Wellhead Protection Plan
Brunswick County,
North Carolina

January 28, 2013
PWS ID#
04-10-045

Contact Name: Jeremy Sexton
Position: Water Resources Superintendent
jsexton@brunsco.net
Phone: (910) 454-0512
Fax: (910) 457-9183
PO Box 249
Bolivia, North Carolina 28422

Table of Contents

Background

In 1986, Safe Water Drinking Act (SWDA) amendments added Section 1428, "State Programs to Establish Wellhead Protection Areas," which requires each state to develop a program to "protect wellhead areas within their jurisdiction from contaminants which may have any adverse affects on the health of persons." The term wellhead protection area is defined in the law as "the surface and subsurface area surrounding a water well or wellfield, supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or wellfield." North Carolina's Environmental Protection Agency (EPA) approved Wellhead Protection Program (WHPP) provides technical support to local governments and public water supply systems in their endeavors to develop and implement their own Wellhead Protection Plans.

North Carolina's objective in developing a protection plan is to provide a process for public water system operators to learn more about their groundwater systems and how to protect them. Wellhead Protection Plans allow communities to take charge of protecting the quality of their drinking water by identifying and carefully managing areas that supply groundwater to their public wells.

Regulations of the **North Carolina Division of Water Resources (DWR) under the Department of Environment and Natural Resources (DENR)** require wellhead protection measures for any public water supply wells to be used as a community or non-transient, non-community water system to meet the following requirements:

(1) The well shall be located on a lot so that the area within 100 feet of the well shall be owned or controlled by the person supplying the water. The supplier of water shall be able to protect the well lot from potential sources of pollution and to construct landscape features for drainage and diversion of pollution.

(2) The minimum horizontal separation between the well and known potential sources of pollution shall be as follows:

- (a) 100 feet from any sanitary sewage disposal system, sewer, or a sewer pipe unless the sewer is constructed of water main materials and joints, in which case the sewer pipe shall be at least 50 feet from the well;
- (b) 200 feet from a subsurface sanitary sewage treatment and disposal system designed for 3000 or more gallons of wastewater a day flows, unless it is determined that the well water source utilizes a confined aquifer;
- (c) 500 feet from a septage disposal site;
- (d) 100 feet from buildings, mobile homes, permanent structures, animal houses or lots, or cultivated areas to which chemicals are applied;
- (e) 100 feet from surface water;
- (f) 100 feet from a chemical or petroleum fuel underground storage tank with secondary containment;
- (g) 500 feet from a chemical or petroleum fuel underground storage tank without secondary containment;
- (h) 500 feet from the boundary of a ground water contamination area;
- (i) 500 feet from a sanitary landfill or non-permitted non-hazardous solid waste disposal site;
- (j) 1000 feet from a hazardous waste disposal site or in any location which conflicts with the North Carolina Hazardous Waste Management Rules cited as 15A NCAC 13A;
- (k) 300 feet from a cemetery or burial ground; and

(l) 100 feet from any other potential source of pollution.

(3) The Department may require greater separation distances or impose other protective measures then necessary to protect the well from pollution; the Department shall consider as follows:

(a) The hazard or health risk associated with the source of pollution;
(b) The proximity of the potential source to the well;
(c) The type of material, facility or circumstance that poses the source or potential source of pollution;
(d) The volume or size of the source or potential source of pollution;
(e) Hydrogeological features of the site which could affect the movement of contaminants to the source water;
(f) The effect which well operation might have on the movement of contamination;
(g) The feasibility of providing additional separation distances or protective measures.

(4) The lot shall be graded or sloped so that surface water is diverted away from the wellhead. The lot shall not be subject to flooding.

(5) When the supplier of water is unable to locate water from any other approved source and when an existing well can no longer provide water that meets the requirement of this Subchapter, a representative of the Division may approve a smaller well lot and reduced separation distances for temporary use.

In addition to this delineation, communities are encouraged to establish wellhead protection plans, which include the following:

1) The formation of a wellhead protection committee to establish and implement the wellhead protection program whose role it is to conduct a potential contaminant source inventory, provide options for the management of the WHP area, seek public input into the creation of the WHP plan, seek approval of the WHP program and to implement the WHP program;

2) Delineation of the contributing areas of the water sources;

3) Identification of potential contamination sources within the wellhead protection area;

4) Develop and implement wellhead protection area management actions to protect the water sources;

5) Develop an emergency contingency plan for alternative water supply sources in the event the groundwater supply becomes contaminated and emergency response planning for incidents that may impact water quality;

6) Development of a public education program;

7) Conduct new water source planning to insure the protection of new water source locations and to augment current supplies.

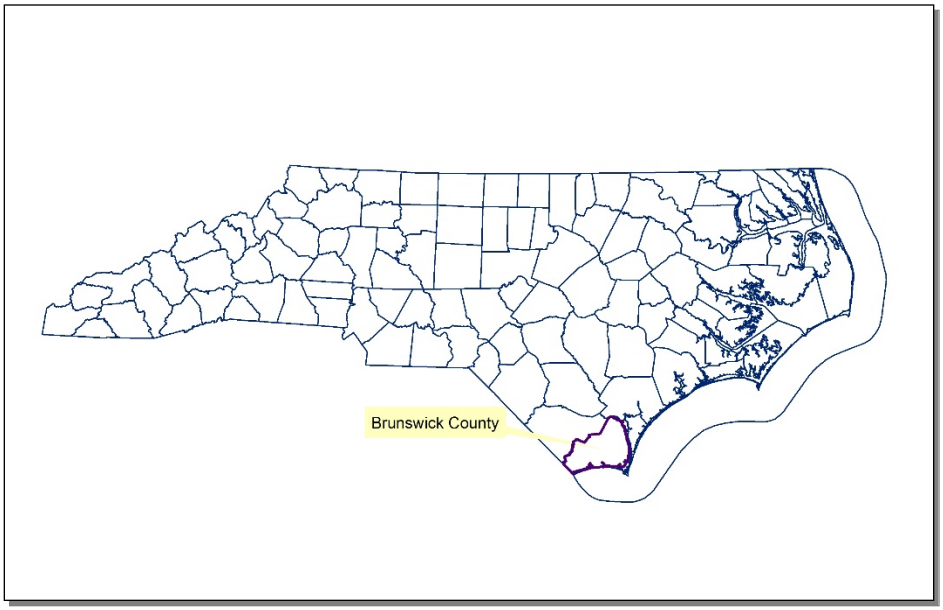
Wellhead protection for public water supply wells is a voluntary program, but water systems across the state are encouraged to take the above steps in protecting all groundwater sources.

The PWSS will provide the final approval for WHP Programs. The Wellhead Protection Program Coordinator is:

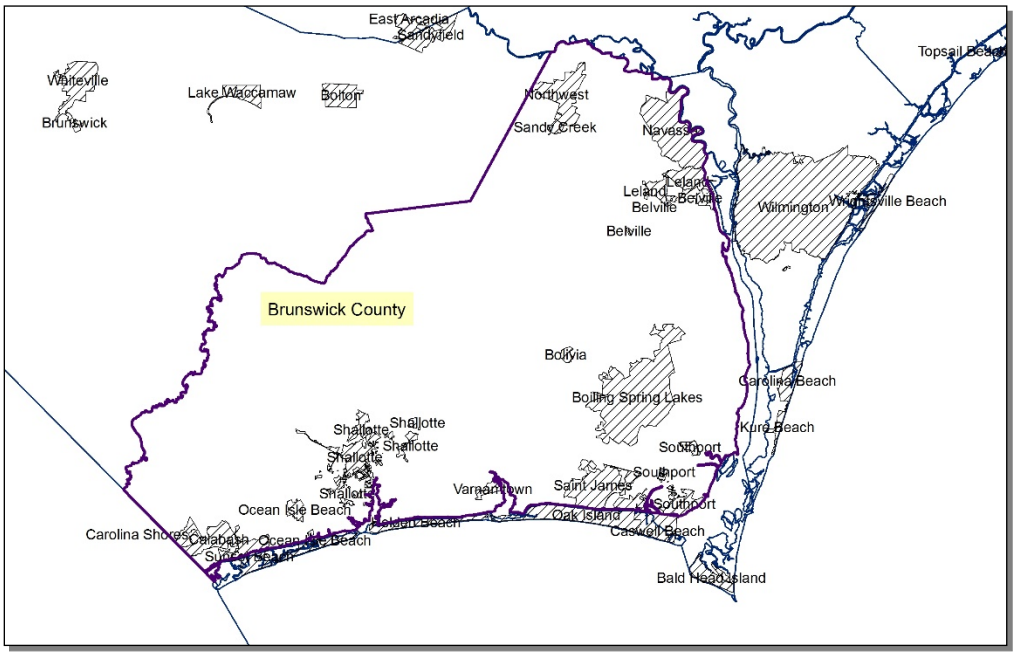
M. Gale Johnson, P.G.
Public Water Supply Section
1634 Mail Service Center
Raleigh, North Carolina 27699-1634
gale.johnson@ncdenr.gov
Phone 919-707-9083
Fax 919-715-4374

Introduction

Brunswick County is located in the southeastern coastal plain of North Carolina. It is bordered by the Atlantic Ocean to the south and east, South Carolina to the southwest, Columbus County to the northwest and Pender County to the northeast. Brunswick County's 211 Water Treatment Plant serves Southport, Oak Island, Caswell Beach, St. James Plantation, and supplements Baldhead Island through a connection in Caswell Beach. Water is provided to a population of 9,935 customers via 4,475 connections, with an average daily usage of 2.86 million gallons. Brunswick County gets a portion (as much as 86%) of its water from a surface water intake located on the Cape Fear River and operated by the Northwest Brunswick Water Treatment Plant. The rest it pumps from a group of fourteen wells. One well, number seven is no longer being used. Additional information about the wells is provided on subsequent pages. This WHPP only addresses protection of the wells. Based upon well records supplied by Brunswick County, the wells are screened in the semi-confined Castle Hayne aquifer. Water treatment consists of lime softening, chloraminate, sulphuric pH correction, polyphosphate for corrosion control and flouride. . There are eight water storage tanks located throughout the systems Brunswick County serves with a total storage capacity of 5.25 million gallons.



Brunswick County within North Carolina



Brunswick County's wells are located near the Town of Southport

Public Water Supply Information
Source Water Assessment Program Report

A Source Water Assessment Program (SWAP) Report has been made available for the Brunswick County by the NC Public Water Supply Section. Water sources can be threatened by many potential contaminant sources, including permitted wastewater discharges, underground storage tanks, urban storm water runoff, or other types of non-point source contamination such as runoff produced by agricultural activities and land clearing for development. A source water assessment is a qualitative evaluation of the potential of a drinking water source to become contaminated by the identified potential contaminant sources (PCSs) within the delineated area. A SWAP Report consists of an assessment area delineation, a potential contaminant source inventory and map, a susceptibility rating, maps, tables and a detailed description of North Carolina's SWAP approach. Brunswick County's water source is fourteen groundwater wells which have been assigned a qualitative susceptibility of Moderate, based on a contaminant and an inherent vulnerability rating of lower, moderate and higher as seen in the SWAP Results Summary table on the next page. The rating process is described in detail in Sections 3 and 6 of the SWAP Report. Brunswick County's entire SWAP Report along with a wealth of other information about water sources in North Carolina can be found on the PWS website. http://swap.deh.enr.state.nc.us/swap/pages/swap.htm. Click on the SWAP Reports box at the bottom of the page.

NC Public Water Supply System Information
Well # 7 is not being used and this WHPP does not include the Surface Water Intake on the Cape Fear River

System Name	BRUNSWICK COUNTY WATER SYSTEM
City	BOLIVIA
PWS ID	04-10-045
Source Name	WELL #19
Source Name	WELL #18
Source Name	WELL #17
Source Name	WELL #15
Source Name	WELL #12A
Source Name	WELL #12
Source Name	WELL #11
Source Name	WELL #8
Source Name	WELL #7
Source Name	WELL #5
Source Name	WELL #2
Source Name	WELL #1
Source Name	CAPE FEAR RIVER
Source Name	WELL #16
Source Name	WELL #3

Well #	Well Yield (gpm)	Depth (ft)
1	250	175
2	130	163
3	350	159
5	300	156
6A	300	171
7	Out of Service	
8	450	130
11	708	164
12	431	96
12A	950	114
15	450	129
16	450	155
17	350	155
18	350	155
19	375	150

SWAP Results Summary

Source Name	Inherent Vulnerability Rating	Contaminant Rating	Susceptibility Rating
WELL #19	Higher	Lower	Moderate
WELL #18	Moderate	Lower	Moderate
WELL #17	Moderate	Lower	Moderate
WELL #15	Moderate	Lower	Moderate
WELL #12A	Higher	Lower	Moderate
WELL #12	Higher	Lower	Moderate
WELL #11	Moderate	Lower	Moderate
WELL #8	Moderate	Lower	Moderate
WELL #7	Higher	Lower	Moderate
WELL #5	Moderate	Moderate	Moderate
WELL #2	Moderate	Lower	Moderate
WELL #1	Moderate	Lower	Moderate
CAPE FEAR RIVER	Higher	Lower	Moderate
WELL #16	Moderate	Lower	Moderate
WELL #3	Higher	Lower	Moderate

The Wellhead Protection Committee

The following people have been designated or volunteered to serve as Brunswick County's Wellhead Protection Committee (WPC):

Name	Position
Jeremy Sexton	Water Resources Superintendent
Jerry Pierce	Public Works Director
Wilbur Williams	Chief Operator

Ms. Debbie Maner, with the North Carolina Rural Water Association, provided technical assistance in the voluntary Wellhead Protection Planning process. The positions responsible for implementing the plan are the Brunswick County Commissioners. They have accepted the recommendations made in the program by the WPC and they have granted the Brunswick County Water Treatment Plant Superintendent authority to implement the plan and to approve any revisions necessary to obtain approval from the NC Public Water Supply Section (PWSS). Brunswick County will begin implementation of the plan immediately following its approval by the PWSS of the North Carolina Department of Environment and Natural Resources (NCDENR) and will complete implementation within ninety (90) days.

Upon completion of the implementation phase of the WHP Plan, the individual responsible for implementation will submit notification to the Public Water Supply Section in accordance with the schedule set forth in the approved WHP Plan.

Delineation of the Wellhead Protection Area

The Aquifer Source Volume (ASV) Method

In North Carolina, the WHPA for wells withdrawing water from certain confined aquifers encompasses the area surrounding the well for which the time of travel from the outer edge of the area to the well is 10 years. A 10-year period was selected to provide time to assess the potential impact of any ground-water contamination discovered within the WHPA and for developing appropriate remediation and ground-water protection strategies for the water supply. A WHPA based on a longer time of travel may provide a greater degree of protection to the well and allow more advance warning to respond to a contamination incident within the WHPA, but it will also expand the area to manage under the WHP Plan.

WHPAs based on a 10 year time of travel from their outer edge to the pumping well can be estimated by using the ground-water velocity or by estimating the volume of the aquifer required to supply 10 years of withdrawals (i.e., the ASV method). Due to the lack of site-specific information necessary to calculate the ground-water velocity, Brunswick County has chosen the ASV method to delineate the WHPA for its water supply wells.

The volume of the aquifer that supplies withdrawals for a specified period of time can be estimated with the following equation:

$$V_P = Q\left(\frac{gal}{\min}\right) \times t_d\left(\frac{\min}{day}\right) \times \left(\frac{ft^3}{7.48\ gal}\right) \times \left(\frac{365.25\ days}{year}\right) \times \frac{P\ (years)}{n}$$

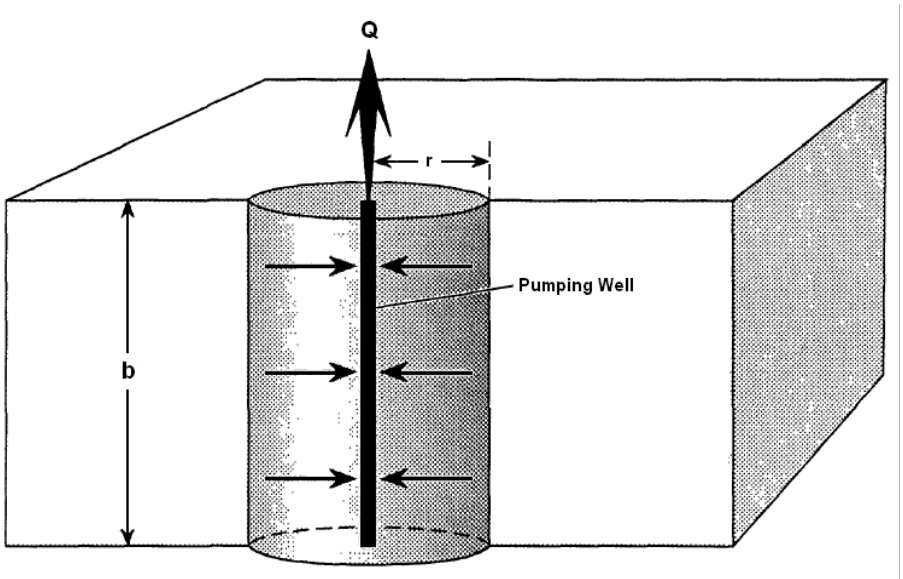
Where: V_P = the volume of aquifer in ft^3 that supplies withdrawals for period P,
Q = the well yield in gallons per minute,
t_d = the daily pumping period in minutes per day,
P = the period of withdrawals in years, and
N = the estimated porosity, dimensionless.

The well yield is the maximum sustained pumping rate possible for the well (not the daily pumping rate) as determined from a 24-hour drawdown test pursuant to North Carolina Administrative Code 15A NCAC 18C.0402(g). If well yield information is unavailable, the maximum capacity of the pump installed on the well may be substituted. The daily pumping period t_p is the number of minutes per day that the well is pumped and should equal 720 (the number of minutes in 12 hours). This value is used because State regulations require that the yield of a public water supply well provide the average daily demand in 12 hours. If the actual pumping period exceeds 12 hours, then the actual pumping period in minutes per day should be used. Using a daily pumping period t_p of 720 minutes per day, a period of withdrawal P of 10 years and an estimated porosity of 0.2, the above equation, rounded, reduces to:

$V_{10} = 1{,}800{,}000 \times Q$

Where: V_{10} = the volume of aquifer in ft^3 that supplies 10 years of withdrawals.

For ease (convenience) in applying the ASV method, it is assumed that the volume is contained in a cylinder centered on the well.



Before the radius of the cylinder, and therefore the WHPA, can be determined, it is first necessary to determine or to estimate the thickness (b) of the aquifer (or the thickness of the part of the aquifer) that supplies water to the well. Because information on well yield and aquifer thickness was available from well construction records for each well judged to be withdrawing water from the Castle Hayne aquifer, Brunswick County calculated the WHPA radii for the Castle Hayne wells by substituting the aquifer thickness, along with the calculated volume (V_{10}) into the following equation for each of these wells:

$$r = \sqrt{\frac{V_{10}}{\pi b}}$$

Where:

r = the radius in feet,
V_{10} = the volume of the aquifer, in ft^3, that supplies 10 years of withdrawals,
π = 3.1416, and
b = the aquifer thickness or the length of screened or open-hole section, in feet.

In the process of acquiring information for Brunswick County's delineations, there were Well Construction Records that either could not be found or that did not have all of the information required to complete their delineations. For Wells 11, 12, 17 and 18, the screened intervals were not known, so North Carolina's Wellhead Protection Guidelines recommend using a chart that estimates the aquifer thickness based on the pumping rates of the wells. The chart is below. The table on the following page shows the radii results using the Aquifer Source Volume Method.

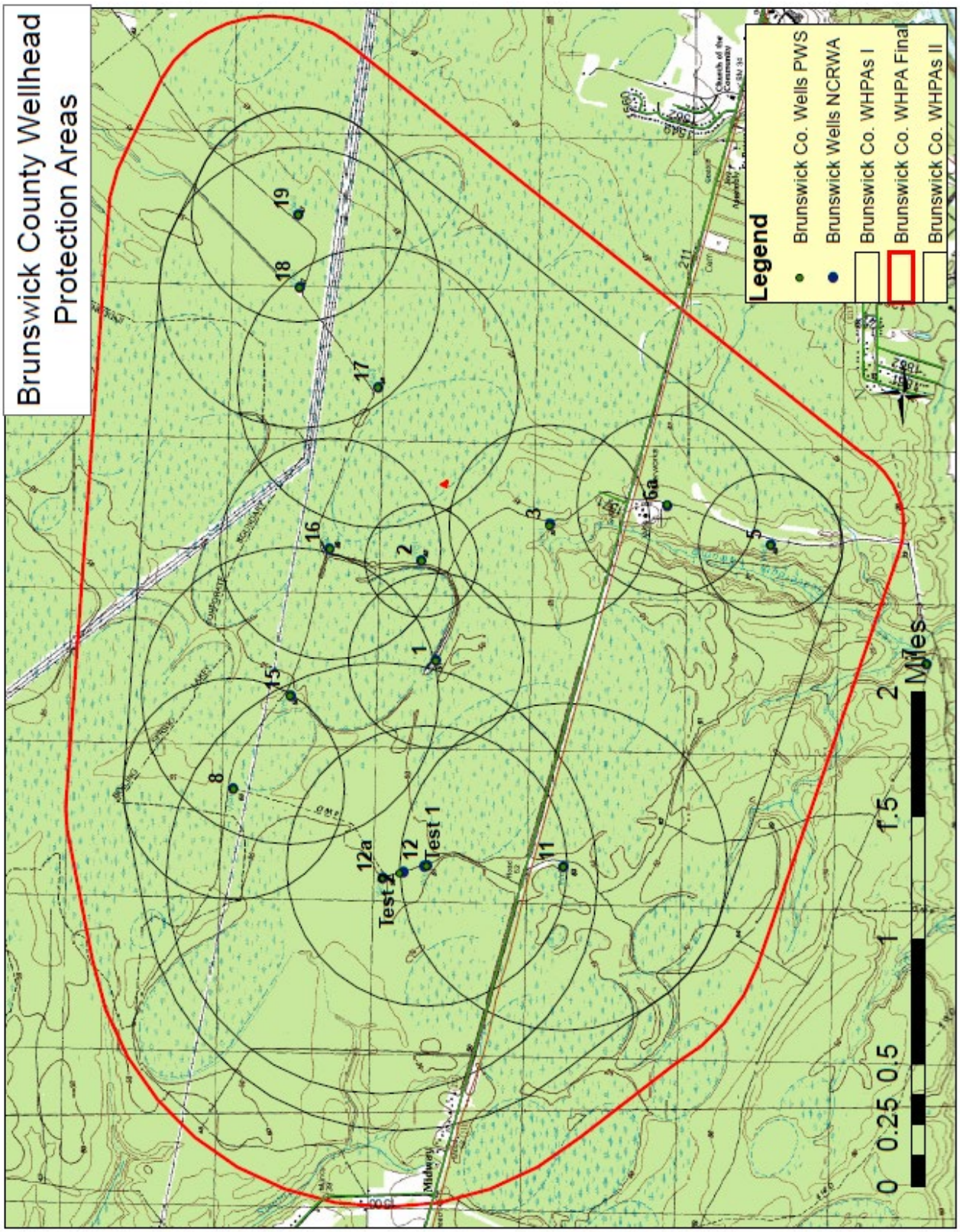
When the calculated radius was drawn around each of the fourteen wells, it resulted in Wellhead Protection Areas with significant overlap, so the outer circles edges were used to draw a large delineation around the whole wellfield. Then, the total area that was calculated for all of the wells was used to delineate an even larger area around all of the wells to compensate for the overlap. Because wells 12 and 12A were so close to each other their WHPA areas were combined into one very large circular area. The map on page 16 shows what the delineations look like. The map also shows two test wells that had been drilled, both of which have been abandoned properly according to State Regulations.

Recommended radii of WHPAs for wells withdrawing from semi-confined and highly confined aquifers.

Well Yield Q[1] (gpm)	**Maximum Permitted Withdrawal (Q_{mpw}[2]) gallons**	**Aquifer Thickness[3] (ft.)**	**Radius of WHPA (ft.) Rounded**
50	36,000	25	1,000
100	72,000	50	1,000
200	144,000	50	1,500
500	360,000	75	2,000
1000	720,000	75	3,000
2000	1,440,000	100	3,500

1 Maximum sustained well yield or maximum capacity of the pump, in gallons per minute. Read as "up to" the indicated value; e.g., for a well yield of 150 gpm, use line representing 200 gpm.
2 Maximum Permitted Withdrawal (Qmpw) based on 12 hours per day of pump operation.
3 Aquifer thickness is a value assumed on the basis of the pumping rate.

Brunswick County WHPA Calculations											
Well #	Q (gpm)	t(min/d)	P(yrs)	porosity (n)	V (ft3)	b (screen length)	WHPA radius (ft)	WHPA (sq. ft.)	WHPA (sq. mi.)	Chart	WHPA (sq. ft.)
1	250	1440	10	0.2	878943850.3	80	1870.0819	10986798	0.39		10986798.13
2	130	1440	10	0.2	457050802.1	100	1206.1666	4570508	0.16		4570508.021
3	350	1440	10	0.2	1230521390	85	2146.6448	14476722	0.52		14476722.24
5	169	1440	10	0.2	594166042.8	80	1537.5668	7427076	0.27		7427075.535
6A	300	1440	10	0.2	1054732620	90	1931.4123	11719251	0.42		11719251.34
8	450	1440	10	0.2	1582098930	90	2365.4873	17578877	0.63		17578877.01
11	708	1440	10	0.2	2489168984					3500	38484510.01
12	431	1440	10	0.2	1515299198					3000	28274333.88
12A	950	1440	10	0.2	3339986631	50	4611.1837	66799733	2.40		66799732.62
15	450	1440	10	0.2	1582098930	50	3173.6343	31641979	1.13		31641978.61
16	450	1440	10	0.2	1582098930	90	2365.4873	17578877	0.63		17578877.01
17	350	1440	10	0.2	1230521390					3000	28274333.88
18	350	1440	10	0.2	1230521390					3000	28274333.88
19	375	1440	10	0.2	1318415775	80	2290.3733	16480197	0.59		16480197.19
											322567529.3
12								28274334			
12a								66799733			
							5501.1831	95074067			


Brunswick County Wellhead Protection Areas
Legend
Brunswick Co. Wells PWS
Brunswick Wells NCRWA
Brunswick Co. WHPAs I
Brunswick Co. WHPA Final
Brunswick Co. WHPAs II
0 0.25 0.5 1 1.5 2 Miles
19
18
17
16
15
8
12a
12
Test 2
Test 1
11
1
2
3
6a
5

Potential Contaminant Source Inventory

The inventory process begins by looking at the Source Water Assessment Program Report for Brunswick County. Information from sixteen State and Federal Databases is combined into that Report, and the information is used as a starting point to research files at the various agencies. All relevant information is in the PCS table and in the summaries that follow.

Windshield Survey – A windshield survey of the entire WHPA identifies each additional potential contamination source (PCS) facility or activity that might exist within the WHPA. Onsite visits are made and additional information is obtained regarding quantity and types of contaminants kept on site. The Potential Contaminant Source list shows the sources identified during the inventory along with quantities and types of contaminants found at each site.

Septic Tanks

Brunswick County is served by a sanitary sewer system and all residents and businesses within the WHPA are connected to the wastewater system.

Abandoned Wells

Brunswick County understands that any unused wells present a possible conduit for contamination to their aquifer and is working to have them properly abandoned in accordance with standard #15A NCAC 2C .0110. Brunswick County is also looking at ways to encourage property owners to abandon any well on their property that is no longer being used.

Potential Contaminant Source Attributes
BRUNSWICK COUNTY WATER SYSTEM
PWS ID: 04-10-045, WELL #5

PCS Name	PCS ID	PCS Type	PCS Risk Rating	Street Address	City	Zip	County
Arbor Creek-Phase 8	SW8040122	NPDES Permits	H	Arbor Creek Dr	Southport	28461	Brunswick
St. James Plantation - Paladin Club Phase 3	SW8030818	NPDES Permits	H	Paladin Dr	Southport	28461	Brunswick
Traemoor @Arbor Creek Phase 7	SW8050426	NPDES Permits	H	Arbor Creek Dr	Southport	28461	Brunswick
St James Plantation-Bancroft Forest (Formerly Paladin Phase 4)	SW8051128	NPDES Permits	H	James Dr From NC 211	Bald Head Island	28461	Brunswick

PCS Name	PCS ID	Attribute	Value
Arbor Creek-Phase 8	SW8040122	Permit Type	State Stormwater
Arbor Creek-Phase 8	SW8040122	Permit Issue Date	2004-05-19
Arbor Creek-Phase 8	SW8040122	Permit Expiration Date	(null)
Arbor Creek-Phase 8	SW8040122	Receiving Stream	Beaverdam Creek
St. James Plantation - Paladin Club Phase 3	SW8030818	Permit Type	State Stormwater
St. James Plantation - Paladin Club Phase 3	SW8030818	Permit Issue Date	2005-08-24
St. James Plantation - Paladin Club Phase 3	SW8030818	Permit Expiration Date	(null)
St. James Plantation - Paladin Club Phase 3	SW8030818	Receiving Stream	(null)
Traemoor @Arbor Creek Phase 7	SW8050426	Permit Type	State Stormwater
Traemoor @Arbor Creek Phase 7	SW8050426	Permit Issue Date	2005-04-29
Traemoor @Arbor Creek Phase 7	SW8050426	Permit Expiration Date	2015-04-29
Traemoor @Arbor Creek Phase 7	SW8050426	Receiving Stream	Beaverdam Creek
St James Plantation-Bancroft Forest (Formerly Paladin Phase 4)	SW8051128	Permit Type	State Stormwater
St James Plantation-Bancroft Forest (Formerly Paladin Phase 4)	SW8051128	Permit Issue Date	2006-03-03
St James Plantation-Bancroft Forest (Formerly Paladin Phase 4)	SW8051128	Permit Expiration Date	(null)

PCS Name	PCS ID	Attribute	Value
St James Plantation-Bancroft Forest (Formerly Paladin Phase 4)	SW8051128	Receiving Stream	(null)

There are several Stormwater Permits issued for Arbor Creek and St. James Plantation developments as noted above. Stormwater control policies, strategies, and rules are designed to protect the surface waters of North Carolina from impacts of stormwater pollutants and run-off volumes. Permits are issued for industrial, municipal, and post construction (development projects) stormwater programs

Potential Contaminant Source Attributes
BRUNSWICK COUNTY WATER SYSTEM
PWS ID: 04-10-045, WELL #3

PCS Name	PCS ID	PCS Type	PCS Risk Rating	Street Address	City	Zip	County
SE Brunswick Sanitary District Administration Building	SW8060840	NPDES Permits	H	4240 Committee Dr	Southport	28461	Brunswick
OLD SOUTHPORT LF	NONCD0000156	Old Landfill Sites	H	Unknown	SOUTHPORT	Unknown	BRUNSWICK

PCS Name	PCS ID	Attribute	Value
SE Brunswick Sanitary District Administration Building	SW8060840	Permit Type	State Stormwater
SE Brunswick Sanitary District Administration Building	SW8060840	Permit Issue Date	2006-10-17
SE Brunswick Sanitary District Administration Building	SW8060840	Permit Expiration Date	2016-10-17
SE Brunswick Sanitary District Administration Building	SW8060840	Receiving Stream	Beaverdam Creek
OLD SOUTHPORT LF	NONCD0000156	Number of Sites	23
OLD SOUTHPORT LF	NONCD0000156	Site Size (Acres)	28.5699996948
OLD SOUTHPORT LF	NONCD0000156	Site Opening Date	1972
OLD SOUTHPORT LF	NONCD0000156	Site Closure Date	1984

The SWAP shows that the SE Brunswick Sanitary District Administration Building has a stormwater permit as noted above. The SE Brunswick Sanitary District Wastewater Treatment Plant is located near Southport outside the WHPA. They have four sewer collection stations in the Arbor Creek development. Those pumping stations are inspected daily, are monitored using a Supervisory Control And Data Acquisition (SCADA) system, and have all been rehabilitated in the last year. They are not considered to be a significant threat to Brunswick County's wells, but the Sanitary District Supervisor has been notified that the pumping stations are within Brunswick County's WHPA.

The Old Southport Landfill is located beside the Water Treatment Plant. It is an old municipal landfill that has been closed since 1984. There are no sampling data available near the landfill, but the PWS Section approved the construction of Well 6A near the old landfill site in 2009, and the well is sampled for VOCs and SOCs once every three years. There have not been any positive sample results. Also, the landfill site is in a location where there is a confining layer between it

and the aquifer the nearby wells use. It is in a discharge area, meaning that any contamination that might be near the surface should discharge into surface waters such as Beaverdam Swamp before it would percolate into, and become a threat to groundwater.

Midway Trading Post appears on the SWAP Map as being on Highway 211 in the southern center of the WHPA, but a Google Earth search of its address (3296 Southport Supply Road, SE), and windshield survey evidence puts its location further northeast at the intersection of Midway Road and Highway 211 outside of the WHPA.

Potential Contaminant Sources:

PCS Site	Owner/Contact	Potential Contaminant	Quantity
Shapemasters, Inc.	PO Box 11128 Southport, NC 28461-1128 910-278-1434 General Contractor Permit # 68223	Build Golf Courses Heavy Equipment Storage Fuel Tank	 2,000 Gallon
St James Maintenance, Inc.	3905 St James Drive O 910-253-7650 C 910-443-0047	Residents of St. James Plantation are not allowed to keep campers, business vehicles, etc. parked at their homes. This is a fenced in area where all manner of vehicles are parked. It is also where the maintenance for the development stores its equipment.	Vehicle fluids
Unabandoned Well	4006 St. James Drive Southport, NC 28461 800-245-3871	Well was previously used for St. James Plantation Water Supply. It is no longer being used but has not been abandoned.	Outside WHPA
Brunswick EMC	BEMC Oak Island Office 4335 Southport-Supply Rd. Southport, NC Brunswick Electric Membership Corporation P.O. Box 826, Shallotte, NC 28459 Toll Free 800-842-5871 P 910-754-4391 F 910-755-4299 Martin Register District Operation Supervisor	Electrical Maintenance equipment.	
Arbor Creek	Residential Development	Served by Municipal Sewer System	
Junkyard	Southport Supply Road MJV Holding Company LLC 232 NE 33rd Street Oak Island 28465 James and Mark Warren 910-278-7673	Numerous abandoned vehicles	Auto fluids
Brunswick Family Medicine	Slade Suchecki 3690 Southport Supply Road 910-454-4343	Medical Waste	Small Quantities

PCS Site	Owner/Contact	Potential Contaminant	Quantity
Four Paw Veterinary Hospital	500 Executive Park Blvd 910-457-pets Dr. Audra Rickman	Medical Waste	Small Quantities
Brunswick Co. EMS	Committee Drive	Gasoline Diesel ASTs	2-approximately 2,000 gallon
Ye Olde Gun Club	4140 Committee Drive Southport, NC 28461 910-523-0203	Lead?	
Old Southport Landfill	Highway 211	NONCD0000156	28 acres
Beaverdam Creek Water Treatment Plant	4305 Southport Supply Highway	NPDES Permit 5509 – supernatant from lime sludge treatment process Chemical Storage, Mixing, Handling	
SE Brunswick Sanitary District	4040 Committee Drive WWTP - Sea Pine Drive Thomas Spivey, Mgr. 910-457-1065	WQ0009106 NDP666 Permits for WW pumping stations in Arbor Creek	
Power Lines	Duke Energy P.O. Box 1090 Charlotte, NC 28201-1090 1-800-777-9898	Power lines run through the center of the WHPA, but a conversation with BEMC indicates that the lines are kept clear of vegetation using heavy equipment and not the spraying of herbicides because they are located in areas of wetlands.	

Duke Energy Power Lines

Aerial View of Junkyard on 211


Brunswick County Wellhead Protection Areas
Legend
Brunswick Co. Wells PWS
Brunswick Wells NCRWA
Brunswick Co. WHPA Final
PCSs
0 0.25 0.5 1 1.5 2 Miles
Olde Gun Club
Shapemasters, Inc.
Test 1
Test 2
MIDWAY TRADING POST
SE Brunswick Sanitary District Admin. Office
Brunswick Co. EMS
Old Southport LF
Brunswick Family Medicine
Four Paw Veterinary Hospital
Bell Swamp Creek WTP
St. James Maintenance, Inc.
St. James Plantation-Palladin Club, Phase I
St. James Plantation WWTF
Arbor Creek-Phase 8
SE BRUNSWICK SANITARY DISTRICT
Southeast Brunswick Sanitary District
Unabandoned Well
RIVER RUN CLEANERS
COASTAL CARWASH
1
2
3
5
7
8
11
12
12a
15
16
17
18
19

Risk Assessment

Brunswick County's fourteen wells are located north and south of Highway 211 northeast of the small town of Southport. They are in a very rural area and most can only be accessed via a dirt road where there is very little development and very few potential contamination sources, so some wellhead areas will contain no PCSs. A few of the wells are closer to Highway 211, so there are more PCSs in those areas.

Risk Assessment Method

For each WHPA, the PCSs were ranked according to the threat each poses to the water supply wells. Each PCS was assigned a risk category of higher, moderate, or lower risk base on published information. (see appendix) This risk categorization was used in conjunction with other information in order to complete the final PCS ranking for the WHPA.

For each PCS, the "category" score was multiplied by a "proximity" score to produce a risk score for the PCS. For the given WHPA, a proximity score was assigned to each PCS with the following equation:

proximity score = 1- (distance from the well/radius of the WHPA)

The result is a relative ranking of each PCS within a given WHPA according to the threat it poses to the water supply well. Assessing the relative risk of contamination within each WHPA from the PCSs it contains allowed for a determination of (1) which water supply wells are at greatest risk of contamination, and (2) which PCSs should be considered first with respect to wellhead protection. Once the risk assessment is carried out, priorities can be set to more effectively manage the PCSs. The higher ranked PCSs are shaded in pink.

PCS Site	Risk Category	Radius	Distance Well 1 (ft.)	Proximity Score 1	Well 1	Comment
Ye Olde Gun Club	1	1870	1884	-0.01	0.0	This hunt club facility is just outside Well 1 WHPA.

PCS Site	Risk Category	Radius	Distance Well 2 (ft.)	Proximity Score 2	Well 2	Comment
Ye Olde Gun Club	1	1206	532	0.56	0.6	

PCS Site	Risk Category	Radius	Distance Well 3 (ft.)	Proximity Score 3	Well 3	Comment
Brunswick Co. EMS	2	2147	943	0.56	1.1	
Brunswick Family Medicine	1	2147	1467	0.32	0.3	
Four Paw Veterinary Hospital	1	2147	1716	0.20	0.2	
Old Southport Landfill	3	2147	1566	0.27	0.8	See description of Landfill.
Beaverdam Creek Water Treatment Plant	2	2147	2022	0.06	0.1	
Highway 211	2	2147	1487	0.31	0.6	
SE Brunswick Sanitary District SW	1	2147	663	0.69	0.7	
Highway 211	2	2147	1496	0.33	0.7	
				TOTAL	4.5	

PCS Site	Risk Category	Radius	Distance Well 5 (ft.)	Proximity Score 5	Well 5	Comment
Arbor Creek	1	1538	101	0.93	0.9	
SE Brunswick Sanitary District	3	1538	898	0.42	1.2	
				TOTAL	3.9	

PCS Site	Risk Category	Radius	Distance Well 6A (ft.)	Proximity Score 6A	Well 6A	Comment
Brunswick EMC	3	1931	483	0.75	2.2	
Beaverdam WTP	2	1931	666	0.66	1.3	
Four Paws Veterinary Center	1	1931	994	0.49	0.5	
Junkyard	3	1931	1344	0.30	0.9	
Old Southport Landfill	3	1931	1649	0.15	0.4	
Brunswick Family Medicine	1	1931	1503	0.22	0.2	
Brunswick EMS	2	1931	1752	0.09	0.2	
Highway 211	2	1931	826	0.57	1.1	
				TOTAL	6.8	

PCS Site	Risk Category	Radius	Distance Well 8 (ft.)	Proximity Score 8	Well 8	Comment
Duke Energy Power Lines	1	2365	309	0.87	0.9	
				TOTAL	0.9	

PCS Site	Risk Category	Radius	Distance Well 11 (ft.)	Proximity Score 11	Well 11	Comment
Highway 211	2	3500	309	0.91	1.8	
Shapemaster, Inc.	2	3500	2334	0.33	0.7	
				TOTAL	2.5	

PCS Site	Risk Category	Radius	Distance Well 12 (ft.)	Proximity Score 12	Well 12	Comment
Highway 211	2	3000	2032	0.32	0.6	
Shapemaster, Inc.	2	3000	640	0.79	1.6	
				TOTAL	2.2	

PCS Site	Risk Category	Radius	Distance Well 12A (ft.)	Proximity Score 12A	Well 12A	Comment
Highway 211	2	4611	2032	0.56	1.1	
Shapemaster, Inc.	2	4611	2899	0.37	0.7	
				TOTAL	1.9	

PCS Site	Risk Category	Radius	Distance Well 15 (ft.)	Proximity Score 15	Well 15	Comment
Duke Energy Power Lines	1	3174	568	0.82	0.8	
				TOTAL	0.8	

PCS Site	Risk Category	Radius	Distance Well 16 (ft.)	Proximity Score 16	Well 16	Comment
Duke Energy Power Lines	1	2365	709	0.70	0.7	
				TOTAL	0.7	

PCS Site	Risk Category	Radius	Distance Well 17 (ft.)	Proximity Score 17	Well 17	Comment
Duke Energy Power Lines	1	3000	1155	0.62	0.6	
				TOTAL	0.6	

PCS Site	Risk Category	Radius	Distance Well 18 (ft.)	Proximity Score 18	Well 18	Comment
Duke Energy Power Lines	1	3000	602	0.80	0.8	
				TOTAL	0.8	

PCS Site	Risk Category	Radius	Distance Well 19 (ft.)	Proximity Score 19	Well 19	Comment
Duke Energy Power Lines	1	2290	801	0.65	0.7	
				TOTAL	0.7	

Risk Assessment Summary

Taking into consideration the nature and number of PCSs and the location of each PCS in relation to the well's location in the WHPA, a ranking of the vulnerability of the water supply wells is as follows with number 1 being the highest risk:

1. Well #6A
2. Well #3
3. Well #5
4. Well #11
5. Well #12
6. Well #12A
7. Well #8
8. Well #15
9. Well #18
10. Well #16
11. Well #19
12. Well #17
13. Well #2
14. Well #1

Management of the Wellhead Protection Area

There are two methods of managing a Wellhead Protection Area. They are regulatory and non-regulatory. Brunswick County has chosen the non-regulatory management method.

A Wellhead Protection Brochure (tri-fold) or newsletter will be delivered to each resident, business, agricultural operation and industry within the Wellhead Protection Area. Copies of this brochure or letter will be made available at the Brunswick County Water Department and other locations deemed necessary for public education on Wellhead Protection. In general, the brochure or letter will convey to each citizen/business the following information:

1- An explanation of what groundwater is and the number of wells in their particular system

2- An explanation of what a Wellhead Protection Program is
3- Sources of groundwater pollution
4- Phone numbers to contact for more information
5- Tips on protecting their water supply such as:
   - Proper disposal of household hazardous wastes and oils (i.e., not disposed of through septic systems, pouring on ground, or through regular garbage collection)
   - Proper use and storage of fertilizers and pesticides
   - Proper maintenance of home heating oil tanks and septic systems

Brunswick County will provide information to each business, industry, and farm located within the WHPAs on waste handling practices, best management practices, standard operating procedures, and waste oil disposal methods which could be employed to reduce the potential for ground water contamination. Brunswick County will also provide information regarding the North Carolina Division of Environmental Assistance and Outreach (DEAO) to each business, industry, and farm located within the WHPA. Owners/operators of potential contamination sources will be encouraged to contact the DEAO. The DEAO provides free technical and other non-regulatory assistance to reduce the amount of waste released into the air and water and on the land. The DEAO serves as a central repository for waste reduction and pollution prevention information. The DEAO emphasizes waste reduction through pollution prevention, encourages companies and government agencies to go beyond compliance, and provides information about the environmental permitting process. This information is provided at no charge to North Carolina businesses, industries, government agencies, and the general public upon request. For additional information, the DEAO may be contacted at 1-877-623-6748 or to report an environmental emergency, call 1-800-858-0368. Their website is http://portal.ncdenr.org/web/deao/.

Personnel in Brunswick County will be educated on Wellhead Protection and steps they can take to reduce the potential for contamination (e.g., information about best management practices, standard operating procedures, waste handling practices, etc.). Brunswick County will also contact the North Carolina Division of Environmental Assistance and Outreach (DEAO) to investigate steps that the County can take to reduce the amount of waste released into the air and water and on the land at County owned and/or managed facilities.

Owners of improperly constructed/abandoned wells within the WHPAs will be provided information regarding the threat posed to the water supply by these wells. Owners of improperly constructed/abandoned wells will be encouraged to have these wells properly abandoned in accordance with NC's well construction standards found at 15A NCAC 2C.0100, "Criteria and Standards Applicable to Water Supply and Certain Other Wells". If information exists that a well

is improperly constructed or is contributing to the contamination of groundwater, Brunswick County will notify the Aquifer Protection Section, Division of Water Quality.

All owners/operators of regulated underground storage tanks (USTs) and other facilities subject to federal and/or state regulations located within the WHPA will be requested to supply documentation that their facility is in compliance with said regulations. Operators of UST's will be asked to supply the town with a copy of their UST permit. If any UST sites are found to be non-compliant, the Underground Storage Tank Section of the State Division of Waste Management will be notified. There are no such facilities within the WHPA at this time.

If an abandoned UST site is found, Brunswick County will contact the North Carolina Division of Waste Management, UST Section, to determine if a closure report was submitted demonstrating that no soil or groundwater contamination was identified during the removal of UST's. If a closure report was not submitted, Brunswick County will notify the UST Section of the location of the facility within the WHPA and its proximity to a public water supply well.

For soil or ground-water contamination incidents occurring within the WHPA, Brunswick County will contact the State agencies with oversight responsibilities for remediation to determine if remediation efforts are proceeding in a timely fashion and in accordance with any schedules established by these agencies. Through this process, the County will bring to the attention of the State agencies with oversight responsibilities for remediation any failures by the responsible parties to comply with required monitoring and corrective action. Brunswick County will also notify the State agencies with oversight responsibilities for remediation of the location of the facility within the WHPA and its proximity to a public water supply well. There are no such facilities within the WHPA at this time.

Household Hazardous Waste Collection in Brunswick County - notification for a fall event. There is also an event held every spring.

The Brunswick County Solid Waste Department will be at South Brunswick Middle School from 9 am to 2 pm to collect household hazardous waste. Items will be taken free of charge from Brunswick County Residents. Must show proof of Brunswick County residency.

Some items that are accepted at the HHW collection are various paints, stains, insecticides, herbicides, household cleaners, automotive fluids, pool chemicals, batteries, fluorescent bulbs, CFL's, and aerosol cans. For items not mentioned please contact the Brunswick County Solid Waste Department at 910-253-2524. All items brought to the event must be labeled. The staff onsite reserves the right to refuse any item brought to the event.

Electronics are not included in the HHW collection. They are recycled year round at the Brunswick County Landfill. There is no charge for this service.

The fall HHW event is sponsored by Brunswick County Solid Waste/Recycling department and the North Carolina Department of Agriculture and Consumer Services and NCCES.

All farms, residents, businesses, and industries in the WHPAs with septic tanks and home heating oil tanks will be distributed a copy of the Wellhead Protection Brochure and any other information Brunswick County can obtain from County and/or State agencies on proper septic tank and heating oil tank maintenance.

Any automotive repair shops in the Wellhead protection area currently, and any new businesses that move into the Wellhead Protection Area that produce auto wastes (oils, acids, anti-freeze, etc.)

will be provided information on waste handling practices, best management practices, standard operating procedures, and waste oil disposal methods which could be employed to reduce the potential for ground water contamination. They will also be provided with information regarding the North Carolina Division of Environmental Assistance and Outreach (DEAO) Owners/operators of these facilities will be encouraged to contact the DEAO. There are no such facilities within the WHPA at this time.

Brunswick County will contact all facilities or agricultural operations within the WHPAs with pesticide storage or otherwise involved with the application of pesticides to ensure that they are pesticide operators licensed by the State of North Carolina and that proper records are maintained to ensure that all NC Pesticide Laws are adhered to. Brunswick County will provide information to these facilities or agricultural operations on waste handling practices, best management practices, standard operating procedures, and proper waste disposal methods which could be employed to reduce the potential for ground water contamination. These facilities will also be provided with information regarding the North Carolina Division of Environmental Assistance and Outreach (DEAO). There are no such facilities within the WHPA at this time.

Brunswick County will notify any individual, industry, business, or government agency installing or planning to install a regulated underground storage tank within the wellhead protection area of the following regulation:
North Carolina Underground Storage Tank (UST) Regulation 15A NCAC 2N .0301 stipulates specific siting and secondary containment requirements for UST systems installed after January 1, 1991. The rule is summarized as follows:
(1) No UST system may be installed within 100 feet of a public water supply well or within 50 feet of any other well used for human consumption.
(2) Secondary containment is required for UST systems within 500 feet of a well serving a public water supply or within 100 feet of any other well used for human consumption.
Violations of this regulation will be reported to the Division of Waste Management, Underground Storage Tank Section. The UST Section will also be notified of the location of the facility within the WHPA and its proximity to a public water supply well or any other well used for human consumption.

A regulated UST system is any underground storage tank and associated piping that contains petroleum (including gasoline, diesel and used oil) or a hazardous substance as defined by the State rules (15A NCAC 2N). Tanks containing heating oil for use on the premises where stored are not regulated.

Facilities with an underground buried storage capacity of more than 42,000 gallons of oil, or an aggregate above ground storage capacity greater than 1320 gallons of oil, or an above ground storage capacity of a single container in excess of 660 gallons are subject to the Oil Pollution Prevention regulations contained in Federal Regulations found at 40 CFR 112. These facilities must prepare and implement a Spill Prevention Control and Countermeasures (SPCC) Plan. The Association should verify the status of the SPCC Plan for each subject facility located within the WHPA. The North Carolina General Statutes require registration of any facilities storing more than 21,000 gallons of petroleum product. Subject facilities not in compliance with these regulations should be notified of their regulatory responsibility under this regulation. The Association should also notify the Division of Water Quality, Aquifer Protection Section if such facilities do not promptly come into compliance.

Brunswick County will contact the Division of Water Quality regarding facilities permitted to discharge wastewater to the land surface (Non-NPDES Permitted Facilities) to determine if any

such operations located within the WHPA are in compliance with applicable regulatory and permit requirements pertaining to environmental protection such as routine monitoring and reporting requirements. Notification will be made to the Division of Water Quality if it is determined that the facility has failed to maintain compliance with any regulatory and/or permit requirements pertaining to environmental protection such as routine monitoring and reporting requirements.

Brunswick County will contact the Division of Water Quality regarding facilities with NPDES permits to determine if all such NPDES discharges are in compliance with applicable regulatory and permit requirements pertaining to environmental protection such as routine monitoring and reporting requirements. Notification will be made to the Division of Water Quality if it is determined that the facility has failed to maintain compliance with any regulatory and/or permit requirements pertaining to environmental protection such as routine monitoring and reporting requirements. Brunswick County Water Department will maintain compliance with conditions in the NPDES permits to discharge supernatant from lime sludge produced during the treatment process.

Brunswick County will contact the Division of Water Quality (DWQ) regarding any lagoon or hog farm located within its WHPAs. The Association will inform the DWQ of the lagoon or hog farm's location within a WHPA and its proximity to a public water supply well. It will also determine if the facility is in compliance with any regulatory and permit requirements pertaining to environmental protection such as routine monitoring and reporting requirements. Notification will be made to the Division of Water Quality if it is determined that the facility has failed to maintain compliance with any regulatory and/or permit requirements pertaining to environmental protection such as routine monitoring and reporting requirements. There are no such facilities within the WHPA at this time.

Brunswick County will contact all facilities within the WHPAs with pesticide storage or otherwise involved with the application of pesticides to ensure that they are pesticide operators licensed by the State of North Carolina and that proper records are maintained to ensure that all NC Pesticide Laws are adhered to. Brunswick County will provide information to these facilities on waste handling practices, best management practices, standard operating procedures, and proper waste disposal methods, which could be employed to reduce the potential for ground water contamination. These facilities will also be provided with information regarding the North Carolina Division of Environmental Assistance and Outreach (DEAO). There are no such facilities within the WHPA at this time.

Emergency Contingency Plan

The primary person responsible for implementing the emergency contingency plan is the Water Resources Superintendant. The secondary (back-up) person responsible for implementation is the Chief Operator.

Should a major oil or chemical spill occur within the Wellhead Protection Area, appropriate emergency agencies will be notified. The first of these would include the Brunswick County Fire Department and the Brunswick County Emergency Coordinator.

Fire Department
911
Brunswick County Emergency Services
Mailing Address: PO Box 249, Bolivia, NC 28422
Physical Address: 3325 Old Ocean Hwy.,Building C, Bolivia, NC 28422
Phone Number: **(910) 253-5383** Fax Number: (910) 253-4451

If power is lost to the wells, there is one large generator and two mobile generators that can provide power to pump the wells until power is restored.

If evidence exists that indicates that a well is contaminated, it will immediately be taken off line and not returned to service until it is determined that water quality from the impacted well is in compliance with standards governing public water supplies.

If one of Brunswick County's wells were to become contaminated, it would be isolated from the rest of the system by shutting -off valves. If it were determined that contaminants had entered the distribution system, residents would be notified by radio, TV, newspaper, door-hangers, etc. not to drink the water until further notice.

The regional office of the Public Water Supply Section would be notified immediately of the situation and asked for assistance. Sampling (i.e. bacteriological, VOC's, SOC's, etc.) would begin to determine the contaminant involved and the extent of contamination. A systematic flushing of the distribution system would begin with follow-up sampling conducted as needed until the system was determined to be free of contamination and in compliance with standards governing public water supplies.

After consultation with the Public Water Supply Section, residents would be notified that the town's water was once again safe for consumption.

Short term contingency plan – Brunswick County has the capacity to store 5.25 million gallons of water in its system. It uses an average of 2.86 MGD so if an emergency occurred with its wells they would have less than two day's worth of water, if its tanks were filled to capacity.

Long term contingency plan – There are two interconnections with the Northwest Water Treatment Plant, one on Rt. 133 and one on Rt. 211, and water can be received from that system in the case of a long term emergency.

Emergency Contact Numbers and Additional Resources:

Name	Resource
Primary person responsible for implementing emergency contingency plan Jeremy Sexton – Water Resources Superintendent Work 910-454-0512 Cell 910-477-0918	Emergency Response
Secondary person Wilber Williams – Chief Operator Cell 910-612-0913	Emergency Response
Local Resources: Brunswick County Health Department 910-253-2250 888-428-4429 **Brunswick Community Hospital** 1 Medical Center DR PO Box 139 Supply, NC 28462 910-755-8121 **J Arthur Dosher Memorial Hospital** 924 Howe St. Southport , NC 28461 910-457-3800 **Southport Police Department** 911 **Brunswick County Offices** PO Box 249 Bolivia, NC 28422 **Location:** David R. Sandifer County Administration Building 30 Government Center Drive, Bolivia **Phone:** 910-253-2000 **E-mail:** admin@brunsco.net **Brunswick County Sheriff** 911	Emergency Response
Local Newspaper **Mailing Address:** The Brunswick Beacon PO Box 2558 Shallotte NC 28459 **Physical and Shipping Address:** The Brunswick Beacon 208 Smith Ave Shallotte NC 28470	Public Notification

Main Phone: 910-754-6890 **Fax:** 910-754-5407	
Public Water Supply Section 1634 Mail Service Center Raleigh, NC 27699-1634 919-715-2853	Technical Assistance Regulatory guidance
NC Department of Environment & Natural Resources, Wilmington Regional Office 127 Cardinal Drive Extension Wilmington, NC 28405 910-796-7215	Regional Water Quality Section, Public Water Supply Section, UST Section, Groundwater Section, Hazardous Waste Section Spills, Regulatory information and technical assistance
Department of Transportation State Traffic Engineer Mr. Ken Ivey 1561 Mail Service Center Raleigh, North Carolina 27699-1561 Local Office –	WHPA Signs, emergency spill notification
National Guard Armory 5050 Main Street Shallotte, NC 28470 910-754-6821	Emergencies, as available: Generators, 400-gallon water trailers, bottled water, transportation
NC Rural Water Association Post Office Box 590 Welcome, NC 27374 336-731-6963	Technical assistance Education
North Carolina Cooperative Extension Service Campus Box 7602 North Carolina State University Raleigh, NC 27695-7602 919-515-2811 www..bae.ncsu.edu	Educational brochures, publications
US EPA Regional Office AST/SPCC Program Region IV 61 Forsyth Street Atlanta, GA 30365-3415 404-562-8761 www.epa.gov/oilspill	Above ground storage tank information
US EPA Regional Office GW & UIC Section Region IV Atlanta Federal Center 61 Forsythe St. Atlanta, GA 30303-8960 www.epa.gov	Educational brochures, publications
North Carolina Division of Environmental Assistance and Outreach (DEAO) 1639 Mail Service Center	Technical and non-regulatory assistance to reduce waste

Raleigh, NC 27699-1639 1-877-623-6748 or to report an environmental emergency, call 1-800-858-0368 http://portal.ncdenr.org/web/deao/.	
National Small Flows Clearinghouse West Virginia University Post Office Box 6064 Morganton, WV 26506-6064 800-624-8301 www.nesc.wvu.edu/nsfc/nsfc_index.htm	Pamphlets, brochures, training aids

Public Participation

Brunswick County posted a notice in its local newspaper explaining to its citizens what a Wellhead Protection Plan is and how they have the opportunity to review Brunswick County's WHPP and make comments (example below). Substantive comments received from the public will be incorporated into the final version of Brunswick County's WHPP. A copy of the public notification showing the date the notification was published is included with this document. A link to a copy of the completed Plan will be placed on Brunswick County's website (http://www.brunsco.net/) for further public review and comment.

Public Notification Example

Brunswick County, with assistance from the North Carolina Rural Water Association, is in the process of developing a Wellhead Protection Plan. This is a voluntary program intended to assist in protecting the County's water supply from contamination, and to identify vulnerable areas around their wells called "Wellhead Protection Areas." Another goal of this plan is to make residents and businesses aware that chemicals and other pollutants spilled or dumped in the vicinity of the "Wellhead Protection Areas" can be drawn into the wells, possibly contaminating the County's drinking water supply.

A draft copy of the Wellhead Protection Plan is available for review and comment at the_____. The public is invited to review the plan, and submit any comments or suggestions to Brunswick County. All written comments will be reviewed by the Wellhead Protection Committee, and any suggestions or comments that may be beneficial will be incorporated into the plan.

If you have any questions or comments, please contact Brunswick County Water Resources Superintendent, Jeremy Sexton at 910-454-0512.

Underlined portion is required. Time period and other wording is optional.

A copy of this notice will be forwarded to the PWS.

New Public Water Supply Wells

Brunswick County will amend its Wellhead Protection Plan to include any new well(s) added to its water system. The following steps will be taken to address any new wells added to the water system.

1. Develop a preliminary WHPA for the proposed well in order to determine the area of vulnerability.
2. Develop a contaminant source inventory for the preliminary WHPA.
3. Submit the information obtained in items 1 and 2 above to the WPC committee identified in Section 1. Any information required by the Public Water Supply Section (PWSS) relating to the development and construction of new public water supply (PWS) wells must also be submitted.
4. If the WPC committee grants provisional approval of the proposed WHP Plan and the PWSS grants approval to construct or expand the PWS well or well system, then work may proceed with well construction.
5. Finalize the WHPA delineation for the new well.
6. Finalize the contaminant source inventory for the WHPA.
7. Submit finalized WHPA and contaminant source inventory to the WPC committee.
8. Once approval is received, implement any necessary regulatory and or non-regulatory potential source management practices.
9. Submit the amended WHP Plan and all necessary supporting information to the PWSS for review and approval.

Future Wellhead Protection

Brunswick County is aware that an effective local Wellhead Protection (WHP) Program is an ongoing process requiring monitoring of the Wellhead Protection Area (WHPA) and periodic review and updating of an approved WHP Plan. Therefore, Brunswick County's WHP Committee will monitor the WHPA for any new or previously unidentified potential contaminant sources (PCSs) and activities occurring within the approved WHPA. Brunswick County will amend the PCS inventory and other Plan components (e.g. the management strategies, emergency contingency plan, etc.) as necessary to incorporate any new threats to the County's ground-water source of drinking water. Additionally, the PCS inventory will be updated annually using the same procedures used to develop the original PCS inventory. Brunswick County will also fully update the WHP Plan every five years or at any time a new well is constructed for use with the County's water supply system or a major land use change occur within a WHPA. The individual responsible for implementation of the WHP Plan will submit notification to the Public Water Supply Section annually upon completion of the PCS inventory update or immediately following the completion of a major revision. Any amended or revised sections of the approved WHP Plan resulting from an update or revision will also be submitted upon completion.

References

Heath, Ralph C., Johnson, M. Gale. (2003). The North Carolina Wellhead Protection Program Guide. North Carolina Public Water Supply Section

NC Department of Environment and Natural Resources, Division of Waste Management, Inactive Hazardous Waste Sites Section, 1601 Mail Service Center, Raleigh, NC 27699-1601, 217 W. Jones St., Archdale Building 512 N. Salisbury St., Toll Free: (877) 623-6748

Southeast Brunswick Sanitary District, 4240 Committee Drive SE, Southport, NC 28461, 910-457-0006, FAX 910-457-4755

Brunswick County website - http://www.brunswickcountync.gov/

Glossary of acronyms and abbreviations

EPA-Environmental Protection Agency
WiRO-Wilmington Regional Office
DWQ-Division of Water Quality
UST-Underground Storage Tank
AST-Above ground Storage Tank
VOC-Volatile Organic Compound
SOC-Semi-volatile Organic Compound
NCDEH-North Carolina Department of Environmental Health
PWS-Public Water Supply
PWSS-Public Water Supply Section
NCDENR-North Carolina Department of Environment and Natural Resources
WPC-Wellhead Protection Committee
WHPP-Wellhead Protection Program
WHPA-Wellhead Protection Area
GPM-gallons per minute
GPD-gallons per day
PPM-parts per million
Ppb-parts per billion
CAP-Corrective Action Plan
NOV-Notice of Violation
PCS-Potential Contamination Source
DWM-Division of Waste Management
NPDES-National Pollutant Discharge Elimination System
SPCC-Spill Prevention Control and Countermeasures
UIC-Underground Injection Control
DPPEA-Division of Pollution Prevention and Environmental Assistance
SWAP – Source Water Assessment Program
PIRF – Pollution Incident Reporting Form

Appendix

Databases used in the Source Water Assessment Program (SWAP) and Searched during the PCS inventory.

Name: Animal Operations

Description:
This database contains permitted facilities for animal operations consisting of swine, cattle, poultry and horse farms that are required to have Certified Animal Waste Management Plans (CAWMP). Division of Water Quality (DWQ) rules mandated that all facilities in operation prior to January 1, 1994 register with the division. Since January 1, 1994 any new facilities were required to obtain a CAWMP before starting their animal operation. In addition, any facilities in operation prior to January 1, 1994 were required to obtain a CAWMP by December 31, 1997. As of January 1, 1997 all new facilities were required to obtain a permit from DWQ prior to construction and be certified prior to startup, and all existing facilities were to be permitted by DWQ over the next 5 years.

Source of Data:
Data was obtained from the Division of Water Quality, Aquifer Protection Section, Animal Operations Program in June of 2004. For additional information about this data, contact the Animal Operations staff by phone at 919-733-3221 or visit their web site.

Name: CERCLIS Sites

Description:
The Superfund program was created by the Comprehensive Environmental Response, Compensation, and Liability Act, amended by the Superfund Amendments and Reauthorization Act. The acts established authority for the government to respond to the release/threat of release of hazardous wastes, including cleanup and enforcement actions. Long-term cleanups at National Priority List sites last more than a year while short term /emergency cleanups are usually completed in less than a year. CERCLIS is a database used by the U.S. Environmental Protection Agency to track activities conducted under its Superfund program. CERCLIS contains data on potentially hazardous waste sites that have been reported to the EPA. Sites are investigated because of a potential for releasing hazardous substances into the environment are added to the CERCLIS inventory. EPA learns of these sites through notification by the owner, citizen complaints, state and local government identification, and investigations by EPA programs other than Superfund. Specific information is tracked for each individual site.

Source of Data:
Data was obtained from the Environmental Protection Agency, Region 4 office in September of 2004. For additional information about this data, contact the EPA Region 4 Waste Management Division or visit their web site.

Name: NPL Sites

Description:
The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), amended by the Superfund Amendments and Reauthorization Act, created the Superfund program. The acts established authority for the government to respond to the release/threat of release of hazardous wastes, including cleanup and enforcement actions. Long-term cleanups at National Priority List (NPL) sites last more than a year while short term /emergency cleanups are usually completed in less than a year. Sites are listed on the NPL upon completion of a Hazard Ranking System (HRS) screening, public solicitation of

comments about the proposed site, and after all comments have been addressed. Section 105(a)(8)(B) of, CERCLA as amended, requires that the statutory criteria provided by the HRS be used to prepare a list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States. This list, which is Appendix B of the National Contingency Plan, is the NPL.
The identification of a site for the NPL is intended to guide EPA in determining which sites warrant further investigation to assess the nature and extent of the human health and environmental risks associated with a site, identifying what CERCLA-financed remedial actions may be appropriate, notifying the public of sites EPA believes warrant further investigation; and serving notice to potentially responsible parties that EPA may initiate CERCLA-financed remedial action. Inclusion of a site on the NPL does not in itself reflect a judgment of the activities of its owner or operator, it does not require those persons to undertake any action, nor does it assign liability to any person. The NPL serves primarily informational purposes, identifying for the States and the public those sites or other releases that appear to warrant remedial actions.

Source of Data:
Data was obtained from the Environmental Protection Agency, Region 4 office in September of 2004. For additional information about this data, contact the EPA Region 4 Waste Management Division or visit their web site.

Name: Non-Discharge Permits

Description:
The non-discharge database identifies industrial and municipal facilities that are permitted to operate any sewer system, treatment works, disposal system, petroleum contaminated soil treatment system, animal waste management system, storm water management system or residual disposal/utilization system which does not discharge to surface waters of the state, including systems which discharge waste onto or below land surface.

Source of Data:
Data was obtained from the Division of Water Quality, Aquifer Protection Section in July of 2004. For additional information about this data, contact the Division of Water Quality staff by phone at 919-733-3221 or visit their web site.

Name: NPDES Permits

Description:
The National Pollutant Discharge Elimination System (NPDES) database identifies facilities permitted for the operation of point source discharges to surface waters in accordance with the requirements of Section 402 of the Federal Water Pollution Control Act. Point sources are discrete conveyances such as pipes or man-made ditches. Industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. The NPDES permit program controls water pollution by regulating point sources that discharge pollutants into public waters.

Source of Data:
Data was obtained from the Division of Water Quality, Surface Water Protection Section in July of 2004. For additional information about this data, contact the Division of Water Quality staff by phone at 919-733-7015 or visit their web site.

Name: Old Landfill Sites

Description:
This database contains sites that are old municipal landfillls or dump sites which were not permitted since they pre-existed the effective date of the solid waste permitting rules. These sites are not currently in operation.

Source of Data:
Data was obtained from the Division of Waste Management, Superfund Section Inactive Hazardous Sites Branch (IHSB) in July of 2004. For additional information about this data, contact the Division of Waste Management staff by phone at 919-733-4996. Since 2000 the IHSB has conducted a geographic inventory of the old landfills in 38 eastern counties. Although they are working to inventory the old landfill sites statewide, the geographic locations of these sites in the remaining counties are much less reliable. You may contact the IHSB for a list of the 38 counties.

Name: PCB Sites

Description:
This database identifies generators, transporters, commercial storers and/or brokers and disposers of Polychlorinated Biphenyls (PCBs). Concern over the toxicity and persistence in the environment of PCBs resulted in the Toxic Substances Control Act that prohibited the manufacture, processing, and distribution in commerce of PCBs. Thus, TSCA legislated true "cradle to grave" (i.e., from manufacture to disposal) management of PCBs in the United States. PCBs are mixtures of synthetic organic chemicals with the same basic chemical structure and similar physical properties ranging from oily liquids to waxy solids. Due to their non-flammability, chemical stability, high boiling point and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications including electrical, heat transfer, and hydraulic equipment, plastics and rubber and many other applications.

Source of Data:
Data was obtained from the Environmental Protection Agency, Office of Pollution Prevention and Toxics in December of 2000. As of September 2004 this data set has not substantially changed. For additional information about this data, contact the PCB staff at 202-566-0500 or visit their web site.

Name: Pollution Incidents

Description:
This database contains information regarding the release of pollutants into the environment that have or are likely to have, impact on the groundwater resources of the State. The initial information regarding these releases is usually obtained from concerned citizens or responsible parties, who report a release to the Department of Environment and Natural Resources. After an incident is reported, regional office staff investigate the reported incident and enter the results of their investigation into a statewide database. This database contains an inventory of reported incidents from a variety of sources, such as leaking storage tanks, tanker spills, animal feedlots, stockpiles and etc. Substances released into the environment include gasoline and other related compounds, chemicals, nitrates, pesticides, and other organic and inorganic contaminants.

Source of Data:
There are two main sources for this data. The Division of Waste Management, Underground Storage Tank Section provided information on the pollution incidents that resulted from a leaking underground

storage tank. The Division of Water Quality, Aquifer Protection Section provided information on all other pollution incidents. In August of 2004 data was obtained from the Underground Storage Tank Section. For additional information about this data, contact the UST section staff by phone at 919-733-9413 or visit their web site. In June of 2004 data was obtained from the Division of Water Quality, Aquifer Protection Section. For Additional information contact the Aquifer Protection Section staff by phone at 919-733-3221.

Name: Hazardous Waste Generators / Transporters

Description:
This database has records for all hazardous waste, generators, and transporters as defined by the Resource Conservation Recovery Act (RCRA). Hazardous waste as defined by RCRA is waste material that exhibits ignitability, corrosivity, reactivity, or toxicity. Hazardous waste comes in many shapes and forms. Chemical, metal, and furniture manufacturing are some examples of processes that create hazardous waste. RCRA tightly regulates all hazardous waste from "cradle to grave" (i.e., from manufacture to disposal).

Source of Data:
Data was obtained from the Environmental Protection Agency, Region 4 office in August of 2004. For additional information about this data, contact the EPA Region 4, Waste Management Division staff by phone at 404-562-8440 or visit the web site.

Name: RCRA TSD Sites

Description:
Treatment/Storage/Disposal or TSD sites are facilities that are engaged in the activities of the treatment, storage, or disposal of hazardous waste. Under the Resource Conservation Recovery Act (RCRA) TSD activity can occur only at facilities that received or stored hazardous waste after November 19, 1980, the effective date of the RCRA regulations.

Source of Data:
Data was obtained from the Environmental Protection Agency, Region 4 office in August of 2004. For additional information about this data, contact EPA Region 4, Waste Management Division staff by phone at 404-562-8440 or visit their web site.

Name: Septage Disposal Sites

Description:
This database contains information on permitted, dedicated sites where septage is land applied. The septage management program assures that septage (a fluid mixture of untreated and partially treated sewage solids, liquids and sludge of human or domestic origin that is removed from a septic tank system) is managed in a responsible, safe and consistent manner across the state.

Source of Data:
Data was obtained from the Division of Waste Management, Solid Waste Section in June of 2004. For additional information about this data, contact the Division of Waste Management staff by phone at 919-733-4996.

Name: Soil Remediation Sites

Description:
This database contains information on permitted, dedicated sites where soil contaminated by leaking petroleum or chemical storage tanks can be taken for bioremediation. Bioremediation is a treatment process that uses naturally occurring microorganisms (yeast, fungi, or bacteria) to break down, or degrade, hazardous substances. These microorganisms break down organic compounds such as petroleum products that are hazardous to humans into harmless products -- mainly carbon dioxide and water.

Source of Data:
Data was obtained from the Division of Waste Management, Underground Storage Tank Section in September of 2004. For additional information about this data, contact the Division of Waste Management staff by phone at 919-733-9413 or visit their web site.

Name: Solid Waste Facilities

Description:
Solid waste includes garbage, construction debris, commercial refuse, sludge from water supply or waste treatment plants, or air pollution control facilities, and other discarded materials. The database contains an inventory of closed, unlined landfills that were primarily operated by municipalities.
How to manage solid waste has been a problem for decades. In the early 1960s, cities and towns across the country practiced open air burning of trash. In response, Congress passed the Solid Waste Disposal Act in 1965 as part of the amendments to the Clean Air Act. This was the first federal law that required environmentally sound methods for disposal of household, municipal, commercial, and industrial waste. But the initial design of the "sanitary" landfill fouled ground water, soil, surface water, and air because of improper disposal methods. Engineers have since designed new liners and leachate treatment systems to prevent environmental degradation.

Source of Data:
Data was obtained from the North Carolina Division of Waste Management, Solid Waste Section in August of 1999. As of August 2004 no changes have been made to this data. For additional information about this data, contact the Division of Waste Management staff by phone at 919-733-4996 or visit their website.

Name: Tier II Sites

Description:
This database contains an inventory of facilities that store types and amounts of hazardous materials and are subject to the reporting requirements of SARA Title III Section 312, Emergency Planning and Community Right to Know Act. Tier II forms require basic facility identification information, employee contact information for both emergencies and non-emergencies, and information about chemicals stored or used at the facility including:

- The chemical name or the common name as indicated on the MSDS;
- An estimate of the maximum amount of the chemical present at any time during the preceding calendar year and the average daily amount;
- A brief description of the manner of storage of the chemical;

- The location of the chemical at the facility; and
- An indication of whether the owner of the facility elects to withhold location information from disclosure to the public.

Source of Data:
Data was obtained from the Division of Emergency Management in July of 2004 that included the Tier II forms submitted to the division describing chemical storage information for the year 2000. As of June 2003 no new data was available. For additional information about this data contact the Division of Emergency Management staff at 919-733-3899.

Name: UIC Permits

Description:
The UIC program permits Class V injection wells that do not inject waste into the subsurface. Examples of permitted Class V facilities include heat pump/air conditioning water wells, remediation wells, tracer wells, and experimental technology wells.

Source of Data:
Data was obtained from the Division of Water Quality, Aquifer Protection Section in July of 2004. For additional information about this data, contact the Division of Water Quality staff by phone at 919-733-3221 or visit their web site.

Name: UST Permits

Description:
An underground storage tank system (UST) is a tank and any underground piping connected to the tank that has at least 10 percent of its combined volume underground. The federal UST regulations apply only to underground tanks and piping storing either petroleum or certain hazardous substances. These facilities are regulated under Subtitle I of RCRA and must be registered with the state and receive an operating permit annually. Until the mid-1980s, most USTs were made of bare steel, which is likely to corrode over time and allow UST contents to leak into the environment. Faulty installation or inadequate operating and maintenance procedures also can cause USTs to release their contents into the environment. The greatest potential hazard from a leaking UST is that the petroleum or other hazardous substance can seep into the soil and contaminate groundwater. A leaking UST can also present other health and environmental risks, including the potential for fire and explosion. The facilities shown in this database have tanks registered with the UST Section.

Source of Data:
Data was obtained from the Division of Waste Management, Underground Storage Tank Section in July of 2004. For additional information about this data, contact the Division of Waste Management staff by phone at 919-733-9413 or visit their web site.

Potential Contamination Sources by Risk Category

Higher Risk Potential Contamination Sources for Ground Water PWS Systems

COMMERCIAL/INDUSTRIAL

° Automobile Body shops
Gas stations
Repair shops

° Chemical /petroleum processing/storage
° *Sewer lines
° Utility right-of-way/pesticide use
° Chemical/petroleum pipelines
° Wood/pulp/paper processing and mills
° Dry cleaners
° Electrical/electronic manufacturing
° Fleet/trucking/bus terminals
° Furniture repair/manufacturing
° Home manufacturing
° Junk/scrap/salvage yards
° Machine shops
° Metal plating/finishing/fabricating
° Mines/sand or gravel excavations
° Parking lots/malls (>50 spaces)
° Photo processing/printing
° Plastics/synthetics producers
° Research laboratories

OTHER

° Road salt storage areas
° Military installations (for classified risks not otherwise listed)

AGRICULTURAL/RURAL

° Farm machinery repair
° Rural machine shops
° *Intensive livestock operations; Lagoons, spray fields
° Fertilizer, pesticide, and petroleum storage, distribution, handling, mixing, and cleaning areas
°*Sewage sludge (biosolids) storage, handling, mixing and cleaning areas
° *Sewage sludge (biosolids) land application
° Unauthorized/illegal disposal of wastes/chemicals

RESIDENTIAL/MUNICIPAL

° Airports - maintenance/fueling areas
° Railroad yards/maintenance/fueling areas
° Landfills/dumps
° Utility stations - maintenance areas
° *Septic systems - high density (>1/acre)
° *Sewer lines
° *Stormwater drains/discharges
° Fertilizer, pesticide, sewage sludge

Notes: 1. This is a list of potential sources of contamination not a list of known databases of contaminants.
2. Higher risk potential contaminant sources are considered to have a higher potential for drinking water contamination than those designated moderate risk or lower risk Facility-specific management practices are not taken into account in estimating risks and assigning these categories.
3. An asterisk [*] indicates activities that may be associated with microbiological contamination.

Potential Contamination Sources by Risk Category (Con't)

Moderate Risk PCSs

COMMERCIAL/INDUSTRIAL
- Car washes
- Cement/concrete plants
- Food processing
- Hardware/lumber/parts stores

AGRICULTURAL/RURAL
- *Auction lots
- *Boarding stables
- Crops, irrigated (berries, Christmas trees, hops, mint, orchards, vineyards, nurseries, greenhouses, vegetables, sod)

NOTE: Drip-irrigated crops are considered lower risks.
- Drinking water treatment plant residuals/sludge application

RESIDENTIAL/MUNICIPAL
- Drinking water treatment plants
- Golf courses
- Housing - high density (>1 house/.5 acres)
- Motor pools
- Parks
- Waste transfer/recycling stations

Wastewater treatment plants collection stations

OTHER
- Above ground storage tanks
- Construction/demolition areas
- Hospitals
- Transportation corridors

Freeways/state highways
Railroads
Right-of-way maintenance (herbicide use areas)
- Irrigation, water supply, or monitoring wells

Lower Risk PCSs

COMMERCIAL/INDUSTRIAL
- Office buildings/complexes
- RV/mini storage

AGRICULTURAL/RURAL
- Crops, non-irrigated (grains, grass seeds, hay)
- *Rangeland
- Managed forests/silviculture

RESIDENTIAL/MUNICIPAL
- Apartments and condominiums
- Campgrounds/RV parks
- Fire stations
- Schools
- Housing – low density (< 1 house/.5 acres)

OTHER
- Medical/dental offices/clinics
- Veterinary offices/clinics

SOURCE: Adapted from EPA (1993), and from the Oregon Wellhead Protection Program

Brunswick County Well Yield				
Well	**Average Daily flow (MG)**		**Estimated Daily Operational Yield (gpm)**	**From Well Construction Records (gpm)**
1	0.24		167	250
2	0.187	Yield is based on a 24 hour period	130	
3	0.3	When the wells run they run for 24 hr	208	350
5	0.244		169	
6a	0.365		253	300
8	0.95		660	450
11	1.02		708	
12	0.62		431	
12a	0.3		208	950
15	0.57		396	450
16	0.73		507	550
17	0.29		201	350
18	0.34		236	350
19	0.3			375

NORTH CAROLINA DEPARTMENT OF NATURAL AND ECONOMIC RESOURCES
OFFICE OF WATER AND AIR RESOURCES
GROUND WATER DIVISION
P. O. BOX 27687 – RALEIGH, N. C. 27611

Well 1

WELL RECORD

DRILLING CONTRACTOR Heater Well Company REG. NO. 1 WELL CONSTRUCTION PERMIT NO. 1954

1. WELL LOCATION: (Show a sketch of the location on back of form) Nearest Town: Southport, N. C. County: Brunswick
Well Site #1, Well Sequence #3 (Road, Community or Subdivision and Lot No.) Quadrangle No.
2. OWNER: Brunswick County Water System
3. ADDRESS: Southport, N. C.
4. TOPOGRAPHY: draw, valley, slope, hilltop, flat
5. USE OF WELL: public DATE: 4-25-75
6. DOES THIS WELL REPLACE AN EXISTING WELL? no
7. TOTAL DEPTH: 175 RIG TYPE OR METHOD: Mud & air
8. FORMATION SAMPLES COLLECTED: [25] YES No. of Bags 25
9. CASING:

Depth From	Depth to	ft.	Inside Diam.	Wall thick. or weight/ft.	Type
0	90		10"	.275	steel
100	120		10"	.275	steel
~~130~~	~~140~~		~~10"~~	~~.275~~	~~steel~~
~~150~~	~~160~~		~~10"~~	~~.275~~	~~steel~~
170	174		10"	.275	steel

10. GROUT:

Depth From	Depth to	ft.	Material	Method
0	65		cement	pressure

11. SCREEN:

Depth From	Depth to	ft.	Diam.	Type and Opening
90	100		10"	SS 30 slot
120	130		10"	SS 30 slot
~~140~~	~~150~~		~~10"~~	~~SS 30 slot~~
160	170		10"	SS 30 slot

12. GRAVEL:

Depth From	Depth to	ft.	Size	Material
0	174			Silica 18 tons

13. WATER ZONES (depth): 90-100; 120-130; 140-150; 160-170.
14. STATIC WATER LEVEL: 7'5" ft. ~~above~~ below top of casing.
Casing is 3 ft. above land surface. ELEV.
DATE MEASURED: 505075
15. YIELD (gpm): 250 METHOD OF TESTING: pump
16. PUMPING WATER LEVEL: 78'11½" ft. after 48 hours
at 250 gpm.
17. CHLORINATION: Type HTH granules Amount
18. WATER QUALITY: TEMPERATURE (°F)
19. PERMANENT PUMP: (Show a sketch of well head on back of form)
Date installed Type Make
Capacity (gpm) HP
Intake Depth Airline Depth
20. HAVE YOU INFORMED THE WELL OWNER OF THE DEPARTMENTS REQUIREMENTS AND RECOMMENDATIONS?
21. REMARKS:

I do hereby certify that this well record is true and exact.

SIGNATURE OF CONTRACTOR OR AGENT DATE

DRILLING LOG

DEPTH FROM	DEPTH TO	FORMATION DESCRIPTION
0	8	Black sand, top soil
8	10	Sand and clay
10	48	Sand and a conglomerate
48	60	Sand and shells
60	90	Sand and shells
90	105	Sand rock, hard
105	120	Shellrock, mixed with sand
120	165	Soft shellrock, also sand pockets
165	198	Hard sand rock
198	239	Soft sandrock
239	264	Hard sandrock

Form GW-1

White Copy - Office of Water and Air Resources; Blue - Drillers Copy; Green - Owners Copy

NORTH CAROLINA DEPARTMENT OF NATURAL AND ECONOMIC RESOURCES
OFFICE OF WATER AND AIR RESOURCES
GROUND WATER DIVISION
P. O. BOX 27687 – RALEIGH, N. C. 27611

WELL RECORD

DRILLING CONTRACTOR: Heater Well Company REG. NO.: 1 WELL CONSTRUCTION PERMIT NO.: 1956

1. WELL LOCATION: (Show a sketch of the location on back of form)
   Nearest Town: Southport County: Brunswick
   Well Site #3, Well sequence #2 (Road, Community or Subdivision and Lot No.) Quadrangle No.:
2. OWNER: Brunswick County Water System
3. ADDRESS: Southport, N. C.
4. TOPOGRAPHY: draw, valley, slope, hilltop, flat
5. USE OF WELL: public DATE: 4-18-75
6. DOES THIS WELL REPLACE AN EXISTING WELL? no
7. TOTAL DEPTH: 159' RIG TYPE OR METHOD: mud & air
8. FORMATION SAMPLES COLLECTED: [X] YES No. of Bags: 25
9. CASING:

From	Depth to	ft.	Inside Diam.	Wall thick. or weight/ft.	Type
0	70		10"	.280	steel
70	100		10"	"	"
110	125		10"	"	"
135	145		10"	"	"

10. GROUT:

From	Depth to	ft	Material	Method
145	159			
0	60		cement	pressure

11. SCREEN:

From	Depth to	ft.	Diam.	Type and Opening
70	90		10"	SS 30 slot
100	110		10"	"
125	135		10"	"
145	155		10"	"

12. GRAVEL:

From	Depth to	ft.	Size	Material
0	159			silica 20 tons

13. WATER ZONES (depth): 70-90; 100-110; 125-135; 145-155
14. STATIC WATER LEVEL: 8 ft. ~~above~~ below top of casing.
    Casing is 3 ft. above land surface. ELEV.
    DATE MEASURED: 4-28-75
15. YIELD (gpm): 350 METHOD OF TESTING: pump
16. PUMPING WATER LEVEL: 54' 2½" ft. after 48 hours
    at gpm.
17. CHLORINATION: Type Amount
18. WATER QUALITY: TEMPERATURE (°F)
19. PERMANENT PUMP: (Show a sketch of well head on back of form)
    Date installed Type Make
    Capacity (gpm) HP
    Intake Depth Airline Depth
20. HAVE YOU INFORMED THE WELL OWNER OF THE DEPARTMENTS REQUIREMENTS AND RECOMMENDATIONS?
21. REMARKS:

I do hereby certify that this well record is true and exact.

4-18-75
SIGNATURE OF CONTRACTOR OR AGENT DATE

DRILLING LOG

DEPTH FROM	DEPTH TO	FORMATION DESCRIPTION
0	3	Top soil, fine sand
3	20	Yellow sand, fine to med grain
20	36	Gray-blue clay, some shells
36	56	Sandy clay, some shells
56	70	Shellrock
70	90	Sand and shells
90	110	Sand rock
110	130	Sand
130	139	Sand rock, soft
139	152	Sand rock, hard
152	155	Sand
155	162	Rock, hard
162	176	Sand rock, soft
176	192	Sand rock, hard
192	193	Sand rock, soft
193	198	Sand rock, soft
198	205	Sand rock, soft
205	220	Sand rock, hard
220	240	Sand rock, soft
240	242	Sand streak
242	250	Sand rock, soft
250	252	Sand rock, hard
252	260	Sand rock, soft

Form GW-1

White Copy - Office of Water and Air Resources; Blue - Drillers Copy; Green - Owners Copy

WELL CONSTRUCTION RECORD

Well 6A

North Carolina-Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) Scott Skipper — CERTIFICATION# 2482

WELL CONTRACTOR COMPANY NAME SKIPPER'S WELL DRILLING & PUMP SERVICE, INC. — PHONE #(910) 371-2770

STATE WELL CONSTRUCTION PERMIT #: (if applicable) WS0800882 — ASSOCIATED WQ PERMIT # (if applicable)

1. WELL USE (Check Applicable bo Residential [ ] Municipal/Public [X] Industrial [ ] Agricultural [ ]
Monitoring [ ] Recovery [ ] Heat Pump Water Injection [ ] Other [ ] If Other, List Use:

2. WELL LOCATION:
Nearest tow Southport County Brunswick
Public Utilities Property Hwy 211 Southport
(Street Name, Numbers, Community, subdivision, Lot No., Zip Code)

Topographic/Land setting
[ ] Ridge [ ] Slope [ ] Valley [ ] Flat
(check appropriate box)

3. OWNER Brunswick Utilities
Addres 4305 Southport-Supply Hwy
(Street or Route No.)
Southport, NC 28461
City or town State Zip Code

Latitude/longitude of well location
(degrees/minutes/second)

Area code-Phone Number

4. DATE DRILLED 3/3/2009 USE OF WELL Public
5. TOTAL DEPTH 171
6. DOES WELL REPLACE EXISTING WELL [ ] Yes [X] No
7. STATIC WATER LEVEL Below Top of Casing 35.6 Ft.
(Use "+" if above Top of Casing
8. TOP OF CASING 2.5 FT. ABOVE LAND SURFACE.
*Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.
9. YIELD (gpm): 300 METHOD OF TES Pump
10. WATER ZONES (depth) 76-96 106-166
11. DISINFECTION: Type 70%HTH Amount lb
12. CASING:

	Depth			Diameter	Wall Thickness Weight/ft.	Material
From	+2.5	To 76	Ft.	10	3.75	steel
From	96	To 106	Ft.	10	3.75	steel
From	+1	To 50	Ft.	24	0.225	steel
From	166	To 171	Ft.	10	3.75	steel

13. GROUT:

	Depth			Material	Method
From	0	To 50	Ft.	cement	pump
From		To	Ft.		
From		To	Ft.		

14. SCREEN

	Depth			Diameter	Slot size		Material
From	76	To 96	Ft.	10	50	in	Stainless
From	106	To 166	Ft.	10	50	in	Stainless
From		To	Ft.			in	

15. SAND/GRAVEL PACK:

	Depth			Size	Material
From	45	To 175	Ft.	#3	southern products
From		To	Ft.		

16. REMARKS:

Drilling log

From	To	Formation Description
0	3	White sand
3	6	hard pan
6	19	sand
19	20	clay
20	30	clay, shell
30	55	shell, fine sand with some clay
55	59	rock
59	65	rock layers
65	73	clay
73	96	rock
96	105	clay
105	115	limestone
115	130	Limestone-turns yellow with traces of limestone mud
130	165	Limestone-turns yellow
165	170	Limestone with rock layers
170	198	Gray clay

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAN 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF PERSON CONSTRUCTING THE WELL — DATE 3/10/09

Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC 27699-1636 Phone No (919) 733-3221, within 30 days.

GW-1 REV. 07/2001

NORTH CAROLINA DEPARTMENT OF NATURAL AND ECONOMIC RESOURCES
OFFICE OF WATER AND AIR RESOURCES
GROUND WATER DIVISION
P. O. BOX 27687 – RALEIGH, N. C. 27611

WELL RECORD

DRILLING CONTRACTOR Heater Well Company REG. NO. 1 WELL CONSTRUCTION PERMIT NO. 1958

1. WELL LOCATION: (Show a sketch of the location on back of form)
   Nearest Town: Southport, N. C. County: Brunswick
   Well Site #8, Well Sequence #5 Quadrangle No.
   (Road, Community or Subdivision and Lot No.)
2. OWNER: Brunswick County Water System
3. ADDRESS: Southport, N. C.
4. TOPOGRAPHY: draw, valley, slope, hilltop, flat
5. USE OF WELL: public DATE: 6-5-75
6. DOES THIS WELL REPLACE AN EXISTING WELL? no
7. TOTAL DEPTH: 153' RIG TYPE OR METHOD: air
8. FORMATION SAMPLES COLLECTED: [x] YES No. of Bags 25
9. CASING:

	Depth		Inside Diam.	Wall thick. or weight / ft.	Type
From	0	to 65 ft.	6 10"	3/8"	stl
	105	130	10"	3/8"	stl

10. GROUT:

	Depth		Material	Method
From	0	to 60 ft	Cement	pressure

11. SCREEN:

	Depth		Diam.	Type and Opening
From	65	to 105 ft	10"	SS 30slot
	105	150	10"	SS 30 slot

12. GRAVEL:

	Depth		Size	Material
From	0	to 160 ft.		Silica

13. WATER ZONES(depth): 65 - 105 and 130 - 150
14. STATIC WATER LEVEL: 9'2" ft. below top of casing.
    Casing is 2 ft. above land surface. ELEV.
    DATE MEASURED: 6-11-75
15. YIELD(gpm): 450 METHOD OF TESTING: pump
16. PUMPING WATER LEVEL: 22'9½" ft. after 69 hours
    at 450 gpm.
17. CHLORINATION: Type Amount
18. WATER QUALITY: TEMPERATURE(°F)
19. PERMANENT PUMP:(Show a sketch of well head on back of form)
    Date installed Type Make
    Capacity (gpm) HP
    Intake Depth Airline Depth
20. HAVE YOU INFORMED THE WELL OWNER OF THE DEPARTMENTS REQUIREMENTS AND RECOMMENDATIONS? yes
21. REMARKS:

I do hereby certify that this well record is true and exact.

SIGNATURE OF CONTRACTOR OR AGENT DATE

DRILLING LOG

DEPTH FROM	DEPTH TO	FORMATION DESCRIPTION
0	4	Top soil
4	20	Sandy clay
20	30	Gray clay
30	46	Sandy clay
46	53	Shells - tight
53	59	Shells - soft
59	95	Shellrock - hard
95	140	Sandrock - hard
140	150	Sand
150	180	Sandrock - hard
180	200	Sandrock - soft
200	215	Sand
215	225	Sandrock - hard
225	240	Sandrock - sand pocket
240	250	Sandrock - hard

Form GW-1

White Copy - Office of Water and Air Resources; Blue - Drillers Copy; Green - Owners Copy

NORTH CAROLINA DEPARTMENT OF NATURAL AND ECONOMIC RESOURCES
OFFICE OF WATER AND AIR RESOURCES
GROUND WATER DIVISION
P. O. BOX 27687 – RALEIGH, N. C. 27611

WELL RECORD

DRILLING CONTRACTOR: Heater Well Co. REG. NO. 1 WELL CONSTRUCTION PERMIT NO.

1. WELL LOCATION: (Show a sketch of the location on back of form)
Nearest Town: Southport County: Brunswick
Well site #12 a. Well sequence #9 Quadrangle No.
(Road, Community or Subdivision and Lot No.)

2. OWNER: Brunswick County Water System

3. ADDRESS: Southport, NC

4. TOPOGRAPHY: draw, valley, slope, hilltop, flat

5. USE OF WELL: public DATE: 7-15-75

6. DOES THIS WELL REPLACE AN EXISTING WELL? no

7. TOTAL DEPTH: 114' RIG TYPE OR METHOD: air

8. FORMATION SAMPLES COLLECTED: [X] YES No. of Bags 20

9. CASING:

	Depth		Inside Diam.	Wall thick. or weight/ft.	Type
b					
From 0	to 59	ft.	20	pit casing	
0	60		10	std	
110	114		10	std	

10. GROUT:

	Depth		Material	Method
From 0	to 59	ft	cement	

11. SCREEN:

	Depth		Diam.	Type and Opening
From 60	to 110	ft.	10"	SS 30 slot

12. GRAVEL:

	Depth		Size	Material
From 0	to 114	ft.		

13. WATER ZONES(depth): 60-110

14. STATIC WATER LEVEL: 6'10½" ft. below top of casing.
Casing is 2 ft. above land surface. ELEV.
DATE MEASURED: 7-23-75

15. YIELD(gpm): 950 METHOD OF TESTING: pump

16. PUMPING WATER LEVEL: 70'5" ft. after 48 hours
at 950 gpm.

17. CHLORINATION: Type HTH Amount

18. WATER QUALITY: TEMPERATURE(°F)

19. PERMANENT PUMP:(Show a sketch of well head on back of form)
Date Installed Type Make
Capacity (gpm) HP
Intake Depth Airline Depth

20. HAVE YOU INFORMED THE WELL OWNER OF THE DEPARTMENTS REQUIREMENTS AND RECOMMENDATIONS? yes

21. REMARKS:

I do hereby certify that this well record is true and exact.

SIGNATURE OF CONTRACTOR OR AGENT DATE

DRILLING LOG

DEPTH FROM	DEPTH TO	FORMATION DESCRIPTION
1	3	Yellow sand
3	9	Brown sand
9	20	Blue clay and sand
20	30	Grey sand
30	40	Blue clay and shells
40	43	Clay and shells
43	50	Light clay and shells
50	51	Shells, soft
51	57	Tight shells, hard
57	60	Rock, hard
60	70	Rock, hard
70	80	Shells, soft
80	100	Sand and shells
100	120	Sand and shells, soft

Form GW-1

White Copy - Office of Water and Air Resources; Blue - Drillers Copy; Green - Owners Copy

NORTH CAROLINA DEPARTMENT OF NATURAL AND ECONOMIC RESOURCES
OFFICE OF WATER AND AIR RESOURCES
GROUND WATER DIVISION
P. O. BOX 27687 – RALEIGH, N. C. 27611

15

WELL RECORD

DRILLING CONTRACTOR Heater Well Co. REG. NO. 1 WELL CONSTRUCTION PERMIT NO. 1959

1. WELL LOCATION: (Show a sketch of the location on back of form)
Nearest Town: Southport County: Brunswick
Well Sequence #8, Well Site #15 Quadrangle No.
(Road, Community or Subdivision and Lot No.)
2. OWNER: Brunswick County Water System
3. ADDRESS: Southport, N. C.
4. TOPOGRAPHY: draw, valley, slope, hilltop, flat
5. USE OF WELL: public DATE: 7-3-75
6. DOES THIS WELL REPLACE AN EXISTING WELL? no
7. TOTAL DEPTH: 129 RIG TYPE OR METHOD: rotary
8. FORMATION SAMPLES COLLECTED: [X] YES No. of Bags
9. CASING:

	Depth		Inside Diam.	Wall thick or weight/ft.	Type
From	0	to 75 ft.	10"		black steel
	125	129	10"		blk steel
	0	69	20"		pit casing, blk

10. GROUT:

	Depth		Material	Method
From	0	to 69½ ft	cement	pressure stl

11. SCREEN:

	Depth		Diam.	Type and Opening
From	75	to 125 ft	10"	SS #30 slot

12. GRAVEL:

	Depth		Size	Material
From	0	to 129 ft.		silica

13. WATER ZONES (depth): 75-125
14. STATIC WATER LEVEL: 12'4½" ft. below top of casing.
Casing is 2 ft. above land surface. ELEV.
DATE MEASURED: 7-8-75
15. YIELD (gpm): 450 METHOD OF TESTING: 48 hr pump
16. PUMPING WATER LEVEL: 48'11½" ft. after 48 hours at 450 gpm.
17. CHLORINATION: Type HTH Amount
18. WATER QUALITY: TEMPERATURE (°F)
19. PERMANENT PUMP: (Show a sketch of well head on back of form)
Date installed Type Make
Capacity (gpm) HP
Intake Depth Airline Depth
20. HAVE YOU INFORMED THE WELL OWNER OF THE DEPARTMENTS REQUIREMENTS AND RECOMMENDATIONS? yes
21. REMARKS:

I do hereby certify that this well record is true and exact.

SIGNATURE OF CONTRACTOR OR AGENT DATE

DRILLING LOG

DEPTH FROM	DEPTH TO	FORMATION DESCRIPTION
1	3	White sand
3	37	Brown sand
37	40	Blue clay
40	60	Blue clay and shell
60	68	Clay and shell
68	69	Hard rock and shell
69	80	Hard rock & shell
80	87	Hard rock, sand
87	90	Sand rock, soft
90	95	Sand rock, soft
95	100	Hard rock, sand
100	105	Hard rock, shell
105	115	Hard rock, shell
115	125	Soft sand, shell
125	160	Soft sand and shell
160	165	Soft sand
165	180	Sand, shell, hard
180	200	Sand, hard
200	220	Sand, soft
220	235	Sand, Hard
235	240	Sand, soft
240	260	Sand, soft, ledgey rock

Form GW-1

White Copy - Office of Water and Air Resources; Blue - Drillers Copy; Green - Owners Copy

#16 #16

NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES & COMMUNITY DEVELOPMENT
DIVISION OF ENVIRONMENTAL MANAGEMENT, GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH, N.C. 27611

WELL RECORD #09-0146-WC-0082

DRILLING CONTRACTOR Skippers Well Drilling REG. NO. 309 WELL CONSTRUCTION PERMIT NO.

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Southport County: Brunswick
   Quadrangle No.
   (Road, Community or Subdivision and Lot No.)
2. OWNER: Brunswick County
3. ADDRESS:
4. TOPOGRAPHY: draw, valley, slope, hilltop, flat (circle one)
5. USE OF WELL: Public DATE: 5-2-81
6. DOES THIS WELL REPLACE AN EXISTING WELL? No
7. TOTAL DEPTH: 155 RIG TYPE OR METHOD: Rotary
8. FORMATION SAMPLES COLLECTED: YES X NO
9. CASING:

	Depth		Inside Dia.	Wall thick. or weight/ft.	type
From	+1	to 60 ft	20	0.375	Black Steel
	+2	63	10	0.365	Black Steel
	153	155	10	0.365	Black Steel

10. GROUT:

	Depth		Material	Method
From	0	to 59 ft	Cement	Pump

11. SCREEN:

	Depth		Dia.	Type & Opening
From	63	to 153 ft	10	Stainless Steel 30 Slot

12. GRAVEL:

	Depth		Size	Material
From	0	to 155 ft	#2	

13. WATER ZONES (depth): 63 to 153
14. STATIC WATER LEVEL: 127 ft. above/below top of casing
    Casing is 2 ft. above land surface ELEV:
15. YIELD (gpm): 550 METHOD OF TESTING: Pump
16. PUMPING WATER LEVEL: 40.10 ft.
    after 24 hours at 500 gpm.
17. CHLORINATION: Type 70%HTH Amount 6lbs
18. WATER QUALITY: TEMPERATURE (°F)
19. PERMANENT PUMP: Date Installed
    Type Capacity (gpm) HP
    Make Intake Depth
    Airline Depth
20. HAS THE OWNER BEEN PROVIDED A COPY OF THIS RECORD AND INFORMED OF THE DEPARTMENTS REQUIREMENTS AND RECOMMENDATIONS? YES
21. REMARKS

DRILLING LOG

DEPTH FROM	TO	FORMATION DESCRIPTION
0	30	Overburden & Finesand
30	40	Blue Clay
40	56	Shells
56	60	Soft Limestone
60	100	Hard Limestone
100	155	P.D. Limestone

If additional space is needed, use back of form

LOCATION SKETCH
(Show distance to numbered roads, or other map reference points)

I do hereby certify that this well was constructed in accordance with N.C. Well Construction Regulations and Standards and that this well record is true and exact.

SIGNATURE OF CONTRACTOR OF AGENT DATE

Form GW-1 Revised 11/3/77 Submit original to Groundwater Section and copy to well owner.

CITY COPY

JOB FILE NO. 0319.A1

#17

NORTH CAROLINA DEPARTMENT OF NATURAL AND ECONOMIC RESOURCES
OFFICE OF WATER AND AIR RESOURCES
GROUND WATER DIVISION
P. O. Box 27687 - Raleigh, N. C. 27611

PUMPING TEST RECORD

Well # 17

#09-0146-NC-0083
Well Construction Permit No.

Test Conducted by: Larry Skipper

1. WELL LOCATION: Nearest Town: Southport County: Brunswick
   Quadrangle No.
   (Road No., Community, or Subdivision and Lot No.)
2. OWNER: Brunswick County
   Name Address
3. USE OF WELL: ( ) Domestic (X) Public ( ) Industrial ( ) Irrigation ( ) Other
4. WELL DEPTH: 155 ft. Casing Diameter 20 10 in. Casing type: Black Steel
5. DRILLING CONTRACTOR: Skippers Well Drilling Was casing grouted? Yes 20" 1
6. STATIC WATER LEVEL: 17 ft. above below top of casing. Casing is 10" 2 ft. above land surface. Date Measured: March 10, 1981 -- March 11, 1981
7. WELL YIELD: 350 gpm. Specific Capacity: gpm/ft.-dd.
8. PUMPING WATER LEVEL: 57 ft. after 26 hours at 300 gpm.
9. CHLORINATION: Type 70% HTH Amount 6 lbs.
10. TIME AND DATE PUMP STARTED: 10:45am 3-10-81 TIME AND DATE PUMP STOPPED: 12:45pm 3-1
11. WATER LEVEL MEASURING DEVICE: Electric Tape FLOW MEASURING DEVICE: Flow Meter
12. TEST PUMP: Type Submersible Make Aermotor Horse Power 10H.P.
    Capacity 500 gpm at T D H. Intake Depth 68 ft.

Time	Water Level	Pumping Rate	TIME	WATER	PUMPING RATE Remarks
10:45	48	350	11:45	54	300
10:50	50	350	12:05	54.6	300
10:55	50	350	12:15	54.9	300
11:00	50.6	350	12:25	55	300
11:05	51	350	12:35	55	300
11:10	51.3	350	12:45	55.6	300
11:15	51.6	350	1:15	55.6	300
11:20	52	350	1:45	56	300
11:25	52.6	350	2:15	56.6	300
11:30	53	350	2:45	57	300
11;35	53.3	350	3:45	57	300
11:40	53.6	350	4:45	56	300
			5:45	56	300 CITY COPY

GW-40 White Copy-Office of Water and Air Resources;Blue-Drillers Copy;Green-Owners Copy

NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT
ENVIRONMENTAL MANAGEMENT COMMISSION
GROUNDWATER SECTION
P. O. BOX 27687 - Raleigh, N. C. 27611

JOB FILE NO. 0319.A1
BY

WELL #18

PUMPING TEST RECORD

#--09-0146-WC-0084

Test Conducted by: Larry Skipper — Well Construction Permit No.

1. WELL LOCATION: Nearest Town: Southport County: Brunswick
   Quadrangel No.
   (Road No., Community, or Subdivision and Lot No.)
2. OWNER: Brunswick County
   Name Address
3. USE OF WELL: ( ) Domestic ( ) Public (X) Industrial ( ) Irrigation ( )
   Other
4. WELL DEPTH: 155 ft. Casing Diameter 20 10 in. Casing type: Black Steel
5. DRILLING CONTRACTOR: Skippers Well Drilling Was casing grouted? Yes 20" 20-1
6. STATIC WATER LEVEL: 12 ft. ~~above~~ below top of casing. Casing is 10"2 ft. above land surface.
   Date Measured: 3-10-81 3-11-81
7. WELL YIELD: 350 gpm. Specific Capacity: gpm/ft.-dd.
8. PUMPING WATER LEVEL 58.9 ft. after 24 hours at 300 gpm.
9. CHLORINATION: Type 70%HTH Amount 6 lbs.
10. TIME AND DATE: PUMP STARTED: 12:00pm - 3-13-81 PUMP STOPPED: 12:00pm - 3-19-81
11. WATER LEVEL MEASURING DEVICE: Electric Tape FLOW MEASURING DEVICE: Flow Meter
12. TEST PUMP: Type Submersible Make Aermotor Horse Power 10 H.P.
    Capacity 500 gpm at T D H. Intake Depth 68 ft.

Time	Water Level	Pumping Rate	TIME	WATER LEVEL	PUMPING RATE Remarks
12:00	12	300	12:40	48.9	300
12:01	15	300	12:45	49.5	300
12:02	18.5	300	12:50	49.9	300
12:03	23	300	12:55	50	300
12:04	26	300	1:00	50.1	300
12:05	29	300	1:10	50.3	300
12:10	36.2	300	1:20	50.5	300
12:15	42.3	300	1:30	50.75	300
12:20	45.1	300	1:40	50.95	300
12:25	46.5	300	1:50	51.1	300
12:30	47.6	300	2:00	51.3	300
12:35	48.6	300	2:30	52.5	300

CITY COPY

GW-40 Submit one copy to Groundwater Section and one to owner.

#19

NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES & COMMUNITY DEVELOPMENT
DIVISION OF ENVIRONMENTAL MANAGEMENT, GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH, N.C. 27611

WELL RECORD #19

#09-0146-WC_0085

DRILLING CONTRACTOR: Skippers Well Drilling REG. NO. 309 WELL CONSTRUCTION PERMIT NO.

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Southport County: Brunswick
   (Road, Community or Subdivision and Lot No.) Quadrangle No.
2. OWNER: Brunswick County
3. ADDRESS:
4. TOPOGRAPHY: draw, valley, slope, hilltop, flat (circle one)
5. USE OF WELL: Public DATE: 4-27-81
6. DOES THIS WELL REPLACE AN EXISTING WELL? No
7. TOTAL DEPTH: 150 RIG TYPE OR METHOD: Rotary
8. FORMATION SAMPLES COLLECTED: YES X NO
9. CASING:

	Depth From	Depth to	Inside Dia.	Wall thick. or weight/ft.	type
From	+1	62 ft	20	0.375	Black Steel
	+2	64	10	0.365	Black Steel
	144	150	10	0.365	Black Steel

10. GROUT:

	Depth From	Depth to	Material	Method
From	0	62 ft	Cement	Pump

11. SCREEN:

	Depth From	Depth to	Dia.	Type & Opening
From	64	144 ft	10	Stainless Steel 30 Slot

12. GRAVEL:

	Depth From	Depth to	Size	Material
From	0	150 ft	#2	

13. WATER ZONES (depth): 63 to 150
14. STATIC WATER LEVEL: 9 ft. ~~above~~ below top of casing
    Casing is 2 ft. above land surface ELEV:
15. YIELD (gpm): 375 METHOD OF TESTING: Pump
16. PUMPING WATER LEVEL: 60 ft.
    after 24 hours at 350 gpm.
17. CHLORINATION: Type 70%HTH Amount 6lbs
18. WATER QUALITY: TEMPERATURE (°F)
19. PERMANENT PUMP: Date Installed
    Type Capacity (gpm) HP
    Make Intake Depth
    Airline Depth
20. HAS THE OWNER BEEN PROVIDED A COPY OF THIS RECORD AND INFORMED OF THE DEPARTMENTS REQUIREMENTS AND RECOMMENDATIONS? Yes
21. REMARKS

DRILLING LOG

DEPTH FROM	DEPTH TO	FORMATION DESCRIPTION
0	25	Overburden and Fine Sand
25	40	Blue Clay
40	52	Shells
52	62	Soft Limestone
62	102	Hard Limestone
102	150	P.D. Limestone

If additional space is needed, use back of form

LOCATION SKETCH
(Show distance to numbered roads, or other map reference points)

I do hereby certify that this well was constructed in accordance with N.C. Well Construction Regulations and Standards and that this well record is true and exact.

SIGNATURE OF CONTRACTOR OR AGENT DATE

CITY COPY

Form GW-1 Revised 11/3/77 Submit original to Groundwater Section and copy to well owner.