EPA FINALIZED TMDL

South Carolina
Department of Health and Environmental Control

Total Maximum Daily Load Development for
Big Generostee Creek:
(Hydrological Unit Code: 03060103-030)
Station SV-316
Fecal Coliform Bacteria

September 7, 2004

Bureau of Water
2600 Bull Street
Columbia, SC 29201

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

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James D. Giattina, Director Date
Water Management Division

Abstract

Big Generostee Creek, in Anderson County, SC, is a tributary of the Savannah River just below the Lake Hartwell dam. The creek at water quality monitoring station SV-316 (Big Generostee Creek at S-4-104 west of Anderson) has been placed on South Carolina's 303(d) list of impaired waters for violations of the fecal coliform standard. During the assessment period for the 2002 303(d) list (1996-2000), 63 % of samples violated the standard. The watershed of Big Generostee Creek is largely urban, containing part of the city of Anderson and adjacent suburbs. At the time of the NLCD data collection (early 1990's) the watershed was 33 % forest and 30 % urban, but also had significant agricultural land use: 17 % pasture/hay, and 19 % cropland. There are two point sources in the watershed, including a major municipal wastewater treatment facility of the city of Anderson. Also large portions of the watershed have been designated as MS4s. The probable sources of fecal coliform bacteria in the creek are runoff from urban and agricultural land, failing septic systems, and cattle-in-streams.

The load-duration curve methodology was used to calculate the existing load and the TMDL load for Big Generostee Creek at SV-316. The existing load was estimated to be 2.1E+12 cfu/day. The TMDL load was determined to be 4.46E+11 cfu/day, which consists of Wasteload Allocations for the two NPDES dischargers of 9.51E+09 and for the two MS4s, which is expressed as a percent reduction, of 80 %; a Load Allocation of 4.14E+11 cfu/day; and the margin of safety of 2.23E+10 cfu/day. In order to reach the target load, a reduction in the existing load to the creek of 80 % will be necessary. Resources and several TMDL implementation strategies to bring about this reduction are suggested.

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Tables and Figures

Big Generostee Creek (HUC 03060103-030)

1.0 INTRODUCTION:

1.1 Background

Levels of fecal coliform bacteria can be elevated in water bodies 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 water bodies 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 water body 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).

1.2 Watershed Description

The watershed of Big Generostee Creek is in Anderson County, in the western Piedmont region of South Carolina (Figure 1). Big Generostee Creek flows into the Savannah River just downstream of the Lake Hartwell dam. The watershed upstream of highway S-4-104 is largely urbanized and includes parts of the City of Anderson. Approximately 30,000 people live in the watershed (2000 US Census). This TMDL includes that part of the watershed upstream of highway S-4-104 (Monitoring Station SV-316). The area of the indicated watershed is 77 km^2 (29.8 mi^2).

The Big Generostee Creek watershed includes both open land and land that is highly urbanized. Though forest/shrub land is the largest land use at 33 %, urbanized land makes up 30 % of the land in this watershed according to the NLCD (Figure 2; Table 1). Essentially all of the remaining land is either cropland (19 %) or pasture-hay land (17 %). Much of the urbanized areas of the watershed are classified as MS4s, requiring stormwater permits.

1.3 Water Quality Standard

The impaired stream segment, Big Generostee Creek, is designated as Class Freshwater. Waters of this class are described as follows:

> "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 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% of the total samples during any 30 day period exceed 400/100 ml."(R.61-68).

Primary contact recreation is not limited to large streams and lakes. Even streams which may seem to small to swim in will allow small children the opportunity to play and immerse their hands and faces. Essentially all perennial streams should therefore be protected from pathogen impairment.

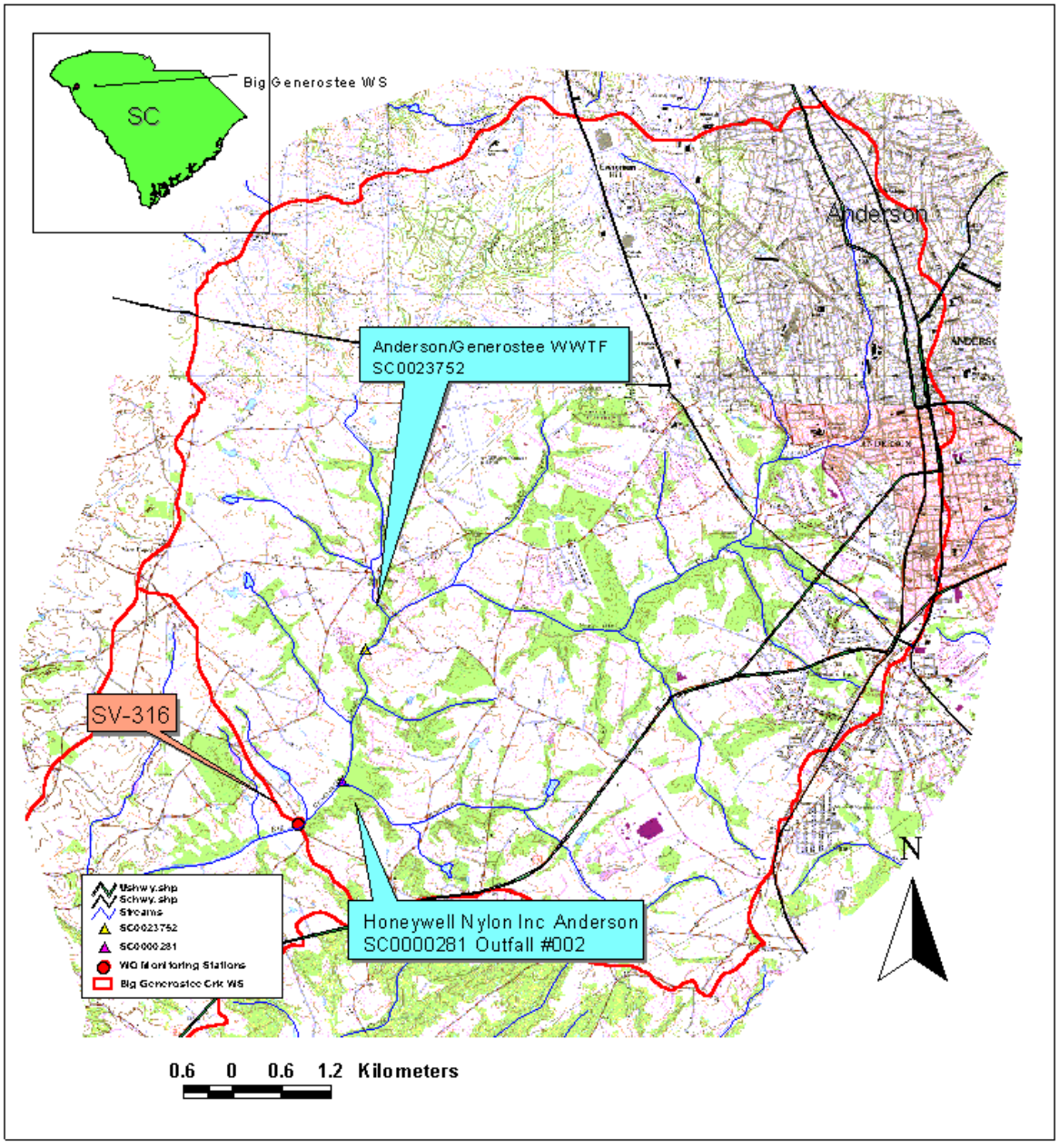

Figure 1. Map of the Big Generostee Creek watershed above SV-316.

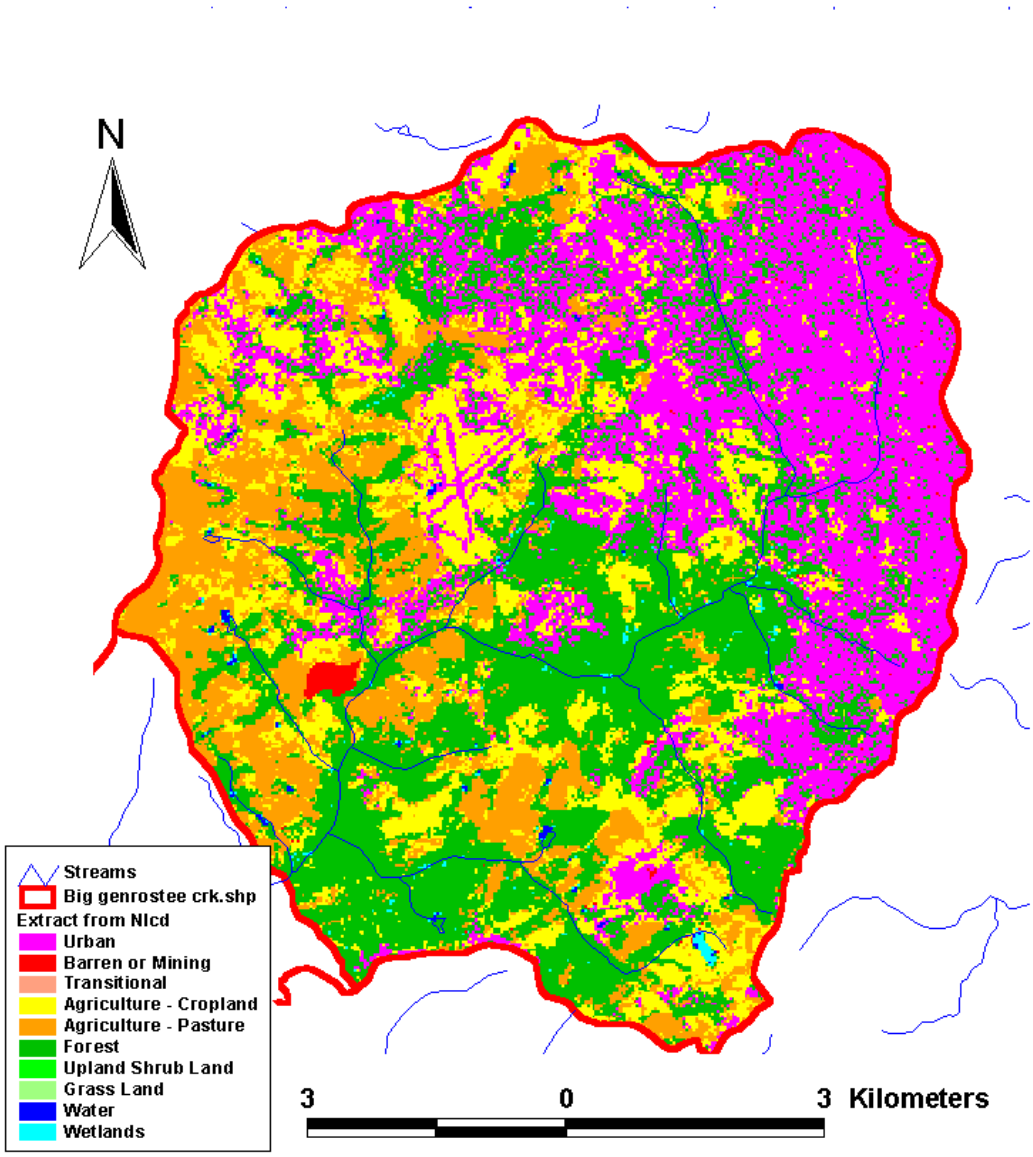

Figure 2. Map showing land uses in the Big Generostee Creek watershed above SV-316.

Table 1. Land uses in the Big Generostee Creek watershed above SV-316.

Land Use Classes	Land Use	Area (hectares)	Area (acres)	Percent-age
	Water	15.9	39.4	0.2%
Urban	Residential LI	1,321.6	3,265.6	
	Residential HI	327.8	810.0	
	Commercial/ Industrial/ Transportation	655.1	1,618.8	
		2,304.5	**5,694.4**	**29.9%**
Barren or Mining	Bare Rock, Sand, Clay	10.8	26.7	
	Quarries/ Strip Mines/ Gravel Pits	19.3	47.6	
		30.1	74.3	0.4%
Forest	Forest, Deciduous	1,252.1	3,093.9	
	Forest, Evergreen	770.9	1,904.8	
	Forest, Mixed/ Shrubland	529.1	1,307.5	
		2,552.0	**6,306.2**	**33.1%**
Pasture/ Hay		**1,342.6**	**3,317.7**	**17.4%**
Agricultural Cropland	Row Crops	1,004.1	2,481.2	
	Urban/ Recreational Grasses	425.5	1,051.5	
		1,429.7	**3,532.7**	**18.6%**
Wetlands	Wetlands, Woody	26.8	66.3	
	Wetlands, Emergent Herbaceous	4.7	11.6	
		31.5	77.8	0.4%
All Land Uses		**7,706**	**19,042**	**100.0%**

2.0 WATER QUALITY ASSESSMENT

There are two water quality monitoring stations on Big Generostee Creek. Station SV-316 is located at the Highway S-4-104 bridge west of Anderson. The second station SV-101 is downstream and is a macro-invertebrate station only. An assessment of water quality data collected in 1996 through 2000 at SV-316 indicated that Big Generostee Creek at this location is impaired for recreational use. In addition to being listed on the 2002 303(d) list, Big Generostee Creek was also

on the 1998 and 2000 lists. Waters in which no more than 10% of the samples collected over a five year period are greater than 400 fecal coliform counts or cfu / 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 cfu/ 100 ml are considered impaired and listed for fecal coliform bacteria on South Carolina's 303(d) list. During the assessment period (1996-2000), 63 % of the samples did not meet the fecal coliform criterion at SV-316. Stream fecal coliform data are provided in Appendix A.

There is little indication of any relationship between precipitation and fecal coliform concentrations in Big Generostee Creek (Figure 3). Precipitation was measured at the Anderson County Airport, which is in the watershed. The fecal coliform excursions in Big Generostee would appear to be caused primarily by continuous sources such as cattle-in-streams, failing septic systems, or illicit discharges. Most of the higher fecal coliform bacteria measurements were associated with moderate rainfall events while some of the moderate fecal coliform measurements were are associated with dry weather.

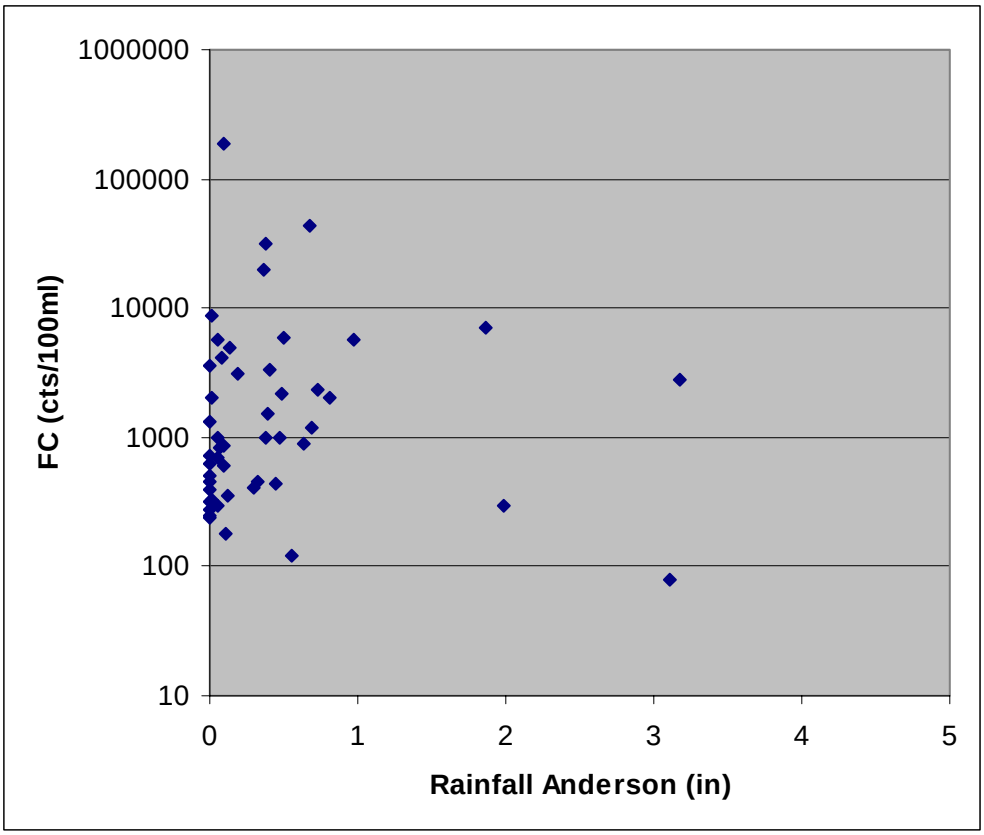

Figure 3. Comparison between precipitation as measured at Anderson and fecal coliform concentrations in Big Generostee Creek.

3.0 SOURCE ASSESSMENT AND LOAD ALLOCATION

Fecal coliform bacteria are used by the State of South Carolina as the indicator for pathogens in surface waters. Pathogens, which are usually difficult to detect, cause disease and make full body contact recreation in lakes and streams risky. Indicators such as fecal coliform bacteria, enteroccoci, or E. *Coli* are easier to measure, have similar sources as pathogens, and persist a similar or longer length of time in surface waters. These bacteria are not in themselves usually disease causing.

There are many sources of pathogen pollution in surface waters. In general these sources may be classified as point and nonpoint sources. With the implementation of technology-based controls, pollution from point sources, such as factories and wastewater treatment facilities, has been greatly reduced. These point sources are required by the Clean Water Act to obtain a NPDES permit. In South Carolina NPDES permits require that dischargers of sanitary wastewater must meet the state standard for fecal coliform at the point of discharge. Municipal and private sanitary wastewater treatment facilities may occasionally be sources of pathogen or fecal coliform bacteria pollution. However, if these facilities are discharging wastewater that meets their permit limits, they are not causing the impairment. If one of these facilities is not meeting its permit limits, enforcement of the permit limit is required. A TMDL is not necessary for this purpose. Pathogen or fecal coliform TMDLs are therefore essentially nonpoint source TMDLs even though the TMDL may include a wasteload allocation for a point source.

3.1 Point Sources in the Big Generostee Creek Watershed

3.1.1 Continuous Discharge Point Sources

There are two NPDES facilities in this watershed, City of Anderson/Generostee WWTF (SC0023752) and Honeywell Nylon Inc Anderson Plant, formerly BASF Corporation, (SC0000281) (Figure 1). The Anderson WWTF is a major domestic wastewater treatment plant that is permitted for 6.2 mgd of wastewater. Honeywell is an industrial facility that discharges wastewater that may contain fecal coliform bacteria from its outfall #002 into Big Generostee Creek. The Honeywell facility has consistently met its permit limits for fecal coliform bacteria. However the City of Anderson/Generostee facility has had a history of permit violations during the 1990s. In December 2003 enforcement action was taken against the facility for violations of the fecal coliform permit limits in November 2002, March 2003, and July 2003. Compliance with it permit will ensure that this wastewater treatment facility does not contribute to the impairment of Big Generostee Creek. Fecal coliform and flow data from these two facilities are provided in Appendix B.

3.1.2 Municipal Separate Storm Sewer Systems

There are two municipalities in the watershed that have or will have NPDES MS4 (Municipal Separate Storm Sewer System) permits. 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.

Almost half (48.5 %) of this watershed has been designated as a MS4 (Figure 4). The City of Anderson (12.6 %) and Anderson County (35.9 %) each have responsibility for their MS4 areas in the watershed.

3.2 Nonpoint Sources in Big Generostee Creek Watershed

3.2.1 Wildlife

Wildlife (mammals and birds) are contributors of fecal coliform bacteria to surface waters. Wildlife wastes are carried into nearby streams by runoff following rainfall or deposited directly in streams. Deer are the largest and probably most noticeable mammals in this area. The SC Department of Natural Resources (Charles Ruth, DNR Deer Project Supervisor, personal communication, 2000) has estimated a density of between 30 and 45 deer/mi^2 for this area. Deer habitat includes forest, cropland, pastures, and some suburban areas. Waterfowl also may be significant contributors of fecal coliform bacteria, particularly in urban and suburban ponds, which often provide a desirable habitat for geese and ducks. Forest lands, which typically have only low concentrations of wildlife as sources of fecal coliform bacteria, usually have low loading rates for fecal coliform bacteria.

3.2.2 Land Application of Manure

Turkey or chicken litter that is not properly stored or applied to land is a potential source of fecal coliform bacteria. Application of excessive amounts of litter, that is adding more nitrogen or phosphorus than the crop can use, and applying the litter too close to streams are the principal methods by which litter can pollute streams. The Big Generostee watershed has no active permitted livestock operations. There is one field in the watershed that is permitted for land application of litter. The operation and other fields are located in Oconee County some 30 km away.

3.2.3 Grazing Animals

Livestock such as cattle and horses spend most of their time grazing on pasture land. Runoff from rainfall washes some of the manure deposited in the pastures into nearby by streams. The 1997 Agricultural Atlas reported that Anderson County had 42,760 cattle and calves. Using the ratio of pasture land in the watershed to that of the county, 1233 cattle and calves were estimated to be in this watershed.

Grazing cattle and other livestock may contaminate streams with fecal coliform bacteria in two ways. Runoff from pastures may carry the bacteria into streams following rain events. Cattle that are allowed access to streams deposit manure directly into the streams. Manure deposited in streams can be a significant source of fecal coliform bacteria. Loading of fecal coliform bacteria to Big Generostee Creek by this route is likely to be a major source of loading of fecal coliform to the stream.

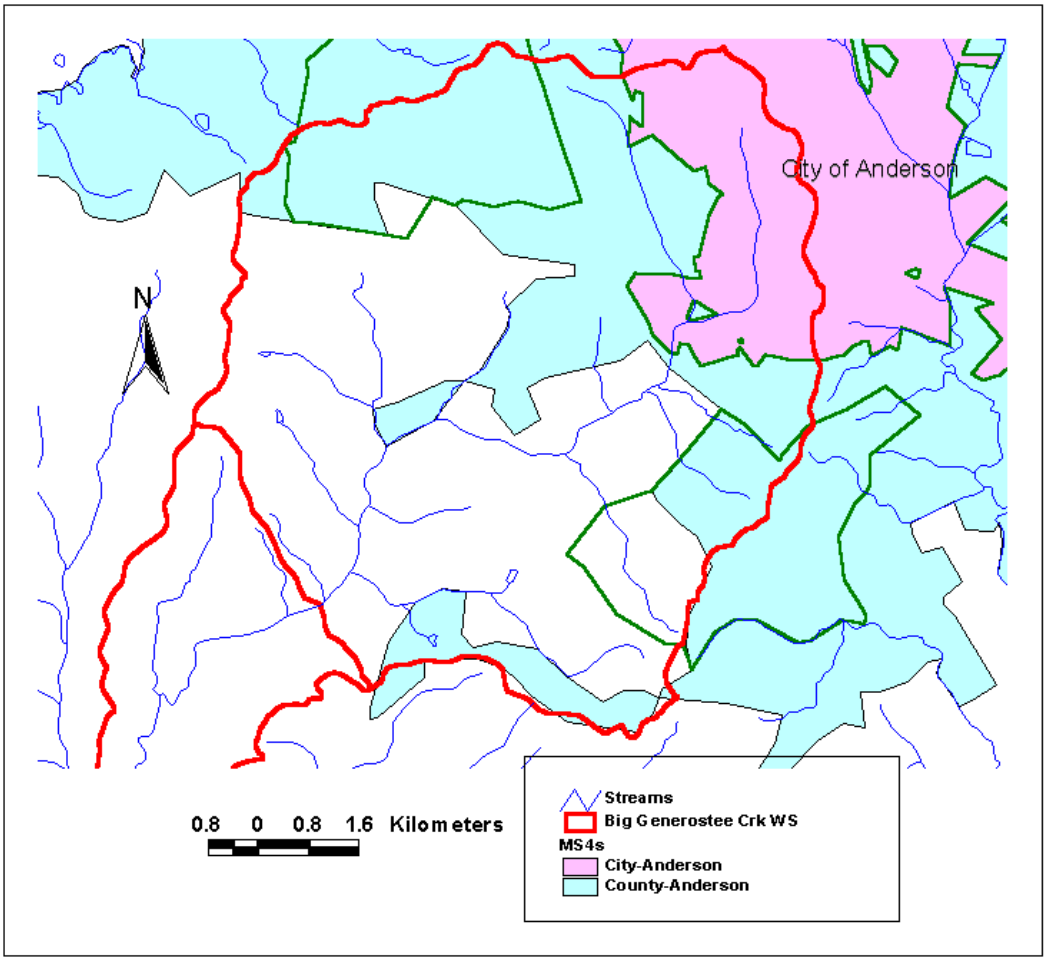

Figure 4. MS4 areas in Big Generostee Creek watershed, Anderson County.

3.2.4 Failing Septic Systems

Septic systems that do not function properly may leak sewage unto the land surface where it can reach nearby streams. Failing septic systems may be improperly designed or constructed or they maybe systems that no longer function. The number of households that have septic systems was estimated using a GIS. The 2000 census database layer was compared to the City of Anderson sewer service area (Figure 5) and the boundaries of the Big Generostee Creek watershed. In 2000 there were an estimated 9,640 people in some 3800 households without sewer service in the Big

Generostee watershed. Assuming each household had its own system, there were 3800 septic systems in the watershed. Using a failure rate of 20 % (Schueler, 1999) for the septic systems, that all wastewater reached the stream and the concentration of fecal coliform in that wastewater was 10^4 cfu/100ml (Horsley and Witten, 1996), loading from septic systems is estimated to be 5.11E+10 cfu/day. This load is about 2.5 % of the existing load calculated from the load duration curve. Therefore failing septic systems were estimated to be a minor source of fecal coliform loading to Big Generostee Creek.

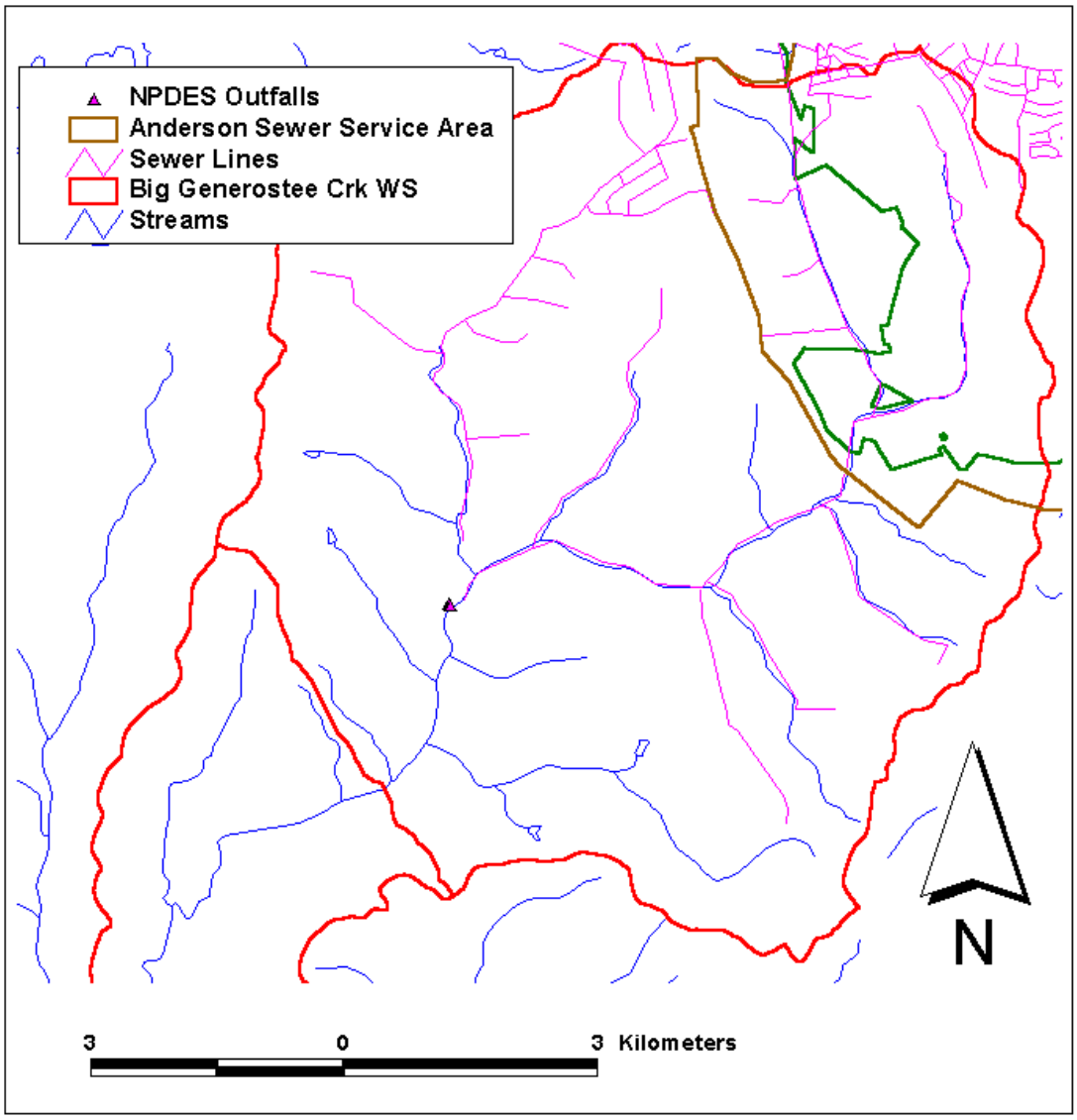

Figure 5. Map of City of Anderson Sewer Service Area and sewer lines outside of area.

3.2.5 Urban and Other Nonpoint Sources

Much of this watershed has been urbanized. With urbanization the large number of pets and the increased amount of impervious surface tend to increase fecal coliform loading to the receiving waters. Most of these areas in this watershed are in the MS4 designated areas. Sewer lines in this urbanized watershed are potential sources of fecal coliform pollution. Overflows of sanitary sewers due to blockages may occur from time to time. Leakage from sanitary sewers may also occur. Sewer trunk lines tend to run along streams because of the gradient. Sewer lines follow several tributaries of Big Generostee Creek (Figure 5). Another potential source of the fecal coliform bacteria in Big Generostee Creek is illicit discharges into creeks and storm sewers.

4.0 LOAD-DURATION CURVE METHOD

Load-duration curves were developed as a method of developing TMDLs that applies to all hydrologic conditions. The load-duration curve method uses the cumulative frequency distribution of stream flow and pollutant concentration data to estimate the existing and the TMDL loads for a water body. Development of the load-duration curve is described in this chapter.

In the ideal situation a long period of record for flow data would be available for the water body of interest. A longer period of record increases the confidence in the results of the load-duration method. Big Generostee Creek, like most small streams in South Carolina is not gauged. South Rabon Creek, in Laurens County, is a comparable, gauged, nearby stream, with a similar sized drainage area, land uses, and topography. Data from the gauge (USGS 02165200) on South Rabon Creek near Gray Court, South Carolina for the period of record (Jan. 25, 1967 to Sept 30, 2001) was used to generate the flow-duration curve. The Big Generostee Creek watershed is slightly larger, 77.06 km^2 compared to 76.4 km^2 for the South Rabon Creek watershed.

The flow for Big Generostee Creek was estimated by multiplying the daily flow rates from South Rabon Creek by the ratio of the Big Generostee Creek drainage area to that of South Rabon Creek (1.0086). The flows were ranked from low to high and the values that exceed certain selected percentiles determined. The load-duration curve was generated by calculating the load from the observed fecal coliform concentrations, the flow rate that corresponds to the date of sampling, and a conversion factor. The load was plotted against the appropriate flow recurrence interval to generate the curve (Figure 6). The target line was created by calculating the allowable load from the flow and the appropriate fecal coliform standard concentration in the same manner. Sample loads above this line are violations of the standard, while loads below the line are in compliance.

No trend line could be determined for loads that were above the target line, that is load values that violated the water quality standard. The trend lines available in Excel produced r^2 coefficients less than 0.2 for this correlation. The existing load to Big Generostee Creek was calculated from the mean of all loads that were between the 10 % and 90 % flow recurrence intervals. This excludes flows that occur infrequently.

The TMDL load is calculated from the target line. Load values at 5 % occurrence intervals along the target line from 10 to 85 % were averaged and this value was reduced by 5 %, which represents the Margin of Safety. The Load Allocation (LA) values are 95 % of the loads from the target line, that is the TMDL load minus the Margin of Safety. Calculations for both existing and TMDL loads are provided in Appendix B.

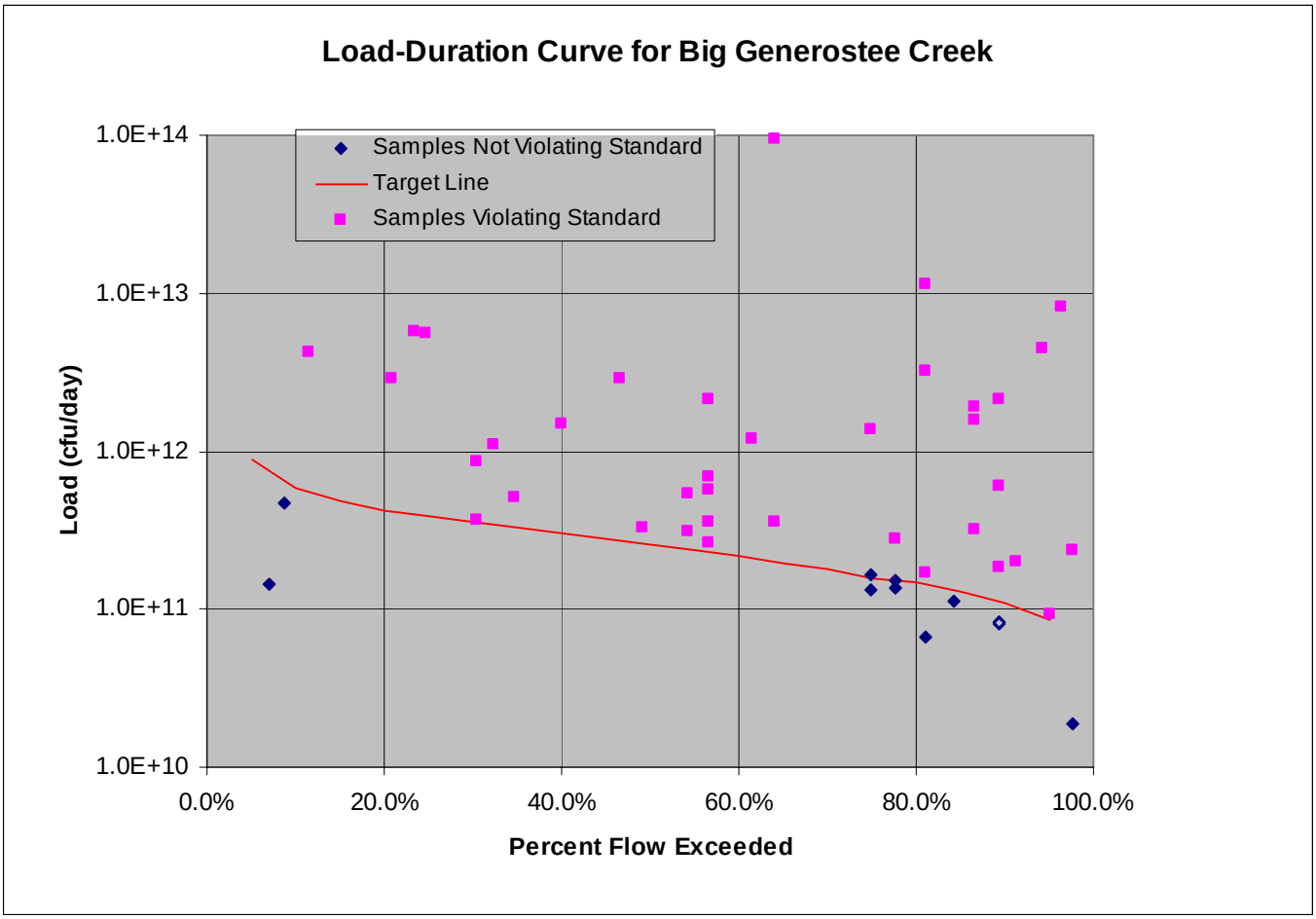

Figure 6. Load-Duration Curve for Big Generostee Creek at SV-316.

5.0 DEVELOPMENT OF TOTAL MAXIMUM DAILY LOAD

A total maximum daily load (TMDL) for a given pollutant and water body 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 water body. Conceptually, this definition is represented by the equation:

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

The TMDL is the total amount of pollutant that can be assimilated by the receiving water body 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 most pollutants, TMDLs are expressed as a mass load (e.g., kilograms per day). For bacteria, however, TMDLs are expressed in terms of number (#), cfu, or organism counts (or resulting concentration), in accordance with 40 CFR 130.2(l).

5.1 Critical Conditions

Critical conditions for Big Generostee Creek occur when a long period of low flow is followed by rainfall event that produces runoff. At low flow rates the continual sources like poorly functioning wastewater treatment plants, cattle in the streams, and failing septic systems cause the concentration of the fecal coliform in the creek to rise as dilution decreases. During the long dry period, fecal coliform bacteria build up on the land surface. Rainfall flushes much of this accumulation into the creek with runoff, which causes the already high concentrations to increase further.

Though most of the standard violations occurred during medium flows, standard violations occurred over much of the total range of flows. The inclusion of all flow conditions in the load-duration curve analysis insures that the critical conditions are protected. Existing and TMDL loads were calculated from the 10 – 90 % flow exceedence intervals.

5.2 Existing Load

The existing load was calculated from the trend line of observed values that exceeded the water quality standard and were between and including 10 and 90 % reoccurrence limits. Loadings from all sources are included in this figure: failing septic systems, cattle-in-streams, and loading from runoff. The total existing load for SV-316 is 2.1 E+12 cfu/day.

5.3 Margin of Safety

The margin of safety (MOS) may be explicit and/or implicit. The explicit margin of safety is 5 % of the 400 cfu/ 100 ml or 20 counts/ 100ml. For SV-316 this is equivalent to 2.2E+10 cfu/day**.** Through the use of conservative assumptions in the model the margin of safety also has an implicit component.

5.4 Total Maximum Daily Load

The Total Maximum Daily Load (TMDL) represents the maximum load the stream may carry and meet the water quality standard for the pollutant of interest. For this TMDL the load will be

expressed as cfu/day (colony forming units/day) and as a percent reduction for the MS4 WLA.

There are two Waste Load Allocations (WLA) for this TMDL. The first WLA is the sum of the allocation for the two NPDES facilities (City of Anderson Generostee WWTP and Honeywell). The City of Anderson and Anderson County 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.

The target loading value is the load to the creek that it can receive and meet the water quality standard. It is simply the TMDL minus the MOS. The target loading for Big Generostee Creek requires a reduction of 80 % from the current load of 2.1E+12 cfu/day for SV-316.

Table 2. TMDL components for Big Generostee Creek.

Impaired Station	WLA cfu/day	WLA-MS4 % Reduction	LA cfu/day	MOS cfu/day	TMDL cfu/day	Target cfu/day
SV-316	9.51E+09	80 %	4.14E+11	2.23E+10	4.46E+11	4.23E+11

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 Big Generostee Creek watershed. Local sources of nonpoint source education and assistance include Clemson Extension Service, the Natural Resource Conservation Service (NRCS), the Anderson County 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. 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 Big Generostee Creek. TMDL implementation projects are given highest priority for 319 funding. 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 to the resources cited above for the implementation of this TMDL in the Big Generostee Creek watershed, Clemson Extension has developed a Home-A-Syst handbook that can help 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.

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.

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7.0 REFERENCES

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APPENDIX A Fecal Coliform Data

Fecal Coliform Data for Big Generostee Creek at SV-316 (S-4-104)
Method: 31616

Date	Time	FC (cfu/100ml)
5-Nov-75	830	6200
7-May-85	1210	40
13-Jun-85	1230	48
18-Jul-85	1345	2
23-Aug-85	1310	120
3-Oct-85	1245	4
9-May-86	1245	2300
25-Jun-86	1110	100
7-Jul-86	1130	145
5-Aug-86	1345	85
9-Sep-86	1240	4
6-Oct-86	1430	4
4-May-87	1225	4
19-Jun-87	1140	20
1-Jul-87	1415	2
6-Aug-87	1205	5
1-Sep-87	1140	60
23-Oct-87	1230	6
12-May-88	1310	100
10-Jun-88	1025	960
20-Jul-88	1415	1200
1-Aug-88	1230	3600
15-Sep-88	1500	180
6-Oct-88	955	130
31-May-89	1340	240
29-Jun-89	1115	410
25-Jul-89	1025	2000
21-Aug-89	1515	570
7-Sep-89	955	860
4-Oct-89	1305	250
30-May-90	1010	1000
19-Jun-90	1040	31000
23-Jul-90	1110	7100
9-Aug-90	1055	20000
14-Sep-90	1345	440
11-Oct-90	1135	2200
9-May-91	1240	5700
20-Jun-91	1440	2000
11-Jul-91	1540	3300
8-Aug-91	1045	1000
25-Sep-91	1335	190000
16-Oct-91	1330	4900
17-May-93	1105	620
16-Jun-93	1055	3600
20-Jul-93	1055	720
4-Aug-93	1100	820
15-Sep-93	1050	120
28-Oct-93	1220	300
26-May-94	1325	460
16-Jun-94	1225	2300
18-Jul-94	1205	350
24-Aug-94	850	500
6-Oct-94	1155	390
14-Oct-94	1140	300
16-May-95	1245	880
2-Jun-95	1230	1200
27-Jul-95	1055	44000
3-Aug-95	1235	1500
6-Sep-95	1150	1300
6-Oct-95	1250	80
31-May-96	1425	420
28-Jun-96	1315	320
26-Jul-96	1230	5700
9-Aug-96	1225	700
19-Sep-96	1240	330
29-Oct-96	1355	180
23-May-97	1355	450
6-Jun-97	1230	600
7-Jul-97	1130	400
7-Aug-97	1130	1000
26-Sep-97	1050	2800
16-Oct-97	1030	6000
6-May-98	1405	3100
16-Jun-98	1205	4200

Date	Time	FC (cfu/100ml)
21-Jul-98	1245	500
14-Aug-98	1235	8600
17-Sep-98	1230	280
26-Oct-98	1115	620
12-May-99		370
15-Jun-99		450
20-Jul-99		250
18-Aug-99		480
01-Sep-99		420
12-Oct-99		2100
09-May-00		360
29-Jun-00		*Present >QL
27-Jul-00		510
25-Aug-00		2300
13-Sep-00		350

APPENDIX B DMR Data

Mean Daily Load (1/1991 - 5/2003): 1.99E+07 cfu/day

Anderson / Generostee Wastewater Treatment Facility					
SC0023752		Permitted Flow:		6.2	mgd
12-Sep-03					
	Flow (mgd)		Fecal Coliform (cfu/100ml)		Mean Load (cfu/day)
Date	Monthly		Monthly		
	Mean	Max	Mean	Max	
1/31/89	1.914	1.942	2	2	1.45E+08
2/28/89	1.976	2.346	8	8	5.98E+08
3/31/89	2.575	2.842	13	83	1.27E+09
4/30/89	2.384	2.533	1	1	9.02E+07
5/31/89	2.855	3.307	1	1	1.08E+08
6/30/89	2.562	3.662	2	2	1.94E+08
8/31/89	2.251	3.501	2	2	1.70E+08
9/30/89	2.642	3.408	8	33	8.00E+08
10/31/89	2.788	4.095	1	1	1.06E+08
11/30/89	2.291	2.371	1	1	8.67E+07
12/31/89	2.806	3.837	2	4	2.12E+08
1/31/90	3.717	4.418	5.6	28	7.88E+08
2/28/90	3.937	5.021	6	63	8.94E+08
3/31/90	3.777	4.165	105	210	1.50E+10
4/30/90	2.993	3.229	2.3	8	2.61E+08
5/31/90	2.744	3.478	4.1	20	4.26E+08
6/30/90	2.384	2.83	9	44	8.12E+08
7/31/90	2.485	3.037	1.4	3	1.32E+08
8/31/90	2.885	3.485	2.6	4	2.84E+08
9/30/90	2.238	3.282	1.3	3	1.10E+08
10/31/90	3.134	3.844	1.3	33	1.54E+08
11/30/90	2.361	2.878	8.4	45	7.51E+08
12/31/90	2.491	3.073	2	8	1.89E+08
1/31/91	3.297	5.07	4.8	36	5.99E+08
2/28/91	3.214	5.03	3	48	3.65E+08
3/31/91	3.818	5.19	14.7	552	2.12E+09
4/30/91	3.252	5.053	25.9	60	3.19E+09
5/31/91	4.357	5.227	7	440	1.15E+09
6/30/91	4.295	5.557	19	2800	3.09E+09
7/31/91	4.07	4.951	102	3500	1.57E+10
8/31/91	4.721	4.922	92	3800	1.64E+10
9/30/91	4.176	4.489	73	3500	1.15E+10

	Flow (mgd)		Fecal Coliform (cfu/100ml)		Mean Load (cfu/day)
Date	Monthly		Monthly		
	Mean	Max	Mean	Max	
10/31/91	4.013	4.059	5	206	7.60E+08
11/30/91	3.954	4.025	3.4	22	5.09E+08
12/31/91	2.908	3.943	2	62	2.20E+08
1/31/92	2.552	2.771	2.2	85	2.13E+08
2/29/92	2.613	2.967	14	155	1.38E+09
3/31/92	3.744	4.526	22.5	107	3.19E+09
4/30/92	3.229	3.463	9.2	432	1.12E+09
5/31/92	3.212	3.333	108.35	1540	1.32E+10
6/30/92	3.412	3.799	117.4	9600	1.52E+10
7/31/92	3.916	6.652	814	8000	1.21E+11
8/31/92	2.758	3.671	185.2	4600	1.93E+10
9/30/92	3.345	5.162	356	5600	4.51E+10
10/31/92	3.772	5.472	7.46	940	1.07E+09
11/30/92	3.499	5.578	4.95	385	6.56E+08
12/31/92	4.864	5.616	4.2	176	7.73E+08
1/31/93	5.696	6.778	4.4	2075	9.49E+08
2/28/93	4.188	5.34	2.1	214	3.33E+08
3/31/93	5.191	7.375	4.1	2900	8.06E+08
4/30/93	3.92	5.064	2.9	100	4.30E+08
5/31/93	3.799	4.329	41.2	1020	5.92E+09
6/30/93	3.673	4.191	62.9	5700	8.75E+09
7/31/93	3.156	3.599	284	14800	3.39E+10
8/31/93	3.78	4.024	36.7	207	5.25E+09
9/30/93	3.729	3.894	21.5	2500	3.03E+09
10/31/93	3.69	4.101	2.5	36	3.49E+08
11/30/93	4.017	4.408	1.9	10	2.89E+08
12/31/93	4.178	4.497	2	3	3.16E+08
1/31/94	4.15	4.485	5	37	7.85E+08
2/28/94	3.962	4.269	4	7	6.00E+08
3/31/94	4.541	5.461	2	90	3.44E+08
4/30/94	4.033	5.072	3	3600	4.58E+08
5/31/94	3.349	3.493	2	2200	2.54E+08
6/30/94	4.139	5.88	2	76	3.13E+08
7/31/94	3.165	4.869	54	1080	6.47E+09
8/31/94	3.937	4.835	42	2800	6.26E+09
9/30/94	4.074	4.725	4	243	6.17E+08
10/31/94	3.637	4.021	5	2600	6.88E+08
11/30/94	3.178	3.26	2	77	2.41E+08
12/31/94	3.493	3.968	2	72	2.64E+08
1/31/95	4.248	5.487	2	420	3.22E+08
2/28/95	4.768	6.171	2	5	3.61E+08

	Flow (mgd)		Fecal Coliform (cfu/100ml)		Mean Load (cfu/day)
Date	Monthly		Monthly		
	Mean	Max	Mean	Max	
3/31/95	4.606	5.529	6	36	1.05E+09
4/30/95	3.592	3.778	5	36	6.80E+08
5/31/95	3.503	3.672	5	24	6.63E+08
6/30/95	3.567	4.334	5	19	6.75E+08
7/31/95	3.658	3.723	4	11	5.54E+08
8/31/95	3.763	4.199	5	21	7.12E+08
9/30/95	3.238	3.434	5	25	6.13E+08
10/31/95	3.936	4.614	12	250	1.79E+09
11/30/95	4.27	5.454	21	560	3.39E+09
12/31/95	3.451	3.955	12	109	1.57E+09
1/31/96	4.499	5.121	11	191	1.87E+09
2/29/96	4.77	5.954	13	136	2.35E+09
3/31/96	5.268	6.649	14	136	2.79E+09
4/30/96	4.24	4.496	10	10	1.61E+09
5/31/96	4.399	5.12	10	10	1.67E+09
6/30/96	3.88	4.451	12	240	1.76E+09
7/31/96	3.277	3.426	11	27	1.36E+09
8/31/96	3.502	3.658	11	109	1.46E+09
9/30/96	3.567	3.668	18	3000	2.43E+09
10/31/96	3.312	3.654	11	41	1.38E+09
11/30/96	3.445	3.562	10	10	1.30E+09
12/31/96	4.175	4.707	7	10	1.11E+09
1/31/97	4.692	5.078	4	8	7.10E+08
2/28/97	5.022	5.94	7	260	1.33E+09
3/31/97	4.868	6.735	16	6000	2.95E+09
4/30/97	3.71	4.301	4	6	5.62E+08
5/31/97	3.845	4.545	5	50	7.28E+08
6/30/97	3.672	4.01	4	6	5.56E+08
7/31/97	3.054	3.396	6	700	6.94E+08
8/31/97	3.054	3.25	7	148	8.09E+08
9/30/97	3.024	3.214	8	1000	9.16E+08
10/31/97	3.245	3.859	4	14	4.91E+08
11/30/97	3.563	4.263	5	180	6.74E+08
12/31/97	3.481	4.146	5	14	6.59E+08
1/31/98	4.497	5.289	4	4	6.81E+08
2/28/98	5.244	5.31	5	290	9.93E+08
3/31/98	4.689	6.049	4	11	7.10E+08
4/30/98	5.946	7.072	7	290	1.58E+09
5/31/98	4.667	5.664	4	6	7.07E+08
6/30/98	3.668	3.863	28	6000	3.89E+09
7/31/98	3.412	3.664	23	200	2.97E+09

	Flow (mgd)		Fecal Coliform (cfu/100ml)		Mean Load (cfu/day)
Date	Monthly		Monthly		
	Mean	Max	Mean	Max	
8/31/98	3.073	3.238	25	320	2.91E+09
9/30/98	2.915	3.121	26	390	2.87E+09
10/31/98	3.438	3.748	20	6000	2.60E+09
11/30/98	3.337	3.664	5	28	6.32E+08
12/31/98	3.024	3.134	6	6000	6.87E+08
1/31/99	3.279	3.613	4	14	4.96E+08
2/28/99	4.34	4.924	4	6	6.57E+08
3/31/99	3.533	3.587	5	39	6.69E+08
4/30/99	4.097	4.784	4	8	6.20E+08
5/31/99	3.563	3.879	5	33	6.74E+08
6/30/99	3.433	3.684	8	490	1.04E+09
7/31/99	2.963	3.614	13	240	1.46E+09
8/31/99	3.414	3.644	24	560	3.10E+09
9/30/99	3.214	3.677	7	19	8.52E+08
10/31/99	4.031	4.802	5	8	7.63E+08
11/30/99	3.538	3.64	4	6	5.36E+08
12/31/99	3.599	3.805	5	22	6.81E+08
1/31/00	3.735	4.409	4	14	5.66E+08
2/29/00	4.041	4.146	4	22	6.12E+08
3/31/00	3.95	4.514	4	10	5.98E+08
4/30/00	3.555	3.915	5	44	6.73E+08
5/31/00	3.206	3.489	5	56	6.07E+08
6/30/00	3.194	3.297	6	380	7.25E+08
7/31/00	2.853	3.131	8	42	8.64E+08
8/31/00	3.256	3.313	9	92	1.11E+09
9/30/00	3.583	4.328	10	10	1.36E+09
10/31/00	3.428	3.682	10	18	1.30E+09
11/30/00	3.283	3.474	10	10	1.24E+09
12/31/00	3.515	4.413	3	10	3.99E+08
1/31/01	3.227	4.025	4	10	4.89E+08
2/28/01	3.199	3.456	10	18	1.21E+09
3/31/01	4.098	5.216	7	18	1.09E+09
4/30/01	3.474	3.805	1	2	1.32E+08
5/31/01	3.218	3.314	1	3	1.22E+08
6/30/01	3.545	3.856	2	76	2.68E+08
7/31/01	3.645	4.194	2	92	2.76E+08
8/31/01	3.761	4.411	1	2	1.42E+08
9/30/01	3.439	3.52	1	3	1.30E+08
10/31/01	3.235	3.359	2	33	2.45E+08
11/30/01	3.014	3.153	2	2	2.28E+08
12/31/01	2.297	3.207	2	6	1.74E+08

	Flow (mgd)		Fecal Coliform (cfu/100ml)		Mean Load (cfu/day)
Date	Monthly		Monthly		
	Mean	Max	Mean	Max	
1/31/02	3.591	4.998	1	3	1.36E+08
2/28/02	3.551	4.139	1	2	1.34E+08
3/31/02	3.755	3.821	2	4	2.84E+08
4/30/02	3.645	4.161	2	6	2.76E+08
5/31/02	3.613	4.438	4	44	5.47E+08
6/30/02	3.452	3.588	3	82	3.92E+08
7/31/02	3.302	3.557	2	12	2.50E+08
8/31/02	3.375	3.556	5	29	6.39E+08
9/30/02	3.833	5.09	4	76	5.80E+08
10/31/02	3.707	4.365	7	43	9.82E+08
11/30/02	4.658	5.972	18	454	3.17E+09
12/31/02	4.22	4.982	6	78	9.58E+08
1/31/03	3.897	4.096	3	10	4.43E+08
2/28/03	4.228	4.446	2	4	3.20E+08
3/31/03	6.505	7.279	3	2000	7.39E+08
4/30/03	4.809	5.828	3	18	5.46E+08
5/31/03	4.236	4.895	6	72	9.62E+08
6/30/03	4.052	4.423	3	14	4.60E+08
Mean (1989-2003)					**2.79E+09**
Permitted Load					**4.69E+10**

Honeywell Nylon Inc. Anderson Plant					**Formerly:**	**BASF**
NPDES #:	**SC0000281**					
Outfall: #002		**Flow:**			**0.273**	**mgd**

	Flow (mgd)			FC (cfu/100ml)		Mean Load
	Monthly			Monthly		(cfu/day
Date	Mean	Max		Mean	Max	
1/31/89	0.35	0.43		65	115	8.61E+08
2/28/89	0.31	0.56		13	15	1.53E+08
3/31/89	0.292	0.46		224	444	2.48E+09
4/30/89	0.292	0.49		15	15	1.66E+08
5/31/89	0.26	0.4		26	30	2.56E+08
6/30/89	0.28	0.41		89	120	9.43E+08
7/31/89	0.29	0.42		65	113	7.14E+08

	Flow (mgd)			FC (cfu/100ml)		Mean Load
	Monthly			Monthly		(cfu/day
Date	Mean	Max		Mean	Max	
8/31/89	0.31	0.43		33	46	3.87E+08
9/30/89	0.42	0.7		24	25	3.82E+08
10/31/89	0.31	0.48		36	60	4.22E+08
11/30/89	0.4	0.54		132	132	2.00E+09
12/31/89	0.38	0.46		30	40	4.32E+08
1/31/90	0.39	0.62		88	145	1.30E+09
2/28/90	0.43	0.7		8	11	1.30E+08
3/31/90	0.435	0.7		24	24	3.95E+08
4/30/90	0.42	0.52		3	3	4.77E+07
5/31/90	0.43	0.54		27	47	4.39E+08
6/30/90	0.42	0.48		7	7	1.11E+08
7/31/90	0.45	0.62		4	4	6.81E+07
8/31/90	0.45	0.56		40	51	6.81E+08
9/30/90	0.44	0.6		13	14	2.17E+08
10/31/90	0.35	0.64		125	190	1.66E+09
11/30/90	0.35	0.52		239	244	3.17E+09
12/31/90	0.43	0.58		100	109	1.63E+09
1/31/91	0.37	0.5		20	40	2.80E+08
2/28/91	0.41	0.54		20	33	3.10E+08
3/31/91	0.45	0.55		7.5	9	1.28E+08
5/31/91	0.464	0.57		20	20	3.51E+08
6/30/91	0.445	0.619		56	111	9.43E+08
7/31/91	0.484	0.585		70	90	1.28E+09
8/31/91	0.492	0.672		48.1	124	8.96E+08
9/30/91	0.438	0.56		11.7	16.7	1.94E+08
10/31/91	0.428	0.534		21	25	3.40E+08
11/30/91	0.498	0.58		22	22	4.15E+08
12/31/91	0.483	0.6		488	560	8.92E+09
2/29/92	0.504	0.651		170	340	3.24E+09
3/31/92	0.481	0.615		64	103	1.17E+09
4/30/92	0.461	0.661		76	114	1.33E+09
5/31/92	0.437	0.578		27.4	99	4.53E+08
6/30/92	0.325	0.489		18	47	2.21E+08
7/31/92	0.34	0.413		9	11	1.16E+08
8/31/92	0.366	0.7		7.2	13	9.98E+07
9/30/92	0.357	0.563		2.7	4.2	3.65E+07
10/31/92	0.309	0.648		27	45	3.16E+08
11/30/92	0.3	0.55		6.6	160	7.50E+07
12/31/92	0.299	0.7		20	74	2.26E+08
1/31/93	0.29	0.451		3	4	3.29E+07
2/28/93	0.276	0.567		3.5	6	3.66E+07

	Flow (mgd)			FC (cfu/100ml)		Mean Load
	Monthly			Monthly		(cfu/day
Date	Mean	Max		Mean	Max	
3/31/93	0.286	0.551		2	6	2.17E+07
4/30/93	0.229	0.358		0	0	0.00E+00
5/31/93	0.259	0.375		13	15	1.27E+08
6/30/93	0.255	0.344		2	2	1.93E+07
7/31/93	0.251	0.617		5	8	4.75E+07
8/31/93	0.333	0.421		18	118	2.27E+08
9/30/93	0.323	0.7		4.5	5	5.50E+07
10/31/93	0.279	0.408		11	12	1.16E+08
11/30/93	0.288	0.683		6	12	6.54E+07
12/31/93	0.251	0.426		6	8	5.70E+07
1/31/94	0.27	0.539		127	254	1.30E+09
2/28/94	0.313	0.567		12	22	1.42E+08
3/31/94	0.313	0.7		0	0	0.00E+00
4/30/94	0.185	0.293		1.5	3	1.05E+07
5/31/94	0.234	0.356		5.6	16	4.96E+07
6/30/94	0.366	0.623		25	48	3.46E+08
7/31/94	0.282	0.439		9.8	16	1.05E+08
8/31/94	0.312	0.944	<	10	< 10	1.18E+08
9/30/94	0.292	0.587		134	2000	1.48E+09
10/31/94	0.268	0.438		104	1000	1.06E+09
11/30/94	0.218	0.302		6	12	4.95E+07
12/31/94	0.251	0.413		16	34	1.52E+08
1/31/95	0.246	0.401		2.8	4	2.61E+07
2/28/95	0.255	0.559		2.4	3	2.32E+07
3/31/95	0.268	0.483			1	0.00E+00
4/30/95	0.286	0.515		6.9	48	7.47E+07
5/31/95	0.281	0.405			70	0.00E+00
6/30/95	0.309	0.552		14	16	1.64E+08
7/31/95	0.32	0.519		34	165	4.12E+08
8/31/95	0.382	0.61		193	260	2.79E+09
9/30/95	0.286	0.508		172	592	1.86E+09
10/31/95	0.252	0.434		23	48	2.19E+08
11/30/95	0.27	0.39		8	8	8.18E+07
12/31/95	0.232	0.391	<	1	65	8.78E+06
1/31/96	0.238	0.342		100	113	9.01E+08
2/29/96	0.222	0.311		110	279	9.24E+08
3/31/96	0.274	0.652		107	160	1.11E+09
4/30/96	0.298	0.421		0	192	0.00E+00
5/31/96	0.341	0.522		0	68	0.00E+00
6/30/96	0.363	0.445		0	195	0.00E+00
7/31/96	0.303	0.365		11.3	32	1.30E+08

	Flow (mgd)			FC (cfu/100ml)		Mean Load
	Monthly			Monthly		(cfu/day
Date	Mean	Max		Mean	Max	
8/31/96	0.311	0.41		0	0	0.00E+00
9/30/96	0.278	0.356		0	15	0.00E+00
10/31/96	0.245	0.289		14.8	65	1.37E+08
11/30/96	0.231	0.346	<	1	4	8.74E+06
12/31/96	0.216	0.31		0	0	0.00E+00
1/31/97	0.225	0.33		1	1	8.52E+06
2/28/97	0.222	0.341		1	2	8.40E+06
3/31/97	0.25	0.344		2	3	1.89E+07
4/30/97	0.249	0.314		7	9	6.60E+07
5/31/97	0.263	0.325		11	128	1.10E+08
6/30/97	0.274	0.317		3	8	3.11E+07
7/31/97	0.288	0.364		41	74	4.47E+08
8/31/97	0.258	0.306		9.4	88	9.18E+07
9/30/97	0.25	0.354		0	0	0.00E+00
10/31/97	0.233	0.335		0	0	0.00E+00
11/30/97	0.191	0.306		0	0	0.00E+00
12/31/97	0.196	0.312		0	0	0.00E+00
1/31/98	0.249	0.332		15	240	1.41E+08
2/28/98	0.221	0.341		0	0	0.00E+00
3/31/98	0.232	0.364		0	0	0.00E+00
4/30/98	0.259	0.393		0	0	0.00E+00
5/31/98	0.239	0.351		8.4	71	7.60E+07
6/30/98	0.232	0.34		0	0	0.00E+00
7/31/98	0.23	0.382		0	0	0.00E+00
8/31/98	0.282	0.325		0	0	0.00E+00
9/30/98	0.258	0.364		0	0	0.00E+00
10/31/98	0.259	0.313		0	0	0.00E+00
11/30/98	0.233	0.311		0	0	0.00E+00
12/31/98	0.194	0.286		0	0	0.00E+00
1/31/99	0.227	0.338		0	0	0.00E+00
2/28/99	0.195	0.298		0	0	0.00E+00
3/31/99	0.182	0.233		0	0	0.00E+00
4/30/99	0.216	0.271		0	0	0.00E+00
5/31/99	0.219	0.278		0	0	0.00E+00
6/30/99	0.299	0.43		0	0	0.00E+00
7/31/99	0.298	0.499		0	0	0.00E+00
8/31/99	0.324	0.712		0	0	0.00E+00
9/30/99	0.278	0.366		0	0	0.00E+00
10/31/99	0.25	0.373		0	0	0.00E+00
11/30/99	0.259	0.366		0	0	0.00E+00
12/31/99	0.249	0.386		0	0	0.00E+00

	Flow (mgd)			FC (cfu/100ml)		Mean Load
	Monthly			Monthly		(cfu/day
Date	Mean	Max		Mean	Max	
1/31/00	0.264	0.327		0	0	0.00E+00
2/29/00	0.279	0.337		0	0	0.00E+00
3/31/00	0.269	0.341		0	0	0.00E+00
4/30/00	0.233	0.301		0	0	0.00E+00
5/31/00	0.25	0.308		0	0	0.00E+00
6/30/00	0.29	0.347		0	0	0.00E+00
7/31/00	0.308	0.371		0	0	0.00E+00
8/31/00	0.325	0.383		0	0	0.00E+00
9/30/00	0.317	0.39		0	0	0.00E+00
10/31/00	0.283	0.349		0	0	0.00E+00
11/30/00	0.282	0.361		4.5	9	4.80E+07
12/31/00	0.251	0.346		4.3	79	4.09E+07
1/31/01	0.224	0.415		0	0	0.00E+00
2/28/01	0.211	0.276		0	0	0.00E+00
3/31/01	0.221	0.304		0	0	0.00E+00
4/30/01	0.218	0.292		0	0	0.00E+00
5/31/01	0.239	0.322		0	0	0.00E+00
6/30/01	0.262	0.368		0	0	0.00E+00
7/31/01	0.284	0.487		0	0	0.00E+00
8/31/01	0.269	0.315		0	0	0.00E+00
9/30/01	0.25	0.327		3	8	2.84E+07
10/31/01	0.224	0.3		0	0	0.00E+00
11/30/01	0.225	0.335		0	0	0.00E+00
12/31/01	0.206	0.308		0	0	0.00E+00
1/31/02	0.203	0.323		0	0	0.00E+00
2/28/02	0.19	0.286		0	0	0.00E+00
3/31/02	0.231	0.482		0	0	0.00E+00
4/30/02	0.24	0.285		0	0	0.00E+00
5/31/02	0.234	0.339		0	0	0.00E+00
6/30/02	0.237	0.309		0	0	0.00E+00
7/31/02	0.229	0.299		0	0	0.00E+00
8/31/02	0.215	0.324		0	0	0.00E+00
9/30/02	0.244	0.419		0	0	0.00E+00
10/31/02	0.26	0.399		0	0	0.00E+00
11/30/02	0.23	0.357		0	0	0.00E+00
12/31/02	0.206	0.461		0	0	0.00E+00
1/31/03	0.17	0.27		0	0	0.00E+00
2/28/03	0.24	0.422		0	0	0.00E+00
3/31/03	0.2	0.31		0	0	0.00E+00
4/30/03	0.19	0.277		0	0	0.00E+00
5/31/03	0.19	0.278		0	0	0.00E+00

	Flow (mgd)			FC (cfu/100ml)		Mean Load
	Monthly			Monthly		(cfu/day
Date	Mean	Max		Mean	Max	
6/30/03	0.17	0.3		0	0	0.00E+00
7/31/03	0.187	0.296		0	0	0.00E+00
Mean						**3.24E+08**
Permitted						**2.07E+09**

APPENDIX C Calculation of Existing and TMDL Loads

Calculation of Existing Load

From equation of Trend Line: y = 9E+12 e ^ -4.2373 x

Percentile	Load	
0.10	5.89E+12	
0.15	4.77E+12	
0.10	5.89E+12	
0.20	3.86E+12	
0.25	3.12E+12	
0.30	2.52E+12	
0.35	2.04E+12	
0.40	1.65E+12	
0.45	1.34E+12	
0.50	1.08E+12	
0.55	8.75E+11	
0.60	7.08E+11	
0.65	5.73E+11	
0.70	4.64E+11	
0.75	3.75E+11	
0.80	3.03E+11	
0.85	2.45E+11	
0.90	1.99E+11	
Mean Load	**1.99E+12**	**cfu/day**

Calculation of TMDL Load

Target Conc 380 cfu/100ml
From Target Line

% Exceeded	Load (cfu/day)		Flow (cfs)
0.10	5.53E+11		59.50
0.15	4.59E+11		49.42
0.20	4.03E+11		43.36
0.25	3.66E+11		39.33
0.30	3.38E+11		36.31
0.35	3.09E+11		33.28
0.40	2.91E+11		31.26
0.45	2.63E+11		28.24
0.50	2.44E+11		26.22
0.55	2.25E+11		24.20
0.60	2.06E+11		22.19
0.65	1.88E+11		20.17
0.70	1.69E+11		18.15
0.75	1.50E+11		16.14
0.80	1.41E+11		15.13
0.85	1.22E+11		13.11
0.90	1.09E+11		11.09
Mean Load	**2.67E+11**		

Samples Not Violating Standard

Date	FC (cfu/100ml)	Flow	Rank	Percen-tile	Load (cfu/day)
15-Sep-93	120	6.4	214	97.8%	1.88E+10
28-Oct-93	300	11.1	1024	89.3%	8.15E+10
18-Jul-94	350	16.1	2139	77.6%	1.38E+11
6-Oct-94	390	16.1	2139	77.6%	1.54E+11
14-Oct-94	300	64.5	8697	8.8%	4.73E+11
6-Oct-95	80	72.6	8863	7.0%	1.42E+11
28-Jun-96	320	17.1	2403	74.8%	1.34E+11
19-Sep-96	330	14.1	1497	84.3%	1.14E+11
29-Oct-96	180	15.1	1808	81.0%	6.65E+10
7-Jul-97	400	17.1	2403	74.8%	1.67E+11
17-Sep-98	280	12.1	1024	89.3%	8.29E+10

Mean Load of Samples Not Violating Standard: 1.43E+11

Samples Violating Standard

Date	FC (cfu/100ml)	Flow	Rank	Percen-tile	Load (cfu/day)
30-May-90	1000	23.2	4130	56.7%	5.68E+11
19-Jun-90	31000	15.1	1808	81.0%	1.15E+13
23-Jul-90	7100	12.1	1024	89.3%	2.10E+12
9-Aug-90	20000	9.2	553	94.2%	4.50E+12
14-Sep-90	440	8.6	461	95.2%	9.26E+10
11-Oct-90	2200	11.1	1024	89.3%	5.97E+11
9-May-91	5700	40.3	7176	24.7%	5.62E+12
20-Jun-91	2000	30.3	5710	40.1%	1.48E+12
11-Jul-91	3300	17.1	2403	74.8%	1.38E+12
8-Aug-91	1000	13.1	1273	86.6%	3.21E+11
25-Sep-91	190000	20.2	3427	64.0%	9.39E+13
16-Oct-91	4900	13.1	1273	86.6%	1.57E+12
17-May-93	620	33.3	6232	34.6%	5.05E+11
16-Jun-93	3600	24.2	4130	56.7%	2.13E+12
20-Jul-93	720	20.2	3427	64.0%	3.56E+11
4-Aug-93	820	10.1	832	91.3%	2.03E+11
26-May-94	460	15.1	1808	81.0%	1.70E+11
16-Jun-94	2300	21.2	3670	61.5%	1.19E+12
24-Aug-94	500	27.2	4844	49.2%	3.33E+11
16-May-95	880	25.2	4370	54.2%	5.43E+11
2-Jun-95	1200	23.2	4130	56.7%	6.81E+11
27-Jul-95	44000	7.6	343	96.4%	8.18E+12
3-Aug-95	1500	6.4	214	97.8%	2.35E+11
6-Sep-95	1300	34.3	6449	32.3%	1.09E+12
31-May-96	420	35.3	6623	30.5%	3.63E+11
26-Jul-96	5700	41.3	7305	23.4%	5.76E+12
9-Aug-96	700	16.1	2139	77.6%	2.76E+11
23-May-97	450	24.2	4130	56.7%	2.66E+11
6-Jun-97	600	24.2	4130	56.7%	3.55E+11
7-Aug-97	1000	35.3	6623	30.5%	8.64E+11
26-Sep-97	2800	42.4	7554	20.8%	2.90E+12
16-Oct-97	6000	13.1	1273	86.6%	1.92E+12
6-May-98	3100	55.5	8441	11.4%	4.21E+12
16-Jun-98	4200	28.2	5094	46.6%	2.90E+12
21-Jul-98	500	25.2	4370	54.2%	3.08E+11
14-Aug-98	8600	15.1	1808	81.0%	3.18E+12
26-Oct-98	620	12.1	1024	89.3%	1.84E+11

Mean Load of Samples Violating Standard: 4.40E+12

APPENDIX D 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 impairment on South Carolina's 303(d) list that will be addressed by the TMDL is listed below. This impaired waterbody is located in the Savannah River Basin in Anderson County.

Waterbody Name	Station ID	§303(d) List Pollutants
Big Generostee Creek	SV-316	Fecal Coliform Bacteria

Persons wishing to comment on the proposed TMDL or to offer new data or information regarding the proposed TMDL are invited to submit the same in writing no later than May 21, 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 TMDL 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 TMDL is: http://www.epa.gov/region4/water/tmdl/tennessee/index.htm#sc.
The proposed TMDL 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

RESPONSE TO COMMENTS

Responsiveness Summary
Rocky River, Wilson Creek, and Big Generostee Creek Fecal Coliform TMDLs
August 31, 2004

Commenters: City of Anderson, County of Anderson

1. Comment: One commenter requested a rationale for why regulated NPDES MS4s are treated as point sources in the TMDL calculation.

A November 2002 USEPA memo stated that regulated NPDES MS4s are considered point sources (http://www.epa.gov/npdes/pubs/final-wwtmdl.pdf): "NPDES-regulated storm water discharges must be addressed by the wasteload allocation component of a TMDL. See 40 C.F.R. § 130.2(h)."

2. Comment: One commenter objected to the statement, "Both of these MS4s will receive a wasteload allocation."

This sentence has been removed. Wasteload allocations for MS4s are included in the TMDLs per USEPA's November 2002 memo.

3. Comment: One commenter suggested that SCDHEC be more specific and forthcoming about how the MS4 program will be monitored and enforced.

This concern cannot be appropriately addressed in the scope of the TMDLs. The commenter should contact SCDHEC MS4 staff and/or EPA MS4 staff for more information. EPA Region 4 contact: Michael Mitchell: 404.562.9303

4. Comment: One commenter requested a rationale for why wasteload allocations were not established for non-point sources of fecal coliforms.

By definition, wasteload allocations are for point sources, and load allocations are for nonpoint sources. USEPA does not require load allocations for individual nonpoint sources; however, USEPA does require individual or categorical wasteload allocations for point source dischargers.

5. Comment: One commenter suggested that SCDHEC establish a baseline of fecal coliform measurements upstream of the City of Anderson and Anderson County MS4.

SCDHEC staff indicate they do not have the resources to perform local baseline sampling in addition to statewide routine monitoring; however, SCDHEC does indicate its availability to offer advice to develop sampling protocol for a baseline survey.

6. Comment: Section 5.4 of the Big Generostee Creek TMDL states: "Compliance by these municipalities with the terms of their individual MS4 permits will fulfill any obligations they have toward implementing this TMDL." Two commenters recommended removing this sentence from the document.

This sentence has been deleted.

7. Comment: Section 6 in both TMDL documents states: "The iterative BMP approach as defined in the General Storm Water NPDES MS4 permit is expected to provide significant implementation of this TMDL." One commenter suggested that this sentence be deleted.

This sentence has been deleted.

8. Comment: Section 6 of the Big Generostee Creek TMDL states: "Using existing authorities and mechanisms, these measures will be implemented in the Big Generostee Creek Watershed in order to bring about an 80% reduction in fecal coliform bacteria loading to Big Generostee Creek". Two commenters recommended that this sentence be deleted from both TMDL documents in their entirety.

This sentence has been deleted.

9. Comment: Two commenters expressed concerns about identifying fecal coliform as a source of impairment. The commenters believe that fecal coliform is an indicator of pollution not an actual pollutant.

Per South Carolina Regulation 61-68, Water Classifications and Standards, the standard in South Carolina for bacterial pollution is fecal coliform. TMDLs must address the pollutant specified in state standards.

10. Comment:Two commenters expressed concerns about the TMDL public notice process. The commenters stated that they were unaware of any TMDLs being public noticed until a few days before the end of the comment period. The commenters requested a 30-day extension of the public notice comment period to submit comments.

This request was granted.

11. Comment:Two commenters expressed concerns that the land use and fecal coliform data used to develop the FC TMDL are flawed. The commenters stated that the data are outdated and are not comparable to today's actual measurements.

The data used were collected by SCDHEC (fecal coliform) and USGS (flow), or provided by USEPA contractors (land use). USEPA believes that the data are valid. Data and TMDL development methods were consistent with those used by USEPA throughout the region.

12. Comment: One commenter noted that SCDHEC gave the impaired water quality monitoring stations in the affected area low priority rankings in the 2002 303(d) list.

*Priority is not the only factor considered when targeting TMDL development. See South Carolina's 2002 303(d) list (**http://www.scdhec.gov/water/pubs/303d2002.pdf**) for more information on TMDL targeting.*

13. Comment:Two commenters expressed concerns that the flow data used to develop the TMDL was not comparable to the actual streams in the affected watersheds.

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.

14. Comment:One commenter believed that in the process of complying with the Phase II MS4 permit, the regulated permit holder would bear the majority of the fecal coliform load reductions.

The MS4 permit holder would only bear the load reduction for the MS4 area within the watershed, not for the entire watershed.

15. Comment:One commenter believed that there were contradictions in statements concerning critical conditions in the Big Generostee, Rocky River, and Wilson Creek TMDL reports.

Analysis for each fecal coliform bacteria TMDL is approached independently. Critical conditions for different watersheds can be very different, depending on the source assessment and rainfall events in those watersheds. Fecal coliform bacteria excursions can occur during a wide range of conditions: at low flow, due to failing septic tanks or illicit discharges, and/or at high flow, due to agricultural or urban runoff. In some cases, a combination of high- and low-flow conditions contribute to known fecal coliform bacteria excursions. Source assessments for the Rocky River/Wilson Creek and Big Generostee Creek TMDLs demonstrated a combination of high-flow and low-flow critical conditions contributed to the impairment. A straight-line relationship between precipitation and concentration is not necessary for identification of critical conditions.