Total Maximum Daily Load

South Santee Coastal Watershed

(Hydrologic Unit Codes 030501120303 & 030502090101)
Stations 06A-01, 06A-01A, 06A-02, 06B-06, 06B-07, 06B-08, 06B-09, 06B-10, 06B-12, 06B-13, 06B-16, 06B-19, 06B-20, 06B-21, 06B-22, 06B-23
Fecal Coliform Bacteria

Prepared by:
Nick Lynn, SCDHEC Bureau of Water

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South Carolina Department of Health and Environmental Control

Abstract

The delineated watershed surrounding the majority of Shellfish Management Area 06B and portions of Area 06A and 07 consists of approximately 52,620 acres (summation of shellfish management total area within the defined watershed) of shellfish growing area habitat located in Charleston, Berkeley and Georgetown Counties, South Carolina. The area is a subwatershed of the Santee basin located within the 8-digit hydrologic unit codes (HUC) 03050112 and 03050209. The watershed is comprised entirely of the 12-digit HUCs 030501120303 and 030502090101. Water quality monitoring stations 06A-01, 06A-01A, 06A-02, 06B-06, 07, 08, 09, 10, 12, 13, 19, 20, 21, 22, and 23 are listed on the 2008 303(d) list as impaired for shellfish use support due to exceeding the fecal coliform standard. Stations are listed as impaired on the basis of at least 30 monthly samples taken over a period of 3 years as required by the National Shellfish Sanitation Program. The department believes that within each 12-digit HUC that meeting the highest percentage reduction or the water quality standard (WQS) will effectively protect the shellfish harvesting beds in the referenced watershed for human consumption. Stations 06B-13, 06A-01, 06A-01A, and 06A-02 lie within the 12-digit HUC 030501120303 and require reductions of 84% as highlighted in table Ab-1. Stations 06B-07, 06B-08, 06B-09, 06B-10, 06B-12, 06B-16, 06B-19, 06B-21, and 06B-22 are within the boundaries of HUC 030502090101 (Figure 2) and require a 70% reduction. Station 06B-20 has been listed as restricted by the shellfish program. Station 06B-20 meets the approved water quality criteria but is classified as restricted to provide a buffer in the interest of public health. The classification and 303(d) listing are not based on a documented water quality impairment; therefore, a percentage reduction is not needed at this location. This TMDL document is based on 77-157 data points per each monitored station from 1994-2007 to ensure greater temporal variability. The primary land use of the watershed is wetlands/open water (73.97%), followed by forested area (21.1%). The remaining land use is comprised of grassland, developed, barren, and agricultural land (4.93%). Probable sources of fecal coliform (FC) bacteria are large populations of waterfowl and wildlife.

Existing conditions and percent reductions for this hydrodynamically complex system were calculated using cumulative probability distributions. Depending on the station, the percent reductions required to meet the fecal coliform water quality standard range from 0% to 84%. For SCDOT, existing and future NPDES MS4 permittees, compliance with terms and conditions of its NPDES permit is effective implementation of the WLA to the Maximum Extent Practicable. For existing and future NPDES construction and Industrial stormwater permittees, compliance with terms and conditions of its permit is effective implementation of the WLA. Required load reductions in the load allocation (LA) portion of this TMDL can be implemented through voluntary measures and are eligible for CWA §319 grants.

The Department recognizes that **adaptive management/implementation** of this TMDL might be needed to achieve the water quality standard and we are committed towards targeting the load reductions to improve water quality in the watershed used in the development of this TMDL document. As additional data and/or information becomes available, it may become necessary to revise and/or modify the TMDL target accordingly.

Table Ab-1. Total Maximum Daily Load for the South Santee Coastal Waterhshed. Load is expressed as colony forming units (cfu) per day.

TABLE AB-1. TMDL COMPONENTS OF SOUTH SANTEE COASTAL WATERSHED								
Station ID	Existing (cfu/100ml)	TMDL[1,2] (cfu/100ml)	WQ Target (cfu/100ml)	Margin of Safety (MOS) (cfu/100ml)	WLA			LA
					Continuous Sources[2] (cfu/100ml)	Non-Continuous Sources[3,4] (% Reduction)	Non-Continuous SCDOT[4,6] (% Reduction)	% Reduction to Meet Load Allocation[6]
06A-01	217	43	40.9	2.1	N/A	81%	0%	81%
06A-01A	110	43	40.9	2.1	N/A	63%	0%	63%
06A-02	103	43	40.9	2.1	N/A	60%	0%	60%
06B-06	45	43	40.9	2.1	N/A	9%	0%	9%
06B-07	**136**	**43**	**40.9**	**2.1**	**N/A**	**70%**	0%	**70%**
06B-08	105	43	40.9	2.1	N/A	61%	0%	61%
06B-09	118	43	40.9	2.1	N/A	65%	0%	65%
06B-10	75	43	40.9	2.1	N/A	46%	0%	46%
06B-12	83	43	40.9	2.1	N/A	51%	0%	51%
06B-13	**260**	**43**	**40.9**	**2.1**	**N/A**	**84%**	0%	**84%**
06B-16	34	43	40.9	2.1	N/A	<1%	0%	<1%
06B-19	65	43	40.9	2.1	N/A	37%	0%	37%
06B-20	28	43	40.9	2.1	N/A	0%	0%	0%
06B-21	65	43	40.9	2.1	N/A	38%	0%	38%
06B-22	45	43	40.9	2.1	N/A	9%	0%	9%
06B-23	41	43	40.9	2.1	N/A	1%	0%	1%

Table Notes:

1. TMDL is expressed as a concentration. If daily average tidal exchange estimates were available, this number could be converted to load in cfu/day by multiplying flow by concentration and a conversion factor.
2. WLA is expressed as total monthly average. Existing and future continuous discharges are required to meet the prescribed loading for the pollutant of concern. Loadings were developed based upon permitted flow and an allowable permitted maximum concentration of 43cfu/100ml.
3. Percent reduction applies to all NPDES-permitted stormwater discharges, including current and future MS4, construction and industrial discharges covered under permits numbered SCS & SCR. Stormwater discharges are expressed as a percentage reduction due to the uncertain nature of stormwater discharge volumes and recurrence intervals. Stormwater discharges are required to meet percentage reduction or the existing instream standard for pollutant of concern in accordance with their NPDES permit.
4. Percent reduction applies to existing concentration.
5. Shellfish WQS = No more than 10% of the samples shall exceed 43cfu/100 ml
6. As long as the conditions within the SCDOT MS4 area remain the same the Department deems the current contributions from SCDOT negligible and no reduction of FC bacteria is necessary. SCDOT must continue to comply with the provisions of its approved NPDES stormwater permit.

Tables and Figures

1.0 INTRODUCTION

1.1 Background

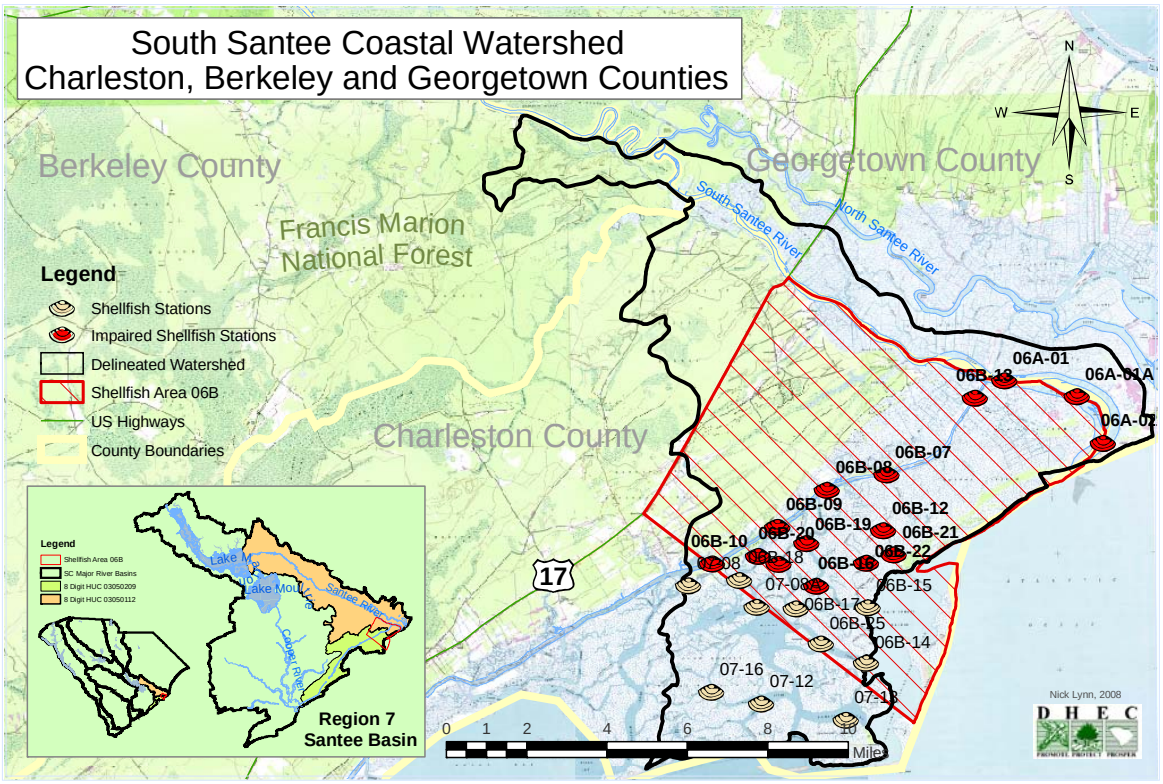
A Total Maximum Daily Load (TMDL) is a written plan and analysis to determine the maximum pollutant load a waterbody can receive and still meet applicable water quality standards. The TMDL process includes estimating pollutant loadings from all sources, linking pollutant sources to their impacts on water quality, allocation of pollutant loads to each source and establishment of control mechanisms to achieve water quality standards (US EPA, 1999). All TMDLs include a wasteload allocation (WLA) for all National Pollutant Discharge Elimination System (NPDES) permitted discharges, a load allocation (LA) for all nonpoint sources, and an explicit and/or implicit margin of safety (MOS). TMDLs are required to be developed for each waterbody and pollutant combination on the State 303(d) list by 40 CFR 130.31(a) (US EPA, 1999).

1.2 Watershed Description

The South Santee Coastal Watershed is located in Charleston County, Georgetown County, and a portion of Berkeley County, South Carolina. It encompasses 102.17 square miles. The area is a subwatershed (consisting of 12-digit hydrologic unit codes (HUC) 030501120303 and 030502090101) of the Santee basin located within the 8-digit HUCs 03050112 and 03050209. Area 06B consists of the waters of Cape Romain Harbor, the Atlantic Intracoastal Waterway (AIWW), portions of Muddy Bay, and Alligator, Casino, Clubhouse, Congaree Boat, DuPree, Horsehead, Mill, Ramhorn and Skrine Creeks. The northern boundary of the area is the South Santee River, while US Highway 17 defines the western border. The area is bounded to the south by an imaginary line extending from AIWW Marker #32 southeastward to Cape Island and the southern portion of Cape Romain Harbor. The eastern boundary is the Atlantic Ocean (Figure 1). Area 06B also contains the Santee Coastal Wildlife Management Area (WMA). The portion of the watershed within Area 06A consists of the South Santee River which forms a border between Charleston and Georgetown Counties. Area 06A also contains a portion of the Santee Swamp and the Santee Delta WMA. Area 07 consists of Muddy Bay, Romain River, Five Fathom Creek, and a portion of the Cape Romain National Wildlife Refuge.

The South Santee Coastal watershed is comprised of salt and brackish marsh and includes shallow bays and meandering creeks protected by a series of offshore barrier islands. The creeks within the area range from 50 to 600 feet in width and average 3 to 9 feet in depth. Additionally, the AIWW traverses the area's entire length in a northeast-southwest direction. The AIWW is maintained at a mean low water depth of 12 feet by the US Army Corps of Engineers and is the major conduit of low salinity water into the watershed from the South Santee River. Cape Romain Harbor, a shallow water bay, is the major conduit of high salinity ocean water into the area. The entire system is approximately twelve miles wide (northwest to southeast) and 15 miles long (southwest to northeast).

Figure 1. Location of South Santee Coastal Watershed



1.2.1 Tides

Tides in the South Santee Coastal watershed are semidiurnal, consisting of two low and two high tides occurring each lunar day. Mean tidal ranges in Casino Creek are 4.6 feet during normal tides and 5.3 feet during spring tides. Wind direction and intensity, as well as atmospheric pressure, typically cause variations in predicted tidal ranges. The prevailing currents in the Atlantic Ocean as well as the tidal cycles contribute to the complex nature of the system.

1.2.2 Precipitation

Precipitation in the watershed is heaviest during late summer and early autumn. Tropical storms and hurricanes occasionally produce extremely large amounts of rainfall. During winter months heavy rainfall events are uncommon, yet occasional intense thunderstorms associated with rapidly moving low-pressure systems generate heavy rains. Precipitation rarely occurs in the form of snow or ice. Spring weather patterns may be dynamic with associated thunderstorms and severe weather conditions.

The yearly rainfall average for a thirty-year period (1971-2000) in Charleston, recorded at the Charleston Airport, is 51.53 inches. The 2006 total precipitation recorded at the nearest meteorological station, Wambaw Ranger District in Francis Marion National Forest at McClellanville, (approximately 35 miles northeast of Charleston) was 45.37 inches. The data from this meteorological station may not be representative of daily precipitation in the South Santee Coastal watershed due to the spotty nature of precipitation near the coast.

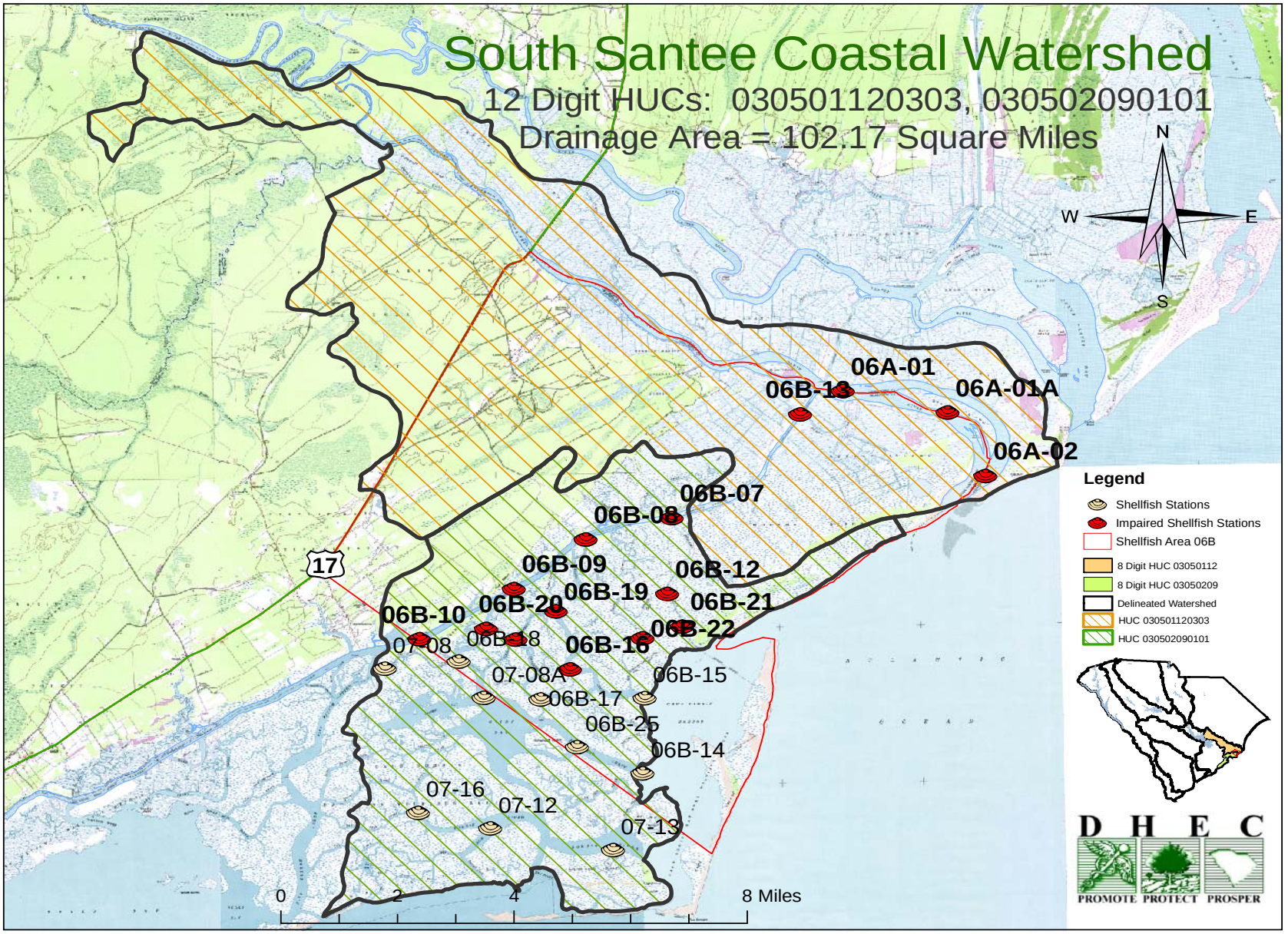
1.2.3 Winds

Prevailing winds along the central portion of the South Carolina coast are from the south and west during spring and summer and from the north during autumn and winter. Wind speeds are generally less than 15 miles per hour (mph); however, strong weather systems may generate winds in excess of 25 mph. Tropical storms and hurricanes occur occasionally.

1.2.4 River Discharges

The South Santee River is the major source of freshwater inflow into the watershed. Flow from the Lake Marion spillway, St. Stephens hydroelectric generating station, and Lake Marion hydroelectric generating station discharge into the Santee River. The Santee River then splits into the North and South Santee Rivers. The North and South Santee Rivers feed the AIWW at the northeastern boundary of the South Santee Coastal watershed.

Figure 2. Close up of Monitoring Sites within Drainage Area



1.2.5 Land Use and Soils

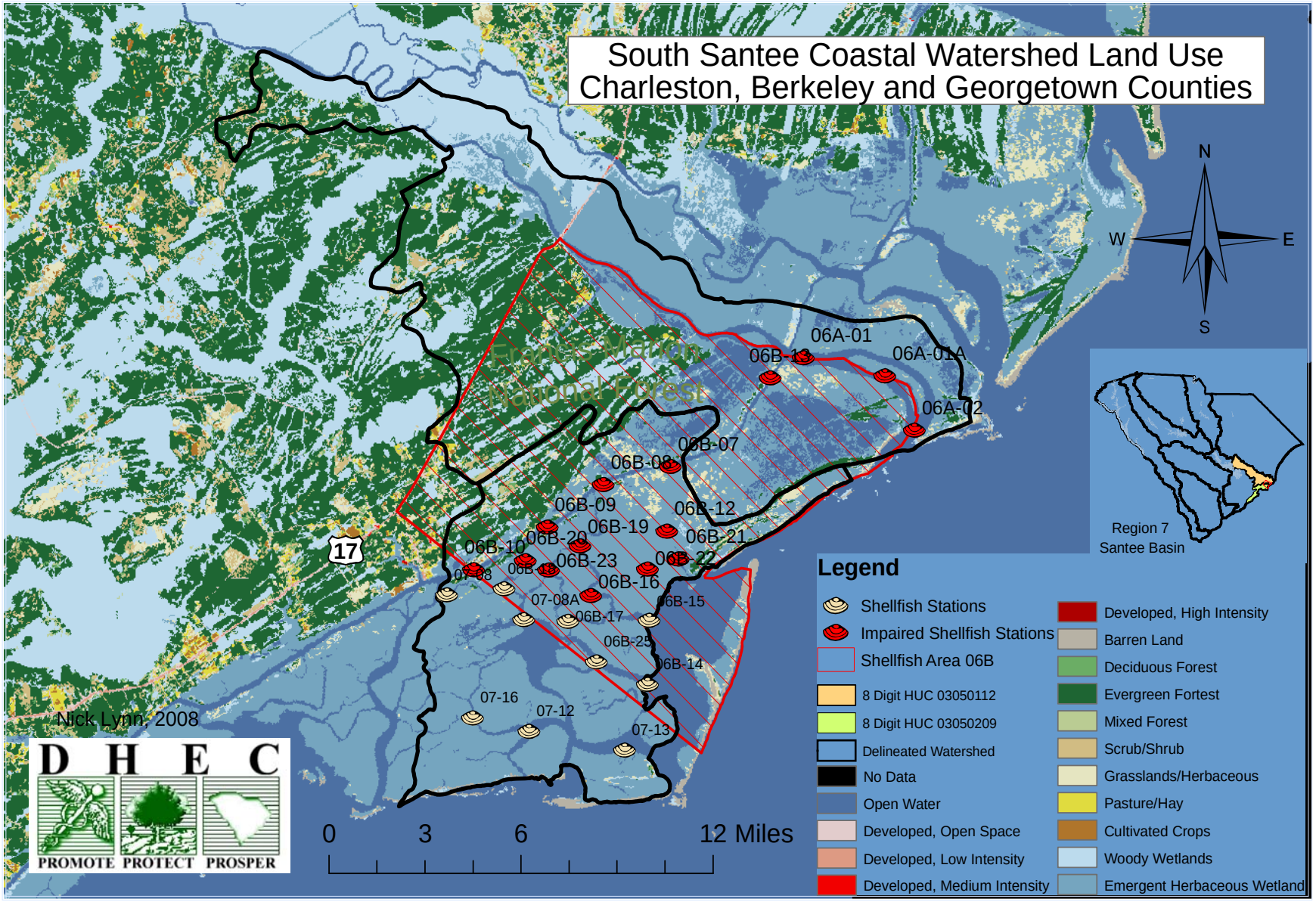
Due to the tidal nature of the area, impairments were addressed and land use was assessed for the 12 digit hydrologic unit codes surrounding shellfish management Area 06B and portions of 06A and 07 (030501120303, 030502090101). The primary land use of the South Santee Coastal watershed is wetlands/open water (73.97%), followed by forested area (21.1%). A majority of the watershed (06B/07) is located within the confines of the Cape Romain National Wildlife Refuge, the Santee Coastal Reserve and Francis Marion National Forest (Figure 3). There is very little agricultural land or urban development in the area at the present time (Table 1).

Table 1. Land Use Summary

Land Use (2001 NLCD)	12-Digit HUCs 030501120303 & 030502090101	
	Area (mi^2)	Percent
Woody Wetlands	14.17	13.87%
Open Water	14.30	14.00%
Emergent Herbaceous Wetlands	47.10	46.10%
Total Wetlands/Open Water	***75.57***	***73.97%***
Evergreen Forest	20.88	20.44%
Deciduous Forest	0.29	0.29%
Mixed Forest	0.37	0.37%
Total Forested	***21.54***	***21.1%***
Cultivated Crops	0.10	0.10%
Pasture/Hay	0.23	0.23%
Total Agricultural	***0.33***	***0.33%***
Developed, Open Space	0.57	0.56%
Developed, Low Intensity	0.10	0.10%
Developed, Medium Intensity	0.00	0.00%
Developed, High Intensity	0.00	0.00%
Total Developed	***0.67***	***0.66%***
Scrub/Shrub	1.20	1.18%
Barren Land	0.35	0.35%
Grassland/Herbaceous	2.45	2.40%
Total Other	***4.00***	***3.93%***
Total Area	**102.17**	**100%**

The uplands surrounding the shellfish growing waters of the South Santee Coastal watershed consist of various soil textures defined by the United States Department of Agriculture (USDA), Soil Conservation Service (1971) utilizing general classifications and descriptions. Although lands within the watershed consist of numerous soil types, the area is generally comprised of Seewee-Rutlege soils, nearly level and gently sloping woodland and cropland loamy fine sand. The USDA (1971) further describes these soils as "somewhat poorly drained to moderately well drained, nearly level, sandy soils on ridges and poorly drained to very poorly drained, sandy soils in depressions."

Figure 3. Land Use Surrounding the South Santee Coastal Watershed



1.3 Water Quality Standard

Water quality standards (WQS) are based on the classification of the waterbody and are designed to protect the designated uses of that classification. The Intracoastal Waterway within the South Santee Coastal watershed is designated as Shellfish Harvesting Waters (SFH) by R.61-69, Classified Waters (SC DHEC, 2004a). SFH waters are defined as:

> "tidal saltwaters protected for shellfish harvesting and uses listed in Class SA and Class SB. Suitable for primary and secondary contact recreation, crabbing, and fishing. Also suitable for the survival and propagation of a balanced indigenous aquatic community of marine fauna and flora" (SC DHEC, 2004b p.26).

The tidal creeks within the watershed are designated as Outstanding Resource Waters (ORW). Standards for class ORW waters are those applicable to the classification of the waterbody immediately prior to reclassification to Class ORW. In this case, waters would be required to meet SFH standards. ORW waters are described as:

> "freshwaters or saltwaters which constitute an outstanding recreational or ecological resource or those freshwaters suitable as a source for drinking water supply purposes with treatment levels specified by the department." (SC DHEC, 2004b p.22).

Guided by the minimum requirements of the National Shellfish Sanitation Program Model Ordinace (US FDA, 2005), the State of South Carolina has implemented a Water Quality Standard (WQS) for fecal coliform in Shellfish Harvesting Waters as:

> "Not to exceed an MPN fecal coliform geometric mean of 14/100 ml; nor shall more than 10% of the samples exceed an MPN of 43/100 ml." (SC DHEC, 2004b).

The National Shellfish Sanitation Program (NSSP) is the federal/state cooperative program recognized by the U. S. Food and Drug Administration (FDA) and the Interstate Shellfish Sanitation Conference (ISSC) for the sanitary control of shellfish produced and sold for human consumption. The purpose of the NSSP is to promote and improve the sanitation of shellfish (oysters, clams, mussels and scallops) moving in interstate commerce through federal/state cooperation and uniformity of State shellfish programs. Participants in the NSSP include agencies from shellfish producing and non-producing States, FDA, EPA, NOAA, and the shellfish industry. Under international agreements with FDA, foreign governments also participate in the NSSP. Other components of the NSSP include program guidelines, State growing area classification and dealer certification programs, and FDA evaluation of State program elements (US FDA, 2005).

2.0 WATER QUALITY ASSESSMENT

The Department currently utilizes a systematic random sampling (SRS) strategy within the watershed in lieu of sampling under adverse pollution conditions. In order to comply with National Shellfish Sanitation Program (NSSP) guidelines, a minimum of thirty samples are

required to be collected and analyzed from each station during the review period. Sampling dates are computer generated prior to the beginning of each quarterly period thereby insuring random selection with respect to tidal stage and weather. Day of week selection criteria is limited to Mondays, Tuesdays and Wednesdays due to shipping requirements and laboratory manpower constraints. Sample schedules are rarely altered.

During July 1998, an updated shellfish water quality data scheduling and collection procedure was formalized. Samples utilized for classification purposes are limited to those samples collected in accordance with the SRS for a 36-month period beginning January 1 and ending December 31. This allows for a maximum of 36 samples per station, yet provides a six-sample 'cushion' (above the NSSP required 30 minimum) for broken sample bottles, lab error, breakdowns, etc. This also allows each annual report's water quality data to meet the requirements for the NSSP Triennial Review sampling criteria.

One thousand and thirty three (1033) routine surface water quality samples (<1.0 ft. deep) were collected for bacteriological analyses and classification purposes from 29 active water quality sampling stations in the South Santee Coastal watershed during the period January 01, 2004 through December 31, 2006 (Appendix A, B). Fifty-nine (59) special samples were collected for non-classification purposes, usually associated with reopening following precautionary closures. Samples were collected in 120 ml amber glass bottles, immediately placed on ice and transported to the South Carolina Department of Health and Environmental Control's Region 7 Environmental Quality Control laboratory at North Charleston, South Carolina. An additional 120 ml water sample was included with each shipment as a temperature control. At the laboratory, sample sets exceeding a 30-hour holding time or containing a temperature control in excess of 10 degrees Celsius were discarded (APHA, 1970).

Surface water temperatures are measured utilizing hand-held, laboratory-quality calibrated centigrade thermometers. Salinity measurements were measured in the laboratory using an automatic temperature compensated refractometer. Additional field data include ambient air temperature, wind direction, tidal stage and date and time of sampling. Tidal stages are determined by using Nautical Software's *Tides & Currents*, Version 2 (1996).

There are 29 monitoring stations within the delineated watershed (Appendix A). Sixteen of these stations are listed on the 2008 303(d) list. The sampling period of January 1, 2004 through December 31, 2006 is used for this assessment to coincide with the time period used for the most recent shellfish area classification and 303(d) report. Fifteen stations exceed the 90^{th} percentile standard of 43 MPN/100ml (06A-01, 06A-01A, 06A-02, 06B-06, 07, 08, 09, 10, 12, 13, 16, 19, 21, 22 and 23). Eight stations (06A-01, 06A-01A, 06B-07, 08, 09, 10, 12 and 13) also exceed the geometric mean standard of 14 MPN/100ml (Table 2). Data used in this document from 1994 – 2007 can be found on EPA's Storet website.

Table 2. Fecal Coliform Data Summary					
January 1, 2004 – December 31, 2006					
Station	**# Samples**	**Geometric Mean**	**90th Percentile**	**2008 303(d) List**	**Shellfish Classification**
06A-01	36	**36.5**	**217**	**Yes**	**Restricted**
06A-01A	36	**16.2**	**110**	**Yes**	**Restricted**
06A-02	36	13.2	**103**	**Yes**	**Restricted**
06B-06	35	8.8	**60**	**Yes**	**Restricted**
06B-07	35	**33.1**	**152**	**Yes**	**Restricted**
06B-08	35	**22.1**	**107**	**Yes**	**Restricted**
06B-09	35	**29.0**	**191**	**Yes**	**Restricted**
06B-10	35	**15.4**	**92**	**Yes**	**Restricted**
06B-12	35	**16.2**	**105**	**Yes**	**Restricted**
06B-13	35	**69.3**	**476**	**Yes**	**Restricted**
06B-14	35	2.3	4	No	Approved
06B-15	35	4.3	15	No	Approved
06B-16	35	7.3	**44**	**Yes**	**Restricted**
06B-17	35	3.4	10	No	Approved
06B-18	35	7.5	42	No	Approved
06B-19	35	12.1	**100**	**Yes**	**Restricted**
06B-20	35	6.7	25	**Yes**	**Restricted**
06B-21	35	10.9	**106**	**Yes**	**Restricted**
06B-22	35	11.6	**69**	**Yes**	**Restricted**
06B-23	35	8.2	**58**	**Yes**	**Restricted**
06B-24	35	5.4	30	No	**Restricted**
06B-25	35	2.4	5	No	Approved
06B-26	35	6.0	34	No	**Restricted**
06B-27	35	4.5	18	No	**Restricted**
07-08	39	6.3	35	No	Approved
07-08A	39	2.3	3	No	Approved
07-12	38	2.6	7	No	Approved
07-13	37	2.9	7	No	Approved
07-16	37	3.8	21	No	Approved

90th percentile calculated per US FDA Model Ordinance (2005).
Numbers in bold exceed standard.

3.0 SOURCE ASSESSMENT AND LOAD ALLOCATION

FC bacteria are used by the State of South Carolina as the indicator for pathogens in surface waters. Pathogens, which are usually difficult to detect, cause disease and make full body contact recreation in lakes and streams a risk to public health. Indicators such as FC bacteria, enteroccoci, or *E. coli* are easier to measure, have similar sources as pathogens, and persist in surface waters for a similar or longer length of time. These bacteria are not in themselves disease causing, but indicate the potential presence of organisms that may result in sickness.

There are many sources of pathogen pollution in surface waters. In general these sources may be classified as point and nonpoint sources. With the implementation of technology-based controls, pollution from continuous point sources, such as factories and wastewater treatment facilities, has been greatly reduced. These point sources are required by the Clean Water Act (CWA) to obtain a NPDES permit. In South Carolina NPDES permits require that dischargers of sanitary wastewater must meet the state standard for fecal coliform at the point of discharge. Municipal and private sanitary wastewater treatment facilities may occasionally be sources of pathogen or FC bacteria pollution. However, if these facilities are discharging wastewater that meets their permit limits, they are not causing impairment. If any of these facilities are not meeting their permit limits, enforcement actions/mechanisms are required.

Other non-continuous point sources required to obtain NPDES permits that may be a source of pathogens include Municipal Separate Storm Sewer Systems (MS4s) and stormwater discharges from industrial or construction sites. MS4s may require NPDES discharge permits for industrial or construction activities under the NPDES Stormwater regulations. These sources are also required to comply with the state standard for the pollutant(s) of concern. If discharges from regulated MS4 entities and from construction and industrial sites meet the percentage reduction or the water quality standard as prescribed in Section 5 of this TMDL document and required in their permit(s), they should not be causing or contributing to an instream FC bacteria impairment.

3.1 Point Sources

3.1.1 Continuous Point Sources

Domestic Wastewater

There are no domestic/municipal wastewater treatment facilities within the delineated watershed. The nearest NPDES permitted facility is Lincoln High School in McClellanville, South Carolina. Historically, Lincoln High School discharged its treated effluent into Shingle Canal which ultimately drains to the administratively Prohibited waters of Jeremy Creek (Area 07). In January of 2004, a permit was issued to Lincoln High School allowing land disposal of the treated wastewater on a parcel of land a few miles from the actual school (ND0073016).

There are nine additional domestic wastewater treatment facilities within the 8-digit HUCs surrounding the South Santee Coastal watershed. Six of these facilities (ND0062260, ND0069329, SC0025283, SC0040771, SC0043583, SC0046817) are located at the southernmost end of HUC 03050209. This area is south of Bulls Bay. It is unlikely that discharges from that area could affect water quality in the South Santee Coastal watershed due to geographical distance and because ND or “No Discharge” permits are not allowed a legal discharge to waters of the State. Two additional facilities, Williamsburg County WSA Santee River WWTP (SC0048097) and the Berkeley County WSA St. Stephen WWTP (SC0025259), are located in the northernmost portion of HUC 03050112 discharging to the Santee River. Assuming a minimum flow in the Santee River from the Wilson Dam of 500 cfs (323.2 MGD), as required by the Federal Energy Regulatory Commission, and the maximum permitted daily discharge and

fecal coliform concentration, this equates to a 1.11 colony forming units (cfu)/100 ml concentration after dilution for each discharger (Appendix C). Given this low initial concentration and the die-off that would occur before reaching the shellfish area, these dischargers are not considered a source of fecal coliform to the South Santee Coastal watershed. The final facility, GCW&SD/ North Santee WWTP (SC0042439), discharges to the North Santee River. Assuming the worst-case scenario of no incremental inflow and an equal split of flow into the North and South Santee Rivers, this discharge could contribute 0.13 cfu/100ml after dilution (Appendix C). This is not considering the tidal flushing that would also occur in that area. GCW&SD/ North Santee WWTP is not considered a significant source of fecal coliform to the watershed. A summary of all NPDES dischargers near the South Santee Coastal watershed is given in Table 3.

Industrial Wastewater

There are no industrial wastewater dischargers within the delineated watershed. There are four dischargers in HUC 03050112 which consists of the Santee River from Lake Marion to the Atlantic Coast. Two of the dischargers (SC0022471 – SC Public SVC Winyah Steam Station & SC0047937 – US Army/St. Stephen Power Plant) are not expected to have fecal coliform in their effluent and therefore are not sources. Albany International (SC002569) manufactures papermaker's felt. Discharge from this facility is discharged to a holding pond and then applied to a sprayfield. Runoff collected from the sprayfield is then discharged to Curiboo Branch, a tributary of the Santee River. Due to the sprayfield discharge design and the distance from the shellfish area, this discharge is not considered a significant source of fecal coliform to the watershed. Chargeurs Wool Inc. (SC0000990) discharges to the Santee River approximately 30 river miles north of the intersection of the South Santee and the AIWW. Assuming a minimum flow in the Santee River from the Wilson Dam of 500 cfs (323.2 MGD), as required by the Federal Energy Regulatory Commission, average daily discharge and maximum permitted fecal coliform concentration, Chargeurs would contribute 0.41 cfu/100ml after dilution at the discharge point (Appendix C). Given this low initial concentration and the die-off that would occur before reaching the shellfish area, this discharge is not considered a source of fecal coliform to the watershed.

Marinas

S.C. Regulation 61-47, South Carolina Shellfish (2007) defines *Marina* as "any of the following: (1) locked harbor facility; (2) any facility which provides fueling, pump-out, maintenance or repair services (regardless of length); (3) any facility which has effective docking space of greater than 250 linear feet or provides moorage for more than 10 boats; (4) any water area with a structure which is used for docking or otherwise mooring vessels and constructed to provide temporary or permanent docking space for more than ten boats, such as a mooring field; or (5) a dry stack facility."

There are currently no marinas or commercial boat docking facilities located within the watershed. The nearest commercial boat docking facilities are located in Jeremy Creek in adjacent Area 07. Sample data from shellfish monitoring station 07-07 in Jeremy Creek suggests that this creek poses minimal impact to additional portions of the South Santee Coastal watershed.

Table 3. NPDES Dischargers within 8 Digit HUCs 03050112 and 03050209					
Permit Number	**Name**	**Type**	**HUC**	**Discharge Point**	**Permitted FC Limit***
ND0062260	Wild Dunes Beach and Racquet Club	Municipal	03050209	Land Application	14/43
ND0069329	Dewees Island Development	Domestic	03050209	Tile Field	NA
ND0073016	Lincoln High School	Domestic	03050209	Land Application	200/400
SC0000990	Chargeurs Wool Inc.	Industrial	03050112	Santee River	200/400
SC0002569	Albany International	Industrial	03050112	Curriboo Branch	200/400
SC0022471	SC PSA Winyah Steam Station	Industrial	03050112	Turkey Creek & North Santee	NA
SC0025259	Berkeley Co WSA St. Stephen WWTP	Municipal	03050112	Santee River	200/400
SC0025283	Forest Trails Subdivision	Municipal	03050209	AIWW	14/43
SC0040771	Mount Pleasant Waterworks	Municipal	03050209	Charleston Harbor	200/400
SC0042439	Georgetown Co WSD North Santee WWTP	Municipal	03050112	North Santee River	200/400
SC0043583	Isle of Palms WS Commission RO WTP	Municipal	03050209	UT to Hamlin Creek	NA
SC0046817	Dewees Island RO WTP	Municipal	03050209	Old House Lagoon to Old House Creek to Dewees Creek to Coastal Water	NA
SC0047937	US Army Corps of Engineers St. Stephen Power Plant	Industrial	03050112	Tailrace Canal to Santee River	NA
SC0048097	Williamsburg Co WSA Santee River WWTP	Municipal	03050112	Santee River	200/400

* Monthly average limit / Daily maximum limit in CFU/100 ml

3.1.2 Non-Continuous Point Sources

Non-continuous point sources include all NPDES-permitted stormwater discharges, including current and future regulated MS4 entities, construction and industrial discharges covered under permits numbered SCS and SCR and regulated under SC Water Pollution Control Permits Regulation 122.26(b)(14)&(15). All regulated MS4 entities have the potential to contribute FC pollutant loadings in the delineated drainage area used in the development of this TMDL**.**

The South Carolina Department of Transportation (SCDOT) is currently the only designated Municipal Separate Storm Sewer System (MS4) within the watershed. The SCDOT operates under NPDES MS4 Permit SCS040001 and owns and operates one road within the watershed (Figure 4). However, the Department recognizes that SCDOT is not a traditional MS4 in that it does not possess statutory taxing or has enforcement powers. SCDOT does not regulate land use or zoning, issue building or development permits.

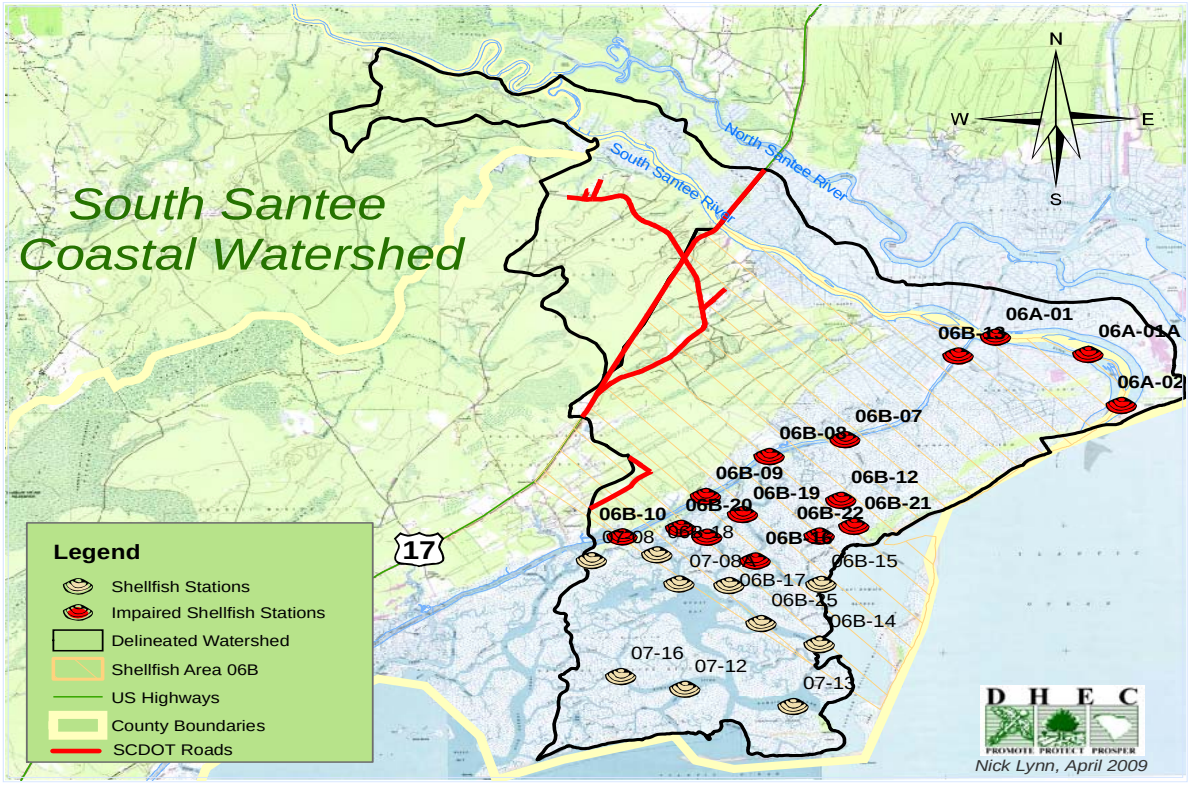
Current developed land use for the South Santee Coastal watershed is 0.66%. Based on current Geographic Information System (GIS) information (available at time of TMDL development) there are currently no SCDOT rest areas or facilities located in the referenced watershed area.

If future MS4 permits are applicable to this watershed, then those discharges will be subject to the assumptions and requirements of the WLA portion of this TMDL. The nearest MS4 areas are portions of Mount Pleasant, Isle of Palms, Sullivan's Island, and unincorporated Charleston County at the southernmost portion of HUC 03050209. These areas are unlikely to affect the watershed. However, there may be industrial or construction activities going on at any time that could produce stormwater runoff.

Industrial facilities that have the potential to cause or contribute to a violation of a water quality standard are covered by the NPDES Storm Water Industrial General Permit (SCR000000). Construction activities are covered by the NPDES Storm Water Construction General Permit from DHEC (SCR100000). Where construction activities have the potential to affect water quality of a water body with a TMDL, the Storm Water Pollution Prevention Plan (SWPPP) for the site must address any pollutants of concern and adhere to any WLAs in the TMDL. Given that the majority of the watershed area is within the confines of the Cape Romain National Wildlife Refuge, the Santee Coastal Reserve and Francis Marion National Forest, it is unlikely that industrial or construction activities will be prevalent. Note that there may be other stormwater discharges not covered under permits numbered SCS and SCR that occur in the referenced watershed. These activities are not subject to the WLA portion of the TMDL.

The Department acknowledges that progress with the assumptions and requirements of the TMDL by MS4s is expected to take one or more permit iteration. Progress towards achieving the WLA reduction for the TMDL may constitute MS4 compliance with its SWMP, provided the MEP definition is met, even where the numeric percent reduction may not be achieved in the interim.

Figure 4. SCDOT Owned and Maintained Roads in South Santee Coastal Watershed



3.2 Nonpoint Sources

Nonpoint source pollution is likely the major contributing factor to lower water quality in the watershed. Stormwater runoff impacts water quality by transporting FC bacteria from land to the shellfish growing area. The Department recognizes that there is likely wildlife, agricultural activities, grazing animals, septic tanks and/or other nonpoint source contributors located within unregulated areas, such as the referenced Watershed (at time of TMDL development). Nonpoint sources located in unregulated areas are subject to the LA and not the WLA component of the TMDL.

3.2.1 Urban and Suburban Stormwater Runoff

Dogs, cats and other domesticated pets are the primary source of fecal coliform deposited on the urban landscape. There are also "urban" wildlife, such as squirrels, raccoons, pigeons and other birds, all of which contribute to the fecal coliform load. There is little urban development within the delineated watershed, therefore, urban non-point sources are considered to be negligible. The Army Corps of Engineers has not conducted any dredging projects recently in the watershed used in the development of this document.

As previously stated, SCDOT is currently the only permitted MS4 in the referenced watershed and is subject to the WLA component of the TMDL. Similar to regulated MS4 entities, potentially designated MS4 entities (as listed in 64 FR, P.68837) or other unregulated MS4 communities located in the South Santee Coastal and surrounding watersheds may have the potential to contribute FC bacteria in stormwater runoff. These unregulated entities are subject to the LA for the purposes of this TMDL.

3.2.2 Agricultural Runoff

Owners/operators of most commercial animal growing operations are required by R. 61-43, Standards for the Permitting of Agricultural Animal Facilities, to obtain permits for the handling, storage, treatment (if necessary) and disposal of the manure, litter and dead animals generated at their facilities (SC DHEC 2002). The requirements of R. 61-43 are designed to protect water quality; therefore, we have a reasonable assurance that facilities operating in compliance with this regulation should not contribute to downstream water quality impairments. In addition to the state permit, animal operations that are Concentrated Animal Feeding Operations (CAFOs) are also required to have an NPDES Permit if they have a discharge to surface waters. There are currently no permitted CAFOs in South Carolina.

There are no permitted agricultural facilities located in the watershed. There are 3 commercial turkey-growing operations in the 8-digit watershed 03050112, near Lake Marion. All facilities apply litter by dry spreader to a total of approximately 180 acres of fields. These fields are approximately 50 river miles from the northernmost portion of the delineated area. At the present time, the lack of concentrated agricultural activity near the shoreline of the growing waters precludes agricultural runoff as a contributing source of fecal coliform in the watershed.

3.2.3 Failing Septic Systems

Failed septic tanks can contribute to bacterial contamination of downstream waterbodies (US EPA, 2001). There has been no documentation of new residential construction adjacent to shellfish growing waters in this area. Existing homes utilize individual sewage treatment disposal (ISTD) systems. Each new system requires inspection and approval by the Division of Environmental Health, Region 7 Health District. Studies demonstrate that wastewater located four feet below properly functioning septic systems contain on average less than one FC bacteria organism per 100 mL (Ayres Associates 1993). Failed or non-conforming septic systems, however, can be a contributing source of fecal coliform to the South Santee Coastal watershed. Wastes from failing septic systems enter surface waters either as direct overland flow or via groundwater. Although loading to streams from failing septic systems is likely to be a continual source, wet weather events can increase the rate of transport of pollutants from failing septic systems because of the wash-off effect from runoff and the increased rate of groundwater recharge.

3.2.4 Wildlife and Domestic Animals

The watershed supports substantial populations of both wildlife and domestic animals. The lands throughout the area are part of the Cape Romain National Wildlife Refuge. The refuge contains such wildlife as beaver, rabbit, white-tailed deer, raccoon, opossum, alligators, various rodents and a substantial bird population typical of the coastal Carolinas. The tidal uplands in the refuge have small creeks and drainage ditches throughout the area. This creek system becomes a conduit for animal FC bacteria to be transported to the adjacent shellfish growing waters.

In 2008, SCDNR estimated that there are 30-45 deer per square mile within the delineated watershed within parts of Berkely and Georgetown Counties (SCDNR 2008). There are approximately 15-30 deer per square mile within the portion of the watershed that lies in Charleston County. SCDNR estimated deer density based on suitable habitat (forests, croplands, and pastures). The fecal coliform production rate for deer has been shown to be 3.47×10^3 cfu/head-day in a study conducted by Yagow (1999), of which only a portion will enter the watershed.

The Santee Coastal Reserve Management Area operates multiple impoundments that are used by migratory waterfowl. The impoundments are managed using rice trunk structures. The water level in the impoundments is lowered in March through May. The impoundments also may overflow at times of heavy rains. The impoundments are located primarily between the South Santee River and south Alligator Creek in the upper portion of the management area, draining into tidal creeks that flow to the AIWW. Waterfowl and other wildlife seem to be the main source of fecal coliform contamination to the drainage area. The greatest 90th percentile fecal coliform value is at Station 06B-13 within the impoundment area (260 cfu/100ml). Fecal coliform 90th percentile concentrations generally decrease progressing in a southern direction through the watershed. Waterfowl and wildlife are considered to be the most probable sources of FC loading in this area. Fecal coliform concentrations for all impaired stations except for 06B-13 are also negatively correlated with salinity, meaning higher fecal coliform concentrations occur with lower salinities (Table 4).

Table 4. Correlation of Fecal Coliform with Salinity

Station ID	r	Station ID	r
06A-01A	-0.28	06B-12	-0.60
06A-01	-0.21	06B-13	-0.07*
06A-02	-0.26	06B-16	-0.63
06B-06	-0.63	06B-19	-0.57
06B-07	-0.33	06B-20	-0.57
06B-08	-0.35	06B-21	-0.65
06B-09	-0.44	06B-22	-0.52
06B-10	-0.57	06B-23	-0.64

*Not significant

Correlation is between the log base 10 fecal coliform concentration and salinity in parts per thousand and includes data from 1995-2007.

3.2.5 Boat Traffic

Recreational boat traffic is moderate throughout the area except during the winter months. Commercial traffic in the AIWW consists primarily of tugs and barges. Commercial fisheries boats, ranging in size from 16 to 50 feet, will operate in the area as long as product demand exists.

3.2.6 Hydrographic Modification

Hydrographic and habitat modification in estuarine areas requires both State and Federal approval. Portions of the AIWW require periodic maintenance dredging. The U.S. Army Corps of Engineers utilizes designated tracts of land adjacent to the AIWW as dredge spoil sites. These sites provide additional habitat for wildlife and waterfowl. The impoundments created by the dredge spoil are connected to the AIWW through a series of large drainage pipes (see photographs in Appendix E). These pipes provide a direct outlet to shellfish waters. The collected water may contain high concentrations of bacteria due to the large wildlife population. These are not regulated stormwater sources; therefore FC bacteria loadings are prescribed under the LA portion of the TMDL.

4.0 METHODS

The delineated watershed used in the construction of this document is a very hydrodynamically complex system encompassing a portion of the South Santee River, the AIWW, Cape Romain Harbor and several small tidal creeks. Creating a functional hydrodynamic model of this system would be resource intensive. However, through statistical and graphical methods a general understanding of the system can be obtained and necessary percent reductions in fecal coliform loading can be calculated.

Cumulative probability distributions were used to calculate existing conditions and percent reduction necessary to meet shellfish waters standards for fecal coliform. All available water quality data from 1994 – 2007 (Appendix B) were used in calculations to provide a more robust dataset. To create a cumulative probability graph, water quality measurements are first sorted in ascending order to determine rank and then assigned a probability plotting position using the following function:

$$p(\%) = \frac{100M}{N+1}$$

where M = rank and N = number of samples (Novotny, 2004). In this case, the log base 10 of fecal coliform is used. If the data follows a log-normal distribution, the data points on the plot will approximate a straight line (the normal distribution). This straight line is then compared to the water quality standard at the appropriate percentile. For SC shellfish waters this equates to 43 cfu/100ml minus a 5% margin of safety (40.9 cfu/100ml) at the 90th percentile. If the fit line crosses the 90th percentile reference line above the standard, the site is considered to not meet the standard for single sample maximums, if the line crosses below the standard reference the site does meet the water quality standard. The evaluation is consistent with the NSSP approach under a systematic random sampling scheme (which we use in place of adverse sampling). If the data does not meet the single sample standard, a line is drawn parallel to the original normal distribution line that intersects the standard at the 90th percentile point (Appendix D). Drawing the line parallel to the original distribution makes the assumption that the coefficient of variation remains the same for the original data and the desired water quality data (Novotny, 2003). The necessary percent reduction is calculated as the difference between the distributions at the 90th percentile point:

$$\frac{\text{Existing Load} - (\text{Standard} - \text{MOS})}{\text{Existing Load}} * 100$$

There are no stations that currently exceed the geometric mean criteria that do not also exceed the single standard sample.

If sufficient approximations of tidal exchange and flow patterns were available, this method could be extended to calculate the total maximum daily fecal coliform loading in cfu/day for locations within the watershed. Average daily tidal exchange would be multiplied by the water quality standard of 43 cfu/100ml and a conversion factor. This number would represent the maximum daily load for all waters within the delineated watershed.

5.0 DEVELOPMENT OF TMDL

5.1 Critical Conditions

Critical conditions are the "worst-case" environmental conditions for exceedance of water quality standards and which occur at an acceptable frequency (US EPA, 1999). Due to the tidal nature of this system, it is unclear what a critical flow would be. By including all data in the calculations, inclusion of the critical condition is implicit. Seasonal variation is also taken into account by including all monitoring data.

5.2 Wasteload Allocation

The WLA is the portion of the TMDL allocated to NPDES-permitted point sources (US EPA, 1999). The wasteload summation is determined by subtracting the margin of safety and the sum of the load allocation from the total maximum daily load. Note that all illicit dischargers, including Sanitary Sewer Overflows (SSOs), are illegal and not covered under the WLA of this TMDL.

5.2.1 Continuous Point Sources

There are currently no continuous dischargers within the South Santee Coastal watershed. Due to the distance from existing facilities to the referenced watershed and high dilution (Appendix C), the WLA from continuous point sources for this watershed is 0 cfu/day. Future continuous discharges are required to meet the prescribed loading for the pollutant of concern based on permitted flow and assuming an allowable permitted maximum concentration of 43cfu/100mL.

5.2.2 Non-Continuous Point Sources

Non-continuous point sources include all NPDES-permitted stormwater discharges, including current and future MS4 entities, construction and industrial discharges covered under permits numbered SCS & SCR and regulated under SC Water Pollution Control Permits Regulation 122.26(b)(14) & (15). Illicit discharges, including SSOs, are not covered under any NPDES permit and are subject to enforcement mechanisms. All areas defined as "Urbanized Area" by the US Census are required under the NPDES Phase II Stormwater Regulations to obtain a permit for the discharge of stormwater. Other non-urbanized areas may be required under the NPDES Phase II Stormwater Regulations to obtain a permit for the discharge of stormwater.

Based on the available information at this time, the portion of the watershed that drains directly to a regulated MS4 and that which drains through the non-regulated MS4 has not been clearly defined for the MS4 jurisdictional area. Loading from both types of sources (regulated and non regulated) typically occur in response to rainfall events, and discharge volumes as well as reoccurrence intervals are largely unknown. Therefore, the regulated MS4 is assigned the same percent reduction as the non-regulated sources in the watershed. The regulated MS4 entity is only responsible for implementing the TMDL WLA in accordance with MS4 permit requirements.

Waste load allocations for stormwater discharges are expressed as a percentage reduction instead of a numeric concentration due to the uncertain nature of stormwater discharge volumes and recurrence intervals. Stormwater discharges are required to meet the percentage reduction or the existing instream standard for the pollutant of concern. The percent reduction is based on the maximum percent reduction (critical condition) within any hydrologic category necessary to achieve target conditions. Table 6 presents the reduction needed for the impaired segments.

The reduction percentages in this TMDL also applies to the fecal coliform waste load attributable to those areas of the watershed which are covered or will be covered under NPDES MS4 permits. Compliance with terms and conditions of existing and future NPDES sanitary and stormwater permits (including all construction, industrial and MS4) may effectively implement the wasteload allocation (WLA) and demonstrate consistency with the assumptions and requirements of the TMDL.

5.3 Load Allocation

The Load Allocation applies to the nonpoint sources of FC bacteria and includes unregulated processes/entities. It is expressed both as a concentration and as a percent reduction and is initiated through implementation. The load allocation is calculated as the difference between the target concentration under the critical condition and the point source WLA. The water quality target for each station is 40.9 cfu/100ml (Table 5). The department believes that within each 12-digit HUC that meeting the highest percentage reduction or the WQS will effectively protect the shellfish harvesting beds in the referenced watershed for human consumption. Stations 06B-13, 06A-01, 06A-01A, and 06A-02 lie within the 12-digit HUC 030501120303 and require reductions of 84% as highlighted in table 5. Stations 06B-07, 06B-08, 06B-09, 06B-10, 06B-12, 06B-16, 06B-19, 06B-21, and 06B-22 are within the boundaries of HUC 030502090101 (Figure 2) and require a 70% reduction. SCDOT is currently the only designated MS4 located in the drainage area and is subject to the WLA portion of the TMDL. There may be potentially designated or other unregulated MS4s located in the watershed that are subject to the LA component of this TMDL. At such time that unregulated entities become regulated NPDES MS4 entities subject to applicable provisions of SC Regulation 61-68 D, they will be required to meet load reductions prescribed in the WLA component of the TMDL. This also applies to future discharges associated with industrial and construction activities that will be subject to SC R. 122.26(b)(14) & (15).

5.4 Existing Load

Due to the tidal nature of the system it is extremely difficult to calculate an existing load for this system. For this reason, existing conditions are given as a concentration. Existing concentration is calculated as the concentration of fecal coliform at the 90^{th} percentile point based on the normal line fit to the monitoring data. Existing conditions range from 28 cfu/100ml to 260 cfu/100ml (Table 5, Appendix D).

5.5 Margin of Safety

A margin of safety (MOS) allows for an accounting of the uncertainty in the relationship between pollutant loads and receiving water quality (US EPA, 1999). Incorporation of a MOS can be done either explicitly within the TMDL calculation or implicitly by using conservative

assumptions (US EPA, 1999). This TMDL has an explicit 5% margin of safety, all water quality data is compared to 40.9 cfu/100ml which is the water quality single sample standard of 43 cfu/100ml minus five percent. There is also an unspecified implicit margin of safety in the percent reduction calculations derived from the cumulative probability graphs due to the assumption of independence of the data points (Novotny, 2004).

5.6 Calculation of the TMDL

A TMDL represents the loading capacity (LC) of a waterbody, which is the maximum loading a waterbody can receive without exceeding water quality standards (US EPA, 1999). The TMDL is the sum of the WLA for point sources, the load allocation (LA) for non-point sources and natural background, and a margin of safety (MOS). The TMDL can be represented by the equation:

TMDL = LC = WLA + LA + MOS (US EPA, 2001).

This equation results in reductions of concentrations ranging from 0% to 84% to consistently meet the instantaneous water quality standard for fecal coliform (Table 5). Applying the required percent reduction to each data point in the 2004-2006 dataset also results in the geometric mean criteria being met for all stations (Table 6). Station 06B-20 has been listed as restricted by the shellfish program. Station 06B-20 meets the approved water quality criteria but is classified as restricted to provide a buffer in the interest of public health. The classification and 303(d) listing are not based on a documented water quality impairment; therefore, a percentage reduction is not needed at this location.

Table 5. TMDL Components of South Santee Coastal Watershed

Station ID	Existing (cfu/100ml)	TMDL[1,2] (cfu/100ml)	WQ Target (cfu/100ml)	Margin of Safety (MOS) (cfu/100ml)	WLA			LA
					Continuous Sources[2] (cfu/100ml)	Non-Continuous Sources[3,4] (% Reduction)	Non-Continuous SCDOT[4,6] (% Reduction)	% Reduction to Meet Load Allocation[4]
06A-01	217	43	40.9	2.1	N/A	81%	0%	81%
06A-01A	110	43	40.9	2.1	N/A	63%	0%	63%
06A-02	103	43	40.9	2.1	N/A	60%	0%	60%
06B-06	45	43	40.9	2.1	N/A	9%	0%	9%
06B-07	**136**	**43**	**40.9**	**2.1**	**N/A**	**70%**	0%	**70%**
06B-08	105	43	40.9	2.1	N/A	61%	0%	61%
06B-09	118	43	40.9	2.1	N/A	65%	0%	65%
06B-10	75	43	40.9	2.1	N/A	46%	0%	46%
06B-12	83	43	40.9	2.1	N/A	51%	0%	51%

06B-13	**260**	**43**	**40.9**	**2.1**	**N/A**	**84%**	0%	**84%**
06B-16	34	43	40.9	2.1	N/A	<1%	0%	<1%
06B-19	65	43	40.9	2.1	N/A	37%	0%	37%
06B-20	28	43	40.9	2.1	N/A	0%	0%	0%
06B-21	65	43	40.9	2.1	N/A	38%	0%	38%
06B-22	45	43	40.9	2.1	N/A	9%	0%	9%
06B-23	41	43	40.9	2.1	N/A	1%	0%	1%

Table Notes:

1. TMDL is expressed as a concentration. If daily average tidal exchange estimates were available, this number could be converted to load in cfu/day by multiplying flow by concentration and a conversion factor.
2. WLA is expressed as total monthly average. Existing and future continuous discharges are required to meet the prescribed loading for the pollutant of concern. Loadings were developed based upon permitted flow and an allowable permitted maximum concentration of 43cfu/100ml.
3. Percent reduction applies to all NPDES-permitted stormwater discharges, including current and future MS4, construction and industrial discharges covered under permits numbered SCS & SCR. Stormwater discharges are expressed as a percentage reduction due to the uncertain nature of stormwater discharge volumes and recurrence intervals. Stormwater discharges are required to meet percentage reduction or the existing instream standard for pollutant of concern in accordance with their NPDES permit.
4. Percent reduction applies to existing concentration.
5. Shellfish WQS = No more than 10% of the samples shall exceed 43cfu/100 ml.
6. As long as the conditions within the SCDOT MS4 area remain the same the Department deems the current contributions from SCDOT negligible and no reduction of FC bacteria is necessary. SCDOT must continue to comply with the provisions of its approved NPDES stormwater permit

Table 6. Geometric Means

Station ID	Geometric Mean Actual Data (2004-2006)	TMDL % Reduction	Geometric Mean w/ % Reduction Applied
06A-01	36.5	81%	6.9
06A-01A	16.2	63%	6.0
06A-02	13.2	60%	5.3
06B-06	8.8	9%	8.0
06B-07	33.1	70%	9.9
06B-08	22.1	61%	8.6
06B-09	29.0	65%	10.2
06B-10	15.4	46%	8.3
06B-12	16.2	51%	8.0
06B-13	69.3	84%	11.1
06B-16	7.3	0%	7.3
06B-19	12.1	37%	7.6
06B-20	6.7	0%	6.7
06B-21	10.9	38%	6.7
06B-22	11.6	9%	10.6
06B-23	8.2	1%	8.1

6.0 IMPLEMENTATION

As discussed in the *Implementation Plan for Achieving Total Maximum Daily Load Reductions From Nonpoint Sources for the State of South Carolina* (SC DHEC, 1998), South Carolina has several tools available for implementing this nonpoint source TMDL. There are a number of voluntary measures available to interested parties. SC DHEC will work with the existing agencies in the area to provide nonpoint source education in this watershed and the surrounding watersheds. Local sources of nonpoint source education and assistance include Clemson Extension Service, the Natural Resource Conservation Service (NRCS), the Charleston County Soil and Water Conservation Services, and the South Carolina Department of Natural Resources.

SCDHEC is empowered under the State Pollution Control Act to perform investigations of and pursue enforcement for activities and conditions that threaten the quality of waters of the state. In addition, other interested parties (universities, local watershed groups, etc.) may apply for section 319 grants to install BMPs that will reduce fecal coliform loading to the watershed. TMDL implementation projects are given highest priority for 319 funding. CWA §319 grants are not available for implementation of the WLA component of this TMDL.

An iterative BMP approach as defined in the general storm water NPDES MS4 permit is expected to provide significant implementation of the WLA. Discovery and removal of illicit storm drain cross connections is one important element of the storm water NPDES permit. Public nonpoint source pollution education is another. Other permit requirements for implementing WLAs in approved TMDLs will vary across waterbodies, discharges, and pollutant(s) of concern. The allocation within a TMDL can take many different forms – narrative, numeric, specified BMPs – and may be complimented by other special requirements such as monitoring.

It is recognized that there will be nonpoint source pollutant loading within the MS4 jurisdictional boundary where MS4 has no jurisdictional authority. As appropriate information is made available to further define the pollutant contributions to the permitted MS4, an effort can be made to revise these TMDLs. This effort will be initiated as resources permit and if deemed appropriate. For the Department to revise these TMDLs the following information should be provided, but not limited too:

1. A mapped inventory of all existing and planned stormwater discharge points as well as service boundaries of the MS4 covered in the MS4 permit.
2. Provide information to establish the stormwater conveyance in a watershed in order to delineate the boundary and areas being drained by each of the stormwater discharge points as defined per the MS4 permit.
3. Information should be provided in an electronic format including geo-spatial information compatible with the GIS system used by the Department.

The level of monitoring necessary, deployment of structural and non-structural BMPs, evaluation of BMP performance, and optimization or revisions to the existing pollutant reduction goals of the SWMP or any other plan is TMDL and watershed specific. Hence, it is expected that NPDES permit holders evaluate their existing SWMP or other plans in a manner that would effectively address implementation of this TMDL with an acceptable schedule and activities for

their permit compliance. The Department staff (permit writers, TMDL project managers, and compliance staff) is willing to assist in developing or updating the referenced plan as deemed necessary. Please see Appendix E which provides additional information as it relates to evaluating the effectiveness of an MS4 Permit as it is related to compliance with approved TMDLs. For SCDOT, existing and future NPDES MS4 permittees, compliance with terms and conditions of its NPDES permit is effective implementation of the WLA to the Maximum Extent Practicable. For existing and future NPDES construction and Industrial stormwater permittees, compliance with terms and conditions of its permit is effective implementation of the WLA.

SCDHEC recognizes illicit discharge detection and elimination activities should be conducted by MS4 entities as pursuant to compliance with existing MS4 permits. Note that these activities are designed to detect and eliminate illicit discharges that may contain FC bacteria. It is the intent of SCDHEC to work with the MS4 entities to recognize FC load reductions as they are achieved. SCDHEC acknowledges that these efforts to reduce illicit discharges and SSOs are ongoing and some reduction may already have been attained (i.e. load reductions occurring during TMDL development process). Thus, the implementation process is an iterative and adaptive process. Regular communication between all implementation stakeholders will result in successful remediation of controllable sources over time. As recreational uses are restored, SCDHEC will recognize the efforts of implementers where their efforts can be directly linked to restoration.

The Department acknowledges that progress with the assumptions and requirements of the TMDL by MS4s is expected to take one or more permit iteration. Progress towards achieving the WLA reduction for the TMDL may constitute MS4 compliance with its SWMP, provided the MEP definition is met, even where the numeric percent reduction may not be achieved in the interim.

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

Using existing authorities and voluntary mechanisms, these measures will be implemented in the watershed in order to bring about the required reductions in FC bacteria loading to the South Santee Coastal watershed. DHEC will continue to monitor, through the shellfish sanitation program, the effectiveness of implementation measures and evaluate stream water quality as the implementation strategy progresses. Source assessment will also be on-going through the continual efforts of the shellfish sanitation officers and the yearly shellfish area sanitary surveys. Shellfish sanitation surveys are available on the web at: www.scdhec.gov/environment/water/sfreports.htm.

The Department recognizes that **adaptive management/implementation** of this TMDL might be needed to achieve the water quality standard and we are committed towards targeting the load reductions to improve water quality in the South Santee Coastal watershed. As additional data and/or information becomes available, it may become necessary to revise and/or modify the TMDL target accordingly.

7.0 REFERENCES

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APPENDIX A – WATERSHED WATER QUALITY SAMPLING STATIONS DESCRIPTION (28 SITES IN TOTAL)

Station	Description
06A-01	South Santee River at Alligator Creek
06A-01A	South Santee River near the Midpoint of Grace Island (C-3/01)
06A-02	South Santee Inlet
06B-06	Alligator Creek and Ocean Inlet
06B-07	Alligator Creek at Marker #26
06B-08	Casino Creek at Marker #29
06B-09	DuPre Creek - 500 feet north of new dock (south of Marker #30)
06B-10	AIWW at Marker #32
06B-12	Alligator Creek State Shellfish Ground
06B-13	Alligator Creek nearest South Santee River between Markers 24 & 25
06B-14	Horsehead Creek at confluence with Cape Romain Harbor
06B-15	Casino Creek at Cape Romain Harbor
06B-16	Casino Creek midway between Stations 19 and 24 (at small unnamed creek on right, southbound)
06B-17	Congaree Creek at Tower Creek
06B-18	Confluence of DuPre Creek and Clubhouse Creek
06B-19	Confluence of Casino Creek and Skrine Creek
06B-20	1,000 yards up DuPre Creek from Clubhouse Creek
06B-21	Confluence of Alligator Creek and Ramhorn Creek
06B-22	Confluence of Ramhorn Creek and Mill Creek
06B-23	Confluence of Skrine Creek and Congaree Boat Creek
06B-24	Confluence of Casino Creek and Congaree Boat Creek
06B-25	Confluence of Horsehead Creek and Unnamed Creek at lower end of Horsehead Island
06B-26	Confluence of Skrine Creek and unnamed creek north of Muddy Bay
06B-27	The confluence of the first large creek on the left, with Congaree Boat Creek, traveling southeast of Station 23
07-08	Clubhouse Creek-1/4 mile north of Five Fathom Creek
07-08A	Oyster Bay at Muddy Bay
07-12	Raccoon Creek and Romain River Confluence
07-13	Romain River at confluence of "S" Creek
07-16	Romain River & Santee Path Creek Confluence

APPENDIX B – MONITORING DATA FOR 303(D) LISTED SITES

06A-01A			
DATE	FC (#/100ml)	DATE	FC (#/100ml)
03/07/2001	31.0	12/6/2004	9.0
4/11/2001	17.0	1/10/2005	540.0
10/2/2001	2.0	2/14/2005	5.0
11/19/2001	1.9	3/7/2005	46.0
12/11/2001	79.0	4/11/2005	31.0
1/28/2002	95.0	5/16/2005	8.0
2/11/2002	8.0	6/22/2005	46.0
3/20/2002	22.0	7/18/2005	220.0
4/2/2002	2.0	8/29/2005	33.0
5/20/2002	7.0	9/28/2005	11.0
6/19/2002	11.0	10/17/2005	22.0
7/17/2002	2.0	11/16/2005	33.0
8/19/2002	5.0	12/20/2005	140.0
9/11/2002	1.9	1/25/2006	33.0
10/16/2002	84.0	2/13/2006	13.0
11/25/2002	1.9	3/15/2006	11.0
12/16/2002	11.0	4/3/2006	5.0
1/7/2003	33.0	5/23/2006	210.0
2/11/2003	11.0	6/6/2006	11.0
3/24/2003	31.0	7/25/2006	8.0
4/2/2003	23.0	8/16/2006	1.9
5/6/2003	5.0	9/13/2006	1.9
6/10/2003	13.0	10/10/2006	5.0
7/8/2003	23.0	11/1/2006	33.0
8/11/2003	46.0	12/6/2006	110.0
9/10/2003	170.0	1/8/2007	110.0
10/21/2003	31.0	2/6/2007	14.0
11/17/2003	6.0	3/6/2007	22.0
12/2/2003	21.0	4/17/2007	79.0
1/12/2004	170.0	5/7/2007	33.0
2/17/2004	180.0	6/11/2007	46.0
3/1/2004	22.0	7/18/2007	1.9
4/21/2004	1.9	8/14/2007	1.9
5/24/2004	1.9	9/12/2007	1.9
6/9/2004	8.0	10/3/2007	4.0
7/27/2004	70.0	11/19/2007	5.0
8/3/2004	1.9	12/4/2007	2.0
9/22/2004	49.0		
10/4/2004	130.0		
11/9/2004	130.0		

06A-01							
DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)
1/11/1994	79.0	3/23/1998	14.0	7/30/2001	14.0	11/9/2004	350.0
2/16/1994	49.0	4/7/1998	17.0	8/14/2001	49.0	12/6/2004	5.0
5/10/1994	33.0	5/20/1998	8.0	9/4/2001	31.0	1/10/2005	240.0
6/20/1994	130.0	6/23/1998	150.0	10/2/2001	11.0	2/14/2005	17.0
7/18/1994	49.0	7/15/1998	11.0	11/19/2001	1.9	3/7/2005	33.0
8/2/1994	49.0	8/18/1998	26.0	12/11/2001	920.0	4/11/2005	110.0
10/10/1994	33.0	9/15/1998	33.0	1/28/2002	140.0	5/16/2005	5.0
12/14/1994	220.0	10/21/1998	9.0	2/11/2002	23.0	6/22/2005	46.0
1/10/1995	11.0	11/23/1998	64.0	3/20/2002	140.0	7/18/2005	170.0
3/21/1995	49.0	12/16/1998	1600.0	4/2/2002	5.0	8/29/2005	79.0
4/3/1995	33.0	1/25/1999	1600.0	5/20/2002	70.0	9/28/2005	17.0
5/22/1995	8.0	2/3/1999	240.0	6/19/2002	5.0	10/17/2005	33.0
10/30/1995	33.0	3/3/1999	33.0	7/17/2002	17.0	11/16/2005	130.0
11/13/1995	49.0	4/21/1999	8.0	8/19/2002	4.0	12/20/2005	33.0
1/23/1996	49.0	5/10/1999	23.0	9/11/2002	2.0	1/25/2006	33.0
2/26/1996	11.0	6/2/1999	6.0	10/16/2002	1600.0	2/13/2006	11.0
3/20/1996	140.0	7/20/1999	2.0	11/25/2002	46.0	3/15/2006	17.0
4/29/1996	23.0	8/3/1999	1.9	12/16/2002	7.0	4/3/2006	180.0
5/13/1996	33.0	9/7/1999	49.0	1/7/2003	11.0	5/23/2006	140.0
6/26/1996	27.0	10/4/1999	49.0	2/11/2003	7.0	6/6/2006	17.0
7/24/1996	31.0	11/15/1999	13.0	3/24/2003	13.0	7/25/2006	33.0
8/20/1996	23.0	12/8/1999	1.9	4/2/2003	33.0	8/16/2006	13.0
9/11/1996	79.0	1/19/2000	64.0	5/6/2003	23.0	9/13/2006	17.0
10/29/1996	140.0	2/14/2000	350.0	6/10/2003	33.0	10/10/2006	130.0
11/18/1996	13.0	3/28/2000	17.0	7/8/2003	17.0	11/1/2006	110.0
12/16/1996	170.0	4/5/2000	6.0	8/11/2003	46.0	12/6/2006	140.0
1/8/1997	2400.0	5/16/2000	8.0	9/10/2003	49.0		
2/5/1997	140.0	6/6/2000	21.0	10/21/2003	17.0		
3/11/1997	280.0	7/10/2000	8.0	11/17/2003	17.0		
4/21/1997	540.0	8/23/2000	46.0	12/2/2003	22.0		
5/12/1997	7.0	9/12/2000	70.0	1/12/2004	350.0		
6/2/1997	27.0	10/16/2000	2.0	2/17/2004	140.0		
7/29/1997	33.0	11/20/2000	130.0	3/1/2004	4.0		
8/19/1997	70.0	12/13/2000	23.0	4/21/2004	13.0		
9/9/1997	2.0	1/3/2001	7.0	5/24/2004	2.0		
10/14/1997	79.0	2/20/2001	49.0	6/9/2004	8.0		
11/24/1997	170.0	3/7/2001	110.0	7/27/2004	46.0		
12/10/1997	63.0	4/11/2001	33.0	8/3/2004	1.9		
1/19/1998	33.0	5/30/2001	23.0	9/22/2004	70.0		
2/23/1998	33.0	6/26/2001	11.0	10/4/2004	95.0		

06A-02							
DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)
1/11/1994	2.0	3/23/1998	17.0	8/14/2001	8.0	12/6/2004	23.0
2/16/1994	2.0	4/7/1998	33.0	9/4/2001	5.0	1/10/2005	540.0
5/10/1994	8.0	5/20/1998	17.0	10/2/2001	2.0	2/14/2005	1.9
6/20/1994	94.0	6/23/1998	14.0	11/19/2001	5.0	3/7/2005	35.0
7/18/1994	33.0	7/15/1998	2.0	12/11/2001	49.0	4/11/2005	49.0
8/2/1994	46.0	8/18/1998	8.0	1/28/2002	31.0	5/16/2005	5.0
10/10/1994	17.0	9/15/1998	11.0	2/11/2002	13.0	6/22/2005	79.0
12/14/1994	170.0	10/21/1998	2.0	3/20/2002	1.9	7/18/2005	140.0
1/10/1995	21.0	12/16/1998	1600.0	4/2/2002	1.9	8/29/2005	12.0
3/21/1995	11.0	1/25/1999	540.0	5/20/2002	5.0	9/28/2005	5.0
4/3/1995	2.0	2/3/1999	170.0	6/19/2002	4.0	10/17/2005	13.0
5/22/1995	2.0	3/3/1999	5.0	7/17/2002	4.0	11/16/2005	33.0
10/30/1995	49.0	4/21/1999	2.0	8/19/2002	2.0	12/20/2005	84.0
11/13/1995	70.0	5/10/1999	33.0	9/11/2002	2.0	1/25/2006	33.0
1/23/1996	2.0	6/2/1999	1.9	10/16/2002	110.0	2/13/2006	5.0
2/26/1996	31.0	7/20/1999	2.0	11/25/2002	1.9	3/15/2006	8.0
3/20/1996	540.0	8/3/1999	1.9	12/16/2002	11.0	4/3/2006	2.0
4/29/1996	5.0	9/7/1999	8.0	1/7/2003	5.0	5/23/2006	23.0
5/13/1996	22.0	10/4/1999	7.0	2/11/2003	8.0	6/6/2006	5.0
6/26/1996	11.0	11/15/1999	2.0	3/24/2003	33.0	7/25/2006	1.9
7/24/1996	5.0	12/8/1999	1.9	4/2/2003	13.0	8/16/2006	1.9
8/20/1996	2.0	1/19/2000	70.0	5/6/2003	23.0	9/13/2006	2.0
9/11/1996	2400.0	2/14/2000	6.0	6/10/2003	46.0	10/10/2006	2.0
10/29/1996	2.0	3/28/2000	33.0	7/8/2003	23.0	11/1/2006	23.0
11/18/1996	4.0	4/5/2000	4.0	8/11/2003	33.0	12/6/2006	110.0
12/16/1996	79.0	5/16/2000	5.0	9/10/2003	31.0	1/8/2007	49.0
1/8/1997	540.0	6/6/2000	2.0	10/21/2003	31.0	2/6/2007	5.0
2/5/1997	70.0	7/10/2000	2.0	11/17/2003	8.0	3/6/2007	79.0
3/11/1997	49.0	8/23/2000	5.0	12/2/2003	22.0	4/17/2007	49.0
4/21/1997	120.0	9/12/2000	33.0	1/12/2004	21.0		
5/12/1997	3.0	10/16/2000	2.0	2/17/2004	170.0		
6/2/1997	17.0	11/20/2000	17.0	3/1/2004	11.0		
7/29/1997	8.0	12/13/2000	79.0	4/21/2004	2.0		
8/19/1997	5.0	1/3/2001	1.9	5/24/2004	2.0		
9/9/1997	2.0	2/20/2001	21.0	6/9/2004	5.0		
10/14/1997	63.0	3/7/2001	17.0	7/27/2004	5.0		
11/24/1997	220.0	4/11/2001	27.0	8/3/2004	4.0		
12/10/1997	46.0	5/30/2001	7.0	9/22/2004	79.0		
1/19/1998	49.0	6/26/2001	8.0	10/4/2004	5.0		
2/23/1998	27.0	7/30/2001	17.0	11/9/2004	79.0		

06B-06							
DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)
1/25/1994	13.0	1/26/1998	140.0	4/11/2001	5.0	8/3/2004	1.9
3/22/1994	21.0	3/16/1998	70.0	5/30/2001	1.9	8/23/2004	5.0
4/10/1994	26.0	3/24/1998	63.0	6/26/2001	2.0	8/31/2004	23.0
5/30/1994	2.0	4/14/1998	17.0	7/30/2001	1.9	9/22/2004	64.0
6/12/1994	2.0	5/18/1998	6.0	8/14/2001	5.0	10/4/2004	5.0
7/12/1994	1.9	5/25/1998	17.0	9/4/2001	23.0	11/9/2004	33.0
9/20/1994	22.0	7/6/1998	8.0	10/2/2001	2.0	12/6/2004	17.0
11/8/1994	23.0	8/4/1998	1.9	11/19/2001	2.0	1/10/2005	280.0
12/15/1994	23.0	9/8/1998	2.0	12/11/2001	280.0	2/14/2005	1.9
1/9/1995	46.0	10/19/1998	5.0	1/28/2002	8.0	3/7/2005	8.0
1/24/1995	94.0	11/2/1998	33.0	2/11/2002	4.0	4/11/2005	33.0
4/25/1995	23.0	12/21/1998	31.0	3/20/2002	1.9	5/16/2005	2.0
6/21/1995	23.0	1/20/1999	11.0	4/2/2002	2.0	6/22/2005	27.0
7/12/1995	5.0	2/10/1999	6.0	5/20/2002	2.0	7/18/2005	23.0
9/27/1995	23.0	3/2/1999	13.0	6/19/2002	2.0	8/23/2005	2.0
11/21/1995	110.0	4/5/1999	2.0	7/17/2002	2.0	9/14/2005	46.0
12/18/1995	49.0	5/17/1999	13.0	8/19/2002	1.9	10/3/2005	8.0
1/10/1996	1.9	6/15/1999	2.0	9/11/2002	1.9	11/16/2005	14.0
2/28/1996	8.0	7/20/1999	1.9	10/16/2002	130.0	12/14/2005	70.0
3/6/1996	33.0	8/3/1999	1.9	11/25/2002	1.9	1/18/2006	79.0
4/24/1996	1.9	9/7/1999	11.0	12/16/2002	8.0	2/13/2006	1.9
5/1/1996	17.0	10/4/1999	7.0	1/7/2003	1.9	3/15/2006	2.0
6/12/1996	8.0	11/17/1999	2.0	2/11/2003	1.9	4/3/2006	1.9
7/29/1996	33.0	12/13/1999	8.0	3/24/2003	5.0	5/23/2006	23.0
8/14/1996	5.0	1/19/2000	21.0	4/2/2003	11.0	6/21/2006	6.0
9/4/1996	22.0	2/14/2000	31.0	5/6/2003	4.0	8/16/2006	1.9
10/28/1996	7.0	3/28/2000	5.0	6/10/2003	13.0	9/5/2006	43.0
11/20/1996	33.0	4/5/2000	1.9	7/8/2003	13.0	9/13/2006	1.9
12/10/1996	33.0	5/16/2000	2.0	8/11/2003	33.0	10/10/2006	5.0
1/29/1997	5.0	6/6/2000	1.9	9/10/2003	46.0	11/1/2006	1.9
2/18/1997	110.0	7/10/2000	1.9	10/21/2003	8.0	12/6/2006	79.0
3/4/1997	5.0	8/23/2000	2.0	11/17/2003	1.9	1/8/2007	95.0
5/13/1997	1.9	9/12/2000	46.0	12/2/2003	1.9	2/6/2007	7.0
5/28/1997	5.0	9/26/2000	8.0	1/12/2004	26.0	3/6/2007	8.0
6/4/1997	23.0	10/16/2000	1.9	2/17/2004	49.0	4/17/2007	1.9
7/8/1997	5.0	11/20/2000	2.0	3/1/2004	8.0		
8/5/1997	4.0	12/13/2000	2.0	4/21/2004	2.0		
9/15/1997	43.0	1/3/2001	1.9	5/24/2004	1.9		
10/28/1997	7.0	2/20/2001	5.0	6/9/2004	1.9		
11/13/1997	7.0	3/7/2001	7.0	7/27/2004	2.0		

06B-07							
DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)
01/25/1994	14.0	01/26/1998	84.0	5/30/2001	49.0	9/22/2004	49.0
03/22/1994	8.0	03/16/1998	140.0	6/26/2001	17.0	10/4/2004	140.0
04/10/1994	240.0	03/24/1998	13.0	7/30/2001	27.0	11/9/2004	110.0
05/30/1994	23.0	04/14/1998	17.0	8/14/2001	23.0	12/6/2004	22.0
06/12/1994	13.0	05/18/1998	8.0	9/4/2001	8.0	1/10/2005	350.0
07/12/1994	11.0	05/25/1998	46.0	10/2/2001	7.0	2/14/2005	33.0
09/20/1994	49.0	07/06/1998	11.0	11/19/2001	5.0	3/7/2005	23.0
11/08/1994	33.0	08/04/1998	33.0	12/11/2001	920.0	4/11/2005	23.0
12/15/1994	540.0	09/08/1998	5.0	1/28/2002	95.0	5/16/2005	8.0
01/09/1995	17.0	10/19/1998	46.0	2/11/2002	8.0	6/22/2005	33.0
01/24/1995	79.0	11/02/1998	240.0	3/20/2002	31.0	7/18/2005	33.0
04/25/1995	14.0	12/21/1998	95.0	4/2/2002	31.0	8/23/2005	49.0
06/21/1995	22.0	1/20/1999	17.0	5/20/2002	7.0	9/14/2005	180.0
07/12/1995	23.0	2/10/1999	33.0	6/19/2002	11.0	10/3/2005	110.0
09/27/1995	170.0	3/2/1999	8.0	07/17/02	13.0	11/16/2005	49.0
11/21/1995	280.0	4/5/1999	33.0	8/19/2002	2.0	12/14/2005	95.0
12/18/1995	540.0	5/17/1999	70.0	9/11/2002	8.0	1/18/2006	49.0
01/10/1996	21.0	6/15/1999	8.0	10/16/2002	49.0	2/13/2006	11.0
02/28/1996	8.0	7/20/1999	5.0	11/25/2002	49.0	3/15/2006	13.0
03/06/1996	49.0	8/3/1999	2.0	12/16/2002	33.0	4/3/2006	23.0
04/24/1996	7.0	9/7/1999	2.0	1/7/2003	130.0	5/23/2006	23.0
05/01/1996	70.0	10/4/1999	33.0	2/11/2003	8.0	6/21/2006	4.0
06/12/1996	63.0	11/17/1999	17.0	3/24/2003	49.0	8/16/2006	23.0
07/29/1996	49.0	12/13/1999	1.9	4/2/2003	7.0	9/13/2006	13.0
08/14/1996	49.0	1/19/2000	33.0	5/6/2003	11.0	10/10/2006	220.0
09/04/1996	94.0	2/14/2000	43.0	6/10/2003	23.0	11/1/2006	70.0
10/28/1996	33.0	3/28/2000	8.0	7/8/2003	13.0	12/6/2006	79.0
11/20/1996	22.0	4/5/2000	23.0	8/11/2003	26.0	1/8/2007	240.0
12/10/1996	240.0	5/16/2000	2.0	9/10/2003	49.0	2/6/2007	13.0
01/29/1997	70.0	6/6/2000	8.0	10/21/2003	23.0	3/6/2007	350.0
02/18/1997	79.0	7/10/2000	2.0	11/17/2003	17.0	4/17/2007	2.0
03/04/1997	49.0	8/23/2000	13.0	12/2/2003	64.0		
05/13/1997	13.0	9/12/2000	49.0	1/12/2004	170.0		
05/28/1997	33.0	10/16/2000	17.0	2/17/2004	79.0		
06/04/1997	79.0	11/20/2000	46.0	3/1/2004	8.0		
07/08/1997	11.0	12/13/2000	31.0	4/21/2004	5.0		
08/05/1997	5.0	1/3/2001	4.0	5/24/2004	2.0		
09/15/1997	17.0	2/20/2001	22.0	6/9/2004	13.0		
10/28/1997	94.0	3/7/2001	49.0	7/27/2004	23.0		
11/13/1997	23.0	4/11/2001	79.0	8/3/2004	23.0		

06B-08							
DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)
01/25/1994	17.0	1/26/1998	33.0	5/30/2001	13.0	10/4/2004	110.0
03/22/1994	33.0	3/16/1998	31.0	6/26/2001	2.0	11/9/2004	33.0
04/10/1994	170.0	3/24/1998	11.0	7/30/2001	7.0	12/6/2004	13.0
05/30/1994	5.0	4/14/1998	49.0	8/14/2001	8.0	1/10/2005	2500.0
06/12/1994	11.0	5/18/1998	11.0	9/4/2001	23.0	2/14/2005	8.0
07/12/1994	8.0	5/25/1998	33.0	10/2/2001	33.0	3/7/2005	79.0
09/20/1994	33.0	7/6/1998	23.0	11/19/2001	8.0	4/11/2005	33.0
11/08/1994	49.0	8/4/1998	22.0	12/11/2001	1600.0	5/16/2005	5.0
12/15/1994	130.0	9/8/1998	5.0	1/28/2002	26.0	6/22/2005	17.0
01/09/1995	33.0	10/19/1998	11.0	2/11/2002	8.0	7/18/2005	17.0
01/24/1995	140.0	11/2/1998	140.0	3/20/2002	17.0	8/23/2005	46.0
04/25/1995	13.0	12/21/1998	140.0	4/2/2002	13.0	9/14/2005	46.0
06/21/1995	23.0	1/20/1999	46.0	5/20/2002	8.0	10/3/2005	22.0
07/12/1995	23.0	2/10/1999	23.0	6/19/2002	2.0	11/16/2005	22.0
09/27/1995	150.0	3/2/1999	5.0	8/19/2002	1.9	12/14/2005	49.0
11/21/1995	46.0	4/5/1999	6.0	9/11/2002	1.9	1/18/2006	17.0
12/18/1995	540.0	5/17/1999	46.0	10/16/2002	79.0	2/13/2006	8.0
01/10/1996	8.0	6/15/1999	17.0	11/25/2002	49.0	3/15/2006	11.0
02/28/1996	17.0	7/20/1999	2.0	12/16/2002	33.0	4/3/2006	23.0
03/06/1996	70.0	8/3/1999	1.9	1/7/2003	23.0	5/23/2006	26.0
04/24/1996	4.0	9/7/1999	1.9	2/11/2003	1.9	6/21/2006	2.0
05/01/1996	33.0	10/4/1999	13.0	3/24/2003	33.0	8/16/2006	5.0
06/12/1996	33.0	11/17/1999	8.0	4/2/2003	12.0	9/13/2006	33.0
07/29/1996	49.0	12/13/1999	46.0	5/6/2003	8.0	10/10/2006	17.0
08/14/1996	33.0	1/19/2000	170.0	6/10/2003	46.0	11/1/2006	70.0
09/04/1996	70.0	2/14/2000	11.0	7/8/2003	11.0	12/6/2006	46.0
10/28/1996	70.0	3/28/2000	8.0	8/11/2003	46.0	1/8/2007	110.0
11/20/1996	49.0	4/5/2000	6.0	9/10/2003	33.0	2/6/2007	33.0
12/10/1996	140.0	5/16/2000	13.0	10/21/2003	46.0	3/6/2007	31.0
01/29/1997	49.0	6/6/2000	7.0	11/17/2003	33.0	4/17/2007	5.0
02/18/1997	23.0	7/10/2000	5.0	12/2/2003	79.0		
03/04/1997	33.0	8/23/2000	2.0	1/12/2004	95.0		
05/13/1997	2.0	9/12/2000	64.0	2/17/2004	46.0		
05/28/1997	23.0	10/16/2000	2.0	3/1/2004	7.0		
06/04/1997	46.0	11/20/2000	46.0	4/21/2004	8.0		
07/08/1997	23.0	12/13/2000	49.0	5/24/2004	11.0		
08/05/1997	22.0	1/3/2001	1.9	6/9/2004	7.0		
09/15/1997	21.0	2/20/2001	2.0	7/27/2004	17.0		
10/28/1997	70.0	3/7/2001	46.0	8/3/2004	7.0		
11/13/1997	27.0	4/11/2001	14.0	9/22/2004	17.0		

06B-09							
DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)
01/25/1994	17.0	1/26/1998	170.0	6/26/2001	17.0	10/4/2004	70.0
03/22/1994	33.0	3/16/1998	31.0	7/30/2001	2.0	11/9/2004	70.0
04/10/1994	140.0	3/24/1998	46.0	8/14/2001	17.0	12/6/2004	13.0
05/30/1994	5.0	4/14/1998	220.0	9/4/2001	23.0	1/10/2005	2500.0
06/12/1994	13.0	5/18/1998	7.0	10/2/2001	13.0	2/14/2005	5.0
07/12/1994	5.0	5/25/1998	33.0	11/19/2001	5.0	3/7/2005	46.0
09/20/1994	33.0	7/6/1998	8.0	12/11/2001	1600.0	4/11/2005	110.0
11/08/1994	23.0	8/4/1998	7.0	1/28/2002	70.0	5/16/2005	17.0
12/15/1994	140.0	9/8/1998	2.0	2/11/2002	8.0	6/22/2005	33.0
01/09/1995	33.0	10/19/1998	11.0	3/20/2002	8.0	7/18/2005	11.0
01/24/1995	130.0	11/2/1998	31.0	4/2/2002	1.9	8/23/2005	64.0
04/25/1995	13.0	12/21/1998	31.0	5/20/2002	8.0	9/14/2005	46.0
06/21/1995	11.0	1/20/1999	95.0	6/19/2002	2.0	10/3/2005	110.0
07/12/1995	23.0	3/2/1999	11.0	7/17/2002	5.0	11/16/2005	170.0
09/27/1995	70.0	4/5/1999	70.0	8/19/2002	1.9	12/14/2005	49.0
11/21/1995	23.0	5/17/1999	23.0	9/11/2002	1.9	1/18/2006	31.0
12/18/1995	540.0	6/15/1999	2.0	10/16/2002	110.0	2/13/2006	8.0
01/10/1996	17.0	7/20/1999	2.0	11/25/2002	23.0	3/15/2006	22.0
02/28/1996	33.0	8/3/1999	5.0	12/16/2002	11.0	4/3/2006	17.0
03/06/1996	23.0	9/7/1999	13.0	1/7/2003	22.0	5/23/2006	33.0
04/24/1996	8.0	10/4/1999	13.0	2/11/2003	1.9	6/21/2006	4.0
05/01/1996	23.0	11/17/1999	17.0	3/24/2003	13.0	8/16/2006	8.0
06/12/1996	13.0	12/13/1999	220.0	4/2/2003	13.0	9/13/2006	2.0
07/29/1996	13.0	1/19/2000	33.0	5/6/2003	70.0	10/10/2006	49.0
08/14/1996	17.0	2/14/2000	13.0	6/10/2003	33.0	11/1/2006	110.0
09/04/1996	33.0	3/28/2000	8.0	7/8/2003	5.0	12/6/2006	350.0
10/28/1996	49.0	4/5/2000	13.0	8/11/2003	46.0	1/8/2007	49.0
11/20/1996	63.0	5/16/2000	95.0	9/10/2003	33.0	2/6/2007	17.0
12/10/1996	130.0	6/6/2000	8.0	10/21/2003	46.0	3/6/2007	46.0
01/29/1997	33.0	7/10/2000	2.0	11/17/2003	13.0	4/17/2007	2.0
02/18/1997	110.0	8/23/2000	5.0	12/2/2003	33.0		
03/04/1997	17.0	9/12/2000	79.0	1/12/2004	49.0		
05/13/1997	17.0	10/16/2000	1.9	2/17/2004	49.0		
05/28/1997	23.0	11/20/2000	6.0	3/1/2004	13.0		
06/04/1997	33.0	12/13/2000	13.0	4/21/2004	8.0		
07/08/1997	13.0	1/3/2001	2.0	5/24/2004	4.0		
08/05/1997	14.0	2/20/2001	1.9	6/9/2004	2.0		
09/15/1997	17.0	3/7/2001	5.0	7/27/2004	17.0		
10/28/1997	540.0	4/11/2001	17.0	8/3/2004	17.0		
11/13/1997	5.0	5/30/2001	8.0	9/22/2004	110.0		

06B-10							
DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)
01/25/1994	11.0	1/26/1998	170.0	5/30/2001	13.0	9/22/2004	23.0
03/22/1994	17.0	3/16/1998	26.0	6/26/2001	1.9	10/4/2004	49.0
04/10/1994	33.0	3/24/1998	170.0	7/30/2001	5.0	11/9/2004	23.0
05/30/1994	2.0	4/14/1998	49.0	8/14/2001	8.0	12/6/2004	33.0
06/12/1994	4.0	5/18/1998	31.0	9/4/2001	5.0	1/10/2005	920.0
07/12/1994	2.0	5/25/1998	11.0	10/2/2001	7.0	2/14/2005	4.0
09/20/1994	23.0	7/6/1998	23.0	11/19/2001	1.9	3/7/2005	9.0
11/08/1994	13.0	8/4/1998	5.0	12/11/2001	540.0	4/11/2005	130.0
12/15/1994	240.0	9/8/1998	8.0	1/28/2002	79.0	5/16/2005	7.0
01/09/1995	79.0	10/19/1998	7.0	2/11/2002	2.0	6/22/2005	33.0
01/24/1995	63.0	11/2/1998	130.0	3/20/2002	5.0	7/18/2005	17.0
04/25/1995	17.0	12/21/1998	7.0	4/2/2002	1.9	8/23/2005	31.0
06/21/1995	49.0	1/20/1999	8.0	5/20/2002	8.0	9/14/2005	22.0
07/12/1995	13.0	2/10/1999	140.0	6/19/2002	11.0	10/3/2005	7.0
09/27/1995	43.0	3/2/1999	5.0	7/17/2002	1.9	11/16/2005	11.0
11/21/1995	46.0	4/5/1999	17.0	8/19/2002	2.0	12/14/2005	240.0
12/18/1995	220.0	5/17/1999	49.0	9/11/2002	4.0	1/18/2006	7.0
01/10/1996	1.9	6/15/1999	2.0	10/16/2002	79.0	2/13/2006	2.0
02/28/1996	22.0	7/20/1999	2.0	11/25/2002	7.0	3/15/2006	4.0
03/06/1996	7.0	8/3/1999	1.9	12/16/2002	23.0	4/3/2006	13.0
04/24/1996	8.0	9/7/1999	33.0	1/7/2003	14.0	5/23/2006	17.0
05/01/1996	33.0	10/4/1999	8.0	2/11/2003	1.9	6/21/2006	7.0
06/12/1996	11.0	11/17/1999	2.0	3/24/2003	220.0	8/16/2006	7.0
07/29/1996	14.0	12/13/1999	5.0	4/2/2003	21.0	9/13/2006	17.0
08/14/1996	23.0	1/19/2000	23.0	5/6/2003	46.0	10/10/2006	7.0
09/04/1996	49.0	2/14/2000	6.0	6/10/2003	13.0	11/1/2006	49.0
10/28/1996	1.9	3/28/2000	2.0	7/8/2003	8.0	12/6/2006	70.0
11/20/1996	17.0	4/5/2000	2.0	8/11/2003	23.0	1/8/2007	110.0
12/10/1996	46.0	5/16/2000	6.0	9/10/2003	46.0	2/6/2007	13.0
01/29/1997	46.0	6/6/2000	2.0	10/21/2003	8.0	3/6/2007	8.0
02/18/1997	49.0	7/10/2000	1.9	11/17/2003	2.0	4/17/2007	7.0
03/04/1997	11.0	8/23/2000	7.0	12/2/2003	23.0		
05/13/1997	8.0	9/12/2000	33.0	1/12/2004	49.0		
05/28/1997	38.0	10/16/2000	1.9	2/17/2004	70.0		
06/04/1997	79.0	11/20/2000	13.0	3/1/2004	8.0		
07/08/1997	5.0	12/13/2000	2.0	4/21/2004	1.9		
08/05/1997	8.0	1/3/2001	1.9	5/24/2004	5.0		
09/15/1997	5.0	2/20/2001	2.0	6/9/2004	2.0		
10/28/1997	70.0	3/7/2001	8.0	7/27/2004	8.0		
11/13/1997	33.0	4/11/2001	14.0	8/3/2004	1.9		

06B-12							
DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)
01/25/1994	5.0	1/26/1998	130.0	6/26/2001	1.9	10/4/2004	33.0
03/22/1994	13.0	3/16/1998	46.0	7/30/2001	4.0	11/9/2004	33.0
04/10/1994	220.0	3/24/1998	33.0	8/14/2001	5.0	12/6/2004	7.0
05/30/1994	1.9	4/14/1998	49.0	9/4/2001	8.0	1/10/2005	540.0
06/12/1994	13.0	5/18/1998	17.0	10/2/2001	1.9	2/14/2005	1.9
07/12/1994	4.0	5/25/1998	17.0	11/19/2001	5.0	3/7/2005	22.0
09/20/1994	84.0	7/6/1998	31.0	12/11/2001	280.0	4/11/2005	49.0
11/08/1994	70.0	8/4/1998	13.0	1/28/2002	8.0	5/16/2005	1.9
12/15/1994	130.0	9/8/1998	1.9	2/11/2002	2.0	6/22/2005	23.0
01/09/1995	70.0	10/19/1998	5.0	3/20/2002	8.0	7/18/2005	33.0
01/24/1995	140.0	11/2/1998	49.0	4/2/2002	5.0	8/23/2005	17.0
04/25/1995	23.0	12/21/1998	21.0	5/20/2002	7.0	9/14/2005	46.0
06/21/1995	5.0	1/20/1999	21.0	6/19/2002	2.0	10/3/2005	13.0
07/12/1995	22.0	2/10/1999	170.0	7/17/2002	2.0	11/16/2005	33.0
09/27/1995	13.0	3/2/1999	2.0	8/19/2002	1.9	12/14/2005	95.0
11/21/1995	140.0	4/5/1999	4.0	9/11/2002	1.9	1/18/2006	33.0
12/18/1995	130.0	5/17/1999	70.0	10/16/2002	110.0	2/13/2006	49.0
01/10/1996	2.0	6/15/1999	2.0	11/25/2002	1.9	3/15/2006	13.0
02/28/1996	5.0	8/3/1999	1.9	12/16/2002	11.0	4/3/2006	7.0
03/06/1996	49.0	9/7/1999	2.0	1/7/2003	46.0	5/23/2006	21.0
04/24/1996	2.0	10/4/1999	13.0	2/11/2003	1.9	6/21/2006	2.0
05/01/1996	63.0	11/17/1999	2.0	3/24/2003	8.0	8/16/2006	2.0
06/12/1996	49.0	12/13/1999	46.0	4/2/2003	13.0	9/13/2006	4.0
07/29/1996	5.0	1/19/2000	95.0	5/6/2003	23.0	10/10/2006	11.0
08/14/1996	33.0	2/14/2000	17.0	6/10/2003	140.0	11/1/2006	17.0
09/04/1996	79.0	3/28/2000	2.0	7/8/2003	7.0	12/6/2006	79.0
10/28/1996	8.0	4/5/2000	33.0	8/11/2003	13.0	1/8/2007	49.0
11/20/1996	33.0	5/16/2000	11.0	9/10/2003	46.0	2/6/2007	27.0
12/10/1996	70.0	6/6/2000	2.0	10/21/2003	11.0	3/6/2007	33.0
01/29/1997	8.0	7/10/2000	1.9	11/17/2003	8.0	4/17/2007	2.0
02/18/1997	31.0	8/23/2000	4.0	12/2/2003	23.0		
03/04/1997	8.0	9/12/2000	17.0	1/12/2004	130.0		
05/13/1997	13.0	10/16/2000	1.9	2/17/2004	130.0		
05/28/1997	46.0	11/20/2000	13.0	3/1/2004	17.0		
06/04/1997	23.0	12/13/2000	6.0	4/21/2004	5.0		
07/08/1997	9.0	1/3/2001	2.0	5/24/2004	1.9		
08/05/1997	13.0	2/20/2001	2.0	6/9/2004	8.0		
09/15/1997	33.0	3/7/2001	11.0	7/27/2004	2.0		
10/28/1997	31.0	4/11/2001	7.0	8/3/2004	2.0		
11/13/1997	22.0	5/30/2001	2.0	9/22/2004	95.0		

06B-13							
DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)
01/25/1994	17.0	1/26/1998	49.0	5/30/2001	17.0	9/22/2004	79.0
03/22/1994	31.0	3/16/1998	58.0	6/26/2001	33.0	10/4/2004	220.0
04/10/1994	79.0	3/24/1998	27.0	7/30/2001	17.0	11/9/2004	540.0
05/30/1994	46.0	4/14/1998	33.0	8/14/2001	13.0	12/6/2004	11.0
06/12/1994	49.0	5/18/1998	21.0	9/4/2001	64.0	1/10/2005	2500.0
07/12/1994	49.0	5/25/1998	33.0	10/2/2001	31.0	2/14/2005	17.0
09/20/1994	79.0	7/6/1998	33.0	11/19/2001	33.0	3/7/2005	140.0
11/08/1994	79.0	8/4/1998	23.0	12/11/2001	540.0	4/11/2005	70.0
12/15/1994	110.0	9/8/1998	110.0	1/28/2002	220.0	5/16/2005	11.0
01/09/1995	33.0	10/19/1998	33.0	2/11/2002	33.0	6/22/2005	33.0
01/24/1995	110.0	11/2/1998	920.0	3/20/2002	280.0	7/18/2005	220.0
04/25/1995	31.0	12/21/1998	350.0	4/2/2002	33.0	8/23/2005	46.0
06/21/1995	23.0	1/20/1999	46.0	5/20/2002	46.0	9/14/2005	350.0
07/12/1995	22.0	2/10/1999	33.0	6/19/2002	23.0	10/3/2005	110.0
09/27/1995	220.0	3/2/1999	33.0	7/17/2002	46.0	11/16/2005	350.0
11/21/1995	280.0	4/5/1999	79.0	8/19/2002	5.0	12/14/2005	79.0
12/18/1995	130.0	5/17/1999	27.0	9/11/2002	21.0	1/18/2006	540.0
01/10/1996	23.0	6/15/1999	33.0	10/16/2002	220.0	2/13/2006	13.0
02/28/1996	33.0	7/20/1999	2.0	11/25/2002	70.0	3/15/2006	17.0
03/06/1996	31.0	8/3/1999	8.0	12/16/2002	17.0	4/3/2006	49.0
04/24/1996	5.0	9/7/1999	17.0	1/7/2003	13.0	5/23/2006	280.0
05/01/1996	17.0	10/4/1999	49.0	2/11/2003	8.0	6/21/2006	43.0
06/12/1996	79.0	11/17/1999	33.0	3/24/2003	27.0	8/16/2006	17.0
07/29/1996	49.0	12/13/1999	70.0	4/2/2003	11.0	9/13/2006	24.0
08/14/1996	79.0	1/19/2000	2500.0	5/6/2003	8.0	10/10/2006	280.0
09/04/1996	220.0	2/14/2000	23.0	6/10/2003	49.0	11/1/2006	280.0
10/28/1996	70.0	3/28/2000	17.0	7/8/2003	31.0	12/6/2006	49.0
11/20/1996	140.0	4/5/2000	6.0	8/11/2003	110.0		
12/10/1996	920.0	5/16/2000	46.0	9/10/2003	140.0		
01/29/1997	49.0	6/6/2000	13.0	10/21/2003	170.0		
02/18/1997	79.0	7/10/2000	17.0	11/17/2003	49.0		
03/04/1997	13.0	8/23/2000	70.0	12/2/2003	70.0		
05/13/1997	17.0	9/12/2000	46.0	1/12/2004	350.0		
05/28/1997	46.0	10/16/2000	33.0	2/17/2004	49.0		
06/04/1997	63.0	11/20/2000	140.0	3/1/2004	1.9		
07/08/1997	33.0	12/13/2000	280.0	4/21/2004	31.0		
08/05/1997	46.0	1/3/2001	4.0	5/24/2004	5.0		
09/15/1997	46.0	2/20/2001	33.0	6/9/2004	46.0		
10/28/1997	2500.0	3/7/2001	49.0	7/27/2004	79.0		
11/13/1997	13.0	4/11/2001	130.0	8/3/2004	79.0		

06B-16							
DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)
01/25/1994	5.0	3/16/1998	14.0	6/26/2001	2.0	8/31/2004	11.0
03/22/1994	13.0	3/24/1998	33.0	7/30/2001	7.0	9/22/2004	95.0
04/10/1994	23.0	4/14/1998	27.0	8/14/2001	7.0	10/4/2004	21.0
05/30/1994	1.9	5/18/1998	11.0	9/4/2001	7.0	11/9/2004	2.0
06/12/1994	8.0	5/25/1998	11.0	10/2/2001	7.0	12/6/2004	7.0
07/12/1994	1.9	7/6/1998	1.9	11/19/2001	2.0	1/10/2005	280.0
09/20/1994	8.0	8/4/1998	1.9	12/11/2001	140.0	2/14/2005	1.9
11/08/1994	33.0	9/8/1998	2.0	1/28/2002	8.0	3/7/2005	14.0
12/15/1994	110.0	10/19/1998	13.0	2/11/2002	2.0	4/11/2005	49.0
01/09/1995	21.0	11/2/1998	17.0	3/20/2002	2.0	5/16/2005	1.9
01/24/1995	79.0	12/21/1998	9.0	4/2/2002	2.0	6/22/2005	17.0
04/25/1995	11.0	1/20/1999	5.0	5/20/2002	1.9	7/18/2005	33.0
06/21/1995	14.0	2/10/1999	9.0	6/19/2002	2.0	8/23/2005	1.9
07/12/1995	4.0	3/2/1999	2.0	7/17/2002	1.9	9/14/2005	13.0
09/27/1995	4.0	4/5/1999	5.0	8/19/2002	1.9	10/3/2005	1.9
11/21/1995	33.0	5/17/1999	4.0	9/11/2002	1.9	10/11/2005	5.0
12/18/1995	49.0	6/15/1999	1.9	10/16/2002	23.0	11/16/2005	8.0
01/10/1996	1.9	7/20/1999	1.9	11/25/2002	2.0	11/21/2005	130.0
02/28/1996	7.0	8/3/1999	1.9	12/16/2002	5.0	12/1/2005	17.0
03/06/1996	220.0	9/7/1999	1.9	1/7/2003	13.0	12/7/2005	2.0
04/24/1996	1.9	10/4/1999	2.0	2/11/2003	1.9	12/14/2005	13.0
05/01/1996	23.0	11/17/1999	1.9	3/24/2003	22.0	1/18/2006	25.0
06/12/1996	5.0	12/13/1999	1.9	4/2/2003	17.0	2/13/2006	1.9
07/29/1996	27.0	1/19/2000	17.0	5/6/2003	11.0	3/15/2006	1.9
08/14/1996	1.9	2/14/2000	46.0	6/10/2003	13.0	4/3/2006	1.9
09/04/1996	23.0	3/28/2000	2.0	7/8/2003	8.0	5/23/2006	11.0
10/28/1996	5.0	4/5/2000	5.0	8/11/2003	33.0	6/21/2006	1.9
11/20/1996	2.0	5/16/2000	7.0	9/10/2003	11.0	8/16/2006	2.0
12/10/1996	70.0	6/6/2000	1.9	10/21/2003	14.0	9/13/2006	1.9
01/29/1997	5.0	7/10/2000	1.9	11/17/2003	2.0	10/10/2006	8.0
02/18/1997	13.0	8/23/2000	8.0	12/2/2003	13.0	11/1/2006	5.0
03/04/1997	17.0	9/12/2000	5.0	1/12/2004	49.0	12/6/2006	33.0
05/13/1997	5.0	10/16/2000	2.0	2/17/2004	49.0	1/8/2007	49.0
05/28/1997	17.0	11/20/2000	1.9	3/1/2004	8.0	2/6/2007	17.0
06/04/1997	8.0	12/13/2000	2.0	4/21/2004	1.9	3/6/2007	7.0
07/08/1997	7.0	1/3/2001	1.9	5/24/2004	1.9	4/17/2007	2.0
09/15/1997	5.0	2/20/2001	5.0	6/9/2004	1.9		
10/28/1997	8.0	3/7/2001	2.0	7/27/2004	8.0		
11/13/1997	11.0	4/11/2001	2.0	8/3/2004	1.9		
01/26/1998	79.0	5/30/2001	2.0	8/23/2004	2.0		

06B-18							
DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)
1/20/1999	1.9	3/20/2002	8.0	5/16/2005	5.0	9/20/1994	13.0
3/2/1999	5.0	4/2/2002	1.9	6/22/2005	8.0	5/30/1994	1.9
4/5/1999	13.0	5/20/2002	1.9	7/18/2005	540.0	4/10/1994	170.0
5/17/1999	5.0	6/19/2002	2.0	8/23/2005	5.0	5/25/1998	13.0
6/15/1999	2.0	7/17/2002	2.0	9/14/2005	17.0	3/16/1998	13.0
7/20/1999	1.9	8/19/2002	8.0	5/1/1996	20.0	11/8/1994	33.0
8/3/1999	1.9	9/11/2002	1.9	8/4/1998	2.0	11/2/1998	33.0
9/7/1999	1.9	10/16/2002	6.0	3/24/1998	17.0	1/26/1998	33.0
9/23/1999	2.0	11/25/2002	7.0	2/18/1997	33.0	9/15/1997	2.0
10/4/1999	13.0	12/16/2002	17.0	12/10/1996	11.0	8/5/1997	7.0
10/26/1999	13.0	1/7/2003	1.9	6/12/1996	1.9	6/4/1997	2.0
11/17/1999	1.9	2/11/2003	1.9	3/22/1994	13.0	10/28/1996	33.0
12/13/1999	1.9	3/24/2003	17.0	1/25/1994	7.0	8/14/1996	8.0
1/19/2000	7.0	4/2/2003	8.0	10/19/1998	8.0	3/6/1996	5.0
2/14/2000	4.0	5/6/2003	13.0	7/6/1998	2.0	4/25/1995	2.0
3/28/2000	4.0	6/10/2003	17.0	5/18/1998	13.0	12/15/1994	8.0
4/5/2000	5.0	7/8/2003	1.9	10/28/1997	49.0	6/12/1994	1.9
5/16/2000	1.9	8/11/2003	31.0	3/4/1997	33.0	10/3/2005	5.0
6/6/2000	5.0	9/10/2003	49.0	7/29/1996	4.0	10/11/2005	2.0
7/10/2000	1.9	10/21/2003	7.0	2/28/1996	8.0	11/16/2005	23.0
8/23/2000	2.0	11/17/2003	2.0	6/21/1995	1.9	11/21/2005	170.0
9/12/2000	1.9	12/2/2003	2.0	1/24/1995	33.0	12/1/2005	64.0
9/26/2000	23.0	1/12/2004	23.0	11/13/1997	33.0	12/7/2005	33.0
10/16/2000	8.0	2/17/2004	33.0	5/28/1997	17.0	12/14/2005	5.0
11/20/2000	2.0	3/1/2004	1.9	5/13/1997	2.0	1/18/2006	23.0
12/13/2000	1.9	4/21/2004	2.0	11/20/1996	7.0	2/13/2006	2.0
1/3/2001	1.9	5/24/2004	1.9	4/24/1996	5.0	3/15/2006	11.0
2/20/2001	7.0	6/9/2004	1.9	9/27/1995	17.0	4/3/2006	1.9
3/7/2001	2.0	7/27/2004	2.0	7/12/1994	31.0	5/23/2006	17.0
4/11/2001	5.0	8/3/2004	1.9	9/8/1998	2.0	6/21/2006	13.0
5/30/2001	1.9	8/23/2004	2.0	4/14/1998	17.0	8/16/2006	5.0
6/26/2001	1.9	8/31/2004	8.0	9/4/1996	49.0	9/13/2006	1.9
7/30/2001	2500.0	9/22/2004	17.0	1/10/1996	1.9	10/10/2006	4.0
8/14/2001	8.0	10/4/2004	33.0	12/18/1995	2.0	11/1/2006	2.0
9/4/2001	8.0	11/9/2004	13.0	1/9/1995	33.0	12/6/2006	22.0
10/2/2001	5.0	12/6/2004	5.0	12/21/1998	8.0	1/8/2007	13.0
11/19/2001	2.0	1/10/2005	140.0	7/8/1997	5.0	2/6/2007	2.0
12/11/2001	110.0	2/14/2005	1.9	1/29/1997	2.0	3/6/2007	1.9
1/28/2002	17.0	3/7/2005	2.0	11/21/1995	21.0	4/17/2007	5.0
2/11/2002	2.0	4/11/2005	17.0	7/12/1995	1.9		

06B-19							
DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)
1/25/1994	17.0	3/24/1998	17.0	7/30/2001	7.0	9/22/2004	33.0
3/22/1994	2.0	4/14/1998	170.0	8/14/2001	11.0	10/4/2004	79.0
4/10/1994	140.0	5/18/1998	23.0	9/4/2001	22.0	11/9/2004	23.0
5/30/1994	1.9	5/25/1998	33.0	10/2/2001	1.9	12/6/2004	5.0
6/12/1994	33.0	7/6/1998	23.0	11/19/2001	1.9	1/10/2005	1600.0
9/20/1994	17.0	8/4/1998	2.0	12/11/2001	95.0	2/14/2005	1.9
11/8/1994	17.0	9/8/1998	2.0	1/28/2002	46.0	3/7/2005	23.0
12/15/1994	44.0	10/19/1998	5.0	2/11/2002	5.0	4/11/2005	33.0
1/9/1995	49.0	11/2/1998	70.0	3/20/2002	5.0	5/16/2005	1.9
1/24/1995	170.0	12/21/1998	2.0	4/2/2002	1.9	6/22/2005	17.0
4/25/1995	23.0	1/20/1999	14.0	5/20/2002	7.0	7/18/2005	33.0
6/21/1995	33.0	2/10/1999	17.0	6/19/2002	2.0	8/23/2005	17.0
7/12/1995	5.0	3/2/1999	2.0	7/17/2002	1.9	9/14/2005	140.0
9/27/1995	1.9	4/5/1999	1.9	8/19/2002	5.0	10/3/2005	13.0
11/21/1995	94.0	5/17/1999	11.0	9/11/2002	1.9	11/16/2005	33.0
12/18/1995	70.0	6/15/1999	2.0	10/16/2002	110.0	12/14/2005	70.0
1/10/1996	1.9	7/20/1999	1.9	11/25/2002	2.0	1/18/2006	13.0
2/28/1996	5.0	8/3/1999	1.9	12/16/2002	8.0	2/13/2006	4.0
3/6/1996	79.0	9/7/1999	7.0	1/7/2003	23.0	3/15/2006	8.0
4/24/1996	7.0	10/4/1999	8.0	2/11/2003	1.9	4/3/2006	2.0
5/1/1996	33.0	11/17/1999	1.9	3/24/2003	17.0	5/23/2006	25.0
6/12/1996	13.0	12/13/1999	5.0	4/2/2003	31.0	6/21/2006	8.0
7/29/1996	11.0	1/19/2000	49.0	5/6/2003	22.0	8/16/2006	5.0
8/14/1996	8.0	2/14/2000	17.0	6/10/2003	13.0	9/13/2006	1.9
9/4/1996	13.0	3/28/2000	7.0	7/8/2003	8.0	10/10/2006	2.0
10/28/1996	2.0	4/5/2000	8.0	8/11/2003	21.0	11/1/2006	33.0
11/20/1996	17.0	5/16/2000	17.0	9/10/2003	79.0	12/6/2006	49.0
12/10/1996	49.0	6/6/2000	5.0	10/21/2003	13.0	1/8/2007	140.0
1/29/1997	1.9	7/10/2000	5.0	11/17/2003	1.9	2/6/2007	9.0
2/18/1997	70.0	8/23/2000	7.0	12/2/2003	14.0	3/6/2007	4.0
3/4/1997	33.0	9/12/2000	13.0	1/12/2004	130.0	4/17/2007	2.0
5/13/1997	5.0	10/16/2000	1.9	2/17/2004	49.0		
5/28/1997	70.0	11/20/2000	7.0	3/1/2004	1.9		
6/4/1997	17.0	12/13/2000	1.9	4/21/2004	1.9		
7/8/1997	33.0	1/3/2001	1.9	5/24/2004	1.9		
9/15/1997	2.0	2/20/2001	7.0	6/9/2004	1.9		
10/28/1997	49.0	3/7/2001	17.0	7/27/2004	1.9		
11/13/1997	8.0	4/11/2001	13.0	8/3/2004	1.9		
1/26/1998	70.0	5/30/2001	21.0	8/23/2004	1.9		
3/16/1998	49.0	6/26/2001	1.9	8/31/2004	33.0		

06B-20							
DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)
1/25/1994	2.0	3/24/1998	33.0	8/14/2001	2.0	10/4/2004	8.0
3/22/1994	33.0	4/14/1998	7.0	9/4/2001	46.0	11/9/2004	8.0
4/10/1994	170.0	5/18/1998	49.0	10/2/2001	1.9	12/6/2004	17.0
5/30/1994	2.0	5/25/1998	2.0	11/19/2001	1.9	1/10/2005	130.0
6/12/1994	7.0	7/6/1998	1.9	12/11/2001	170.0	2/14/2005	1.9
9/20/1994	4.0	8/4/1998	1.9	1/28/2002	64.0	3/7/2005	1.9
11/8/1994	17.0	9/8/1998	1.9	2/11/2002	1.9	4/11/2005	11.0
12/15/1994	23.0	10/19/1998	5.0	3/20/2002	1.9	5/16/2005	7.0
1/9/1995	21.0	11/2/1998	14.0	4/2/2002	2.0	6/22/2005	2.0
1/24/1995	13.0	12/21/1998	5.0	5/20/2002	2.0	7/18/2005	49.0
4/25/1995	2.0	1/20/1999	13.0	6/19/2002	5.0	8/23/2005	33.0
6/21/1995	17.0	3/2/1999	1.9	7/17/2002	1.9	9/14/2005	8.0
7/12/1995	2.0	4/5/1999	1.9	8/19/2002	1.9	10/3/2005	8.0
9/27/1995	5.0	5/17/1999	7.0	9/11/2002	1.9	10/11/2005	7.0
11/21/1995	63.0	6/15/1999	2.0	10/16/2002	49.0	11/16/2005	11.0
12/18/1995	1.9	7/20/1999	2.0	11/25/2002	1.9	12/14/2005	9.0
1/10/1996	1.9	8/3/1999	1.9	12/16/2002	2.0	1/18/2006	12.0
2/28/1996	8.0	9/7/1999	1.9	1/7/2003	7.0	2/13/2006	4.0
3/6/1996	9.0	11/17/1999	1.9	2/11/2003	1.9	3/15/2006	8.0
4/24/1996	6.0	12/13/1999	1.9	3/24/2003	17.0	4/3/2006	8.0
5/1/1996	23.0	1/19/2000	11.0	4/2/2003	13.0	5/23/2006	7.0
6/12/1996	1.9	2/14/2000	2.0	5/6/2003	11.0	6/21/2006	5.0
7/29/1996	5.0	3/28/2000	5.0	6/10/2003	23.0	8/16/2006	1.9
8/14/1996	2.0	4/5/2000	5.0	7/8/2003	17.0	9/13/2006	1.9
9/4/1996	6.0	5/16/2000	5.0	8/11/2003	49.0	10/10/2006	8.0
10/28/1996	23.0	6/6/2000	1.9	9/10/2003	23.0	11/1/2006	5.0
11/20/1996	4.0	7/10/2000	1.9	10/21/2003	8.0	12/6/2006	33.0
12/10/1996	17.0	8/23/2000	5.0	11/17/2003	5.0	1/8/2007	130.0
1/29/1997	7.0	9/12/2000	5.0	12/2/2003	7.0	2/6/2007	13.0
2/18/1997	6.0	9/26/2000	23.0	1/12/2004	8.0	3/6/2007	5.0
3/4/1997	110.0	10/16/2000	1.9	2/17/2004	9.0	4/17/2007	1.9
5/13/1997	7.0	11/20/2000	7.0	3/1/2004	1.9		
5/28/1997	17.0	12/13/2000	1.9	4/21/2004	7.0		
6/4/1997	11.0	1/3/2001	1.9	5/24/2004	1.9		
7/8/1997	8.0	2/20/2001	8.0	6/9/2004	1.9		
8/5/1997	2.0	3/7/2001	5.0	7/27/2004	1.9		
9/15/1997	5.0	4/11/2001	5.0	8/3/2004	2.0		
10/28/1997	22.0	5/30/2001	2.0	8/23/2004	7.0		
11/13/1997	1.9	6/26/2001	2.0	8/31/2004	23.0		
1/26/1998	58.0	7/30/2001	8.0	9/22/2004	17.0		

06B-21							
DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)	DATE	FC (#/100ml)
1/25/1994	13.0	1/26/1998	220.0	5/30/2001	1.9	8/23/2004	2.0
3/22/1994	14.0	3/16/1998	49.0	6/26/2001	1.9	8/31/2004	170.0
4/10/1994	8.0	3/24/1998	63.0	7/30/2001	2.0	9/22/2004	64.0
5/30/1994	4.0	4/14/1998	17.0	8/14/2001	4.0	10/4/2004	33.0
6/12/1994	2.0	5/18/1998	9.0	9/4/2001	2.0	11/9/2004	33.0
7/12/1994	1.9	5/25/1998	7.0	10/2/2001	2.0	12/6/2004	33.0
9/20/1994	49.0	7/6/1998	11.0	11/19/2001	5.0	1/10/2005	2500.0
11/8/1994	31.0	8/4/1998	2.0	12/11/2001	280.0	2/14/2005	1.9
12/15/1994	130.0	9/8/1998	1.9	1/28/2002	11.0	3/7/2005	13.0
1/9/1995	63.0	10/19/1998	11.0	2/11/2002	2.0	4/11/2005	27.0
1/24/1995	120.0	11/2/1998	17.0	3/20/2002	33.0	5/16/2005	1.9
4/25/1995	11.0	12/21/1998	13.0	4/2/2002	5.0	6/22/2005	17.0
6/21/1995	13.0	1/20/1999	17.0	5/20/2002	13.0	7/18/2005	17.0
7/12/1995	2.0	2/10/1999	49.0	6/19/2002	1.9	8/23/2005	1.9
9/27/1995	7.0	3/2/1999	4.0	7/17/2002	5.0	9/14/2005	140.0
11/21/1995	110.0	4/5/1999	1.9	8/19/2002	1.9	10/3/2005	5.0
12/18/1995	70.0	5/17/1999	26.0	9/11/2002	1.9	10/11/2005	22.0
1/10/1996	1.9	6/15/1999	7.0	10/16/2002	79.0	11/16/2005	49.0
2/28/1996	22.0	7/20/1999	1.9	11/25/2002	1.9	11/21/2005	920.0
3/6/1996	49.0	8/3/1999	1.9	12/16/2002	13.0	12/1/2005	110.0
4/24/1996	1.9	9/7/1999	5.0	1/7/2003	17.0	12/7/2005	5.0
5/1/1996	33.0	10/4/1999	2.0	2/11/2003	1.9	12/14/2005	170.0
6/12/1996	13.0	11/17/1999	1.9	3/24/2003	17.0	1/18/2006	70.0
7/29/1996	11.0	12/13/1999	17.0	4/2/2003	5.0	2/13/2006	1.9
8/14/1996	14.0	1/19/2000	70.0	5/6/2003	13.0	3/15/2006	4.0
9/4/1996	11.0	2/14/2000	8.0	6/10/2003	17.0	4/3/2006	2.0
10/28/1996	17.0	3/28/2000	5.0	7/8/2003	11.0	5/23/2006	13.0
11/20/1996	14.0	4/5/2000	2.0	8/11/2003	31.0	6/21/2006	7.0
12/10/1996	31.0	5/16/2000	7.0	9/10/2003	46.0	8/16/2006	2.0
1/29/1997	8.0	6/6/2000	1.9	10/21/2003	5.0	9/13/2006	1.9
2/18/1997	94.0	7/10/2000	1.9	11/17/2003	1.9	10/10/2006	2.0
3/4/1997	23.0	8/23/2000	5.0	12/2/2003	17.0	11/1/2006	23.0
5/13/1997	8.0	9/12/2000	17.0	1/12/2004	6.0	12/6/2006	49.0
5/28/1997	17.0	10/16/2000	1.9	2/17/2004	70.0	1/8/2007	95.0
6/4/1997	23.0	11/20/2000	5.0	3/1/2004	8.0	2/6/2007	6.0
7/8/1997	11.0	12/13/2000	2.0	4/21/2004	2.0	3/6/2007	17.0
8/5/1997	8.0	1/3/2001	1.9	5/24/2004	2.0	4/17/2007	2.0
9/15/1997	8.0	2/20/2001	2.0	6/9/2004	1.9		
10/28/1997	1.9	3/7/2001	1.9	7/27/2004	2.0		
11/13/1997	33.0	4/11/2001	1.9	8/3/2004	1.9		

APPENDIX C – NPDES DISCHARGER CALCULATIONS

Berkeley Co WSA St. Stephen WWTP (SC0025259)
Maximum Permitted Flow = 0.9 MGD
Daily Maximum Fecal Coliform Limit = 400 cfu/100ml
Minimum River Flow = 500 cfs / 323.2 MGD

$$\frac{0.9\,\text{MGD}}{323.2\,\text{MGD} + 0.9\,\text{MGD}} * 400\,\text{cfu/100mL} = 1.11\,\text{cfu/100mL}$$

Williamsburg Co WSA Sante River WWTP (SC0048097)
Maximum Permitted Flow = 0.9 MGD
Daily Maximum Fecal Coliform Limit = 400 cfu/100ml
Minimum River Flow = 500 cfs / 323.2 MGD

$$\frac{0.9\,\text{MGD}}{323.2\,\text{MGD} + 0.9\,\text{MGD}} * 400\,\text{cfu/100mL} = 1.11\,\text{cfu/100mL}$$

Georgetown Co WSD North Santee WWTP (SC0042439)
Maximum Permitted Flow = 0.052 MGD
Daily Maximum Fecal Coliform Limit = 400 cfu/100ml
Minimum River Flow = 250 cfs / 161.6 MGD

$$\frac{0.052\,\text{MGD}}{161.6\,\text{MGD} + 0.052\,\text{MGD}} * 400\,\text{cfu/100mL} = 0.13\,\text{cfu/100mL}$$

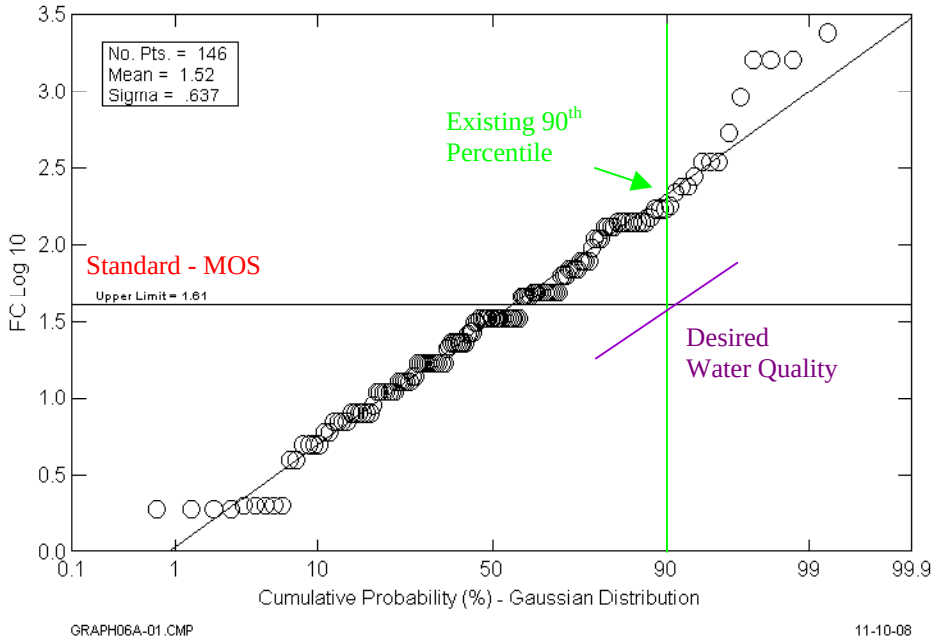
Chargeurs Wool Inc. (SC0000990)
Average Flow = 0.331 MGD
Daily Maximum Fecal Coliform Limit = 400 cfu/100ml
Minimum River Flow = 500 cfs / 323.2 MGD

$$\frac{0.331\,\text{MGD}}{323.2\,\text{MGD} + 0.331\,\text{MGD}} * 400\,\text{cfu/100mL} = 0.41\,\text{cfu/100mL}$$

*Calculations assume the minimum required flow in the Santee River from the Wilson Dam (500 cfs), no incremental inflow, no tidal flushing and no pathogen die-off. Due to the very low contributions under these very conservative assumptions, these dischargers are not considered significant sources of fecal coliform to Area 06A/ 06B.

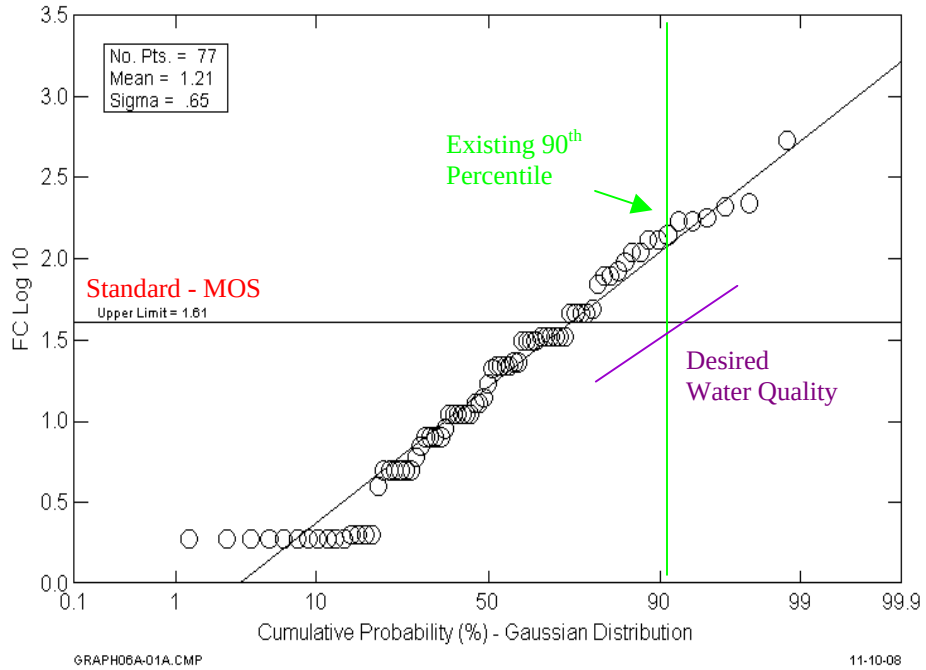
APPENDIX D – CUMULATIVE PROBABILITY PLOTS

Station 06A-01



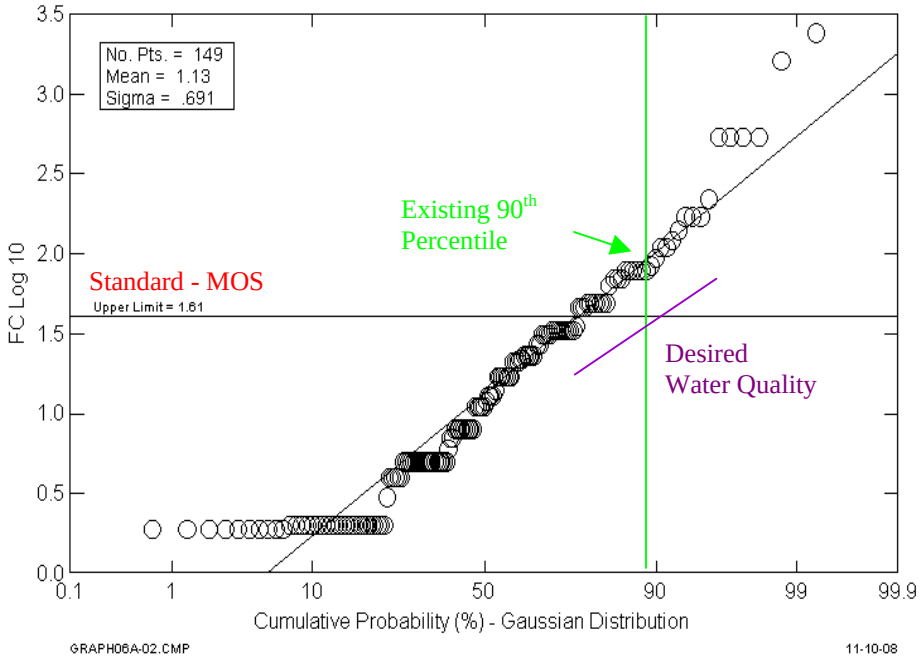
Existing 90th Percentile = 217 cfu/100ml
Required % Reduction = 81%

Station 06A-01A



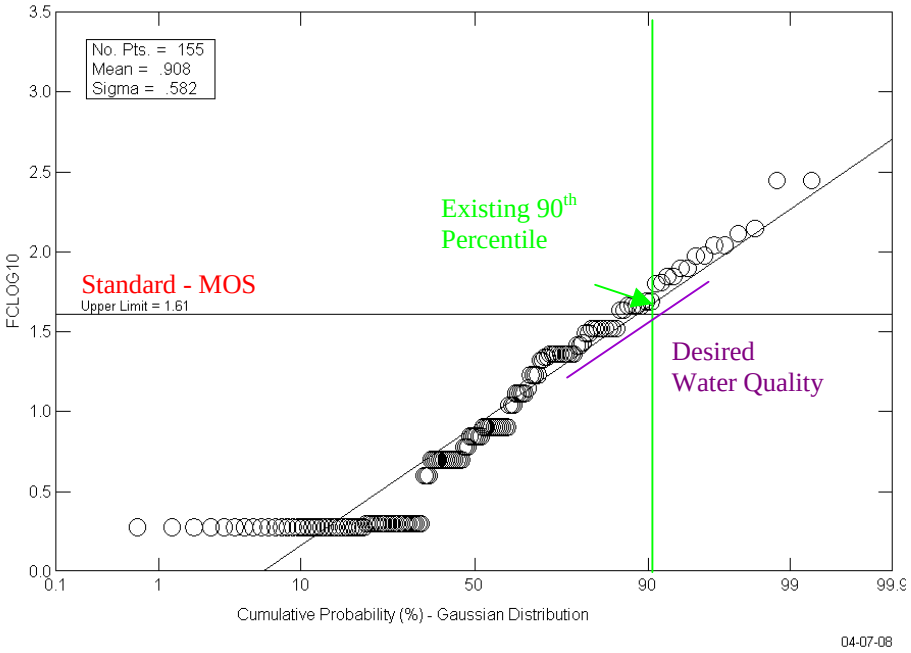
Existing 90th Percentile = 110 cfu/100ml
Required % Reduction = 63%

Station 06A-02



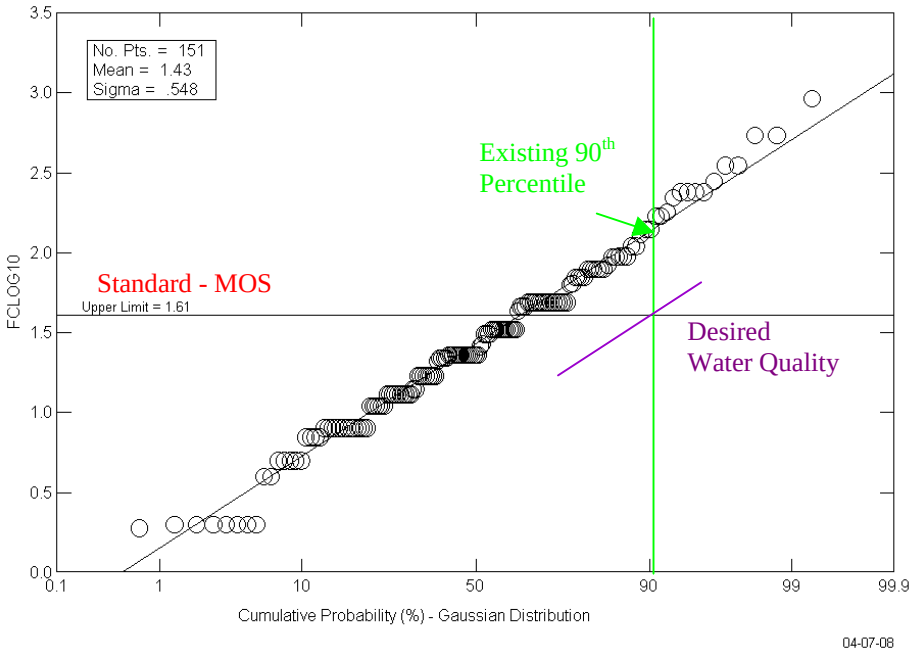
Existing 90th Percentile = 103 cfu/100ml
Required % Reduction = 60%

Station 06B-06



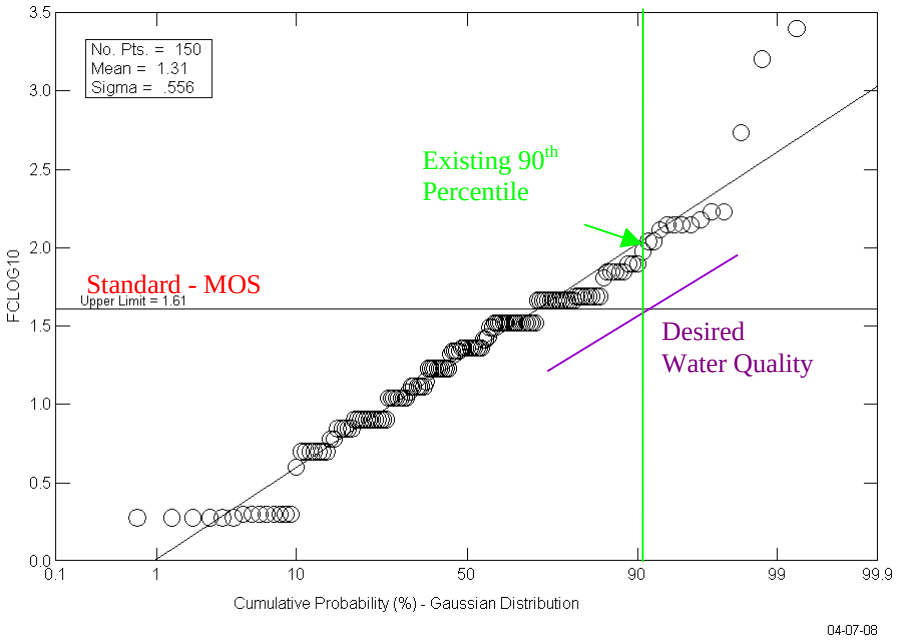
Existing 90th Percentile = 45 cfu/100ml
Required % Reduction = 9%

Station 06B-07



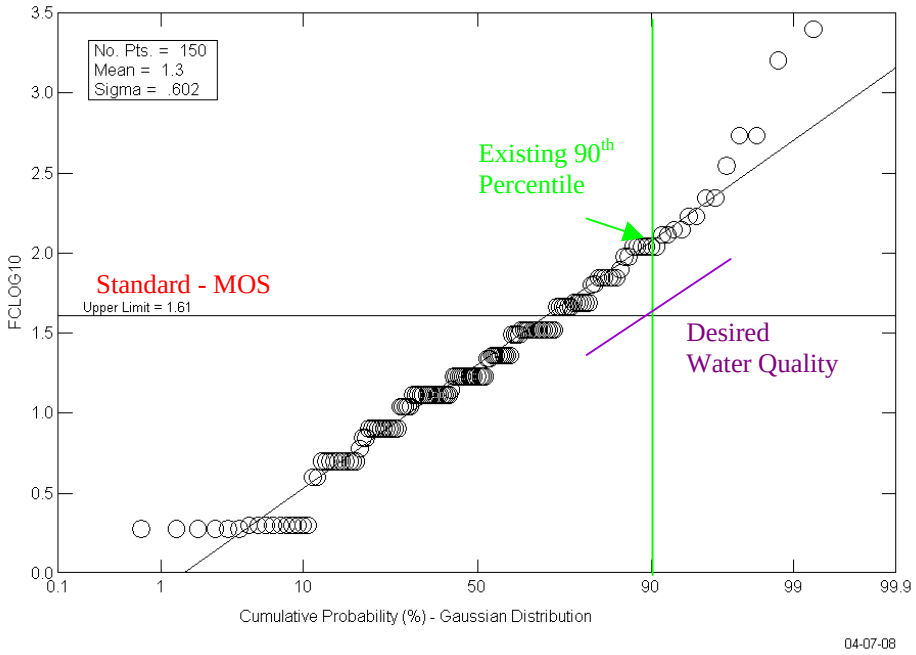
Existing 90th Percentile = 136 cfu/100ml
Required % Reduction = 70%

Station 06B-08



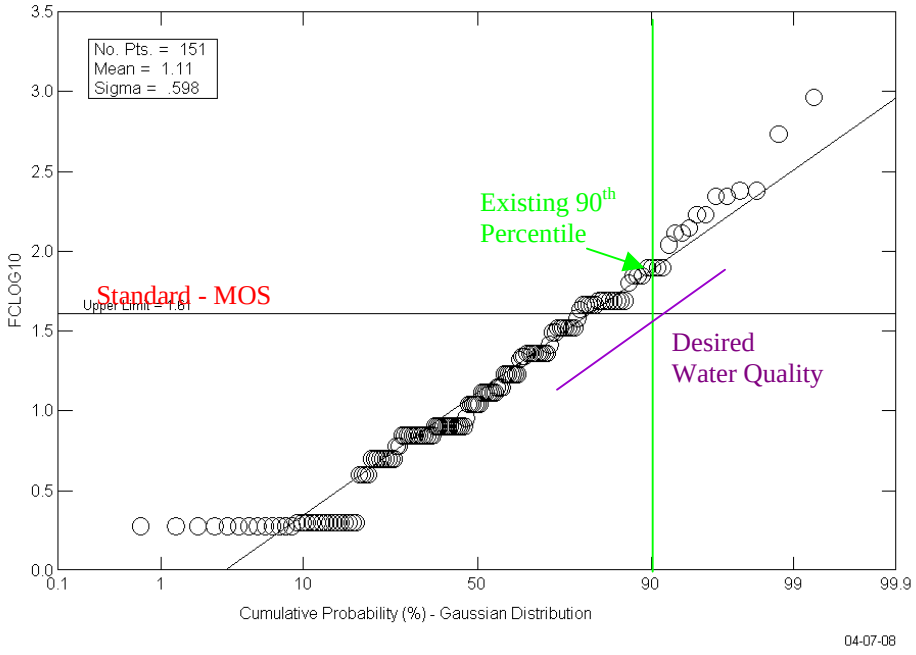
Existing 90th Percentile = 105 cfu/100ml
Required % Reduction = 61%

Station 06B-09



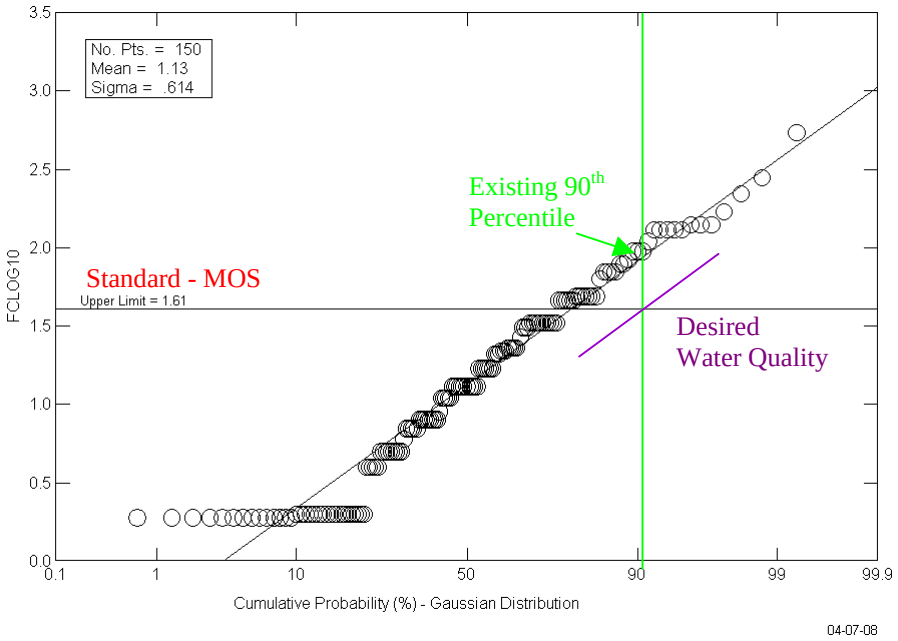
Existing 90th Percentile = 118 cfu/100ml
Required % Reduction = 65%

Station 06B-10



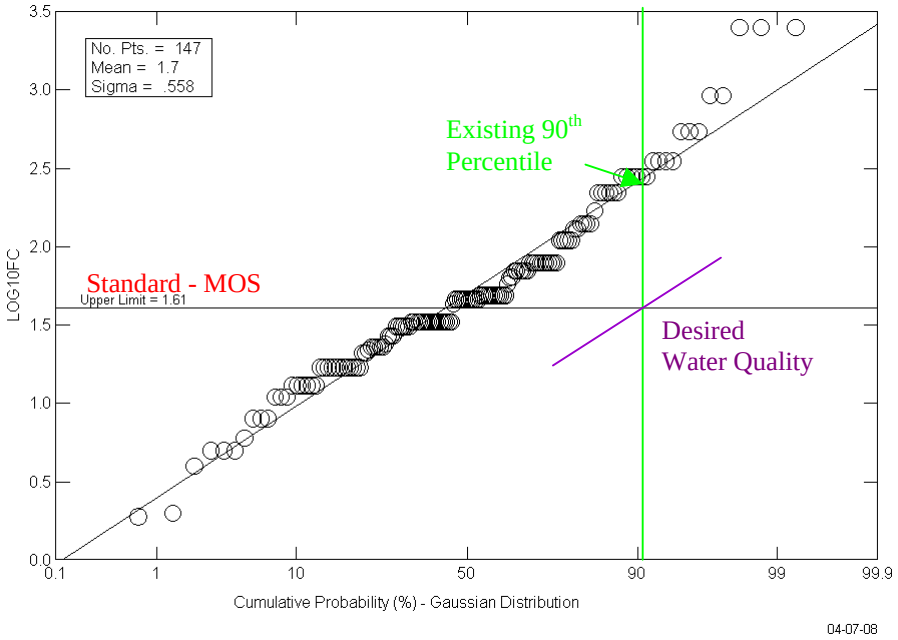
Existing 90th Percentile = 75 cfu/100ml
Required % Reduction = 46%

Station 06B-12



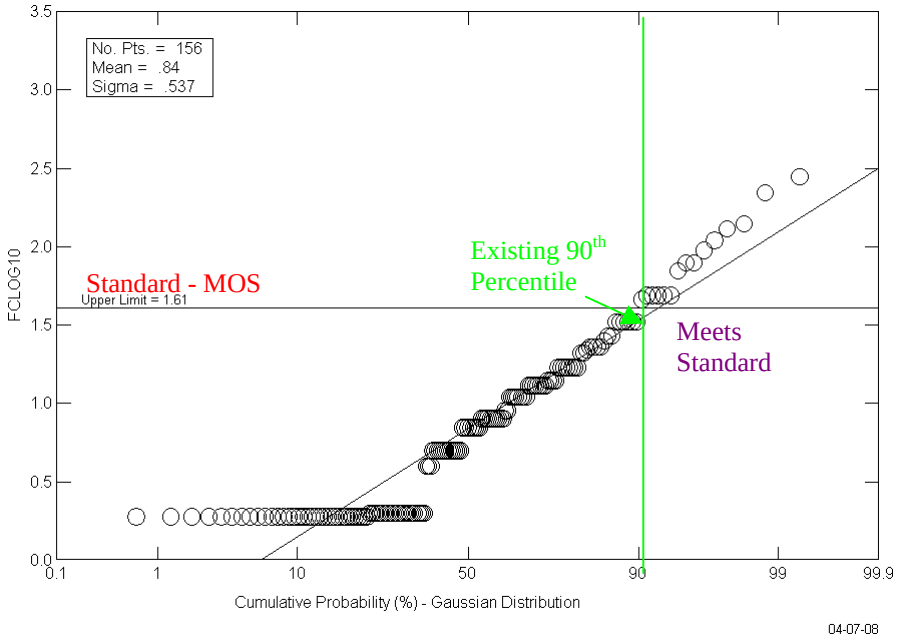
Existing 90th Percentile = 83 cfu/100ml
Required % Reduction = 51%

Station 06B-13



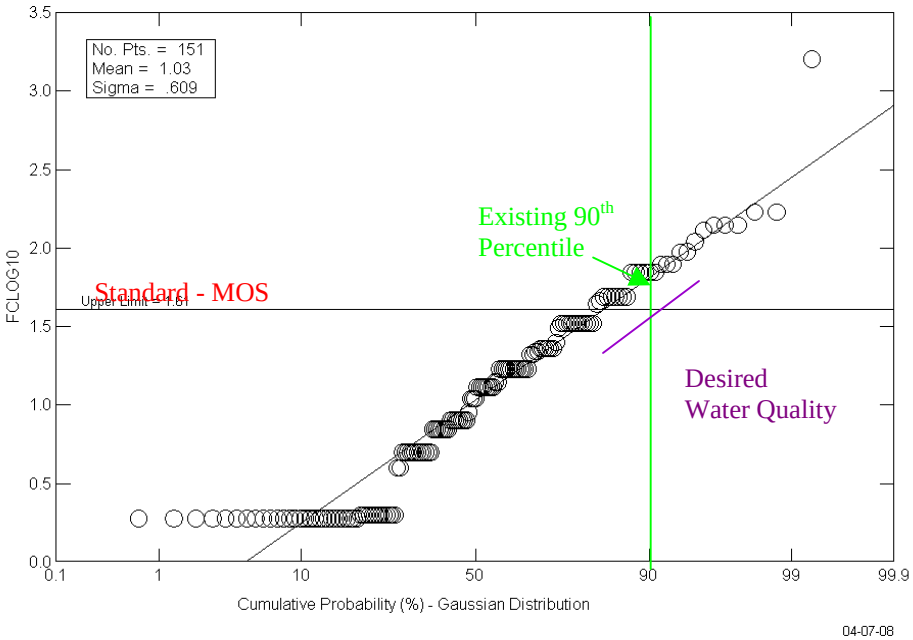
Existing 90th Percentile = 260 cfu/100ml
Required % Reduction = 84%

Station 06B-16



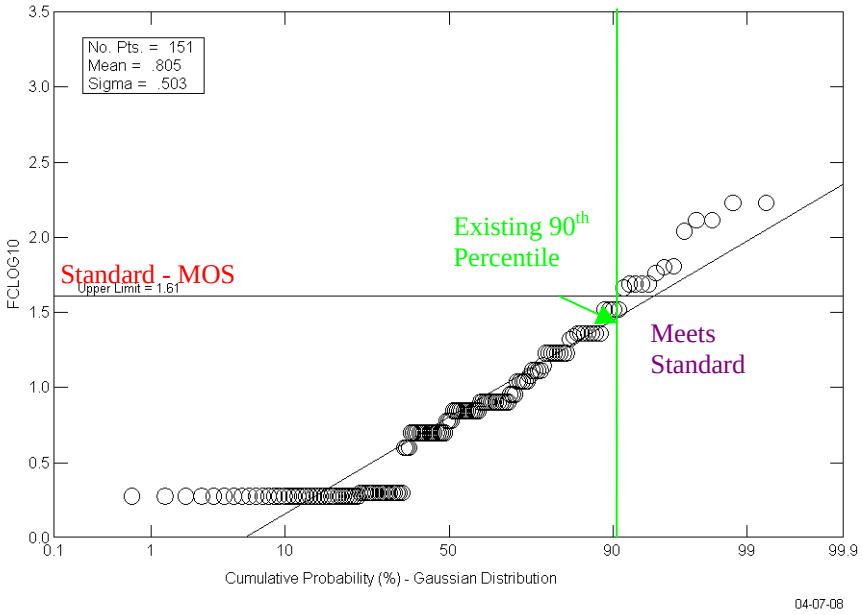
Existing 90th Percentile = 34 cfu/100ml
Required % Reduction = 0%

Station 06B-19



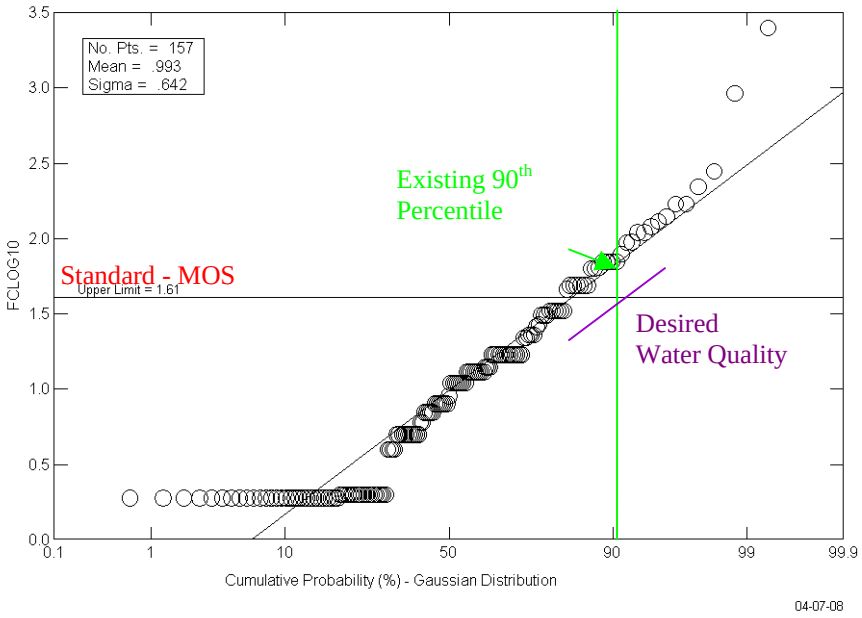
Existing 90th Percentile = 65 cfu/100ml
Required % Reduction = 37%

Station 06B-20



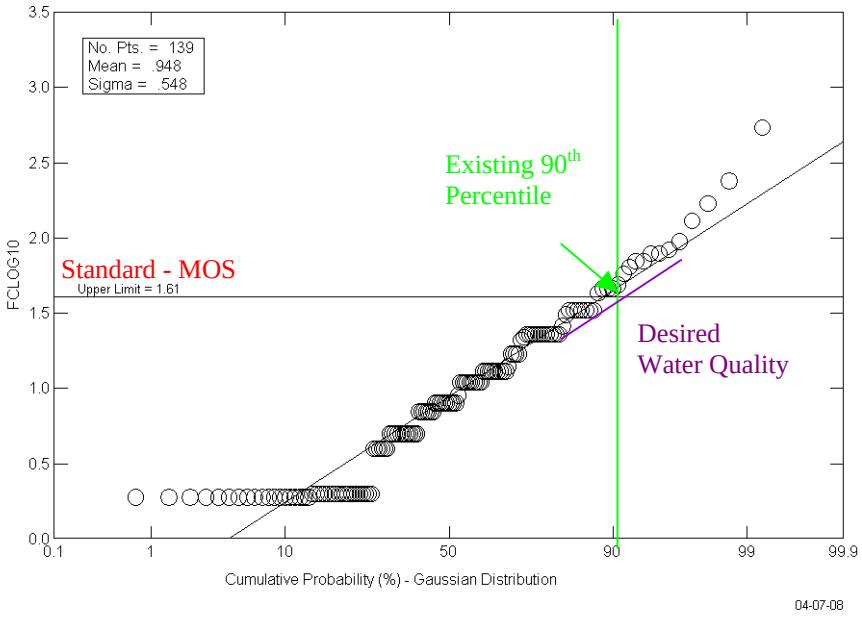
Existing 90th Percentile = 28 cfu/100ml
Required % Reduction = 0%

Station 06B-21



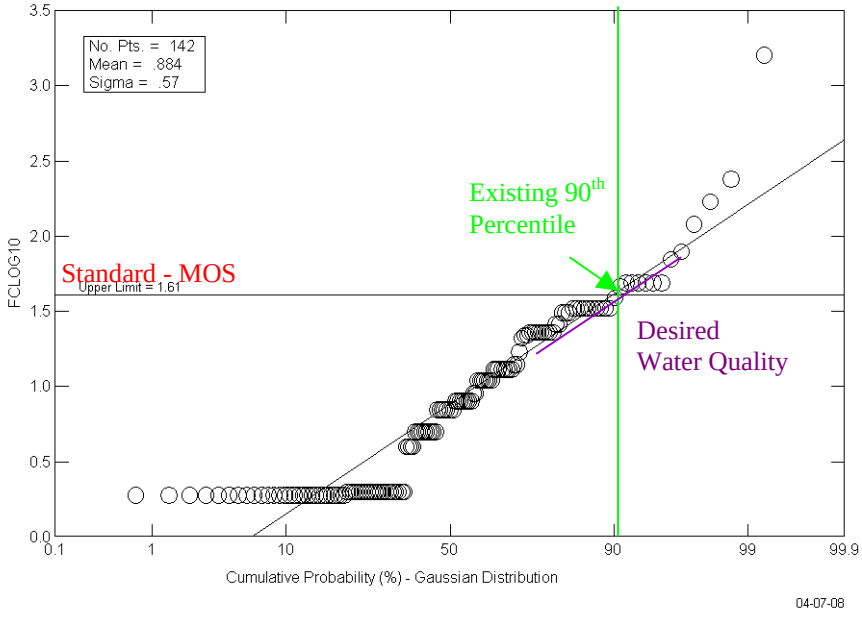
Existing 90th Percentile = 65 cfu/100ml
Required % Reduction = 38%

Station 06B-22



Existing 90th Percentile = 45 cfu/100ml
Required % Reduction = 9%

Station 06B-23



Existing 90th Percentile = 41 cfu/100ml
Required % Reduction = 1%

APPENDIX E – EVALUATING THE PROGRESS OF MS4 PROGRAMS

Evaluating the Progress of MS4 Programs:

Meeting the Goals of TMDLs and Attaining Water Quality Standards

Bureau of Water

August 2008

Described below are potential approaches that may be used by MS4 permit holders. These are recommendations and examples only, as SCDHEC-BOW recognizes that other approaches may be utilized or employed to meet compliance goals.

1. Calculate pollutant load reduction for each best management practice (BMP) deployed:
    - Retrofitting stormwater outlets
    - Creation of green space
    - LID activities (e.g., creation of porous pavements)
    - Creations of riparian buffers
    - Stream bank restoration
    - Scoop the poop program (how many pounds of poop were scooped/collected)
    - Street sweeping program (amount of materials collected etc.)
    - Construction & post-construction site runoff controls
2. Description & documentation of programs directed towards reducing pollutant loading
    - Document tangible efforts made to reduce impacts to urban runoff
    - Track type and number of structural BMPs installed
    - Parking lot maintenance program for pollutant load reduction
    - Identification and elimination of illicit discharges
    - Zoning changes and ordinances designed to reduce pollutant loading

- Modeling of activities & programs for reducing pollutant reductions

3. Description & documentation of social indicators, outreach, and education programs

   - Number/Type of training & education activities conducted and survey results
   - Activities conducted to increase awareness and knowledge – residents, business owners. What changes have been made based on these efforts? Any measured behavior or knowledge changes?
   - Participation in stream and/or lake clean-up events or activities
   - Number of environmental action pledges

4. Water quality monitoring: A direct and effective way to evaluate the effectiveness of stormwater management plan activities.

   - Use of data collected from existing monitoring activities (e.g., SCDHEC data for ambient monitoring program available through STORET; water supply intake testing; voluntary watershed group's monitoring, etc)
   - Establish a monitoring program for permitted outfalls and/or waterbodies within MS4 areas as deemed necessary– use a certified lab
   - Monitoring should focus on water quality parameters and locations that would both link pollutant sources and BMPs being implemented

5. Links:

   - Evaluating the Effectiveness of Municipal Stormwater Programs. September 2007. EPA 833-F-07-010
   - The BMP database - http://www.bmpdatabase.org/BMPPerformance.htm (this link is specifically to the BMP performance page, and lot more)
   - EPA's STORET data warehouse - http://www.epa.gov/storet/dw_home.html
   - EPARegion 5: STEPL – Spreadsheet tool for estimating pollutant loads http://it.tetratech-ffx.com/stepl/
   - Measurable goals guidance for Phase II Small MS4 - http://cfpub.epa.gov/npdes/stormwater/measurablegoals/index.cfm
   - Environmental indicators for sotrmwater program- http://cfpub.epa.gov/npdes/stormwater/measurablegoals/part5.cfm
   - National menu of stormwater best management practices (BMPs) - http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm
   - SCDHEC – BOW: 319 grant program has attempted to calculate the load reductions for the following BMPs:

     - Septic tank repair or replacement

- Removing livestock from streams (cattle, horses, mules)
- Livestock fencing
- Waste Storage Facilities (aka stacking sheds)
- Strip cropping
- Prescribed grazing
- Critical Area Planting
- Runoff Management System
- Waste Management System
- Solids Separation Basin
- Riparian Buffers

APPENDIX F – SITE PHOTOGRAPHS

Figure F-1. Outfall Ditch in AIWW near Alligator Creek. Leads to managed waterfowl impoundment.

Figure F-2. Atlantic Intercoastal Waterway near Alligator Creek.

Figure F-3. Stakes used by shellfish lease holders to cultivate wild oyster spat.

Figure F-4. Shellfish Management Area closed sign located in Area 06B.

Figure F-5. Dredge Spoil Area outfall on AIWW North of Harbor River.

Figure F-6. Shellfish Sanitation Officer Marshall Kinsey at outfall shown in figure F-5.

Figure F-7. Additional outfall in same spoil area as figure F-5.

Figure F-8. Additional spoil area outfall located in Area 06B.

Responsiveness Summary
South Santee Coastal TMDL Document

Comments were received from the following:

Charleston County Public Works
South Carolina Department of Transportation

Comments From Charleston County Public Works

Comment 1:

"The boundaries of Shellfish Management Area (Area) 06B for which this TMDL are being applied are unclear."

Response 1:

The area used in the development of this TMDL document has been redefined based on hydrologic characteristics of the watershed. It now consists of the 12 digit hydrologic unit codes (HUCs) 030501120303 and 030502090101. These HUCs lie in portions of Areas 06A, 06B and 07. The watershed consists of an area of 102.17 square miles and includes parts of Berkeley, Horry and Charleston Counties. Figure 1 is now consistent with the watershed boundary as described in the TMDL document.

Comment 2:

"The 15,223 acres figure used as the area of the shellfish growing area does not agree with any of the map boundaries included."

Response 2:

The area used in the development of this TMDL document has been redefined based on hydrologic characteristics of the watershed. It now consists of the 12 digit hydrologic unit codes (HUCs) 030501120303 and 030502090101. These HUCs lie in portions of Areas 06A, 06B and 07. The watershed consists of an area of 102.17 square miles and includes parts of Berkeley, Horry and Charleston Counties. Figure 1 is now consistent with the watershed boundary as described in the TMDL document.

The revised watershed consists of approximately 52,620 acres of shellfish growing area and is based on the total area of the portions of Shellfish Management Areas within the South Santee Coastal Watershed.

Comment 3:

"The Shellfish Management Area (Area) 06B as described is not a watershed or a subwatershed boundary and should not be described as one. The boundary shown in Figure 1 does not follow watershed lines."

Response 3:

The area used in the development of this TMDL document has been redefined based on hydrologic characteristics of the watershed. It now consists of the 12 digit hydrologic unit codes (HUCs) 030501120303 and 030502090101. These HUCs lie in portions of Areas 06A, 06B and 07. The watershed consists of an area of 102.17 square miles and includes parts of Berkeley, Horry and Charleston Counties. Figure 1 is now consistent with the watershed boundary as described in the TMDL document.

Comment 4:

"The TMDL boundary should either use watershed or not use watershed boundaries. The mixing of data and analysis needs to be consistent."

Response 4:

The area used in the development of this TMDL document has been redefined based on hydrologic characteristics of the watershed. It now consists of the 12 digit hydrologic unit codes (HUCs) 030501120303 and 030502090101. These HUCs lie in portions of Areas 06A, 06B and 07. The watershed consists of an area of 102.17 square miles and includes parts of Berkeley, Horry and Charleston Counties. Figure 1 is now consistent with the watershed boundary as described in the TMDL document.

Comment 5:

"If watersheds are to be used they need to be correct. It was stated that the Shellfish Management Area (Area) 06B boundary was used because it already exits is a poor excuse for not using accurate/correct boundary for the development of such an important process (development of a TMDL which will never expire). The boundary shown on Figure 1 actually cuts through the middle of the high school football field."

Response 5:

The area used in the development of this TMDL document has been redefined based on hydrologic characteristics of the watershed. It now consists of the 12 digit hydrologic unit codes (HUCs) 030501120303 and 030502090101. These HUCs lie in portions of Areas 06A, 06B and 07. The watershed consists of an area of 102.17 square miles and includes parts of Berkeley, Horry and Charleston Counties. Figure 1 is now consistent with the watershed boundary as described in the TMDL document.

Comment 6:

"The loads are being set up as percent reductions at sampling points. The points must include boundaries such that the requirements can be understood. The entire area may need to be evaluated using all the date collected within a correctly defined (watershed) boundary and the analysis made for the entire boundary."

Response 6:

The sampling location with the highest percentage reduction within each 12-digit HUC will be targeted. The department believes that meeting the highest percentage reduction or the WQS will effectively protect the shellfish harvesting beds in the referenced watershed for human consumption. Stations 06B-13, 06A-01, 06A-01A, and 06A-02 lie within the 12-digit HUC 030501120303 and require reductions of 84% as highlighted in table Ab-1 of the TMDL document. Stations 06B-07, 06B-08, 06B-09, 06B-10, 06B-12, 06B-16, 06B-19, 06B-21, and 06B-22 are within the boundaries of HUC 030502090101 (Figure 2) and require a 70% reduction.

Comment 7:

"The land use figures in the Land Use Summary tables do not agree with the data we obtained from DHEC 8-digit hydrologic unit codes (HUC) 03050112 and 03950209."

Response 7:

The land use summary table was previously based on a watershed consisting of the 8-digit hydrologic unit codes 03050112 and 03950209. Since the referenced TMDL watershed has been redefined, the land use summary is no longer based on HUCs 03050112 and 03950209. Land use is now based on a delineated watershed (within 12-digit HUCs 030501120303 and 030502090101) consisting of 102.17 square miles within portions of Berkeley, Horry and Charleston Counties (Figure 3, p. 6 of the TMDL document).

Comment 8:

"There are major portions of the defined areas (8-digit HUC 03050112 and 03950209) that do not provide direct impact to water at the monitoring stations."

Response 8:

The area used in the development of this TMDL document has been redefined based on hydrologic characteristics of the watershed. It now consists of the 12 digit hydrologic unit codes (HUCs) 030501120303 and 030502090101. These HUCs lie in portions of Areas 06A, 06B and 07. The watershed consists of an area of 102.17 square miles and includes parts of Berkeley, Horry and Charleston Counties. Figure 1 is now consistent with the watershed boundary as described in the TMDL document. Portions of the 8-digit hydrologic unit codes 03050112 and 03950209 that were previously included in the delineated TMDL watershed are not considered to provide direct impact to water quality at the monitoring stations used in the development of this TMDL document.

Comment 9:

"Why is station 06B-20 restricted?"

Response 9:

Station 06B-20 has been classified as restricted by the shellfish program and included on the 2008 303(d) list. Based on the shellfish sanitation program protocol, waters are classified as restricted back to the next approved monitoring station. Station 06B-20 meets the approved water quality criteria but is classified as restricted to provide a buffer in the interest of public health. The

classification and 303(d) listing are not based on a documented water quality impairment; therefore, a percentage reduction is not needed at this location.

Comment 10:

"The use of cumulative probability distributions needs to be explained/justified. How is this process the appropriate method to be used for this "hydrodynamically complex system"? This is a very hydrodynamically complex system. The statistical and graphical methods only give a general understanding of the system."

Response 10:

The cumulative probability distributions (CPD) approach was utilized by the Department with concurrence from USEPA Region 4. The methodology was deemed appropriate as input variables are based upon existing data collected in the referenced watershed during a range of hydrologic conditions and CPD results provide a percentage reduction FC bacteria *target* at each shellfish monitoring site. In addition, there is no published flow data available for the referenced system. The lack of flow data in this complex estuarine waterway limits the ability to develop a more complete characterization of FC bacteria loadings; therefore, TMDLs are expressed only as a percentage reduction at each site.

Comment 11:

"The data present in the report can not be reproduced with the data provide in the report. The graphic information in the Appendix indicated anywhere from 139-157 points being used. Where does this data come from?"

Response 11:

This data is stored in EPA's Storet Database and can be retrieved through Modern Storet (all data supplied to EPA since January 1, 1999) and Legacy Storet (Data supplied to EPA before 1999). The following link is for EPA's Storet website:
http://www.epa.gov/storet/dbtop.html
The TMDL document has been revised to include all data points from the monitoring stations used in its development (Appendix B).

Comment 12:

"It is indicated that field data included ambient air temperature, wind direction, tidal stage, date, and time of sampling. This data should be included in the report. With the complexity of the system it can be quite useful."

Response 12:

The lack of flow data in this complex estuarine waterway limits the ability to develop a more complete characterization of FC bacteria loadings; therefore, the additional field data referenced in comment 12 was not needed for calculating the TMDLs and was subsequently not included in the TMDL document. This data can be viewed in EPA's Storet Database at the following link:
http://www.epa.gov/storet/dbtop.html

Comment 13:

"On 01/10/05 many of the samples recorded high reading (four had 2500/100ml FC counts). The lab information should be investigated to confirm. The chain of custody, for these samples should be reviewed. With the unusually high counts and the number of samples the analysis may skewed."

Response 13:

While these results are significantly higher than the existing FC bacteria standard for SFH waters, the results were considered for the purposes of shellfish management area classification for use in development of the 2008 303(d) list and, consequently, the data was used for development of TMDLs in the referenced system. Since the department uses a Systematic Random Sampling methodology for the shellfish program, we must use all data collected as part of that sampling regime.

Comment 14 :

"Explain how Load Allocations apply to non-point sources."

Response 14 :

A load allocation is given to unregulated processes/entities that are not covered under the wasteload allocation portion of a TMDL. It is defined by EPA as "a receiving water's loading capacity that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources" and is derived by taking the difference between the target load under the critical condition and the point source wasteload allocation.

The TMDL is expressed as a percentage reduction, which is equivalent for both the WLA and LA. In order for the WQS to be attained in these areas, the percentage reduction must be achieved from all sources.

Comment 15:

"Why are potential/future point sources from stormwater discharges being targeted when they are not identified as problem sources."

Response 15:

Potential/future point sources from stormwater discharges are not being targeted, but rather included within the scope of the TMDL. Similar to regulated MS4s and point sources, potentially designated MS4 entities (as listed in 64 FR, P. 688837) and future point sources located within the watershed may have the potential to contribute fecal coliform bacteria (FC bacteria) in stormwater runoff. By prescribing the TMDL percentage reduction to potential/future point sources we are assuring the WQS will be achieved once the TMDL is implemented.

Comment 16:

"How do you demonstrate that development in this area will meet these newly imposed limits? This will have to be done with all industrial and construction permits. This is creating an un-necessary burden on property owners."

Response 16:

New limits are not being imposed in the referenced watershed. The current FC bacteria WQS for SFH waters has been in place since 1990. Because the standard is not being met, TMDLs have been developed at each impaired site. TMDLs define the percentage reduction (or target) necessary in order for the sites to meet the existing FC bacteria standard in the referenced watershed. Only through implementation of the *regulated* WLA component and the *unregulated* LA component of these TMDLs can the water quality standard be achieved.

Industrial facilities that have the potential to cause or contribute to a violation of a water quality standard are covered by the NPDES Storm Water Industrial General Permit (SCR000000). Construction activities are usually covered by the NPDES Storm Water Construction General Permit from DHEC (SCR100000). Where the construction has the potential to affect water quality of a water body within a TMDL, the Storm Water Pollution Prevention Plan (SWPPP) for the site must address any pollutants of concern and adhere to any wasteload allocations in the TMDL.

Comment 17:

"Based on the information provide in this TMDL the reduction in habitat for wildlife and waterfowl would be the answer for compliance."

Response 17:

Based on the information provided in this TMDL document wildlife and waterfowl are considered to be a significant contributer, but not the sole source of fecal impairment. TMDL development requires that all potential point and nonpoint sources be inventoried with an understanding that potentially designated MS4 entities (as listed in FR 64, 235, P. 688837) and future point sources located within the watershed may have the potential to contribute fecal coliform bacteria in stormwater runoff. Nonpoint sources such as hydrographic modification, stormwater runoff, agricultural runoff, failing septic systems, boat traffic, etc, as defined in the document also have the potential to or are currently contributing to FC bacteria loading within the delineated watershed.

Comment 18:

"As a professional engineer, I'm not sure how to demonstrate that the TMDL is being met. With the complexities of the system what, how would you calculate the base line and what are the boundaries of allocations?"

Response 18:

Stormwater discharges from all regulated sources, including permitted construction activities, are required to meet the percentage reduction or the existing instream standard for pollutant of concern. The SWPPP should demonstrate that the construction activity should not cause or contribute to the existing impairment. Compliance by an entity with responsibility for the MS4, with the terms of its individual MS4 permit may fulfill any obligations it has towards implementing this TMDL.

Comment 19:

"The influence of the Atlantic Ocean needs to be identified as a major factor in this complex system."

Response 19:

The influence of the Atlantic Ocean within the watershed has been acknowledged in the TMDL document. The prevailing currents in the Atlantic Ocean as well as the tidal cycles contribute to the complex nature of the system. However, it is assumed that the Atlantic Ocean is not a significant source of FC bacteria as FC bacteria to salinity correlations indicate that higher bacteria concentrations are more greatly related to lower salinity.

Comment 20:

"Stormwater runoff has not been identified as a source of the fecal. Why would it be included to meet the reduction requirements of the TMDL when it is not the source?"

Response 20:

Stormwater runoff has been identified in the document as a potential contributor of FC bacteria as described in sections 3.1.2, 3.2.1, and 3.2.4. Regulated and unregulated stormwater runoff may contain FC bacteria levels higher than the current WQS; therefore stormwater runoff is prescribed a percentage reduction similar to other potential sources.

Comment 21:

"Why are the dredge spoil areas not identified as potential sources. The monitoring stations that have the highest level of facial are near the discharge locations of the spoil areas. Spoil areas support wildlife and waterfowl. Are the dredge spoil area discharge points required to obtain NPDES permits? The spoil areas may not be active but they continue to discharge at specific points through pipes installed for their on going operations."

Response 21:

Dredging spoil areas are identified as sources in section 3.2.6, Hydrographic Modification. The TMDL document contains the following:
"Hydrographic and habitat modification in estuarine areas requires both State and Federal approval. Portions of the AIWW require periodic maintenance dredging. The U.S. Army Corps of Engineers utilizes designated tracts of land adjacent to the AIWW as dredge spoil sites. These sites provide additional habitat for wildlife and waterfowl. The impoundments created by the dredge spoil are connected to the AIWW through a series of large drainage pipes (see photographs in Appendix E). These pipes provide a direct outlet to shellfish waters. The collected water may contain high concentrations of bacteria due to the large wildlife population."

These are not regulated sources that require NPDES stormwater coverage; therefore FC bacteria loadings are prescribed under the LA portion of the TMDL.

Comment 22:

"The impoundments [dredge spoils] are also identified. These are lands owned and /or managed by the State or Federal Governments for wildlife. These lands should be identified in the document as they are the primary areas that surround the points identified in the TMDL."

Response 22:

Impoundments created by the dredge spoils are identified as sources in section 3.2.6, Hydrographic Modification. The TMDL document contains the following:
"Hydrographic and habitat modification in estuarine areas requires both State and Federal approval. Portions of the AIWW require periodic maintenance dredging. The U.S. Army Corps of Engineers utilizes designated tracts of land adjacent to the AIWW as dredge spoil sites. These sites provide additional habitat for wildlife and waterfowl. The impoundments created by the dredge spoil are connected to the AIWW through a series of large drainage pipes (see photographs in Appendix E). These pipes provide a direct outlet to shellfish waters. The collected water may contain high concentrations of bacteria due to the large wildlife population."

These are not regulated sources that require NPDES stormwater coverage; therefore FC bacteria loadings are prescribed under the LA portion of the TMDL.

Comments From South Carolina Department of Transportation

Comment 1:

"During the above referenced discussion regarding the TMDL for Shellfish Management Area 06B, Mr. Metha commented to SCDOT that SCDHEC wanted to develop TMDLs that were Implementable, Defensible and Reasonable. SCDOT agrees with this approach."

Response 1:

The department believes that the referenced TMDL document is implementable, defensible, and reasonable.

Comment 2:

"On page 16, DHEC does a good job in analyzing the potential impact of Agricultural Runoff on Area 06B. Section 3.2.1 also states that, "there is little urban development in Area 06B, therefore, urban non-point sources are considered to be negligible." A similar analysis should have been included for SCDOT potential impact. Please include the following, "There are no SCDOT rest areas or maintenance facilities located in Area 06B and SCDOT roads make up less than one percent of Area 06B. The lack of SCDOT facilities and roadways in the area, combined with the fact that pavement does not produce bacteria, precludes SCDOT as a contributing source of fecal coliform (FC) in Area 06B.""

Response 2:

SCDOT's potential impact relative to FC loading has been evaluated for the referenced watershed. Section 3.1.2 of the TMDL document has been revised to include the following:

> The South Carolina Department of Transportation (SCDOT) is currently the only designated Municipal Separate Storm Sewer System (MS4) within the watershed. Roads, facilities or properties owned or operated by SCDOT are currently covered under NPDES MS4 Permit SCS040001. Runoff from properties including but not limited to ditches, culverts, right of ways, maintenance buildings, rest areas, facilities with improperly-maintained onsite septic systems, etc. may have the potential to contribute pollutant loadings to waters of the State. There are currently no SCDOT rest areas or other facilities located in the referenced watershed area based on Geographical Information System (GIS) data and SCDOT roads make up less than one percent of this area at the time of TMDL development (Figure 4). Also, much of the referenced watershed has a low potential for growth as it is located in a protected area. Based on current information, FC bacteria contributions from SCDOT may occur but are considered negligible in the delineated drainage area used in the development of this TMDL document.

Comment 3:

"We understand DHEC's desired correction in moving the reference of SCDOT from the nonpoint source Section 3.2.1 to the point source Section 3.1.2. The reference made to SCDOT in Section 3.1.2., however, should be revised to that contained in Comment 2 above."

Response 3:

SCDOT's potential impact relative to FC loading has been evaluated for the referenced watershed. Section 3.1.2 of the TMDL document has been revised to include the following:

> The South Carolina Department of Transportation (SCDOT) is currently the only designated Municipal Separate Storm Sewer System (MS4) within the watershed. Roads, facilities or properties owned or operated by SCDOT are currently covered under NPDES MS4 Permit SCS040001. Runoff from properties including but not limited to ditches, culverts, right of ways, maintenance buildings, rest areas, facilities with improperly-maintained onsite septic systems, etc. may have the potential to contribute pollutant loadings to waters of the State. There are currently no SCDOT rest areas or other facilities located in the referenced watershed area based on Geographical Information System (GIS) data and SCDOT roads make up less than one percent of this area at the time of TMDL development (Figure 4). Also, much of the referenced watershed has a low potential for growth as it is located in a protected area. Based on current information, FC bacteria contributions from SCDOT may occur but are considered negligible in the delineated drainage area used in the development of this TMDL document.

Comment 4:

"Page 16 states that the SCDOT, "…may have the potential to contribute or convey fecal coliform loading to Waters of the State." SCDOT believes that it is responsible for pollutants generated within the SCDOT right-of-way only and is not responsible for pollutants generated offsite and passing through the SCDOT right-of-way. The word "convey" should be removed from the statement."

Response 4:

By definition of MS4 as prescribed in R.61-9 section 122.26(b), "Municipal separate storm sewer" means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains)". SCDOT is a phase I MS4 which may have the potential to contribute or convey fecal coliform loading to waters of the State. However, as previously stated, FC bacteria contributions from SCDOT are considered negligible in the delineated drainage area used in the development of this TMDL document.

Comment 5:

"We agree with DHEC's conclusion on page 17, that "There are no sources in this area except for waterfowl and wildlife". That being the case, it is not reasonable for DHEC to subject SCDOT to the required percent reductions contained in the Waste Load Allocation (WLA) in Table 5 on page 25. Therefore, the sentence on page 23, stating that SCDOT is subject to the load reductions prescribed in the WLA must be removed or Table 5 must be revised so that the current WLA, Non-Continuous Sources (% Reduction) column is relabeled as Wildlife and Waterfowl Sources (%Reduction) to properly reflect the source of the FC."

Response 5:

The statement in section 3.2.4 ,"There are no sources in this area except for waterfowl and wildlife", is in relation to Station 06B-13 and is not a blanket statement for the entire watershed. In its original context, it needs to be read and quoted as follows:

> Fecal coliform 90th percentile concentrations generally decrease progressing in a sourthern direction through the AIWW and decrease drastically in the tidal creeks from the AIWW to the ocean (Figure 5). This suggests a source near Station 06B-13. There are no sources in this area except for waterfowl and wildlife.

The statement "There are no sources in this area except for waterfowl and wildlife" has been revised to read as follows:

> Waterfowl and wildlife are considered to be the most probable sources of FC loading in this area.

Comment 6:

"This TMDL represents the epitome of the complicated intersection of water quality and MS4s. The primary purpose of the MS4 permitting program is to reduce, and ultimately prevent, the adverse impact of urban runoff on the quality of receiving waters. Here DHEC has properly concluded that one of the most un-urbanized, pristine areas of the State has FC violations due to

waterfowl and wildlife. The TDML almost gets it correct but then errs when it attempts to make current and future MS4s responsible for % reductions in this naturally occurring FC. This inconsistency must be corrected and an "implementable, defensible and reasonable" TMDL must be issued; the current wording of this TMDL is not "implementable, defensible, and reasonable."

Response 6:

Recognizing the complicated relationship between the watershed and current and future MS4 entities, SCDOT is currently a Phase I MS4 located in the delineated drainage area used in the development of this TMDL. As such, SCDOT may have the potential to contribute or convey fecal coliform loading to the referenced watershed. The TMDL must also account for all future MS4 entities that may come to exist in the watershed. The department believes that the referenced TMDL document is implementable, defensible, and reasonable.

Comment 7:

"The referenced TMDL states on page 23, "where runoff from roads, facilities and/or properties subject to NPDES MS4 permit SCS040001 have the potential to cause or contribute to the pollutant of concern, SCDOT is subject to the load reductions prescribed in the WLA of this TMDL." However, based on the above comments, SCDOT does not believe it has the potential to cause or contribute to the pollutant of concern.."

Response 7:

Section 3.1.2 of the TMDL document has been revised to include the following:

> The South Carolina Department of Transportation (SCDOT) is currently the only designated Municipal Separate Storm Sewer System (MS4) within the watershed. Roads, facilities or properties owned or operated by SCDOT are currently covered under NPDES MS4 Permit SCS040001. Runoff from properties including but not limited to ditches, culverts, right of ways, maintenance buildings, rest areas, facilities with improperly-maintained onsite septic systems, etc. may have the potential to contribute pollutant loadings to waters of the State. There are currently no SCDOT rest areas or other facilities located in the referenced watershed area based on Geographical Information System (GIS) data and SCDOT roads make up less than one percent of this area at the time of TMDL development (Figure 4). Also, much of the referenced watershed has a low potential for growth as it is located in a protected area. Based on current information, FC bacteria contributions from SCDOT may occur but are considered negligible in the delineated drainage area used in the development of this TMDL document.

Amendments to the South Santee Coastal TMDL Document

As a result of comments received by the Department during the public comment period from June 12th, 2008 to July 11th, 2008 the following amendments have been made to the South Santee Coastal TMDL Document. Changes are shown as bold font and are reflected in the most recent version of the referenced TMDL document.

Amendment Location 1:

Abstract

Amendment:

Existing conditions and percent reductions for this hydrodynamically complex system were calculated using cumulative probability distributions. Depending on the station, the percent reductions required to meet the fecal coliform water quality standard range from 0% to 84%. **For SCDOT, existing and future NPDES MS4 permittees, compliance with terms and conditions of its NPDES permit is effective implementation of the WLA to the Maximum Extent Practicable. For existing and future NPDES construction and Industrial stormwater permittees, compliance with terms and conditions of its permit is effective implementation of the WLA.** Required load reductions in the load allocation (LA) portion of this TMDL can be implemented through voluntary measures and are eligible for CWA §319 grants.

Amendment Location 2:

Table Ab-1 and Table 8 Footnote

Amendment:

Table notes 3 and 6 have been revised as follows:

Table Notes:

3. Percent reduction applies to all NPDES-permitted stormwater discharges, including current and future MS4, construction and industrial discharges covered under permits numbered SCS & SCR. Stormwater discharges are expressed as a percentage reduction due to the uncertain nature of stormwater discharge volumes and recurrence intervals. Stormwater discharges are required to meet percentage reduction or the existing instream standard for pollutant of concern **in accordance with their NPDES Permit.**

6. **As long as the conditions within the SCDOT MS4 area remain the same the Department deems the current contributions from SCDOT negligible and no reduction of FC bacteria is necessary. SCDOT must continue to comply with the provisions of its approved NPDES stormwater permit.**

Amendment Location 3:

Section 3.1.2, Page 13

Amendment:

Section 3.1.2 has been revised to read as follows:

> Non-continuous point sources include all NPDES-permitted stormwater discharges, including current and future MS4s, construction and industrial discharges covered under permits numbered SCS and SCR and regulated under SC Water Pollution Control Permits Regulation 122.26(b)(14)&(15). **All**

regulated MS4 entities have the potential to contribute FC pollutant loadings in the delineated drainage area used in the development of this TMDL.

The South Carolina Department of Transportation (SCDOT) is currently the only designated Municipal Separate Storm Sewer System (MS4) within the watershed. The SCDOT operates under NPDES MS4 SCS040001 and owns and operates one road in the watershed (Figure 4). However, the Department recognizes that SCDOT is not a traditional MS4 in that it does not possess statutory taxing or has enforcement powers. SCDOT does not regulate land use or zoning, issue building or development permits.

Current Developed land use for the South Santee Coastal watershed is 0.66%. Based on current Geographic Information System (GIS) information (available at time of TMDL development) there are currently no SCDOT rest areas or facilities located in the referenced watershed area.

Amendment Location 4:

Section 3.1.2, Page 13

Amendment:

Industrial facilities that have the potential to cause or contribute to a violation of a water quality standard are covered by the NPDES Storm Water Industrial General Permit (SCR000000). Construction activities are covered by the NPDES Storm Water Construction General Permit from DHEC (SCR100000). Where construction activities have the potential to affect water quality of a water body with a TMDL, the Storm Water Pollution Prevention Plan (SWPPP) for the site must address any pollutants of concern and adhere to any WLAs in the TMDL. Given that the majority of the watershed area is within the confines of the Cape Romain National Wildlife Refuge, the Santee Coastal Reserve and Francis Marion National Forest, it is unlikely that industrial or construction activities will be prevalent. **Note that there may be other stormwater discharges not covered under permits numbered SCS and SCR that occur in the referenced watershed. These activities are not subject to the WLA portion of the TMDL.**

Amendment Location 5:

Section 6.0, Page 24

Amendment:

The level of monitoring necessary, deployment of structural and non-structural BMPs, evaluation of BMP performance, and optimization or revisions to the existing pollutant reduction goals of the SWMP or any other plan is TMDL and watershed specific. Hence, it is expected that NPDES permit holders evaluate their existing SWMP or other plans in a manner that would effectively address implementation of this TMDL with an acceptable schedule and activities for their permit compliance. The Department staff (permit writers, TMDL project managers, and compliance staff) is willing to assist in developing or updating the referenced plan as deemed necessary. Please see Appendix E which provides additional information as it relates to evaluating the effectiveness of an MS4 Permit as it is related to compliance with approved TMDLs.

Compliance with terms and conditions of existing and future NPDES sanitary and stormwater permits (including all construction, industrial and MS4) may effectively implement the WLA and demonstrate consistency with the assumptions and requirements of the TMDL. **For SCDOT, compliance with terms and conditions of its NPDES MS4 permit is effective implementation of the WLA to the MEP. For existing and future NPDES construction and Industrial stormwater permittees, compliance with terms and conditions of its permit is effective implementation of the WLA.**