their time grazing. Horses and ponies are expected to spend the majority of spring, summer, and fall months grazing in pastureland where manure is a source of nonpoint pollution.

Table 3-4 1997 USDA Agricultural Census Data Animal Estimates

Animal	1997 Census Estimate
Beef Cow	8720
Dairy Cow	1399
Hog	5107
Sheep	38
Horses and Ponies	634

3.2.3 Failing Septic Systems and Illicit Discharges

Failing septic systems and illegal discharges also represent a nonpoint source that can contribute fecal coliform bacteria to receiving waterbodies through surface or subsurface malfunctions, or direct discharges. Based on 1990 census information, population change from 1990 and 2000, and assuming an average of 2.5 people per household (U.S. Census, 2000), greater than 115,000 people in the Enoree River basin use septic systems. Though the precise failure rate is unknown, Schueler (1999) suggests an average septic failure rate of 20 percent. Many of these areas are also on sewer systems that may leak and/or overflow during rain events contributing significant loads of fecal coliform bacteria directly to streams.

3.2.4 Urban Runoff

Runoff from urban areas not permitted under the MS4 program are probably a significant source of fecal coliform bacteria into Gilder and Duncan Creeks and the Enoree River. Water quality data collected from streams draining many of the un-permitted communities show existing loads of fecal coliform bacteria at levels greater than the

State's instantaneous standards. Best management practices (BMPs) such as buffer strips and the proper disposal of domestic animal wastes reduce fecal coliform bacteria loading to water bodies.

4.0 TECHNICAL APPROACH – LOAD-DURATION METHOD

Load-duration curves were developed for water quality monitoring stations in the Enoree River basin to establish allowable fecal coliform bacteria loads under various hydrologic conditions. The load-duration methodology uses the cumulative frequency distribution of streamflow and pollutant concentration (fecal coliform bacteria) data to estimate the allowable loads for a waterbody. Allowable load-duration curves were established in the basin using the instantaneous concentration of fecal coliform bacteria, minus a five percent margin of safety (MOS), and streamflow measured at various USGS stations in the Enoree River basin and surrounding watersheds, as shown in Figure 1-1 and listed in Table 4-1.

Table 4-1 USGS Stations Used to Establish Area-Weighted Flows

Site Number	Site Name	From	To	Drainage Area (mile2)
02154500	N PACOLET RIVER AT FINGERVILLE	4/1/1930	9/30/2001	116
02160200	ENOREE RIVER AT TAYLORS	3/1/1998	9/30/2001	49.7
02160326	ENOREE RIVER AT PELHAM	3/10/1993	9/30/2001	84.2
02160381	DURBIN CREEK ABOVE FOUNTAIN INN	7/6/1994	9/30/1999	14
02160390	ENOREE RIVER NEAR WOODRUFF	2/9/1993	9/30/2001	249
02160700	ENOREE RIVER AT WHITMIRE	10/1/1973	9/30/2001	444
02164000	REEDY RIVER NEAR GREENVILLE	11/21/1941	9/30/2001	48.6
02165200	S RABON CREEK NEAR GRAY COURT	1967-1981 and 1990-2001		29.3

Streamflow data was not available at each impaired water quality monitoring station to develop load-duration curves. Therefore, flows were determined by area-weighted data collected at USGS stations listed in Table 4-1. Data collected at these stations through 2001 were used in the analysis. For USGS station 02160200, Enoree River at Taylors; USGS station 02160326, Enoree River at Pelham; USGS station 02160381, Durbin Creek above Fountain Inn; and USGS station 02160390, Enoree River near Woodruff, where data were not collected for the period from 1990 through 2001, the program MOVE1 was used to interpolate streamflow by comparing overlapping records with USGS station

02160700, Enoree River at Whitmire. Statistical analysis from matched stations and technical clarification of the MOVE1 methods can be found in Appendix D.

Watershed characteristics (including the distribution of land use activities, ecoregions, and topography) for the USGS stations and impaired water quality monitoring sites were compared to associate stations and develop load-duration curves. Table 4-2 lists the impaired water quality monitoring stations and associated streamflow stations used to develop area-weighted flow relationships. The location of both USGS and water quality monitoring stations are identified in Figure 1-1. Figure 4-1 illustrates the water yield for impaired stations associated with USGS station 02160326.

Table 4-2 USGS Stations and Associated Water Quality Stations

USGS Gage	Waterbody ID	Waterbody Name
02154500	B-038	Lick Creek
02160200	B-231	Beards Fork
	BE-039	Beaverdam Creek
02160326	B-035	Durbin Creek
	B-037	Enoree River
	B-186	Mountain Creek
	B-241	Gilder Creek
	BE-001	Enoree River
	BE-007	Rocky Creek
	BE-015	Enoree River
	BE-017	Enoree River
	BE-018	Enoree River
	BE-020	Gilder Creek
	BE-040	Gilder Creek
02160381	B-097	Durbin Creek
02160390	BE-024	Enoree River
02160700	B-041	Enoree River
	B-053	Enoree River
	B-054	Enoree River
	B-072	Duncan Creek
02164000	B-192	Princess Creek
02165200	B-150	Warrior Creek
	B-246	Beaverdam Creek

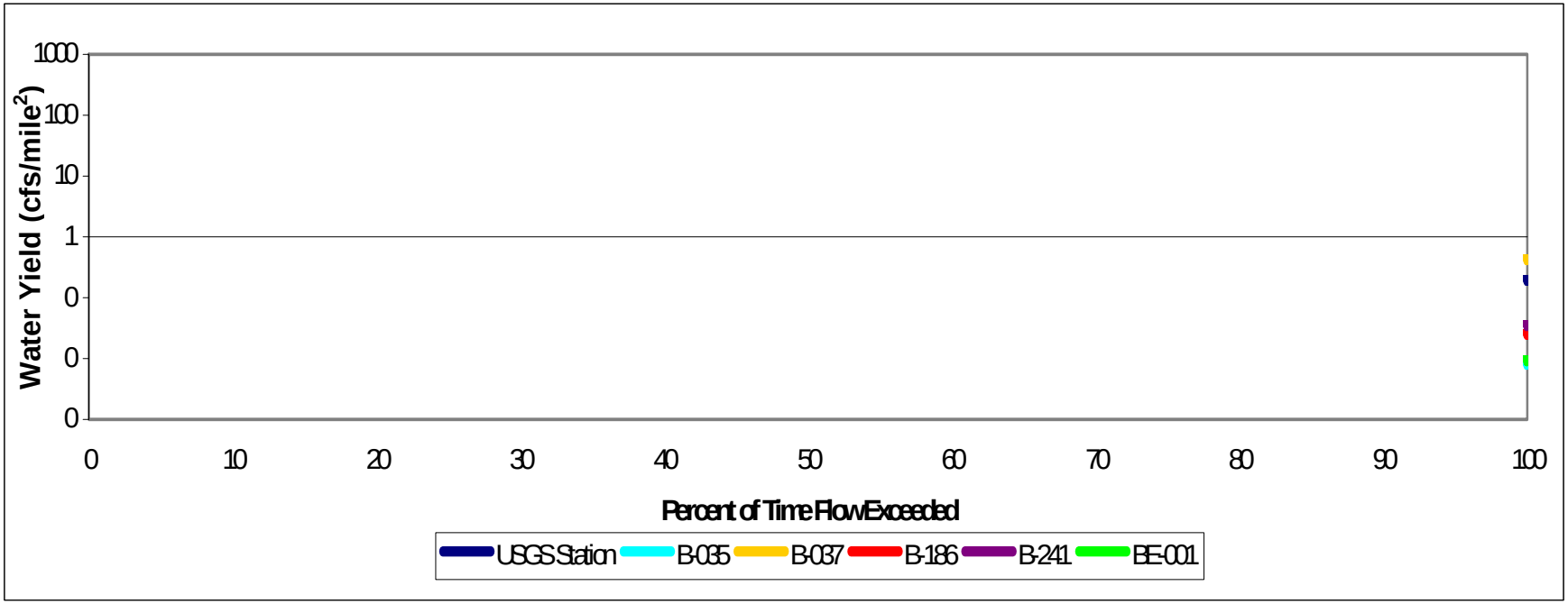

Figure 4-1 Water Yield (cubic feet per second per square mile) Based on Measured Daily Streamflow from USGS station 02160326

After calculating streamflow for each impaired monitoring station the data were ranked to determine the percent of time streamflow was exceeded. The streamflow was then multiplied by a concentration of 380 counts/100 mL (based on the instantaneous concentration and a five percent MOS) to generate a load-duration curve for each impaired station (Appendix B, Figures B-23 through B-29). The result of the load-duration curve is the TMDL target.

To define the TMDL for each station, an average of the load-duration curve was calculated. The average was calculated using loads at five percent intervals from the 10^{th} percentile of flow exceeded to the 90^{th} percentile of flow exceeded. Loads occurring at less than the 10^{th} percentile of flow exceeded are extreme high flow events and the data collected at greater than the 90^{th} percentile of flow exceeded are extreme low flow events and therefore were not considered in developing theses TMDLs. Loads established at intervals and the mean load for each station can be found in Appendix B, Table B-1.

5.0 DEVELOPMENT OF TOTAL MAXIMUM DAILY LOAD

A total maximum daily load (TMDL) for a given pollutant and waterbody is comprised of the sum of individual wasteload allocations (WLAs) for point sources, and load allocations (LAs) for both nonpoint sources and natural background levels. In addition, the TMDL must include a margin of safety (MOS), either implicitly or explicitly, to account for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. Conceptually, this definition is represented by the equation:

$$TMDL = \sum WLAs + \sum LAs + MOS$$

The TMDL is the total amount of a pollutant that can be assimilated by the receiving waterbody while still achieving water quality standards. In TMDL development, allowable loadings from all pollutant sources that cumulatively amount to no more than the TMDL must be established and thereby provide the basis to establish water quality-based controls. For some pollutants, TMDLs are expressed on a mass-loading basis (e.g., pounds per day). For bacteria, however, TMDLs can be expressed in terms of organism counts (or resulting concentration), in accordance with 40 CFR 130.2(l).

5.1 Critical Conditions

Critical conditions for fecal coliform bacteria in the Enoree River basin occur at various flow regimes. The load-duration curve methodology used to establish TMDLs in the basin considers various hydrologic conditions critical in maintaining water quality standards.

5.2 Existing Load

The existing load for each impaired station was established using observed fecal coliform bacteria data and area-weighted streamflow. The measured data occurring at less than the

10th percentile of flow exceeded is an extreme high flow event and the data collected at greater than the 90th percentile of flow exceeded is an extreme low flow event and therefore not considered as critical conditions for these TMDLs.

The data violating the instantaneous concentration were isolated and a best-fit trendline was fit to violating data. The power trendline was determined using a best-fit relationship that was most representative of the violating data. The equation representing the trendline was then used to calculate the average violating load that occurred between the 10th and 90th percentiles, at every fifth percentile. This average load is equal to the existing instream fecal coliform bacteria load at the associated station. The existing load from nonpoint sources is then equal to the existing instream load minus the existing wasteload from point sources.

Figure 5-1 presents the power best-fit trendline for station B-035, the impaired station on Durbin Creek near Simpsonville. Interval loads calculated for existing conditions are presented in Table B-2. Power trendlines at other stations in the basin are presented in Appendix (Figures B-1 through B-22). Existing loads calculated for each station are listed in Table 5-1.

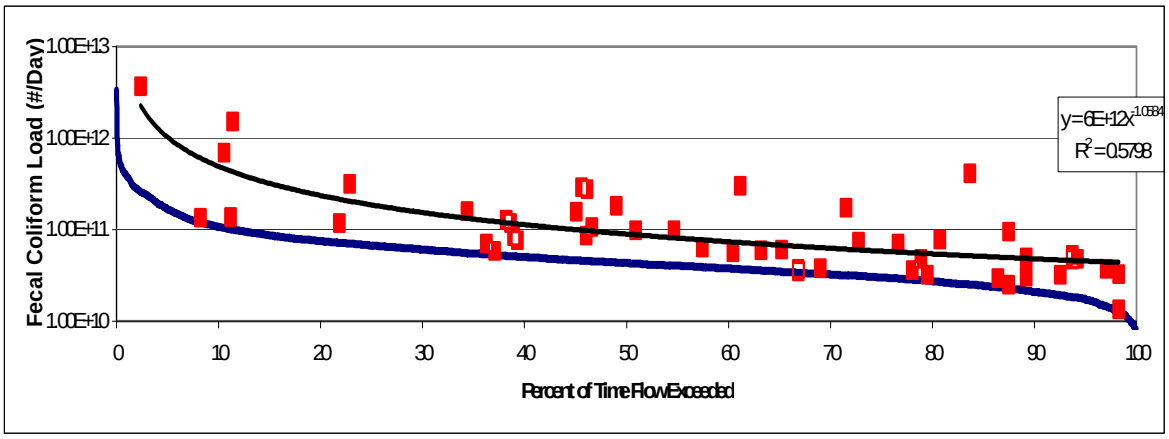

Figure 5-1 Power Trendline Generated from Violating Fecal Coliform Bacteria Measured at B-035

Table 5-1 Existing Loads for Impaired Water Quality Stations in the Enoree River Basin (03050108)

Station ID	Existing Load (counts/day)
B-035	1.45E+11
B-037	8.05E+12
B-038	3.15E+11
B-041	4.34E+12
B-053	5.35E+12
B-054	1.62E+13
B-072	3.29E+12
B-097	3.27E+11
B-150	6.60E+11
B-186	6.23E+11
B-192	2.60E+10
B-231	2.36E+11
B-241	6.93E+11
B-246	2.21E+11
BE-001	2.06E+11
BE-007	9.98E+11
BE-015	2.99E+12
BE-017	8.76E+12
BE-018	8.42E+12
BE-020	1.26E+12
BE-024	4.95E+12
BE-039	1.18E+11
BE-040	7.12E+11

5.3 Existing Wasteload

The existing wasteload was calculated for each NPDES permitted continuous discharge. The facilities were assumed to discharge at permitted flows, or design flows when a flow limit was not designated in the permit, and permitted limits of fecal coliform bacteria equal to the State criteria for both instantaneous and geometric mean loads. In South Carolina, NPDES permittees that discharge sanitary wastewater must meet the State's criteria for fecal coliform bacteria at the point of discharge (i.e. a daily maximum concentration of 400 counts per 100 mL, and a 30-day geometric mean of 200 counts per 100 mL). Under these permitted concentrations facilities should not be in exceedance of the fecal coliform bacteria water quality criteria, and therefore, not considered to be a major contributing source. If facilities are discharging at greater than permitted concentrations this is an illicit discharge and regulated through the NPDES program. Allowable TMDL wasteloads for impaired stations, as shown in Table 5-2, are equal to loads calculated for facilities in the basin.

Table 5-2 Wasteloads from NPDES Continuous Discharges to Impaired Water Quality Stations in the Enoree River Basin (03050108)

Station ID	Existing Waste Load Continuous (counts/day)
B-035	NA
B-037	3.50E+11
B-038	NA
B-041	4.14E+11
B-053	4.14E+11
B-054	4.29E+11
B-072	1.51E+10
B-097	NA
B-150	NA
B-186	NA
B-192	NA
B-231	NA
B-241	NA
B-246	NA
BE-001	NA
BE-007	NA
BE-015	1.15E+11
BE-017	2.29E+11
BE-018	3.50E+11
BE-020	3.50E+11
BE-024	4.13E+11
BE-039	NA
BE-040	NA

5.4 Margin of Safety

There are two methods for incorporating a margin of safety (MOS) in the analysis: a) by implicitly incorporating the MOS using conservative assumptions to develop allocations; or b) by explicitly specifying a portion of the TMDL as the MOS and using the remainder for allocations. For the Enoree River basin TMDLs, both methods were applied to incorporate a MOS. An implicit MOS was incorporated through the use of conservative assumptions in developing the TMDL, such as the use of the design or permitted flow for NPDES facilities and averaging the exponential trend of measured violations. A five percent explicit MOS was also reserved from the water quality criteria in developing the load-duration curves. Specifically, the water quality target was set at 190 counts per 100 mL for the geometric mean 30-day period and 380 counts per 100 mL for the instantaneous criterion, which is five percent lower than the water quality criteria of 200 and 400 counts per 100 mL, respectively.

5.5 Total Maximum Daily Load

The TMDL represents the maximum fecal coliform bacteria load the stream may carry and still meet water quality standards. The TMDL is presented in fecal coliform counts to be protective of both the instantaneous, per day, and geometric mean, per 30-day, criteria. Table 5-3 defines the fecal coliform bacteria total maximum daily load for protection of water quality standards for impaired stations in the Enoree River basin.

There are several municipalities in the watershed that have or will have NPDES MS4 permits. Greenville County became covered under NPDES Phase I in August of 2000. The other counties, towns, and cities will eventually be covered under one or more

Table 5-3 Total Maximum Daily Loads for Impaired Water Quality Monitoring Stations in the Enoree River Basin (03050108)

Station ID	Existing Waste Load	TMDL WLA		Existing Load	TMDL LA	MOS	TMDL[3]	Percent Reduction[4]
	Continuous (counts/day)	Continuous[1] (counts/day)	MS4[2]	(counts/day)	(counts/day)	(counts/day)	(counts/day)	
B-035	NA	NA	66%	1.45E+11	4.68E+10	2.60E+09	4.94E+10	66%
B-037	3.50E+11	3.50E+11	NA	8.05E+12	2.13E+12	1.38E+11	2.61E+12	68%
B-038	NA	NA	NA	3.15E+11	3.53E+10	1.96E+09	3.72E+10	88%
B-041	4.14E+11	4.14E+11	NA	4.34E+12	2.21E+12	1.46E+11	2.77E+12	36%
B-053	4.14E+11	4.14E+11	NA	5.35E+12	3.19E+12	2.00E+11	3.80E+12	29%
B-054	4.29E+11	4.29E+11	NA	1.62E+13	5.76E+12	3.44E+11	6.54E+12	60%
B-072	1.51E+10	1.51E+10	NA	3.29E+12	1.00E+12	5.65E+10	1.07E+12	67%
B-097	NA	NA	67%	3.27E+11	1.03E+11	5.72E+09	1.09E+11	67%
B-150	NA	NA	NA	6.60E+11	2.04E+11	1.13E+10	2.15E+11	67%
B-186	NA	NA	75%	6.23E+11	1.46E+11	8.12E+09	1.54E+11	75%
B-192	NA	NA	60%	2.60E+10	9.97E+09	5.54E+08	1.05E+10	60%
B-231	NA	NA	NA	2.36E+11	1.18E+11	6.55E+09	1.25E+11	47%
B-241	NA	NA	69%	6.93E+11	2.02E+11	1.12E+10	2.13E+11	69%
B-246	NA	NA	NA	2.21E+11	1.44E+11	7.98E+09	1.52E+11	31%
BE-001	NA	NA	72%	2.06E+11	5.36E+10	2.98E+09	5.66E+10	72%
BE-007	NA	NA	81%	9.98E+11	1.78E+11	9.91E+09	1.88E+11	81%
BE-015	1.15E+11	1.15E+11	69%	2.99E+12	7.54E+11	4.83E+10	9.17E+11	69%
BE-017	2.29E+11	2.29E+11	81%	8.76E+12	1.36E+12	8.82E+10	1.68E+12	81%
BE-018	3.50E+11	3.50E+11	72%	8.42E+12	1.92E+12	1.26E+11	2.39E+12	72%
BE-020	3.50E+11	3.50E+11	65%	1.26E+12	7.18E+10	2.34E+10	4.45E+11	65%
BE-024	4.13E+11	4.13E+11	35%	4.95E+12	2.65E+12	1.70E+11	3.24E+12	35%
BE-039	NA	NA	79%	1.18E+11	2.31E+10	1.28E+09	2.44E+10	79%
BE-040	NA	NA	78%	7.12E+11	1.47E+11	8.14E+09	1.55E+11	78%

Table Notes:

1. Total monthly wasteload cannot exceed loads (counts/30-days) listed in Table 3-3.
2. MS4 expressed as percent reduction equal to LA reduction.
3. TMDLs expressed as monthly load by station are listed in Table B-1 of Appendix B.
4. Percent reduction applies to LA and MS4 components when an MS4 is in the watershed.

NPDES phase II stormwater permits. The reduction percentages in this TMDL apply also to the fecal coliform waste load attributable to those areas of the watershed which are covered or will be covered under NPDES MS4 (Municipal Separate Storm Sewer System) permits. Compliance by these municipalities with the terms of their individual MS4 permits will fulfill any obligations they have towards implementing this TMDL.

6.0 IMPLEMENTATION

As discussed in the *Implementation Plan for Achieving Total Maximum Daily Load Reductions From Nonpoint Sources for the State of South Carolina* (SCDHEC,1998), South Carolina has several tools available for implementing this nonpoint source TMDL. Specifically, SCDHEC's animal agriculture permitting program addresses animal operations and land application of animal wastes. In addition, SCDHEC will work with the existing agencies in the area to provide nonpoint source education in the Enoree River watershed. Local sources of nonpoint source education and assistance include Clemson Extension Service, the Natural Resource Conservation Service (NRCS), the Laurens, Greenville, Spartanburg, Newberry, and Union Counties Soil and Water Conservation Services, and the South Carolina Department of Natural Resources. Clemson Extension Service offers a 'Farm-A-Syst' package to farmers. Farm-A-Syst allows the farmer to evaluate practices on their property and determine the nonpoint source impact they may be having. It recommends best management practices (BMPs) to correct nonpoint source problems on the farm. NRCS can provide cost share money to land owners installing BMPs.

SCDHEC is empowered under the State Pollution Control Act to perform investigations of and pursue enforcement for activities and conditions which threaten the quality of waters of the state.

The iterative BMP approach as defined in the general storm water NPDES MS4 permit is expected to provide significant implementation of this TMDL. Discovery and removal of illicit storm drain cross connection is one important element of the storm water NPDES permit. Public nonpoint source pollution education is another.

In addition, other interested parties (universities, local watershed groups, etc.) may apply for section 319 grants to install BMPs that will reduce fecal coliform loading to the Enoree Rivers and its tributaries. TMDL implementation projects are given highest priority for 319 funding.

In addition to the resources cited above for the implementation of this TMDL in the Enoree River watershed, Clemson Extension has developed a Home-A-Syst handbook that can help urban or rural homeowners reduce sources of NPS pollution on their property. This document guides homeowners through a self-assessment, including information on proper maintenance practices for septic tanks. SCDHEC also employs a nonpoint source educator who can assist with distribution of these tools as well as provide additional BMP information.

Using existing authorities and mechanisms, these measures will be implemented in the Enoree River watershed in order to bring about the necessary reductions in fecal coliform bacteria loading to the impaired streams. DHEC will continue to monitor, according to the basin monitoring schedule, the effectiveness of implementation measures and evaluate stream water quality as the implementation strategy progresses.

7.0 REFERENCES

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APPENDIX A Data

Table A-1 Percent of Watershed Area Aggregated by Land Use Class for Areas Draining to Streamflow and Water Quality Monitoring Stations Used in TMDL Development

Monitoring Station ID	Water	Urban	Row Crop	Pasture	Forest	Barren
B-035	0.1%	26.4%	14.0%	10.1%	49.1%	0.2%
B-037	0.3%	18.8%	14.6%	16.1%	49.9%	0.3%
B-038	0.4%	5.6%	13.1%	8.5%	72.4%	0.0%
B-041	0.3%	13.2%	16.0%	15.7%	54.4%	0.4%
B-053 /USGS 02160700	0.4%	9.8%	12.7%	13.0%	62.6%	1.5%
B-054	0.4%	6.5%	9.6%	9.9%	70.7%	2.9%
B-072	0.3%	3.7%	5.7%	6.0%	78.8%	5.5%
B-097	0.1%	15.5%	16.5%	16.4%	51.4%	0.1%
B-150	1.1%	1.9%	16.8%	17.1%	62.7%	0.4%
B-186	0.4%	31.7%	3.1%	4.1%	60.5%	0.2%
B-192	0.0%	52.0%	9.0%	16.7%	22.3%	0.0%
B-231	0.9%	13.4%	6.1%	6.3%	73.2%	0.1%
B-241	0.3%	34.8%	12.3%	20.5%	30.2%	2.0%
B-246	1.3%	2.3%	24.7%	20.7%	49.6%	1.4%
BE-001	0.3%	20.4%	7.3%	12.3%	59.5%	0.1%
BE-007	0.8%	32.8%	15.6%	14.0%	36.4%	0.4%
BE-015	0.3%	19.8%	9.9%	11.2%	58.7%	0.1%
BE-017	0.3%	23.6%	12.1%	14.2%	49.5%	0.2%
BE-018	0.3%	20.5%	14.4%	16.3%	48.1%	0.4%
BE-020	0.4%	20.8%	16.1%	19.4%	42.3%	1.0%
BE-024	0.3%	14.0%	16.4%	16.1%	52.7%	0.4%
BE-039	0.1%	16.7%	5.1%	6.9%	71.1%	0.2%
BE-040	0.2%	40.1%	8.3%	20.5%	28.4%	2.6%
USGS 02154500	0.4%	6.0%	8.0%	11.0%	74.5%	0.1%
USGS 02160200	0.4%	15.3%	8.2%	10.6%	65.4%	0.1%
USGS 02160326	0.3%	26.8%	9.6%	10.9%	52.1%	0.2%
USGS 02160381	0.1%	14.4%	17.2%	16.7%	51.5%	0.1%
USGS 02160390	0.3%	15.6%	15.6%	16.0%	52.2%	0.3%
USGS 02164000	0.3%	52.5%	3.1%	6.3%	37.4%	0.4%
USGS 02165200	0.6%	2.0%	19.4%	19.7%	57.5%	0.8%

Table A-2 Watershed Area in Miles Squared Aggregated by Land Use Class for Areas Draining to Streamflow and Water Quality Monitoring Stations Used in TMDL Development

Monitoring Station ID	Water	Urban	Row Crop	Pasture	Forest	Barren	Total
	miles^2						
USGS 02154500	0.4	5.9	7.9	11	73	0.1	99
USGS 02160200	0.2	7.6	4.1	5.3	32	0.1	50
USGS 02160326	0.2	23	8.1	9.2	44	0.2	84
USGS 02160381	0.0	2.1	2.5	2.4	7.5	0.0	15
USGS 02160390	0.7	39	39	40	130	0.8	249
USGS 02164000	0.1	25	1.5	3.1	18	0.2	48
USGS 02165200	0.2	0.6	5.7	5.8	16.8	0.2	29
B-035	0.0	0.9	0.5	0.4	1.7	0.0	3.5
B-037	0.6	35	27	30	93	0.6	187
B-038	0.0	0.2	0.4	0.2	1.9	0.0	2.7
B-041	1.1	40	49	48	166	1.2	305
B-053 /USGS 02160700	1.6	41	53	54	262	6.4	419
B-054	2.6	47	69	71	510	21.0	721
B-072	0.4	4.4	6.7	7.1	93	6.5	118
B-097	0.0	2.0	2.2	2.2	6.8	0.0	13
B-150	0.3	0.5	4.0	4.1	15.0	0.1	24
B-186	0.0	3.5	0.3	0.5	6.7	0.0	11
B-192	0.0	0.5	0.1	0.2	0.2	0.0	0.9
B-231	0.1	1.3	0.6	0.6	7.3	0.0	10
B-241	0.0	5.3	1.9	3.1	4.6	0.3	15
B-246	0.2	0.4	4.1	3.5	8.3	0.2	17
BE-001	0.0	0.8	0.3	0.5	2.4	0.0	4.0
BE-007	0.1	4.4	2.1	1.9	4.9	0.1	13
BE-015	0.2	13	6.5	7.3	38	0.1	65
BE-017	0.4	28	15	17	59	0.3	120
BE-018	0.6	35	25	28	82	0.6	171
BE-020	0.1	6.6	5.1	6.2	13.4	0.3	32
BE-024	1.0	39	46	45	148	1.1	280
BE-039	0.0	0.5	0.2	0.2	2.3	0.0	3.2
BE-040	0.0	4.4	0.9	2.3	3.1	0.3	11

Table A-3 Fecal Coliform Data Collected between 1990 and 2001 at Water Quality Monitoring Stations in the Enoree River Basin

B-035	
Date	Value
5/2/90	420
6/5/90	630
7/6/90	1000
8/2/90	170
9/5/90	260
10/1/90	640
5/1/91	430
6/4/91	630
7/17/91	2100
8/22/91	720
9/24/91	480
10/22/91	160
5/4/93	5400
6/3/93	580
7/26/93	920
8/12/93	1600
9/21/93	6300
10/7/93	1100
5/5/94	380
6/14/94	880
7/7/94	2300
8/3/94	1700
9/1/94	880
9/27/94	630
5/9/95	620
6/7/95	940
7/18/95	440
8/14/95	540
9/11/95	3100
10/10/95	500
5/21/96	2400

B-035	
Date	Value
6/6/96	1100
7/12/96	340
8/14/96	2500
9/11/96	420
10/15/96	900
5/21/97	340
6/27/97	340
7/30/97	580
8/8/97	350
9/11/97	1300
10/31/97	900
5/19/98	340
6/10/98	520
7/14/98	280
7/19/98	280
8/17/98	920
9/10/98	420
10/14/98	390
5/17/99	650
6/21/99	480
7/7/99	670
8/3/99	410
9/30/99	1600
10/5/99	5800
5/17/00	440
6/1/00	1100
7/10/00	980
8/2/00	880
9/5/00	980
10/20/00	1000

Table A-3 Continued

B-037	
Date	Value
5/30/90	370
6/19/90	170
7/25/90	150
8/28/90	190
9/20/90	220
10/5/90	280
5/23/91	160
6/24/91	380
7/25/91	140
8/14/91	1000
9/23/91	270
10/1/91	460
5/11/93	260
6/15/93	300
7/13/93	32
8/2/93	140
9/23/93	180
10/4/93	140
5/16/94	500
6/10/94	310
7/14/94	320
8/19/94	940
10/15/94	130
6/8/95	230
7/17/95	2000
8/8/95	60
9/13/95	310
10/9/95	250

B-037	
Date	Value
5/28/96	1200
6/26/96	150
7/30/96	180
8/20/96	200
9/17/96	6000
10/23/96	50
5/29/97	700
6/13/97	6000
7/29/97	18000
8/13/97	15
9/23/97	100
10/7/97	110
5/5/98	400
6/25/98	120
7/21/98	280
8/6/98	71
9/9/98	380
10/7/98	560
10/4/99	3300
9/27/99	310
8/24/99	900
7/19/99	80
6/7/99	100
5/4/99	160
10/3/00	140
9/12/00	200
8/22/00	160
7/26/00	320
6/20/00	50
5/16/00	520

Table A-3 Continued

B-038	
Date	Value
5/30/90	430
6/19/90	2800
7/25/90	31000
8/28/90	250
9/20/90	280
10/5/90	210
5/23/91	3300
6/24/91	2000
7/25/91	380
8/14/91	830
9/23/91	280
10/1/91	44
5/11/93	29000
6/15/93	31000
7/13/93	270
8/2/93	200
9/23/93	310
10/4/93	260
5/16/94	470
6/10/94	110000
7/14/94	430
8/19/94	9500
10/15/94	100000
5/8/95	6300
6/8/95	60000
7/17/95	380
8/8/95	930
9/13/95	340
10/9/95	790

B-038	
Date	Value
5/28/96	6000
6/26/96	580
7/30/96	1000
8/20/96	640
9/17/96	650
10/23/96	110
5/29/97	210
6/13/97	5200
7/29/97	530
8/13/97	230
9/23/97	410
10/7/97	200
5/5/98	2800
6/25/98	320
7/21/98	360
8/6/98	600
9/9/98	270
10/7/98	390
5/4/99	500
6/7/99	420
7/19/99	160
8/24/99	66000
9/27/99	2800
10/4/99	12000
5/16/00	80
6/20/00	1600
7/26/00	2100
8/22/00	200
9/12/00	330
10/3/00	420

Table A-3 Continued

B-041	
Date	Value
1/3/90	120
2/8/90	250
3/1/90	120
4/5/90	200
5/30/90	320
6/19/90	250
7/25/90	240
8/28/90	230
9/19/90	240
10/5/90	600
11/2/90	255
12/4/90	1900
1/4/91	330
2/7/91	320
3/8/91	370
4/11/91	380
5/23/91	200
6/24/91	200
7/25/91	190
8/14/91	1100
9/23/91	460
10/1/91	280
11/8/91	470
12/2/91	340
1/8/92	240
2/7/92	55
3/4/92	120
4/8/92	75
5/12/92	180
6/5/92	8700
7/9/92	260
8/3/92	190
9/1/92	290
10/1/92	180
11/24/92	2900
12/10/92	210
1/8/93	6100
2/4/93	55
3/2/93	50
4/8/93	80
5/11/93	300
6/2/93	420

B-041	
Date	Value
7/13/93	170
8/2/93	140
9/23/93	420
10/4/93	320
11/4/93	250
12/8/93	150
1/13/94	1100
2/2/94	91
3/8/94	86
4/14/94	720
5/16/94	460
6/10/94	800
7/14/94	310
8/19/94	2000
10/15/94	270
10/26/94	420
11/16/94	60
12/7/94	340
1/26/95	130
2/28/95	480
3/17/95	120
4/13/95	290
5/8/95	220
6/8/95	480
7/17/95	180
8/8/95	210
9/13/95	1200
10/9/95	86
11/7/95	2100
12/8/95	340
1/11/96	220
2/6/96	150
3/21/96	460
4/30/96	1600
5/28/96	740
6/26/96	94
7/30/96	110
8/20/96	250
9/17/96	1500
10/23/96	110
11/18/96	150
12/4/96	290
1/17/97	160
2/4/97	110
3/6/97	260
4/10/97	69

B-041	
Date	Value
5/29/97	240
6/13/97	1300
7/29/97	340
8/13/97	120
9/23/97	160
10/7/97	160
11/24/97	160
12/12/97	230
1/9/98	1200
3/4/98	74
4/23/98	880
5/5/98	150
6/25/98	89
7/21/98	190
8/6/98	110
9/9/98	110
10/7/98	550
11/23/98	240
12/7/98	120
2/16/99	120
1/11/99	280
12/14/99	210
11/2/99	580
10/20/99	190
9/29/99	940
8/18/99	73
7/22/99	140
6/16/99	240
5/5/99	89
4/15/99	91
3/18/99	35
1/19/00	150
8/28/00	330
7/31/00	320
6/22/00	260
5/2/00	93
4/18/00	90
3/15/00	80
2/17/00	170
12/27/00	100
11/1/00	1800
10/23/00	180
9/6/00	450

Table A-3 Continued

B-053	
Date	Value
11/9/1994	140
12/7/1994	1000
1/17/1995	800
2/10/1995	37
3/14/1995	67
4/18/1995	49
5/5/1995	120
6/26/1995	480
7/18/1995	200
8/10/1995	680
9/26/1995	200
10/10/1995	150
11/4/1998	410
12/2/1998	110
10/5/1999	480
9/16/1999	320
8/19/1999	560
7/15/1999	160
6/8/1999	74
5/3/1999	430
4/15/1999	28
3/29/1999	45
2/18/1999	97
1/19/1999	170
2/14/2001	71
1/16/2001	200
12/10/2001	100
11/15/2001	160
10/16/2001	460
9/12/2001	620
8/22/2001	180
7/9/2001	200
7/9/2001	200
6/5/2001	160
6/5/2001	160
5/2/2001	1800
4/2/2001	160
3/6/2001	460

Table A-3 Continued

B-054	
Date	Value
1/11/90	410
2/15/90	230
3/15/90	270
4/12/90	20000
5/10/90	740
6/18/90	160
7/12/90	180
8/9/90	470
9/13/90	780
10/18/90	200
11/19/90	150
12/13/90	110
1/10/91	430
2/14/91	200
3/7/91	250
4/11/91	760
5/1/91	1500
6/6/91	560
7/18/91	4700
8/22/91	340
9/26/91	930
10/24/91	170
11/21/91	180
12/12/91	320
1/9/92	200
2/25/92	1800
3/19/92	240
4/23/92	1200
5/29/92	130
6/25/92	45
7/9/92	110
8/20/92	320
9/17/92	550
10/15/92	210
11/18/92	200
12/16/92	130
1/14/93	1000
2/25/93	170
3/18/93	150
4/8/93	270
5/6/93	2800
6/10/93	60
7/1/93	140
8/19/93	270

B-054	
9/16/93	700
10/14/93	510
11/23/93	140
12/2/93	270
1/20/94	140
2/10/94	110
3/17/94	180
4/21/94	170
5/12/94	50
6/9/94	1600
7/14/94	210
8/18/94	1200
9/15/94	350
10/18/94	170
11/17/94	100
12/15/94	220
1/12/95	110
2/9/95	51
3/24/95	420
4/27/95	120
5/19/95	310
6/9/95	310
7/20/95	180
8/17/95	320
9/20/95	420
10/18/95	520
11/7/95	220
12/14/95	180
1/4/96	420
2/7/96	160
3/13/96	150
4/2/96	570
5/23/96	230
6/13/96	430
8/28/96	24000
9/12/96	980
10/24/96	120
11/14/96	310
12/5/96	410
1/16/97	2800
2/19/97	170
3/13/97	210
4/17/97	68
5/20/97	13
6/19/97	180
7/10/97	230
8/21/97	300
9/4/97	200
10/23/97	340
11/18/97	140
12/4/97	190
1/22/98	210
2/11/98	74
3/26/98	140

B-054	
4/14/98	110
5/21/98	120
6/4/98	390
7/9/98	110
8/4/98	140
9/10/98	390
10/7/98	570
11/5/98	740
12/30/98	860
3/18/99	80
2/18/99	170
1/28/99	32
12/16/99	1000
11/16/99	260
10/5/99	2300
9/23/99	860
8/26/99	2000
7/29/99	370
6/17/99	1500
5/20/99	100
4/15/99	20
7/11/00	160
6/15/00	62
5/18/00	73
4/13/00	40
3/16/00	70
2/23/00	120
1/12/00	2200
12/12/00	*Present <(
11/16/00	180
10/26/00	130
9/28/00	300
8/22/00	350
10/4/01	310
9/5/01	3300
8/16/01	320
7/30/01	240
6/26/01	5200
5/7/01	120
4/17/01	68
3/21/01	1200
2/21/01	140
1/18/01	67
12/6/01	240
11/6/01	210

Table A-3 Continued

B-072	
Date	Value
5/10/90	3400
6/18/90	350
7/27/90	500
8/24/90	4200
9/14/90	5300
10/4/90	420
5/16/91	160
6/26/91	260
8/23/91	440
9/19/91	240
10/3/91	260
5/7/92	3800
6/4/92	440
7/22/92	190
8/6/92	950
9/24/92	3800
10/22/92	110
11/24/92	2000
12/18/92	3000
1/28/93	1500
2/25/93	20
3/18/93	160
4/1/93	280
5/18/93	210
6/22/93	290
7/28/93	340
8/17/93	760
9/9/93	450
10/20/93	300
11/5/93	500
12/10/93	220
1/7/94	120
2/3/94	57
3/25/94	2300
4/22/94	650
5/17/94	210
6/24/94	220
7/12/94	220
8/9/94	84
9/27/94	2300
10/18/94	580
11/9/94	1600
12/7/94	720
1/17/95	840
2/10/95	110

B-072	
Date	Value
3/14/95	89
4/18/95	43
5/5/95	3600
6/26/95	1900
7/18/95	400
8/10/95	620
9/26/95	640
10/5/95	4900
12/13/95	430
1/3/96	2800
2/1/96	320
3/6/96	7700
4/3/96	1600
5/23/96	2600
6/12/96	560
7/18/96	2700
8/12/96	2100
9/23/96	1800
10/15/96	1200
11/14/96	7000
12/4/96	560
1/8/97	440
3/18/97	200
4/2/97	80
5/14/97	450
6/17/97	6600
6/25/97	980
7/9/97	12000
8/20/97	4900
9/3/97	120
9/16/97	270
10/15/97	630
11/20/97	120
1/15/98	220
2/10/98	200
3/16/98	420
4/21/98	230
5/20/98	1200
6/2/98	14000

B-072	
Date	Value
6/8/98	11000
6/8/98	160
7/8/98	200
8/5/98	290
9/2/98	410
10/29/98	640
11/4/98	1300
12/3/98	300
5/3/99	440
3/29/99	80
2/18/99	1400
1/19/99	1300
6/8/99	560
12/1/99	120
11/22/99	150
10/5/99	560
9/16/99	180
8/19/99	260
7/15/99	560
8/2/00	2300
7/11/00	290
6/14/00	4700
5/1/00	340
4/19/00	130
3/30/00	260
2/23/00	280
1/12/00	1700
12/5/00	120
11/28/00	400
10/16/00	290
9/5/00	1200
10/16/01	220
9/12/01	820
8/22/01	290
7/9/01	500
7/9/01	500
6/5/01	1400
6/5/01	1400
5/2/01	270
4/2/01	150
3/6/01	240
2/14/01	160
1/16/01	120
12/10/01	270
11/15/01	80

Table A-3 Continued

B-097	
Date	Value
5/1/90	670
6/4/90	840
7/5/90	300
8/1/90	940
9/4/90	4400
10/2/90	520
5/2/91	540
6/5/91	500
7/18/91	1100
8/7/91	240
9/19/91	740
10/21/91	540
5/7/92	820
6/16/92	780
7/14/92	700
8/5/92	2200
9/3/92	430
10/27/92	440
11/5/92	480
12/4/92	380
1/26/93	110
2/26/93	80
3/25/93	140
4/20/93	420
5/26/93	490
6/15/93	1200
7/14/93	550
8/3/93	560
9/9/93	250
10/6/93	300
11/5/93	5500
12/9/93	240
1/19/94	90
2/1/94	270
3/9/94	270
4/21/94	560
5/27/94	900
6/21/94	440
7/6/94	1600

B-097	
Date	Value
8/2/94	1300
9/6/94	4100
10/12/94	2100
11/9/94	140
12/7/94	440
1/26/95	390
2/28/95	510
3/17/95	180
4/13/95	580
5/3/95	920
6/26/95	4100
7/28/95	510
8/9/95	880
9/7/95	1500
10/12/95	560
11/7/95	6400
12/8/95	660
1/11/96	840
2/6/96	210
3/21/96	300
4/30/96	3000
5/10/96	1400
6/25/96	2800
7/24/96	560
8/13/96	4400
9/10/96	560
10/8/96	2900
11/18/96	320
12/4/96	680
1/17/97	840
2/4/97	680
3/6/97	430
4/10/97	550
5/21/97	600
6/27/97	760
7/30/97	4800
8/8/97	790
9/11/97	1400

B-097	
Date	Value
10/31/97	340
11/24/97	130
12/12/97	250
1/22/98	430
3/4/98	200
5/19/98	500
6/10/98	610
6/11/98	2300
7/14/98	420
7/19/98	420
8/17/98	3100
9/10/98	580
10/14/98	560
11/23/98	340
12/7/98	580
8/18/99	460
7/22/99	760
6/16/99	1500
5/5/99	680
4/15/99	620
3/18/99	100
2/16/99	180
1/11/99	500
12/14/99	2200
11/2/99	4000
10/20/99	1400
9/29/99	1500
4/20/00	740
3/15/00	210
2/17/00	100
1/19/00	320
12/27/00	310
11/1/00	440
10/23/00	240
9/6/00	1500
8/28/00	1300
7/31/00	*Present >(
6/22/00	500
5/2/00	780

Table A-3 Continued

B-150	
Date	Value
11/9/1994	64
12/7/1994	260
1/26/1995	200
2/28/1995	3100
3/17/1995	270
4/13/1995	370
5/8/1995	310
6/8/1995	240
7/17/1995	1100
8/8/1995	810
9/13/1995	550
10/9/1995	380
4/15/1999	280
3/18/1999	160
2/16/1999	60
1/11/1999	340
10/20/1999	640
9/29/1999	1600
8/18/1999	70
7/22/1999	160
6/16/1999	620
5/5/1999	260
8/23/2001	230
7/13/2001	240
6/11/2001	280
4/5/2001	200
2/21/2001	300
1/24/2001	400
12/18/2001	480
12/15/2001	5600
11/5/2001	370
10/10/2001	650
9/25/2001	360

Table A-3 Continued

B-186	
Date	Value
5/31/90	400
6/6/90	500
7/19/90	920
8/16/90	580
9/17/90	490
10/3/90	300
5/10/91	260
6/7/91	270
7/25/91	1300
8/9/91	840
9/13/91	560
10/23/91	400
5/10/93	480
6/4/93	380
7/14/93	540
8/16/93	370
9/10/93	380
10/5/93	490
5/6/94	780
6/2/94	720
7/1/94	480
8/4/94	11000
9/29/94	380
5/3/95	270
6/6/95	3000
7/20/95	33000
8/2/95	640

B-186	
Date	Value
9/5/95	2600
10/4/95	3000
5/14/96	330
6/3/96	160
7/1/96	2700
8/6/96	860
9/13/96	210
10/9/96	430
5/15/97	190
6/20/97	380
7/18/97	600
8/15/97	1200
9/5/97	250
10/3/97	160
6/11/98	860
7/17/98	5400
8/18/98	960
10/7/98	2200
6/1/99	100
5/18/99	200
10/13/99	100
9/2/99	920
7/7/99	330
6/12/00	190
5/8/00	83
10/2/00	90
9/1/00	9700
8/14/00	210
7/17/00	100

Table A-3 Continued

B-192			B-192			B-192	
Date	Value		Date	Value		Date	Value
5/31/90	8		7/1/94	40		9/5/97	350
6/6/90	2		8/4/94	720		10/3/97	510
7/19/90	30		9/29/94	8		11/20/97	100
8/16/90	170		10/26/94	2		12/30/97	4
9/17/90	700		11/17/94	2		1/22/98	54
10/3/90	130		12/15/94	92		2/13/98	46
5/10/91	2		1/26/95	2		3/6/98	4
6/7/91	18		2/15/95	2		4/3/98	84
7/25/91	2		3/16/95	10		5/15/98	70
8/9/91	1		4/20/95	18		6/11/98	1500
9/13/91	14		5/3/95	90		7/17/98	1200
10/23/91	2		6/6/95	3100		8/18/98	2600
5/12/92	2		7/20/95	8800		10/7/98	880
6/5/92	2		8/2/95	240		11/4/98	1500
7/9/92	2		9/5/95	1400		12/9/98	740
8/3/92	6		10/4/95	1200		12/15/99	100
9/1/92	4		11/8/95	40		11/30/99	230
10/1/92	4		12/7/95	5		10/13/99	120
11/4/92	2600		1/18/96	5		9/2/99	340
12/10/92	2		2/7/96	5		8/4/99	520
1/5/93	2		3/14/96	5		7/7/99	460
1/7/93	2		4/12/96	70		6/1/99	220
2/19/93	2		5/14/96	230		5/18/99	280
3/3/93	2		6/3/96	140		4/28/99	1700
4/15/93	2		7/1/96	700		3/2/99	160
5/10/93	2		8/6/96	600		2/1/99	980
6/4/93	4		9/13/96	190		1/21/99	6
7/14/93	920		10/9/96	180		12/5/00	42
8/16/93	200		11/22/96	42		11/2/00	340
9/10/93	420		12/5/96	2		10/2/00	*Present <
10/5/93	480		1/23/97	2		9/1/00	11000
11/5/93	2		2/6/97	2		8/14/00	*Present >
12/7/93	30		3/5/97	6		7/17/00	740
1/12/94	460		4/1/97	4		6/12/00	940
2/1/94	2		5/15/97	270		5/8/00	370
3/10/94	2		6/20/97	400		4/10/00	200
4/13/94	2000		7/18/97	520		3/27/00	65
5/6/94	18		8/15/97	1500		2/10/00	10
6/2/94	140					1/5/00	150

Table A-3 Continued

B-231	
Date	Value
5/1/90	140
6/4/90	36
7/5/90	380
8/1/90	70
9/4/90	2700
10/2/90	540
5/2/91	200
6/5/91	84
7/18/91	200
8/7/91	130
9/19/91	1100
10/21/91	120
5/26/93	96
6/15/93	36
7/14/93	360
8/3/93	1400
9/9/93	140
10/6/93	110
5/27/94	140
6/21/94	30
7/6/94	1100
8/2/94	40
9/6/94	500
10/12/94	480
5/3/95	99
6/26/95	50
7/28/95	18
8/9/95	100
9/7/95	84
10/12/95	68

B-231	
Date	Value
5/10/96	100
6/25/96	40
7/24/96	390
8/13/96	130
9/10/96	88
10/8/96	700
5/16/97	40
6/26/97	58
7/8/97	88
8/19/97	110
9/4/97	400
10/20/97	250
5/7/98	70
6/30/98	100
7/20/98	150
8/5/98	38
9/1/98	230
10/29/98	72
9/9/99	130
8/12/99	54
7/7/99	5800
6/14/99	110
5/20/99	98
10/12/99	460
10/23/00	360
9/6/00	410
8/28/00	490
7/31/00	760
6/22/00	370
5/2/00	100

Table A-3 Continued

B-241	
Date	Value
5/2/90	630
6/5/90	760
7/6/90	640
8/2/90	4300
9/5/90	400
10/1/90	380
5/1/91	740
6/4/91	900
7/17/91	5500
8/22/91	4400
9/24/91	800
10/22/91	170
5/4/93	9900
6/3/93	760
7/26/93	440
8/12/93	520
9/21/93	1300
10/7/93	840
5/5/94	820
6/14/94	1000
7/7/94	2000
8/3/94	2200
9/27/94	320
5/9/95	580
6/7/95	2100
7/18/95	1100
8/14/95	640
9/11/95	150
10/10/95	440
5/21/96	330

B-241	
Date	Value
6/6/96	960
7/12/96	860
8/14/96	2200
9/11/96	1000
10/15/96	160
5/21/97	490
6/27/97	270
7/30/97	1200
8/8/97	390
9/11/97	1100
10/31/97	460
5/19/98	600
6/10/98	2200
7/14/98	460
7/19/98	460
8/17/98	2000
9/10/98	590
10/16/98	420
5/19/98	600
10/5/99	2200
9/30/99	5800
8/3/99	3900
7/7/99	1500
6/21/99	750
5/17/99	280
6/1/00	320
5/17/00	360
10/20/00	260
8/2/00	380
7/10/00	460

Table A-3 Continued

B-246	
Date	Value
11/9/1994	160
12/7/1994	270
1/26/1995	260
2/28/1995	1300
3/17/1995	210
4/13/1995	1500
5/8/1995	750
6/8/1995	520
7/17/1995	1200
8/8/1995	510
9/13/1995	550
10/9/1995	240
11/23/1998	280
12/7/1998	410
10/20/1999	830
9/29/1999	900
8/18/1999	7100
7/22/1999	470
6/16/1999	900
5/5/1999	310
4/15/1999	470
3/18/1999	100
2/16/1999	220
1/11/1999	190
12/18/2001	71
12/15/2001	690
11/5/2001	130
10/10/2001	180
9/25/2001	810
8/23/2001	430
7/12/2001	350
6/11/2001	390
4/5/2001	100
2/21/2001	300
1/24/2001	140

Table A-3 Continued

BE-001	
Date	Value
1/4/90	84
2/1/90	54
3/8/90	120
4/11/90	20000
5/31/90	1100
6/6/90	740
7/19/90	380
8/1/90	630
9/7/90	550
10/18/90	4500
11/2/90	110
12/7/90	1100
1/2/91	110
2/1/91	25
3/1/91	200
4/4/91	120
5/8/91	920
6/21/91	1500
7/18/91	2800
8/16/91	130
9/27/91	280
10/24/91	100
11/14/91	400
12/5/91	140
1/2/92	50
2/14/92	60
3/2/92	78
4/6/92	260
5/14/92	500
6/12/92	230
7/16/92	400
8/6/92	280
9/1/92	240
10/1/92	70
11/4/92	6900
12/10/92	430
1/5/93	320
1/7/93	320
2/19/93	5
3/3/93	50
4/15/93	19000
5/12/93	860

BE-001	
Date	Value
6/3/93	250
7/27/93	1300
8/18/93	480
9/22/93	420
10/13/93	140
11/5/93	640
12/7/93	130
1/12/94	55
1/12/94	190
2/1/94	10
3/10/94	300
4/13/94	6000
5/13/94	140
6/9/94	300
7/22/94	280
8/12/94	300
9/23/94	120
10/31/94	30
11/4/94	140
12/2/94	30
2/3/95	30
3/7/95	120
4/26/95	110
5/12/95	280
6/5/95	740
7/13/95	170
8/25/95	260
9/14/95	200
10/23/95	40
11/16/95	60
12/14/95	25
1/3/96	50
2/1/96	55
3/14/96	25
4/17/96	120
6/14/96	1200
7/26/96	700
8/16/96	580
9/20/96	230
10/25/96	220
11/20/96	45
12/5/96	94
1/24/97	2200
2/5/97	480
3/4/97	150
4/11/97	110
5/2/97	140
6/3/97	700

BE-001	
Date	Value
7/1/97	400
8/28/97	800
9/16/97	1100
10/1/97	900
11/24/97	25
12/4/97	410
1/16/98	6900
2/6/98	45
3/2/98	10
4/1/98	390
5/12/98	210
6/23/98	740
7/22/98	460
8/7/98	820
9/3/98	180
10/6/98	620
11/4/98	200
12/9/98	700
9/1/99	440
8/26/99	1000
7/14/99	400
6/22/99	30
5/6/99	680
4/28/99	2000
3/2/99	200
2/1/99	4200
1/21/99	260
12/15/99	150
11/30/99	260
10/19/99	120
12/5/00	50
11/2/00	100
10/11/00	120
9/8/00	250
8/8/00	360
7/13/00	1700
6/13/00	460
5/18/00	250
4/10/00	200
3/27/00	6500
2/10/00	740
1/5/00	220

Table A-3 Continued

BE-007	
Date	Value
5/2/90	410
6/5/90	470
7/6/90	340
8/2/90	220
9/5/90	5200
10/1/90	270
5/1/91	220
6/4/91	320
7/17/91	6200
8/22/91	5
9/24/91	250
10/22/91	180
5/4/93	4400
6/3/93	900
7/26/93	380
8/12/93	140
9/21/93	580
10/7/93	190
5/5/94	1100
6/14/94	360
7/7/94	8500
8/3/94	1100
9/27/94	330
5/9/95	260
6/7/95	940
7/18/95	550
8/14/95	440
9/11/95	4200
10/10/95	190
5/21/96	210
6/6/96	200
7/12/96	290

BE-007	
Date	Value
10/10/95	190
5/21/96	210
6/6/96	200
7/12/96	290
8/14/96	1600
9/11/96	400
10/15/96	200
5/21/97	2050
5/21/97	220
6/27/97	1700
7/30/97	220
8/8/97	200
9/11/97	20000
10/31/97	70
5/19/98	180
6/11/98	5600
7/15/98	90
8/17/98	1500
9/10/98	200
10/14/98	310
10/21/99	1000
9/30/99	1700
8/3/99	250
7/7/99	790
6/21/99	230
5/17/99	220
10/20/00	300
9/5/00	1600
8/2/00	360
7/10/00	160
6/1/00	200
5/17/00	260

Table A-3 Continued

BE-015	
Date	Value
5/2/90	340
6/5/90	420
7/6/90	1600
8/2/90	440
9/5/90	690
10/1/90	540
5/1/91	430
6/4/91	240
7/17/91	400
8/22/91	1300
9/24/91	290
10/22/91	60
5/4/93	4000
6/3/93	120
7/26/93	180
8/12/93	210
9/21/93	480
10/7/93	150
5/5/94	240
6/14/94	360
7/7/94	1900
8/3/94	350
9/27/94	600
5/9/95	270
6/7/95	960
7/18/95	700
8/14/95	500
9/11/95	3600
10/10/95	280

BE-015	
Date	Value
5/21/96	60
6/6/96	290
7/12/96	160
8/14/96	2800
9/11/96	260
10/15/96	120
5/21/97	210
6/27/97	1900
7/30/97	870
8/8/97	280
9/11/97	1200
10/31/97	300
5/19/98	180
6/11/98	900
7/15/98	160
8/17/98	1200
9/10/98	380
10/14/98	250
10/6/99	820
9/30/99	780
8/3/99	160
7/7/99	*Presen
6/21/99	84
5/17/99	180
9/5/00	440
8/2/00	180
7/10/00	77
6/1/00	*Presen
5/17/00	2400
10/20/00	50

Table A-3 Continued

BE-017	
Date	Value
11/16/94	180
12/6/94	780
1/5/95	150
2/2/95	120
3/8/95	110
4/24/95	1400
5/31/95	1600
6/7/95	700
7/18/95	32000
8/14/95	380
9/11/95	1200
10/10/95	220
11/7/95	7400
12/8/95	330
1/11/96	210
2/6/96	50
3/21/96	240
4/30/96	3400
6/26/96	140
7/30/96	240
8/20/96	190
9/17/96	8900
10/23/96	140
11/18/96	120
12/4/96	140
1/17/97	490
2/4/97	220
3/6/97	740
4/10/97	280
5/29/97	350
6/13/97	8000
7/29/97	1400
8/13/97	230
9/24/97	8500
10/7/97	230
11/24/97	10
12/12/97	110
1/22/98	200
3/4/98	150
4/1/98	360
5/5/98	240
6/25/98	240

BE-017	
Date	Value
7/21/98	11000
8/6/98	160
9/9/98	970
10/7/98	590
11/12/98	220
12/16/98	690
7/7/99	1700
6/21/99	81
5/17/99	30
4/22/99	87
3/18/99	*Presen
2/11/99	140
1/7/99	140
12/1/99	280
11/10/99	70
10/5/99	2400
9/30/99	630
8/3/99	120
12/12/00	420
11/16/00	200
10/20/00	220
9/5/00	900
8/2/00	370
7/10/00	1100
6/1/00	180
5/17/00	160
4/25/00	6000
3/9/00	*Presen
2/9/00	110
1/12/00	3700
6/4/01	370
4/2/01	190
3/1/01	140
2/1/01	92
1/17/01	200
12/3/01	82
11/1/01	52
10/4/01	190
9/14/01	400
8/2/01	260
7/3/01	110

Table A-3 Continued

BE-020	
Date	Value
5/30/90	530
6/19/90	460
7/25/90	670
8/28/90	600
9/20/90	470
10/5/90	2000
5/23/91	330
6/24/91	780
7/25/91	440
8/14/91	970
9/23/91	480
10/1/91	860
5/11/93	700
6/2/93	540
7/13/93	500
8/2/93	270
9/23/93	210
10/4/93	760
5/16/94	760
6/10/94	2000
7/14/94	540
8/19/94	2500
10/15/94	480
5/8/95	700
6/8/95	1600
7/17/95	900
8/8/95	1000
9/13/95	620
10/9/95	340
5/28/96	14000
6/26/96	270
7/30/96	660
8/20/96	380
9/17/96	6000
10/23/96	360
5/21/97	600
6/27/97	530
7/30/97	1000
8/8/97	350
9/11/97	3800

BE-020	
Date	Value
10/31/97	260
5/19/98	400
6/10/98	1400
7/14/98	310
7/19/98	310
8/17/98	2600
9/10/98	540
10/16/98	340
10/6/99	1100
8/3/99	120
7/7/99	10000
6/21/99	310
5/17/99	260
6/1/00	240
5/17/00	300
10/20/00	240
9/5/00	1100
8/2/00	560
7/10/00	140

BE-024	
Date	Value
5/30/90	300
6/19/90	300
7/25/90	200
8/28/90	130
9/19/90	180
10/5/90	110
5/23/91	210
6/24/91	130
7/25/91	200
8/14/91	1100
9/23/91	160
10/1/91	200
5/11/93	280
6/2/93	450
7/13/93	170
8/2/93	160
9/23/93	250
10/4/93	130
5/16/94	470
6/10/94	320
7/14/94	170
8/19/94	2200
10/15/94	180

Table A-3 Continued

BE-039	
Date	Value
5/31/90	310
6/6/90	410
7/19/90	290
8/1/90	340
9/7/90	2700
10/18/90	6300
5/8/91	280
6/21/91	240
7/18/91	3500
8/16/91	3500
9/27/91	400
10/24/91	240
5/12/93	360
6/3/93	270
7/27/93	1800
8/18/93	230
9/22/93	540
10/13/93	170
5/13/94	400
6/9/94	440
7/22/94	440
8/12/94	440
9/23/94	530
5/12/95	410
6/5/95	930
7/13/95	64
8/25/95	410
9/14/95	170

BE-039	
Date	Value
10/23/95	84
6/14/96	620
7/26/96	1600
8/16/96	490
10/25/96	200
5/2/97	200
6/4/97	550
7/1/97	240
8/28/97	690
9/16/97	1500
10/1/97	1800
5/12/98	200
6/23/98	710
7/22/98	840
8/7/98	690
9/3/98	2300
10/6/98	440
9/1/99	4100
8/26/99	1100
7/14/99	220
6/22/99	350
5/6/99	680
10/19/99	400
7/13/00	280
6/13/00	580
5/18/00	330
10/11/00	1000
9/8/00	4600
8/8/00	610

Table A-3 Continued

BE-040	
Date	Value
5/2/90	820
6/5/90	1500
7/6/90	1900
8/2/90	9900
9/5/90	1100
10/1/90	1100
5/1/91	400
6/4/91	2800
7/17/91	4200
8/22/91	3300
9/24/91	660
10/22/91	300
5/4/93	16000
6/3/93	4800
7/26/93	2200
8/12/93	1500
9/21/93	5E+05
10/7/93	390
5/5/94	980
6/14/94	1600
7/7/94	1900
8/3/94	2000
9/27/94	500
5/9/95	1100
6/7/95	14000
7/18/95	6500
8/14/95	220
9/11/95	3200
10/10/95	680

BE-040	
Date	Value
5/21/96	160000
6/6/96	2500
7/12/96	1100
8/14/96	1500
9/11/96	860
10/15/96	280
5/21/97	800
6/27/97	670
7/30/97	800
8/8/97	600
9/11/97	6000
10/31/97	310
5/19/98	560
6/10/98	1500
7/15/98	5000
8/17/98	3300
9/10/98	620
10/16/98	60
10/6/99	1400
9/30/99	3600
8/3/99	34000
7/7/99	10000
6/21/99	750
5/17/99	430
10/20/00	120
9/5/00	2100
8/2/00	800
7/10/00	2800
6/1/00	490
5/17/00	960

Table A-3 Continued

BE-018	
Date	Value
5/30/90	670
6/19/90	300
7/25/90	320
8/28/90	250
9/20/90	540
10/5/90	820
5/23/91	260
6/24/91	3100
7/25/91	250
8/14/91	1100
9/25/91	390
10/1/91	420
5/11/93	330
6/2/93	380
7/13/93	140
8/2/93	470
9/23/93	270
10/4/93	250
5/16/94	530
6/10/94	880
7/14/94	1300
8/19/94	7300
10/15/94	380
5/8/95	370
6/8/95	470
7/17/95	13000
8/8/95	1000

BE-018	
Date	Value
9/13/95	450
10/9/95	520
5/28/96	8800
6/26/96	210
7/30/96	290
8/20/96	450
9/17/96	6000
10/23/96	140
5/29/97	1100
6/13/97	15000
7/29/97	5300
8/13/97	140
9/23/97	210
10/7/97	240
6/25/98	660
7/21/98	2000
8/6/98	190
9/9/98	2600
10/7/98	560
5/4/99	160
6/7/99	240
7/19/99	70
8/24/99	7300
9/27/99	360
5/16/00	80
6/20/00	250
7/26/00	280
8/22/00	10
9/12/00	200
10/3/00	240

APPENDIX B Calculations

Table B-1 TMDL Target Loads

Station	B-035
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190
Mean	4.94E+10
Allowable Load (#/day)	4.94E+10
Geometric Mean Load (#/30days)	7.42E+11

Percent Exceedance (%)	Load(#/Day)
10	1.08E+11
15	8.67E+10
20	7.50E+10
25	6.72E+10
30	6.10E+10
35	5.48E+10
40	5.04E+10
45	4.63E+10
50	4.31E+10
55	4.04E+10
60	3.77E+10
65	3.50E+10
70	3.24E+10
75	3.01E+10
80	2.74E+10
85	2.42E+10
90	2.10E+10

Station	B-037
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190
Mean	2.61E+12
Allowable Load (#/day)	2.61E+12
Geometric Mean Load (#/30days)	3.92E+13

Percent Exceedance (%)	Load(#/Day)
10	5.69E+12
15	4.58E+12
20	3.97E+12
25	3.56E+12
30	3.23E+12
35	2.90E+12
40	2.67E+12
45	2.45E+12
50	2.28E+12
55	2.14E+12
60	1.99E+12
65	1.85E+12
70	1.71E+12
75	1.59E+12
80	1.45E+12
85	1.28E+12
90	1.11E+12

Station	B-186
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190
Mean	1.54E+11
Allowable Load (#/day)	1.54E+11
Geometric Mean Load (#/30days)	2.31E+12

Percent Exceedance (%)	Load(#/Day)
10	3.36E+11
15	2.70E+11
20	2.34E+11
25	2.10E+11
30	1.90E+11
35	1.71E+11
40	1.57E+11
45	1.44E+11
50	1.35E+11
55	1.26E+11
60	1.18E+11
65	1.09E+11
70	1.01E+11
75	9.40E+10
80	8.55E+10
85	7.55E+10
90	6.55E+10

Table B-1 (Continued)

Station	B-241
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190
Mean	2.13E+11
Allowable Load (#/day)	2.13E+11
Geometric Mean Load (#/30days)	3.20E+12

Percent Exceedance (%)	Load(#/Day)
10	4.64E+11
15	3.74E+11
20	3.23E+11
25	2.90E+11
30	2.63E+11
35	2.36E+11
40	2.18E+11
45	2.00E+11
50	1.86E+11
55	1.74E+11
60	1.63E+11
65	1.51E+11
70	1.40E+11
75	1.30E+11
80	1.18E+11
85	1.04E+11
90	9.05E+10

Station	BE-001
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190
Mean	5.66E+10
Allowable Load (#/day)	5.66E+10
Geometric Mean Load (#/30days)	8.49E+11

Percent Exceedance (%)	Load(#/Day)
10	1.23E+11
15	9.92E+10
20	8.58E+10
25	7.69E+10
30	6.98E+10
35	6.27E+10
40	5.77E+10
45	5.30E+10
50	4.94E+10
55	4.62E+10
60	4.31E+10
65	4.00E+10
70	3.71E+10
75	3.45E+10
80	3.14E+10
85	2.77E+10
90	2.40E+10

Station	BE-007
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190
Mean	1.88E+11
Allowable Load (#/day)	1.88E+11
Geometric Mean Load (#/30days)	2.82E+12

Percent Exceedance (%)	Load(#/Day)
10	4.10E+11
15	3.30E+11
20	2.86E+11
25	2.56E+11
30	2.32E+11
35	2.09E+11
40	1.92E+11
45	1.76E+11
50	1.64E+11
55	1.54E+11
60	1.44E+11
65	1.33E+11
70	1.23E+11
75	1.15E+11
80	1.04E+11
85	9.22E+10
90	7.99E+10

Table B-1 (Continued)

Station	BE-015
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190
Mean	9.17E+11
Allowable Load (#/day)	9.17E+11
Geometric Mean Load (#/30days)	1.38E+13

Percent Exceedance (%)	Load(#/Day)
10	2.00E+12
15	1.61E+12
20	1.39E+12
25	1.25E+12
30	1.13E+12
35	1.02E+12
40	9.36E+11
45	8.60E+11
50	8.01E+11
55	7.50E+11
60	7.00E+11
65	6.49E+11
70	6.01E+11
75	5.59E+11
80	5.09E+11
85	4.49E+11
90	3.89E+11

Station	BE-017
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190
Mean	1.68E+12
Allowable Load (#/day)	1.68E+12
Geometric Mean Load (#/30days)	2.51E+13

Percent Exceedance (%)	Load(#/Day)
10	3.65E+12
15	2.94E+12
20	2.54E+12
25	2.28E+12
30	2.07E+12
35	1.86E+12
40	1.71E+12
45	1.57E+12
50	1.46E+12
55	1.37E+12
60	1.28E+12
65	1.19E+12
70	1.10E+12
75	1.02E+12
80	9.29E+11
85	8.21E+11
90	7.11E+11

Station	BE-018
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190
Mean	2.39E+12
Allowable Load (#/day)	2.39E+12
Geometric Mean Load (#/30days)	3.59E+13

Percent Exceedance (%)	Load(#/Day)
10	5.21E+12
15	4.20E+12
20	3.63E+12
25	3.26E+12
30	2.96E+12
35	2.65E+12
40	2.44E+12
45	2.24E+12
50	2.09E+12
55	1.96E+12
60	1.83E+12
65	1.69E+12
70	1.57E+12
75	1.46E+12
80	1.33E+12
85	1.17E+12
90	1.02E+12

Station	BE-020
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190

Mean	4.45E+11
Allowable Load (#/day)	4.45E+11
Geometric Mean Load (#/30days)	6.68E+12

Percent Exceedance (%)	Load(#/Day)
10	9.70E+11
15	7.81E+11
20	6.76E+11
25	6.06E+11
30	5.50E+11
35	4.93E+11
40	4.55E+11
45	4.17E+11
50	3.89E+11
55	3.64E+11
60	3.40E+11
65	3.15E+11
70	2.92E+11
75	2.72E+11
80	2.47E+11
85	2.18E+11
90	1.89E+11

Station	BE-040
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190

Mean	1.55E+11
Allowable Load (#/day)	1.55E+11
Geometric Mean Load (#/30days)	2.32E+12

Percent Exceedance (%)	Load(#/Day)
10	3.37E+11
15	2.71E+11
20	2.35E+11
25	2.10E+11
30	1.91E+11
35	1.71E+11
40	1.58E+11
45	1.45E+11
50	1.35E+11
55	1.27E+11
60	1.18E+11
65	1.09E+11
70	1.01E+11
75	9.43E+10
80	8.58E+10
85	7.58E+10
90	6.57E+10

Station	B-097
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190

Mean	1.09E+11
Allowable Load (#/day)	1.09E+11
Geometric Mean Load (#/30days)	1.63E+12

Percent Exceedance (%)	Load(#/Day)
10	2.50E+11
15	2.02E+11
20	1.75E+11
25	1.49E+11
30	1.36E+11
35	1.23E+11
40	1.14E+11
45	1.04E+11
50	9.39E+10
55	8.60E+10
60	7.88E+10
65	7.11E+10
70	6.49E+10
75	5.94E+10
80	5.35E+10
85	4.74E+10
90	3.97E+10

Table B-1 (Continued)

Station	BE-024
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190

Mean	3.24E+12
Allowable Load (#/day)	3.24E+12
Geometric Mean Load (#/30days)	4.86E+13

Percent Exceedance (%)	Load(#/Day)
10	6.87E+12
15	5.70E+12
20	5.01E+12
25	4.50E+12
30	4.06E+12
35	3.68E+12
40	3.38E+12
45	3.10E+12
50	2.85E+12
55	2.64E+12
60	2.42E+12
65	2.23E+12
70	2.07E+12
75	1.90E+12
80	1.71E+12
85	1.56E+12
90	1.36E+12

Station	B-039
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190

Mean	2.44E+10
Allowable Load (#/day)	2.44E+10
Geometric Mean Load (#/30days)	3.66E+11

Percent Exceedance (%)	Load(#/Day)
10	5.60E+10
15	4.42E+10
20	3.76E+10
25	3.31E+10
30	3.00E+10
35	2.75E+10
40	2.53E+10
45	2.34E+10
50	2.16E+10
55	1.99E+10
60	1.84E+10
65	1.68E+10
70	1.50E+10
75	1.35E+10
80	1.21E+10
85	1.09E+10
90	9.40E+09

Station	B-231
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190

Mean	1.25E+11
Allowable Load (#/day)	1.25E+11
Geometric Mean Load (#/30days)	1.87E+12

Percent Exceedance (%)	Load(#/Day)
10	2.99E+11
15	2.32E+11
20	1.97E+11
25	1.73E+11
30	1.55E+11
35	1.40E+11
40	1.28E+11
45	1.16E+11
50	1.06E+11
55	9.81E+10
60	8.99E+10
65	8.30E+10
70	7.46E+10
75	6.72E+10
80	6.06E+10
85	5.30E+10
90	4.40E+10

Table B-1 (Continued)

Station	B-072
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190
Mean	1.07E+12
Allowable Load (#/day)	1.07E+12
Geometric Mean Load (#/30days)	1.61E+13

Percent Exceedance (%)	Load(#/Day)
10	2.47E+12
15	1.95E+12
20	1.65E+12
25	1.46E+12
30	1.32E+12
35	1.21E+12
40	1.11E+12
45	1.03E+12
50	9.52E+11
55	8.75E+11
60	8.08E+11
65	7.39E+11
70	6.62E+11
75	5.95E+11
80	5.33E+11
85	4.81E+11
90	4.14E+11

Station	B-054
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190
Mean	6.54E+12
Allowable Load (#/day)	6.54E+12
Geometric Mean Load (#/30days)	9.80E+13

Percent Exceedance (%)	Load(#/Day)
10	1.50E+13
15	1.18E+13
20	1.01E+13
25	8.87E+12
30	8.03E+12
35	7.36E+12
40	6.77E+12
45	6.28E+12
50	5.79E+12
55	5.33E+12
60	4.92E+12
65	4.50E+12
70	4.03E+12
75	3.62E+12
80	3.24E+12
85	2.93E+12
90	2.52E+12

Station	B-038
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190
Mean	3.72E+10
Allowable Load (#/day)	3.72E+10
Geometric Mean Load (#/30days)	5.59E+11

Percent Exceedance (%)	Load(#/Day)
10	7.20E+10
15	6.08E+10
20	5.41E+10
25	4.94E+10
30	4.57E+10
35	4.20E+10
40	3.90E+10
45	3.66E+10
50	3.43E+10
55	3.21E+10
60	3.00E+10
65	2.78E+10
70	2.59E+10
75	2.39E+10
80	2.22E+10
85	2.00E+10
90	1.72E+10

Station	B-192
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190

Mean	1.05E+10
Allowable Load (#/day)	1.05E+10
Geometric Mean Load (#/30days)	1.58E+11

Percent Exceedance (%)	Load(#/Day)
10	4.25E+09
15	4.96E+09
20	5.49E+09
25	6.20E+09
30	6.73E+09
35	7.26E+09
40	7.79E+09
45	8.50E+09
50	9.21E+09
55	9.92E+09
60	1.06E+10
65	1.17E+10
70	1.28E+10
75	1.42E+10
80	1.61E+10
85	1.89E+10
90	2.43E+10

Station	B-041
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190

Mean	2.77E+12
Allowable Load (#/day)	2.77E+12
Geometric Mean Load (#/30days)	4.15E+13

Percent Exceedance (%)	Load(#/Day)
10	1.07E+12
15	1.24E+12
20	1.37E+12
25	1.53E+12
30	1.71E+12
35	1.90E+12
40	2.08E+12
45	2.25E+12
50	2.45E+12
55	2.66E+12
60	2.87E+12
65	3.12E+12
70	3.40E+12
75	3.76E+12
80	4.26E+12
85	5.01E+12
90	6.35E+12

Station	B-053
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190

Mean	3.80E+12
Allowable Load (#/day)	3.80E+12
Geometric Mean Load (#/30days)	5.70E+13

Percent Exceedance (%)	Load(#/Day)
10.01	1.46E+12
15.01	1.70E+12
20.01	1.89E+12
25.01	2.10E+12
30.01	2.34E+12
35.01	2.61E+12
40.01	2.86E+12
45.01	3.10E+12
50.01	3.37E+12
55.01	3.65E+12
60.01	3.94E+12
65.01	4.28E+12
70.01	4.67E+12
75.01	5.16E+12
80.01	5.85E+12
85.01	6.88E+12
90.01	8.73E+12

Table B-1 (Continued)

Station	B-192
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190

Mean	1.05E+10
Allowable Load (#/day)	1.05E+10
Geometric Mean Load (#/30days)	1.58E+11

Percent Exceedance (%)	Load(#/Day)
10	4.25E+09
15	4.96E+09
20	5.49E+09
25	6.20E+09
30	6.73E+09
35	7.26E+09
40	7.79E+09
45	8.50E+09
50	9.21E+09
55	9.92E+09
60	1.06E+10
65	1.17E+10
70	1.28E+10
75	1.42E+10
80	1.61E+10
85	1.89E+10
90	2.43E+10

Station	B-041
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190

Mean	2.77E+12
Allowable Load (#/day)	2.77E+12
Geometric Mean Load (#/30days)	4.15E+13

Percent Exceedance (%)	Load(#/Day)
10	1.07E+12
15	1.24E+12
20	1.37E+12
25	1.53E+12
30	1.71E+12
35	1.90E+12
40	2.08E+12
45	2.25E+12
50	2.45E+12
55	2.66E+12
60	2.87E+12
65	3.12E+12
70	3.40E+12
75	3.76E+12
80	4.26E+12
85	5.01E+12
90	6.35E+12

Station	B-053
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190

Mean	3.80E+12
Allowable Load (#/day)	3.80E+12
Geometric Mean Load (#/30days)	5.70E+13

Percent Exceedance (%)	Load(#/Day)
10.01	1.46E+12
15.01	1.70E+12
20.01	1.89E+12
25.01	2.10E+12
30.01	2.34E+12
35.01	2.61E+12
40.01	2.86E+12
45.01	3.10E+12
50.01	3.37E+12
55.01	3.65E+12
60.01	3.94E+12
65.01	4.28E+12
70.01	4.67E+12
75.01	5.16E+12
80.01	5.85E+12
85.01	6.88E+12
90.01	8.73E+12

Table B-1 (Continued)

Station	B-150
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190

Mean	2.15E+11
Allowable Load (#/day)	2.15E+11
Geometric Mean Load (#/30days)	3.23E+12

Percent Exceedance (%)	Load(#/Day)
10	4.47E+11
15	3.72E+11
20	3.26E+11
25	2.96E+11
30	2.73E+11
35	2.50E+11
40	2.35E+11
45	2.12E+11
50	1.97E+11
55	1.82E+11
60	1.67E+11
65	1.52E+11
70	1.36E+11
75	1.21E+11
80	1.14E+11
85	9.86E+10
90	8.34E+10

Station	B-246
Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190

Mean	1.52E+11
Allowable Load (#/day)	1.52E+11
Geometric Mean Load (#/30days)	2.27E+12

Percent Exceedance (%)	Load(#/Day)
10	3.48E+11
15	2.75E+11
20	2.33E+11
25	2.06E+11
30	1.86E+11
35	1.71E+11
40	1.57E+11
45	1.46E+11
50	1.34E+11
55	1.24E+11
60	1.14E+11
65	1.04E+11
70	9.34E+10
75	8.40E+10
80	7.52E+10
85	6.79E+10
90	5.84E+10

Table B-1 (Continued)

Table B-2 Existing Loads

Station	B-035
Trend Line:	Power
Equation: y=6E+12*x^(-1.0584)	

Existing Load (#/Day):	1.45E+11
Average (#/Day):	1.45E+11

Percent Exceedance(%)	Load(#/Day)
10	5.25E+11
15	3.41E+11
20	2.52E+11
25	1.99E+11
30	1.64E+11
35	1.39E+11
40	1.21E+11
45	1.07E+11
50	9.55E+10
55	8.63E+10
60	7.87E+10
65	7.23E+10
70	6.69E+10
75	6.22E+10
80	5.81E+10
85	5.45E+10
90	5.13E+10

Station	B-037
Trend Line:	Power
Equation: y=2E+14*x^(-0.9048)	

Existing Load (#/Day):	8.05E+12
Average (#/Day):	8.05E+12

Percent Exceedance(%)	Load(#/Day)
10	2.49E+13
15	1.73E+13
20	1.33E+13
25	1.09E+13
30	9.22E+12
35	8.02E+12
40	7.10E+12
45	6.39E+12
50	5.80E+12
55	5.33E+12
60	4.92E+12
65	4.58E+12
70	4.28E+12
75	4.02E+12
80	3.79E+12
85	3.59E+12
90	3.41E+12

Station	B-186
Trend Line:	Power
Equation: y=5E+13*x^(-1.2661)	

Existing Load (#/Day):	6.23E+11
Average (#/Day):	6.23E+11

Percent Exceedance(%)	Load(#/Day)
10	2.71E+12
15	1.62E+12
20	1.13E+12
25	8.49E+11
30	6.74E+11
35	5.55E+11
40	4.68E+11
45	4.03E+11
50	3.53E+11
55	3.13E+11
60	2.80E+11
65	2.53E+11
70	2.31E+11
75	2.11E+11
80	1.95E+11
85	1.80E+11
90	1.68E+11

Table B-2 (Continued)

Station	B-241
Trend Line:	Power
Equation: y=4E+13*x^(-1.1624)	

Existing Load (#/Day):	6.93E+11
Average (#/Day):	6.93E+11

Percent Exceedance(%)	Load(#/Day)
10	2.75E+12
15	1.72E+12
20	1.23E+12
25	9.49E+11
30	7.67E+11
35	6.42E+11
40	5.49E+11
45	4.79E+11
50	4.24E+11
55	3.79E+11
60	3.43E+11
65	3.12E+11
70	2.87E+11
75	2.65E+11
80	2.45E+11
85	2.29E+11
90	2.14E+11

Station	BE-001
Trend Line:	Power
Equation: y=2E+13*x^(-1.3274)	

Existing Load (#/Day):	2.06E+11
Average (#/Day):	2.06E+11

Percent Exceedance(%)	Load(#/Day)
10	9.41E+11
15	5.49E+11
20	3.75E+11
25	2.79E+11
30	2.19E+11
35	1.78E+11
40	1.49E+11
45	1.28E+11
50	1.11E+11
55	9.79E+10
60	8.72E+10
65	7.84E+10
70	7.11E+10
75	6.49E+10
80	5.95E+10
85	5.49E+10
90	5.09E+10

Station	BE-007
Trend Line:	Power
Equation: y=3E+13*x^(-0.9619)	

Existing Load (#/Day):	9.98E+11
Average (#/Day):	9.98E+11

Percent Exceedance(%)	Load(#/Day)
10	3.28E+12
15	2.22E+12
20	1.68E+12
25	1.36E+12
30	1.14E+12
35	9.81E+11
40	8.63E+11
45	7.71E+11
50	6.96E+11
55	6.35E+11
60	5.84E+11
65	5.41E+11
70	5.04E+11
75	4.72E+11
80	4.43E+11
85	4.18E+11
90	3.96E+11

Station	BE-015
Trend Line:	Power
Equation: y=8E+13*x^(-0.9273)	

Existing Load (#/Day):	2.99E+12
Average (#/Day):	2.99E+12

Percent Exceedance(%)	Load(#/Day)
10	9.46E+12
15	6.49E+12
20	4.97E+12
25	4.04E+12
30	3.41E+12
35	2.96E+12
40	2.62E+12
45	2.34E+12
50	2.13E+12
55	1.95E+12
60	1.80E+12
65	1.67E+12
70	1.56E+12
75	1.46E+12
80	1.38E+12
85	1.30E+12
90	1.23E+12

Station	BE-017
Trend Line:	Power
Equation: y=3E+14*x^(-1.0016)	

Existing Load (#/Day):	8.76E+12
Average (#/Day):	8.76E+12

Percent Exceedance(%)	Load(#/Day)
10	2.99E+13
15	1.99E+13
20	1.49E+13
25	1.19E+13
30	9.95E+12
35	8.52E+12
40	7.46E+12
45	6.63E+12
50	5.96E+12
55	5.42E+12
60	4.97E+12
65	4.58E+12
70	4.26E+12
75	3.97E+12
80	3.72E+12
85	3.50E+12
90	3.31E+12

Station	BE-018
Trend Line:	Power
Equation: y=5E+14*x^(-1.1713)	

Existing Load (#/Day):	8.42E+12
Average (#/Day):	8.42E+12

Percent Exceedance(%)	Load(#/Day)
10	3.37E+13
15	2.10E+13
20	1.50E+13
25	1.15E+13
30	9.31E+12
35	7.77E+12
40	6.64E+12
45	5.79E+12
50	5.12E+12
55	4.58E+12
60	4.13E+12
65	3.76E+12
70	3.45E+12
75	3.18E+12
80	2.95E+12
85	2.75E+12
90	2.57E+12

Table B-2 (Continued)

Station	BE-020
Trend Line:	Power
Equation: y=5E+13*x^(-1.0468)	

Existing Load (#/Day):	1.26E+12
Average (#/Day):	1.26E+12

Percent Exceedance(%)	Load(#/Day)
10	4.49E+12
15	2.94E+12
20	2.17E+12
25	1.72E+12
30	1.42E+12
35	1.21E+12
40	1.05E+12
45	9.30E+11
50	8.33E+11
55	7.54E+11
60	6.88E+11
65	6.33E+11
70	5.85E+11
75	5.45E+11
80	5.09E+11
85	4.78E+11
90	4.50E+11

Station	BE-040
Trend Line:	Power
Equation: y=1E+13*x^(-0.7358)	

Existing Load (#/Day):	7.12E+11
Average (#/Day):	7.12E+11

Percent Exceedance(%)	Load(#/Day)
10	1.84E+12
15	1.36E+12
20	1.10E+12
25	9.36E+11
30	8.19E+11
35	7.31E+11
40	6.63E+11
45	6.08E+11
50	5.62E+11
55	5.24E+11
60	4.92E+11
65	4.64E+11
70	4.39E+11
75	4.17E+11
80	3.98E+11
85	3.80E+11
90	3.65E+11

Station	B-097
Trend Line:	Power
Equation: y=7E+12*x^(-0.9003)	

Existing Load (#/Day):	3.27E+11
Average (#/Day):	3.27E+11

Percent Exceedance(%)	Load(#/Day)
10	1.01E+12
15	6.99E+11
20	5.39E+11
25	4.41E+11
30	3.74E+11
35	3.26E+11
40	2.89E+11
45	2.60E+11
50	2.36E+11
55	2.17E+11
60	2.01E+11
65	1.87E+11
70	1.75E+11
75	1.64E+11
80	1.55E+11
85	1.47E+11
90	1.39E+11

Station	BE-024
Trend Line:	Power
Equation: y=2E+14*x^(-1.0524)	

Existing Load (#/Day):	4.95E+12
Average (#/Day):	4.95E+12

Percent Exceedance(%)	Load(#/Day)
10	1.77E+13
15	1.16E+13
20	8.55E+12
25	6.76E+12
30	5.58E+12
35	4.74E+12
40	4.12E+12
45	3.64E+12
50	3.26E+12
55	2.95E+12
60	2.69E+12
65	2.47E+12
70	2.29E+12
75	2.13E+12
80	1.99E+12
85	1.86E+12
90	1.76E+12

Station	BE-039
Trend Line:	Power
Equation: y=7E+12*x^(-1.1716)	

Existing Load (#/Day):	1.18E+11
Average (#/Day):	1.18E+11

Percent Exceedance(%)	Load(#/Day)
10	4.72E+11
15	2.93E+11
20	2.09E+11
25	1.61E+11
30	1.30E+11
35	1.09E+11
40	9.29E+10
45	8.09E+10
50	7.15E+10
55	6.40E+10
60	5.78E+10
65	5.26E+10
70	4.82E+10
75	4.45E+10
80	4.13E+10
85	3.84E+10
90	3.59E+10

Station	B-231
Trend Line:	Power
Equation: y=6E+12*x^(-0.9113)	

Existing Load (#/Day):	2.36E+11
Average (#/Day):	2.36E+11

Percent Exceedance(%)	Load(#/Day)
10	7.36E+11
15	5.09E+11
20	3.91E+11
25	3.19E+11
30	2.70E+11
35	2.35E+11
40	2.08E+11
45	1.87E+11
50	1.70E+11
55	1.56E+11
60	1.44E+11
65	1.34E+11
70	1.25E+11
75	1.17E+11
80	1.11E+11
85	1.05E+11
90	9.94E+10

Table B-2 (Continued)

Station	B-072
Trend Line:	Power
Equation: y=5E+13*x^(-0.7591)	

Existing Load (#/Day):	3.29E+12
Average (#/Day):	3.29E+12

Percent Exceedance(%)	Load(#/Day)
10	8.71E+12
15	6.40E+12
20	5.14E+12
25	4.34E+12
30	3.78E+12
35	3.36E+12
40	3.04E+12
45	2.78E+12
50	2.57E+12
55	2.39E+12
60	2.23E+12
65	2.10E+12
70	1.99E+12
75	1.89E+12
80	1.80E+12
85	1.72E+12
90	1.64E+12

Station	B-054
Trend Line:	Power
Equation: y=3E+14*x^(-0.8167)	

Existing Load (#/Day):	1.62E+13
Average (#/Day):	1.62E+13

Percent Exceedance(%)	Load(#/Day)
10	4.58E+13
15	3.29E+13
20	2.60E+13
25	2.16E+13
30	1.87E+13
35	1.64E+13
40	1.47E+13
45	1.34E+13
50	1.23E+13
55	1.14E+13
60	1.06E+13
65	9.92E+12
70	9.34E+12
75	8.83E+12
80	8.37E+12
85	7.97E+12
90	7.60E+12

Station	B-038
Trend Line:	Power
Equation: y=4E+13*x^(-1.4137)	

Existing Load (#/Day):	3.15E+11
Average (#/Day):	3.15E+11

Percent Exceedance(%)	Load(#/Day)
10	1.54E+12
15	8.70E+11
20	5.79E+11
25	4.22E+11
30	3.26E+11
35	2.63E+11
40	2.17E+11
45	1.84E+11
50	1.59E+11
55	1.39E+11
60	1.23E+11
65	1.09E+11
70	9.85E+10
75	8.94E+10
80	8.16E+10
85	7.49E+10
90	6.91E+10

Table B-2 (Continued)

Station	B-192
Trend Line:	Power
Equation: y=5E+11*x^(-0.828)	

Existing Load (#/Day):	2.60E+10
Average (#/Day):	2.60E+10

Percent Exceedance(%)	Load(#/Day)
10	7.43E+10
15	5.31E+10
20	4.19E+10
25	3.48E+10
30	2.99E+10
35	2.63E+10
40	2.36E+10
45	2.14E+10
50	1.96E+10
55	1.81E+10
60	1.69E+10
65	1.58E+10
70	1.48E+10
75	1.40E+10
80	1.33E+10
85	1.26E+10
90	1.20E+10

Station	B-041
Trend Line:	Power
Equation: y=1E+14*x^(-0.8823)	

Existing Load (#/Day):	4.34E+12
Average (#/Day):	4.34E+12

Percent Exceedance(%)	Load(#/Day)
10	1.31E+13
15	9.17E+12
20	7.11E+12
25	5.84E+12
30	4.97E+12
35	4.34E+12
40	3.86E+12
45	3.48E+12
50	3.17E+12
55	2.91E+12
60	2.70E+12
65	2.51E+12
70	2.36E+12
75	2.22E+12
80	2.09E+12
85	1.98E+12
90	1.89E+12

Station	B-053
Trend Line:	Power
Equation: y=5E+13*x^(-0.6175)	

Existing Load (#/Day):	5.35E+12
Average (#/Day):	5.35E+12

Percent Exceedance(%)	Load(#/Day)
10	1.21E+13
15	9.39E+12
20	7.86E+12
25	6.85E+12
30	6.12E+12
35	5.57E+12
40	5.13E+12
45	4.77E+12
50	4.47E+12
55	4.21E+12
60	3.99E+12
65	3.80E+12
70	3.63E+12
75	3.48E+12
80	3.34E+12
85	3.22E+12
90	3.11E+12

Table B-2 (Continued)

Station	B-150
Trend Line:	**Power**
Equation: y=4E+13*x^(-1.1776)	

Existing Load (#/Day):	**6.60E+11**
Average (#/Day):	**6.60E+11**

Percent Exceedance(%)	Load(#/Day)
10	2.66E+12
15	1.65E+12
20	1.17E+12
25	9.03E+11
30	7.29E+11
35	6.08E+11
40	5.19E+11
45	4.52E+11
50	3.99E+11
55	3.57E+11
60	3.22E+11
65	2.93E+11
70	2.69E+11
75	2.48E+11
80	2.30E+11
85	2.14E+11
90	2.00E+11

Station	B-246
Trend Line:	**Power**
Equation: y=1E+13*x^(-1.0876)	

Existing Load (#/Day):	**2.21E+11**
Average (#/Day):	**2.21E+11**

Percent Exceedance(%)	Load(#/Day)
10	8.17E+11
15	5.26E+11
20	3.85E+11
25	3.02E+11
30	2.47E+11
35	2.09E+11
40	1.81E+11
45	1.59E+11
50	1.42E+11
55	1.28E+11
60	1.16E+11
65	1.07E+11
70	9.85E+10
75	9.13E+10
80	8.52E+10
85	7.97E+10
90	7.49E+10

Figure B-1 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-037

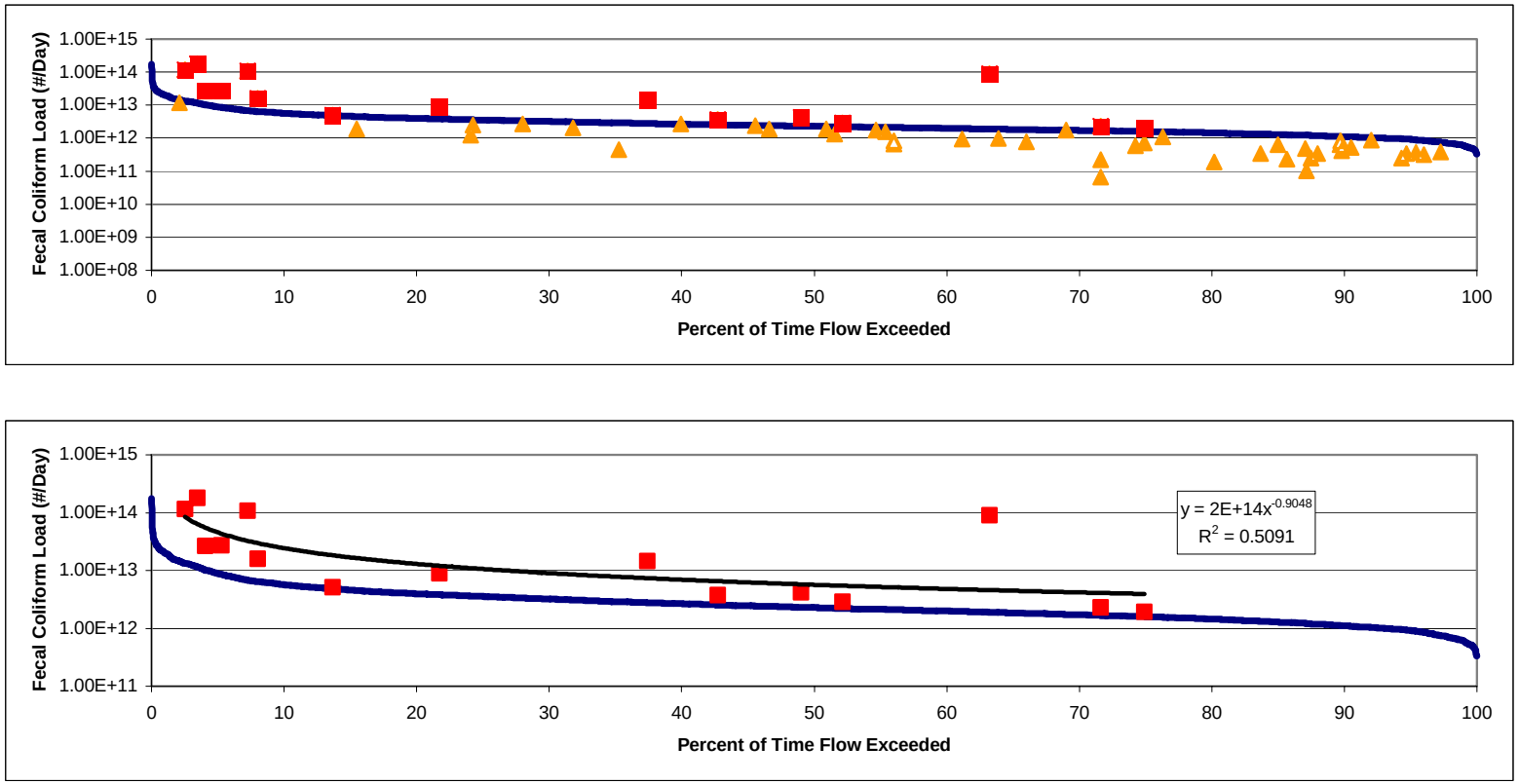
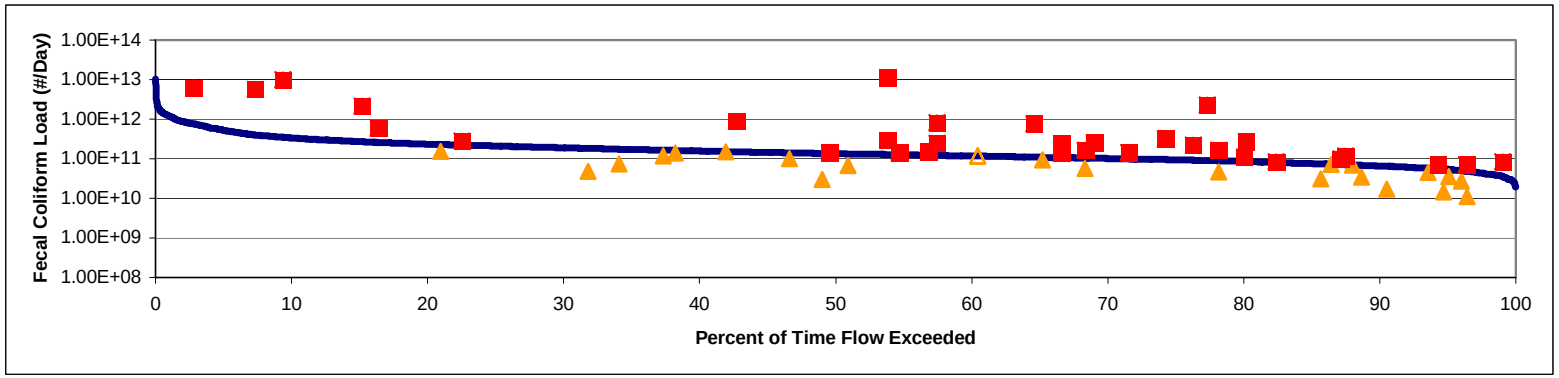


Figure B-2 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-186



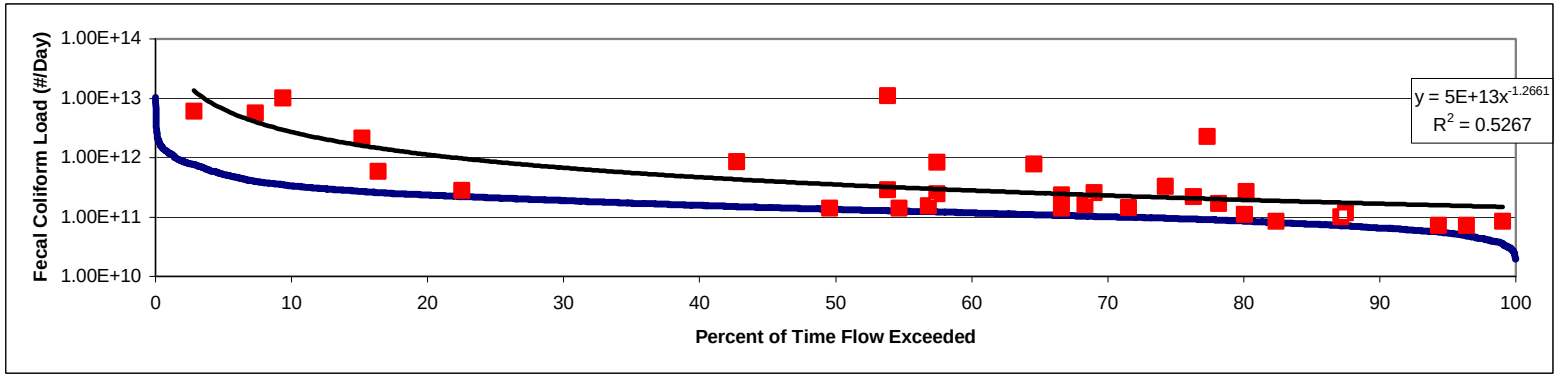


Figure B-3 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-241

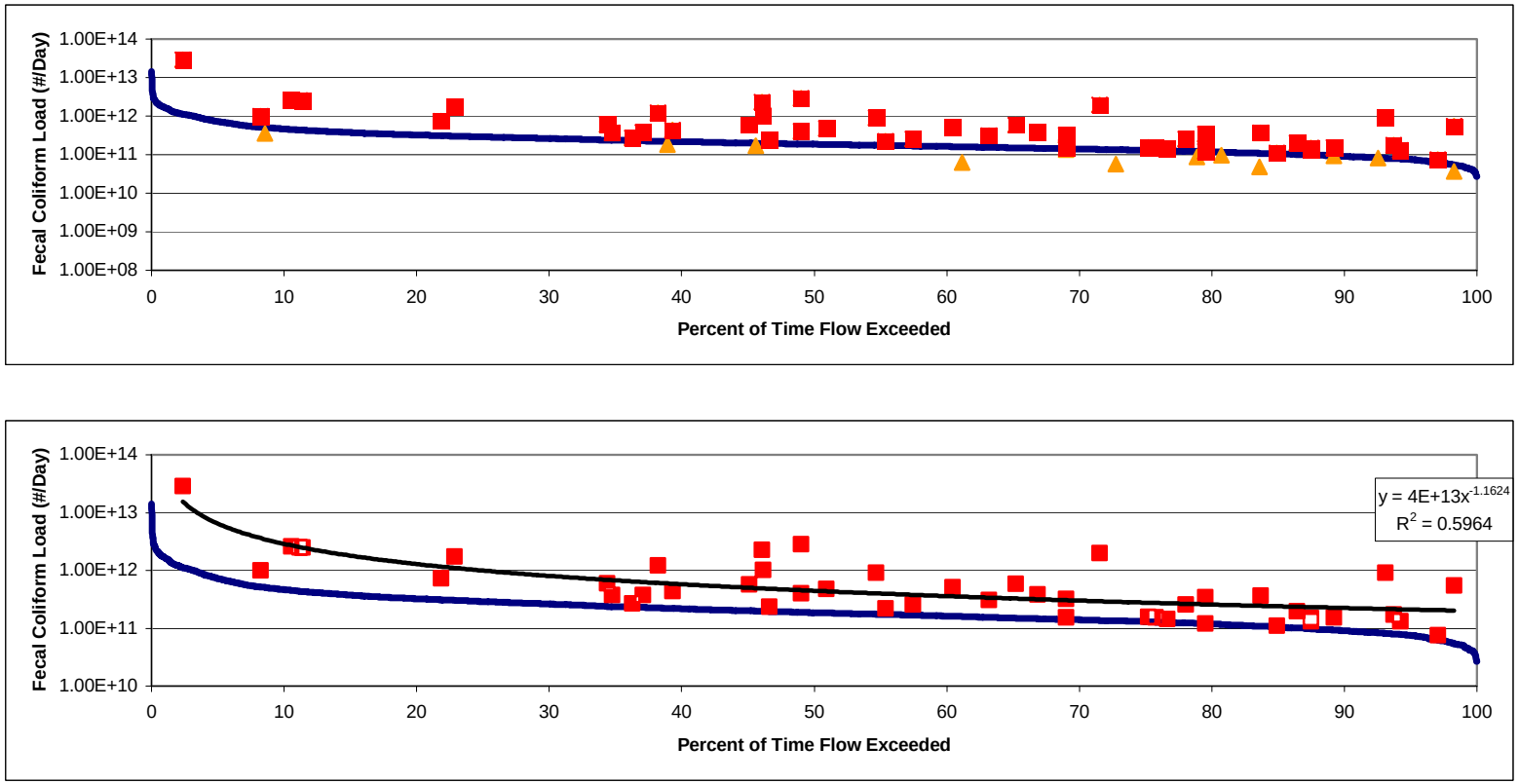


Figure B-4 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at BE-001

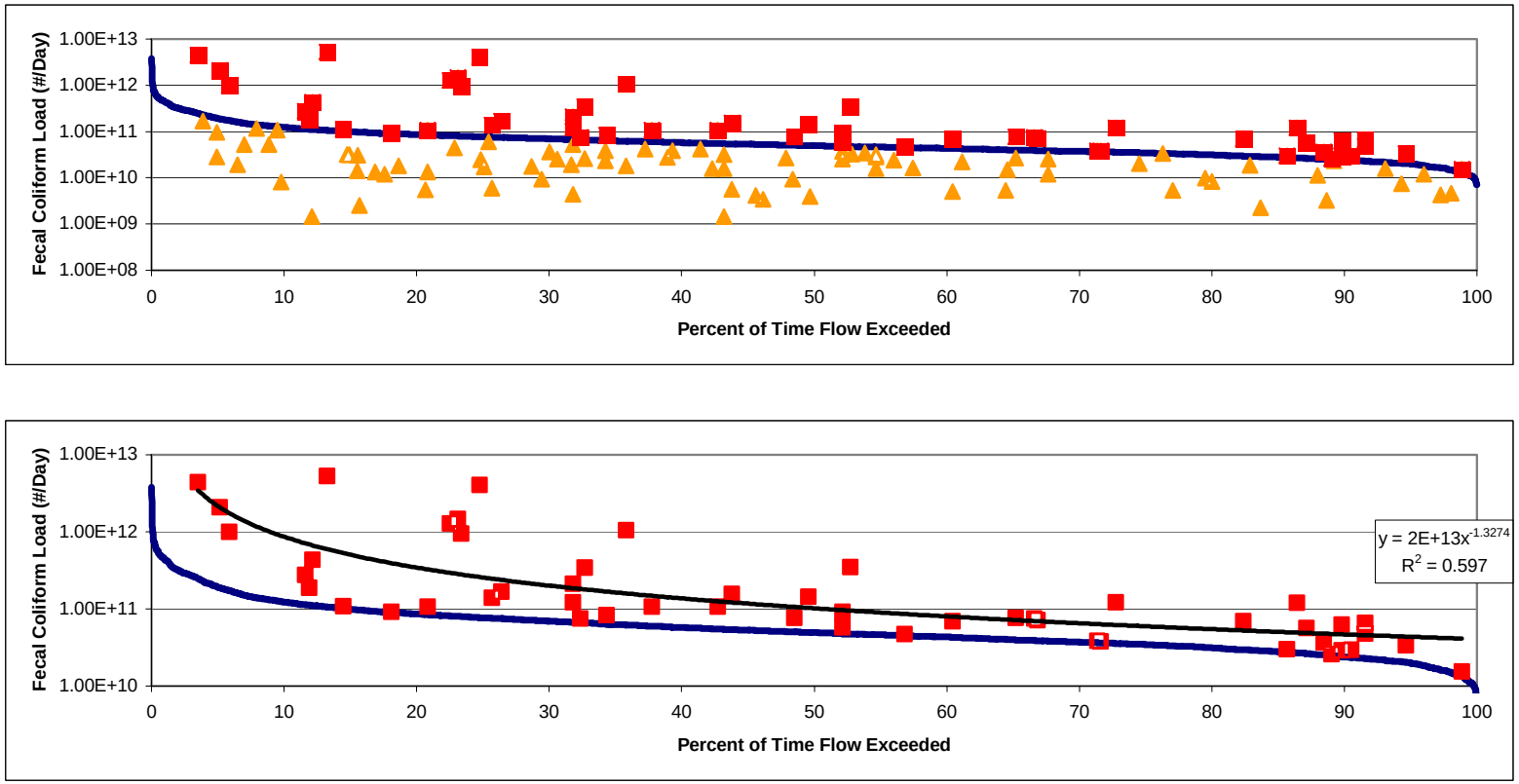


Figure B-5 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at BE-007

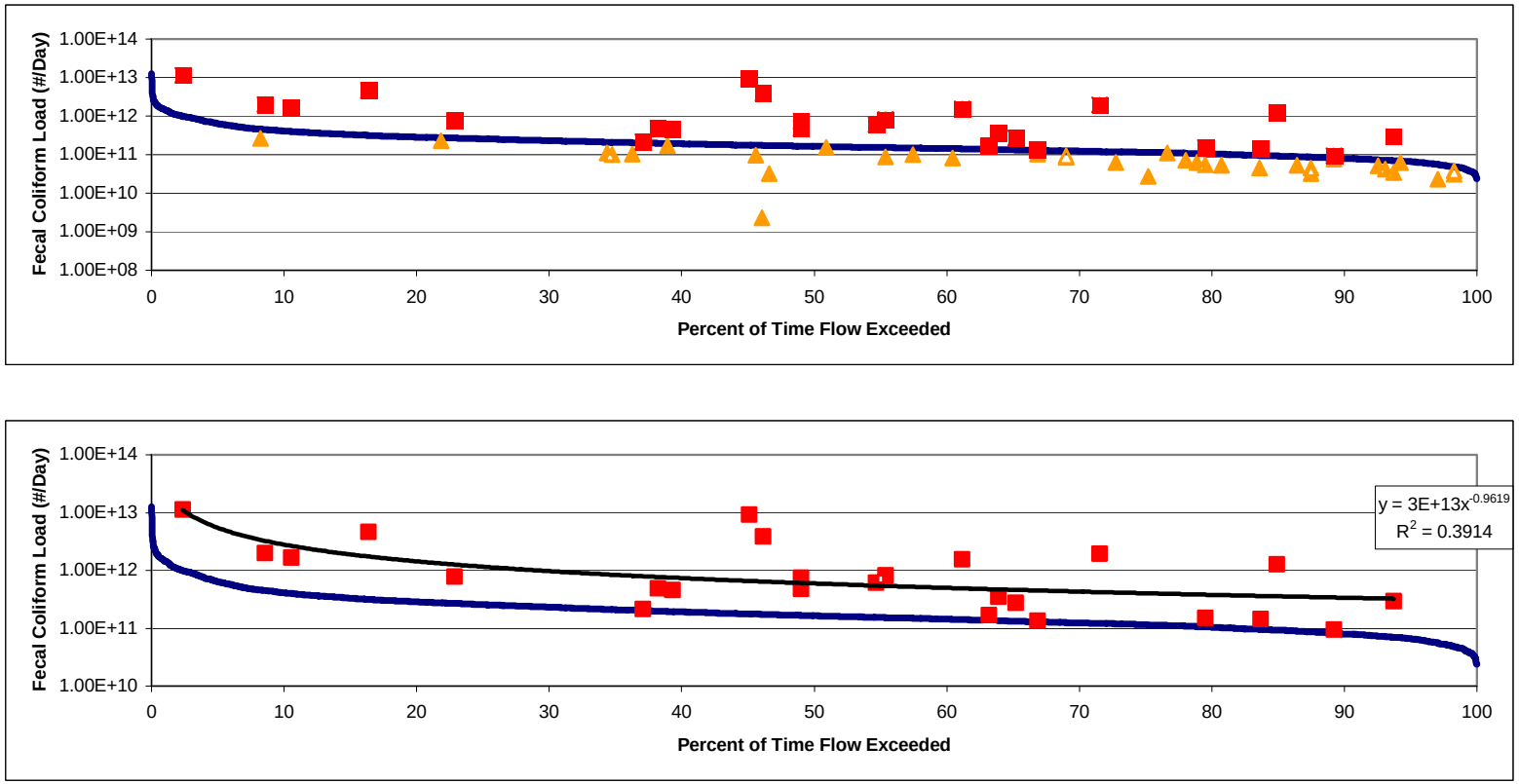


Figure B-6 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at BE-015

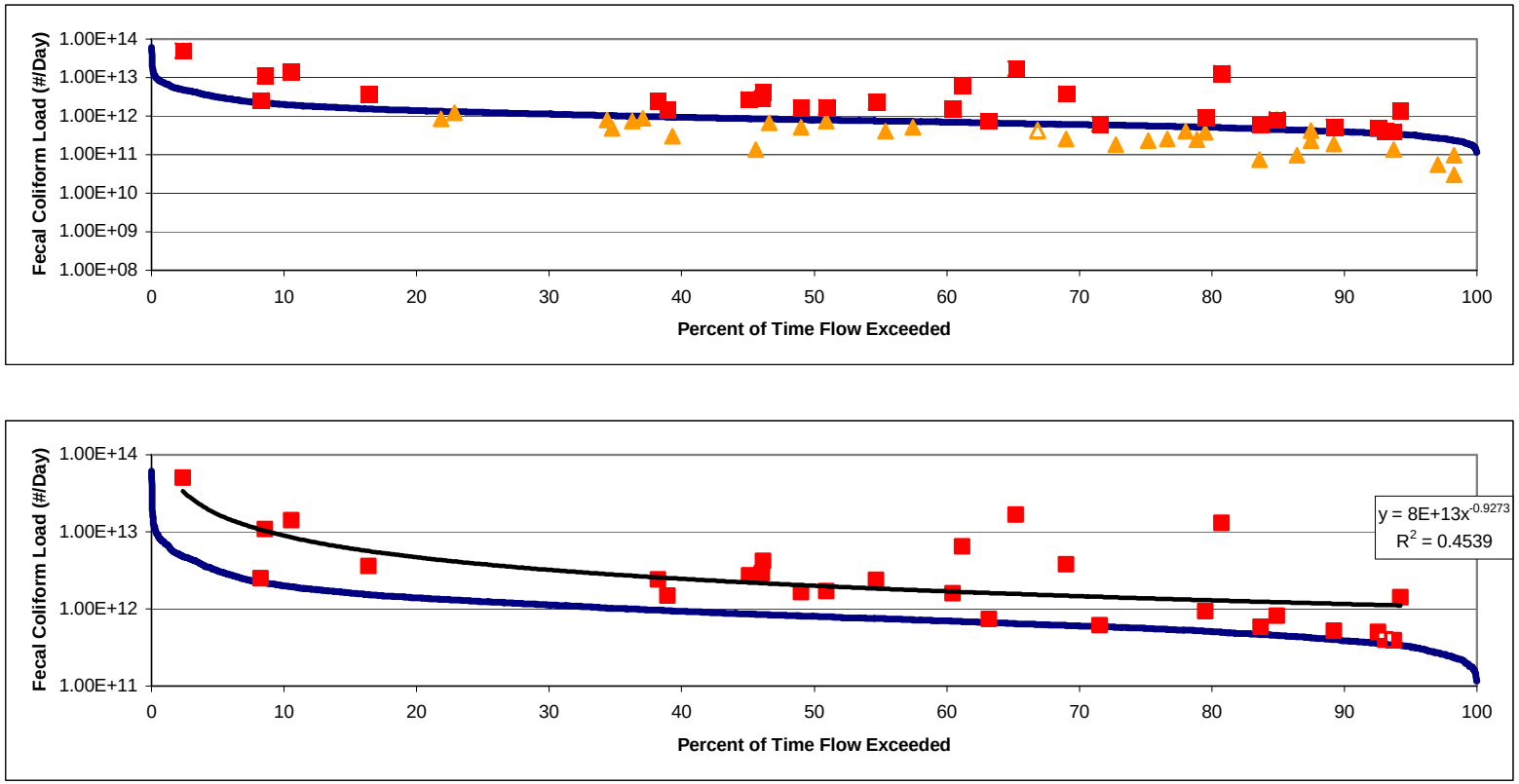


Figure B-7 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at BE-017

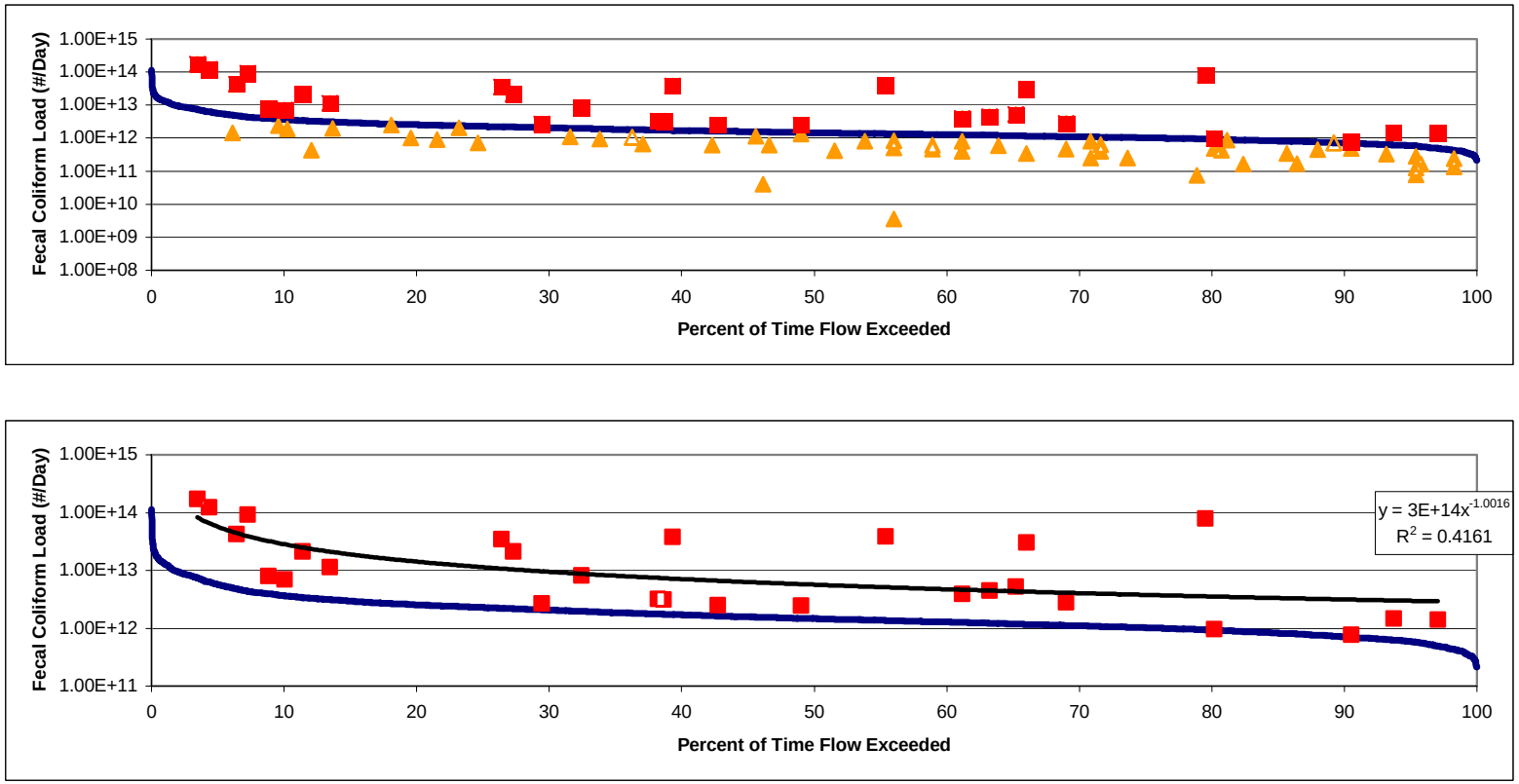


Figure B-8 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at BE-018

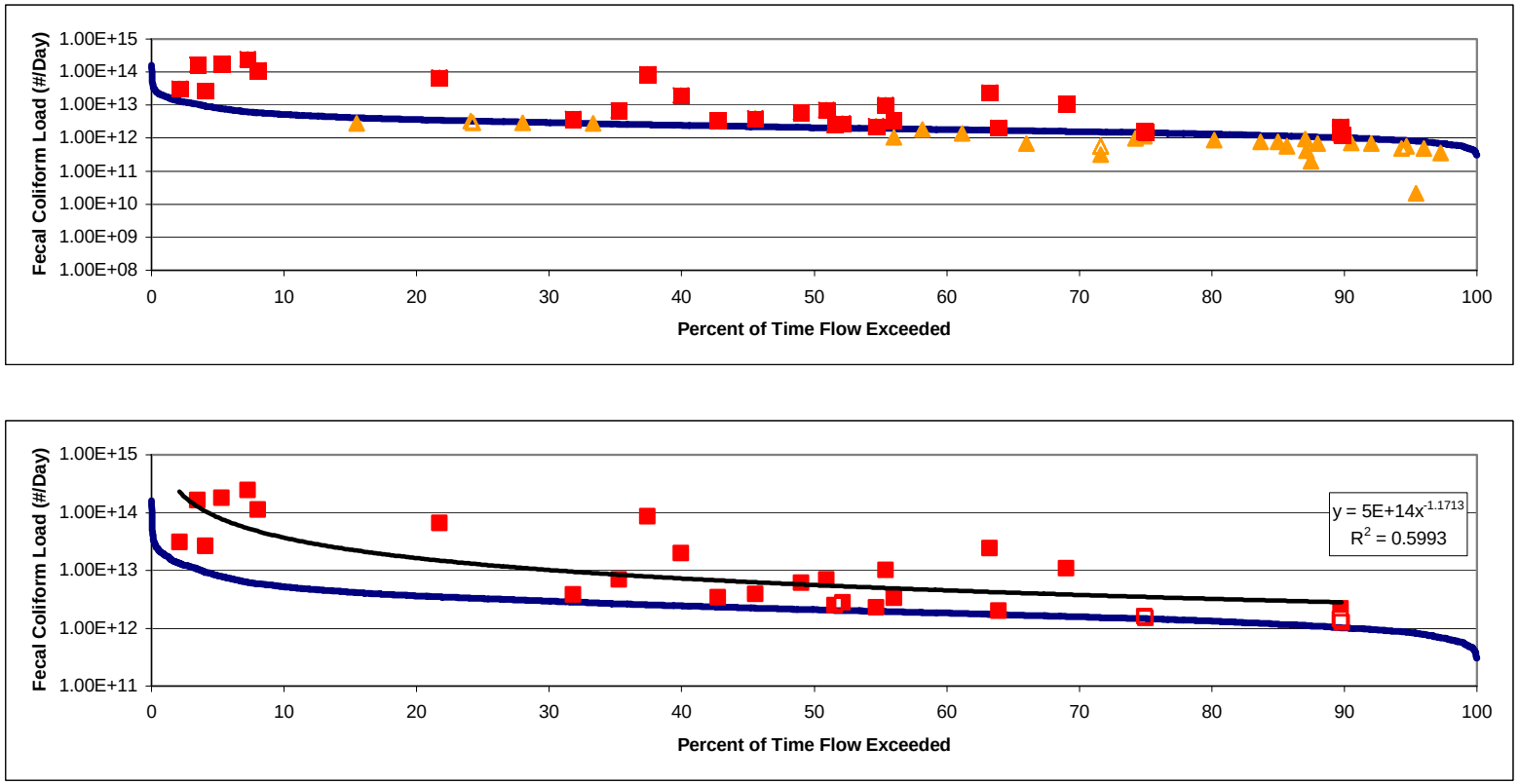


Figure B-9 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at BE-020

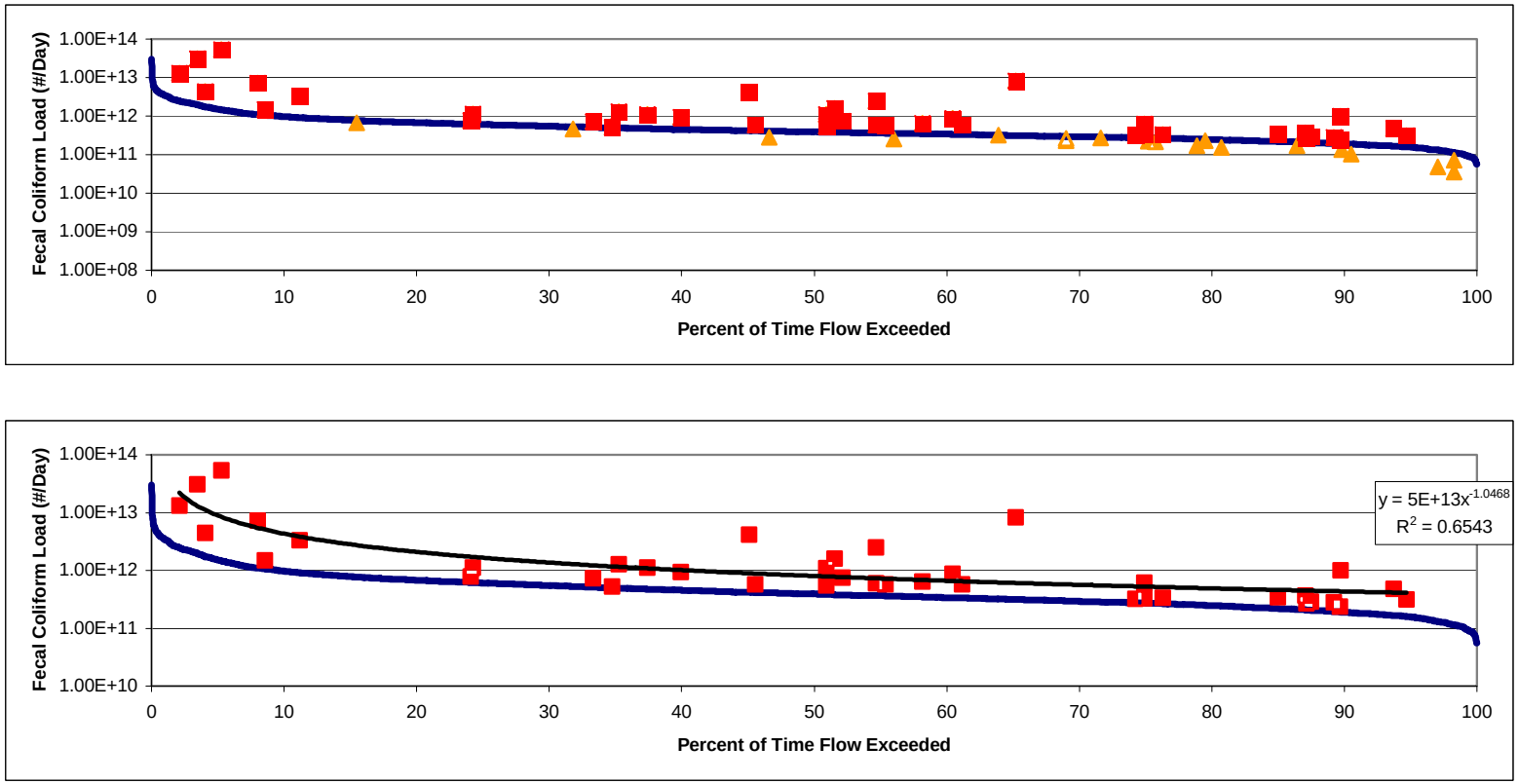


Figure B-10 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at BE-040

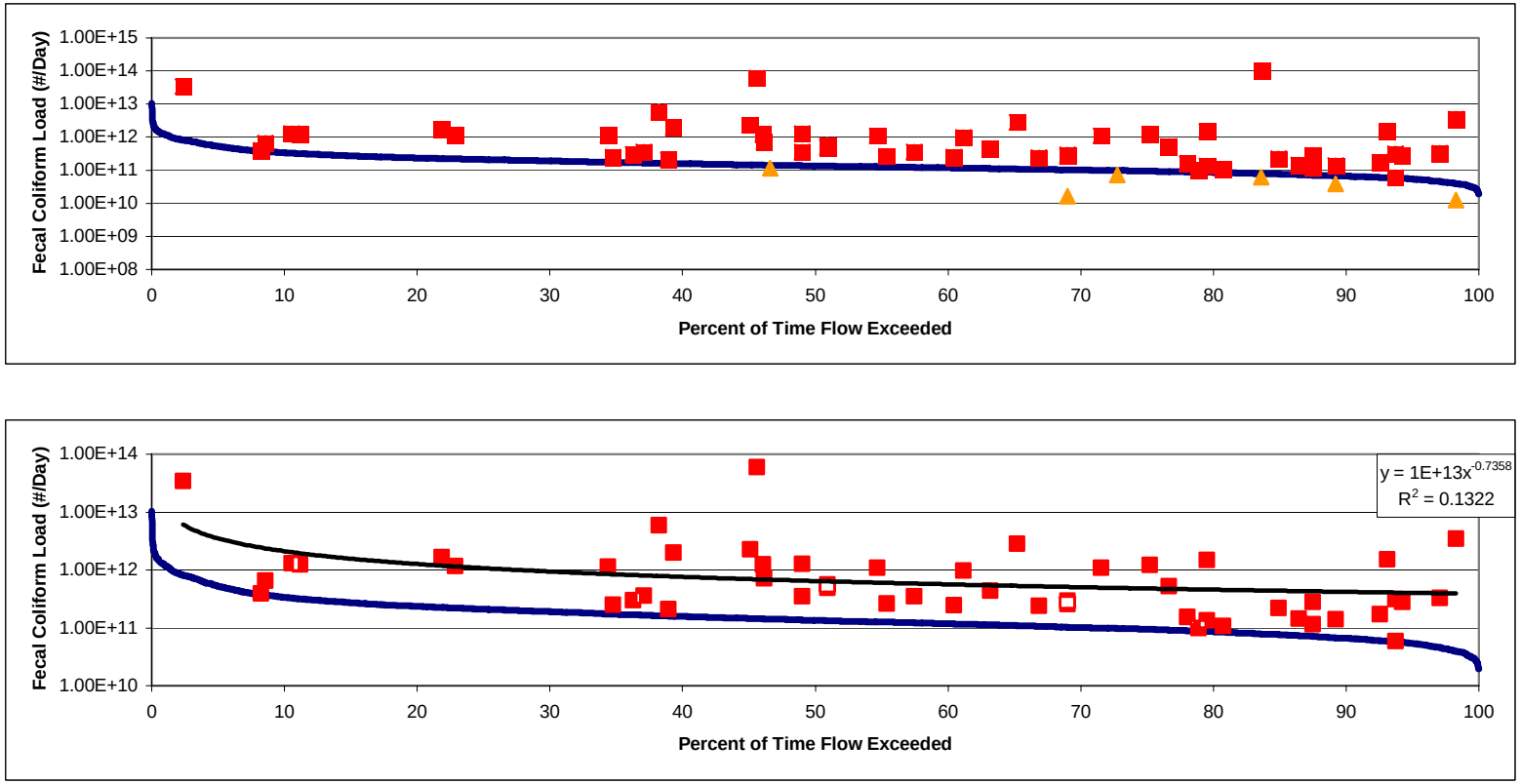
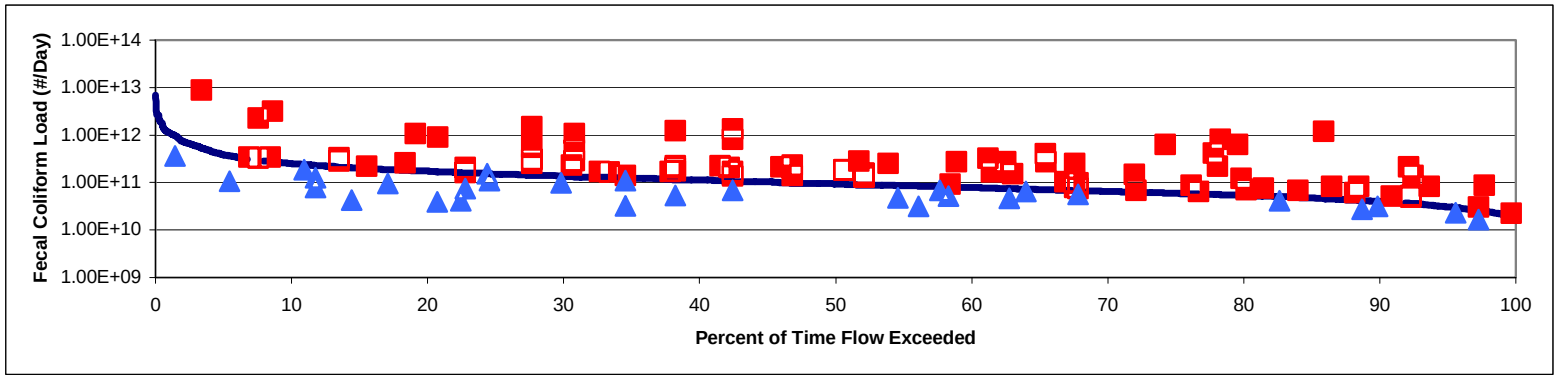


Figure B-11 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-097



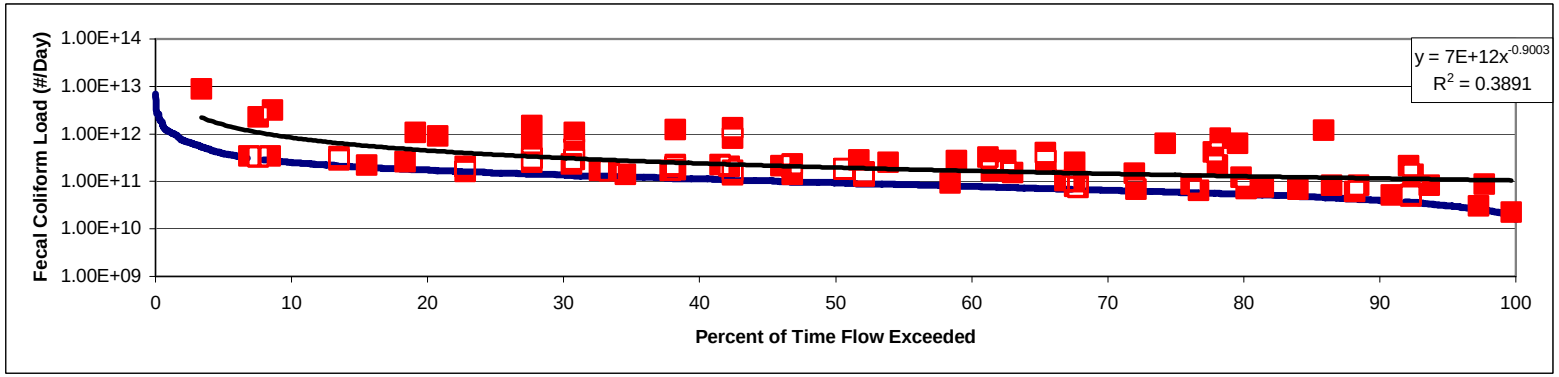


Figure B-12 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at BE-024

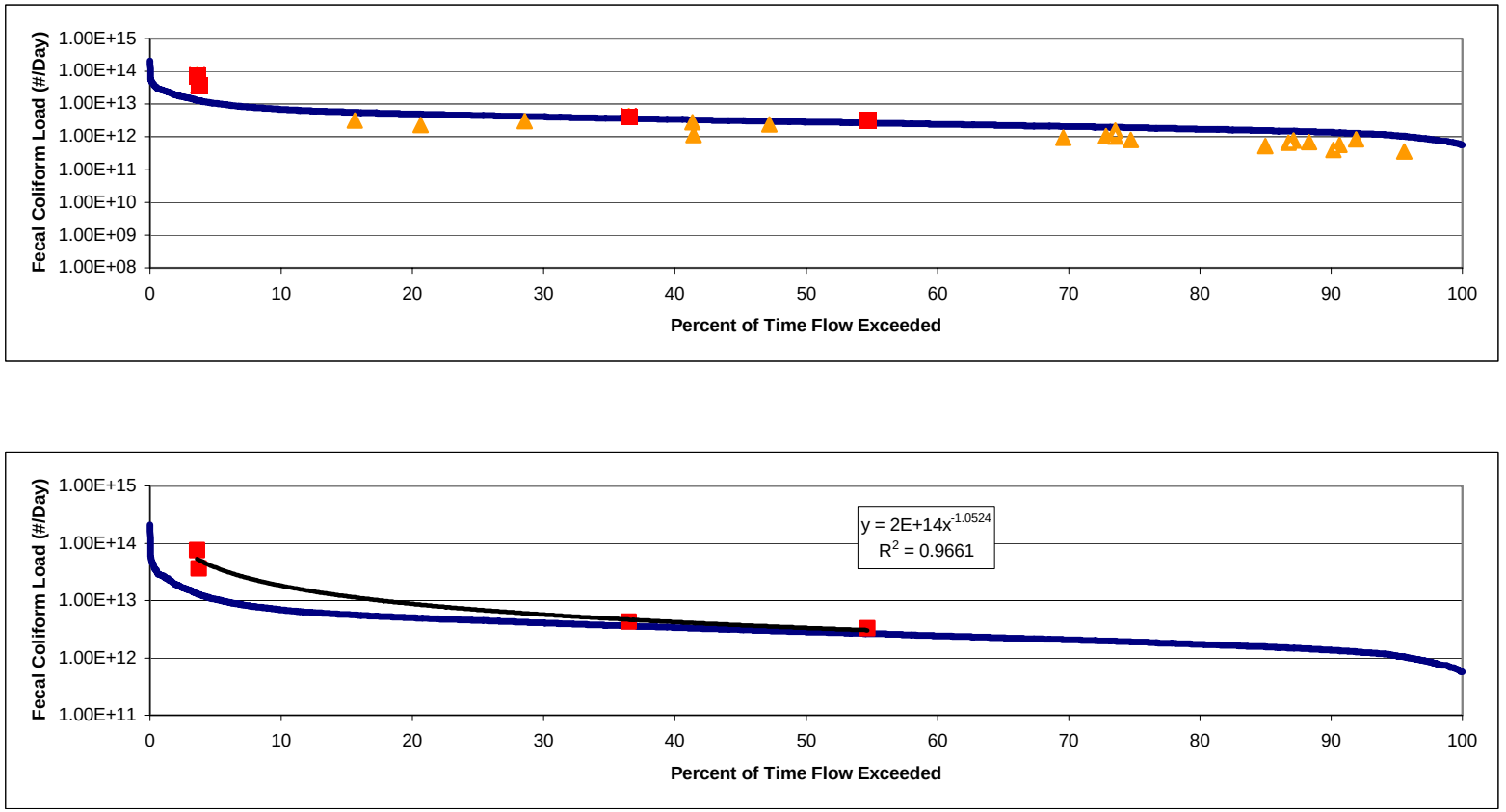
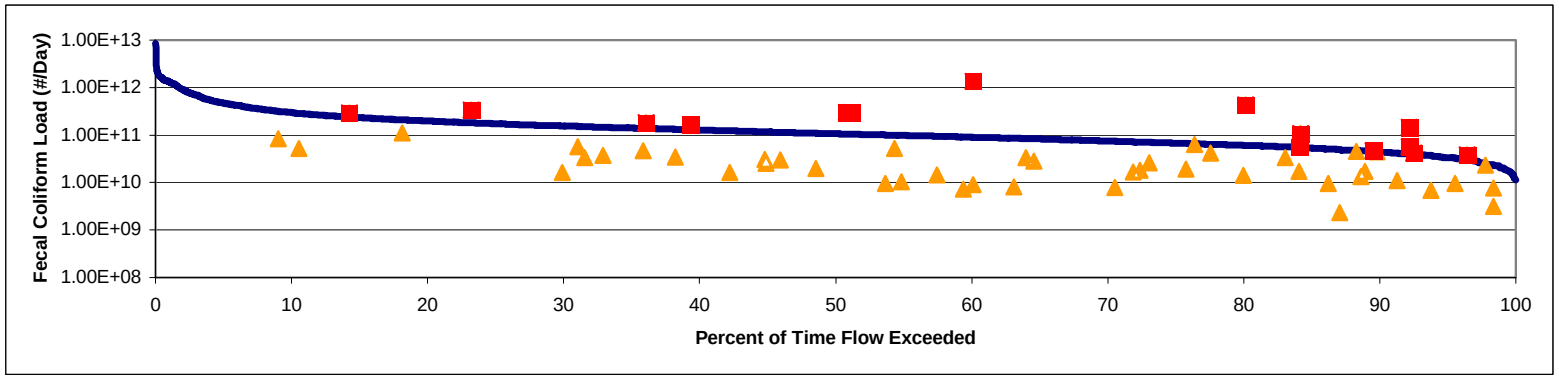


Figure B-13 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-231



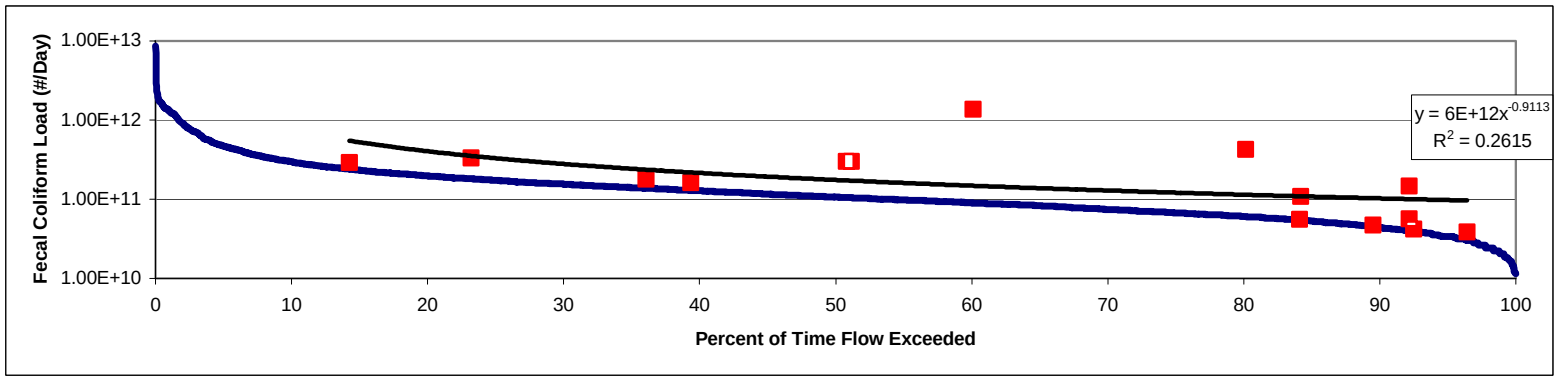


Figure B-14 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at BE-039

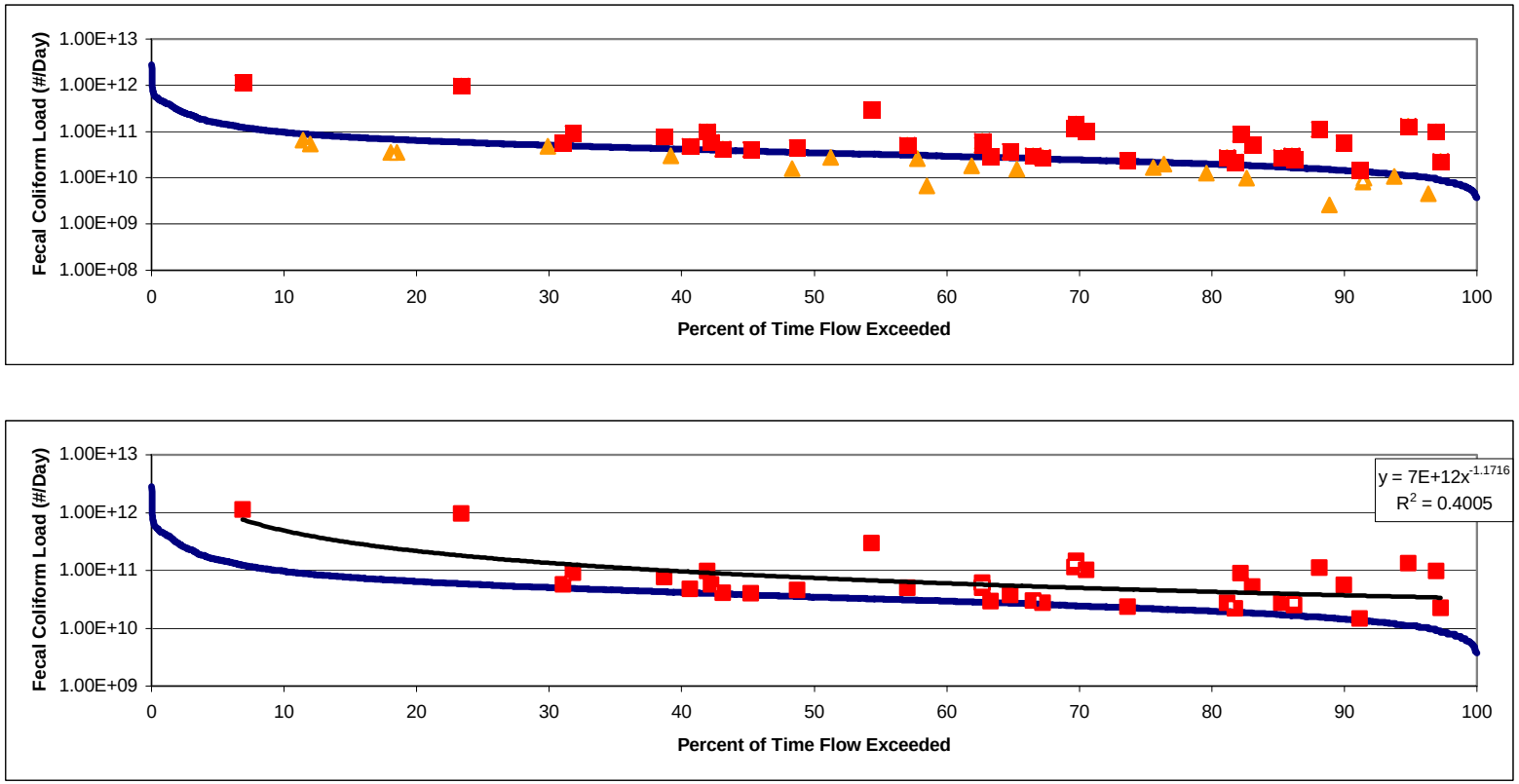


Figure B-15 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-054

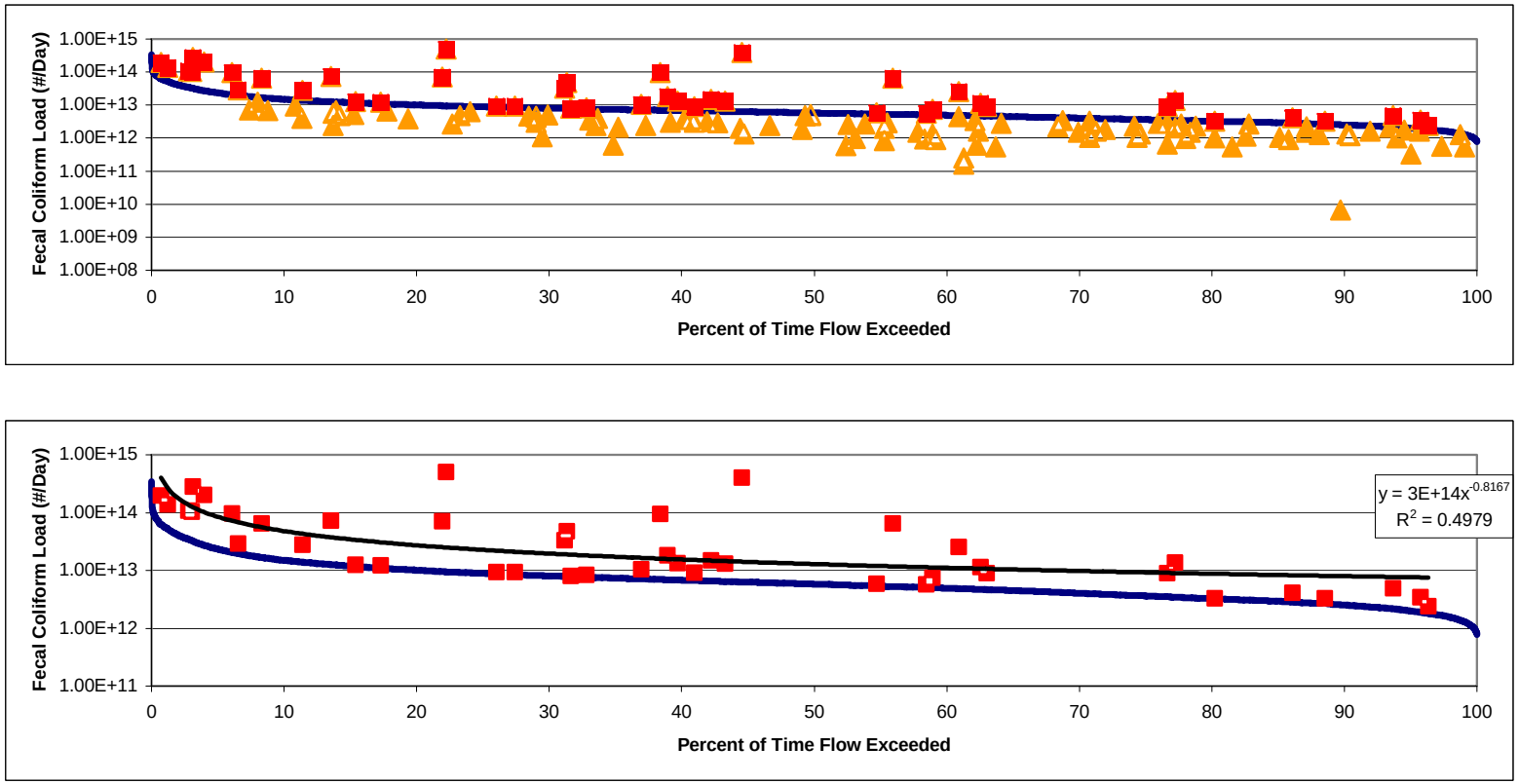
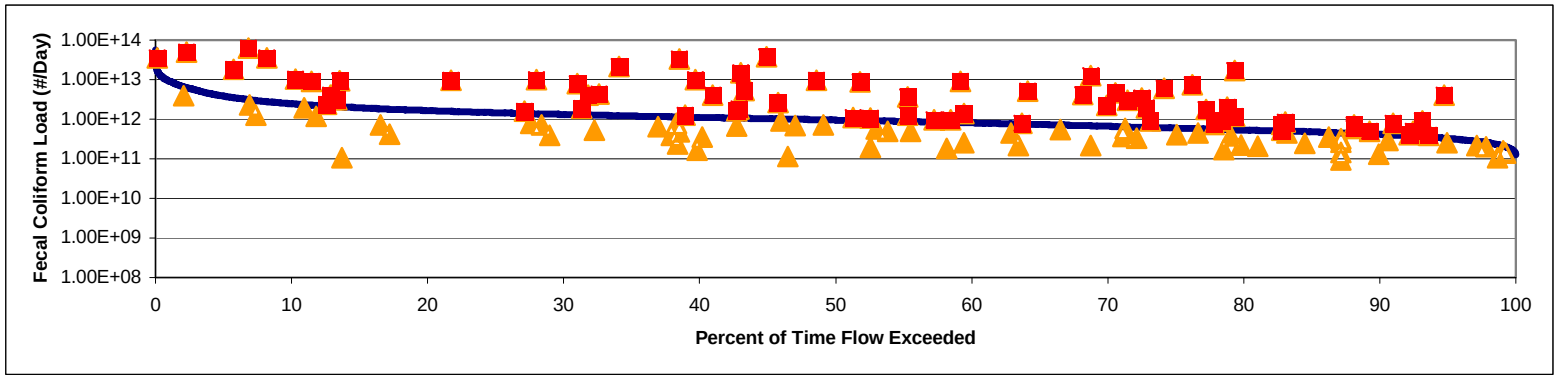


Figure B-16 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-072



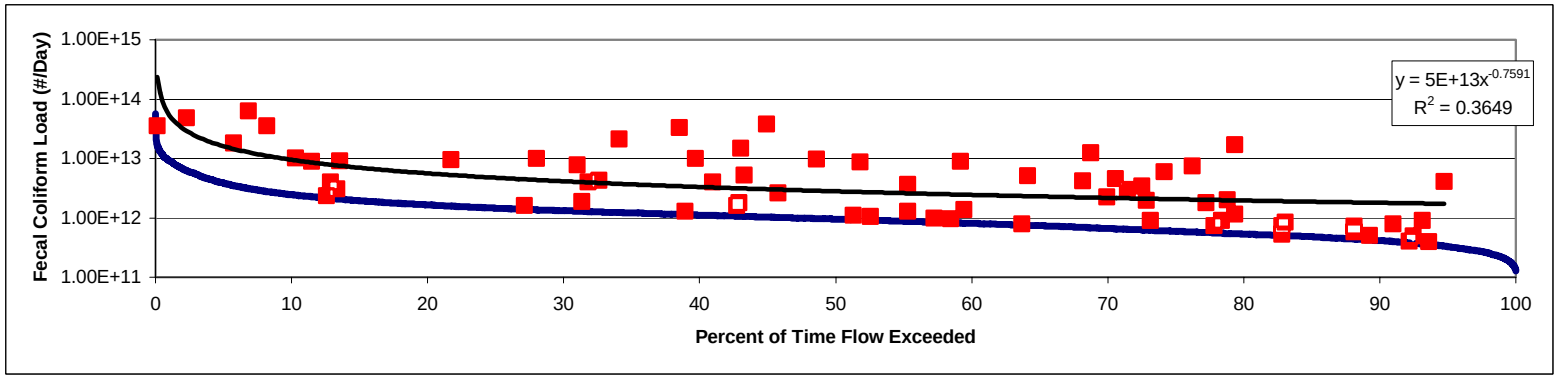


Figure B-17 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-038

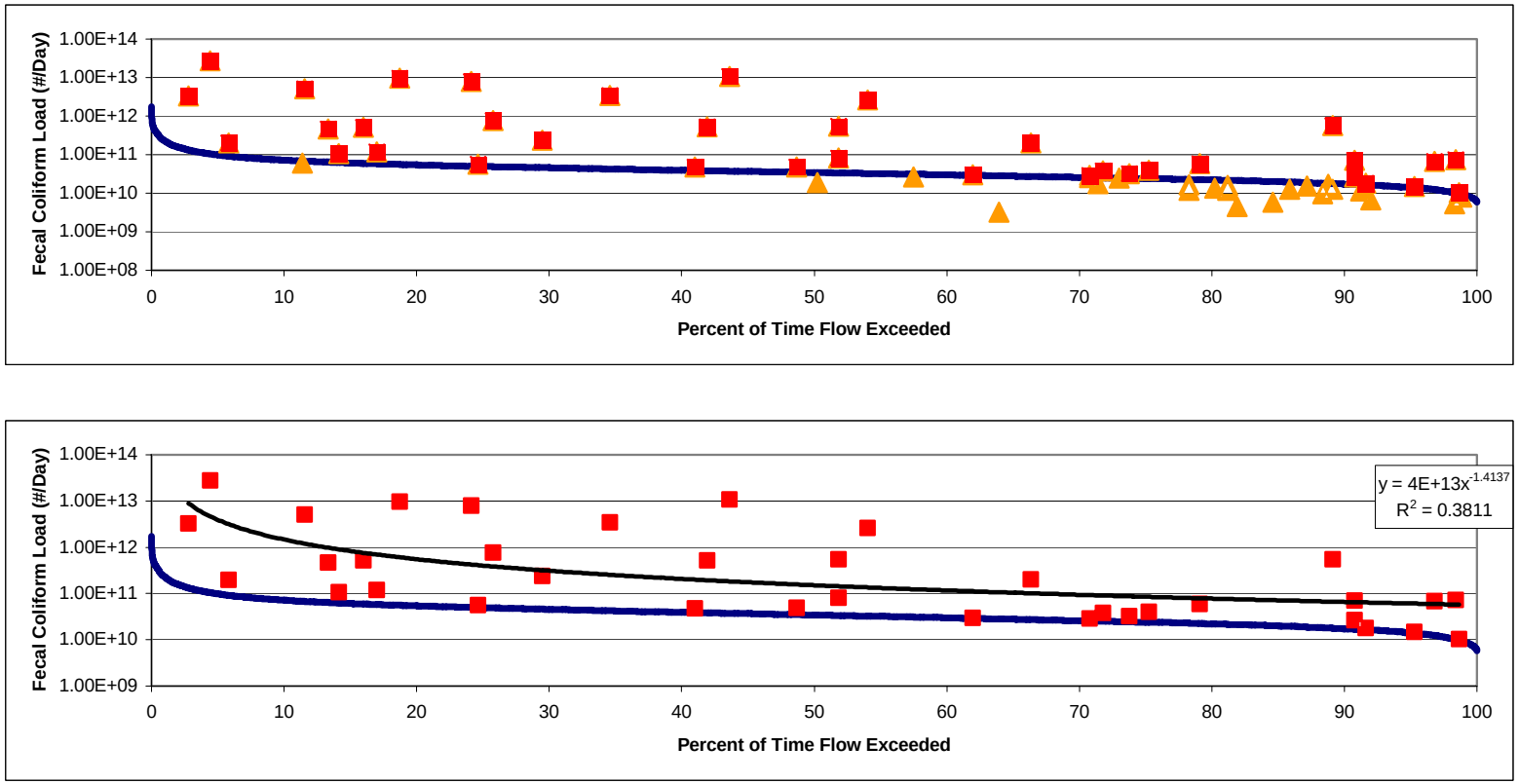


Figure B-18 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-192

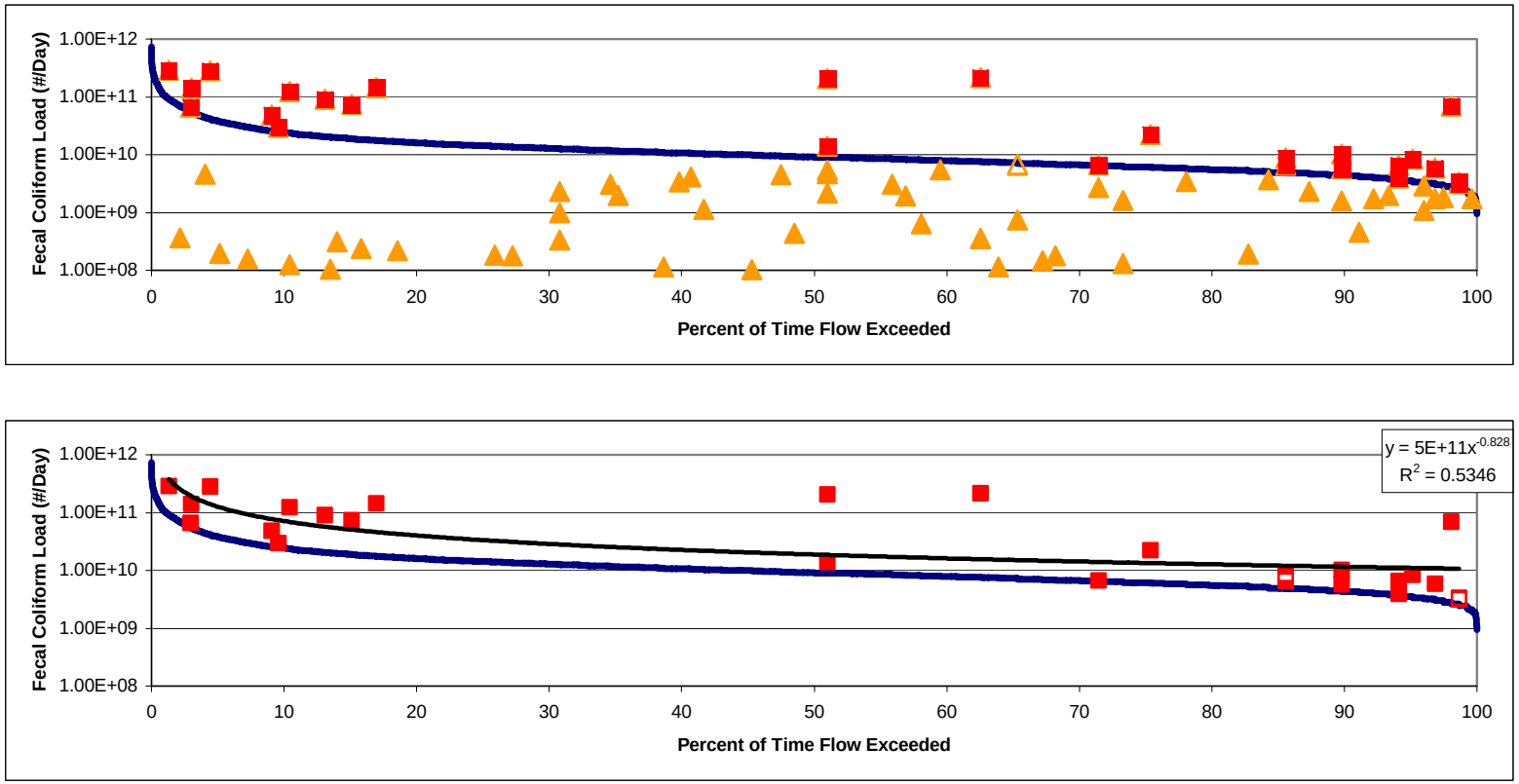


Figure B-19 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-041

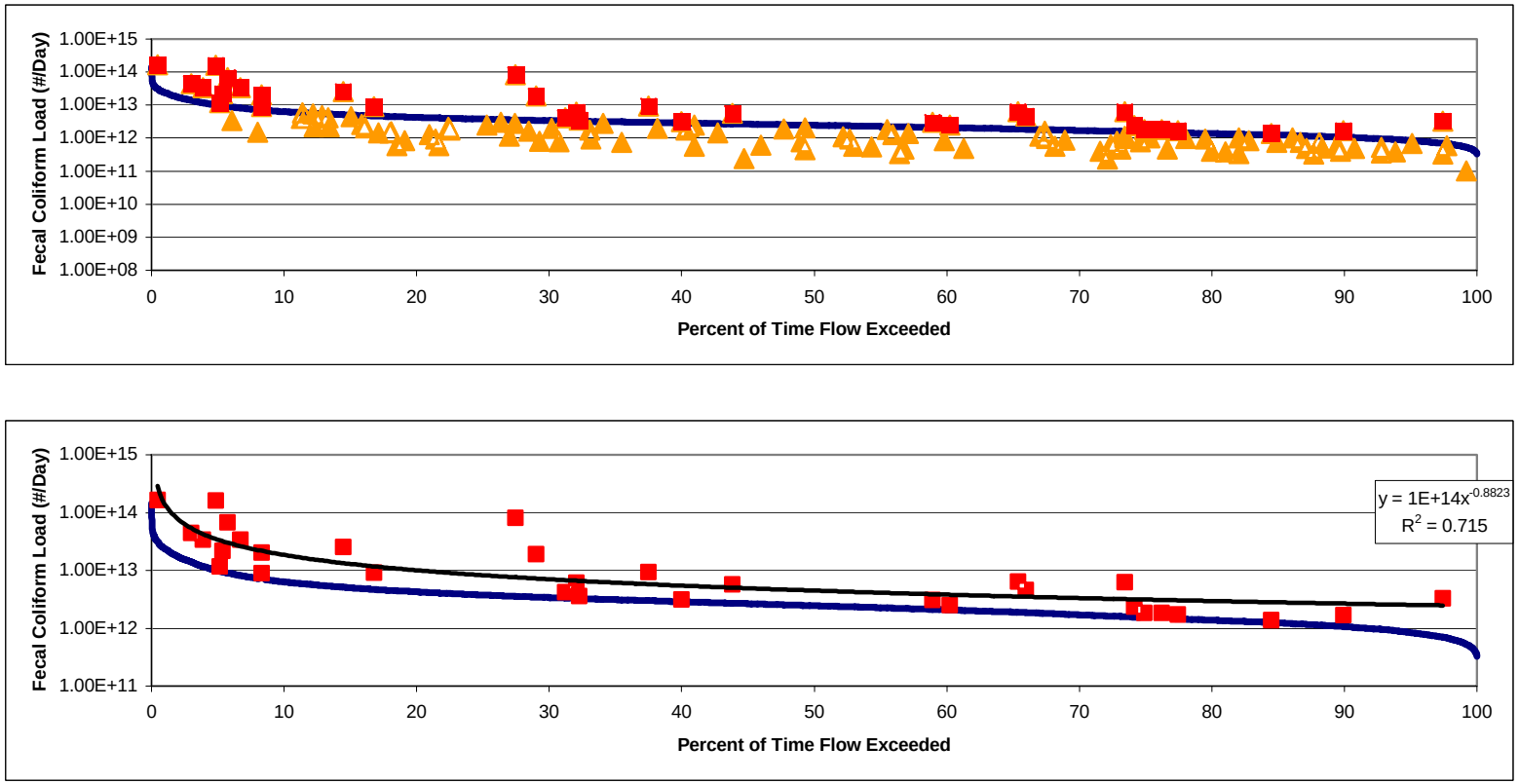


Figure B-20 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-053

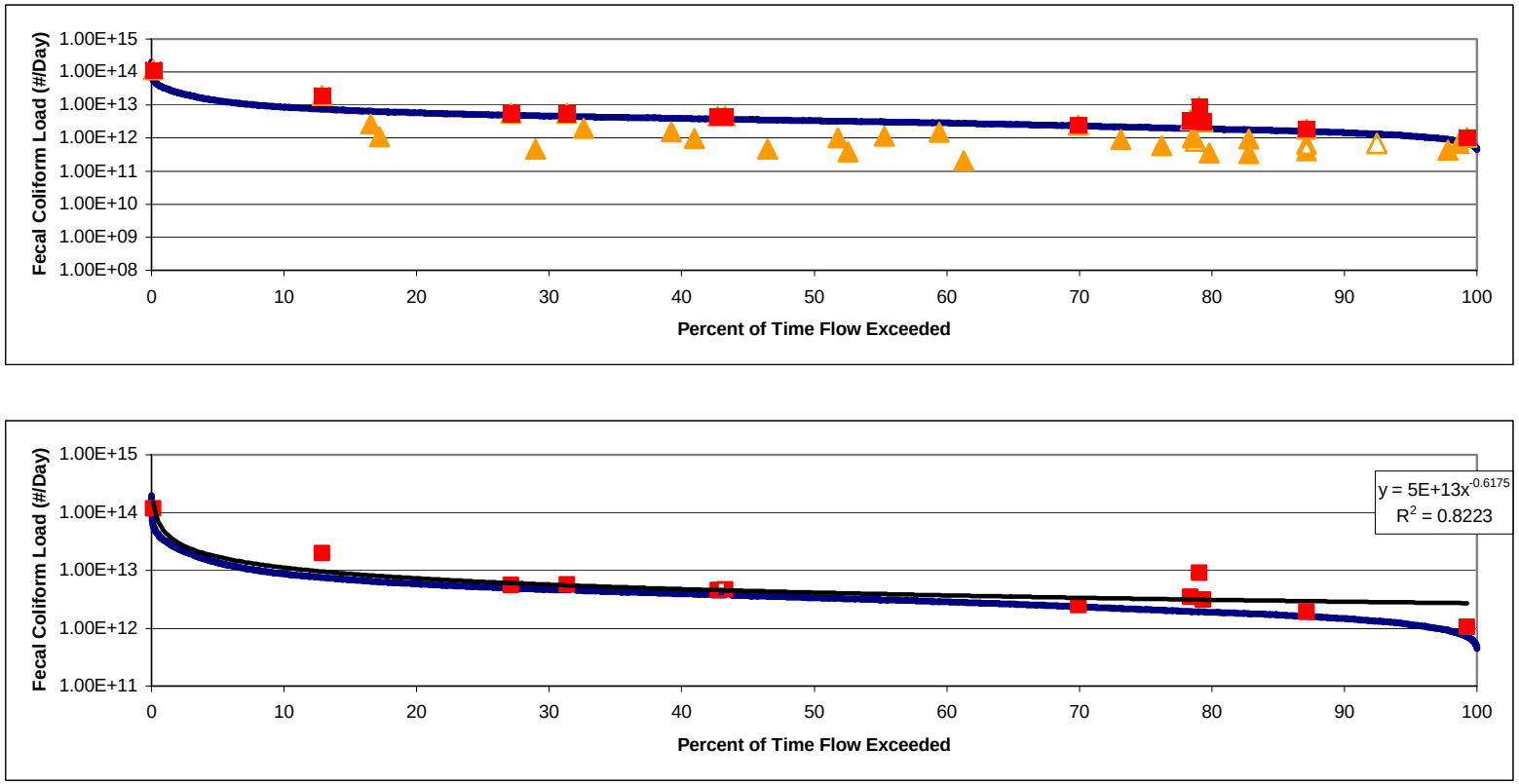
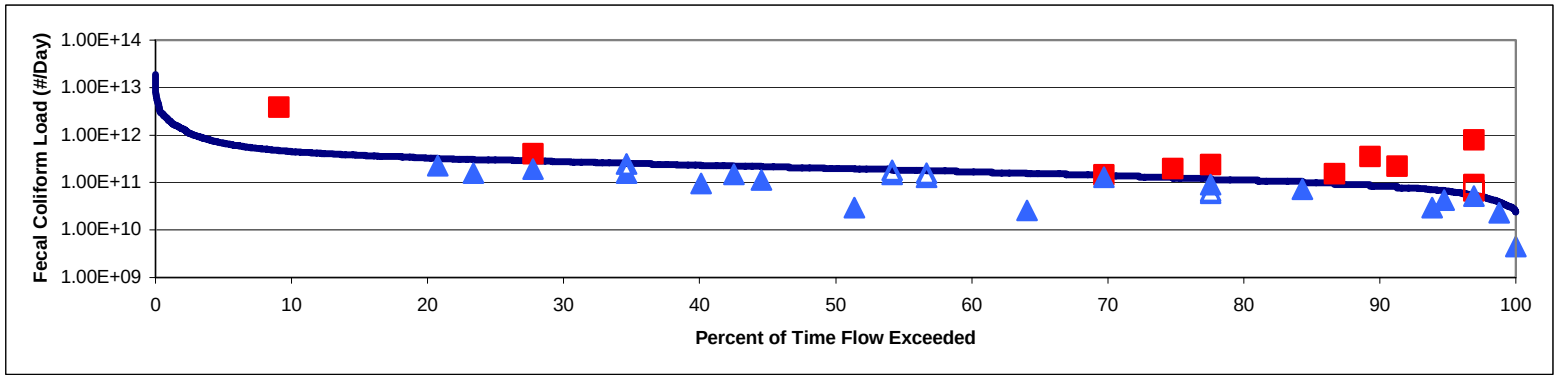


Figure B-21 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-150



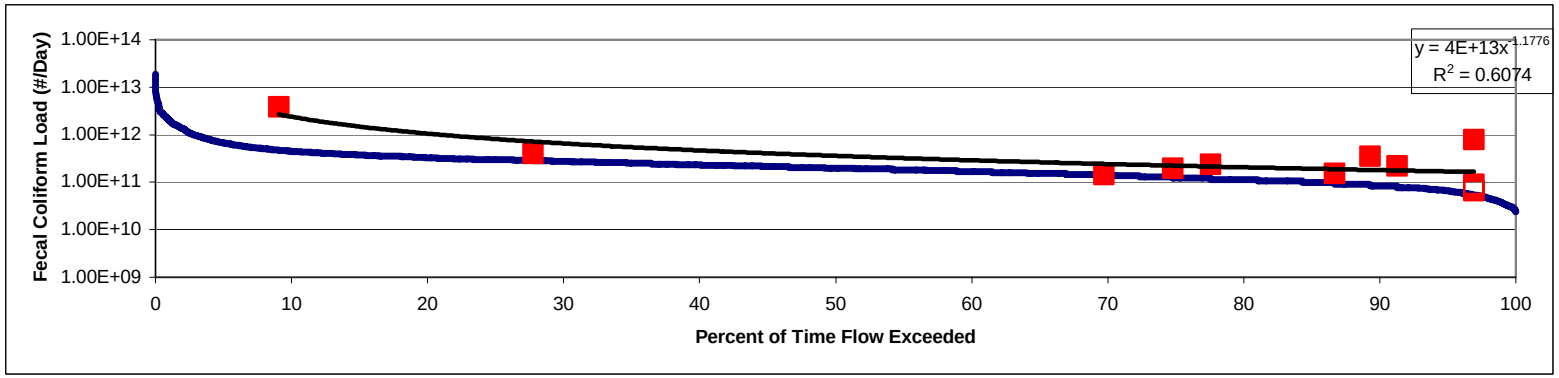
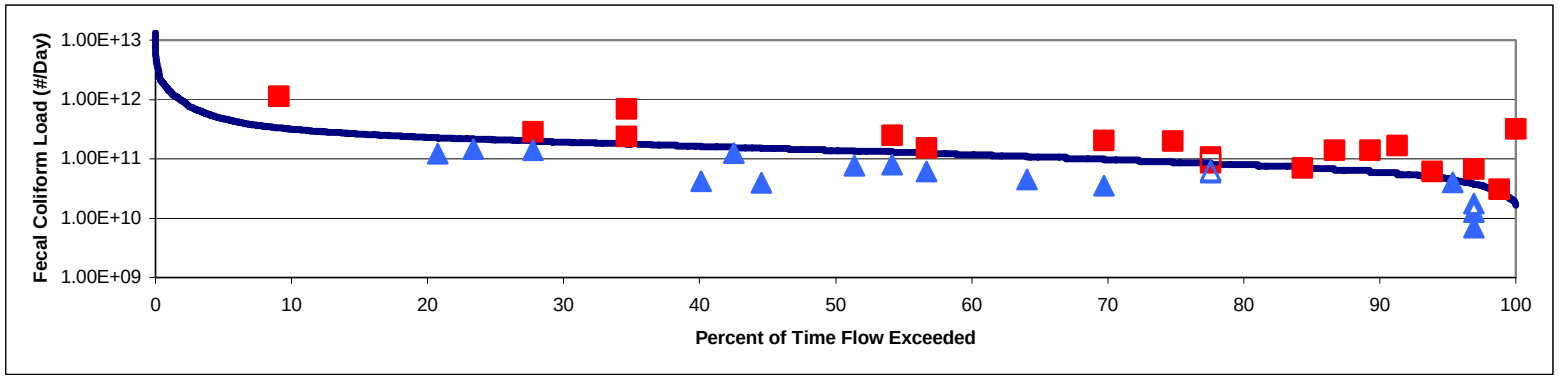


Figure B-22 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-246



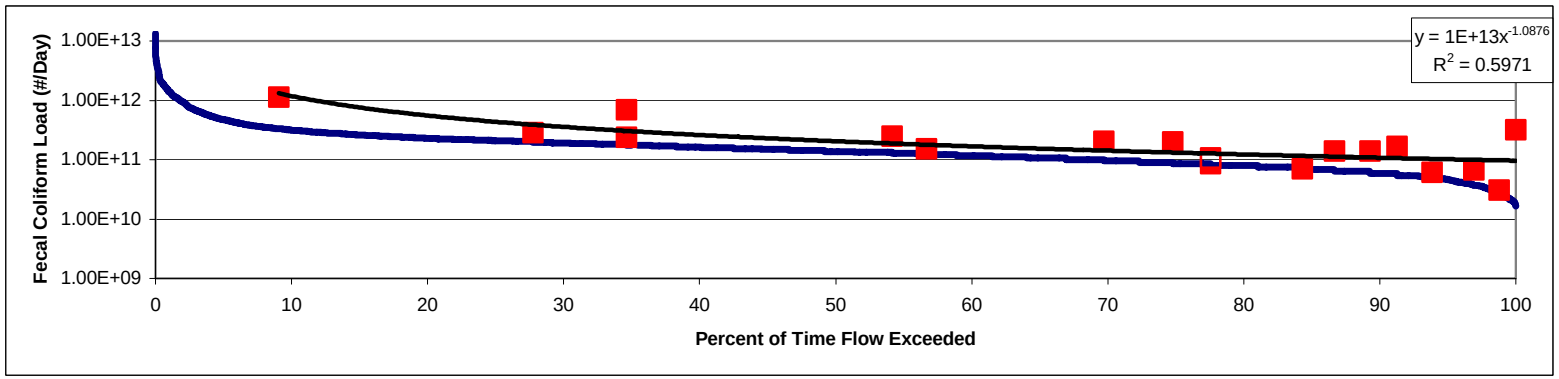


Figure B-23 Water Yield (cubic feet per second per square mile) Based on Measured Daily Streamflow from USGS station 02154500

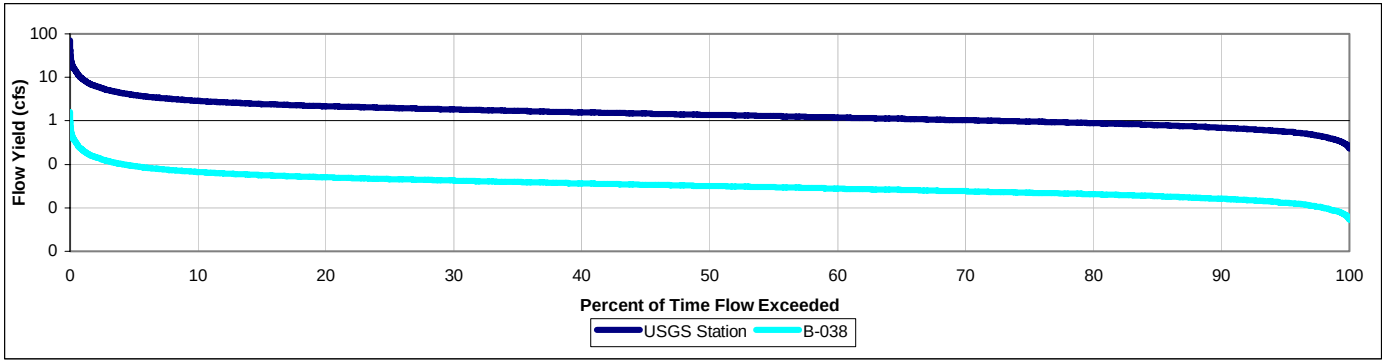
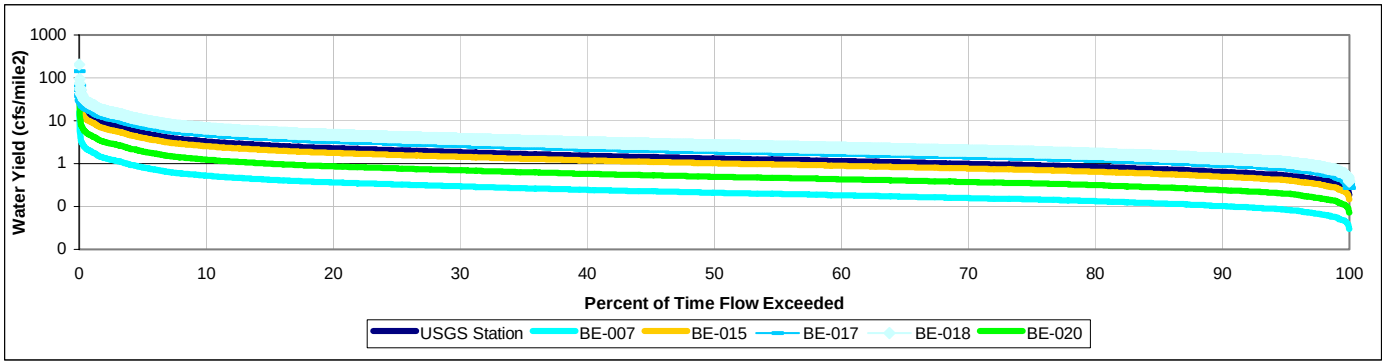


Figure B-24 Water Yield (cubic feet per second per square mile) Based on Measured Daily Streamflow from USGS station 02160326



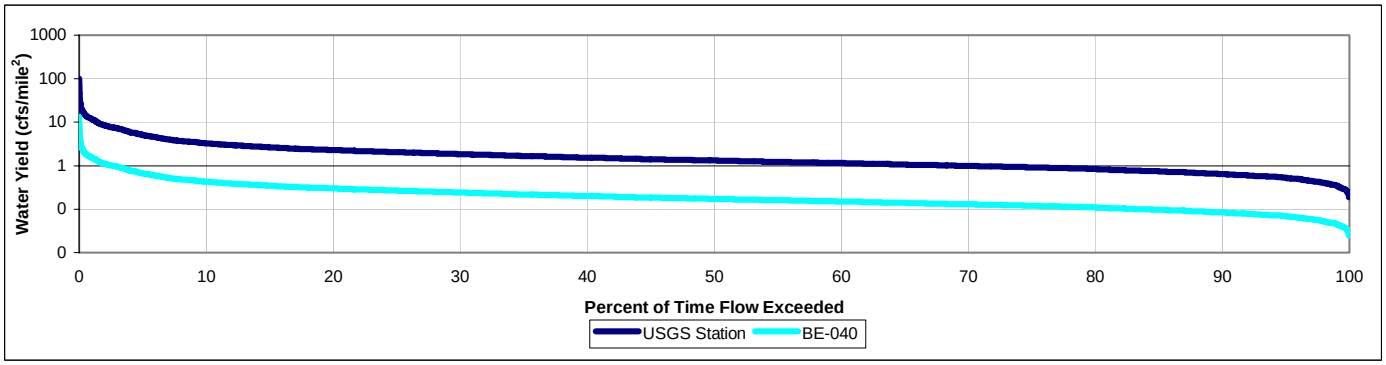


Figure B-25 Water Yield (cubic feet per second per square mile) Based on Measured Daily Streamflow from USGS station 02160200

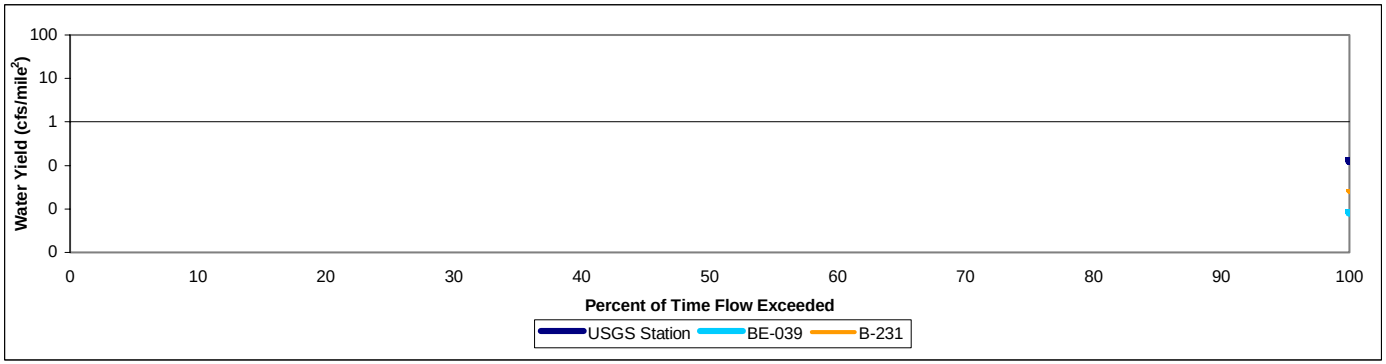


Figure B-26 Water Yield (cubic feet per second per square mile) Based on Measured Daily Streamflow from USGS station 02160381

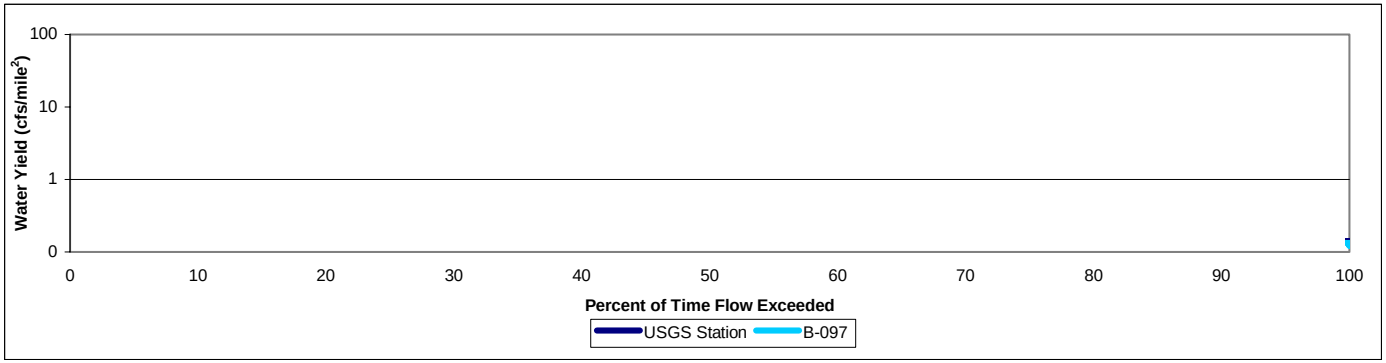


Figure B-27 Water Yield (cubic feet per second per square mile) Based on Measured Daily Streamflow from USGS station 02160390

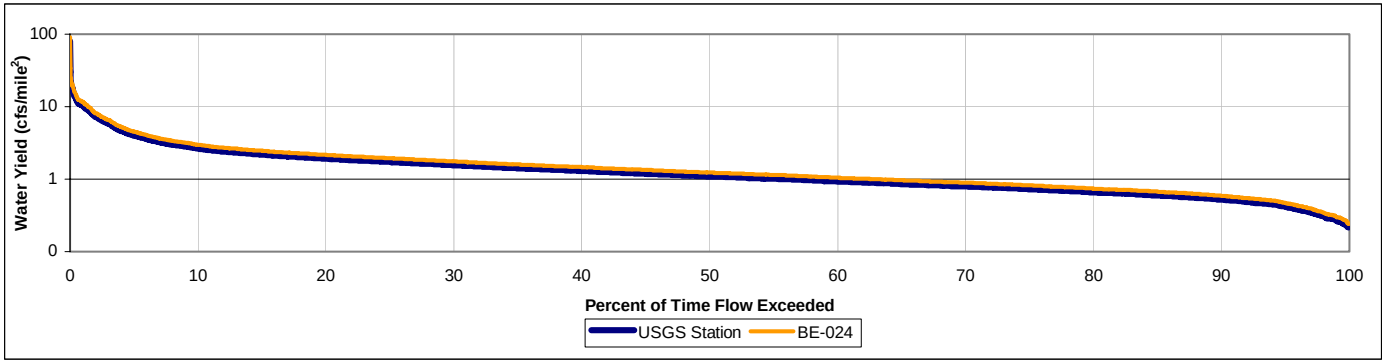


Figure B-28 Water Yield (cubic feet per second per square mile) Based on Measured Daily Streamflow from USGS station 02160700

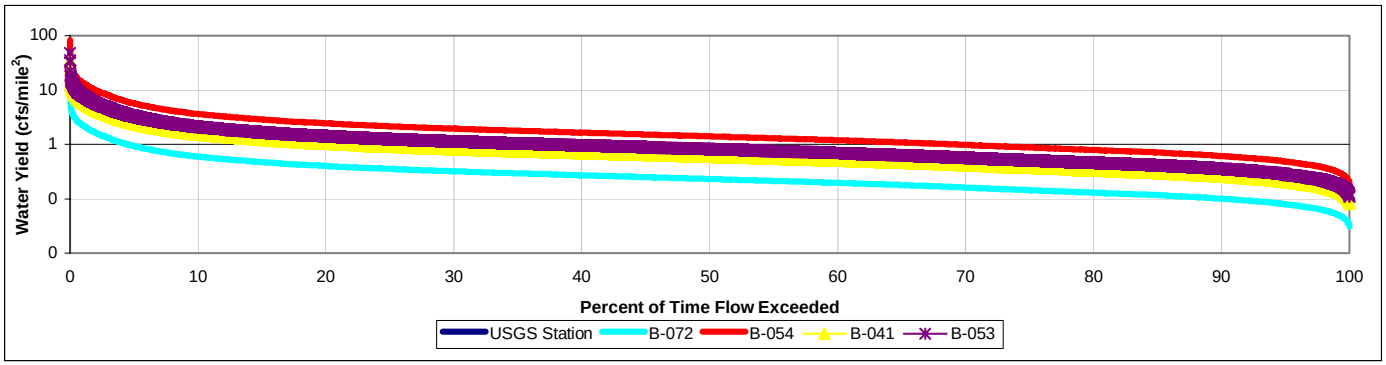


Figure B-29 Water Yield (cubic feet per second per square mile) Based on Measured Daily Streamflow from USGS station 02164000

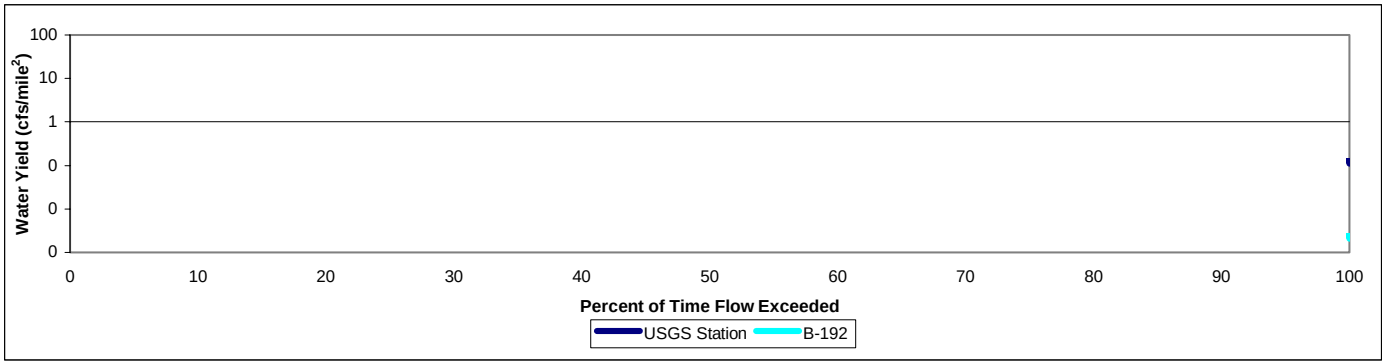
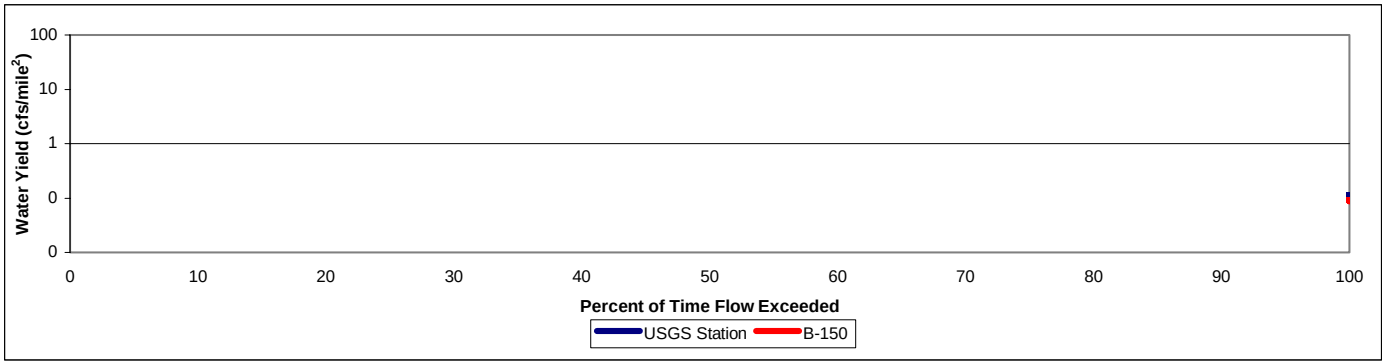
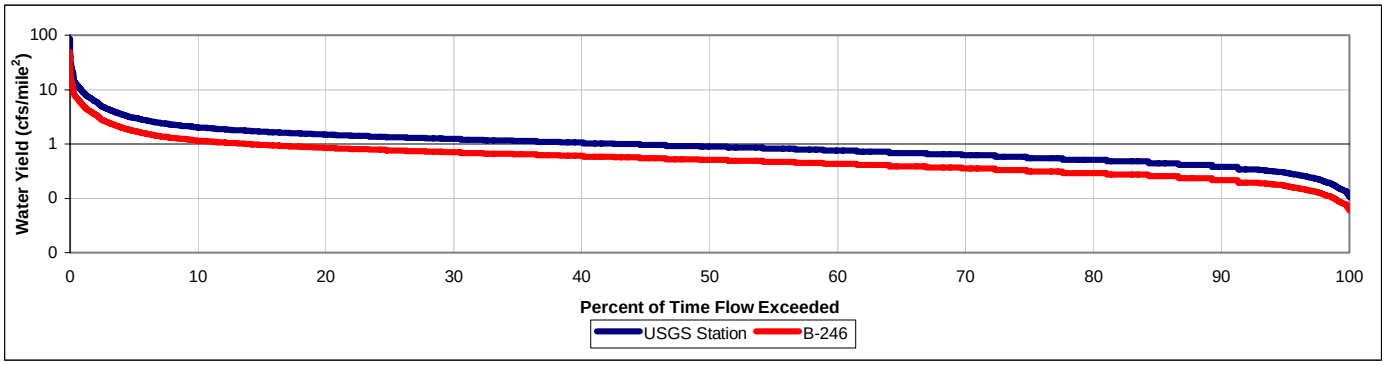


Figure B-30 Water Yield (cubic feet per second per square mile) Based on Measured Daily Streamflow from USGS station 02165200





APPENDIX C Public Notification

PUBLIC NOTICE
U.S. Environmental Protection Agency, Region 4
Water Management Division
61 Forsyth Street, S.W.
Atlanta, GA 30303-8960
NOTICE OF AVAILABILITY
TOTAL MAXIMUM DAILY LOADS (TMDLS)
FOR WATER AND POLLUTANTS IN THE STATE OF SOUTH CAROLINA
Section 303(d)(1)(C) of the Clean Water Act (CWA), 33 U.S.C. '1313(d)(1)(C), and the U.S. Environmental Protection Agency's implementing regulation, 40 CFR '130.7(c)(1), require
the establishment of Total Maximum Daily Loads (TMDLs) for waters identified by states as not
meeting water quality standards under authority of '303(d)(1)(A) of the CWA. These TMDLs are
to be established levels necessary to implement applicable water quality standards with seasonal
variations and a margin of safety, accounting for lack of knowledge concerning the relationship
between pollutant loading and water quality.
The waterbody impairments on South Carolina=s 303(d) list that will be addressed by the TMDLs are listed below. These impaired waterbodies are located in the Enoree Basin near
Greenville, South Carolina.

LIST ID Impairment Description Waterbody Name
SC-B-231 Fecal Coliform Beards Fork CK at US 276 (I-385) 3.7 MI NNE of Clinton
SC-BE-039 Fecal Coliform Beaverdam Ck at RD 1967
SC-B-246 Fecal Coliform Beaverdam Ck at S-30-97, 7 MI NE of Gray Court
SC-B-072 Fecal Coliform Duncan Ck at US 176 1.5 MI SE of Whitmire
SC-B-035 Fecal Coliform Durbin Ck on S-23-160 3 MI E of Simpsonville
SC-B-097 Fecal Coliform Durbin Ck at SC 418
SC-BE-015 Fecal Coliform Enoree Rvr at CO RD 164
SC-BE-018 Fecal Coliform Enoree Rvr at S-30-75
SC-B-041 Fecal Coliform Enoree Rvr at SC 49 SE of Woodruff
SC-B-024 Fecal Coliform Enoree Rvr at US 121
SC-B-054 Fecal Coliform Enoree Rvr at S-36-45 3.5 MI AB JCT with Broad Rvr
SC-B-037 Fecal Coliform Enoree Rvr at S-42-118 SW of Woodruff
SC-BE-017 Fecal Coliform Enoree Rvr at SC 296, 7.5 MI NE of Mauldin
SC-B-053 Fecal Coliform Enoree Rvr at SC 72, 121, & US 176, 1 MI NE Whitmire
SC-BE-001 Fecal Coliform Enoree Rvr at UNNUM Rd W US 25 N Travelers Rest
SC-B-241 Fecal Coliform Gilder Ck at S-23-142 2.75 MI ENE of Mauldin
SC-BE-020 Fecal Coliform Gilder Ck at S-23-143 ¼ MI AB JCT with Enoree Rvr
SC-BE-040 Fecal Coliform Gilder Ck at SC 14-AB Gilders Ck Pt
SC-B-038 Fecal Coliform Lick Ck at S-42-1181 ¼ MI SW Woodruff
SC-B-186 Fecal Coliform Mountain Ck at S-23-335
SC-B-192 Fecal Coliform Princess Ck at Suber Mill Rd, Off S-23-540
SC-BE-007 Fecal Coliform Rocky Ck at Brdg in Batesville 1 MI AB JCT with Enoree
SC-B-150 Fecal Coliform Warrior Ck at US 221, 8 MI NNE of Laurens

Persons wishing to comment on the proposed TMDLs or to offer new data or information regarding the proposed TMDLs are invited to submit the same in writing no later than August
16, 2004 to the U.S. Environmental Protection Agency, Region 4, Water Management Division,
61 Forsyth Street, S.W., Atlanta, Georgia, 30303-8960, ATTENTION: Ms. Sibyl Cole, Standards, Monitoring and TMDL Branch.
A copy of the proposed TMDLs can be obtained through the Internet or by contacting Ms. Cole at (404) 562-9437 or via electronic mail at cole.sibyl@epa.gov. The URL address for
the proposed TMDLs is http://www.epa.gov/region4/water/tmdl/tennessee/index.htm#sc. The
proposed TMDLs and supporting documents, including technical information, data, and analyses, may be reviewed at 61 Forsyth Street, S.W., Atlanta, Georgia, between the hours of
8:00 AM and 3:00 PM, Monday through Friday. Persons wishing to review this information
should contact Ms. Cole to schedule a time for that review.

_____/s/_____

James D. Giattina, Director
Water Management Division
Region 4
U.S. Environmental Protection Agency
August 16, 2004

NO COMMENTS RECEIVED

APPENDIX D MOVE.1

Constructing Flow Curves Using MOVE.1

The concept of record extension is to transfer the characteristics of distribution shape, serial correlation, and seasonality from the base station to the short-record station with adjustments of location and scale appropriate to the short-record station. MOVE.1 is a statistical technique developed by the USGS (Hirsch, 1982) for extending discharge records at partial or discontinued gages using continuous records at a base station having a common period of record as the partial station. Record extension is based on the following equation:

$$Y(i) = m(y_1) + (S(y_1)/S(x_1))(x(i) - m(x_1)) \qquad \text{Equation 1}$$

Where: Y = discharge at partial record station on particular date
$m(y_1)$ = mean value at partial record station
$S(y_1)$ = standard deviation of discharge record at partial station
$S(x_1)$ = standard deviation of discharge record at continuous station
X(i) = discharge at continuous gage on a particular date
$m(x_1)$ = mean value at continuous record station

Application of the MOVE.1 technique is explained below; however, for more information on the derivation of the equations used in the analysis, please refer to Hirsch (1982).

The record extension procedure can be easily performed in a spreadsheet, such as Excel, having the "analysis toolpak" feature loaded as an add-in program. In Excel, the "descriptive statistic" feature in the "analysis toolpak" is used to compute the complex statistical parameters described in Equation 1. The first step in utilizing MOVE.1 is to compute the logarithms of the discharges at each gage during the concurrent time period. By selecting the "descriptive statistic" feature from the data analysis menu (in Excel, this is located under the "tools" menu bar), and highlighting the cells containing the logarithms of the discharges at both the partial and continuous record stations, the summary statistics used in Equation 1 can be calculated. Flows at other time periods at the partial record station can be estimated by using Equation 1, the summary statistics from the analysis toolpak, and flow at the continuous record station.

A partial flow record is available at four stations used to develop load-duration curves for these TMDLs. For USGS station 02160200, Enoree River at Taylors; USGS station 02160326, Enoree River at Pelham; USGS station 02160381, Durbin Creek above Fountain Inn; and USGS station 02160390, Enoree River near Woodruff, MOVE.1 was used to establish the missing period of record from 1990 through 2001. The partial station was matched with USGS station 02160700 on the Enoree River at Whitmire. The concurrent time period was paired for use in the MOVE.1 analysis. Statistical parameters

derived from the MOVE.1 analysis are shown in Tables D-1 through D-4. The resulting flow duration curves are presented in Figures D-1 through D-4.

Table D-1 Statistical Parameters Derived from the MOVE.1 Analysis Comparing USGS 02160700 and USGS 02160381

log 02160700		*log 02160381*	
Mean	2.629557732	Mean	1.089851515
Standard Error	0.007203046	Standard Error	0.007492697
Median	2.597695186	Median	1.079181246
Mode	2.519827994	Mode	1.041392685
Standard Deviation	0.315045783	Standard Deviation	0.3277145
Sample Variance	0.099253845	Sample Variance	0.107396793
Kurtosis	2.03035589	Kurtosis	3.07531938
Skewness	0.933766112	Skewness	0.945977257
Range	2.447540838	Range	2.647817482
Minimum	1.908485019	Minimum	0.255272505
Maximum	4.356025857	Maximum	2.903089987
Sum	5030.343942	Sum	2084.885948
Count	1913	Count	1913
Standard Deviation Y / Standard Deviation X = 1.04			

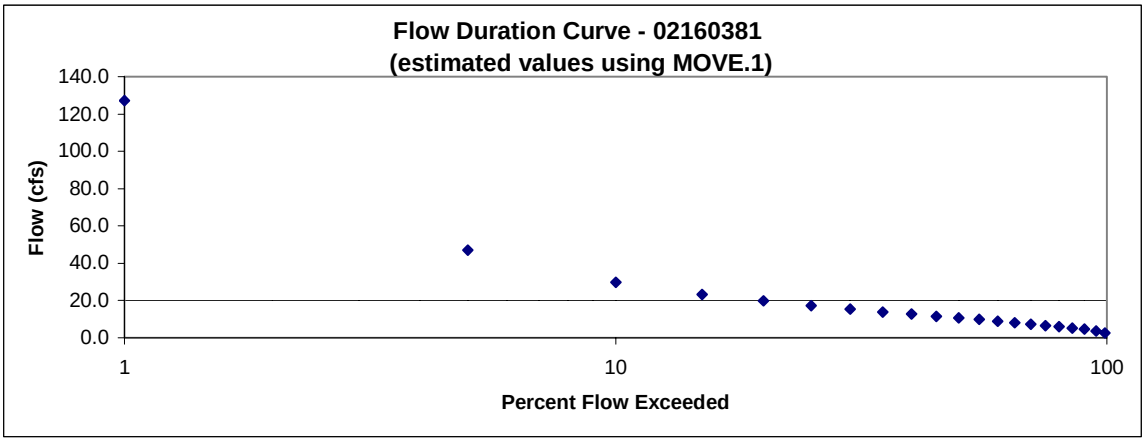


Figure D-1 Flow Duration Curve for USGS 02160381 (Estimated Using MOVE.1)

Table D-2 Statistical Parameters Derived from the MOVE.1 Analysis Comparing USGS 02160700 and USGS 02160326

log 02160700		*log 02160326*	
Mean	2.566	Mean	2.051
Standard Error	0.006	Standard Error	0.005
Median	2.550	Median	2.025
Mode	2.322	Mode	1.908
Standard Deviation	0.322	Standard Deviation	0.297
Sample Variance	0.104	Sample Variance	0.088
Kurtosis	1.502	Kurtosis	2.096
Skewness	0.812	Skewness	0.800
Range	2.448	Range	2.725
Minimum	1.908	Minimum	1.204
Maximum	4.356	Maximum	3.929
Sum	8025.202	Sum	6414.859
Count	3127	Count	3127
Standard Deviation Y / Standard Deviation X = 0.9225			

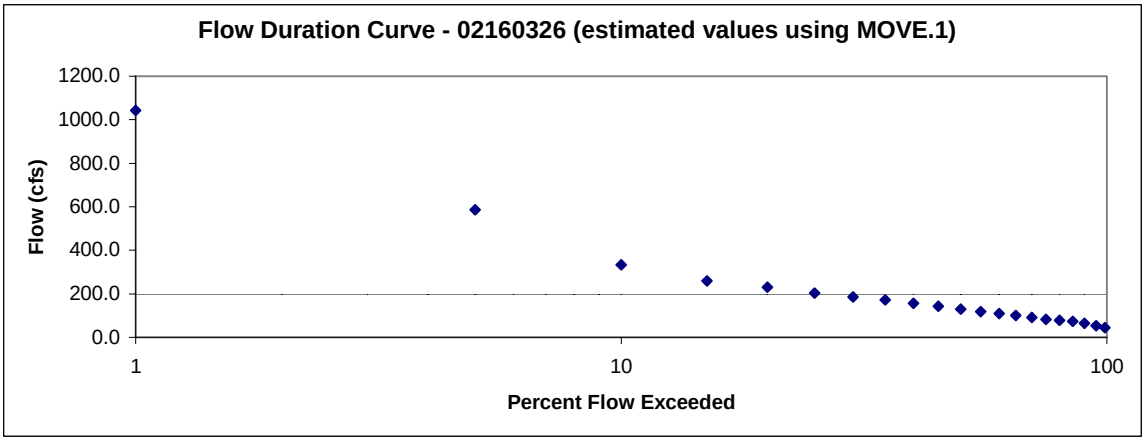


Figure D-2 Flow Duration Curve for USGS 02160326 (Estimated Using MOVE.1)

Table D-3 Statistical Parameters Derived from the MOVE.1 Analysis Comparing USGS 02160700 and USGS 02160200

log 02160700		*log 02160200*	
Mean	2.448526182	Mean	1.625350738
Standard Error	0.008372637	Standard Error	0.008940827
Median	2.402260531	Median	1.633468456
Mode	2.33243846	Mode	1.531478917
Standard Deviation	0.303038574	Standard Deviation	0.323603613
Sample Variance	0.091832377	Sample Variance	0.104719298
Kurtosis	1.543495996	Kurtosis	0.55652867
Skewness	0.905139864	Skewness	0.22527388
Range	1.906428162	Range	2.134793491
Minimum	1.908485019	Minimum	0.785329835
Maximum	3.814913181	Maximum	2.920123326
Sum	3207.569298	Sum	2129.209467
Count	1310	Count	1310
Standard Deviation Y / Standard Deviation X = 1.0679			

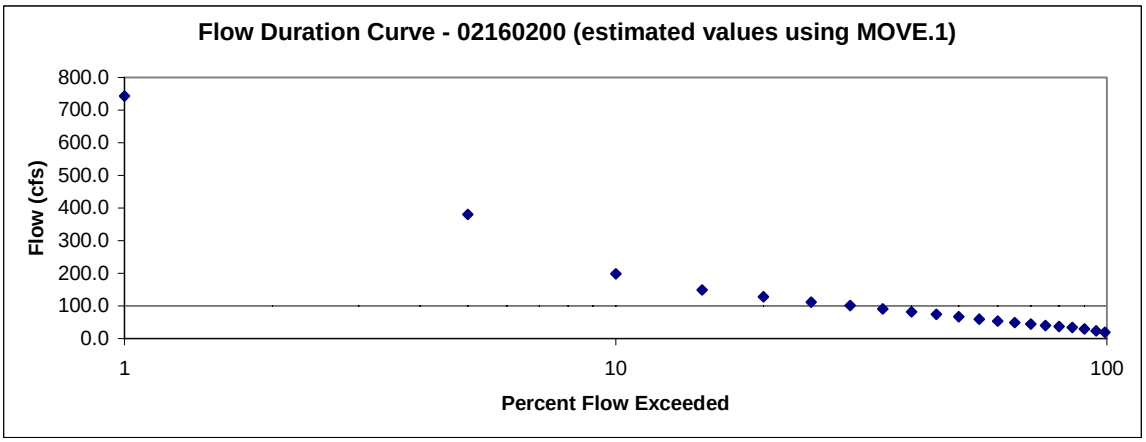


Figure D-3 Flow Duration Curve for USGS 02160200 (Estimated Using MOVE.1)

Table D-4 Statistical Parameters Derived from the MOVE.1 Analysis Comparing USGS 02160700 and USGS 02160390

log 02160700		*log 02160390*	
Mean	2.571	Mean	2.438
Standard Error	0.006	Standard Error	0.005
Median	2.554	Median	2.420
Mode	2.322	Mode	2.204
Standard Deviation	0.325	Standard Deviation	0.304
Sample Variance	0.105	Sample Variance	0.092
Kurtosis	1.410	Kurtosis	1.735
Skewness	0.799	Skewness	0.713
Range	2.448	Range	2.569
Minimum	1.908	Minimum	1.732
Maximum	4.356	Maximum	4.301
Sum	8114.353	Sum	7694.598
Count	3156	Count	3156
Standard Deviation Y / Standard Deviation X = 0.936			

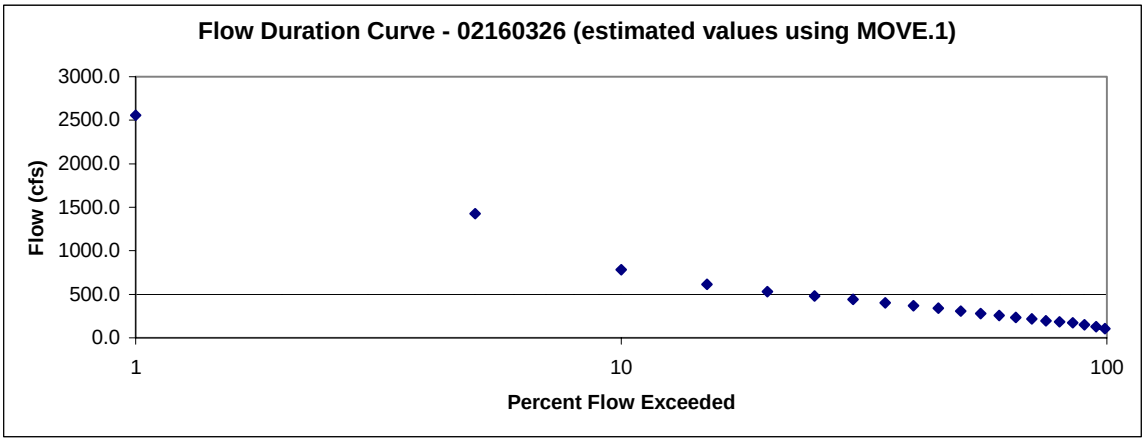


Figure D-4 Flow Duration Curve for USGS 02160326 (Estimated Using MOVE.1)