# Total Maximum Daily Load Development for Twelve Mile Creek Watershed, SC

Hydrological Unit Codes: 03060101-060 and 03060101-070

(Stations: SV-015, SV-136, SV-137, SV-206, SV-239)
Fecal Coliform Bacteria

South Carolina Department of Health and Environmental Control
Bureau of Water

**June 19, 2003**

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# SUMMARY SHEET

Total Maximum Daily Load (TMDL) Development for Twelve Mile Creek Watershed

## 1. 303(d) Listed Waterbody Information

| | |
|---|---|
| State | South Carolina |
| County | Pickens |
| Major River Basin | Upper Savannah |
| Watershed | Twelve Mile Creek |
| Constituent(s) Causing Impairments | Fecal Coliform Bacteria |
| Designated Uses | Recreational |

Impaired Stations (from South Carolina's 2002 Section 303(d) List):

| Station | Station Location |
|---|---|
| SV-206 | NORTH FORK 12 MI CREEK AT US 178 2.9 MI NORTH OF PICKENS |
| SV-239 | GOLDEN CREEK AT S-39-222 1.2 MI NW OF LIBERTY |
| SV-015 | TWELVE MILE CREEK AT S-39-51 N OF NORRIS |
| SV-137 | TWELVE MILE CREEK AT S-39-337 |
| SV-136 | FIRST CREEK AFTER LEAVING CENTRAL AT CLVT ON MAW BRDG RD |

Applicable fecal coliform bacteria water quality criteria for recreation (most stringent): The concentration of the fecal coliform bacteria group shall not exceed 200 counts per 100 mL as a geometric mean based on five consecutive samples during any 30 day period (hereafter referred to as the geometric mean standard or criteria); nor shall more than 10 percent of the total samples during any 30 day period exceed 400 counts per 100 mL (hereafter referred to as the instantaneous standard or criteria).

## 2. TMDL Development

Analysis/Modeling:

EPA's Watershed Characterization System and Fecal Coliform Loading Estimation Spreadsheet were used to assess watershed characteristics and develop estimates of bacteria loading from various sources. EPA's Loading Simulation Program in C++ (LSPC) was used to simulate water quality conditions in Twelve Mile Creek and evaluate results through comparison to the geometric mean criteria. An hourly time step was used to simulate hydrologic and water quality conditions with results expressed as daily averages. Load-duration curves were additionally developed for TMDL determination based on the instantaneous criteria.

Critical Conditions:

A simulation period of 6 years (1995-2000) was considered to determine a critical 30-day period for each impaired location. This time period was selected to reflect the most recent conditions in the watershed. For each subbasin, critical periods were identified for the geometric mean standard. Model results for the identified critical periods are consistent with observation data. A range of hydrologic and meteorological conditions was represented. Extreme low and high flow occurrences were eliminated from consideration in selecting the critical period.

Seasonal Variation:

Although a 6-year period was selected to identify critical conditions and to be consistent with the monitoring period upon which the Section 303(d) listing was based, a longer simulation period, nine years, was used to assess hydrologic variations for this TMDL. This period was selected to improve the accuracy of the hydrologic model and to represent a wide range of seasonal patterns associated with wet and dry years. A period of nine years was chosen to better represent the variety of possible weather conditions in the watershed.

## 3. Fecal Coliform Bacteria Allocations by Impaired Station (Downstream to Upstream)

| Impaired Water Quality Station | WLAs (counts/day) | MS4 WLAs % Reduction | LAs (counts/day or % Reduction) | MOS** (counts/day) | TMDL*** (counts/day or % Reduction) | % Reduction |
|---|---|---|---|---|---|---|
| SV-136 | 1.14E+09 | NA | 1.08E+12 | Explicit & Implicit | 1.08E+12 | 56 |
| SV-137 | 1.82E+10 | 64 | 64 | Explicit & Implicit | 64 | 64 |
| SV-015 | 1.74E+10 | 64 | 64 | Explicit & Implicit | 64 | 64 |
| SV-239 | 8.17E+09 | 64 | 64 | Explicit & Implicit | 64 | 64 |
| SV-206 | 0.00E+00 | NA | 4.84E+11 | Explicit & Implicit | 4.84E+11 | 39 |

* Loading units are counts/ day or percent reduction.
** Margin of safety (MOS) equivalent to 5 percent of the target concentration. Also refer to section 6.5
*** TMDL – WLA = LA

Notes:

- All future permitted discharges shall meet the water quality criterion for fecal coliform bacteria of 200 counts/100mL (expressed as a monthly geometric mean)
- All future permitted discharges shall meet the water quality criterion for fecal coliform bacteria of 400 counts/100 mL (expressed as a daily maximum)

**4. Public Notice Date**:

**5. Submittal Date:**

**6. Establishment Date:**

**7. Endangered Species (yes or blank):**

**8. EPA Lead on TMDL (EPA or blank):**

**9. TMDL Considers Point Source, Nonpoint Source, or both: Both**

**10. NPDES Discharges of Fecal Coliform Bacteria**

| NPDES No. | Facility Name | WLA (counts/day) |
|---|---|---|
| SC0000132 | AMERICAN HOUSE SPINNING | 3.33E+08 |
| SC0000302 | BASF CORP/FIBERS DIV/CLEMSON | 6.93E+08 |
| SC0000370 | ALICE MFG/FOSTER & ELLJEAN PLT | 3.21E+08 |
| SC0000434 | SPANGLER'S GROCERY | 5.13E+07 |
| SC0020010 | CLEMSON WWTF | 5.57E+09 |
| SC0022012 | PICKENS CO/CATEECHEE VILLAGE | 1.51E+08 |
| SC0023035 | EASLEY/GOLDEN CREEK LAGOON | 4.40E+09 |
| SC0023141 | ISAQUEENA MOBILE HOME PARK | 1.82E+08 |
| SC0024996 | PICKENS CO PSC/CENTRAL-NORTH | 1.14E+09 |
| SC0026166 | PICKENS CO-LIBERTY/CRAMER | 1.19E+09 |
| SC0026191 | PICKENS CO-LIBERTY/ROPER | 3.80E+09 |
| SC0027049 | MASSINGILL TRAILER COURT | 1.82E+07 |
| SC0028762 | R C EDWARDS JR HIGH SCHOOL | 1.36E+08 |
| SC0038652 | DANIEL HIGH SCHOOL/PICKENS CO | 1.51E+08 |
| SC0047716 | PICKENS/12 MILE RV & WOLF CRK | 7.20E+09 |
| SC0047899 | PICKENS COUNTY STOCKADE | 4.53E+08 |

Notes:

No fecal coliform bacteria reductions are required from these point sources. The WLAs represent a constant fecal coliform load over a 30-day period based on the facility's permitted flow and permit limits of 200 counts/100ml. For "Measure and Report" permits, the average observed flow was used for the WLA calculation.

# TABLE OF CONTENTS

# LIST OF TABLES



# LIST OF FIGURES

# 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 five locations in the Twelve Mile Creek watershed (HUCs 03060101-070 and 03060101-060) on South Carolina's 2002 Section 303(d) list due to fecal coliform bacteria impairments. The impaired locations are identified by water quality sampling station locations from which the samples that exceeded criteria were taken. The presence of fecal coliform bacteria in aquatic environments indicates that the water has been contaminated with the fecal material of humans or other animals. Fecal coliform bacteria contamination is an indicator that a potential health risk exists for individuals exposed to the water.

## 1.2 Watershed Description

The Twelve Mile Creek watershed is located in Pickens County, South Carolina (Figure 1-1). Parts or all of the following towns fall within the watershed: Pickens, Easley, Liberty, Norris, Central, Clemson, and Six Mile. North Fork Twelve Mile Creek and Middle Fork Twelve Mile Creek join to form Twelve Mile Creek, which flows through the watershed and is joined, along the way, by Town Creek, Wolf Creek, Rices Creek, and Golden Creek. The lower reach of Twelve Mile Creek flows into and forms an arm of Lake Hartwell. Based on EPA's National Hydrography Dataset (NHD), there are a total of 139 miles of Level 1, 2 and 3 streams in the Twelve Mile Creek watershed.

The watershed occupies 98,835 acres of the Piedmont region of South Carolina (SCDHEC 1998). According to the Natural Resources Conservation Service's State Soil Geographic Database (STATSGO), soil types consist of an association of the Cecil-Hiwassee-Pacolet series. About 90 percent of the watershed contains soils classified as hydrologic group B, while the rest are classified as hydrologic group C.

Based on USGS's Multi-Resolution Land Characterization (MRLC) data, 72 percent of the watershed is forested. The remaining 28 percent is composed of pasture land (13%), cropland (6%), urban areas (7%), and a small mix of wetlands, barren, and transitional land uses. Figure 1-2 shows the land use distribution for the Twelve Mile Creek watershed.

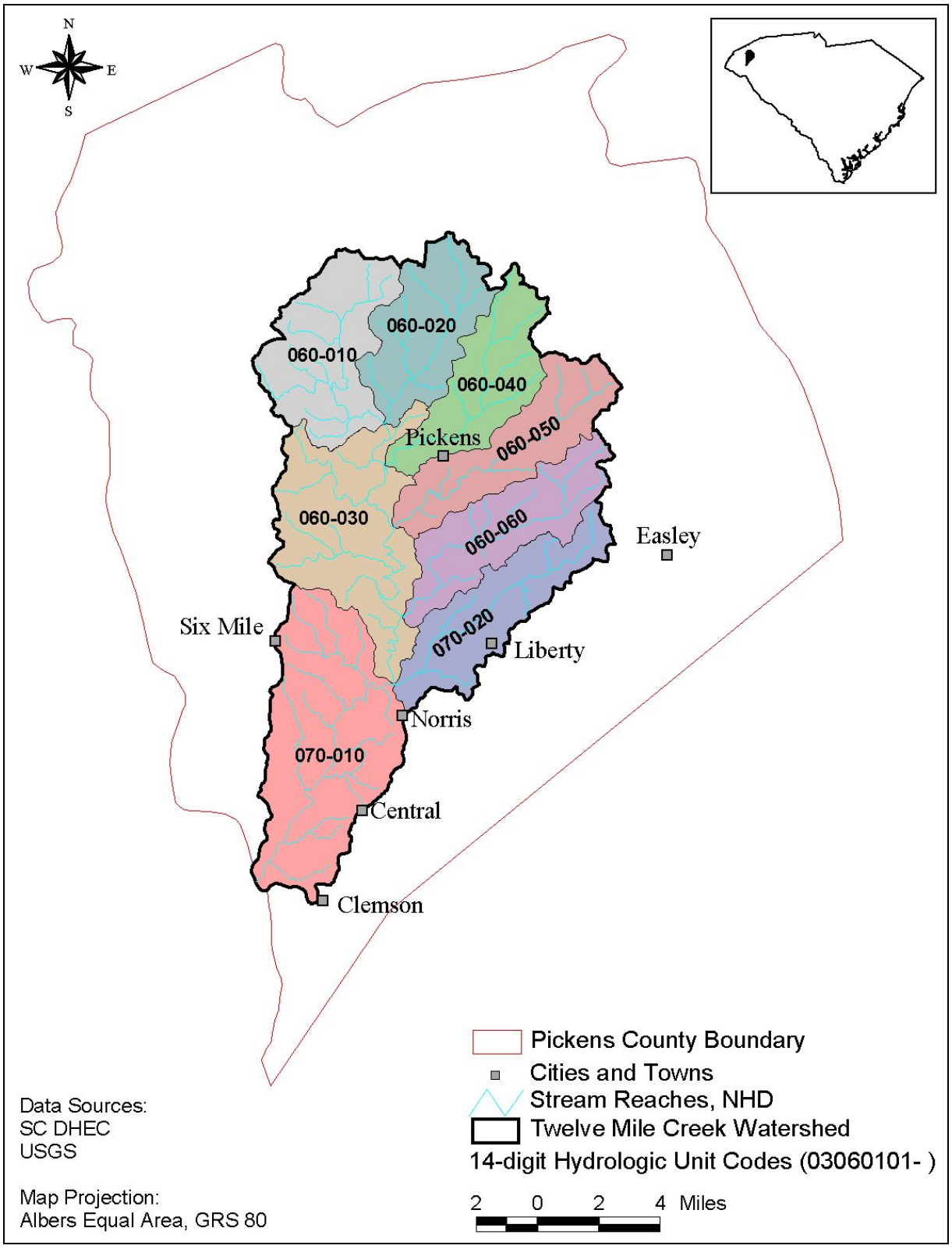


**Figure 1-1. Twelve Mile Creek watershed with 14-digit HUCs and nearby cities**

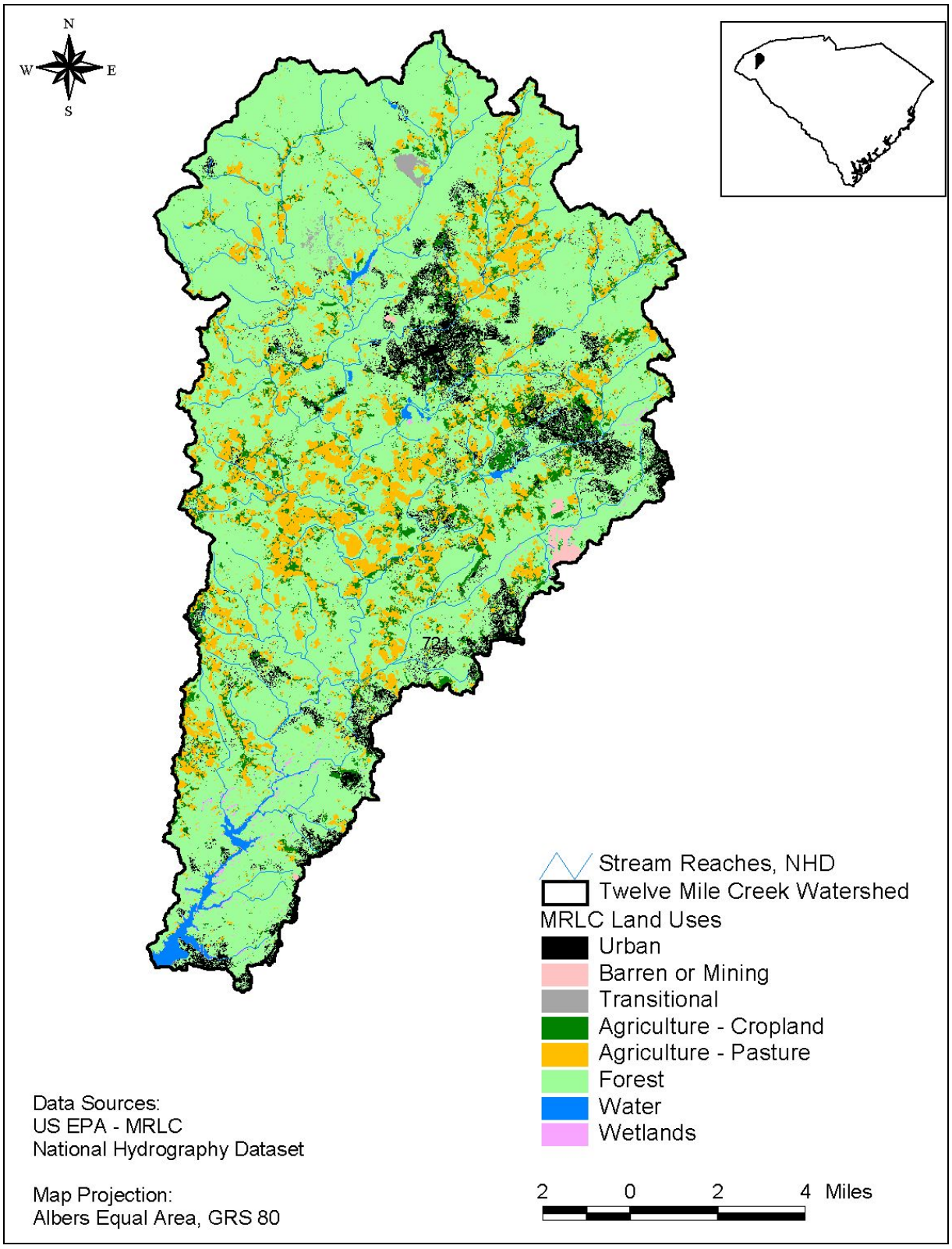


**Figure 1-2. Land use coverage in the Twelve Mile Creek watershed**

## 1.3 Water Quality Standards

The impaired streams, Twelve Mile Creek and its tributaries, are 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 bacteria in Freshwater is:

> "Not to exceed a geometric mean of 200/100ml, 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 400/100ml." (R.61-68).

# 2.0 WATER QUALITY ASSESSMENT

The *State of South Carolina Section 303(d) List for 2002* was used to identify impaired water quality stations of the Twelve Mile Creek watershed. For fecal coliform bacteria, if 10 percent or less of the samples are greater than 400/100ml, then recreational uses are said to be fully supported. A percentage of criteria excursions greater than 10 percent indicates impairment of recreational uses and the waterbody is placed on the Section 303(d) list. Use attainment determinations for listing were made using water quality data collected from 1996 to 2000. Monitoring data for five stations in the Twelve Mile Creek watershed show violations of listing criteria, causing them to be placed on the Section 303 (d) List for 2002.

Available instream water quality monitoring data were evaluated with respect to seasonality, relation to flows, and magnitude of criteria exceedence. To develop a better understanding of the conditions under which bacteria loads are entering streams in the Twelve Mile Creek watershed, several different analyses were performed including an analysis of flow weighted concentration data, monthly concentrations, and load duration curves. The goal of flow weighted concentration analysis is to compare in stream observations with flow values to see whether violations generally occur during low flow periods or high flow periods. Data from all impaired stations in the Twelve Mile Creek watershed were evaluated. Results from this analysis indicate that fecal coliform bacteria violations are occurring in the Twelve Mile Creek watershed during both high and low flow periods. Load duration curves for the watershed support this assessment as well.

As an example, Figure 2-1 presents the load duration curve for Station SV-239. Load duration analysis involves using measured or estimated flow data, instream criteria, and fecal coliform observation data to assess flow conditions in which violations are occurring. For this analysis, the flow data was obtained from the modeled flow for the relevant sub-basin, since continuous measurements of flow are not available at the locations of the impaired stations (hydrologic modeling is further described later in this document). The flow was plotted based

on exceedence probability, which indicates the percentage of time in days that the flow (or load) is exceeded. This is a useful technique in examining loading events because it shows the load magnitude and also reveals the corresponding hydrological event. The allowable load is the modeled flow record multiplied by the instream fecal coliform criteria minus a five percent margin of safety; it represents the maximum load for the given flow that still satisfies water quality criteria. The line drawn through the allowable load data points is called the target line.

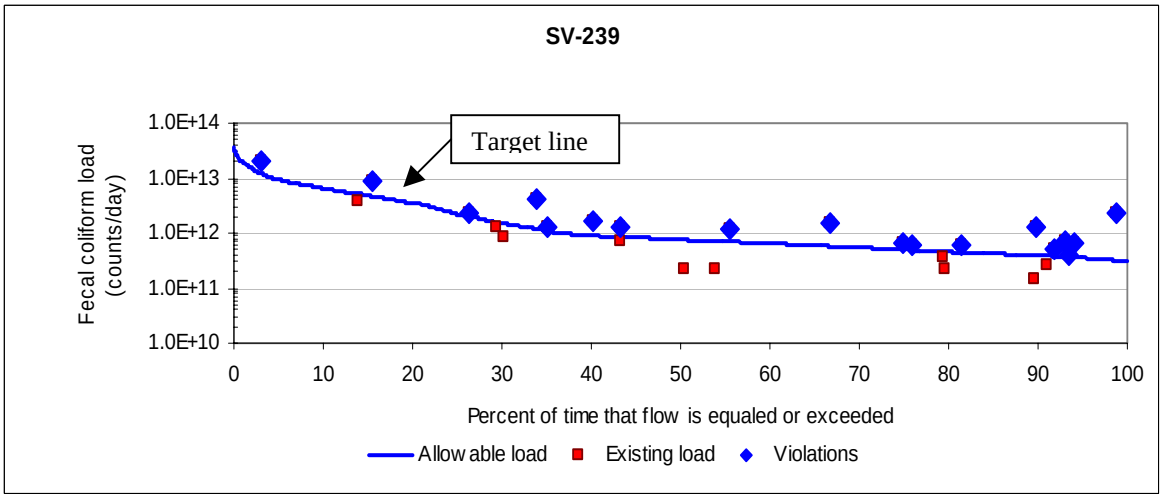


**Figure 2-1. Fecal coliform bacteria load duration curve for station SV-239**

The existing instream fecal coliform load (modeled flow multiplied by observed fecal coliform concentration) is compared to the allowable load for that flow. Any existing loads above the allowable load curves represent a violation of water quality criteria. For a low flow loading situation, one typically sees observations in excess of criteria at the low flow side of the chart; for a high flow loading situation one would see observations in excess of criteria at the high flow side of the chart. The load duration curve was developed for the time period for which the 303(d) listing was based (1995-2000) and existing loads were plotted. Existing loads are shown as dots; violations as starred dots. The load duration curve for station 239 indicates that there are occasional exceedences of the instantaneous standard under high, average, and low flow conditions. These exceedences are likely due to a combination of wet weather sources (surface runoff) and low flow direct sources. The load duration curves for each impaired station in the Twelve Mile Creek watershed show similar loading characteristics (i.e., existing loads above the criteria curve under a range of flow conditions). Usually, both low flow loading and high flow loading is occurring, but one is more of a critical source than the other, i.e. you see most exceedences for one loading mechanism, even though both are occurring.

Appendix A presents seasonal variations and general statistics for fecal coliform bacteria concentrations observed at each impaired water quality station. The data analysis shows that high fecal coliform bacteria concentrations tend to occur during both high and low flow periods. This indicates that runoff during storm events is a significant fecal coliform bacteria source, as well as the direct inputs to the stream during low flow periods (especially during

summer low flow). Examining the data in the context of existing land uses is also helpful in determining what types of sources are probably impacting a particular sub-basin. Figure 2-2 shows the location of impaired water quality stations in the Twelve Mile Creek watershed based on South Carolina's 2002 303(d) list. All sub-basins of the Twelve Mile Creek watershed show the characteristics of runoff-related and direct loading, although the sources of loading are most likely different.

Station SV-206 presents the least percentage of exceedences of all the impaired stations. Forests dominate its drainage area, with the second most prevalent land use being pastures. Direct contributions from wildlife, failing septic systems and livestock may be contributing factors. The area draining to SV-239 presents the most variety in terms of land use of all impaired stations in the Twelve Mile Creek watershed. The non-forest components of this drainage area have significant portions of urban land, pastures and cropland. Of the impaired stations, this exhibits the highest percentage of exceedences for all flow regimes from very high flows to very low flows, suggesting a combination of contributing sources. Similarly, Station SV-015 shows high exceedences for high and low flows so a combination of sources are likely contributing here as well—urban and pasture runoff during runoff related loading and failing septic systems and animals in streams during low-flow conditions. Station SV-136, exhibits no exceedences for very high or very low flows; a combination of sources during average flows may be causing exceedences in this drainage area. Low flows seem to be most critical in the drainage area of Station SV-137, the most downstream station, with most exceedences during average and low flows.

For some sub-basins, runoff during storm events is the more significant fecal coliform bacteria source, for others, direct inputs to streams during low flow periods (e.g. in-stream cattle or wildlife) may be equally or even more important. Stations SV-137 and SV-015 have been sampled throughout the year (all seasons). Data for stations SV-206, SV-239, SV-136 are not available during the winter months, but because land practices and bacteria load delivery mechanisms are relatively consistent over the course of the year, it is assumed that winter loading should be consistent with that of periods for which data do exist.

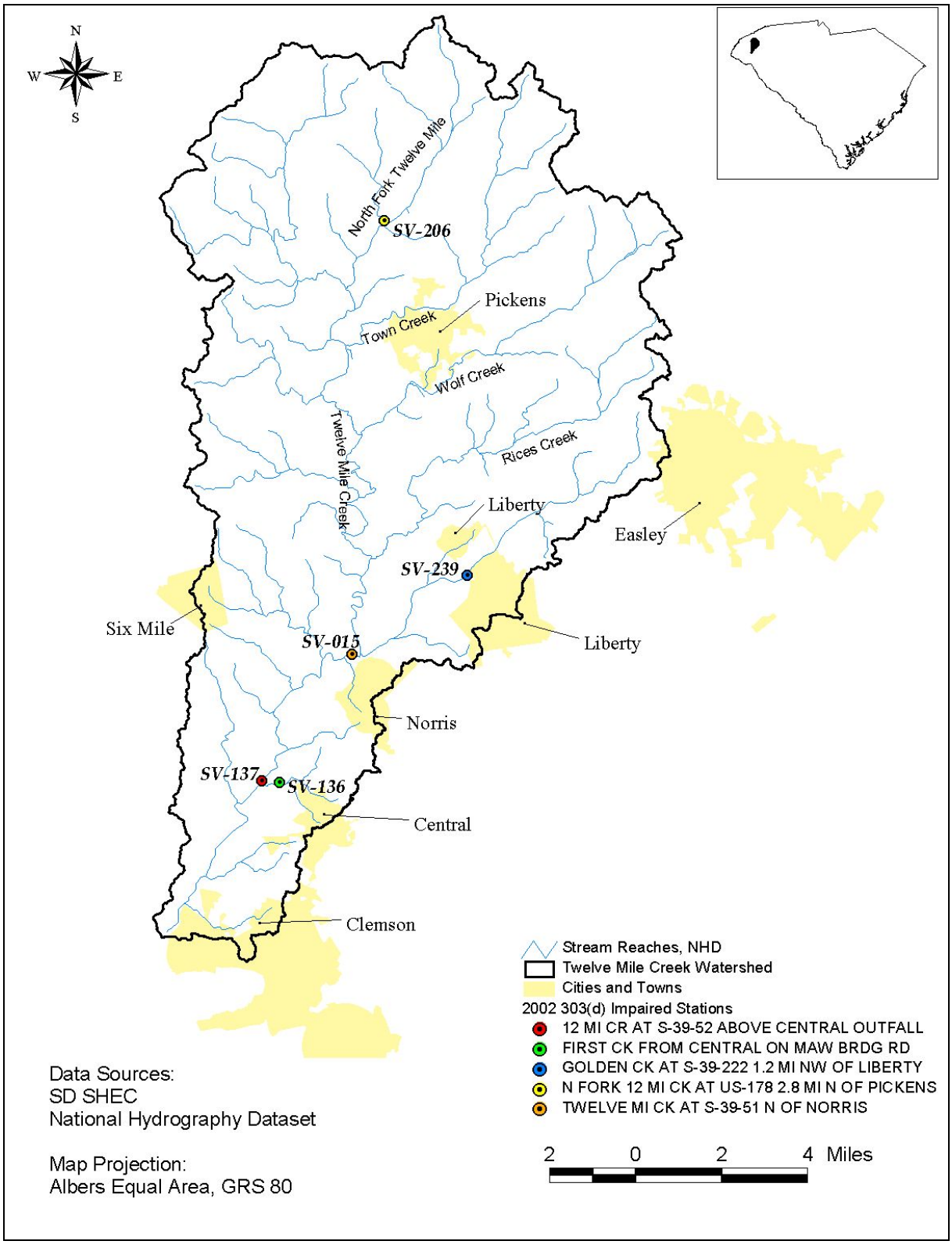


**Figure 2-2. 2002 Section 303(d) listed waters of the Twelve Mile Creek watershed**

# 3.0 SOURCE AND LOAD ASSESSMENT

Fecal coliform bacteria enter surface waters from both point and nonpoint sources. Point sources are facilities that discharge at a specific location from pipes, outfalls, and conveyance channels from either municipal wastewater treatment plants or industrial waste treatment facilities. All point sources must have a National Pollutant Discharge Elimination System (NPDES) permit. Nonpoint sources are diffuse sources that have multiple routes of entry into surface waters. Some sources are related to land use activities that accumulate fecal coliform bacteria on the land surface (i.e., pasture land) that runs off during storm events. Other sources, such as in-stream cattle, are more or less continuous, at least seasonally. Point source contributions can typically be attributed to the following sources:

- Municipal wastewater facilities,
- Municipal Separate Storm Sewers (MS4s),
- Illicit discharges, and
- Leaking or overflowing sewers.

Municipal wastewater treatment facilities are permitted through the National Pollutant Discharge Elimination System (NPDES). Larger treatment facilities have disinfection systems that remove fecal coliform bacteria in the effluent before it is discharged. Treatment facilities treat human waste received from the collection system and then discharge their effluent into a nearby stream.

Municipal Separate Stormwater Systems (MS4s) are point sources also regulated by the NPDES program. Discharge from stormwater pipes or conveyances potentially include urban runoff high in bacteria and other pollutants.

Illicit discharges are made when facilities or persons discharge fecal coliform bacteria without a permit, or violate their defined permit discharge limit by exceeding the fecal coliform concentration.

In urban settings, sewer lines typically run parallel to the stream in the floodplain. If there is a leaking or overflowing sewer line, high concentrations of fecal coliform can flow into the stream or leach into the groundwater. Groundwater monitoring wells can signal if there are leaking sewer lines contributing to the problem.

## 3.1 Point Sources

### 3.1.1 Permitted Point Sources

Table 3-1 lists the 16 active facilities that are permitted to discharge fecal coliform bacteria into waterbodies of the Twelve Mile Creek watershed. Figure 3-1 shows their locations. The permitted flows range from 0.0024 to 1.15 million gallons per day (MGD). Four of the facilities do not have a specific allowable flow limit, and only need to measure and report their flow. In South Carolina, NPDES permittees that discharge sanitary wastewater must meet the state criterion for fecal coliform bacteria at the point of discharge (i.e. a daily

maximum concentration of 400 counts/100ml, and a 30-day maximum geometric mean of 200 counts/100ml).

**Table 3-1. Active facilities permitted to discharge fecal coliform bacteria into waterbodies of the Twelve Mile Creek watershed**

| NPDES No. | Facility Name | Principal Activity | Flow Limit (MGD) |
|---|---|---|---|
| SC0000132 | AMERICAN HOUSE SPINNING | BROAD WOVEN FABRIC MILLS, SYNT | MR[1] |
| SC0000302 | BASF CORP/FIBERS DIV/CLEMSON | PLSTC MAT./SYN RESINS/NV ELAST | MR |
| SC0000370 | ALICE MFG/FOSTER & ELLJEAN PLT | BROAD WOVEN FABRIC MILLS, SYNT | MR |
| SC0000434 | SPANGLER'S GROCERY | COIN-OPERATED LAUNDRIES/DRYCLE | MR |
| SC0020010 | CLEMSON WWTF | SEWERAGE SYSTEMS | 1.15 |
| SC0022012 | PICKENS CO/CATEECHEE VILLAGE | SEWERAGE SYSTEMS | 0.02 |
| SC0023035 | EASLEY/GOLDEN CREEK LAGOON | SEWERAGE SYSTEMS | 0.58 |
| SC0023141 | ISAQUEENA MOBILE HOME PARK | OPER OF RES MOBILE HOME SITES | 0.024 |
| SC0024996 | PICKENS CO PSC/CENTRAL-NORTH | SEWERAGE SYSTEMS | 0.15 |
| SC0026166 | PICKENS CO-LIBERTY/CRAMER | SEWERAGE SYSTEMS | 0.157 |
| SC0026191 | PICKENS CO-LIBERTY/ROPER | SEWERAGE SYSTEMS | 0.5 |
| SC0027049 | MASSINGILL TRAILER COURT | OPER OF RES MOBILE HOME SITES | 0.0024 |
| SC0028762 | R C EDWARDS JR HIGH SCHOOL | ELEMENTARY & SECONDARY SCHOOLS | 0.018 |
| SC0038652 | DANIEL HIGH SCHOOL/PICKENS CO | ELEMENTARY & SECONDARY SCHOOLS | 0.02 |
| SC0047716 | PICKENS/12 MILE RV & WOLF CRK | SEWERAGE SYSTEMS | 0.95 |
| SC0047899 | PICKENS COUNTY STOCKADE | SEWERAGE SYSTEMS | 0.06 |

[1] MR = Measure and Report

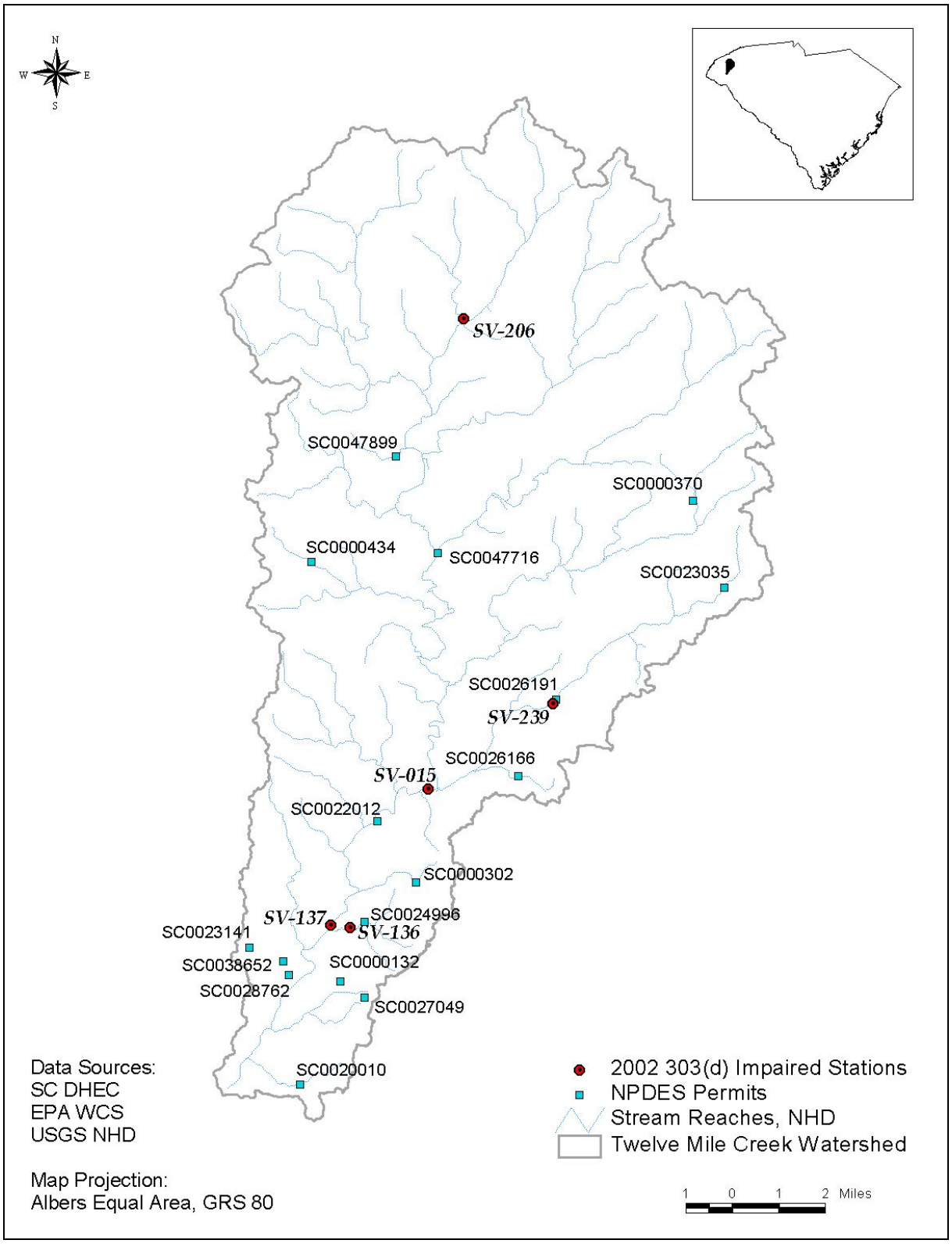


**Figure 3-1. Location of NPDES facilities permitted to discharge fecal coliform bacteria into waters of the Twelve Mile Creek watershed**

Table 3-2 presents the NPDES facilities located upstream of each of the impaired stations. Table 3-3 shows fecal coliform bacteria concentration statistics for each facility. Estimates of existing fecal coliform bacteria loading for each individual NPDES facility are shown in Table 3-4. These results were obtained using Discharge Monitoring Report (DMR) data provided by DHEC. The original DMR data is shown in Appendix A.

**Table 3-2. NPDES facilities located in each impaired station's catchment area**

| Impaired Station | NPDES Facilities | | | |
|---|---|---|---|---|
| SV-206 | - None - | | | |
| SV-239 | SC0023035 | SC0026191 | | |
| SV-015 | SC0023035 | SC0026191 | SC0047899 | SC0000370 |
| | SC0000434 | SC0047716 | SC0026166 | |
| SV-137 | SC0023035 | SC0026191 | SC0047899 | SC0000370 |
| | SC0000434 | SC0047716 | SC0026166 | SC0022012 |
| | SC0000302 | | | |
| SV-136 | SC0024996 | | | |

**Table 3-3. Fecal coliform bacteria concentration statistics for NPDES facilities in the Twelve Mile Creek watershed (1990-2002)**

| NPDES ID | Pipe | Count | Mean (counts/100ml) | Maximum (counts/100ml) | Geometric Mean (counts/100ml) | Exceedence based on 400counts/100ml | By-passes | Sanitary Sewer Overflow (SSO) |
|---|---|---|---|---|---|---|---|---|
| SC0000132 | 1 | 85 | 36 | 850 | 14 | 1 | None | None |
| SC0000302 | 1 | 131 | 9 | 423 | 2 | 1 | None | None |
| SC0000370 | 1 | 111 | 19 | 590 | 3 | 2 | None | None |
| SC0000434 | 1 | 68 | 88 | 4100 | 13 | 2 | None | None |
| SC0020010 | 1 | 130 | 20 | 296 | 14 | 0 | None | None |
| SC0022012 | 1 | 76 | 793 | 33000 | 27 | 6 | None | None |
| SC0023035 | 1 | 130 | 33 | 382 | 19 | 0 | None | None |
| SC0023141 | 1 | 57 | 22 | 195 | 13 | 0 | None | None |
| SC0024996 | 1 | 133 | 76 | 1023 | 34 | 1 | None | None |
| SC0026166 | 1 | 127 | 60 | 708 | 18 | 5 | None | None |
| SC0026191 | 1 | 128 | 111 | 954 | 30 | 10 | None | None |
| SC0027049 | 1 | 19 | 102 | 1000 | 21 | 1 | None | None |
| SC0028762 | 1 | 76 | 90 | 4700 | 16 | 1 | None | None |
| SC0038652 | 1 | 72 | 53 | 2500 | 14 | 1 | None | None |
| SC0047716 | 1 | 19 | 15 | 65 | 13 | 0 | None | None |
| SC0047899 | 1 | 22 | 10 | 65 | 5 | 0 | None | None |

**Table 3-4. Estimated existing fecal coliform loads from each permitted NPDES facilities in the Twelve Mile Creek watershed**

| NPDES No. | Facility Name | Pipe | Concentration[1] (counts/100ml) | Flow (MGD) | Load (counts/30days) |
|---|---|---|---|---|---|
| SC0000132 | AMERICAN HOUSE SPINNING | 1 | 14.1 | 0.044 | 7.06E+08 |
| SC0000302 | BASF CORP/FIBERS DIV/CLEMSON | 1 | 2.2 | 0.092 | 2.29E+08 |
| SC0000370 | ALICE MFG/FOSTER & ELLJEAN PLT | 1 | 3.4 | 0.043 | 1.64E+08 |
| SC0000434 | SPANGLER'S GROCERY | 1 | 13.4 | 0.006 | 1.03E+08 |
| SC0020010 | CLEMSON WWTF | 1 | 13.7 | 0.735 | 1.14E+10 |
| SC0022012 | PICKENS CO/CATEECHEE VILLAGE | 1 | 26.5 | 0.013 | 3.88E+08 |
| SC0023035 | EASLEY/GOLDEN CREEK LAGOON | 1 | 18.7 | 0.217 | 4.62E+09 |
| SC0023141 | ISAQUEENA MOBILE HOME PARK | 1 | 13.3 | 0.010 | 1.45E+08 |
| SC0024996 | PICKENS CO PSC/CENTRAL-NORTH | 1 | 34.3 | 0.070 | 2.72E+09 |
| SC0026166 | PICKENS CO-LIBERTY/CRAMER | 1 | 17.9 | 0.065 | 1.32E+09 |
| SC0026191 | PICKENS CO-LIBERTY/ROPER | 1 | 30.4 | 0.148 | 5.12E+09 |
| SC0027049 | MASSINGILL TRAILER COURT | 1 | 21.1 | 0.001 | 3.11E+07 |
| SC0028762 | R C EDWARDS JR HIGH SCHOOL | 1 | 16.2 | 0.008 | 1.58E+08 |
| SC0038652 | DANIEL HIGH SCHOOL/PICKENS CO | 1 | 13.8 | 0.010 | 1.49E+08 |
| SC0047716 | PICKENS/12 MILE RV & WOLF CRK | 1 | 12.9 | 0.313 | 4.58E+09 |
| SC0047899 | PICKENS COUNTY STOCKADE | 1 | 4.8 | 0.008 | 4.68E+07 |

[1] The geometric mean fecal coliform concentration was used for this calculation.

### 3.1.2 Municipal Separate Storm System Permits

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 from the MS4 into local waterbodies. Phase I of the program required operators of “medium” and “large” MS4s (those generally serving populations of 100,000 or greater) to implement a storm water management program as a means to control polluted discharges from MS4s. 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, hazardous waste treatment, etc. There are no large or medium MS4s in the Twelve Mile Creek watershed.

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. Only a select subset of small MS4s, referred to as “regulated small MS4s”, require an NPDES storm water permit. Regulated small MS4s are defined as all small MS4s located in "urbanized areas" as defined by the Bureau of the Census, and those small MS4s located outside of a UA that are designated by NPDES

permitting authorities. There are four regulated small MS4s in this watershed: the City of Easley, City of Liberty, City of Pickens, and Pickens County.

Phase II requires operators of regulated small MS4s to obtain a National Pollutant Discharge Elimination System (NPDES) permit 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. Small MS4 storm water programs must address the following minimum control measures:

- Public Education and Outreach
- Public Participation/Involvement
- Illicit Discharge Detection and Elimination
- Construction Site Runoff Control
- Post-Construction Runoff Control
- Pollution Prevention/Good Housekeeping

Implementation of small MS4s will usually involve development of measurable goals and implementation of BMPs to satisfy each of the control measures.

## 3.2 Nonpoint Sources

In addition to point sources, nonpoint sources also contribute fecal coliform bacteria loads into the waters of the Twelve Mile Creek watershed. Nonpoint sources represent contributions from diffuse sources, rather than from a defined outlet. On the land surface, fecal coliform bacteria accumulate over time and wash off during rain events. As the runoff transports the sediment over the land surface, more fecal coliform bacteria are collected and carried to the stream. While the concentrations of bacteria are accumulating, they also die. The net loading into the stream is determined by the local watershed hydrology.

The land use distribution of the Twelve Mile Creek watershed provides insight into determining nonpoint sources of fecal coliform bacteria (Figure 1-2). The predominant land uses in the Twelve Mile Creek watershed were identified based on the Multi-Resolution Land Characterization (MRLC) land use data (representative of the mid-1990s). Figure 3-2 displays the land use distribution of the catchment area of each impaired water quality station. Key nonpoint sources identified in the watershed include urban areas, failing septic systems, livestock, manure application, and natural sources.

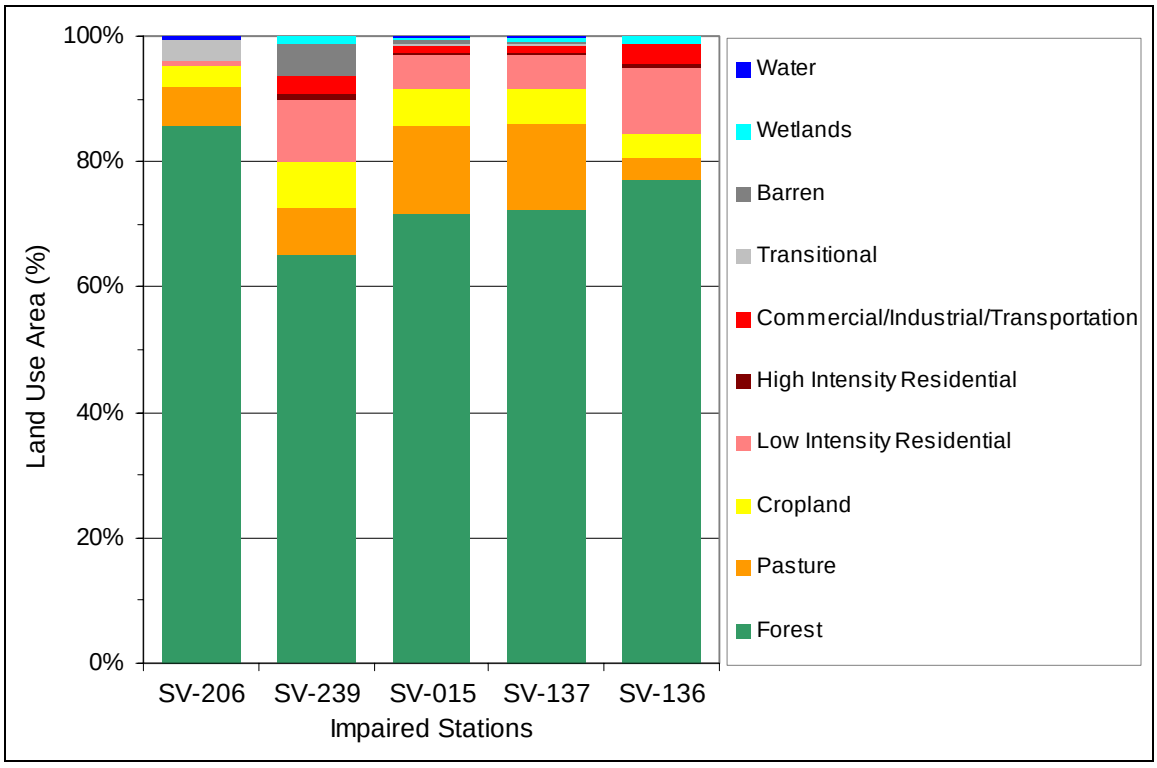


**Figure 3-2. Landuse distribution in impaired stations' drainage areas**

### 3.2.1 Urban Areas

Sources of fecal coliform bacteria in urban areas include wildlife and pets, particularly dogs. Much of the loading from urban areas is due simply to the increase in impervious surfaces relative to other land uses and the resulting increase in runoff. In estimating the potential loading of fecal coliform bacteria from urban areas, accumulation rates are often used to represent the aggregate of available sources. For this study, initial accumulation rates assumed for the built-up land were $1.0 \times 10^7$ counts/acre/day (Horner, 1992) for both the pervious and impervious fractions. The assumed perviousness percentages for built-up land were as follows:

- Low Intensity Residential—88 percent
- High Intensity Residential—35 percent
- High Intensity Commercial/Industrial/Transportation—15 percent
- Urban Grasses - 100 percent.

### 3.2.2 Failing Septic Systems

Failing septic systems represent a nonpoint source that can contribute fecal coliform bacteria to receiving waterbodies through surface or subsurface malfunctions. Loadings from failing septic systems were represented by constant flows and concentrations in the analysis. The

estimate was derived by examining a combination of US Census data and technical references:

- Number of septic systems (derived from US Census 1990)
- Estimated population served by the septic systems (an average of 2.5 people per household, US Census 1990)
- An average daily discharge of 70 gallons/person/day (Horsley & Witten, 1996)
- Septic effluent concentration of $10^4$ counts/100mL (Horsley & Witten, 1996)
- Septic failure rate of 20 percent (initial estimate)

Since the estimates of the number of septic systems were based on 1990 Census data, population estimates from 1990 were also used in estimating septic loadings. To provide a margin of safety accounting for the uncertainty of the number, location, and behavior (e.g., surface vs. subsurface breakouts; proximity to stream) of these sources, failing septic systems and illegal discharges or leaky sewer lines are represented in the model as direct sources of fecal coliform to the stream reaches. Although quantifying loading from precise contributions from these sources is not feasible, the MOS included in the septic failure rate is assumed to address the uncertainty regarding these sources.

Table 3-5 presents the estimated population on septic systems. Population estimates are cumulative for each station.

**Table 3-5. Estimated population on septic systems for each impaired station's drainage area (populations are cumulative for each station)**

| Impaired Station | Population |
|---|---|
| SV-206 | 1,771 |
| SV-239 | 1,545 |
| SV-015 | 23,048 |
| SV-137 | 25,874 |
| SV-136 | 923 |

### 3.2.3 Agriculture

Agricultural land can be a source of fecal coliform bacteria. Runoff from pastures, animal operations, the improper land application of animal wastes, and animals with access to waterbodies are all sources of fecal coliform bacteria. Agricultural Best Management Practices or BMPs such as buffer strips, alternative watering sources, limiting livestock access to creeks, and the proper land application of animal wastes reduce fecal coliform loading to waterbodies.

EPA's Fecal Coliform Load Estimation Spreadsheet (FCLES) tool was used to develop initial estimates of the amount of fecal coliform bacteria introduced directly to streams, as well as initial estimates of accumulation rates of fecal coliform bacteria on the land surface (USEPA, 2000.) The FCLES tool quantifies the fecal coliform bacteria component of waste generated

by warm-blooded animals and distributes these quantities to streams and to the land surface based on land use type and waste management practices. Estimates derived from the FCLES tool were used as inputs to the watershed loading model. These initial estimates were fine-tuned during the model testing (calibration) process to more closely match available monitoring data.

Grazing cattle are of more relevance in this watershed than confined animal operations. Based on the 1997 USDA census data for Pickens County (Table 3-6), it was estimated that 4,457 cattle, 2,561 beef cows, 38 dairy cows, 287 hogs, and 35 sheep are found in the watershed. Table 3-7 describes fecal coliform production rates for various animals used to calculate loadings from each livestock category. Livestock, except for the dairy cattle, are not usually confined and are typically grazing in the pastures. Manure deposited by cattle onto pasture land is a source of nonpoint pollution. It was assumed that cattle manure is applied to cropland and pasture and hog manure is applied to pasture only. It is also assumed that no manure is imported into the watershed.

**Table 3-6. 1997 Agricultural Census information for Pickens County**

| Name | Number |
|---|---|
| Cattle | 10,585 |
| Beef Cow | 6,079 |
| Milk Cow | 96 |
| Hogs | 686 |
| Sheep | 90 |
| Chickens | 0 |

**Table 3-7. Fecal coliform production rates for various animals**

| Livestock Animal | Fecal Coliform Bacteria Production Rate* (counts/animal/day) |
|---|---|
| Beef Cow | 1.04E+11 |
| Dairy Cow | 1.01E+11 |
| Hogs | 1.08E+10 |
| Sheep | 1.20E+10 |
| Chicken | 1.36E+08 |

*Source: ASAE, 1998

Loading of fecal coliform bacteria from cattle defecating directly into streams was estimated from the number of cattle and an assumption regarding the time cattle are expected to be standing or wading in the streams. This number was refined through model calibration, which considered bacteria monitoring data. The time that cattle are assumed to be in the stream is 0.045 percent of total grazing time.

### 3.2.4 Wildlife

Fecal coliform bacteria also originate in forested areas. Generally, sources include wild animals such as deer, raccoons, wild turkeys, and waterfowl. The Department of Natural Resources in South Carolina estimated a deer density of 45 deer per square mile of deer habitat (Data provided by Charles Ruth, Deer Project Supervisor, DNR, 5/1/01). Deer habitat was assumed to include forest, wetlands, cropland, and pasture. The fecal coliform bacteria production rate for deer was estimated based on best professional judgment using the rates for other animals, such as turkey and cattle, which are available in Metcalf and Eddy (1991). An interpolation was conducted based on animal weight. This method results in a rate of $5 \times 10^8$ counts/animal/day for deer. Using this rate and the assumption of an equally distributed population of deer across forest, wetlands, and agricultural land uses, the fecal coliform bacteria accumulation rates from wildlife were determined to be $3.52 \times 10^7$ counts/acre/day, which represents background fecal coliform bacteria loading. It is important to note that the accuracy of predicted loading depends upon the accuracy of the various assumptions described above.

# 4.0 MODELING

Watersheds with varied land uses and numerous potential sources of pollutants typically require a complex model to ascertain the effect of source loadings on in-stream water quality. This relationship must be understood in order to develop an effective TMDL. In this section, the modeling techniques that were applied to simulate fecal coliform bacteria fate and transport in the watershed are discussed as applied to the Twelve Mile Creek watershed.

## 4.1 Model Selection

Selection of the appropriate analytical technique for TMDL development was based on an evaluation of technical and regulatory criteria. Key technical factors that were important in the selection process include:

- Point and nonpoint sources must be considered.
- Fecal coliform bacteria impairments are temporally-variable and occur at low, average, and high flow conditions.
- Time-variable aspects of land practices have a large effect on in-stream bacteria concentrations.
- Bacteria transport mechanisms are highly variable and often weather dependent.

The primary regulatory factor that drove the selection process was South Carolina's water quality standards. Compliance with the standards requires attaining both instantaneous and geometric mean-based criteria. To ensure a valid comparison to these criteria, results from a time-variable analysis are required.

The USEPA has assembled a variety of tools to use in the development of TMDLs. Of these tools, the geographic information system (GIS)-based Watershed Characterization System (WCS), the Fecal Coliform Loading Estimation Spreadsheet (FCLES), and the Loading Simulation Program in C++ (LSPC) were applied to model the Twelve Mile Creek watershed. WCS is similar to EPA's BASINS, however, it includes source loading calculation tools, as

well as updated agricultural data. WCS, a GIS tool, was used to display and analyze GIS information including land use, land type, point source discharges, soil types, population, and stream characteristics. FCLES is a spreadsheet tool used to quantify nonpoint source bacteria accumulation rates based on watershed-specific information.

LSPC is a system designed to support TMDL development for areas impacted by nonpoint and point sources. The most critical component of LSPC to TMDL development is the dynamic watershed model, because it provides the linkage between source contributions and in-stream response. LSPC is essentially a re-coded C++ version of selected Hydrological Simulation Program FORTRAN (HSPF) modules. LSPC is used to simulate watershed hydrology and pollutant transport as well as stream hydraulics and in-stream water quality. It is capable of simulating different flow regimes and bacteria loading variations. LSPC's algorithms are identical to those in HSPF. Table 4-1 presents the modules from HSPF used in LSPC for this study. Refer to the *Hydrologic Simulation Program FORTRAN User's Manual for Release 11* (USEPA, 1996) for a more detailed discussion of simulated processes and model parameters.

**Table 4-1. HSPF modules used in LSPC for the Twelve Mile Creek TMDL analysis**

| | | |
|---|---|---|
| **RCHRES Modules** | HYDR | Simulates hydraulic behavior |
| | GQUAL | Simulates behavior of a generalized quality constituent |
| **PQUAL and IQUAL Modules** | PWATER | Simulates water budget for a pervious land segment |
| | IQUAL | Uses simple relationships with solids and water yield |
| | PQUAL | Simple relationships with sediment and water yield |

Source: EPA, 1996

## 4.2 Model Set Up

LSPC was configured for the Twelve Mile Creek watershed to simulate the watershed as a series of hydrologically connected sub-watersheds. Configuration of the model involved subdivision of the Twelve Mile Creek watershed into modeling units and continuous simulation of flow and water quality for these units using meteorological, land use, point source loading, and stream data. The Twelve Mile Creek watershed was delineated into 29 sub-watersheds to characterize the relative fecal coliform bacteria contributions from smaller units (see Figure 4-1). Some of the small sub-basins were created to ensure the stream network configuration within the basin. Watershed delineation was based on the NHD stream coverage and digital elevation data. This discretization allows for management and load reduction alternatives to be varied by sub-watershed.

A continuous simulation period of ten years (1990-1999) was used in the hydrologic simulation analysis. An important factor driving model simulations is precipitation data. The pattern and intensity of rainfall affects the build-up and wash-off of fecal coliform bacteria from the land into the streams, as well as the dilution potential of the stream. Two weather stations located in and just outside the basin were applied to the watersheds to simulate

hydrologic events. These stations are Pickens and Clemson University, as shown in Figure 4-1.

Modeled land uses contributing to bacteria loads include pasture, cropland, urban pervious lands, urban impervious lands, and forest (including barren and wetlands). Other sources, such as septic systems and livestock in streams were modeled as direct sources in the model. Development of initial loading rates for land uses and direct sources was based on the analysis described in Section 3. These initial estimates are presented in Table 4-2, and they were further refined during the model testing (calibration) process (described in Section 4.3). Table 4-3 presents the final bacteria accumulation rates for land use sources. Loading rates used in the model to represent cattle and septic system contributions are presented in Table 4-4. The septic system contribution represents a failure rate of 6 percent.

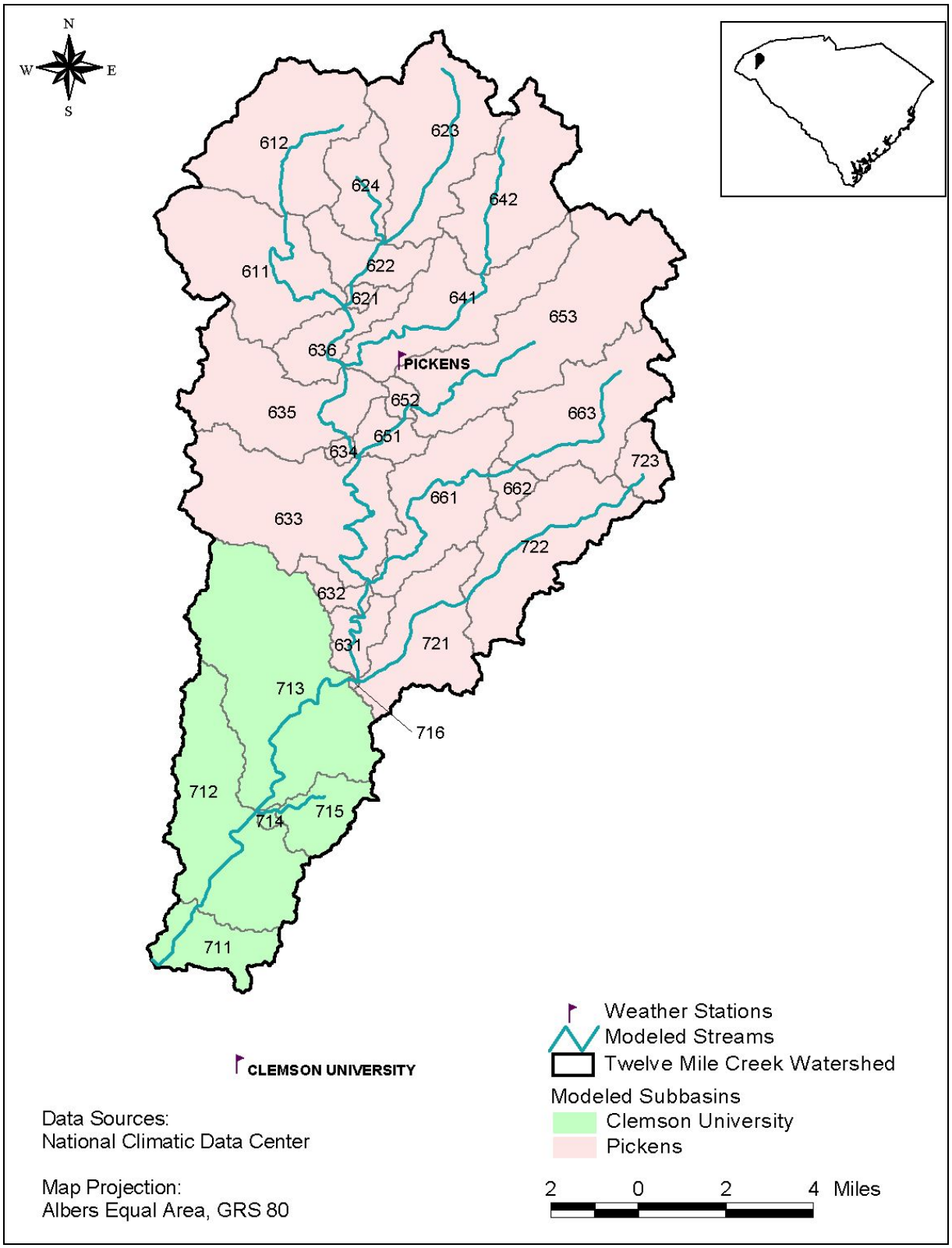


**Figure 4-1. Delineated sub-watersheds in the Twelve Mile Creek watershed, and weather station data applied to them**

### Table 4-2. Initial monthly accumulation rates (counts/acre/day) derived from FCLES

| Pickens County, SC | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cropland** | 8.60E+09 | 9.52E+09 | 8.60E+09 | 8.89E+09 | 8.60E+09 | 8.90E+09 | 8.61E+09 | 8.61E+09 | 8.90E+09 | 8.60E+09 | 8.89E+09 | 8.60E+09 |
| **Forest** | 3.52E+07 | 3.52E+07 | 3.52E+07 | 3.52E+07 | 3.52E+07 | 3.52E+07 | 3.52E+07 | 3.52E+07 | 3.52E+07 | 3.52E+07 | 3.52E+07 | 3.52E+07 |
| **Pasture** | 2.33E+10 | 2.35E+10 | 2.33E+10 | 2.34E+10 | 2.33E+10 | 2.34E+10 | 2.33E+10 | 2.33E+10 | 2.34E+10 | 2.33E+10 | 2.34E+10 | 2.33E+10 |
| **Urban Pervious and impervious** | 1.02E+07 | 1.02E+07 | 1.02E+07 | 1.02E+07 | 1.02E+07 | 1.02E+07 | 1.02E+07 | 1.02E+07 | 1.02E+07 | 1.02E+07 | 1.02E+07 | 1.02E+07 |

### Table 4-3. Final (calibrated) monthly accumulation rates (counts/acre/day) used in the model

| Pickens County, SC | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cropland** | 8.60E+09 | 9.52E+09 | 8.60E+09 | 8.89E+09 | 8.60E+09 | 8.90E+09 | 8.61E+09 | 8.61E+09 | 8.90E+09 | 8.60E+09 | 8.89E+09 | 8.60E+09 |
| **Forest** | 3.52E+07 | 3.52E+07 | 3.52E+07 | 3.52E+07 | 3.52E+07 | 3.52E+07 | 3.52E+07 | 3.52E+07 | 3.52E+07 | 3.52E+07 | 3.52E+07 | 3.52E+07 |
| **Pasture** | 2.33E+10 | 2.35E+10 | 2.33E+10 | 2.34E+10 | 2.33E+10 | 2.34E+10 | 2.33E+10 | 2.33E+10 | 2.34E+10 | 2.33E+10 | 2.34E+10 | 2.33E+10 |
| **Urban Pervious and impervious** | 1.02E+09 | 1.02E+09 | 1.02E+09 | 1.02E+09 | 1.02E+09 | 1.02E+09 | 1.02E+09 | 1.02E+09 | 1.02E+09 | 1.02E+09 | 1.02E+09 | 1.02E+09 |

### Table 4-4. Final loading rates for cattle and septic systems (counts/day)

| | Sub 611 | Sub 612 | Sub 621 | Sub 622 | Sub 623 | Sub 624 | Sub 631 | Sub 632 | Sub 633 | Sub 634 | Sub 635 | Sub 636 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cattle loadings (counts/day)** | 5.74E+09 | 3.46E+09 | 2.81E+08 | 1.23E+09 | 4.62E+09 | 1.86E+09 | 1.72E+09 | 1.37E+09 | 2.59E+10 | 1.16E+09 | 1.04E+10 | 2.30E+09 |
| **Septic loadings (counts/day)** | 2.98E+09 | 2.89E+09 | 1.10E+08 | 9.00E+08 | 2.82E+09 | 9.89E+08 | 5.62E+08 | 3.42E+08 | 3.60E+09 | 1.07E+08 | 2.58E+09 | 9.21E+08 |
| | Sub 641 | Sub 642 | Sub 651 | Sub 652 | Sub 653 | Sub 661 | Sub 662 | Sub 663 | Sub 711 | Sub 712 | Sub 713 | Sub 714 |
| **Cattle loadings (counts/day)** | 7.55E+09 | 1.18E+10 | 1.72E+09 | 7.02E+08 | 1.03E+10 | 1.40E+10 | 1.30E+09 | 8.89E+09 | 5.26E+08 | 8.75E+09 | 1.40E+10 | 7.25E+06 |
| **Septic loadings (counts/day)** | 2.01E+09 | 2.29E+09 | 4.87E+08 | 1.53E+08 | 3.95E+09 | 2.20E+09 | 2.99E+08 | 2.49E+09 | 5.05E+08 | 3.25E+09 | 4.46E+09 | 6.53E+07 |
| | Sub 715 | Sub 716 | Sub 721 | Sub 722 | Sub 723 | | | | | | | |
| **Cattle loadings (counts/day)** | 1.02E+09 | 7.02E+07 | 7.55E+09 | 7.20E+09 | 5.26E+08 | | | | | | | |
| **Septic loadings (counts/day)** | 1.47E+09 | 1.75E+07 | 1.56E+09 | 2.01E+09 | 4.46E+08 | | | | | | | |

## 4.3 Model Calibration

Hydrology and water quality calibration were performed in sequence, since water quality modeling is dependent on an accurate hydrology simulation. Flow data from the U.S. Geological Survey's (USGS) stream gauging station 02186000 (Figure 4-2) were obtained for comparison to model results. Calibration of the hydrologic model was accomplished by adjusting model parameters until the simulated and observed water budgets matched. The intensity and arrival time of storm peaks was then calibrated. The model was calibrated to observed data recorded from January 1st, 1990 to December 31st, 1990. The hydrology was validated for the period of January 1$^{st}$, 1900 to December 31$^{st}$, 1999. Results of the hydrology calibration and validation are included in Appendix B.

Following hydrology calibration, the water quality was calibrated by comparing modeled versus observed in-stream fecal coliform bacteria concentrations. The water quality calibration consisted of executing the watershed model, comparing water quality time series output to available water quality observation data, and adjusting water quality parameters within a reasonable range. Water quality parameters that were adjusted to obtain a calibrated model were the build-up and washoff of fecal coliform bacteria from the land uses and the direct load estimates such as cattle in the streams and the failing septic systems as described in Section 3.2.

The approach taken to calibrate water quality focused on matching trends identified during the water quality analysis. Daily average in-stream fecal coliform concentrations from the model were compared directly to observed data. Observed fecal coliform data were obtained from EPA's STORET for 1990 through 2000. The objective was to best simulate low flow, mean flow, and storm peaks at representative water quality monitoring stations. The available water quality data for the water quality calibration locations are presented in Appendix C.

The time period of the model calibration was from 1995 to 1997. Validation was performed for the period 1998 to 2000. This time period was selected based on the availability and relevance of the observed data to the current conditions in the watershed. The period also includes various wet and dry conditions. The water quality calibration and validation results are shown in Appendix D.

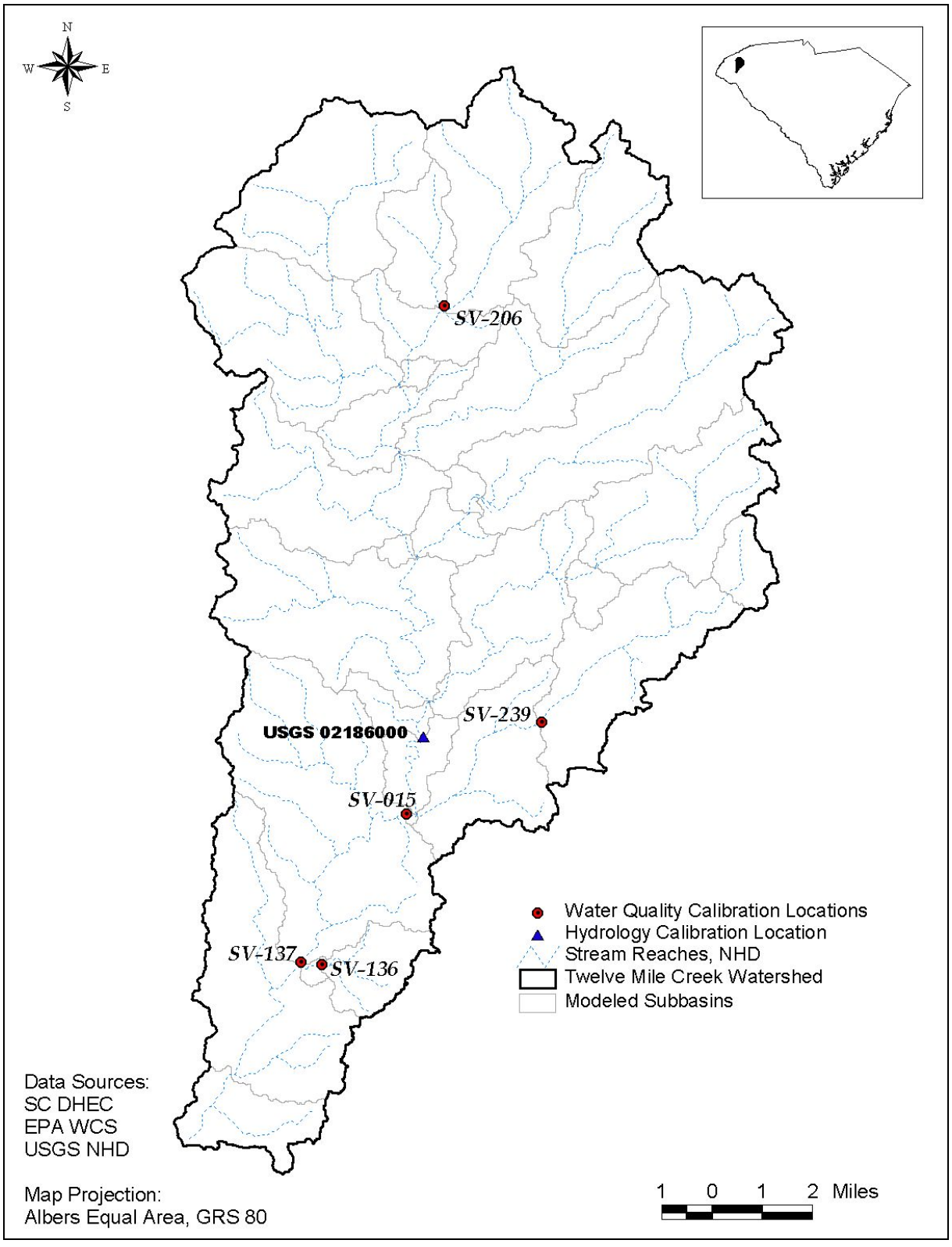


**Figure 4-2. Hydrology and water quality calibration locations**

# 5.0 MODELING RESULTS

## 5.1 Existing Conditions

An examination of the Twelve Mile Creek watershed indicates that the majority of the violations of the geometric mean standard occur in streams during low-flow conditions followed by a storm event. Storm events create high loading inputs from various land uses due to the accumulation of fecal coliform bacteria on the land surface. These high flow conditions, especially the high flows created by a storm after a long dry period, cause not only violations of the geometric mean standard, but also violations of the not to exceed criterion.

Existing conditions of each source are determined based on available information or simulated model results. Loadings from permitted facilities are calculated using their flow and fecal coliform bacteria concentration limits. Existing loading (Table 5-1 and Figure 5-1) from land, cattle in the streams, failing septic systems, and permitted facilities are simulated using the LSPC model during the critical condition determined based on the procedure described in Section 5.1. The loadings presented in Table 5-1 represent cumulative loadings from the contributions of upper watersheds at each impaired water quality station.

| Impaired Station | Loading from Land (counts/30days) | Loading from Cattle in the Stream (counts/30days) | Loading from Permitted Facilities (counts/30days) | Loading from Septics (counts/30days) |
|---|---|---|---|---|
| SV-137 | 2.72E+14 | 3.96E+12 | 5.46E+11 | 1.18E+12 |
| SV-15 | 2.44E+14 | 3.94E+12 | 5.21E+11 | 1.16E+12 |
| SV-206 | 9.87E+12 | 5.58E+10 | 0.00E+00 | 2.97E+10 |
| SV-136 | 1.10E+12 | 2.62E+11 | 3.41E+10 | 9.76E+10 |
| SV-239 | 1.03E+13 | 3.26E+10 | 2.45E+11 | 4.45E+10 |

**Table 5-1. 30-day existing loadings at impaired water quality stations from each different source**

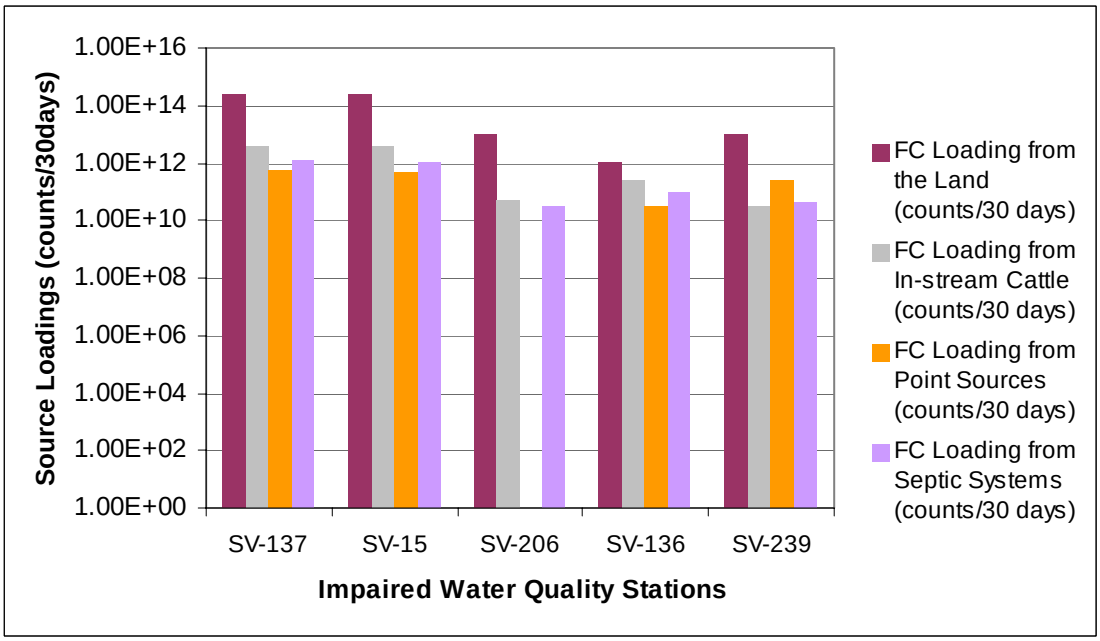


**Figure 5-1. Cumulative existing loading percentages at impaired water quality stations from different sources (loadings are based on counts/30days)**

# 6.0 TMDL

The TMDL process quantifies the amount of a pollutant that can be assimilated in a waterbody, identifies the sources of the pollutant, and recommends regulatory or other actions to be taken to achieve compliance with applicable water quality standards based on the relationship between pollution sources and in-stream water quality conditions. A TMDL can be expressed as the sum of all point source loads (Waste Load Allocations), non-point source loads (Load Allocations), and an appropriate margin of safety (MOS), which takes into account any uncertainty concerning the relationship between effluent limitations and water quality:

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

The objective of a TMDL is to allocate loads among all of the known pollutant sources throughout a watershed so that appropriate control measures can be implemented and water quality standards achieved. 40 CFR §130.2 (i) states that TMDLs can be expressed in terms of mass per time (e.g. pounds per day), toxicity, or other appropriate measure. TMDLs for the impaired waterbodies are expressed in terms of a percent reduction, and where possible, as counts per day. The TMDL value represents the maximum one-day load the stream can transport over a 30-day period and maintain the water quality criterion.

## 6.1 Critical Conditions

EPA regulations at 40 CFR 130.7(c)(1) require TMDLs to take into account critical conditions for stream flow, loading, and water quality parameters. The critical condition for

the Twelve Mile Creek watershed was selected based on the six year simulation of fecal coliform bacteria concentrations from 1995 to 2000. A summary of how critical conditions were determined at each impaired water quality station is described below:

1. The running geometric mean of simulated concentrations was calculated over the entire simulation period and compared to South Carolina's geometric mean criterion of 200 fecal coliform bacteria counts per 100ml.
2. Each violation of the criterion was compared to the corresponding 30-day geometric mean simulated flow value.
3. If the violation occurred during a flow event that was below the 10th percentile (low flows) or above the 90th percentile (high flow) the violation was ignored because these flows were considered to be extreme conditions (USEPA Region 4, personal communication 2002).
4. Of the remaining violations, the largest was then identified and used to develop the TMDL. This resulted in meeting the criteria at all times. The date on which this violation occurred was determined to be the critical date. The critical period was established so that it represented the 30-day period leading up to the critical date. For example, if the critical date for a sub-basin was identified as January 30, the critical period for that sub-basin would be January 1 through January 30.

The critical period determined for each impaired station was applied to all unimpaired upstream watersheds contributing loads to that impaired station.

## 6.2 TMDL Methodology and Endpoints

TMDLs and source allocations were developed for impaired tributaries and the main stem in the Twelve Mile Creek watershed based on the 30-day geometric mean and instantaneous fecal coliform bacteria criteria. A top-down methodology was used to develop these TMDLs and allocate loads to sources. Impaired headwaters were analyzed first, because their impact frequently had a profound effect on down-stream water quality. Loading contributions were reduced from applicable sources for these waterbodies and TMDLs were developed.

TMDL endpoints represent the in-stream water quality targets used in quantifying TMDLs and their individual components. South Carolina's numeric water quality criteria for fecal coliform bacteria (identified in Section 1.3), including an explicit and implicit MOS, were used to identify endpoints for TMDL development. The endpoint was selected as the geometric mean of 190 counts/100ml (based on the 200 counts/100ml geometric mean criterion minus a 5 percent MOS) and the instantaneous endpoint of 380 counts/100ml (based on the 400 counts/100ml criterion minus a 5 percent MOS). The instantaneous criterion allows for 10 percent exceedence. The MOS is explained in greater detail in Section 6.5.

Reductions were determined through a comparison of model results to the geometric mean criteria during the geometric mean critical period. For the Twelve Mile Creek watershed, model results predicted that reductions are necessary to meet the geometric mean criteria for all impaired stations with the exception of SV-206. The instantaneous portion of the WQS was also evaluated because South Carolina water quality standards require that both the

geometric mean and instantaneous criteria be met. The instantaneous criteria was evaluated through development of load-duration curves, and this analysis is further identified in Appendix E. The instantaneous analysis identified that reductions are necessary at all impaired stations. Results of this analysis are presented in Appendix E and are used as the basis for the TMDL.

## 6.3 Wasteload Allocations

Table 6-1 shows the permitted NPDES facilities with their allocated loadings. Since these facilities were assumed to be discharging at their permitted limits, it was assumed that they are not contributing to the fecal coliform impairment at the each stations, and therefore, were not considered to be major contributing sources. This assumption was derived from DMR data provided from South Carolina (Refer to Table 3-2 and Appendix A).

**Table 6-1. Waste load allocations (WLAs) for each NPDES permitted facility**

| NPDES Permit | Facility Name | Pipe | Concentration (counts/100ml) | Permitted Flow (MGD) | Load (counts/day) |
|---|---|---|---|---|---|
| SC0000132 | AMERICAN HOUSE SPINNING* | 1 | 200 | 0.044 | 3.33E+08 |
| SC0000302 | BASF CORP/FIBERS DIV/CLEMSON* | 1 | 200 | 0.092 | 6.93E+08 |
| SC0000370 | ALICE MFG/FOSTER & ELLJEAN PLT* | 1 | 200 | 0.043 | 3.21E+08 |
| SC0000434 | SPANGLER'S GROCERY* | 1 | 200 | 0.006 | 5.13E+07 |
| SC0020010 | CLEMSON WWTF | 1 | 200 | 0.735 | 8.70E+09 |
| SC0022012 | PICKENS CO/CATEECHEE VILLAGE | 1 | 200 | 0.013 | 1.51E+08 |
| SC0023035 | EASLEY/GOLDEN CREEK LAGOON | 1 | 200 | 0.217 | 4.40E+09 |
| SC0023141 | ISAQUEENA MOBILE HOME PARK | 1 | 200 | 0.010 | 1.82E+08 |
| SC0024996 | PICKENS CO PSC/CENTRAL-NORTH | 1 | 200 | 0.070 | 1.14E+09 |
| SC0026166 | PICKENS CO-LIBERTY/CRAMER | 1 | 200 | 0.065 | 1.19E+09 |
| SC0026191 | PICKENS CO-LIBERTY/ROPER | 1 | 200 | 0.148 | 3.80E+09 |
| SC0027049 | MASSINGILL TRAILER COURT | 1 | 200 | 0.001 | 1.82E+07 |
| SC0028762 | R C EDWARDS JR HIGH SCHOOL | 1 | 200 | 0.008 | 1.36E+08 |
| SC0038652 | DANIEL HIGH SCHOOL/PICKENS CO | 1 | 200 | 0.010 | 1.51E+08 |
| SC0047716 | PICKENS/12 MILE RV & WOLF CRK | 1 | 200 | 0.313 | 7.20E+09 |
| SC0047899 | PICKENS COUNTY STOCKADE | 1 | 200 | 0.008 | 4.53E+08 |

*Permit is “Measure and Report”. The number provided is a representative flow based on DMR data

Twelve Mile Creek watershed has four MS4s which were assigned the same percent reductions as the other nonpoint sources in the watershed of the impaired station. The reductions are given in Table 6-2.

Each of the MS4s was determined to have different reductions for each of the impaired locations. Therefore all MS4 WLAs and LAs for each impaired location with a MS4 will be given the same reduction of 64 %. This reduction percentage is largest reduction required of any MS4 or impaired waterbody station. These WLAs and LAs are conservative and protective of the water quality without being onerous to those required to implement the reduction.

**Table 6-2. Waste load allocations (WLAs) for each MS4 Entity.**

| MS4 Entity | Impaired Stations Affected | WLA (Pecent Reduction) |
|---|---|---|
| Easley, City of | SV-015, SV-137, SV-239 | 64 |
| Liberty, City of | SV-015, SV-137 | 64 |
| Pickens, City of | SV-015, SV-137 | 64 |
| Pickens, County of | SV-015, SV-137, SV-239 | 64 |

## 6.4 Load Allocations

There are two modes of transport for non-point source fecal coliform bacteria loading into the stream. First, loading from failing septic systems and animals in the stream are considered direct sources to the stream, as they are independent of precipitation. The second mode involves loading resulting from fecal coliform accumulation on land surfaces and is transported to the stream during storm events.

The positioning of the water quality data values on the load duration curve provide an indication of the mode of transport occurring during periods of violations. For streams in the Twelve Mile Creek watershed, violations are distributed along both sides of the curve, indicating violations occur during both dry and wet weather events. The LA components for stations SV-136 and SV-206 are represented in Table 6-3 are calculated as the difference between the TMDL and the WLA components. The LAs for the stations with MS4 are expressed as percent reductions.

## 6.5 Margin of Safety

There are two methods for incorporating an MOS in the analysis: a) implicitly incorporate the MOS using conservative model assumptions to develop allocations; or b) explicitly specify a portion of the TMDL as the MOS and use the remainder for allocations. In these TMDLs, both and explicit and implicit MOS were used. For the explicit margin of safety, the water quality target was set at 380 counts per 100ml for the instantaneous criterion, which is five percent lower than the water quality criteria of 400 counts per 100ml. The implicit MOS is based on using instream concentrations to estimate loads. The actual load that can be applied to the land and transported to the stream during a precipitation event would be greater as the instream concentration incorporate decay. Additionally, the use of a multiple year simulation period enabled the consideration of multiple hydrologic conditions; the TMDL was ultimately based on the most stringent. Conservative assumptions were employed in developing the TMDL. Permitted facilities were represented in the model using maximum permitted quantities. All cattle were assumed to have access to streams.

## 6.6 Seasonal Variability

Fecal coliform bacteria data in the Twelve Mile Creek watershed show that increased fecal coliform bacteria concentrations occur during both wet and dry weather periods. High concentrations are seen during high flows as well as during low summer flows. To

adequately address the wet and dry weather related problems, a long-term simulation period covering a variety of hydrologic and rainfall conditions must be evaluated. By using continuous flow simulation (estimating flow over a period of several years), seasonal hydrologic and source loading was inherently considered.

## 6.7 TMDL Results

The load duration curve methodology can be used to illustrate that water quality standards can be achieved under a range of flow conditions. To assign the TMDLs one value, representing the maximum daily load the stream can assimilate and maintain water quality standards, the target load corresponding to the median percentile of the data violations is chosen for the TMDLs. The target load is based on the maximum one-day concentration of 380 counts/100mL including the 5 percent of MOS.

The TMDLs are expressed in units of counts per day. The WLA component represents the maximum one-day load that can occur in any 30-day period. The WLA is based on the NPDES facilities' maximum design flow and the permitted one-day maximum concentration. The target load is reduced by the WLA, if any, to obtain the LA component. The TMDLs are presented in Table 6-3 for the instantaneous criteria. They are presented for each impaired water quality monitoring station, starting with the downstream stations and working upstream.

The percent reduction required to achieve the numerical criterion is also provided with the TMDL, and represents the average reduction over the range of flows measured, or estimated, in the impaired stream. The percent reduction is the average of the differences between the trend line through the existing data and the target load at each recurrence interval.

**Table 6-3. TMDL Components for the Twelve Mile Creek watershed**

| Impaired Water Quality Station | WLAs (counts/day) | MS4 WLAs (% Reduction) | LAs (counts/day or % Reduction) | MOS** (counts/day) | TMDL*** (counts/day or % Reduction) | Percent Reduction |
|---|---|---|---|---|---|---|
| SV-137 | 1.82E+10 | 64 | 64 | Explicit & Implicit | 64 | 64 |
| SV-136 | 1.14E+09 | NA | 1.08E+12 | Explicit & Implicit | 1.08E+12 | 56 |
| SV-015 | 1.74E+10 | 64 | 64 | Explicit & Implicit | 64 | 64 |
| SV-239 | 8.17E+09 | 64 | 64 | Explicit & Implicit | 64 | 64 |
| SV-206 | 0.00E+00 | NA | 4.84E+11 | Explicit & Implicit | 4.84E+11 | 39 |

* Each loading unit is counts/ day, reflecting the instantaneous criteria.
** Margin of safety (MOS) equivalent to 5 percent of the target concentration. Also refer to section 6.5
*** TMDL – WLA = LA

# 7.0 IMPLEMENTATION

South Carolina has several tools available to reduce loading of fecal coliform bacteria due to agricultural activities as discussed in the *Implementation Plan for Achieving Total Maximum Daily Load Reductions From Nonpoint Sources* for the State of South Carolina. Specifically, SCDHEC's animal agriculture permitting program addresses animal operations and land application of animal wastes. In addition, SCDHEC will work with existing agencies in the area to provide nonpoint source education in the Twelve Mile Creek Watershed. Local sources of nonpoint source education include Clemson Extension Service, the Natural Resource Conservation Service (NRCS) 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. Fencing cattle out of streams and restoring an adequate stream buffer have been shown to reduce pollution entering streams. NRCS can provide cost share money to land owners installing BMPs. SCDHEC employs a nonpoint source educator who can also provide BMP information.

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 bacteria loading to Cane Creek and its tributuaries.

SCDHEC will work with other Federal, State and Local agencies in the region to provide nonpoint source education in the Twelve Mile Creek watershed to reduce pollution from built-up areas. Also, 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. In built-up areas, failing septic systems should be repaired or replaced. Also, maintenance of sanitary sewers and prevention of sewer overflows (from blockages) should be emphasized.

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. This TMDL may be revised if additional monitoring data and better modeling tools become available.

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# 8.0 REFERENCES

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# Appendix A
# DMR Data

## Table A-1. DMR data for NPDES permit SC0000132, American House Spinning

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0000132 | 1 | 1/31/1994 | 0.0165 | < 10 | |
| SC0000132 | 1 | 3/31/1994 | 0.017 | < 10 | |
| SC0000132 | 1 | 4/30/1994 | 0.023 | < 10 | |
| SC0000132 | 1 | 5/31/1994 | 0.037 | < 10 | |
| SC0000132 | 1 | 6/30/1994 | 0.057 | 9 | |
| SC0000132 | 1 | 7/31/1994 | 0.044 | 81 | |
| SC0000132 | 1 | 8/31/1994 | 0.0408 | < 10 | |
| SC0000132 | 1 | 9/30/1994 | 0.0401 | 10 | |
| SC0000132 | 1 | 10/31/1994 | 0.0373 | 10 | |
| SC0000132 | 1 | 11/30/1994 | 0.021 | 10 | |
| SC0000132 | 1 | 12/31/1994 | 0.058 | 10 | |
| SC0000132 | 1 | 1/31/1995 | 0.042 | < 10 | |
| SC0000132 | 1 | 2/28/1995 | 0.034 | < 10 | |
| SC0000132 | 1 | 3/31/1995 | 0.022 | 9 | |
| SC0000132 | 1 | 4/30/1995 | 0.041 | < 10 | |
| SC0000132 | 1 | 5/31/1995 | 0.103 | < 45 | |
| SC0000132 | 1 | 6/30/1995 | 0.053 | < 10 | |
| SC0000132 | 1 | 7/31/1995 | 0.043 | 10 | |
| SC0000132 | 1 | 8/31/1995 | 0.046 | < 10 | |
| SC0000132 | 1 | 9/30/1995 | 0.05 | < 10 | |
| SC0000132 | 1 | 10/31/1995 | 0.035 | < 10 | |
| SC0000132 | 1 | 11/30/1995 | 0.0192 | < 10 | |
| SC0000132 | 1 | 12/31/1995 | 0.018 | < 10 | |
| SC0000132 | 1 | 1/31/1996 | 0.0176 | < 10 | |
| SC0000132 | 1 | 2/29/1996 | 0.023 | < 10 | |
| SC0000132 | 1 | 3/31/1996 | 0.025 | 9 | |
| SC0000132 | 1 | 4/30/1996 | 0.063 | < 10 | |
| SC0000132 | 1 | 5/31/1996 | 0.046 | < 10 | |
| SC0000132 | 1 | 6/30/1996 | 0.041 | < 10 | |
| SC0000132 | 1 | 7/31/1996 | 0.051 | < 10 | |
| SC0000132 | 1 | 8/31/1996 | 0.046 | < 10 | |
| SC0000132 | 1 | 9/30/1996 | 0.043 | < 10 | |
| SC0000132 | 1 | 10/31/1996 | 0.04 | < 10 | |
| SC0000132 | 1 | 11/30/1996 | 0.027 | < 10 | |
| SC0000132 | 1 | 12/31/1996 | 0.015 | < 10 | |
| SC0000132 | 1 | 1/31/1997 | 0.032 | < 10 | |
| SC0023035 | 1 | 1/31/2000 | 0.1803 | 6 | |
| SC0023035 | 1 | 2/29/2000 | 0.18 | 3.1 | |
| SC0023035 | 1 | 3/31/2000 | 0.22 | 4.9 | |
| SC0023035 | 1 | 4/30/2000 | 0.23 | 32 | |
| SC0023035 | 1 | 5/31/2000 | 0.18 | 33 | |
| SC0023035 | 1 | 6/30/2000 | 0.1868 | 114 | |
| SC0023035 | 1 | 7/31/2000 | 0.2158 | 40 | |
| SC0023035 | 1 | 8/31/2000 | 0.2079 | 6.8 | |
| SC0023035 | 1 | 9/30/2000 | 0.2241 | 2 | |
| SC0023035 | 1 | 10/31/2000 | 0.2108 | 4.5 | |
| SC0023035 | 1 | 11/30/2000 | 0.2659 | 3 | |
| SC0023035 | 1 | 12/31/2000 | 0.2301 | 9.8 | |
| SC0023141 | 1 | 3/31/1994 | 0.016 | 180 | |
| SC0023141 | 1 | 4/30/1994 | 0.017 | 9 | |
| SC0023141 | 1 | 6/30/1994 | 0.014 | 195 | |
| SC0023141 | 1 | 7/31/1994 | 0.018 | < 10 | |
| SC0023141 | 1 | 8/31/1994 | 0.015 | 57 | |
| SC0023141 | 1 | 9/30/1994 | 0.017 | < 10 | |
| SC0023141 | 1 | 11/30/1994 | 0.016 | 27 | |
| SC0023141 | 1 | 12/31/1994 | 0.018 | 76 | |
| SC0023141 | 1 | 1/31/1995 | 0.02 | 28 | |
| SC0023141 | 1 | 2/28/1995 | 0.02 | < 10 | |
| SC0023141 | 1 | 4/30/1997 | 0.0088 | < 10 | |
| SC0023141 | 1 | 5/31/1997 | 0.0088 | < 10 | |
| SC0023141 | 1 | 6/30/1997 | 0.0088 | < 10 | |
| SC0023141 | 1 | 7/31/1997 | 0.0088 | < 10 | |
| SC0023141 | 1 | 8/31/1997 | 0.0088 | 18 | |
| SC0023141 | 1 | 9/30/1997 | 0.0088 | < 10 | |
| SC0023141 | 1 | 10/31/1997 | 0.0088 | < 10 | |
| SC0023141 | 1 | 11/30/1997 | 0.0088 | < 10 | |
| SC0023141 | 1 | 12/31/1997 | 0.0088 | < 10 | |
| SC0023141 | 1 | 1/31/1998 | 0.0088 | < 10 | |
| SC0023141 | 1 | 2/28/1998 | 0.0088 | < 10 | |
| SC0023141 | 1 | 3/31/1998 | 0.0088 | < 10 | |
| SC0023141 | 1 | 4/30/1998 | 0.0088 | < 10 | |
| SC0023141 | 1 | 5/31/1998 | 0.0088 | < 10 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0000132 | 1 | 2/28/1997 | 0.03 | < 10 | |
| SC0000132 | 1 | 3/31/1997 | 0.027 | < 10 | |
| SC0000132 | 1 | 4/30/1997 | 0.041 | < 10 | |
| SC0000132 | 1 | 5/31/1997 | 0.038 | < 10 | |
| SC0000132 | 1 | 6/30/1997 | 0.059 | < 10 | |
| SC0000132 | 1 | 7/31/1997 | 0.054 | 16.4 | |
| SC0000132 | 1 | 8/31/1997 | 0.068 | < 10 | |
| SC0000132 | 1 | 10/31/1997 | 0.055 | < 10 | |
| SC0000132 | 1 | 11/30/1997 | 0.053 | < 10 | |
| SC0000132 | 1 | 12/31/1997 | 0.044 | < 10 | |
| SC0000132 | 1 | 1/31/1998 | 0.05 | 126 | |
| SC0000132 | 1 | 2/28/1998 | 0.07 | < 10 | |
| SC0000132 | 1 | 3/31/1998 | 0.055 | 108 | |
| SC0000132 | 1 | 4/30/1998 | 0.079 | < 10 | |
| SC0000132 | 1 | 5/31/1998 | 0.056 | < 10 | |
| SC0000132 | 1 | 6/30/1998 | 0.068 | 36 | |
| SC0000132 | 1 | 7/31/1998 | 0.063 | < 10 | |
| SC0000132 | 1 | 8/31/1998 | 0.067 | < 10 | |
| SC0000132 | 1 | 9/30/1998 | 0.062 | < 10 | |
| SC0000132 | 1 | 10/31/1998 | 0.045 | < 10 | |
| SC0000132 | 1 | 11/30/1998 | 0.043 | < 10 | |
| SC0000132 | 1 | 12/31/1998 | 0.033 | < 105 | |
| SC0000132 | 1 | 1/31/1999 | 0.047 | < 10 | |
| SC0000132 | 1 | 2/28/1999 | 0.034 | < 10 | |
| SC0000132 | 1 | 3/31/1999 | 0.033 | < 10 | |
| SC0000132 | 1 | 4/30/1999 | 0.059 | < 10 | |
| SC0000132 | 1 | 5/31/1999 | 0.054 | < 10 | |
| SC0000132 | 1 | 6/30/1999 | 0.053 | < 107.3 | |
| SC0000132 | 1 | 7/31/1999 | 0.055 | 281 | - |
| SC0000132 | 1 | 8/31/1999 | 0.076 | < 10 | |
| SC0000132 | 1 | 9/30/1999 | 0.073 | < 10 | |
| SC0000132 | 1 | 10/31/1999 | 0.055 | < 10 | |
| SC0000132 | 1 | 11/30/1999 | 0.049 | < 10 | |
| SC0000132 | 1 | 12/31/1999 | 0.041 | < 10 | |
| SC0000132 | 1 | 1/31/2000 | 0.066 | < 10 | |
| SC0000132 | 1 | 2/29/2000 | 0.0086 | < 10 | |
| SC0000132 | 1 | 4/30/2000 | 0.041 | < 10 | |
| SC0023141 | 1 | 6/30/1998 | 0.0088 | < 10 | |
| SC0023141 | 1 | 7/31/1998 | 0.0088 | < 10 | |
| SC0023141 | 1 | 8/31/1998 | 0.0013 | 18 | |
| SC0023141 | 1 | 9/30/1998 | 0.003 | < 10 | |
| SC0023141 | 1 | 10/31/1998 | 0.0058 | < 10 | |
| SC0023141 | 1 | 11/30/1998 | 0.0022 | < 10 | |
| SC0023141 | 1 | 12/31/1998 | 0.002 | < 10 | |
| SC0023141 | 1 | 1/31/1999 | 0.0073 | < 10 | |
| SC0023141 | 1 | 2/28/1999 | 0.0105 | < 10 | |
| SC0023141 | 1 | 3/31/1999 | 0.0038 | < 10 | |
| SC0023141 | 1 | 4/30/1999 | 0.0022 | < 10 | |
| SC0023141 | 1 | 5/31/1999 | 0.0013 | < 10 | |
| SC0023141 | 1 | 6/30/1999 | 0.0105 | < 10 | |
| SC0023141 | 1 | 7/31/1999 | 0.0105 | < 10 | |
| SC0023141 | 1 | 8/31/1999 | 0.0135 | < 10 | |
| SC0023141 | 1 | 9/30/1999 | 0.006 | < 10 | |
| SC0023141 | 1 | 10/31/1999 | 0.014 | < 10 | |
| SC0023141 | 1 | 11/30/1999 | 0.0053 | < 10 | |
| SC0023141 | 1 | 12/31/1999 | 0.0018 | < 10 | |
| SC0023141 | 1 | 1/31/2000 | 0.0053 | < 10 | |
| SC0023141 | 1 | 2/29/2000 | 0.0018 | < 10 | |
| SC0023141 | 1 | 3/31/2000 | 0.0073 | < 10 | |
| SC0023141 | 1 | 4/30/2000 | 0.0135 | < 10 | |
| SC0023141 | 1 | 5/31/2000 | 0.0209 | < 10 | |
| SC0023141 | 1 | 6/30/2000 | 0.0135 | < 10 | |
| SC0023141 | 1 | 7/31/2000 | 0.0073 | < 10 | |
| SC0023141 | 1 | 8/31/2000 | 0.0073 | 54 | |
| SC0023141 | 1 | 9/30/2000 | 0.0105 | < 10 | |
| SC0023141 | 1 | 10/31/2000 | 0.0022 | 10 | |
| SC0023141 | 1 | 11/30/2000 | 0.0073 | < 10 | |
| SC0023141 | 1 | 12/31/2000 | 0.0073 | < 1 | |
| SC0024996 | 1 | 1/31/1990 | 0.109 | 20 | |
| SC0024996 | 1 | 2/28/1990 | 0.101 | < 10 | |
| SC0024996 | 1 | 3/31/1990 | 0.09 | 73 | |
| SC0024996 | 1 | 4/30/1990 | 0.073 | 173 | |
| SC0024996 | 1 | 5/31/1990 | 0.075 | 12.2 | |
| SC0024996 | 1 | 6/30/1990 | 0.065 | 25 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0000132 | 1 | 5/31/2000 | 0.045 | < 10 | |
| SC0000132 | 1 | 6/30/2000 | 0.055 | < 10 | |
| SC0000132 | 1 | 7/31/2000 | 0.044 | < 10 | |
| SC0000132 | 1 | 8/31/2000 | 0.052 | < 10 | |
| SC0000132 | 1 | 9/30/2000 | 0.0497 | < 10 | |
| SC0000132 | 1 | 10/31/2000 | 0.044 | < 10 | |
| SC0000132 | 1 | 11/30/2000 | 0.0647 | < 10 | |
| SC0000132 | 1 | 12/31/2000 | 0.071 | < 10 | |
| SC0000302 | 1 | 1/31/1990 | 0.0464 | 194 | |
| SC0000302 | 1 | 2/28/1990 | 0.0461 | 11.2 | |
| SC0000302 | 1 | 3/31/1990 | 0.0362 | 80 | |
| SC0000302 | 1 | 4/30/1990 | 0.0289 | 8 | |
| SC0000302 | 1 | 5/31/1990 | 0.039 | 3 | |
| SC0000302 | 1 | 6/30/1990 | 0.0412 | 4 | |
| SC0000302 | 1 | 7/31/1990 | 0.0431 | < 1 | |
| SC0000302 | 1 | 8/31/1990 | 0.0513 | 1 | |
| SC0000302 | 1 | 9/30/1990 | 0.0598 | 2 | |
| SC0000302 | 1 | 10/31/1990 | 0.0497 | < 1 | |
| SC0000302 | 1 | 11/30/1990 | 0.0387 | 2 | |
| SC0000302 | 1 | 12/31/1990 | 0.0381 | 57 | |
| SC0000302 | 1 | 1/31/1991 | 0.044 | 423 | x |
| SC0000302 | 1 | 2/28/1991 | 0.047 | 13 | |
| SC0000302 | 1 | 3/31/1991 | 0.0569 | 9.4 | |
| SC0000302 | 1 | 4/30/1991 | 0.0493 | 3 | |
| SC0000302 | 1 | 5/31/1991 | 0.0562 | 3 | |
| SC0000302 | 1 | 6/30/1991 | 0.0572 | 2 | |
| SC0000302 | 1 | 7/31/1991 | 0.0584 | 3 | |
| SC0000302 | 1 | 8/31/1991 | 0.0788 | 4 | |
| SC0000302 | 1 | 9/30/1991 | 0.0775 | 10 | |
| SC0000302 | 1 | 10/31/1991 | 0.0599 | 4 | |
| SC0000302 | 1 | 11/30/1991 | 0.0564 | 34 | |
| SC0000302 | 1 | 12/31/1991 | 0.0547 | 19 | |
| SC0000302 | 1 | 2/29/1992 | 0.0577 | 27 | |
| SC0000302 | 1 | 3/31/1992 | 0.0608 | 5 | |
| SC0000302 | 1 | 4/30/1992 | 0.0495 | < 1 | |
| SC0000302 | 1 | 5/31/1992 | 0.0633 | 1 | |
| SC0000302 | 1 | 6/30/1992 | 0.0643 | 4 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0024996 | 1 | 7/31/1990 | 0.068 | 20 | |
| SC0024996 | 1 | 8/31/1990 | 0.068 | 270 | - |
| SC0024996 | 1 | 9/30/1990 | 0.078 | 44.7 | |
| SC0024996 | 1 | 10/31/1990 | 0.083 | 178 | |
| SC0024996 | 1 | 11/30/1990 | 0.041 | 151 | |
| SC0024996 | 1 | 12/31/1990 | 0.042 | 100 | |
| SC0024996 | 1 | 1/31/1991 | 0.075 | 25 | |
| SC0024996 | 1 | 2/28/1991 | 0.046 | 79 | |
| SC0024996 | 1 | 3/31/1991 | 0.059 | 159 | |
| SC0024996 | 1 | 4/30/1991 | 0.052 | 28 | |
| SC0024996 | 1 | 5/31/1991 | 0.056 | 96 | |
| SC0024996 | 1 | 6/30/1991 | 0.053 | 79 | |
| SC0024996 | 1 | 7/31/1991 | 0.049 | 104 | |
| SC0024996 | 1 | 8/31/1991 | 0.06 | 125 | |
| SC0024996 | 1 | 9/30/1991 | 0.044 | 174 | |
| SC0024996 | 1 | 10/31/1991 | 0.039 | 50 | |
| SC0024996 | 1 | 2/29/1992 | 0.054 | 56 | |
| SC0024996 | 1 | 3/31/1992 | 0.064 | 32 | |
| SC0024996 | 1 | 4/30/1992 | 0.061 | 100 | |
| SC0024996 | 1 | 5/31/1992 | 0.07 | 39.8 | |
| SC0024996 | 1 | 6/30/1992 | 0.068 | 40 | |
| SC0024996 | 1 | 7/31/1992 | 0.068 | 145 | |
| SC0024996 | 1 | 8/31/1992 | 0.072 | 141 | |
| SC0024996 | 1 | 9/30/1992 | 0.089 | 129 | |
| SC0024996 | 1 | 10/31/1992 | 0.069 | 200 | - |
| SC0024996 | 1 | 11/30/1992 | 0.096 | 100 | |
| SC0024996 | 1 | 12/31/1992 | 0.073 | 50 | |
| SC0024996 | 1 | 1/31/1993 | 0.146 | 40 | |
| SC0024996 | 1 | 2/28/1993 | 0.121 | 10 | |
| SC0024996 | 1 | 3/31/1993 | 0.138 | 158 | |
| SC0024996 | 1 | 4/30/1993 | 0.122 | 50 | |
| SC0024996 | 1 | 5/31/1993 | 0.13 | 281 | - |
| SC0024996 | 1 | 6/30/1993 | 0.08 | 35 | |
| SC0024996 | 1 | 7/31/1993 | 0.785 | 8.5 | |
| SC0024996 | 1 | 8/31/1993 | 0.042 | 141 | |
| SC0024996 | 1 | 9/30/1993 | 0.094 | 60 | |
| SC0024996 | 1 | 10/31/1993 | 0.075 | 25 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0000302 | 1 | 7/31/1992 | 0.0797 | 3 | |
| SC0000302 | 1 | 8/31/1992 | 0.0768 | 1 | |
| SC0000302 | 1 | 9/30/1992 | 0.0599 | 1 | |
| SC0000302 | 1 | 10/31/1992 | 0.064 | 1 | |
| SC0000302 | 1 | 11/30/1992 | 0.0684 | 1 | |
| SC0000302 | 1 | 12/31/1992 | 0.0649 | 3 | |
| SC0000302 | 1 | 1/31/1993 | 0.0659 | 3 | |
| SC0000302 | 1 | 2/28/1993 | 0.0554 | 2 | |
| SC0000302 | 1 | 3/31/1993 | 0.0666 | 3 | |
| SC0000302 | 1 | 4/30/1993 | 0.0604 | 6 | |
| SC0000302 | 1 | 5/31/1993 | 0.0588 | 7 | |
| SC0000302 | 1 | 6/30/1993 | 0.0681 | 1 | |
| SC0000302 | 1 | 7/31/1993 | 0.0801 | 1 | |
| SC0000302 | 1 | 8/31/1993 | 0.079 | 1 | |
| SC0000302 | 1 | 9/30/1993 | 0.0764 | 1 | |
| SC0000302 | 1 | 10/31/1993 | 0.06331 | 2 | |
| SC0000302 | 1 | 11/30/1993 | 0.062 | 1 | |
| SC0000302 | 1 | 12/31/1993 | 0.0611 | 5 | |
| SC0000302 | 1 | 1/31/1994 | 0.0517 | 15 | |
| SC0000302 | 1 | 2/28/1994 | 0.0632 | 7 | |
| SC0000302 | 1 | 3/31/1994 | 0.0718 | 1 | |
| SC0000302 | 1 | 4/30/1994 | 0.0775 | 1 | |
| SC0000302 | 1 | 5/31/1994 | 0.0714 | 1 | |
| SC0000302 | 1 | 6/30/1994 | 0.0972 | 3 | |
| SC0000302 | 1 | 7/31/1994 | 0.1205 | 1 | |
| SC0000302 | 1 | 8/31/1994 | 0.1117 | 1 | |
| SC0000302 | 1 | 9/30/1994 | 0.1147 | 1 | |
| SC0000302 | 1 | 10/31/1994 | 0.1098 | 1 | |
| SC0000302 | 1 | 11/30/1994 | 0.08396 | 4 | |
| SC0000302 | 1 | 12/31/1994 | 0.0923 | 1 | |
| SC0000302 | 1 | 1/31/1995 | 0.0786 | 2 | |
| SC0000302 | 1 | 2/28/1995 | 0.068 | 1 | |
| SC0000302 | 1 | 3/31/1995 | 0.0676 | 1 | |
| SC0000302 | 1 | 4/30/1995 | 0.0692 | 1 | |
| SC0000302 | 1 | 5/31/1995 | 0.0757 | < 1 | |
| SC0000302 | 1 | 7/31/1996 | 0.0974 | 5 | |
| SC0000302 | 1 | 8/31/1996 | 0.0888 | 7 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0024996 | 1 | 11/30/1993 | 0.077 | 79 | |
| SC0024996 | 1 | 12/31/1993 | 0.077 | 49 | |
| SC0024996 | 1 | 1/31/1994 | 0.078 | 14 | |
| SC0024996 | 1 | 2/28/1994 | 0.066 | 230 | - |
| SC0024996 | 1 | 3/31/1994 | 0.083 | 79 | |
| SC0024996 | 1 | 4/30/1994 | 0.043 | 205 | - |
| SC0024996 | 1 | 5/31/1994 | 0.079 | 46 | |
| SC0024996 | 1 | 6/30/1994 | 0.062 | 10 | |
| SC0024996 | 1 | 7/31/1994 | 0.071 | 178 | |
| SC0024996 | 1 | 8/31/1994 | 0.08 | 1023 | x |
| SC0024996 | 1 | 8/31/1994 | 0.08 | 1023 | x |
| SC0024996 | 1 | 8/31/1994 | 0.08 | 1023 | x |
| SC0024996 | 1 | 8/31/1994 | 0.08 | 1023 | x |
| SC0024996 | 1 | 9/30/1994 | 0.044 | 126 | |
| SC0024996 | 1 | 9/30/1994 | 0.044 | 126 | |
| SC0024996 | 1 | 9/30/1994 | 0.044 | 126 | |
| SC0024996 | 1 | 9/30/1994 | 0.044 | 126 | |
| SC0024996 | 1 | 10/31/1994 | 0.043 | 79 | |
| SC0024996 | 1 | 10/31/1994 | 0.043 | 79 | |
| SC0024996 | 1 | 10/31/1994 | 0.043 | 79 | |
| SC0024996 | 1 | 10/31/1994 | 0.043 | 79 | |
| SC0024996 | 1 | 11/30/1994 | 0.036 | 85 | |
| SC0024996 | 1 | 12/31/1994 | 0.05 | 99 | |
| SC0024996 | 1 | 1/31/1995 | 0.069 | 10 | |
| SC0024996 | 1 | 2/28/1995 | 0.068 | 10 | |
| SC0024996 | 1 | 3/31/1995 | 0.054 | 142 | |
| SC0024996 | 1 | 4/30/1995 | 0.043 | 16 | |
| SC0024996 | 1 | 5/31/1995 | 0.046 | 48 | |
| SC0024996 | 1 | 6/30/1995 | 0.052 | 61 | |
| SC0024996 | 1 | 7/31/1995 | 0.059 | 10 | |
| SC0024996 | 1 | 8/31/1995 | 0.09 | 54 | |
| SC0024996 | 1 | 9/30/1995 | 0.049 | 9 | |
| SC0024996 | 1 | 10/31/1995 | 0.061 | 18 | |
| SC0024996 | 1 | 11/30/1995 | 0.08 | 9 | |
| SC0024996 | 1 | 12/31/1995 | 0.036 | 10 | |
| SC0024996 | 1 | 1/31/1996 | 0.077 | 10 | |
| SC0024996 | 1 | 2/29/1996 | 0.079 | 13 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0000302 | 1 | 9/30/1996 | 0.088 | 2 | |
| SC0000302 | 1 | 10/31/1996 | 0.0815 | 3 | |
| SC0000302 | 1 | 11/30/1996 | 0.0884 | 1 | |
| SC0000302 | 1 | 12/31/1996 | 0.0761 | 1 | |
| SC0000302 | 1 | 1/31/1997 | 0.072 | 1 | |
| SC0000302 | 1 | 2/28/1997 | 0.0757 | 3 | |
| SC0000302 | 1 | 3/31/1997 | 0.09 | 1 | |
| SC0000302 | 1 | 4/30/1997 | 0.0716 | 2 | |
| SC0000302 | 1 | 5/31/1997 | 0.085 | 1 | |
| SC0000302 | 1 | 6/30/1997 | 0.1229 | 1 | |
| SC0000302 | 1 | 7/31/1997 | 0.1306 | 1 | |
| SC0000302 | 1 | 8/31/1997 | 0.1204 | 1 | |
| SC0000302 | 1 | 9/30/1997 | 0.1105 | 1 | |
| SC0000302 | 1 | 10/31/1997 | 0.1009 | 1 | |
| SC0000302 | 1 | 11/30/1997 | 0.0886 | 1 | |
| SC0000302 | 1 | 12/31/1997 | 0.0884 | 1 | |
| SC0000302 | 1 | 1/31/1998 | 0.1024 | 1 | |
| SC0000302 | 1 | 2/28/1998 | 0.9613 | 1 | |
| SC0000302 | 1 | 3/31/1998 | 0.0951 | 1 | |
| SC0000302 | 1 | 4/30/1998 | 0.106 | 3 | |
| SC0000302 | 1 | 5/31/1998 | 0.1273 | 1 | |
| SC0000302 | 1 | 6/30/1998 | 0.1339 | 1 | |
| SC0000302 | 1 | 7/31/1998 | 0.1436 | 1 | |
| SC0000302 | 1 | 8/31/1998 | 0.1429 | 1 | |
| SC0000302 | 1 | 9/30/1998 | 0.1474 | 2 | |
| SC0000302 | 1 | 10/31/1998 | 0.1286 | 1 | |
| SC0000302 | 1 | 11/30/1998 | 0.1138 | 1 | |
| SC0000302 | 1 | 12/31/1998 | 0.1123 | 1 | |
| SC0000302 | 1 | 1/31/1999 | 0.1028 | 12 | |
| SC0000302 | 1 | 2/28/1999 | 0.1259 | 1 | |
| SC0000302 | 1 | 3/31/1999 | 0.1032 | 2 | |
| SC0000302 | 1 | 4/30/1999 | 0.1019 | 2 | |
| SC0000302 | 1 | 5/31/1999 | 0.1124 | 3 | |
| SC0000302 | 1 | 6/30/1999 | 0.1204 | 1 | |
| SC0000302 | 1 | 7/31/1999 | 0.1458 | 1 | |
| SC0000302 | 1 | 8/31/1999 | 0.1249 | 1 | |
| SC0000302 | 1 | 9/30/1999 | 0.1076 | 2 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0024996 | 1 | 3/31/1996 | 0.09 | 25 | |
| SC0024996 | 1 | 4/30/1996 | 0.071 | 10 | |
| SC0024996 | 1 | 5/31/1996 | 0.073 | 10 | |
| SC0024996 | 1 | 6/30/1996 | 0.061 | 10 | |
| SC0024996 | 1 | 7/31/1996 | 0.062 | 103 | |
| SC0024996 | 1 | 8/31/1996 | 0.051 | 124 | |
| SC0024996 | 1 | 9/30/1996 | 0.058 | 10 | |
| SC0024996 | 1 | 10/31/1996 | 0.04 | 10 | |
| SC0024996 | 1 | 11/30/1996 | 0.036 | 16 | |
| SC0024996 | 1 | 12/31/1996 | 0.046 | 10 | |
| SC0024996 | 1 | 1/31/1997 | 0.061 | 10 | |
| SC0024996 | 1 | 2/28/1997 | 0.064 | 10 | |
| SC0024996 | 1 | 3/31/1997 | 0.061 | 13 | |
| SC0024996 | 1 | 4/30/1997 | 0.057 | 43 | |
| SC0024996 | 1 | 5/31/1997 | 0.053 | 10 | |
| SC0024996 | 1 | 6/30/1997 | 0.047 | 10 | |
| SC0024996 | 1 | 7/31/1997 | 0.048 | 10 | |
| SC0024996 | 1 | 8/31/1997 | 0.046 | 10 | |
| SC0024996 | 1 | 9/30/1997 | 0.059 | 10 | |
| SC0024996 | 1 | 10/31/1997 | 0.052 | 10 | |
| SC0024996 | 1 | 11/30/1997 | 0.038 | 10 | |
| SC0024996 | 1 | 12/31/1997 | 0.053 | 115 | |
| SC0024996 | 1 | 1/31/1998 | 0.079 | 10 | |
| SC0024996 | 1 | 2/28/1998 | 0.085 | 10 | |
| SC0024996 | 1 | 3/31/1998 | 0.05 | 10 | |
| SC0024996 | 1 | 4/30/1998 | 0.056 | 10 | |
| SC0024996 | 1 | 5/31/1998 | 0.04 | 10 | |
| SC0024996 | 1 | 6/30/1998 | 0.042 | 37 | |
| SC0024996 | 1 | 7/31/1998 | 0.046 | 10 | |
| SC0024996 | 1 | 8/31/1998 | 0.049 | 10 | |
| SC0024996 | 1 | 9/30/1998 | 0.041 | 66 | |
| SC0024996 | 1 | 10/31/1998 | 0.058 | 147.6 | |
| SC0024996 | 1 | 11/30/1998 | 0.055 | 196 | |
| SC0024996 | 1 | 12/31/1998 | 0.056 | 16 | |
| SC0024996 | 1 | 1/31/1999 | 0.046 | 10 | |
| SC0024996 | 1 | 2/28/1999 | 0.072 | < 10 | |
| SC0024996 | 1 | 3/31/1999 | 0.05 | 10 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0000302 | 1 | 10/31/1999 | 0.131 | 1 | |
| SC0000302 | 1 | 11/30/1999 | 0.1044 | 1 | |
| SC0000302 | 1 | 12/31/1999 | 0.0848 | 1 | |
| SC0000302 | 1 | 1/31/2000 | 0.09016 | 1 | |
| SC0000302 | 1 | 2/29/2000 | 0.0937 | 1 | |
| SC0000302 | 1 | 3/31/2000 | 0.1019 | 1 | |
| SC0000302 | 1 | 4/30/2000 | 0.0982 | 3 | |
| SC0000302 | 1 | 5/31/2000 | 0.1084 | 3 | |
| SC0000302 | 1 | 6/30/2000 | 0.1244 | 2 | |
| SC0000302 | 1 | 7/31/2000 | 0.1234 | 1 | |
| SC0000302 | 1 | 8/31/2000 | 0.1322 | 2 | |
| SC0000302 | 1 | 9/30/2000 | 0.1252 | 2 | |
| SC0000302 | 1 | 10/31/2000 | 0.095 | 1 | |
| SC0000302 | 1 | 11/30/2000 | 0.1024 | 1 | |
| SC0000302 | 1 | 12/31/2000 | 0.0989 | 2 | |
| SC0000370 | 1 | 2/28/1991 | 0.0304 | 10 | |
| SC0000370 | 1 | 3/31/1991 | 0.0445 | 10 | |
| SC0000370 | 1 | 4/30/1991 | 0.0623 | < 10 | |
| SC0000370 | 1 | 5/31/1991 | 0.0544 | 100 | |
| SC0000370 | 1 | 7/31/1991 | 0.0576 | 10 | |
| SC0000370 | 1 | 8/31/1991 | 0.0778 | 590 | x |
| SC0000370 | 1 | 9/30/1991 | 0.0544 | 10 | |
| SC0000370 | 1 | 11/30/1991 | 0.0321 | < 10 | |
| SC0000370 | 1 | 12/31/1991 | 0.0337 | 260 | - |
| SC0000370 | 1 | 1/31/1992 | 0.0323 | < 10 | |
| SC0000370 | 1 | 7/31/1992 | 0.0467 | < 10 | |
| SC0000370 | 1 | 8/31/1992 | 0.0577 | < 10 | |
| SC0000370 | 1 | 9/30/1992 | 0.0576 | < 10 | |
| SC0000370 | 1 | 10/31/1992 | 0.0479 | < 10 | |
| SC0000370 | 1 | 11/30/1992 | 0.0606 | 10 | |
| SC0000370 | 1 | 12/31/1992 | 0.0382 | < 10 | |
| SC0000370 | 1 | 1/31/1993 | 0.0256 | 50 | |
| SC0000370 | 1 | 2/28/1993 | 0.0151 | 10 | |
| SC0000370 | 1 | 3/31/1993 | 0.0341 | < 10 | |
| SC0000370 | 1 | 4/30/1993 | 0.0357 | 10 | |
| SC0000370 | 1 | 5/31/1993 | 0.0406 | 10 | |
| SC0000370 | 1 | 6/30/1993 | 0.0566 | < 10 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0024996 | 1 | 4/30/1999 | 0.061 | < 10 | |
| SC0024996 | 1 | 5/31/1999 | 0.063 | 13 | |
| SC0024996 | 1 | 6/30/1999 | 0.05 | 139 | |
| SC0024996 | 1 | 7/31/1999 | 0.054 | 27 | |
| SC0024996 | 1 | 8/31/1999 | 0.061 | 63 | |
| SC0024996 | 1 | 9/30/1999 | 0.068 | 57 | |
| SC0024996 | 1 | 10/31/1999 | 0.073 | < 10 | |
| SC0024996 | 1 | 11/30/1999 | 0.072 | 59 | |
| SC0024996 | 1 | 12/31/1999 | 0.068 | 10 | |
| SC0024996 | 1 | 1/31/2000 | 0.078 | 2 | |
| SC0024996 | 1 | 2/29/2000 | 0.076 | 5 | |
| SC0024996 | 1 | 3/31/2000 | 0.072 | 78 | |
| SC0024996 | 1 | 4/30/2000 | 0.082 | 2 | |
| SC0024996 | 1 | 5/31/2000 | 0.055 | 15 | |
| SC0024996 | 1 | 6/30/2000 | 0.05 | 107 | |
| SC0024996 | 1 | 7/31/2000 | 0.052 | 378 | - |
| SC0024996 | 1 | 8/31/2000 | 0.055 | 97 | |
| SC0024996 | 1 | 9/30/2000 | 0.055 | < 2 | |
| SC0024996 | 1 | 10/31/2000 | 0.046 | 80 | |
| SC0024996 | 1 | 11/30/2000 | 0.055 | 13 | |
| SC0024996 | 1 | 12/31/2000 | 0.054 | 3 | |
| SC0026166 | 1 | 1/31/1990 | 0.087 | 10 | |
| SC0026166 | 1 | 2/28/1990 | 0.07 | < 10 | |
| SC0026166 | 1 | 3/31/1990 | 0.089 | < 700 | x |
| SC0026166 | 1 | 4/30/1990 | 0.063 | 79 | |
| SC0026166 | 1 | 5/31/1990 | 0.072 | 224 | - |
| SC0026166 | 1 | 6/30/1990 | 0.063 | < 63 | |
| SC0026166 | 1 | 7/31/1990 | 0.081 | 468 | x |
| SC0026166 | 1 | 8/31/1990 | 0.071 | 94 | |
| SC0026166 | 1 | 9/30/1990 | 0.077 | 141 | |
| SC0026166 | 1 | 10/31/1990 | 0.088 | 178 | |
| SC0026166 | 1 | 11/30/1990 | 0.054 | < 22 | |
| SC0026166 | 1 | 12/31/1990 | 0.053 | 63 | |
| SC0026166 | 1 | 1/31/1991 | 0.074 | 69 | |
| SC0026166 | 1 | 2/28/1991 | 0.067 | 47 | |
| SC0026166 | 1 | 3/31/1991 | 0.08 | 126 | |
| SC0026166 | 1 | 4/30/1991 | 0.083 | 355 | - |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0000370 | 1 | 7/31/1993 | 0.0419 | < 2.0 | |
| SC0000370 | 1 | 8/31/1993 | 0.0444 | 30 | |
| SC0000370 | 1 | 9/30/1993 | 0.0447 | 2 | |
| SC0000370 | 1 | 10/31/1993 | 0.0388 | 10 | |
| SC0000370 | 1 | 12/31/1993 | 0.0313 | 423 | x |
| SC0000370 | 1 | 1/31/1994 | 0.0388 | < 4 | |
| SC0000370 | 1 | 2/28/1994 | 0.0412 | < 4 | |
| SC0000370 | 1 | 3/31/1994 | 0.0446 | < 4 | |
| SC0000370 | 1 | 4/30/1994 | 0.0326 | 4 | |
| SC0000370 | 1 | 5/31/1994 | 0.0305 | 4 | |
| SC0000370 | 1 | 6/30/1994 | 0.0406 | 10 | |
| SC0000370 | 1 | 7/31/1994 | 0.0413 | 4 | |
| SC0000370 | 1 | 8/31/1994 | 0.0573 | 10 | |
| SC0000370 | 1 | 9/30/1994 | 0.0332 | 4 | |
| SC0000370 | 1 | 10/31/1994 | 0.0339 | 4 | |
| SC0000370 | 1 | 11/30/1994 | 0.0201 | 4 | |
| SC0000370 | 1 | 12/31/1994 | 0.0295 | < 4 | |
| SC0000370 | 1 | 1/31/1995 | 0.0315 | < 10 | |
| SC0000370 | 1 | 2/28/1995 | 0.0297 | < 4 | |
| SC0000370 | 1 | 3/31/1995 | 0.03 | < 10 | |
| SC0000370 | 1 | 4/30/1995 | 0.0324 | < 4 | |
| SC0000370 | 1 | 5/31/1995 | 0.0321 | 4 | |
| SC0000370 | 1 | 6/30/1995 | 0.0453 | < 4 | |
| SC0000370 | 1 | 7/31/1995 | 0.0488 | 8 | |
| SC0000370 | 1 | 8/31/1995 | 0.058 | 4 | |
| SC0000370 | 1 | 9/30/1995 | 0.0429 | < 10 | |
| SC0000370 | 1 | 10/31/1995 | 0.046 | 18 | |
| SC0000370 | 1 | 11/30/1995 | 0.03 | 10 | |
| SC0000370 | 1 | 12/31/1995 | 0.0248 | 10 | |
| SC0000370 | 1 | 1/31/1996 | 0.0357 | 10 | |
| SC0000370 | 1 | 2/29/1996 | 0.0305 | 10 | |
| SC0000370 | 1 | 3/31/1996 | 0.0339 | 10 | |
| SC0000370 | 1 | 4/30/1996 | 0.0277 | 10 | |
| SC0000370 | 1 | 5/31/1996 | 0.0381 | 10 | |
| SC0000370 | 1 | 6/30/1996 | 0.0415 | 10 | |
| SC0000370 | 1 | 7/31/1996 | 0.0434 | 10 | |
| SC0000370 | 1 | 8/31/1996 | 0.0597 | < 10 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0026166 | 1 | 5/31/1991 | 0.08 | 708 | x |
| SC0026166 | 1 | 6/30/1991 | 0.084 | 355 | - |
| SC0026166 | 1 | 7/31/1991 | 0.059 | 398 | - |
| SC0026166 | 1 | 8/31/1991 | 0.081 | 457 | x |
| SC0026166 | 1 | 9/30/1991 | 0.053 | 178 | |
| SC0026166 | 1 | 10/31/1991 | 0.042 | 100 | |
| SC0026166 | 1 | 2/29/1992 | 0.088 | < 40 | |
| SC0026166 | 1 | 3/31/1992 | 0.084 | 32 | |
| SC0026166 | 1 | 4/30/1992 | 0.067 | < 40 | |
| SC0026166 | 1 | 5/31/1992 | 0.07 | 158 | |
| SC0026166 | 1 | 6/30/1992 | 0.071 | 251 | - |
| SC0026166 | 1 | 7/31/1992 | 0.061 | 85 | |
| SC0026166 | 1 | 8/31/1992 | 0.087 | 45 | |
| SC0026166 | 1 | 9/30/1992 | 0.051 | 226 | - |
| SC0026166 | 1 | 10/31/1992 | 0.023 | 76 | |
| SC0026166 | 1 | 11/30/1992 | 0.048 | > 82 | |
| SC0026166 | 1 | 12/31/1992 | 0.045 | < 4 | |
| SC0026166 | 1 | 1/31/1993 | 0.077 | < 4 | |
| SC0026166 | 1 | 2/28/1993 | 0.032 | < 12 | |
| SC0026166 | 1 | 3/31/1993 | 0.043 | < 4 | |
| SC0026166 | 1 | 4/30/1993 | 0.02 | < 10 | |
| SC0026166 | 1 | 5/31/1993 | 0.026 | < 15 | |
| SC0026166 | 1 | 6/30/1993 | 0.02 | < 10 | |
| SC0026166 | 1 | 7/31/1993 | 0.025 | < 7 | |
| SC0026166 | 1 | 8/31/1993 | 0.031 | < 7 | |
| SC0026166 | 1 | 9/30/1993 | 0.028 | < 5 | |
| SC0026166 | 1 | 10/31/1993 | 0.045 | 17 | |
| SC0026166 | 1 | 11/30/1993 | 0.06 | 480 | x |
| SC0026166 | 1 | 12/31/1993 | 0.06 | < 7 | |
| SC0026166 | 1 | 1/31/1994 | 0.075 | < 10 | |
| SC0026166 | 1 | 2/28/1994 | 0.084 | < 7 | |
| SC0026166 | 1 | 3/31/1994 | 0.085 | < 5 | |
| SC0026166 | 1 | 5/31/1994 | 0.054 | 32 | |
| SC0026166 | 1 | 6/30/1994 | 0.062 | < 10 | |
| SC0026166 | 1 | 7/31/1994 | 73 | < 10 | |
| SC0026166 | 1 | 8/31/1994 | 0.098 | < 10 | |
| SC0026166 | 1 | 9/30/1994 | 0.084 | < 10 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0000370 | 1 | 9/30/1996 | 0.0559 | < 10 | |
| SC0000370 | 1 | 10/31/1996 | 0.0604 | < 10 | |
| SC0000370 | 1 | 11/30/1996 | 0.0563 | 197.5 | |
| SC0000370 | 1 | 12/31/1996 | 0.0375 | < 10 | |
| SC0000370 | 1 | 1/31/1997 | 0.0355 | < 4 | |
| SC0000370 | 1 | 2/28/1997 | 0.0659 | 1 | |
| SC0000370 | 1 | 3/31/1997 | 0.032 | < 0.60206 | |
| SC0000370 | 1 | 4/30/1997 | 0.0364 | 0.60206 | |
| SC0000370 | 1 | 5/31/1997 | 0.039 | < 0.60206 | |
| SC0000370 | 1 | 6/30/1997 | 0.0451 | 0.60206 | |
| SC0000370 | 1 | 7/31/1997 | 0.0511 | < 2.24055 | |
| SC0000370 | 1 | 8/31/1997 | 0.038 | < 0.60206 | |
| SC0000370 | 1 | 9/30/1997 | 0.0406 | < 0.60206 | |
| SC0000370 | 1 | 10/31/1997 | 0.0415 | < 0.60206 | |
| SC0000370 | 1 | 11/30/1997 | 0.0281 | < 0.60206 | |
| SC0000370 | 1 | 12/31/1997 | 0.0494 | < 0.60206 | |
| SC0000370 | 1 | 1/31/1998 | 0.0561 | < 0.60206 | |
| SC0000370 | 1 | 2/28/1998 | 0.0477 | < 0.60206 | |
| SC0000370 | 1 | 3/31/1998 | 0.04 | 0.60206 | |
| SC0000370 | 1 | 4/30/1998 | 0.0508 | < 0.60206 | |
| SC0000370 | 1 | 5/31/1998 | 0.0489 | < 0.60206 | |
| SC0000370 | 1 | 6/30/1998 | 0.0414 | < 0.60206 | |
| SC0000370 | 1 | 7/31/1998 | 0.0368 | 1.5563 | |
| SC0000370 | 1 | 8/31/1998 | 0.0575 | < 0.60206 | |
| SC0000370 | 1 | 9/30/1998 | 0.0537 | < 0.60206 | |
| SC0000370 | 1 | 10/31/1998 | 0.0519 | < 0.60206 | |
| SC0000434 | 1 | 11/30/1994 | 0.0004 | 10 | |
| SC0000434 | 1 | 12/31/1994 | 0.004 | < 10 | |
| SC0000434 | 1 | 1/31/1995 | 0.009 | 10 | |
| SC0000434 | 1 | 2/28/1995 | 0.009 | < 10 | |
| SC0000434 | 1 | 3/31/1995 | 0.009 | < 10 | |
| SC0000434 | 1 | 4/30/1995 | 0.009 | 4100 | x |
| SC0000434 | 1 | 5/31/1995 | 0.009 | 590 | x |
| SC0000434 | 1 | 8/31/1995 | 0.009 | < 10 | |
| SC0000434 | 1 | 9/30/1995 | 0.009 | 350 | - |
| SC0000434 | 1 | 10/31/1995 | 0.009 | < 10 | |
| SC0000434 | 1 | 11/30/1995 | 0.009 | 6 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0026166 | 1 | 10/31/1994 | 0.069 | < 17 | |
| SC0026166 | 1 | 11/30/1994 | 0.059 | 10 | |
| SC0026166 | 1 | 12/31/1994 | 0.061 | 7 | |
| SC0026166 | 1 | 1/31/1995 | 0.11 | < 10 | |
| SC0026166 | 1 | 2/28/1995 | 0.113 | 40 | |
| SC0026166 | 1 | 3/31/1995 | 0.066 | 13 | |
| SC0026166 | 1 | 4/30/1995 | 0.053 | 78 | |
| SC0026166 | 1 | 5/31/1995 | 0.05 | 10 | |
| SC0026166 | 1 | 6/30/1995 | 0.046 | 10 | |
| SC0026166 | 1 | 7/31/1995 | 0.047 | 10 | |
| SC0026166 | 1 | 8/31/1995 | 0.118 | 10 | |
| SC0026166 | 1 | 9/30/1995 | 0.066 | 10 | |
| SC0026166 | 1 | 10/31/1995 | 0.091 | 10 | |
| SC0026166 | 1 | 11/30/1995 | 0.078 | 10 | |
| SC0026166 | 1 | 12/31/1995 | 0.052 | 10 | |
| SC0026166 | 1 | 1/31/1996 | 0.08 | 10 | |
| SC0026166 | 1 | 2/29/1996 | 0.073 | 10 | |
| SC0026166 | 1 | 3/31/1996 | 0.077 | 10 | |
| SC0026166 | 1 | 4/30/1996 | 0.06 | 10 | |
| SC0026166 | 1 | 5/31/1996 | 0.052 | 10 | |
| SC0026166 | 1 | 6/30/1996 | 0.045 | 10 | |
| SC0026166 | 1 | 7/31/1996 | 0.02 | 10 | |
| SC0026166 | 1 | 8/31/1996 | 0.043 | 10 | |
| SC0026166 | 1 | 9/30/1996 | 0.045 | 10 | |
| SC0026166 | 1 | 10/31/1996 | 0.043 | 10 | |
| SC0026166 | 1 | 11/30/1996 | 0.047 | 10 | |
| SC0026166 | 1 | 12/31/1996 | 0.047 | 10 | |
| SC0026166 | 1 | 1/31/1997 | 0.073 | 10 | |
| SC0026166 | 1 | 2/28/1997 | 0.076 | 10 | |
| SC0026166 | 1 | 3/31/1997 | 0.061 | 10 | |
| SC0026166 | 1 | 4/30/1997 | 0.062 | 10 | |
| SC0026166 | 1 | 5/31/1997 | 0.061 | 10 | |
| SC0026166 | 1 | 6/30/1997 | 0.047 | 10 | |
| SC0026166 | 1 | 7/31/1997 | 0.049 | 10 | |
| SC0026166 | 1 | 8/31/1997 | 0.038 | 10 | |
| SC0026166 | 1 | 10/31/1997 | 0.075 | 10 | |
| SC0026166 | 1 | 11/30/1997 | 0.067 | 10 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0000434 | 1 | 12/31/1995 | 0.009 | < 10 | |
| SC0000434 | 1 | 1/31/1996 | 0.009 | < 10 | |
| SC0000434 | 1 | 2/29/1996 | 0.009 | < 10 | |
| SC0000434 | 1 | 5/31/1996 | 0.009 | 81 | |
| SC0000434 | 1 | 7/31/1996 | 0.009 | < 10 | |
| SC0000434 | 1 | 8/31/1996 | 0.009 | 27 | |
| SC0000434 | 1 | 9/30/1996 | 0.009 | 9 | |
| SC0000434 | 1 | 11/30/1996 | 0.009 | < 10 | |
| SC0000434 | 1 | 12/31/1996 | 0.009 | < 10 | |
| SC0000434 | 1 | 1/31/1997 | 0.009 | < 10 | |
| SC0000434 | 1 | 3/31/1997 | 0.009 | < 10 | |
| SC0000434 | 1 | 4/30/1997 | 0.009 | 144 | |
| SC0000434 | 1 | 5/31/1997 | 0.009 | < 10 | |
| SC0000434 | 1 | 6/30/1997 | 0.009 | 27 | |
| SC0000434 | 1 | 7/31/1997 | 0.009 | < 10 | |
| SC0000434 | 1 | 10/31/1997 | 0.009 | < 10 | |
| SC0000434 | 1 | 11/30/1997 | 0.009 | < 10 | |
| SC0000434 | 1 | 12/31/1997 | 0.009 | < 10 | |
| SC0000434 | 1 | 1/31/1998 | 0.009 | < 10 | |
| SC0000434 | 1 | 2/28/1998 | 0.009 | < 10 | |
| SC0000434 | 1 | 3/31/1998 | 0.009 | < 10 | |
| SC0000434 | 1 | 4/30/1998 | 0.009 | < 10 | |
| SC0000434 | 1 | 5/31/1998 | 0.009 | < .10 | |
| SC0000434 | 1 | 6/30/1998 | 0.009 | < 10 | |
| SC0000434 | 1 | 7/31/1998 | 0.009 | < 10 | |
| SC0000434 | 1 | 8/31/1998 | 0.009 | < 10 | |
| SC0000434 | 1 | 9/30/1998 | 0.009 | < 10 | |
| SC0000434 | 1 | 10/31/1998 | 0.009 | < 10 | |
| SC0000434 | 1 | 11/30/1998 | 0.004 | < 10 | |
| SC0000434 | 1 | 12/31/1998 | 0.008 | < 10 | |
| SC0000434 | 1 | 1/31/1999 | 0.004 | < 10 | |
| SC0000434 | 1 | 2/28/1999 | 0.004 | < 10 | |
| SC0000434 | 1 | 3/31/1999 | 0.004 | < 10 | |
| SC0000434 | 1 | 4/30/1999 | 0.004 | < 10 | |
| SC0000434 | 1 | 5/31/1999 | 0.004 | < 10 | |
| SC0000434 | 1 | 6/30/1999 | 0.009 | 36 | |
| SC0000434 | 1 | 7/31/1999 | 0.006 | < 10 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0026166 | 1 | 12/31/1997 | 0.089 | 10 | |
| SC0026166 | 1 | 1/31/1998 | 0.139 | 10 | |
| SC0026166 | 1 | 2/28/1998 | 0.13 | 10 | |
| SC0026166 | 1 | 3/31/1998 | 0.095 | 10 | |
| SC0026166 | 1 | 4/30/1998 | 0.104 | 10 | |
| SC0026166 | 1 | 5/31/1998 | 0.1 | 10 | |
| SC0026166 | 1 | 6/30/1998 | 0.055 | 13 | |
| SC0026166 | 1 | 7/31/1998 | 0.055 | 32 | |
| SC0026166 | 1 | 8/31/1998 | 0.056 | 10 | |
| SC0026166 | 1 | 9/30/1998 | 0.058 | 10 | |
| SC0026166 | 1 | 10/31/1998 | 0.0781 | 13.4 | |
| SC0026166 | 1 | 11/30/1998 | 0.07 | 57 | |
| SC0026166 | 1 | 12/31/1998 | 0.084 | 19 | |
| SC0026166 | 1 | 1/31/1999 | 0.085 | 10 | |
| SC0026166 | 1 | 2/28/1999 | 0.118 | < 10 | |
| SC0026166 | 1 | 3/31/1999 | 0.083 | 16 | |
| SC0026166 | 1 | 4/30/1999 | 0.065 | < 10 | |
| SC0026166 | 1 | 5/31/1999 | 0.064 | 10 | |
| SC0026166 | 1 | 6/30/1999 | 0.051 | 63 | |
| SC0026166 | 1 | 7/31/1999 | 0.0459 | < 10 | |
| SC0026166 | 1 | 8/31/1999 | 0.046 | 49 | |
| SC0026166 | 1 | 9/30/1999 | 0.051 | 108 | |
| SC0026166 | 1 | 10/31/1999 | 0.069 | 10 | |
| SC0026166 | 1 | 11/30/1999 | 0.0469 | 6 | |
| SC0026166 | 1 | 12/31/1999 | 0.054 | 5 | |
| SC0026166 | 1 | 1/31/2000 | 0.065 | 5 | |
| SC0026166 | 1 | 2/29/2000 | 0.063 | 2 | |
| SC0026166 | 1 | 3/31/2000 | 0.072 | 2 | |
| SC0026166 | 1 | 4/30/2000 | 0.06846 | 2 | |
| SC0026166 | 1 | 5/31/2000 | 0.05 | 21 | |
| SC0026166 | 1 | 6/30/2000 | 0.043 | < 2 | |
| SC0026166 | 1 | 7/31/2000 | 0.042 | < 2 | |
| SC0026166 | 1 | 8/31/2000 | 0.061 | < 2.0 | |
| SC0026166 | 1 | 9/30/2000 | 0.055 | < 2 | |
| SC0026166 | 1 | 10/31/2000 | 0.049 | < 2 | |
| SC0026166 | 1 | 11/30/2000 | 0.057 | < 2 | |
| SC0026166 | 1 | 12/31/2000 | 0.048 | < 2 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0000434 | 1 | 8/31/1999 | 0.004 | < 10 | |
| SC0000434 | 1 | 9/30/1999 | 0.007 | < 10 | |
| SC0000434 | 1 | 10/31/1999 | 0.005 | < 10 | |
| SC0000434 | 1 | 11/30/1999 | 0.003 | < 10 | |
| SC0000434 | 1 | 12/31/1999 | 0.002 | < 10 | |
| SC0000434 | 1 | 1/31/2000 | 0.003 | < 10 | |
| SC0000434 | 1 | 2/29/2000 | 0.004 | < 10 | |
| SC0000434 | 1 | 3/31/2000 | 0.002 | 36 | |
| SC0000434 | 1 | 4/30/2000 | 0.005 | < 10 | |
| SC0000434 | 1 | 5/31/2000 | 0.003 | < 10 | |
| SC0000434 | 1 | 6/30/2000 | 0.001 | < 10 | |
| SC0000434 | 1 | 7/31/2000 | 0.002 | < 10 | |
| SC0000434 | 1 | 8/31/2000 | 0.003 | < 10 | |
| SC0000434 | 1 | 9/30/2000 | 0.002 | < 10 | |
| SC0000434 | 1 | 10/31/2000 | 0.002 | < 10 | |
| SC0000434 | 1 | 11/30/2000 | 0.002 | < 10 | |
| SC0000434 | 1 | 12/31/2000 | 0.005 | < 10 | |
| SC0020010 | 1 | 1/31/1990 | 0.687 | < 10 | |
| SC0020010 | 1 | 2/28/1990 | 0.822 | < 10 | |
| SC0020010 | 1 | 3/31/1990 | 0.721 | < 10 | |
| SC0020010 | 1 | 4/30/1990 | 0.767 | < 10 | |
| SC0020010 | 1 | 5/31/1990 | 0.59 | < 28 | |
| SC0020010 | 1 | 6/30/1990 | 0.551 | < 10 | |
| SC0020010 | 1 | 7/31/1990 | 0.515 | < 10 | |
| SC0020010 | 1 | 8/31/1990 | 0.561 | < 10 | |
| SC0020010 | 1 | 9/30/1990 | 0.795 | < 10 | |
| SC0020010 | 1 | 10/31/1990 | 0.753 | < 12 | |
| SC0020010 | 1 | 11/30/1990 | 0.757 | < 10 | |
| SC0020010 | 1 | 12/31/1990 | 0.631 | 12 | |
| SC0020010 | 1 | 1/31/1991 | 0.62 | < 10 | |
| SC0020010 | 1 | 2/28/1991 | 0.681 | < 28 | |
| SC0020010 | 1 | 3/31/1991 | 0.657 | < 10 | |
| SC0020010 | 1 | 4/30/1991 | 0.857 | < 10 | |
| SC0020010 | 1 | 5/31/1991 | 0.779 | < 10 | |
| SC0020010 | 1 | 6/30/1991 | 0.615 | < 9 | |
| SC0020010 | 1 | 7/31/1991 | 0.595 | < .35 | |
| SC0020010 | 1 | 8/31/1991 | 0.788 | < 47 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0026191 | 1 | 1/31/1990 | 0.167 | 305 | - |
| SC0026191 | 1 | 2/28/1990 | 0.185 | 65 | |
| SC0026191 | 1 | 3/31/1990 | 0.193 | 237 | - |
| SC0026191 | 1 | 4/30/1990 | 0.131 | 95 | |
| SC0026191 | 1 | 5/31/1990 | 0.128 | 36 | |
| SC0026191 | 1 | 6/30/1990 | 0.126 | < 20 | |
| SC0026191 | 1 | 7/31/1990 | 0.136 | 603 | x |
| SC0026191 | 1 | 8/31/1990 | 0.136 | 283 | - |
| SC0026191 | 1 | 9/30/1990 | 0.147 | 141 | |
| SC0026191 | 1 | 10/31/1990 | 0.174 | 562 | x |
| SC0026191 | 1 | 11/30/1990 | 0.104 | < 16 | |
| SC0026191 | 1 | 12/31/1990 | 0.085 | 89 | |
| SC0026191 | 1 | 1/31/1991 | 0.12 | 285 | - |
| SC0026191 | 1 | 2/28/1991 | 0.098 | 240 | - |
| SC0026191 | 1 | 3/31/1991 | 0.132 | 56 | |
| SC0026191 | 1 | 4/30/1991 | 0.136 | 794 | x |
| SC0026191 | 1 | 5/31/1991 | 0.146 | 355 | - |
| SC0026191 | 1 | 6/30/1991 | 0.134 | < 40 | |
| SC0026191 | 1 | 7/31/1991 | 0.14 | 79 | |
| SC0026191 | 1 | 8/31/1991 | 0.18 | 251 | - |
| SC0026191 | 1 | 9/30/1991 | 0.134 | 354 | - |
| SC0026191 | 1 | 10/31/1991 | 0.118 | < 20 | |
| SC0026191 | 1 | 2/29/1992 | 0.262 | > 94 | |
| SC0026191 | 1 | 3/31/1992 | 0.194 | 355 | - |
| SC0026191 | 1 | 4/30/1992 | 0.17 | 794 | x |
| SC0026191 | 1 | 5/31/1992 | 0.174 | 631 | x |
| SC0026191 | 1 | 6/30/1992 | 0.169 | 794 | x |
| SC0026191 | 1 | 7/31/1992 | 0.16 | 145 | |
| SC0026191 | 1 | 8/31/1992 | 0.202 | 837 | x |
| SC0026191 | 1 | 9/30/1992 | 0.164 | 954 | x |
| SC0026191 | 1 | 10/31/1992 | 0.171 | 310 | - |
| SC0026191 | 1 | 11/30/1992 | 0.242 | 82 | |
| SC0026191 | 1 | 12/31/1992 | 0.235 | < 16 | |
| SC0026191 | 1 | 1/31/1993 | 0.262 | 450 | x |
| SC0026191 | 1 | 2/28/1993 | 0.169 | 490 | x |
| SC0026191 | 1 | 3/31/1993 | 0.0273 | 49 | |
| SC0026191 | 1 | 4/30/1993 | 0.18 | < 7 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0020010 | 1 | 9/30/1991 | 0.818 | < 10 | |
| SC0020010 | 1 | 10/31/1991 | 0.73 | < .10 | |
| SC0020010 | 1 | 11/30/1991 | 0.775 | < 10 | |
| SC0020010 | 1 | 2/29/1992 | 0.906 | < 10 | |
| SC0020010 | 1 | 3/31/1992 | 0.795 | < 90 | |
| SC0020010 | 1 | 4/30/1992 | 0.784 | < 25 | |
| SC0020010 | 1 | 5/31/1992 | 0.696 | < 14 | |
| SC0020010 | 1 | 6/30/1992 | 0.707 | < 36 | |
| SC0020010 | 1 | 7/31/1992 | 0.669 | < 23 | |
| SC0020010 | 1 | 8/31/1992 | 0.91 | 67 | |
| SC0020010 | 1 | 9/30/1992 | 0.969 | < 7 | |
| SC0020010 | 1 | 10/31/1992 | 0.844 | < 20 | |
| SC0020010 | 1 | 11/30/1992 | 0.97 | 14 | |
| SC0020010 | 1 | 12/31/1992 | 0.836 | 65 | |
| SC0020010 | 1 | 1/31/1993 | 0.972 | < 36 | |
| SC0020010 | 1 | 2/28/1993 | 0.839 | < 13 | |
| SC0020010 | 1 | 3/31/1993 | 0.889 | < 24 | |
| SC0020010 | 1 | 4/30/1993 | 0.932 | 24 | |
| SC0020010 | 1 | 5/31/1993 | 0.711 | < 13 | |
| SC0020010 | 1 | 6/30/1993 | 0.664 | < 12 | |
| SC0020010 | 1 | 7/31/1993 | 0.682 | < 14 | |
| SC0020010 | 1 | 8/31/1993 | 0.893 | < 44 | |
| SC0020010 | 1 | 9/30/1993 | 0.835 | < 31 | |
| SC0020010 | 1 | 10/31/1993 | 0.771 | < 16 | |
| SC0020010 | 1 | 11/30/1993 | 0.781 | < 87 | |
| SC0020010 | 1 | 12/31/1993 | 0.673 | < 296 | - |
| SC0020010 | 1 | 1/31/1994 | 0.74 | < 21 | |
| SC0020010 | 1 | 2/28/1994 | 0.827 | < 15 | |
| SC0020010 | 1 | 3/31/1994 | 0.78 | < 22 | |
| SC0020010 | 1 | 4/30/1994 | 0.779 | < 18 | |
| SC0020010 | 1 | 5/31/1994 | 0.72 | < 31 | |
| SC0020010 | 1 | 6/30/1994 | 0.748 | < 16 | |
| SC0020010 | 1 | 7/31/1994 | 0.783 | < 15 | |
| SC0020010 | 1 | 8/31/1994 | 0.945 | < 16 | |
| SC0020010 | 1 | 9/30/1994 | 0.834 | < 37 | |
| SC0020010 | 1 | 10/31/1994 | 0.852 | < 25 | |
| SC0020010 | 1 | 11/30/1994 | 0.747 | < 17 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0026191 | 1 | 5/31/1993 | 0.16 | 100 | |
| SC0026191 | 1 | 6/30/1993 | 0.14 | > 420 | x |
| SC0026191 | 1 | 7/31/1993 | 0.149 | 77 | |
| SC0026191 | 1 | 8/31/1993 | 0.111 | 24 | |
| SC0026191 | 1 | 9/30/1993 | 0.126 | 47 | |
| SC0026191 | 1 | 10/31/1993 | 0.105 | 81 | |
| SC0026191 | 1 | 11/30/1993 | 0.164 | 14 | |
| SC0026191 | 1 | 12/31/1993 | 0.194 | < 10 | |
| SC0026191 | 1 | 1/31/1994 | 0.199 | < 23 | |
| SC0026191 | 1 | 2/28/1994 | 0.232 | 25 | |
| SC0026191 | 1 | 3/31/1994 | 0.234 | 20 | |
| SC0026191 | 1 | 4/30/1994 | 0.181 | 33 | |
| SC0026191 | 1 | 5/31/1994 | 0.184 | 20 | |
| SC0026191 | 1 | 6/30/1994 | 0.189 | 49 | |
| SC0026191 | 1 | 7/31/1994 | 0.153 | < 17 | |
| SC0026191 | 1 | 8/31/1994 | 0.279 | 24 | |
| SC0026191 | 1 | 9/30/1994 | 0.21 | < 10 | |
| SC0026191 | 1 | 10/31/1994 | 0.177 | < 10 | |
| SC0026191 | 1 | 11/30/1994 | 0.134 | 42 | |
| SC0026191 | 1 | 12/31/1994 | 0.159 | 17 | |
| SC0026191 | 1 | 1/31/1995 | 0.18 | < 10 | |
| SC0026191 | 1 | 2/28/1995 | 0.127 | 37 | |
| SC0026191 | 1 | 3/31/1995 | 0.144 | 557 | x |
| SC0026191 | 1 | 4/30/1995 | 0.121 | 10 | |
| SC0026191 | 1 | 5/31/1995 | 0.133 | 21 | |
| SC0026191 | 1 | 6/30/1995 | 0.13 | 10 | |
| SC0026191 | 1 | 7/31/1995 | 0.14 | 16 | |
| SC0026191 | 1 | 8/31/1995 | 0.13 | 20 | |
| SC0026191 | 1 | 9/30/1995 | 0.13 | 40 | |
| SC0026191 | 1 | 10/31/1995 | 0.137 | 30 | |
| SC0026191 | 1 | 11/30/1995 | 0.126 | 41 | |
| SC0026191 | 1 | 12/31/1995 | 0.125 | 31 | |
| SC0026191 | 1 | 1/31/1996 | 0.121 | 19 | |
| SC0026191 | 1 | 2/29/1996 | 0.121 | < 10 | |
| SC0026191 | 1 | 3/31/1996 | 0.122 | 73 | |
| SC0026191 | 1 | 4/30/1996 | 0.112 | 80 | |
| SC0026191 | 1 | 5/31/1996 | 0.11 | 36 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0020010 | 1 | 12/31/1994 | 0.696 | < 65 | |
| SC0020010 | 1 | 1/31/1995 | 0.744 | < 12 | |
| SC0020010 | 1 | 2/28/1995 | 0.78 | < 13 | |
| SC0020010 | 1 | 3/31/1995 | 0.745 | < 17 | |
| SC0020010 | 1 | 4/30/1995 | 0.723 | < 16 | |
| SC0020010 | 1 | 5/31/1995 | 0.679 | < 37 | |
| SC0020010 | 1 | 6/30/1995 | 0.672 | < 17 | |
| SC0020010 | 1 | 7/31/1995 | 0.652 | 9.74 | |
| SC0020010 | 1 | 8/31/1995 | 0.796 | < 19 | |
| SC0020010 | 1 | 9/30/1995 | 0.833 | < 10 | |
| SC0020010 | 1 | 10/31/1995 | 0.856 | < 10 | |
| SC0020010 | 1 | 11/30/1995 | 0.832 | < 65 | |
| SC0020010 | 1 | 12/31/1995 | 0.662 | 12 | |
| SC0020010 | 1 | 1/31/1996 | 0.756 | < 57 | |
| SC0020010 | 1 | 2/29/1996 | 0.772 | < 10 | |
| SC0020010 | 1 | 3/31/1996 | 0.917 | < 13 | |
| SC0020010 | 1 | 4/30/1996 | 0.822 | < 12 | |
| SC0020010 | 1 | 5/31/1996 | 0.699 | < 23 | |
| SC0020010 | 1 | 6/30/1996 | 0.662 | < 10 | |
| SC0020010 | 1 | 7/31/1996 | 0.627 | < 10 | |
| SC0020010 | 1 | 8/31/1996 | 0.714 | < 10 | |
| SC0020010 | 1 | 9/30/1996 | 0.794 | < 10 | |
| SC0020010 | 1 | 10/31/1996 | 0.81 | < 10 | |
| SC0020010 | 1 | 11/30/1996 | 0.723 | < 10 | |
| SC0020010 | 1 | 12/31/1996 | 0.597 | < 10 | |
| SC0020010 | 1 | 1/31/1997 | 0.755 | < 47 | |
| SC0020010 | 1 | 2/28/1997 | 0.766 | < 10 | |
| SC0020010 | 1 | 3/31/1997 | 0.8 | < 10 | |
| SC0020010 | 1 | 4/30/1997 | 0.745 | < 10 | |
| SC0020010 | 1 | 5/31/1997 | 0.775 | < 10 | |
| SC0020010 | 1 | 6/30/1997 | 0.654 | < 10 | |
| SC0020010 | 1 | 7/31/1997 | 0.659 | < 10 | |
| SC0020010 | 1 | 8/31/1997 | 0.68 | < 10 | |
| SC0020010 | 1 | 9/30/1997 | 0.743 | < 10 | |
| SC0020010 | 1 | 10/31/1997 | 0.742 | < 10 | |
| SC0020010 | 1 | 11/30/1997 | 0.745 | < 10 | |
| SC0020010 | 1 | 12/31/1997 | 0.613 | < 10 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0026191 | 1 | 6/30/1996 | 0.115 | 13 | |
| SC0026191 | 1 | 7/31/1996 | 0.12 | 195 | |
| SC0026191 | 1 | 9/30/1996 | 0.096 | 113 | |
| SC0026191 | 1 | 10/31/1996 | 0.097 | 10 | |
| SC0026191 | 1 | 11/30/1996 | 0.11 | 10 | |
| SC0026191 | 1 | 12/31/1996 | 0.137 | 10 | |
| SC0026191 | 1 | 1/31/1997 | 0.172 | 10 | |
| SC0026191 | 1 | 2/28/1997 | 0.148 | 10 | |
| SC0026191 | 1 | 3/31/1997 | 0.14 | 10 | |
| SC0026191 | 1 | 4/30/1997 | 0.17 | 10 | |
| SC0026191 | 1 | 5/31/1997 | 0.129 | 10 | |
| SC0026191 | 1 | 6/30/1997 | 0.127 | 21 | |
| SC0026191 | 1 | 7/31/1997 | 0.117 | 9 | |
| SC0026191 | 1 | 8/31/1997 | 0.116 | 13 | |
| SC0026191 | 1 | 9/30/1997 | 0.143 | 10 | |
| SC0026191 | 1 | 10/31/1997 | 0.146 | 41.3 | |
| SC0026191 | 1 | 11/30/1997 | 0.139 | 10 | |
| SC0026191 | 1 | 12/31/1997 | 0.159 | 10 | |
| SC0026191 | 1 | 1/31/1998 | 0.211 | 10 | |
| SC0026191 | 1 | 2/28/1998 | 0.205 | 10 | |
| SC0026191 | 1 | 3/31/1998 | 0.195 | 10 | |
| SC0026191 | 1 | 4/30/1998 | 0.21 | 10 | |
| SC0026191 | 1 | 5/31/1998 | 0.167 | 10 | |
| SC0026191 | 1 | 6/30/1998 | 0.124 | 76 | |
| SC0026191 | 1 | 7/31/1998 | 0.115 | 35 | |
| SC0026191 | 1 | 8/31/1998 | 0.116 | 19 | |
| SC0026191 | 1 | 9/30/1998 | 0.12 | 18 | |
| SC0026191 | 1 | 10/31/1998 | 0.131 | 21.2 | |
| SC0026191 | 1 | 11/30/1998 | 0.117 | 16.4 | |
| SC0026191 | 1 | 12/31/1998 | 0.123 | < 10 | |
| SC0026191 | 1 | 1/31/1999 | 0.147 | 10 | |
| SC0026191 | 1 | 2/28/1999 | 0.174 | 126 | |
| SC0026191 | 1 | 3/31/1999 | 0.126 | 19 | |
| SC0026191 | 1 | 4/30/1999 | 0.146 | 13 | |
| SC0026191 | 1 | 5/31/1999 | 0.172 | 128 | |
| SC0026191 | 1 | 6/30/1999 | 0.108 | 23 | |
| SC0026191 | 1 | 7/31/1999 | 0.116 | 10 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0020010 | 1 | 1/31/1998 | 0.764 | < 21 | |
| SC0020010 | 1 | 2/28/1998 | 0.95 | < 10 | |
| SC0020010 | 1 | 3/31/1998 | 0.751 | < 10 | |
| SC0020010 | 1 | 4/30/1998 | 0.91 | < 10 | |
| SC0020010 | 1 | 5/31/1998 | 0.727 | < 10 | |
| SC0020010 | 1 | 6/30/1998 | 0.644 | < 10 | |
| SC0020010 | 1 | 7/31/1998 | 0.605 | < 10 | |
| SC0020010 | 1 | 8/31/1998 | 0.673 | < 10 | |
| SC0020010 | 1 | 9/30/1998 | 0.757 | < 10 | |
| SC0020010 | 1 | 10/31/1998 | 0.792 | < 10 | |
| SC0020010 | 1 | 11/30/1998 | 0.671 | < 10 | |
| SC0020010 | 1 | 12/31/1998 | 0.555 | < 10 | |
| SC0020010 | 1 | 1/31/1999 | 0.684 | < 10 | |
| SC0020010 | 1 | 2/28/1999 | 0.758 | < 10 | |
| SC0020010 | 1 | 3/31/1999 | 0.663 | < 10 | |
| SC0020010 | 1 | 4/30/1999 | 0.746 | < 10 | |
| SC0020010 | 1 | 5/31/1999 | 0.653 | < 27 | |
| SC0020010 | 1 | 6/30/1999 | 0.548 | < 10 | |
| SC0020010 | 1 | 7/31/1999 | 0.624 | < 10 | |
| SC0020010 | 1 | 8/31/1999 | 0.689 | < 10 | |
| SC0020010 | 1 | 9/30/1999 | 0.695 | < 10 | |
| SC0020010 | 1 | 10/31/1999 | 0.789 | < 10 | |
| SC0020010 | 1 | 11/30/1999 | 0.659 | < 10 | |
| SC0020010 | 1 | 12/31/1999 | 0.588 | < 10 | |
| SC0020010 | 1 | 1/31/2000 | 0.659 | < 10 | |
| SC0020010 | 1 | 2/29/2000 | 0.716 | < 10 | |
| SC0020010 | 1 | 3/31/2000 | 0.704 | < 10 | |
| SC0020010 | 1 | 4/30/2000 | 0.729 | < 10 | |
| SC0020010 | 1 | 5/31/2000 | 0.638 | < 10 | |
| SC0020010 | 1 | 6/30/2000 | 0.588 | < 10 | |
| SC0020010 | 1 | 7/31/2000 | 0.604 | < 10 | |
| SC0020010 | 1 | 8/31/2000 | 0.634 | < 15 | |
| SC0020010 | 1 | 9/30/2000 | 0.694 | < 10 | |
| SC0020010 | 1 | 10/31/2000 | 0.724 | < 10 | |
| SC0020010 | 1 | 11/30/2000 | 0.636 | < 10 | |
| SC0020010 | 1 | 12/31/2000 | 0.57 | < 10 | |
| SC0022012 | 1 | 10/31/1994 | 0.0112 | 10 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0026191 | 1 | 8/31/1999 | 0.108 | 10 | |
| SC0026191 | 1 | 9/30/1999 | 0.104 | < 10 | |
| SC0026191 | 1 | 10/31/1999 | 0.152 | < 4 | |
| SC0026191 | 1 | 11/30/1999 | 0.13 | 5 | |
| SC0026191 | 1 | 12/31/1999 | 0.143 | 2 | |
| SC0026191 | 1 | 1/31/2000 | 0.166 | 2 | |
| SC0026191 | 1 | 2/29/2000 | 0.174 | 2 | |
| SC0026191 | 1 | 3/31/2000 | 0.175 | 2 | |
| SC0026191 | 1 | 4/30/2000 | 0.161 | 3 | |
| SC0026191 | 1 | 5/31/2000 | 0.123 | < 2 | |
| SC0026191 | 1 | 6/30/2000 | 0.101 | 2 | |
| SC0026191 | 1 | 7/31/2000 | 0.087 | < 2 | |
| SC0026191 | 1 | 8/31/2000 | 0.102 | < 2 | |
| SC0026191 | 1 | 9/30/2000 | 0.121 | 4 | |
| SC0026191 | 1 | 10/31/2000 | 0.108 | 5 | |
| SC0026191 | 1 | 11/30/2000 | 0.139 | < 2 | |
| SC0026191 | 1 | 12/31/2000 | 0.15 | < 2 | |
| SC0027049 | 1 | 4/30/1997 | 0.002 | < 10 | |
| SC0027049 | 1 | 3/31/1998 | 0.002 | < 10 | |
| SC0027049 | 1 | 4/30/1998 | 0.001 | < 10 | |
| SC0027049 | 1 | 12/31/1998 | 0.0016 | < 10 | |
| SC0027049 | 1 | 6/30/1999 | 0.0015 | < 10 | |
| SC0027049 | 1 | 1/31/2000 | 0.0009 | < 10 | |
| SC0027049 | 1 | 2/29/2000 | 0.0001 | < 10 | |
| SC0028762 | 1 | 11/30/1993 | 0.0092 | < 10 | |
| SC0028762 | 1 | 12/31/1993 | 0.0092 | < 10 | |
| SC0028762 | 1 | 1/31/1994 | 0.0092 | < 10 | |
| SC0028762 | 1 | 2/28/1994 | 0.0058 | <10 | |
| SC0028762 | 1 | 3/31/1994 | 0.009 | 9 | |
| SC0028762 | 1 | 4/30/1994 | 0.009 | < 10 | |
| SC0028762 | 1 | 5/31/1994 | 0.018 | < 10 | |
| SC0028762 | 1 | 9/30/1994 | 0.014 | < 10 | |
| SC0028762 | 1 | 10/31/1994 | 0.009 | 10 | |
| SC0028762 | 1 | 11/30/1994 | 0.011 | 10 | |
| SC0028762 | 1 | 1/31/1995 | 0.009 | 10 | |
| SC0028762 | 1 | 2/28/1995 | 0.009 | < 10 | |
| SC0028762 | 1 | 5/31/1995 | 0.01 | < 10 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0022012 | 1 | 1/31/1995 | 0.0155 | 10 | |
| SC0022012 | 1 | 8/31/1995 | 0.019 | 10 | |
| SC0022012 | 1 | 9/30/1995 | 0.015 | 18 | |
| SC0022012 | 1 | 10/31/1995 | 0.015 | < 10 | |
| SC0022012 | 1 | 2/29/1996 | 0.035 | 10 | |
| SC0022012 | 1 | 3/31/1996 | 0.02 | 10 | |
| SC0022012 | 1 | 4/30/1996 | 0.013 | 10 | |
| SC0022012 | 1 | 5/31/1996 | 0.01 | < 10 | |
| SC0022012 | 1 | 6/30/1996 | 0.009 | 10 | |
| SC0022012 | 1 | 7/31/1996 | 0.01 | 10 | |
| SC0022012 | 1 | 8/31/1996 | 0.01 | 10 | |
| SC0022012 | 1 | 9/30/1996 | 0.01 | 164 | |
| SC0022012 | 1 | 10/31/1996 | 0.009 | 114 | |
| SC0022012 | 1 | 11/30/1996 | 0.009 | 73.7 | |
| SC0022012 | 1 | 12/31/1996 | 0.012 | 18 | |
| SC0022012 | 1 | 1/31/1997 | 0.018 | 36 | |
| SC0022012 | 1 | 2/28/1997 | 0.023 | 10 | |
| SC0022012 | 1 | 3/31/1997 | 0.027 | 137 | |
| SC0022012 | 1 | 4/30/1997 | 0.014 | 10 | |
| SC0022012 | 1 | 5/31/1997 | 0.012 | 10 | |
| SC0022012 | 1 | 6/30/1997 | 0.009 | 10 | |
| SC0022012 | 1 | 7/31/1997 | 0.009 | 10 | |
| SC0022012 | 1 | 8/31/1997 | 0.008 | 10 | |
| SC0022012 | 1 | 9/30/1997 | 0.009 | 152 | |
| SC0022012 | 1 | 10/31/1997 | 0.011 | 10 | |
| SC0022012 | 1 | 11/30/1997 | 0.011 | 10 | |
| SC0022012 | 1 | 12/31/1997 | 0.014 | 80 | |
| SC0022012 | 1 | 1/31/1998 | 0.02 | 10 | |
| SC0022012 | 1 | 2/28/1998 | 0.022 | 10 | |
| SC0022012 | 1 | 3/31/1998 | 0.016 | 10 | |
| SC0022012 | 1 | 4/30/1998 | 0.022 | 9 | |
| SC0022012 | 1 | 5/31/1998 | 0.0167 | 10 | |
| SC0022012 | 1 | 6/30/1998 | 0.0091 | 10 | |
| SC0022012 | 1 | 7/31/1998 | 0.01 | 10 | |
| SC0022012 | 1 | 8/31/1998 | 0.0099 | 63 | |
| SC0022012 | 1 | 9/30/1998 | 0.0097 | < 10 | |
| SC0022012 | 1 | 10/31/1998 | 0.0087 | 10 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0028762 | 1 | 9/30/1995 | 0.0018 | < 10 | |
| SC0028762 | 1 | 10/31/1995 | 0.0095 | < 10 | |
| SC0028762 | 1 | 11/30/1995 | 0.01 | 4700 | x |
| SC0028762 | 1 | 1/31/1996 | 0.014 | < 10 | |
| SC0028762 | 1 | 2/29/1996 | 0.009 | < 10 | |
| SC0028762 | 1 | 3/31/1996 | 0.012 | < 10 | |
| SC0028762 | 1 | 4/30/1996 | 0.009 | < 10 | |
| SC0028762 | 1 | 5/31/1996 | 0.009 | < 10 | |
| SC0028762 | 1 | 9/30/1996 | 0.009 | < 10 | |
| SC0028762 | 1 | 10/31/1996 | 0.009 | < 10 | |
| SC0028762 | 1 | 11/30/1996 | 0.011 | < 10 | |
| SC0028762 | 1 | 1/31/1997 | 0.008 | < 10 | |
| SC0028762 | 1 | 2/28/1997 | 0.011 | < 10 | |
| SC0028762 | 1 | 3/31/1997 | 0.011 | < 10 | |
| SC0028762 | 1 | 4/30/1997 | 0.01 | < 10 | |
| SC0028762 | 1 | 5/31/1997 | 0.008 | < 10 | |
| SC0028762 | 1 | 9/30/1997 | 0.008 | < 10 | |
| SC0028762 | 1 | 10/31/1997 | 0.007 | < 10 | |
| SC0028762 | 1 | 11/30/1997 | 0.014 | < 10 | |
| SC0028762 | 1 | 12/31/1997 | 0.009 | < 10 | |
| SC0028762 | 1 | 1/31/1998 | 0.009 | < 10 | |
| SC0028762 | 1 | 2/28/1998 | 0.009 | < 10 | |
| SC0028762 | 1 | 3/31/1998 | 0.011 | 54 | |
| SC0028762 | 1 | 4/30/1998 | 0.01 | < 10 | |
| SC0028762 | 1 | 5/31/1998 | 0.008 | < 10 | |
| SC0028762 | 1 | 7/31/1998 | 0.003 | < 10 | |
| SC0028762 | 1 | 8/31/1998 | 0.0049 | 295 | - |
| SC0028762 | 1 | 9/30/1998 | 0.0058 | < 10 | |
| SC0028762 | 1 | 10/31/1998 | 0.011 | < 10 | |
| SC0028762 | 1 | 11/30/1998 | 0.011 | < 10 | |
| SC0028762 | 1 | 12/31/1998 | 0.009 | < 10 | |
| SC0028762 | 1 | 1/31/1999 | 0.0062 | < 10 | |
| SC0028762 | 1 | 2/28/1999 | 0.008 | < 10 | |
| SC0028762 | 1 | 3/31/1999 | 0.0068 | 47.4 | |
| SC0028762 | 1 | 4/30/1999 | 0.0017 | < 10 | |
| SC0028762 | 1 | 5/31/1999 | 0.0135 | 36 | |
| SC0028762 | 1 | 8/31/1999 | 0 | 72 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0022012 | 1 | 11/30/1998 | 0.009 | 141 | |
| SC0022012 | 1 | 12/31/1998 | 0.0119 | < 10 | |
| SC0022012 | 1 | 1/31/1999 | 0.015 | 10 | |
| SC0022012 | 1 | 2/28/1999 | 0.016 | < 10 | |
| SC0022012 | 1 | 3/31/1999 | 0.009 | 10 | |
| SC0022012 | 1 | 4/30/1999 | 0.018 | 18 | |
| SC0022012 | 1 | 5/31/1999 | 0.01 | 10 | |
| SC0022012 | 1 | 7/31/1999 | 0.005 | < 10 | |
| SC0022012 | 1 | 8/31/1999 | 0.004 | 10 | |
| SC0022012 | 1 | 9/30/1999 | 0.007 | 10 | |
| SC0022012 | 1 | 10/31/1999 | 0.011 | < 10 | |
| SC0022012 | 1 | 11/30/1999 | 0.01 | 2 | |
| SC0022012 | 1 | 12/31/1999 | 0.009 | 50 | |
| SC0022012 | 1 | 1/31/2000 | 0.012 | 2 | |
| SC0022012 | 1 | 2/29/2000 | 0.013 | 22 | |
| SC0022012 | 1 | 3/31/2000 | 0.015 | 2 | |
| SC0022012 | 1 | 4/30/2000 | 0.02 | 55 | |
| SC0022012 | 1 | 5/31/2000 | 0.011 | < 2 | |
| SC0022012 | 1 | 6/30/2000 | 0.011 | 90 | |
| SC0022012 | 1 | 7/31/2000 | 0.01 | 35 | |
| SC0022012 | 1 | 8/31/2000 | 0.01 | 128 | |
| SC0022012 | 1 | 9/30/2000 | 0.009 | 76 | |
| SC0022012 | 1 | 10/31/2000 | 0.0079 | 2 | |
| SC0022012 | 1 | 11/30/2000 | 0.013 | < 2 | |
| SC0022012 | 1 | 12/31/2000 | 0.012 | 57 | |
| SC0023035 | 1 | 1/31/1990 | 0.24 | 5 | |
| SC0023035 | 1 | 2/28/1990 | 0.21 | 8 | |
| SC0023035 | 1 | 3/31/1990 | 0.25 | 13 | |
| SC0023035 | 1 | 4/30/1990 | 0.2014 | 3 | |
| SC0023035 | 1 | 5/31/1990 | 0.18 | 27 | |
| SC0023035 | 1 | 6/30/1990 | 0.2 | 49 | |
| SC0023035 | 1 | 7/31/1990 | 0.23 | 28 | |
| SC0023035 | 1 | 8/31/1990 | 0.23 | > 18 | |
| SC0023035 | 1 | 9/30/1990 | 0.24 | > 29 | |
| SC0023035 | 1 | 10/31/1990 | 0.29 | < 4 | |
| SC0023035 | 1 | 11/30/1990 | 0.21 | < 3 | |
| SC0023035 | 1 | 12/31/1990 | 0.21 | < 3 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0028762 | 1 | 9/30/1999 | 0.0073 | < 10 | |
| SC0028762 | 1 | 10/31/1999 | 0.006 | < 10 | |
| SC0028762 | 1 | 11/30/1999 | 0.009 | < 10 | |
| SC0028762 | 1 | 12/31/1999 | 0.006 | 27 | |
| SC0028762 | 1 | 1/31/2000 | 0.0068 | < 10 | |
| SC0028762 | 1 | 2/29/2000 | 0.0062 | < 10 | |
| SC0028762 | 1 | 3/31/2000 | 0.006 | < 10 | |
| SC0028762 | 1 | 4/30/2000 | 0.007 | < 10 | |
| SC0028762 | 1 | 5/31/2000 | 0.007 | < 10 | |
| SC0028762 | 1 | 9/30/2000 | 0.005 | < 10 | |
| SC0028762 | 1 | 10/31/2000 | 0.007 | < 10 | |
| SC0028762 | 1 | 11/30/2000 | 0.006 | < 10 | |
| SC0038652 | 1 | 1/31/1994 | 0.012 | < 10 | |
| SC0038652 | 1 | 3/31/1994 | 0.0012 | < 10 | |
| SC0038652 | 1 | 4/30/1994 | 0.014 | < 10 | |
| SC0038652 | 1 | 5/31/1994 | 0.012 | < 10 | |
| SC0038652 | 1 | 9/30/1994 | 0.009 | < 10 | |
| SC0038652 | 1 | 10/31/1994 | 0.012 | 10 | |
| SC0038652 | 1 | 11/30/1994 | 0.012 | 10 | |
| SC0038652 | 1 | 1/31/1995 | 0.011 | 9 | |
| SC0038652 | 1 | 2/28/1995 | 0.012 | 9 | |
| SC0038652 | 1 | 3/31/1995 | 0.012 | < 10 | |
| SC0038652 | 1 | 4/30/1995 | 0.007 | 9 | |
| SC0038652 | 1 | 5/31/1995 | 0.012 | 9 | |
| SC0038652 | 1 | 9/30/1995 | 0.011 | < 10 | |
| SC0038652 | 1 | 11/30/1995 | 0.011 | < 10 | |
| SC0038652 | 1 | 1/31/1996 | 0.011 | < 10 | |
| SC0038652 | 1 | 2/29/1996 | 0.011 | < 10 | |
| SC0038652 | 1 | 3/31/1996 | 0.014 | < 10 | |
| SC0038652 | 1 | 4/30/1996 | 0.011 | < 10 | |
| SC0038652 | 1 | 5/31/1996 | 0.014 | < 10 | |
| SC0038652 | 1 | 9/30/1996 | 0.01 | 2500 | x |
| SC0038652 | 1 | 10/31/1996 | 0.008 | < 10 | |
| SC0038652 | 1 | 11/30/1996 | 0.009 | < 10 | |
| SC0038652 | 1 | 1/31/1997 | 0.009 | < 10 | |
| SC0038652 | 1 | 2/28/1997 | 0.008 | < 10 | |
| SC0038652 | 1 | 3/31/1997 | 0.009 | < 10 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0023035 | 1 | 1/31/1991 | 0.221 | < 3 | |
| SC0023035 | 1 | 2/28/1991 | 0.22 | > 27 | |
| SC0023035 | 1 | 3/31/1991 | 0.2067 | < 3 | |
| SC0023035 | 1 | 4/30/1991 | 0.1911 | < 17 | |
| SC0023035 | 1 | 5/31/1991 | 0.1966 | < 25 | |
| SC0023035 | 1 | 6/30/1991 | 0.2015 | < 8 | |
| SC0023035 | 1 | 7/31/1991 | 0.2167 | < 5 | |
| SC0023035 | 1 | 8/31/1991 | 0.2684 | 30 | |
| SC0023035 | 1 | 9/30/1991 | 0.189 | 5 | |
| SC0023035 | 1 | 10/31/1991 | 0.1649 | < 18 | |
| SC0023035 | 1 | 11/30/1991 | 0.1377 | > 17 | |
| SC0023035 | 1 | 1/31/1992 | 0.1277 | < 4 | |
| SC0023035 | 1 | 2/29/1992 | 0.2105 | > 136 | |
| SC0023035 | 1 | 3/31/1992 | 0.2512 | > 140 | |
| SC0023035 | 1 | 4/30/1992 | 0.2147 | > 29 | |
| SC0023035 | 1 | 5/31/1992 | 0.2019 | > 136 | |
| SC0023035 | 1 | 6/30/1992 | 0.2044 | > 32 | |
| SC0023035 | 1 | 7/31/1992 | 0.2315 | > 86 | |
| SC0023035 | 1 | 8/31/1992 | 0.2855 | > 77 | |
| SC0023035 | 1 | 9/30/1992 | 0.25 | > 158 | |
| SC0023035 | 1 | 10/31/1992 | 0.19 | > 86 | |
| SC0023035 | 1 | 11/30/1992 | 0.24 | > 38 | |
| SC0023035 | 1 | 12/31/1992 | 0.3813 | > 22 | |
| SC0023035 | 1 | 1/31/1993 | 0.2198 | > 74 | |
| SC0023035 | 1 | 2/28/1993 | 0.1675 | > 66 | |
| SC0023035 | 1 | 4/30/1993 | 0.2131 | > 34 | |
| SC0023035 | 1 | 5/31/1993 | 0.3052 | > 41 | |
| SC0023035 | 1 | 6/30/1993 | 0.2088 | > 51 | |
| SC0023035 | 1 | 7/31/1993 | 0.1999 | < 41 | |
| SC0023035 | 1 | 8/31/1993 | 0.2099 | 77 | |
| SC0023035 | 1 | 9/30/1993 | 0.2232 | 12 | |
| SC0023035 | 1 | 10/31/1993 | 0.2371 | 53 | |
| SC0023035 | 1 | 11/30/1993 | 0.2051 | > 35 | |
| SC0023035 | 1 | 12/31/1993 | 0.1833 | 4 | |
| SC0023035 | 1 | 1/31/1994 | 0.2243 | 24 | |
| SC0023035 | 1 | 2/28/1994 | 0.245 | 33 | |
| SC0023035 | 1 | 3/31/1994 | 0.2728 | > 382 | - |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0038652 | 1 | 4/30/1997 | 0.011 | < 10 | |
| SC0038652 | 1 | 5/31/1997 | 0.009 | < 10 | |
| SC0038652 | 1 | 9/30/1997 | 0.009 | < 10 | |
| SC0038652 | 1 | 10/31/1997 | 0.009 | 9 | |
| SC0038652 | 1 | 11/30/1997 | 0.01 | < 10 | |
| SC0038652 | 1 | 12/31/1997 | 0.011 | < 10 | |
| SC0038652 | 1 | 1/31/1998 | 0.011 | < 10 | |
| SC0038652 | 1 | 2/28/1998 | 0.011 | < 10 | |
| SC0038652 | 1 | 3/31/1998 | 0.007 | < 10 | |
| SC0038652 | 1 | 4/30/1998 | 0.012 | < 10 | |
| SC0038652 | 1 | 5/31/1998 | 0.0076 | < 10 | |
| SC0038652 | 1 | 7/31/1998 | 0.0014 | < 10 | |
| SC0038652 | 1 | 8/31/1998 | 0.008 | 212 | - |
| SC0038652 | 1 | 9/30/1998 | 0.0064 | < 10 | |
| SC0038652 | 1 | 10/31/1998 | 0.012 | < 10 | |
| SC0038652 | 1 | 11/30/1998 | 0.013 | < 10 | |
| SC0038652 | 1 | 12/31/1998 | 0.0085 | < 10 | |
| SC0038652 | 1 | 1/31/1999 | 0.0089 | < 10 | |
| SC0038652 | 1 | 2/28/1999 | 0.0063 | < 10 | |
| SC0038652 | 1 | 3/31/1999 | 0.0066 | < 10 | |
| SC0038652 | 1 | 4/30/1999 | 0.012 | < 10 | |
| SC0038652 | 1 | 5/31/1999 | 0.0093 | 9 | |
| SC0038652 | 1 | 8/31/1999 | 0.003 | 99 | |
| SC0038652 | 1 | 9/30/1999 | 0.01 | < 10 | |
| SC0038652 | 1 | 10/31/1999 | 0.014 | < 10 | |
| SC0038652 | 1 | 11/30/1999 | 0.0045 | < 10 | |
| SC0038652 | 1 | 12/31/1999 | 0.011 | < 10 | |
| SC0038652 | 1 | 1/31/2000 | 0.0152 | < 10 | |
| SC0038652 | 1 | 2/29/2000 | 0.0084 | < 10 | |
| SC0038652 | 1 | 3/31/2000 | 0.008 | < 10 | |
| SC0038652 | 1 | 4/30/2000 | 0.007 | < 10 | |
| SC0038652 | 1 | 5/31/2000 | 0.007 | < 10 | |
| SC0038652 | 1 | 8/31/2000 | 0.007 | 108 | |
| SC0038652 | 1 | 9/30/2000 | 0.007 | < 10 | |
| SC0038652 | 1 | 10/31/2000 | 0.006 | < 10 | |
| SC0038652 | 1 | 11/30/2000 | 0.005 | < 10 | |
| SC0047716 | 1 | 6/30/1999 | 0.341 | 65 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0023035 | 1 | 4/30/1994 | 0.19 | > 108 | |
| SC0023035 | 1 | 5/31/1994 | 0.1782 | 22 | |
| SC0023035 | 1 | 6/30/1994 | 0.239 | > 30 | |
| SC0023035 | 1 | 7/31/1994 | 0.2296 | 3 | |
| SC0023035 | 1 | 8/31/1994 | 0.2723 | 10 | |
| SC0023035 | 1 | 9/30/1994 | 0.215 | 22 | |
| SC0023035 | 1 | 10/31/1994 | 0.2414 | 10 | |
| SC0023035 | 1 | 11/30/1994 | 0.2159 | 13 | |
| SC0023035 | 1 | 12/31/1994 | 0.2371 | 6 | |
| SC0023035 | 1 | 1/31/1995 | 0.2744 | 20 | |
| SC0023035 | 1 | 2/28/1995 | 0.2632 | < 18 | |
| SC0023035 | 1 | 3/31/1995 | 0.2224 | 6 | |
| SC0023035 | 1 | 4/30/1995 | 0.195 | 19 | |
| SC0023035 | 1 | 5/31/1995 | 0.2021 | > 11 | |
| SC0023035 | 1 | 6/30/1995 | 0.2091 | 29 | |
| SC0023035 | 1 | 7/31/1995 | 0.1983 | 35 | |
| SC0023035 | 1 | 8/31/1995 | 0.2925 | 9 | |
| SC0023035 | 1 | 9/30/1995 | 0.1786 | < 82 | |
| SC0023035 | 1 | 10/31/1995 | 0.2401 | 69 | |
| SC0023035 | 1 | 11/30/1995 | 0.2362 | 40 | |
| SC0023035 | 1 | 12/31/1995 | 0.1867 | 3 | |
| SC0023035 | 1 | 1/31/1996 | 0.2307 | 3 | |
| SC0023035 | 1 | 2/29/1996 | 0.2806 | > 10 | |
| SC0023035 | 1 | 3/31/1996 | 0.2566 | 16 | |
| SC0023035 | 1 | 4/30/1996 | 0.2052 | 6 | |
| SC0023035 | 1 | 5/31/1996 | 0.2309 | 9 | |
| SC0023035 | 1 | 6/30/1996 | 0.211 | 33 | |
| SC0023035 | 1 | 7/31/1996 | 0.1986 | 18 | |
| SC0023035 | 1 | 8/31/1996 | 0.1926 | 37 | |
| SC0023035 | 1 | 9/30/1996 | 0.1978 | 32 | |
| SC0023035 | 1 | 10/31/1996 | 0.1605 | 37 | |
| SC0023035 | 1 | 11/30/1996 | 0.181 | 24 | |
| SC0023035 | 1 | 12/31/1996 | 0.2197 | 22 | |
| SC0023035 | 1 | 1/31/1997 | 0.2221 | 21 | |
| SC0023035 | 1 | 2/28/1997 | 0.2519 | 5 | |
| SC0023035 | 1 | 3/31/1997 | 0.2184 | > 101 | |
| SC0023035 | 1 | 4/30/1997 | 0.1929 | > 31 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0047716 | 1 | 7/31/1999 | 0.473 | 20 | |
| SC0047716 | 1 | 8/31/1999 | 0.37 | 10 | |
| SC0047716 | 1 | 9/30/1999 | 0.29 | 12 | |
| SC0047716 | 1 | 10/31/1999 | 0.36 | 9 | |
| SC0047716 | 1 | 11/30/1999 | 0.26 | 10 | |
| SC0047716 | 1 | 12/31/1999 | 0.28 | 10 | |
| SC0047716 | 1 | 1/31/2000 | 0.29 | 10 | |
| SC0047716 | 1 | 2/29/2000 | 0.25 | 10 | |
| SC0047716 | 1 | 3/31/2000 | 0.34 | 10 | |
| SC0047716 | 1 | 4/30/2000 | 0.35 | 10 | |
| SC0047716 | 1 | 5/31/2000 | 0.28 | 10 | |
| SC0047716 | 1 | 6/30/2000 | 0.28 | 10 | |
| SC0047716 | 1 | 7/31/2000 | 0.35 | 36 | |
| SC0047716 | 1 | 8/31/2000 | 0.29 | 13 | |
| SC0047716 | 1 | 9/30/2000 | 0.29 | 10 | |
| SC0047716 | 1 | 10/31/2000 | 0.23 | < 10 | |
| SC0047716 | 1 | 11/30/2000 | 0.31 | 19 | |
| SC0047716 | 1 | 12/31/2000 | 0.308 | 10 | |
| SC0047899 | 1 | 9/30/1999 | 0.0053 | 10 | |
| SC0047899 | 1 | 10/31/1999 | 0.0166 | < 10 | |
| SC0047899 | 1 | 11/30/1999 | 0.007 | 2 | |
| SC0047899 | 1 | 12/31/1999 | 0.007 | 2 | |
| SC0047899 | 1 | 1/31/2000 | 0.008 | 2 | |
| SC0047899 | 1 | 2/29/2000 | 0.007 | 3 | |
| SC0047899 | 1 | 3/31/2000 | 0.008 | 2 | |
| SC0047899 | 1 | 4/30/2000 | 0.01 | 2 | |
| SC0047899 | 1 | 5/31/2000 | 0.008 | 19 | |
| SC0047899 | 1 | 6/30/2000 | 0.008 | < 2 | |
| SC0047899 | 1 | 7/31/2000 | 0.0075 | < 2 | |
| SC0047899 | 1 | 8/31/2000 | 0.009 | 7 | |
| SC0047899 | 1 | 9/30/2000 | 0.0075 | 42 | |
| SC0047899 | 1 | 10/31/2000 | 0.0045 | 42 | |
| SC0047899 | 1 | 11/30/2000 | 0.0059 | 4 | |
| SC0047899 | 1 | 12/31/2000 | 0.0069 | < 2 | |
| SC0047899 | 1 | 1/31/2001 | 0.0063 | < 2 | |
| SC0047899 | 1 | 2/28/2001 | 0.0067 | < 2 | |
| SC0047899 | 1 | 3/31/2001 | 0.0068 | < 2 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0023035 | 1 | 5/31/1997 | 0.1675 | 13 | |
| SC0023035 | 1 | 6/30/1997 | 0.1721 | 31 | |
| SC0023035 | 1 | 7/31/1997 | 0.1975 | 37 | |
| SC0023035 | 1 | 8/31/1997 | 0.1548 | 45 | |
| SC0023035 | 1 | 9/30/1997 | 0.1833 | 39 | |
| SC0023035 | 1 | 10/31/1997 | 0.2252 | 22 | |
| SC0023035 | 1 | 11/30/1997 | 0.2026 | 8 | |
| SC0023035 | 1 | 12/31/1997 | 0.2361 | 8 | |
| SC0023035 | 1 | 1/31/1998 | 0.2869 | 10 | |
| SC0023035 | 1 | 2/28/1998 | 0.2851 | 15 | |
| SC0023035 | 1 | 3/31/1998 | 0.2445 | 19 | |
| SC0023035 | 1 | 4/30/1998 | 0.2433 | 16 | |
| SC0023035 | 1 | 5/31/1998 | 0.2225 | 42 | |
| SC0023035 | 1 | 6/30/1998 | 0.1841 | 59 | |
| SC0023035 | 1 | 7/31/1998 | 0.1926 | 10 | |
| SC0023035 | 1 | 8/31/1998 | 0.1971 | 13 | |
| SC0023035 | 1 | 9/30/1998 | 0.1839 | 13 | |
| SC0023035 | 1 | 10/31/1998 | 0.2092 | 12 | |
| SC0023035 | 1 | 11/30/1998 | 0.2143 | 7 | |
| SC0023035 | 1 | 12/31/1998 | 0.2383 | 13 | |
| SC0023035 | 1 | 1/31/1999 | 0.2561 | 6 | |
| SC0023035 | 1 | 2/28/1999 | 0.2494 | 9 | |
| SC0023035 | 1 | 3/31/1999 | 0.2021 | 3 | |
| SC0023035 | 1 | 4/30/1999 | 0.2045 | 40 | |
| SC0023035 | 1 | 5/31/1999 | 0.1951 | 13 | |
| SC0023035 | 1 | 6/30/1999 | 0.2053 | 66 | |
| SC0023035 | 1 | 7/31/1999 | 0.2105 | 46 | |
| SC0023035 | 1 | 8/31/1999 | 0.1844 | > 81 | |
| SC0023035 | 1 | 9/30/1999 | 0.1957 | 102 | |
| SC0023035 | 1 | 10/31/1999 | 0.2181 | 25 | |
| SC0023035 | 1 | 11/30/1999 | 0.1587 | 24 | |
| SC0023035 | 1 | 12/31/1999 | 0.1839 | 7.5 | |

| NPDES | Pipe | Date | Average Flow (MGD) | Fecal Coliform (#/100 ml) | Permit Exceedence |
|---|---|---|---|---|---|
| SC0047899 | 1 | 4/30/2001 | 0.0067 | < 2 | |
| SC0047899 | 1 | 5/31/2001 | 0.008 | 2 | |
| SC0047899 | 1 | 6/30/2001 | 0.0078 | 2 | |
| SC0047899 | 1 | 7/31/2001 | 0.0095 | 43 | |
| SC0047899 | 1 | 8/31/2001 | 0.0107 | 4 | |
| SC0047899 | 1 | 9/30/2001 | 0.011 | 65 | |
| SC0047899 | 1 | 10/31/2001 | 0.0104 | 13 | |
| SC0047899 | 1 | 11/30/2001 | 0.0083 | 2 | |
| SC0047899 | 1 | 12/31/2001 | 0.0097 | 2 | |
| SC0047899 | 1 | 1/31/2002 | 0.0066 | 10 | |
| SC0047899 | 1 | 2/28/2002 | 0.0079 | 13 | |
| SC0047899 | 1 | 3/31/2002 | 0.009 | 2 | |
| SC0047899 | 1 | 4/30/2002 | 0.0098 | 2 | |
| SC0047899 | 1 | 5/31/2002 | 0.0115 | 2 | |
| SC0047899 | 1 | 6/30/2002 | 0.015 | 8 | |
| SC0047899 | 1 | 7/31/2002 | 0.0145 | 25 | |

# Appendix B
# Hydrology Calibration and Validation

The following pages present graphs depicting model runs versus observed flow data for the calibration period (January 1, 1990 to December 1, 1990). Additional tables are provided as validation of the model calibration. The hydrology was validated for the longer time period of January 1, 1990 to December 31, 1999.

Although the nearest weather stations (Clemson University Station and Pickens) were selected for modeling, localized rainfall events were not always reflected in actual rainfall recorded data. This resulted in discrepancies between modeled and observed flow for various storms throughout the calibration and validation time period.

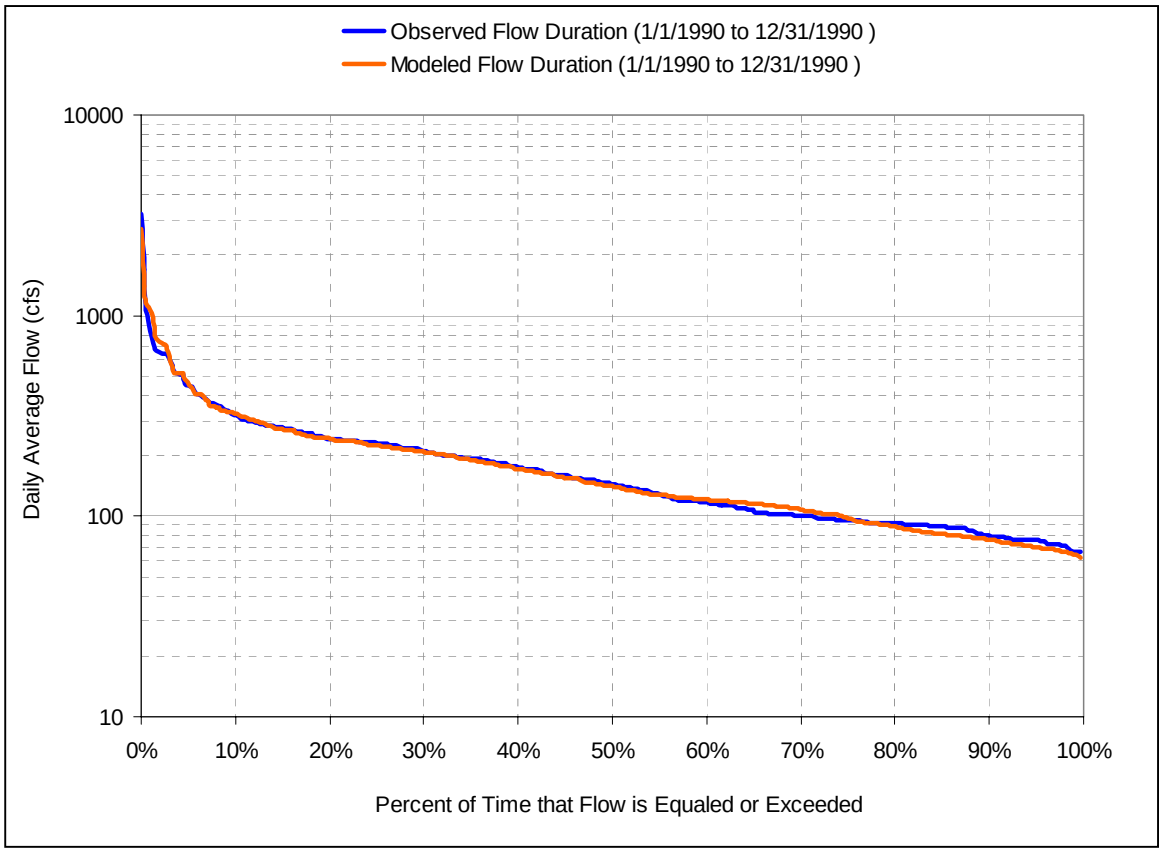


**Figure B-1. Hydrology Calibration: Flow Duration Analysis, 1990**

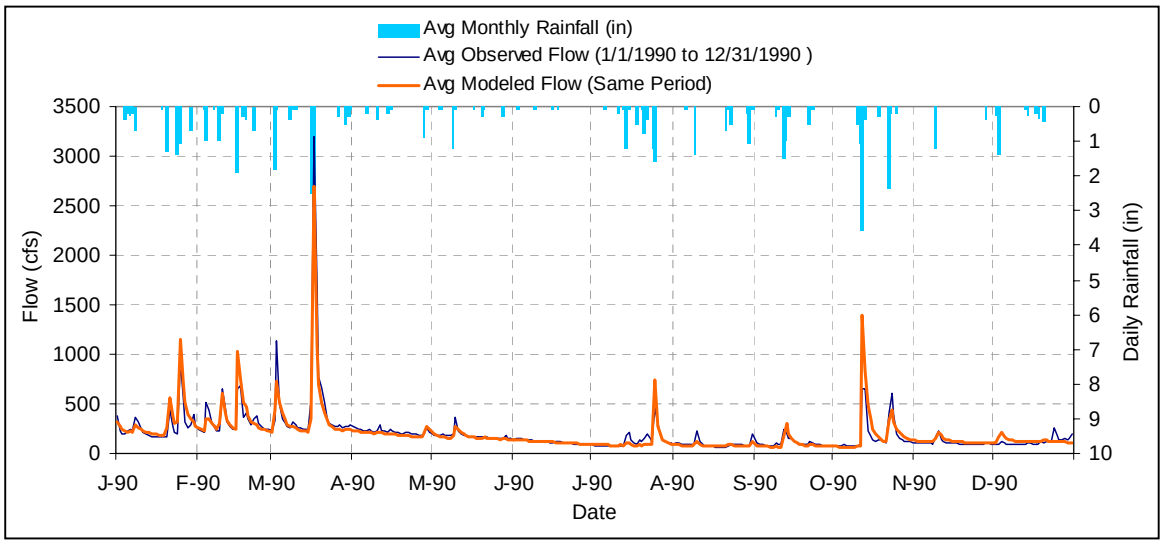


**Figure B-2. Hydrology Calibration: Modeled vs. Observed Flow, 1990**

## Table B-1. Statistical Hydrology Calibration Analysis, 1990

| LSPC Simulated Flow | | Observed Flow Gage | | |
|---|---|---|---|---|
| **REACH OUTFLOW FROM SUBBASIN 632**<br>1-Year Analysis Period: 1/1/1990 - 12/31/1990<br>Flow volumes are (inches/year) for upstream drainage area | | **USGS 02186000 TWELVEMILE CREEK NEAR LIBERTY, SC**<br>Pickens County, South Carolina<br>Hydrologic Unit Code 03060101<br>Latitude 34°48'05", Longitude 82°44'55" NAD27<br>Drainage area 106.00 square miles | | |
| Total Simulated In-stream Flow: | **25.14** | Total Observed In-stream Flow: | | **25.23** |
| | | | | |
| Total of simulated highest 10% flows: | **7.97** | Total of Observed highest 10% flows: | | **7.91** |
| Total of Simulated lowest 50% flows: | **6.36** | Total of Observed Lowest 50% flows: | | **6.37** |
| | | | | |
| Simulated Summer Flow Volume ( months 7-9): | **3.21** | Observed Summer Flow Volume (7-9): | | **3.51** |
| Simulated Fall Flow Volume (months 10-12): | **5.18** | Observed Fall Flow Volume (10-12): | | **4.40** |
| Simulated Winter Flow Volume (months 1-3): | **11.58** | Observed Winter Flow Volume (1-3): | | **11.80** |
| Simulated Spring Flow Volume (months 4-6): | **5.17** | Observed Spring Flow Volume (4-6): | | **5.51** |
| | | | | |
| Total Simulated Storm Volume: | **6.81** | Total Observed Storm Volume: | | **6.94** |
| Simulated Summer Storm Volume (7-9): | **0.73** | Observed Summer Storm Volume (7-9): | | **0.83** |
| *Errors (Simulated-Observed)* | *% Error* | *Recommended Criteria* | | |
| Error in total volume: | -0.35 | 10 | | |
| Error in 50% lowest flows: | -0.20 | 10 | | |
| Error in 10% highest flows: | 0.70 | 15 | | |
| Seasonal volume error - Summer: | -9.52 | 30 | | |
| Seasonal volume error - Fall: | 15.10 | 30 | | |
| Seasonal volume error - Winter: | -1.93 | 30 | | |
| Seasonal volume error - Spring: | -6.58 | 30 | | |
| Error in storm volumes: | -1.92 | 20 | | |
| Error in summer storm volumes: | -13.29 | 50 | | |

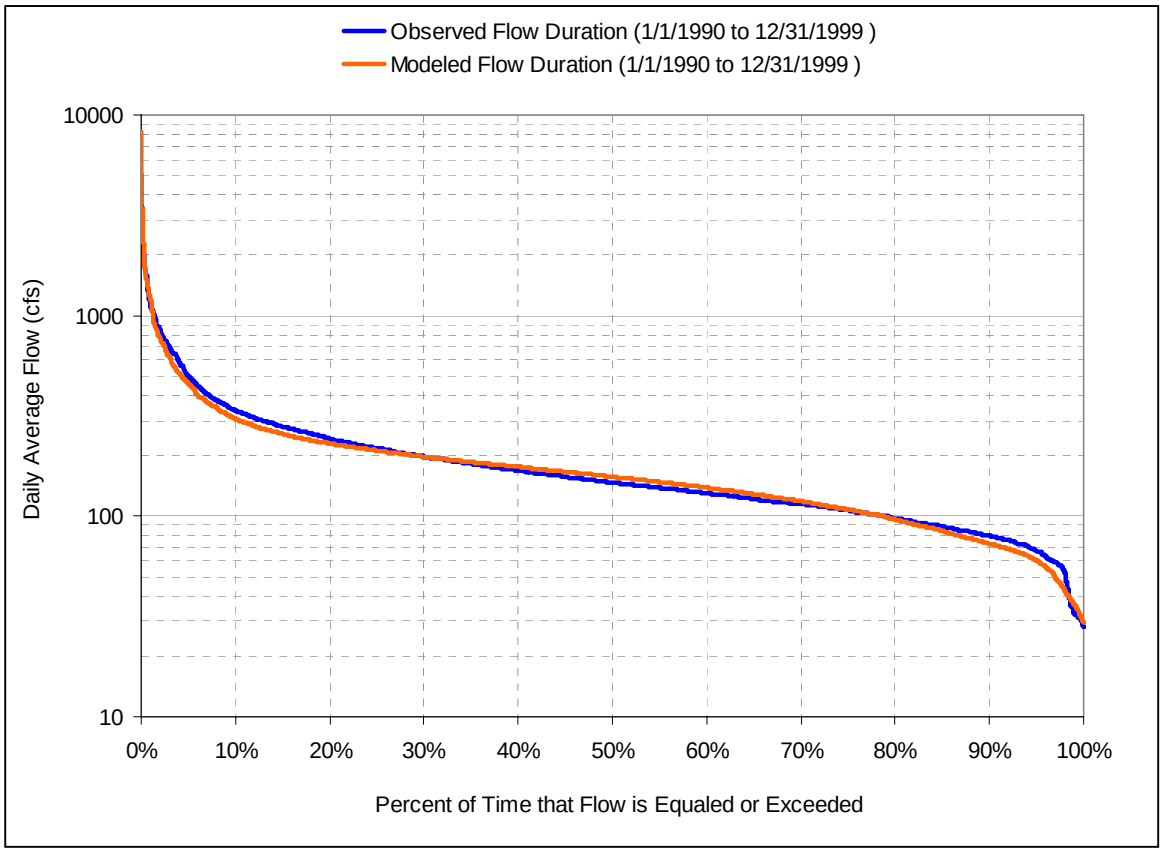


**Figure B-3. Hydrology Validation: Flow duration analysis, 1990-1999**

**Table B-2. Statistical Hydrology Validation analysis, 1990-1999**

| **LSPC Simulated Flow** | | **Observed Flow Gage** | |
|---|---|---|---|
| **REACH OUTFLOW FROM SUBBASIN 632**<br>10-Year Analysis Period: 1/1/1990 - 12/31/1999<br>Flow volumes are (inches/year) for upstream drainage area | | **USGS 02186000 TWELVEMILE CREEK NEAR LIBERTY, SC**<br>Pickens County, South Carolina<br>Hydrologic Unit Code 03060101<br>Latitude 34°48'05", Longitude 82°44'55" NAD27<br>Drainage area 106.00 square miles | |
| Total Simulated In-stream Flow: | **25.76** | Total Observed In-stream Flow: | **26.30** |
| | | | |
| Total of simulated highest 10% flows: | **8.43** | Total of Observed highest 10% flows: | **8.84** |
| Total of Simulated lowest 50% flows: | **6.74** | Total of Observed Lowest 50% flows: | **6.66** |
| | | | |
| Simulated Summer Flow Volume ( months 7-9): | **4.81** | Observed Summer Flow Volume (7-9): | **4.62** |
| Simulated Fall Flow Volume (months 10-12): | **5.15** | Observed Fall Flow Volume (10-12): | **5.34** |
| Simulated Winter Flow Volume (months 1-3): | **9.12** | Observed Winter Flow Volume (1-3): | **9.83** |
| Simulated Spring Flow Volume (months 4-6): | **6.67** | Observed Spring Flow Volume (4-6): | **6.52** |
| | | | |
| Total Simulated Storm Volume: | **7.09** | Total Observed Storm Volume: | **8.12** |
| Simulated Summer Storm Volume (7-9): | **1.18** | Observed Summer Storm Volume (7-9): | **1.50** |
| *Errors (Simulated-Observed)* | *% Error* | *Recommended Criteria* | |
| Error in total volume: | -2.09 | 10 | |
| Error in 50% lowest flows: | 1.32 | 10 | |
| Error in 10% highest flows: | -4.87 | 15 | |
| Seasonal volume error - Summer: | 4.05 | 30 | |
| Seasonal volume error - Fall: | -3.64 | 30 | |
| Seasonal volume error - Winter: | -7.69 | 30 | |
| Seasonal volume error - Spring: | 2.33 | 30 | |
| Error in storm volumes: | -14.53 | 20 | |
| Error in summer storm volumes: | -27.43 | 50 | |

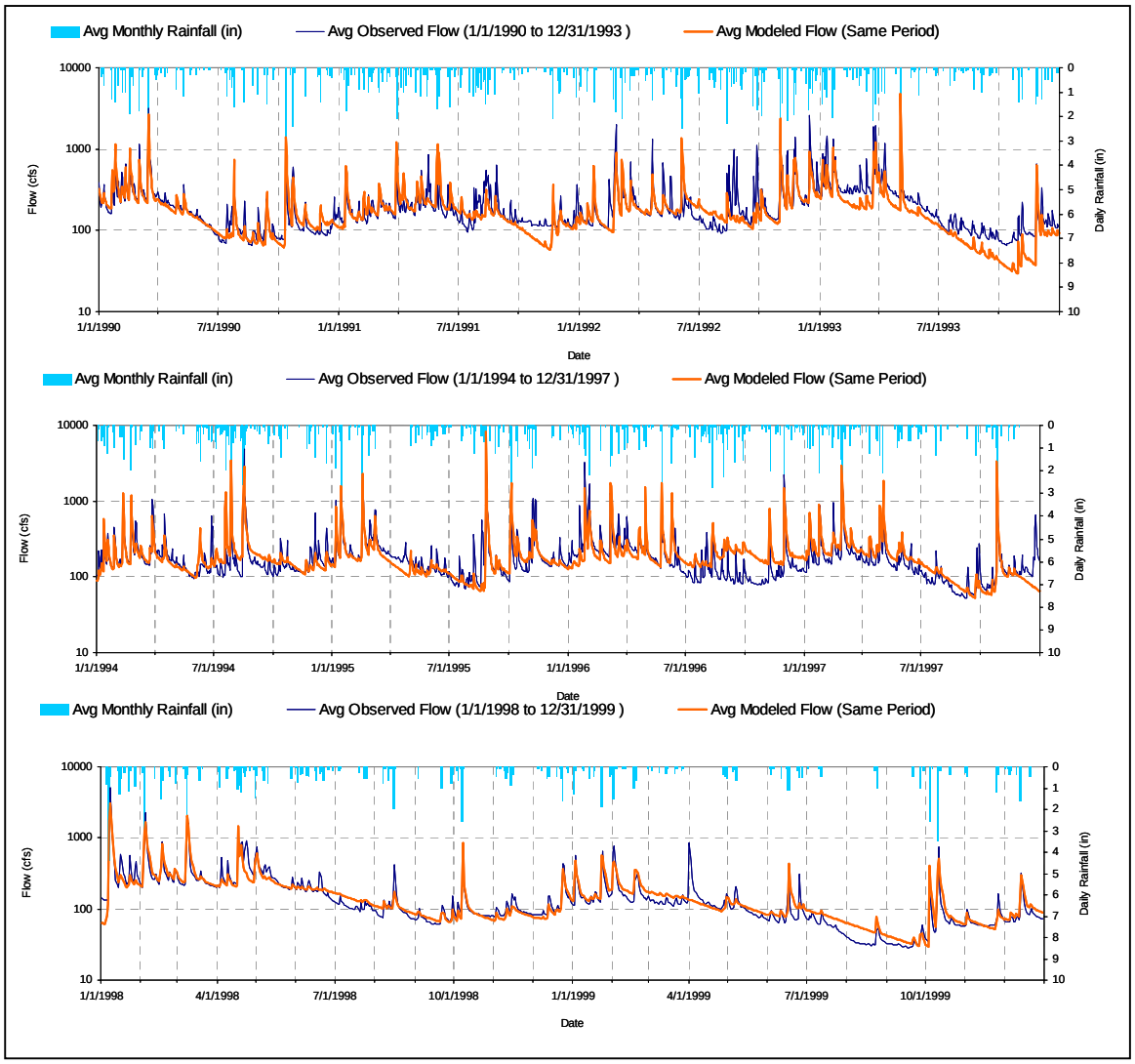


**Figure B-4. Hydrology Validation: Observed vs. Modeled Flow, 1990-1999**

# Appendix C
# Water Quality Data

## Table C-1 Fecal coliform bacteria data for impaired water quality stations on Twelve Mile Creek

| Station ID | Station Name | Date | Value: FC (#/100ml) | Comment |
|---|---|---|---|---|
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 5/24/1990 | 280 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 6/18/1990 | 200 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 7/24/1990 | 730 | Estimated |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 8/29/1990 | 550 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 9/13/1990 | 7200 | Estimated |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 10/23/1990 | 3800 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 5/13/1991 | 5800 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 6/27/1991 | 680 | Estimated |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 7/16/1991 | 290 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 8/28/1991 | 420 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 9/18/1991 | 260 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 10/14/1991 | 130 | Estimated |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 5/20/1993 | 390 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 11/17/1995 | 130 | Estimated |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 12/11/1995 | 270 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 1/11/1996 | 130 | Estimated |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 2/2/1996 | 3000 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 3/6/1996 | 6400 | Estimated |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 4/3/1996 | 530 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 5/29/1996 | 1700 | Estimated |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 6/21/1996 | 810 | Estimated |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 7/10/1996 | 250 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 8/23/1996 | 460 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 9/25/1996 | 490 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 10/22/1996 | 310 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 11/30/1999 | 320 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 12/9/1999 | 230 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 1/11/2000 | 860 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 2/23/2000 | 180 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 3/14/2000 | 110 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 4/12/2000 | 400 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 5/11/2000 | 150 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 6/6/2000 | 530 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 7/12/2000 | 280 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 8/7/2000 | 350 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 9/18/2000 | 210 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 10/10/2000 | 290 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 11/1/2000 | 180 | |
| SV-015 | TWELVE MI CK AT S-39-51 N OF NORRIS | 12/4/2000 | 190 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 5/24/1990 | 50 | Estimated |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 6/18/1990 | 180 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 7/24/1990 | 160 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 8/30/1990 | 240 | |

| Station ID | Station Name | Date | Value: FC (#/100ml) | Comment |
|---|---|---|---|---|
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 9/20/1990 | 160 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 10/10/1990 | 140 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 5/14/1991 | 45 | Estimated |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 6/13/1991 | 50 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 7/12/1991 | 120 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 8/6/1991 | 110 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 9/16/1991 | 320 | Estimated |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 10/3/1991 | 330 | Estimated |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 5/13/1993 | 170 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 6/2/1993 | 29 | Estimated |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 7/19/1993 | 310 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 8/17/1993 | 120 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 9/16/1993 | 140 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 10/22/1993 | 260 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 5/17/1994 | 84 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 6/8/1994 | 240 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 7/8/1994 | 200 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 8/23/1994 | 84 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 9/13/1994 | 180 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 5/9/1995 | 400 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 6/14/1995 | 440 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 7/21/1995 | 760 | Estimated |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 8/11/1995 | 420 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 9/21/1995 | 280 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 10/20/1995 | 140 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 5/29/1996 | 290 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 6/21/1996 | 620 | Estimated |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 7/19/1996 | 320 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 8/29/1996 | 220 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 9/20/1996 | 160 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 10/28/1996 | 60 | Estimated |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 5/20/1997 | 87 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 6/5/1997 | 230 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 7/30/1997 | 500 | Estimated |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 8/29/1997 | 200 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 9/25/1997 | 3200 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 10/10/1997 | 120 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 5/26/1998 | 68 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 6/23/1998 | 180 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 7/31/1998 | 81 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 8/18/1998 | 520 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 10/19/1998 | 220 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 5/11/1999 | 180 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 6/1/1999 | 160 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 7/8/1999 | 310 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 9/16/1999 | 840 | |

| Station ID | Station Name | Date | Value: FC (#/100ml) | Comment |
|---|---|---|---|---|
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 10/21/1999 | 390 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 5/11/2000 | 280 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 6/6/2000 | 330 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 7/12/2000 | 220 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 8/7/2000 | 420 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 9/18/2000 | 55 | |
| SV-136 | FIRST CK FROM CENTRAL ON MAW BRDG RD | 10/10/2000 | 140 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 5/24/1990 | 160 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 6/18/1990 | 110 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 7/26/1990 | 2200 | Estimated |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 8/30/1990 | 500 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 9/20/1990 | 140 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 10/10/1990 | 210 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 5/14/1991 | 460 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 6/13/1991 | 50 | Estimated |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 7/12/1991 | 4 | Estimated |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 8/6/1991 | 160 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 9/16/1991 | 270 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 10/3/1991 | 130 | Estimated |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 5/13/1993 | 310 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 11/17/1995 | 200 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 12/11/1995 | 130 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 1/11/1996 | 100 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 2/2/1996 | 440 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 3/6/1996 | 1700 | Estimated |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 4/3/1996 | 410 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 5/29/1996 | 1300 | Estimated |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 6/21/1996 | 1300 | Estimated |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 7/10/1996 | 97 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 8/23/1996 | 110 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 9/25/1996 | 180 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 10/22/1996 | 250 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 11/30/1999 | 100 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 12/9/1999 | 82 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 1/11/2000 | 1000 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 2/23/2000 | 170 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 3/14/2000 | 20 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 4/12/2000 | 100 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 5/11/2000 | 40 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 6/6/2000 | 290 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 7/12/2000 | 50 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 8/7/2000 | 80 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 9/18/2000 | 42 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 10/10/2000 | 130 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 11/1/2000 | 120 | |
| SV-137 | 12 MI CR AT S-39-52 ABOVE CENTRAL OUTFALL | 12/4/2000 | 130 | |

| Station ID | Station Name | Date | Value: FC (#/100ml) | Comment |
|---|---|---|---|---|
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 5/24/1990 | 250 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 6/18/1990 | 1000 | Estimated |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 7/24/1990 | 62 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 8/29/1990 | 100 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 9/13/1990 | 440 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 10/23/1990 | 740 | Estimated |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 5/13/1991 | 760 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 6/27/1991 | 75 | Estimated |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 7/16/1991 | 250 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 8/28/1991 | 60 | Estimated |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 9/18/1991 | 230 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 10/14/1991 | 160 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 5/20/1993 | 190 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 6/4/1993 | 68 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 7/21/1993 | 40 | Estimated |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 8/9/1993 | 43 | Estimated |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 9/20/1993 | 100 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 10/14/1993 | 240 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 5/26/1994 | 120 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 6/17/1994 | 130 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 7/28/1994 | 13000 | Estimated |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 8/18/1994 | 3600 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 10/16/1994 | 100 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 5/4/1995 | 130 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 6/8/1995 | 35 | Estimated |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 7/25/1995 | 120 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 8/25/1995 | 220 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 9/22/1995 | 100 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 10/13/1995 | 230 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 5/29/1996 | 520 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 6/21/1996 | 510 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 7/10/1996 | 120 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 8/23/1996 | 180 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 9/6/1996 | 210 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 10/22/1996 | 140 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 5/28/1997 | 180 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 6/19/1997 | 400 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 7/24/1997 | 1300 | Estimated |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 8/7/1997 | 140 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 9/18/1997 | 190 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 10/17/1997 | 370 | Estimated |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 5/27/1998 | 100 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 6/5/1998 | 1700 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 7/28/1998 | 86 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 8/13/1998 | 30 | Estimated |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 9/10/1998 | 89 | |

| Station ID | Station Name | Date | Value: FC (#/100ml) | Comment |
|---|---|---|---|---|
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 10/16/1998 | 71 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 5/13/1999 | 94 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 6/10/1999 | 100 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 7/8/1999 | 68 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 8/19/1999 | 30 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 9/16/1999 | 390 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 10/14/1999 | 240 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 5/1/2000 | 100 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 7/18/2000 | 90 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 8/10/2000 | 200 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 9/6/2000 | 180 | |
| SV-206 | N FORK 12 MI CK AT US-178 2.8 MI N OF PICKENS | 10/6/2000 | 200 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 5/24/1990 | 190 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 6/18/1990 | 450 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 7/24/1990 | 410 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 8/29/1990 | 390 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 9/13/1990 | 16000 | Estimated |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 10/23/1990 | 1300 | Estimated |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 5/13/1991 | 970 | Estimated |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 6/27/1991 | 280 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 7/16/1991 | 260 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 8/28/1991 | 1100 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 9/18/1991 | 820 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 10/14/1991 | 470 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 5/20/1993 | 270 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 6/4/1993 | 3000 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 7/21/1993 | 370 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 8/9/1993 | 560 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 9/20/1993 | 7900 | Estimated |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 10/14/1993 | 400 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 5/26/1994 | 370 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 6/17/1994 | 3300 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 7/28/1994 | 12000 | Estimated |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 8/18/1994 | 1000 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 10/16/1994 | 290 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 5/4/1995 | 220 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 6/8/1995 | 480 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 7/25/1995 | 420 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 8/25/1995 | 900 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 9/22/1995 | 250 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 10/13/1995 | 110 | Estimated |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 5/29/1996 | 620 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 6/21/1996 | 440 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 7/19/1996 | 580 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 8/29/1996 | 740 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 9/20/1996 | 500 | |

| Station ID | Station Name | Date | Value: FC (#/100ml) | Comment |
|---|---|---|---|---|
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 10/28/1996 | 140 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 5/20/1997 | 1000 | Estimated |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 6/5/1997 | 1300 | Estimated |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 7/30/1997 | 700 | Estimated |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 8/29/1997 | 210 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 9/25/1997 | 1200 | Estimated |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 10/10/1997 | 120 | Estimated |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 5/26/1998 | 460 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 6/23/1998 | 500 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 7/31/1998 | 260 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 8/18/1998 | 700 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 10/19/1998 | 330 | Estimated |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 5/11/1999 | 650 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 6/1/1999 | 420 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 7/8/1999 | 700 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 9/16/1999 | 270 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 10/21/1999 | 300 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 4/24/2000 | 320 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 5/1/2000 | 190 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 7/18/2000 | 400 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 8/10/2000 | 2700 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 9/6/2000 | 490 | |
| SV-239 | GOLDEN CK AT S-39-222 1.2 MI NW OF LIBERTY | 10/6/2000 | 890 | |

# Appendix D
# Water Quality Calibration

The following pages present water quality simulation graphs depicting model runs versus observed water quality data for impaired stations in the Twelve Mile Creek Watershed. The water quality calibration was performed for the period 1995 to 1997. The validation period was from 1998 to 2000.

At water quality station SV-206 some of the higher observed concentrations (around 1500 counts/100ml) are not simulated by the model. This may be the result of temporally localized sources that the model does not include (i.e. animals in the stream).

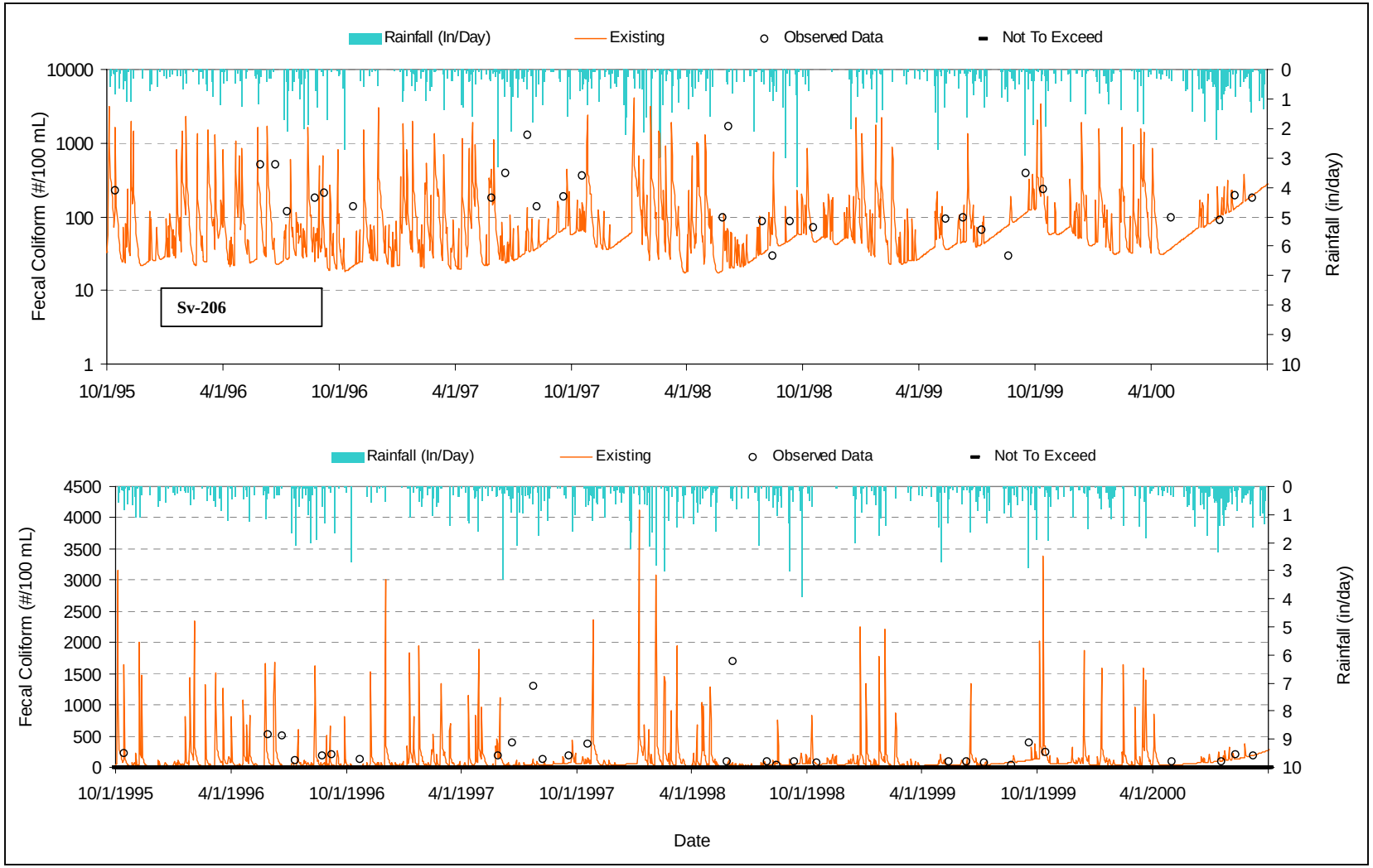


**Figure D-1. Fecal coliform bacteria calibration at water quality station SV-206**


**Figure D-2. Fecal coliform bacteria calibration at water quality station at SV-239**


**Figure D-3. Fecal coliform bacteria calibration at water quality station at Station SV-015**


**Figure D-4. Fecal coliform bacteria calibration at water quality station at Station SV-137**

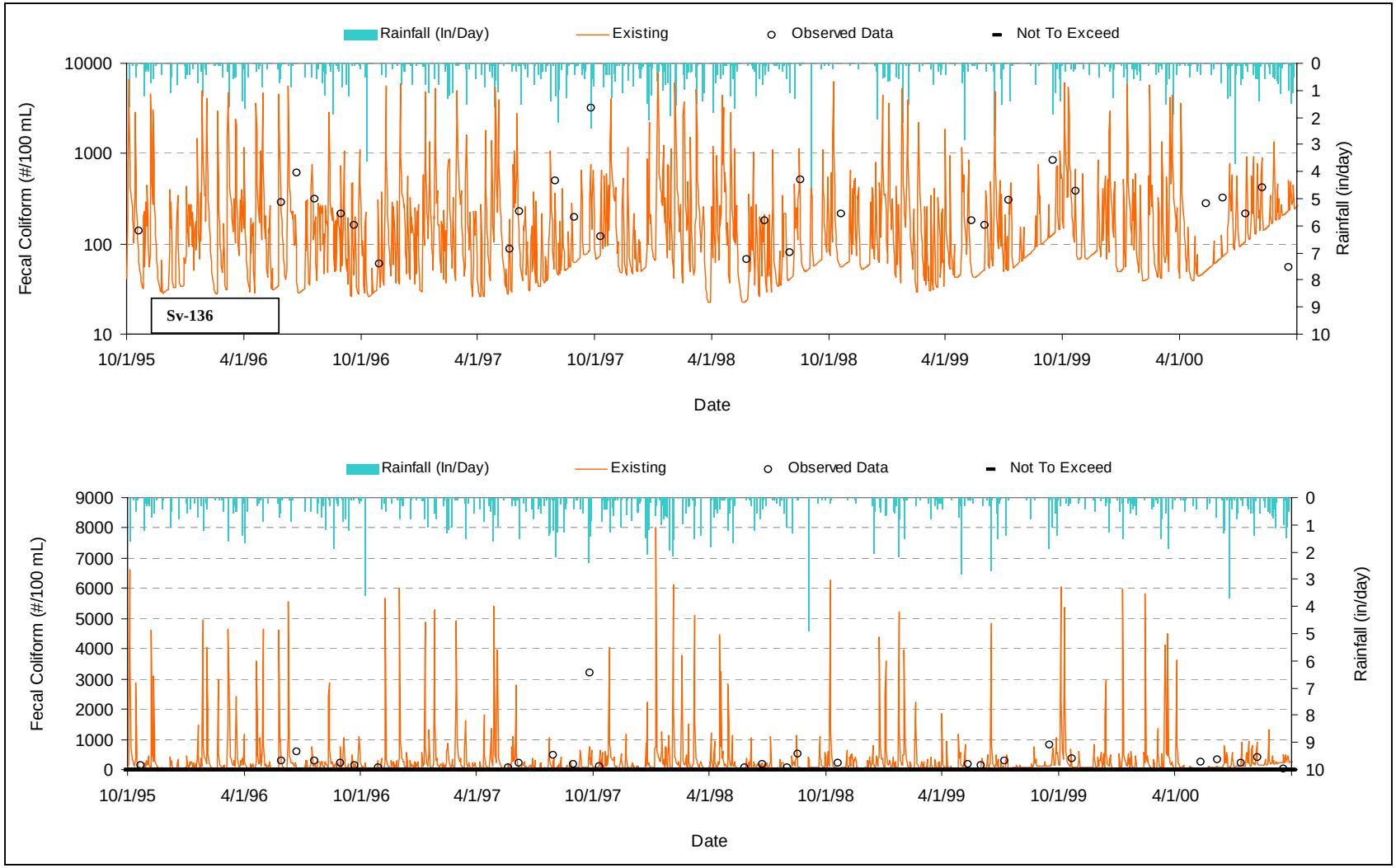


**Figure D-5. Fecal coliform bacteria calibration at water quality station at Station SV-136**

# Appendix E
# Load Reduction Curves
# for Impaired Water Quality Stations

The LSPC Twelve Mile Creek model allowed for examining bacterial loading on a dynamic basis. Based on the calibrated model predictions, loading reductions required to meet the geometric mean standard in the watershed were smaller than those required to meet the instantaneous standard. As a result, bacteria load reductions in the Twelve Mile Creek TMDL were developed to meet the instantaneous criteria, incorporating a five per cent margin of safety. This section describes the methodology used to develop the necessary reductions based on load duration curves developed for each impaired water quality station. While based on instantaneous observations, this methodology utilizes modeled flow based on the calibrated LSPC model of the Twelve Mile Creek watershed.

For each impaired station a load duration graph was generated and a trend line drawn through the data points representing water quality violations. In the load curve application, trend lines are used to predict the load at other flow recurrence intervals. The type of line that can be drawn through the data can have several shapes, ranging from linear (simplest form) to moving average. The type of the line chosen should result in a relatively high correlation factor, denoted by the variable $R^2$. The correlation factor provides an indication of how well the equation of the line represents the data. For the Twelve Mile Creek stations, exponential and power functions resulted in the best fit of the data.

In this method, the percent reduction for the subbasin is the average of the differences between the trend line through the existing data and the target load at each recurrence interval. For example, in Figure E-1 the existing load violates the target when the flow is exceeded less than 40 percent of the time. At each recurrence interval between 10 and 40 (using recurrence intervals in multiples of 5) the equation of the trend line is used to estimate the existing load. Flows exceeded less than 10 percent of the time represent abnormally high events and are not considered in the TMDL analysis. In the trend line equation, the x-variable represents the percent of time the flow is exceeded. The percent reduction required to achieve the target load is calculated at each interval. The final percent reduction is the average of these values.

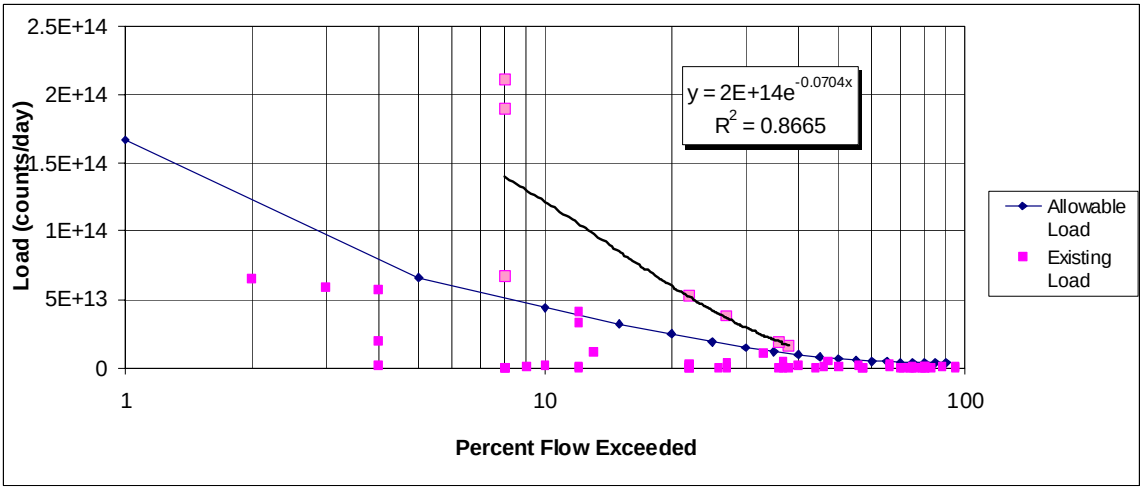


**Figure E-1. Example fecal coliform bacteria load duration curve with trendline**

Table E-1 though E-5 shows the required percent reductions and loads (allowable and existing) for each impaired subbasin based on the load duration curve reduction method. Figures E-2 through E-6 present the load duration curves with the trendline equation and correlation factor for each impaired segment.

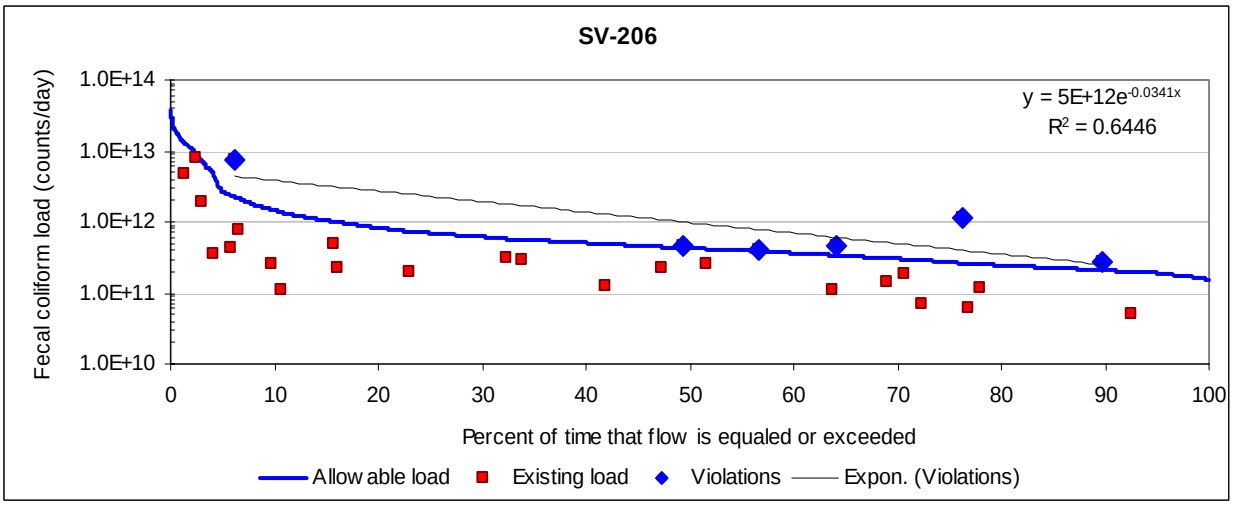


**Figure E-2. Load duration curve and trendline for station SV-206**

**Table E-1. Allocation loads and reduction percentage at SV-206**

| Maximum of the Interval (%) | Allowable Load (counts/day) | Existing Load (counts/day) | Percent Reduction |
|---|---|---|---|
| 100 | 1.55E+11 | 2.98E+11 | 48 |
| 95 | 1.91E+11 | 3.15E+11 | 39 |
| 90 | 2.07E+11 | 3.35E+11 | 38 |
| 85 | 2.26E+11 | 3.57E+11 | 37 |
| 80 | 2.43E+11 | 3.82E+11 | 36 |
| 75 | 2.70E+11 | 4.10E+11 | 34 |
| 70 | 3.03E+11 | 4.43E+11 | 32 |
| 65 | 3.32E+11 | 4.81E+11 | 31 |
| 60 | 3.62E+11 | 5.26E+11 | 31 |
| 55 | 3.96E+11 | 5.79E+11 | 32 |
| 50 | 4.26E+11 | 6.44E+11 | 34 |
| 45 | 4.63E+11 | 7.24E+11 | 36 |
| 40 | 5.07E+11 | 8.26E+11 | 39 |
| 35 | 5.52E+11 | 9.58E+11 | 42 |
| 30 | 6.17E+11 | 1.14E+12 | 46 |
| 25 | 6.96E+11 | 1.39E+12 | 50 |
| 20 | 8.24E+11 | 1.79E+12 | 54 |
| 15 | 1.05E+12 | 2.46E+12 | 57 |
| 10 | 1.44E+12 | 3.86E+12 | 63 |
| 5 | 2.67E+12 | 8.35E+12 | 68 |

**Average Reduction (90%<interval<10%) at SV-206: 39% reduction**

**Average Allowable Load (90%<interval<10%) at SV-206: 4.84E+11 (counts/day)**

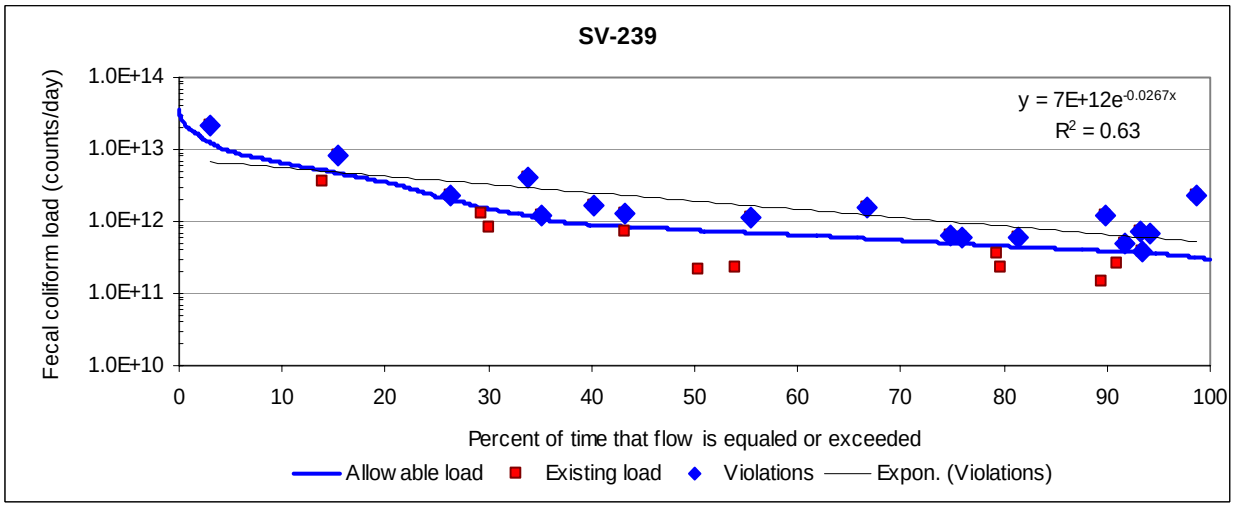


**Figure E-3. Load duration curve and trendline for station SV-239**

**Table E-2. Allocation loads and reduction percentage at SV-239**

| Maximum of the Interval (%) | Allowable Load (counts/day) | Existing Load (counts/day) | Percent Reduction |
|---|---|---|---|
| 100 | 3.01E+11 | 6.47E+11 | 53 |
| 95 | 3.56E+11 | 6.83E+11 | 48 |
| 90 | 3.91E+11 | 7.22E+11 | 46 |
| 85 | 4.22E+11 | 7.67E+11 | 45 |
| 80 | 4.53E+11 | 8.17E+11 | 45 |
| 75 | 4.97E+11 | 8.74E+11 | 43 |
| 70 | 5.46E+11 | 9.4E+11 | 42 |
| 65 | 5.92E+11 | 1.02E+12 | 42 |
| 60 | 6.50E+11 | 1.1E+12 | 41 |
| 55 | 7.01E+11 | 1.21E+12 | 42 |
| 50 | 7.58E+11 | 1.34E+12 | 43 |
| 45 | 8.29E+11 | 1.49E+12 | 44 |
| 40 | 8.95E+11 | 1.69E+12 | 47 |
| 35 | 1.09E+12 | 1.94E+12 | 44 |
| 30 | 1.51E+12 | 2.28E+12 | 34 |
| 25 | 2.18E+12 | 2.76E+12 | 21 |
| 20 | 3.52E+12 | 3.48E+12 | -1 |
| 15 | 4.84E+12 | 4.71E+12 | -3 |
| 10 | 6.53E+12 | 7.19E+12 | 9 |
| 5 | 9.34E+12 | 1.49E+13 | 37 |

**Average Reduction (90%<interval<10%) at SV-239: 41% reduction**

**Average Allowable Load (90%<interval<10%) at SV-239: 1.30E+12 (counts/day)**

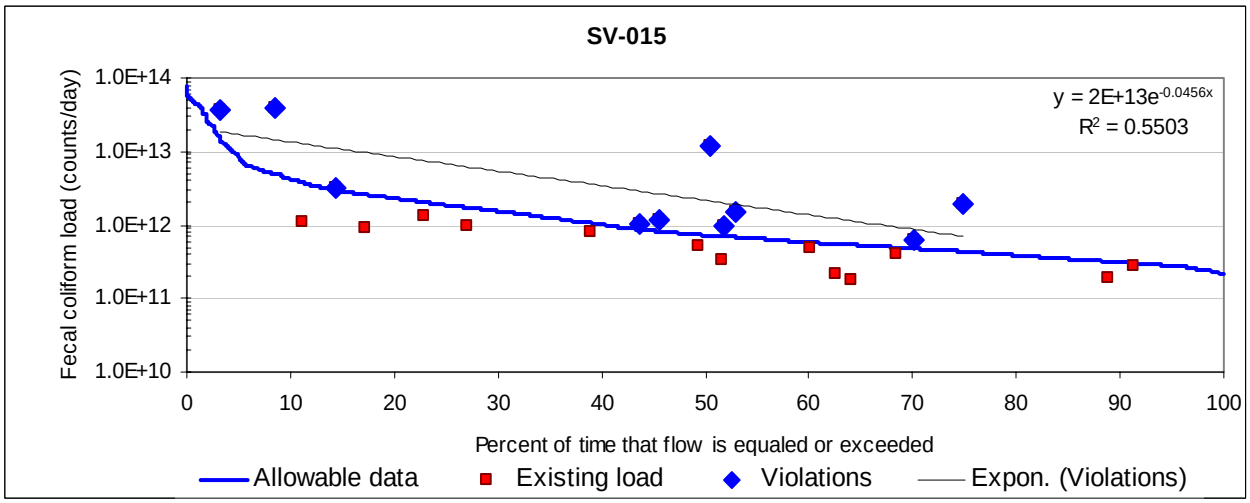


**Figure E-4. Load duration curve and trendline for station SV-015**

**Table E-3. Allocation loads and reduction percentage at SV-015**

| Maximum of the Interval (%) | Allowable Load (counts/day) | Existing Load (counts/day) | Percent Reduction |
|---|---|---|---|
| 100 | 2.19E+11 | 9.25E+11 | 76 |
| 95 | 2.77E+11 | 9.82E+11 | 72 |
| 90 | 3.13E+11 | 1.05E+12 | 70 |
| 85 | 3.46E+11 | 1.12E+12 | 69 |
| 80 | 3.87E+11 | 1.2E+12 | 68 |
| 75 | 4.34E+11 | 1.29E+12 | 66 |
| 70 | 4.79E+11 | 1.4E+12 | 66 |
| 65 | 5.30E+11 | 1.53E+12 | 65 |
| 60 | 5.78E+11 | 1.68E+12 | 66 |
| 55 | 6.57E+11 | 1.86E+12 | 65 |
| 50 | 7.26E+11 | 2.08E+12 | 65 |
| 45 | 8.38E+11 | 2.35E+12 | 64 |
| 40 | 1.02E+12 | 2.7E+12 | 62 |
| 35 | 1.25E+12 | 3.15E+12 | 60 |
| 30 | 1.55E+12 | 3.77E+12 | 59 |
| 25 | 1.86E+12 | 4.67E+12 | 60 |
| 20 | 2.31E+12 | 6.05E+12 | 62 |
| 15 | 2.88E+12 | 8.47E+12 | 66 |
| 10 | 4.16E+12 | 1.36E+13 | 69 |
| 5 | 7.95E+12 | 3.05E+13 | 74 |

**Average Reduction (90%<interval<10%) at SV-015: 64% reduction**

**Average Allowable Load (90%<interval<10%) at SV-015: 1.06E+12 (counts/day)**

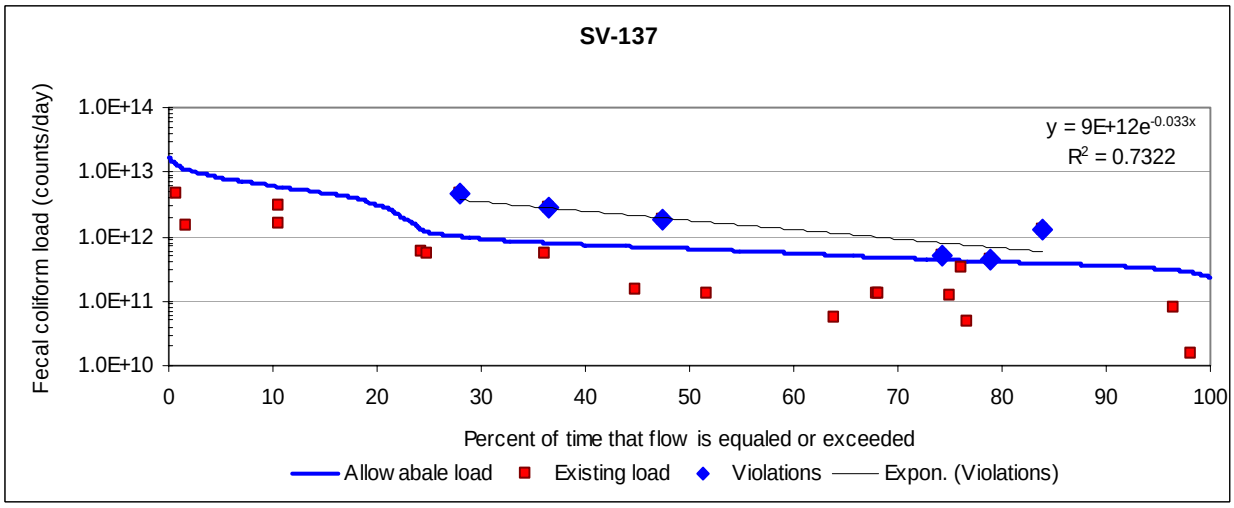


**Figure E-5. Load duration curve and trendline for station SV-137**

**Table E-4. Allocation loads and reduction percentage at SV-137**

| Maximum of the Interval (%) | Allowable Load (counts/day) | Existing Load (counts/day) | Percent Reduction |
|---|---|---|---|
| 100 | 2.35E+11 | -7.56E+10 | 411 |
| 95 | 3.15E+11 | 8.50E+10 | -271 |
| 90 | 3.52E+11 | 2.54E+11 | -38 |
| 85 | 3.79E+11 | 4.33E+11 | 12 |
| 80 | 4.03E+11 | 6.23E+11 | 35 |
| 75 | 4.33E+11 | 8.25E+11 | 48 |
| 70 | 4.68E+11 | 1.04E+12 | 55 |
| 65 | 5.04E+11 | 1.27E+12 | 60 |
| 60 | 5.53E+11 | 1.52E+12 | 64 |
| 55 | 6.00E+11 | 1.80E+12 | 67 |
| 50 | 6.49E+11 | 2.09E+12 | 69 |
| 45 | 6.92E+11 | 2.42E+12 | 71 |
| 40 | 7.46E+11 | 2.79E+12 | 73 |
| 35 | 8.18E+11 | 3.21E+12 | 75 |
| 30 | 9.25E+11 | 3.69E+12 | 75 |
| 25 | 1.15E+12 | 4.26E+12 | 73 |
| 20 | 3.08E+12 | 4.96E+12 | 38 |
| 15 | 4.74E+12 | 5.86E+12 | 19 |
| 10 | 6.13E+12 | 7.13E+12 | 14 |
| 5 | 8.13E+12 | 9.30E+12 | 13 |

**Average Reduction (90%<interval<10%) at SV-137: 56% reduction**

**Average Allowable Load (90%<interval<10%) at SV-137: 1.08E+12 (counts/day)**

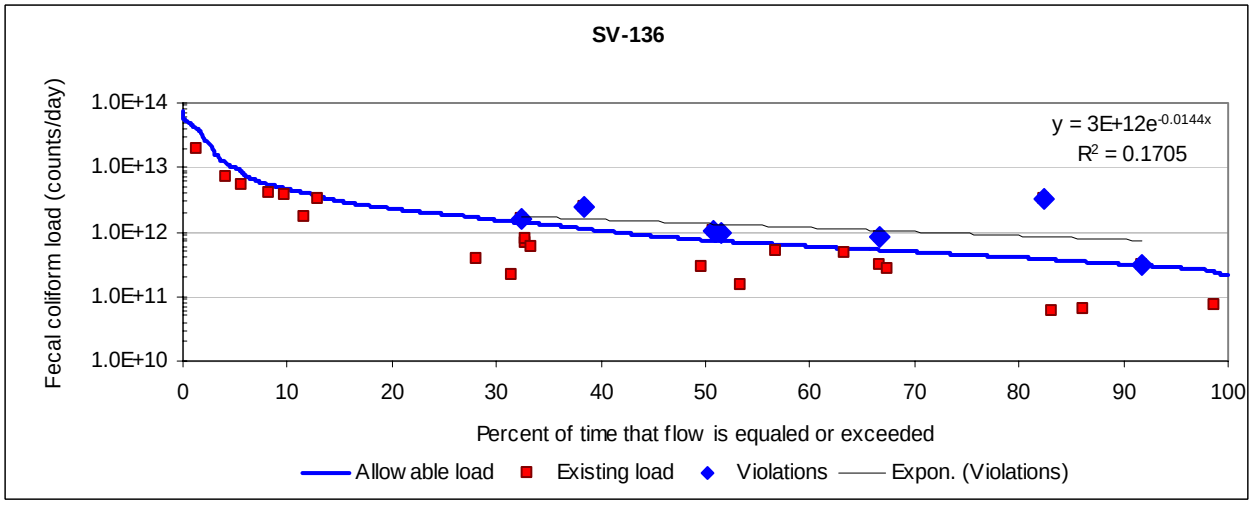


**Figure E-6. Load duration curve and trendline for station SV-136**

**Table E-5. Allocation loads and reduction percentage at SV-136**

| Maximum of the Interval (%) | Allowable Load (counts/day) | Existing Load (counts/day) | Percent Reduction |
|---|---|---|---|
| 100 | 2.15E+11 | 7.11E+11 | 70 |
| 95 | 2.81E+11 | 7.64E+11 | 63 |
| 90 | 3.15E+11 | 8.21E+11 | 62 |
| 85 | 3.52E+11 | 8.82E+11 | 60 |
| 80 | 4.03E+11 | 9.48E+11 | 57 |
| 75 | 4.44E+11 | 1.02E+12 | 56 |
| 70 | 4.91E+11 | 1.09E+12 | 55 |
| 65 | 5.39E+11 | 1.18E+12 | 54 |
| 60 | 6.00E+11 | 1.26E+12 | 53 |
| 55 | 6.68E+11 | 1.36E+12 | 51 |
| 50 | 7.48E+11 | 1.46E+12 | 49 |
| 45 | 8.56E+11 | 1.57E+12 | 45 |
| 40 | 1.05E+12 | 1.69E+12 | 38 |
| 35 | 1.29E+12 | 1.81E+12 | 29 |
| 30 | 1.52E+12 | 1.95E+12 | 22 |
| 25 | 1.88E+12 | 2.09E+12 | 10 |
| 20 | 2.31E+12 | 2.25E+12 | -3 |
| 15 | 3.00E+12 | 2.42E+12 | -24 |
| 10 | 4.58E+12 | 2.6E+12 | -76 |
| 5 | 9.82E+12 | 2.79E+12 | -252 |

**Average Reduction (90%<interval<10%) at SV-136: 45% reduction**

**Average Allowable Load (90%<interval<10%) at SV-136: 1.08E+12 (counts/day)**