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Expanded Site Inspection
of
Southern Wood Piedmont
Wilmington, New Hanover County, North Carolina

EPA ID No. NCD058517467
WasteLAN No. 02821

Prepared Under:
Contract No. 68-W9-0055
For The
Waste Management Division
U.S. Environmental Protection Agency

Prepared By:
Black & Veatch Special Projects Corp.
BVSPC Project Nº 52014.755

July 16, 1997

Prepared by:	Reviewed by:	Approved by:
Robert Mangum, P.G.	Hubert Wieland	Carter J. Helm
Site Manager	Technical Reviewer	Project Manager

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WILMINGTON, N. C. 28401

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Executive Summary

The purpose of the Expanded Site Inspection (ESI) for the Southern Wood Piedmont (SWP) site in Wilmington, New Hanover County, North Carolina is to further determine the nature of contaminants present at the site, to determine if a release of hazardous materials to the environment has occurred or may occur and, if a release has occurred, to determine attribution of those contaminants to the site. Furthermore, this inspection sought to further define the possible pathways by which contamination could migrate from the site and the populations and environments it potentially affects as well as to provide information needed to evaluate the site using the Hazard Ranking System (HRS) scoring stategies. The sampling investigation included the collection of 31 groundwater, 8 surface water, 21 surface soil, 21 subsurface soil, 18 sediment, and 3 biological tissue samples. The biological tissue samples were analyzed for pesticides, PCBs, and extractable organics. All other samples collected were analyzed for extractable and purgeable organic compounds, pesticides, PCBs, cyanide, and metals. In addition, 7 of the 21 surface soil samples were analyzed for dioxins and furans.

The results of the field investigation indicate elevated concentrations of extractable organics, pesticides, PCBs, dioxins/furans and inorganics in surface soil samples. Elevated concentrations of extractable and purgeable organics, pesticides, PCBs, and inorganics were also noted in subsurface soil samples. Sediment samples obtained during this investigation revealed elevated concentrations of extractable and purgeable organics, pesticides, PCBs, and inorganics. Elevated concentrations of pesticides, PCBs, and inorganics were also noted in surface water samples. Groundwater samples in the shallow, intermediate, and deep aquifers revealed elevated concentrations of extractable and purgeable organics and inorganics. All soil samples collected during the field investigation were considered source samples.

The groundwater migration pathway is of moderate concern. The majority of residents within a 4-mile radius of the site are supplied water by the Wilmington Water Department or the Leland Sanitary District Water Department. Both of these municipal water systems are supplied water by surface water intakes located approximately 23 miles upstream of the site. Approximately 437 persons are estimated to obtain drinking water from private wells within 4 miles of the site. A

community water system is located at the Runnymeade subdivision approximately 3.75 miles northeast of the site. The community system utilizes two wells which draw from the Castle Hayne limestone aquifer. Approximately 622 persons are estimated to obtain drinking water from the Runnymeade subdivision community system. Analytical results obtained verify the presence of purgeable and extractable organics in groundwater samples from monitoring wells located at the SWP site. Elevated constituents that were detected in these groundwater samples can be attributed to past site activities. Approximately 1,059 persons (including Runnymeade subdivision residents and private well users) residing within a 4-mile radius of the Southern Wood Piedmont site obtain potable water from groundwater supply wells.

The surface water migration pathway is of major concern and was evaluated based on site-related contaminants detected in the onsite canal, Greenfield Creek, and the Cape Fear River. Elevated constituents that were detected onsite can be attributed to past site activities. The overland drainage from the site flows either east to a drainage ditch, south into Greenfield Creek, or west into the Cape Fear River. The surface water migration pathway continues in the Cape Fear River for approximately 14 miles both upstream and downstream due to tidal influence from the Atlantic Ocean. There are extensive wetland frontage located both upstream and downstream along the 15-mile surface water migration pathway. Surface water intakes utilized by the Wilmington Water Department and the Leland Sanitary District are located more than 15 miles upstream of the site. The surface water pathway is known to support both recreational and commercial fishing, as well as recreational boating. The American alligator (*Alligator mississippiensis*) is classified as a federally-designated threatened species which is known to inhabit the Cape Fear River. The federally-designated endangered shortnose sturgeon (*Acipenser brevirostrum*) has been observed in the Lower Cape Fear River. The West Indian manatee (*Trichechus manatus*) is classified as a federally-designated endangered species known to have habitat locations in the Cape Fear estuary, approximately 7.4 and 12 miles downstream of the site. The Southern Wood Piedmont site lies within a 100-year flood plain.

The soil exposure and air pathways are of minimal concern due to several factors including a lack of resident population, presence of vegetative cover on the site, and lack of an observed release. The SWP site is currently inactive and all previous site structures have been demolished and removed. Unpaved site areas are covered by

grass and other vegetation. The site is not fenced, but does have a gated entrance to prevent vehicular traffic. The site is accessible by foot on the rail bed.

Further action under CERCLA is recommended for the Southern Wood Piedmont site in Wilmington, New Hanover County, North Carolina.

DRAFT
EXPANDED SITE INSPECTION
Southern Wood Piedmont
Wilmington, New Hanover County, North Carolina
EPA ID No. NCD058517467
WasteLAN No. 02821

1.0 Introduction

Black & Veatch Special Projects Corp. (Black & Veatch) was tasked by the U. S. Environmental Protection Agency (EPA), Waste Management Division, Region IV to conduct an Expanded Site Inspection (ESI) at the former Southern Wood Piedmont (SWP) site in Wilmington, New Hanover County, North Carolina. The inspection was performed under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA). This ESI was performed in accordance with the objectives specified in the scoping meetings for this site conducted on February 8, and April 11, 1996.

1.1 Objectives

The objectives of the ESI are to further determine the nature of contaminants present at the site, to determine if a release of hazardous materials to the environment has occurred or may occur, and if a release has occurred, to determine attribution of those contaminants to the site. Furthermore, this inspection seeks to further define the possible pathways by which contamination could migrate from the site and the populations and environments it potentially affects. The purpose of this inspection is to provide data and information needed to evaluate and score the site using the Hazard Ranking System (HRS).

Specific elements include:

- Outline the major milestones, develop a schedule, and determine the level of effort (LOE) required to complete the ESI.
- Identify the data gaps that need to be addressed by the ESI.

- Further define the site characteristics and contaminant sources, including waste type and volume.
- Determine the human population, sensitive environments, and fisheries that are threatened or potentially threatened by releases of hazardous materials from the site.
- Develop a sampling strategy to obtain the additional analytical data to support the HRS score.

1.2 Scope of Work

The scope of this investigation includes the following activities:

- Obtain and review background materials relevant to assessing the potential health and environmental hazards posed by the site.
- Obtain aerial photographs and maps of site, if possible.
- Obtain information on local water systems.
- Evaluate target populations associated with the groundwater, surface water, and air migration pathways and the onsite soil exposure pathway.
- Determine location and distance to nearest potable well.
- Develop a site sketch.
- Install and sample groundwater monitoring wells.
- Sample existing groundwater monitoring wells.
- Collect various types of environmental samples including biological samples.
- Characterize source areas at the site.

2.0 Location, Site Description, Operational History and Waste Characteristics

2.1 Location

The SWP site is located on Greenfield Street in Wilmington, New Hanover County, North Carolina (Refs. 1; 2; Figure 1). The geologic coordinates of the site are 34° 12' 59" North latitude and 77° 57' 07" West longitude (Ref. 3). The climate of New Hanover County is characterized by hot and humid summers and cool winters with occasional cold spells of short duration (Ref. 4, p. 1). The January average daily temperature is 45.6 degrees Fahrenheit and the July average daily temperature is 80.1 degrees Fahrenheit (Ref. 4, Table 1). Mean annual precipitation is approximately 54 inches in the Wilmington area (Ref. 4, Table 1). The mean lake evaporation is approximately 42 inches, yielding a net annual precipitation of 12 inches (Ref. 5). The 2-year, 24-hour rainfall is approximately 5 inches (Ref. 6). Topography in the region extends from flat, low-lying swamps and marshes, 3 to 6 feet above mean sea level (amsl), to rolling uplands, approximately 300 to 800 feet amsl (Ref. 7, p. 271). More specifically, the site lies approximately 5 feet amsl (Ref.1).

2.2 Site Description

The SWP site consists of approximately 52 acres of vacant land along the east bank of the Cape Fear River (Ref. 2). There are no structures on the site and it is inactive at the present time. The site is currently owned by the City of Wilmington (COW) and the North Carolina State Ports Authority (NCSPA). Thirty-five acres in the northern and central portion of the site are owned by the COW, and the remaining seventeen acres are owned by the NCSPA (Ref. 2). The site is bordered by the Amerada Hess Petroleum Terminal to the north, by the Paktank Petroleum Terminal to the south, by the Cape Fear River to the west, and by Optimist Park and Front Street to the east (Ref. 4, Fig. 3). The site layout and sample locations are shown on Figures 1 and 2, respectively.

2.3 Operational History and Waste Characteristics

The SWP site was developed for construction of concrete barges and ships during World War I. Operations at the site changed to wood-treating beginning in the 1930s. Southern Wood Preserving Company (presently Southern Wood Piedmont)

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CREATION DATE: 3-25-97
DRAFTERS INITIALS: GB
52014.753

ORIGINAL DWG [redacted]
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PLOT SCALE: 1=200

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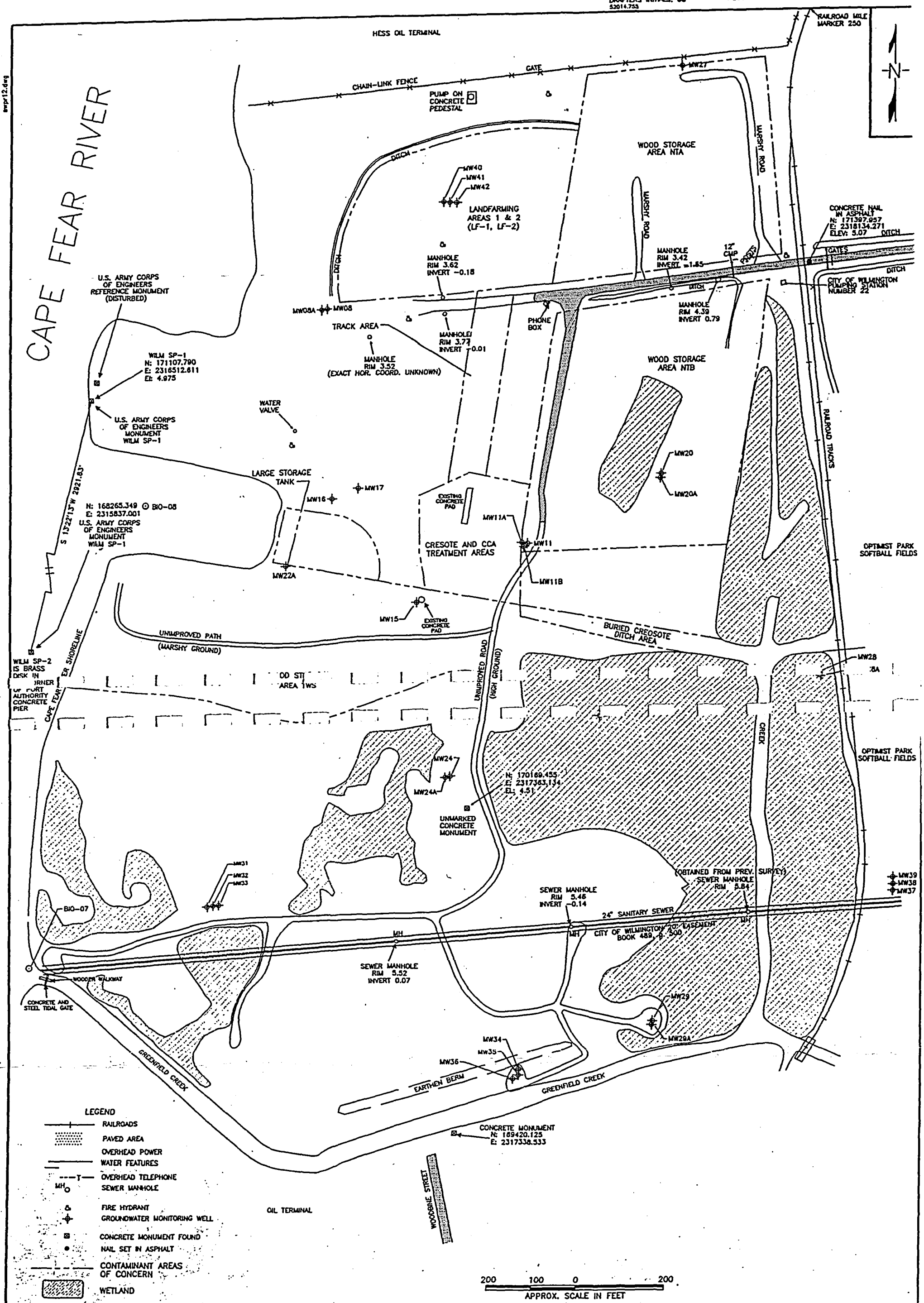

SITE LAYOUT MAP
SOUTHERN WOOD PIEDMONT
WILMINGTON, NEW HANOVER COUNTY, NORTH CAROLINA

FIGURE 1

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CREATION DATE: 3-25-97
DRAFTERS INITIALS: GB
52014.755

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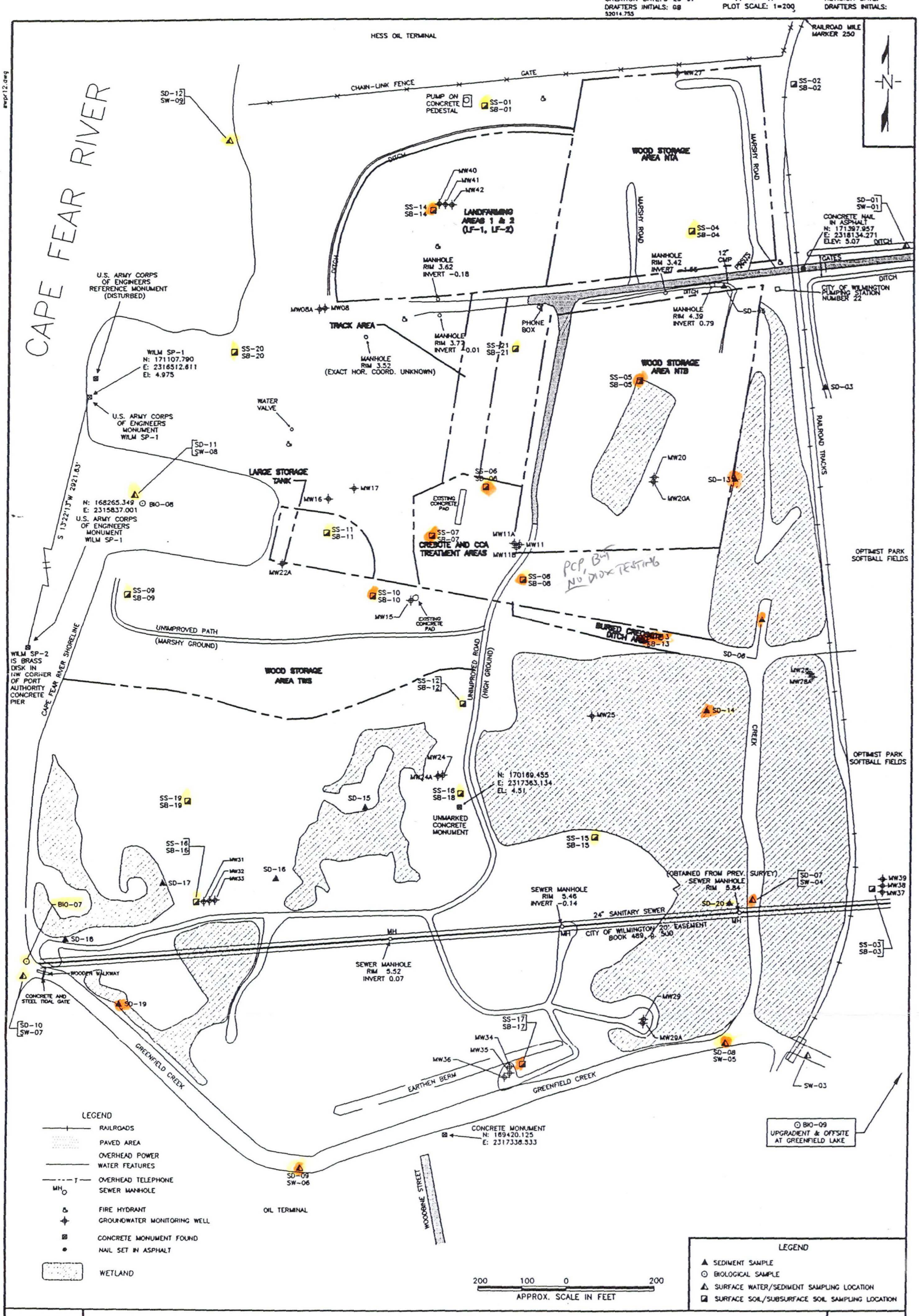

SAMPLE LOCATION MAP
SOUTHERN WOOD PIEDMONT
WILMINGTON, NEW HANOVER COUNTY, NORTH CAROLINA

FIGURE 2

began operating in 1964 at the site. Prior to 1972, creosote was the only wood preservative in use at the site. Chromated copper arsenate (CCA) was introduced at the site after 1972 as a wood preservative. Pentachlorophenol (PCP) was added as a wood preservative after 1980. Site closure activities began about 1975 when SWP obtained a permit to bury an onsite drainage ditch which contained creosote sludge. The ditch was subsequently covered with fill material. In May 1983, wood treatment operations on site ceased and the site equipment was removed (Ref. 8). In 1981, COW authorized Soil and Materials Engineering, Inc. (SME) to install five soil borings on the thirty-five acres of the site which the COW owns. Four of the borings were completed as shallow monitoring wells (screened above the peat). The additional boring was completed as an intermediate monitoring well (screened below the peat, but above the limestone believed to be the Pee Dee formation). As part of this field work, groundwater samples were obtained for inorganic and organic analyses.

A Preliminary Assessment of the site was completed in July 1984 by the North Carolina Department of Human Resources (Ref. 9). Representatives of NCDHR observed visibly stained soil in the main production area, near a cluster of creosote storage tanks, and in the vicinity of the covered sludge ditch. Surface water and shallow groundwater were both noted as having an oily sheen present at several locations (Ref. 9). No samples were believed to have been collected during the Preliminary Assessment. A recommendation of a medium priority site inspection was made.

A Screening Site Investigation (SSI) was conducted for the EPA by Halliburton Corporation (NUS) in January 1985. Sampling for this investigation included the following: four of the five COW groundwater monitoring wells, one groundwater monitoring well at Greenfield Lake, and subsurface soil samples in the land farming areas, on the jetty, and near the boat slips. In addition, NUS representatives collected one surface water and one sediment sample adjacent to the site in the Cape Fear River. A background surface water and sediment sample were obtained from the overflow stream from Greenfield Lake (Ref. 10). Sample results indicated the presence of organic constituents of creosote and inorganics associated with chromated copper arsenate (CCA) in soil and groundwater (Ref 10).

An Administrative Order of Consent between the State of North Carolina and SWP was agreed upon in May of 1985 (Ref. 11). As part of the order, one upgradient and three downgradient wells were installed to monitor groundwater during the landfarming activities outlined in the Order. Periodic land farm soil monitoring and biannual water quality monitoring were also part of the Administrative Order. Land farming continued from the mid-1980s through the early 1990s. During this time, SWP collected 59 composite soil samples from Land Farming Area 1 (LF-1) and 37 composite soil samples from Land Farming Area 2 (LF-2) (Ref. 2). Analyses included the detection of phosphorous, chloride, total organic carbon (TOC), pH, polynuclear aromatic hydrocarbons (PAHs), pentachlorophenol (PCP), phenol, and microbial content (Ref. 2).

In September 1985, Law Environmental installed four groundwater monitoring wells outside the perimeter of the landfill areas. These wells were sampled for PCP and semivolatile organics between 1985 and 1990 (Ref. 2). Geraghty & Miller, Inc. (G & M), conducted soil investigations in 1991 at three areas (outdoor wood storage areas) which were not excavated for land farming. A total of forty-eight shallow soil samples were collected from two nontreated wood storage areas and one treated wood storage area. G & M also conducted soil borings and sampling at LF-1 and LF-2 in October 1990 and October 1991. Composite soil samples were obtained from five locations within each landfarm during these investigations and groundwater samples were taken from the four groundwater monitoring wells installed at the perimeter of the land farming areas (Ref. 12). Sample results indicated the presence of organic constituents of creosote and inorganics in soil and groundwater. In addition, polychlorinated dibenzodioxins and dibenzofurans were detected in soil samples (Ref. 12). Pentachlorophenols used in wood preservation can contain relatively high levels of dioxins and furans. These dioxins and furans are inadvertently produced during manufacture of chlorophenols (Ref. 13).

In February 1992, Environmental Technology Engineering, Inc. (ETE), began a groundwater investigation comprised of three phases. During Phase I, five temporary and eight permanent groundwater monitoring wells were installed and subsequently sampled. Phase II consisted of the abandonment of the five temporary wells and the placement of an additional twelve permanent groundwater monitoring wells. In December 1992, soil and sediment samples were taken from surface drainage areas

including the onsite drainage ditch and Greenfield Creek. Phase III began in October 1993 and involved the installation of another eleven permanent groundwater monitoring wells, sampling of these wells, and the resampling of the preexisting wells (Ref. 14). Sample results indicated organic constituents of creosote and inorganics in soil and groundwater. The locations of the preexisting monitoring wells and newly installed monitoring wells are presented on Figure 2.

The North Carolina Department of Health, Environment, and Natural Resources (NCDEHNR) conducted a Site Inspection Prioritization (SIP) in January 1995 for the purpose of collecting sufficient information to assess threats to human health and the environment. Based on the information collected, the SWP site was recommended as a high priority for an Expanded Site Inspection (Ref. 2).

3.0 Field Investigation

An initial site reconnaissance and walk-over was performed at the SWP site on May 20, 1996, by a representative of BVSPC, 3 representatives of the USEPA Region IV, and a representative of SWPs environmental consultant, Virogroup. Proposed boring locations were observed and discussed, photographs were taken, and general observations of site conditions were made. Field work for the ESI conducted by BVSPC commenced on October 3, 1996 and continued through October 9, 1996, at which time Tropical Storm Josephine and flooding of the Cape Fear River caused a demobilization of personnel and equipment (Refs. 15; 16). Field work resumed on November 4, 1996 and continued through December 23, 1996. Surveying of the groundwater monitoring wells occurred from January 27, 1997 to January 29, 1997. The sampling investigation included the collection of groundwater, surface water, surface soil, subsurface soil, sediment, and biological tissue samples. All samples collected were analyzed for extractable and purgeable organic compounds, pesticides, PCBs, cyanide, and metals. In addition, select samples were analyzed for dioxins and furans. Most sample analyses was performed under the Contract Laboratory Program (CLP) for routine analytical services (RAS). Dioxin/furan analyses were performed under CLP for special analytical services (SAS). All water samples were field tested for temperature, turbidity, pH, and conductivity. Quality Assurance/Quality Control (QA/QC) samples were also collected. QA/QC samples included a trip blank, and a preservative blank for each week of sampling, and a matrix duplicate for every 20 samples in each media (soil and water). Twelve monitoring wells were installed by a drilling subcontractor. Four shallow wells were constructed with screen sections intersecting the unconfined water table aquifer. Four intermediate wells were screened in the semi-confined aquifer beneath the peat/clay layer. Four deep wells were screened in the confined to semi-confined limestone of the Upper PeeDee Formation. The wells provided information required to help characterize the site hydrogeology and assess the nature and extent of groundwater contamination. The monitoring well locations are presented on Figure 2. Details of the shallow, intermediate, and deep monitoring well construction are shown on Figure 3.

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DRAFTERS INITIALS: GB
32014753

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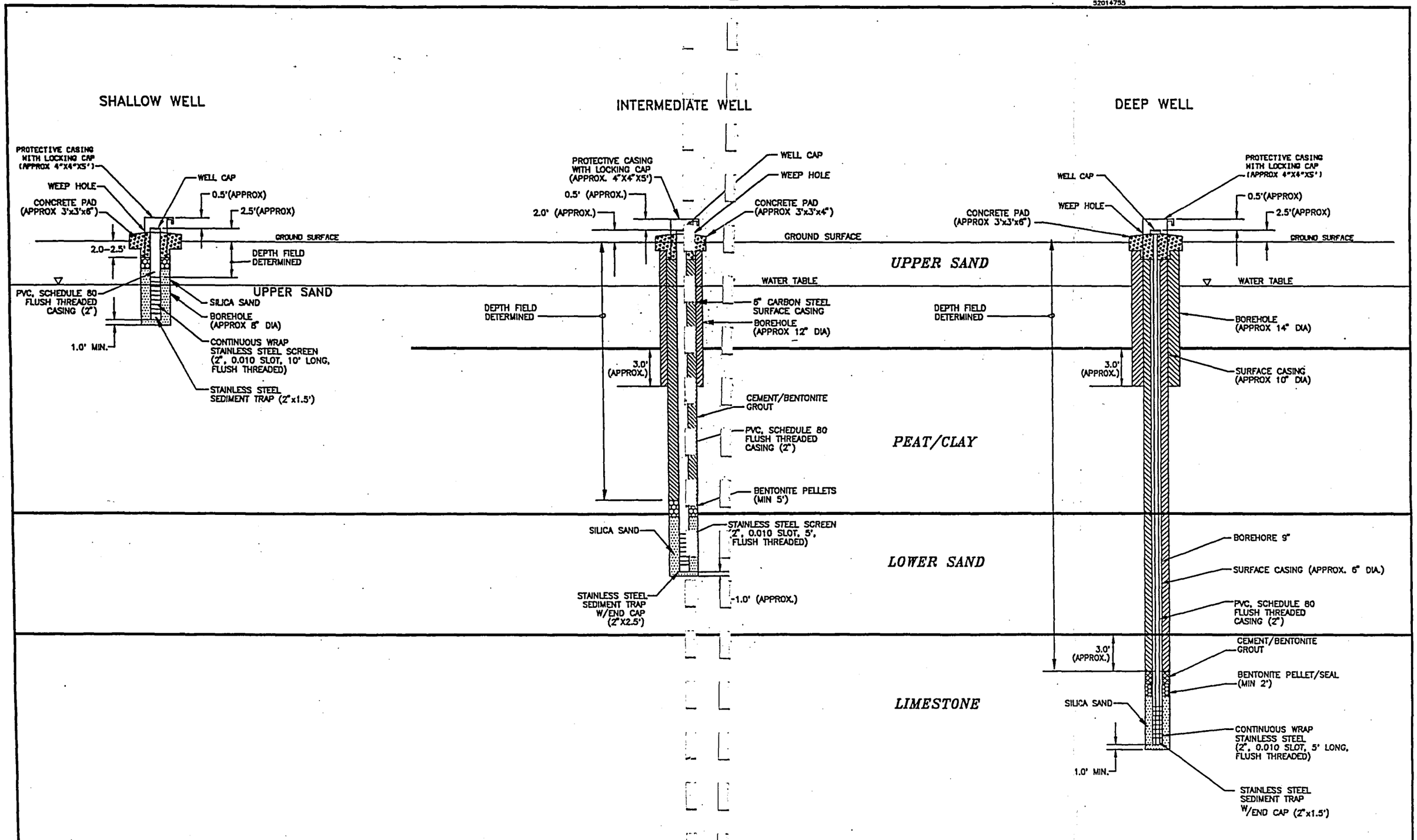

SOUTHERN WOOD PIEDMONT
WILMINGTON, NEW HANOVER COUNTY, NORTH CAROLINA

MONITORING WELL CONSTRUCTION DIAGRAM

FIGURE 3

The following deviations to the sampling plan occurred during field work at the SWP site (Refs. 15; 16). All deviations from the FSP were reported to the EPA Site Assessment Manager (SAM) :

- Sample SP-SW-02 was not obtained due to an inability to gain access to the sample location.
- Biotic samples SP-BIO-01, -02, -03, -04, and -05 were not collected due to the absence of sessile benthic habitats and organisms.
- Sample SP-SD-02 was not collected due to an inability to gain access by boat or using waders.

3.1 Sample Collection

The sampling investigation included the collection of 31 groundwater, 8 surface water, 21 surface soil, 21 subsurface soil, 18 sediment, and 3 biological tissue samples. All samples collected were analyzed for extractable and purgeable organic compounds, pesticides, PCBs, cyanide, and metals. Additionally, 7 of the 21 surface soil samples were analyzed for dioxins and furans.

3.2 Sample Collection Methodology

3.2.1 Surface Soil and Sediment Samples

Surface soil and sediment samples were collected using a stainless steel spoon and a 2-quart or equivalent glass bowl. Some sediment samples were collected using stainless steel open or closed bucket hand augers, and/or a stainless steel, Ponar dredge sampler. Samples being analyzed for volatile organic compounds (VOC), were collected first and placed directly into the appropriate containers. The remainder of the sample was placed into the bowl, mixed thoroughly, then distributed to the appropriate containers. The surface soil samples were collected from a depth of no greater than two feet below land surface (bls).

3.2.2 Subsurface Soil Samples

Subsurface soil samples for chemical analyses were collected by using a stainless steel spoon or a stainless steel, 24 inch long split spoon sampler and a 2-quart or equivalent glass bowl. Typically, a subsurface soil sample was obtained using a hand auger, if possible, from a depth of greater than 2 feet bls but above the water table. If a hand auger was inadequate, a drill rig using hollow stem augers and split spoon samplers of the appropriate type were used. The VOC sample was collected first

and placed directly into the appropriate sample container. The remainder of the sample was thoroughly mixed in the bowl and placed into the appropriate containers.

3.2.3 Groundwater Samples

Groundwater samples from the 12 monitoring wells installed during this field investigation were collected after the wells had been installed, developed, and purged. Groundwater samples from 19 of the existing monitoring wells on site were collected after the wells were purged. Details of the 12, newly installed monitoring wells are presented on Figure 3.

Plastic sheeting was placed around the well to keep equipment from coming in contact with the ground surface. A previously decontaminated electric, water level indicator was placed into the well to measure the depth of the static water level and total depth of the well. Measurements were measured to the nearest 0.01 foot and taken from a reference notch etched at the top of the casing. The volume of the well casing was then calculated. Depth measurements and volume calculations were recorded in the field logbook. A decontaminated, submersible pump was used to develop the wells in a manner that minimized water turbidity. Care was exercised in maintaining the location of the pump or teflon hose just below the level of water in the well to assure that the entire static volume was removed. After the pump was removed from the well, all wetted portions of the pump and related tubing were decontaminated. The pump used was a submersible pump constructed of stainless steel and equipped with new, polyethylene tubing at each well location.

During well purging, field parameters (pH, temperature, specific conductance, and turbidity) was measured and recorded. Purging terminated when a minimum of three casing volumes had been withdrawn and field parameter readings had stabilized (pH readings within 0.1 units, temperature within 0.5 degrees Celsius, specific conductance within three percent, and turbidity at or below 20 nephelometric units) or upon removal of five casing volumes from each well. Water from well purging activities was containerized in Department of Transportation (DOT) approved 55-gallon drums.

Prior to sampling, new, decontaminated Teflon tubing was inserted into the well casing. A peristaltic pump was used to remove groundwater from the well and place

it into the appropriate sample containers. The time of sampling was recorded in the field logbook. VOC samples were collected by manually creating a vacuum which traps water in the Teflon tubing, removing the tubing from the well and then filling VOA containers with this water by releasing the vacuum. The volatile organic fraction of the sample was collected first and placed directly into pre-preserved VOA vials. The vials were filled such that headspace was eliminated and no air bubbles were present. The remainder of the sample was placed into a one gallon amber glass jug and subsequently transferred into the remaining containers. Temperature, turbidity, pH, and conductivity measurements were taken upon collection of each groundwater sample. Each portion of the sample was properly preserved upon collection.

3.2.4 Surface Water Samples

Surface water sample locations on the Cape Fear River and Greenfield Creek were accessed by use of a small boat. The most downstream sample was collected first and obtained by orienting the sampler and sample container upstream of the boat. The intent of this sampling method was to obtain the most representative and least disturbed surface water samples. At each sample location, the volatile organic fraction of the sample was collected first and placed directly into pre-preserved VOA vials. The vials were filled such that headspace was eliminated and no air bubbles were present. The remainder of the sample was placed into a one gallon amber glass jug and subsequently transferred into the other containers. Temperature, turbidity, pH, and conductivity measurements were taken upon collection of each surface water sample. Samples were properly preserved upon collection.

3.2.5 Biological Tissue Samples

Biological tissue samples were collected from the Cape Fear River and Greenfield Lake by use of hook and line from a small boat. Biological tissue samples consisted of fish tissue only.

Three fish tissue samples were collected to determine the human health exposure risk from the site. The target species for this sampling event were recreational species. Species collected were Speckled Perch, Spot, and Channel Catfish. Two samples were collected in the Cape Fear River and one background sample was collected in Greenfield Lake.

Upon collection of the desired fish species, the specimens were rinsed with surface water from the collection point, identified, weighed, measured, catalogued, and visually inspected for any lesions or other physical abnormalities. The recommended weight for each sample was 500 grams. Attempts were made to obtain more than one specimen of the same species if the weight of one organism was inadequate. The combined fish sample was then prepared for shipment to the analytical laboratory. The whole fish samples were wrapped in new aluminum foil, placed in a waterproof freezer bag, labelled, stored on wet ice, and shipped to the laboratory following laboratory protocols. A chain of custody record was completed by the sampler and included in the shipment of the samples to the laboratory.

3.3 Duplicate Samples

Duplicate samples were offered to Mr. Raymond Knox, Project Manager with ViroGroup (Southern Wood Piedmonts' consultant). Mr. Knox declined to split samples.

3.4 Description of Sample Locations

3.4.1 Surface Soil Sampling

Twenty-one surface soil samples were collected in association with the SWP site at depths no greater than two feet bls. Six samples were taken in former wood storage and landfarming areas. Five samples were located in previously identified contamination source areas. Seven samples were taken in areas which have not been previously sampled. Three background samples were also collected. Two of these background samples were located northeast and southeast of the site. An additional background sample was collected along the north property boundary, between LF-1 & LF-2 and the Amerada Hess Terminal. Sample codes and descriptions are listed in Table 1 and are shown on Figures 1 and 2.

3.4.2 Subsurface Soil Sampling

Twenty-one subsurface soil samples were collected at the same locations as the surface soil samples, including the background locations. The samples were collected at depths greater than two feet bls, but above the water table. Sample codes and descriptions are listed in Table 1 and are shown on Figures 1 and 2.

Table 1
Sample Codes, Descriptions, Locations, and Rationale
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Sample Code	Sample Description	Sample Location	Rationale
SP-SS-01 / SP-SB-01	Surface Soil / Subsurface Soil	North of LF-1 & LF-2.	To establish background levels.
SP-SS-02 / SP-SB-02	Surface Soil / Subsurface Soil	Northeast of the site.	To establish background levels.
SP-SS-03 / SP-SB-03	Surface Soil / Subsurface Soil	Southeast of the site.	To establish background levels.
SP-SS-04 / SP-SB-04	Surface Soil / Subsurface Soil	Wood Storage Area (NTA).	To confirm presence or absence of contamination.
SP-SS-05 / SP-SB-05	Surface Soil / Subsurface Soil	Wood Storage Area (NTB).	To confirm presence or absence of contamination.
SP-SS-06 / SP-SB-06	Surface Soil / Subsurface Soil	CCA and Creosote Treatment Area, center of the site.	To confirm presence or absence of contamination.
SP-SS-07 / SP-SB-07	Surface Soil / Subsurface Soil	CCA and Creosote Treatment Area, center of the site.	To confirm presence or absence of contamination.
SP-SS-08 / SP-SB-08	Surface Soil / Subsurface Soil	CCA and Creosote Treatment Area, center of the site.	To confirm presence or absence of contamination.
SP-SS-09 / SP-SB-09	Surface Soil / Subsurface Soil	Wood Storage Area (TWS).	To confirm presence or absence of contamination.
SP-SS-10 / SP-SB-10	Surface Soil / Subsurface Soil	Wood Storage Area (TWS).	To confirm presence or absence of contamination.
SP-SS-11 / SP-SB-11	Surface Soil / Subsurface Soil	Large Storage Tank Area.	To confirm presence or absence of contamination.
SP-SS-12 / SP-SB-12	Surface Soil / Subsurface Soil	West of road near center of site.	To confirm presence or absence of contamination.
SP-SS-13 / SP-SB-13	Surface Soil / Subsurface Soil	Buried Creosote Ditch Area.	To confirm presence or absence of contamination.
SP-SS-14 / SP-SB-14	Surface Soil / Subsurface Soil	LF-1 and LF-2	To confirm presence or absence of contamination.
SP-SS-15 / SP-SB-15	Surface Soil / Subsurface Soil	Buried Creosote Ditch Area.	To confirm presence or absence of contamination.
SP-SS-16 / SP-SB-16	Surface Soil / Subsurface Soil	Southwest corner of the site.	To confirm presence or absence of contamination.
SP-SS-17 / SP-SB-17	Surface Soil / Subsurface Soil	Between Greenfield Creek and the earthen berm.	To confirm presence or absence of contamination.
SP-SS-18 / SP-SB-18	Surface Soil / Subsurface Soil	South central portion of the site.	To confirm presence or absence of contamination.

Table 1 (continued)
Sample Codes, Descriptions, Locations, and Rationale
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Sample Code	Sample Description	Sample Location	Rationale
SP-SS-19 / SP-SB-19	Surface Soil / Subsurface Soil	South of Wood Storage Area (TWS).	To confirm presence or absence of contamination.
SP-SS-20 / SP-SB-20	Surface Soil / Subsurface Soil	West of Track Area.	To confirm presence or absence of contamination.
SP-SS-21 / SP-SB-21	Surface Soil / Subsurface Soil	Track area.	To confirm presence or absence of contamination.
SP-SD-01	Sediment	East of the site near the entrance gates.	To establish background levels.
SP-SD-03	Sediment	East of the site in the offsite drainage.	To determine presence or absence of contamination.
SP-SD-05	Sediment	Ditch south of Northeast Wood Storage Area (NTA).	To determine presence or absence of contamination.
SP-SD-06	Sediment	Onsite creek southeast of Southeast Wood Storage Area (NTB).	To determine presence or absence of contamination.
SP-SD-07	Sediment	Onsite drainage ditch west of Optimist Park.	To determine presence or absence of contamination.
SP-SD-08	Sediment	Greenfield Creek downstream of the confluence with the on site drainage ditch.	To determine presence or absence of contamination.
SP-SD-09	Sediment	Greenfield Creek downstream of SP-SD-08.	To determine presence or absence of contamination.
SP-SD-10	Sediment	Near the outfall of Greenfield Creek into Cape Fear River.	To determine presence or absence of contamination.
SP-SD-11	Sediment	In the Cape Fear River west of Large Storage Tank Area.	To determine presence or absence of contamination.
SP-SD-12	Sediment	Northwest property boundary at the Cape Fear River.	To determine presence or absence of contamination.
SP-SD-13	Sediment	Wood Storage Area (NTB) near MW-20.	To determine presence or absence of contamination.
SP-SD-14	Sediment	South of the Buried Creosote Ditch Area.	To determine presence or absence of contamination.

Table 1 (continued)
Sample Codes, Descriptions, Locations, and Rationale
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Sample Code	Sample Dscription	Sample Location	Rationale
SP-SD-15	Sediment	South central portion of the site.	To determine presence or absence of contamination.
SP-SD-16	Sediment	Southwestern portion of the site.	To determine presence or absence of contamination.
SP-SD-17	Sediment	Southwestern portion of the site.	To determine presence or absence of contamination.
SP-SD-18	Sediment	Southwestern portion of the site.	To determine presence or absence of contamination.
SP-SD-19	Sediment	Southwestern portion of the site.	To determine presence or absence of contamination.
SP-SD-20	Sediment	Southeastern portion of the site, north of manhole.	To determine presence or absence of contamination.
SP-SW-01	Surface Water	Same location as SP-SD-01.	To establish background levels.
SP-SW-03	Surface Water	East of the railroad crossing Greenfield Creek.	To determine presence or absence of contamination.
SP-SW-04	Surface Water	Same location as SP-SD-07.	To determine presence or absence of contamination.
SP-SW-05	Surface Water	Same location as SP-SD-08.	To determine presence or absence of contamination.
SP-SW-06	Surface Water	Same location as SP-SD-09.	To determine presence or absence of contamination.
SP-SW-07	Surface Water	Same location as SP-SD-10.	To determine presence or absence of contamination.
SP-SW-08	Surface Water	Same location as SP-SD-11.	To determine presence or absence of contamination.
SP-SW-09	Surface Water	Same location as SP-SD-12.	To determine presence or absence of contamination.

Table 1 (continued)
Sample Codes, Descriptions, Locations, and Rationale
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Sample Code	Sample Description	Sample Location	Rationale
SP-MW-08	Groundwater	Southwest of LF-1 and LF-2.	To determine presence or absence of contamination.
SP-MW-08A	Groundwater	West of MW-08.	To determine presence or absence of contamination.
SP-MW-11	Groundwater	East of the CCA and Creosote Treatment Area.	To determine presence or absence of contamination.
SP-MW-11A	Groundwater	Northwest of MW-11.	To determine presence or absence of contamination.
SP-MW-11B	Groundwater	Southwest of MW-11.	To determine presence or absence of contamination.
SP-MW-15	Groundwater	Large Storage Tank Area.	To determine presence or absence of contamination.
SP-MW-16	Groundwater	North of Large Storage Tank Area.	To determine presence or absence of contamination.
SP-MW-17	Groundwater	North of Large Storage Tank Area.	To determine presence or absence of contamination.
SP-MW-20	Groundwater	Wood Storage Area NTB.	To determine presence or absence of contamination.
SP-MW-20A	Groundwater	South of MW-20.	To determine presence or absence of contamination.
SP-MW-22A	Groundwater	Large Storage Area.	To determine presence or absence of contamination.
SP-MW-24	Groundwater	South central portion of the site.	To determine presence or absence of contamination.
SP-MW-24A	Groundwater	West of MW-24.	To determine presence or absence of contamination.
SP-MW-25	Groundwater	South of Buried Creosote Ditch Area.	To determine presence or absence of contamination.
SP-MW-27	Groundwater	Northeast corner of site.	To determine presence or absence of contamination.

Table 1 (continued)
Sample Codes, Descriptions, Locations, and Rationale
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Sample Code	Sample Description	Sample Location	Rationale
SP-MW-28	Groundwater	West of railroad tracks along eastern boundary of the site.	To determine presence or absence of contamination.
SP-MW-28A	Groundwater	Southeast of MW-28.	To determine presence or absence of contamination.
SP-MW-29	Groundwater	Southeastern portion of site.	To determine presence or absence of contamination.
SP-MW-29A	Groundwater	South of MW-29.	To determine presence or absence of contamination.
SP-MW-31	Groundwater	Southwest corner of the site.	To determine presence or absence of contamination.
SP-MW-32	Groundwater	East of MW-31.	To determine presence or absence of contamination.
SP-MW-33	Groundwater	East of MW-32.	To determine presence or absence of contamination.
SP-MW-34	Groundwater	Southern boundary of the site.	To determine presence or absence of contamination.
SP-MW-35	Groundwater	South of MW-34.	To determine presence or absence of contamination.
SP-MW-36	Groundwater	Southwest of MW-35.	To determine presence or absence of contamination.
SP-MW-37	Groundwater	South of softball fields.	To establish background levels.
SP-MW-38	Groundwater	North of MW-37.	To establish background levels.
SP-MW-39	Groundwater	North of MW-38.	To establish background levels.
SP-MW-40	Groundwater	In LF-1 and LF-2.	To determine presence or absence of contamination.
SP-MW-41	Groundwater	East of MW-40.	To determine presence or absence of contamination.
SP-MW-42	Groundwater	East of MW-41.	To determine presence or absence of contamination.

Table 1 (continued)
Sample Codes, Descriptions, Locations, and Rationale
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Sample Code	Sample Description	Sample Location	Rationale
SP-BIO-07	Biological, Fish Tissue	In Cape Fear River near southwestern portion of site.	To determine presence or absence of contamination.
SP-BIO-08	Biological, Fish Tissue	In the Cape Fear River west of Large Storage Tank Area.	To determine presence or absence of contamination.
SP-BIO-09	Biological, Fish Tissue	East of site in Greenfield Lake.	To establish background levels.

SP - Southern Wood Piedmont
SD - Sediment Sample
SS - Surface Soil Sample
SB - Subsurface Soil Sample
MW - Monitoring Well
SW - Surface Water
BIO - Biological Sample
LF - Land Farm Area
NTA - Non-Treated Wood Area
NTB - Non-Treated Wood Area
CCA - Chromated Copper Arsenate Area
TWS - Treated Wood Storage Area

3.4.3 Groundwater Sampling

To characterize the groundwater at the SWP site, groundwater samples were collected from 31 permanent monitoring wells. Nineteen of the wells were previously installed and 12 wells were installed during field work for this ESI. Sample codes and descriptions are listed in Table 1 and shown on Figure 2. Figure 1 describes source areas of the site.

3.4.4 Surface Water Sampling

Eight surface water samples were collected at the same locations as eight of the sediment samples. The eight sediment sample locations chosen for surface water collection are as follows: SP-SD-01, and SP-SD-03 through SP-SD-09. A background surface water sample was taken from SP-SD-01 location. Sample codes and descriptions are listed in Table 1 and shown on Figure 2.

3.4.5 Sediment Sampling

Eighteen sediment samples were collected during the ESI at the SWP site. One of the sediment samples was collected as a background sample, inland and upgradient of the site. Three sediment samples were collected in the Cape Fear River, one at the northwest property boundary, one in the south boat slip, and one at the outfall of Greenfield Creek into the Cape Fear River. Three sediment samples were taken from Greenfield Creek. Two samples were collected in the onsite drainage feature. One sediment sample came from an offsite drainage feature which lies parallel to the train tracks along the eastern property boundary. A total of five sediment samples were taken in the wetland areas located in the southwestern portion of the site. Two samples were from the wetland area south of the buried creosote sludge ditch. The remaining two sediment samples were taken from wetlands in and around the southeast wood storage area (NTB). Sample codes and descriptions are listed in Table 1 and shown on Figure 2.

3.4.6 Biological Sampling

Three biological tissue samples were collected in the surface waters near to the site. One sample was collected at the outfall of Greenfield Creek into the Cape Fear River, one was collected in the south slip on the western portion of the site, and one was collected upgradient and offsite as a background sample in Greenfield Lake. Sample codes and descriptions are listed in Table 1 and shown on Figure 2.

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3.5 Analytical Support and Methodology

All sample collection, sample preservation, and chain-of-custody procedures used during this investigation was in accordance with the standard operating procedures as specified in the USEPA Region 4, Environmental Services Division, Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, May, 1996, (EISOPQAM). Water matrix trip blanks were collected weekly for quality control purposes.

All laboratory analyses and laboratory quality assurance procedures used during this investigation were in accordance with standard procedures and protocols as specified in the Analytical Support Branch's Laboratory Operations and Quality Control Manual, United States Environmental Protection Agency Region IV, Environmental Services Division, October 1990, or as specified by the existing United States Environmental Protection Agency standard procedures and protocols for the Contract Laboratory Program (CLP). Analysis for dioxins was by EPA SW-846 method 8290 for select soil samples. All samples were submitted to CLP laboratories, as appropriate, at the time of sampling.

3.6 Analytical Data and Data Qualifiers

All analytical data were subjected to a quality assurance review as described in the EPA Environmental Services Division laboratory data evaluation guidelines. In the tables presented, some of the concentrations of the organic and inorganic analytes may have been assigned a "J" qualifier. This indicates that the qualitative analysis was acceptable, but the quantitative value is an estimate. Other analytes may have been assigned an "N" qualifier, indicating that they were detected based on the presumptive evidence of their presence. This means that the compound is only tentatively identified, and its detection cannot be a positive indication of its presence. The results for some of the samples are assigned a "U" qualifier. This qualifier indicates that the contaminant was analyzed for but not detected above the sample quantitation limit for that sample (SQL). The reported number is the laboratory derived sample quantitation limit for the compound or element in that sample. At times, miscellaneous organic compounds that do not appear on the target compound list are reported with a data set. These compounds are assigned a "JN" qualifier, indicating that they are tentatively identified at estimated quantities. Because these compounds are not routinely analyzed for, background levels or SQL levels are not

generally available for comparison. The complete analytical data sheets are provided in Appendix A of this report.

Samples containing concentrations of contaminants greater than three times those of the background sample are considered to be elevated. In the cases where there was no detection of a contaminant at the background location, any sample with a concentration above its sample quantitation limit (SQL) and above the background SQL is considered to be elevated. These samples are noted in the text and are shaded in the tables.

4.0 Waste Sources

4.1 Source Descriptions

The source area for soil contamination at the SWP site is approximately 35 acres of land which lie from the north central to southeastern portion of the site. Included are areas which were once utilized for wood preserving and wood storage activities, the large storage tank area, the creosote treatment area, the covered sludge ditch, small diesel storage area, and landfarming activities. Potential source areas are illustrated on Figure 1.

4.2 Source Sample Locations

Twenty-one surface and twenty-one subsurface soil samples were collected in association with the SWP site at depths from 0 to 2 feet bls and at depths greater than 2 feet but above the water table, respectively. Six samples were taken in former wood storage and landfarming areas. Five samples were located in previously identified contamination source areas. Seven samples were taken in areas which were not previously sampled. Three samples were collected as background samples, with two of these located northeast and southeast of the site. An additional background sample was collected along the north property boundary, between LF-1 & LF-2 and the Amerada Hess Terminal. Sample codes and descriptions are listed in Table 1 and are shown on Figure 2.

4.3 Source Sampling Results

4.3.1 Source Organic Analytical Results

Elevated levels of extractable organic constituents were detected in surface soil samples SP-SS-05, SP-SS-06, SP-SS-07, SP-SS-08, SP-SS-09, SP-SS-10, SP-SS-11, SP-SS-13, SP-SS-14, SP-SS-17, and SP-SS-21. Extractable organic constituents detected at elevated levels in surface soil samples include: naphthalene, 2-methylnaphthalene, acenaphthylene, acenaphthene, dibenzofuran, fluorene, pentachlorophenol, phenanthrene, anthracene, carbazole, fluoranthene, pyrene, benzo(a)anthracene, chrysene, bis(2-ethylhexyl)phthalate, benzo (b and/or k) fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, and indeno(1,2,3-cd)pyrene. No purgeable organic constituents were detected in surface soil samples obtained during this

investigation. Elevated levels of pesticides were detected in surface soil samples SP-SS-03, SP-SS-05, SP-SS-08, and SP-SS-21. Pesticides detected at elevated levels in surface soils include: endosulfan I (alpha) and 4,4'-DDE (P,P'-DDE). Dioxin/furan constituents were detected in surface soil samples SP-SS-06, SP-SS-13, SP-SS-14, SP-SS-17, and SP-SS-19. Dioxin/furan compounds detected at elevated levels in surface soil samples include 2,3,7,8-tetrachlorodibenzodioxin, tetrachlorodibenzodioxin (total), 1,2,3,7,8-pentachlorodibenzodioxin, pentachlorodibenzodioxin (total), 1,2,3,4,7,8-hexachlorodibenzodioxin, 1,2,3,6,7,8-hexa-chlorodibenzodioxin, 1,2,3,7,8,9-hexachlorodibenzodioxin, hexachlorodibenzodioxin (total), 1,2,3,4,6,7,8-heptachlorodibenzodioxin, heptachlorodibenzodioxin (total), octa-chlorodibenzodioxin, 2,3,7,8-tetrachlorodibenzofuran, tetrachlorodibenzofuran (total), 2,3,4,7,8-pentachlorodibenzofuran, pentachlorodibenzofuran (total), 1,2,3,6,7,8-hexachlorodibenzofuran, 2,3,4,6,7,8-hexachlorodibenzofuran, hexachlorodibenzofuran (total), 1,2,3,4,6,7,8-heptachlorodibenzofuran, 1,2,3,4,,7,8,9-heptachlorodibenzofuran, heptachlorodibenzofuran (total), and octachlorodibenzofuran (total). Toxicity Equivalency Values (TEQ) ranged from 250 to 3,100 ng/kg for the surface soil source sample. The surface soil source sample organic analytical results for extractables, pesticides/PCBs, and dioxin/furans are summarized in Tables 2, 3, and 4, respectively. Elevated levels of extractable organic constituents were detected in subsurface soil samples SP-SB-03, SP-SB-04, SP-SB-05, SP-SB-07, SP-SB-08, SP-SB-09, SP-SB-10, SP-SB-11, SP-SB-12, SP-SB-13, SP-SB-14, SP-SB-17, SP-SB-20, and SP-SB-21. Extractable organic constituents detected at elevated levels in subsurface soil samples include: naphthalene, 2-methylnaphthalene, acenaphthylene, acenaphthene, dibenzofuran, fluorene, phenanthrene, anthracene, carbazole, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo (b and/or k) fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, and indeno(1,2,3-cd)pyrene. Elevated levels of purgeable organic constituents were detected in subsurface soil samples SP-SB-03, SA-SB-05, SP-SB-07, SP-SB-08, and SP-SB-11. These purgeable organic constituents included benzene, ethyl benzene, methyl ethyl ketone, toluene and total xylenes.

Table 2
Surface Soil Extractable Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background SP-SS-01	SP-SS-02	SP-SS-03	SP-SS-04	SP-SS-05	SP-SS-06
Extractable Organic Compounds						
2-Chlorophenol	390 U	-	-	-	-	-
2,4 -Dimethylphenol	390 U	-	-	-	-	-
Naphthalene	390 U	85 J	62 J	-	-	42 J
2-Methylnaphthalene	390 U	120 J	-	-	-	-
Acenaphthylene	390 U	-	-	-	38 J	160 J
Acenaphthene	390 U	-	-	-	-	110 J
Dibenzofuran	390 U	46 J	-	-	42 J	84 J
Fluorene	390 U	-	-	-	-	130 J
Hexachlorobenzene	390 U	-	-	-	-	-
Pentachlorophenol	970 U	-	-	-	170 J	4,800
Phenanthrene	390 U	140J	72 J	59 J	390	1,500
Anthracene	390 U	-	-	50 J	220 J	2,200
Carbazole	390 U	-	-	77 J	220 J	320 J
Di-n-Butyl Phthalate	390 U	100 J	-	-	-	-
Fluoranthene	250 J	-	160 J	520	1,600	9,800
Pyrene	220 J	96 J	180 J	400 J	1,500 J	8,000 J
Benzo(a)anthracene	390 U	-	110 J	-	740	2,700 J
Chrysene	220 J	100 J	150 J	310 J	1,300	3,900 J
Bis(2-ethylhexyl) Phthalate	390 U	-	-	-	-	-
Benzo (b and/or k) Fluoranthene	220 J	150 J	260 J	300 J	1,600	2,800 J
Benzo(a)Pyrene	150 J	87 J	140 J	110 J	140 J	1,400 J
Indeno (1,2,3 -cd) Pyrene	110 J	63 J	140 J	92 J	290 J	910 J
Benzo (g,h,i) Perylene	110 J	56 J	180 J	79 J	260 J	910 J
Miscellaneous Extractable Organic Compounds						
1- Methylnaphthalene		90 JN				
Biphenyl						
Methylnaphthalene						
Dimethylnaphthalene		90 JN				
Methyldibenzofuran						
Fluorenone					80 JN	
Methylanthracene						
Methylanthracene (2 isomers)					200 JN	
Methylphenanthrene					400 JN	
Phenylnaphthalene					90 JN	
Anthracenedione					300 JN	
Dimethylphenanthrene						

Table 2 (continued)
Surface Soil Extractable Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background SP-SS-01	SP-SS-02	SP-SS-03	SP-SS-04	SP-SS-05	SP-SS-06
Miscellaneous Extractable Organic Compounds						
Dimethylphenanthrene (2 isomers)					500 JN	
Cyclopentaphenanthrenone					300 JN	
Benzacephenanthrylene						
Ethyleneglycol						
Benzofluorene						
Methylpyrene	100 JN				90 JN	
Methylpyrene (2 isomers)						
Benzoanthracenone						
Benzoanthracenone (2 isomers)					300 JN	
Benzonaphthothiophene					200 JN	
Methylbenzanthracene					600 JN	
Perylene	200 JN	100 JN		400 JN	200 JN	
Benzanthracenone						
Carboxylic Acid			700 JN			
Benzofluoranthene (not B or K)						
Benzopyrene (not A)						
Unidentified Compounds / #	6,000 J/ 4	3,000 J / 4	1,000 J/2	3,000 J/3	2,000 J/3	
Alkanes						

ug/kg micrograms per kilogram
SP Southern Wood Piedmont
SS Surface Soil
J Estimated Value
N Presumptive evidence of presence of material
U Material analyzed for but not detected. Number is the sample quantitation limit (SQL).
\- Not detected

Elevated levels which are greater than three times the background level or greater than the SQL.

Table 2 (continued)
Surface Soil Extractable Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background					
	SP-SS-01	SP-SS-07	SP-SS-08	SP-SS-09	SP-SS-10	SP-SS-11
Extractable Organic Compounds						
2-Chlorophenol	390 U	-	-	-	-	-
2,4-Dimethylphenol	390 U	-	-	-	-	-
Naphthalene	390 U	570 J	620	-	250 J	-
2-Methylnaphthalene	390 U	470 J	360 J	-	230 J	-
Acenaphthylene	390 U	470 J	160 J	-	190 J	-
Acenaphthene	390 U	-	300 J	-	-	-
Dibenzofuran	390 U	360 J	590	-	220 J	-
Fluorene	390 U	-	230 J	-	-	-
Hexachlorobenzene	390 U	-	-	-	-	-
Pentachlorophenol	970 U	-	1,200	-	-	-
Phenanthrene	390 U	1,600 J	1,900	71 J	920	-
Anthracene	390 U	800 J	670	220 J	510 J	-
Carbazole	390 U	400 J	270 J	97 J	360 J	
Di-n-butyl Phthalate	390 U	-	-	-	-	-
Fluoranthene	250 J	5,500	5,200	380	5,000	-
Pyrene	220 J	9,400 J	4,900 J	580 J	4,900 J	-
Benzo(a)anthracene	390 U	4,200	1,500	170 J	1,800	-
Chrysene	220 J	6,600	2,700	340 J	3,600	-
Bis(2-ethylhexyl)phthalate	390 U	-	-	-	-	800
Benzo(b and/or k) fluoranthene	220 J	13,000	6,200	830 J	5,500	-
Benzo(a)pyrene	150 J	5,300	1,000	180 J	1,300	-
Indeno(1,2,3-cd)pyrene	110 J	5,000	1,600	190 J	240 J	-
Benzo(g,h,i)perylene	110 J	5,100	1,900	200 J	1,300	-
Miscellaneous Extractable Organic Compounds						
1- Methylnaphthalene			100 JN			
Biphenyl			200 JN			
Methylnaphthalene					200 JN	
Dimethylnaphthalene		400 JN	200 JN		400 JN	
Methyldibenzofuran					200 JN	
Fluorenone			200 JN		600 JN	
Methylanthracene		500 JN	300 JN			
Methylanthracene (2 isomers)						
Methylphenanthrene			200 JN			
Phenylnaphthalene						
Anthracenedione		600 JN	1,000 JN			
Dimethylphenanthrene						

Table 2 (continued)
Surface Soil Extractable Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background					
	SP-SS-01	SP-SS-07	SP-SS-08	SP-SS-09	SP-SS-10	SP-SS-11
Miscellaneous Extractable Organic Compounds						
Dimethylphenanthrene (2 isomers)						
Cyclopentaphenanthrenone		600 JN	300 JN			
Benzacephenanthrylene		4,000 JN				
Ethyleneglycol						
Benzofluorene					700 JN	
Methylpyrene	100 JN					
Methylpyrene (2 isomers)			4,000 JN			
Benzoanthracenone						
Benzoanthracenone (2 isomers)						
Benzonaphthothiophene			1,000 JN		300 JN	
Methylbenzanthracene						
Perylene	200 JN		90 JN		200 JN	
Benzanthracenone			800 JN	100 JN		
Carboxylic Acid				500 JN		
Benzofluoranthene (not B or K)						
Benzopyrene (not A)						
Unidentified Compounds / #	6,000 J/ 4		2,000 J/4	900 J/2		2,000 J/3
Alkanes			400 J		4,000 J	

ug/kg micrograms per kilogram
SP Southern Wood Piedmont
SS Surface Soil
J Estimated Value
N Presumptive evidence of presence of material
U Material analyzed for but not detected. Number is the sample quantitation limit (SQL).
\- Not detected
Elevated levels which are greater than three times the background level or greater than the SQL.

Table 2 (continued)
Surface Soil Extractable Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background	Source Samples				
	SP-SS-01	SP-SS-12	SP-SS-13	SP-SS-14	SP-SS-15	SP-SS-16
Extractable Organic Compounds						
2-Chlorophenol	390 U	-	-	39 J	-	-
2,4-Dimethylphenol	390 U	-	-	70 J	-	-
Naphthalene	390 U	180 J	65 J	620	-	-
2-Methylnaphthalene	390 U	66 J	-	250 J	-	-
Acenaphthylene	390 U	-	120 J	11,000	-	-
Acenaphthene	390 U	53 J	39 J	510	-	-
Dibenzofuran	390 U	66 J	47 J	380	-	-
Fluorene	390 U	-	55 J	690	-	-
Hexachlorobenzene	390 U	-	40 J	-	-	-
Pentachlorophenol	970 U	-	160 J	1,900	-	-
Phenanthrene	390 U	240 J	210 J	3,600 J	-	-
Anthracene	390 U	120 J	370	33,000	-	-
Carbazole	390 U	48 J	96 J	3,500 J	-	-
Di-n-butyl Phthalate	390 U	-	-	-	-	-
Fluoranthene	250 J	430 J	400	23,000	-	-
Pyrene	220 J	360 J	340 J	41,000 J	-	-
Benzo(a)anthracene	390 U	200 J	190 J	21,000 J	-	-
Chrysene	220 J	270 J	280 J	28,000 J	-	-
Bis(2-ethylhexyl)phthalate	390 U	-	-	-	-	-
Benzo(b and/or k) fluoranthene	220 J	460 J	780 J	34,000 J	-	-
Benzo(a)pyrene	150 J	130 J	310 J	29,000 J	-	-
Indeno(1,2,3-cd)pyrene	110 J	170 J	550	17,000 J	-	-
Benzo(g,h,i)perylene	110 J	200 J	580	17,000 J	-	-
Miscellaneous Extractable Organic Compounds						
1- Methylnaphthalene						
Biphenyl						
Methylnaphthalene						
Dimethylnaphthalene						
Methyldibenzofuran						
Fluorenone						
Methylanthracene						
Methylanthracene (2 isomers)						
Methylphenanthrene						
Phenylnaphthalene						
Anthracenedione						
Dimethylphenanthrene						

Table 2 (continued)
Surface Soil Extractable Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background	Source Samples				
	SP-SS-01	SP-SS-12	SP-SS-13	SP-SS-14	SP-SS-15	SP-SS-16
Miscellaneous Extractable Organic Compounds						
Dimethylphenanthrene (2 isomers)						
Cyclopentaphenanthrenone						
Benzacephenanthrylene						
Ethyleneglycol						
Benzofluorene						
Methylpyrene	100 JN					
Methylpyrene (2 isomers)						
Benzoanthracenone						
Benzoanthracenone (2 isomers)						
Benzonaphthothiophene						
Methylbenzanthracene						
Perylene	200 JN	200 JN	200 JN			
Benzanthracenone						
Carboxylic Acid		600 JN				3,000 J
Benzofluoranthene (not B or K)						
Benzopyrene (not A)						
Unidentified Compounds / #	6,000 J/ 4	2,000 J/4	5,000 J/6		4,000 J/4	700 J/1
Alkanes		5,000 J				

ug/kg micrograms per kilogram
SP Southern Wood Piedmont
SS Surface Soil
J Estimated Value
N Presumptive evidence of presence of material
U Material analyzed for but not detected. Number is the sample quantitation limit (SQL).
\- Not detected

Elevated levels which are greater than three times the background level or greater than the SQL.

Table 2 (continued)
Surface Soil Extractable Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background	Source Samples				
	SP-SS-01	SP-SS-17	SP-SS-18	SP-SS-19	SP-SS-20	SP-SS-21
Extractable Organic Compounds						
2-Chlorophenol	390 U	-	-	-	-	-
2,4-Dimethylphenol	390 U	-	-	-	-	-
Naphthalene	390 U	480 J	-	-	-	82 J
2-Methylnaphthalene	390 U	420 J	-	-	-	47 J
Acenaphthylene	390 U	360 J	-	-	-	37 J
Acenaphthene	390 U	-	-	-	-	-
Dibenzofuran	390 U	300 J	-	-	-	54 J
Fluorene	390 U	-	-	-	-	-
Hexachlorobenzene (HCB)	390 U	-	-	-	-	-
Pentachlorophenol	970 U	-	-	-	-	-
Phenanthrene	390 U	1,400 J	150 J	55 J	38 J	210 J
Anthracene	390 U	670 J	-	-	34 J	110 J
Carbazole	390 U	320 J	-	-	46 J	63 J
Di-n-butyl Phthalate	390 U	-	-	-	-	-
Fluoranthene	250 J	4,800	620	210 J	360 J	520
Pyrene	220 J	7,200 J	560	230 J	340 J	710 J
Benzo(a)anthracene	390 U	3,700	350 J	200 J	140 J	270 J
Chrysene	220 J	5,700	300 J	220 J	290 J	480
Bis(2-ethylhexyl)phthalate	390 U	-	-	-	-	-
Benzo(b and/or k) fluoranthene	220 J	12,000	330 J	280 J	450 J	1,100
Benzo(a)pyrene	150 J	4,700	340 J	250 J	95 J	260 J
Indeno(1,2,3-cd)pyrene	110 J	4,500	210 J	130 J	97 J	340 J
Benzo(g,h,i)perylene	110 J	4,600	250 J	160 J	98 J	360
Miscellaneous Extractable Organic Compounds						
1- Methylnaphthalene						
Biphenyl						
Methylnaphthalene						
Dimethylnaphthalene		400 JN				
Methyldibenzofuran						
Fluorenone		400 JN				
Methylanthracene		200 JN				
Methylanthracene (2 isomers)						
Methylphenanthrene						
Phenylnaphthalene						
Anthracenedione		700 JN				400 JN
Dimethylphenanthrene		400 JN				

Table 2 (continued)
Surface Soil Extractable Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background	Source Samples				
	SP-SS-01	SP-SS-17	SP-SS-18	SP-SS-19	SP-SS-20	SP-SS-21
Miscellaneous Extractable Organic Compounds						
Dimethylphenanthrene (2 isomers)						
Cyclopentaphenanthrenone		500 JN				100 JN
Benzacephenanthrylene						
Ethyleneglycol					300 JN	
Benzofluorene					100 JN	
Methylpyrene	100 JN				400 JN	200 JN
Methylpyrene (2 isomers)						
Benzoanthracenone		500 JN				
Benzoanthracenone (2 isomers)						
Benzonaphthothiophene			100 JN		100 JN	
Methylbenzanthracene			100 JN			
Perylene	200 JN	3,000 JN	200 JN	200 JN	100 JN	
Benzanthracenone					100 JN	
Carboxylic Acid						
Benzofluoranthene (not B or K)						80 JN
Benzopyrene (not A)						80 JN
Unidentified Compounds / #	6,000 J/ 4		4,000 J/3	6,000 J/5	600 J/1	600 J/1
Alkanes					1,000 J	

ug/kg micrograms per kilogram
SP Southern Wood Piedmont
SS Surface Soil
J Estimated Value
N Presumptive evidence of presence of material
U Material analyzed for but not detected. Number is the sample quantitation limit (SQL).
\- Not detected

Elevated levels which are greater than three times the background level or greater than the SQL.

Table 3
Surface Soil Pesticide/PCB Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background	Source Samples				
	SP-SS-01	SP-SS-02	SP-SS-03	SP-SS-04	SP-SS-05	SP-SS-06
Pesticides / PCB Compounds						
Endosulfan I (Alpha)	2.0 U	-	-	-	75 J	-
4,4' -DDE (P,P' -DDE)	3.9 U	-	15 J	-	-	-
Endrin	3.9 U	-	-	-	-	-
4,4' -DDT (P,P' -DDT)	3.9 U	-	10 JN	-	-	-
Pesticides / PCB Compounds	**SP-SS-01**	**SP-SS-07**	**SP-SS-08**	**SP-SS-09**	**SP-SS-10**	**SP-SS-11**
Endosulfan I (Alpha)	2.0 U	130 N	78 J	-	-	-
4,4' -DDE (P,P' -DDE)	3.9 U	-	-	-	-	-
Endrin	3.9 U	-	-	-	-	-
4,4' -DDT (P,P' -DDT)	3.9 U	-	-	-	-	-
Pesticides / PCB Compounds	**SP-SS-01**	**SP-SS-12**	**SP-SS-13**	**SP-SS-14**	**SP-SS-15**	**SP-SS-16**
Endosulfan I (Alpha)	2.0 U	6.0 N	-	-	-	-
4,4' -DDE (P,P' -DDE)	3.9 U	-	-	-	-	-
Endrin	3.9 U	-	-	150 N	-	-
4,4' -DDT (P,P' -DDT)	3.9 U	-	-	-	-	-
Pesticides / PCB Compounds	**SP-SS-01**	**SP-SS-17**	**SP-SS-18**	**SP-SS-19**	**SP-SS-20**	**SP-SS-21**
Endosulfan I (Alpha)	2.0 U	-	-	-	5.2 N	16
4,4' -DDE (P,P' -DDE)	3.9 U	-	-	-	-	-
Endrin	3.9 U	-	-	-	-	-
4,4' -DDT (P,P' -DDT)	3.9 U	-	-	-	-	-

ug/kg micrograms per kilogram
SP Southern Wood Piedmont
SS Surface Soil
J Estimated Value
N Presumptive evidence of presence of material
U Material analyzed for but not detected. Number is the sample quantitation limit (SQL).
\- Not detected

Elevated levels which are greater than three times the background level or greater than the SQL.

TABLE 4
Surface Soil Dioxin/Furan Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ng/kg)	Control	Source Sample					
	SP-SS-02	SP-SS-06	SP-SS-13	SP-SS-14	SP-SS-15	SP-SS-17	SP-SS-19
2,3,7,8-Tetrachlorodibenzodioxin	2.2 U	23	-	-	-	-	0.90 J
Tetrachlorodibenzodioxin (Total)	2.8 J	1,200 J	-	82 J	-	-	2.3 J
1,2,3,7,8-Pentachlorodibenzodioxin	0.76 J	360	12 J	40	-	-	2.6 J
Pentachlorodibenzodioxin (Total)	4.1 J	4,300 J	12 J	750 J	-	16 J	14 J
1,2,3,4,7,8-Hexachlorodibenzodioxin	5.5 U	1,100	44 J	250	-	46 J	7.0
1,2,3,6,7,8-Hexachlorodibenzodioxin	5.5 U	2,500	130	1,700	-	350	12
1,2,3,7,8,9-Hexachlorodibenzodioxin	1.3 J	1,800	130	660	-	120	14
Hexachlorodibenzodioxin (Total)	18 J	22,000 J	2,500 J	28,000 J	4.8 J	4,600 J	130 J
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	30 U	84,000	7,900 J	76,000	-	24,000	460
Heptachlorodibenzodioxin (Total)	80 UJ	180,000 J	33,000 J	460,000 J	47 J	110,000 J	1,200 J
Octachlorodibenzodioxin (Total)	300 U	1,000,000	100,000	940,000	-	300,000	4,400 J
2,3,7,8-Tetrachlorodibenzofuran	2.2 U	100 J	-	16 J	-	-	-
Tetrachlorodibenzofuran (Total)	46 J	470 J	-	71 J	-	-	-
2,3,4,7,8-Pentachlorodibenzofuran	3.2 J	170	-	66	-	-	1.2 J
Pentachlorodibenzofuran (Total)	370 J	2,800 J	58 J	1,300 J	4.9 J	100 J	19 J
1,2,3,6,7,8-Hexachlorodibenzofuran	4.0 J	550	-	390	2.0 J	-	2.1 J
2,3,4,6,7,8-Hexachlorodibenzofuran	17	1,100	-	580	2.6 J	-	-
Hexachlorodibenzofuran (Total)	230 J	12,000 J	1,100 J	15,000 J	180 J	1,800 J	77 J
1,2,3,4,6,7,8-Heptachlorodibenzofuran	42	12,000	2,500	94,000	410	3,100	160
1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.0 J	850	68 J	1,100	4.6 J	99 J	-
Heptachlorodibenzofuran (Total)	43 J	13,000 J	2,600 J	95,000 J	420 J	3,200 J	160 J
Octachlorodibenzofuran (Total)	28	52,000	5,000	75,000	210	11,000	250
TEQ* (Toxicity Equivalents Value)	4.7 J	3,000	250	3,100	4.8 J	640	17 J

> 1 ppb

NOTES:

- \- Material analyzed for but not detected
- SP Southern Wood Piedmont
- SS Surface Soil
- ng/kg Nanograms per kilogram
- J Estimated Value.
- U Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).
- * The total amount of toxic dioxin and furan concentrations present at a site is usually expressed as toxic equivalents (TEQ) of 2,3,7,8-tetrachlorodibenzodioxion (TCDD) present.

Elevated levels which are greater than three times background level or greater than the SQL.

Elevated levels of pesticides were detected in subsurface soil samples SP-SB-03, SP-SB-04, SP-SB-05, SP-SB-09, SP-SB-11, SP-SB-20, and SP-SB-21. Pesticides detected at elevated levels in subsurface soils include: endosulfan I (alpha), 4,4'-DDE (P,P'-DDE), and 4,4'-DDD (P,P'-DDD). Subsurface soil samples were not analyzed for dioxin/furans during this investigation. The subsurface soil source sample extractable, purgeable, and pesticide/PCB analytical results are summarized in Tables 5, 6, and 7, respectively.

4.3.2 Source Inorganic Analytical Results

Inorganic analytes were detected at elevated levels in all surface and subsurface soil source samples when compared to background levels of naturally occurring levels for the area. Inorganic analytes were detected at elevated levels in surface soil samples SP-SS-02, SP-SS-03, SP-SS-04, SP-SS-05, SP-SS-06, SP-SS-07, SP-SS-08, SP-SS-09, SP-SS-10, SP-SS-11, SP-SS-12, SP-SS-14, SP-SS-19, SP-SS-20, and SP-SS-21 and in subsurface soil samples SP-SB-02, SP-SB-03, SP-SB-04, SP-SB-06, SP-SB-07, SP-SB-08, SP-SB-09, SP-SB-10, SP-SB-11, SP-SB-12, SP-SB-14, and SP-SB-18. Inorganic analytes detected at elevated levels in both surface and subsurface soil include aluminum, arsenic, barium, cadmium, calcium, chromium, cobalt, copper, cyanide, iron, lead, magnesium, manganese, mercury, nickel, potassium, sodium, vanadium, and zinc. No additional inorganic analytes were detected in surface soil samples. A more detailed summary of surface and subsurface soil inorganic analytical results are presented in Tables 8 and 9. The complete set of analytical data is presented in Appendix A.

Table 5
Subsurface Soil Extractable Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background					
	SP-SB-01	SP-SB-02	SP-SB-03	SP-SB-04	SP-SB-05	SP-SB-06
Extractable Organic Compounds						
Acenaphthene	390 U	-	-	-	9,400 J	360 J
Acenaphthylene	390 U	-	-	-	-	-
Anthracene	390 U	-	56 J	43 J	21,000 J	58 J
Benzo(a)anthracene	390 U	-	57 J	-	29,000 J	42 J
Benzo(a)pyrene	390 U	-	-	100 J	-	51 J
Benzo(b and/or k)fluoranthene	44 J	-	110 J	160 J	24,000 J	77 J
Benzo(g,h,i)perylene	390 U	-	-	77 J	-	42 J
Carbazole	390 U	-	-	-	-	-
Chrysene	390 U	-	81 J	160 J	35,000 J	78 J
Dibenzofuran	390 U	-	-	-	69,000	82 J
Fluoranthene	390 U	-	220 J	180 J	210,000	77 J
Fluorene	390 U	-	-	-	150,000	190 J
Indeno(1,2,3-cd)pyrene	390 U	-	-	86 J	-	-
2-Methylnaphthalene	390 U	-	-	-	-	-
Naphthalene	390 U	-	-	-	-	-
Phenanthrene	390 U	-	120 J	100 J	430,000	67 J
Pyrene	49 J	-	210 J	190 J	97,000 J	71 J
Miscellaneous Extractable Organic Compounds						
Methylnaphthalene						
1 -Methylnaphthalene						
Biphenyl						
Ethylnaphthalene						
Dimethylnaphthalene						
Dimethylnaphthalene (2 isomers)						
Dimethylnaphthalene (3 isomers)						
Trimethylnaphthalene						
Methylbiphenyl						
Vanillin						
Methyldibenzofuran					30,000 JN	
Methylfluorene						
Dibenzothiophene						
Methylanthracene						
Methyl (Methylethyl) Phenanthrene						

Table 5 (continued)
Subsurface Soil Extractable Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background					
	SP-SB-01	SP-SB-02	SP-SB-03	SP-SB-04	SP-SB-05	SP-SB-06
Miscellaneous Extractable Organic						
Benzonaphthothiophene						
Cyclopentaphenanthrenone						
Indenosoquinoline						
Acenaphthopyridine						
Benzofluorene					20,000 JN	
Benzofluorene (2 isomers)						
Benzanthracenone						
Cyclopentapyrene						
Methylphenanthrene						
Anthracenedione					20, 000 JN	
Methylpyrene						
Methylpyrene (2 isomers)						
Tetramethylphenanthrene				6,000 JN		
Benzopyrene (not A)						
Benzofluoranthene (not b or k)					100,000 JN	
Methylchrysene						
Perylene				100 JN		
Naphthochrysene						
Carboxylic Acids						
Benzoic Acid	80 JN					
Hexahydrohydroxytrimethyl Phenanthrenone						
Unidentified Compounds / #	2,000 J/1	1,000 J/2	7,000 J/4	7,000 J/6		
Branched Alkane						
Alkanes			6,000 J			

ug/kg micrograms per kilogram
SP Southern Wood Piedmont
SB Subsurface Soil
J Estimated Value
N Presumptive evidence of presence of material
U Material analyzed for but not detected. Number is the sample quantitation limit (SQL).
\- Not detected.

Elevated levels which are greater than three times the background level or greater than the SQL.

Table 5 (continued)
Subsurface Soil Extractable Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background					
	SP-SB-01	SP-SB-07	SP-SB-08	SP-SB-09	SP-SB-10	SP-SB-11
Extractable Organic Compounds						
Acenaphthene	390 U	20,000	4,900,000	59 J	53 J	270,000 J
Acenaphthylene	390 U	1,500 J	-	62 J	-	2,300 J
Anthracene	390 U	5,800	4,600,000	91 J	-	32,000 J
Benzo(a)anthracene	390 U	6,700	1,400,000	530	120 J	26,000 J
Benzo(a)pyrene	390 U	26,000	370,000 J	580	120 J	9,300 J
Benzo(b and/or k)fluoranthene	44 J	55,000	1,000,000 J	960 J	220 J	21,000 J
Benzo(g,h,i)perylene	390 U	16,000	-	450 J	72 J	3,300 J
Carbazole	390 U	4,400 J	1,200,000 J	-	-	20,000 J
Chrysene	390 U	19,000	1,400,000	740	150 J	25,000 J
Dibenzofuran	390 U	15,000	4,000,000	-	-	82,000 J
Fluoranthene	390 U	11,000	7,300,000	670	130 J	250,000 J
Fluorene	390 U	18,000	7,000,000	69 J	-	170,000 J
Indeno(1,2,3-cd)pyrene	390 U	16,000	84,000 J	350 J	57 J	3,300 J
2-Methylnaphthalene	390 U	7,200	2,400,000	42 J	51 J	240,000 J
Naphthalene	390 U	11,000	2,900,000	54 J	130 J	360,000 J
Phenanthrene	390 U	26,000	15,000,000	370 J	110 J	470,000 J
Pyrene	49 J	23,000 J	4,600,000 J	930 J	240 J	80,000 J
Miscellaneous Extractable Organic Compounds						
Methylnaphthalene		3,000 JN	1,000,000 JN			
1 -Methylnaphthalene						8,000 JN
Biphenyl			500,000 JN			5,000 JN
Ethylnaphthalene			300,000 JN			
Dimethylnaphthalene		2,000 JN				
Dimethylnaphthalene (2 isomers)						7,000 JN
Dimethylnaphthalene (3 isomers)			3,000,000 JN			
Trimethylnaphthalene			400,000 JN			
Methylbiphenyl		1,000 JN	1,000,000 JN			5,000 JN
Vanillin						
Methyldibenzofuran		1,000 JN	700,000 JN			5,000 JN
Methylfluorene						4,000 JN
Dibenzothiophene		2,000 JN	400,000 JN			
Methylanthracene		1,000 JN				
Methyl (Methylethyl) Phenanthrene						

Table 5 (continued)
Subsurface Soil Extractable Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background					
	SP-SB-01	SP-SB-07	SP-SB-08	SP-SB-09	SP-SB-10	SP-SB-11
Miscellaneous Extractable Organic						
Benzonaphthothiophene						
Cyclopentaphenanthrenone		10,000 JN	500,000 JN			3,000 JN
Indenosoquinoline		1,000 JN				
Acenaphthopyridine		2,000 JN				
Benzofluorene		4,000 JN	400,000 JN			
Benzofluorene (2 isomers)						10,000 JN
Benzanthracenone						
Cyclopentapyrene						
Methylphenanthrene						
Anthracenedione						
Methylpyrene						10,000 JN
Methylpyrene (2 isomers)		10,000 JN	1,000,000 JN			
Tetramethylphenanthrene						
Benzopyrene (not A)						
Benzofluoranthene (not b or k)		3,000 JN				
Methylchrysene		10,000 JN				
Perylene		2,000 JN				6,000 JN
Naphthochrysene		1,000 JN				
Carboxylic Acids						
Benzoic Acid						
Hexahydrohydroxytrimethyl (Methylethyl) Phenanthrenone						
Unidentified Compounds / #		10,000 J/1		4,000 J/5	5,000 J/5	
Branched Alkane		10,000 J				
Alkanes				1,000 J	1,000 J	

ug/kg micrograms per kilogram
SP Southern Wood Piedmont
SB Subsurface Soil
J Estimated Value
N Presumptive evidence of presence of material
U Material analyzed for but not detected. Number is the sample quantitation limit (SQL).
\- Not detected.

Elevated levels which are greater than three times the background level or greater than the SQL.

Table 5 (continued)
Subsurface Soil Extractable Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background					
	SP-SB-01	SP-SB-12	SP-SB-13	SP-SB-14	SP-SB-15	SP-SB-16
Extractable Organic Componds						
Acenaphthene	390 U	9,300	660	-	-	-
Acenaphthylene	390 U	210 J	-	42 J	-	-
Anthracene	390 U	1,900	55 J	160 J	-	-
Benzo(a)anthracene	390 U	1,900	37 J	200 J	-	-
Benzo(a)pyrene	390 U	1,500	31 J	150 J	-	-
Benzo(b and/or k)fluoranthene	44 J	3,300	120 J	230 J	52 J	-
Benzo(g,h,i)perylene	390 U	790	-	110 J	-	-
Carbazole	390 U	190 J	-	39 J	-	-
Chrysene	390 U	2,700	120 J	270 J	-	-
Dibenzofuran	390 U	2,200	85 J	-	-	-
Fluoranthene	390 U	8,200	160 J	290 J	85 J	-
Fluorene	390 U	4,200	170 J	-	-	-
Indeno(1,2,3-cd)pyrene	390 U	830	-	94 J	-	-
2-Methylnaphthalene	390 U	480 J	450	-	-	-
Naphthalene	390 U	1,100	-	-	-	-
Phenanthrene	390 U	7,100	83 J	110 J	-	-
Pyrene	49 J	4,900 J	97 J	320 J	64 J	-
Miscellaneous Extractable Organic Compounds						
Methylnaphthalene						
1 -Methylnaphthalene			300 JN			
Biphenyl						
Ethylnaphthalene						
Dimethylnaphthalene		400 JN				
Dimethylnaphthalene (2 isomers)						
Dimethylnaphthalene (3 isomers)						
Trimethylnaphthalene						
Methylbiphenyl						
Vanillin		100 JN				
Methyldibenzofuran		300 JN				
Methylfluorene						
Dibenzothiophene						
Methylanthracene		400 JN				
Methyl (Methylethyl) Phenanthrene		1,000 JN				

Table 5 (continued)
Subsurface Soil Extractable Organic Analytical Results
Southern Wood Piedmont Company
Willmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background					
	SP-SB-01	SP-SB-12	SP-SB-13	SP-SB-14	SP-SB-15	SP-SB-16
Miscellaneous Extractable Organic						
Benzonaphthothiophene		1,000 JN				
Cyclopentaphenanthrenone						
Indenosoquinoline						
Acenaphthopyridine						
Benzofluorene						
Benzofluorene (2 isomers)						
Benzanthracenone						
Cyclopentapyrene						
Methylphenanthrene						
Anthracenedione						
Methylpyrene						
Methylpyrene (2 isomers)						
Tetramethylphenanthrene			200 JN			
Benzopyrene (not A)						
Benzofluoranthene (not b or k)						
Methylchrysene						
Perylene						
Naphthochrysene						
Carboxylic Acids		2,000 J				
Benzoic Acid						
Hexahydrohydroxytrimethyl (Methylethyl) Phenanthrenone						
Unidentified Compounds / #		20,000 J/8			1,000 J/2	2,000 J/3
Branched Alkane						
Alkanes						

ug/kg micrograms per kilogram
SP Southern Wood Piedmont
SB Subsurface Soil
J Estimated Value
N Presumptive evidence of presence of material
U Material analyzed for but not detected. Number is the sample quantitation limit (SQL).
\- Not detected.

Elevated levels which are greater than three times the background level or greater than the SQL.

Table 5 (continued)
Subsurface Soil Extractable Organic Analytical Results
Southern Wood Piedmont Company
Willmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background					
	SP-SB-01	SP-SB-17	SP-SB-18	SP-SB-19	SP-SB-20	SP-SB-21
Extractable Organic Componds						
Acenaphthene	390 U	-	-	-	-	69 J
Acenaphthylene	390 U	-	-	-	71 J	58 J
Anthracene	390 U	37 J	-	-	180 J	130 J
Benzo(a)anthracene	390 U	190 J	-	-	510	410
Benzo(a)pyrene	390 U	140 J	-	41 J	480	540
Benzo(b and/or k)fluoranthene	44 J	420 J	-	52 J	790 J	1,600
Benzo(g,h,i)perylene	390 U	120 J	-	-	540	470
Carbazole	390 U	-	-	-	-	110 J
Chrysene	390 U	260 J	-	41 J	680	850
Dibenzofuran	390 U	-	-	-	-	79 J
Fluoranthene	390 U	390	-	-	640	850
Fluorene	390 U	-	-	-	-	100 J
Indeno(1,2,3-cd)pyrene	390 U	99 J	-	-	420	440
2-Methylnaphthalene	390 U	-	-	-	-	65 J
Naphthalene	390 U	-	-	-	-	150 J
Phenanthrene	390 U	60 J	-	-	300 J	360 J
Pyrene	49 J	350 J	-	-	800 J	990 J
Miscellaneous Extractable Organic Compounds						
Methylnaphthalene						
1 -Methylnaphthalene						
Biphenyl						
Ethylnaphthalene						
Dimethylnaphthalene						
Dimethylnaphthalene (2 isomers)						
Dimethylnaphthalene (3 isomers)						
Trimethylnaphthalene						
Methylbiphenyl						
Vanillin						
Methyldibenzofuran						
Methylfluorene						
Dibenzothiophene						
Methylanthracene						
Methyl (Methylethyl) Phenanthrene						

Table 5 (continued)
Subsurface Soil Extractable Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background					
	SP-SB-01	SP-SB-17	SP-SB-18	SP-SB-19	SP-SB-20	SP-SB-21
Miscellaneous Extractable Organic						
Benzonaphthothiophene						
Cyclopentaphenanthrenone						
Indenosoquinoline						
Acenaphthopyridine						
Benzofluorene						
Benzofluorene (2 isomers)						200 JN
Benzanthracenone						100 JN
Cyclopentapyrene						100 JN
Methylphenanthrene						100 JN
Anthracenedione						800 JN
Methylpyrene						90 JN
Methylpyrene (2 isomers)						
Tetramethylphenanthrene					400 JN	
Benzopyrene (not A)					100 JN	
Benzofluoranthene (not b or k)						300 JN
Methylchrysene						
Perylene		100 JN			100 JN	
Naphthochrysene						
Carboxylic Acids						
Benzoic Acid						
Hexahydrohydroxytrimethyl (Methylethyl) Phenanthrenone				90 JN		
Unidentified Compounds / #			4,000 J/4	2,000 J/2	2,000 J/3	1,000 J/2
Branched Alkane						
Alkanes						

ug/kg micrograms per kilogram
SP Southern Wood Piedmont
SB Subsurface Soil
J Estimated Value
N Presumptive evidence of presence of material
U Material analyzed for but not detected. Number is the sample quantitation limit (SQL).
\- Not detected.

Elevated levels which are greater than three times the background level or greater than the SQL.

Table 6
Subsurface Soil Purgeable Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background SP-SB-01	SP-SB-02	SP-SB-03	SP-SB-04	SP-SB-05	SP-SB-06
Purgeable Organic Compounds						
Methyl Ethyl Ketone	14 U	-	44 J	-	30 J	-
Benzene	14 U	-	-	-	-	-
Toluene	14 U	-	-	-	-	-
Ethyl Benzene	14 U	-	-	-	-	-
Total Xylenes	14 U	-	-	-	-	-
Miscellaneous Purgeable Organic Compounds						
Unidentified Compounds/#						
Cyclic Alkanes						
Branched Alkane						
Alkanes						
(Methylethyl) Benzene						
Ethylmethyl Benzene (2 isomers)						
Trimethylbenzene (3 isomers)						
Methyl (Methylethyl) Benzene						
(Methylphenyl) Ethanone						
Indene						
Ethyldimethylbenzene						
Dihydromethylindene						
Ethenylbenzaldehyde						
Phenylpropenal						
Dihydromethylindene (2 isomers)						
Dihydrodimethylindene						
Pinene						
Ethylmethylbenzene						
Benzofuran						
Indane						
Ethynylmethylbenzene						
Methylbenzofuran						
Methyl(Methylethyl)Benzene (3 isomers)						
Ethenylmethylbenzene						
Methyl(Propenyl)Benzene						

Table 6 (continued)
Subsurface Soil Purgeable Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background SP-SB-01	SP-SB-07	SP-SB-08	SP-SB-09	SP-SB-10	SP-SB-11
Purgeable Organic Compounds						
Methyl Ethyl Ketone	14 U	19 J	71 J	-	-	-
Benzene	14 U	-	78 J	-	-	-
Toluene	14 U	-	550 J	-	-	-
Ethyl Benzene	14 U	21	530 J	-	-	510
Total Xylenes	14 U	47	2,300 J	-	-	910
Miscellaneous Purgeable Organic Compounds						
Unidentified Compounds/#		700 J/2	10,000 J/4			2,000 J/3
Cyclic Alkanes						400 J
Branched Alkane						200 J
Alkanes						1,000 J
(Methylethyl) Benzene		10 JN				700 JN
Ethylmethylbenzene (2 isomers)		80 JN				3,000 JN
Trimethylbenzene (3 isomers)		200 JN	6,000 JN			5,000 JN
Methyl (Methylethyl) Benzene		40 JN	800 JN			
(Methylphenyl) Ethanone		30 JN				
Indene		30 JN				
Ethyldimethylbenzene		20 JN	500 JN			
Dihydromethylindene		100 JN				
Ethenylbenzaldehyde		30 JN				
Phenylpropenal		100 JN				4,000 JN
Dihydromethylindene (2 isomers)		400 JN				
Dihydrodimethylindene		40 JN				
Pinene			1,000 JN			
Ethylmethylbenzene			1,000 JN			
Benzofuran			1,000 JN			
Indane			9,000 JN			
Ethynylmethylbenzene			4,000 JN			
Methylbenzofuran			700 JN			
Methyl(Methylethyl)Benzene (3 isomers)						2,000 JN
Ethenylmethylbenzene						30,000 JN
Methyl(Propenyl)Benzene						2,000 JN

Table 6 (continued)
Subsurface Soil Purgeable Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background					
	SP-SB-01	SP-SB-12	SP-SB-13	SP-SB-14	SP-SB-15	SP-SB-16
Purgeable Organic Compounds						
Methyl Ethyl Ketone	14 U	-	-	-	-	-
Benzene	14 U	-	-	-	-	-
Toluene	14 U	-	-	-	-	-
Ethyl Benzene	14 U	-	-	-	-	-
Total Xylenes	14 U	-	-	-	-	-
Miscellaneous Purgeable Organic Compounds						
Unidentified Compounds/#			50 J/1			
Cyclic Alkanes						
Branched Alkane						
Alkanes						
(Methylethyl) Benzene						
Ethylmethyl Benzene (2 isomers)						
Trimethylbenzene (3 isomers)						
Methyl (Methylethyl) Benzene						
(Methylphenyl) Ethanone						
Indene						
Ethyldimethylbenzene						
Dihydromethylindene						
Ethenylbenzaldehyde						
Phenylpropenal						
Dihydromethylindene (2 isomers)			30 JN			
Dihydrodimethylindene						
Pinene						
Ethylmethylbenzene						
Benzofuran						
Indane						
Ethynylmethylbenzene						
Methylbenzofuran						
Methyl(Methylethyl)Benzene (3 isomers)						
Ethenylmethylbenzene						
Methyl(Propenyl)Benzene						

Table 6 (continued)
Subsurface Soil Purgeable Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background					
	SP-SB-01	SP-SB-17	SP-SB-18	SP-SB-19	SP-SB-20	SP-SB-21
Purgeable Organic Compounds						
Methyl Ethyl Ketone	14 U	-	-	-	-	-
Benzene	14 U	-	-	-	-	-
Toluene	14 U	-	-	-	-	-
Ethyl Benzene	14 U	-	-	-	-	-
Total Xylenes	14 U	-	-	-	-	-
Miscellaneous Purgeable Organic Compounds						
Unidentified Compounds/#						
Cyclic Alkanes						
Branched Alkane						
Alkanes						
(Methylethyl) Benzene						
Ethylmethyl Benzene (2 isomers)						
Trimethylbenzene (3 isomers)						
Methyl (Methylethyl) Benzene						
(Methylphenyl) Ethanone						
Indene						
Ethyldimethylbenzene						
Dihydromethylindene						
Ethenylbenzaldehyde						
Phenylpropenal						
Dihydromethylindene (2 isomers)						
Dihydrodimethylindene						
Pinene						
Ethylmethylbenzene						
Benzofuran						
Indane						
Ethynylmethylbenzene						
Methylbenzofuran						
Methyl(Methylethyl)Benzene (3 isomers)						
Ethenylmethylbenzene						
Methyl(Propenyl)Benzene						

NOTES

ug/kg	micrograms per kilogram
SP	Southern Wood Piedment.
SB	Subsurface Boring.
J	Estimated value.
N	Presumptive evidence of presence of material.
U	Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).
-	Not detected.
	Elevated levels which are greater than three times the background level or greater than the SQL.

Table 7
Subsurface Soil Pesticide/PCB Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background	Source Samples				
	SP-SB-01	SP-SB-02	SP-SB-03	SP-SB-04	SP-SB-05	SP-SB-06
Pesticides / PCB Compounds						
Endosulfan I (Alpha)	2.0 U	-	2.4 N	-	89 J	-
4,4'-DDE (P,P'-DDE)	3.9 U	-	35 J	6.3	-	-
4,4'-DDT (P,P' - DDT)	3.9 U	-	7.5 JN	-	-	-
4,4'-DDD (P,P'-DDD)	3.9 U	-	44	20	-	-
Alpha-Chlordane/2	2.0 U	-	-	-	-	-
Dieldrin	3.9 U	-	-	-	-	-
Pesticides / PCB Compounds	**SP-SB-01**	**SP-SB-07**	**SP-SB-08**	**SP-SB-09**	**SP-SB-10**	**SP-SB-11**
Endosulfan I (Alpha)	2.0 U	-		8.0	-	-
4,4'-DDE (P,P'-DDE)	3.9 U	-	-	-	-	-
4,4'-DDT (P,P' - DDT)	3.9 U	-	-	-	-	-
4,4'-DDD (P,P'-DDD)	3.9 U	-	-	-	-	64
Alpha-Chlordane/2	2.0 U	150 JN	-	-	-	-
Dieldrin	3.9 U	-	-	-	-	-
Pesticides / PCB Compounds	**SP-SB-01**	**SP-SB-12**	**SP-SB-13**	**SP-SB-14**	**SP-SB-15**	**SP-SB-16**
Endosulfan I (Alpha)	2.0 U	23 N	-	-	-	-
4,4'-DDE (P,P'-DDE)	3.9 U	-	-	-	-	-
4,4'-DDT (P,P' - DDT)	3.9 U	-	-	-	-	-
4,4'-DDD (P,P'-DDD)	3.9 U	-	-	-	-	-
Alpha-Chlordane/2	2.0 U	-	-	-	-	-
Dieldrin	3.9 U	14 N	-	-	-	-
Pesticides / PCB Compounds	**SP-SS-01**	**SP-SB-17**	**SP-SB-18**	**SP-SB-19**	**SP-SB-20**	**SP-SB-21**
Endosulfan I (Alpha)	2.0 U	5.4 N	-	-	3.2	17
4,4'-DDE (P,P'-DDE)	3.9 U	-	-	-	-	-
4,4'-DDT (P,P' - DDT)	3.9 U	-	-	-	-	-
4,4'-DDD (P,P'-DDD)	3.9 U	-	-	-	-	-
Alpha-Chlordane/2	2.0 U	-	-	-	-	-
Dieldrin	3.9 U	-	-	-	-	-

ug/kg Micrograms per kilogram
SP Southern Wood Piedmont
SB Subsurface Soil
J Estimated value
N Presumptive evidence indicates the presence of material
U Material was analyzed for but not detected. The number is the sample quantitation limit (SQL).
\- Not detected

Elevated levels which are greater than three times the background level or greater than the SQL.

Table 8
Surface Soil Inorganic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (mg/kg)	Background	Source Samples					Naturally Occurring Levels*
	SP-SS-01	SP-SS-02	SP-SS-03	SP-SS-04	SP-SS-05	SP-SS-06	
Aluminum	990	2,400	4,700	710	710	1,200	7,000 - 15,000
Arsenic	1.8 J	56 J	5.4	-	2.2	210	0 - 2.6
Barium	8.8	27	43	13	4.6	28	10 - 200
Cadmium	0.26 U	-	-	-	-	-	n/a
Calcium	1,200 J	580 J	4,800	260 J	230	22,000	0 - 2,300
Chromium	3.6	3.5 J	10.9	2.2 J	2.2	130 J	0 - 20
Cobalt	1 U	1.4 J	1.8 J	-	-	1.6 J	< 3
Copper	19	24	24.	5.7 J	14	170 J	0 - 10
Iron	2,000 J	5,000 J	6,600	2,300 J	1,300	11,000	0 - 10,000
Lead	25 J	54 J	100	5.6 J	2.6	19 J	< 10
Magnesium	200	220	640	84	110	480 J	0 - 1,500
Manganese	11	60	65	21	8.8 J	110 J	0 - 150
Mercury	0.11 U	-	-	-	-	0.17	0 - 0.051
Nickel	1.3 J	3.3 J	-	-	-	-	0 - 5
Potassium	220	170	300	120	-	150	0 - 6,800
Sodium	26	16 J	270	13 J	87	62	0 - 2,000
Vanadium	4.3 J	4.7 J	12	3.5 J	2.4 J	4.1 J	0 - 20
Zinc	11	18	100	40	13	57	< 0

Notes:

* Hanford T. Shacklette and Josephine G. Boerngen, U.S. Geological Survey, Elemental Concentrations in Soils and Other Surficial Materials of the Conterminous United States. U.S. Geological Survey Paper 1270, Washington D.C.: GPO, 1984.

mg/kg milligrams per kilogram
SP Southern Wood Piedmont
SS Surface Soil
< Less than

J Estimated value

U Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).

\- Not detected

Elevated levels which are greater than three times background level or greater than the SQL.

Table 8 (continued)
Surface Soil Inorganic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (mg/kg)	Background	Source Samples					Naturally Occurring Levels*
	SP-SS-01	SP-SS-07	SP-SS-08	SP-SS-09	SP-SS-10	SP-SS-11	
Aluminum	990	1,200	1,900	1,500	1,900	2,400	7,000 - 15,000
Arsenic	1.8 J	16	27	-	18	-	0 - 2.6
Barium	8.8	22	21	3.2	12	17	10 - 200
Cadmium	0.26 U	-	-	-	-	-	n/a
Calcium	1,200 J	720	15,000	5,200	710	640	0 - 2,300
Chromium	3.6	9.2	22	2.8	8.7	6.3	0 - 20
Cobalt	1 U	-	0.80 J	-	-	-	< 3
Copper	19	16	55	-	16	-	0 - 10
Iron	2,000 J	2,500	3,500	1,300	3,100	1,100	0 - 10,000
Lead	25 J	37	19	2.7	9.9	24	< 10
Magnesium	200	140	610	170	140	91	0 - 1,500
Manganese	11	40 J	120	11 J	28 J	6.4 J	0 - 150
Mercury	0.11 U	0.12	0.22	-	0.15	-	0 - 0.051
Nickel	1.3 J	-	-	-	-	-	0 - 5
Potassium	220	-	310	-	-	-	0 - 6,800
Sodium	26	34	230	110	120	-	0 - 2,000
Vanadium	4.3 J	4.6 J	5.7 J	2.4 J	5.9 J	6.2 J	0 - 20
Zinc	11	32	43	6.7	14	57	< 0

Notes:

* Hanford T. Shacklette and Josephine G. Boerngen, U.S. Geological Survey, Elemental Concentrations in Soils and Other Surficial Materials of the Conterminous United States. U.S. Geological Survey Paper 1270, Washington D.C.: GPO, 1984.

mg/kg milligrams per kilogram
SP Southern Wood Piedmont
SS Surface Soil
< Less than
J Estimated value
U Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).
\- Not detected
Elevated levels which are greater than three times background level or greater than the SQL.

Table 8 (continued)
Surface Soil Inorganic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (mg/kg)	Background	Source Samples					Naturally Occurring Levels*
	SP-SS-01	SP-SS-12	SP-SS-13	SP-SS-14	SP-SS-15	SP-SS-16	
Aluminum	990	2,300	2,000	3,700	640	310	7,000 - 15,000
Arsenic	1.8 J	12	3.1	5	-	-	0 - 2.6
Barium	8.8	11	3	15	2.3	2	10 - 200
Cadmium	0.26 U	-	-	-	-	-	n/a
Calcium	1,200 J	7,700	280	1,200	33 J	-	0 - 2,300
Chromium	3.6	18	4.1	7.8 J	2.9	1.7 J	0 - 20
Cobalt	1 U	-	-	-	-	-	< 3
Copper	19	11	-	35 J	-	-	0 - 10
Iron	2,000 J	2,400	1,600	4,600	1,100 J	650	0 - 10,000
Lead	25 J	45	3.2	16 J	2.6 J	2.8	< 10
Magnesium	200	260	88	370 J	96	-	0 - 1,500
Manganese	11	34	8	53 J	6.9	3.8 J	0 - 150
Mercury	0.11 U	-	-	0.77	-	-	0 - 0.051
Nickel	1.3 J	-	-	-	-	-	0 - 5
Potassium	220	240 J	-	230	180	-	0 - 6,800
Sodium	26	100	-	46	-	-	0 - 2,000
Vanadium	4.3 J	5.4 J	3.6 J	9 J	3.6 J	-	0 - 20
Zinc	11	32	7	37	1.8 J	5.8	< 0

Notes:

* Hanford T. Shacklette and Josephine G. Boerngen, U.S. Geological Survey, Elemental Concentrations in Soils and Other Surficial Materials of the Conterminous United States. U.S. Geological Survey Paper 1270, Washington D.C.: GPO, 1984.

mg/kg milligrams per kilogram
SP Southern Wood Piedmont
SS Surface Soil
< Less than
J Estimated value
U Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).
\- Not detected
Elevated levels which are greater than three times background level or greater than the SQL.

Table 8 (continued)
Surface Soil Inorganic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (mg/kg)	Background	Source Samples					Naturally Occurring Levels*
	SP-SS-01	SP-SS-17	SP-SS-18	SP-SS-19	SP-SS-20	SP-SS-21	
Aluminum	990	650	1,200	3,400	1,000	2,100	7,000 - 15,000
Arsenic	1.8 J	-	-	3 J	83	43	0 - 2.6
Barium	8.8	4.1	3	7.7	4.5	7.2	10 - 200
Cadmium	0.26 U	-	-	-	1 J	-	n/a
Calcium	1,200 J	-	15 J	37 J	130,000	9,700	0 - 2,300
Chromium	3.6	2.2 J	4	9.2	61	19	0 - 20
Cobalt	1 U	-	-	-	2.8 J	-	< 3
Copper	19	-	-	-	110	29	0 - 10
Iron	2,000 J	1,300	2,200 J	4,700 J	20,000	1,300	0 - 10,000
Lead	25 J	6.5	5.5 J	6.1 J	6.1	8	< 10
Magnesium	200	82	170	430	4,700	290	0 - 1,500
Manganese	11	4.9 J	9.2	14	230	13 J	0 - 150
Mercury	0.11 U	-	-	-	-	-	0 - 0.051
Nickel	1.3 J	-	-	-	6 J	-	0 - 5
Potassium	220	-	210	600	280	-	0 - 6,800
Sodium	26	-	-	-	260	92	0 - 2,000
Vanadium	4.3 J	2.6 J	6.3 J	14	19	3.6 J	0 - 20
Zinc	11	6.9	5.6	8.3	11	12	< 0

Notes:

* Hanford T. Shacklette and Josephine G. Boerngen, U.S. Geological Survey, Elemental Concentrations in Soils and Other Surficial Materials of the Conterminous United States. U.S. Geological Survey Paper 1270, Washington D.C.: GPO, 1984.

mg/kg milligrams per kilogram
SP Southern Wood Piedmont
SS Surface Soil
< Less than

J Estimated value

U Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).

\- Not detected

Elevated levels which are greater than three times background level or greater than the SQL.

Table 9
Subsurface Soil Inorganic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (mg/kg)	Background	Source Samples					Naturally Occurring Levels*
	SP-SB-01	SP-SB-02	SP-SB-03	SP-SB-04	SP-SB-05	SP-SB-06	
Aluminum	770	2,600	3,700	1,100	1,000	1,100	7,000 - 15,000
Arsenic	2 UJ	9.2 J	-	4.2 J	-	-	0 - 2.6
Barium	4.4	1.9	16	25	4.5	7.3	10 - 200
Cadmium	0.28 U	-	-	-	-	-	n/a
Calcium	1,400 J	170 J	17,000	490 J	470	230	0 - 2,300
Chromium	2.9	1.8 J	10	3.4 J	2.3 J	2.8 J	0 - 20
Cobalt	1 U	-	1.5 J	0.77 J	-	-	< 3
Copper	3.1 J	4.2 J	-	30	-	8 J	0 - 10
Iron	1,600 J	720 J	4,000	3,600 J	1,600	1,400	0 - 10,000
Lead	1.6 J	5.4 J	15	180 J	3.7	2.8 J	< 10
Magnesium	160	14 J	1,800	120	110	140 J	0 - 1,500
Manganese	6	2.2 J	24	26	8.1	-	0 - 150
Mercury	0.11 U	-	-	0.48	-	-	0 - 0.051
Nickel	1 U	-	-	-	-	-	0 - 5
Potassium	130	50 J	450	180	220 J	230	0 - 6,800
Sodium	65	-	280	12 J	-	-	0 - 2,000
Vanadium	3.2 J	2.1 J	12 J	3.7 J	3.2 J	3.1 J	0 - 20
Zinc	5.9	-	24	48	18	23	<0
Cyanide	0.14 U	-	-	-	-	-	n/a

Notes:

* Hanford T. Shacklette and Josephine G. Boerngen, U.S. Geological Survey, Elemental Concentrations in Soils and Other Surficial Materials of the Conterminous United States. U.S. Geological Survey Paper 1270, Washington D.C.: GPO, 1984.

mg/kg milligrams per kilogram
SP Southern Wood Piedmont
SB Subsurface Soil
< Less than

J Estimated value

U Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).

\- Not detected

Elevated levels which are greater than three times the background level or greater than the SQL.

Table 9 (continued)
Subsurface Soil Inorganic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (mg/kg)	Background	Source Samples					Naturally Occurring Levels*
	SP-SB-01	SP-SB-07	SP-SB-08	SP-SB-09	SP-SB-10	SP-SB-11	
Aluminum	770	920	1,600	13,000	7,400	1,100	7,000 -
Arsenic	2 UJ	-	19	5.2	-	2.9	0 - 2.6
Barium	4.4	18	47	39	21	24	10 - 200
Cadmium	0.28 U	-	0.96 J	-	-	-	n/a
Calcium	1,400 J	380	8,700	820	800	970	0 - 2,300
Chromium	2.9	2.5	12	18	12	6.5	0 - 20
Cobalt	1 U	0.75 J	2.7 J	6.2 J	3.6 J	-	< 3
Copper	3.1 J	-	100	11	-	7.9	0 - 10
Iron	1,600 J	1,900	17,000	14,000	7,200	2,600	0 - 10,000
Lead	1.6 J	7.4	110	14	3.8	58	< 10
Magnesium	160	96	420	1,300	910	180	0 - 1,500
Manganese	6	10	130	110	130	18	0 - 150
Mercury	0.11 U	-	1.0	-	-	-	0 - 0.051
Nickel	1 U	-	11	-	-	-	0 - 5
Potassium	130	-	-	780	560 J	170	0 - 6,800
Sodium	65	-	150	110	180	-	0 - 2,000
Vanadium	3.2 J	3.3 J	8.7 J	34	18	4.7 J	0 - 20
Zinc	5.9	22	120	73	36	82	< 0
Cyanide	0.14 U	-	12	-	-	-	n/a

Notes:

*	Hanford T. Shacklette and Josephine G. Boerngen, U.S. Geological Survey, Elemental Concentrations in Soils and Other Surficial Materials of the Conterminous United States. U.S. Geological Survey Paper 1270, Washington D.C.: GPO, 1984.
mg/kg	milligrams per kilogram
SP	Southern Wood Piedmont
SB	Subsurface Soil
<	Less than
J	Estimated value
U	Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).
-	Not detected
	Elevated levels which are greater than three times the background level or greater than the SQL.

Table 9 (continued)
Subsurface Soil Inorganic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (mg/kg)	Background	Source Samples					Naturally Occurring Levels*
	SP-SB-01	SP-SB-12	SP-SB-13	SP-SB-14	SP-SB-15	SP-SB-16	
Aluminum	770	1,800	2,100	800	440	350	7,000 - 15,000
Arsenic	2 UJ	4.2	-	2.3	-	-	0 - 2.6
Barium	4.4	18	2.3	11	2	2.4	10 - 200
Cadmium	0.28 U	-	-	-	-	-	n/a
Calcium	1,400 J	13,000	-	230	41 J	150	0 - 2,300
Chromium	2.9	6.4	1.6 J	3.4 J	2.4 J	1.5 J	0 - 20
Cobalt	1 U	-	-	-	-	-	< 3
Copper	3.1 J	12	-	6.3 J	-	-	0 - 10
Iron	1,600 J	2,700	1,300	2,100	970 J	570	0 - 10,000
Lead	1.6 J	38	2	8.1 J	0.94 J	1.3	< 10
Magnesium	160	900	-	-	90	-	0 - 1,500
Manganese	6	51	4.1	9.5 J	5.1	-	0 - 150
Mercury	0.11 U	-	-	-	-	-	0 - 0.051
Nickel	1 U	-	-	-	-	-	0 - 5
Potassium	130	-	-	210	170	-	0 - 6,800
Sodium	65	620	-	-	-	-	0 - 2,000
Vanadium	3.2 J	6.1 J	3.6 J	3 J	2.3 J	1.7 J	0 - 20
Zinc	5.9	60	5.1	19	2.2 J	8.6	< 0
Cyanide	0.14 U	-	-	-	-	-	n/a

Notes:

* Hanford T. Shacklette and Josephine G. Boerngen, U.S. Geological Survey, Elemental Concentrations in Soils and Other Surficial Materials of the Conterminous United States. U.S. Geological Survey Paper 1270, Washington D.C.: GPO, 1984.

mg/kg milligrams per kilogram
SP Southern Wood Piedmont
SB Subsurface Soil
< Less than

J Estimated value

U Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).

\- Not detected

Elevated levels which are greater than three times the background level or greater than the SQL.

Table 9 (continued)
Subsurface Soil Inorganic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (mg/kg)	Background	Source Samples					Naturally Occurring Levels*
	SP-SB-01	SP-SB-17	SP-SB-18	SP-SB-19	SP-SB-20	SP-SB-21	
Aluminum	770	950	440	340	2,100	1,100	7,000 - 15,000
Arsenic	2 UJ	-	-	-	-	-	0 - 2.6
Barium	4.4	5.2	0.99 J	0.74 J	6	5.9	10 - 200
Cadmium	0.28 U	-	-	-	-	-	n/a
Calcium	1,400 J	71	170 J	2.7 J	550	460	0 - 2,300
Chromium	2.9	3.2	-	-	5.8	6.1	0 - 20
Cobalt	1 U	-	-	-	-	-	< 3
Copper	3.1 J	-	-	-	-	-	0 - 10
Iron	1,600 J	1,500	1,000 J	840 J	1,900	1,500	0 - 10,000
Lead	1.6 J	2	7.4 J	0.93 J	2	2.6	< 10
Magnesium	160	150	23	22	340	120	0 - 1,500
Manganese	6	6.1	4.1	4.4	10	8.8	0 - 150
Mercury	0.11 U	-	-	-	-	-	0 - 0.051
Nickel	1 U	-	-	-	-	-	0 - 5
Potassium	130	330 J	67	84	320	-	0 - 6,800
Sodium	65	-	-	-	120	-	0 - 2,000
Vanadium	3.2 J	4.2 J	-	1.4 J	5.1 J	3.8 J	0 - 20
Zinc	5.9	9.2	3.6 J	2.2 J	7.7	15	< 0
Cyanide	-	-	-	-	-	-	n/a

Notes:

* Hanford T. Shacklette and Josephine G. Boerngen, U.S. Geological Survey, Elemental Concentrations in Soils and Other Surficial Materials of the Conterminous United States. U.S. Geological Survey Paper 1270, Washington D.C.: GPO, 1984.

mg/kg milligrams per kilogram
SP Souhtern Wood Piedmont
SB Subsurface Soil
< Less than

J Estimated value

U Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).

\- Not detected

Elevated levels which are greater than three times the background level or greater than the SQL.

4.4 Source Conclusions

Surface and subsurface soils at the SWP site in Wilmington, North Carolina represent a source of organic and inorganic contamination. In addition, dioxins and furans were detected in surface soil samples. Pentachlorophenols used in wood preservation can contain relatively high levels of dioxins and furans. These dioxins and furans are inadvertently produced during manufacture of chlorophenols and are the likely source of surface soil dioxin/furan contamination. The results of surface and subsurface soils collected from the central two-thirds of the site suggest that significant contamination is present in the surface and subsurface soil. The highest concentrations and frequency of detections were found in sample locations SP-SS/SB-08 located near the former CCA and Creosote Treatment Areas and sample SP-SS/SB-11 located near the former Large Storage Tank Area.

5.0 Groundwater Pathway

5.1 Hydrogeologic Setting

The SWP site lies within the Coastal Plain physiographic region in southeast North Carolina (Ref. 17). Topography in the region extends from flat, low-lying swamps and marshes 3 to 6 feet above mean sea level (amsl) to rolling uplands, 300 to 600 feet amsl (Refs. 1; 7, p. 271). More specifically, the site lies approximately 5 feet amsl on urban lands derived from Urban land complex (Refs. 1; 4, pp. 7, 13, sheet 18). These complexes consist of sands and sandy loams which have been disturbed and appear to be derived from poorly drained floodplain or tidal sediments surrounding the site (Ref. 4, pp. 7, 13). The soil encountered beneath the existing drainage ditch and the southeastern portion of the site is believed to be in the Dorovan Series (Ref. 4, sheet 18).

The region is covered by unconsolidated sediments that thicken toward the coast. These sediments consist of sands, silts, and clays which are generally of fluvial origin (Ref. 7, p. 271). These sediments are usually about 50 feet thick and overlie the Castle Hayne Marl of the late Eocene age (Ref. 18, p. 221). Beneath the unconsolidated sediments, three prominent geologic formations are typically present throughout most of New Hanover County. These formations are, in descending order: The Castle Hayne Limestone (also known as the Castle Hayne Marl, the Peedee Formation, and the Black Creek Formation (Ref. 19, p. 8).

The Castle Hayne Limestone is of middle and late Eocene age, and typically consists of shell, marl, sand, and limestone with beds of clay and sandy clay present in the upper portion of the unit (Refs. 19, p. 13; 20, Figure 8, p. 25). This unit is reported to be as thick as 150 feet in some areas of New Hanover County; however, it is very thin and possibly absent in the vicinity of SWP (Ref. 19, Figure 9). The Castle Hayne Limestone rests unconformably upon the Peedee Formation (Ref. 19, p. 13).

The Peedee Formation is of Cretaceous age and is comprised primarily of unconsolidated greenish-gray to dark gray silt, olive green to gray sand, and massive black clay interbedded with impure limestones and consolidated sandstones (Ref. 19, p. 9). This formation is largely glauconitic and generally decreases in clay content in the upper portions except for approximately 15 feet at the top of the formation which

is clay (Ref. 19, p. 9, Figure 8). This unit may be over 700 feet thick in some areas of the county (Ref. 19, p. 9). The Peedee Formation rests conformably upon the Black Creek Formation (Ref. 19, p. 9).

The Black Creek Formation is Upper Cretaceous in age and is approximately 380 feet thick in New Hanover County (Ref. 19, p. 9). This formation ranges from around 700 to 1,100 feet below land surface in New Hanover County and is comprised of thinly laminated gray to black clay interbedded with gray to tan sands (Refs. 19, p. 9; 20, p. 30). The upper portion of the Black Creek Formation increases in clay content (Ref. 20, Figure 8).

Three principal aquifers are present throughout most of New Hanover: the upper sandy aquifer, the limestone aquifer, and the lower sandy aquifer. The uppermost aquifer is the upper sand aquifer, or water table aquifer, which is has a saturated thickness range of 20 to 60 feet thick in New Hanover County; however, it is likely no more than 46 feet thick beneath the facility (Ref. 19, Figure 7; 20, p. 30). This aquifer is primarily comprised of the unconsolidated surficial sands (Refs. 18, p. 221; 19, p. 21, 24, 30, 33). This unit typically rests upon approximately 10 feet of lower permeability deposits in the upper portion of the Castle Hayne Limestone; however, these deposits are not believed to form a competent confining unit separating the surficial aquifer from underlying aquifers and the Castle Hayne Limestone may not be present beneath the SWP facility (Refs. 19, Figure 9; 20, Figure 8, p. 25).

The limestone aquifer (also known as the Castle Hayne Aquifer) is comprised of permeable deposits (primarily limestone and sand) of the Castle Hayne Limestone (Refs. 19, p. 24; 20, p. 25). This unit is very thin (less than 25 feet thick) or absent beneath the SWP facility, but is reportedly over 100 feet thick in the southern part of New Hanover County (Ref. 19, p. 26, Figure 3, Figure 4, Figure 9). The hydraulic conductivity of this aquifer ranges from 15 feet per day, where comprised of fine sand, to approximately 200 feet per day where comprised of porous limestone (Ref. 20, p. 25). The Castle Hayne Aquifer, where present, rests upon a clay confining unit which is approximately 15 feet thick beneath the SWP facility (Ref. 19, Figure 8).

The lower sandy aquifer (also known as the sandstone aquifer) is the most important aquifer in New Hanover County and is comprised of calcareous sand within the upper

portion of the Peedee Formation (Ref. 19, pp. 9, 24, 25, Figure 13). This aquifer is approximately 35 feet thick and is confined above by a clay layer within the Peedee Formation which is approximately 15 feet thick beneath the SWP facility (Ref. 19, p. 24; Figure 8). The top of this aquifer is approximately 46 feet beneath the SWP facility and the average horizontal hydraulic conductivity is estimated to be approximately 33 ft/d (Refs. 19, Figure 7; 21 p. 29). There are three more aquifers contained within the Peedee Formation; however, these contain brackish water and are of limited significance to the scope of this investigation (Ref. 19, p. 9).

Both the limestone aquifer and the upper sandy aquifer are capable of yielding significant water supplies. Groundwater in the unconfined surficial (upper sandy) aquifer can be obtained within 10 feet bls in New Hanover County (Ref. 19, p.2). During this investigation, groundwater in the surficial aquifer was encountered at depths ranging from land surface to 5 feet bls. Within the region, saltwater encroachment from the ocean and the Cape Fear River affects water quality approximately 225 feet bls (Ref. 19, Figure 5). Beneath the site, groundwater flow is to the south and southeast toward Greenfield Creek and southeast toward the onsite drainage ditch in the shallow and intermediate wells and toward the west in the deep wells. Hydraulic conductivities for clays similar to those present in the upper portion of the PeeDee Formation range from 10^{-9} to 10^{-5} cm/sec (Ref. 21, p.29).

Groundwater levels were measured from a fixed point at the top of casing (TOC) on January 28, 1997 for Southern Wood Piedmont monitoring wells. The water levels are presented on Table 10. A general groundwater flow direction was determined for the surficial wells, the intermediate wells, and the deep wells and is identified on Figures 4, 5, and 6.

5.2 Groundwater Pathway Targets

There are no municipal water supply wells within 4 miles of the site (Refs. 2; 22). The majority of residents within a 4-mile radius of the site are supplied water by the City of Wilmington Water Department or the Leland Sanitary District (Refs. 1; 22; 23; 24). The City of Wilmington Water Department serves the area east of the Cape Fear River, south of Smith Creek, and north of the Wilmington Corporate Limit at Barnards Creek (Refs. 23; 25; 26). The Leland Sanitary District serves the area west

of the Cape Fear and Brunswick Rivers (Refs. 1; 23; 24). Both of these municipal water systems are supplied water by surface water intakes located 23 miles upstream of the site on the Cape Fear River (Ref. 23). Approximately 437 persons are estimated to obtain drinking water from private wells within 4 miles of the site (Ref. 25; 27; 28; 29). Additionally, one community system, Runnymeade subdivision, is located within a 4-mile radius of the site. The Runnymeade subdivision community water system is located approximately 3.75 miles northeast of the site (Ref. 27). This community system utilizes two wells which draw from the Castle Hayne Limestone aquifer. Approximately 622 persons are estimated to obtain drinking water from this community system (Refs. 1; 27; 28; 29). Approximately 1,059 persons obtain drinking water from groundwater supply within 4 miles of the site (Refs. 1; 27; 28; 29). No wellhead protection areas exist within a 4-mile radius of the SWP site (Ref. 30). The population within a 4-mile radius which uses groundwater is shown below.

Radial Distance (miles)	Target Population (Groundwater)
0.00 - 0.25	0
>0.25 - 0.50	0
>0.50 - 1.00	0
>1.00 - 2.00	0
>2.00 - 3.00	24
>3.00 - 4.00	1,035

Table 10
Groundwater Level Measurements
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Monitoring Well Number	Top of Casing Elevation in Feet (AMSL)	Depth To Water (BTOC) in Feet	Water Elevation in Feet (AMSL)	Total Depth of Well (BTOC) in Feet
MW-08	6.84	4.68	2.16	21.95
MW-08A	6.46	4.25	2.21	33.04
MW-11	8.05	5.46	2.59	14.26
MW-11A	6.45	4.18	2.27	36.39
MW-11B	6.34	4.07	2.27	44.09
MW-15	7.10	4.50	2.60	14.15
MW-16	7.70	5.58	2.12	14.47
MW-17	7.69	5.42	2.27	14.77
MW-20	5.48	3.27	2.21	14.83
MW-20A	5.21	2.93	2.28	33.17
MW-22A	5.39	3.18	2.21	34.06
MW-24	6.03	3.38	2.65	15.18
MW-24A	5.87	3.52	2.35	36.32
MW-25	3.88	2.05	1.83	15.37
MW-27	5.47	2.11	3.36	7.52
MW-28	5.20	4.20	1.00	15.43
MW-28A	5.51	3.88	1.63	27.87
MW-29	5.36	3.96	1.40	9.52
MW-29A	5.20	3.22	1.98	40.69
MW-31	6.63	3.38	3.25	16.75
MW-32	6.22	3.94	2.28	46.84
MW-33	5.92	3.39	2.53	55.70
MW-34	8.13	7.54	0.59	17.02

Table 10 (continued)
Groundwater Level Measurements
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Monitoring Well Number	Top of Casing Elevation in Feet (AMSL)	Depth To Water (BTOC) in Feet	Water Elevation in Feet (AMSL)	Total Depth of Well (BTOC) in Feet
MW-35	7.71	5.50	2.21	39.14
MW-36	7.93	5.72	2.21	51.69
MW-37	5.97	4.44	1.53	17.47
MW-38	5.91	4.36	1.55	27.40
MW-39	5.75	0.10	5.65	52.80
MW-40	8.20	6.01	2.19	16.96
MW-41	7.66	5.22	2.44	40.65
MW-42	7.68	5.12	2.56	67.64

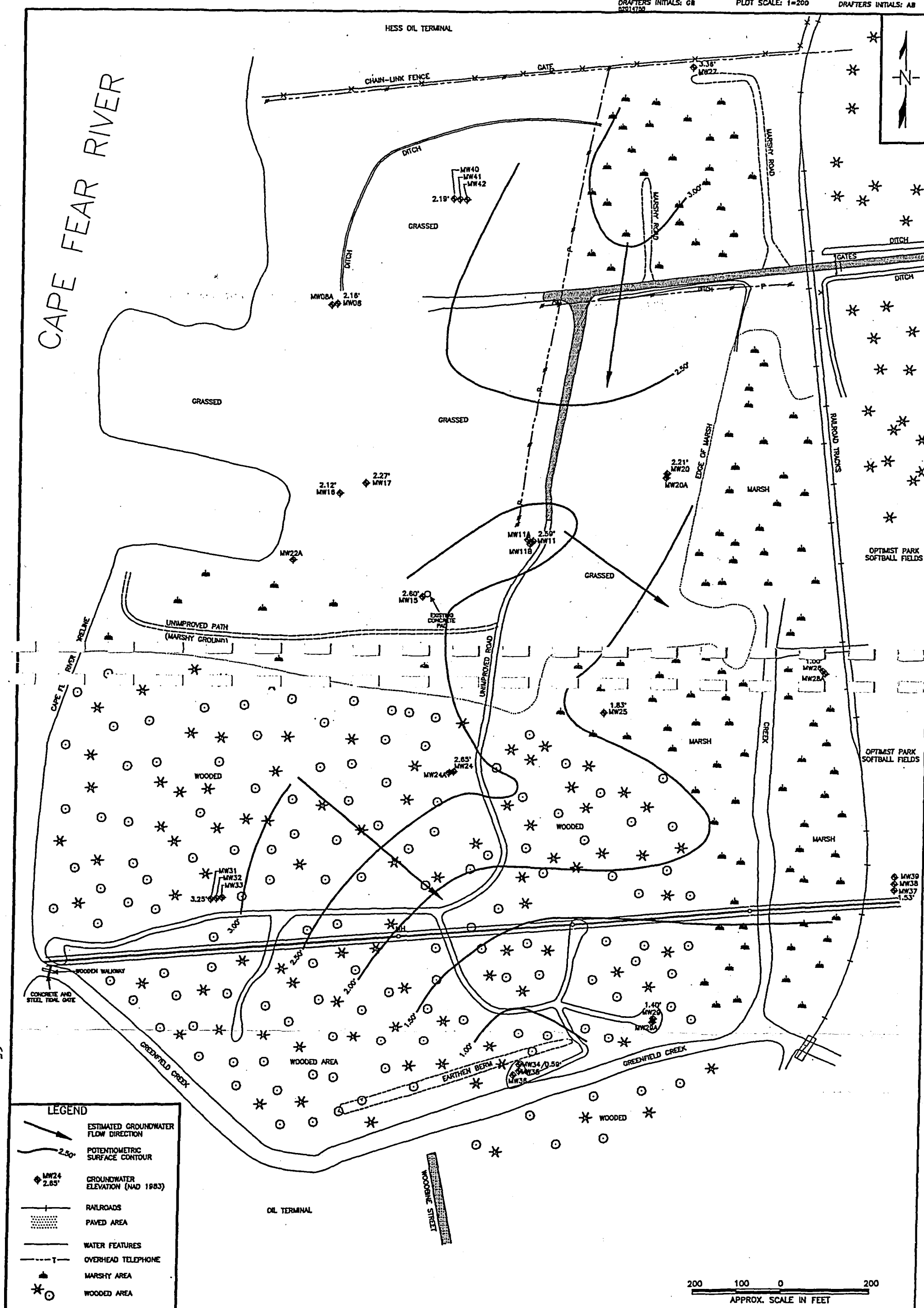
NOTES:

AMSL	Above Mean Sea Level
MW	Monitoring Well
BTOC	Below Top Of Casing
SP	Southern Wood Piedmont

CAD DWG NO: ESSWPSSW
CREATION DATE: 3-24-97
DRAFTERS INITIALS: GB
02014700

ORIGINAL DWG SIZE
11 x 17
PLOT SCALE: 1=200

MOST RECENT REVISION:
REVISION DATE: 4-3-97
DRAFTERS INITIALS: AB



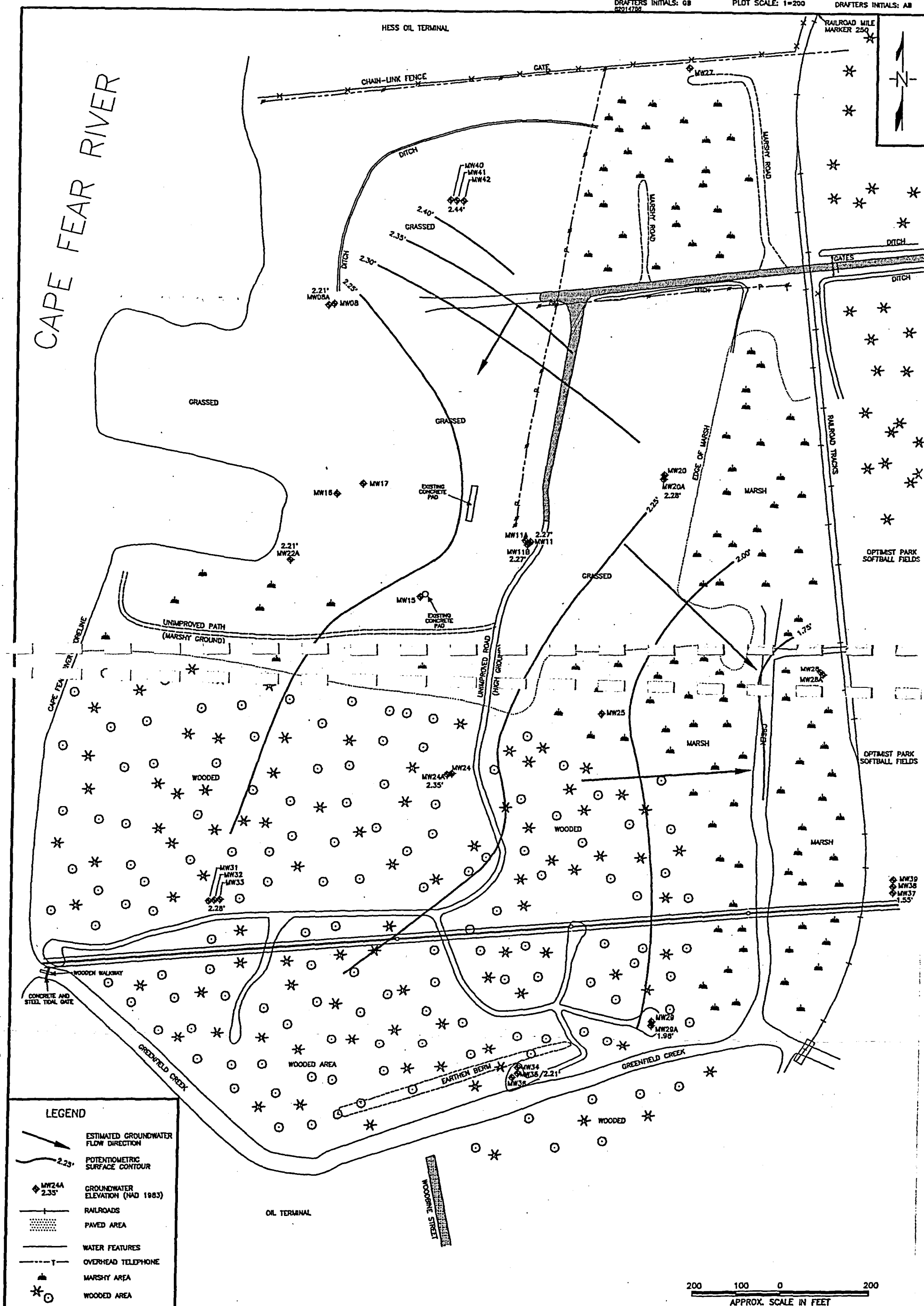
POTENTIOMETRIC SURFACE MAP SHALLOW WELLS ON 1/28/97
SOUTHERN WOOD PIEDMONT
WILMINGTON, NEW HANOVER COUNTY, NORTH CAROLINA

FIGURE 4

CAD DWG NO: ESSWPSIW
CREATION DATE: 3-24-97
DRAFTERS INITIALS: GB
82014786

ORIGINAL DWG SIZE
11 x 17
PLOT SCALE: 1=200

MOST RECENT REVISION:
REVISION DATE: 4-3-97
DRAFTERS INITIALS: AB



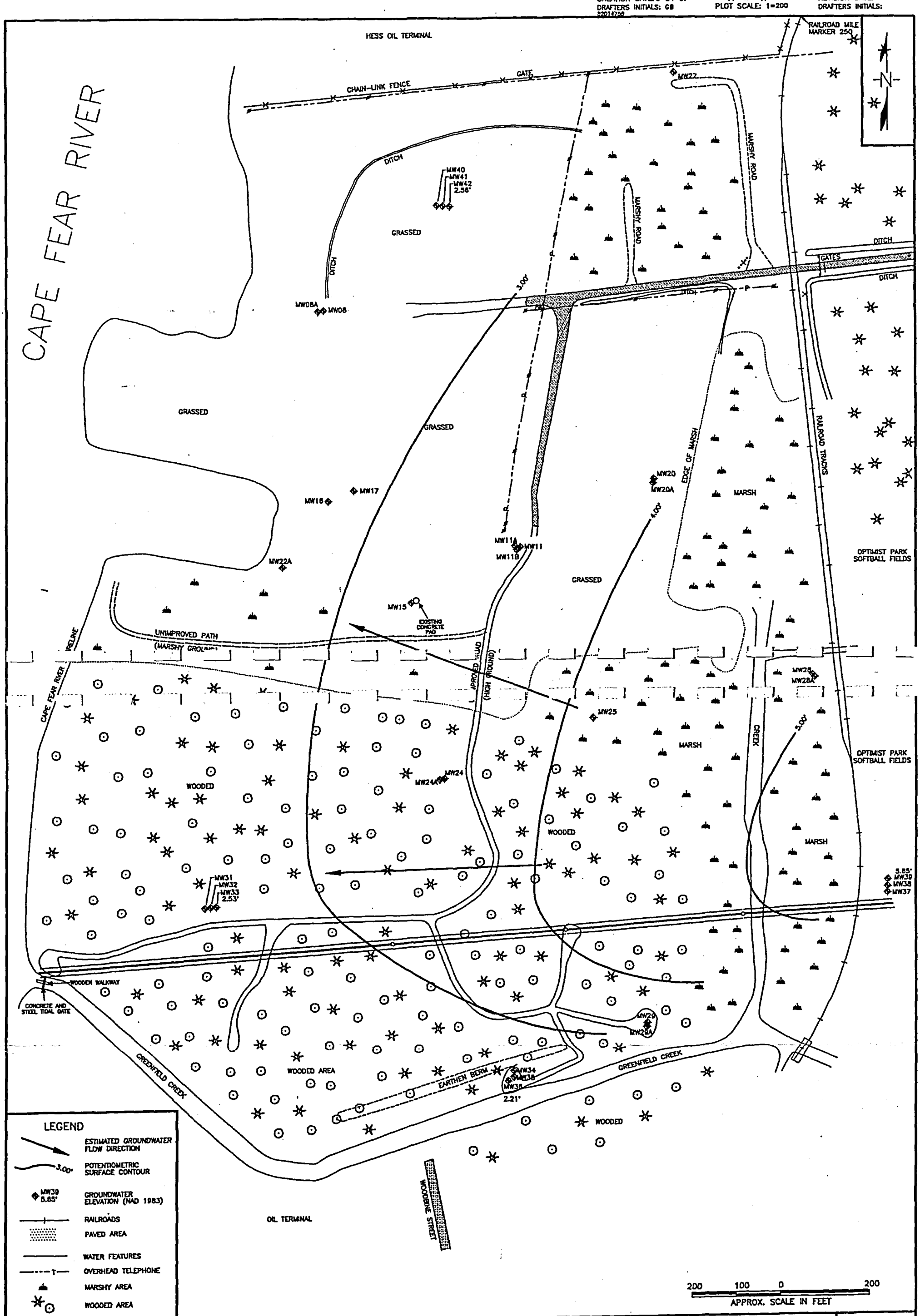
POTENTIOMETRIC SURFACE MAP INTERMEDIATE WELLS ON 1/28/97
SOUTHERN WOOD PIEDMONT
WILMINGTON, NEW HANOVER COUNTY, NORTH CAROLINA

FIGURE 5

CAD DWG NO: ESSWPSDW
CREATION DATE: 3-24-97
DRAFTERS INITIALS: GB
92014799

ORIGINAL DWG SIZE
11 x 17
PLOT SCALE: 1=200

MOST RECENT REVISION:
REVISION DATE:
DRAFTERS INITIALS:



POTENTIOMETRIC SURFACE MAP DEEP WELLS ON 1/28/97
SOUTHERN WOOD PIEDMONT
WILMINGTON, NEW HANOVER COUNTY, NORTH CAROLINA

FIGURE 6

5.3 Groundwater Pathway Sample Locations and Analytical Results

Groundwater samples were collected from 31 permanent monitoring wells. Nineteen of the wells were previously installed and 12 wells were installed during field work for this ESI. Eleven of the nineteen existing wells are screened in the shallow aquifer and eight are screened in the intermediate aquifer. Four of the new wells are screened in the shallow aquifer, four are screened in the intermediate aquifer, and four are screened in the deep aquifer. Sample codes and descriptions are listed in Table 1 and are shown on Figure 2. Field measurements of groundwater parameters taken during sampling are listed on Table 11.

5.3.1 Shallow Organic Analytical Results

Elevated levels of extractable organic constituents were detected in groundwater samples SP-MW-11, SP-MW-15, SP-MW-24, SP-MW-25, and SP-MW-34. Extractable organic constituents detected at elevated levels in groundwater samples include: phenol, 2-methylphenol, (3- and/ or 4-) methylphenol, 2,4-dimethylphenol, naphthalene, 2-methylnaphthalene, acenaphthylene, acenaphthene, dibenzofuran, fluorene, phenanthrene, anthracene, carbazole, fluoranthene, pyrene, benzo(a)anthracene, chrysene, bis (2-ethylhexyl) phthalate, benzo (b and/or k) fluoranthene, benzo(a)pyrene, indeno (1,2,3-cd) pyrene, and benzo (g,h,i) perylene. Elevated levels of purgeable organic constituents were detected in groundwater samples SP-MW-11, SP-MW-15, and SP-MW-17. Purgeable organic constituents detected at elevated levels in groundwater samples include: benzene, methyl isobutyl ketone, methyl butyl ketone, toluene, ethyl benzene, and total xylenes. Elevated pesticide constituents include alpha-chlordane/2 and 4,4'-DDE (P,P-DDE) which were detected in samples SP-MW-11 and SP-MW-34, respectively. A more detailed summary of shallow groundwater organic analytical results are presented on Table 12 and in Appendix A.

5.3.2 Intermediate Organic Analytical Results

Elevated levels of extractable organic constituents were detected in groundwater samples SP-MW-11A, SP-MW-11B, SP-MW-28A, SP-MW-29A, and SP-MW-35. Extractable organic constituents detected at elevated levels in groundwater samples include: 2,4 dimethylphenol, naphthalene, 2-methylnaphthalene, acenaphthene, dibenzofuran, fluorene, phenanthrene, anthracene, carbazole, fluoranthene, and

Table 11
Field Measurements of Groundwater Samples
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Sample Code	pH	Conductivity (µmhos/cm)	Temperature (°F)	Turbidity (NTU)
SP-MW-08	6.14	662	60.4	19.4
SP-MW-08A	6.50	455	61.2	2.3
SP-MW-11	6.26	1050	61.9	91.5
SP-MW-11A	6.87	35.9	60	6.04
SP-MW-11B	6.94	353	56.7	0.87
SP-MW-15	6.63	1420	59.9	2.1
SP-MW-16	5.64	424	68.8	2.4
SP-MW-17	6.45	1090	64.9	2.6
SP-MW-20	6.36	1276	70.4	5.1
SP-MW-20A	6.81	337	67.6	0.7
SP-MW-22A	5.67	310	67.9	0.67
SP-MW-24	6.02	1899	64.6	10.9
SP-MW-24A	5.98	374	62.6	0.43
SP-MW-25	5.96	1292	63.6	28.3
SP-MW-27	6.24	700	61.5	7.78
SP-MW-28	6.56	2170	67.1	3.93
SP-MW-28A	6.15	246	66.3	0.34
SP-MW-29	5.79	3890	61.6	6.22
SP-MW-29A	6.80	475	61.5	1.24

NOTES:

µmhos/cm	micromhos per centimeter
°F	degrees Fahrenheit
NTU	Nephelometric Turbidity Units
SP	Southern Wood Piedmont
MW	Monitoring Well

Table 11 (continued)
Field Measurements of Groundwater Samples
Southern Wood Piedmont
Wilmington, New Hanover County, North Carolina

Sample Code	pH	Conductivity (µmhos/cm)	Temperature (°F)	Turbidity (NTU)
SP-MW-31	7.78	824	58.6	1.2
SP-MW-32	8.02	396	60.1	5.5
SP-MW-33	8.73	598	60.2	3.0
SP-MW-34	6.58	737	69.1	0.8
SP-MW-35	7.04	399	67.3	4.6
SP-MW-36	7.28	395	63.8	0.96
SP-MW-37	6.43	458	67.2	8.02
SP-MW-38	6.46	397	67.8	1.41
SP-MW-39	7.51	300	66.4	4.12
SP-MW-40	7.98	579	58.9	2.0
SP-MW-41	7.92	335	60.5	5.2
SP-MW-42	8.44	450	61.3	0.80

NOTES:

µmhos/cm	micromhos per centimeter
°F	degrees Fahrenheit
NTU	Nephelometric Turbidity Units
SP	Southern Wood Piedmont
MW	Monitoring Well

Table 12
Shallow Groundwater Organic Analytical Results
Southern Wood Piedmont Company
Willmington, New Hanover County, North Carolina

Parameters (ug/L)	Background							
	SP-MW-37	SP-MW-08	SP-MW-11	SP-MW-15	SP-MW-16	SF-MW-17	SP-MW-20	SP-MW-24
Extractable Organic Compounds								
Phenol	10 U	-	210 J	-	-	-	-	-
2-Methylphenol	10 U	-	530 J	-	-	-	-	-
(3- and/or 4-) Methylphenol	10 U	-	890 J	-	-	-	-	-
2,4-Dimethylphenol	10 U	-	220 J	16	-	-	-	-
Naphthalene	10 U	-	85 J	380	-	-	-	-
2-Methylnaphthalene	5 J	-	67	48	-	-	-	-
Acenaphthylene	10 U	-	34	2 J	-	-	-	-
Acenaphthene	51	-	720 J	140	-	10	14	200
Dibenzofuran	10 U	-	540 J	50	-	2 J	-	41 J
Fluorene	7 J	-	660 J	29	-	9 J	1 J	72 J
Phenanthrene	3 J	-	4,800 J	15	-	2 J	-	22 J
Anthracene	10 U	-	990 J	4 J	1 J	3 J	1 J	-
Carbazole	1 J	-	1,600 J	9 J	-	-	-	-
Fluoranthene	10 U	-	3,000 J	-	-	2 J	1 J	-
Pyrene	10 U	-	570 J	-	-	2 J		-
Benzo (a) Anthracene	10 U	-	220 J	-	-	-	-	-
Chrysene	10 U	-	220 J	-	-	-	-	-
Bis (2-ethylhexyl) Phthalate	10 U	-	--	-	-	-	-	-
Benzo (b and/or k) Fluoranthene	10 U	-	145 J	-	-	-	-	-
Benzo(a)Pyrene	10 U	-	67	-	-	-	-	-
Indeno (1,2,3-CD) Pyrene	10 U	-	22	-	-	-	-	-
Benzo Perylene	10 U	-	19	-	-	-	-	-

Table 12 (continued)
Shallow Groundwater Organic Analytical Results
Southern Wood Piedmont Company
Willmington, New Hanover County, North Carolina

Parameters (ug/L)	Background							
	SP-MW-37	SP-MW-08	SP-MW-11	SP-MW-15	SP-MW-16	SF-MW-17	SP-MW-20	SP-MW-24
Miscellaneous Extractable Organic Compounds								
Indane			20 JN					
Phenylpropenal				4 JN				
Dimethylphenol (not 2,4)				4 JN				
Ethylmethylphenol			20 JN	2 JN				
Trimethylphenol			30 JN	2 JN				
Biphenyl			6 JN	6 JN				
1-Methylnaphthalene	8 JN			9 JN				
Dimethylnaphthalene (2 isomers)	10 JN							
1-Dimethylnaphthalene (3 isomers)			20 JN					
Dimethylnaphthalene (5 isomers)								
Methylbenzothiophene	3 JN							
Methylindanol			4 JN					
Phenylpyridine			3 JN					
Trimethylnaphthalene			4 JN					
Methylfluorene			6 JN					
Methylfluorene (2 isomers)								
Dibenzothiophene			8 JN					
Dihydrobenzothiophene				3 JN				
Benzofluorene (2 isomers)			200 JN					
Methyltriphenylene			10 JN					
Perylene			3 JN					
Naphthalenecarbonitrile				4 JN				
Naphthalenol				5 JN				
Dimethylphenolisocyanate				7 JN				
Isoquinolinone				20 JN				
Methylnaphthalene			10 JN					
Naphthalic Anhydride				8 JN				

Table 12 (continued)
Shallow Groundwater Organic Analytical Results
Southern Wood Piedmont Company
Willmington, New Hanover County, North Carolina

Parameters (ug/L)	Background							
	SP-MW-37	SP-MW-08	SP-MW-11	SP-MW-15	SP-MW-16	SF-MW-17	SP-MW-20	SP-MW-24
Miscellaneous Extractable Organic Compounds								
Phenanthridinone				100 JN				
Cyclopentaphenanthrenone				10 JN				
(Methylehtyl) Benzene						3 JN		
Ethyldimethylbenzene						3 JN	7 JN	
Ethenlydimethylbenzene						8 JN		
Dihydrodimethylindene						5 JN	2 JN	
Dihydrodimethylindene (2 isomers)						20 JN		
Dimethylnaphthalene				8 JN		7 JN		
(Methylethylidene) Biphenol								
Unidentified Compounds / #	20 J/1	50 J/3	200 J/5	100 J/4	20 J/1	100 J/3	50 J/3	

ug/L micrograms per Liter
SP Southern Wood Piedmont
MW Monitoring Well

U Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).
J Estimated Value.
N Presumptive evidence of presence of material.

\- Not detected

Elevated levels which are greater than three times the background level or greaterr than the SQL.

Table 12 (continued)
Shallow Groundwater Organic Analytical Results
Southern Wood Piedmont Company
Willmington, New Hanover County, North Carolina

Parameters (ug/L)	Backround							
	SP-MW-37	SP-MW-25	SP-MW-27	SP-MW-28	SP-MW-29	SP-MW-31	SP-MW-34	SP-MW-40
Extractable Organic Compounds								
Phenol	10 U	-	-	-	-	-	-	-
2-Methylphenol	10 U	-	-	-	-	-	-	-
(3- and/or 4-) Methylphenol	10 U	-	-	-	4 J	-	-	-
2,4-Dimethylphenol	10 U	-	-	-	-	-	-	-
Naphthalene	10 U	-	-	-	-	-	-	-
2-Methylnaphthalene	5 J	1 J	-	-	-	-	-	-
Acenaphthylene	10 U	-	-	-	-	-	-	-
Acenaphthene	51	9 J	1 J	17	-	-	250	-
Dibenzofuran	10 U	5 J	-	6 J	-	-	150	-
Fluorene	7 J	8 J	-	13	-	-	200	-
Phenanthrene	3 J	17	-	3 J	-	-	230	-
Anthracene	10 U	6 J	-	-	-	-	16 J	2 J
Carbazole	1 J	-	-	-	-	-	-	-
Fluoranthene	10 U	12	-	2 J	-	-	36 J	-
Pyrene	10 U	8 J	-	1 J	-	-	22 J	-
Benzo (A) Anthracene	10 U	-	-	-	-	-	-	-
Chrysene	10 U	1 J	-	-	-	-	-	-
Bis (2-ethylhexyl) Phthalate	10 U	-	-	-	-	-	68	-
Benzo (b and/or k) Fluoranthene	10 U	-	-	-	-	-	-	-
Benzo-A-Pyrene	10 U	-	-	-	-	-	-	-
Indeno (1,2,3-CD) Pyrene	10 U	-	-	-	-	-	-	-
Benzo (GHI) Perylene	10 U	-	-	-	-	-	-	-

Table 12 (continued)
Shallow Groundwater Organic Analytical Results
Southern Wood Piedmont Company
Willmington, New Hanover County, North Carolina

Parameters (ug/L)	Backround							
	SP-MW-37	SP-MW-25	SP-MW-27	SP-MW-28	SP-MW-29	SP-MW-31	SP-MW-34	SP-MW-40
Miscellaneous Extractable Organic Compounds								
Indane								
Phenylpropenal								
Dimethylphenol (not 2,4)								
Ethylmethylphenol								
Trimethylphenol								
Biphenyl								
1-Methylnaphthalene	8 JN						80 JN	
Methylnaphthalene								
Dimethylnaphthalene (2 isomers)	10 JN							
Dimethylnaphthalene (3 isomers)								
Dimethylnaphthalene (5 isomers)							100 JN	
Methylbenzothiophene	3 JN							
Methylindanol								
Phenylpyridine								
Trimethylnaphthalene								
Methylfluorene								
Methylfluorene (2 isomers)							30 JN	
Dibenzothiophene							20 JN	
Dihydrobenzothiophene							10 JN	
Benzofluorene (2 isomers)								
Methyltriphenylene								
Perylene								
Naphthalenecarbonitrile							20 JN	
Naphthalenol								
Dimethylphenolisocyanate								
Isoquinolinone								
Naphthalic Anhydride								

Table 12 (continued)
Shallow Groundwater Organic Analytical Results
Southern Wood Piedmont Company
Willmington, New Hanover County, North Carolina

Parameters (ug/L)	Backround							
	SP-MW-37	SP-MW-25	SP-MW-27	SP-MW-28	SP-MW-29	SP-MW-31	SP-MW-34	SP-MW-40
Miscellaneous Extractable Organic Compounds								
Phenanthridinone								
Cyclopentaphenanthrenone								
(Methylehtyl) Benzene								
Ethyldimethylbenzene								
Ethenlydimethylbenzene								
Dihydrodimethylindene								
Dihydrodimethylindene (2 isomers)								
Dimethylnaphthalene								
(Methylethylidene) Biphenol								
Unidentified Compounds / #	20 J/1							

ug/L micrograms per Liter
SP Southern Wood Piedmont
MW Monitoring Well

U Material analyzed for but not detected, number is the minimum quantitation limit.
J Estimated value.
N Presumptive evidence of presence of material.

\- Not detected

Elevated levels which are greater than three times the background level or greater than the SQL.

Table 12 (continued)
Shallow Groundwater Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/L)	Background							
	SP-MW-37	SP-MW-08	SP-MW-11	SP-MW-15	SP-MW-16	SP-MW-17	SP-MW-20	SP-MW-24
Purgeable Organic Compounds								
Benzene	10 U	-	130	-	-	-	-	-
Methyl Isobutyl Ketone	10 U	-	-	-	-	15	-	-
Methyl Butyl Keytone	10 U	-	-	-	-	17	-	-
1,1,2,2-Tetrachloroethane	10 U	-	-	-	-	6 J	-	-
Toluene	10 U	-	160	-	-	-	-	-
Ethyl Benzene	1 J	-	130	6 J	-	-	-	-
Total Xylenes	2 J	-	250	9 J	-	-	-	-
Miscellaneous Purgeable Organic Compounds								
Ethylmethylbenzene			70 JN	6 JN				
Trimethylbenzene			100 JN	10 JN				
Benzofuran			200 JN					
(Methyl Ethyl) Benzene			50 JN					
Ethylmethylbenzene			1,000 JN					
Indene			100 JN					
Methylindan			50 JN	20 JN				
Methylbenzofuran (2 Isomers)			300 JN	50 JN				
Indane	60 JN			200 JN				
Ethenyldimethylbenzene	20 JN							
Dihydromethylindene (2 isomers)	20 JN							
Benzothiophene	7 JN							
Ethyldimethylbenzene								
Tetramethylbenzene						10 JN		

ug/L microgram per lter.
SP Southern Wood Piedmont
MW Monitoring Well
J Estimated value.
N Presumptive evidence of presence of material.
U Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).
- Not detected
Elevated levels which are greater than three times the background level or greater than the SQL.

Table 12 (continued)
Shallow Groundwater Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background							
	SP-MW-37	SP-MW-25	SP-MW-27	SP-MW-28	SP-MW-29	SP-MW-31	SP-MW-34	SP-MW-40
Purgeable Organic Compounds								
Benzene	10 U	-	-	-	-	-	-	-
Methyl Isobutyl Ketone	10 U	-	-	-	-	-	-	-
Methyl Butyl Keytone	10 U	-	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	10 U	-	-	-	-	-	-	-
Toluene	10 U	-	-	-	-	-	-	-
Ethyl Benzene	1 J	-	-	-	-	-	-	-
Total Xylenes	2 J	-	-	-	-	-	-	-
Miscellaneous Purgeable Organic Compounds								
Ethylmethylbenzene								
Trimethylbenzene								
Benzofuran								
(Methyl Ethyl) Benzene								
Ethylmethylbenzene								
Indene								
Methylindan								
Methylbenzofuran (2 Isomers)								
Indane							30 JN	
Ethenyldimethylbenzene							20 JN	
Dihydromethylindene (2 isomers)							10 JN	
Benzothiophene								
Ethyldimethylbenzene							50 JN	
Tetramethylbenzene								

ug/L microgram per liter.
SP Southern Wood Piedmont
MW Monitoring Well
J Estimated value.
N Presumptive evidence of presence of material.
U Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).
\- Not detected
Elevated levels which are greater than three times the background level or greater than the SQL.

Table 12
Shallow Groundwater Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/L)	Background		
	SP-MW-37	SP-MW-11	SP-MW-34
Alpha-Chlordane/2	0.050 U	1.2 J	-
4,4' - DDE (P,P' - DDE)	.10U	-	0.10 N

Notes:

ug/L	micrograms per Liter
J	Estimated value
U	Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).
N	Presumptive evidence of presence of material.
-	Not detected

Elevated levels which are greater than three times background levels or greater than the SQL.

pyrene. Elevated levels of purgeable organic constituents were detected in groundwater samples SP-MW-08A, SP-MW-11B, SP-MW-32, and SP-MW-35. Purgeable organic constituents detected at elevated levels in groundwater samples include: acetone, chloroform, ethyl benzene, and total xylenes. Pesticide/PCB analyses detected the constituent heptachlor in SP-MW-22A at greater than background. A more detailed summary of intermediate groundwater organic analytical results are presented in Appendix A and on Table 13.

5.3.3 Deep Organic Analytical Results

Elevated levels of extractable organic constituents were detected in groundwater samples SP-MW-33 and SP-MW-36. Extractable organic constituents detected at elevated levels in groundwater samples include acenaphthene and fluorene. An elevated level of the purgeable organic chloroform was detected in groundwater sample SP-MW-36. A more detailed summary of deep groundwater organic analytical results are presented on Table 14.

5.3.4 Shallow Inorganic Analytical Results

Inorganic analytes were detected at elevated levels in shallow groundwater samples SP-MW-08, SP-MW-11, SP-MW-15, SP-MW-16, SP-MW-17, SP-MW-20, SP-MW-24, SP-MW-25, SP-MW-27, SP-MW-28, SP-MW-29, SP-MW-31, SP-MW-34, and SP-MW-40. Inorganic analytes detected at elevated levels include: aluminum, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, potassium, selenium, sodium, vanadium, and zinc. A more detailed summary of shallow groundwater organic analytical results are presented on Table 15. The complete set of analytical data is presented in Appendix A.

5.3.5 Intermediate Inorganic Analytical Results

Inorganic analytes were detected at elevated levels in intermediate groundwater samples SP-MW-08A, SP-MW-32, SP-MW-35, and SP-MW-41. Inorganic analytes detected at elevated levels include: chromium, copper, and lead. A more detailed summary of intermediate groundwater organic analytical results are presented on Table 16. The complete set of analytical data is presented in Appendix A.

5.3.6 Deep Inorganic Analytical Results

Inorganic analytes were detected at elevated levels in deep groundwater samples SP-MW-33, SP-MW-36, and SP-MW-42. Inorganic analytes detected at elevated levels

include: barium, chromium, lead, potassium, sodium, vanadium, and zinc. A more detailed summary of deep groundwater organic analytical results are presented on Table 17. The complete set of analytical data is presented in Appendix A.

5.4 Groundwater Pathway Conclusions

Most of the people in the vicinity of the site use treated surface water for potable water. Therefore, the groundwater pathway is of moderate concern for this site due to the minimal population in the area which utilize potable groundwater. Groundwater samples indicate that several contaminants have migrated into the shallow, intermediate and deep monitoring wells beneath the SWP site.

Table 13
Intermediate Groundwater Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/L)	Background						
	SP-MW-38	SP-MW-08A	SP-MW-11A	SP-MW-11B	SP-MW-20A	SP-MW-22A	SP-MW-24A
Extractable Organic Compounds							
2,4-Dimethylphenol	10 U	-	3 J	54	-	-	-
Naphthalene	10 U	-	86	880	-	9 J	-
2-Methylnaphthalene	10 U	-	45	320	-	-	-
Acenaphthene	10 U	-	38	260	3 J	5 J	-
Dibenzofuran	10 U	-	21	150	-	-	-
Fluorene	10 U	-	22	170	-	-	-
Anthracene	10 U	-	3 J	12	-	-	-
Carbazole	10 U	-	17 J	95 J	-	1 J	-
Fluoranthene	10 U	-	4 J	21	-	-	-
Acenaphthylene	10 U	-	-	3 J	-	-	-
Phenanthrene	10 U	-	17 J	89 J	-	-	-
Benzo (a) anthracene	10 U	-	-	1 J	-	-	-
Pyrene	10 U	-	-	12 J	-	-	-
Miscellaneous Extractable Organic Compounds							
Unidentified Compounds/No.							
(Methylethylindene) Biphenol							
Benzofuranone							
Dihydroindenol							
Dihydroindeniol							
Acridinone							
Methylbenzonitrile							
Methylindanol							
Caprolatam	4 JN						
Benzothiophene			5 JN				
Methylnaphthalene			10 JN				

Table 13 (continued)
Intermediate Groundwater Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/L)	Background						
	SP-MW-38	SP-MW-08A	SP-MW-11A	SP-MW-11B	SP-MW-20A	SP-MW-22A	SP-MW-24A
Miscellaneous Extractable Organic							
Dimethylnaphthalene			4 JN				
Phenanthridinone			7 JN				
Indene				20 JN			
Ethylmethylphenol				2 JN			
Trimethylphenol				3 JN			
Thymol				3 JN			
Biphenyl				5 JN			
Dimethylnaphthalene (2 isomers)							
Dimethylnaphthalene (3 isomers)				20 JN			
Naphthalenecarbonitrile				3 JN			
Naphthalenol				2 JN			
Methylbiphenyl				2 JN			
Hydroxbiphenyl				3 JN			
Methylquinolinone				4 JN			
1-Methylnaphthalene				7 JN			
Aminofluorenone				20 JN			

ug/L micrograms per liter
SP Southern Wood Piedmont
MW Monitoring Well

J Estimated value.
N Presumptive evidence of presence of material.

U Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).

\- Not detected

Elevated levels which are greater than three times the background level or greater than the SQL.

Table 13 (continued)
Intermediate Groundwate Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/L)	Background					
	SP-MW-38	SP-MW-28A	SP-MW-29A	SP-MW-32	SP-MW-35	SP-MW-41
Extractable Organic Compounds						
2,4-Dimethylphenol	10 U	-	-	-	-	-
Naphthalene	10 U	2 J	54	-	-	-
2-Methylnaphthalene	10 U	-	130	-	-	-
Acenaphthene	10 U	20 J	160	-	110	-
Dibenzofuran	10 U	3 J	97	-	40	-
Fluorene	10 U	3 J	95	-	96	-
Anthracene	10 U	-	-	-	7 J	-
Carbazole	10 U	-	72	-	110	-
Fluoranthene	10 U	3 J	-	-	7 J	-
Acenaphthylene	10 U	-	-	-	-	-
Phenanthrene	10 U	-	50 J	-	-	-
Pyrene	10 U	-	-	-	3 J	-
Miscellaneous Extractable Organic Compounds						
Unidentified Compounds/No.				200 JN/9	500 J/7	
(Methylethylindene) Biphenol				10 JN	20 JN	20 JN
Benzofuranone				6 JN		
Dihydroindenol					200 JN	
Dihydroindeniol					60 JN	
Acridinone					40 JN	
Methylbenzonitrile					40 JN	
Methylindanol					20 JN	
Caprolactum	4 JN					
Benzothiophene						
Methylnaphthalene						

Table 13 (continued)
Intermediate Groundwater Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/L)	Background					
	SP-MW-38	SP-MW-28A	SP-MW-29A	SP-MW-32	SP-MW-35	SP-MW-41
Miscellaneous Extractable Organic						
Dimethylnaphthalene						
Phenanthridinone						
Indene						
Ethylmethylphenol						
Trimethylphenol					20 JN	
Thymol						
Biphenyl						
Dimethylnaphthalene (2 isomers)					60 JN	
Dimethylnaphthalene (3 isomers)						
Naphthalenecarbonitrile					40 JN	
Naphthalenol						
Methylbiphenyl						
Hydroxbiphenyl						
Methylquinolinone						
Aminofluorenone						

ug/l micrograms per liter
SP Southern Wood Piedmont
MW Monitoring Well

J Estimated value.
N Presumptive evidence of presence of material.

U Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).

- Not detected

Elevated levels which are greater than three times the background level or greater than the SQL.

Table 13 (continued)
Intermediate Groundwater Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/L)	Background SP-MW-38	SP-MW-08A	SP-MW-11A	SP-MW-11B	SP-MW-20A	SP-MW-22A	SP-MW-24A
Purgeable Organic Compounds							
Acetone	10 U	1,700	-	-	-	-	-
1,1,2-Trichloroethane	10 U	-	4 J	-	-	-	-
Chloroform	10 U	-	-	-	-	-	-
Bromodichloromethane	10 U	-	-	-	-	-	-
Benzene	10 U	-	-	8 J	-	-	-
1,1,1-Trichloroethane	1 J	-	-	-	-	-	-
Ethyl Benzene	10 U	-	-	17	-	-	-
Total Xylenes	10 U	-	-	25	-	-	-
Miscellaneous Purgeable Organic Compounds							
Ethenyldimethyl benzene							
Benzothiophene							
Propanol		8,000 JN					
CyclopentathiapyNan		700 JN					
Indane		70 JN	80 JN	400 JN			
Methylbenzofuran			6 JN				
Benzofuran				8 JN			
Trimethylbenzene				10 JN			
Trimethylbenzene (2 isomers)							
(Methylpropenyl) Benzene				20 JN			
Methylbenzofuran							
Ethylmethylbenzene (2 isomers)							
Methyl benzofuran (2 isomers)				90 JN			
Ethylmethyl benzene				20 JN			
Ethyldimethylbenzene							
(Methylethyl) Benzene				7 JN			
Dihydromethylindene				20 JN			
Dihydromethylindene (2 isomers)							
Alkane	20 JN						

ug/l micrograms per liter
SP Southern Wood Piedmont
MW Monitoring Well
J Estimated value.
N Presumptive evidence of presence of material.
U Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).
- Not detected
Elevated levels which are greater than three times the background level or greater than the SQL.

Table 13 (continued)
Intermediate Groundwater Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/L)	Background SP-MW-38	SP-MW-28A	SP-MW-29A	SP-MW-32	SP-MW-35	SP-MW-41
Purgeable Organic Compounds						
Acetone	10 U	-	-	-	-	-
1,1,2-Trichloroethane	10 U	-	-	-	-	-
Chloroform	10 U	-	-	44	16	-
Bromodichloromethane	10 U	-	-	5 J	2 J	-
Benzene	10 U	-	-	-	4 J	-
1,1,1-Trichloroethane	1 J	-	-	-	-	-
Ethyl Benzene	10 U	-	-	-	26	-
Total Xylenes	10 U	-	-	-	32	-
Miscellaneous Purgeable Organic Compounds						
Ethenyldimethyl benzene					20 JN	
Benzothiophene					50 JN	
Propanol						
Cyclopentathiapyran						
Indane					500 JN	
Methylbenzofuran					60 JN	
Benzofuran					9 JN	
Trimethylbenzene						
Trimethylbenzene (2 isomers)					60 JN	
(Methylpropenyl) Benzene						
Methylbenzofuran					20 JN	
Ethylmethylbenzene (2 isomers)					20 JN	
Methyl benzofuran (2 isomers)						
Ethylmethyl benzene						
Ethyldimethylbenzene					5 JN	
(Methylethyl) Benzene					7 JN	
Dihydromethylindene						
Dihydromethylindene (2 isomers)					50 JN	
Alkane						

ug/l micrograms per liter
SP Southern Wood Piedmont
MW Monitoring Well
J Estimated value.
N Presumptive evidence of presence of material.
U Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).
- Not detected
Elevated levels which are greater than three times the background level or greater than the SQL.

Table 14
Deep Groundwater Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/l)	Background			
	SP-MW-39	SP-MW-33	SP-MW-36	SP-MW-42
Extractable Organic Compounds				
Acenaphthene	10 U	20	45	-
Fluorene	10 U	2 J	15	-
Carbazole	10 U	3 J	3 J	-
Fluoranthene	10 U	-	3 J	-
Pyrene	10 U	-	2 J	-
Miscellaneous Extractable Organic Compounds				
(Methylethylidene) Biphenol		30 JN	50 JN	20 JN
1-Methylnaphthalene		9 JN		
Benzofuranone		6 JN		9 JN
Dihydrobenzothiophene		2 JN		
Iodonaphthol			50 JN	
Dihydroindenol			30 JN	
Hydroxbiphenyl			30 JN	
Dihydroindenone			30 JN	
Phenylpropenal			20 JN	
Dihydroindenediol			20 JN	
Hydroxybenzaldehyde			20 JN	
Fluorenol			10 JN	
Benzopyranone			10 JN	
Naphthalenol			8 JN	
Benzonaphthothiophene			7 JN	
Benzothiophene			7 JN	
Dimethylnaphthalene			4 JN	
Purgeable Organic Compounds				
Chloroform	10 U	-	28	-
Bromodichloromethane	10 U	-	5 J	-
Ethylbenzene	10 U	-	3 J	-
Total Xylenes	10 U	-	4 J	-
Miscellaneous Purgeable Organic Compounds				
Indane		80 JN	50 JN	
Trimethylbenzene			10 JN	
Dihydromethylindene			6 JN	

ug/L micrograms per liter
SP Southern Wood Piedmont
MW Monitoring Well
J Estimated value
N Presumptive evidence of presence of material.
U Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).
- Not detected.
Elevated levels which are greater than three times the background level or greater than the SQL.

Table 14-continued
Deep Groundwater Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/l)	Background			
	SP-MW-39	SP-MW-33	SP-MW-36	SP-MW-42
Purgeable Organic Compounds				
Chloroform	10 U	28	-	-
Bromodichloromethane	10 U	5 J	-	-
Ethylbenzene	10 U	3 J	-	-
Total Xylenes	10 U	4 J	-	-
Miscellaneous Purgeable Organic Compounds				
Indane		80 JN	50 JN	
Trimethylbenzene			10 JN	
Dihydromethylindene			6 JN	

ug/L micrograms per liter

J Estimated value.

N Presumptive evidence of presence of material.

U Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).

\- Not detected

Elevated levels which are greater than three times the background level or greater than the SQL.

Table 15
Shallow Groundwater Inorganic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/L)	Background														
	SP-MW-37	SP-MW-08	SP-MW-11	SP-MW-15	SP-MW-16	SP-MW-17	SP-MW-20	SP-MW-24	SP-MW-25	SP-MW-27	SP-MW-28	SP-MW-29	SP-MW-31	SP-MW-34	SP-MW-40
Aluminum	780	-	7,700	-	-	-	700	140	2,200	64	170	760	230	730	380
Arsenic	5 U	-	12	68	-	10	-	-	-	-	-	-	-	-	220
Barium	34	50	170	94	44	150	190	320	47	240	280	140	47	44	85
Cadmium	1 U	-	-	-	-	-	-	-	-	-	-	-	1 J	-	-
Calcium	67,000	20,000	78,000	91,000	9,100	32,000	63,000	88,000	14,000	89,000	140,000	42,000	45,000	19,000	53,000
Chromium	2 J	-	15	9 J	6 J	-	-	-	3.9	-	-	70	4 J	3 J	3 J
Cobalt	1 U	-	7 J	-	-	-	-	-	-	-	-	-	-	1 J	5 J
Copper	1 U	-	51	-	-	-	-	-	-	-	-	-	2 J	3 J	27
Iron	3,300	15,000	69,000	23,000	2,300	17,000	73,000	61,000	7,200	76,000	37,000	39,000	25,000	16,000	8,600
Lead	8	-	32	-	-	-	-	-	3	-	8	-	-	-	-
Magnesium	5,700	8,900	18,000	22,000	4,500	11,000	39,000	33,000	13,000	9,600	36,000	53,000	14,000	4,900	8,100
Manganese	160	240	2,000	1,800	63	400	2,200	3,600	250	1,200	630	1,400	610	340	640
Mercury	0.10 U	-	0.42	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	19 J	-	-	-	-	-	-	-	-	-	-	-	17 J	7 J	12 J
Potassium	4,400	2,100	15,000	11,000	6,000	10,000	17,000	8,900	5,700	4,100	14,000	9,900	6,400	2,900	6,700
Selenium	3 U	-	-	-	-	-	-	-	-	-	-	-	-	4 J	3 J
Sodium	15,000	69,000	33,000	140,000	44,000	120,000	220,000	130,000	140,000	14,000	250,000	420,000	89,000	22,000	11,000
Vanadium	2 J	-	30 J	-	-	-	19 J	-	-	-	-	-	11 J	5 J	4 J
Zinc	11 J	32	92	34	45	-	-	-	21 J	27 J	-	16 J	9 J	14 J	27

NOTES:

ug/L	micrograms per Liter
SP	Southern Wood Piedmont
MW	Monitoring Well
J	Estimated value.
U	Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).
-	Not detected.
	Elevated levels which are greater than three times the background level or greater than the SQL.

Table 16
Intermediate Groundwater Inorganic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/L)	Background						
	SP-MW-38	SP-MW-08A	SP-MW-11A	SP-MW-11B	SP-MW-20A	SP-MW-22A	SP-MW-24A
Aluminum	160	-	-	-	-	94	81
Arsenic	5 U	-	-	-	-	-	-
Barium	61	27	16	29	13	33	77
Cadmium	1 U	-	-	-	-	-	-
Calcium	47,000	48,000	3,800	52,000	43,000	12,000	17,000
Chromium	2 J	-	-	-	-	-	-
Copper	1 U	-	-	-	-	-	-
Iron	2,600	3,600	1,900	220	2,200	3,600	5,000
Lead	3 U	12	-	-	-	-	-
Magnesium	3,900	3200	2,700	1,700	4,100	4,200	4,100
Manganese	240	78	62	-	330	73	160
Nickel	20 J	-	-	-	-	-	-
Potassium	2,900	3,800	690	990 J	3,500	2,000	1,400
Sodium	19,000	26,000	5,900	7,200	10,000	30,000	29,000
Vanadium	2 J	-	-	-	-	-	-
Zinc	24	27	21	-	-	-	-

Notes:

ug/L micrograms per Liter
SP Southern Wood Piedmont
MW Monitoring Well

J Estimated value

U Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).

\- Not detected

Elevated levels which are greater than three times the background levle or greater than the SQL.

Table 16 (continued)
Intermediate Groundwater Inorganic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/L)	Background					
	SP-MW-38	SP-MW-28A	SP-MW-29A	SP-MW-32	SP-MW-35	SP-MW-41
Aluminum	160	-	-	220	350	380
Arsenic	5 U	-	-	-	-	-
Barium	61	15	18	34	20	34
Cadmium	1 U	-	-	-	-	1 J
Calcium	47,000	23,000	52,000	29,000	41,000	28,000
Chromium	2 J	-	-	6 J	4 J	3 J
Copper	1 U	-	-	4 J	17 J	6 J
Iron	2,600	1,600	-	380	390	1,200
Lead	3 U	-	-	22	10	14
Magnesium	3,900	2,100	5,400	2,600	4,400	3,800
Manganese	240	41	37	37	41	310
Nickel	20 J	-	-	4 J	4 J	41
Potassium	2,900	2,100	2,100	5,600	2,900	3,100
Sodium	19,000	8,600	20,000	43,000	25,000	23,000
Vanadium	2 J	-	-	3 J	3 J	-
Zinc	24	-	-	10	9 J	23

Notes:

ug/L micrograms per Liter
SP Southern Wood Piedmont
MW Monitoring Well

J Estimated value

U Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).

\- Not detected

Elevated levels which are greater than three times the background levle or greater than the SQL.

Table 17
Deep Groundwater Inorganic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/L)	Background			
	SP-MW-39	SP-MW-33	SP-MW-36	SP-MW-42
Aluminum	95	71	270	49
Barium	12	43	88	200
Calcium	45,000	52,000	32,000	51,000
Chromium	1 J	-	4 J	-
Copper	8 J	6 J	21 J	2 J
Iron	140	150	220	55
Lead	3 J	12	22	20
Magnesium	6,000	6,900	2,600	4,600
Manganese	21	34	16	6 J
Nickel	3 U	3 J	-	-
Potassium	2,800	6,200	9,000	19,000
Sodium	11,000	52,000	54,000	46,000
Vanadium	2 U	-	6 J	2 J
Zinc	3 J	13 J	22	4 J

NOTES:

ug/L micrograms per Liter
SP Southern Wood Piedmont
MW Monitoring Well
J Estimated value.
U Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).
- Not detected.

Elevated levels which are greater than three times the background level or greater than the SQL.

6.0 Surface Water Pathway

6.1 Hydrologic Setting

Overland runoff from the site generally flows south and southeast toward the onsite drainage ditch and Greenfield Creek which discharges into the Cape Fear River (Refs. 1, 2). The surface water pathway begins in the upper end of the drainage ditch along the southeastern portion of the site. The pathway continues southward for approximately 1,500 feet, where it then empties into Greenfield Creek. The surface water pathway continues west approximately 1,800 feet before discharging into the Cape Fear River (Refs. 1; 2; Fig. 2). The surface water pathway continues in the Cape Fear River for a distance of approximately 14.4 miles both upstream and 14.4 miles downstream due to tidal influence from the Atlantic Ocean (Refs. 1; 31). The site is located within the 100 year floodplain (Ref. 32).

6.2 Surface Water Pathway Targets

The active surface water intakes utilized by the Wilmington Water Department and the Leland Sanitary District are located more than 15 miles upstream of the site (Refs. 30; 31). A 10 year average flow rate for the Cape Fear River was calculated at 5,247 cubic feet per year (Ref. 33). Approximately 10 acres (including 4,000 feet of frontage) of wetland exist on the southeastern portion of the site (Refs. 1; 34; 35). Approximately 56 miles of wetland frontage exist along the 15 miles of the surface water pathway, both upstream and downstream (Ref. 34). The North Carolina and U.S. threatened species, the American alligator (*Alligator mississippiensis*), has been identified at 16 locations on the Cape Fear River system (Ref 36; 37; 38). The U.S. and North Carolina endangered mammal, West Indian manatee (*Trichechus manatus*), have been reported in the Cape Fear estuary approximately 12 miles downstream of the site (Ref. 36). The federally-designated endangered shortnose sturgeon (*Acipenser brevirostrum*) has been observed in the Lower Cape Fear River (Ref. 36). There are seven commercial fisheries located along the Cape Fear River between Eagle Island and the Atlantic Ocean (Ref. 39). In addition, the Cape Fear is used extensively by recreational fishers and boaters (Ref. 40). Species of greatest commercial value include fluke flounder, hard clam, blue crabs (hard shell), and shrimp (Ref. 41). Fishing tackle, floats, and bait containers were observed lying on the ground along the southern site boundary creek bank of Greenfield Creek (Ref. 42).

6.3 Surface Water Pathway Sample Locations

In order to characterize potential contamination in the surface water pathway, one background surface water and one background sediment sample were collected. Surface water and sediment samples SP-SW-01 and SP-SD-01 were collected immediately offsite and upgradient of the site, approximately 250 feet east of the site entrance on Greenfield Street. Biological fish tissue samples were collected in the Cape Fear River and Greenfield Lake. The sample taken in Greenfield Lake serves as a control sample. The complete set of analytical data is presented in Appendix A. Sample locations are shown in Figure 2 and are described in Table 1.

6.4 Surface Water Pathway Analytical Results

6.4.1 Surface Water/Sediment Organic Analytical Results

Elevated concentrations of extractable organics were detected in analytical results of sediment samples SP-SD-06, SP-SD-07, SP-SD-08, SP-SD-09, SP-SD-11, and SP-SD-14. Extractable organic constituents detected at elevated levels in sediment samples include: naphthalene, 2-methylnaphthalene, acenaphthene, dibenzofuran, fluorene, phenanthrene, anthracene, carbazole, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo (b and/or k) fluoranthene, and benzo(a)pyrene. Elevated concentrations of pesticides were detected in analytical results of sediment samples SP-SD-03, SP-SD-06, SP-SD-14, and SP-SD-19. The pesticide constituents 4,4'-DDD (P,P'-DDD), methoxychlor, and gamma chlordane/2 were detected at elevated levels in sediment samples SP-SD-14, SP-SD-06 and SP-SD-19, and SP-SD-03, respectively. Elevated concentrations of purgeable organics were detected in analytical results of sediment samples SP-SD-06 and SP-SD-07. The purgeable organic compounds methyl ethyl ketone, ethyl benzene, and total xylenes were detected at elevated levels in sediment samples SP-SD-06 and SP-SD-07. The sample SP-SD-01, which contained polynuclear aromatic hydrocarbons (PAHs) and other extractable compunds, is considered a control sample. A summary of sediment organic and pesticide/PCB analytical results are presented in Tables 18 and 19. Sample locations are illustrated on Figure 2. The complete set of analytical data is presented in Appendix A.

Table 18
Sediment Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background					
	SP-SD-01	SP-SD-02	SP-SD-03	SP-SD-04	SP-SD-05	SP-SD-06
Extractable Organic Compounds						
Bis(2-ethylhexyl)Phthalate	1,900	-	-	-	-	-
Di-n-butylphthalate	1,400	-	-	-	-	-
Pentachlorophenol	1900 U	-	-	-	-	-
(3- and/or 4-) Methylphenol	760 U	-	-	-	-	-
Naphthalane	760 U	-	-	-	-	3,200 J
2-Methylnaphthalene	760 U	-	-	-	-	38,000
Acenaphthylene	760 U	-	70 J	-	-	-
Acenaphthene	130 J	-	140 J	-	-	31,000
Dibenzofuran	82 J	-	-	-	-	21,000
Fluorene	110 J	-	-	-	-	41,000
Phenanthrene	1200	-	200 J	-	260 J	94,000
Anthracene	170 J	-	340 J	-	140 J	61,000
Carbazole	200 J	-	59 J	-	64 J	20,000
Fluoranthene	2200	-	1000	-	580	130,000
Pyrene	1700	-	750	-	630	91,000
Benzo(a)anthracene	860	-	-	-	260 J	33,000
Chrysene	1200	-	520 J	-	320 J	42,000
Benzo(b and/or k)fluoranthene	1400 J	-	920 J	-	350 J	27,000 J
Benzo(a)pyrene	780	-	440 J	-	250 J	10,000 J
Dibenzo(a,h)anthracene	760 U	-	-	-	-	-
Miscellaneous Extractable Organic Compounds						
Benzonaphthothiophene	500 JN					
Octahydrodimethyl (Methylethenyl) Azulene						
Methylchrysene	1,000 JN					
1- Methylnaphthalene						20,000 JN
Hexachlorobiphenyl						
Perylene						
Dimethylnaphthalene (2 isomers)						
Dimethylnaphthalene (3 isomers)						
Methylfluorene (2 isomers)						
Methyldibenzofuran						
Methylfluorene						

Table 18 (continued)
Sediment Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background					
	SP-SD-01	SP-SD-02	SP-SD-03	SP-SD-04	SP-SD-05	SP-SD-06
Miscellaneous Extractable Organic						
Dibenzothiophene						7,000 JN
Methylphenanthrene (2 isomers)						
Methylanthracene						10,000 JN
Methylanthracene (2 isomers)						
Tetramethylphenanthrene						
Methylphenanthrene (3 isomers)						30,000 JN
Phenylnaphthalene						10,000 JN
Cyclopentaphenanthrenone						
Benzofluorene						
Benzofluorene (2 isomers)						
Benzofluorene (3 isomers)						30,000 JN
Methylpyrene						
Cyclopentapyrene						
Benzopyrene (not A)						
Aminofluorenone						5,000 JN
Anthracenecarbonitrile						
Benzoanthracenone						
Benzonaphthothiophene						
Benzonaphthothiophene (2 isomers)						10,000 JN
Benzofluoranthene (not B or K)						8,000 JN
Benzofluoranthene (not B or K) (2 isomers)						
Pentachlorobiphenyl (2 isomers)						
Hexahydrohydroxytrimethyl (Methylethyl) Phenanthrenone						-
Unidentified Compounds / #	10,000 J / 8		10,000J/15		1,000 J / 2	30,000 J/1

ug/kg micrograms per kilogram
SP Southern Wood Piedmont
SD Sediment
J Estimated Value
N Presumptive evidence of presence of material
U Material analyzed for but not detected. Number is the sample quantitation limit (SQL)
- Not detected

Elevated levels which are greater than three times the background level or greater than the SQL.

Table 18 (continued)
Sediment Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background					
	SP-SD-01	SP-SD-07	SP-SD-08	SP-SD-09	SP-SD-10	SP-SD-11
Extractable Organic Compounds						
Bis(2-ethylhexyl)Phthalate	1,900	-	-	-	-	-
Di-n-butylphthalate	1,400	-	-	-	-	-
Pentachlorophenol	1900 U	-	-	-	-	-
(3- and/or 4-)Methylphenol	760 U	-	-	-	-	-
Naphthalene	760 U	13,000 J	-	3,600 J	-	-
2-Methylnaphthalene	760 U	21,000 J	340 J	4,000 J	-	-
Acenaphthylene	760 U	-	-	-	-	-
Acenaphthene	130 J	63,000	590 J	6,700	-	-
Dibenzofuran	82 J	37,000	860 J	6,400	-	-
Fluorene	110 J	89,000	2,200	9,600	-	-
Phenanthrene	1200	230,000	7,000	22,000	-	140 J
Anthracene	170 J	88,000	7,800	33,000	110 J	740 J
Carbazole	200 J	9,800 J	1,400 J	4,800	-	170 J
Fluoranthene	2200	190,000	5,500	13,000	100 J	1,200 J
Pyrene	1700	140,000	-	9,200	100 J	810 J
Benzo(a)anthracene	860	38,000	-	-	-	-
Chrysene	1200	46,000	2,200	3,100 J	130 J	450 J
Benzo(b and/or k)fluoranthene	1400 J	26,000 J	2,200 J	1,100 J	380 J	690 J
Benzo(a)pyrene	780	11,000 J	630 J	750 J	180 J	280 J
Dibenzo(a,h)anthracene	760 U	-	-	-	-	-
Miscellaneous Extractable Organic Compounds						
Benzonaphthothiophene	500 JN					
Octahydrodimethyl (Methylethenyl) Azulene						
Methylchrysene	1,000 JN					
1- Methylnaphthalene		20,000 JN		2,000 JN		
Hexachlorobiphenyl						
Perylene						
Dimethylnaphthalene (2 isomers)		20,000 JN				
Dimethylnaphthalene (3 isomers)				4,000 JN		
Methylfluorene (2 isomers)		30,000 JN				
Methyldibenzofuran		10,000 JN		1,000 JN		
Methylfluorene				1,000 JN		

Table 18 (continued)
Sediment Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background					
	SP-SD-01	SP-SD-07	SP-SD-08	SP-SD-09	SP-SD-10	SP-SD-11
Miscellaneous Extractable Organic						
Dibenzothiophene		20,000 JN		2,000 JN		
Methylphenanthrene (2 isomers)		30,000 JN		4,000 JN		
Methylanthracene		40,000 JN	1,000 JN			
Methylanthracene (2 isomers)				4,000 JN		
Tetramethylphenanthrene			3,000 JN			
Methylphenanthrene (3 isomers)						
Phenylnaphthalene		20,000 JN		1,000 JN		
Cyclopentaphenanthrenone						
Benzofluorene			800 JN		90 JN	
Benzofluorene (2 isomers)				3,000 JN		
Benzofluorene (3 isomers)		40,000 JN				
Methylpyrene		6,000 JN				
Cyclopentapyrene						
Benzopyrene (not A)						
Aminofluorenone						
Anthracenecarbonitrile						
Benzoanthracenone						
Benzonaphthothiophene					200 JN	
Benzonaphthothiophene (2 isomers)						
Benzofluoranthene (not B or K)		9,000 JN				
Benzofluoranthene (not B or K) (2 isomers)						
Pentachlorobiphenyl (2 isomers)						
Hexahydrohydroxytrimethyl (Methylethyl) Phenanthrenone			4,000 JN			
Unidentified Compounds / #	10,000 J / 8	200,000J/2	700,000			

ug/kg micrograms per kilogram
SP Southern Wood Piedmont
SD Sediment
J Estimated Value
N Presumptive evidence of presence of material
U Material analyzed for but not detected. Number is the sample quantitation limit (SQL)
\- Not detected

Elevated levels which are greater than three times the background level or greater than the SQL.

Table 18 (continued)
Sediment Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background					
	SP-SD-01	SP-SD-12	SP-SD-13	SP-SD-14	SP-SD-15	SP-SD-16
Extractable Organic Compounds						
Bis(2-ethylhexyl)Phthalate	1,900	-	-	-	-	-
Di-n-butylphthalate	1,400	-	-	-	-	-
Pentachlorophenol	1900 U	-	-	220 J	-	-
(3- and/or 4-)Methylphenol	760 U	-	-	-	-	-
Naphthalene	760 U	-	-	-	-	-
2-Methylnaphthalene	760 U	-	-	-	-	-
Acenaphthylene	760 U	-	-	210 J	-	-
Acenaphthene	130 J	-	-	-	-	-
Dibenzofuran	82 J	-	-	-	-	-
Fluorene	110 J	-	-	69 J	-	-
Phenanthrene	1200	-	-	130 J	-	-
Anthracene	170 J	-	-	780	-	-
Carbazole	200 J	-	-	100 J	-	-
Fluoranthene	2200	-	240 J	1,000	-	-
Pyrene	1700	-	350 J	1,600	-	-
Benzo(a)anthracene	860	-	170 J	970	-	-
Chrysene	1200	-	330 J	1,500	-	-
Benzo(b and/or k)fluoranthene	1400 J	-	540 J	3,800 J	-	-
Benzo(a)pyrene	780	-	150 J	1,400	-	-
Dibenzo(a,h)antrhacene	760 U	-	-	-	-	-
Miscellaneous Extractable Organic Compounds						
Benzonaphthothiophene	500 JN					
Octahydrodimethyl (Methylethenyl) Azulene						
Methylchrysene	1,000 JN					
1- Methylnaphthalene						
Hexachlorobiphenyl			100 JN			
Perylene			200 JN			
Dimethylnaphthalene (2 isomers)						
Dimethylnaphthalene (3 isomers)						
Methylfluorene (2 isomers)						
Methyldibenzofuran						
Methylfluorene						

Table 18 (continued)
Sediment Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background					
	SP-SD-01	SP-SD-12	SP-SD-13	SP-SD-14	SP-SD-15	SP-SD-16
Miscellaneous Extractable Organic						
Dibenzothiophene						
Methylphenanthrene (2 isomers)						
Methylanthracene						
Methylanthracene (2 isomers)						
Tetramethylphenanthrene						
Methylphenanthrene (3 isomers)						
Phenylnaphthalene						
Cyclopentaphenanthrenone				200 JN		
Benzofluorene				200 JN		
Benzofluorene (2 isomers)						
Benzofluorene (3 isomers)						
Methylpyrene				100 JN		
Cyclopentapyrene				100 JN		
Benzopyrene (not A)				300 JN		
Aminofluorenone						
Anthracenecarbonitrile						
Benzoanthracenone						
Benzonaphthothiophene						
Benzonaphthothiophene (2 isomers)						
Benzofluoranthene (not B or K)				700 JN		
Benzofluoranthene (not B or K) (2 isomers)						
Phenanthrenone						
Pentachlorobiphenyl (2 isomers)						
Hexahydrohydroxytrimethyl (Methylethyl) Phenanthrenone						
Unidentified Compounds / #	10,000 J / 8		500 J / 1		700 J / 1	600 J / 1

ug/kg micrograms per kilogram
SP Southern Wood Piedmont
SD Sediment
J Estimated Value
N Presumptive evidence of presence of material
U Material analyzed for but not detected. Number is the sample quantitation limit (SQL)
\- Not detected
Elevated levels which are greater than three times the background level or greater than the SQL.

Table 18 (continued)
Sediment Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background					
	SP-SD-01	SP-SD-17	SP-SD-18	SP-SD-19	SP-SD-20	SP-SD-21
Extractable Organic Compounds						
Bis(2-ethylhexyl)Phthalate	1,900	-	-	-	-	-
Di-n-butylphthalate	1,400	-	-	-	-	-
Pentachlorophenol	1900 U	-	-	-	-	-
(3- and/or 4-)Methylphenol	760 U	260 J	-	-	-	-
Naphthalene	760 U	-	-	-	-	-
2-Methylnaphthalene	760 U	-	-	-	-	-
Acenaphthylene	760 U	-	-	-	-	-
Acenaphthene	130 J	-	-	-	-	-
Dibenzofuran	82 J	-	-	-	-	-
Fluorene	110 J	-	-	-	-	-
Phenanthrene	1200	-	-	110 J	-	-
Anthracene	170 J	-	-	240 J	-	-
Carbazole	200 J	-	-	-	-	-
Fluoranthrene	2200	-	170 J	730	65 J	-
Pyrene	1700	-	190 J	1,600	77 J	-
Benzo(a)anthracene	860	-	-	550	-	-
Chrysene	1200	-	160 J	1,300	75 J	-
Benzo(b and/or k)fluoranthene	1400 J	51 J	200 J	3,800 J	130 J	-
Benzo(a)pyrene	780	-	140 J	880 J	94 J	-
Dibenzo(a,h)anthracene	760 U	-	-	200 J	-	-
Miscellaneous Extractable Organic Compounds						
Benzonaphthothiophene	500 JN					
Octahydrodimethyl (Methylethenyl) Azulene		200 JN				
Methylchrysene	1,000 JN					
1- Methylnaphthalene						
Hexachlorobiphenyl						
Perylene			100 JN			
Dimethylnaphthalene (2 isomers)						
Dimethylnaphthalene (3 isomers)						
Methylfluorene (2 isomers)						
Methyldibenzofuran						
Methylfluorene						

Table 18 (continued)
Sediment Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background					
	SP-SD-01	SP-SD-17	SP-SD-18	SP-SD-19	SP-SD-20	SP-SD-21
Miscellaneous Extractable Organic						
Dibenzothiophene						
Methylphenanthrene (2 isomers)						
Methylanthracene						
Methylanthracene (2 isomers)						
Tetramethylphenanthrene						
Methylphenanthrene (3 isomers)						
Phenylnaphthalene						
Cyclopentaphenanthrenone						
Benzofluorene				200 JN		
Benzofluorene (2 isomers)						
Benzofluorene (3 isomers)						
Cyclopentapyrene						
Benzopyrene (not A)				300 JN		
Methylpyrene						
Aminofluorenone						
Anthracenecarbonitrile				200 JN		
Benzoanthracenone				100 JN		
Benzonaphthothiophene						
Benzonaphthothiophene (2 isomers)						
Benzofluoranthene (not B or K)						
Benzofluoranthene (not B or K) (2 isomers)				1,000 JN		
Pentachlorobiphenyl (2 isomers)					400 JN	
Hexahydrohydroxytrimethyl (Methylethyl) Phenanthrenone						
Unidentified Compounds / #	10,000 J / 8	700 J / 1		1,000 J / 2	800 J / 1	

ug/kg micrograms per kilogram
SP Southern Wood Piedmont
SD Sediment
J Estimated Value
N Presumptive evidence of presence of material
U Material analyzed for but not detected. Number is the sample quantitation limit (SQL)
\- Not detected
Elevated levels which are greater than three times the background level or greater than the SQL.

Table 18-continued
Sediment Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background					
	SP-SD-01	SP-SD-06	SP-SD-07	SP-SD-09	SP-SD-12	SP-SD-17
Purgeable Organic Compounds						
Methyl Ethyl Ketone	23 U	100	320	-	-	-
Toluene	160	20 J	-	-	2 J	2 J
Ethyl Benzene	3 J	64	20 J	-	-	-
Total Xylenes	23 U	94	37 J	2 J	-	-
Miscellaneous Purgeable Organic Compounds						
Trimethylbenzene				10 JN		
Trimethylbenzene (2 isomers)		400 JN	200 JN			
Ethylmethylbenzene		70 JN		9 JN		
Ethyldimethylbenzene			60 JN			
Ethyldimethylbenzene (2 isomers)				10 JN		
Ethyldimethylbenzene (3 isomers)		200 JN				
Camphene		40 JN				
Indane		2,000 JN	900 JN	50 JN		
Indene		30 JN				
Tetramethylbenzene				8 JN		
Methylindan		400 JN				
Dihydromethylindene			100 JN			
Methylbenzofuran (2 isomers)			400 JN			
Methylbenzofuran (3 isomers)		900 JN				

ug/kg micrograms per kilogram

J Estimated value.

N Presumptive evidence of presence of material.

U Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).

\- Not detected

Elevated levels which are greater than three times background level or greater

Table 19
Sediment Pesticide/PCB Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/kg)	Background	Source Samples																
	SP-SD -01	SP-SD -03	SP-SD -05	SP-SD -06	SP-SD -07	SP-SD -08	SP-SD -09	SP-SD -10	SP-SD -11	SP-SD -12	SP-SD -13	SP-SD -14	SP-SD -15	SP-SD -16	SP-SD -17	SP-SD -18	SP-SD -19	SP-SD -20
Pesticides / PCB Compounds																		
Delta-BHC	3.9U	-	-	-	-	-	-	0.42J	-	-	-	-	-	-	-	-	-	-
Aldrin	1.2J	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dieldrin	12	-	-	-	-	-	-	-	-	-	-	-	1.4JN	-	-	-	-	-
4,4'-DDE (P,P'-DDE)	17	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan II	7.6U	2.9J	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDD (P,P'-DDD)	7.6U	-	0.71JN	-	-	-	-	-	-	-	-	7.8	-	-	-	-	-	-
Endosulfan Sulfate	7.6U	-	-	-	16JN	-	-	-	-	-	-	-	2.6J	-	-	-	-	-
4,4'-DDT (P,P'-DDT)	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methoxychlor	39U	-	-	100	-	-	-	-	-	-	-	-	-	-	-	-	49	-
Endrin Aldehyde	39U	23	-	-	-	-	-	1.2J	-	-	-	-	-	-	-	-	-	0.78J
Gamma Chlordane /2	20U	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.43JN
PCB-1260 (Arochlor 1260)	76U	-	-	-	-	590N	170N	-	-	-		-	-	-	-	-	-	-

NOTES:

ug/kg Micrograms per kilogram
SP Southern Wood Piedmont
SD Sediment
J Estimated value.
N Presumptive evidence indicates the presence of material.
U Material was analyzed for but not detected. The number is the sample quantitation limit (SQL).
- Not detected.
Elevated levels which are greater than three times the background level or greater than the SQL.

Extractable organic compounds were not detected in any surface water samples. Elevated concentrations of the pesticide alpha-chlordane/2 were detected in surface water sample SP-SW-06 obtained from Greenfield Creek on the south side of the site. Toluene was detected in the background surface water sample SP-SW-01. Elevated concentrations of PCB-1260 were detected in surface water samples SP-SW-05 and SP-SW-06 obtained from Greenfield Creek, near the southeast corner of the site. Surface water samples were not analyzed for dioxins/furans. A summary of surface water pesticide/PCB and purgeable analytical results are presented on Table 20. A complete set of analytical data is presented in Appendix A.

Tissue samples SP-BIO-07, -80, and -09 were analyzed for extractable organics and pesticides/PCBs. Miscellaneous extractable organic compounds detected at estimated quantities in the fish tissue samples include hexadecanoic acid, hexadecanoic acid, oleic acid, octadecenoic acid, and tetradecanoic acid. Sample locations are illustrated on Figure 2. The complete set of analytical data is presented in Appendix A.

6.4.2 Surface Water/Sediment Inorganic Analytical Results

Inorganic analytes were detected at elevated levels in sediment samples SP-SD-03, SP-SD-05, SP-SD-06, SP-SD-07, SP-SD-08, SP-SD-09, SP-SD-11, SP-SD-12, SP-SD-15, SP-SD-16, SP-SD-17, SP-SD-18, and SP-SD-19. Inorganic analytes detected at elevated levels in the sediment samples include: aluminum, arsenic, cadmium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc. Inorganic analytes were detected at elevated levels in surface water samples SP-SW-04, SP-SW-07, SP-SW-08, and SP-SW-09. Inorganic analytes detected at elevated levels in the surface water samples include arsenic, magnesium, potassium, sodium, and vanadium. Sample codes and descriptions are listed in Table 1 and are shown on Figure 2. The complete set of analytical data is presented in Appendix A. A summary of the sediment and surface water inorganic analytical results are presented in Tables 21 and 22, respectively.

6.5 Surface Water Pathway Conclusions

Analytical results of sediment samples collected from the onsite drainage ditch along the east side of the site revealed elevated levels of the site related extractable organic contaminants naphthalene, 2-methylnaphthalene, acenaphthene, dibenzofuran, fluorene, phenanthrene, anthracene, carbazole, fluoranthene, pyrene, benzo(a)

anthracene, chrysene, benzo (b and/or k) fluoranthene, and benzo(a)pyrene and site related inorganic contaminants arsenic, cadmium, chromium, copper, and lead. These contaminants were also detected at elevated levels in surface and subsurface soil samples collected from the SWP site. The surface water migration pathway is of primary concern for this site. There is an increased probability that surface water flows over the contaminated surface soils at the site and discharges to the on-site drainage ditch and Greenfield Creek, providing a mechanism for contaminant migration into nearby fisheries and sensitive environments.

Table 20
Surface Water Organic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/L)	Background								
	SP-SW-01	SP-SW-01D	SP-SW-03	SP-SW-04	SP-SW-05	SP-SW-06	SP-SW-07	SP-SW-08	SP-SW-09
Pesticides / PCB Compounds									
Alpha-Chlordane/2	0.050 UJ	0.050 UJ	-	-	-	0.064	-	-	-
PCB-1260	1.0 UJ	1.0 J	-	0.33 J	1.9	9.4	0.55 J	0.15 J	-
Purgeable Organic Compounds									
Toluene	1 J								

Notes:

ug/L	micrograms per Liter
SP	Southern Wood Piedmont
SW	Surface Water
J	Estimated value
U	Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).
UJ	Estimated minimum quantitation limit. The analyte is not present at concentrations above the minimum SQL.
-	Not detected

Elevated levels which are greater than three times background levels or greater than the SQL.

Table 21
Sediment Inorganic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (mg/kg)	Background	Source Samples																
	SP-SD -01	SP-SD -03	SP-SD -05	SP-SD -06	SP-SD -07	SP-SD -08	SP-SD -09	SP-SD -10	SP-SD -11	SP-SD -12	SP-SD -13	SP-SD -14	SP-SD -15	SP-SD -16	SP-SD -17	SP-SD -18	SP-SD -19	SP-SD -20
Aluminum	2,700	15,000	3,100	13,000	28,000	11,000	650	790	26,000	1,900	1,100	3,300	1,200	1,200	1,900	890	7,200	1,600
Arsenic	3.8 UJ	33 J	6.2 J	30 J	29 J	20 J	-	2.6 J	17 J	-	2.6 J	3.5 J	2.9 J	-	2.6 J	7.1 J	-	-
Barium	46	84	60	83	110	53	4.4	2.8	54	5.8	-	16	6	3.7	6.6	2.9	16	5.1
Cadmium	0.58 J	2.1 J	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	15,000	5,400	2,000	7,800	12,000	6,700	440	360	3,300	480	330	890	460	340	830	340	920	550
Chromium	14	45	4.9	54	53	52	3.5	2.4 J	44	6.1	2.8	6.4	71	9.1	20	6	16	5.2
Cobalt	1.4 J	7.5 J	1 J	6.6 J	15 J	-	0.47 J	0.30 J	12 J	1.2 J	-	0.84 J	1.4 J	1.1 J	1.1 J	0.37 J	1.7 J	0.66 J
Copper	29	100	1,100	64	94	74	2.6 J	3.1 J	24	4.3 J	3.8 J	8 J	2.9 J	3 J	4.8 J	2.5 J	13	2.8 J
Iron	5,900	25,000	7,000	39,000	59,000	20,000	880	710	27,000	2,000	780	2,800	1,600	1,300	1,300	1,600	5,400	2,000
Lead	130	590	69	100	210	120	3.8	13	28	3.9	3.5	11	4.3	2.1	9.3	3.2	28	6.7
Magnesium	950	3,200	220	1,800	3,800	1,800	-	-	4,900	400	-	320	270	250	550	210	990	400
Manganese	43	110	29	110	160	68	7.2	6.7	210	14	3.5	14	12	11	15	7.5	23	8
Nickel	9 U	-	-	-	-	-	13	-	-	-	-	-	52	35	18	-	-	-
Potassium	210	950	-	800	1,200	840	-	-	1,900	260	-	-	160	170	310	170	470	270
Selenium	1.9 U	-	-	-	-	-	-	-	-	-	-	-	1.6	-	-	-	-	1.2 J
Sodium	220 U	1,600	290	-	1,400	1,100	-	210	3,300	560	-	-	-	270	740	-	-	-
Vanadium	13 J	63 J	5 J	49 J	85 J	50 J	10 J	2.1 J	56	5 J	2.4 J	8 J	3.6 J	3.3 J	8.7 J	4.3 J	21	6.7 J
Zinc	210	530	82	440	640	340	19	23	120	17	7.8	54	12	11	18	7.8	38	14

NOTES:

mg/kg milligrams per kilogram.
SP Southern Wood Piedmont
SD Sediment
J Estimated value.
U Material was analyzed for but not detected. The number is the sample quantitation limit (SQL).
- Not detected.
Elevated levels which are greater than three times the background level or greater than the SQL.

Table 22
Surface Water Inorganic Analytical Results
Southern Wood Piedmont Company
Wilmington, New Hanover County, North Carolina

Parameters (ug/L)	Background								
	SP-SW-01	SP-SW-01D	SP-SW-03	SP-SW-04	SP-SW-05	SP-SW-06	SP-SW-07	SP-SW-08	SP-SW-09
Aluminum	160 U	160 U	-	-	-	-	-	-	-
Arsenic	8 U	8 U	-	9 J	-	-	-	-	-
Barium	65	72	30	33	34	36	27	28	27
Cadmium	1 U	1 U	-	-	-	-	-	-	-
Calcium	65,000	70,000	32,000	35,000	35,000	38,000	30,000	28,000	37,000
Chromium	1 U	3J	-	-	-	-	-	-	-
Copper	20 J	20J	17 J	15 J	23 J	15 J	22 J	15 J	15 J
Cyanide	10 U	17	-	-	-	-	-	-	-
Iron	5,100	4,700	440	650	450	1,400	940	1,300	830
Lead	6	9	-	-	4	3	-	-	-
Magnesium	6,000	6,400	2,400	2,800	2,600	3,900	68,000	64,000	96,000
Manganese	510	560	22	29	27	68	66	73	73
Nickel	3 U	5 U	-	-	-	-	-	-	-
Potassium	3,100	3,600	2,200	2,400	2,400	2,900	43,000	39,000	57,000
Sodium	16,000	19,000	8,100	9,400	8,900	17,000	550,000	520,000	690,000
Vanadium	1 J	1 U	-	-	2 J	2 J	2 J	3 J	-
Zinc	42	34	28	28	33	26	33	39	37

NOTES:

ug/L	micrograms per Liter.
SP	Southern Wood Piedmont
SW	Surface Water
J	Estimated value.
U	Material analyzed for but not detected. Number shown is the sample quantitation limit (SQL).
-	Not detected.
	Elevated levels which are greater than three times background levels or greater than the SQL.

7.0 Soil Exposure and Air Pathways

7.1 Physical Conditions

The SWP site is located in a river front area with numerous marine and non-marine commercial operations as well as public housing nearby. The site is situated on the eastern bank of the Cape Fear River, immediately south of the Wilmington business district (Ref. 1). An elevated railroad bed, vegetation, and the onsite drainage ditch border the east side of the site (Fig. 1). The eastern portion of the site is accessible by foot on the rail bed and accessible by vehicle only at the gated site entrance (Ref. 2; Fig. 1).

7.2 Soil Exposure and Air Pathway Targets

The estimated population within 4 miles of the site is approximately 49,515 (Ref. 43, pp. 12, 13). The estimated population within the 4-mile radius of the site is distributed as follows: 0 - 0.25 mile, 304 persons; 0.25 - 0.5 mile, 266 persons; 0.5 - 1 mile, 5,674 persons; 1 - 2 mile, 15,062 persons; 2 - 3 miles, 13,886 persons; and 3 - 4 miles, 14,322 persons (Ref. 43, pp. 12,13). There are two schools located less than 1/2 mile from the site (Ref. 1). The school closest to the site is approximately 0.20 miles south of the site. Day care facilities are located approximately 1/4 mile east of the site (Ref. 2). A park is located less than a 1/4 mile east of site (Ref. 1). There are currently no workers on the SWP site (Ref. 25). The nearest residents are located approximately 400 feet east of the site (Ref. 2). The estimated surface water pathway extends approximately 14.4 miles upstream and 14.4 miles downstream of the site due to tidal fluctuations. The estimated wetland acreage within a 4-mile radius of the site is distributed as follows: onsite, 10 acres; 0-0.25 miles, 32.5 acres; 0.25-0.5 miles, 130 acres; 0.5-1.0 mile, 690 acres; 1-2 miles, 3,400 acres; 2-3 miles, 4,640 acres; 3-4 miles, 3,840 acres (Ref. 35).

7.3 Soil Exposure and Air Pathway Sample Locations

Surface soil samples were collected to determine soil exposure at the SWP site. Background surface soil samples SP-SS-01, SP-SS-02, and SP-SS-03 were collected from upgradient areas located north, east, and southeast, respectively, of the site. Six samples were taken in former wood storage and landfarming areas. Five samples were located in previously identified contamination source areas. Seven samples were

taken in areas which were not previously sampled. Sample locations are shown in Figure 2 and described in Table 1.

No formal air sampling program was conducted. Portable flame ionization detectors, or organic vapor analyzers (OVAs) were used for onsite safety monitoring during sampling activities. No atmospheric readings were noted above background levels while performing air monitoring during sampling activities.

7.4 Soil Exposure and Air Pathway Analytical Results

Surface soil analytical results are presented in Section 4.3. Formal analytical air sampling was not conducted during this investigation.

7.5 Soil Exposure and Air Pathway Conclusions

Surface soil samples collected at the site have indicated elevated levels of organic and inorganic contamination. The soil pathway concern is minimal due to the lack of onsite residential housing in areas of detected contamination. However, there concerns about the proximity of nearby residences and the future plans to perform significant excavation and construction at the site. Airborne contamination of nearby populations is of limited concern at this site due to the lack of residences onsite, the low volatility of the primary contaminants of concern, the vegetative cover throughout most of the site, and the lack of workers on site.

8.0 Summary and Conclusions

The ESI for the Southern Wood Piedmont Company site was performed to further determine the nature of contaminants present at the site, to determine if a release of hazardous materials to the environment has occurred or may occur, and if a release has occurred, to determine attribution of those contaminants to the site. This inspection also sought to further define the possible pathways by which contamination could migrate from the site and the populations and environments it potentially affects.

An initial site reconnaissance and walk-over was performed at the SWP site on May 20, 1996, by a representative of BVSPC, 3 representatives of the USEPA Region IV, and a representative of SWPs environmental consultant, Virogroup. Proposed boring locations were observed and discussed, photographs were taken, and general observations of site conditions were made. Field work for the ESI conducted by BVSPC commenced on October 3, 1996 and continued through October 9, 1996, at which time Tropical Storm Josephine and flooding of the Cape Fear River caused a demobilization of personnel and equipment. Field work resumed on November 4, 1996 and continued through December 23, 1996. Surveying of the groundwater monitoring wells occurred from January 27, 1997 to January 29, 1997.

A total of 103 environmental samples were collected during the field investigation conducted between October 3, 1996 and October 9, 1996 and November 4, 1996 to December 20, 1996. This ESI confirms information that has been provided about the site through numerous other past investigations and serves to fill data gaps which existed from previous site investigations. Analytical results from the ESI environmental samples indicate that surface soil, subsurface soil, groundwater, and sediment at and adjacent to the site have been impacted by releases of contaminants which are associated with previous activities at the site.

Groundwater samples indicate that several contaminants have migrated into the shallow, intermediate and deep monitoring wells beneath the SWP site. However, most of the people in the vicinity of the site use treated surface water in their homes

and businesses. Therefore, the groundwater pathway is of moderate concern for this site due to the minimal poulation in the area which utilize potable groundwater.

The surface water migration pathway has been affected by contamination at the site. Analytical results of sediment samples collected from the onsite drainage ditch along the east side of the site revealed elevated levels of the site-related extractable organic contaminants naphthalene, 2-methylnaphthalene, acenaphthene, dibenzofuran, fluorene, phenanthrene, anthracene, carbazole, fluoranthene, pyrene, benzo (a) anthracene, chrysene, benzo(b and/or k)fluoranthene, and benzo(a)pyrene and site related inorganic contaminants arsenic, cadmium, chromium, copper, and lead. The Cape Fear River and Greenfield are known fisheries and potential habitats for several federally-endangered species. Based on the proximity of the site to the Cape Fear River and Greenfield Creek, there is an increased probability that contaminant migration has occurred into the Cape Fear River. The surface water migration pathway is of primary concern for the site.

The results of surface and subsurface soils collected from the central two-thirds of the site suggest that significant contamination is present in the surface soil. However, there are concerns about the proximity of nearby residences and the future plans to perform significant excavation and construction at the site. The soil pathway is of minimal concern based upon the lack of onsite residential housing in areas of detected contamination.

Airborne contamination of nearby populations is of limited concern at this site due to the lack of residences onsite, the low volatility of the primary contaminants of concern, the vegetative cover throughout most of the site, and the lack of workers on site.

Further action under CERCLA is recommended at the Southern Wood Piedmont site.

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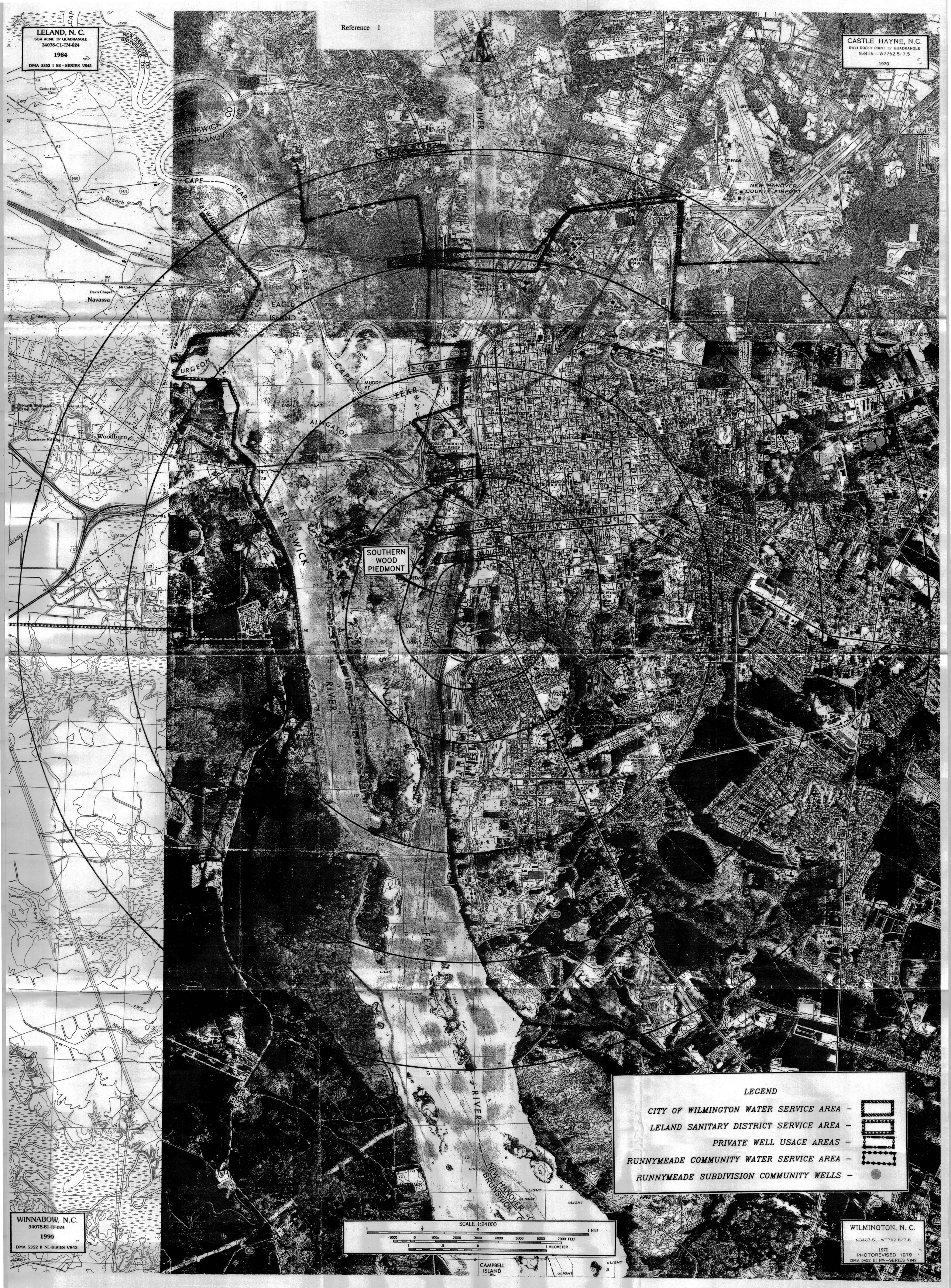
LELAND, N. C.
SE/4 ACME 15' QUADRANGLE
34078-C1-TM-024
1984
DMA 5352 I SE-SERIES V842
CASTLE HAYNE, N.C.
SW/4 ROCKY POINT 15' QUADRANGLE
N3415—W7752.5/7.5
1970
WINNABOW, N.C.
34078-B1-TF-024
1990
DMA 5352 II NE-SERIES V842
WILMINGTON, N. C.
N3407.5—W7752.5/7.5
1970
PHOTOREVISED 1979
DMA 5452 III NW—SERIES V842
SOUTHERN WOOD PIEDMONT
CAPE FEAR RIVER
BRUNSWICK CO
NEW HANOVER CO
EAGLE ISLAND
WRIGHTSBORO
NEW HANOVER COUNTY AIRPORT
Navassa
Woodburn
LEGEND
CITY OF WILMINGTON WATER SERVICE AREA –
LELAND SANITARY DISTRICT SERVICE AREA –
PRIVATE WELL USAGE AREAS –
RUNNYMEADE COMMUNITY WATER SERVICE AREA –
RUNNYMEADE SUBDIVISION COMMUNITY WELLS –
SCALE 1:24 000
1 MILE
7000 FEET
1 KILOMETER
CAMPBELL ISLAND