South Carolina
Department of Health and Environmental Control

Total Maximum Daily Load Development for The Upper Broad River Watershed (Hydrological Unit Code: 03050105) Stations: B-026, B-028, B-042, B-044, B-048, B-056, B-057, B-059, B-062, B-088, B-095, B-100, B-103, B-119, B-126, B-128, B-133, B-159, B-191, B-211, B-221, B-259, B-277, B-278, B-301, B-302, B-323, B-325, B-326, B-330, B-331, B-334, BL-001, BL-005, BP-001 Fecal Coliform Bacteria

Bureau of Water
2600 Bull Street
Columbia, SC 29201

September 29, 2004

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 Upper Broad Basin. Subsequent actions must be consistent with this TMDL.

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James D. Giattina, Director Date
Water Management Division

Abstract

The upper Broad River Basin (8-digit HUC 03050105) is located in parts of Burke, McDowell, Buncombe, Rutherford, Cleveland, Lincoln, Henderson, Transylvania, Gaston, and Polk counties of North Carolina and Greenville, Spartanburg, Cherokee, York and Union counties of South Carolina (Figure 1-1). Thirty-five 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 2480 square mile basin is composed of mostly forested land (70%) with some pasture (12%) and cropland (11%). The basin includes a Municipal Separate Storm Sewer (MS4) for unincorporated Spartanburg and Cherokee Counties and the several towns within the watershed. There are also 27 active continuous point sources discharging fecal coliform bacteria in the Upper Broad River basin of South Carolina.

The load-duration curve methodology was used to establish allowable fecal coliform loads in the watershed. The existing load was determined using measured data from the impaired water quality monitoring stations. Loads were established from measured concentrations and a power trend line was fit to samples violating the instantaneous standard. The existing load and allowable total maximum daily load for impaired stations is presented in Table I. To achieve the TMDL target, reductions of fecal coliform loads will be necessary, as shown in Table I on page 2.

Table I Total Maximum Daily Loads for Impaired Water Quality Stations in the upper Broad River Basin (03050105)

Station ID	Existing WasteLoad	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)	(counts/day)	
B-026	1.51E+10	1.51E+10	NA	2.35E+12	1.04E+12	5.89E+10	1.12E+12	52%
B-028	1.63E+10	1.63E+10	74%	9.61E+12	2.34E+12	1.31E+11	2.49E+12	74%
B-042	NA	NA	NA	5.43E+13	1.64E+13	9.12E+11	1.73E+13	68%
B-044	1.34E+11	1.34E+11	NA	4.67E+13	2.06E+13	1.15E+12	2.19E+13	53%
B-048	3.23E+11	3.23E+11	49%	1.17E+13	5.36E+12	3.16E+11	5.99E+12	49%
B-056	NA	NA	NA	1.14E+12	2.61E+11	1.45E+10	2.75E+11	76%
B-057	1.14E+08	1.14E+08	NA	6.52E+12	1.74E+12	9.67E+10	1.84E+12	72%
B-059	NA	NA	NA	3.54E+11	1.01E+11	5.59E+09	1.06E+11	70%
B-062	7.66E+10	7.66E+10	85%	1.20E+13	1.68E+12	9.75E+10	1.85E+12	85%
B-088	NA	NA	NA	2.70E+10	6.33E+09	3.52E+08	6.68E+09	75%
B-095	7.60E+10	7.60E+10	NA	1.13E+12	2.72E+11	1.93E+10	3.67E+11	68%
B-100	NA	NA	NA	2.94E+11	8.98E+10	4.99E+09	9.48E+10	68%
B-103	NA	NA	NA	1.24E+11	4.76E+10	2.65E+09	5.03E+10	59%
B-119	NA	NA	NA	6.83E+12	1.68E+12	9.35E+10	1.78E+12	74%
B-126	1.56E+10	1.56E+10	NA	5.52E+12	1.28E+12	7.18E+10	1.36E+12	75%
B-128	NA	NA	NA	3.41E+11	9.11E+10	5.06E+09	9.62E+10	72%
B-133	7.60E+10	7.60E+10	49%	2.30E+12	1.04E+12	6.22E+10	1.18E+12	49%
B-159	3.94E+07	3.94E+07	NA	2.70E+12	1.34E+12	7.45E+10	1.41E+12	48%
B-191	NA	NA	69%	6.15E+10	1.82E+10	1.01E+09	1.93E+10	69%
B-211	NA	NA	NA	2.18E+11	3.85E+10	2.14E+09	4.06E+10	81%
B-221	2.65E+09	2.65E+09	70%	5.75E+11	4.99E+10	2.92E+09	5.55E+10	70%
B-259	NA	NA	NA	3.54E+11	4.68E+10	2.60E+09	4.94E+10	86%
B-277	2.65E+09	2.65E+09	70%	5.04E+11	5.76E+10	3.35E+09	6.36E+10	70%
B-278	1.78E+10	1.78E+10	70%	5.58E+11	5.24E+10	3.90E+09	7.41E+10	70%
B-301	NA	NA	NA	6.57E+10	2.39E+10	1.33E+09	2.53E+10	62%
B-302	3.63E+08	3.63E+08	NA	2.21E+12	6.68E+11	3.71E+10	7.05E+11	68%
B-323	NA	NA	NA	8.96E+10	2.54E+10	1.41E+09	2.68E+10	70%
B-325	NA	NA	NA	2.69E+10	1.29E+10	7.16E+08	1.36E+10	49%
B-326	3.94E+07	3.94E+07	NA	3.00E+10	1.04E+10	5.77E+08	1.10E+10	63%
B-330	NA	NA	NA	7.40E+10	2.44E+10	1.35E+09	2.57E+10	65%
B-331	7.90E+10	7.90E+10	73%	1.51E+13	3.74E+12	2.12E+11	4.04E+12	73%
B-334	6.48E+08	6.48E+08	NA	8.02E+11	2.41E+11	1.34E+10	2.56E+11	68%
BL-001	2.52E+11	2.52E+11	70%	1.45E+13	3.88E+12	2.29E+11	4.36E+12	70%
BL-005	1.78E+10	1.78E+10	70%	3.21E+12	3.62E+11	2.11E+10	4.00E+11	70%
BP-001	3.18E+11	3.18E+11	77%	1.94E+13	3.95E+12	2.37E+11	4.51E+12	77%

Table Notes:

1. Total monthly wasteload cannot exceed loads listed in Table 3-4.
2. MS4 expressed as percent reduction equal to LA reduction.
3. TMDLs expressed as monthly load by station are listed in Table B-1.
4. Percent reduction applies to LA and MS4 components.

Table of Contents

Figures

Tables

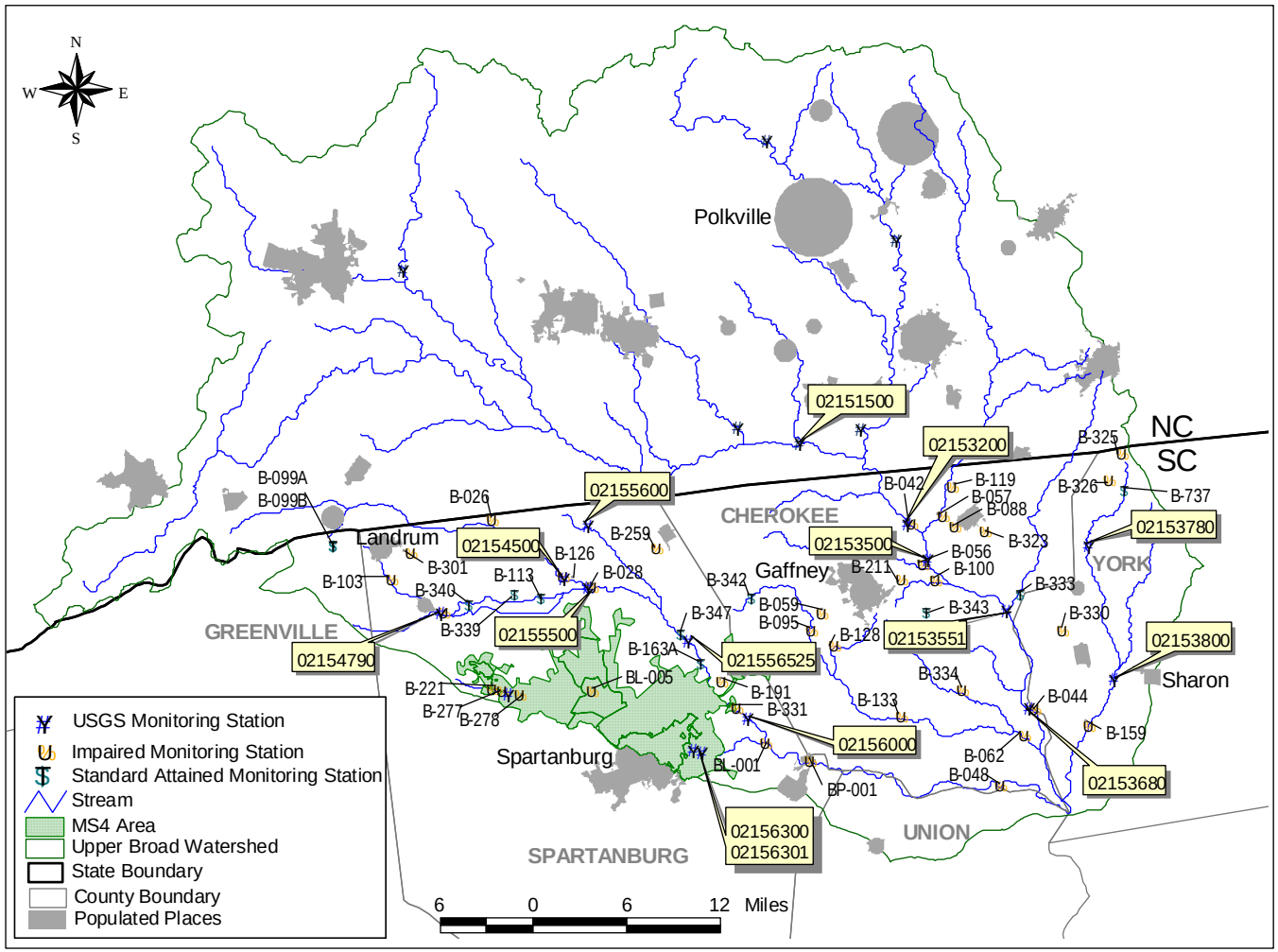

Figure 1-1 Upper Broad River Watershed (03050105)

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 in-stream 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 35 monitoring stations in the upper Broad River basin (8-digit HUC 03050105) 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 in the upper Broad River Basin (03050105)

Waterbody Name	Waterbody ID	Waterbody Location
N Pacolet Rvr	B-026	NORTH PACOLET RIVER AT S-42-956 6.5 MI E LANDRUM
Pacolet Rvr	B-028	PACOLET RIVER AT S-42-55 BL JCT OF N & S PACOLET R
Broad Rvr	B-042	BROAD RIVER AT SC 18 4 MI NE GAFFNEY
Broad Rvr	B-044	BROAD RIVER AT SC 211 12 MI SE OF GAFFNEY
Pacolet Rvr	B-048	PACOLET RIVER AT SC 105 6 MI AB JCT WITH BROAD RIVER
Cherokee Ck	B-056	CHEROKEE CREEK AT US 29 3 MI E OF GAFFNEY
Buffalo Ck	B-057	BUFFALO CREEK AT SC 5 1 MI W OF BLACKSBURG
Irene Ck	B-059	IRENE CREEK AT S-11-307 2.5 MI W OF GAFFNEY
Thicketty Ck	B-062	THICKETTY CREEK AT SC 211 2 MI AB JCT WITH BROAD RIVER
Canoe Ck	B-088	CANOE CREEK AT S-11-245 1/2 MI W OF BLACKSBURG
Thicketty Ck	B-095	THICKETTY CREEK AT S-11-164
Furnace Ck	B-100	FURNACE CREEK AT S-11-50 6 MI E OF GAFFNEY
Spivey Ck	B-103	SPIVEY CREEK AT S-42-208 2.5 MI SSE OF LANDRUM
Buffalo Ck	B-119	BUFFALO CREEK AT S-11-213, 2.2 MI NNW OF BLACKSBURG
N Pacolet Rvr	B-126	NORTH PACOLET RIVER AT S-42-978, 1 MI SE OF FINGERVILLE
Limestone Ck	B-128	LIMESTONE CREEK AT S-11-301
Thicketty Ck	B-133	THICKETTY CREEK AT SC 18 8.3 MI S OF GAFFNEY
Bullock Ck	B-159	BULLOCK CREEK AT SC 97 4.8 MI S OF HICKORY GROVE
Potter Br	B-191	POTTER BR ON RD 30 BL OUTFALL FROM HOUSING PROJ COWPENS
Peoples Ck	B-211	PEOPLES CREEK AT UNIMPROVED RD 2.3 MI E OF GAFFNEY

Table 1-1 (Continued)

Waterbody Name	Waterbody ID	Waterbody Location
N Pacolet Rvr	B-026	NORTH PACOLET RIVER AT S-42-956 6.5 MI E LANDRUM
Pacolet Rvr	B-028	PACOLET RIVER AT S-42-55 BL JCT OF N & S PACOLET R
Broad Rvr	B-042	BROAD RIVER AT SC 18 4 MI NE GAFFNEY
Broad Rvr	B-044	BROAD RIVER AT SC 211 12 MI SE OF GAFFNEY
Pacolet Rvr	B-048	PACOLET RIVER AT SC 105 6 MI AB JCT WITH BROAD RIVER
Cherokee Ck	B-056	CHEROKEE CREEK AT US 29 3 MI E OF GAFFNEY
Buffalo Ck	B-057	BUFFALO CREEK AT SC 5 1 MI W OF BLACKSBURG
Irene Ck	B-059	IRENE CREEK AT S-11-307 2.5 MI W OF GAFFNEY
Thicketty Ck	B-062	THICKETTY CREEK AT SC 211 2 MI AB JCT WITH BROAD RIVER
Canoe Ck	B-088	CANOE CREEK AT S-11-245 1/2 MI W OF BLACKSBURG
Thicketty Ck	B-095	THICKETTY CREEK AT S-11-164
Lake Lanier	B-099A	LAKE LANIER #1 INLET IN GREENVILLE COUNTY
Lake Lanier	B-099B	LAKE LANIER DAM IN GREENVILLE COUNTY
Furnace Ck	B-100	FURNACE CREEK AT S-11-50 6 MI E OF GAFFNEY
Spivey Ck	B-103	SPIVEY CREEK AT S-42-208 2.5 MI SSE OF LANDRUM
Spartanburg Reservoir	B-113	SPARTANBURG RESERVOIR #1 ON S-42-213 NE OF INMAN
Buffalo Ck	B-119	BUFFALO CREEK AT S-11-213, 2.2 MI NNW OF BLACKSBURG
N Pacolet Rvr	B-126	NORTH PACOLET RIVER AT S-42-978, 1 MI SE OF FINGERVILLE
Limestone Ck	B-128	LIMESTONE CREEK AT S-11-301
Thicketty Ck	B-133	THICKETTY CREEK AT SC 18 8.3 MI S OF GAFFNEY
Bullock Ck	B-159	BULLOCK CREEK AT SC 97 4.8 MI S OF HICKORY GROVE
Pacolet Rvr	B-163A	PACOLET RIVER AT BRIDGE ON C-42-737 2.9 MILES NW OF COWPENS
Potter Br	B-191	POTTER BR ON RD 30 BL OUTFALL FROM HOUSING PROJ COWPENS
Lawsons Fork Ck	B-221	LAWSONS FORK CREEK AT S-42-40 BL INMAN MILL EFF
Little Buck Ck	B-259	LITTLE BUCK CREEK AT UN# CO RD 2.3 MI SW OF CHESNEE
Lawsons Fork Ck	B-277	LAWSONS FORK CREEK AT S-42-218 2.7 MI SSE OF INMAN
Lawsons Fork Ck	B-278	LAWSONS FORK CREEK AT UN# RD BL MILLIKEN CHEM
Page Ck	B-301	PAGE CREEK AT S-42-1258 1.7 MI SE LANDRUM
S Pacolet Rvr	B-302	SOUTH PACOLET RIVER AT S-42-866 1 MI SE CAMPOBELLO
Doolittle Ck	B-323	DOOLITTLE CREEK AT S-11-100 1.25 MI SE OF BLACREEKSBURG
Clark Fork into Crawford Lk	B-325	CLARK FORK INTO CRAWFORD LK ON UN# RD NEAR SC 161 & 705-KINGS MT
Long Branch	B-326	LONG BRANCH ON SC 216 BL KINGS MTN PK REC AREA
Guyonmoore Ck	B-330	GUYONMOORE CREEK AT S-46-233
Pacolet Rvr	B-331	PACOLET RIVER AT S-42-59, BEACON LIGHT RD IN CLIFTON
Gilkey Ck	B-334	GILKEY CREEK AT S-11-231, 9 MI SE OF GAFFNEY
Lawsons Fork Ck	BL-001	LAWSONS FORK CREEK AT S-42-108
Lawsons Fork Ck	BL-005	LAWSONS FORK CREEK AT S-42-79 AT VALLEY FALLS
Pacolet Rvr	BP-001	PACOLET RIVER AB DAM AT PACOLET MILLS

1.2 Watershed Description

The Upper Broad River basin (03050105) is located in parts of Burke, McDowell, Buncombe, Rutherford, Cleveland, Lincoln, Henderson, Transylvania, Gaston, and Polk counties of North Carolina and Greenville, Spartanburg, Cherokee, York and Union counties of South Carolina (Figure 1-1). The basin drains nearly 2480 square miles in North Carolina and the Piedmont region of South Carolina. Major tributaries contributing to the Upper Broad River in South Carolina are Buffalo Creek, Cherokee Creek, Kings Creek, Thicketty Creek, Bullock Creek, North Pacolet River, South Pacolet River, Pacolet River, and Lawsons Fork Creek.

Based on 1996 USGS Multi-Resolution Land Characteristic (MRLC) land use data, 70 percent of the watershed is forested. The remaining 30 percent is composed of pastureland (12%), cropland (11%), urban area (5%), and a small mix of water and barren land uses (2%). Table 1-2 presents the percentage of total watershed area for each aggregated land use. Table A-1 in the appendix, presents the percentage of land use area in each monitoring station drainage area. Figure 1-2 illustrates land use for the Upper Broad River basin.

Table 1-2 MRLC Aggregated Land Use for the upper Broad River Basin (03050105)

Aggregated Land Use	Percent of Total Area
Urban	4.5%
Barren	1.1%
Row Crops	11.1%
Pasture	12.3%
Forest	70.3%
Water	0.7%

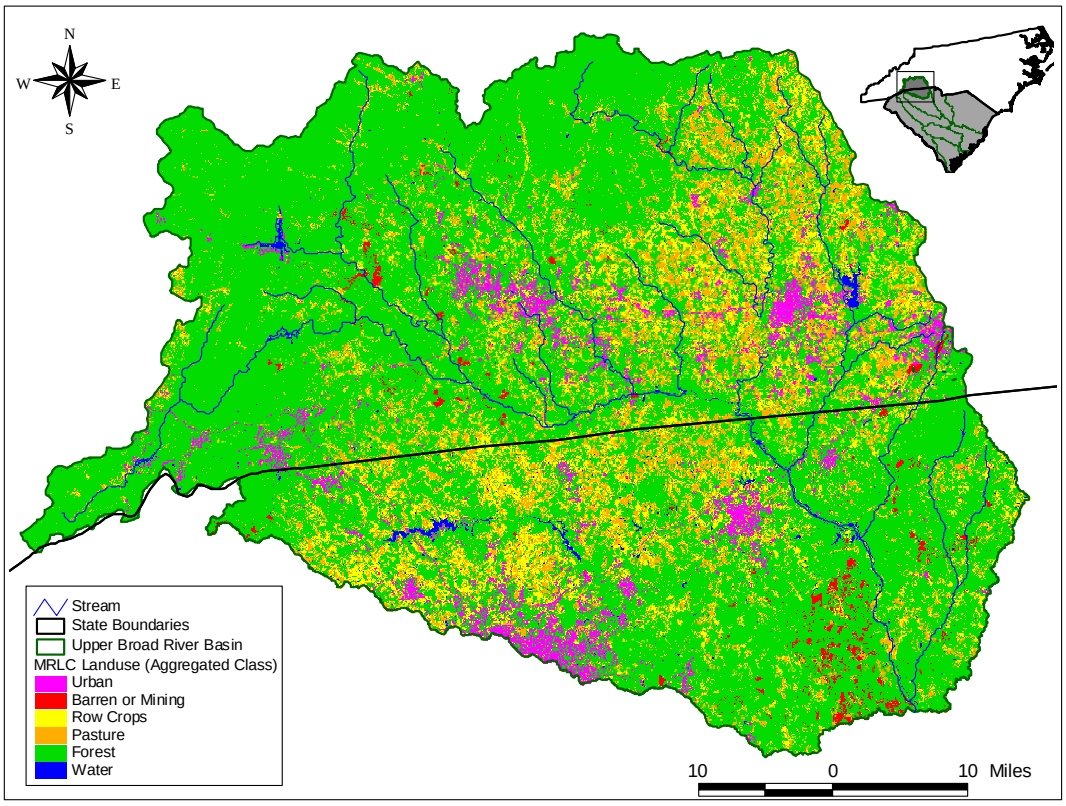

Figure 1-2 Upper Broad River Basin Land Use

1.3 Water Quality Standard

The impaired stream segments of the upper Broad 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 upper Broad River basin from 1996 through 2000 were assessed at §303(d) listed water quality monitoring stations. The State of South Carolina monitors fecal coliform bacteria at 46 stations in the watershed. Figure 1-1 shows the location of water quality monitoring stations in the watershed.

Thirty-five quality monitoring stations in the basin have been identified on the State of South Carolina 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 Table A-3 of Appendix A. Waters in which no more than 10 percent of the samples collected over a five year period are greater then 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 Section §303(d) list. Table 2-1 presents the statistical information supporting the listing of water quality monitoring sites in the watershed.

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

Station	Total Number of Samples	Total Number of Samples >400 #/100 mL	Percent of Samples >400 #/100 mL
B-026	59	31	53%
B-028	35	6	17%
B-042	56	15	27%
B-044	56	13	23%
B-048	55	20	36%
B-056	32	17	53%
B-057	32	13	41%
B-059	26	18	69%
B-062	32	11	34%
B-088	26	17	65%
B-095	26	17	65%
B-100	32	12	38%
B-103	36	6	17%
B-119	20	9	45%
B-126	11	2	18%
B-128	27	25	93%
B-133	25	15	60%
B-159	32	18	56%
B-191	29	6	21%
B-211	26	20	77%
B-221	28	26	93%
B-259	24	5	21%
B-277	28	27	96%
B-278	29	27	93%
B-301	29	22	76%
B-302	35	12	34%
B-323	8	6	75%
B-325	27	5	19%
B-326	27	5	19%
B-330	26	6	23%
B-331*	12	0	0%
B-334	13	4	31%
BL-001	59	20	34%
BL-005	36	19	53%
BP-001	30	4	13%

*Data collected in 1994 and 1995 was in violation.

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 was not collected at B-331 in 1996, 1997 or 2000. The data collected at this station in 1998 and 1999 and presented in Table 2-1 does not reflect violations of the standard. Data collected prior to

1996 was in violation of the standard and therefore B-331 remains on South Carolina's §303(d) list of impaired waters for violations of the fecal coliform bacteria standard.

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 curve 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-35, and in Figure 2-1 for B-028, 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-35 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 the majority of impaired stations in the basin have violations during all flow conditions. Data collected at B-044 and B-331 are the exceptions. Most violations at these stations occur during high flow events. High flow events suggest that overland sources are a governing cause of violations or illicit discharges from point sources. Violations during various flow events suggest both overland, instream and continuous sources, such as groundwater, of fecal coliform bacteria.

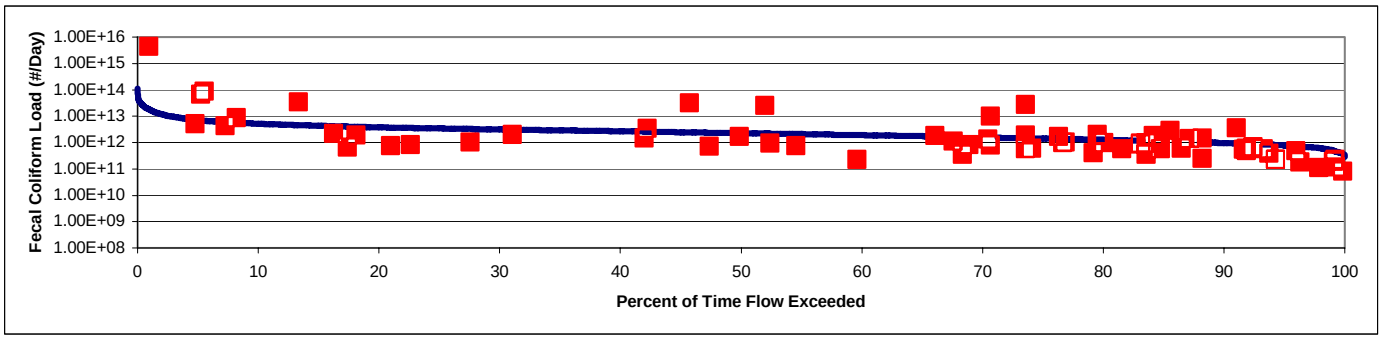

Figure 2-1 Fecal Coliform Bacteria Load-Duration Curve for Station B-028 Illustrating Observed Fecal Coliform Bacteria Loads Over Various Hydrologic Conditions

3.0 SOURCE ASSESSMENT AND LOAD ALLOCATION

Fecal coliform bacteria enter surface waters 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. pasture land) and run off during storm events.

3.1 Point Sources

There are 27 active continuous point sources discharging fecal coliform bacteria in the upper Broad River basin of South Carolina and one or more Municipal Separate Storm Sewer Systems (MS4) for unincorporated Spartanburg and Cherokee Counties and other urban areas.

3.1.1 Continuous Point Sources

Since 1996, 17 discharges in the basin have become inactive. Both active and inactive continuous NPDES facilities are listed in Table 3-1 and shown 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 upper Broad River Basin in South Carolina

FACILITY	NPDES_PERMIT	Receiving River	Flow (mgd)
SC DISTRIBUTORS INC	SC0002755	BROAD RIVER	0.04
ARTEVA SPECIALTIES SARL	SC0002798	PACOLET RIVER	0.8700
MILLIKEN/MAGNOLIA PLANT	SC0003182	BROAD RIVER	3.1000
SSSD/LAWSON FORK PLANT	SC0020427	LAWSON FORK CK	15.5000
GAFFNEY/PEOPLES CREEK	SC0020478	PEOPLES CK-BROAD RVR	Inactive 09/97
GAFFNEY/PROVIDENCE CREEK	SC0020508	CHEROKEE CK-BROAD RVR	Inactive 07/99
CITY OF INMAN	SC0021601	LAWSONS FORK CREEK	1.0000
SSSD/TOWN OF LANDRUM-PLANT #1	SC0021636	WOLF CK	Inactive 06/01
MILLIKEN/NEW PROSPECT MILL	SC0023540	N PACOLET RVR	0.0200
UNITED UTIL/BRIARCREEK S/D #I	SC0023736	SPENCRS BR TR-GILKEY CK	0.0228
INMAN MILLS WATER DISTRICT	SC0024414	LAWSON FORK CK	0.1750
US PARK SERV/KINGS MOUNTAIN	SC0025275	CLARKS FORK/BULLOCKS/BROAD RVR	0.0026
CHESNEE WWTF	SC0025763	LITTLE BUCK-BUCK-PACOLET RVR	0.5000
BLACKSBURG/CANOE CREEK	SC0026042	BROAD RIVER TRIB.	Inactive 05/99
UNITED UTILS/BRIARCREEK SD #II	SC0026409	SPENCERS BR-GILKEY CK	0.0200

Table 3-1 (Continued)

FACILITY	NPDES_PERMIT	Receiving River	Flow (mgd)
ARTEVA SPECIALTIES SARL	SC0002798	PACOLET RIVER	0.8700
MILLIKEN/MAGNOLIA PLANT	SC0003182	BROAD RIVER	3.1000
SSSD/LAWSON FORK PLANT	SC0020427	LAWSON FORK CK	15.5000
GAFFNEY/PEOPLES CREEK	SC0020478	PEOPLES CK-BROAD RVR	Inactive 09/97
GAFFNEY/PROVIDENCE CREEK	SC0020508	CHEROKEE CK-BROAD RVR	Inactive 07/99
CITY OF INMAN	SC0021601	LAWSONS FORK CREEK	1.0000
SSSD/TOWN OF LANDRUM-PLANT #1	SC0021636	WOLF CK	Inactive 06/01
MILLIKEN/NEW PROSPECT MILL	SC0023540	N PACOLET RVR	0.0200
UNITED UTIL/BRIARCREEK S/D #I	SC0023736	SPENCRS BR TR-GILKEY CK	0.0228
INMAN MILLS WATER DISTRICT	SC0024414	LAWSON FORK CK	0.1750
US PARK SERV/KINGS MOUNTAIN	SC0025275	CLARKS FORK/BULLOCKS/BROAD	0.0026
CHESNEE WWTF	SC0025763	LITTLE BUCK-BUCK-PACOLET RVR	0.5000
BLACKSBURG/CANOE CREEK	SC0026042	BROAD RIVER TRIB.	Inactive 05/99
UNITED UTILS/BRIARCREEK SD #II	SC0026409	SPENCERS BR-GILKEY CK	0.0200
SSSD/LANDRUM-PAGE CREEK WWTF	SC0026875	PAGE CK-NORTH PACOLET RVR	1.0000
G & W Inc	SC0027561	BEAVERDAM CREEK	Inactive 02/00
H B SWOFFORD VOCATIONAL CENT	SC0028037	OBED CK-PACOLET RVR	Inactive 05/02
SC DEPT TRANS/BLACKSBURG W C	SC0029203	BUFFALO CR	Inactive 03/96
SC DEPT TRANS/INFO I-26-E	SC0029297	PAGE CREEK	Inactive 06/97
SSSD/HILLBROOK FOREST SD	SC0029718	PACOLET RIVER	Inactive 06/00
SSSD/LANDRUM-PAGE CREEK WWTF	SC0026875	PAGE CK-NORTH PACOLET RVR	1.0000
G & W Inc	SC0027561	BEAVERDAM CREEK	Inactive 02/00
H B SWOFFORD VOCATIONAL CENT	SC0028037	OBED CK-PACOLET RVR	Inactive 05/02
SC DEPT TRANS/BLACKSBURG W C	SC0029203	BUFFALO CR	Inactive 03/96
SC DEPT TRANS/INFO I-26-E	SC0029297	PAGE CREEK	Inactive 06/97
SSSD/HILLBROOK FOREST SD	SC0029718	PACOLET RIVER	Inactive 06/00
SPARTANBURG WTR SYS WWTP/SIMMS	SC0030279	S PACOLET RVR	0.0120
JIM'S MOBILE HOME PARK	SC0030503	LITTLE THICKETY CR	Inactive 02/00
SSSD/IDLEWOOD SD	SC0030554	PACOLET RIVER	0.0800
GAFFNEY/CLARY WWTF	SC0031551	THICKETTY CREEK-BROAD RIVER	5.0000
TALL TALES FISH CAMP	SC0031577	ISLAND CK-PACOLET RIVER	0.0136
UNITED UTILITIES/STONECREEK SD	SC0031763	LAWSONS FORK CREEK	Inactive 08/98
J.M. BROWN VEND/MR WAFFLE #104	SC0031968	BEE BR TR DI-BUFFALO CR	Inactive 06/00
BROAD RIVER TRUCK STOP	SC0032433	BUFFALO CR TR-BROAD RV	0.0100
PINECONE CAMPGROUND WWTF	SC0034002	ALLGOOD BR-THICKETTY CR	0.0180
ONEITA INDUSTRIES/FINGERVILLE	SC0035157	N PACOLET RIVER	Inactive 08/98
SSSD/COMPARK	SC0035351	PACOLET RIVER	Inactive 02/97
SSSD/CINDER BRANCH PLANT	SC0035424	PACOLET RIVER	Inactive 02/00
NATIONAL TEXTILES	SC0035947	BROAD RIVER	1.0300
R R DONNELLEY AND SONS CO	SC0036102	UNN DITCH/PETERS CK/PACOLET	Inactive 03/01
SPARTAN MILLS/ROSEMONT DIV	SC0037371	MILLS CREEK TO THE PACOLET RVR	0.0060
SSSD/PACOLET ELEM SCH	SC0038326	PACOLET RIVER	Inactive 10/00
SPEEDWAY #66/BLACKSBURG	SC0042196	UNTRIB TO BUFFALO TO BROAD RVR	0.0075
SSSD/CLIFTON WWTP	SC0042668	PACOLET RIVER	0.2900
LINKS WATER LLC/LINKS-O-TRYON	SC0042684	S PACOLET RIVER	0.0240
SSSD/PACOLET MILLS WWTP	SC0044717	PACOLET RIVER	0.3000
SSSD/COWPENS-PACOLET RIVER	SC0045624	LAWSONS FORK CREEK	1.5000
GAFFNEY/PEOPLES CRK-BROAD RV.	SC0047091	BROAD RIVER	4.0000
BLACKSBURG/CANOE CREEK (NEW)	SC0047457	BROAD RIVER	0.6800
SSSD/COMMUNITY OF FINGERVILLE	SC0047759	N PACOLET RVR	0.0200

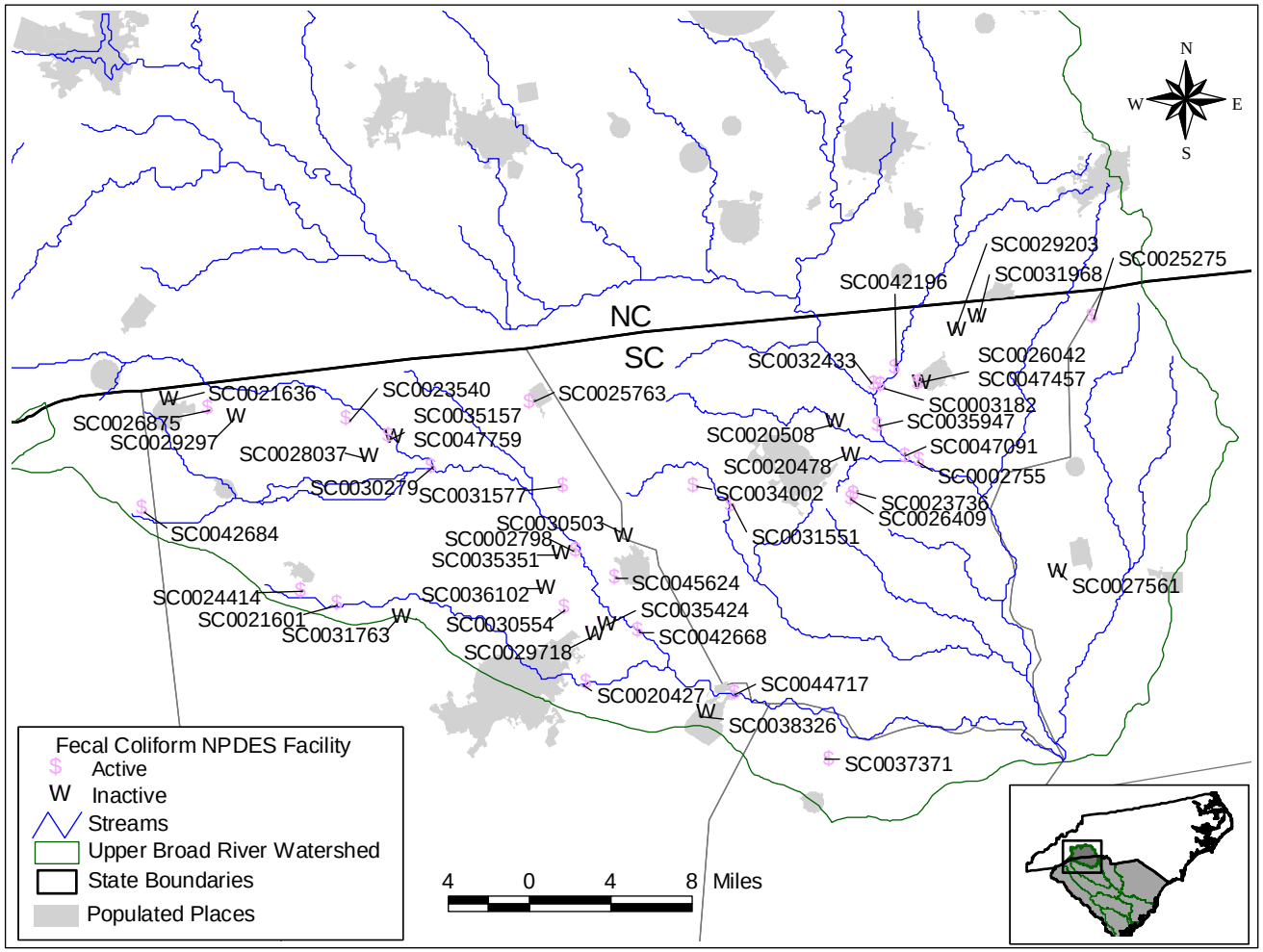

Figure 3-1 Active Fecal Coliform Bacteria Discharging NPDES Facilities

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

B-048	BP-001	B-331	B-044	B-028	B-062	BL-001	BL-005	B-277 B-221
SC0002798	SC0002798	SC0002798	SC0002755	SC0023540	SC0031551	SC0020427	SC0021601	SC0024414
SC0020427	SC0020427	SC0021601	SC0047091	SC0026875	SC0034002	SC0021601	SC0024414	
SC0021601	SC0021601	SC0023540	SC0003182	SC0030279	SC0023736	SC0024414		**B-326 B-159**
SC0023540	SC0023540	SC0024414	SC0032433	SC0042684	SC0026409		**B-278**	SC0025275
SC0024414	SC0024414	SC0025763	SC0035947	SC0047759		**B-126**	SC0021601	
SC0025763	SC0025763	SC0026875	SC0042196			SC0026875	SC0024414	**B-026**
SC0026875	SC0026875	SC0030279	SC0047457			SC0030279		SC0026875
SC0030279	SC0030279	SC0030554				SC0047759	**B-334**	
SC0030554	SC0030554	SC0031577					SC0023736	**B-057**
SC0031577	SC0031577	SC0042684					SC0026409	SC0042196
SC0037371	SC0042668	SC0045624						
SC0042668	SC0042684	SC0047759					**B-095 B-133**	**B-302**
SC0042684	SC0045624						SC0031551	SC0042684
SC0044717	SC0047759						SC0034002	
SC0045624								
SC0047759								

Table 3-3 shows fecal coliform bacteria concentration statistics for facilities actively discharging. Statistics were calculated using data collected from 1990 through 2000 and submitted to DHEC in Discharge Monitoring Reports (DMR). Many of the facilities active during this period report maximum monthly exceedances greater than water quality standards. Under the NPDES program these discharges are violating their permit and therefore addressed through the NPDES permitting program.

The TMDLs presented in this report will be developed using permitted flows (or design flows when there is no permitted flow) and permitted concentrations. Estimated existing loads and the permitted geometric mean concentration of 200 counts per 100 mL and instantaneous concentration of 400 counts per 100 mL are listed in Table 3-4.

The collection systems of wastewater treatment facilities are also possible 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 in the stream. Identified collection system and/or SSO problems are addressed by SCDHEC through compliance and enforcement mechanisms. Canoe, Lawson Fork, Irene, and Peoples Creeks and also Pacolet River have significant presence of sewer lines. Lawsons Fork Creek in Spartanburg County has reported very high fecal coliform concentrations (Appendix A Table A-3), which suggests leaking sanitary sewers or sewer overflows.

3.1.2 Municipal Separate Storm System (NPDES)

Several towns or cities and surrounding areas of unincorporated Spartanburg and Cherokee Counties 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

Table 3-3 Fecal Coliform Bacteria Statistics from NPDES Facilities in the upper Broad River Basin

NPDES	Count	Mean	Minimum	Maximum	Std Deviation	Geometric Mean	25 Percentile	50 Percentile	75 Percentile
SC0002755	91	1248	1	20000	2925	1	2	5	260
SC0002798	130	16	0	146	20	2	4	10	19
SC0003182	132	101	0	2256	302	3	1	8	43
SC0020427	138	17	0	166	30	3	2	7	17
SC0021601	127	63	2	1865	200	4	5	16	41
SC0023540	75	6	0	59	9	5	2	2	7
SC0023736	100	31	0	560	88	6	2	5	11
SC0024414	118	26	3	450	52	6	10	10	21
SC0025275	100	3	0	142	16	6	0	0	0
SC0025763	125	361	5	8107	1191	6	10	31	91
SC0026409	104	25	0	620	71	7	2	5	10
SC0026875	123	132	0	6000	663	7	3	10	21
SC0030279	126	95	0	1097	232	10	2	2	24
SC0030554	105	26	0	229	41	10	2	7	31
SC0031551	132	200	1	6000	737	12	5	16	69
SC0031577	47	2370	0	76000	11129	13	5	5	168
SC0032433	67	1390	0	26000	3655	16	2	5	650
SC0034002	101	207	0	1000	259	17	3	92	285
SC0035947	129	47	1	683	101	21	4	13	37
SC0037371	99	58	0	980	165	25	1	2	30
SC0042196	109	652	0	6000	1713	27	5	11	110
SC0042668	119	23	0	783	77	32	2	5	18
SC0042684	66	212	5	6000	783	34	5	10	103
SC0044717	95	12	0	229	33	37	1	2	10
SC0045624	79	23	0	229	37	39	2	12	25
SC0047091	41	10	1	80	14	41	3	5	13
SC0047457	25	11	0	32	10	49	2	8	17
SC0047759	37	7	0	69	16	249	0	1	1

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. Approved storm water management programs for medium and large MS4s are required to address a variety of water quality related issues including roadway runoff management, municipal owned operations, and hazardous waste treatment.

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

Table 3-4 Estimated Existing Fecal Coliform Bacteria Loads from NPDES Facilities in the upper Broad River Basin

NPDES Facility	Flow (MGD)	Existing Loading (counts/days)	Existing Loading (counts/30days)
SC0002755	0.04	6.06E+08	9.08E+09
SC0002798	0.8700	1.32E+10	1.98E+11
SC0003182	3.1000	4.69E+10	7.04E+11
SC0020427	15.5000	2.35E+11	3.52E+12
SC0021601	1.0000	1.51E+10	2.27E+11
SC0023540	0.0200	3.03E+08	4.54E+09
SC0023736	0.0228	3.45E+08	5.18E+09
SC0024414	0.1750	2.65E+09	3.97E+10
SC0025275	0.0026	3.94E+07	5.91E+08
SC0025763	0.5000	7.57E+09	1.14E+11
SC0026409	0.0200	3.03E+08	4.54E+09
SC0026875	1.0000	1.51E+10	2.27E+11
SC0030279	0.0120	1.82E+08	2.73E+09
SC0030554	0.0800	1.21E+09	1.82E+10
SC0031551	5.0000	7.57E+10	1.14E+12
SC0031577	0.0136	2.06E+08	3.09E+09
SC0032433	0.0100	1.51E+08	2.27E+09
SC0034002	0.0180	2.73E+08	4.09E+09
SC0035947	1.0300	1.56E+10	2.34E+11
SC0037371	0.0060	9.08E+07	1.36E+09
SC0042196	0.0075	1.14E+08	1.70E+09
SC0042668	0.2900	4.39E+09	6.59E+10
SC0042684	0.0240	3.63E+08	5.45E+09
SC0044717	0.3000	4.54E+09	6.81E+10
SC0045624	1.5000	2.27E+10	3.41E+11
SC0047091	4.0000	6.06E+10	9.08E+11
SC0047457	0.6800	1.03E+10	1.54E+11
SC0047759	0.0200	3.03E+08	4.54E+09

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 upper Broad River basin provides insight into determining nonpoint sources of fecal coliform bacteria (Figure 1-2). In the watershed nearly three-fourths of the land area is classified forested, 70 percent, and 12 percent of the area is pastureland. The distribution of land use activities does include the portion of the basin in North Carolina. Key nonpoint sources identified in the watershed include livestock, manure application, failing septic systems, and natural sources.

3.2.1 Wildlife

Fecal coliform bacteria also originate in forested areas. Generally, the sources are wild animals 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 (SC Deer Density 2000 map). Deer habitat was assumed to include forests, cropland, and pastures. 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 contributions transported over land.

3.2.2 Agricultural Activities and Grazing Animals

Agricultural land can be a source of fecal coliform bacteria. Runoff from 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 was estimated based on the 1997 USDA census data for Greenville, Union, Spartanburg, Cherokee, and York counties. Census data show that grazing cattle are of more relevance in counties with in the basin than confined animal operations, with an estimated 13,014 beef cows and nearly 800 dairy cows. 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. Based on information provided by South Carolina Natural Resources Conservation Service (NRCS), cattle in Spartanburg County were assumed to spend a fraction of 0.007 of the total estimated grazing time directly in streams. Estimates for other counties in the basin are assumed to be similar.

3.2.3 Failing Septic Systems and Illicit Discharges

Failing septic systems represent a nonpoint source that can contribute fecal coliform bacteria to receiving waterbodies through surface or subsurface malfunctions. Based on 1990 census information, population change from 1990 and 2000, and assuming an average of 2.5 people per household (US Census, 2000), greater than 350,000 people in basin use septic systems, this number includes estimates made for the portion of the basin in North Carolina. Though the precise failure rate is unknown, the State Natural Resources Conservation Service suggests an average septic failure rate of 30 percent in York County, 35 percent in Spartanburg County, and 12.5 percent in Cherokee County. Schueler (1999) also 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 a significant source of fecal coliform bacteria in the upper Broad River basin. Water quality data collected from streams draining many of the unpermitted 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 waterbodies.

4.0 TECHNICAL APPROACH – LOAD-DURATION METHOD

Load-duration curves were developed for water quality stations in the upper Broad 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 listed in Table 4-1.

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 was used in the analysis. For USGS stations 02153500 and 02156301, where data where not collected through 2001, the program MOVE1 was used to interpolate streamflow by comparing overlapping records with another USGS station 02151500. Statistical analysis from matched stations and technical clarification of the MOVE1 methods can be found in Appendix D.

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

Site Number	Site Name	From	To	Drainage Area (mi^2)
02151500	BROAD RIVER NEAR BOILING SPRINGS, NC	7/1/1925	9/30/2002	875
02153500	BROAD RIVER NEAR GAFFNEY, SC	12/1/1938	9/30/1990	1490
02153780	CLARKS FORK CREEK NEAR SMYRNA, SC	10/1/1980	9/30/2001	24.1
02154500	NORTH PACOLET RIVER AT FINGERVILLE, SC	4/1/1930	9/30/2001	116
02154790	SOUTH PACOLET RIVER NEAR CAMPOBELLO, SC	1/6/1989	9/30/2001	55.4
02155500	PACOLET RIVER NEAR FINGERVILLE, SC	12/1/1929	9/30/2001	212
02156050	LAWSONS FORK CREEK AT DEWEY PLANT NEAR INMAN, SC	10/1/1979	9/30/2001	6.46
02156301	LAWSON FORK CREEK AT WWTP NEAR SPARTANBURG, SC	5/11/1989	9/30/1997	75.6

Table 4-2 USGS Stations and Associated Water Quality Stations

USGS Gage	Waterbody ID	Waterbody Name
02155500	B-028	Pacolet Rvr
	B-048	Pacolet Rvr
	B-062	Thicketty Ck
	B-133	Thicketty Ck
02154500	B-026	N Pacolet Rvr
	B-103	Spivey Ck
	B-126	N Pacolet Rvr
	B-159	Bullock Ck
	B-334	Gilkey Ck
02156050	B-057	Buffalo Ck
	B-095	Thicketty Ck
	B-119	Buffalo Ck
	B-128	Limestone Ck
	B-191	Potter Br
	B-277	Lawsons Fork Ck
	B-278	Lawsons Fork Ck
	B-323	Doolittle Ck
	BL-001	Lawsons Fork Ck
	BL-005	Lawsons Fork Ck
	BP-001	Pacolet Rvr
02153780	B-325	Clark Fork into Crawford Lk
	B-326	Long Branch
	B-330	Guyonmoore Ck
02154790	B-259	Little Buck Ck
	B-302	S Pacolet Rvr
	B-331	Pacolet Rvr
02156301	B-056	Cherokee Ck
	B-059	Irene Ck
	B-088	Canoe Ck
	B-100	Furnace Ck
	B-211	Peoples Ck
	B-221	Lawsons Fork Ck
	B-301	Page Ck
02153500	B-042	Broad Rvr
	B-044	Broad Rvr

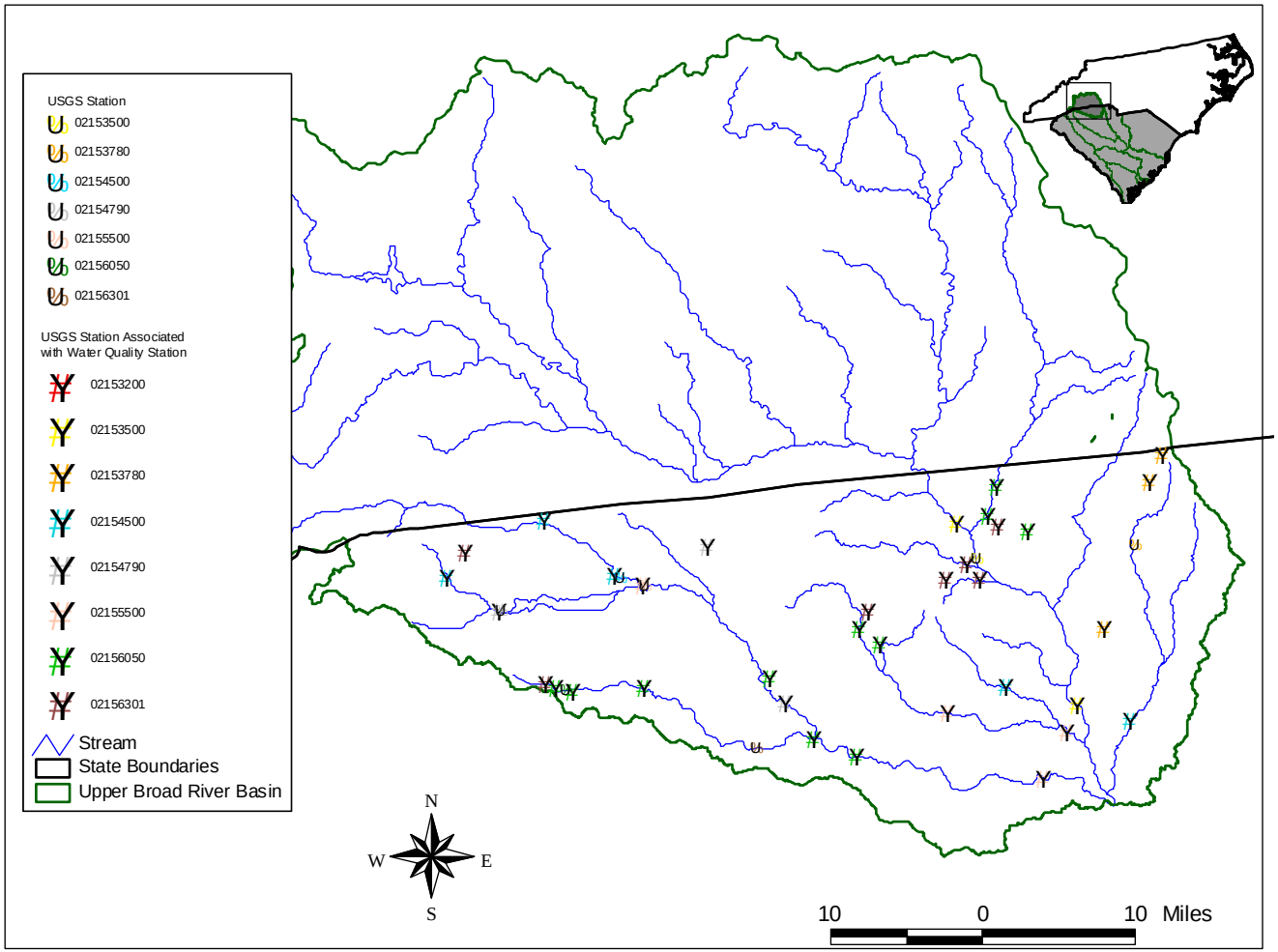

Figure 4-1 USGS Stations and Associated Water Quality Stations

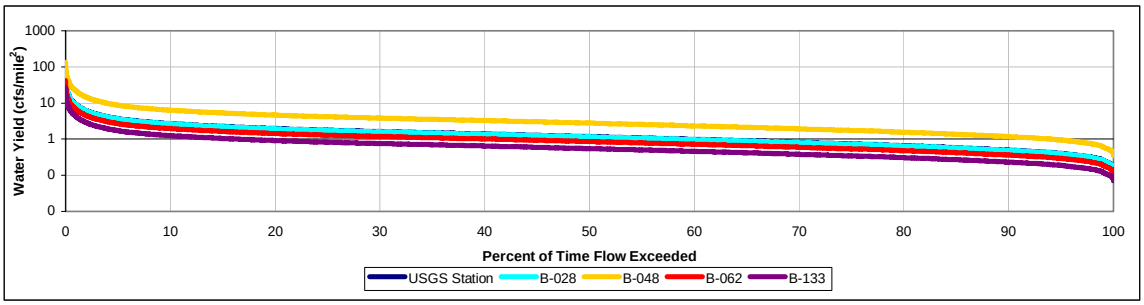

Figure 4-2 Water Yield (cubic feet per second per square mile) Based on Measured Daily Streamflow from USGS station 02155500

Watershed characteristics for the USGS stations and impaired water quality monitoring sites were compared to associate stations. Table 4-2 lists the impaired water quality monitoring stations and streamflow stations used to develop area-weighted flow relationships. The location of both USGS and water quality monitoring stations are identified in Figure 4-1. Figure 4-2 illustrates the streamflow yield for impaired stations associated with USGS station 02155500.

After calculating streamflow for each impaired monitoring station the data were ranked to determine the percent of time a 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, shown in Figures B-36 though B-41. 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} percent of time flow is exceeded to the 90^{th} percent of time flow is 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 event and therefore were not considered in developing the TMDL. Loads established at intervals and the mean load for each station can be found in Table B-1 of the Appendix B.

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:

$$\text{TMDL} = \sum \text{WLAs} + \sum \text{LAs} + \text{MOS}$$

The TMDL is the total amount of 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 upper Broad River basin occur at various flow regimes. The load-duration curve methodology used to establish TMDLs in the watershed 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 generated for the day the data were collected. The data violating the instantaneous concentration were isolated. Of violating data collected at impaired water quality monitoring stations, a best-fit trend line was fit to violations. The trend line was determined using a best-fit relationship that was most representative of the violating data. The equation representing the trend line was then used to calculate the average violating load that occurred between the 10^{th} and 90^{th} percentile, at every fifth percentile. This average load is equal to the existing fecal coliform load at the associated station.

Figure 5-1 presents the power best-fit trend line for B-028, an impaired station on Pacolet River. Existing loads at other stations in the basin are presented in Table B-2 and power trend lines are presented for other stations in Figures B-1 through B-35 of Appendix B. Existing loads calculated for each station are listed in Table 5-1.

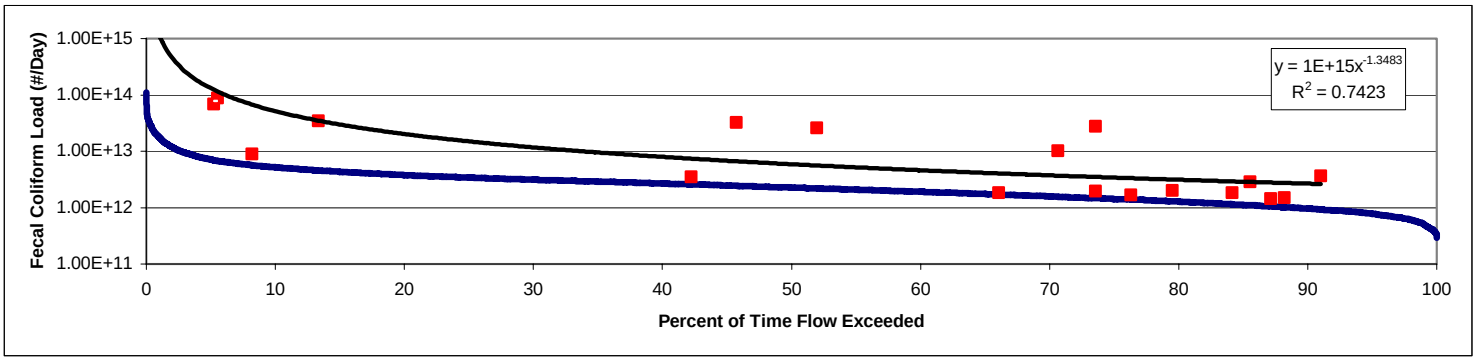

Figure 5-1 Power Trend line Generated from Violating Fecal Coliform Bacteria at B-028

Table 5-1 Existing Loads for Impaired Water Quality Stations in the upper Broad River Basin (03050105)

Station ID	Existing Load (counts/day)
B-026	2.35E+12
B-028	9.61E+12
B-042	5.43E+13
B-044	4.67E+13
B-048	1.17E+13
B-056	1.14E+12
B-057	6.52E+12
B-059	3.54E+11
B-026	1.51E+10
B-028	1.63E+10
B-042	1.43E+15
B-044	1.34E+11
B-048	3.23E+11
B-056	7.96E+13
B-057	1.14E+08
B-059	1.35E+13
B-062	1.20E+13
B-088	2.70E+10
B-095	1.13E+12
B-100	2.94E+11
B-103	1.24E+11
B-119	6.83E+12
B-126	5.52E+12
B-128	3.41E+11
B-133	2.30E+12
B-159	2.70E+12
B-191	6.15E+10
B-211	2.18E+11
B-221	5.75E+11
B-259	3.54E+11
B-277	5.04E+11
B-278	5.58E+11
B-301	6.57E+10
B-302	2.21E+12
B-323	8.96E+10
B-325	2.69E+10
B-326	3.00E+10
B-330	7.40E+10
B-331	1.51E+13
B-334	8.02E+11
BL-001	1.45E+13
BL-005	3.21E+12
BP-001	1.94E+13

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 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 upper Broad River Basin (03050105)

Waterbody ID	Existing Wasteload (counts/days)
B-026	1.51E+10
B-028	1.63E+10
B-042	NA
B-044	1.34E+11
B-048	3.23E+11
B-056	NA
B-057	1.14E+08
B-059	NA
B-062	7.66E+10
B-088	NA
B-095	7.60E+10
B-100	NA
B-103	NA
B-119	NA
B-126	1.56E+10
B-128	NA
B-133	7.60E+10
B-159	3.94E+07
B-191	NA
B-211	NA
B-221	2.65E+09
B-259	NA
B-277	2.65E+09
B-278	1.78E+10
B-301	NA
B-302	3.63E+08
B-323	NA
B-325	NA
B-326	3.94E+07
B-330	NA
B-331	7.90E+10

Table 5-2 Continued.

Waterbody ID	Existing Wasteload (counts/days)
B-334	6.48E+08
BL-001	2.52E+11
BL-005	1.78E+10
BP-001	3.18E+11

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 upper Broad 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 maximum permitted quantity from NPDES facilities and the methods used to develop trendlines of measured violations. A five percent explicit MOS was 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 upper Broad River basin.

The Counties of Cherokee and Spartanburg and several towns in the watershed have or will have NPDES MS4 permits. All the designated areas will eventually be covered under one or more 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.

The MS4 WLAs and LAs for Lawsons Fork Creek at B-221, B-277, B-278, and BL-005, which are expressed as percent reductions, were reduced from 90 %, 87 %, 87 % and 88 % respectively, to 70 % because of the evidence of leaking sewers or sewer overflows into the creek. The station downstream, BL-001, which have not shown the extremely high fecal coliform concentrations, requires reductions in load of 70 %. Therefore it is reasonable to assign the upstream locations of Lawsons Fork Creek the same reductions for the MS4 contributions and nonpoint sources.

Table 5-3 Total Maximum Daily Loads for Impaired Water Quality Stations in the upper Broad River Basin (03050105)

Station ID	Existing WasteLoad	TMDL WLA		Existing Load	TMDL LA	MOS	TMDL[3]	
	Continuous (counts/day)	Continuous[1] (counts/day)	MS4[2] (counts/day)	(counts/day)	(counts/day)	(counts/day)	(counts/day)	Percent Reduction[4]
B-026	1.51E+10	1.51E+10	NA	2.35E+12	1.04E+12	5.89E+10	1.12E+12	52%
B-028	1.63E+10	1.63E+10	74%	9.61E+12	2.34E+12	1.31E+11	2.49E+12	74%
B-042	NA	NA	NA	5.43E+13	1.64E+13	9.12E+11	1.73E+13	68%
B-044	1.34E+11	1.34E+11	NA	4.67E+13	2.06E+13	1.15E+12	2.19E+13	53%
B-048	3.23E+11	3.23E+11	49%	1.17E+13	5.36E+12	3.16E+11	5.99E+12	49%
B-056	NA	NA	NA	1.14E+12	2.61E+11	1.45E+10	2.75E+11	76%
B-057	1.14E+08	1.14E+08	NA	6.52E+12	1.74E+12	9.67E+10	1.84E+12	72%
B-059	NA	NA	NA	3.54E+11	1.01E+11	5.59E+09	1.06E+11	70%
B-062	7.66E+10	7.66E+10	85%	1.20E+13	1.68E+12	9.75E+10	1.85E+12	85%
B-088	NA	NA	NA	2.70E+10	6.33E+09	3.52E+08	6.68E+09	75%
B-095	7.60E+10	7.60E+10	NA	1.13E+12	2.72E+11	1.93E+10	3.67E+11	68%
B-100	NA	NA	NA	2.94E+11	8.98E+10	4.99E+09	9.48E+10	68%
B-103	NA	NA	NA	1.24E+11	4.76E+10	2.65E+09	5.03E+10	59%
B-119	NA	NA	NA	6.83E+12	1.68E+12	9.35E+10	1.78E+12	74%
B-126	1.56E+10	1.56E+10	NA	5.52E+12	1.28E+12	7.18E+10	1.36E+12	75%
B-128	NA	NA	NA	3.41E+11	9.11E+10	5.06E+09	9.62E+10	72%
B-133	7.60E+10	7.60E+10	49%	2.30E+12	1.04E+12	6.22E+10	1.18E+12	49%
B-159	3.94E+07	3.94E+07	NA	2.70E+12	1.34E+12	7.45E+10	1.41E+12	48%
B-191	NA	NA	69%	6.15E+10	1.82E+10	1.01E+09	1.93E+10	69%
B-211	NA	NA	NA	2.18E+11	3.85E+10	2.14E+09	4.06E+10	81%
B-221	2.65E+09	2.65E+09	70%	5.75E+11	4.99E+10	2.92E+09	5.55E+10	70%
B-259	NA	NA	NA	3.54E+11	4.68E+10	2.60E+09	4.94E+10	86%
B-277	2.65E+09	2.65E+09	70%	5.04E+11	5.76E+10	3.35E+09	6.36E+10	70%
B-278	1.78E+10	1.78E+10	70%	5.58E+11	5.24E+10	3.90E+09	7.41E+10	70%
B-301	NA	NA	NA	6.57E+10	2.39E+10	1.33E+09	2.53E+10	62%
B-302	3.63E+08	3.63E+08	NA	2.21E+12	6.68E+11	3.71E+10	7.05E+11	68%
B-323	NA	NA	NA	8.96E+10	2.54E+10	1.41E+09	2.68E+10	70%
B-325	NA	NA	NA	2.69E+10	1.29E+10	7.16E+08	1.36E+10	49%
B-326	3.94E+07	3.94E+07	NA	3.00E+10	1.04E+10	5.77E+08	1.10E+10	63%
B-330	NA	NA	NA	7.40E+10	2.44E+10	1.35E+09	2.57E+10	65%
B-331	7.90E+10	7.90E+10	73%	1.51E+13	3.74E+12	2.12E+11	4.04E+12	73%
B-334	6.48E+08	6.48E+08	NA	8.02E+11	2.41E+11	1.34E+10	2.56E+11	68%
BL-001	2.52E+11	2.52E+11	70%	1.45E+13	3.88E+12	2.29E+11	4.36E+12	70%
BL-005	1.78E+10	1.78E+10	70%	3.21E+12	3.62E+11	2.11E+10	4.00E+11	70%
BP-001	3.18E+11	3.18E+11	77%	1.94E+13	3.95E+12	2.37E+11	4.51E+12	77%

Table Notes:

1. Total monthly wasteload cannot exceed loads listed in Table 3-4.
2. MS4 expressed as percent reduction equal to LA reduction.
3. TMDLs expressed as monthly load by station are listed in Table B-1.
4. Percent reduction applies to LA and MS4 components.

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 upper Broad River watershed. Local sources of nonpoint source education and assistance include Clemson Extension Service, the Natural Resource Conservation Service (NRCS), the Greenville, Spartanburg, Cherokee, York, 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 upper Broad River 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 upper Broad 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 upper Broad River watershed in order to bring about the necessary reductions in fecal coliform bacteria loading to the Broad River in South Carolina. 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 in the upper Broad River Basin

Monitoring Station ID	Aggregated Land Use Class					
	Urban	Barren	Row Crop	Pasture	Forest	Water
USGS 02153500	3.8%	0.6%	10.4%	13.0%	71.7%	0.5%
USGS 02153780	0.8%	0.0%	4.1%	5.6%	89.2%	0.4%
USGS 02153800	0.6%	1.1%	9.3%	7.2%	81.4%	0.3%
USGS 02155600	0.2%	0.0%	30.2%	29.3%	40.0%	0.2%
USGS 02156000	5.2%	0.3%	15.6%	14.9%	62.7%	1.4%
USGS 02156050	19.6%	0.1%	26.3%	14.6%	39.0%	0.4%
USGS 02156300	26.8%	0.1%	19.2%	14.1%	39.3%	0.4%
USGS 021556525	4.2%	0.3%	15.6%	14.4%	63.9%	1.6%
B-026	7.1%	0.1%	6.4%	10.2%	75.8%	0.4%
B-028	4.5%	0.3%	12.7%	11.7%	69.2%	1.5%
B-042	3.4%	0.6%	9.3%	11.7%	74.6%	0.3%
B-044	3.9%	0.9%	10.4%	12.6%	71.7%	0.6%
B-048	8.2%	0.7%	14.5%	13.0%	62.6%	1.0%
B-056	9.8%	0.6%	20.4%	26.3%	41.5%	1.3%
B-057	6.8%	0.5%	18.9%	23.4%	49.0%	1.4%
B-059	20.1%	0.5%	18.4%	17.0%	43.6%	0.5%
B-062	3.2%	3.3%	10.9%	11.0%	71.1%	0.5%
B-088	53.2%	0.8%	5.9%	2.7%	37.4%	0.1%
B-095	5.7%	0.5%	15.2%	20.8%	56.8%	1.0%
B-099A	0.1%	0.0%	0.3%	0.5%	99.1%	0.1%
B-099B	0.1%	0.0%	0.3%	0.5%	99.1%	0.1%
B-100	28.5%	0.6%	14.3%	11.8%	44.7%	0.1%
B-103	11.0%	0.1%	10.5%	9.3%	69.0%	0.1%
B-113	2.9%	0.7%	18.2%	13.1%	62.2%	2.9%
B-119	6.8%	0.5%	19.2%	23.9%	48.2%	1.4%
B-126	6.0%	0.1%	8.0%	11.0%	74.5%	0.4%
B-128	13.8%	0.1%	12.6%	14.7%	58.4%	0.3%
B-133	4.1%	0.4%	13.3%	14.9%	66.6%	0.7%
B-159	0.6%	1.1%	10.0%	7.7%	80.2%	0.3%
B-163A	4.3%	0.3%	16.0%	15.3%	62.7%	1.5%
B-191	32.7%	0.1%	10.4%	4.5%	52.3%	0.0%
B-211	59.4%	1.1%	3.3%	9.0%	27.2%	0.0%
B-221	20.5%	0.1%	25.7%	15.4%	38.0%	0.3%
B-259	0.2%	0.0%	30.2%	29.3%	40.0%	0.2%
B-277	20.4%	0.1%	25.9%	15.7%	37.6%	0.4%
B-278	19.1%	0.1%	25.4%	15.6%	39.5%	0.4%

Table A-1 (Continued)

Monitoring Station ID	Aggregated Land Use Class					
	Urban	Barren	Row Crop	Pasture	Forest	Water
USGS 02153500	3.8%	0.6%	10.4%	13.0%	71.7%	0.5%
USGS 02153780	0.4%	0.0%	4.7%	7.9%	86.9%	0.1%
USGS 02153800	0.6%	1.6%	11.3%	7.9%	78.3%	0.3%
USGS 02155600	0.2%	0.0%	30.2%	29.3%	40.0%	0.2%
USGS 02156000	5.2%	0.3%	15.6%	14.9%	62.7%	1.4%
USGS 02156050	11.7%	0.1%	30.3%	4.6%	52.7%	0.6%
USGS 02156300	26.8%	0.1%	19.2%	14.1%	39.3%	0.4%
USGS 021556525	0.2%	0.1%	16.5%	12.5%	65.2%	5.6%
B-026	7.1%	0.1%	6.4%	10.2%	75.8%	0.4%
B-028	4.5%	0.3%	12.7%	11.7%	69.2%	1.5%
B-042	3.4%	0.6%	9.3%	11.7%	74.6%	0.3%
B-044	3.9%	0.9%	10.4%	12.6%	71.7%	0.6%
B-048	8.2%	0.7%	14.5%	13.0%	62.6%	1.0%
B-056	9.8%	0.6%	20.4%	26.3%	41.5%	1.3%
B-057	6.8%	0.5%	18.9%	23.4%	49.0%	1.4%
B-059	20.1%	0.5%	18.4%	17.0%	43.6%	0.5%
B-062	3.2%	3.3%	10.9%	11.0%	71.1%	0.5%
B-088	53.2%	0.8%	5.9%	2.7%	37.4%	0.1%
B-095	5.7%	0.5%	15.2%	20.8%	56.8%	1.0%
B-099A	0.1%	0.0%	0.3%	0.5%	99.1%	0.1%
B-099B	0.1%	0.0%	0.3%	0.5%	99.1%	0.1%
B-100	28.5%	0.6%	14.3%	11.8%	44.7%	0.1%
B-103	11.0%	0.1%	10.5%	9.3%	69.0%	0.1%
B-113	2.9%	0.7%	18.2%	13.1%	62.2%	2.9%
B-119	6.8%	0.5%	19.2%	23.9%	48.2%	1.4%
B-126	6.0%	0.1%	8.0%	11.0%	74.5%	0.4%
B-128	13.8%	0.1%	12.6%	14.7%	58.4%	0.3%
B-133	4.1%	0.4%	13.3%	14.9%	66.6%	0.7%
B-159	0.6%	1.1%	10.0%	7.7%	80.2%	0.3%
B-163A	4.3%	0.3%	16.0%	15.3%	62.7%	1.5%
B-191	32.7%	0.1%	10.4%	4.5%	52.3%	0.0%
B-211	59.4%	1.1%	3.3%	9.0%	27.2%	0.0%
B-221	20.5%	0.1%	25.7%	15.4%	38.0%	0.3%
B-259	0.2%	0.0%	30.2%	29.3%	40.0%	0.2%
B-277	20.4%	0.1%	25.9%	15.7%	37.6%	0.4%
B-278	19.1%	0.1%	25.4%	15.6%	39.5%	0.4%
B-301	25.8%	0.0%	8.5%	8.3%	57.4%	0.0%
B-302	2.1%	1.0%	17.2%	12.4%	66.9%	0.3%
B-323	13.6%	1.9%	7.3%	11.8%	65.2%	0.3%
B-325	2.5%	0.1%	4.0%	2.4%	90.7%	0.2%
B-326	0.0%	0.0%	0.5%	0.0%	99.5%	0.0%
B-330	0.6%	12.8%	3.9%	2.7%	79.7%	0.3%
B-331	5.1%	0.3%	15.7%	15.0%	62.5%	1.4%
B-333	3.7%	3.0%	9.3%	7.8%	75.7%	0.5%
B-334	4.7%	3.0%	11.6%	4.6%	75.8%	0.3%
B-339	2.7%	0.7%	18.2%	13.2%	62.9%	2.2%
B-340	2.3%	0.8%	18.2%	12.8%	65.1%	0.8%
B-342	0.2%	0.1%	21.3%	29.4%	46.0%	3.0%
B-343	0.4%	0.3%	19.0%	21.2%	57.7%	1.3%
B-347	4.2%	0.3%	15.6%	14.4%	63.9%	1.6%
B-737	1.3%	0.1%	3.2%	2.4%	92.3%	0.7%
BL-001	9.5%	0.2%	15.9%	14.4%	58.7%	1.2%
BL-005	13.5%	0.1%	24.9%	17.5%	43.5%	0.5%
BP-001	9.4%	0.3%	15.5%	14.1%	59.5%	1.2%

Table A-2 Watershed Area in Square Miles Aggregated by Land Use Class for Areas Draining to Streamflow and Water Quality Monitoring Stations in the upper Broad River Basin

Monitoring Station ID	Aggregated Land Use Class						
	Urban	Barren	Row Crop	Pasture	Forest	Water	Total
	(miles^2)						
USGS 02153500	57	9.3	156	195	1075	7.2	1500
USGS 02153780	0.2	0.0	1.0	1.4	22	0.1	24
USGS 02153800	0.5	1.0	7.9	6.1	69	0.3	85
USGS 02155600	0.0	0.0	3.2	3.1	4.2	0.0	10
USGS 02156000	17	0.9	50	48	202	4.6	322
USGS 02156050	1.3	0.0	1.7	1.0	2.6	0.0	6.6
USGS 02156300	20	0.1	14	11	29	0.3	75
USGS 021556525	11	0.8	42	39	173	4.4	270
B-026	5.7	0.1	5.2	8.2	61	0.3	81
B-028	9.3	0.7	26	24	144	3.2	208
B-042	45	8.3	122	154	984	4.6	1318
B-044	65	14	173	209	1195	9.4	1666
B-048	41	3.6	72	65	314	5.2	501
B-056	2.2	0.1	4.7	6.0	9.5	0.3	23
B-057	12	0.8	33	41	85	2.4	174
B-059	1.8	0.0	1.6	1.5	3.8	0.0	8.8
B-062	5.0	5.1	17	17	110	0.8	155
B-088	0.3	0.0	0.0	0.0	0.2	0.0	0.6
B-095	2	0	5	7	20	0.3	35
B-099A	0.0	0.0	0.0	0.0	5.2	0.0	5.2
B-099B	0.0	0.0	0.0	0.0	5.2	0.0	5.2
B-100	2.2	0.0	1.1	0.9	3.5	0.0	7.9
B-103	0.4	0.0	0.4	0.3	2.5	0.0	3.6
B-113	2.4	0.6	15	11	51	2.4	82
B-119	11	0.8	32	40	81	2.4	168
B-126	5.9	0.1	7.9	11	73	0.4	99
B-128	1.3	0.0	1.1	1.3	5.3	0.0	9.1
B-133	4.1	0.4	13	15	66	0.7	99
B-159	0.6	1.1	10	7.9	82	0.3	102
B-163A	13	0.8	47	45	186	4.5	297
B-191	0.6	0.0	0.2	0.1	1.0	0.0	1.8
B-211	2.0	0.0	0.1	0.3	0.9	0.0	3.4
B-221	0.9	0.0	1.2	0.7	1.8	0.0	4.6
B-259	0.7	0.0	0.8	0.6	1.8	0.0	3.9
B-277	1.2	0.0	1.6	0.9	2.3	0.0	6.0
B-278	1.3	0.0	1.8	1.1	2.8	0.0	7.0
B-301	0.5	0.0	0.2	0.2	1.2	0.0	2.1
B-302	1.2	0.6	10	6.9	37	0.2	56
B-323	0.3	0.0	0.2	0.3	1.7	0.0	2.5
B-325	0.1	0.0	0.1	0.1	2.3	0.0	2.6
B-326	0.0	0.0	0.0	0.0	2.1	0.0	2.1
B-330	0.0	0.6	0.2	0.1	3.9	0.0	4.8
B-331	16	0.9	50	48	199	4.6	318
B-333	2.3	1.8	5.7	4.8	46	0.3	61
B-334	0.9	0.6	2.1	0.8	14	0.0	18
B-339	2.1	0.6	14	10	50	1.8	79

Table B-2 (Continued)

Monitoring Station ID	Aggregated Land Use Class						
	Urban	Barren	Row Crop	Pasture	Forest	Water	Total
	(miles^2)						
USGS 02153500	57	9.3	156	195	1075	7.2	1500
USGS 02153780	0.2	0.0	1.0	1.4	22	0.1	24
USGS 02153800	0.5	1.0	7.9	6.1	69	0.3	85
USGS 02155600	0.0	0.0	3.2	3.1	4.2	0.0	10
USGS 02156000	17	0.9	50	48	202	4.6	322
USGS 02156050	1.3	0.0	1.7	1.0	2.6	0.0	6.6
USGS 02156300	20	0.1	14	11	29	0.3	75
USGS 021556525	11	0.8	42	39	173	4.4	270
B-026	5.7	0.1	5.2	8.2	61	0.3	81
B-028	9.3	0.7	26	24	144	3.2	208
B-042	45	8.3	122	154	984	4.6	1318
B-044	65	14	173	209	1195	9.4	1666
B-048	41	3.6	72	65	314	5.2	501
B-056	2.2	0.1	4.7	6.0	9.5	0.3	23
B-057	12	0.8	33	41	85	2.4	174
B-059	1.8	0.0	1.6	1.5	3.8	0.0	8.8
B-062	5.0	5.1	17	17	110	0.8	155
B-088	0.3	0.0	0.0	0.0	0.2	0.0	0.6
B-095	2	0	5	7	20	0.3	35
B-099A	0.0	0.0	0.0	0.0	5.2	0.0	5.2
B-099B	0.0	0.0	0.0	0.0	5.2	0.0	5.2
B-100	2.2	0.0	1.1	0.9	3.5	0.0	7.9
B-103	0.4	0.0	0.4	0.3	2.5	0.0	3.6
B-113	2.4	0.6	15	11	51	2.4	82
B-119	11	0.8	32	40	81	2.4	168
B-126	5.9	0.1	7.9	11	73	0.4	99
B-128	1.3	0.0	1.1	1.3	5.3	0.0	9.1
B-133	4.1	0.4	13	15	66	0.7	99
B-159	0.6	1.1	10	7.9	82	0.3	102
B-163A	13	0.8	47	45	186	4.5	297
B-191	0.6	0.0	0.2	0.1	1.0	0.0	1.8
B-211	2.0	0.0	0.1	0.3	0.9	0.0	3.4
B-221	0.9	0.0	1.2	0.7	1.8	0.0	4.6
B-259	0.7	0.0	0.8	0.6	1.8	0.0	3.9
B-277	1.2	0.0	1.6	0.9	2.3	0.0	6.0
B-278	1.3	0.0	1.8	1.1	2.8	0.0	7.0
B-301	0.5	0.0	0.2	0.2	1.2	0.0	2.1
B-302	1.2	0.6	10	6.9	37	0.2	56
B-323	0.3	0.0	0.2	0.3	1.7	0.0	2.5
B-325	0.1	0.0	0.1	0.1	2.3	0.0	2.6
B-326	0.0	0.0	0.0	0.0	2.1	0.0	2.1
B-330	0.0	0.6	0.2	0.1	3.9	0.0	4.8
B-331	16	0.9	50	48	199	4.6	318
B-333	2.3	1.8	5.7	4.8	46	0.3	61
B-334	0.9	0.6	2.1	0.8	14	0.0	18
B-339	2.1	0.6	14	10	50	1.8	79
B-340	1.5	0.6	12	8.6	44	0.5	67
B-342	0.0	0.0	1.3	1.8	2.9	0.2	6.3
B-343	0.0	0.0	0.0	0.0	0.1	0.0	0.2
B-347	11	0.8	42	39	172	4.4	270
B-737	0.1	0.0	0.3	0.2	9.3	0.1	10
BL-001	39	1.0	66	60	243	5.0	413
BL-005	5.1	0.0	9.5	6.6	17	0.2	38

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

B-026	
Date	Result
01/03/90	40
02/08/90	154
03/01/90	225
04/05/90	118
05/29/90	8800
06/14/90	760
07/31/90	500
08/28/90	580
09/21/90	2000
10/12/90	23000
11/02/90	220
12/07/90	780
01/02/91	780
02/01/91	170
03/01/91	220
04/04/91	240
05/22/91	540
06/13/91	680
07/24/91	820
08/22/91	290
09/12/91	590
10/25/91	680
11/14/91	200
12/05/91	520
01/02/92	310
02/14/92	500
03/02/92	230
04/06/92	75
05/12/92	590
06/05/92	1100
07/09/92	220
08/03/92	760
09/01/92	310
10/01/92	360

B-026	
Date	Result
11/24/92	300
12/10/92	480
01/08/93	5300
02/04/93	210
03/02/93	100
04/08/93	100
05/14/93	390
06/18/93	390
07/30/93	580
08/26/93	280
09/16/93	440
10/14/93	250
11/04/93	150
12/08/93	200
01/13/94	680
02/02/94	160
03/08/94	100
04/14/94	800
05/19/94	250
06/24/94	3400
07/13/94	680
08/10/94	1300
10/15/94	400
10/26/94	100
11/17/94	200
12/15/94	250
01/26/95	280
02/15/95	490
03/16/95	260
04/20/95	3600
05/11/95	360
06/26/95	5800
07/31/95	550
08/31/95	1300

B-026	
Date	Result
09/12/95	2400
10/19/95	1100
11/08/95	2600
12/07/95	2000
01/18/96	410
02/07/96	200
03/14/96	240
04/12/96	57
05/23/96	310
06/13/96	1100
07/17/96	980
08/23/96	740
09/18/96	920
10/14/96	280
11/22/96	500
12/05/96	250
01/14/97	30
02/06/97	380
03/05/97	63
04/01/97	220
05/02/97	200
06/26/97	620
07/02/97	530
08/12/97	200
09/17/97	460
10/24/97	400
11/20/97	140
01/22/98	280
02/13/98	94
03/06/98	180
04/03/98	240
05/07/98	600
06/04/98	1500
07/22/98	420

B-026	
Date	Result
08/13/98	1000
09/17/98	520
10/20/98	470
11/17/98	860
12/10/98	1000
01/06/99	180
02/04/99	330
03/25/99	120
04/21/99	210
05/05/99	380
06/10/99	450
07/15/99	880
08/05/99	430
09/14/99	440
10/20/99	470
11/10/99	390
12/01/99	520
01/12/00	540
02/09/00	220
03/09/00	560
04/25/00	980
05/18/00	300
06/08/00	590
07/13/00	1800
08/17/00	430
09/13/00	360
10/19/00	2500
11/16/00	540
12/12/00	190
09/10/01	480
11/05/01	290

Table A-3 (Continued)

B-028	
Date	Result
05/29/90	4500
06/14/90	510
07/31/90	290
08/28/90	520
09/21/90	410
10/12/90	95000
05/22/91	280
06/13/91	200
07/24/91	280
08/22/91	330
09/12/91	290
10/25/91	310
05/14/93	200
06/18/93	170
07/30/93	300
08/26/93	270
09/16/93	570
10/14/93	300
05/19/94	180
06/24/94	220
07/13/94	620
08/10/94	460
10/15/94	270
11/17/94	160
12/15/94	87
01/26/95	64
02/15/95	80
03/16/95	220
04/20/95	5100
05/11/95	3800
06/26/95	2900
07/31/95	320
08/31/95	600
09/12/95	5000
10/19/95	250
05/23/96	200

B-028	
Date	Result
06/13/96	280
07/17/96	600
08/23/96	200
09/18/96	520
10/14/96	120
05/15/97	140
06/19/97	150
07/25/97	2500
08/22/97	260
09/12/97	260
10/09/97	260
05/05/98	190
06/26/98	260
08/19/98	1000
10/20/98	210
11/17/98	280
12/10/98	83
01/06/99	120
02/04/99	120
03/25/99	45
04/21/99	120
05/26/99	240
06/21/99	110
06/21/99	110
07/26/99	100
08/23/99	70
09/21/99	150
10/05/99	7200
05/18/00	96
06/08/00	180
07/13/00	1500
08/17/00	100
09/13/00	190
10/19/00	83

Table A-3 (Continued)

B-042	
Date	Result
01/29/90	70
02/21/90	780
03/19/90	1300
04/04/90	130
05/14/90	190
06/27/90	340
07/10/90	20
08/30/90	310
09/24/90	2700
10/29/90	190
11/06/90	230
12/11/90	410
01/07/91	130
02/27/91	60
03/18/91	70
04/15/91	3300
05/08/91	170
06/05/91	280
07/08/91	120
08/07/91	2000
09/26/91	2000
10/28/91	20
11/26/91	40
12/17/91	460
01/16/92	120
02/03/92	40
03/05/92	140
04/02/92	120
05/13/92	270
06/09/92	400
07/29/92	100
08/13/92	50
09/09/92	160
10/15/92	420

B-042	
Date	Result
11/19/92	410
12/03/92	2300
01/26/93	240
02/17/93	1100
03/25/93	2500
04/29/93	90
05/06/93	1900
06/24/93	90
07/29/93	700
08/24/93	1200
09/29/93	450
10/26/93	1100
11/02/93	100
12/15/93	1300
01/27/94	200
02/02/94	240
03/23/94	170
04/21/94	2800
05/25/94	60
06/14/94	2900
07/26/94	1200
08/24/94	5200
09/20/94	580
10/12/94	720
11/22/94	7600
12/08/94	290
02/21/95	140
03/29/95	310
04/06/95	130
05/17/95	420
07/27/95	80
08/08/95	210
09/27/95	1200
10/25/95	270

B-042	
Date	Result
11/02/95	450
12/07/95	220
01/30/96	280
02/27/96	90
03/06/96	16000
04/11/96	50
05/16/96	70
06/05/96	2100
09/04/96	510
11/12/96	220
12/04/96	390
01/14/97	120
02/27/97	100
03/20/97	1000
04/08/97	480
05/12/97	90
06/24/97	220
07/08/97	20
07/09/97	40
10/28/97	4100
11/20/97	70
12/11/97	230
1/8/1998	13000
2/5/1998	760
3/11/1998	380
4/1/1998	260
5/26/1998	70
6/23/1998	430
7/28/1998	3800
8/25/1998	60
9/22/1998	20
10/13/1998	150
11/12/1998	80
1/27/1999	260

B-042	
Date	Result
2/17/1999	50
3/24/1999	150
4/1/1999	2100
5/25/1999	20
6/7/1999	31
7/6/1999	97
8/11/1999	110
9/22/1999	120
10/4/1999	30
11/3/1999	*Present >QL
12/7/1999	840
12/15/1999	430
1/20/2000	80
2/24/2000	30
3/22/2000	480
4/24/2000	30
5/1/2000	110
6/8/2000	15
7/12/2000	30
8/2/2000	200
9/27/2000	80
10/11/2000	150
11/2/2000	10
12/28/2000	23
1/23/2001	120
2/28/2001	90
3/6/2001	40
4/10/2001	110
5/8/2001	15
8/30/2001	5
9/12/2001	140
10/24/2001	18
11/20/2001	16
12/6/2001	73

Table A-3 (Continued)

B-044	
Date	Result
01/29/90	130
02/21/90	550
03/19/90	1200
04/04/90	310
05/21/90	70
06/27/90	17
07/11/90	46
08/13/90	50
09/06/90	46
10/31/90	100
11/06/90	59
12/11/90	100
01/07/91	800
02/26/91	40
03/18/91	140
04/15/91	360
05/28/91	210
06/06/91	90
07/09/91	70
08/29/91	2000
09/30/91	70
10/30/91	80
11/26/91	140
12/17/91	100
01/16/92	170
03/05/92	100
04/02/92	90
05/26/92	90
06/09/92	170
07/21/92	50
08/13/92	350
10/15/92	70
11/19/92	410
12/02/92	120

B-044	
Date	Result
02/17/93	410
03/25/93	2900
04/29/93	170
05/06/93	3000
06/16/93	150
08/04/93	30
08/19/93	30
09/22/93	40
10/07/93	450
11/02/93	180
12/16/93	280
01/27/94	110
02/02/94	50
03/17/94	30
04/21/94	70
05/18/94	30
06/23/94	30
07/14/94	250
08/17/94	6000
09/27/94	1600
10/06/94	40
11/22/94	70
12/08/94	310
02/21/95	560
03/30/95	150
04/06/95	40
05/03/95	2100
06/27/95	720
07/26/95	170
08/09/95	130
09/27/95	210
10/11/95	200
11/02/95	2200
12/07/95	9

B-044	
Date	Result
01/30/96	220
02/27/96	30
03/06/96	2400
04/11/96	20
05/23/96	10
07/02/96	27
09/05/96	1100
11/12/96	150
12/04/96	410
01/14/97	130
02/27/97	30
03/20/97	660
04/08/97	1600
05/13/97	50
06/23/97	30
07/22/97	2300
08/28/97	50
09/09/97	10
10/27/97	3300
11/20/97	30
12/11/97	90
1/8/1998	8000
2/5/1998	780
3/11/1998	320
4/1/1998	80
5/26/1998	80
7/27/1998	310
8/26/1998	90
9/21/1998	60
10/12/1998	40
11/10/1998	30
12/10/1998	52
1/26/1999	680
2/3/1999	2900

B-044	
Date	Result
3/23/1999	760
4/6/1999	20
5/27/1999	50
6/10/1999	23
7/13/1999	87
8/12/1999	29
9/21/1999	56
10/5/1999	70
11/3/1999	160
12/7/1999	250
1/20/2000	10
2/24/2000	5
3/22/2000	820
4/24/2000	10
5/10/2000	20
6/28/2000	60
7/10/2000	25
8/10/2000	80
9/7/2000	45
10/10/2000	50
11/2/2000	50
12/28/2000	10
1/23/2001	310
2/28/2001	420
3/7/2001	35
4/10/2001	20
5/8/2001	24
8/30/2001	120
9/12/2001	80
10/24/2001	33
11/20/2001	24
12/5/2001	18

Table A-3 (Continued)

B-048	
Date	Result
01/29/90	780
02/21/90	710
03/19/90	3100
04/04/90	330
05/21/90	170
06/27/90	330
07/11/90	580
08/13/90	180
09/06/90	550
10/31/90	470
11/06/90	380
12/11/90	370
01/07/91	1200
02/26/91	360
03/18/91	110
04/15/91	3100
05/28/91	410
06/06/91	480
07/09/91	740
08/29/91	1100
09/30/91	410
10/30/91	500
11/26/91	340
12/17/91	300
01/16/92	370
03/05/92	140
04/02/92	200
05/26/92	480
06/09/92	380
07/21/92	220
08/13/92	420
10/15/92	210
11/19/92	380
12/02/92	200

B-048	
Date	Result
02/17/93	1200
03/25/93	1500
04/29/93	80
05/06/93	1100
06/16/93	120
08/04/93	520
08/19/93	140
09/22/93	330
10/07/93	160
11/02/93	550
12/16/93	380
01/27/94	70
02/02/94	10
03/17/94	50
04/21/94	90
05/18/94	150
06/23/94	120
07/14/94	540
08/17/94	6000
09/27/94	1100
10/06/94	320
11/22/94	1100
12/08/94	380
02/21/95	340
03/29/95	130
04/06/95	110
05/03/95	340
06/27/95	220
07/26/95	290
08/09/95	250
09/27/95	230
10/11/95	180
11/02/95	2000
12/07/95	210

B-048	
Date	Result
01/30/96	490
02/27/96	70
03/06/96	4100
04/11/96	50
05/23/96	130
07/02/96	60
09/05/96	3000
11/12/96	320
12/04/96	430
01/14/97	330
02/27/97	180
03/20/97	360
04/08/97	160
05/13/97	190
06/23/97	110
07/22/97	3300
08/28/97	360
09/09/97	260
10/27/97	3300
11/20/97	120
12/11/97	280
1/8/1998	3200
2/5/1998	500
3/11/1998	800
4/1/1998	140
5/26/1998	470
7/27/1998	590
8/26/1998	210
9/21/1998	340
10/12/1998	640
11/10/1998	120
12/10/1998	200
1/26/1999	340
2/3/1999	1900

B-048	
Date	Result
3/23/1999	200
4/6/1999	160
5/27/1999	150
6/10/1999	50
7/13/1999	410
8/12/1999	200
9/22/1999	1400
10/5/1999	3300
11/3/1999	920
12/7/1999	2000
1/20/2000	150
2/24/2000	90
3/22/2000	1400
4/24/2000	60
5/10/2000	110
7/10/2000	120
8/10/2000	370
9/7/2000	410
10/10/2000	340
11/2/2000	180
12/28/2000	80
1/23/2001	120
2/28/2001	120
3/8/2001	30
4/10/2001	84
5/8/2001	90
8/30/2001	190
9/12/2001	290
10/24/2001	65
11/20/2001	160
12/5/2001	140

Table A-3 (Continued)

B-056	
Date	Result
05/14/90	650
06/27/90	780
07/10/90	1600
08/30/90	2000
09/24/90	6600
10/29/90	80
05/08/91	10200
06/05/91	380
07/08/91	20
08/07/91	210
09/26/91	3380
10/28/91	760
05/13/92	1000
06/09/92	3400
07/29/92	1100
08/13/92	2000
09/09/92	1200
10/15/92	220
05/06/93	4800
06/24/93	440
07/29/93	1700
08/24/93	540
09/29/93	680
10/26/93	430
05/25/94	920
06/14/94	800
07/26/94	860
08/24/94	880
09/20/94	1500
10/12/94	2100
11/22/94	1000
12/08/94	560
02/21/95	360
04/06/95	290
04/12/95	1800
05/17/95	560
06/27/95	1200
07/27/95	1200
08/08/95	680
09/27/95	180
10/25/95	840
05/16/96	3300
06/05/96	2500

B-056	
Date	Result
09/04/96	3300
05/12/97	560
06/24/97	490
07/08/97	190
07/09/97	280
10/28/97	1000
5/26/1998	580
6/22/1998	1100
7/28/1998	630
8/25/1998	380
9/22/1998	2200
10/13/1998	960
11/12/1998	240
12/15/1998	260
1/27/1999	180
2/17/1999	310
3/24/1999	700
4/1/1999	2600
5/25/1999	80
6/7/1999	80
7/6/1999	*Present >QL
8/11/1999	*Present >QL
9/20/1999	140
10/4/1999	6600
5/1/2000	220
6/8/2000	60
7/12/2000	2600
8/2/2000	110
9/27/2000	210
10/9/2000	100
1/23/2001	410
2/28/2001	140
3/7/2001	60
4/10/2001	230
5/8/2001	400
8/30/2001	150
9/12/2001	160
10/24/2001	370
11/20/2001	350
12/6/2001	160

Table A-3 (Continued)

B-057	
Date	Result
05/14/90	370
06/27/90	390
07/10/90	4400
08/30/90	570
09/24/90	360
10/29/90	350
05/07/91	1000
06/05/91	630
07/08/91	50
08/07/91	340
09/26/91	6600
10/28/91	60
05/13/92	480
06/09/92	6600
07/29/92	110
08/13/92	3300
09/09/92	500
10/15/92	140
05/06/93	1100
06/24/93	340
07/29/93	280
08/24/93	600
09/29/93	180
10/26/93	180
05/25/94	120
06/14/94	420
07/26/94	160
08/24/94	480
09/20/94	580
10/12/94	1800
11/22/94	920
12/08/94	100
02/21/95	460
04/06/95	90
04/12/95	300
05/17/95	380
07/27/95	560
08/08/95	720
09/27/95	3300
10/25/95	360
05/16/96	190

B-057	
Date	Result
06/05/96	3300
09/04/96	3100
05/12/97	170
06/24/97	220
07/08/97	320
09/08/97	110
10/28/97	1800
5/26/1998	170
6/24/1998	550
7/28/1998	3500
8/25/1998	220
9/22/1998	1000
10/13/1998	1000
11/12/1998	90
1/27/1999	180
2/17/1999	300
3/24/1999	60
4/1/1999	*Present >QL
5/25/1999	240
6/7/1999	430
7/6/1999	9200
8/11/1999	*Present >QL
9/22/1999	310
10/4/1999	3300
12/15/1999	360
5/2/2000	210
6/8/2000	130
7/12/2000	6900
8/2/2000	160
9/27/2000	350
10/11/2000	240
2/28/2001	180
3/6/2001	90
4/10/2001	140
5/8/2001	85
8/30/2001	100
9/12/2001	140
10/24/2001	70
11/20/2001	210
12/6/2001	82

Table A-3 (Continued)

B-059	
Date	Result
05/21/90	200
06/27/90	530
07/11/90	1200
08/13/90	320
09/05/90	540
10/31/90	340
05/09/91	200
06/06/91	700
07/09/91	2300
08/29/91	1700
09/30/91	520
10/30/91	1100
05/26/92	140
06/09/92	1320
07/21/92	860
08/13/92	3300
09/09/92	360
10/15/92	210
05/06/93	600
06/16/93	780
08/04/93	2600
08/19/93	760
09/22/93	510
10/07/93	450
05/18/94	520
06/23/94	8100
07/14/94	1100
08/17/94	7200
09/27/94	3200
10/06/94	560
05/03/95	420

B-059	
Date	Result
06/27/95	800
07/26/95	340
08/09/95	700
09/27/95	460
10/11/95	110
05/23/96	1600
07/02/96	350
09/05/96	3800
05/13/97	140
06/23/97	1100
07/22/97	3300
08/28/97	600
09/09/97	170
10/27/97	2200
5/26/1998	330
7/27/1998	6600
8/26/1998	520
9/21/1998	700
10/12/1998	880
5/27/1999	460
6/10/1999	330
7/8/1999	1000
8/12/1999	260
9/22/1999	5500
10/5/1999	1500
5/10/2000	210
6/28/2000	230
7/10/2000	440
8/10/2000	4000
9/7/2000	6600
10/9/2000	700

Table A-3 (Continued)

B-062	
Date	Result
05/21/90	210
06/27/90	380
07/11/90	400
08/13/90	320
09/06/90	500
10/31/90	140
05/28/91	190
06/06/91	490
07/09/91	170
08/29/91	440
09/30/91	180
10/30/91	160
05/26/92	210
06/09/92	490
07/21/92	760
08/13/92	2500
10/15/92	110
05/06/93	2000
06/16/93	180
08/04/93	200
08/19/93	250
09/22/93	550
10/07/93	350
05/18/94	150
06/23/94	170
07/14/94	960
08/17/94	4300
09/27/94	1400
10/06/94	260
11/22/94	560
12/08/94	140
02/21/95	140
03/30/95	120
04/06/95	60
05/03/95	900
06/27/95	200
07/26/95	230
08/09/95	390
09/27/95	350
10/11/95	190
05/23/96	170

B-062	
Date	Result
07/02/96	360
09/05/96	4300
05/13/97	80
06/23/97	290
07/22/97	280
08/28/97	430
09/09/97	400
10/27/97	3300
5/26/1998	220
7/27/1998	390
8/26/1998	490
9/21/1998	430
10/12/1998	450
11/10/1998	180
12/10/1998	200
1/26/1999	300
2/3/1999	720
3/23/1999	0
4/6/1999	120
5/27/1999	420
6/10/1999	290
7/13/1999	450
8/12/1999	160
9/22/1999	1500
10/5/1999	2200
5/10/2000	200
6/28/2000	180
7/10/2000	90
8/10/2000	400
9/7/2000	170
10/10/2000	230
1/23/2001	140
2/28/2001	120
3/8/2001	60
4/10/2001	75
5/8/2001	74
8/30/2001	140
9/12/2001	370
10/24/2001	100
11/20/2001	160
12/5/2001	160

Table A-3 (Continued)

B-088	
Date	Result
05/14/90	140
06/27/90	160
07/10/90	290
08/30/90	820
09/24/90	260
10/29/90	190
05/07/91	380
06/05/91	160
07/08/91	130
08/07/91	1000
09/26/91	2100
10/28/91	170
05/13/92	40
06/09/92	360
07/29/92	160
08/13/92	3300
09/09/92	580
10/15/92	270
05/06/93	60
06/24/93	30
07/29/93	310
08/24/93	470
09/29/93	130
10/26/93	370
05/25/94	170
06/14/94	310
07/26/94	310
08/24/94	380
09/20/94	140
10/12/94	640
05/17/95	780

B-088	
Date	Result
07/27/95	300
08/08/95	1000
09/27/95	180
10/25/95	2800
05/16/96	120
06/05/96	180
09/04/96	3300
05/12/97	80
06/24/97	320
07/08/97	660
09/08/97	250
10/28/97	420
5/26/1998	520
6/23/1998	890
7/28/1998	1700
8/25/1998	360
9/22/1998	2800
10/13/1998	160
5/25/1999	3100
6/7/1999	3300
7/6/1999	1200
8/11/1999	*Present >QL
9/21/1999	1500
10/4/1999	6600
5/2/2000	100
6/8/2000	2700
7/12/2000	3700
8/2/2000	1000
9/27/2000	360
10/11/2000	420

Table A-3 (Continued)

B-095	
Date	Result
05/21/90	120
06/27/90	200
07/11/90	430
08/13/90	200
09/05/90	200
10/31/90	100
05/09/91	100
06/06/91	1000
07/09/91	6000
08/29/91	3300
09/30/91	270
10/30/91	170
05/26/92	330
06/09/92	3300
07/21/92	3300
08/13/92	10000
10/15/92	80
05/06/93	790
06/16/93	740
08/04/93	660
08/19/93	400
09/22/93	10000
10/07/93	100
05/18/94	270
06/23/94	580
07/14/94	4000
08/17/94	6000
09/27/94	1400
10/06/94	1100
05/03/95	580
06/27/95	2300

B-095	
Date	Result
07/26/95	540
08/09/95	820
09/27/95	280
10/11/95	250
05/23/96	530
07/02/96	250
09/05/96	780
05/13/97	1400
06/23/97	640
07/22/97	3300
08/28/97	270
09/09/97	440
10/27/97	4600
5/26/1998	240
7/27/1998	1300
8/26/1998	380
9/21/1998	2500
10/12/1998	560
5/27/1999	470
6/10/1999	600
7/8/1999	2100
8/12/1999	390
9/22/1999	620
10/5/1999	3300
5/10/2000	260
6/28/2000	250
7/10/2000	250
8/10/2000	1700
9/7/2000	640
10/9/2000	250

Table A-3 (Continued)

B-100	
Date	Result
05/14/90	760
06/27/90	1600
07/10/90	400
08/30/90	350
09/24/90	260
10/29/90	140
05/08/91	1700
06/05/91	600
07/08/91	560
08/07/91	270
09/26/91	3300
10/28/91	120
05/13/92	4600
06/09/92	1400
07/29/92	820
08/13/92	3000
09/09/92	400
10/15/92	460
05/06/93	1300
06/24/93	70
07/29/93	510
08/24/93	310
09/29/93	330
10/26/93	150
05/25/94	300
06/14/94	540
07/26/94	2200
08/24/94	860
09/20/94	95
10/12/94	1200
11/22/94	680
12/08/94	5000
02/21/95	440
04/06/95	90
04/12/95	120
05/17/95	500
06/27/95	320

B-100	
Date	Result
07/27/95	580
08/08/95	420
09/27/95	320
10/25/95	760
05/16/96	130
06/05/96	570
09/04/96	3300
05/12/97	420
06/24/97	170
07/08/97	140
07/09/97	230
10/28/97	1100
5/26/1998	160
6/22/1998	130
7/28/1998	460
8/25/1998	200
9/22/1998	3300
10/13/1998	860
11/12/1998	60
12/15/1998	350
2/17/1999	160
3/24/1999	90
4/1/1999	*Present >QL
5/25/1999	30
6/7/1999	100
7/6/1999	180
8/11/1999	3300
9/20/1999	100
10/4/1999	3300
1/27/1999	200
5/2/2000	70
6/8/2000	140
7/12/2000	3900
8/2/2000	2600
9/27/2000	350
10/11/2000	310

Table A-3 (Continued)

B-103	
Date	Result
05/29/90	16000
06/14/90	170
07/31/90	150
08/28/90	460
09/21/90	280
10/12/90	11000
05/22/91	220
06/13/91	140
07/24/91	350
08/22/91	75
09/12/91	190
10/25/91	260
05/14/93	19
06/18/93	110
07/30/93	360
08/26/93	120
09/16/93	200
10/14/93	45
05/19/94	81
06/24/94	470
07/13/94	210
08/10/94	380
10/15/94	180
11/17/94	71
12/15/94	15
01/26/95	10
02/15/95	30
03/16/95	20
04/20/95	600
05/11/95	1400
06/26/95	650
07/31/95	2600
08/31/95	270
09/12/95	700
10/19/95	110
05/23/96	420

B-103	
Date	Result
06/13/96	160
07/17/96	590
08/23/96	120
09/18/96	490
10/14/96	15
05/15/97	26
06/26/97	470
07/02/97	390
08/12/97	140
09/17/97	120
10/24/97	100
07-May-98	250
04-Jun-98	140
22-Jul-98	200
13-Aug-98	270
17-Sep-98	180
20-Oct-98	140
17-Nov-98	170
10-Dec-98	240
06-Jan-99	50
04-Feb-99	64
25-Mar-99	310
21-Apr-99	490
05-May-99	50
10-Jun-99	160
15-Jul-99	100
05-Aug-99	320
14-Sep-99	290
20-Oct-99	140
18-May-00	120
08-Jun-00	100
13-Jul-00	1100
17-Aug-00	240
13-Sep-00	200
19-Oct-00	230

Table A-3 (Continued)

B-119	
Date	Result
05/14/90	1100
06/27/90	760
07/10/90	11500
08/30/90	550
09/24/90	40
10/29/90	290
05/07/91	370
06/05/91	600
07/08/91	380
08/07/91	380
09/26/91	10000
10/28/91	220
05/13/92	360
06/09/92	6600
07/29/92	140
08/13/92	500
09/09/92	500
10/15/92	170
05/06/93	1500
06/24/93	330
07/29/93	330
08/24/93	520
09/29/93	170
10/26/93	210
05/25/94	170
06/14/94	3300
07/26/94	220
08/24/94	600

B-119	
Date	Result
09/20/94	260
10/12/94	1000
05/17/95	700
07/27/95	560
08/08/95	820
09/27/95	4400
10/25/95	250
05/16/96	170
06/05/96	3300
09/04/96	3300
05/12/97	170
06/24/97	230
07/08/97	600
09/08/97	170
10/28/97	1600
5/25/1999	180
6/7/1999	160
7/6/1999	520
8/11/1999	*Present >QL
9/22/1999	2400
10/4/1999	1400
5/2/2000	130
6/8/2000	110
7/12/2000	3400
8/2/2000	80
9/27/2000	200
10/11/2000	160

Table A-3 (Continued)

B-126	
Date	Result
11/17/94	190
12/15/94	260
01/26/95	250
02/15/95	220
03/16/95	270
04/20/95	19000
05/11/95	2300
06/26/95	9100
07/31/95	460
08/31/95	1700
09/12/95	4000
10/19/95	920
11/17/1998	1500
12/10/1998	400
1/6/1999	170
2/4/1999	400
3/25/1999	70
4/21/1999	10
5/26/1999	150
6/21/1999	150
7/26/1999	180
9/21/1999	290
10/5/1999	7100

Table A-3 (Continued)

B-128	
Date	Result
5/21/1990	820
6/27/1990	1500
7/11/1990	1500
8/13/1990	1000
9/5/1990	1100
10/31/1990	460
5/9/1991	1000
6/6/1991	240
7/9/1991	760
8/29/1991	380
9/30/1991	240
10/30/1991	470
5/26/1992	2500
6/9/1992	2100
7/21/1992	4300
8/13/1992	5400
10/15/1992	900
5/6/1993	1200
6/16/1993	880
8/4/1993	4900
8/19/1993	720
9/22/1993	320
10/7/1993	1000
5/18/1994	370
6/23/1994	510
7/14/1994	2700
8/17/1994	6000
9/27/1994	640
10/6/1994	280
5/3/1995	420
6/27/1995	20

B-128	
Date	Result
7/26/1995	840
8/9/1995	460
9/27/1995	270
10/11/1995	290
5/23/1996	4300
7/2/1996	1500
9/5/1996	3800
5/13/1997	440
6/23/1997	980
7/22/1997	3300
8/28/1997	460
9/9/1997	3200
10/27/1997	1500
5/26/1998	1200
7/27/1998	1300
8/26/1998	1200
9/21/1998	2200
10/12/1998	740
5/27/1999	3300
6/10/1999	2700
7/8/1999	3300
8/23/1999	160
8/12/1999	3200
9/21/1999	820
10/5/1999	1800
8/16/2000	2600
9/7/2000	280
10/10/2000	570
5/10/2000	830
6/28/2000	2000
7/10/2000	1600

Table A-3 (Continued)

B-133	
Date	Result
5/21/1990	260
6/27/1990	740
7/11/1990	400
8/13/1990	170
9/5/1990	460
10/31/1990	160
5/28/1991	620
6/6/1991	1400
7/9/1991	20000
8/29/1991	860
9/30/1991	160
10/30/1991	180
5/26/1992	390
6/9/1992	880
7/21/1992	2200
8/13/1992	3300
10/15/1992	130
5/6/1993	1200
6/16/1993	450
8/4/1993	680
8/19/1993	390
9/22/1993	500
10/7/1993	540
5/18/1994	300
6/23/1994	360
7/14/1994	1400
8/17/1994	6000
9/27/1994	1000
10/6/1994	880
5/3/1995	520

B-133	
Date	Result
6/27/1995	440
7/26/1995	580
8/9/1995	320
9/27/1995	1200
10/11/1995	390
5/23/1996	520
7/2/1996	250
9/5/1996	1000
5/13/1997	120
6/23/1997	310
7/22/1997	6600
8/28/1997	260
9/9/1997	390
10/27/1997	2900
5/26/1998	370
7/27/1998	1000
8/26/1998	580
9/21/1998	2300
10/12/1998	430
5/27/1999	1200
6/10/1999	500
7/13/1999	660
8/12/1999	370
9/21/1999	780
10/5/1999	3300
5/10/2000	330
6/28/2000	240
7/10/2000	200
9/7/2000	450
10/10/2000	410

Table A-3 (Continued)

B-159	
Date	Result
5/21/1990	250
6/27/1990	380
7/11/1990	300
8/13/1990	310
9/6/1990	380
10/31/1990	240
5/28/1991	400
6/6/1991	150
7/9/1991	260
8/29/1991	6600
9/30/1991	510
10/30/1991	200
5/26/1992	260
6/9/1992	3300
7/21/1992	130
8/13/1992	500
10/15/1992	160
5/6/1993	1200
6/16/1993	420
8/4/1993	350
8/19/1993	320
9/22/1993	470
10/7/1993	470
5/18/1994	310
6/23/1994	380
7/14/1994	620
8/17/1994	7100
9/27/1994	360
10/6/1994	200
11/22/1994	500
12/8/1994	100
2/21/1995	100
3/30/1995	90
4/6/1995	280
5/3/1995	920
6/27/1995	620
7/26/1995	860
8/9/1995	380
9/27/1995	860
10/11/1995	320
5/23/1996	370

B-159	
Date	Result
7/2/1996	360
9/5/1996	2100
5/13/1997	310
6/23/1997	370
7/22/1997	290
8/28/1997	520
9/9/1997	41000
10/27/1997	5000
5/26/1998	430
7/27/1998	720
8/26/1998	620
9/21/1998	2100
10/12/1998	330
11/10/1998	420
12/10/1998	290
1/26/1999	380
2/3/1999	540
3/23/1999	760
4/6/1999	360
5/27/1999	600
6/10/1999	260
7/13/1999	460
8/12/1999	1600
9/20/1999	460
10/5/1999	500
5/10/2000	110
6/28/2000	350
7/10/2000	200
8/10/2000	1600
9/7/2000	330
10/10/2000	420
1/23/2001	140
2/28/2001	260
3/7/2001	170
4/10/2001	210
5/8/2001	150
8/30/2001	1100
9/12/2001	410
10/24/2001	540
11/20/2001	320
12/6/2001	220

Table A-3 (Continued)

B-191	
Date	Result
5/10/1990	2200
6/6/1990	200
7/25/1990	10000
8/9/1990	580
9/6/1990	440
10/4/1990	7100
5/3/1991	100
6/3/1991	210
7/19/1991	200
8/9/1991	200
9/12/1991	200
10/2/1991	100
5/19/1993	900
6/9/1993	1800
7/22/1993	210
8/6/1993	300
9/8/1993	1100
10/8/1993	340
5/12/1994	190
6/15/1994	160
7/28/1994	450
8/25/1994	200
9/8/1994	530
10/11/1994	260
5/10/1995	1400
6/22/1995	820
7/24/1995	1300
8/1/1995	2100
9/5/1995	280
10/5/1995	11000

B-191	
Date	Result
5/24/1996	120
6/14/1996	160
7/19/1996	130
8/22/1996	250
9/26/1996	140
5/1/1997	20
6/5/1997	290
7/29/1997	1500
8/20/1997	300
9/10/1997	14000
10/6/1997	280
5/6/1998	50
6/22/1998	220
7/20/1998	260
8/6/1998	200
9/8/1998	560
10/6/1998	190
5/3/1999	5
6/8/1999	110
7/20/1999	260
8/31/1999	410
9/22/1999	620
10/25/1999	30
5/15/2000	76
6/19/2000	150
7/25/2000	1400
8/21/2000	110
9/11/2000	280
10/16/2000	120

Table A-3 (Continued)

B-211	
Date	Result
5/14/1990	10000
6/27/1990	2000
7/10/1990	1900
8/30/1990	1800
9/24/1990	1100
10/29/1990	1800
5/8/1991	5200
6/5/1991	2800
7/8/1991	940
8/7/1991	2700
9/26/1991	10000
10/28/1991	250
5/13/1992	1400
6/9/1992	3300
7/29/1992	980
8/13/1992	3300
9/9/1992	510
10/15/1992	960
5/6/1993	340
6/24/1993	1300
7/29/1993	20000
8/24/1993	260
9/29/1993	440
10/26/1993	240
5/25/1994	1200
6/14/1994	1900
7/26/1994	21000
8/24/1994	2000
9/20/1994	4200
10/12/1994	19000
5/17/1995	1000

B-211	
Date	Result
6/27/1995	1900
7/27/1995	3300
8/8/1995	1100
9/27/1995	580
10/25/1995	1500
5/16/1996	2200
6/5/1996	4000
9/4/1996	3300
5/12/1997	3200
6/24/1997	1100
7/8/1997	240
7/9/1997	250
10/28/1997	1000
5/26/1998	500
6/22/1998	3300
7/28/1998	720
8/25/1998	290
9/22/1998	3600
10/13/1998	460
5/25/1999	450
6/10/1999	6000
7/6/1999	6000
8/11/1999	3300
9/20/1999	180
10/4/1999	6600
5/1/2000	320
6/8/2000	540
7/12/2000	3200
8/2/2000	2600
9/27/2000	540
10/9/2000	260

Table A-3 (Continued)

B-221	
Date	Result
5/29/1990	4000
6/14/1990	11000
7/31/1990	200
8/28/1990	780
9/20/1990	2800
10/12/1990	270000
5/22/1991	15000
6/13/1991	870
7/24/1991	1500
8/22/1991	440
9/12/1991	5900
10/25/1991	140000
5/14/1993	1100
6/18/1993	2900
7/30/1993	2000
8/26/1993	1600
9/16/1993	230
10/14/1993	2100
5/19/1994	480
6/24/1994	2900
7/13/1994	2900
8/10/1994	560
9/15/1994	640
5/11/1995	10000
6/26/1995	13000
7/31/1995	12000
8/31/1995	3200
9/12/1995	420
10/19/1995	1200

B-221	
Date	Result
5/23/1996	8600
6/13/1996	10000
7/17/1996	28000
8/21/1996	10000
9/18/1996	8200
10/14/1996	5300
5/15/1997	640
6/19/1997	1500
7/25/1997	16000
8/22/1997	4000
9/12/1997	4100
10/9/1997	3700
5/5/1998	5200
6/26/1998	4200
8/19/1998	5000
10/20/1998	2700
5/5/1999	2300
6/10/1999	1000
7/15/1999	4300
8/5/1999	830
9/14/1999	540
10/20/1999	600
5/18/2000	2300
6/8/2000	1400
7/13/2000	*Present >QL
8/17/2000	800
9/13/2000	280
10/19/2000	320

Table A-3 (Continued)

B-259	
Date	Result
5/29/1990	2600
6/14/1990	260
7/31/1990	240
8/28/1990	280
9/21/1990	650
10/12/1990	25000
5/22/1991	180
6/13/1991	150
7/24/1991	220
8/22/1991	150
9/12/1991	340
10/25/1991	510
5/14/1993	700
6/18/1993	200
7/30/1993	55000
8/26/1993	170
9/16/1993	560
10/14/1993	1500
5/19/1994	290
6/24/1994	260
7/13/1994	3500
8/10/1994	3600
9/15/1994	600
5/11/1995	550
6/26/1995	2400
7/31/1995	340
8/31/1995	550

B-259	
Date	Result
9/12/1995	1100
10/19/1995	180
5/23/1996	330
6/13/1996	280
7/17/1996	260
8/21/1996	240
9/18/1996	320
10/14/1996	100
5/15/1997	210
6/19/1997	340
7/25/1997	480
8/22/1997	360
9/12/1997	230
10/9/1997	400
10/5/1999	8700
9/21/1999	120
8/23/1999	110
7/26/1999	250
6/21/1999	330
5/26/1999	280
10/19/2000	380
9/13/2000	540
8/17/2000	270
7/13/2000	*Present >QL
6/8/2000	280
5/18/2000	520

Table A-3 (Continued)

B-277	
Date	Result
5/29/1990	3800
6/14/1990	19000
7/31/1990	4300
8/28/1990	760
9/20/1990	660
10/12/1990	300000
5/22/1991	1500
6/13/1991	440
7/24/1991	1600
8/22/1991	740
9/12/1991	1500
10/25/1991	420000
5/14/1993	920
6/18/1993	1800
7/30/1993	2900
8/26/1993	1100
9/16/1993	860
10/14/1993	1400
5/19/1994	640
6/24/1994	3600
7/13/1994	1500
8/10/1994	820
9/15/1994	600
5/11/1995	7100
6/26/1995	3700
7/31/1995	11000
8/31/1995	3300
9/12/1995	700
10/19/1995	960

B-277	
Date	Result
5/23/1996	4600
6/13/1996	7400
7/17/1996	1100
8/21/1996	4500
9/18/1996	4500
10/14/1996	2200
5/15/1997	9000
6/19/1997	3500
7/25/1997	1100
8/22/1997	2200
9/12/1997	1200
10/9/1997	200
5/5/1998	3200
6/26/1998	5000
8/19/1998	4900
9/16/1998	2000
10/20/1998	1100
7/15/1999	1200
8/5/1999	750
9/13/2000	1200
5/5/1999	900
6/10/1999	2000
9/14/1999	670
10/20/1999	1000
5/18/2000	1000
6/8/2000	2200
8/17/2000	2300
10/19/2000	2100

Table A-3 (Continued)

B-278	
Date	Result
5/29/1990	740
6/14/1990	6200
7/31/1990	27000
8/28/1990	30000
9/20/1990	300
10/12/1990	160000
5/22/1991	2300
6/13/1991	2000
7/24/1991	3500
8/22/1991	620
9/12/1991	2600
10/25/1991	91000
5/14/1993	1400
6/18/1993	1800
7/30/1993	3000
8/26/1993	3800
9/16/1993	5400
10/14/1993	1900
5/19/1994	1500
6/24/1994	3200
7/13/1994	48000
8/10/1994	1600
9/15/1994	1200
5/11/1995	13000
6/26/1995	6200
7/31/1995	9700
8/31/1995	2000
9/12/1995	620
10/19/1995	820

B-278	
Date	Result
5/23/1996	3100
6/13/1996	1700
7/17/1996	12000
8/21/1996	3100
9/18/1996	5400
10/14/1996	2300
5/15/1997	3300
6/19/1997	1400
7/25/1997	17000
8/22/1997	2900
9/12/1997	4300
10/9/1997	1900
5/5/1998	1400
6/26/1998	11000
8/19/1998	6800
9/16/1998	1000
10/20/1998	1200
5/5/1999	1500
6/10/1999	5200
7/15/1999	130
8/5/1999	1700
9/14/1999	850
10/20/1999	1300
5/18/2000	770
6/8/2000	2400
7/13/2000	0
8/17/2000	2700
9/13/2000	1400
10/19/2000	3500

Table A-3 (Continued)

B-301	
Date	Result
5/29/1990	13000
6/14/1990	1200
7/31/1990	220
8/28/1990	200
9/21/1990	510
10/12/1990	70000
5/22/1991	710
6/13/1991	570
7/24/1991	260
8/22/1991	120
9/12/1991	200
10/25/1991	220
5/14/1993	140
6/18/1993	220
7/30/1993	190
8/26/1993	250
9/16/1993	340
10/14/1993	210
5/19/1994	400
6/24/1994	1200
7/13/1994	520
8/10/1994	1100
9/15/1994	860
5/11/1995	1100
6/26/1995	700
7/31/1995	210
8/31/1995	3900
9/12/1995	600
10/19/1995	2600

B-301	
Date	Result
5/23/1996	660
6/13/1996	720
7/17/1996	480
8/21/1996	2700
9/18/1996	740
10/14/1996	400
5/2/1997	160
6/26/1997	2000
8/12/1997	220
9/17/1997	640
10/24/1997	180
5/7/1998	460
6/4/1998	920
7/22/1998	250
8/13/1998	2500
9/17/1998	2000
10/20/1998	700
5/5/1999	210
6/10/1999	2400
7/15/1999	600
8/5/1999	480
9/14/1999	570
10/20/1999	590
5/18/2000	270
6/8/2000	1100
7/13/2000	1300
8/17/2000	1000
9/13/2000	830
10/19/2000	600

Table A-3 (Continued)

B-302	
Date	Result
5/29/1990	4800
6/14/1990	440
7/31/1990	310
8/28/1990	460
9/21/1990	620
10/12/1990	36000
5/22/1991	230
6/13/1991	300
7/24/1991	480
8/22/1991	340
9/12/1991	440
10/25/1991	320
10/28/1991	240
11/25/1991	160
12/10/1991	540
1/28/1992	170
5/14/1993	140
6/18/1993	210
7/30/1993	460
8/26/1993	480
9/16/1993	500
10/14/1993	300
5/19/1994	170
6/24/1994	380
7/13/1994	320
8/10/1994	620
9/15/1994	420
11/17/1994	140
12/15/1994	100
1/26/1995	120
2/15/1995	110
3/16/1995	140
4/20/1995	700
5/11/1995	1100
6/26/1995	840
7/31/1995	400
8/31/1995	380
9/12/1995	1200
10/19/1995	260
5/23/1996	120
6/13/1996	240
7/17/1996	540

B-302	
Date	Result
8/21/1996	280
9/18/1996	660
10/14/1996	210
5/15/1997	220
6/27/1997	390
8/12/1997	120
9/17/1997	390
10/24/1997	280
5/7/1998	130
6/4/1998	420
7/22/1998	1200
8/13/1998	500
9/17/1998	450
10/20/1998	290
11/17/1998	440
12/10/1998	210
1/6/1999	110
2/4/1999	180
3/25/1999	120
4/21/1999	440
5/5/1999	230
6/10/1999	270
7/15/1999	290
8/5/1999	370
9/14/1999	380
10/20/1999	450
5/18/2000	160
6/8/2000	760
7/13/2000	840
8/17/2000	600
9/13/2000	340
10/19/2000	210
1/10/2001	220
2/13/2001	42
3/8/2001	100
7/13/2001	330
8/21/2001	210
9/11/2001	200
9/21/2001	650
10/12/2001	330
11/6/2001	280
12/13/2001	280

Table A-3 (Continued)

B-323	
Date	Result
05/14/90	360
06/27/90	520
07/10/90	200
08/30/90	300
09/24/90	80
10/29/90	90
05/07/91	520
06/05/91	1200
07/08/91	250
08/07/91	120
09/26/91	2100
10/28/91	30
05/13/92	270
06/09/92	1400
07/29/92	360
08/13/92	3300
09/09/92	660
10/15/92	820
05/06/93	1100
06/24/93	6600
07/29/93	1100
08/24/93	400
09/29/93	60
10/26/93	450
05/25/94	500
06/14/94	1100
07/26/94	450
08/24/94	1600
09/20/94	2100
10/12/94	1300
05/17/95	280
07/27/95	560
08/08/95	430
09/27/95	920
10/25/95	460
05/16/96	3300
06/05/96	960
09/04/96	6600
05/12/97	290
06/24/97	1000
07/08/97	430
09/08/97	330
10/28/97	1000

Table A-3 (Continued)

B-325	
Date	Result
5/8/1990	110
6/11/1990	30
7/11/1990	170
8/1/1990	140
9/5/1990	84
10/2/1990	100
5/6/1991	800
6/20/1991	110
7/15/1991	50
8/29/1991	2500
9/23/1991	300
10/10/1991	190
5/5/1992	160
6/3/1992	170
7/7/1992	140
9/2/1992	130
10/8/1992	270
5/20/1993	130
6/15/1993	140
7/20/1993	30
8/4/1993	840
9/14/1993	540
10/21/1993	80
5/31/1994	230
6/7/1994	320
7/7/1994	80
8/18/1994	500
9/21/1994	900
10/6/1994	80
5/18/1995	360
6/20/1995	980

B-325	
Date	Result
7/12/1995	320
8/15/1995	80
9/7/1995	110
10/10/1995	30
5/22/1996	70
6/18/1996	130
9/12/1996	110
5/22/1997	210
6/4/1997	130
7/7/1997	40
8/26/1997	200
9/3/1997	20
10/23/1997	150
5/21/1998	340
6/16/1998	100
7/22/1998	190
8/6/1998	130
9/10/1998	200
10/28/1998	10
5/11/1999	350
6/24/1999	100
7/8/1999	580
8/5/1999	10
9/2/1999	30
10/21/1999	1000
5/15/2000	790
6/22/2000	1100
7/17/2000	140
8/31/2000	120
9/19/2000	2700
10/26/2000	20

Table A-3 (Continued)

B-326	
Date	Result
5/8/1990	30
6/11/1990	30
7/11/1990	59
8/1/1990	71
9/5/1990	47
10/2/1990	100
5/6/1991	960
6/20/1991	3300
7/15/1991	20
8/29/1991	3300
9/23/1991	90
10/10/1991	20
5/5/1992	170
6/3/1992	70
7/7/1992	80
9/2/1992	100
10/8/1992	80
5/20/1993	120
6/15/1993	10
7/20/1993	70
8/4/1993	160
9/14/1993	40
10/21/1993	20
5/31/1994	1100
6/7/1994	110
7/7/1994	50
8/18/1994	180
9/15/1994	3
9/21/1994	260
10/6/1994	300
5/18/1995	330
6/20/1995	216

B-326	
Date	Result
7/12/1995	410
8/15/1995	70
9/7/1995	190
10/10/1995	200
5/22/1996	380
6/18/1996	390
9/12/1996	50
5/22/1997	170
6/4/1997	30
7/7/1997	140
8/26/1997	84
9/3/1997	60
10/23/1997	77
5/21/1998	26
6/16/1998	130
7/22/1998	50
8/6/1998	47
9/10/1998	110
10/28/1998	30
5/11/1999	50
6/24/1999	*Present >QL
7/8/1999	570
8/5/1999	140
9/2/1999	100
10/21/1999	1000
5/15/2000	220
6/22/2000	400
7/17/2000	250
8/31/2000	660
9/19/2000	16000
10/26/2000	40

Table A-3 (Continued)

B-330	
Date	Result
5/21/1990	80
6/27/1990	69
7/11/1990	240
8/13/1990	140
9/5/1990	130
10/31/1990	53
5/28/1991	220
6/6/1991	103
7/9/1991	83
8/29/1991	100
9/30/1991	100
10/30/1991	130
5/26/1992	180
6/9/1992	500
7/21/1992	920
8/13/1992	840
10/15/1992	40
5/6/1993	1600
6/16/1993	220
8/4/1993	60
8/19/1993	270
9/22/1993	130
10/7/1993	110
5/18/1994	160
6/23/1994	470
7/14/1994	80
8/17/1994	2000
9/27/1994	130
10/6/1994	80
5/3/1995	140
6/27/1995	130

B-330	
Date	Result
7/26/1995	410
8/9/1995	80
9/27/1995	170
10/11/1995	120
5/23/1996	50
7/2/1996	100
9/5/1996	510
5/13/1997	85
6/23/1997	90
7/22/1997	40
8/28/1997	120
9/9/1997	120
10/27/1997	1600
5/26/1998	260
7/27/1998	6600
8/26/1998	90
9/21/1998	30
10/12/1998	40
5/27/1999	*Present >QL
6/10/1999	43
7/13/1999	*Present >QL
8/12/1999	5
9/21/1999	21
10/5/1999	120
5/10/2000	180
6/28/2000	2300
7/10/2000	60
8/10/2000	140
9/7/2000	230
10/10/2000	170

Table A-3 (Continued)

B-331	
Date	Result
11/16/1994	5
12/6/1994	180
1/5/1995	30
2/2/1995	30
3/8/1995	100
4/24/1995	480
5/31/1995	55
6/22/1995	1100
7/24/1995	9300
8/1/1995	480
9/5/1995	160
10/5/1995	1700
11/12/1998	58
12/16/1998	74
1/7/1999	28
2/11/1999	26
3/18/1999	4
4/22/1999	22
5/3/1999	24
6/8/1999	20
7/20/1999	134
8/31/1999	18
9/22/1999	29
10/25/1999	35
2/7/2001	7
3/8/2001	23
7/13/2001	370
8/21/2001	70
9/11/2001	34
9/21/2001	100
10/12/2001	40
11/6/2001	8
12/13/2001	79

Table A-3 (Continued)

B-333	
Date	Result
11/29/1994	320
12/8/1994	110
1/4/1995	210
2/2/1995	150
3/2/1995	120
4/25/1995	360
5/17/1995	140
6/27/1995	220
7/27/1995	620
8/8/1995	1000
9/28/1995	180
10/25/1995	100
3/24/1999	95
2/17/1999	100
1/27/1999	170
10/4/1999	340
9/21/1999	110
8/11/1999	70
7/6/1999	180
6/7/1999	180
5/25/1999	*Present >QL
4/1/1999	*Present >QL

B-333	
Date	Result
12/6/2001	330
11/20/2001	*Present >QL
10/24/2001	140
9/12/2001	250
8/30/2001	80
5/8/2001	380
4/10/2001	260
3/7/2001	250
2/28/2001	230
1/23/2001	70
12/9/2002	60
10/24/2002	290
9/30/2002	330
8/29/2002	960
7/23/2002	120
6/11/2002	1700
5/15/2002	330
4/9/2002	140
3/12/2002	86
2/19/2002	53
1/30/2002	110

Table A-3 (Continued)

BL-001	
Date	Result
1/3/1990	5
2/8/1990	174
3/1/1990	310
4/5/1990	210
5/10/1990	3600
6/6/1990	290
7/25/1990	110
8/9/1990	720
9/6/1990	180
10/4/1990	960
11/2/1990	185
12/4/1990	1000
1/4/1991	77
2/7/1991	260
3/8/1991	150
4/11/1991	860
5/3/1991	400
6/3/1991	2700
7/19/1991	370
8/9/1991	75
9/12/1991	210
10/2/1991	100
11/8/1991	40
12/2/1991	570
1/8/1992	110
2/7/1992	25
3/4/1992	150
4/8/1992	150
5/12/1992	420
6/5/1992	4000
7/9/1992	150
8/3/1992	220
9/1/1992	220
10/1/1992	220
11/24/1992	5200

BL-001	
Date	Result
12/10/1992	430
1/8/1993	1300
3/2/1993	260
4/8/1993	210
5/19/1993	550
6/9/1993	350
7/22/1993	350
8/6/1993	130
9/8/1993	140
10/8/1993	160
11/4/1993	140
12/8/1993	420
1/13/1994	2500
2/2/1994	80
3/8/1994	120
4/14/1994	560
5/12/1994	370
6/15/1994	370
7/28/1994	820
8/25/1994	1100
9/8/1994	2200
10/11/1994	4000
11/16/1994	300
12/6/1994	4900
1/5/1995	210
2/2/1995	160
3/8/1995	140
4/24/1995	260
5/10/1995	4000
6/22/1995	82000
7/24/1995	29000
8/1/1995	4600
9/5/1995	530
10/5/1995	79000
11/8/1995	18000

BL-001	
Date	Result
12/7/1995	360
1/18/1996	340
2/7/1996	240
3/14/1996	180
4/12/1996	470
5/24/1996	200
6/14/1996	400
7/19/1996	260
8/22/1996	220
9/26/1996	240
10/29/1996	77
11/22/1996	1700
12/5/1996	2400
1/9/1997	10000
2/6/1997	1800
3/5/1997	680
4/1/1997	300
5/1/1997	460
6/5/1997	480
7/29/1997	1200
8/20/1997	620
9/10/1997	780
10/6/1997	120
11/20/1997	240
1/8/1998	1200
2/13/1998	390
3/6/1998	150
4/21/1998	1400
5/6/1998	290
6/22/1998	310
7/20/1998	1200
8/6/1998	100
9/8/1998	190
10/6/1998	400
11/12/1998	120

BL-001	
Date	Result
12/16/1998	1200
1/7/1999	380
2/11/1999	220
3/18/1999	210
4/22/1999	100
5/3/1999	390
6/8/1999	100
7/20/1999	25
8/31/1999	240
9/22/1999	*Present >QL
10/25/1999	380
11/10/1999	100
12/1/1999	200
1/12/2000	1000
2/9/2000	100
3/9/2000	110
4/25/2000	*Present >QL
5/15/2000	240
6/19/2000	1400
7/25/2000	1900
8/21/2000	60
9/11/2000	130
10/16/2000	90
11/16/2000	170
12/12/2000	92
2/7/2001	48
3/8/2001	84
7/13/2001	*Present >QL
8/21/2001	71
9/11/2001	87
9/21/2001	120
10/12/2001	58
11/6/2001	210
12/13/2001	1100

Table A-3 (Continued)

BL-005	
Date	Result
5/29/1990	7000
6/14/1990	710
7/12/1990	6800
8/24/1990	4000
9/26/1990	620
10/11/1990	15000
5/21/1991	1400
6/14/1991	240
7/23/1991	460
8/15/1991	2200
9/13/1991	530
10/10/1991	600
5/18/1993	860
6/8/1993	680
7/21/1993	700
8/5/1993	370
9/7/1993	6100
10/4/1993	7800
5/5/1994	490
6/23/1994	760
7/12/1994	25000
8/16/1994	11000
9/22/1994	420
10/13/1994	20000
11/17/1994	300
12/15/1994	370
1/26/1995	210
2/15/1995	170
3/16/1995	400
4/20/1995	600
5/4/1995	780
6/9/1995	1200
7/13/1995	400
8/24/1995	2900
9/29/1995	1100
10/16/1995	1600

BL-005	
Date	Result
5/24/1996	920
6/11/1996	1400
7/12/1996	620
8/9/1996	1100
9/13/1996	4600
10/11/1996	670
5/1/1997	1200
6/5/1997	1000
7/29/1997	1300
8/20/1997	200
9/10/1997	1800
10/6/1997	480
5/6/1998	320
6/18/1998	200
7/20/1998	300
8/6/1998	400
9/8/1998	550
10/6/1998	940
11/17/1998	2300
12/10/1998	290
1/6/1999	530
2/4/1999	410
3/25/1999	240
4/21/1999	230
5/5/1999	250
6/10/1999	660
7/15/1999	360
8/5/1999	50
9/14/1999	140
10/20/1999	600
5/15/2000	190
6/19/2000	650
7/25/2000	240
8/21/2000	180
9/11/2000	97
10/16/2000	340

Table A-3 (Continued)

BP-001	
Date	Result
5/10/1990	3100
6/6/1990	810
7/25/1990	22000
8/9/1990	170
9/6/1990	140
10/4/1990	1500
5/3/1991	200
6/3/1991	920
7/19/1991	40
8/9/1991	20
9/12/1991	45
10/2/1991	85
5/19/1993	160
6/9/1993	85
7/22/1993	180
8/6/1993	160
9/8/1993	50
10/8/1993	110
5/12/1994	30
6/15/1994	230
7/28/1994	260
8/25/1994	580
9/8/1994	760
10/11/1994	1300
5/10/1995	420
6/22/1995	6700
7/24/1995	2000
8/1/1995	1100
9/5/1995	160
10/5/1995	16000

BP-001	
Date	Result
5/24/1996	50
6/14/1996	160
7/19/1996	88
8/22/1996	140
9/26/1996	100
10/29/1996	45
5/1/1997	170
6/5/1997	160
7/29/1997	3700
8/20/1997	120
9/10/1997	81
10/6/1997	25
5/6/1998	87
6/22/1998	30
7/20/1998	2000
8/6/1998	40
9/8/1998	77
10/6/1998	220
5/3/1999	180
6/8/1999	30
7/20/1999	25
8/31/1999	160
9/22/1999	420
10/25/1999	120
5/15/2000	55
6/19/2000	280
7/25/2000	530
8/21/2000	50
9/11/2000	40
10/16/2000	65

APPENDIX B Calculations

Table B-1 TMDL Loads

Station	B-028	Station	B-048	Station	B-062
Instantaneous Conc. (#/100 ml)	380	Instantaneous Conc. (#/100 ml)	380	Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190	Geo. Mean Conc. (#/100 ml)	190	Geo. Mean Conc. (#/100 ml)	190

Mean	2.49E+12	Mean	5.99E+12	Mean	1.85E+12
Allowable Load (#/day)	2.49E+12	Allowable Load (#/day)	5.99E+12	Allowable Load (#/day)	1.85E+12
Geometric Mean Load (#/30days)	3.73E+13	Geometric Mean Load (#/30days)	8.99E+13	Geometric Mean Load (#/30days)	2.78E+13

Percent Exceedance (%)	Load(#/Day)	Percent Exceedance (%)	Load(#/Day)	Percent Exceedance (%)	Load(#/Day)
10%	9.58E+11	10%	2.31E+12	10%	7.13E+11
15%	1.11E+12	15%	2.68E+12	15%	8.29E+11
20%	1.28E+12	20%	3.08E+12	20%	9.51E+11
25%	1.42E+12	25%	3.43E+12	25%	1.06E+12
30%	1.58E+12	30%	3.80E+12	30%	1.18E+12
35%	1.75E+12	35%	4.22E+12	35%	1.30E+12
40%	1.92E+12	40%	4.62E+12	40%	1.43E+12
45%	2.09E+12	45%	5.03E+12	45%	1.56E+12
50%	2.27E+12	50%	5.47E+12	50%	1.69E+12
55%	2.48E+12	55%	5.98E+12	55%	1.85E+12
60%	2.68E+12	60%	6.46E+12	60%	2.00E+12
65%	2.89E+12	65%	6.97E+12	65%	2.15E+12
70%	3.14E+12	70%	7.56E+12	70%	2.34E+12
75%	3.42E+12	75%	8.24E+12	75%	2.55E+12
80%	3.79E+12	80%	9.12E+12	80%	2.82E+12
85%	4.34E+12	85%	1.04E+13	85%	3.23E+12
90%	5.18E+12	90%	1.25E+13	90%	3.86E+12

Table B-1 (Continued)

Station	B-133	Station	B-042	Station	B-044
Instantaneous Conc. (#/100 ml)	380	Instantaneous Conc. (#/100 ml)	380	Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190	Geo. Mean Conc. (#/100 ml)	190	Geo. Mean Conc. (#/100 ml)	190

Mean	1.18E+12	Mean	1.73E+13	Mean	2.19E+13
Allowable Load (#/day)	1.18E+12	Allowable Load (#/day)	1.73E+13	Allowable Load (#/day)	2.19E+13
Geometric Mean Load (#/30days)	1.77E+13	Geometric Mean Load (#/30days)	2.60E+14	Geometric Mean Load (#/30days)	3.29E+14

Percent Exceedance (%)	Load(#/Day)	Percent Exceedance (%)	Load(#/Day)	Percent Exceedance (%)	Load(#/Day)
10%	4.55E+11	10%	7.47E+12	10%	9.45E+12
15%	5.29E+11	15%	8.80E+12	15%	1.11E+13
20%	6.07E+11	20%	9.88E+12	20%	1.25E+13
25%	6.76E+11	25%	1.09E+13	25%	1.38E+13
30%	7.50E+11	30%	1.19E+13	30%	1.51E+13
35%	8.33E+11	35%	1.28E+13	35%	1.62E+13
40%	9.11E+11	40%	1.38E+13	40%	1.75E+13
45%	9.93E+11	45%	1.48E+13	45%	1.87E+13
50%	1.08E+12	50%	1.59E+13	50%	2.01E+13
55%	1.18E+12	55%	1.71E+13	55%	2.16E+13
60%	1.27E+12	60%	1.83E+13	60%	2.31E+13
65%	1.37E+12	65%	1.97E+13	65%	2.48E+13
70%	1.49E+12	70%	2.12E+13	70%	2.68E+13
75%	1.63E+12	75%	2.30E+13	75%	2.91E+13
80%	1.80E+12	80%	2.56E+13	80%	3.24E+13
85%	2.06E+12	85%	2.91E+13	85%	3.68E+13
90%	2.46E+12	90%	3.44E+13	90%	4.35E+13

Table B-1 (Continued)

Station	B-325	Station	B-326	Station	B-330
Instantaneous Conc. (#/100 ml)	380	Instantaneous Conc. (#/100 ml)	380	Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190	Geo. Mean Conc. (#/100 ml)	190	Geo. Mean Conc. (#/100 ml)	190

Mean	1.36E+10	Mean	1.10E+10	Mean	2.57E+10
Allowable Load (#/day)	1.36E+10	Allowable Load (#/day)	1.10E+10	Allowable Load (#/day)	2.57E+10
Geometric Mean Load (#/30days)	2.04E+11	Geometric Mean Load (#/30days)	1.65E+11	Geometric Mean Load (#/30days)	3.86E+11

Percent Exceedance (%)	Load(#/Day)	Percent Exceedance (%)	Load(#/Day)	Percent Exceedance (%)	Load(#/Day)
10%	3.36E+09	10%	2.71E+09	10%	6.35E+09
15%	4.25E+09	15%	3.43E+09	15%	8.03E+09
20%	5.24E+09	20%	4.22E+09	20%	9.90E+09
25%	6.23E+09	25%	5.02E+09	25%	1.18E+10
30%	7.21E+09	30%	5.82E+09	30%	1.36E+10
35%	8.10E+09	35%	6.54E+09	35%	1.53E+10
40%	9.09E+09	40%	7.33E+09	40%	1.72E+10
45%	9.88E+09	45%	7.97E+09	45%	1.87E+10
50%	1.19E+10	50%	9.57E+09	50%	2.24E+10
55%	1.28E+10	55%	1.04E+10	55%	2.43E+10
60%	1.48E+10	60%	1.20E+10	60%	2.80E+10
65%	1.58E+10	65%	1.28E+10	65%	2.99E+10
70%	1.78E+10	70%	1.43E+10	70%	3.36E+10
75%	1.98E+10	75%	1.59E+10	75%	3.74E+10
80%	2.37E+10	80%	1.91E+10	80%	4.48E+10
85%	2.77E+10	85%	2.23E+10	85%	5.23E+10
90%	3.36E+10	90%	2.71E+10	90%	6.35E+10

Table B-1 (Continued)

Station	B-126	Station	B-103	Station	B-026
Instantaneous Conc. (#/100 ml)	380	Instantaneous Conc. (#/100 ml)	380	Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190	Geo. Mean Conc. (#/100 ml)	190	Geo. Mean Conc. (#/100 ml)	190

Mean	1.36E+12	Mean	5.0262E+10	Mean	1.12E+12
Allowable Load (#/day)	1.36E+12	Allowable Load (#/day)	5.0262E+10	Allowable Load (#/day)	1.12E+12
Geometric Mean Load (#/30days)	2.05E+13	Geometric Mean Load (#/30days)	7.54E+11	Geometric Mean Load (#/30days)	1.68E+13

Percent Exceedance (%)	Load(#/Day)	Percent Exceedance (%)	Load(#/Day)	Percent Exceedance (%)	Load(#/Day)
10%	6.32E+11	10%	2.3274E+10	10%	5.18E+11
15%	7.34E+11	15%	2.7056E+10	15%	6.02E+11
20%	8.13E+11	20%	2.9965E+10	20%	6.67E+11
25%	8.77E+11	25%	3.2293E+10	25%	7.19E+11
30%	9.48E+11	30%	3.4911E+10	30%	7.77E+11
35%	1.02E+12	35%	3.7529E+10	35%	8.35E+11
40%	1.10E+12	40%	4.0439E+10	40%	9.00E+11
45%	1.18E+12	45%	4.3348E+10	45%	9.65E+11
50%	1.26E+12	50%	4.6257E+10	50%	1.03E+12
55%	1.34E+12	55%	4.9457E+10	55%	1.10E+12
60%	1.43E+12	60%	5.2658E+10	60%	1.17E+12
65%	1.54E+12	65%	5.6731E+10	65%	1.26E+12
70%	1.67E+12	70%	6.1676E+10	70%	1.37E+12
75%	1.81E+12	75%	6.6622E+10	75%	1.48E+12
80%	1.98E+12	80%	7.3022E+10	80%	1.63E+12
85%	2.23E+12	85%	8.2041E+10	85%	1.83E+12
90%	2.64E+12	90%	9.7169E+10	90%	2.16E+12

Table B-1 (Continued)

Station	B-159	Station	B-334	Station	B-259
Instantaneous Conc. (#/100 ml)	380	Instantaneous Conc. (#/100 ml)	380	Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190	Geo. Mean Conc. (#/100 ml)	190	Geo. Mean Conc. (#/100 ml)	190

Mean	1.41E+12	Mean	2.56E+11	Mean	4.94E+10
Allowable Load (#/day)	1.41E+12	Allowable Load (#/day)	2.56E+11	Allowable Load (#/day)	4.94E+10
Geometric Mean Load (#/30days)	2.12E+13	Geometric Mean Load (#/30days)	3.83E+12	Geometric Mean Load (#/30days)	7.41E+11

Percent Exceedance (%)	Load(#/Day)	Percent Exceedance (%)	Load(#/Day)	Percent Exceedance (%)	Load(#/Day)
10%	6.55E+11	10%	1.18E+11	10%	2.2203E+10
15%	7.62E+11	15%	1.38E+11	15%	2.4815E+10
20%	8.43E+11	20%	1.52E+11	20%	2.8081E+10
25%	9.09E+11	25%	1.64E+11	25%	3.1346E+10
30%	9.83E+11	30%	1.77E+11	30%	3.3958E+10
35%	1.06E+12	35%	1.91E+11	35%	3.5917E+10
40%	1.14E+12	40%	2.06E+11	40%	3.8529E+10
45%	1.22E+12	45%	2.20E+11	45%	4.1141E+10
50%	1.30E+12	50%	2.35E+11	50%	4.4406E+10
55%	1.39E+12	55%	2.51E+11	55%	4.7672E+10
60%	1.48E+12	60%	2.68E+11	60%	5.0937E+10
65%	1.60E+12	65%	2.88E+11	65%	5.5508E+10
70%	1.74E+12	70%	3.14E+11	70%	6.0079E+10
75%	1.88E+12	75%	3.39E+11	75%	6.5957E+10
80%	2.06E+12	80%	3.71E+11	80%	7.3793E+10
85%	2.31E+12	85%	4.17E+11	85%	8.4242E+10
90%	2.73E+12	90%	4.94E+11	90%	1.01E+11

Table B-1 (Continued)

Station	B-302	Station	B-331	Station	B-057
Instantaneous Conc. (#/100 ml)	380	Instantaneous Conc. (#/100 ml)	380	Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190	Geo. Mean Conc. (#/100 ml)	190	Geo. Mean Conc. (#/100 ml)	190

Mean	7.05E+11	Mean	4.04E+12	Mean	1.84E+12
Allowable Load (#/day)	7.05E+11	Allowable Load (#/day)	4.04E+12	Allowable Load (#/day)	1.84E+12
Geometric Mean Load (#/30days)	1.06E+13	Geometric Mean Load (#/30days)	6.05E+13	Geometric Mean Load (#/30days)	2.76E+13

Percent Exceedance (%)	Load(#/Day)	Percent Exceedance (%)	Load(#/Day)	Percent Exceedance (%)	Load(#/Day)
10%	3.17E+11	10%	1.81E+12	10%	8.60E+11
15%	3.54E+11	15%	2.03E+12	15%	9.61E+11
20%	4.01E+11	20%	2.29E+12	20%	1.06E+12
25%	4.47E+11	25%	2.56E+12	25%	1.16E+12
30%	4.85E+11	30%	2.77E+12	30%	1.29E+12
35%	5.13E+11	35%	2.93E+12	35%	1.42E+12
40%	5.50E+11	40%	3.15E+12	40%	1.52E+12
45%	5.87E+11	45%	3.36E+12	45%	1.62E+12
50%	6.34E+11	50%	3.63E+12	50%	1.74E+12
55%	6.81E+11	55%	3.89E+12	55%	1.85E+12
60%	7.27E+11	60%	4.16E+12	60%	1.95E+12
65%	7.92E+11	65%	4.53E+12	65%	2.10E+12
70%	8.58E+11	70%	4.91E+12	70%	2.23E+12
75%	9.42E+11	75%	5.39E+12	75%	2.38E+12
80%	1.05E+12	80%	6.03E+12	80%	2.53E+12
85%	1.20E+12	85%	6.88E+12	85%	3.03E+12
90%	1.45E+12	90%	8.27E+12	90%	3.54E+12

Table B-1 (Continued)

Station	B-095	Station	B-119	Station	B-128
Instantaneous Conc. (#/100 ml)	380	Instantaneous Conc. (#/100 ml)	380	Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190	Geo. Mean Conc. (#/100 ml)	190	Geo. Mean Conc. (#/100 ml)	190

Mean	3.67E+11	Mean	1.78E+12	Mean	9.62E+10
Allowable Load (#/day)	3.67E+11	Allowable Load (#/day)	1.78E+12	Allowable Load (#/day)	9.62E+10
Geometric Mean Load (#/30days)	5.50E+12	Geometric Mean Load (#/30days)	2.67E+13	Geometric Mean Load (#/30days)	1.44E+12

Percent Exceedance (%)	Load(#/Day)	Percent Exceedance (%)	Load(#/Day)	Percent Exceedance (%)	Load(#/Day)
10%	1.72E+11	10%	8.32E+11	10%	4.50E+10
15%	1.92E+11	15%	9.29E+11	15%	5.03E+10
20%	2.12E+11	20%	1.03E+12	20%	5.56E+10
25%	2.32E+11	25%	1.13E+12	25%	6.09E+10
30%	2.58E+11	30%	1.25E+12	30%	6.75E+10
35%	2.83E+11	35%	1.37E+12	35%	7.41E+10
40%	3.03E+11	40%	1.47E+12	40%	7.94E+10
45%	3.23E+11	45%	1.57E+12	45%	8.47E+10
50%	3.48E+11	50%	1.69E+12	50%	9.13E+10
55%	3.69E+11	55%	1.79E+12	55%	9.66E+10
60%	3.89E+11	60%	1.88E+12	60%	1.02E+11
65%	4.19E+11	65%	2.03E+12	65%	1.10E+11
70%	4.44E+11	70%	2.15E+12	70%	1.17E+11
75%	4.75E+11	75%	2.30E+12	75%	1.24E+11
80%	5.05E+11	80%	2.45E+12	80%	1.32E+11
85%	6.06E+11	85%	2.94E+12	85%	1.59E+11
90%	7.07E+11	90%	3.42E+12	90%	1.85E+11

Table B-1 (Continued)

Station	B-191	Station	B-277	Station	B-278
Instantaneous Conc. (#/100 ml)	380	Instantaneous Conc. (#/100 ml)	380	Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190	Geo. Mean Conc. (#/100 ml)	190	Geo. Mean Conc. (#/100 ml)	190

Mean	1.93E+10	Mean	6.36E+10	Mean	7.41E+10
Allowable Load (#/day)	1.93E+10	Allowable Load (#/day)	6.36E+10	Allowable Load (#/day)	7.41E+10
Geometric Mean Load (#/30days)	2.89E+11	Geometric Mean Load (#/30days)	9.55E+11	Geometric Mean Load (#/30days)	1.11E+12

Percent Exceedance (%)	Load(#/Day)	Percent Exceedance (%)	Load(#/Day)	Percent Exceedance (%)	Load(#/Day)
10%	9.01E+09	10%	2.98E+10	10%	3.47E+10
15%	1.01E+10	15%	3.33E+10	15%	3.88E+10
20%	1.11E+10	20%	3.68E+10	20%	4.28E+10
25%	1.22E+10	25%	4.03E+10	25%	4.69E+10
30%	1.35E+10	30%	4.47E+10	30%	5.20E+10
35%	1.48E+10	35%	4.91E+10	35%	5.71E+10
40%	1.59E+10	40%	5.26E+10	40%	6.12E+10
45%	1.70E+10	45%	5.61E+10	45%	6.53E+10
50%	1.83E+10	50%	6.04E+10	50%	7.04E+10
55%	1.94E+10	55%	6.39E+10	55%	7.45E+10
60%	2.04E+10	60%	6.75E+10	60%	7.85E+10
65%	2.20E+10	65%	7.27E+10	65%	8.47E+10
70%	2.33E+10	70%	7.71E+10	70%	8.98E+10
75%	2.49E+10	75%	8.23E+10	75%	9.59E+10
80%	2.65E+10	80%	8.76E+10	80%	1.02E+11
85%	3.18E+10	85%	1.05E+11	85%	1.22E+11
90%	3.71E+10	90%	1.23E+11	90%	1.43E+11

Table B-1 (Continued)

Station	BL-001	Station	BL-005	Station	B-323
Instantaneous Conc. (#/100 ml)	380	Instantaneous Conc. (#/100 ml)	380	Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190	Geo. Mean Conc. (#/100 ml)	190	Geo. Mean Conc. (#/100 ml)	190

Mean	4.36E+12	Mean	4.00E+11	Mean	2.68E+10
Allowable Load (#/day)	4.36E+12	Allowable Load (#/day)	4.00E+11	Allowable Load (#/day)	2.68E+10
Geometric Mean Load (#/30days)	6.54E+13	Geometric Mean Load (#/30days)	6.01E+12	Geometric Mean Load (#/30days)	4.02E+11

Percent Exceedance (%)	Load(#/Day)	Percent Exceedance (%)	Load(#/Day)	Percent Exceedance (%)	Load(#/Day)
10%	2.04E+12	10%	1.87E+11	10%	1.25E+10
15%	2.28E+12	15%	2.09E+11	15%	1.40E+10
20%	2.52E+12	20%	2.31E+11	20%	1.55E+10
25%	2.76E+12	25%	2.54E+11	25%	1.70E+10
30%	3.06E+12	30%	2.81E+11	30%	1.88E+10
35%	3.36E+12	35%	3.09E+11	35%	2.06E+10
40%	3.60E+12	40%	3.31E+11	40%	2.21E+10
45%	3.84E+12	45%	3.53E+11	45%	2.36E+10
50%	4.14E+12	50%	3.80E+11	50%	2.54E+10
55%	4.38E+12	55%	4.02E+11	55%	2.69E+10
60%	4.62E+12	60%	4.24E+11	60%	2.84E+10
65%	4.98E+12	65%	4.57E+11	65%	3.06E+10
70%	5.28E+12	70%	4.85E+11	70%	3.24E+10
75%	5.64E+12	75%	5.18E+11	75%	3.46E+10
80%	6.00E+12	80%	5.51E+11	80%	3.68E+10
85%	7.20E+12	85%	6.61E+11	85%	4.42E+10
90%	8.40E+12	90%	7.72E+11	90%	5.16E+10

Table B-1 (Continued)

Station	BP-001	Station	B-056	Station	B-059
Instantaneous Conc. (#/100 ml)	380	Instantaneous Conc. (#/100 ml)	380	Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190	Geo. Mean Conc. (#/100 ml)	190	Geo. Mean Conc. (#/100 ml)	190

Mean	4.51E+12	Mean	2.75E+11	Mean	1.06E+11
Allowable Load (#/day)	4.51E+12	Allowable Load (#/day)	2.75E+11	Allowable Load (#/day)	1.06E+11
Geometric Mean Load (#/30days)	6.76E+13	Geometric Mean Load (#/30days)	4.12E+12	Geometric Mean Load (#/30days)	1.59E+12

Percent Exceedance (%)	Load(#/Day)	Percent Exceedance (%)	Load(#/Day)	Percent Exceedance (%)	Load(#/Day)
10%	2.11E+12	10%	1.31E+11	10%	5.08E+10
15%	2.36E+12	15%	1.50E+11	15%	5.81E+10
20%	2.61E+12	20%	1.68E+11	20%	6.51E+10
25%	2.85E+12	25%	1.80E+11	25%	6.97E+10
30%	3.16E+12	30%	1.94E+11	30%	7.48E+10
35%	3.47E+12	35%	2.07E+11	35%	7.99E+10
40%	3.72E+12	40%	2.22E+11	40%	8.57E+10
45%	3.97E+12	45%	2.33E+11	45%	9.00E+10
50%	4.28E+12	50%	2.47E+11	50%	9.54E+10
55%	4.53E+12	55%	2.63E+11	55%	1.02E+11
60%	4.78E+12	60%	2.81E+11	60%	1.08E+11
65%	5.15E+12	65%	3.01E+11	65%	1.16E+11
70%	5.46E+12	70%	3.27E+11	70%	1.27E+11
75%	5.83E+12	75%	3.61E+11	75%	1.40E+11
80%	6.20E+12	80%	4.04E+11	80%	1.56E+11
85%	7.44E+12	85%	4.52E+11	85%	1.75E+11
90%	8.69E+12	90%	5.53E+11	90%	2.14E+11

Table B-1 (Continued)

Station	B-088	Station	B-100	Station	B-211
Instantaneous Conc. (#/100 ml)	380	Instantaneous Conc. (#/100 ml)	380	Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190	Geo. Mean Conc. (#/100 ml)	190	Geo. Mean Conc. (#/100 ml)	190

Mean	6.68E+09	Mean	9.48E+10	Mean	4.06E+10
Allowable Load (#/day)	6.68E+09	Allowable Load (#/day)	9.48E+10	Allowable Load (#/day)	4.06E+10
Geometric Mean Load (#/30days)	1.00E+11	Geometric Mean Load (#/30days)	1.42E+12	Geometric Mean Load (#/30days)	6.09E+11

Percent Exceedance (%)	Load(#/Day)	Percent Exceedance (%)	Load(#/Day)	Percent Exceedance (%)	Load(#/Day)
10%	3.19E+09	10%	4.53E+10	10%	1.94E+10
15%	3.65E+09	15%	5.18E+10	15%	2.22E+10
20%	4.09E+09	20%	5.81E+10	20%	2.49E+10
25%	4.38E+09	25%	6.22E+10	25%	2.66E+10
30%	4.70E+09	30%	6.68E+10	30%	2.86E+10
35%	5.02E+09	35%	7.13E+10	35%	3.05E+10
40%	5.39E+09	40%	7.65E+10	40%	3.27E+10
45%	5.66E+09	45%	8.03E+10	45%	3.44E+10
50%	6.00E+09	50%	8.52E+10	50%	3.65E+10
55%	6.40E+09	55%	9.08E+10	55%	3.89E+10
60%	6.82E+09	60%	9.68E+10	60%	4.14E+10
65%	7.31E+09	65%	1.04E+11	65%	4.44E+10
70%	7.95E+09	70%	1.13E+11	70%	4.83E+10
75%	8.78E+09	75%	1.25E+11	75%	5.33E+10
80%	9.82E+09	80%	1.39E+11	80%	5.97E+10
85%	1.10E+10	85%	1.56E+11	85%	6.67E+10
90%	1.34E+10	90%	1.91E+11	90%	8.16E+10

Table B-1 (Continued)

Station	B-221		Station	B-301
Instantaneous Conc. (#/100 ml)	380		Instantaneous Conc. (#/100 ml)	380
Geo. Mean Conc. (#/100 ml)	190		Geo. Mean Conc. (#/100 ml)	190

Mean	5.55E+10		Mean	2.53E+10
Allowable Load (#/day)	5.55E+10		Allowable Load (#/day)	2.53E+10
Geometric Mean Load (#/30days)	8.33E+11		Geometric Mean Load (#/30days)	3.79E+11

Percent Exceedance (%)	Load(#/Day)		Percent Exceedance (%)	Load(#/Day)
10%	2.65E+10		10%	1.21E+10
15%	3.03E+10		15%	1.38E+10
20%	3.40E+10		20%	1.55E+10
25%	3.64E+10		25%	1.66E+10
30%	3.91E+10		30%	1.78E+10
35%	4.17E+10		35%	1.90E+10
40%	4.48E+10		40%	2.04E+10
45%	4.70E+10		45%	2.14E+10
50%	4.99E+10		50%	2.27E+10
55%	5.31E+10		55%	2.42E+10
60%	5.67E+10		60%	2.58E+10
65%	6.08E+10		65%	2.76E+10
70%	6.61E+10		70%	3.01E+10
75%	7.29E+10		75%	3.32E+10
80%	8.16E+10		80%	3.71E+10
85%	9.12E+10		85%	4.15E+10
90%	1.12E+11		90%	5.08E+10

Table B-2 Existing Loads

Station:	B-028
Trend Line:	Power
Equation: y=1E+15*x^(-1.3483)	

Existing Load (#/Day):	9.63E+12
Average (#/Day):	9.63E+12

Percent Exceedance(%)	Load(#/Day)
10%	4.48E+13
15%	2.60E+13
20%	1.76E+13
25%	1.30E+13
30%	1.02E+13
35%	8.28E+12
40%	6.92E+12
45%	5.90E+12
50%	5.12E+12
55%	4.50E+12
60%	4.00E+12
65%	3.59E+12
70%	3.25E+12
75%	2.96E+12
80%	2.72E+12
85%	2.50E+12
90%	2.32E+12

Station:	B-048
Trend Line:	Power
Equation: y=2E+14*x^(-0.7844)	

Existing Load (#/Day):	1.21E+13
Average (#/Day):	1.21E+13

Percent Exceedance(%)	Load(#/Day)
10%	3.29E+13
15%	2.39E+13
20%	1.91E+13
25%	1.60E+13
30%	1.39E+13
35%	1.23E+13
40%	1.11E+13
45%	1.01E+13
50%	9.30E+12
55%	8.63E+12
60%	8.06E+12
65%	7.57E+12
70%	7.14E+12
75%	6.76E+12
80%	6.43E+12
85%	6.13E+12
90%	5.86E+12

Station:	B-062
Trend Line:	Power
Equation: y=6E+13*x^(-0.8647)	

Existing Load (#/Day):	1.21E+13
Average (#/Day):	1.21E+13

Percent Exceedance(%)	Load(#/Day)
10%	3.29E+13
15%	2.39E+13
20%	1.91E+13
25%	1.60E+13
30%	1.39E+13
35%	1.23E+13
40%	1.11E+13
45%	1.01E+13
50%	9.30E+12
55%	8.63E+12
60%	8.06E+12
65%	7.57E+12
70%	7.14E+12
75%	6.76E+12
80%	6.43E+12
85%	6.13E+12
90%	5.86E+12

Table B-2 (Continued)

Station:	B-133
Trend Line:	Power
Equation: y=4E+13*x^(-0.7888)	

Existing Load (#/Day):	2.38E+12
Average (#/Day):	2.38E+12

Percent Exceedance(%)	Load(#/Day)
10%	6.51E+12
15%	4.72E+12
20%	3.77E+12
25%	3.16E+12
30%	2.73E+12
35%	2.42E+12
40%	2.18E+12
45%	1.99E+12
50%	1.83E+12
55%	1.70E+12
60%	1.58E+12
65%	1.49E+12
70%	1.40E+12
75%	1.33E+12
80%	1.26E+12
85%	1.20E+12
90%	1.15E+12

Station:	B-042
Trend Line:	Power
Equation: y=7E+14*x^(-0.7108)	

Existing Load (#/Day):	5.43E+13
Average (#/Day):	5.43E+13

Percent Exceedance(%)	Load(#/Day)
10%	1.36E+14
15%	1.02E+14
20%	8.32E+13
25%	7.10E+13
30%	6.24E+13
35%	5.59E+13
40%	5.09E+13
45%	4.68E+13
50%	4.34E+13
55%	4.06E+13
60%	3.81E+13
65%	3.60E+13
70%	3.42E+13
75%	3.25E+13
80%	3.11E+13
85%	2.98E+13
90%	2.86E+13

Station:	B-044
Trend Line:	Power
Equation: y=7E+14*x^(-0.7537)	

Existing Load (#/Day):	4.69E+13
Average (#/Day):	4.69E+13

Percent Exceedance(%)	Load(#/Day)
10%	1.23E+14
15%	9.09E+13
20%	7.32E+13
25%	6.19E+13
30%	5.39E+13
35%	4.80E+13
40%	4.34E+13
45%	3.97E+13
50%	3.67E+13
55%	3.41E+13
60%	3.20E+13
65%	3.01E+13
70%	2.85E+13
75%	2.70E+13
80%	2.57E+13
85%	2.46E+13
90%	2.36E+13

Table B-2 (Continued)

Station:	B-325
Trend Line:	Power
Equation: y=5E+11*x^(-0.8181)	

Existing Load (#/Day):	2.69E+10
Average (#/Day):	2.69E+10

Percent Exceedance(%)	Load(#/Day)
10%	7.60E+10
15%	5.46E+10
20%	4.31E+10
25%	3.59E+10
30%	3.09E+10
35%	2.73E+10
40%	2.45E+10
45%	2.22E+10
50%	2.04E+10
55%	1.88E+10
60%	1.75E+10
65%	1.64E+10
70%	1.55E+10
75%	1.46E+10
80%	1.39E+10
85%	1.32E+10
90%	1.26E+10

Station:	B-326
Trend Line:	Power
Equation: y=6E+11*x^(-0.8397)	

Existing Load (#/Day):	3.00E+10
Average (#/Day):	3.00E+10

Percent Exceedance(%)	Load(#/Day)
10%	8.68E+10
15%	6.17E+10
20%	4.85E+10
25%	4.02E+10
30%	3.45E+10
35%	3.03E+10
40%	2.71E+10
45%	2.45E+10
50%	2.25E+10
55%	2.07E+10
60%	1.93E+10
65%	1.80E+10
70%	1.69E+10
75%	1.60E+10
80%	1.51E+10
85%	1.44E+10
90%	1.37E+10

Station:	B-330
Trend Line:	Power
Equation: y=2E+12*x^(-0.9298)	

Existing Load (#/Day):	7.40E+10
Average (#/Day):	7.40E+10

Percent Exceedance(%)	Load(#/Day)
10%	2.35E+11
15%	1.61E+11
20%	1.23E+11
25%	1.00E+11
30%	8.46E+10
35%	7.33E+10
40%	6.48E+10
45%	5.81E+10
50%	5.26E+10
55%	4.82E+10
60%	4.44E+10
65%	4.12E+10
70%	3.85E+10
75%	3.61E+10
80%	3.40E+10
85%	3.21E+10
90%	3.05E+10

Table B-2 (Continued)

Station:	B-126
Trend Line:	Power
Equation: y=1E+14*x^(-0.8098)	

Existing Load (#/Day):	5.53E+12
Average (#/Day):	5.53E+12

Percent Exceedance(%)	Load(#/Day)
10%	1.55E+13
15%	1.12E+13
20%	8.84E+12
25%	7.38E+12
30%	6.37E+12
35%	5.62E+12
40%	5.04E+12
45%	4.58E+12
50%	4.21E+12
55%	3.90E+12
60%	3.63E+12
65%	3.40E+12
70%	3.21E+12
75%	3.03E+12
80%	2.88E+12
85%	2.74E+12
90%	2.61E+12

Station:	B-103
Trend Line:	Power
Equation: y=4E+12*x^(-0.9834)	

Existing Load (#/Day):	1.24E+11
Average (#/Day):	1.24E+11

Percent Exceedance(%)	Load(#/Day)
10%	4.16E+11
15%	2.79E+11
20%	2.10E+11
25%	1.69E+11
30%	1.41E+11
35%	1.21E+11
40%	1.06E+11
45%	9.47E+10
50%	8.54E+10
55%	7.77E+10
60%	7.14E+10
65%	6.60E+10
70%	6.13E+10
75%	5.73E+10
80%	5.38E+10
85%	5.07E+10
90%	4.79E+10

Station:	B-026
Trend Line:	Power
Equation: y=8E+13*x^(-0.9973)	

Existing Load (#/Day):	2.37E+12
Average (#/Day):	2.37E+12

Percent Exceedance(%)	Load(#/Day)
10%	8.05E+12
15%	5.37E+12
20%	4.03E+12
25%	3.23E+12
30%	2.69E+12
35%	2.31E+12
40%	2.02E+12
45%	1.80E+12
50%	1.62E+12
55%	1.47E+12
60%	1.35E+12
65%	1.24E+12
70%	1.16E+12
75%	1.08E+12
80%	1.01E+12
85%	9.53E+11
90%	9.00E+11

Table B-2 (Continued)

Station:	B-159
Trend Line:	Power
Equation: y=5E+13*x^(-0.8171)	

Existing Load (#/Day):	2.70E+12
Average (#/Day):	2.70E+12

Percent Exceedance(%)	Load(#/Day)
10%	7.62E+12
15%	5.47E+12
20%	4.32E+12
25%	3.60E+12
30%	3.10E+12
35%	2.74E+12
40%	2.45E+12
45%	2.23E+12
50%	2.05E+12
55%	1.89E+12
60%	1.76E+12
65%	1.65E+12
70%	1.55E+12
75%	1.47E+12
80%	1.39E+12
85%	1.33E+12
90%	1.27E+12

Station:	B-334
Trend Line:	Power
Equation: y=1E+13*x^(-0.7007)	

Existing Load (#/Day):	8.03E+11
Average (#/Day):	8.03E+11

Percent Exceedance(%)	Load(#/Day)
10%	1.99E+12
15%	1.50E+12
20%	1.23E+12
25%	1.05E+12
30%	9.23E+11
35%	8.28E+11
40%	7.54E+11
45%	6.94E+11
50%	6.45E+11
55%	6.03E+11
60%	5.68E+11
65%	5.37E+11
70%	5.09E+11
75%	4.85E+11
80%	4.64E+11
85%	4.45E+11
90%	4.27E+11

Station:	B-259
Trend Line:	Power
Equation: y=4E+12*x^(-0.8763)	

Existing Load (#/Day):	1.77E+11
Average (#/Day):	1.77E+11

Percent Exceedance(%)	Load(#/Day)
10%	5.32E+11
15%	3.73E+11
20%	2.90E+11
25%	2.38E+11
30%	2.03E+11
35%	1.77E+11
40%	1.58E+11
45%	1.42E+11
50%	1.30E+11
55%	1.19E+11
60%	1.11E+11
65%	1.03E+11
70%	9.66E+10
75%	9.10E+10
80%	8.60E+10
85%	8.15E+10
90%	7.75E+10

Table B-2 (Continued)

Station:	B-302
Trend Line:	Power
Equation: y=3E+14*x^(-1.4349)	

Existing Load (#/Day):	2.21E+12
Average (#/Day):	2.21E+12

Percent Exceedance(%)	Load(#/Day)
10%	1.10E+13
15%	6.16E+12
20%	4.08E+12
25%	2.96E+12
30%	2.28E+12
35%	1.83E+12
40%	1.51E+12
45%	1.27E+12
50%	1.09E+12
55%	9.55E+11
60%	8.43E+11
65%	7.51E+11
70%	6.75E+11
75%	6.12E+11
80%	5.58E+11
85%	5.11E+11
90%	4.71E+11

Station:	B-331
Trend Line:	Power
Equation: y=9E+13*x^(-0.4878)	

Existing Load (#/Day):	1.52E+13
Average (#/Day):	1.52E+13

Percent Exceedance(%)	Load(#/Day)
10%	2.93E+13
15%	2.40E+13
20%	2.09E+13
25%	1.87E+13
30%	1.71E+13
35%	1.59E+13
40%	1.49E+13
45%	1.41E+13
50%	1.34E+13
55%	1.27E+13
60%	1.22E+13
65%	1.17E+13
70%	1.13E+13
75%	1.10E+13
80%	1.06E+13
85%	1.03E+13
90%	1.00E+13

Station:	B-057
Trend Line:	Power
Equation: y=8E+13*x^(-0.6962)	

Existing Load (#/Day):	6.52E+12
Average (#/Day):	6.52E+12

Percent Exceedance(%)	Load(#/Day)
10%	1.61E+13
15%	1.21E+13
20%	9.94E+12
25%	8.51E+12
30%	7.49E+12
35%	6.73E+12
40%	6.13E+12
45%	5.65E+12
50%	5.25E+12
55%	4.91E+12
60%	4.63E+12
65%	4.37E+12
70%	4.15E+12
75%	3.96E+12
80%	3.79E+12
85%	3.63E+12
90%	3.49E+12

Table B-2 (Continued)

Station:	B-095
Trend Line:	Power
Equation: y=2E+13*x^(-0.7834)	
Existing Load (#/Day):	1.21E+12
Average (#/Day):	1.21E+12

Percent Exceedance(%)	Load(#/Day)
10%	3.29E+12
15%	2.40E+12
20%	1.91E+12
25%	1.61E+12
30%	1.39E+12
35%	1.23E+12
40%	1.11E+12
45%	1.01E+12
50%	9.33E+11
55%	8.66E+11
60%	8.09E+11
65%	7.60E+11
70%	7.17E+11
75%	6.79E+11
80%	6.46E+11
85%	6.16E+11
90%	5.89E+11

Station:	B-119
Trend Line:	Power
Equation: y=4E+13*x^(-0.4842)	
Existing Load (#/Day):	6.83E+12
Average (#/Day):	6.83E+12

Percent Exceedance(%)	Load(#/Day)
10%	1.31E+13
15%	1.08E+13
20%	9.38E+12
25%	8.42E+12
30%	7.71E+12
35%	7.15E+12
40%	6.70E+12
45%	6.33E+12
50%	6.02E+12
55%	5.75E+12
60%	5.51E+12
65%	5.30E+12
70%	5.11E+12
75%	4.94E+12
80%	4.79E+12
85%	4.65E+12
90%	4.53E+12

Station:	B-128
Trend Line:	Power
Equation: y=4E+12*x^(-0.683)	
Existing Load (#/Day):	3.41E+11
Average (#/Day):	3.41E+11

Percent Exceedance(%)	Load(#/Day)
10%	8.30E+11
15%	6.29E+11
20%	5.17E+11
25%	4.44E+11
30%	3.92E+11
35%	3.53E+11
40%	3.22E+11
45%	2.97E+11
50%	2.76E+11
55%	2.59E+11
60%	2.44E+11
65%	2.31E+11
70%	2.20E+11
75%	2.10E+11
80%	2.01E+11
85%	1.92E+11
90%	1.85E+11

Table B-2 (Continued)

Station:	B-191
Trend Line:	Power
Equation: y=6E+11*x^(-0.6298)	

Existing Load (#/Day):	6.15E+10
Average (#/Day):	6.15E+10

Percent Exceedance(%)	Load(#/Day)
10%	1.41E+11
15%	1.09E+11
20%	9.09E+10
25%	7.90E+10
30%	7.04E+10
35%	6.39E+10
40%	5.88E+10
45%	5.46E+10
50%	5.11E+10
55%	4.81E+10
60%	4.55E+10
65%	4.33E+10
70%	4.13E+10
75%	3.96E+10
80%	3.80E+10
85%	3.66E+10
90%	3.53E+10

Station:	B-277
Trend Line:	Power
Equation: y=3E+13*x^(-1.1702)	

Existing Load (#/Day):	5.07E+11
Average (#/Day):	5.07E+11

Percent Exceedance(%)	Load(#/Day)
10%	2.03E+12
15%	1.26E+12
20%	9.01E+11
25%	6.94E+11
30%	5.61E+11
35%	4.68E+11
40%	4.00E+11
45%	3.49E+11
50%	3.08E+11
55%	2.76E+11
60%	2.49E+11
65%	2.27E+11
70%	2.08E+11
75%	1.92E+11
80%	1.78E+11
85%	1.66E+11
90%	1.55E+11

Station:	B-278
Trend Line:	Power
Equation: y=2E+13*x^(-1.0059)	

Existing Load (#/Day):	5.76E+11
Average (#/Day):	5.76E+11

Percent Exceedance(%)	Load(#/Day)
10%	1.97E+12
15%	1.31E+12
20%	9.82E+11
25%	7.85E+11
30%	6.53E+11
35%	5.60E+11
40%	4.89E+11
45%	4.35E+11
50%	3.91E+11
55%	3.55E+11
60%	3.25E+11
65%	3.00E+11
70%	2.79E+11
75%	2.60E+11
80%	2.44E+11
85%	2.29E+11
90%	2.16E+11

Table B-2 (Continued)

Station:	BL-001
Trend Line:	Power
Equation: y=3E+14*x^(-0.8453)	

Existing Load (#/Day):	1.47E+13
Average (#/Day):	1.47E+13

Percent Exceedance(%)	Load(#/Day)
10%	4.28E+13
15%	3.04E+13
20%	2.38E+13
25%	1.97E+13
30%	1.69E+13
35%	1.49E+13
40%	1.33E+13
45%	1.20E+13
50%	1.10E+13
55%	1.01E+13
60%	9.42E+12
65%	8.80E+12
70%	8.27E+12
75%	7.80E+12
80%	7.39E+12
85%	7.02E+12
90%	6.69E+12

Station:	BL-005
Trend Line:	Power
Equation: y=5E+13*x^(-0.9714)	

Existing Load (#/Day):	1.61E+12
Average (#/Day):	1.61E+12

Percent Exceedance(%)	Load(#/Day)
10%	5.34E+12
15%	3.60E+12
20%	2.72E+12
25%	2.19E+12
30%	1.84E+12
35%	1.58E+12
40%	1.39E+12
45%	1.24E+12
50%	1.12E+12
55%	1.02E+12
60%	9.37E+11
65%	8.67E+11
70%	8.07E+11
75%	7.54E+11
80%	7.08E+11
85%	6.68E+11
90%	6.32E+11

Station:	B-323
Trend Line:	Power
Equation: y=2E+12*x^(-0.8726)	

Existing Load (#/Day):	8.96E+10
Average (#/Day):	8.96E+10

Percent Exceedance(%)	Load(#/Day)
10%	2.68E+11
15%	1.88E+11
20%	1.46E+11
25%	1.21E+11
30%	1.03E+11
35%	8.99E+10
40%	8.00E+10
45%	7.22E+10
50%	6.58E+10
55%	6.06E+10
60%	5.62E+10
65%	5.24E+10
70%	4.91E+10
75%	4.62E+10
80%	4.37E+10
85%	4.14E+10
90%	3.94E+10

Table B-2 (Continued)

Station:	BP-001
Trend Line:	Power
Equation: y=5E+14*x^(-0.9109)	

Existing Load (#/Day):	1.97E+13
Average (#/Day):	1.97E+13

Percent Exceedance(%)	Load(#/Day)
10%	6.14E+13
15%	4.24E+13
20%	3.26E+13
25%	2.66E+13
30%	2.26E+13
35%	1.96E+13
40%	1.74E+13
45%	1.56E+13
50%	1.42E+13
55%	1.30E+13
60%	1.20E+13
65%	1.12E+13
70%	1.04E+13
75%	9.79E+12
80%	9.24E+12
85%	8.74E+12
90%	8.30E+12

Station:	B-056
Trend Line:	Power
Equation: y=3E+13*x^(-0.9219)	

Existing Load (#/Day):	1.14E+12
Average (#/Day):	1.14E+12

Percent Exceedance(%)	Load(#/Day)
10%	3.59E+12
15%	2.47E+12
20%	1.90E+12
25%	1.54E+12
30%	1.30E+12
35%	1.13E+12
40%	1.00E+12
45%	8.97E+11
50%	8.14E+11
55%	7.46E+11
60%	6.88E+11
65%	6.39E+11
70%	5.97E+11
75%	5.60E+11
80%	5.28E+11
85%	4.99E+11
90%	4.74E+11

Station:	B-059
Trend Line:	Power
Equation: y=6E+12*x^(-0.791)	

Existing Load (#/Day):	3.54E+11
Average (#/Day):	3.54E+11

Percent Exceedance(%)	Load(#/Day)
10%	9.71E+11
15%	7.04E+11
20%	5.61E+11
25%	4.70E+11
30%	4.07E+11
35%	3.60E+11
40%	3.24E+11
45%	2.95E+11
50%	2.72E+11
55%	2.52E+11
60%	2.35E+11
65%	2.21E+11
70%	2.08E+11
75%	1.97E+11
80%	1.87E+11
85%	1.79E+11
90%	1.71E+11

Table B-2 (Continued)

Station:	B-088
Trend Line:	Power
Equation: y=8E+11*x^(-0.9582)	

Existing Load (#/Day):	2.70E+10
Average (#/Day):	2.70E+10

Percent Exceedance(%)	Load(#/Day)
10%	8.81E+10
15%	5.97E+10
20%	4.53E+10
25%	3.66E+10
30%	3.07E+10
35%	2.65E+10
40%	2.33E+10
45%	2.08E+10
50%	1.88E+10
55%	1.72E+10
60%	1.58E+10
65%	1.47E+10
70%	1.36E+10
75%	1.28E+10
80%	1.20E+10
85%	1.13E+10
90%	1.07E+10

Station:	B-100
Trend Line:	Power
Equation: y=1E+13*x^(-0.9998)	

Existing Load (#/Day):	2.94E+11
Average (#/Day):	2.94E+11

Percent Exceedance(%)	Load(#/Day)
10%	1.00E+12
15%	6.67E+11
20%	5.00E+11
25%	4.00E+11
30%	3.34E+11
35%	2.86E+11
40%	2.50E+11
45%	2.22E+11
50%	2.00E+11
55%	1.82E+11
60%	1.67E+11
65%	1.54E+11
70%	1.43E+11
75%	1.33E+11
80%	1.25E+11
85%	1.18E+11
90%	1.11E+11

Station:	B-211
Trend Line:	Power
Equation: y=1E+13*x^(-1.0917)	

Existing Load (#/Day):	2.18E+11
Average (#/Day):	2.18E+11

Percent Exceedance(%)	Load(#/Day)
10%	8.10E+11
15%	5.20E+11
20%	3.80E+11
25%	2.98E+11
30%	2.44E+11
35%	2.06E+11
40%	1.78E+11
45%	1.57E+11
50%	1.40E+11
55%	1.26E+11
60%	1.14E+11
65%	1.05E+11
70%	9.68E+10
75%	8.97E+10
80%	8.36E+10
85%	7.83E+10
90%	7.35E+10

Table B-2 (Continued)

Station:	B-221
Trend Line:	Power
Equation: y=3E+13*x^(-1.1298)	

Existing Load (#/Day):	5.77E+11
Average (#/Day):	5.77E+11

Percent Exceedance(%)	Load(#/Day)
10%	2.22E+12
15%	1.41E+12
20%	1.02E+12
25%	7.90E+11
30%	6.43E+11
35%	5.40E+11
40%	4.65E+11
45%	4.07E+11
50%	3.61E+11
55%	3.24E+11
60%	2.94E+11
65%	2.68E+11
70%	2.47E+11
75%	2.28E+11
80%	2.12E+11
85%	1.98E+11
90%	1.86E+11

Station:	B-301
Trend Line:	Power
Equation: y=3E+12*x^(-1.0897)	

Existing Load (#/Day):	6.57E+10
Average (#/Day):	6.57E+10

Percent Exceedance(%)	Load(#/Day)
10%	2.44E+11
15%	1.57E+11
20%	1.15E+11
25%	8.99E+10
30%	7.37E+10
35%	6.23E+10
40%	5.39E+10
45%	4.74E+10
50%	4.22E+10
55%	3.81E+10
60%	3.46E+10
65%	3.17E+10
70%	2.93E+10
75%	2.72E+10
80%	2.53E+10
85%	2.37E+10
90%	2.23E+10

Figure B-1 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-028

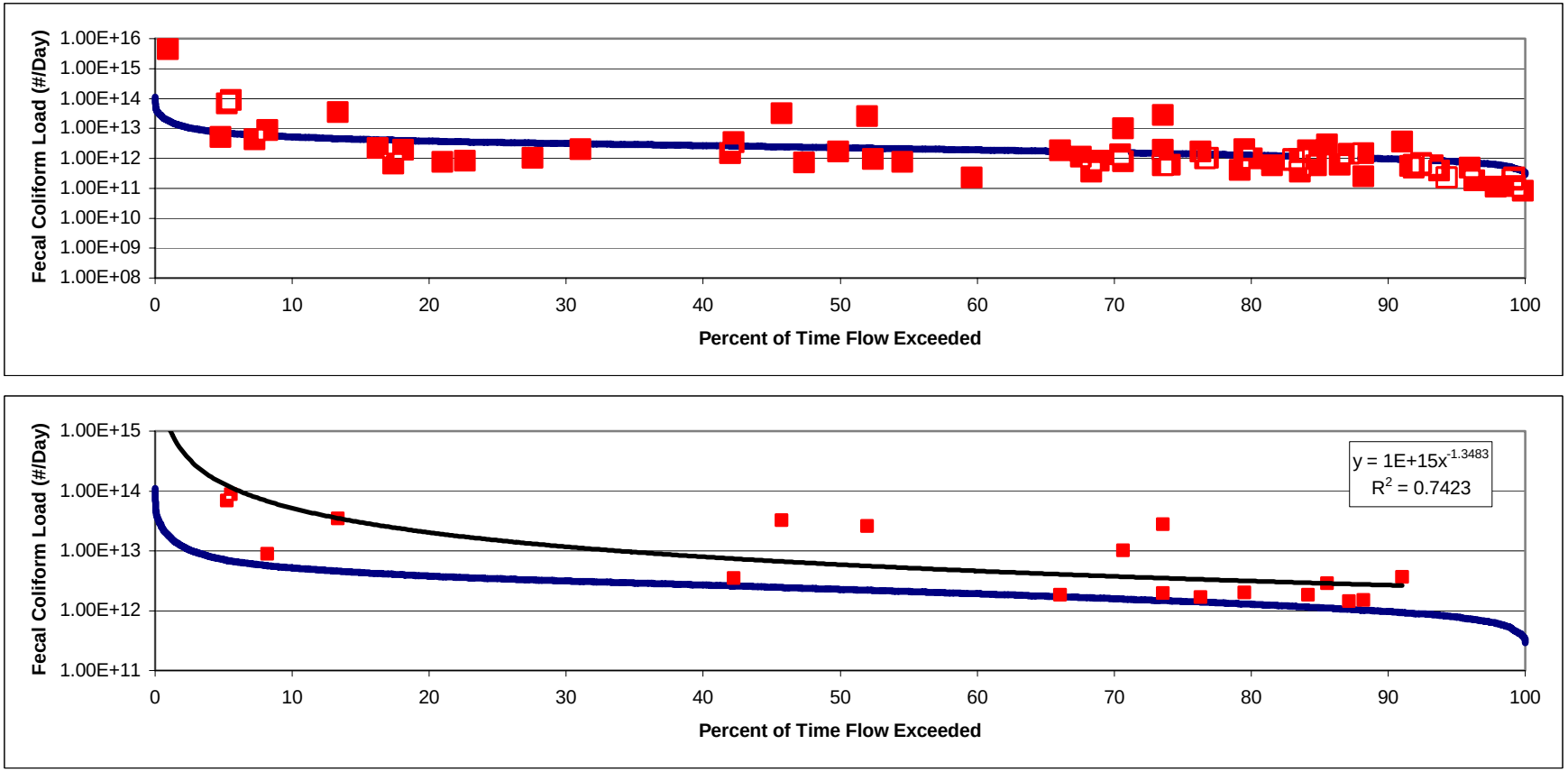


Figure B-2 Load Duration Curve with All Measured Data and Power Trend line Generated from Violating Fecal Coliform Bacteria Measured at B-048

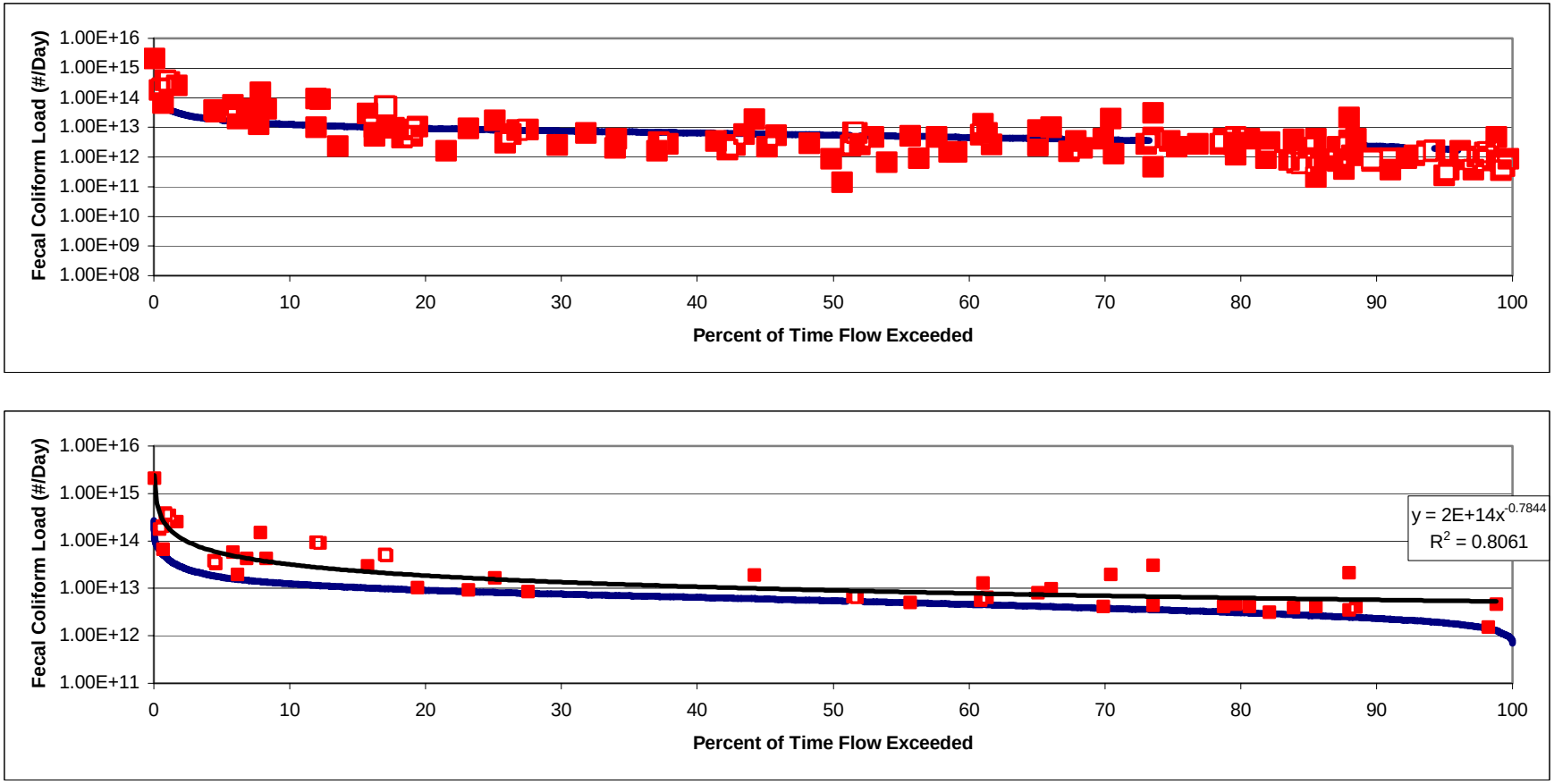


Figure B-3 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-062

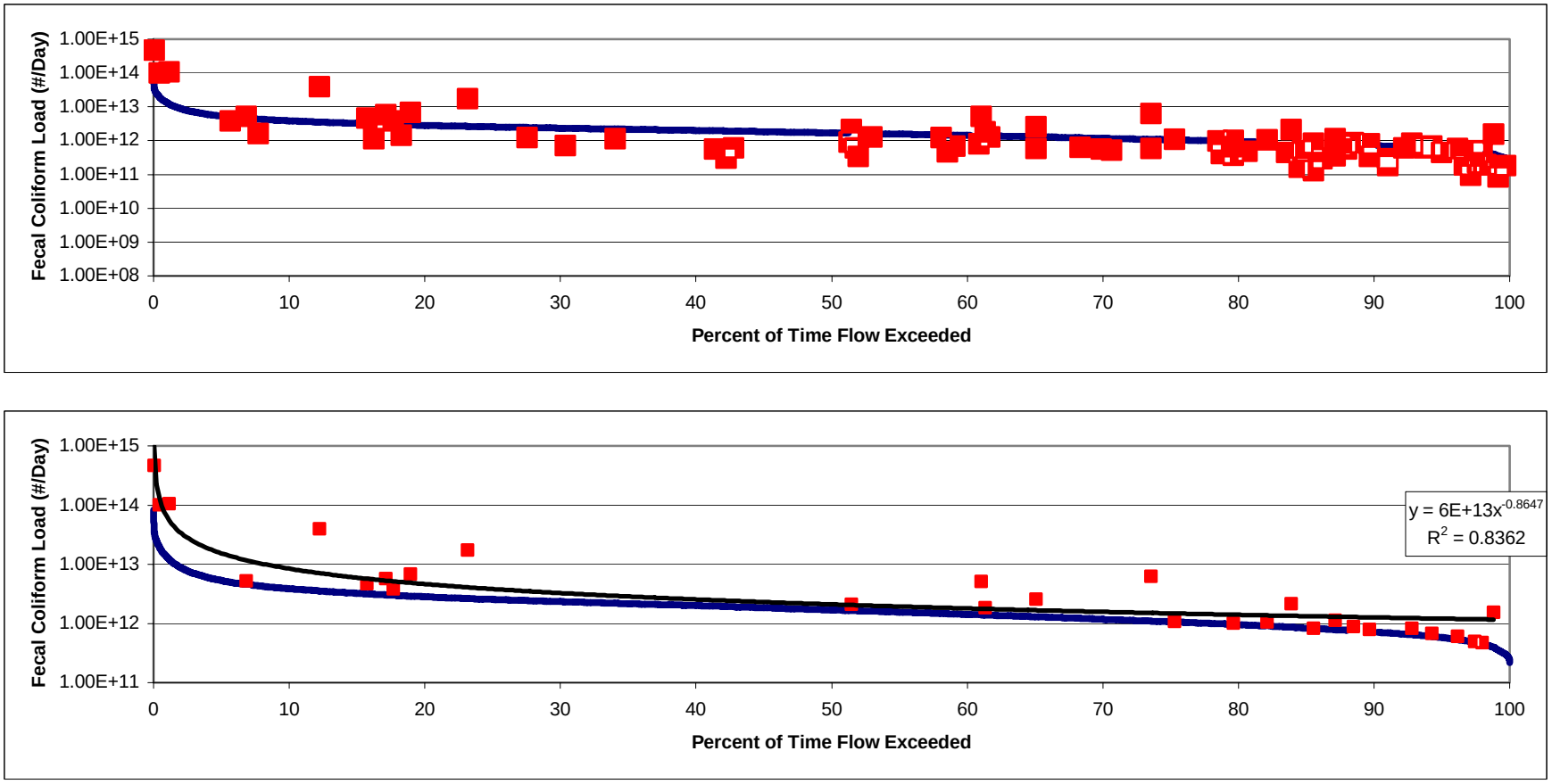


Figure B-4 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-133

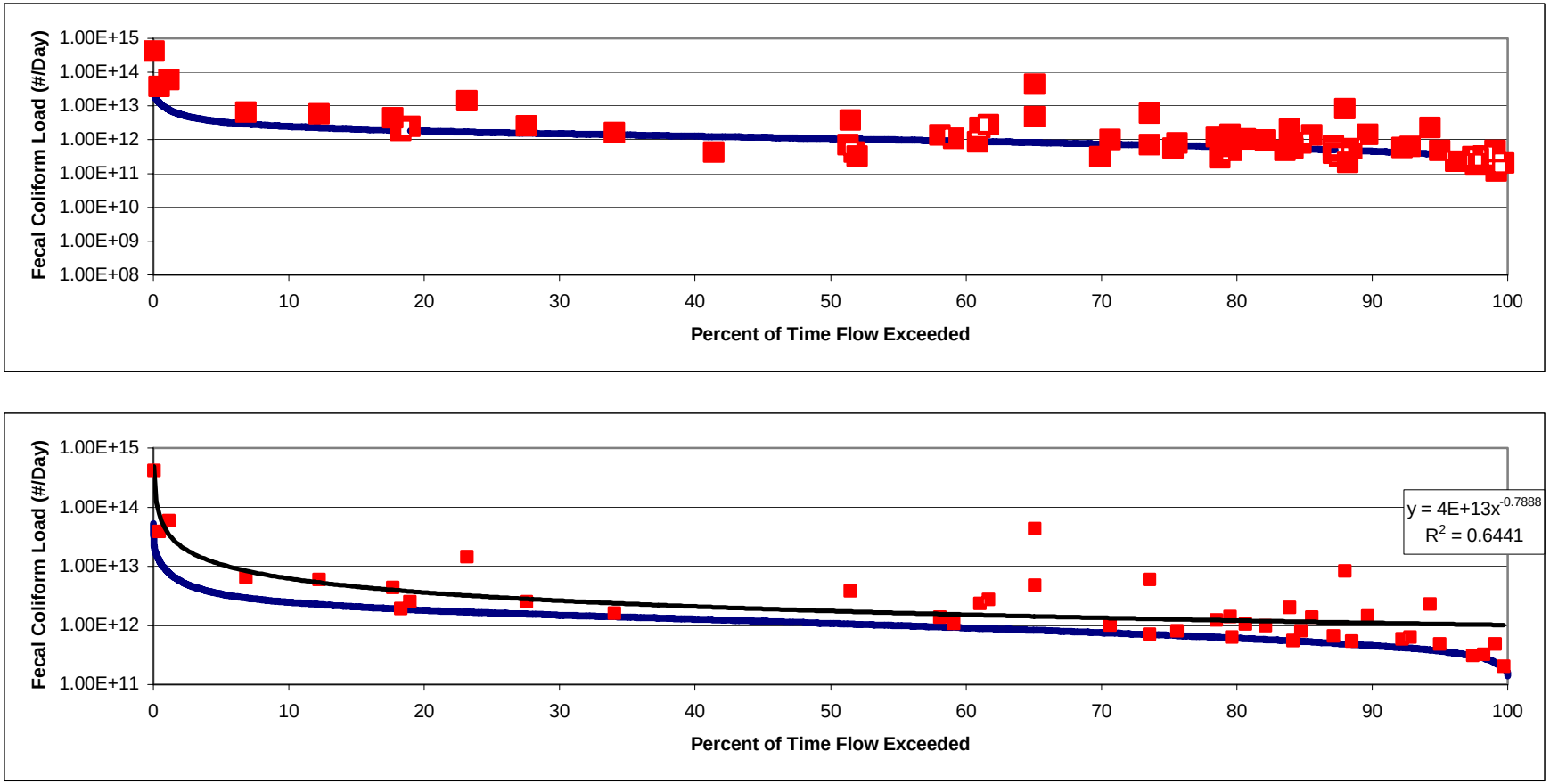


Figure B-5 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-042

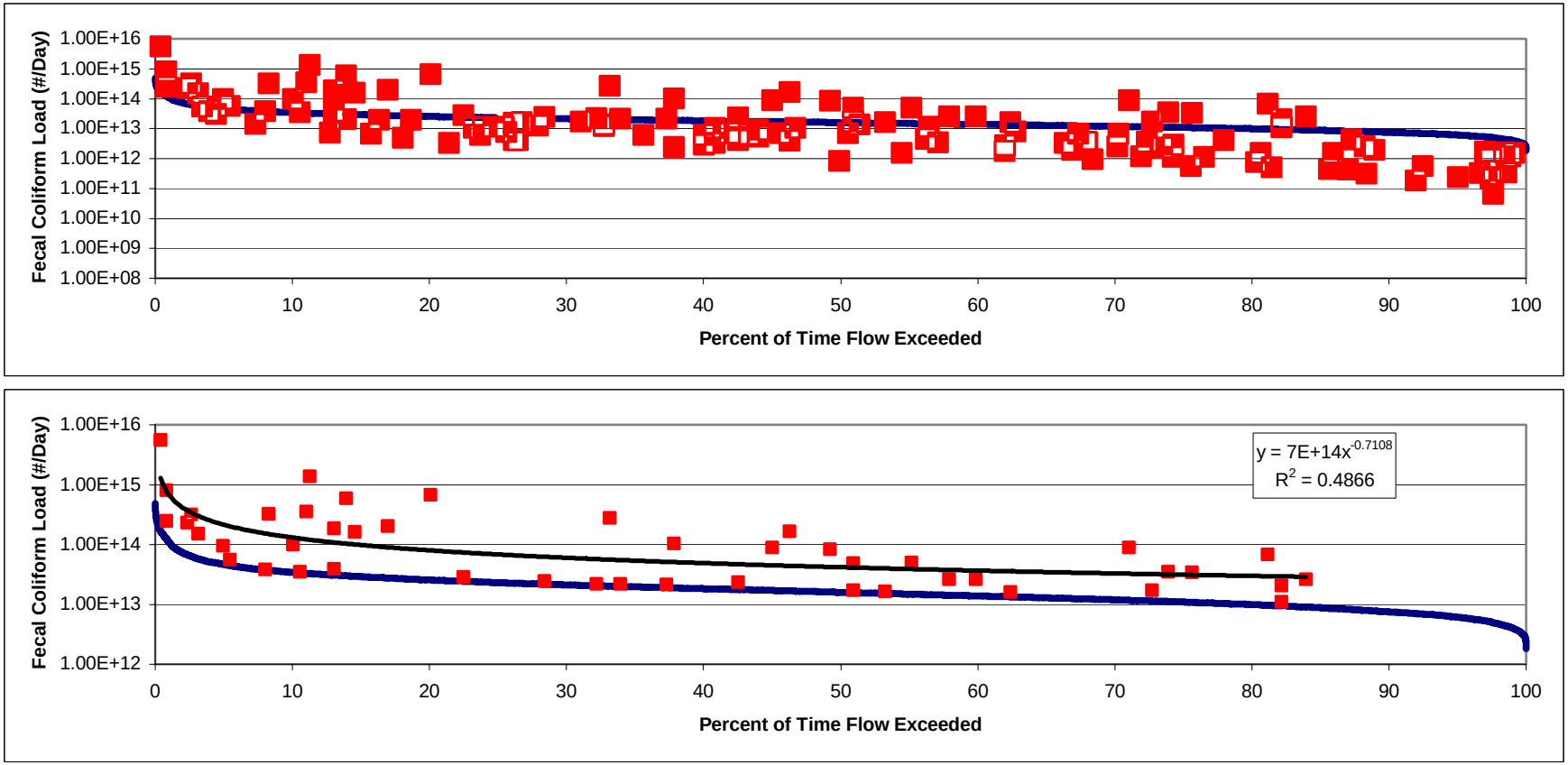


Figure B-6 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-044

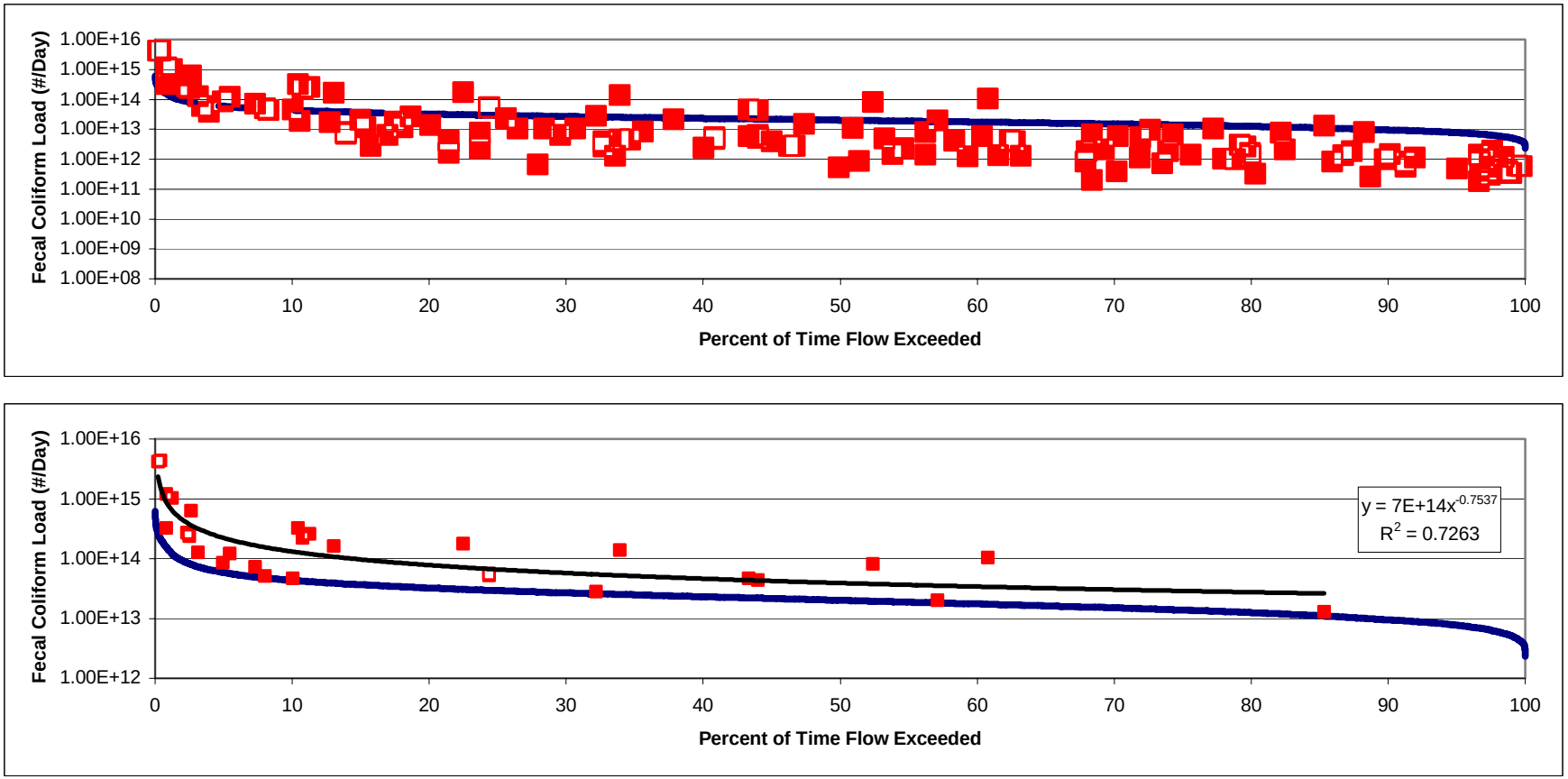


Figure B-7 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-325

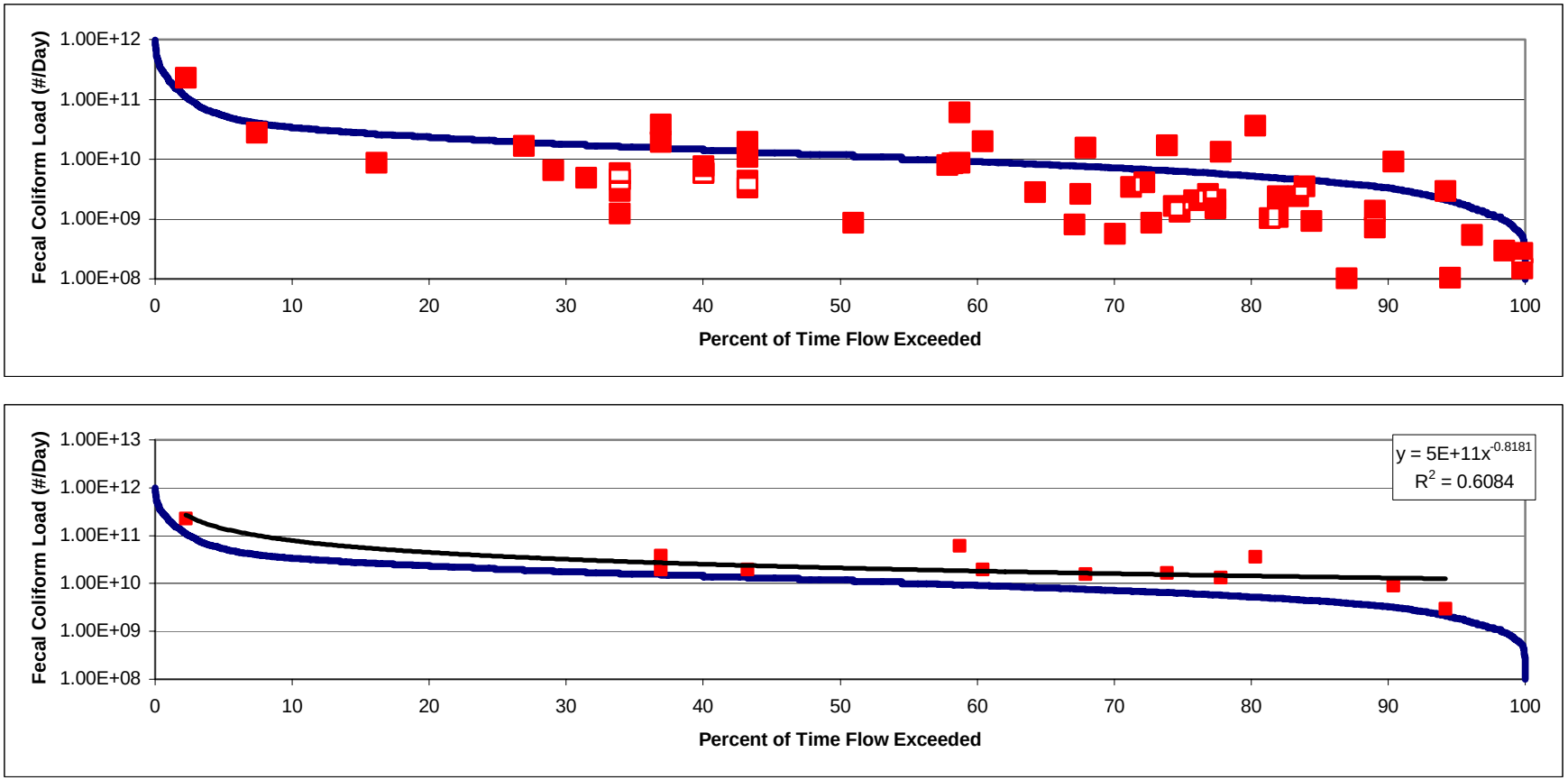


Figure B-8 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-326

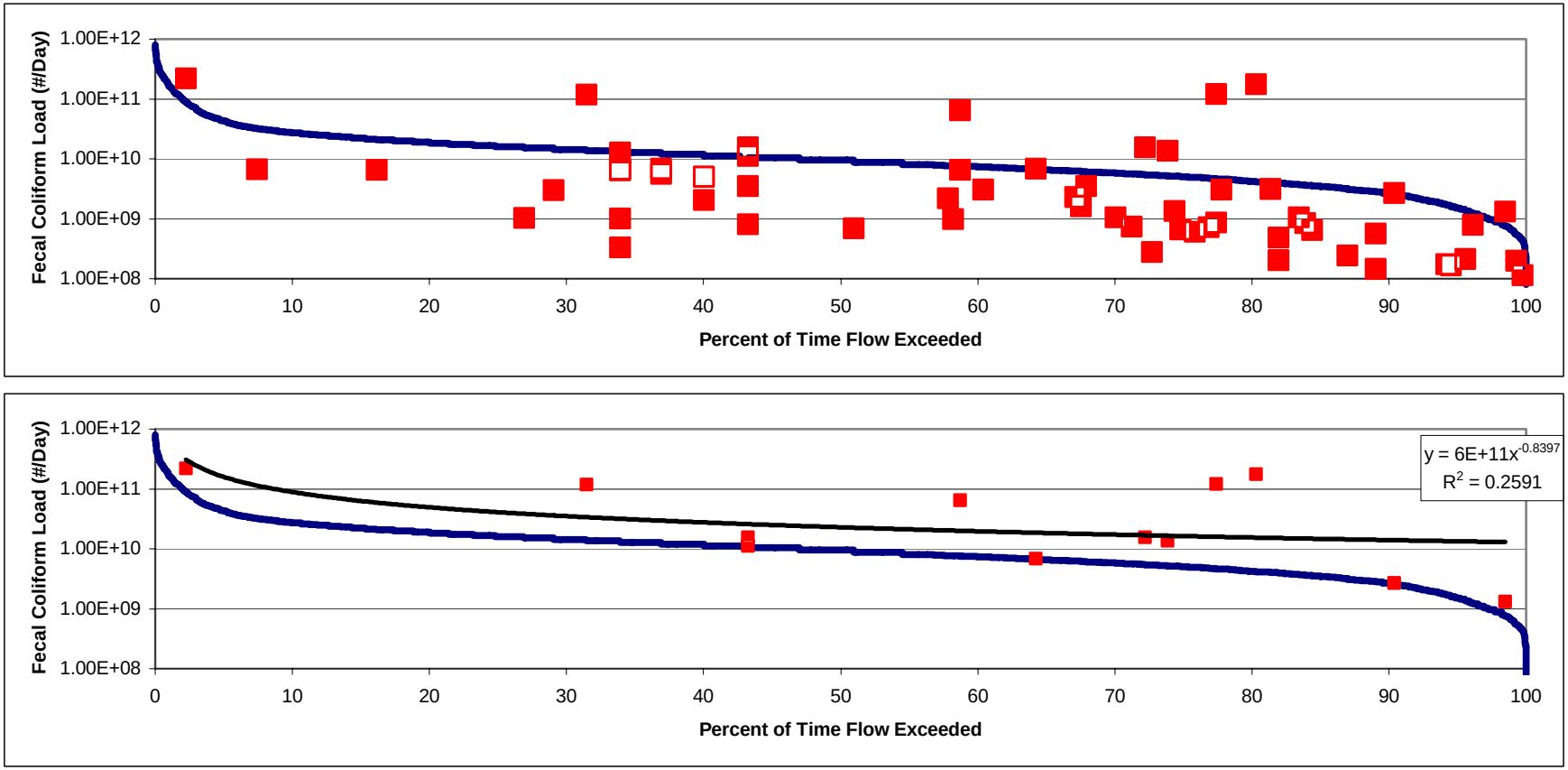


Figure B-9 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-330

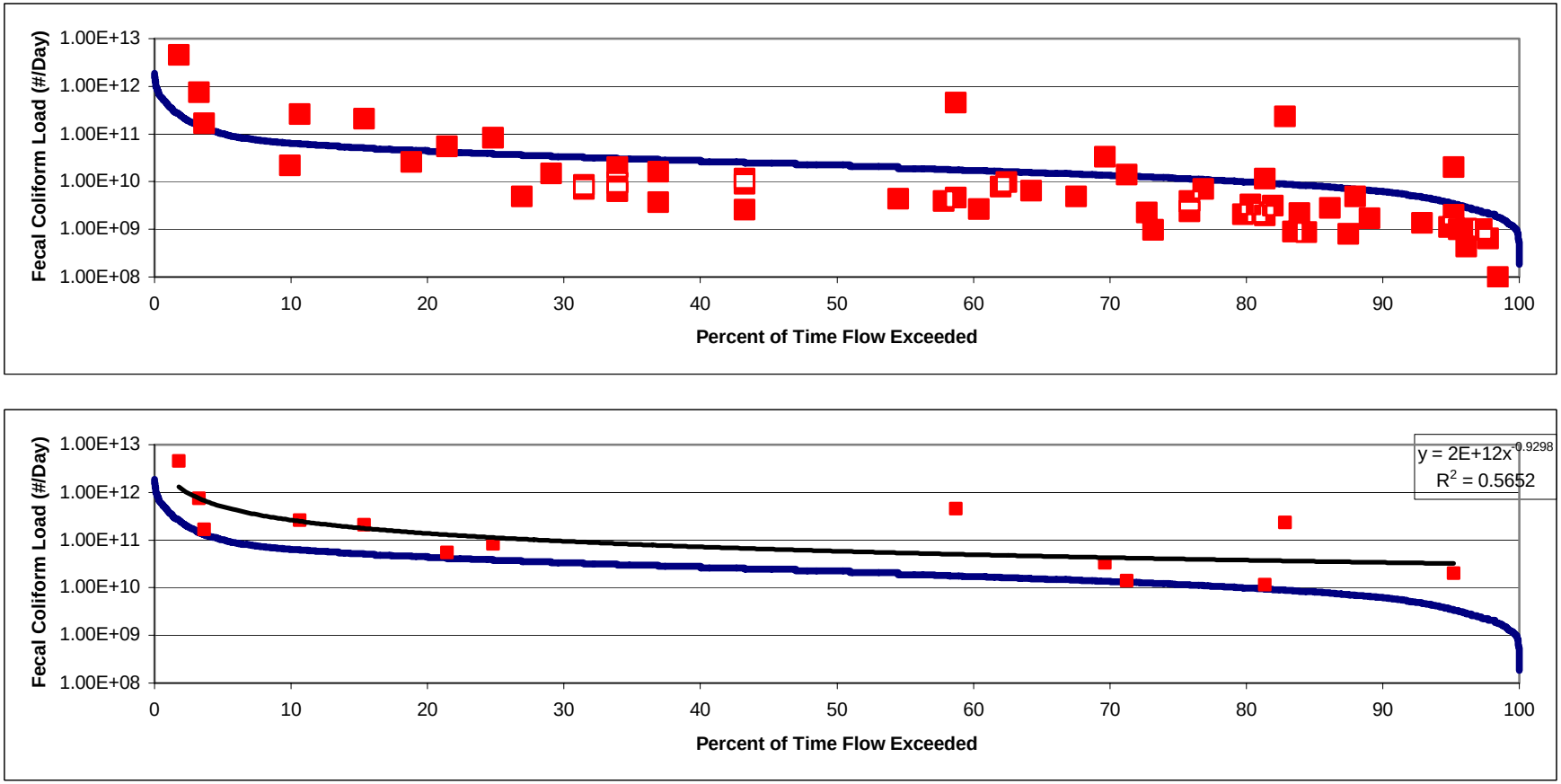


Figure B-10 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-126

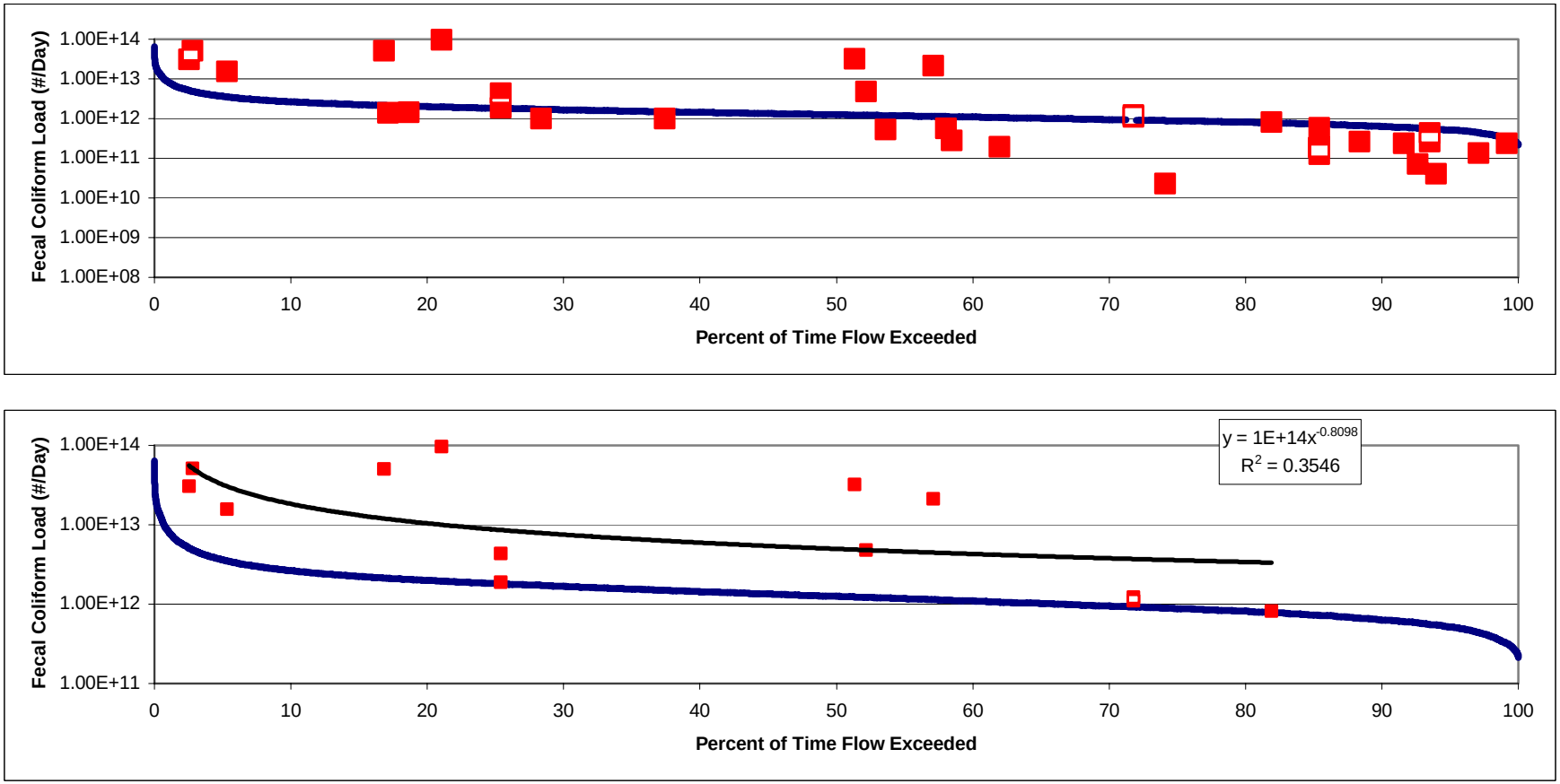


Figure B-11 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-103

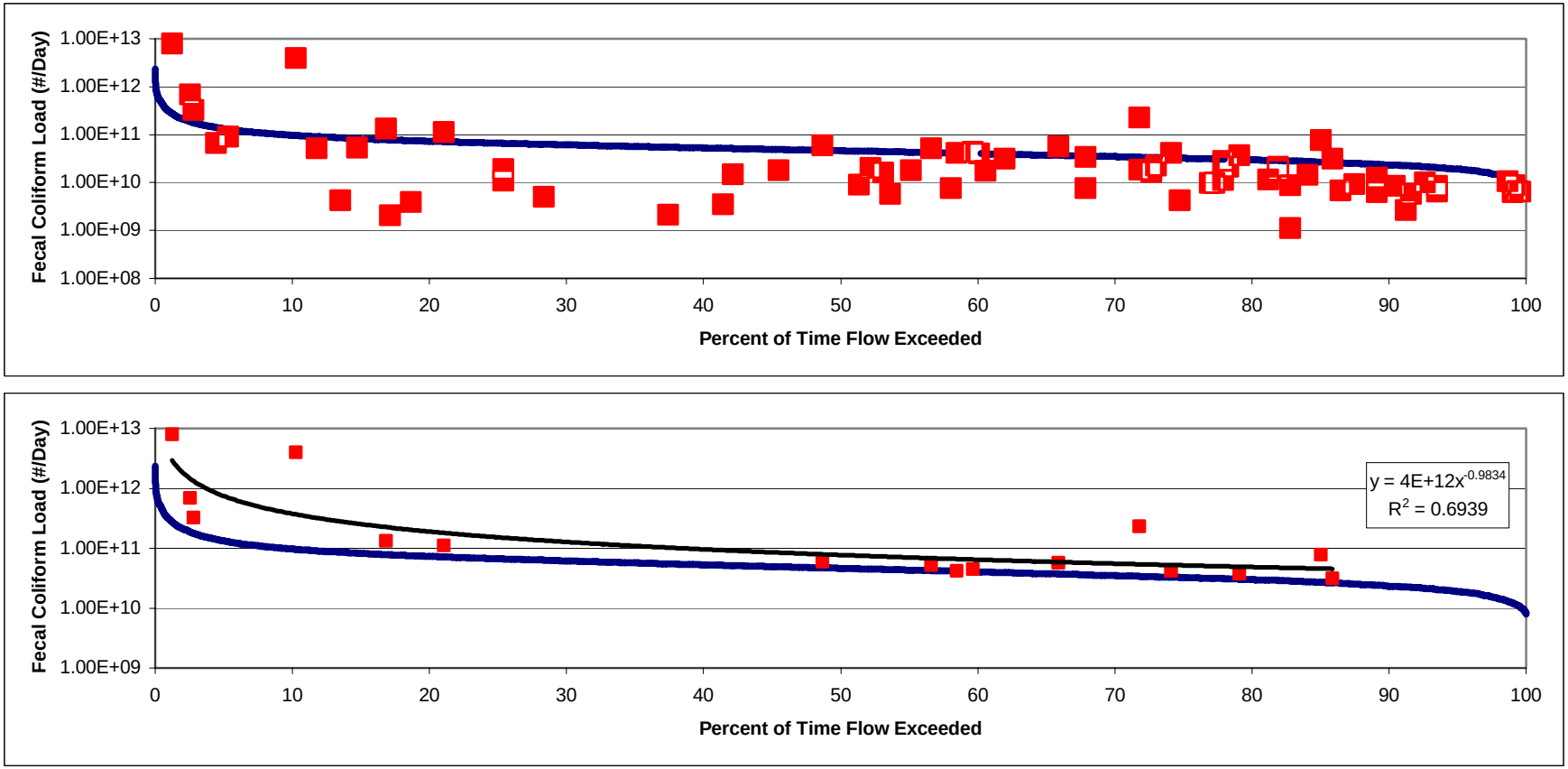
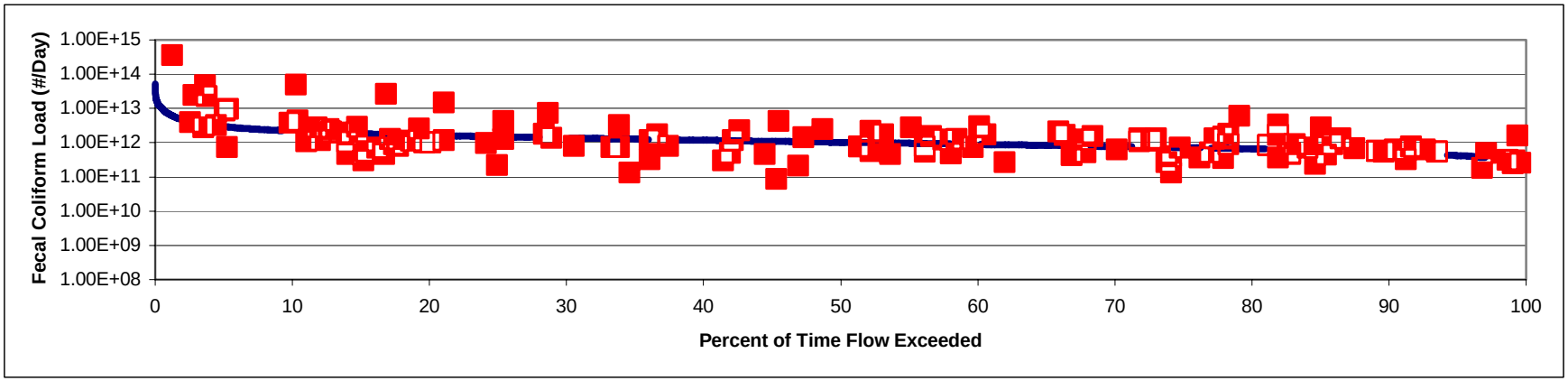


Figure B-12 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-026



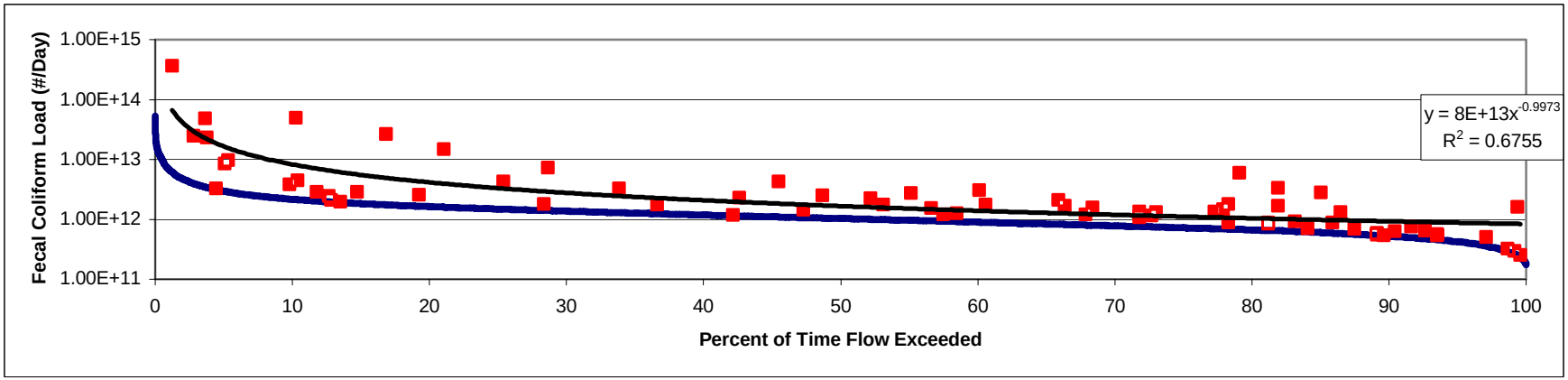


Figure B-13 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-159

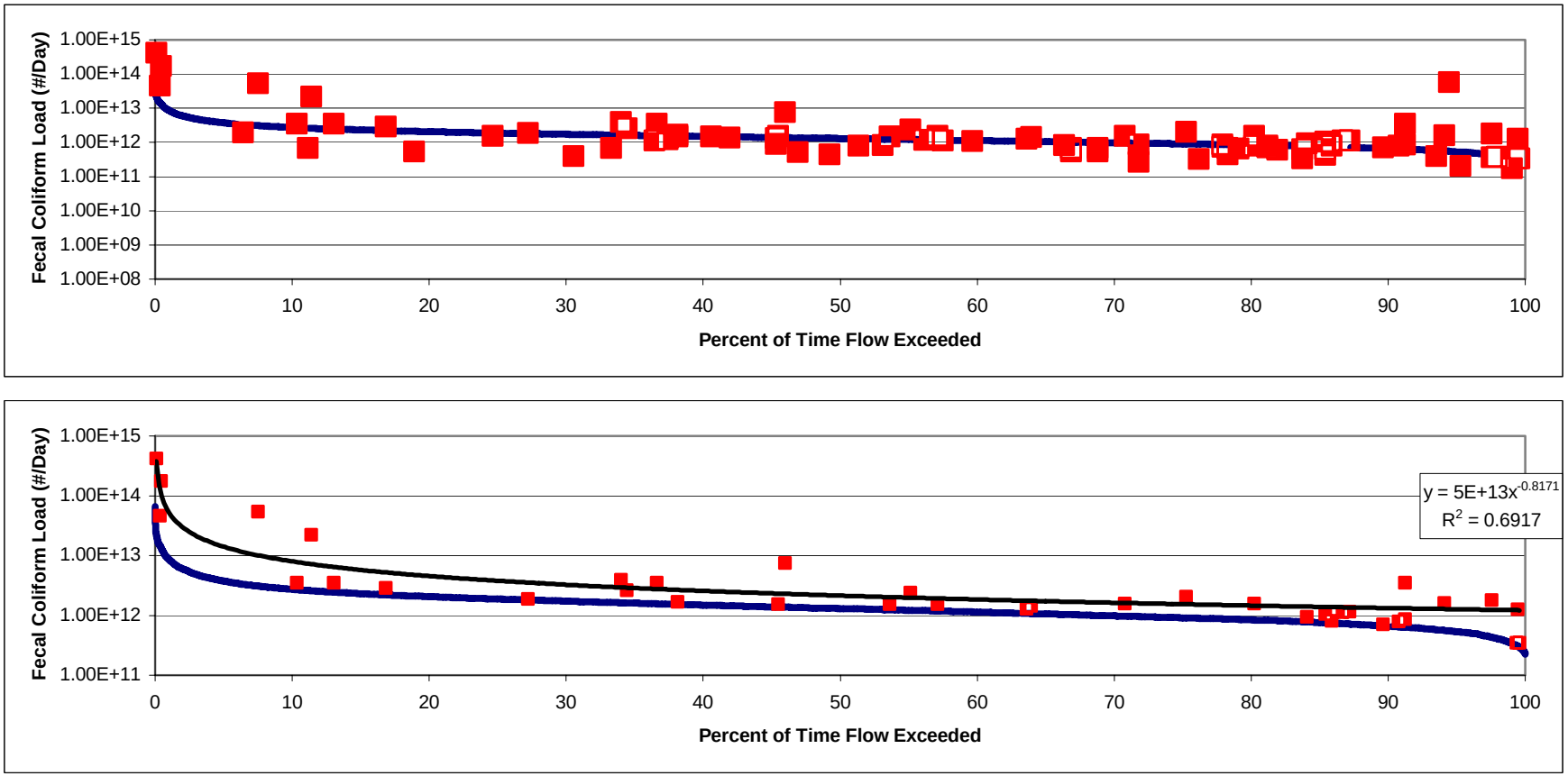


Figure B-14 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-334

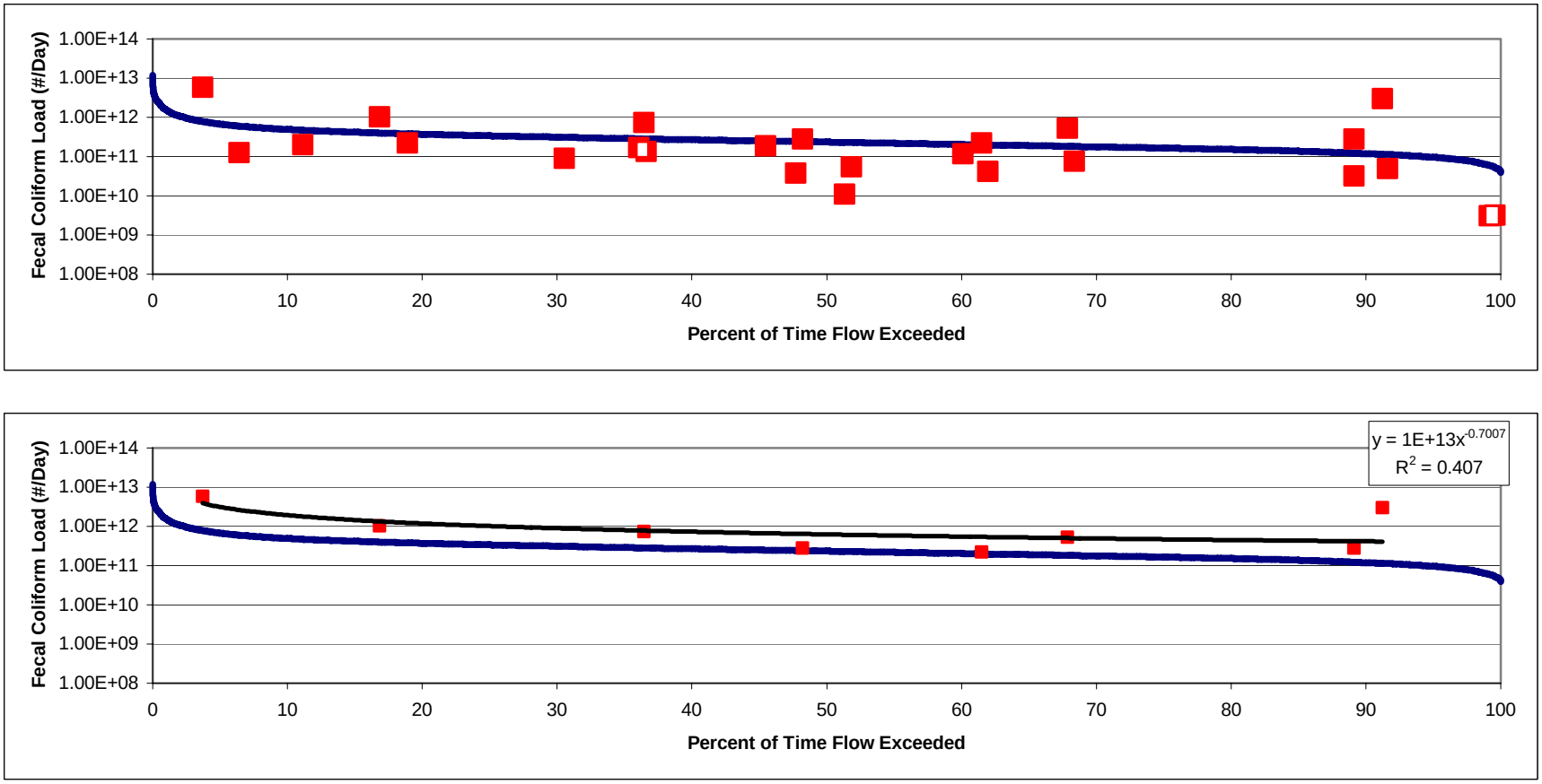


Figure B-15 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-259

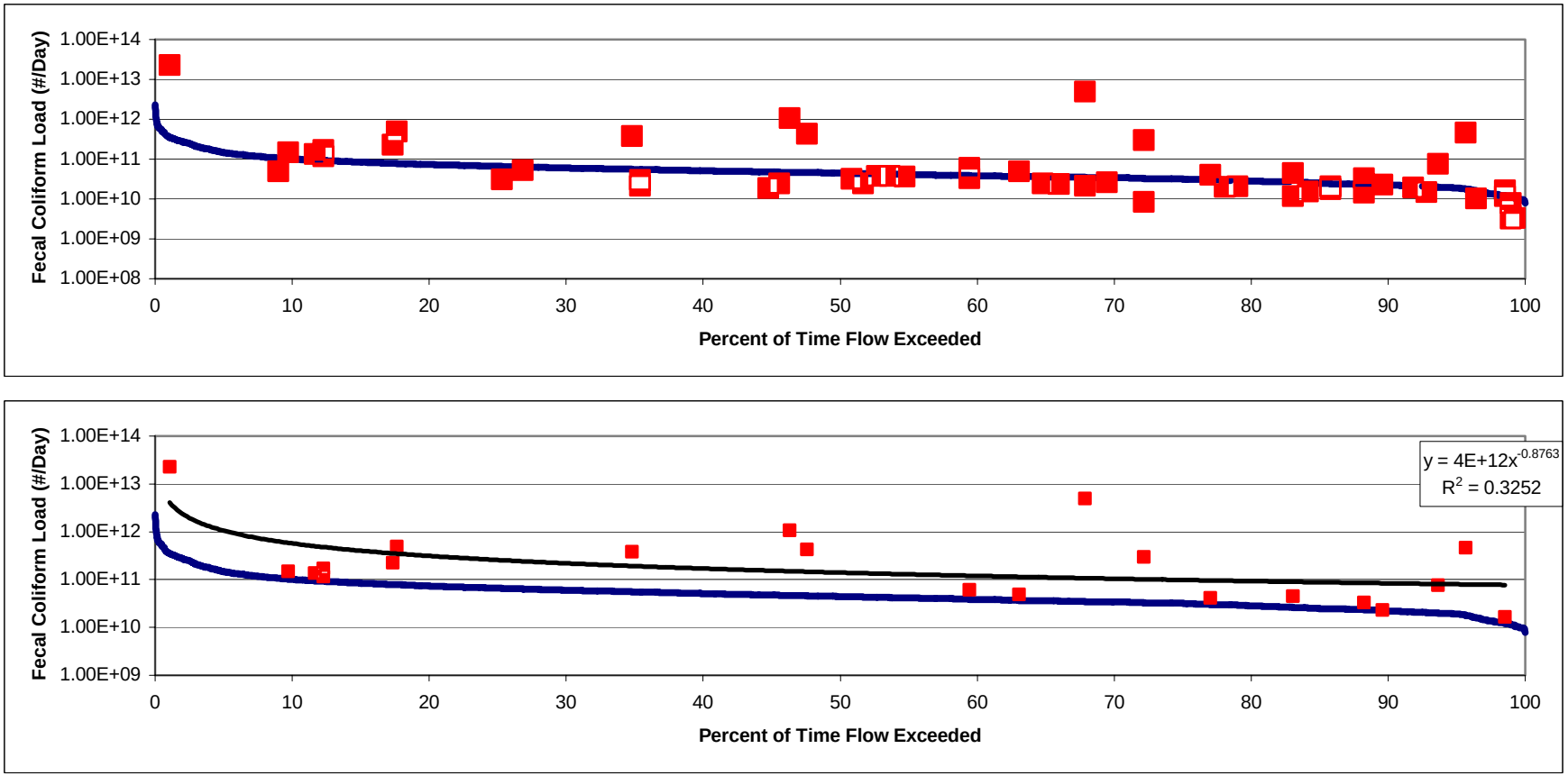
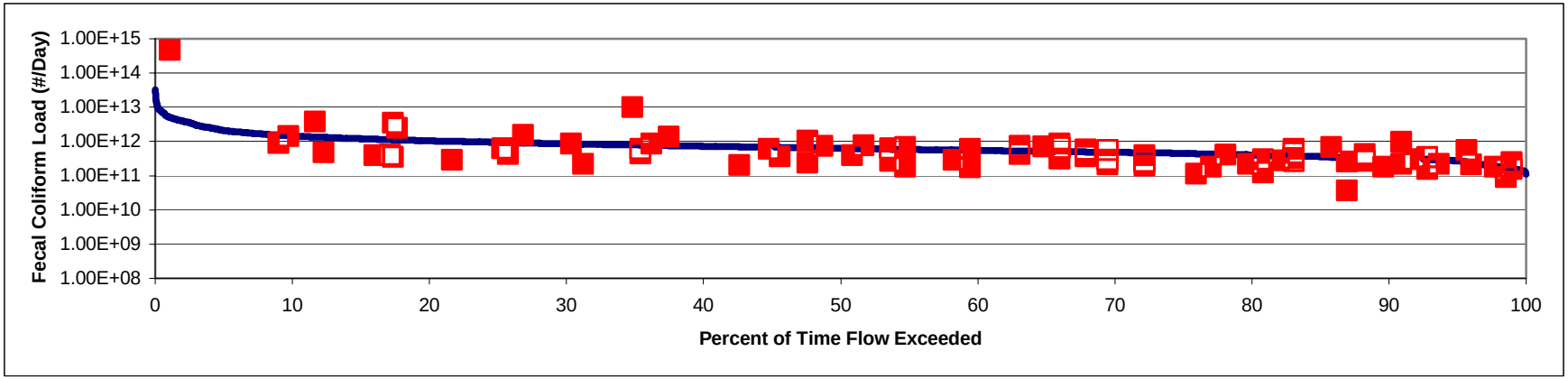


Figure B-16 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-302



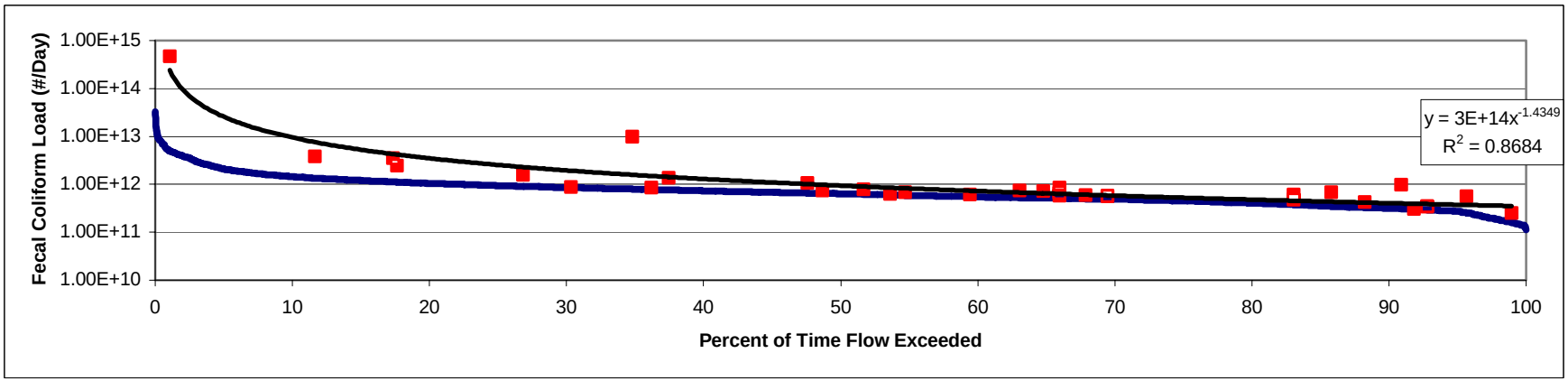


Figure B-17 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-331

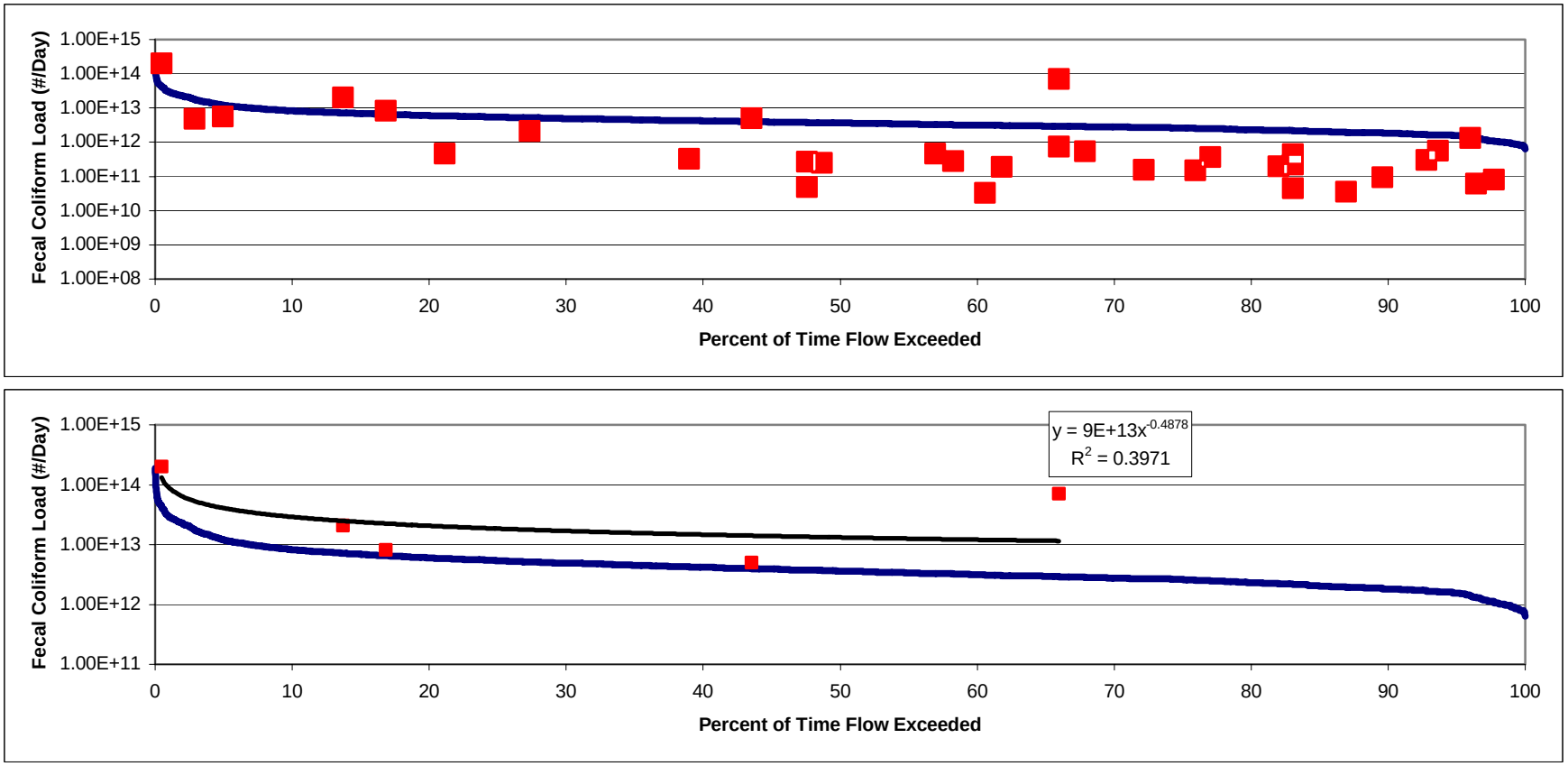


Figure B-18 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-057

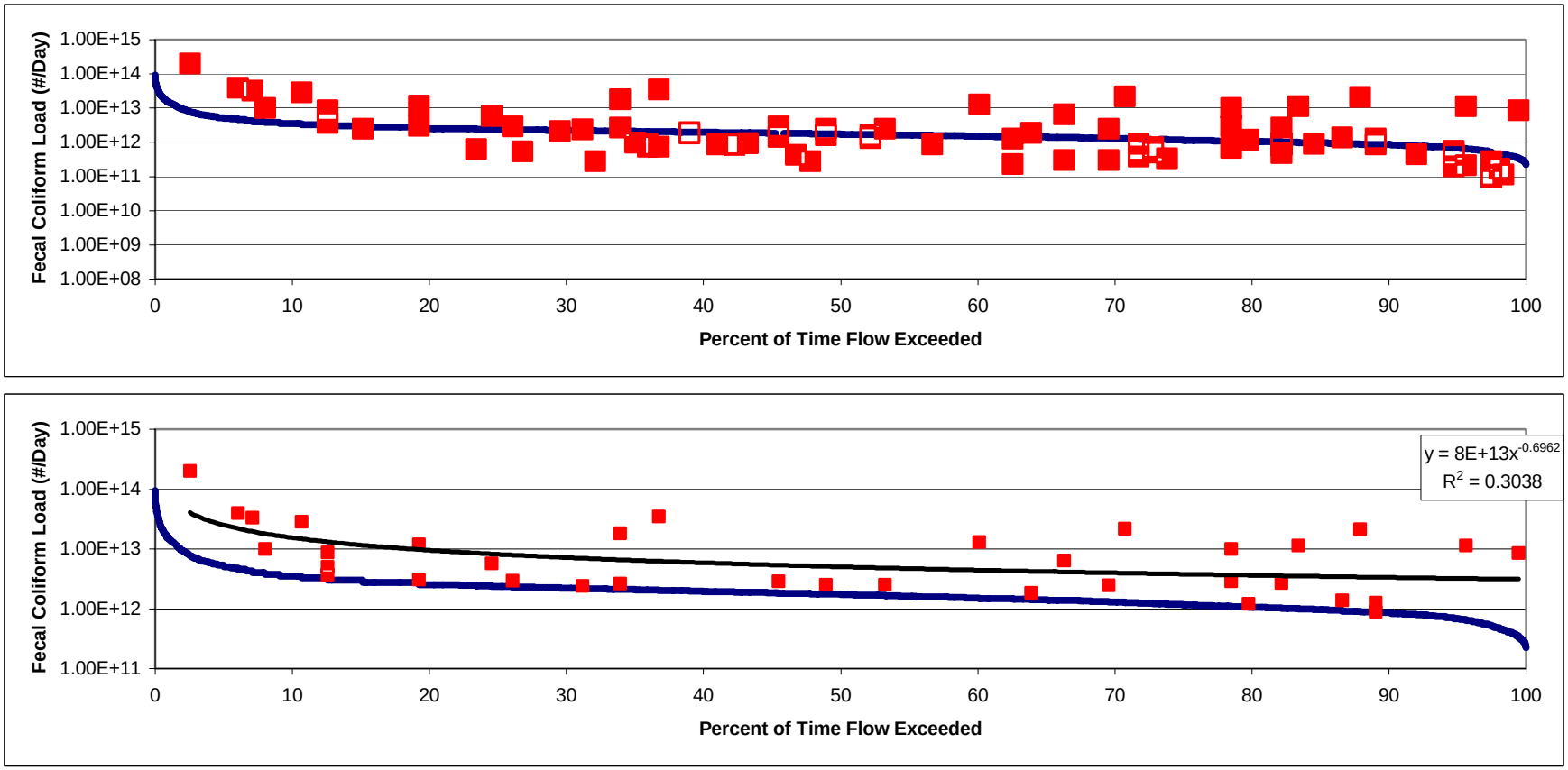


Figure B-19 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-095

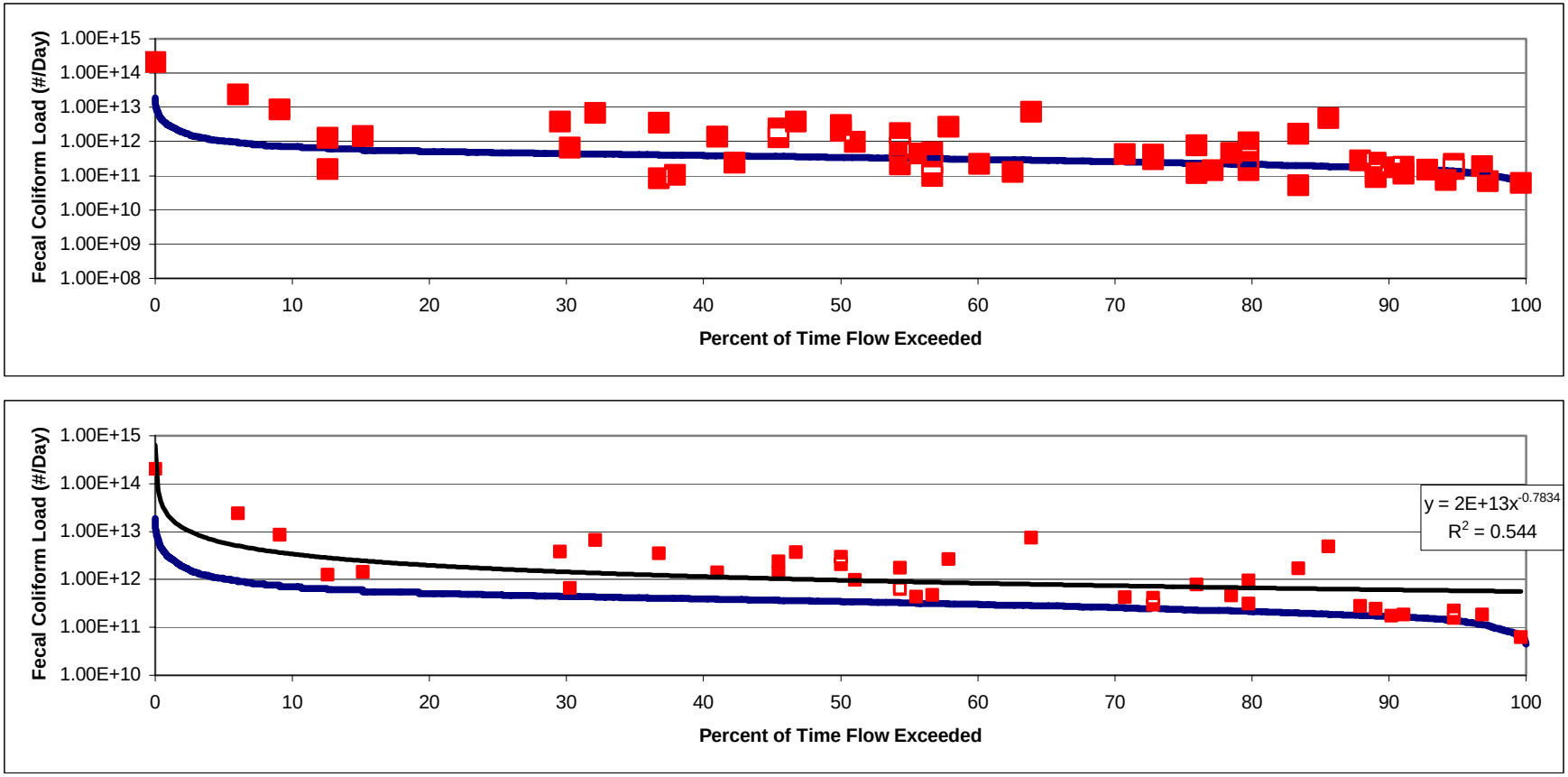


Figure B-20 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-119

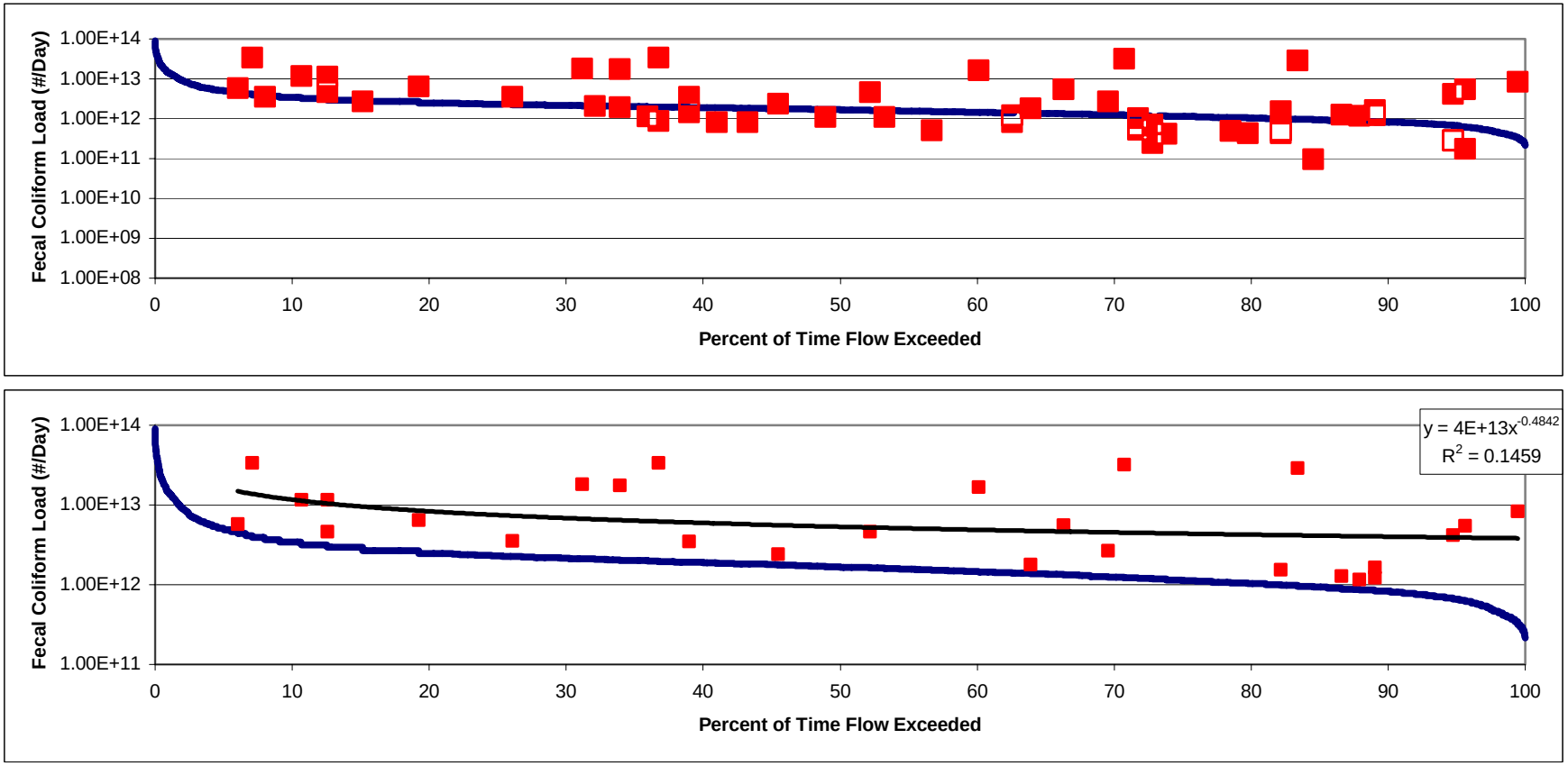


Figure B-21 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-128

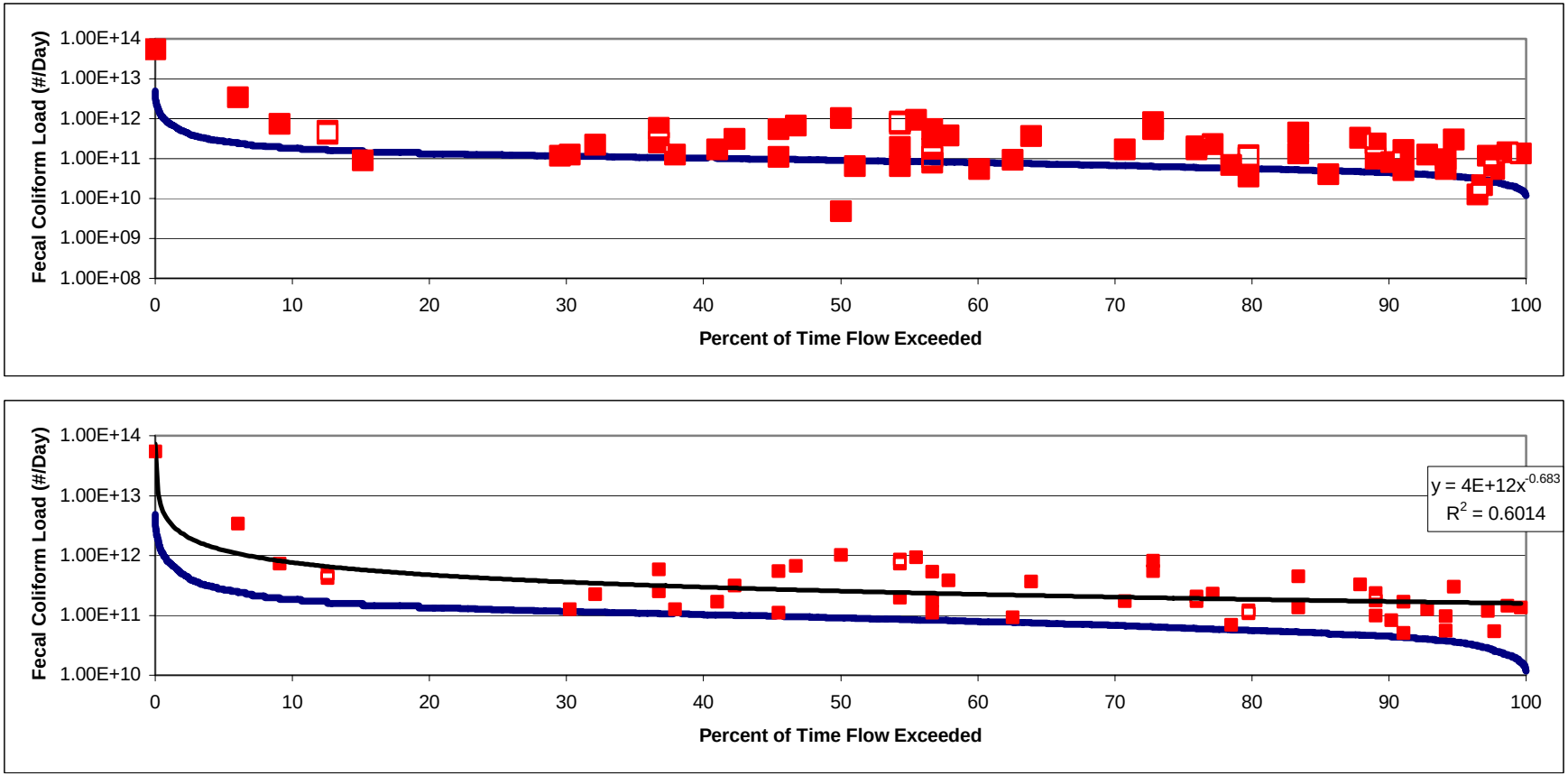


Figure B-22 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-191

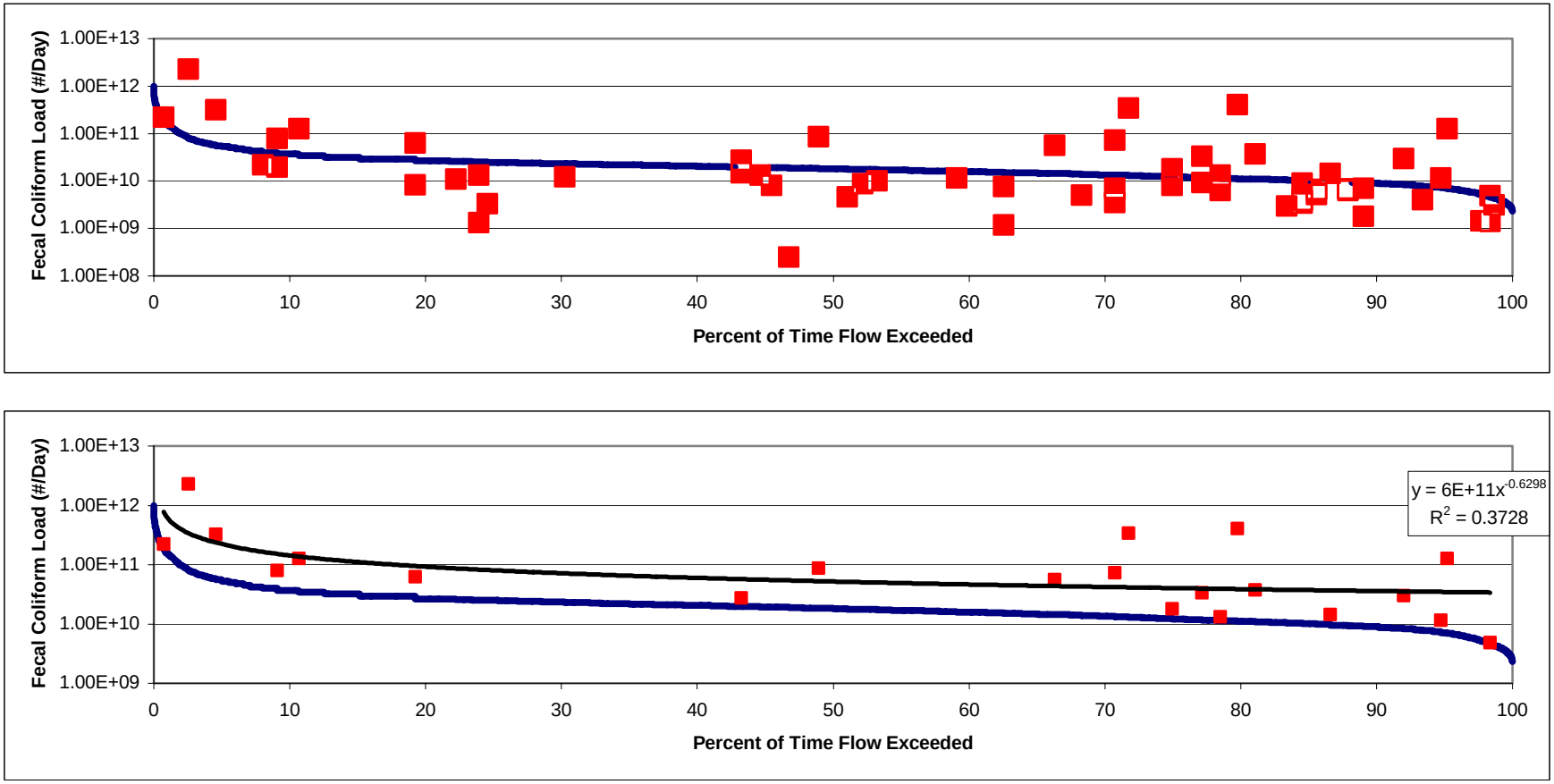


Figure B-23 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-277

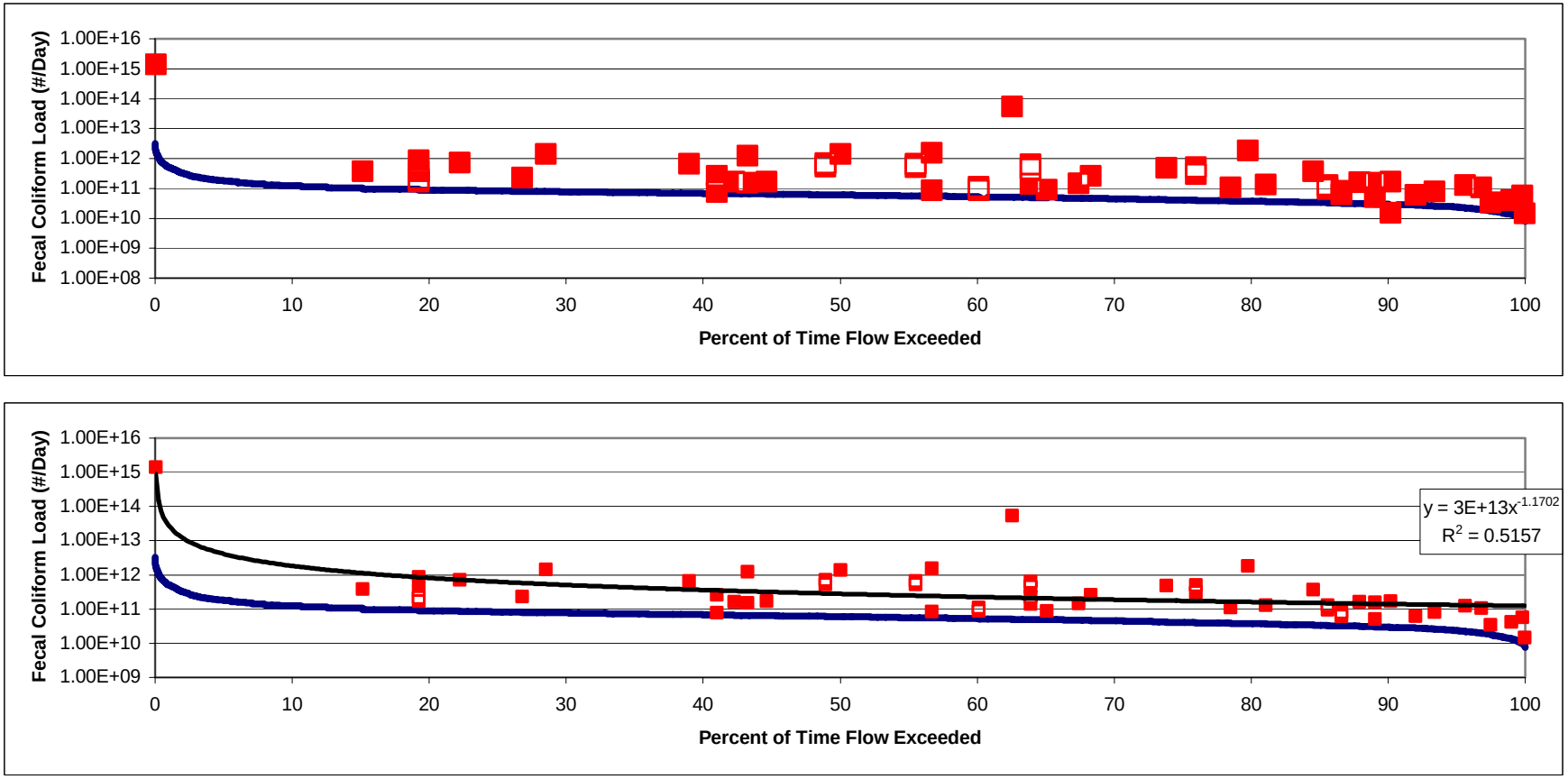


Figure B-24 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-278

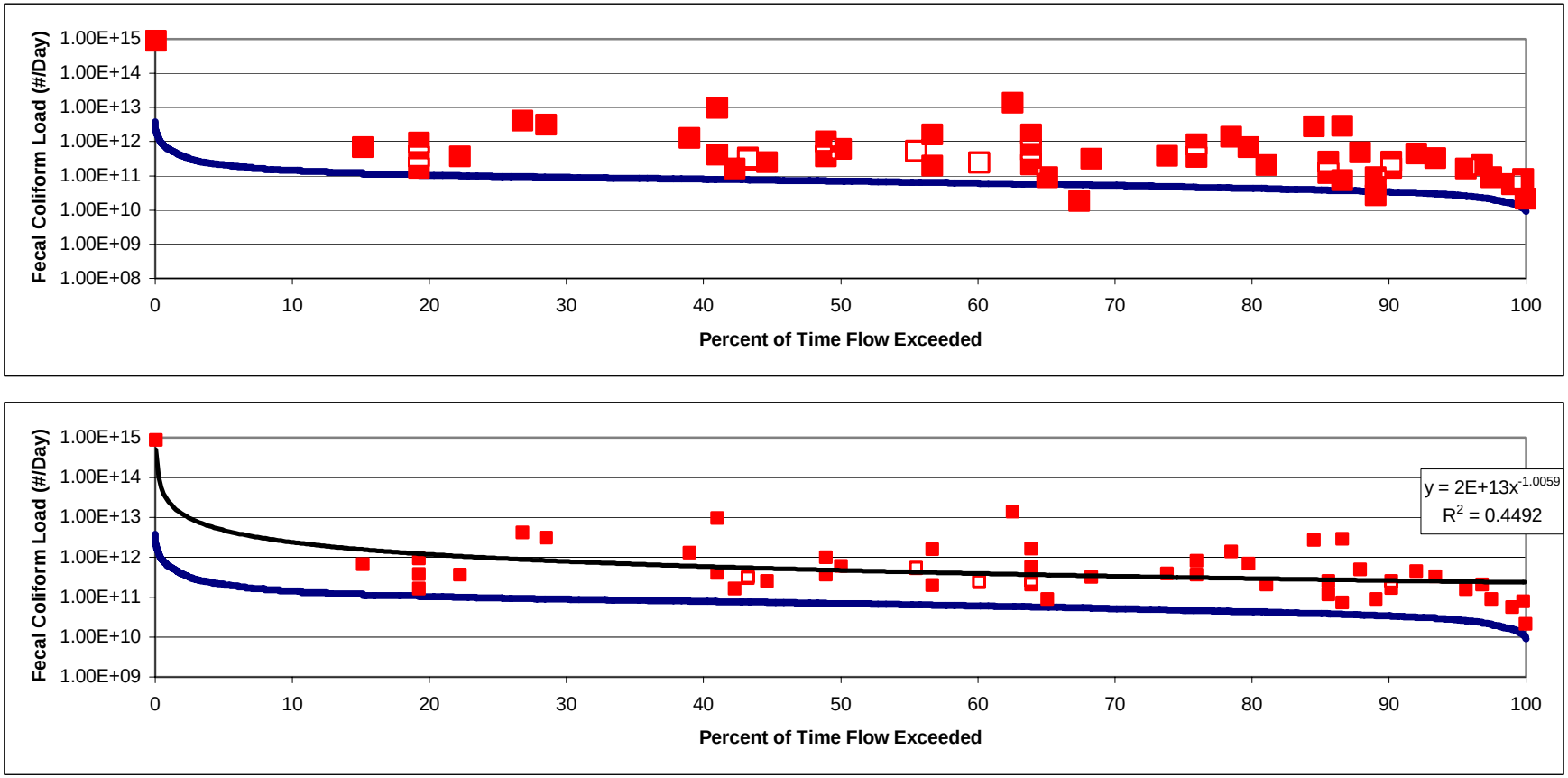


Figure B-25 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at BL-001

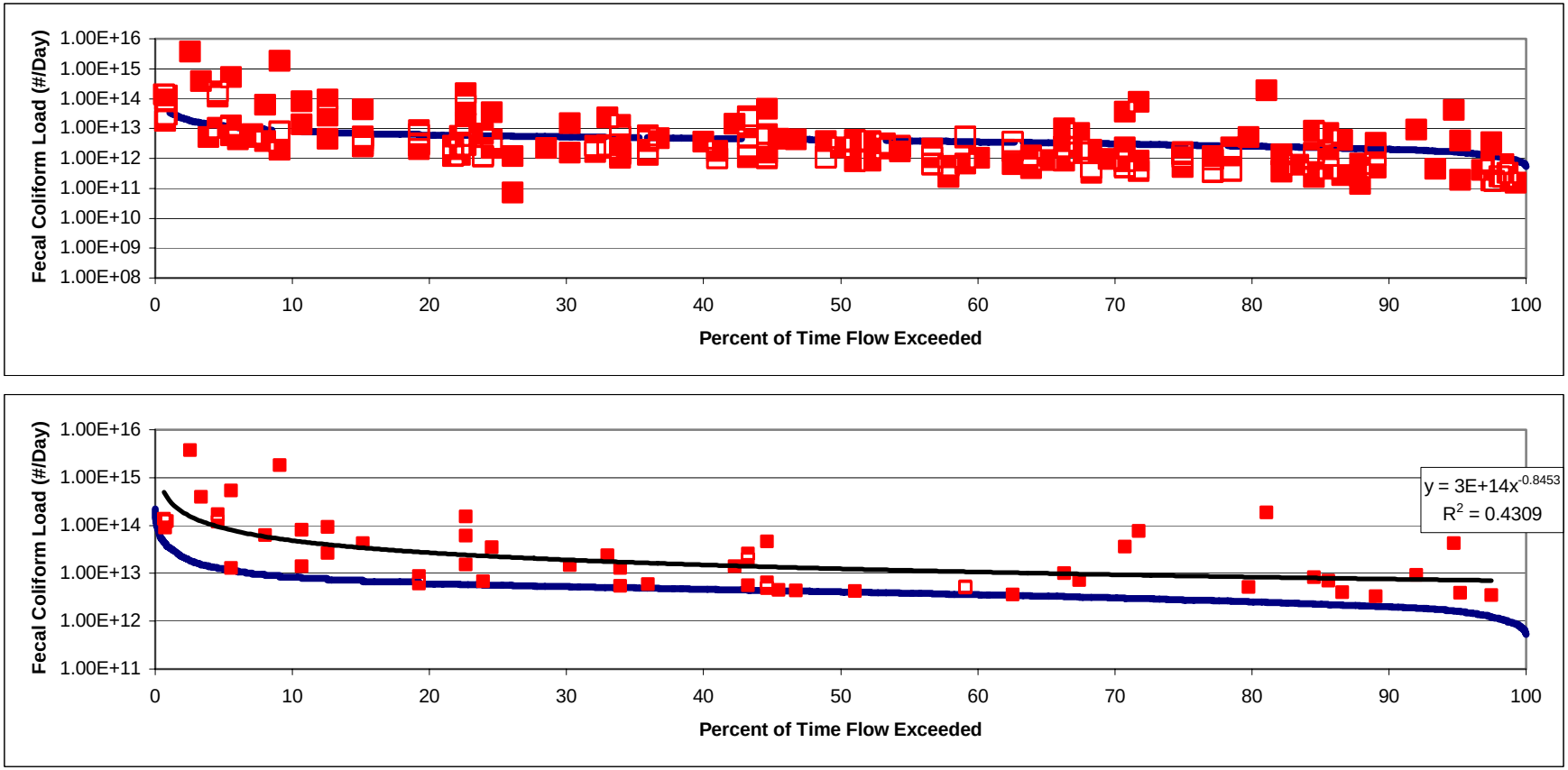


Figure B-26 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at BL-005

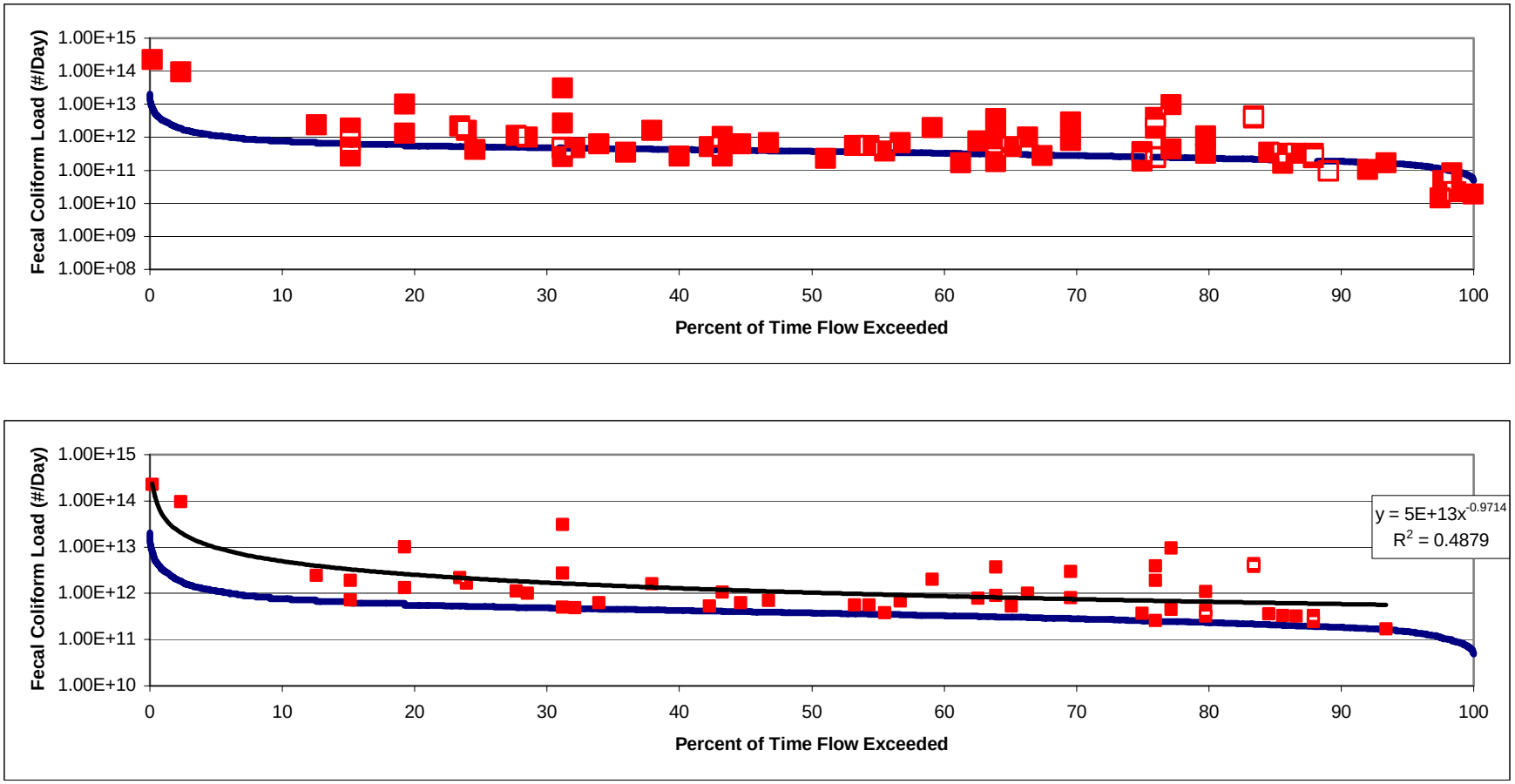


Figure B-27 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-323

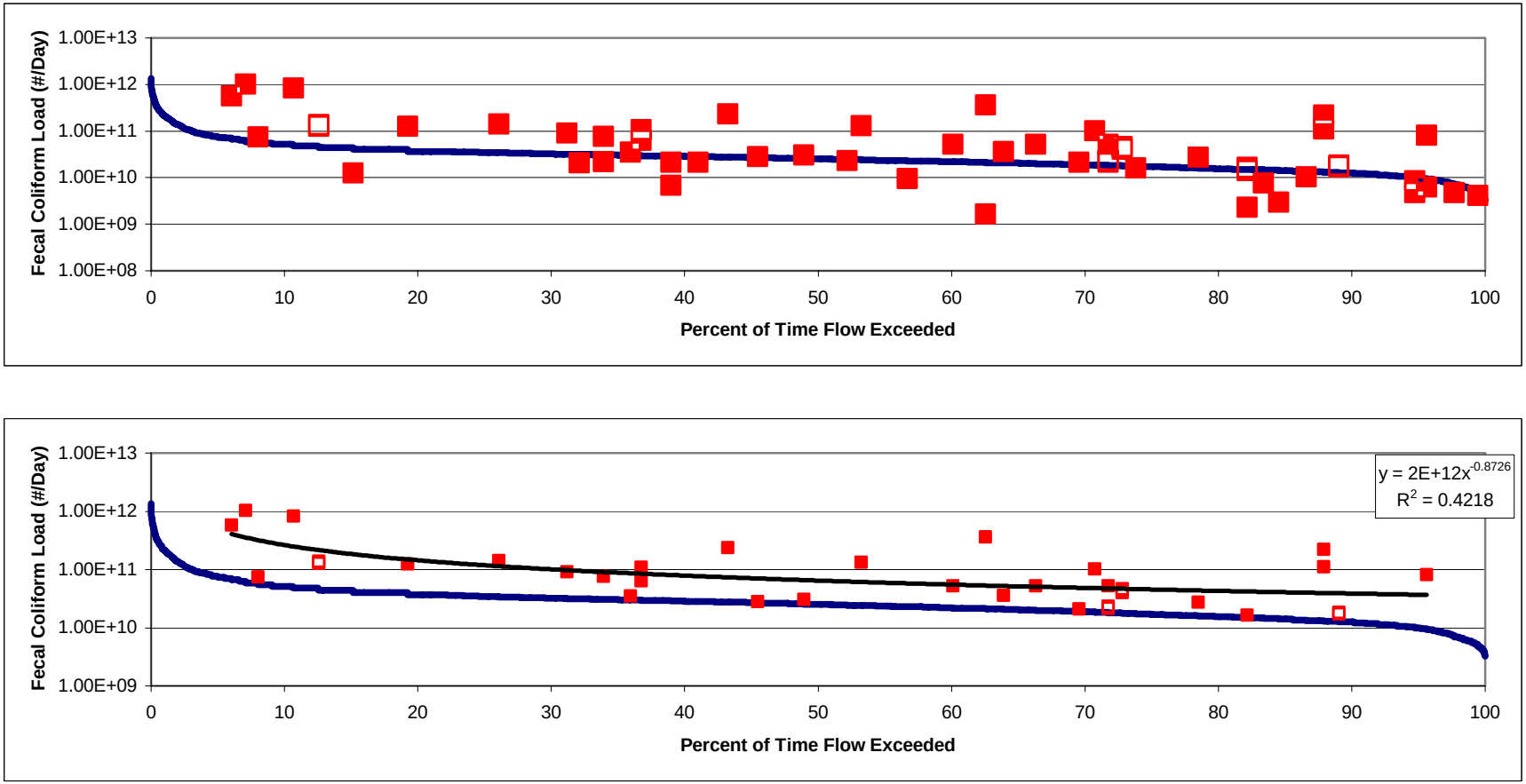
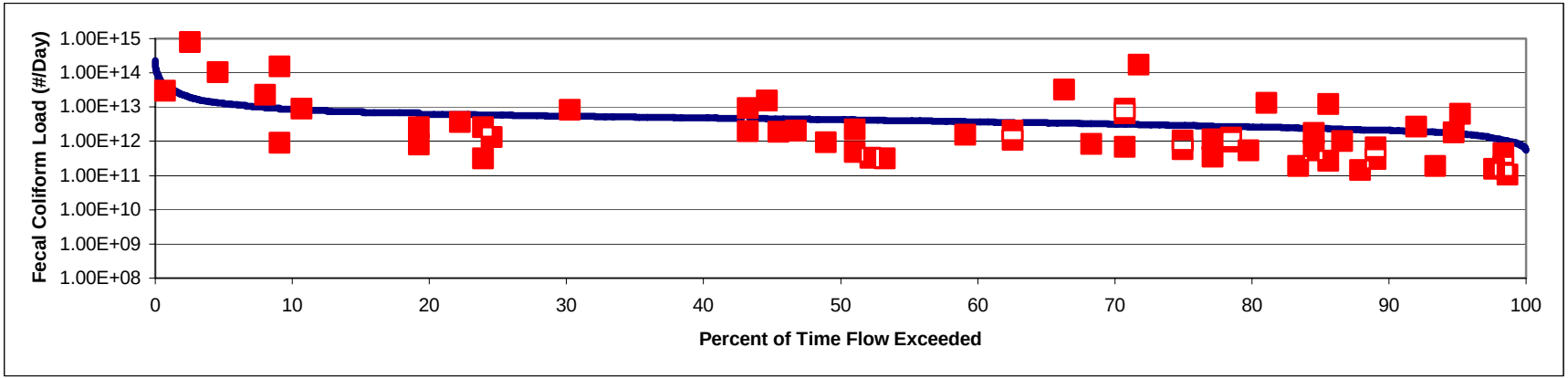


Figure B-28 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at BP-001



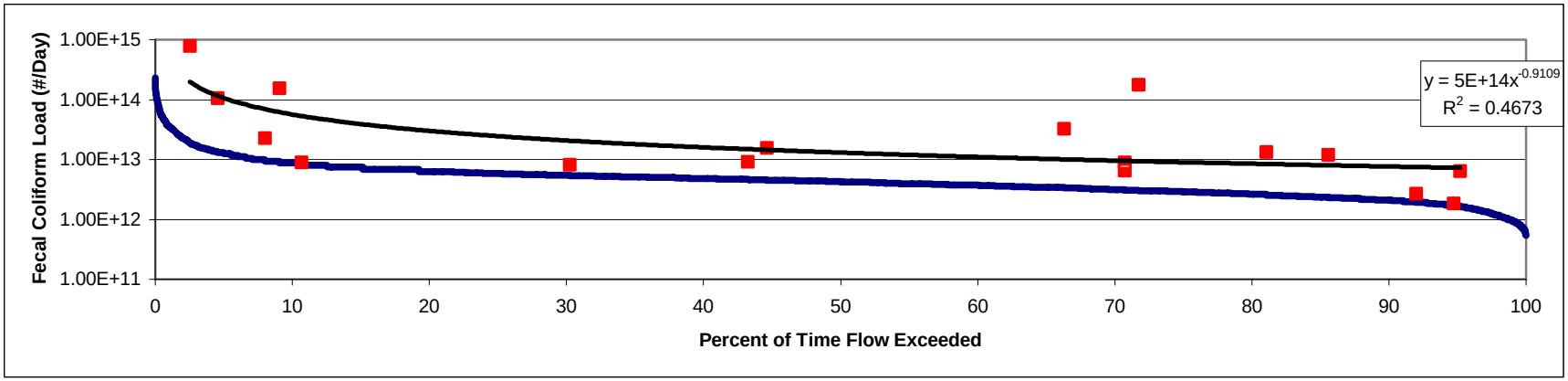


Figure B-29 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-056

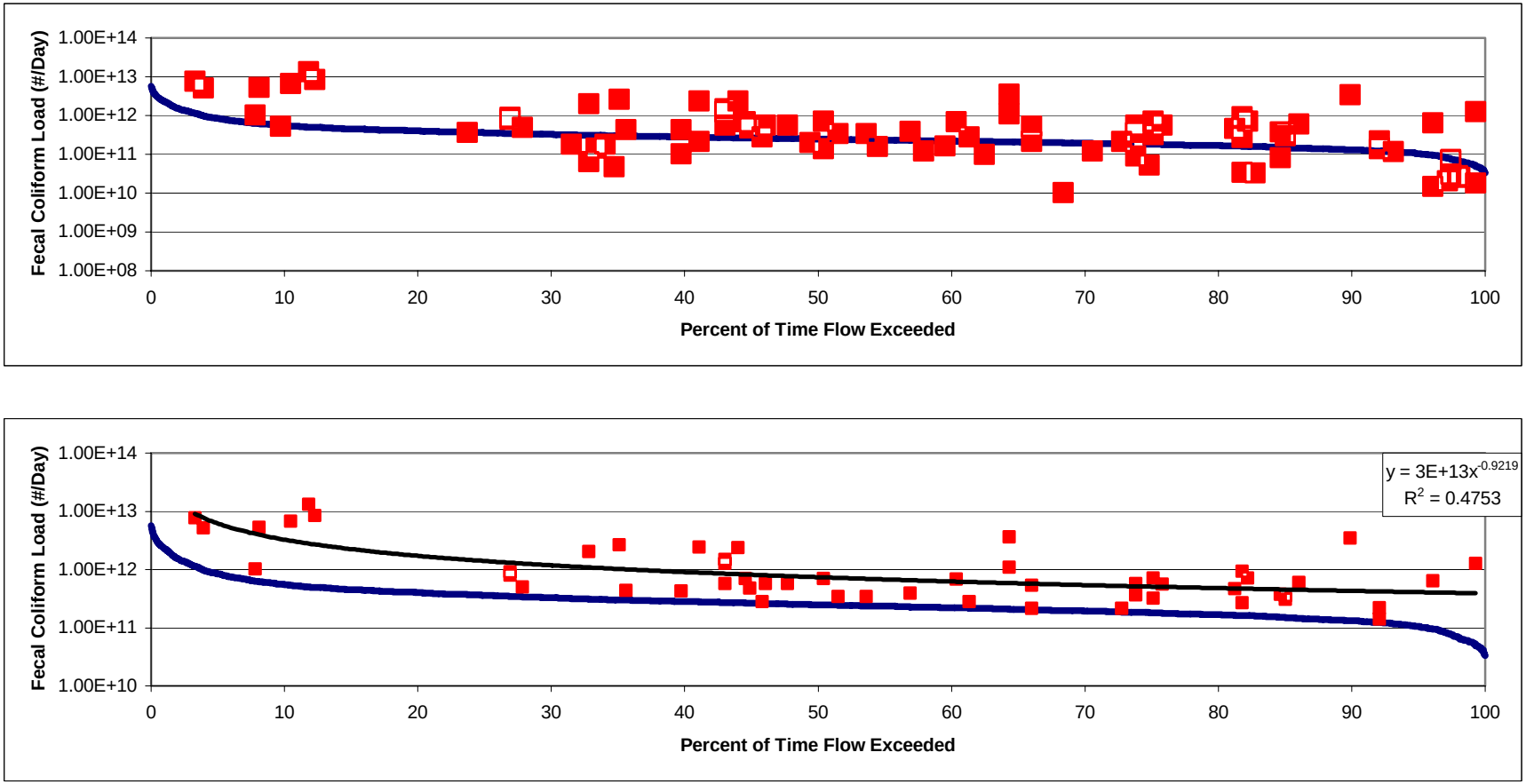


Figure B-30 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-059

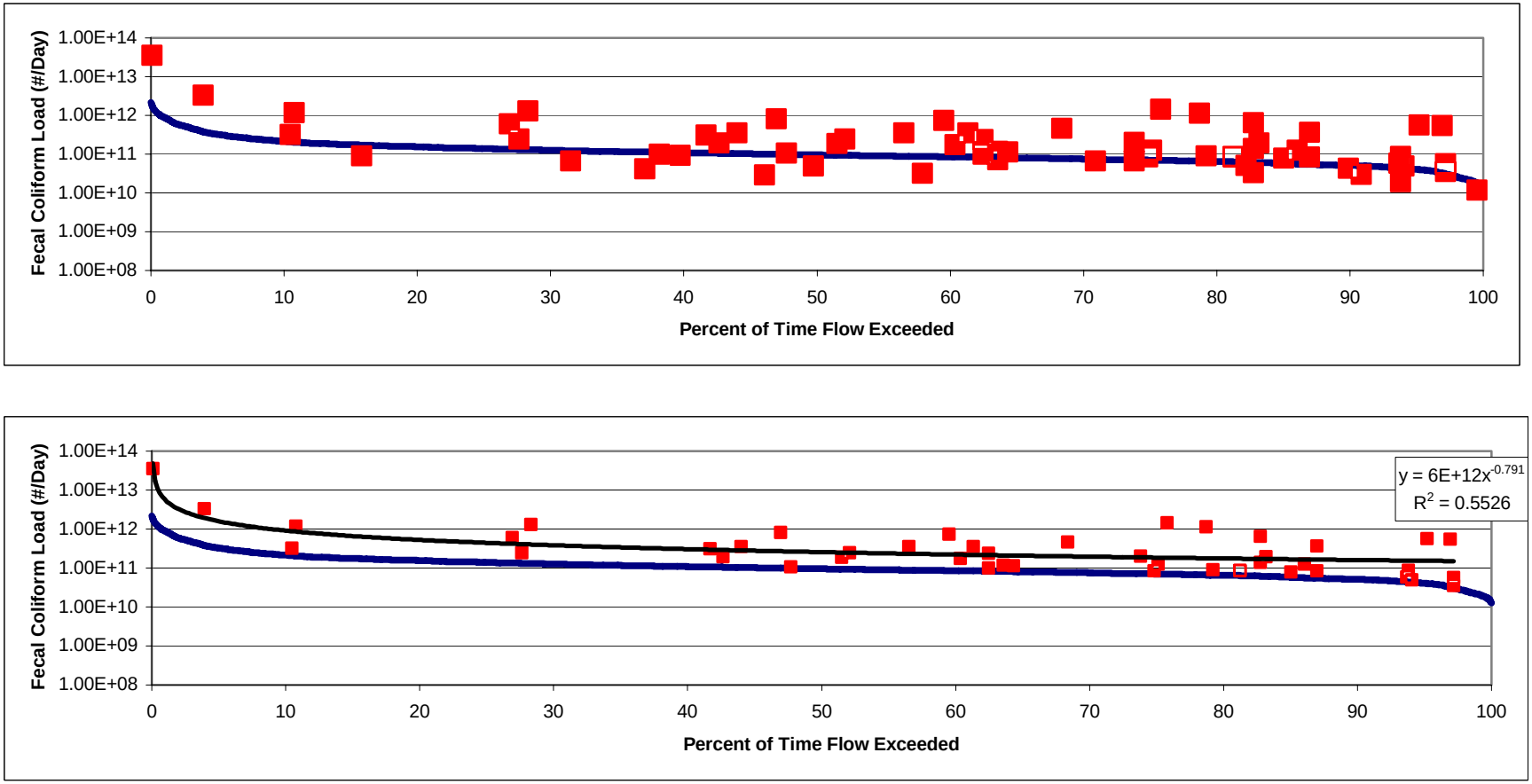


Figure B-31 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-088

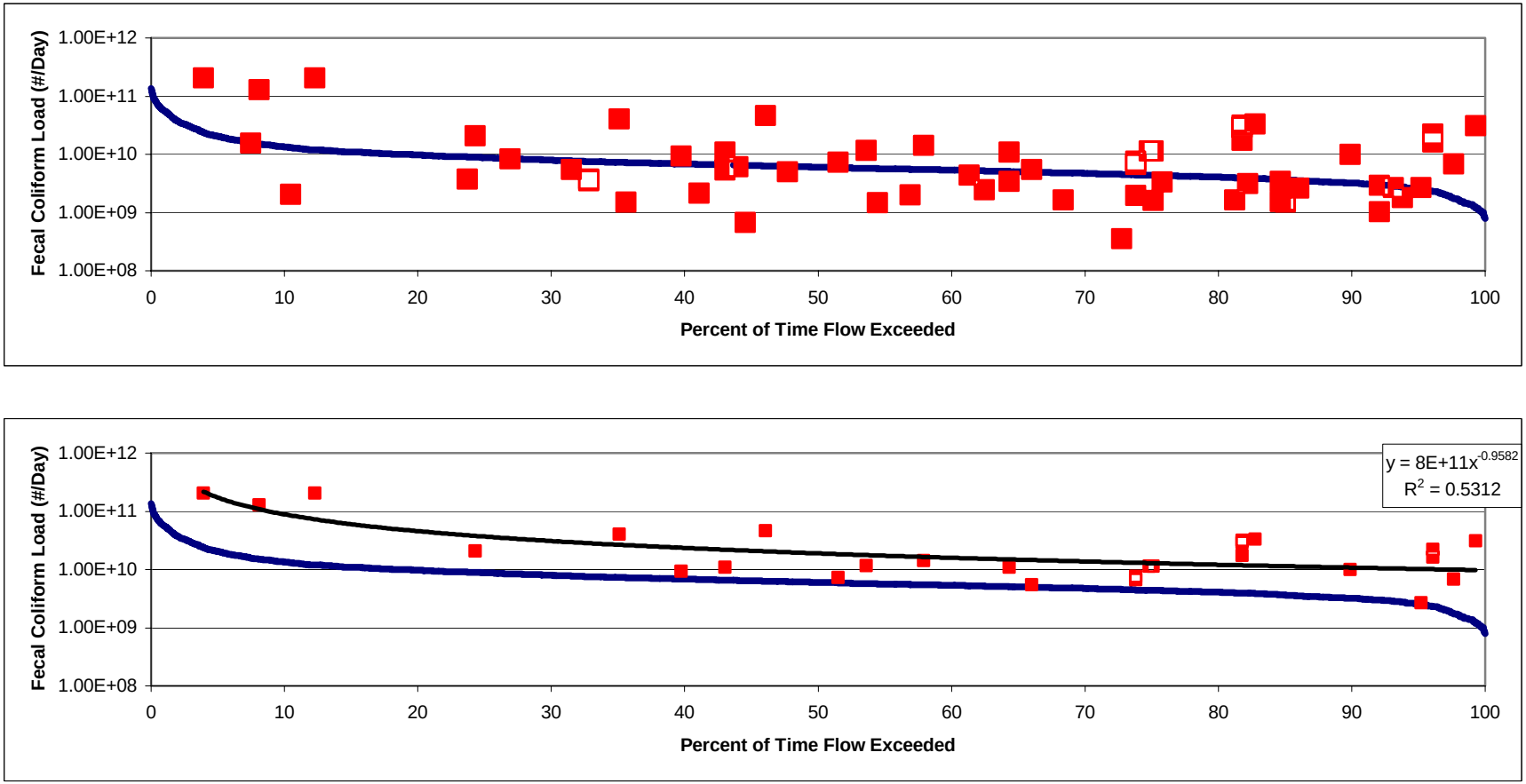


Figure B-32 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-100

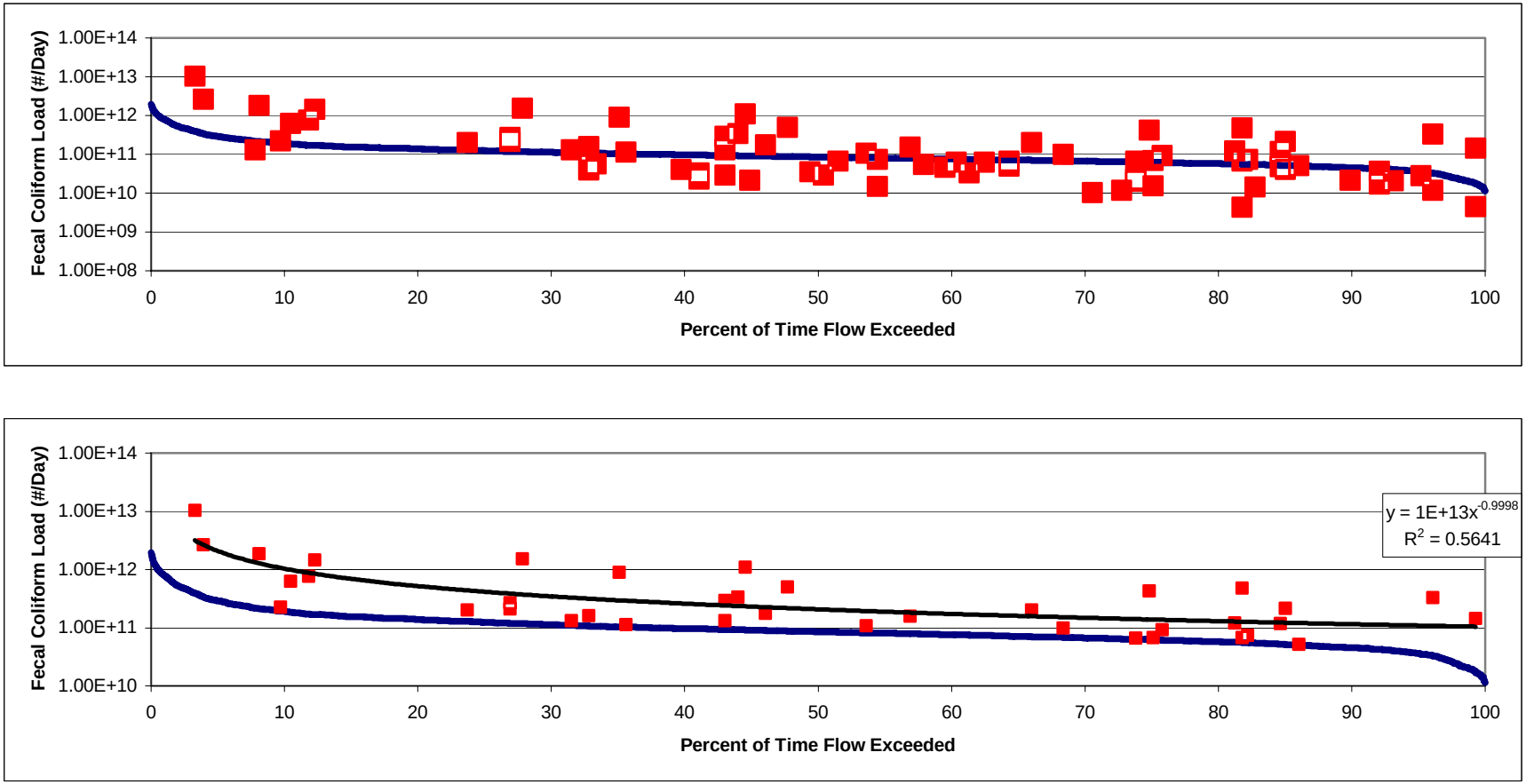


Figure B-33 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-211

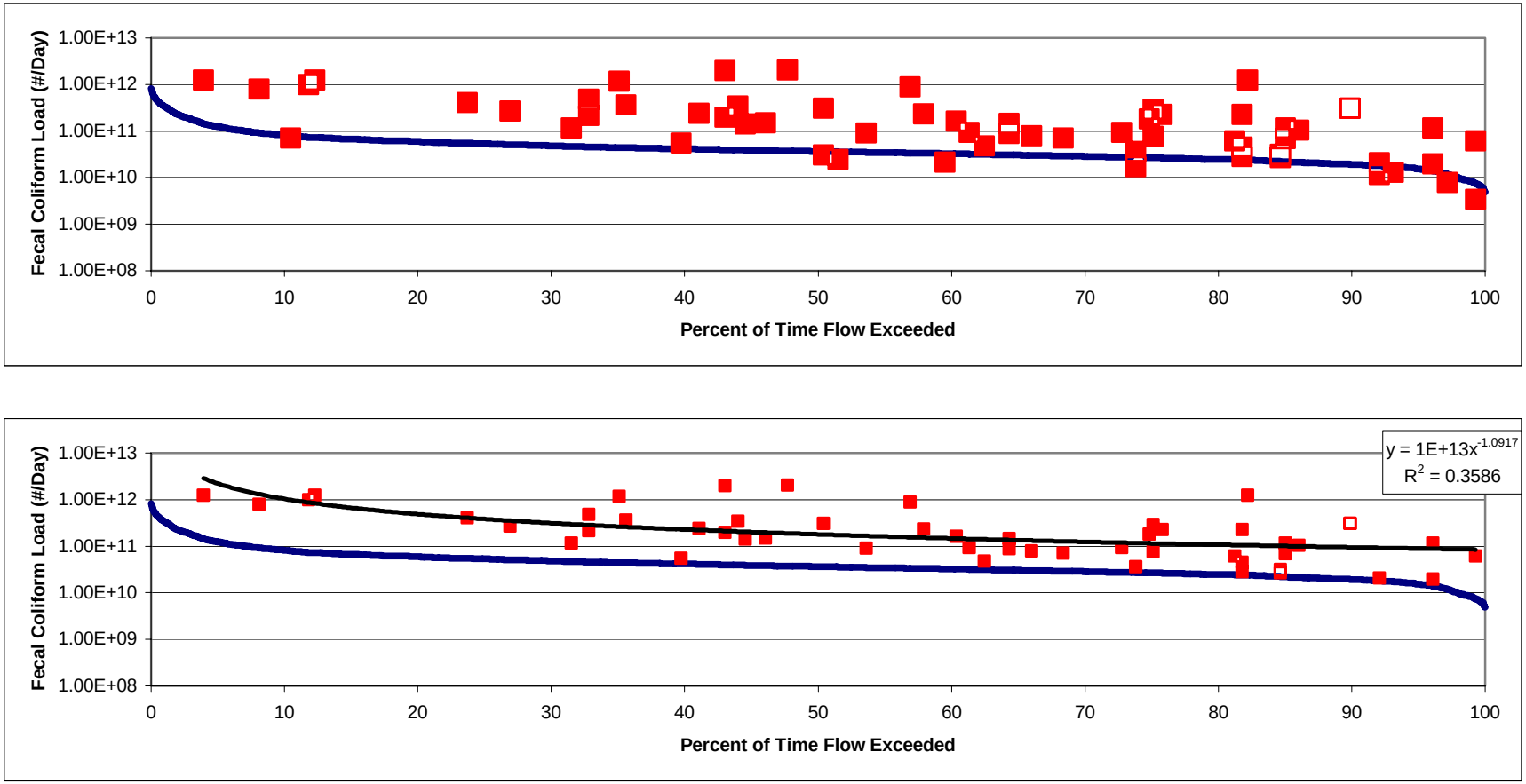


Figure B-34 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-221

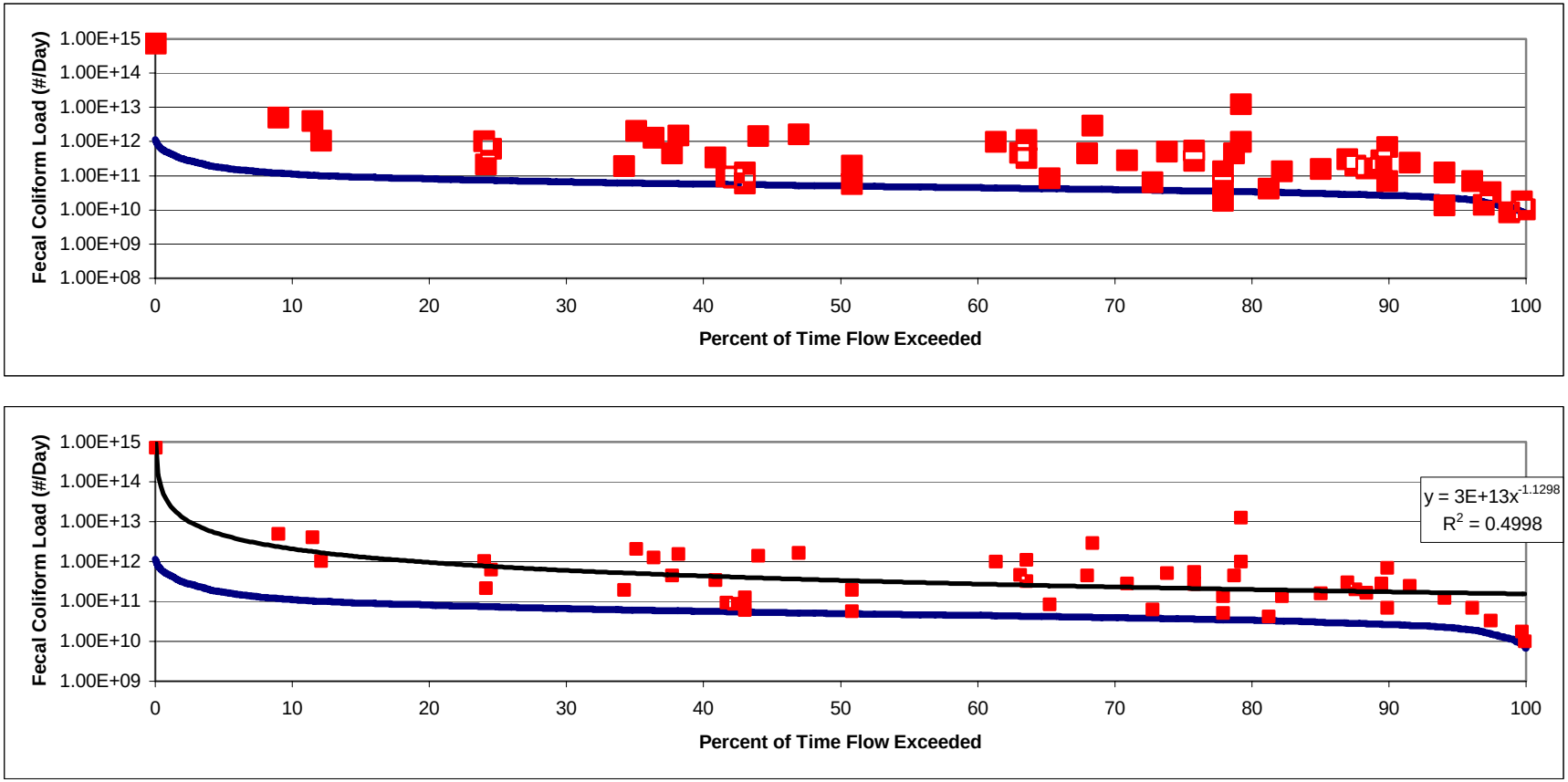


Figure B-35 Load Duration Curve with All Measured Data and Power Trend Line Generated from Violating Fecal Coliform Bacteria Measured at B-301

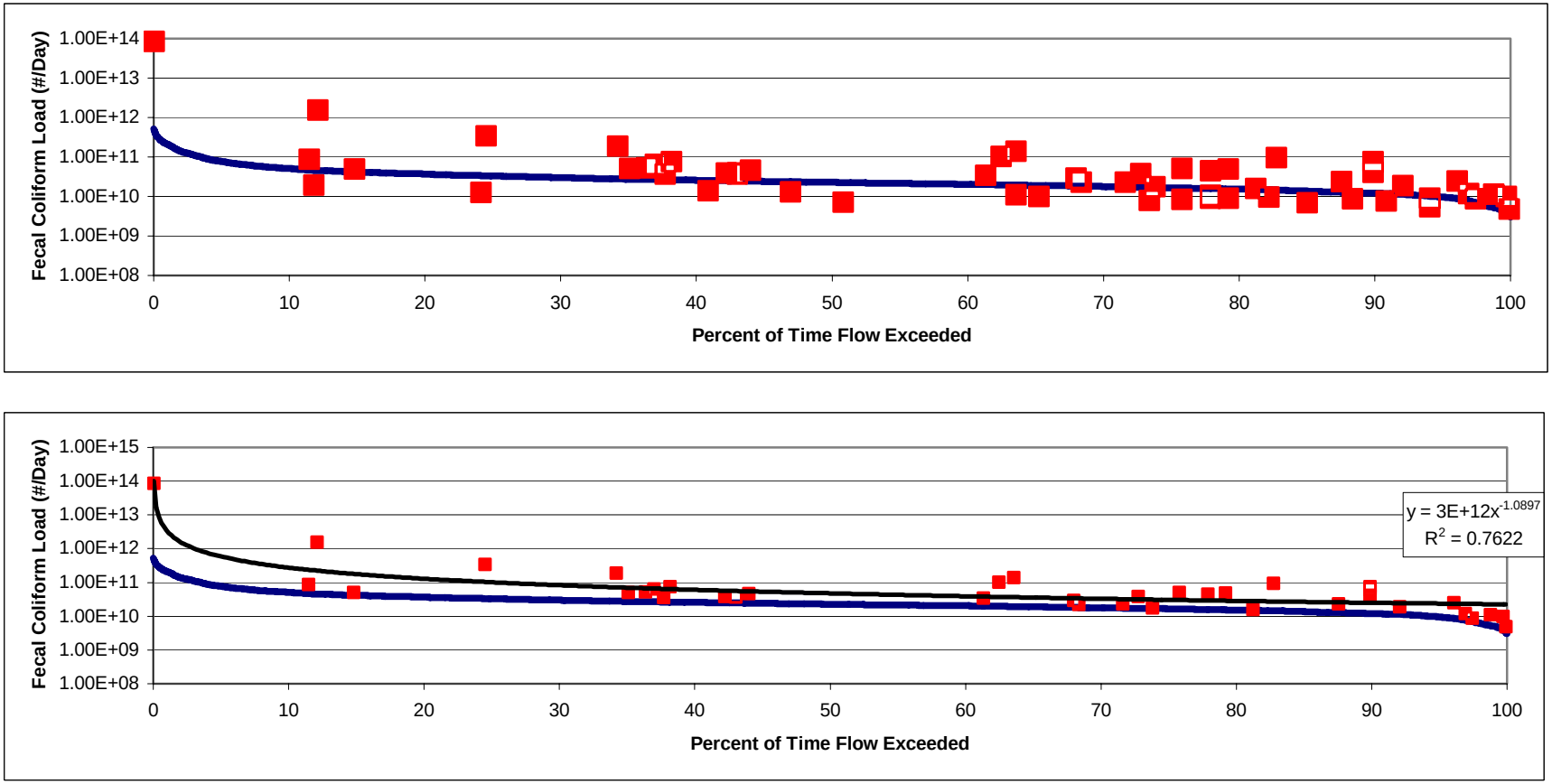


Figure B-36 Water Yield (cubic feet per second per square mile) Based on Measured Daily Streamflow from USGS station 02153500

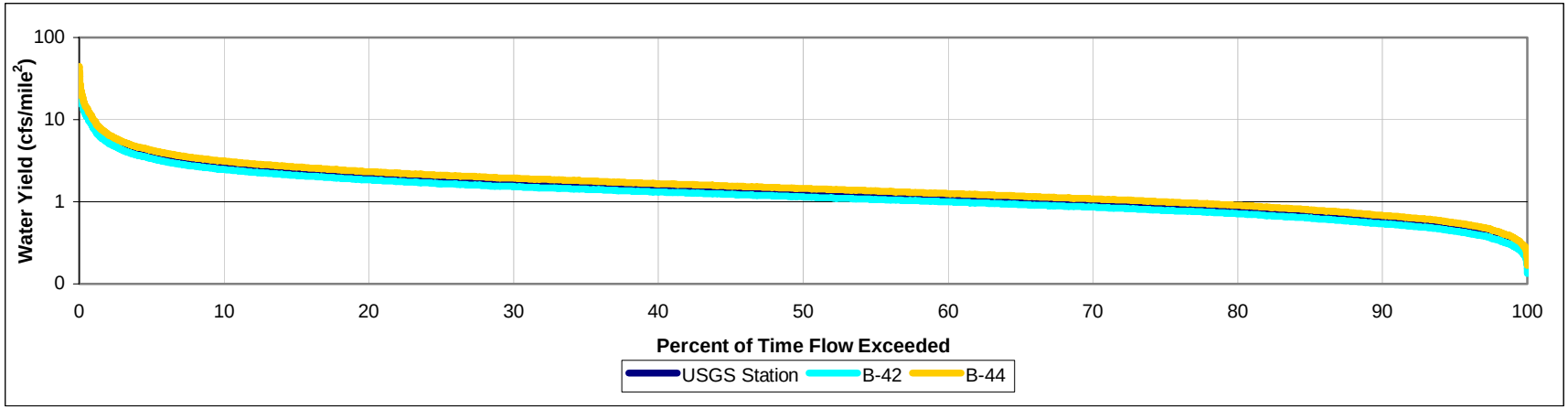


Figure B-37 Water Yield (cubic feet per second per square mile) Based on Measured Daily Streamflow from USGS station 02153780

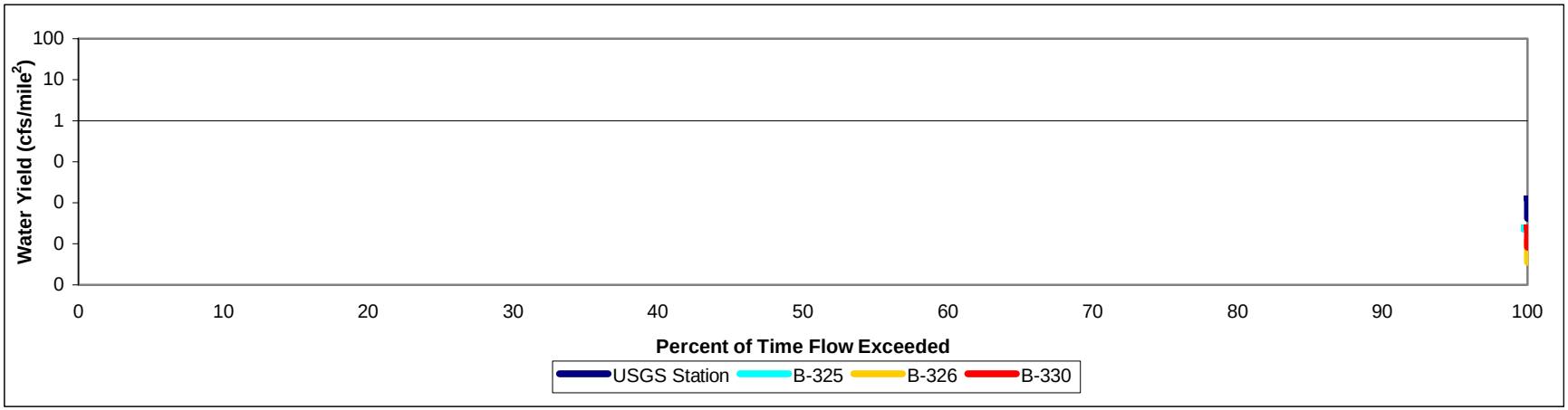


Figure B-38 Water Yield (cubic feet per second per square mile) Based on Measured Daily Streamflow from USGS station 02154790

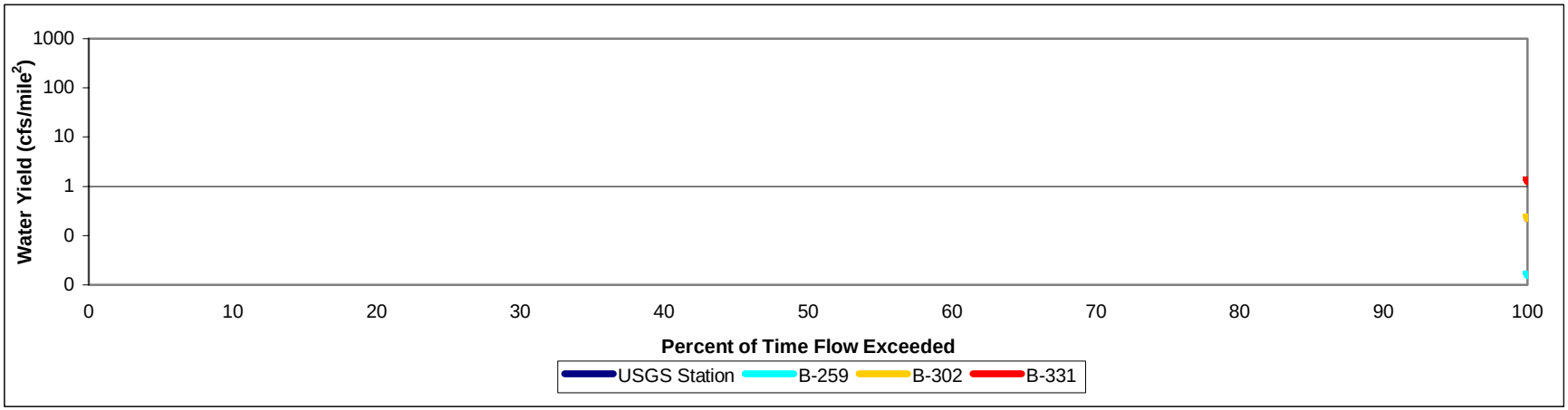


Figure B-39 Water Yield (cubic feet per second per square mile) Based on Measured Daily Streamflow from USGS station 02154500

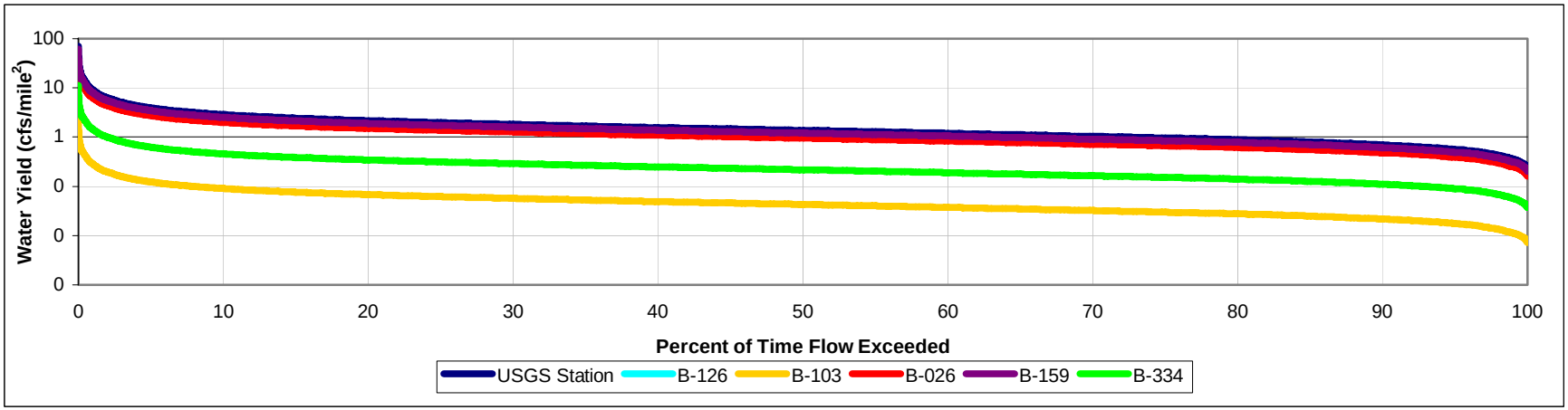
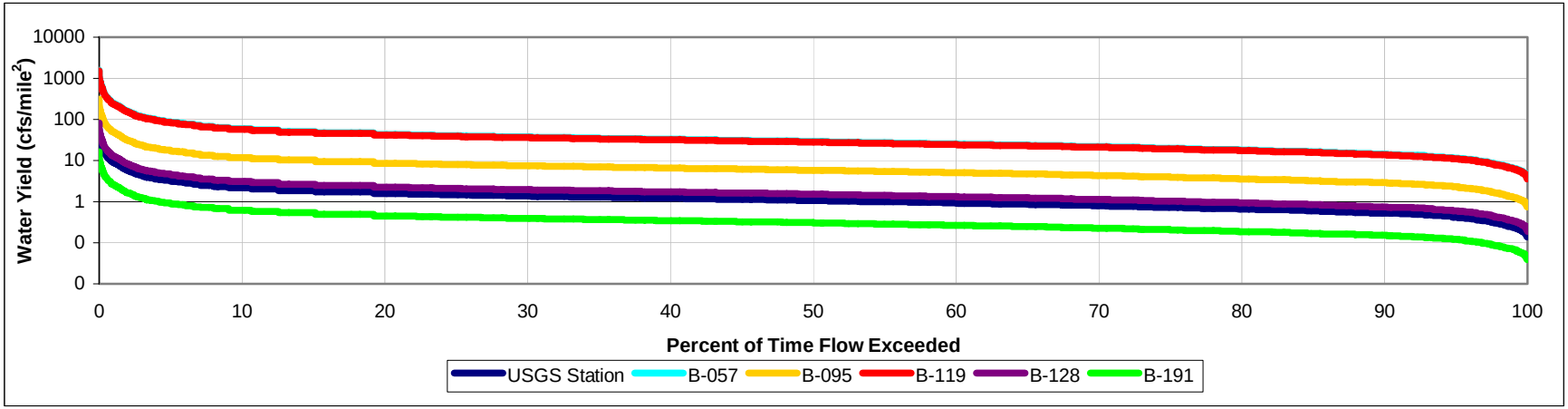


Figure B-40 Water Yield (cubic feet per second per square mile) Based on Measured Daily Streamflow from USGS station 02156050



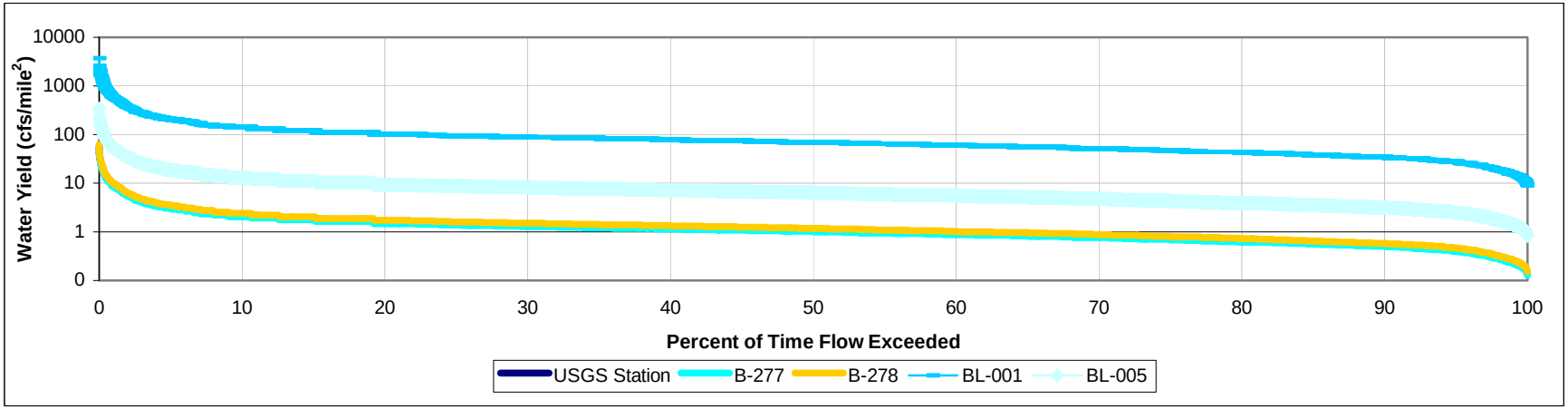


Figure B-40 (Continued)

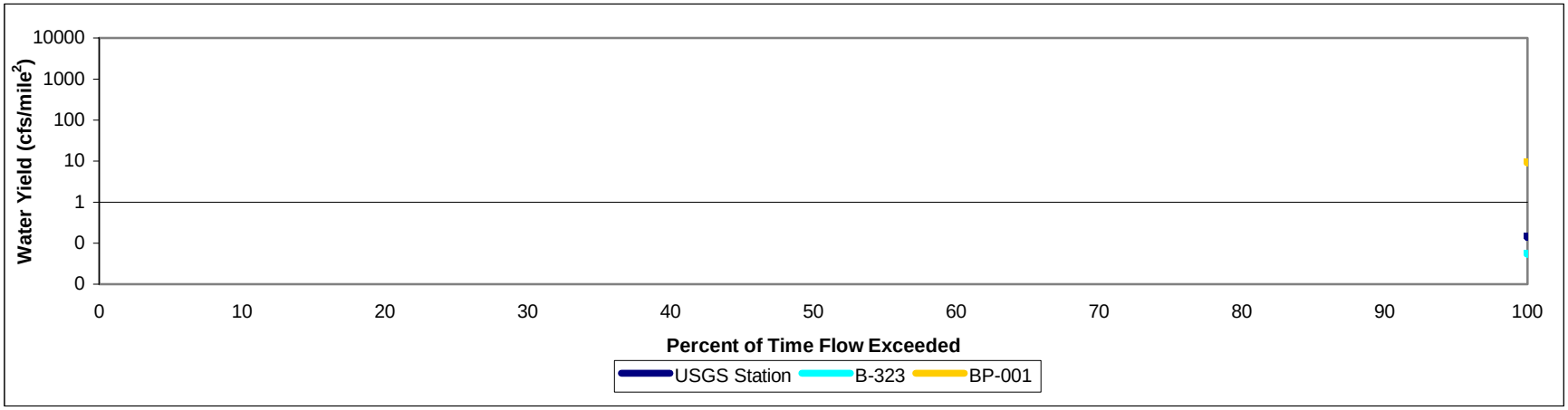
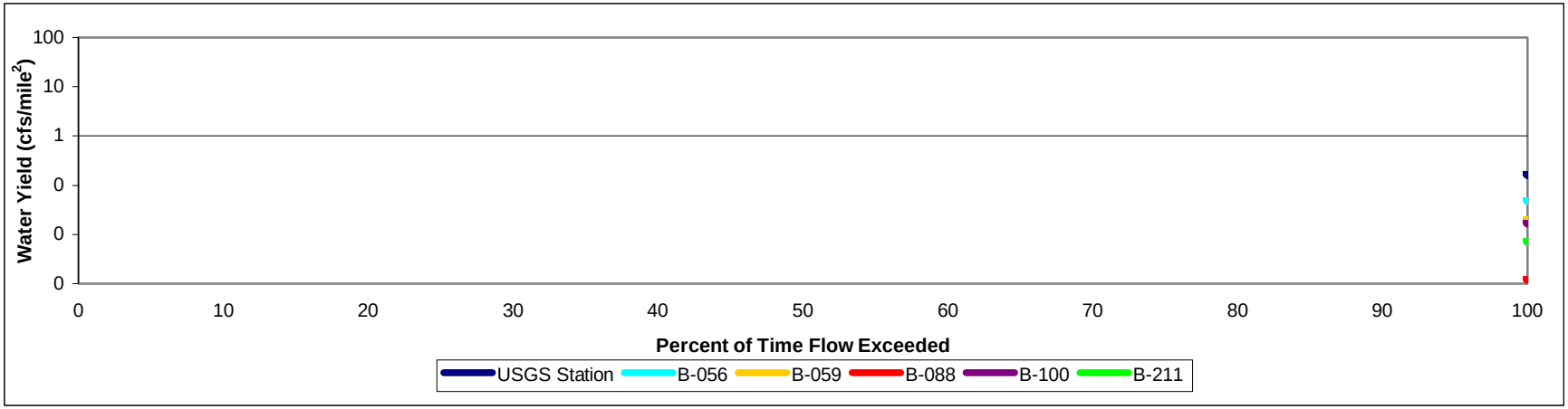
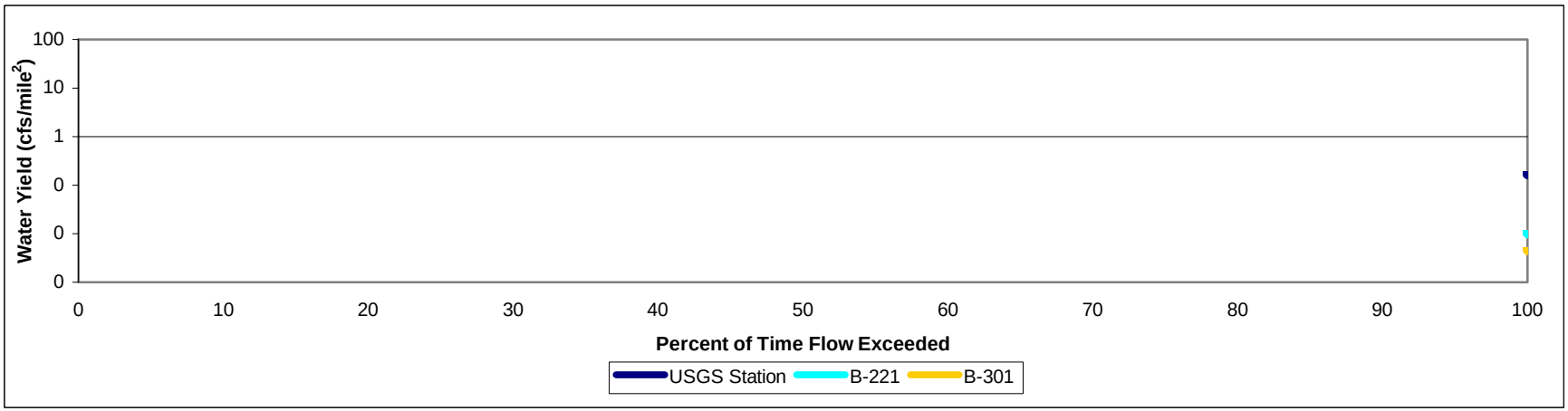


Figure B-41 Water Yield (cubic feet per second per square mile) Based on Measured Daily Streamflow from USGS station 02156301





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 Broad River Basin in Greenville, Spartanburg, Cherokee, York and Union Counties.

List ID	Impairment Description	Water Body Name
SC-B-042	FECAL COLIFORM	BROAD RVR AT SC 18 4 MI NE GAFFNEY
SC-B-044	FECAL COLIFORM	BROAD RVR AT SC 211 12 MI SE OF GAFFNEY
SC-B-119	FECAL COLIFORM	BUFFALO CREEK AT S-11-213, 2.2 MI NNW OF BLACKSBURG
SC-B-057	FECAL COLIFORM	BUFFALO CREEK AT SC 5 1 MI W OF BLACKSBURG
SC-B-159	FECAL COLIFORM	BULLOCK CK AT SC 97 4.8 MI S OF HICKORY GROVE
SC-B-088	FECAL COLIFORM	CANOE CK AT S-11-245 1/2 MI W OF BLACKSBURG
SC-B-056	FECAL COLIFORM	CHEROKEE CK AT US 29 3 MI E OF GAFFNEY
SC-B-325	FECAL COLIFORM	CLARK FORK INTO CRAWFORD LK ON UN# RD NEAR SC 161 & 705-KINGS MT
SC-B-323	FECAL COLIFORM	DOOLITTLE CK AT S-11-100 1.25 MI SE OF BLACKSBURG
SC-B-100	FECAL COLIFORM	FURNACE CK AT S-11-50 6 MI E OF GAFFNEY
SC-B-334	FECAL COLIFORM	GILKEY CK AT S-11-231, 9 MI SE OF GAFFNEY
SC-B-330	FECAL COLIFORM	GUYONMOORE CREEK AT S-46-233
SC-B-059	FECAL COLIFORM	IRENE CK AT S-11-307 2.5 MI W OF GAFFNEY
SC-BL-001	FECAL COLIFORM	LAWSONS FORK CK AT S-42-108
SC-B-277	FECAL COLIFORM	LAWSONS FORK CK AT S-42-218 2.7 MI SSE OF INMAN
SC-B-221	FECAL COLIFORM	LAWSONS FORK CK AT S-42-40 BL INMAN MILL EFF

SC-BL-005	FECAL COLIFORM	LAWSONS FORK CK AT S-42-79 AT VALLEY FALLS
SC-B-278	FECAL COLIFORM	LAWSONS FORK CK AT UN# RD BL MILLIKEN CHEM.
SC-B-128	FECAL COLIFORM	LIMESTONE CK AT S-11-301
SC-B-259	FECAL COLIFORM	LITTLE BUCK CK AT UN# CO RD 2.3 MI SW OF CHESNEE
SC-B-326	FECAL COLIFORM	LONG BRANCH ON SC 216 BL KINGS MTN PK REC AREA
SC-B-026	FECAL COLIFORM	NORTH PACOLET RVR AT S-42-956 6.5 MI E LANDRUM
SC-B-126	FECAL COLIFORM	NORTH PACOLET RVR AT S-42-978, 1 MI SE OF FINGERVILLE
SC-B-048	FECAL COLIFORM	PACOLET RIVER AT SC 105 6 MI AB JCT WITH BROAD RIVER
SC-BP-001	FECAL COLIFORM	PACOLET RVR AB DAM
SC-B-028	FECAL COLIFORM	PACOLET RVR AT S-42-55 BL JCT OF N & S PACOLET R
SC-B-331	FECAL COLIFORM	PACOLET RVR AT S-42-59, BEACON LIGHT ROAD IN CLIFTON
SC-B-301	FECAL COLIFORM	PAGE CK AT S-42-1258 1.7 MI SE LANDRUM
SC-B-211	FECAL COLIFORM	PEOPLES CK AT UNIMPROVED RD 2.3 MI E OF GAFFNEY
SC-B-191	FECAL COLIFORM	POTTER BR ON RD 30 BL OUTFALL FROM HOUSING PROJ COWPENS
SC-B-302	FECAL COLIFORM	SOUTH PACOLET RVR AT S-42-866 1 MI SE CAMPOBELLO
SC-B-103	FECAL COLIFORM	SPIVEY CK AT S-42-208 2.5 MI SSE OF LANDRUM
SC-B-133	FECAL COLIFORM	THICKETTY CK AT SC 18 8.3 MI S OF GAFFNEY
SC-B-062	FECAL COLIFORM	THICKETTY CK AT SC 211 2 MI AB JCT WITH BROAD RVR
SC-B-095	FECAL COLIFORM	THICKETTY CREEK AT S-11-164

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 AM and 4:30 PM, Monday through Friday. Persons wishing to review this information should contact Ms. Cole to schedule a time for that review.

http://www.epa.gov/region

/s/

James D. Giattina, Director — Date
Water Management Division
Region 4
U.S. Environmental Protection Agency

Responsiveness Summary

Upper Broad River Basin TMDLs

September 17, 2004

Commenter: County of Spartanburg

1. Comment: The commenter questioned the short comment period for the public notice of the TMDLs. The commenter stated that the regulated community was given only 30 days to review such a complex issue that took three and a half years to develop.

The commenter was offered an extension of the comment period but declined.

2. Comment: The commenter questioned the lack of procedures established for review of target compliance.

The TMDL is not required to address implementation, including target compliance. Implementation was addressed in this document in general terms only.

3. Comment: The commenter expressed concern that several streams did not have flow gauges at the study point to determine actual flow levels. The commenter stated that erratic summer and fall thunderstorms make the use of estimating techniques difficult, and that drought conditions would exaggerate impacts because of the low flow conditions.

Because USGS gauging data is not available for all streams, USGS data from similar streams was used to make this determination. This method is used by USEPA throughout the region.

4. Comment: The commenter questioned the validity of the assumption that waters entering South Carolina meet South Carolina water quality standards.

This sentence has been deleted. The language was included in error.

5. Comment: The commenter stated that the TMDL considered wildlife background fecal loading to be insignificant, however there has been a significant increase in the migratory bird population that contributes fecal matter directly into waterways. The commenter also stated that the TMDL listed a 20% average failure rate for septic tanks, but the commenter believes that the septic tank failure rate in the county averages around 35%.

This information was used in the source assessment only and not in the development of the TMDL. All nonpoint sources are included in one load allocation. More specific/accurate information such as that offered by the commenter will be useful in the TMDL implementation phase.

6. Comment: The commenter stated that septic tank failures are assumed to discharge directly into streams, and expressed concern that infiltration was not considered. The commenter suggested that data be developed to corroborate these assumptions.

This information was used in the source assessment only and not in the development of the TMDL. This conservative assumption is used by USEPA throughout the region.

7. Comment: The Upper Broad River Basin TMDL states "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 water body." The commenter stated that the use of implicit conservative assumptions is not transparent or verifiable. The commenter stated that subjective decisions by the modeler should be transparent in the study to give confidence in the results.

Implicit MOS is commonly applied witht eh load duration methodology. By determining total load reduction required exclusively on violating data, the methodology is conservatively protective. EPA does not believe this application of MOS to be opaque or non-verifiable.

8. Comment: The commenter expressed concern that point sources discharging at the maximum do not require the MOS that non-point sources must meet; therefore the entire MOS is imposed entirely on non-point sources.

Point sources discharging at their permitted limits are not contributors to violations of water quality standards; therefore no load reduction or MOS are required for them.

9. Comment: The commenter expressed concern that the MS4 program is currently being challenged in the South Carolina court system. The commenter believes that the issue of TMDL allocation among sources should be considered depending on the outcome of the court decision.

Regardless of the status of the MS4 permit, the Clean Water Act requires states and EPA to develop TMDLs for all impaired waters.

10. Comment: The commenter suggested that a meeting be scheduled with the regulated community to discuss the TMDL allocation and what it means within the watershed.

*SCDHEC staff would like to schedule a meeting to discuss these issues. Please contact Kathy Stecker at (803) 898-4011 or **steckemk@dhec.sc.gov**.*

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 for the Broad River near Gaffney at USGS stations 02153500 and on Lawsons Creek at USGS station 02156301 near Spartanburg. MOVE.1 was used to establish the missing periods of record between 1990 and 2001 for the purpose of developing loads for water quality samples. The partial stations were matched with USGS stations were complete records. The USGS station 02151500 on the Broad River near Boiling Springs, North Carolina was used to extend the record at the Broad River near Gaffney, South Carolina and the USGS station 02156050 was used to extend the record at Lawsons Creek. The concurrent time period for each pair was used in the

MOVE.1 analysis. Statistical parameters derived from the MOVE.1 analysis are shown in Table D-1 and D-2. The resulting flow duration curves are presented in Figure D-1 and D-2.

Table D-1 Statistical Parameters Derived from the MOVE.1 Analysis Comparing USGS 02153500 and USGS 02151500

X		Y	
log USGS 02151500		***log USGS 02153500***	
Mean	3.058617148	Mean	3.28866263
Standard Error	0.002254786	Standard Error	0.002297992
Median	3.049218023	Median	3.271841607
Mode	3.113943352	Mode	3.414973348
Standard Deviation	0.262631777	Standard Deviation	0.267664315
Sample Variance	0.06897545	Sample Variance	0.071644186
Kurtosis	1.448775887	Kurtosis	1.775566111
Skewness	0.463489924	Skewness	0.687271538
Range	2.669006781	Range	2.556087023
Minimum	2.021189299	Minimum	2.350248018
Maximum	4.69019608	Maximum	4.906335042
Sum	41496.25885	Sum	44617.2859
Count	13567	Count	13567
Standard Deviation Y / Standard Deviation X =			
		1.02	

Table D-2 Statistical Parameters Derived from the MOVE.1 Analysis Comparing USGS 02156301 and USGS 02156050

X		Y	
log USGS02156050		***log USGS 0216301***	
Mean	0.899503029	Mean	2.026714503
Standard Error	0.004684218	Standard Error	0.004694399
Median	0.875061263	Median	1.982271233
Mode	1.041392685	Mode	1.903089987
Standard Deviation	0.259329724	Standard Deviation	0.25989341
Sample Variance	0.067251906	Sample Variance	0.067544585
Kurtosis	5.883743624	Kurtosis	2.667819834
Skewness	1.680061659	Skewness	1.330539323
Range	2.337752803	Range	1.809668302
Minimum	0.230448921	Minimum	1.491361694
Maximum	2.568201724	Maximum	3.301029996
Sum	2756.976783	Sum	6211.879951
Count	3065	Count	3065
Standard Deviation Y / Standard Deviation X =			
		1.002	

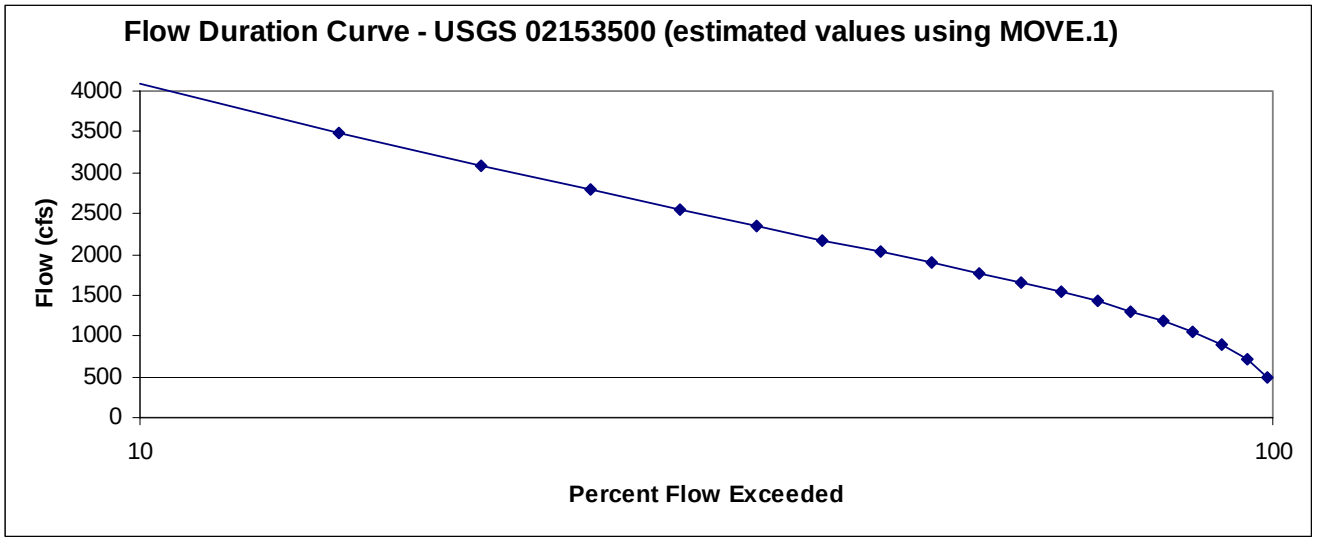


Figure D-1 Flow Duration Curve for the Broad River near Gaffney (estimated using MOVE.1)

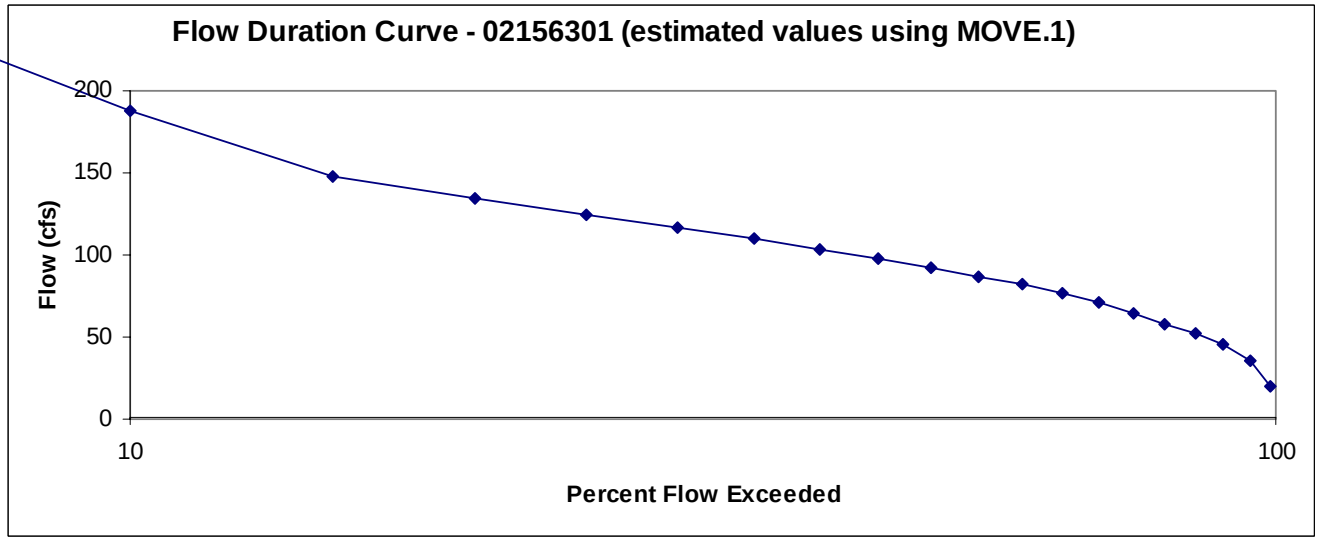


Figure D-2 Flow Duration Curve for Lawsons Creek in Spartanburg (estimated using MOVE.1)