

SHELLFISH MANAGEMENT AREA 09B 2008 ANNUAL UPDATE

[Data Through December 2007]



Prepared By:

Marshall Kinsey, Regional Shellfish Program Manager
and
Chad E. Freeland, Environmental/Health Manager
Region 7 Environmental Quality Control
1362 McMillan Avenue Suite 300
Charleston, SC 29405

Reviewers/Editors:

D.M. Pearson, Shellfish Program Manager
and
Charles L. Newell, Technical Consultant
Monitoring, Assessment, and Protection Division
Environmental Quality Control - Bureau of Water
2600 Bull Street
Columbia, South Carolina 29201

Charles Gorman, Division Director
Water Monitoring, Assessment, and Protection Division
Environmental Quality Control - Bureau of Water

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ANNUAL UPDATE
Shellfish Management Area 09B
SCDHEC EQC Bureau of Water

Data Inclusive Dates:

01 / 01 / 05 thru 12 / 31 / 07

Classification Change:

X Yes No

Shoreline Survey Completed: Yes

(I)ncreased/(D)ecreased/(N)one:

D Approved

N Conditionally Approved

I Restricted

N Prohibited

Prior Report & Date: Annual-2007

SUMMARY

Based on reviews of fecal coliform bacteriological data and a pollution source survey, Shellfish Management Area 09B (Area 09B) is impacted by one primary pollution source. Nonpoint source runoff appears to be the major source of fecal coliform bacteria concentrations throughout the area. Development within the management area continues at a rapid pace. Impervious surfaces typically result in increased volumes of stormwater runoff and a more rapid movement of stormwater into adjacent shellfish harvesting waters. Additionally, a substantial portion of the Francis Marion National Forest drains to Area 09B.

Based upon the current pollution source survey and bacteriological data review, shellfish harvest classification boundaries will need to be modified. Station 9B-16 exhibits impaired water quality; therefore Nowell Creek from its headwaters to its confluence with the Wando River at Station 9B-01 will be downgraded to Restricted. Station 9B-11 exhibits improved water quality, and the area of the Wando River from Station 9B-17 to 9B-11 will be upgraded to an Approved classification.

Slight modifications to existing boundary lines will also be made. These modifications are not a result of changes in water quality, but are being made to provide an accurate map as possible in regards to harvest classification boundaries. The Restricted portions of Mill Creek to its headwaters will be changed to an Approved classification based on water quality at neighboring stations 9B-08 and 9B-17. Also, the unnamed creek just north of Horlbeck Creek will be changed to an Approved classification, based on water quality at neighboring stations 9B-02 and 9B-08. All other Restricted/Approved classification boundaries will remain the same as the previous Annual Update.

Three station changes are also recommended for this Annual Update. Currently, harvest classification boundaries in the lower Wando River are being determined by water quality at stations 9B-02, 9B-19 and 9B-01. These stations are all in the mouths of tributaries, located to provide water quality data for creeks draining to the Wando. However, the only Department of Natural Resources (DNR) permitted harvest area in the lower Wando River is S-238, which only incorporates the Wando River itself and portions of Nowell Creek, not the Wando River's many other tributaries. Creation of 3 new sample stations in the main channel of the Wando River, at Day markers 13, 20 and 27, will give a more accurate representation of water quality in the Wando River. There is

decent sub-tidal clam resource in this area, and these new stations will hopefully provide stability to any fluctuations in harvest classification boundaries at existing sampling stations.

INTRODUCTION

PURPOSE AND SCOPE

The authority to regulate the harvest, sanitation, processing and handling of shellfish is granted to the South Carolina Department of Health and Environmental Control by Section 44-1-140 of the Code of Laws of South Carolina, 1976, as amended. The Department promulgated Regulation 61-47, which provides the rules used to implement this authority and outlines the requirements applied in regulating shellfish sanitation in the State. This regulation specifically addresses classification of shellfish harvesting areas and requires that all areas be examined by sanitary and bacteriological surveys and classified into an appropriate shellfish harvesting classification.

The United States Food and Drug Administration (USFDA) uses The National Shellfish Sanitation Program's (NSSP) *Guide for the Control of Molluscan Shellfish* to evaluate state shellfish sanitation programs. The NSSP Model Ordinance requires that a sanitary survey be in place for each growing area prior to its use as a source of shellfish for human consumption and prior to the area's classification as Approved, Conditionally Approved, Restricted or Conditionally Restricted. Each sanitary survey shall be updated on an annual basis and accurately reflect changes which have occurred within the area. Requirement of the annual reevaluation include, at a minimum, field observations of pollution sources, an analysis of water quality data consisting of the past year's data in combination with appropriate previously collected data, review of reports and effluent samples from pollution sources, and review of performance standards for discharges impacting the growing area. A brief report documenting the findings shall also be provided.

The following criteria consistent with the NSSP Model Ordinance and SC Regulation 61-47 are used in establishing shellfish harvesting classifications:

Approved Area - Growing areas shall be classified approved when the sanitary survey concludes that fecal material, pathogenic microorganisms, and poisonous or deleterious substances are not present in concentrations that would render shellfish unsafe for human consumption. Approved classifications shall be determined upon a sanitary survey that includes water samples collected from stations in the designated area adjacent to actual or potential sources of pollution. For waters sampled under adverse pollution conditions, the median fecal coliform Most Probable Number (MPN) or the geometric mean MPN shall not exceed fourteen per one hundred milliliters, nor shall more than ten percent of the samples exceed a fecal coliform MPN of forty-three per one hundred milliliters (per five tube decimal dilution). For waters sampled under a systematic random sampling plan, the geometric mean fecal coliform MPN shall not exceed fourteen per one hundred milliliters, nor shall the estimated ninetieth percentile exceed an MPN of forty three per one hundred milliliters (per five tube decimal dilution). Computation of the estimated ninetieth percentile shall be determined using National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish methodology.

Conditionally Approved Area - Growing areas may be classified conditionally approved when they are subject to temporary conditions of actual or potential pollution. When such events are predictable, as in non-point source pollution from rainfall runoff or discharge of a major river, a management plan describing conditions under which harvesting will be allowed shall be adopted by the Department prior to classifying an area as conditionally approved. Where appropriate, the management plan for each conditionally approved area shall include performance standards for sources of controllable pollution (e.g., wastewater treatment and collection systems), evaluation of each source of pollution, and means of rapidly closing and subsequently reopening areas to shellfish harvesting. Memorandums of agreements shall be a part of these management plans where appropriate. Shellfish shall not be directly marketed from a conditionally approved area until conditions for an approved classification have been met for a period of time likely to ensure the shellfish are safe for consumption. Shellstock from conditionally approved areas that have been subjected to temporary conditions of actual or potential pollution may be relayed to approved areas for purification or deperated through controlled purification operations only by special permit issued by the Department.

Restricted Area - Growing areas shall be classified restricted when sanitary survey data show a moderate degree of pollution or the presence of deleterious or poisonous substances to a degree that may cause the water quality to fluctuate unpredictably or at such a frequency that a conditionally approved classification is not feasible. Shellfish may be harvested from areas classified as restricted only for the purposes of relaying or deperation and only by special permit issued by the Department and under Department supervision. The suitability of restricted areas for harvesting of shellstock for relay or deperation purposes may be determined through the use of comparison studies of background tissue samples with post-process tissue samples, as well as other process verification techniques deemed appropriate by the Department. For restricted areas to be utilized as a source of shellstock for deperation, or as source water for deperation, the fecal coliform geometric mean MPN of restricted waters sampled under adverse pollution conditions shall not exceed eighty-eight per one hundred milliliters nor shall more than ten percent of the samples exceed a MPN of two hundred and sixty per one hundred milliliters for a five tube decimal dilution test. For waters sampled under a systematic random sampling plan, the fecal coliform geometric mean MPN shall not exceed eighty-eight per one hundred milliliters nor shall the estimated ninetieth percentile exceed an MPN of two hundred and sixty (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish methodology.

Conditionally Restricted Area - Growing areas may be classified conditionally restricted when they are subject to temporary conditions of actual or potential pollution. When such events are predictable, as in the malfunction of wastewater treatment facilities, non-point source pollution from rainfall runoff, discharge of a major river or potential discharges from dock or harbor facilities that may affect water quality, a management plan describing conditions under which harvesting will be allowed shall be prepared by the Department prior to classifying an area as conditionally restricted. Where appropriate, the management plan for each conditionally restricted area shall include performance standards for sources of controllable pollution, e.g., wastewater treatment and collection systems and an evaluation of each source of pollution, and description of the means of rapidly closing and subsequent reopening areas to shellfish harvesting. Memorandums of agreements shall be a part of these management plans where appropriate. Shellfish may be harvested from areas classified as conditionally restricted only for the purposes of relaying or deperation and only by

permit issued by the Department and under Department supervision. For conditionally restricted areas to be utilized as a source of shellstock for depuration, the fecal coliform geometric mean MPN of conditionally restricted waters sampled under adverse pollution conditions shall not exceed eighty-eight per one hundred milliliters nor shall more than ten percent of the samples exceed a MPN of two hundred and sixty per one hundred milliliters for a five tube decimal dilution test. For waters sampled under a systematic random sampling plan, the fecal coliform geometric mean MPN shall not exceed eighty-eight per one hundred milliliters nor shall the estimated ninetieth percentile exceed an MPN of two hundred and sixty per one hundred milliliters (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish methodology.

Prohibited Area - Growing areas shall be classified prohibited if there is no current sanitary survey report or if the sanitary survey report or monitoring data show unsafe levels of fecal material, pathogenic microorganisms, or poisonous or deleterious substances in the growing area or otherwise indicate that such substances could potentially reach quantities that could render shellfish unfit or unsafe for human consumption.

BACKGROUND INFORMATION

This sanitary survey evaluates the current harvest classification of shellfish growing waters designated as Shellfish Management Area 09B (Area 09B). Area 09B consists of approximately 17,105 acres of shellfish growing area habitat located in Berkeley and Charleston Counties, South Carolina. Area 09B extends from the headwaters of the Wando River, located within the Francis Marion National Forest at Ion Swamp, 19 miles southwest to the Wando River's confluence with the Cooper River. Area 09B consists entirely of the Wando River and all of its tributaries, including Alston, Boone Hall, Darrell, Deep, Foster, Guerin, Hobcaw, Horlbeck, Nowell, Toomer and Wagner Creeks.

The harvesting classifications of Area 09B prior to this sanitary survey were as follows:

Prohibited: (Administrative closure)

1. Seaward portions of the Wando River (and adjacent tributaries and marshland), from Remley's Point to Station 9B-15, including all of Hobcaw and Molasses Creek;
2. Southern portions of Beresford Creek adjacent to the Cooper River and Area 10B;
3. The Wando River, within approximately 1000 feet Detyen's Shipyard;
4. The Wando River, within approximately 1000 feet of Detyen's Shipyard NPDES discharge outfall.
5. The Wando River within approximately 200 feet of the Halsey Cannon Boatyard.

Restricted:

1. That portion of the Wando River from the Prohibited boundary at Station 9B-15 to an imaginary line drawn from Station 9B-01 to Station 9B- 19. This closure will include all of Rat Hall Creek and Ralston Creek and their tributaries.
2. All of Horlbeck Creek, Boone Hall Creek and their tributaries from their headwaters to Station 9B- 02 in the Wando River.
3. The Wando River from Station 9B- 17 to its headwaters. This includes the tributaries of Guerin, Alston, Darrell, Wagner, Deep, and Toomer creeks.

Approved: All other waters of Area 09B.

The shellfish industry in South Carolina is based primarily on the harvest of the eastern oyster (*Crassostrea virginica*) and hard clams, which include both the northern clam (*Mercenaria mercenaria*) and several small populations of the southern clam (*Mercenaria campechiensis*). The ribbed mussel (*Geukensia demissa*) is also harvested in South Carolina, primarily on a small scale by the general public for recreational harvest. Areas in South Carolina designated for commercial harvest by the South Carolina Department of Natural Resources (SCDNR) include State shellfish grounds, Culture permits, Mariculture permits and Kings Grant areas. The South Carolina Department of Health and Environmental Control will disallow the harvesting of shellfish within Area 09B, for direct marketing purposes, from the Restricted waters listed below in the Recommendations.

There are three State Shellfish Grounds (S) located within Area 09B: S-237, S-238 and S-248. There are no other shellfish harvesting areas in Area 09B.

The shellfish-harvesting season in South Carolina normally extends from mid-September through mid-May. The South Carolina Department of Natural Resources (SCDNR) has the authority to alter the shellfish-harvesting season for resource management purposes and grant permits for year-round mariculture operations. Additionally, the South Carolina Department of Health and Environmental Control has the authority to prohibit shellfish harvesting when necessary to ensure that shellfish harvested in South Carolina waters are safe for human consumption.

POLLUTION SOURCE SURVEY

CHANGES IN POLLUTION SOURCES

No substantial changes in pollution sources have occurred in Area 09B since the 2007 Report.

SURVEY PROCEDURES

Shoreline surveys are typically conducted by Region 7 Shellfish Sanitation staff, by watercraft, vehicle and on foot. For current shoreline survey efforts, two separate projects have been undertaken outside of the Shellfish Sanitation Program that should prove immeasurable benefit.

A shoreline survey of Area 09B was conducted during this reporting year by the Office of Coastal Resource Management (OCRM). OCRM hired an intern, Jason McMaster, who, as part of his Master's thesis, developed GIS shapefiles documenting rural, non-MS4 (Municipal separate storm sewer system), areas in Charleston County on septic tanks as well as documenting any observed animal farms. Jason began by drawing a mile buffer around all impaired shellfish water bodies in the county. He then cross-referenced county parcel data with Department of Health septic tank permit data in those areas to develop shapefiles of all parcels on septic tanks, to include the number of tanks on the property and the property owners names(s) and address(s). Jason also conducted a physical shoreline survey of these same areas, taking GPS coordinates of any observed animal farms, to include the parcel information of the farm, the type and number of animals observed, and their

distance from shellfish harvesting waters. Together, the septic data and animal farm data should provide focus for future shoreline survey efforts in locating and evaluating potential non-point source impacts near impaired shellfish harvesting waters.

The Thermal Imaging project from last year is also still ongoing, and will hopefully be nearing completion this year. All thermal anomalies have been or are being ground-truthed by DHEC personnel out of Columbia and suspicious anomalies will then be sampled to evaluate their source and potential impact to shellfish growing areas. Below is a table outlining initial results of the project. Formal results of this project will be included in the Annual Update for 2009 with future efforts focused on remediation of identified problem sources.

Area 9B			
Upper Wando			
Sector-Anomaly	Visited Y/N	Probable Reason for Anomaly	Supplementary Sample (Y/N), #
WAN-1	Y, 7/19	Discharge from gas station lot	Y
WAN-05	Y, 7/19	Puddles in shipyard	N
WAN-27	Y, 7/19	Likely Heat pump/Well outflow	N
WAN-39	Y, 7/19	Probable ground seep	N
WAN-49	Y, 7/19	Fire Hydrant drainage	N
WAN-51	Y, 7/19	Old drainage Ditch	N
WAN-51	Y, 7/19	Leaky Pump Station	Y, 2
WAN-18	Y, 7/19	Likely old illicit discharge site, dead trees, no more water	N
WAN-37	Y, 7/27	Golf course pond, swimming pool discharge	N
WAN-42	TBS		
WAN-45	TBS		
WAN-10	Y, 7/19	Likely Heat pump/Well outflow	Y-test Florida heat pump
WAN-11	Y, 7/19	Likely Heat pump/Well outflow	Y-test Florida heat pump
WAN-12	Y, 7/19	Likely Heat pump/Well outflow	Y-test Florida heat pump
WAN-36	Y	Some type of potable water pump station with Mt. Pleasant Waterworks	N
WAN-17	Y, 7/27	Small Pond behind house, older house	Y, 1
WAN-21	Y, 7/27	Large drainage collector for Golf club	Y, 1
WAN-38	Y, 7/27	White PVC, probable Florida heat pump	N
WAN-47	Y, 7/27	Tidal drainage way from pond	Y, 1
WAN-20	Y, 7/19	Drainage channels with flood gates	Y, 1
WAN-13	Y, 7/19	Drainage channel with flood gates	N

Horlbeck-Boone Hall			
Sector-Anomaly	Visited Y/N	Probable Reason for Anomaly	Supplementary Sample (Y/N), #
HOL-2	N	Couldn't find in New neighborhood	Not likely source too far from any waterbody
HOL-5	N	Couldn't find New neighborhood	Not likely source too far from any waterbody
HOL-7	Y, 9/19	No apparent inflow, perhaps coming through bank side below surface	Y, 1

*Entries in yellow are closer in proximity to shellfish waters will be prioritized first

POINT SOURCE POLLUTION

National Pollutant Discharge Elimination System (NPDES) Permitted Facilities		
PERMIT #	FACILITY NAME	FACILITY TYPE
SC0033022	Detyens Shipyards/Wando Yard	Industrial Wastewater-Discharge
SC0043273	Mt. Pleasant Water Works-Water	Municipal- RO Discharge
SCG750021	Sewee Outpost LLC	Industrial-Vehicle Wash water
SCG730086	French Quarter Group L.P Mine	Industrial-Discharge-Borrow Pit

- A. Municipal and Community Waste Treatment Facilities** - Detyens Shipyards (SC0033022) operates a sewage waste treatment system located on their property adjacent to the Wando River and Highway 41. The plant receives generated onsite wastewater as well as wastewater from a convenience store located across Highway 41. The treated effluent discharges into the Wando River adjacent to the shipyard. Mount Pleasant Waterworks (SC0043273) operates a water treatment plant located in Area 9A. The facility discharges into the Lower Wando in Area 09B, however, the effluent has no fecal coliform component. Refer to the Potential Pollution Sources map included in this report.
- B. Industrial Waste (Discharges)** - There are two permitted industrial discharges located within the boundaries of Area 09B. The French Quarter Group (SCG730086) operates a borrow pit located along the northern portion of the area, adjacent to Highway 41. The permit was issued for de-watering activities that may be necessary during normal operations. However, their discharge is to French Quarter Creek and the Cooper River (Area 10B). Also the Sewee Outpost (SCG750021) gas station has a permit to discharge vehicle wash water. However, the vehicle washing station has yet to be built and the owner is unsure if the discharge permit will ever be used. Refer to the Potential Pollution Sources map included in this report.

- C. Marinas** - In 2007, prompted by a SCDHEC Office of Coastal Resource Management (OCRM) marina definition change, South Carolina Regulation 61-47, Shellfish was amended. R. 61-47, Shellfish now 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); or, 3) any facility which has permanent docking space of 250 linear feet or greater. 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. 5) A dry stack facility.

SCDHEC is currently in the process of identifying all facilities meeting the new marina definition. Once identified, they will be mapped and adequate closure zones established to protect public health.

Prior to the 2006 definition change, a wide variety of boating facilities were located in Area 09B. Hobcaw View Marina, located on Hobcaw Creek, provides dockage for approximately 25 boats and allows for another 10 moorings within the creek. No fueling or pump-out facilities are provided. Two marine repair facilities are located on the Wando River: Detyens Shipyard and Halsey Cannon Boatyard. Detyens Shipyard is located on the south side of the Wando River, adjacent to the SC Hwy 41 Bridge. Detyens has three large dry docks and serves as a vessel repair facility. Halsey Cannon Boatyard, located across the river from Detyens off SC Hwy S-8-26, provides repairs to recreational boats ranging in size from 15 to 30 feet. This closure zone was established based upon a sizing determination conducted by the Bureau of Water's Division of Water Quality, 401 Certification section. Additionally, the S.C. Ports Authority operates the Wando Terminal located on the eastern shore of the Wando River approximately three miles from the Wando and Cooper River confluence. The terminal loads/unloads intercontinental transport cargo vessels on a weekly basis. There are no commercial fisheries docks within Area 09B. Closure zones exist around all marinas within the area.

- D. Radionuclides** - Sources of radionuclides have not been identified within Area 09B, and radionuclide monitoring has not been conducted. No other sources of poisonous or deleterious substances have been identified within the area.

NONPOINT SOURCE POLLUTION

- A. Urban and Suburban Stormwater Runoff** – Previous shoreline surveys conducted in Area 09B revealed the highest concentration of homes to be along the Mount Pleasant side of the Wando River. Single-family homes continue to be built along the south side of the Wando River between Guerin Creek and the Paradise Island Boat Landing. Multiple housing developments are being built from Station 9B-08 up to Station 9B-17. Residential subdivisions start at the Wando Terminal and continue northward along the Wando River.

New homes and docks are continually under construction in Alston, Boone Hall, Guerin, Nowell and Rat Hall Creeks. Stormwater runoff adversely impacts water quality by transporting fecal coliform bacteria from land to the shellfish growing area.

A dredge spoil area is located on the southern most portion of Daniel Island, located at the mouth of the Wando River. The Army Corps of Engineers conducted one dredging project in this area during 2007. The area between Charleston Harbor and the Wando Terminal was dredged. They also performed a dredge operation in Area 10B. Materials from both dredge operations were deposited in the Daniel Island Spoil area. The South Carolina State Ports Authority also conducts its own maintenance dredging directly in front of the Wando Terminal on an “as needed” basis.

The uplands surrounding the shellfish growing waters of Area 09B consist of various soil textures defined by the United States Department of Agriculture (USDA), Soil Conservation Service (Berkeley Co.1980 & Charleston Co.1971) utilizing general classifications and descriptions. Although lands within Area 09B, along the Berkeley County side of the river, consist of numerous soil types, the area is generally comprised of Chipley-Echaw-Pickney soils, made up of nearly level soils on long, narrow to broad ridges in areas roughly parallel with the coastline. The USDA (1980) further describes these soils as "Moderately well drained and very poorly drained soils that are sandy throughout." The upland area along the Charleston County side of the river consists of numerous soil types, however the area is generally comprised of soils in the Yonges series. Soils of this series typically occur on a low, swamp-like plain and on islands of higher areas that separate and parallel major streams. The USDA (1971) further describes these soils as “Poorly drained to very poorly drained, level to nearly level soils that have a loamy to sandy surface layer and a loamy to clayey subsoil.”

- B. Agricultural Runoff** - There are no permitted agricultural facilities located in Area 09B. Previous shoreline surveys found a residence adjacent to Station 9B-05 that has a pasture that occasionally contains two to four horses. There were also approximately eight cows one to two miles upstream from Station 9B-06. Area 09B serves as a drainage basin for southwestern portions of the Francis Marion National Forest.
- C. Individual Sewage Treatment and Disposal Systems** – The uplands bordering the Wando River and its tributaries, upstream of Station 9B-05, continue to be served exclusively by individual septic systems. Development in Paradise Island has continued to increase the number of residences served by septic systems. Each system requires inspection and approval by the Division of Environmental Health, Region 7 Health District, prior to final installation.
- D. Wildlife and Domestic Animals** - Area 09B supports a large population of domestic animals attributable to a number of private residences along the shores of the Wando River. The area supports a moderate amount of wildlife along the northern border that extends into the Francis Marion Forest. The area has many small tidal creeks. This creek system provides a possible conduit for animal fecal coliform bacteria to be transported to the adjacent growing waters.
- E. Boat Traffic** - Recreational boat traffic is moderate throughout the area between the months of November and April and heavy between the months of May and October. Commercial boat traffic ranges from fisherman collecting blue crabs to large commercial cargo vessels utilizing the S.C. Ports Authority Wando Terminal.

- F. Hydrographic and Habitat Modification** - Hydrographic and habitat modification in estuarine areas requires both State and Federal approval. Portions of the Wando River from the Charleston Harbor to the I-526 Bridge require regular maintenance dredging. The U.S. Army Corps of Engineers utilizes designated tracts of land adjacent to the Cooper River as dredge spoil sites.
- G. Marine Biotoxins - Marine Biotoxins** - Bivalve shellfish contamination from marine biotoxins has not been shown to be a human health concern within Area 09B. During the winter and spring of 1988, South Carolina experienced an occurrence of "Red Tide", specifically *Ptychodiscus brevis* (*G. breve*), which affected water quality in Area 01. There has been no documented reoccurrences of this organism at levels requiring emergency response in South Carolina waters subsequent to the 1988 event. Due to the vast media coverage of events related to *Pfiesteria piscicida*, the Department participates in a State Task Group on Toxic Algae and operates a toxic algae emergency response team.

HYDROGRAPHIC AND METEOROLOGICAL CHARACTERISTICS

PHYSIOGRAPHY

Area 09B is comprised of the Wando River and associated deep-water tributaries and marshlands. The creeks within the area range from 30 to 450 feet in width and average 5 to 25 feet in depth. The shipping channel near the Wando Terminal is maintained at a mean low water depth between 37 and 40 feet by the U.S. Army Corps of Engineers. Freshwater flows into the area from the Francis Marion National Forest and associated creeks. High salinity ocean water enters the area from the Charleston Harbor. The entire management area is approximately eight miles wide (northwest to southeast) and nineteen miles long (southwest to northeast).

Tides - Tides in Area 09B are semidiurnal, consisting of two low and two high tides occurring each lunar day. Mean tidal ranges in the Wando River at the Highway 41 Bridge are 6.2 feet during normal tides and 8.0 feet during spring tides. Wind direction and intensity, as well as atmospheric pressure, typically cause variations in predicted tidal ranges.

Rainfall - Precipitation in Area 09B 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 mean total annual rainfall for the sixty-five year period 1941-2005, recorded at the Charleston International Airport, is 51.5 inches. The 2007 precipitation total recorded in Mount Pleasant was 41.35 inches.

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.

River Discharges - The Wando River receives freshwater from two primary sources, freshwater flowing into the mouth of the Wando River from the Cooper River and runoff from the Wando River watershed.

WATER QUALITY STUDIES

DESCRIPTION OF THE PROGRAM

The Department currently utilizes a systematic random sampling (SRS) strategy within Area 09B in lieu of sampling under adverse pollution conditions. In order to comply with 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.

Four Hundred and Eighty-six (486) surface water quality samples (<1.0 ft. deep) were collected for bacteriological analyses and classification purposes from 15 active water quality sampling stations in Area 09B during the period 01/01/05 through 12/31/07. No special bacteriological samples were collected during the review period for non-classification purposes. The 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 C. were discarded (APHA, 1970).

Surface water temperatures were 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.

MONITORING RESULTS

Stations exceeding a fecal coliform geometric mean MPN value of 14 are 9B-04, 9B-05, 9B-07, and 9B-09. No station exceeds a fecal coliform geometric mean MPN value of 88. The stations that exceed a fecal coliform MPN estimated 90th percentile value of 43 are 9B-04, 9B-05, 9B-07, 9B-09, 9B-12, 9B-16 and 9B-18. Station 9B-09 exceeds a fecal coliform MPN estimated 90th percentile value of 260.

CONCLUSIONS

Based on review of fecal coliform bacteriological data and a pollution source survey, Area 09B is impacted by one primary source of actual or potential pollution. Nonpoint source runoff appears to be a major source of fecal coliform bacteria concentrations throughout the area. Development within the management area continues at a rapid pace.

RECOMMENDATIONS

Based upon the current pollution source survey and bacteriological data review of Shellfish Management Area 09B, shellfish harvest classification boundaries will need to be modified. Station 9B-16 exhibits impaired water quality; therefore Nowell Creek from its headwaters to its confluence with the Wando River at Station 9B-01 will be downgraded to Restricted. Station 9B-11 exhibits improved water quality, and the area of the Wando River from Station 9B-17 to 9B-11 will be upgraded to an Approved classification.

Slight modifications to existing boundary lines will also be made. These modifications are not a result of changes in water quality, but are being made to provide an accurate map as possible in regards to harvest classification boundaries. The Restricted portions of Mill Creek to its headwaters will be changed to an Approved classification based on water quality at neighboring Stations 9B-08 and 9B-17. Also, the unnamed creek just north of Horlbeck Creek will be changed to an Approved classification, based on water quality at neighboring stations 9B-02 and 9B-08. All other Restricted/Approved classification boundaries will remain the same as the previous Annual Update.

The following harvesting classification of Area 09B is recommended:

Prohibited: (Administrative closure)

1. Seaward portions of the Wando River (and adjacent tributaries and marshland), from Remley's Point to Station 9B-15, including all of Hobcaw and Molasses Creek;
2. Southwestern portions of Beresford Creek and adjacent marsh near Thomas Island, extending to the Area 10B boundary;
3. The Wando River, within approximately 1000 feet Detyen's Shipyard;
4. The Wando River, within approximately 1000 feet of Detyen's Shipyard NPDES discharge outfall.
5. The Wando River within approximately 200 feet of the Halsey Cannon Boatyard.

Restricted:

1. That portion of the Wando River from the Prohibited boundary at Station 9B-15 to an imaginary line drawn from Station 9B-01 to Station 9B-19. This closure will include all

- of Rat Hall Creek and Ralston Creek and their tributaries.
2. All of Nowell Creek and its tributaries from its headwaters to Station 9B-01 in the Wando River.
 3. All of Horlbeck Creek, Boone Hall Creek and their tributaries from their headwaters to Station 9B-02 in the Wando River.
 4. The Wando River from Station 9B-11 to its headwaters. This includes the tributaries of Guerin, Alston, Darrell, Wagner, Deep, and Toomer creeks.

Approved: All other waters of Area 09B.

Station Additions/Deactivations/Modifications:

Additions:

- 9B-22 Wando River at Marker #27
- 9B-23 Wando River at Marker #20
- 9B-24 Wando River at Marker #13

Currently, harvest classification boundaries in the lower Wando River are being determined by water quality at Stations 9B-02, 9B-19 and 9B-01. These stations are all in the mouths of tributaries, located to provide water quality data for creeks draining to the Wando. However, the only Department of Natural Resources (DNR) permitted harvest area in the lower Wando River is S-238, which only incorporates the Wando River itself and portions of Nowell Creek, not the Wando River's many other tributaries. Creation of these 3 new sample stations will give a more accurate representation of water quality in the Wando River. There is decent sub-tidal clam resource in this area, and these new stations will hopefully provide stability to any fluctuations in harvest classification boundaries at existing sampling stations.

Analysis of sampling data for Area 09B demonstrates the probability of a significant impact from rainfall exceeding 4.00" in a 24-hour period. Therefore, a precautionary closure of Area 09B will be implemented following rainfall events of greater than 4.00" in a 24-hour period, as measured at the Mount Pleasant Waterworks, Rifle Range Road facility located in Mount Pleasant. This methodology is associated with the concept of the Probable Maximum Precipitation (PMP). The National Weather Service publishes PMP estimates for the coastal United States in a series of hydro-meteorological reports (HMRs) (*National Weather Service*). PMP estimates for South Carolina's growing areas are derived from HMRs 51, 52 and 53 (*National Research Council, 1985*).

REFERENCES

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National Weather Service. The National Oceanic and Atmospheric Administration. *Precipitation Frequency Atlas of the Western US: NOAA Atlas II*. Superintendent of Documents, US Government Printing Office - Washington DC.

United States Department of Agriculture, Soil Conservation Service, 1971. *Soil survey of Charleston County, South Carolina*. In cooperation with South Carolina Agricultural Experiment Station and South Carolina Land Resources Conservation Commission, National Cooperative Soil Survey, Washington, D.C. p. 78.

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Figure 1.
Shellfish Management
Area 09B
Prior Classification

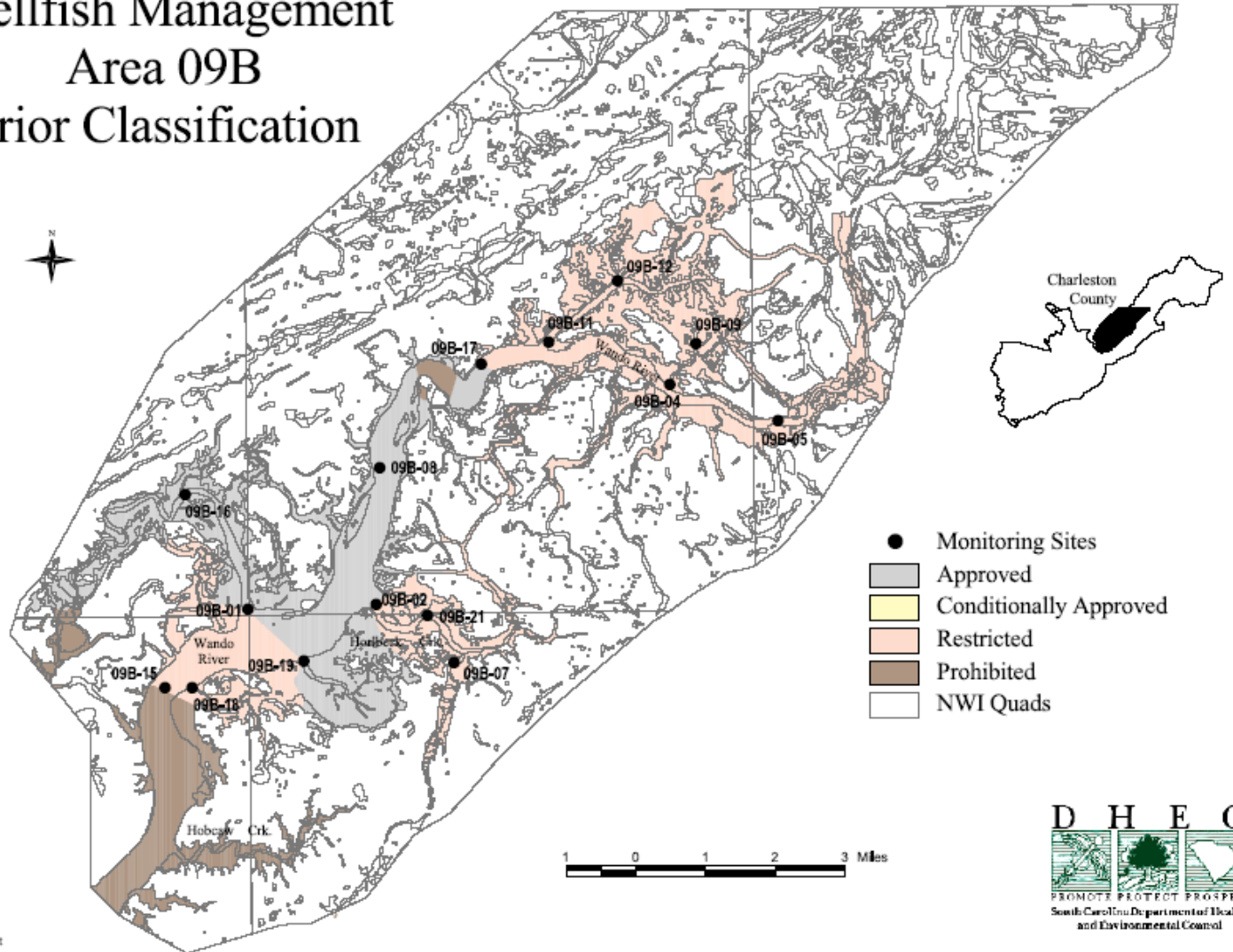


Figure 2.
Shellfish Management
Area 09B
Current Classification

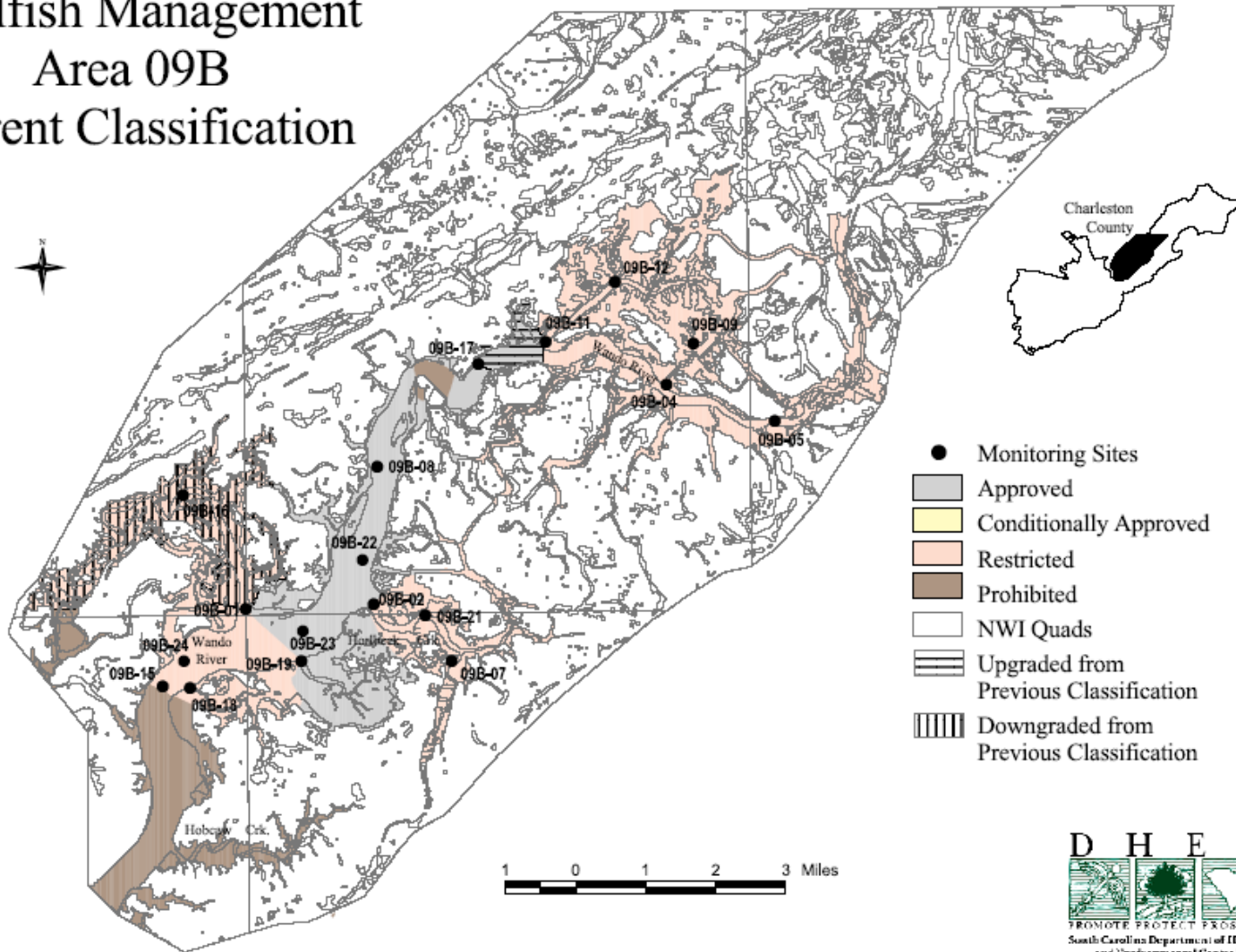
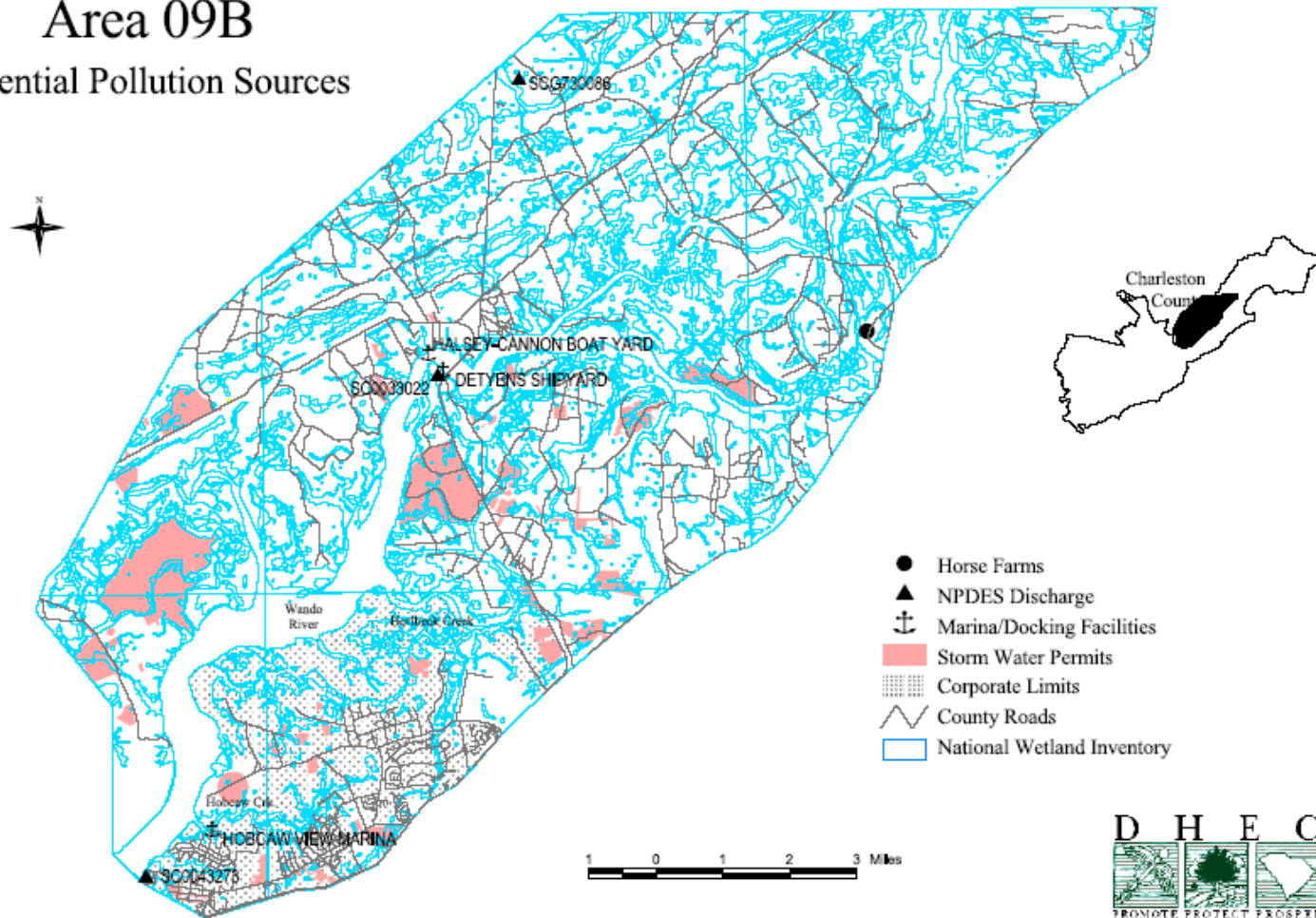


Figure 3.
Shellfish Management
Area 09B
Potential Pollution Sources



2008 Annual Report



TABLE #1
Shellfish Management Area 09B
Water Quality Sampling Stations Description

<u>Station</u>	<u>Description</u>
9B-01.....	Wando River at Nowell Creek
9B-02.....	Wando River at Horlbeck Creek
9B-04.....	Wando River at Deep Creek
9B-05.....	Wando River opposite Big Paradise Island
9B-07.....	Boone Hall Creek opposite County Recreation Area
9B-08.....	Wando River at Marker #29
9B-09.....	Deep Creek - 1 mile from confluence with Wando River
9B-11.....	Wando River at Guerin Creek
9B-12.....	Guerin Creek at Old House Creek
9B-15.....	New bridge- Route I-526
9B-16.....	Confluence of Martin Creek and Nowell Creek
9B-17.....	Wando River midway between Stations 9B-03 and 9B-11 (at old dry dock)
9B-18.....	Rat Hall Creek at confluence with Wando River
9B-19.....	Foster Creek at confluence with Wando River
9B-21.....	Horlbeck Creek at the power line crossing
9B-22.....	Wando River at Marker #27 – (New Station)
9B-23.....	Wando River at Marker #20 – (New Station)
9B-24.....	Wando River at Marker #13 – (New Station)
(Total 18 Active)	

TABLE #2
Shellfish Management Area 09B

FECAL COLIFORM BACTERIOLOGICAL DATA SUMMARY
from Shellfish Water Quality Sampling Stations between

January 1, 2005 and December 31, 2007

Station #	01	02	04	05	07	08	09	11	12	15
SAMPLES	34	34	34	34	33	33	34	34	34	34
GEOMEAN	5.6	8.3	24.0	22.9	17.8	4.8	30.4	7.0	13.5	6.3
90TH %ILE	17	38	216	120	113	16	275	32	88	21
WATER QLTY	A	A	R	R	R	A	R	A	R	A
CLASSIFICATION	R	R	R	R	R	A	RND	R	R	P

Station #	16	17	18	19	21	22	23	24		
SAMPLES	34	34	34	34	12	0	0	0		
GEOMEAN	9.9	6.6	13.0	7.6	7.4	NEW	NEW	NEW		
90TH %ILE	49	26	47	36	27	NEW	NEW	NEW		
WATER QLTY	R	A	R	A	A	NEW	NEW	NEW		
CLASSIFICATION	R	A	R	R	R	NEW	NEW	NEW		

A - Approved **CA** - Conditionally Approved **R** - Restricted
RND - Restricted/No Depuration **P** - Prohibited

TABLE #3

**WATER QUALITY
SAMPLING STATIONS DATA**

Shellfish Management Area 09B

Detailed data for each shellfish monitoring station listed in this report's "Fecal Coliform Bacteriological Data Summary Table" and in other shellfish reports, can be obtained by writing South Carolina's Department of Health and Environmental Control – Freedom of Information office at the address below.

Freedom of Information
SC Dept. of Health & Environmental Control
2600 Bull Street
Columbia, SC 29201

Any explanation or clarity needed on the report's content can be obtained by contacting the preparer(s), and/or reviewer(s) listed on the cover page.

TABLE #4

RAINFALL DATA

Shellfish Management Area 09B

**SOURCE:
Mount Pleasant Waterworks and Sewer Commission**

AREA 9A ANNUAL TABLE OF DAILY RAINFALL DATA

*SOURCE: Mt. Pleasant Waterworks and Sewer Commission
Mt. Pleasant, SC (Rifle Range Road rainfall recording station)*

2005	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1st				1.50		0.50	0.70	0.10		0.50		
2nd		0.10		0.10								
3rd		0.70				0.40	0.40					
4th					0.30					0.40		0.30
5th					1.10	0.50		0.20		2.00		1.00
6th								2.00	0.50	3.00		
7th			0.50	0.20						0.70		
8th							0.30	1.30				1.00
9th		0.50					0.40	0.40		0.50		
10th							0.20					
11th								0.70		0.20		
12th	0.30			0.20				0.40				
13th	0.50			0.20			0.10		0.20			
14th	0.10											
15th			0.50					0.50				0.20
16th			1.20									
17th			0.10		0.70			2.50				1.00
18th					1.50							
19th						0.40						
20th					2.00						6.00	
21st		0.70										
22th			3.00	0.10				1.00				
23rd		0.20				0.40		0.50		1.00		
24th		0.10				0.10		0.50	0.50	0.50		0.10
25th			0.10			1.20		0.50				
26th			0.50					0.50				
27th		1.30	2.50			0.20		0.70	1.50	0.10	0.20	
28th					0.20	0.40			1.25		0.50	0.10
29th					1.50	0.30	0.30				0.70	
30th	0.60				0.30			0.10				
31st					1.20		0.20					

(Monthly Figures)

Year's Rainfall Total:

67.45

SUM	1.50	3.60	8.40	2.30	8.80	4.40	2.60	11.90	3.95	8.90	7.40	3.70
MAX	0.60	1.30	3.00	1.50	2.00	1.20	0.70	2.50	1.50	3.00	6.00	1.00
MIN	0.10	0.10	0.10	0.10	0.20	0.10	0.10	0.10	0.20	0.10	0.20	0.10
AVG	0.38	0.51	1.05	0.38	0.98	0.44	0.33	0.74	0.79	0.89	1.85	0.53

2006 Annual Rainfall Summary
Source: Mt. Pleasant Waterworks
Mt. Pleasant, SC

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.25				0.10				0.10			
2	1.00	1.10			0.20	0.90						
3									0.10			0.10
4						0.10			0.70			
5					0.20							
6		0.30					0.50		0.80		0.70	
7					0.70		0.10		0.20		1.20	
8				0.60		0.20				0.10		
9												
10												
11							0.50					
12								2.00				
13	0.10					3.00			1.20			0.30
14					1.05							
15					0.10		0.50				0.50	
16												
17	0.10			0.10						0.60		
18		0.10				0.50						
19				0.10					0.10			
20											1.20	
21			0.50		0.10						1.10	
22				0.30			0.10			0.60	0.20	1.00
23	0.60		0.40		0.10		0.30					
24							0.20	1.20				0.60
25		1.00				0.70		1.80	0.01			0.50
26				0.90		0.30	1.00			0.30		
27					0.20	0.10		0.20		1.20		
28				0.40					0.20			
29							0.90					
30	0.50							0.20				
31												0.20
Total	2.55	2.50	0.90	2.40	2.75	5.80	4.10	5.40	3.41	2.80	4.90	2.70
Max	1.00	1.10	0.50	0.90	1.05	3.00	1.00	2.00	1.20	1.20	1.20	1.00

Annual Total 40.21

2007 Annual Rainfall Summary
Source: Mt. Pleasant Waterworks
Mt. Pleasant, SC

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.29	1.90	0.00	0.00	0.00	0.00	0.00	0.00	3.50	0.00	0.00	0.00
2	0.16	0.00	1.00	0.00	0.00	3.50	0.00	0.00	0.20	0.70	0.00	0.00
3	0.01	0.00	0.00	0.00	0.00	0.30	0.00	1.10	0.00	1.30	0.00	0.00
4	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
5	0.01	0.00	0.00	0.00	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.01	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00
8	0.03	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.10	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00
13	0.00	0.20	0.00	0.00	0.40	0.20	0.00	0.00	0.50	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	4.25	0.00	0.10	0.00	0.00	0.00
15	0.00	0.00	0.00	0.50	0.00	0.10	0.00	0.00	0.00	0.00	0.00	1.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.00
19	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.20	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.35	2.10	0.00	0.00	0.00	0.00	1.10
21	0.00	0.20	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.50
22	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
24	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.00	0.00
25	0.01	0.10	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.60	0.00	0.55
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.00	0.50	0.00	0.00
27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00
29	0.02		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10
30	0.00		0.00	0.00	0.00	0.00	2.50	0.00	0.00	0.00	0.00	0.00
31	0.00		0.00		0.00			2.00		0.00		0.00
Total	1.75	2.40	1.10	0.50	2.30	4.85	9.75	3.55	6.00	5.90	0.00	3.25
Max	0.74	1.90	1.00	0.50	0.90	3.50	4.25	2.00	3.50	1.30	0.00	1.10

Annual Total 41.35