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State of North Carolina
Department of Environment,
Health, and Natural Resources
Division of Waste Management

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Wayne McDevitt, Secretary
William L. Meyer, Director

DEHNR

October 6, 1997

Mr. Phil Vorsatz
US EPA Region IV Waste Division
61 Forsyth Street
Atlanta, GA 30303-3104

Subject: Expanded Site Inspection
Southern Wood Piedmont Co. (NCD 053 488 557)
Gulf, Chatham County, NC

Dear Mr. Vorsatz:

This report contains the findings of the Expanded Site Inspection performed at the former Southern Wood Piedmont Co. facility (NCD 053 488 557) located on State Road 2139 (Creosote Rd), Gulf, Chatham County, North Carolina.

Southern Wood Piedmont operated a wood treating plant at the site from 1946 until 1980 using coal-tar creosote and pentachlorophenol (PCP). The facility produced treated utility poles, lumber, crossties, and other industrial timbers. According to the Notification of Hazardous Waste Site (CERCLA 103 (C)) form filed by SWPC on June 4, 1981, wastes generated at the site include bottom sediment sludge from the treatment of wastewater from the wood preserving process (K001), and waste creosote (U051). The plant contained storage tanks for the wood preservatives, pumps, piping, vacuum systems, a boiler, and steam-generating equipment as well as several buildings. The process area included treatment cylinders, drip areas, product storage tanks and associated structures, and control buildings. The wood treatment process involved pressurizing the wood with treatment solution in treatment cylinders. The preservative, consisting of PCP dissolved in diesel fuel, was heated prior to pumping into the cylinders. Following this process, the treated wood was allowed to drip excess treatment solution onto the ground at the drip track area.

During the period from 1976 to 1980, the plant's wastewater was handled by an 8000 gallon per day (GPD) non-discharge waste treatment facility which included storage-settling ponds, aeration lagoons, and a 40-acre spray irrigation area. The aeration ponds and spray irrigation area were located on that portion of the site which is situated north of the Norfolk and Southern Railroad tracks. Historical waste management practices at the site are unknown. However, prior to the construction of the non-discharge treatment system described above, the facility discharged effluent from an on-site wastewater treatment facility into Cedar Creek.

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The wastewater treatment process prior to 1976 consisted of passing the wastewater through a concrete oil separator and then to three holding ponds prior to discharge to Cedar Creek.

In 1980, operations at the site were halted and the wood treating facility was closed. All of the buildings were destroyed and the process equipment for the wood treating plant was dismantled and removed. All the liquids remaining in the lagoons were removed and passed through the spray irrigation system. The lagoons and settling ponds were backfilled with site waste and soil from the spray irrigation field, regraded and then seeded.

On March 26, 1982, eight sediment and surface water samples were collected by representatives of the North Carolina Department of Natural Resources and Community Development (NRCD) from drainage ditches on the site and from Cedar Creek. Laboratory analytical data indicated that wood treating constituents were present in the site drainage pathway and had migrated off-site to Cedar Creek. In September of 1983, a Site Investigation was performed at the site by the US Environmental Protection Agency (EPA). Sampling was performed to identify sources and determine migration of hazardous substances. The EPA sampled soil from the old lagoon areas, the drainage ditch that carries runoff to Cedar Creek, sediment from Cedar Creek upstream and downstream of the drainage ditch confluence, sediment at the confluence, and soil from the creek floodplain adjacent to the site. Analytical results of the 1983 EPA investigation indicate that, with the exception of one sample, all of the samples contained organic contaminants including PAH's and pentachlorophenol.

A Remedial Investigation was conducted by Geraghty & Miller, Inc. for the Southern Wood Piedmont - Gulf site and completed on October 7, 1994. According to the Geraghty & Miller report, groundwater, bedrock, and subsurface soils in the northern ponds area, excavated southern ponds area, and drip track area had been impacted by chemical constituents associated with wood treatment wastes. In addition, gasoline and diesel fuel were detected in soils at the diesel fuel storage area located at the southern edge of the property along State Road 2145. On March 31, 1994, a Site Inspection Prioritization (SIP) was completed by the North Carolina Department of Environment, Health, and Natural Resources - Superfund Section. However, no sampling was conducted during the SIP. Based upon the findings summarized in the SIP report, the site was recommended as a high priority for Expanded Site Inspection (ESI).

On November 13 & 14, 1995, an ESI was conducted at the site by the NC Superfund Section. On-site surficial and subsurface soil samples were collected to determine areas of residual contamination remaining at the site from the former wood treatment operation. Off-site samples were collected in the surface water pathway to determine the extent of contaminant migration from the source areas. No groundwater samples were collected during the ESI. All samples were submitted for analyses under the USEPA Contract Laboratory Program.

ESI sampling results indicated the presence of chromium, cobalt, mercury, vanadium, benzene, toluene, ethyl benzene, styrene, xylene, PCDD, HCDD, HpCDD, OCDD, PCDF, HCDF, HpCDF, OCDF, naphthalene, 2-methylnaphthalene, dibenzofuran, fluorene, acenaphthylene, pentachlorophenol, phenanthrene, anthracene, carbazole, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(bk)fluoranthene, benzo-a-pyrene, indeno(1,2,3-cd)pyrene, dibenzo(ah)anthracene, and benzo(ghi)perylene in surficial soils of the source areas at levels significantly above background. Elevated levels of many of these compounds were detected in the drainage ditch that carries site run-off to Cedar Creek. An observed release of many of the same metals, dioxins/furans, extractable organic and purgeable organic compounds, attributable to the former Southern Wood Piedmont facility, has been documented in sediments of Cedar Creek at the point where on-site runoff enters the creek. The sediment sample collected at the closest portion of the surface water pathway considered to be a fishery contained only barium, copper, one isomer of HpCDD and total OCDDs at levels significantly above background. Barium and copper were not detected at elevated levels in sources on the site and are therefore not attributable to the site. HpCDD and OCDDs were detected on site, however, due to the levels of these contaminants in the control samples collected from the unnamed tributaries which enter Cedar Creek between the PPE and the fishery, these contaminants may not be attributable to the site. Therefore, actual contamination of a fishery by a release from this site has not been documented. The nearest downstream wetland is located approximately 3.25-mile downstream of the site. There are no surface water intakes along the site surface water pathway 15-mile target distance limit.

Residential population surrounding the site is sparse, the nearest residence as measured from the former wood treatment process area, is approximately 600 ft south. No groundwater samples were collected during the ESI because previous on-site and off-site groundwater sample data was available. The nearest residence not connected to the municipal water supply is located approximately 0.3-mile southeast of the site. A sample collected from this well in 1990 was shown to have not been impacted by groundwater conditions at the site. Based on the information currently available, the former Southern Wood Piedmont - Gulf site poses a potential threat to human health and the environment, however, no water supply wells, intakes, or wetlands have been impacted and only low levels of copper have been detected in a fishery. Therefore, the site is not recommended for further remedial action under CERCLA/SARA.

If you have any questions, please feel free to call me at (919) 733-2801.

Sincerely,

G. Doug Rumford

G. Doug Rumford
Hydrogeologist
NC Superfund Section

STATE OF NORTH CAROLINA

Department of Environment
and Natural Resources
Division of Waste Management
Superfund Section

EXPANDED SITE INSPECTION
VOLUME I

Southern Wood Piedmont Company
NCD 053 488 557
Gulf, Chatham County, North Carolina
Reference No. 02802

October 1997

G. Doug Rumford
Hydrogeologist
Division of Waste Management
Superfund Section

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EXPANDED SITE INSPECTION

Southern Wood Piedmont Company
NCD 053 488 557
Gulf, Chatham County, North Carolina
Reference No. 02802

October 1997

Superfund Section
Division of Waste Management
North Carolina Department of Environment
and Natural Resources

Prepared by:

G. Doug Rumford
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Site Evaluation & Removal Branch

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EXECUTIVE SUMMARY

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During the period from 1976 to 1980, the plant's wastewater was handled by an 8000 gallon per day (GPD) non-discharge waste treatment facility which included storage-settling ponds, aeration lagoons, and a 40-acre spray irrigation area. The aeration ponds and spray irrigation area were located on that portion of the site which is situated north of the Norfolk and Southern Railroad tracks. Historical waste management practices at the site are unknown. However, prior to the construction of the non-discharge treatment system described above, the facility discharged effluent from an on-site wastewater treatment facility into Cedar Creek. The wastewater treatment process prior to 1976 consisted of passing the wastewater through a concrete oil separator and then to three holding ponds prior to discharge to Cedar Creek.

In 1980, operations at the site were halted and the wood treating facility was closed. All of the buildings were destroyed and the process equipment for the wood treating plant was dismantled and removed. All the liquids remaining in the lagoons were removed and passed through the spray irrigation system. The lagoons and settling ponds were backfilled with site waste and soil from the spray irrigation field, regraded and then seeded.

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ESI sampling results indicated the presence of chromium, cobalt, mercury, vanadium, benzene, toluene, ethyl benzene, styrene, xylene, PCDD, HCDD, HpCDD, OCDD, PCDF, HCDF, HpCDF, OCDF, naphthalene, 2-methylnaphthalene, dibenzofuran, fluorene, acenaphthylene, pentachlorophenol, phenanthrene, anthracene, carbazole, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(bk)fluoranthene, benzo-a-pyrene, indeno(1,2,3-cd)pyrene, dibenzo(ah)anthracene, and benzo(ghi)perylene in surficial soils of the source areas at levels significantly above background. Elevated levels of many of these compounds were detected in the drainage ditch that carries site run-off to Cedar Creek. An observed release of many of the same metals, dioxins/furans, extractable organic and purgeable organic compounds, attributable to the former Southern Wood Piedmont facility, has been documented in sediments of Cedar Creek at the point where on-site runoff enters the creek. The sediment sample collected at the closest portion of the surface water pathway considered to be a fishery contained only barium, copper, one isomer of HpCDD and total OCDDs at levels significantly above background. Barium and copper were not detected at elevated levels in sources on the site and are therefore not attributable to the site. HpCDD and OCDDs were detected on site, however, due to the levels of these contaminants in the control samples collected from the unnamed tributaries which enter Cedar Creek between the PPE and the fishery, these contaminants may not be attributable to the site. Therefore, actual contamination of a fishery by a release from this site has not been documented. The nearest downstream wetland is located approximately 3.25-mile downstream of the site. There are no surface water intakes along the site surface water pathway 15-mile target distance limit.

Residential population surrounding the site is sparse, the nearest residence as measured from the former wood treatment process area, is approximately 600 ft south. No groundwater samples were collected during the ESI because previous on-site and off-site groundwater sample data was available. The nearest residence not connected to the municipal water supply is located approximately 0.3-mile southeast of the site. A sample collected from this well in 1990 was shown to have not been impacted by groundwater conditions at the site.

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Based on the information currently available, the former Southern Wood Piedmont - Gulf site poses a potential threat to human health and the environment, however, no water supply wells, intakes, or wetlands have been impacted and only low levels of copper have been detected in a fishery. Therefore, the site is not recommended for further remedial action under CERCLA/SARA.

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1.0 INTRODUCTION

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), the North Carolina Superfund Section conducted an Expanded Site Inspection (ESI) of the former Southern Wood Piedmont Company (SWPC) (NCD 053 488 557) facility in Gulf, Chatham County, North Carolina. The purpose of this investigation was to update information on conditions at the Southern Wood Piedmont- Gulf site. Information regarding potentially impacted populations and sensitive environments not documented in the Site Inspection Prioritization report, March 31, 1994, was also updated. This data was used to assess the threat posed to human health and the environment and to determine the need for additional CERCLA/SARA or other appropriate action. The scope of the Expanded Site Inspection included review of available file information, a revised target survey, on and off-site reconnaissance (May 11, 1995 & June 27, 1995), on and off-site sampling (November 13 & 14, 1995), and a more thorough evaluation of the surface water pathway. All samples collected during the ESI were analyzed under the U.S. Environmental Protection Agency (EPA) Contract Laboratory Program (CLP).

2.0 SITE DESCRIPTION, OPERATIONAL HISTORY, AND WASTE CHARACTERISTICS

2.1 Location

The site of the former Southern Wood Piedmont facility is located in the small rural community of Gulf in Chatham County, North Carolina on State Road 2139 (Creosote Road) (Ref.3). The geographic coordinates for the site are latitude 35° 33' 36.0" North and longitude 79° 16' 34.0" West (Ref. 4). To reach the site take U.S. Highway 1 southwest from Raleigh to Sanford to U.S. Highway 421. Proceed northwest on 421 to State Road 2139, then north to the site.

The area is characterized by a low, rolling topography with elevation increasing west of the site. The elevation of the facility is approximately 250 feet above mean sea level (MSL). The surrounding areas range in elevation from 220 feet above MSL to 290 feet above MSL within a 1 mile radius of the site (Fig. 1). The 2-year, 24-hour rainfall is approximately 3.5 inches (Ref. 26). Normal annual total precipitation in this area is 48 inches. Mean annual lake evaporation in this area is 41 inches, yielding a net annual rainfall of 7 inches (Ref. 35).

2.2 Site Description

The former Southern Wood Piedmont site is an inactive wood treatment facility. There are no buildings or structures of any kind remaining at the site. The site is primarily overgrown with tall grass and trees although some sections are exposed hard packed dirt and gravel (Ref. 31 ; Photos 1,2,3,9,10). Figure 2 shows the physical details of the site as they were in 1977 when the facility was active. The site of the former facility occupies approximately 80 acres of land and is bordered by a church with a cemetery, and woodland on the western side, Cedar Creek to the north, Creosote

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Road and a residential area to the south, and woodlands to the east. The Norfolk and Southern Railroad crosses the property east to west (Ref. 2; Figs. 1; 2).

Vehicle access to the former Southern Wood Piedmont facility from Creosote Road is restricted by a gate, however, no property boundary fences were observed during the ESI (Ref. 31; Photos). The nearest school, Walters School, is located approximately 3.75 miles northwest of the site in the town of Goldston (Fig. 1). The nearest off-site residence is located approximately 600 feet south of the former wood treating portion of the facility (Fig. 1). There are approximately 1933 residents within a 4-mile radius of the site (Ref. 24).

2.3 Operational History and Waste Characteristics

Southern Wood Piedmont operated a wood treating plant at the Gulf site from 1946 until 1980 using coal-tar creosote and pentachlorophenol (PCP). The facility produced treated utility poles, lumber, crossties, and other industrial timbers (Ref. 3). According to the Notification of Hazardous Waste Site (CERCLA 103 (C)) form filed by SWPC on June 4, 1981, wastes generated at the site included bottom sediment sludge from the treatment of wastewater from the wood preserving process (K001), and waste creosote (U051) (Refs. 3; 20, pp.26,38). The plant contained storage tanks for the wood preservatives, pumps, piping, vacuum systems, a boiler, and steam-generating equipment as well as several buildings. The process area included treatment cylinders, drip areas, product storage tanks and associated structures, and control buildings. Wood treatment involved pressurizing the wood with treatment solution in treatment cylinders. The preservative, consisting of PCP dissolved in diesel fuel, and coal-tar creosote, was heated prior to pumping into the cylinders. Following this process, the treated wood was allowed to drip excess treatment solution onto the ground at the drip track area. This was the area located along the railroad spurs east of the treatment cylinders (Ref. 39; Figs. 2; 3).

During the period from 1976 to 1980, the plant's process wastewater was handled by an 8000 gallons per day (GPD) non-discharge wastewater treatment facility which included three storage-settling ponds, three aeration lagoons, and a 40-acre spray irrigation area (N.C. Permit Numbers 3931 and 3931-R, effective from August 1976 until June 1981) (Refs. 7; 29, p.3; 39, p.1-5). The aeration ponds and spray irrigation area were located on that portion of the site which is situated north of the Norfolk and Southern Railroad tracks; the storage-settling ponds were located south of the railroad tracks, west of the process area (Figs. 2; 3). Historical waste management practices at the site are unknown. However, prior to the construction of the non-discharge treatment system described above, the facility operated under N.C. Department of Natural and Economic Resources Permit Number 8132, for the discharge of effluent from an on-site wastewater treatment facility into Cedar Creek. The wastewater treatment process prior to 1976 consisted of passing the wastewater through a concrete oil separator and then to the three storage-settling ponds prior to discharge to Cedar Creek (Refs. 33; 39, p. 1-4; Fig. 3). The location of the concrete oil separator is not indicated on Figure 3, but presumably it was located near the southern ponds. The application for Permit Number 8132 was dated April 5, 1974, and was in effect until June 1976 (Ref. 29, p.3).

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In 1980, operations at the site were halted and the wood treating facility was closed. All of the buildings were destroyed and the process equipment for the wood treating plant was dismantled and removed. All the liquids remaining in the lagoons were removed and used for spray irrigation on site. The lagoons and settling ponds were backfilled with site waste and soil from the spray irrigation field, regraded and then seeded (Refs. 3; 29; 39, p.1-3; 34; 25).
In July 1990, the three ponds in the process area (southern ponds) were excavated by a remedial contractor under the supervision of Southern Wood Piedmont Company. Approximately seventy-three million pounds (36,500 tons) of K001 listed waste were removed from the site for disposal at the Marine Shale facility in Louisiana. The excavated area was then filled with clean soil obtained from the adjacent property (Refs. 28; 39, p. 1-8; 22). The total depth of this excavated area is not known, however, post-removal confirmation samples collected at the bottom of the pit indicated that several wood treatment chemical constituents were present at elevated levels. Bedrock core samples collected in 1991 from within the excavated southern ponds area (CB-3 & CB-9) also indicated the presence of several PAH's at depths of 90 ft. bls (Ref.39, tables 4-2, 4-6, app. B-5, fig. 2-8).

On March 26, 1982, eight sediment and surface water samples were collected by representatives of the North Carolina Department of Natural Resources and Community Development (NRCD) from drainage ditches on the site and from Cedar Creek. Laboratory analytical data indicated that wood treating constituents were present in the site drainage pathway and had migrated off-site to Cedar Creek. These included a number of organic compounds which were detected but not quantified including several polynuclear aromatic hydrocarbons (PAH's) such as anthracene, chrysene, napthalene, phenanthrene, and fluoranthene, and Phenols such as pentachlorophenol, tetrachlorophenol, methylphenol and phenol. Several metals such as arsenic, chromium, copper, lead, and mercury were reported as being above the detection limit (Ref. 21).

In September of 1983, a site investigation was performed at the site by the U.S.E.P.A. (EPA). Sampling was performed to identify sources and determine migration of hazardous substances. The EPA sampled soil from the old lagoon areas and from the drainage ditch that carries runoff into Cedar Creek. They also sampled sediment from Cedar Creek upstream and downstream of the drainage ditch confluence, sediment at the confluence, and soil from the creek floodplain adjacent to the site (Ref. 2). Analytical results of the 1983 EPA investigation indicate that, with the exception of the sample from the southeast edge of the site (SWP-008), all of the samples contained organic compounds, including PAH's and pentachlorophenol, that were positively identified and quantified with concentrations ranging from 1100 ug/kg to 2,900,000 ug/kg. All of the organic compounds detected during the EPA investigation are associated with wood preserving. The off-site sediment samples collected in Cedar Creek and the adjacent floodplain contained many of the same organic compounds that were detected in the on-site soil samples, but in lower concentrations ranging from 2,200 ug/kg to 19,000 ug/kg. Chromium was found in soil in the drainage ditch at levels significantly above background (Ref. 5; 2, pp.6,7,9).

A Remedial Investigation was conducted by Geraghty & Miller, Inc. for the Southern Wood Piedmont - Gulf site and completed on October 7, 1994. According to the Geraghty & Miller report, groundwater, bedrock, and subsurface soils in the northern ponds area, excavated southern ponds

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area, and drip track area have been shown to be impacted by constituents associated with wood preserving wastes. In addition, gasoline and diesel fuel were detected in soils at the diesel fuel storage area located at the southern edge of the property along State Road 2145 (Ref. 39). On March 31, 1994, a Site Inspection Prioritization (SIP) was completed by the North Carolina Department of Environment, Health, and Natural Resources - Superfund Section. However, no sampling was conducted during the SIP (Ref. 30). Based upon the findings summarized in the SIP report, the site was recommended as a high priority for an Expanded Site Inspection (ESI).

3.0 WASTE/SOURCE SAMPLING

3.1 Sampling Locations

Six potential source areas were identified at the former Southern Wood Piedmont - Gulf site during the ESI. The two primary source areas included the backfilled northern ponds area and the contaminated soils at the drip track area, the four additional source areas included the contaminated soils of the site drainage ditch , the excavated southern ponds area (including the settling ponds, oil separator, and process area), the treated wood storage area, and the diesel fuel storage area. Waste/source sampling was not conducted at the excavated southern ponds area, the treated wood storage area, and the diesel fuel storage area as these were determined to not be primary sources or sampling was impractical. Based on the scale of Figure 2, the northern ponds area is estimated to be approximately 200 ft x 500 ft in size; the drip track area is estimated to be approximately 100 ft x 300 ft in size. During the 1994 Geraghty & Miller Remedial Investigation, contaminated soils in the northern ponds area and drip track area were encountered at depths of approximately 10 ft below land surface (bls) and 6 ft bls respectively (Ref. 39, table 4-3, 4-4).

Soil samples collected during the ESI from the backfilled northern ponds, the drip track area, and the drainage ditch are listed in Table 1 and sample locations are shown on Figure 4. During the ESI, three (3) surficial soil samples (SW-017-SL, SW-019-SL, SW-021-SL, and duplicate SW-121-SL) were collected at a depth of between 0 ft-2 ft bls and three subsurface soil samples (SW-018-SL, SW-020-SL, SW-022-SL, and duplicate SW-122-SL) were collected at a depth of between 2 ft-4 ft bls from three locations within the backfilled northern ponds. At the drip track area, surficial and subsurface soil samples were collected from five (5) locations for source characterization. Five (5) surficial soil samples (SW-003-SL, SW-005-SL, SW-007-SL, SW-009-SL, SW-011-SL) were collected at a depth of between 0 ft-2 ft bls and three (3) subsurface soil samples (SW-004-SL, SW-006-SL, SW-008-SL) were collected at a depth of between 2 ft-4 ft bls. An associated background surficial soil sample (SW-001-SL) and subsurface soil sample (SW-001-SL) was collected from a wooded area on the western adjacent property (Ref. 31; Photos).

Four additional surficial soil samples (SW-014-SL, SW-015-SL, SW-023-SL, SW-024-SL) were collected from the drainage ditch that carries runoff from the site to Cedar Creek. These samples were collected from a depth of 0 in. - 6 inches bls at four locations along the ditch. All source area samples collected during the ESI were collected according to EPA Standard Operating

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Table 1. ESI Soil Sample Locations
Southern Wood Piedmont, Gulf, Chatham County, NC
NCD 053 488 557

Sample ID Number	Map Grid	Sample Depths	Analytes	Description
SW-001-SL SW-002-SL	Q2,3	0' - 2' 2' - 4'	V,S,I,D V,S,I,D	2 SOIL SAMPLES, SW OF SITE ON ADJACENT PROPERTY ABOUT 200' S36W FROM MW 10A/ BACKGROUND SOIL
SW-003-SL SW-004-SL	T11	0' - 2' 2' - 4'	V,S,I,D V,S,I,D	2 SOIL SAMPLES IN DRIP TRACK AREA ABOUT 63' S OF MW6/ SOURCE CHARACTERIZATION
SW-005-SL SW-006-SL	T12	0' - 2' 2' - 4'	V,S,I,D V,S,I,D	2 SOIL SAMPLES IN DRIP TRACK AREA ABOUT 100' E OF SAMPLING POINT SW-003-SL/ SOURCE CHARACTERIZATION
SW-013-SL	Q8	0' - 1'	V,S,I,D	SOIL SAMPLE IN DRAINAGE DITCH ALONG RR TRACKS WEST OF SOUTHERN PONDS / BACKGROUND DITCH CHARACTERIZATION
SW-014-SL	R10	0' - 1'	V,S,I	SOIL SAMPLE IN DRAINAGE DITCH S OF RR/ SOURCE CHARACTERIZATION, MIGRATION FROM S PONDS AREA
SW-015-SL	P9	0" - 6"	V,S,I,D	SEDIMENT SAMPLE FROM SEDIMENT POND JUST N OF RAILROAD/ SOURCE CHARACTERIZATION, MIGRATION FROM S. PONDS
SW-007-SL SW-008-SL	T11	0' - 2' 2' - 4'	V,S,I,D V,S,I,D	2 SOIL SAMPLES IN DRIP TRACK AREA ABOUT 160' S OF MW6/ VERTICAL COMPOSITES FOR SOURCE CHARACTERIZATION
SW-009-SL	U12	0' - 2'	V,S,I	SOIL SAMPLE IN DRIP TRACK AREA ABOUT 90' E OF SW-007-SL/ VERTICAL COMPOSITE FOR SOURCE CHARACTERIZATION
SW-011-SL	U12	0' - 2'	V,S,I,D	SOIL SAMPLE IN DRIP TRACK AREA ABOUT 70' S OF SW-009-SL/ VERTICAL COMPOSITE FOR SOURCE CHARACTERIZATION
SW-023-SL	G6	0" - 6"	V,S,I	SOIL SAMPLE IN DRAINAGE DITCH NEAR SW-021-SL/ SOURCE CHARACTERIZATION, MIGRATION FROM N. IMPOUNDMENTS
SW-024-SL	A4	0" - 6"	V,S,I,D	SOIL SAMPLE IN DRAINAGE DITCH NEAR MW14A/ SOURCE CHARACTERIZATION, MIGRATION FROM N. IMPOUNDMENTS

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Table 1. ESI Soil Sample Locations
Southern Wood Piedmont, Gulf, Chatham County, NC
NCD 053 488 557

Sample ID Number	Map Grid	Sample Depths	Analytes	Description
SW-021-SL SW-022-SL	H6	0' - 2' 2' - 4'	V,S,I,D V,S,I,D	SOIL SAMPLES IN N. IMPOUNDMENTS AREA (ABOUT 100' W & 200' N OF MW13)/ SOURCE CHARACTERIZATION
SW-121-SL SW-122-SL	H6	0' - 2' 2' - 4'	V,S,I,D V,S,I,D	DUPLICATE OF SAMPLES SW-021-SL & SW-022-SL
SW-019-SL SW-020-SL	I6	0' - 2' 2' - 4'	V,S,I,D V,S,I,D	SOIL SAMPLES IN N. IMPOUNDMENTS AREA (ABOUT 100' W & 100' N OF MW13)/ SOURCE CHARACTERIZATION
SW-017-SL SW-018-SL	J6	0' - 2' 2' - 4'	V,S,I,D V,S,I,D	SOIL SAMPLES IN N. IMPOUNDMENTS AREA (ABOUT 100' W OF MW13)/ SOURCE CHARACTERIZATION

V: Volatile Organic Compounds
S: Semi-volatile Organic Compounds
I: Inorganics
D: Dioxin/Furan

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Procedure (SOP) and analyzed under the EPA Contract Laboratory Program (CLP) for volatile organic compounds (VOC's), semi-volatile organic compounds (SVOC's) and inorganics; selected samples were also analyzed for dioxin/furans (Ref. 31).

3.2 Analytical Results

Analytical results for source area soil samples collected during the ESI are included in Appendix A. Results of the metals analyses, dioxin/furan analyses and purgeable and extractable organics analyses are summarized below in Tables 2, 3 and 4, respectively.

In the drip track area, elevated levels of aluminum, calcium, chromium, cobalt, mercury, nickel and vanadium were detected in surface and/or subsurface soils. Isomers of pentachlorodibenzodioxin (PCDD), hexachlorodibenzodioxin (HCDD), heptachlorodibenzodioxin (HpCDD), octachlorodibenzodioxin (OCDD), hexachlorodibenzofuran (HCDF), heptachlorodibenzofuran (HpCDF) and octachlorodibenzofuran (OCDF) were also detected at levels significantly above background in soils collected from this area. No purgeable organics were detected. Elevated levels of extractable organics detected in the drip track soils included naphthalene, fluoranthene and benzo(b,k)fluoranthene in both surficial and subsurface soils and acenapthylene, pentachlorophenol, phenanthrene, anthracene, carbazole, pyrene, benzo(a)anthracene, chrysene, benzo(a)pyrene, benzo(g,h,i)perylene, dibenzo(a,h)anthracene, indeno(1,2,3-CD)pyrene in surficial soils.

Surficial soils in the drainage ditch which carries site runoff to Cedar Creek contained elevated levels of aluminum, calcium, cobalt as well as isomers of HCDD, HpCDD, OCDD, HpCDF and OCDF. Elevated levels of purgeable organics detected in the drainage ditch included benzene, toluene, ethyl benzene, styrene and total xylenes. Elevated levels of extractable organics in the drainage ditch include naphthalene, 2-methyl naphthalene, dibenzofuran, fluorene, phenanthrene, anthracene, carbazole, fluoranthene, benzo(a)anthracene, chrysene, and benzo(b,k)fluoranthene.

In the backfilled northern impoundment area, aluminum, calcium cobalt, manganese and mercury were detected in surface and/or subsurface soils at levels significantly above background. Isomers of PCDD, HCDD, HpCDD, OCDD, PCDF, HCDF, HpCDF and OCDF were also detected at elevated levels. No purgeable organics were detected. Elevated levels of extractable organics detected in the northern impoundment soils included phenanthrene, anthracene, fluoranthene, benzo(a)anthracene, chrysene, benzo(a)pyrene benzo(b,k)fluoranthene in both surficial and subsurface soils as well as dibenzofuran, fluorene, pentachlorophenol, carbazole, indeno(1,2,3-CD)pyrene, naphthalene, and 2-methylnapthalene in the subsurface soils.

3.3 Conclusions

During the ESI, surficial and subsurface soil samples were collected from three (3) locations at the northern ponds area, five (5) locations at the drip track area, and from one (1) off-site location for background comparison. Additionally, four (4) surficial soil samples were collected from the ditch that carries site runoff to Cedar Creek. Laboratory analytical data indicates that surficial and

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TABLE 2
SOIL / SOURCE SAMPLES ANALYTICAL DATA SUMMARY
METALS DATA REPORT (MG/KG)
Southern Wood Piedmont - Gulf, NC NCD 053 488 557

	Background Surficial Soil Sample SW-001-SL	Background Subsurface Soil Sample SW-002-SL	Surficial Soil Sample SW-003-SL	Subsurface Soil Sample SW-004-SL	Surficial Soil Sample SW-005-SL	Subsurface Soil Sample SW-006-SL	Surficial Soil Sample SW-007-SL	Subsurface Soil Sample SW-008-SL	Superfund Chemical Data Matrix Benchmarks (Ref. 32)	NC Soil Remediation Goals (ppm) (Ref. 36)
Aluminum	1600	9500	**18000**	**34000**	**11000**	13000	**7700**	11000	-	-
Antimony	3UR	2.8UR	5UJ	3.2UR	4UJ	4UJ	2.9UR	4UJ	3.1+E1 *	6.2
Arsenic	6.1	3.2	3.8	3U	5.8	6.9	4.8	2U	4.3+E-1 **	4.6
Barium	100	92	120	160	110	110	59	85	5.5+E3 *	-
Beryllium	0.68J	0.65J	0.68J	1.1J	0.85J	1.2	1U	0.63J	1.5+E-1 **	0.15
Cadmium	0.30U	0.27U	0.29U	0.31U	0.27U	0.27U	0.29U	0.27U	3.9+E1 *	7.8
Calcium	80U	110U	**2900**	**2700**	**2400**	**950**	**560**	**3200**	-	-
Chromium	19	16	47	**72**	140	110	13	20	3.9+E2 *	78
Cobalt	10U	5U	**22**	**22**	**56**	**57**	7U	**18**	-	-
Copper	59	62	43	57	29	21	21	26	-	620
Iron	33000	22000	30000	58000	49000	57000	19000	19000	-	-
Lead	11	11	10J	11J	14J	22J	14J	13J	-	400
Magnesium	2200	1900	5000	6100	2400	1500	1200	4100	-	-
Manganese	250	42	750J	740J	1900J	3300J	140J	880J	1.4+E4 *	-
Mercury	0.06U	0.05U	0.1U	0.07U	0.06U	0.06U	0.06U	0.06U	2.3+E1 *	4.6
Nickel	22	13	57	**63**	33	22	12	35	1.6+E3 *	320
Potassium	820	620	360	600	300	200	390	320	-	-
Selenium	1U	0.48U	0.50U	1UJ	1UJ	1UJ	0.50U	0.47U	3.9+E2 *	78
Silver	2U	1U	0.79U	0.87U	1U	2U	0.79U	0.74U	3.9+E2 *	78
Sodium	70U	260U	330U	450	140U	120U	100U	410	-	-
Thallium	0.54U	0.50U	0.53U	0.58U	0.49U	0.49U	0.52U	0.49U	-	1.26
Tin	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Vanadium	27	31	55	**110**	**160**	**160**	18	31	5.5+E2 *	-
Zinc	63	50U	40UJ	50UJ	30UJ	30UJ	40UJ	30UJ	2.3+E4 *	4600

NA: Not Analyzed
U: Material was analyzed for but not detected. Value is minimum quantitation limit
J: Estimated Value R: Data Unusable
Shaded Concentrations >= SCDM Benchmarks; Cross-Hatched Concentrations >= NC Remediation Goals
Concentrations in **Bold** >= 3X Background or >= CRDL when Background is < CRDL
** : Cancer Risk Screen Concentration (ppm)
* : Reference Dose Screen Concentration (ppm)

TABLE 2 - cont.
SOIL / SOURCE SAMPLES ANALYTICAL DATA SUMMARY
METALS DATA REPORT (MG/KG)
Southern Wood Piedmont - Gulf, NC NCD 053 488 557

	Surficial Soil Sample SW-009-SL	Surficial Soil Sample SW-011-SL	Surficial Soil Sample SW-013-SL	Surficial Soil Sample SW-014-SL	Surficial Soil Sample SW-015-SL	Surficial Soil Sample SW-017-SL	Subsurface Soil Sample SW-018-SL	Surficial Soil Sample SW-019-SL	Superfund Chemical Data Matrix Benchmarks (Ref. 32)	NC Soil Remediation Goals (ppm) (Ref. 36)
Aluminum	**18000**	**11000**	**11000**	**12000**	**8100**	**10000**	16000	**7900**	-	-
Antimony	5UJ	4UJ	3UR	3UR	3.4UR	2.9UR	2.9UR	3.1UR	3.1+E1 *	6.2
Arsenic	5	3.3	7.9	6.9	3.2	5.6	5.9	4.4	4.3+E-1 **	4.6
Barium	110	67	60	94	62	130	180	78	5.5+E3 *	-
Beryllium	1U	0.30J	0.75J	0.71J	0.68J	0.77J	0.89J	0.73J	1.5+E-1 **	0.15
Cadmium	0.29U	0.29U	0.29U	0.30U	0.34U	0.28U	0.29U	0.31U	3.9+E1 *	7.8
Calcium	**4600**	**1300**	80U	**1400**	**980**	**1400**	**1200**	**380**	-	-
Chromium	44	30	21	23	14	20	31	13	3.9+E2 *	78
Cobalt	**19**	20U	9U	20U	9U	**13**	**17**	10U	-	-
Copper	45	24	32	25	20U	30	28	20U	-	620
Iron	29000	18000	26000	29000	17000	24000	35000	15000	-	-
Lead	22	15	10	14	9.7	12J	12J	9.5J	-	400
Magnesium	5400	2100	780	2200	1800	2800	3100	2500	-	-
Manganese	430	330	100	350	220	330J	310J	180J	1.4+E4 *	-
Mercury	**0.13**	0.06U	0.06U	0.06U	0.07U	**0.2**	0.06U	0.2U	2.3+E1 *	4.6
Nickel	49	25	17	16	14	21	29	14	1.6+E3 *	320
Potassium	620	220	570	530	500	440	570	430	-	-
Selenium	1U	0.51U	0.53U	1U	0.52U	0.50U	0.51U	0.54U	3.9+E2 *	78
Silver	0.79U	0.80U	0.80U	0.82U	0.93U	0.78U	0.80U	0.86U	3.9+E2 *	78
Sodium	480	190U	90U	220U	80U	310U	**330**	130U	-	-
Thallium	0.52U	0.51U	0.54U	0.54U	0.62U	0.52U	0.53U	0.57U	-	1.26
Tin	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Vanadium	54	33	30	35	24	26	41	17	5.5+E2 *	-
Zinc	59	30U	40U	40U	50U	46J	44J	40UJ	2.3+E4 *	4600

NA: Not Analyzed
U: Material was analyzed for but not detected. Value is minimum quantitation limit
J: Estimated Value R: Data Unusable
Shaded Concentrations >= SCDM Benchmarks
Concentrations in **Bold** >= 3X Background or >= CRDL when Background is < CRDL
** : Cancer Risk Screen Concentration (ppm)
* : Reference Dose Screen Concentration (ppm)

TABLE 2 - cont.
SOIL / SOURCE SAMPLES ANALYTICAL DATA SUMMARY
METALS DATA REPORT (MG/KG)
Southern Wood Piedmont - Gulf, NC NCD 053 488 557

	Subsurface Soil Sample SW-020-SL	Surficial Soil Sample SW-021-SL	Surficial Soil Sample SW-121-SL	Subsurface Soil Sample SW-022-SL	Subsurface Soil Sample SW-122-SL	Surficial Soil Sample SW-023-SL	Surficial Soil Sample SW-024-SL	Superfund Chemical Data Matrix Benchmarks (Ref. 32)	NC Soil Remediation Goals (ppm) (Ref. 36)
Aluminum	13000	**9400**	**11000**	8400	8500	7400	13000	-	-
Antimony	3.3UR	3.3UR	5UJ	6UJ	3.2UR	4UJ	4UJ	3.1+E1 *	6.2
Arsenic	5.2	5.2	4.5	5	4.7	3.1	3.9	4.3+E-1 **	4.6
Barium	150	87	95	120	120	69	150	5.5+E3 *	-
Beryllium	0.77J	0.75J	0.73J	0.73J	0.72J	0.50J	0.90J	1.5+E-1 **	0.15
Cadmium	0.33U	0.33U	0.32U	0.32U	0.32U	0.30U	0.29U	3.9+E1 *	7.8
Calcium	**2400**	**890**	**860**	**1200**	**1200**	**1500**	**1400**	-	-
Chromium	28	21	17	18	18	23	19	3.9+E2 *	78
Cobalt	**16**	20U	20U	20U	20U	**15**	10U	-	-
Copper	33	25	25	24	21	13	28	-	620
Iron	25000	22000	22000	23000	22000	15000	25000	-	-
Lead	14J	13	14	15	15	6.2J	11	-	400
Magnesium	4000	2400	2500	1900	2100	2500	3200	-	-
Manganese	590J	240	280	**470**	**640**	260J	290	1.4+E4 *	-
Mercury	**0.15**	**0.22**	**0.25**	**0.55**	**0.26**	0.06U	0.06U	2.3+E1 *	4.6
Nickel	36	19	18	16	16	23	14	1.6+E3 *	320
Potassium	460	440	540	390	400	170	360	-	-
Selenium	0.58U	1U	0.56U	0.56U	0.56U	0.53U	0.51U	3.9+E2 *	78
Silver	0.91U	0.90U	0.89U	0.88U	0.88U	0.83U	0.79U	3.9+E2 *	78
Sodium	340U	180U	170U	170U	180U	140U	160U	-	-
Thallium	0.61U	0.60U	0.59U	0.58U	0.58U	0.55U	0.53U	-	1.26
Tin	NA	NA	NA	NA	NA	NA	NA	-	-
Vanadium	35	28	25	28	26	32	41	5.5+E2 *	-
Zinc	60UJ	50U	50U	40U	40U	30UJ	30U	2.3+E4 *	4600

NA: Not Analyzed
U: Material was analyzed for but not detected. Value is minimum quantitation limit
J: Estimated Value R: Data Unusable
Shaded Concentrations >= SCDM Benchmarks
Concentrations in **Bold** >= 3X Background or >= CRDL when Background is < CRDL
** : Cancer Risk Screen Concentration (ppm)
* : Reference Dose Screen Concentration (ppm)

TABLE 3
SOIL/SOURCE SAMPLES ANALYTICAL DATA SUMMARY
DIOXIN/FURAN DATA REPORT (NG/KG)
Southern Wood Piedmont - Gulf, NC NCD 053 488 557

	Background Surficial Soil Sample SW-001-SL	Background Subsurface Soil Sample SW-002-SL	Surficial Soil Sample SW-003-SL	Subsurface Soil Sample SW-004-SL	Surficial Soil Sample SW-005-SL	Subsurface Soil Sample SW-006-SL	Surficial Soil Sample SW-007-SL	Subsurface Soil Sample SW-008-SL	Superfund Chemical Data Matrix Benchmarks (Ref. 32)	NC Soil Remediation Goals (ppt) (Ref.36)
2,3,7,8 Tetrachlorodibenzodioxin	5.0U	6.0U	2.7J	7.0U	6.0U	6.0U	6.0U	6.0U	4 **	-
Tetrachlorodibenzodioxin (Total)	1.5J	6.0UJ	130J	7.0UJ	58J	16J	14J	5.3J	-	-
1,2,3,7,8 Pentachlorodibenzodioxin	12U	15U	**56**	18U	**15**	3.7J	5.0J	2.3J	8 **	-
Pentachlorodibenzodioxin (Total)	12UJ	15UJ	590J	18UJ	170J	43J	57J	28J	-	-
1,2,3,4,7,8 Hexachlorodibenzodioxin	12U	15U	**280**	3.0J	**130**	**26**	**23**	11J	40 **	-
1,2,3,6,7,8 Hexachlorodibenzodioxin	1.7J	15U	**1800**	14J	**920**	**160**	**110**	**47**	100 **	-
1,2,3,7,8,9 Hexachlorodibenzodioxin	1.4J	15U	**890**	8J	**410**	**110**	**90**	**37**	100 **	-
Hexachlorodibenzodioxin (Total)	13J	15UJ	15000J	130J	10000J	2000J	2000J	740J	-	-
1,2,3,4,6,7,8 Heptachlorodibenzodioxin	270	91	**46000**	**820**	**40000**	**9600**	**6800**	**3000**	400 **	-
Heptachlorodibenzodioxin (Total)	590J	220J	140000J	2700J	140000J	34000J	34000J	15000J	-	-
Octachlorodibenzodioxin (Total)	40000J	3400	**470000**	**12000J**	**490000J**	**110000J**	**78000J**	**32000J**	-	4000
2,3,7,8 Tetrachlorodibenzofuran	5.0U	6.0U	6.0U	7.0U	6.0U	6.0U	6.0U	6.0U	40 **	40
Tetrachlorodibenzofuran (Total)	5.0UJ	6.0UJ	56J	7.0UJ	24J	4.0J	100J	110J	-	-
1,2,3,7,8 Pentachlorodibenzofuran	12U	15U	15U	18U	15U	15U	15U	15U	80 **	80
2,3,4,7,8 Pentachlorodibenzofuran	12U	15U	5.0J	18U	4.0J	1.3J	15U	15U	8 **	-
Pentachlorodibenzofuran (Total)	12UJ	15UJ	390J	3J	140J	25J	630J	640J	-	-
1,2,3,4,7,8 Hexachlorodibenzofuran	12U	15U	1600U	18U	1800U	280U	130U	90U	40 **	-
1,2,3,6,7,8 Hexachlorodibenzofuran	12U	15U	15U	18U	15U	15U	15U	15U	40 **	-
1,2,3,7,8,9 Hexachlorodibenzofuran	12U	15U	15U	18U	15U	15U	15U	15U	40 **	-
2,3,4,6,7,8 Hexachlorodibenzofuran	12U	15U	**280**	2.0J	**60**	**27**	**33**	**23**	40 **	-
Hexachlorodibenzofuran (Total)	1.2J	15UJ	8500J	55J	5500J	740J	860J	590J	-	-
1,2,3,4,6,7,8 Heptachlorodibenzofuran	12U	15U	**4500**	**78**	**7500**	**1000**	**590**	**270**	40 **	-
1,2,3,4,7,8,9 Heptachlorodibenzofuran	12U	15U	**1300**	7.0J	**640**	**93**	**65**	**25**	-	-
Heptachlorodibenzofuran (Total)	12UJ	15U	5300J	100J	9500J	1300J	760J	340J	-	-
Octachlorodibenzofuran (Total)	20J	15UJ	**31000**	**510**	**56000**	**6300**	**2900**	**1500**	-	4000
TEQ (Toxic. Equiv. Value, From I-TEF/89)	43J	15U	**1400**	24J	1200J	260J	180J	79J	-	-

Shaded Concentrations >= SCDM Benchmarks; Cross-Hatched Concentrations >= NC Remediation Goals
Concentrations in **Bold** >= 3X Background or >= CRDL when Background is < CRDL
U: Material analyzed for but not detected. Value given is the minimum quantitation limit
J: Estimated Value
** : Cancer Risk Screen Concentration (ppt)

TABLE 3 cont.
SOIL/SOURCE SAMPLES ANALYTICAL DATA SUMMARY
DIOXIN/FURAN DATA REPORT (NG/KG)
Southern Wood Piedmont - Gulf, NC NCD 053 488 557

	Surficial Soil Sample SW-011-SL	Surficial Soil Sample SW-013-SL	Surficial Soil Sample SW-015-SL	Surficial Soil Sample SW-017-SL	Subsurface Soil Sample SW-018-SL	Surficial Soil Sample SW-019-SL	Subsurface Soil Sample SW-020-SL	Surficial Soil Sample SW-021-SL	Superfund Chemical Data Matrix Benchmarks (Ref.32)	NC Soil Remediation Goals (ppt) (Ref. 36)
2,3,7,8 Tetrachlorodibenzodioxin	6.0U	0.6J	7.0U	2.0J	0.8J	6.0U	0.97J	2.9J	4 **	-
Tetrachlorodibenzodioxin (Total)	15J	7.4J	32J	84J	40J	4.0J	70J	140J	-	-
1,2,3,7,8 Pentachlorodibenzodioxin	7.0J	2.3J	7.0J	**36**	11J	4.0J	**16**	**37**	8 **	-
Pentachlorodibenzodioxin (Total)	77J	18J	67J	420J	120J	48J	180J	460J	-	-
1,2,3,4,7,8 Hexachlorodibenzodioxin	6.0J	3.7J	**29**	**330**	**100**	**18**	**120**	**240**	40 **	-
1,2,3,6,7,8 Hexachlorodibenzodioxin	**39**	7.9J	**160**	**4600**	**1300**	**160**	**1600**	**1800**	100 **	-
1,2,3,7,8,9 Hexachlorodibenzodioxin	**24**	9.1J	**97**	**950**	**320**	**88**	**430**	**920**	100 **	-
Hexachlorodibenzodioxin (Total)	430J	87J	2000J	25000J	7600J	2000J	9500J	19000J	-	-
1,2,3,4,6,7,8 Heptachlorodibenzodioxin	**570**	320	**8200**	**230000**	**54000**	**11000**	**82000**	**82000**	400 **	-
Heptachlorodibenzodioxin (Total)	2500J	1100J	32000J	660000J	160000J	62000J	240000J	250000J	-	-
Octachlorodibenzodioxin (Total)	**5700**	**2000J**	**92000J**	**2400000J**	**600000**	**160000J**	**900000**	**940000**	-	4000
2,3,7,8 Tetrachlorodibenzofuran	6.0U	6.0U	7.0U	6.0U	5.0J	6.0U	6.0U	5.0U	40 **	40
Tetrachlorodibenzofuran (Total)	470J	23J	27J	140J	18J	7.0J	120J	130J	-	-
1,2,3,7,8 Pentachlorodibenzofuran	15U	15U	18U	**17**	12U	15U	15U	13J	80 **	80
2,3,4,7,8 Pentachlorodibenzofuran	15U	1.4J	18U	**87**	**20**	1.5J	**26**	**58**	8 **	-
Pentachlorodibenzofuran (Total)	1600J	120J	140J	1600J	260J	54J	550J	950J	-	-
1,2,3,4,7,8 Hexachlorodibenzofuran	210U	15U	210U	4200U	1600U	320U	2000U	4400U	40 **	-
1,2,3,6,7,8 Hexachlorodibenzofuran	15U	2.5J	18U	15U	12U	15U	15U	**190**	40 **	-
1,2,3,7,8,9 Hexachlorodibenzofuran	15U	15J	18U	15U	12U	15U	15U	15U	40 **	-
2,3,4,6,7,8 Hexachlorodibenzofuran	**94**	6.9J	18U	15U	12U	15U	15U	800U	40 **	-
Hexachlorodibenzofuran (Total)	1200J	100J	860J	28000J	7000J	720J	8200J	14000J	-	-
1,2,3,4,6,7,8 Heptachlorodibenzofuran	**100**	**31**	**950**	**30000**	**7900**	**890**	**12000**	**9200**	40 **	-
1,2,3,4,7,8,9 Heptachlorodibenzofuran	9.0J	1.9J	92	**2400**	**480**	**76**	**650**	**1600**	-	-
Heptachlorodibenzofuran (Total)	130J	130J	1200J	37000J	9200J	990J	14000J	11000J	-	-
Octachlorodibenzofuran (Total)	**300**	**120**	**5000**	**220000**	**49000**	**5100**	**66000**	**60000**	-	4000
TEQ (Toxic. Equiv. Value, From I-TEF/89)	33J	21J	220J	5900J	**1500**	310J	**2200**	**2300**	-	-

Concentrations in **Bold** >= 3X Background or >= CRDL when Background is < CRDL
U: Material analyzed for but not detected. Value given is the minimum quantitation limit
J: Estimated Value
** : Cancer Risk Screen Concentration (ppt)
Shaded Concentrations >= SCDM Benchmarks; Cross-Hatched Concentrations >= NC Remediation Goals

TABLE 3 cont.
SOIL/SOURCE SAMPLES ANALYTICAL DATA SUMMARY
DIOXIN/FURAN DATA REPORT (NG/KG)
Southern Wood Piedmont - Gulf, NC NCD 053 488 557

	Surficial Soil Sample SW-121-SL	Subsurface Soil Sample SW-022-SL	Subsurface Soil Sample SW-122-SL	Surficial Soil Sample SW-024-SL	Superfund Chemical Data Matrix Benchmarks (Ref. 32)	NC Soil Remediation Goals (ppt) (Ref. 36)
2,3,7,8 Tetrachlorodibenzodioxin	6.0U	6.0U	5.7U	5.6U	4 **	-
Tetrachlorodibenzodioxin (Total)	10J	95J	98J	2.0J	-	-
1,2,3,7,8 Pentachlorodibenzodioxin	15	28J	25J	4.0J	8 **	-
Pentachlorodibenzodioxin (Total)	140J	200J	200J	22J	-	-
1,2,3,4,7,8 Hexachlorodibenzodioxin	83	240	260	17	40 **	-
1,2,3,6,7,8 Hexachlorodibenzodioxin	1200	2800	3200	120	100 **	-
1,2,3,7,8,9 Hexachlorodibenzodioxin	360	400	390	60	100 **	-
Hexachlorodibenzodioxin (Total)	8900J	11000J	13000J	900J	-	-
1,2,3,4,6,7,8 Heptachlorodibenzodioxin	45000	120000	170000J	5800	400 **	-
Heptachlorodibenzodioxin (Total)	160000J	340000J	480000	16000J	-	-
Octachlorodibenzodioxin (Total)	530000J	1000000	1600000J	63000J	-	4000
2,3,7,8 Tetrachlorodibenzofuran	570U	R	R	5.6U	40 **	40
Tetrachlorodibenzofuran (Total)	39J	380J	660J	3.0J	-	-
1,2,3,7,8 Pentachlorodibenzofuran	15U	15U	14U	14U	80 **	80
2,3,4,7,8 Pentachlorodibenzofuran	20	15U	10J	14U	8 **	-
Pentachlorodibenzofuran (Total)	380J	860J	1300J	43J	-	-
1,2,3,4,7,8 Hexachlorodibenzofuran	2600U	2900U	4000U	200U	40 **	-
1,2,3,6,7,8 Hexachlorodibenzofuran	51	15U	14U	14U	40 **	-
1,2,3,7,8,9 Hexachlorodibenzofuran	15U	15U	14U	14U	40 **	-
2,3,4,6,7,8 Hexachlorodibenzofuran	15U	15U	14U	10	40 **	-
Hexachlorodibenzofuran (Total)	6400J	8700J	11000J	580J	-	-
1,2,3,4,6,7,8 Heptachlorodibenzofuran	7400	17000	22000	680	40 **	-
1,2,3,4,7,8,9 Heptachlorodibenzofuran	650	610	760	55	-	-
Heptachlorodibenzofuran (Total)	9200J	22000J	28000J	860J	-	-
Octachlorodibenzofuran (Total)	33000	89000	150000J	3400	-	4000
TEQ (Toxic. Equiv. Value, From I-TEF/89)	1300J	2800	4100J	150J	-	-

Concentrations in **Bold** >= 3X Background or >= CRDL when Background is < CRDL
U: Material analyzed for but not detected. Value given is the minimum quantitation limit
J: Estimated Value R: Data Unusable
** : Cancer Risk Screen Concentration (ppt)
Shaded Concentrations >= SCDM Benchmarks; Cross-Hatched Concentrations >= NC Remediation Goals

TABLE 4
SOIL/SOURCE SAMPLE ANALYTICAL DATA SUMMARY
PURGEABLE ORGANIC, EXTRACTABLE ORGANIC DATA REPORT (ug/kg)
Southern Wood Piedmont - Gulf, NC NCD 053 488 557

	Background Surficial Soil Sample SW-001-SL	Background Subsurface Soil Sample SW-002-SL	Surficial Soil Sample SW-003-SL	Subsurface Soil Sample SW-004-SL	Surficial Soil Sample SW-005-SL	Subsurface Soil Sample SW-006-SL	Surficial Soil Sample SW-007-SL	Subsurface Soil Sample SW-008-SL	Superfund Chemical Data Matrix Benchmarks (Ref. 32)	NC Soil Remediation Goals (ppb) (Ref. 36)
Benzene	13U	12U	13U	14U	11U	12U	12U	12U	2.2+E4 **	2.2+E4
Toluene	13U	12U	13U	14U	11U	12U	12U	12U	1.6+E10 *	3.2+E6
Ethyl Benzene	13U	12U	13U	14U	11U	12U	12U	12U	7.8+E6 *	1.56+E6
Styrene	13U	12U	13U	14U	11U	12U	12U	12U	1.6+E10 *	3.2+E6
Total Xylenes	13U	12U	13U	14U	11U	12U	12U	12U	1.6+E11 *	3.2+E7
(3/4) Methylphenol	430U	400U	420U	460U	700U	380U	420U	410U	3.9+E5 *	7.8+E4
Isophorone	430U	400U	420U	460U	700U	380U	420U	410U	6.7+E5 **	6.7+E5
2,4-Dimethylphenol	430U	400U	420U	460U	700U	54J	420U	410U	1.6+E6*	3.2+E5
Naphthalene	430U	400U	420U	460U	**1000**	**1300**	420U	410U	3.1+E6 *	6.2+E5
2-Methylnaphthalene	430U	400U	420U	460U	440J	55J	420U	410U	-	-
Acenaphthylene	430U	400U	420U	460U	**1000**	380U	89J	410U	-	-
Acenaphthene	430U	400U	420U	460U	420J	46J	420U	410U	4.7+E6*	9.4+E5
Dibenzofuran	430U	400U	420U	460U	490J	42J	420U	410U	-	6.2+E4
Fluorene	430U	400U	67J	460U	420J	380U	420U	410U	3.1+E6 *	6.2+E5
Pentachlorophenol	1100U	1000U	1000U	1100U	**3300**	960U	1000U	1000U	5.3+E3 **	5300
Phenanthrene	430U	400U	120J	460U	**3000**	270J	250J	83J	-	-
Anthracene	430U	400U	**700**	460U	**7200**	380U	**840**	92J	2.3+E7 *	4.6+E6
Carbazole	430U	400U	230J	460U	**1200**	380U	130J	410U	3.2+E4 **	-
Fluoranthene	430U	400U	160J	460U	**11000**	380U	**13000**	**660**	3.1+E6*	6.2+E5
Pyrene	430U	400U	160J	460U	24000J	200J	**23000**	660J	2.3+E6 *	4.6+E5
Benzo(a)anthracene	430U	400U	57J	460U	7600J	54J	**4900**	190J	880 **	880
Chrysene	430U	400U	75J	460U	**11000**	60J	**7900**	330J	8.8+E4 *	8.8+E4
Benzo(bk)fluoranthene	430U	400U	130J	460U	**21000**	72J	**7900**	**510**	880 **	880
Benzo-a-pyrene	430U	400U	420U	460U	**9400**	380U	**1700**	120J	88 **	88
Indeno(1,2,3-CD)pyrene	430U	400U	420U	460U	**3500**	380U	**420**	93J	880 **	880
Dibenzo(ah)anthracene	430U	400U	420U	460U	**970**	380U	420U	410U	88 **	88
Benzo(ghi)perylene	430U	400U	420U	460U	**2200**	380U	220J	410U	-	-

U: Material analyzed for but not detected. Value given is the minimum quantitation limit
J: Estimated Value
**: Cancer Risk Screen Concentration (ppb)
*: Reference Dose Screen Concentration (ppb)
Concentrations in **Bold** >= 3X Background or >= CRDL when Background is < CRDL
Shaded Concentrations >= SCDM Benchmarks

TABLE 4 cont.
SOIL/SOURCE SAMPLE ANALYTICAL DATA SUMMARY
PURGEABLE ORGANIC, EXTRACTABLE ORGANIC DATA REPORT (ug/kg)
Southern Wood Piedmont - Gulf, NC NCD 053 488 557

	Suficial Soil Sample SW-009-SL	Suficial Soil Sample SW-011-SL	Suficial Soil Sample SW-013-SL	Suficial Soil Sample SW-014-SL	Suficial Soil Sample SW-015-SL	Subsurface Soil Sample SW-017-SL	Subsurface Soil Sample SW-018-SL	Suficial Soil Sample SW-019-SL	Superfund Chemical Data Matrix Benchmarks (Ref. 32)	NC Soil Remediation Goals (ppb) (Ref. 36)
Benzene	13U	14U	12U	39	15U	12U	13U	23U	2.2+E4 **	2.2+E4
Toluene	13U	14U	12U	140	15U	12U	13U	23U	1.6+E10 *	3.2+E6
Ethyl Benzene	13U	14U	12U	80	4J	12U	13U	23U	7.8+E6 *	1.56+E6
Styrene	13U	14U	12U	82	15U	12U	13U	23U	1.6+E10 *	3.2+E6
Total Xylenes	13U	14U	12U	290	16	12U	13U	23U	1.6+E11 *	3.2+E7
(3/4) Methylphenol	410U	460U	410U	1200J	5100U	36000U	420U	760U	3.9+E5 *	7.8+E4
Isophorone	410U	460U	410U	13000U	5100U	36000U	420U	760U	6.7+E5 **	6.7+E5
2,4-Dimethylphenol	410U	460U	410U	3900J	5100U	36000U	420U	760U	1.6+E6*	3.2+E5
Naphthalene	110J	460U	410U	480000	39000	36000U	110J	760U	3.1+E6 *	6.2+E5
2-Methylnaphthalene	82J	460U	410U	260000	31000	36000U	410J	760U	-	-
Acenaphthylene	74J	460U	410U	4300J	660J	36000U	420U	140J	-	-
Acenaphthene	48J	460U	410U	200000J	32000J	36000U	1300J	760U	4.7+E6*	9.4+E5
Dibenzofuran	110J	460U	410U	220000	26000	36000U	1500	81J	-	6.2+E4
Fluorene	42J	460U	410U	370000	30000	36000U	1700	90J	3.1+E6 *	6.2+E5
Pentachlorophenol	1100J	460U	1000U	32000U	13000U	150000	6200J	1200J	5.3+E3 **	5300
Phenanthrene	500	460U	410U	700000	120000	5700J	15000	1100	-	-
Anthracene	410J	460U	410U	860000	7300	42000	22000	7700	2.3+E7 *	4.6+E6
Carbazole	180J	460U	410U	300000	2600J	36000U	1100	560J	3.2+E4 **	-
Fluoranthene	1700	79J	72J	200000	30000	110000	41000	1600	3.1+E6*	6.2+E5
Pyrene	1600J	64J	61J	120000J	24000J	230000J	55000J	1800J	2.3+E6 *	4.6+E5
Benzo(a)anthracene	960	460U	410U	32000	6700	41000	9700	1000	880 **	880
Chrysene	1300	460U	67J	29000	6100	60000	13000	2900	8.8+E4 *	8.8+E4
Benzo(bk)fluoranthene	2900	460U	79J	17000	4500	34000J	12000	7500	880 **	880
Benzo-a-pyrene	680	460U	410U	8100J	1600J	16000J	300	3000	88 **	88
Indeno(1,2,3-CD)pyrene	380J	460U	410U	13000U	5100U	6300J	880	490J	880 **	880
Dibenzo(ah)anthracene	85J	460U	410U	13000U	5100U	36000U	420U	760U	88 **	88
Benzo(ghi)perylene	190J	460U	410U	13000U	5100U	5100J	400J	760U	-	-

U: Material analyzed for but not detected. Value given is the minimum quantitation limit
J: Estimated Value
**: Cancer Risk Screen Concentration (ppb)
*: Reference Dose Screen Concentration (ppb)
Concentrations in Bold >= 3X Background or >= CRDL when Background is < CRDL
Shaded Concentrations >= SCDM Benchmarks; Cross-Hatched Concentrations >= NC Remediation Goals

TABLE 4 cont.
SOIL/SOURCE SAMPLE ANALYTICAL DATA SUMMARY
PURGEABLE ORGANIC, EXTRACTABLE ORGANIC DATA REPORT (ug/kg)
Southern Wood Piedmont - Gulf, NC NCD 053 488 557

	Subsurface Soil Sample SW-020-SL	Surficial Soil Sample SW-021-SL	Surficial Soil Sample SW-121-SL	Subsurface Soil Sample SW-022-SL	Subsurface Soil Sample SW-122-SL	Surficial Soil Sample SW-023-SL	Surficial Soil Sample SW-024-SL	Superfund Chemical Data Matrix Benchmarks (Ref. 32)	NC Soil Remediation Goals (ppb) (Ref. 36)
Benzene	12U	13U	13U	15U	14U	14U	13U	2.2+E4 **	2.2+E4
Toluene	3J	2J	4J	27	39	14U	13U	1.6+E10 *	3.2+E6
Ethyl Benzene	3J	13U	13U	21	24	14U	13U	7.8+E6 *	1.56+E6
Styrene	12U	13U	13U	15U	14U	14U	13U	1.6+E10 *	3.2+E6
Total Xylenes	6J	13U	13U	71	81	14U	13U	1.6+E11 *	3.2+E7
(3/4) Methylphenol	24000U	430U	430U	1400J	14000U	440U	420U	3.9+E5 *	7.8+E4
Isophorone	24000U	430U	430U	5100U	14000U	440U	420U	6.7+E5 **	6.7+E5
2,4-Dimethylphenol	24000U	430U	430U	5100U	14000U	440U	420U	1.6+E6*	3.2+E5
Naphthalene	**31000**	430U	72J	**300000**	**67000**	350J	420U	3.1+E6 *	6.2+E5
2-Methylnaphthalene	**38000**	430U	53J	**210000**	**22000**	51J	420U	-	-
Acenaphthylene	24000U	430U	430U	5100U	14000U	440U	420U	-	-
Acenaphthene	69000J	430U	84J	330000J	92000J	69J	420U	4.7+E6*	9.4+E5
Dibenzofuran	**52000**	430U	67J	**240000**	**62000**	**990**	420U	-	6.2+E4
Fluorene	**83000**	430U	85J	**360000**	**95000**	**480**	420U	3.1+E6 *	6.2+E5
Pentachlorophenol	60000U	200J	1500J	77000J	7900J	7600J	250J	5.3+E3 **	5300
Phenanthrene	**180000**	59J	330J	**660000**	**280000**	**480**	54J	-	-
Anthracene	**97000**	76J	300J	**230000**	**74000**	100J	140J	2.3+E7 *	4.6+E6
Carbazole	**24000**	430U	83J	43000J	**22000**	440J	420U	3.2+E4 **	-
Fluoranthene	**100000**	160J	**1300**	**450000**	**150000**	360J	210J	3.1+E6*	6.2+E5
Pyrene	77000J	140J	1200J	330000J	89000J	390J	200J	2.3+E6 *	4.6+E5
Benzo(a)anthracene	17000J	78J	**720**	**38000**	**18000**	440U	170J	880 **	880
Chrysene	17000J	190J	**1600**	**41000**	**20000**	310J	320J	8.8+E4 *	8.8+E4
Benzo(bk)fluoranthene	5800J	430U	**3200**	**30000**	13000J	**640**	**930**	880 **	880
Benzo-a-pyrene	4400J	150U	**1200**	**12000**	4900J	140J	350J	88 **	88
Indeno(1,2,3-CD)pyrene	24000U	430U	240J	2600J	1400U	140J	290J	880 **	880
Dibenzo(ah)anthracene	24000U	430U	76J	1000J	1400U	440U	76J	88 **	88
Benzo(ghi)perylene	24000U	430U	110J	1400J	1400U	80J	170J	-	-

U: Material analyzed for but not detected. Value given is the minimum quantitation limit
J: Estimated Value
** : Cancer Risk Screen Concentration (ppb)
* : Reference Dose Screen Concentration (ppb)
Concentrations in **Bold** >= 3X Background or >= CRDL when Background is < CRDL
Shaded Concentrations >= SCDM Benchmarks; Cross-Hatched Concentrations >= NC Remediation Goals

subsurface soils in the northern ponds area, the drip track area and the drainage ditch have been impacted with various metals, dioxins & furans, purgeable organics, and extractable organics. Arsenic was detected in the background surficial soil sample at a level exceeding health based benchmarks for soil exposure. However, arsenic levels in source samples were not significantly above the background level. No other potential source areas were sampled during the ESI.

4.0 GROUNDWATER PATHWAY

4.1 Hydrogeologic Setting

The Southern Wood Piedmont site is located in the Piedmont physiographic province in southeastern Chatham County. The topography of Chatham County is similar to that of other counties in the North Carolina Piedmont. The upland surface generally slopes toward the southeast and is submaturely dissected by southeastward-flowing antecedent streams. A topographic lowland has developed on the Triassic rocks in the eastern and southeastern parts of the county. The eastern and south-central parts of Chatham County are underlain by rocks of Triassic age. These rocks include maroon to gray arkosic sandstones, siltstones, shales and fanglomerates. The Triassic rocks dip to the southeast where they abut against the Jonesboro fault. The Triassic rocks as well as the surrounding volcanic-sedimentary terrane have been intruded by diabase dikes of Triassic Age (Ref. 6, pp.66-67). The land surface in the Piedmont is underlain by clay-rich, unconsolidated material, referred to as saprolite, derived from in-situ weathering of the underlying bedrock. Because the saprolite contains water in pore spaces between rock particles and acts as a storage reservoir for the underlying fractured bedrock, the result is a single aquifer system (Ref. 37, pp. 46-48).

The rocks in the vicinity of the site are associated with the Cumnock, Sanford, and Pekin Formations of the Deep River basin, a geologic belt which lies along the eastern edge of the Piedmont Plateau in Chatham County. The Deep River basin is a part of the Chatham Group (Newark Supergroup) of Upper Triassic age. These rocks consist of fine-grained, reddish, grey, or black shales, siltstones and sandstones (Ref. 8). The upper portions (west) of the site along the drainage ditch and railroad cuts revealed outcrops of siltstone and sandstone. The rocks in the middle and lower portions of the site have been decomposed by differential weathering. The soils on site are silt and clay sandy loams (Ref. 2, p.2).

Site specific geologic information collected during the Geraghty & Miller Remedial Investigation indicates that the subsurface of the site comprises several geologic structures: the Gulf Fault, a diabase dike, and several diabase sills. The Gulf Fault trends east to west through the area of the site south of the railroad tracks, under the excavated former southern ponds. The diabase dike is oriented north to south in close proximity to the drainage ditch on the northeast property line, while the diabase sills are clustered in the southern portion of the site along SR 2145. Deep bedrock core borings revealed that the site is underlain by the three formations of the Chatham Group; Pekin Formation under the northern portion, Sanford Formation under the southern portion, and Cumnock Formation under the center portion of the site (Ref. 39, pp.3-7, 3-8, figs.3-3, 3-4).

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Drilled wells in Chatham County obtain their water from fractures, planes of schistosity, and other secondary openings within the bedrock below the water table. Sixty-four wells tapping the Triassic unit in the county have an average depth of 97.7 feet. For the three wells closest to the site, the water-bearing material is Triassic rock. Three wells within a 1.5-mile radius of the site have an average depth of 151 feet. Depth to water level for these wells averages 26.7 feet (Ref. 6, pp.69,83-84). Average water level in Chatham County is 24.2 feet below land surface (Ref. 6, p.70). During a three year period of water level measurement recording by Geraghty & Miller, the depth to water in on-site monitoring wells ranged from approximately 4 ft bls to 25 ft bls.
The general trend of groundwater flow direction during this same period was north towards Cedar Creek, however, south of the railroad tracks there are eastern and southeastern components to groundwater flow (Ref. 39,p. 3-9, table 3-1,fig.3-5).

4.2 Targets

The area within a 4-mile radius of the site is served by the Goldston-Gulf Sanitary District and the Lee County Municipal Water Supply Service. These systems obtain surface water from intakes on the Deep River which are outside the 15-mile surface water pathway (Ref. 12, p.1). A house count and review of water line maps obtained for the 1994 SIP indicate that there are an estimated 844 persons within a 4-mile radius of the site using ground water as a source of drinking water. There are no known community wells within a 4-mile radius of the site (Refs. 11; 12; 16; 17; 18; Fig.1). There are no wellhead protection areas in the vicinity of the site (Ref. 23). In the EPA site investigation report, it was stated that there were no private wells in the immediate vicinity of the site (Ref. 2, p.1). From review of the topographic map and water line maps, and the Geraghty & Miller report, it appears that the nearest private well is at the Jordan-Ellis residence located approximately 0.3-mile southeast of the site (Fig. 1; Ref. 39, p.4-15). The ground water population is apportioned as follows:

Distance Ring	Groundwater Population
0 -1/4 mi.	0
>1/4 - 1/2	8
>1/2 - 1	50
1 - 2	66
2 - 3	123
3 - 4	605
Total	844

4.3 Previous Groundwater Investigation

Ground water samples were not collected during the 1995 Expanded Site Inspection because no private drinking water wells are located within 0.25-miles of the site and the closest residential well, sampled in 1990, was shown to be free of contaminants. Extensive on-site groundwater

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monitoring well analytical data is available from previous investigations. During the period between 1990 to 1993, Geraghty & Miller collected groundwater samples annually from the 33 on-site monitoring wells for volatile organic and semi-volatile organic compound analysis. The depths of these monitoring wells ranged from 12 ft bls to 115 ft bls. An upgradient background off-site monitoring well (MW-4A), located approximately 800 ft south of the former wood treating process area and 28.5 ft deep, was also included during these sampling events (Refs. 39).

All monitoring well locations are detailed on Figure 4. Analytical results for samples taken by Geraghty & Miller between 1990 and 1993 from monitoring wells at the Southern Wood Piedmont site indicate groundwater has been impacted by wood treatment waste constituents including toluene, xylene, 2,4-dimethylphenol, anthracene, fluoranthene, chrysene, benzo(bk)fluoranthene, benzo-a-pyrene, carbazole, cresol, analine, fluorene, 2-methylnaphthalene, and 2,3,4,6-tetrachlorophenol; benzene, ethylbenzene, phenol, pentachlorophenol, naphthalene, acenaphthene, phenanthrene, and benzo(a)anthracene were present in groundwater at levels considerably higher than the current NCDEHNR Subchapter 2L groundwater standards. The closest residential well sample and samples collected between 1990 and 1993 from the off-site monitoring well did not reveal any contaminant concentrations above detection limits (Refs. 39, fig.2-9, tables 4-9, 4-10, 4-11, 4-12, 4-13, 4-14; 40).

4.4 Conclusions

Most of the residents in the vicinity of the site receive their potable water from the Goldston-Gulf Sanitary District water system and the Lee County Municipal Water Supply Service. Those residents within the 4-mile site radius that do not receive city-supplied water drinking water utilize private wells for drinking purposes. The nearest private drinking water well, relative to the wood treatment area of the former Southern Wood Piedmont site, is located approximately 0.3-mile southeast. The primary drinking water aquifer in the area is the unconfined saprolite/fractured bedrock aquifer system. Groundwater at the site has been shown to be impacted with several volatile organic and semi-volatile organic compounds. The off-site monitoring well had not been affected by groundwater conditions at the site.

5.0 SURFACE WATER PATHWAY

5.1 Hydrologic Setting

Surface runoff from the site follows a drainage ditch to a probable point of entry to surface water (PPE) at Cedar Creek about 1600 feet north of the backfilled northern ponds area of the property (Fig. 2). From the PPE, Cedar Creek flows to the east approximately 2 miles to its confluence with the Deep River. The Deep River continues in a generally northeasterly direction for about 13 miles to the end of the 15-mile surface water pathway, approximately 0.5 mile north of U.S. Highway 1 and west of the town of Moncure (Fig. 1). The flow rate for Cedar Creek near the site is approximately 4.6 cubic feet per second (cfs). The flow rate for the Deep River in the 15-mile

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target distance limit is about 1146 cfs (Ref. 9). The site is located outside the 500-year floodplain (Ref. 10).

5.2 Targets

There are no surface water intakes within 15 miles downstream of the site (Refs. 12, 16, 17). The intake for the Goldston-Gulf Sanitary District is located on the Deep River near the intersection of Highway 421 and State Road 1007. The Lee County Municipal Water Supply Service intake is located on the Deep River near the Norfolk-Southern Railroad bridge at Cumnock, NC. Both the Goldston-Gulf intake and the Lee County intake are located upstream of the Cedar Creek mouth at the Deep River. The city of Sanford is served by an intake on the Cape Fear River, beyond the 15-mile surface water pathway (SWP) target distance limit to the east (Refs. 11; 12; Fig.1)

An investigation of N.C. Natural Heritage Program data revealed several sensitive environments in the 15-mile surface water pathway. Four habitats of the fish Notropis mekistocholas, or Cape Fear Shiner, an endangered species at both the U.S. and N.C. levels, were noted. These 4 habitats are located within a 4 mile portion of the Deep River ranging from about 10.5 miles to 14.5 miles downstream of the PPE. Ptilimnium noduosum, or Harperella, an endangered plant species at both the U.S. and N.C. levels, occurs in the 15-mile surface water pathway at about 12 miles downstream of the PPE. Enemion biternatum, or Eastern Isopyrum, which is classified Significantly Rare at the N.C. level, is also found within the surface water target distance limit at about 12.5 miles downstream of the PPE (Ref. 13; Fig.1).

Wetlands occur in small pockets along Cedar Creek downstream of the PPE, however, none of these pockets were at least 528 feet of SWP frontage. The nearest wetland along the SWP is approximately 3.25 miles downstream of the site PPE and includes 0.5-mile of SWP frontage. Other areas of wetlands occur intermittently for the remainder of the 15-mile surface water pathway. The total wetlands frontage adjacent to the 15-mile surface water pathway is about 7 miles (Refs. 14; 38; Fig.1).

Downstream of the site PPE, Cedar Creek has reportedly not been fished for several years. However, the mouth of the creek at the Deep River is easily accessible from the SR 2145 bridge and may be lightly fished by local people. Because of this, the nearest fishery along the SWP was assigned to this location, approximately 2-miles downstream of the site PPE. The remaining 13 miles of the 15-mile surface water pathway along the Deep River is a fishery with heavy fishing pressure (Ref. 15; Fig. 1). The portion of Cedar Creek downstream of the site is classified by the State as class "C" waters, to be protected for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. The portion of the Deep River within the 15-mile surface water pathway is divided into segments classified either "C" or "WS-IV", to be protected as water supplies which are generally in moderately to highly developed watersheds and suitable for all Class C uses (Ref. 19)

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5.3 Previous Surface-Water Pathway Investigations

During the EPA investigation in September of 1983, sampling was performed to determine off-site migration of hazardous substances to the SWP. The EPA sampled soil from the old lagoon areas, from the drainage ditch that carries runoff into Cedar Creek, and from the old operations area. They also sampled Cedar Creek sediment upstream and downstream of the confluence of the drainage ditch and Cedar Creek, sediment at the confluence, and soil from the creek floodplain adjacent to the site (Ref. 2, pp.6,9).

5.4 Sample Locations

During the ESI, sediment and surface water samples were collected from ten (10) locations along Cedar Creek as documented in Table 5 and shown on Figures 1 & 4. Four (4) sample locations (SW-025, SW-026, SW-027, SW-028), upstream of the western property line, were used for background comparison of stream conditions. Two sample locations, SW-029 at the PPE and SW-030 approximately 200 ft downstream of the PPE, were collected to show attribution of site contaminants. The furthest downstream sample location (SW-034) was collected at the SR 2145 bridge fishery. Three (3) additional sets of sediment and surface water samples (SW-031, SW-032, SW-033) were collected for background comparison at each of three unnamed tributaries that enter Cedar Creek between the site PPE and the fishery at the SR 2145 bridge (Ref. 31). All surface water pathway samples collected during the ESI were collected according to EPA SOP and analyzed under the EPA Contract Laboratory Program for VOC's, SVOC's and inorganics; selected samples were also analyzed for dioxin/furans (CLP)(Ref. 31).

5.5 Analytical Results

Analytical results from the EPA SI report indicate significantly elevated levels (greater than three times background level) of several metals, including arsenic, chromium, copper, nickel, and aluminum in sediment in the surface water pathway downstream of the confluence of the drainage ditch with Cedar Creek. Significantly elevated levels of barium, cobalt, chromium, copper, nickel, and aluminum were found in sediment at the PPE (Ref. 2, p.6) Analytical data also indicate that, with the exception of the soil sample from the southeast edge of the site (SWP-008), all of the soil and sediment samples collected by EPA in 1983, including an upstream sediment sample (SWP-009) contained organic compounds that were associated with wood preserving. These compounds include several PAH's and pentachlorophenol. The concentrations of these compounds ranged from 1100 ug/kg to 2,900,000 ug/kg. The off-site sediment samples collected in Cedar Creek and soil collected from the adjacent floodplain (SWP-006) contained many of the same organic compounds that were detected in the on-site sediment and soil samples, but in lower concentrations ranging from 2,200 ug/kg to 19,000 ug/kg (Refs. 5; 2, p.7).

Analytical results for surface water and sediment samples collected during the ESI are included in Appendix A. Results of the metals analyses, dioxin/furan analyses and purgeable and extractable organics analyses are summarized below in Tables 6, 7, and 8, respectively. Sample

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Table 5. ESI Surface Water and Sediment Sample Locations
Southern Wood Piedmont, Gulf, Chatham County, NC
NCD 053 488 557

Sample ID Number	Analytes	Sample Depths	Description
SW-025-SW SW-025-SD	V,S,I V,S,I,D	0" - 12"	1 SURFACE WATER AND 1 SEDIMENT SAMPLE IN CEDAR CREEK ABOUT 150' UPSTREAM OF SR 2142 BRIDGE/ BACKGROUND SAMPLES
SW-025-SW Matrix Spike Dup	V,S,I		DUPLICATE OF SW-025-SW FOR MATRIX SPIKE
SW-026-SW SW-026-SD	V,S,I V,S,I	0" - 12"	1 SURFACE WATER AND 1 SEDIMENT SAMPLE IN CEDAR CREEK JUST DOWNSTREAM OF SR 2142 BRIDGE/ BACKGROUND SAMPLES
SW-027-SW SW-027-SD	V,S,I V,S,I	0" - 12"	1 SURFACE WATER AND 1 SEDIMENT SAMPLE IN CEDAR CREEK ABOUT 700' DOWNSTREAM OF SR 2142 BRIDGE/ BACKGROUND SAMPLES
SW-028-SW SW-028-SD	V,S,I V,S,I,D	0" - 12"	1 SURFACE WATER AND 1 SEDIMENT SAMPLE IN CEDAR CREEK ABOUT 300' UPSTREAM OF WESTERN PROPERTY LINE OF SITE/BACKGROUND SAMPLES
SW-029-SW SW-029-SD	V,S,I V,S,I,D	0" - 12"	1 SURFACE WATER AND 1 SEDIMENT SAMPLE IN CEDAR CREEK AT CONFLUENCE WITH SITE DRAINAGE DITCH/ MIGRATION TO SURFACE WATER PATHWAY
SW-129-SW SW-129-SD	V,S,I V,S,I,D	0" - 12"	DUPLICATE OF SW-029-SW & SW-029-SD
SW-030-SW SW-030-SD	V,S,I V,S,I	0" - 12"	1 SURFACE WATER AND 1 SEDIMENT SAMPLE IN CEDAR CREEK ABOUT 200' DOWNSTREAM OF CONFLUENCE WITH SITE DRAINAGE DITCH/ MIGRATION TO SURFACE WATER PATHWAY
SW-031-SW SW-031-SD	V,S,I V,S,I,D	0" - 12"	1 SURFACE WATER AND 1 SEDIMENT SAMPLE IN UNNAMED TRIBUTARY TO CEDAR CREEK, APPROX. 0.25 MILE BELOW PPE
SW-032-SW SW-032-SD	V,S,I V,S,I,D	0" - 12"	1 SURFACE WATER AND 1 SEDIMENT SAMPLES IN UNNAMED TRIBUTARY TO CEDAR CREEK, APPROX. 1.5 MILE BELOW PPE

Table 5. ESI Surface Water and Sediment Sample Locations
Southern Wood Piedmont, Gulf, Chatham County, NC
NCD 053 488 557

Sample ID Number	Analytes	Sample Depths	Description
SW-033-SW SW-033-SD	V,S,I V,S,I,D	0" - 12"	1 SURFACE WATER AND 1 SEDIMENT SAMPLE IN UNNAMED TRIBUTARY TO CEDAR CREEK, APPROX. 1.75 MILE BELOW PPE
SW-034-SW SW-034-SD	V,S,I V,S,I,D	0" - 12"	1 SURFACE WATER AND 1 SEDIMENT SAMPLE IN CEDAR CREEK JUST UPSTREAM OF SR 2145 BRIDGE/FISHERY SAMPLES
SW-037-TB	V		TRIP BLANK FOR QA/QC
SW-038-PB	I		POST-PRESERVATIVE BLANK FOR QA/QC

V: Volatile Organic Compounds
S: Semi-volatile Organic Compounds
I: Inorganics
D: Dioxin/Furan

locations SW-025 or SW-028 were used as the upstream background samples. Where contaminant levels in these two samples varied, the higher level was used to account for natural variation and contaminants contributed by runoff from SR 2142.

Surface water samples were tested for metals, purgeable organics and extractable organics. None of these were detected at levels significantly above background.

Two sets of sediment samples were collected at the PPE (SW-029-SD and SW-129-SD). Barium, calcium, cobalt, copper, magnesium, and nickel were detected at levels significantly above background in one or both of the samples at the PPE. Dioxin/furan isomers of hexachlorodibenzodioxin (HCDD), heptachlorodibenzodioxin (HpCDD), octachlorodibenzodioxin (OCDD), hexachlorodibenzofuran (HCDF), heptachlorodibenzofuran (HpCDF), and octachlorodibenzofuran (OCDF) were also detected at elevated concentrations in these samples. No purgeable organics were detected at levels significantly above background. Extractable organics naphthalene, 2-methylnapthalene, dibenzofuran, fluorene, pentachlorophenol, phenanthrene, anthracene, fluoranthene, benzo(a)anthracene, chrysene, benzo(a)pyrene, and benzo(b,k)fluoranthene were detected at levels significantly above background in the sediments at the PPE. All of the above contaminants except for barium, copper and magnesium were also detected at elevated levels in soils in the drainage ditch or other sources areas on site during the ESI. These results document an observed release of these contaminants from the site to Cedar Creek at the PPE.

Sample SW-030-SD was collected approximately 200' downstream of the PPE and upstream of the three unnamed tributaries entering Cedar Creek upstream of its confluence with the Deep River (Fig. 1). This sample was collected to document the extent of contaminant migration along Cedar Creek. No dioxin/furan analysis was performed on this sample. Arsenic, cobalt, copper, magnesium, nickel, anthracene, fluoranthene, benzo(a)anthracene, chrysene, benzo(b,k)fluoranthene, and benzo(a)pyrene were detected at elevated levels in this sample. All of the above contaminants, except for arsenic, copper, and magnesium, are attributable to the site and support an observed release of these contaminants from the site.

Control samples (SW-031-SD, SW-032-SD, and SW-033-SD) were collected from the three unnamed tributaries which enter Cedar Creek downstream of the PPE and upstream of the Deep River (Fig. 1). No metals or purgeable organics were detected in these samples at levels significantly above background. Sample SW-031-SD contained elevated levels of one HpCDD isomer and total OCDFs. Sample SW-032-SD contained many of the same dioxin/furan isomers detected in on-site soils and at the PPE (HCDD, HpCDD, OCDD, HCDF, HpCDF, and OCDF) as well as chrysene and benzo(b,k)fluoranthene which were also detected on site and at the PPE. Sample SW-033-SD contained only one isomer of HpCDD at elevated levels. The source of these contaminants in the unnamed tributaries is unknown. No likely sources other than the Southern Wood Piedmont facility have been identified in the area, however, it is not clear how site contaminants would have come to be deposited in the unnamed tributaries which feed into Cedar Creek.

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TABLE 6
SURFACE WATER PATHWAY SAMPLES ANALYTICAL DATA SUMMARY
METALS DATA REPORT (MG/KG)
Southern Wood Piedmont - Gulf, NC NCD 053 488 557

	BACKGROUND SEDIMENT SAMPLE SW-025-SD	SEDIMENT SAMPLE SW-026-SD	SEDIMENT SAMPLE SW-027-SD	BACKGROUND SEDIMENT SAMPLE SW-028-SD	SEDIMENT SAMPLE SW-029-SD	SEDIMENT SAMPLE SW-129-SD	SEDIMENT SAMPLE SW-030-SD	SEDIMENT SAMPLE SW-031-SD	SEDIMENT SAMPLE SW-032-SD	SEDIMENT SAMPLE SW-033-SD	SEDIMENT SAMPLE SW-034-SD
Aluminum	4500	9700	4100	1900	10000	12000	12000	3900	8400	8600	13000
Antimony	3UR	2.8UR	2.7UR	3UR	3.2UR	3.2UR	5UJ	5UJ	4UJ	3.3UR	3.3UR
Arsenic	2.6J	2U	3U	**3.3**	2U	4J	**9.9**	**6.2**	2U	1U	2.9
Barium	35	70	37	14	110	160	100	34	95	76	140
Beryllium	1U	0.65J	0.24J	1U	1U	0.99J	1.1J	1	0.69J	1U	0.79J
Cadmium	0.29U	0.28U	0.26U	0.30U	0.32U	0.32U	0.30U	0.36U	0.34U	0.32U	0.33U
Calcium	480	550	530	250	820	2100	1300	360	670	560	920
Chromium	11	15	9.8	9.7	15	28	32	27	12	8.5	14
Cobalt	5U	6U	8U	4U	20U	**27**	**18**	5U	20U	4U	20U
Copper	6U	8U	7U	3U	20U	**26**	**20**	20U	20U	10U	**25**
Iron	11000	13000	9000	13000	15000	26000	37000	19000	9800	4000	18000
Lead	6.2J	7.4J	6.3J	4.9J	7J	9.2J	11J	6.2J	13	12J	9.6
Magnesium	790	1500	710	250	2000	**4000**	2600	390	1500	680	1700
Manganese	240J	200J	190J	160J	360J	900J	570J	130J	460	92J	660
Mercury	0.06U	0.06U	0.06U	0.06U	0.06U	0.06U	0.06U	0.08U	0.07U	0.07U	0.2U
Nickel	4U	8U	4U	3U	**15**	**37**	**36**	3U	9U	4U	9U
Potassium	140	200	130	46J	240	310	310	70J	310	330	380
Selenium	0.52U	1U	0.46U	0.53U	1U	1U	1U	0.63U	0.60U	0.57U	1U
Silver	0.81U	0.77U	0.73U	0.83U	0.87U	0.87U	1U	0.99U	0.94U	0.89U	0.9U
Sodium	70U	80U	40U	20U	160U	190U	110U	40U	70U	80U	70U
Thallium	0.54U	0.51U	0.48U	0.55U	0.58U	0.58U	0.54U	0.66U	0.63U	0.60U	0.6U
Tin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	26	30	20	19	27	46	51	28	24	14	42
Zinc	30UJ	30UJ	30UJ	20UJ	30UJ	40UJ	40UJ	30UJ	40U	40UJ	40U

NA: Not Analyzed
U: Material was analyzed for but not detected. Value is minimum quantitation limit
J: Estimated Value
Concentrations in **Bold** >= 3X Background or >= CRDL when Background is < CRDL

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TABLE 6 cont.
SURFACE WATER PATHWAY SAMPLES ANALYTICAL DATA SUMMARY
METALS DATA REPORT (UG/L)
Southern Wood Piedmont - Gulf, NC NCD 053 488 557

	BACKGROUND SURFACE WATER SAMPLE SW-025-SW	SURFACE WATER SAMPLE SW-026-SW	SURFACE WATER SAMPLE SW-027-SW	BACKGROUND SURFACE WATER SAMPLE SW-028-SW	SURFACE WATER SAMPLE SW-029-SW	SURFACE WATER SAMPLE SW-129-SW	SURFACE WATER SAMPLE SW-030-SW	SURFACE WATER SAMPLE SW-031-SW	SURFACE WATER SAMPLE SW-032-SW	SURFACE WATER SAMPLE SW-033-SW	SURFACE WATER SAMPLE SW-034-SW	PRESERVATIVE BLANK SW-038-PB
Aluminum	400J	570	590	470J	1200J	730	450	680	640	1300	830J	30U
Antimony	20UJ	20U	20U	20UJ	20UJ	20U	20U	20U	20U	20U	20UJ	20U
Arsenic	3UJ	3U	3U	3UJ	3UJ	3U	3U	3U	3U	3U	3UJ	3U
Barium	20J	20	20	20J	27J	25	24	26	38	28	31J	2U
Beryllium	1UJ	1U	1U	1UJ	1UJ	1U	1U	1U	1U	1U	1UJ	1U
Cadmium	2UJ	2U	2U	2UJ	2UJ	2U	2U	2U	2U	2U	2UJ	2U
Calcium	6200J	6400	6300	6200J	6200J	6200	5900	2000	3600	2200	4800J	70U
Chromium	2UJ	2U	3U	2UJ	2UJ	2U	2U	2U	2U	3U	2UJ	2U
Cobalt	4UJ	3U	3U	3UJ	3UJ	3U	3U	3U	3U	3U	3UJ	3U
Copper	7UJ	6U	4U	7UJ	6UJ	5U	4U	6U	5U	7U	5UJ	4U
Iron	770J	920	950	820J	2000J	1300	810	940	1500	1900	1300J	9U
Lead	1UJ	1U	1U	1UJ	1UJ	2UJ	2UJ	2UJ	1U	2UJ	1UJ	1U
Magnesium	3300J	3400	3300	3300J	3700J	3500	3100	1700	1400	1000	2400J	30U
Manganese	37J	43	40	40J	69J	52	37	57	110	72	78J	1U
Mercury	0.2UJ	0.10U	0.2UJ	0.2UJ	0.20J	0.2UJ	0.2UJ	0.2UJ	0.2UJ	0.2UJ	0.10UJ	0.10U
Nickel	7UJ	7U	7U	7UJ	7UJ	7U	7U	7U	7U	7U	7UJ	7U
Potassium	1900J	1900	2000	1900J	1800J	1900	1800	860	890	1000	1400J	80U
Selenium	3UJ	3U	3U	3UJ	3UJ	3U	3U	3U	3U	3U	3UJ	3U
Silver	3UJ	5U	4U	3UJ	3UJ	3U	3U	3U	3U	3U	5UJ	3U
Sodium	5100J	5200	5100	5000J	5900J	5500	4800	3200	3200	3100	4800J	60U
Thallium	3UJ	3U	3U	3UJ	3UJ	3U	3U	3U	3U	3U	3UJ	3U
Tin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	3UJ	5U	4U	3UJ	5UJ	5U	3U	4U	3U	5U	4UJ	3U
Zinc	7UJ	11J	8U	28J	8UJ	7U	20U	7U	7U	13J	9UJ	7U

NA: Not Analyzed
U: Material was analyzed for but not detected. Value is minimum quantitation limit
J: Estimated Value
Concentrations in **Bold** >= 3X Background or >= CRDL when Background is < CRDL

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TABLE 7
SURFACE WATER PATHWAY SAMPLES ANALYTICAL DATA SUMMARY
DIOXIN/FURAN DATA REPORT (NG/KG)
Southern Wood Piedmont - Gulf, NC NCD 053 488 557

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	BACKGROUND SEDIMENT SAMPLE SW-025-SD	BACKGROUND SEDIMENT SAMPLE SW-028-SD	SEDIMENT SAMPLE SW-029-SD	SEDIMENT SAMPLE SW-129-SD	SEDIMENT SAMPLE SW-031-SD	SEDIMENT SAMPLE SW-032-SD	SEDIMENT SAMPLE SW-033-SD	SEDIMENT SAMPLE SW-034-SD
2,3,7,8 Tetrachlorodibenzodioxin	5.0U	5.0U	6.0U	6.0U	5.0U	6.7U	6.3U	6.4U
Tetrachlorodibenzodioxin (Total)	5.0UJ	5.0UJ	24J	17J	5.0UJ	11J	0.7J	1.4J
1,2,3,7,8 Pentachlorodibenzodioxin	12U	12U	4.0J	5.1J	12U	7.0J	16U	16U
Pentachlorodibenzodioxin (Total)	12UJ	12UJ	40J	36J	1.3J	79J	16UJ	2.2J
1,2,3,4,7,8 Hexachlorodibenzodioxin	12U	12U	**23**	**43**	12U	**62**	16U	16U
1,2,3,6,7,8 Hexachlorodibenzodioxin	12U	12U	**470**	**820**	3.0J	**790**	1.4J	2.2J
1,2,3,7,8,9 Hexachlorodibenzodioxin	12U	12U	**100**	**130**	2.0J	**210**	2.2J	2.4J
Hexachlorodibenzodioxin (Total)	22J	12UJ	4100J	5400J	28J	5200J	14J	35J
1,2,3,4,6,7,8 Heptachlorodibenzodioxin	30U	12U	**18000**	36000J	130	**30000**	**53**	**130**
Heptachlorodibenzodioxin (Total)	70UJ	20UJ	72000J	120000J	340J	79000J	130J	330J
Octachlorodibenzodioxin (Total)	810	140U	**220000J**	**340000J**	2000	**360000J**	1400	**4300**
2,3,7,8 Tetrachlorodibenzofuran	5.0U	5.0U	6.0U	6.0U	5.0U	6.7U	6.3U	6.4U
Tetrachlorodibenzofuran (Total)	5.0UJ	5.0UJ	8.5J	11J	5.0UJ	22J	1.8J	6.4UJ
1,2,3,7,8 Pentachlorodibenzofuran	12U	12U	14U	14U	12U	17U	16U	16U
2,3,4,7,8 Pentachlorodibenzofuran	12U	12U	4.0J	9.1J	12U	6.2J	16U	16U
Pentachlorodibenzofuran (Total)	12UJ	12UJ	120J	190J	1.5J	200J	4.4J	16UJ
1,2,3,4,7,8 Hexachlorodibenzofuran	12U	12U	610U	1200U	12U	1200U	16U	16U
1,2,3,6,7,8 Hexachlorodibenzofuran	12U	12U	9.0J	**31**	12U	17U	16U	16U
1,2,3,7,8,9 Hexachlorodibenzofuran	12U	12U	14U	14U	12U	17U	16U	16U
2,3,4,6,7,8 Hexachlorodibenzofuran	12U	12U	14U	14U	12U	**38**	16U	16U
Hexachlorodibenzofuran (Total)	27J	12UJ	3300J	5000J	12U	4400J	12J	39J
1,2,3,4,6,7,8 Heptachlorodibenzofuran	13	12U	**4300**	**6800**	10J	**4800**	29	6.8J
1,2,3,4,7,8,9 Heptachlorodibenzofuran	12U	12U	**170**	**310**	12U	**390**	16U	16U
Heptachlorodibenzofuran (Total)	16J	12UJ	5200J	8200J	13J	6100J	34J	7.9J
Octachlorodibenzofuran (Total)	25U	25U	**20000**	**37000**	**63**	**31000**	32U	24J
TEQ (Toxic. Equiv. Value, From I-TEF/89)	0.94	0	530J	920J	3.9J	860J	2.6J	6.2

Concentrations in **Bold** >= 3X Background or >= CRDL when Background is < CRDL
U: Material analyzed for but not detected. Value given is the minimum quantitation limit
J: Estimated Value
** : Cancer Risk Screen Concentration (ppt)

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TABLE 8
SURFACE WATER PATHWAY SAMPLES ANALYTICAL DATA SUMMARY
PURGEABLE ORGANIC*, EXTRACTABLE ORGANIC DATA REPORT (ug/kg)
Southern Wood Piedmont - Gulf, NC NCD 053 488 557

	SEDIMENT SAMPLE SW-025-SD	SEDIMENT SAMPLE SW-026-SD	SEDIMENT SAMPLE SW-027-SD	SEDIMENT SAMPLE SW-028-SD	SEDIMENT SAMPLE SW-029-SD	SEDIMENT SAMPLE SW-129-SD	SEDIMENT SAMPLE SW-030-SD	SEDIMENT SAMPLE SW-031-SD	SEDIMENT SAMPLE SW-032-SD	SEDIMENT SAMPLE SW-033-SD	SEDIMENT SAMPLE SW-034-SD
(3/4) Methylphenol	420U	390U	510U	410U	430U	410U	990U	460U	52J	80J	520U
Isophorone	420U	390U	510U	410U	430U	410U	990U	460U	540U	470U	520U
2,4-Dimethylphenol	420U	390U	510U	410U	430U	410U	990U	460U	540U	470U	520U
Naphthalene	420U	390U	510U	410U	**53000**	**12000**	990U	460U	120J	470U	520U
2-Methylnaphthalene	420U	390U	510U	410U	**250000**	**42000**	990U	460U	64J	470U	520U
Acenaphthylene	420U	390U	510U	410U	1300U	410U	990U	460U	74J	470U	520U
Acenaphthene	420U	390U	510U	410U	180000J	37000J	220J	460U	65J	470U	520U
Dibenzofuran	420U	390U	510U	410U	**150000**	**32000**	200J	460U	66J	470U	520U
Fluorene	420U	390U	510U	410U	**110000**	**31000**	380J	460U	'80J	470U	520U
Pentachlorophenol	1000U	990U	1300U	1000U	110000J	**1200**	740J	1200U	300J	1200U	1300U
Phenanthrene	420U	390U	510U	410U	**200000**	**47000**	900J	240J	230J	470U	520U
Anthracene	420U	390U	510U	410U	9200J	**2800**	**1100**	460U	390J	470U	520U
Carbazole	420U	390U	510U	410U	12000J	5400J	180J	460U	100J	470U	520U
Fluoranthene	420U	390U	510U	410U	**59000**	**18000**	**3500**	200J	230J	470U	520U
Pyrene	420U	390U	510U	410U	10000J	15000J	3200J	160J	230J	470UJ	520U
Benzo(a)anthracene	420U	390U	510U	410U	6500J	**2300**	**2000**	49J	280J	470U	520U
Chrysene	420U	390U	510U	410U	4600J	**2000**	**3500**	64J	**640**	470U	520U
Benzo(bk)fluoranthene	420U	390U	510U	410U	4200J	**2500**	**5300**	80J	**1900**	470U	120J
Benzo-a-pyrene	420U	390U	510U	410U	**1200**	**830**	**1800**	460U	530J	470U	520U
Indeno(1,2,3-CD)pyrene	420U	390U	510U	410U	180J	210J	990J	460U	540J	470U	520U
Dibenzo(ah)anthracene	420U	390U	510U	410U	430U	57J	280J	460U	110J	470U	520U
Benzo(ghi)perylene	420U	390U	510U	410U	89J	130J	500J	460U	270J	470U	520U

* No Purgeable Organic Compounds Detected
U: Material analyzed for but not detected. Value given is the minimum quantitation limit
J: Estimated Value
Concentrations in **Bold** >= 3X Background or >= CRDL when Background is < CRDL

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TABLE 8 cont.
SURFACE WATER PATHWAY SAMPLES ANALYTICAL DATA SUMMARY
PURGEABLE ORGANIC*, EXTRACTABLE ORGANIC DATA REPORT (ug/kg)
Southern Wood Piedmont - Gulf, NC NCD 053 488 557

	SURFACE WATER SAMPLE SW-025-SW	SURFACE WATER SAMPLE SW-026-SW	SURFACE WATER SAMPLE SW-027-SW	SURFACE WATER SAMPLE SW-028-SW	SURFACE WATER SAMPLE SW-029-SW	SURFACE WATER SAMPLE SW-129-SW	SURFACE WATER SAMPLE SW-030-SW	SURFACE WATER SAMPLE SW-031-SW	SURFACE WATER SAMPLE SW-032-SW	SURFACE WATER SAMPLE SW-033-SW	SURFACE WATER SAMPLE SW-034-SW
(3/4) Methylphenol	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	1J
Isophorone	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	1J
2,4-Dimethylphenol	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Naphthalene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	1J
2-Methylnaphthalene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Acenaphthylene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Acenaphthene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Dibenzofuran	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Fluorene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Pentachlorophenol	25U	25U	25U	25U	11J	16J	25U	25U	25U	25U	25U
Phenanthrene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Anthracene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Carbazole	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Fluoranthene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Pyrene	10U	10U	10U	10U	10U	10U	10UJ	10UJ	10UJ	10UJ	3J
Benzo(a)anthracene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Chrysene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Benzo(bk)fluoranthene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Benzo-a-pyrene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Indeno(1,2,3-CD)pyrene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Dibenzo(ah)anthracene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Benzo(ghi)perylene	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U

* No Purgeable Organic Compounds Detected
U: Material analyzed for but not detected. Value given is the minimum quantitation limit
J: Estimated Value
Concentrations in **Bold** >= 3X Background or >= CRDL when Background is < CRDL

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Sample SW-034-SD was collected in Cedar Creek in the nearest likely downstream fishery. This sample was collected downstream of the unnamed tributaries and approximately 450 ft. upstream of the confluence with the Deep River at the SR 2145 bridge (Fig. 1). Barium, copper, one isomer of HpCDD and total OCDDs were the only contaminants detected at levels significantly above background. Barium and copper were not detected at elevated levels in sources on the site and are not likely to be attributable to the site. HpCDD and OCDD were detected on site, however, due to the levels of these contaminants in the control samples collected from the unnamed tributaries upstream of the fishery, these contaminants may not be attributable to the site. Therefore, actual contamination of a fishery by a release from this site has not been documented.

5.6 Conclusions

Laboratory analytical data for the surface water pathway sediment samples collected during the ESI indicate that an observed release of barium, cobalt, nickel, HCDD, HpCDD, OCDD, HCDF, HpCDF, OCDF, naphthalene, dibenzofuran, phenanthrene, anthracene, fluoranthene, chrysene, benzo(a)anthracene, benzo(bk)fluoranthene, benzo-a-pyrene, fluorene, pentachlorophenol, and 2-methylnaphthalene has occurred in Cedar Creek. However, the portion of the creek below the PPE where these sample collection points are located is not a fishery nor are any sensitive environments present.

6.0 SOIL EXPOSURE AND AIR PATHWAYS

6.1 Physical Conditions

The site currently includes three backfilled lagoons and contaminated soil on property that once housed a wood preserving facility. Various wood preservatives were used in the operation, but creosote was the major preservative utilized. In 1980, process equipment for the wood treating plant was dismantled and removed, and all process waste lagoons were backfilled with soil excavated from the spray irrigation field (Ref. 2, p.1). In 1990, approximately 36,500 tons of contaminated soil excavated from the southern backfilled lagoons was removed from the property to an incineration facility in Louisiana (Ref. 28, pp.2,5,6). The site is primarily overgrown with tall grass and trees although some sections are exposed hard packed dirt and gravel. At the time of the ESI the site was not fenced, although vehicle access was restricted from State Road 2139 by a locked gate and warning signs were posted (Ref. 31).

6.2 Soil and Air Targets

An estimated one hundred ninety (190) persons live within a 1-mile radius of the site and a total population of 1,933 persons live within a 4-mile radius base on 1990 Census data (Ref. 24). There are an estimated 275 acres of wetlands within a 4-mile radius of the site (Ref. 14). There are no terrestrial sensitive environments located within the boundaries of the site (Ref. 13). There are two plant species habitats, Collinsonia tuberosa (Piedmont Horsebalm) and Porteranthus stipulatus

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(Indian Physic) classified as candidate for endangered and significantly rare respectively, located within a 4-mile radius of the site (Ref. 13; Fig.1).
The nearest residence is located approximately 600 ft south of the former wood treatment process area of the site. The nearest day care facility is located in The town of Goldston, as is the nearest school, approximately 3.5 miles west (Ref. 27; Fig. 1). There have been no workers on-site since the facility was closed in 1980 (Ref. 31). The population distribution around the sit is as follows:

Distance Ring	Population
0 -1/4 mi.	27
>1/4 - 1/2	60
>1/2 - 1	103
1 - 2	227
2 - 3	464
3 - 4	1052
Total	1933

6.3 Soil and Air Sample Locations

Because there are no residences or sensitive environments located on or within 200 ft of the site source areas, no off-site soil samples were collected during the ESI. No air sampling, other than that which was done at each soil sample location for health and safety reasons, was conducted during the ESI. Numerous surficial and subsurface soil samples were collected on-site as part of the waste/source area characterization as discussed previously in Section 3.1 Waste/Source Sampling - Sampling Locations.

6.4 Analytical Results

Analytical results for soil samples collected during the ESI are included in Appendix A. Results of the metals analyses, dioxin/furan analyses and purgeable and extractable organics analyses are summarized in Tables 2,3 and 4 , respectively.

In the drip track area, elevated levels of aluminum, calcium, chromium, cobalt, mercury and vanadium were detected in surface soils. Isomers of pentachlorodibenzodioxin (PCDD), hexachlorodibenzodioxin (HCDD), heptachlorodibenzodioxin (HpCDD), octachlorodibenzodioxin (OCDD), hexachlorodibenzofuran (HCDF), heptachlorodibenzofuran (HpCDF) and octachlorodibenzofuran (OCDF) were also detected at levels significantly above background in surface soils collected from this area. No purgeable organics were detected. Elevated levels of extractable organics detected in the drip track area surficial soils included naphthalene, fluoranthene, and benzo(b,k)fluoranthene, acenapthylene, pentachlorophenol, phenanthrene, anthracene, carbazole, pyrene, benzo(a)anthracene, chrysene, benzo(a)pyrene, benzo(g,h,i)perylene, dibenzo(a,h)anthracene, and indeno(1,2,3-CD)pyrene.

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Of the contaminants detected at levels significantly above background in the drip track area surface soils, isomers of PCDD, HCDD, HpCDD, HCDF, HpCDF, as well as benzo(a)anthracene, benzo(b,k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-CD)pyrene,and dibenzo(a,h)anthracene were detected at levels above EPA health-based benchmarks for soil exposure (Ref. 32).

Chromium, OCDD, OCDF, benzo(a)anthracene, benzo(b,k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-CD)pyrene, and dibenzo(a,h)anthracene levels were detected above NC health-based soil remediation goals (Ref. 36). Arsenic was detected at levels exceeding both EPA and State benchmarks, however, background levels for arsenic also exceeded these benchmarks.

Surficial soils in the drainage ditch which carries site runoff to Cedar Creek contained elevated levels of aluminum, calcium, cobalt as well as isomers of HCDD, HpCDD, OCDD, HpCDF and OCDF. Elevated levels of purgeable organics detected in the drainage ditch included benzene, toluene, ethyl benzene, styrene and total xylenes. Elevated levels of extractable organics in the drainage ditch include naphthalene, 2-methyl naphthalene, dibenzofuran, fluorene, phenanthrene, anthracene, carbazole, fluoranthene, benzo(a)anthracene, chrysene, benzo(b,k)fluoranthene.

Of the contaminants detected in the drainage ditch, isomers of HCDD, HpCDD, HpCDF, plus carbazole, benzo(a)anthracene, and benzo(b,k)fluoranthene were detected at levels above EPA health-based benchmarks for soil exposure (Ref. 32). OCDD, OCDF, dibenzofuran, benzo(a)anthracene, and benzo(b,k)fluoranthene levels were detected above NC health-based soil remediation goals (Ref. 36). Arsenic was detected at levels exceeding both EPA and State benchmarks, however, background levels for arsenic also exceeded these benchmarks.

In the backfilled northern impoundment area, aluminum, calcium cobalt, and mercury were detected in surface soils at levels significantly above background. Isomers of PCDD, HCDD, HpCDD, OCDD, PCDF, HCDF, HpCDF and OCDF were also detected at elevated levels. No purgeable organics were detected. Elevated levels of extractable organics detected in the northern impoundment surface soils included phenanthrene, anthracene, fluoranthene, benzo(a)anthracene, chrysene, benzo(a)pyrene and benzo(b,k)fluoranthene.

Of the contaminants detected in surficial soils in the northern impoundment area, isomers of PCDD, HCDD, HpCDD, PCDF, HCDF, HpCDF, pentachlorophenol, benzo(a)anthracene, benzo(b,k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-CD)pyrene, were detected at levels above EPA health-based benchmarks for soil exposure (Ref. 32). OCDD, OCDF,pentachlorophenol, benzo(a)anthracene, benzo(b,k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-CD)pyrene, and dibenzofuran were also detected above NC health-based soil remediation goals (Ref. 36). Arsenic was detected at levels exceeding both EPA and State benchmarks, however, background levels for arsenic also exceeded these benchmarks.

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6.5 Conclusions

Laboratory analytical data indicates that surficial and subsurface soils collected as part of the waste/source area characterization, have been impacted with various metals, dioxins & furans, purgeable organics, and extractable organics. Levels of PCDD, HCDD, HpCDD, PCDF, HCDF, HpCDF, pentachlorophenol, benzo(a)anthracene, benzo(b,k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-CD)pyrene detected in surficial soils are above EPA health-based benchmarks for soil exposure. Levels of chromium, OCDD, OCDF, pentachlorophenol, benzo(a)anthracene, benzo(b,k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-CD)pyrene, and dibenzofuran detected in surficial soils are above NC health-based soil remediation goals.
Currently there are no on-site residents or workers and the nearest off-site residence is located approximately 600 ft south of the former wood treatment process area of the site. There are approximately 1933 residents living within 4 miles of the site. There are two plant species habitats, Collinsonia tuberosa (Piedmont Horsebalm) and Porteranthus stipulatus (Indian Physic) classified as candidate for endangered and significantly rare respectively, located within a 4-mile radius of the site; the closest is approximately 1.5-miles southwest of the site.

7.0 SUMMARY AND CONCLUSIONS

The former Southern Wood Piedmont - Gulf Site was assessed to identify sources of possible contaminant migration at the site, and potentially impacted populations and sensitive environments. Current and prior sampling analytical data has shown that as a result of practices associated with the treating of lumber at the site, groundwater, surface water sediment, and surficial and subsurface soils at several locations of the site have been impacted by various metals, dioxins & furans, purgeable organics, and extractable organics. On March 31, 1994, a Site Inspection Prioritization was completed by the North Carolina Department of Environment, Health, and Natural Resources - Superfund Section. However, no sampling was conducted during the SIP. Based upon the findings summarized in the SIP report, the site was recommended for assignment of a high priority ESI.

On November 13 & 14, 1995, an ESI was conducted by the NC Superfund Section. On-site surficial and subsurface soil samples were collected to determine areas of residual contamination remaining at the site from the former wood treatment operation. Off-site samples were collected in the surface water pathway to determine the extent of contaminant migration from the source areas. No groundwater samples were collected during the ESI due to the distance to off-site drinking water wells and previous sample results indicating no contamination present in the nearest well. All samples were submitted for analyses under the USEPA Contract Laboratory Program.

ESI sampling results indicate the presence of aluminum, calcium, chromium, cobalt, manganese, mercury, nickel and vanadium at levels significantly above background in surface and/or subsurface soils on site. Isomers of pentachlorodibenzodioxin (PCDD), hexachlorodibenzodioxin (HCDD), heptachlorodibenzodioxin (HpCDD), octachlorodibenzodioxin (OCDD), pentachlorodibenzofuran (PCDF), hexachlorodibenzofuran (HCDF), heptachlorodibenzofuran

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(HpCDF) and octachlorodibenzofuran (OCDF) were also detected at levels significantly above background. Elevated levels of extractable organics included naphthalene, 2-methyl naphthalene, dibenzofuran, fluorene, benzo(b,k)fluoranthene, fluoranthene, acenapthylene, pentachlorophenol, phenanthrene, anthracene, carbazole, pyrene, benzo(a)anthracene, chrysene, benzo(a)pyrene, benzo(g,h,i)perylene, dibenzo(a,h)anthracene, and indeno(1,2,3-CD)pyrene. Elevated levels of purgeable organics detected on site included benzene, toluene, ethyl benzene, styrene and total xylenes.

Barium, calcium, cobalt, copper, magnesium, and nickel were detected at levels significantly above background in one or both of the sediment samples collected at the PPE. Dioxin/furan isomers of hexachlorodibenzodioxin (HCDD), heptachlorodibenzodioxin (HpCDD), octachlorodibenzodioxin (OCDD), hexachlorodibenzofuran (HCDF), heptachlorodibenzofuran (HpCDF), and octachlorodibenzofuran (OCDF) were also detected at elevated concentrations in these samples. No purgeable organics were detected at levels significantly above background. Extractable organics naphthalene, 2-methylnapthalene, dibenzofuran, fluorene, pentachlorophenol, phenanthrene, anthracene, fluoranthene, benzo(a)anthracene, chrysene, benzo(a)pyrene, and benzo(b,k)fluoranthene were detected at levels significantly above background in the sediments at the PPE. All of the above contaminants except for barium, copper and magnesium were also detected at elevated levels in soils in the drainage ditch or other source areas on site during the ESI. Therefore, an observed release of these site contaminants to Cedar Creek has been documented.

There are no surface water intakes locatred within 15 miles downstream of the site. The nearest wetland is located at least 3.25-miles downstream of the iste. The nearest fishery is located approximately 2-miles downstream of the site at the SR2145 bridge on Cedar Creek. Sediment samples collected at this location contained only barium, copper, one isomer of HpCDD and total OCDDs at levels significantly above background. Barium and copper were not detected at elevated levels in sources on the site and are therefore not attributable to the site. HpCDD and OCDDs were detected on site, however, due to the levels of these contaminants in the control samples collected from the unnamed tributaries which enter Cedar Creek between the PPE and the fishery, these contaminants may not be attributable to the site. Therefore, actual contamination of a fishery by a release from this site has not been documented.

Of the contaminants detected in surface soils on site, isomers of PCDD, HCDD, HpCDD, HCDF, HpCDF, as well as benzo(a)anthracene, benzo(b,k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-CD)pyrene, dibenzo(a,h)anthracene, carbazole, pentachlorophenol, and indeno(1,2,3-CD)pyrene were detected at levels above EPA health-based benchmarks for soil exposure. Chromium, OCDD, OCDF, benzo(a)anthracene, benzo(b,k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-CD)pyrene, and dibenzo(a,h)anthracene, dibenzofuran, and pentachlorophenol were detected at levels exceeding NC health-based soil remediation goals. Currently there are no residents or workers on the site. The nearest residence is located 600 ft.south of the site. Although the site is accessible by foot, the surrounding area is sparsely populated and the site is not likely used for recreation. There are also no sensitive environments on site. Based on current land use in the area, the soil exposure threat posed by the site is low.

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Based on the information currently available, the Southern Wood Piedmont site poses a potential threat to human health and the environment. Groundwater and surface water have been contaminated by releases from the site, however, no actual contamination of drinking water wells, fisheries, wetlands or other sensitive environments has been documented. Under the current land use scenario, there are no residents or workers on site and the surrounding area is sparsely populated. Based on these findings, the site is not recommended for further remedial action under CERCLA/SARA.

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PHOTOGRAPHS

PHOTO LOG
Southern Wood Piedmont Co.
Gulf, Chatham County, NC
NCD 053 488 557

Photograph #	Description
1	Drip Track Area; East View
2	Drip Track Area Soil Sample Location SW-003-SL/ SW-004-SL; Northwest View
3	Drip Track Area Soil Sample Location SW-005-SL/ SW-006-SL; North View
4	Drip Track Area Soil Sample Location SW-011-SL; North View
5	Site Drainage Ditch Soil Sample Location SW-015-SL; East View
6	Site Drainage Ditch Soil Sample Location SW-015-SL; Oil Sheen
7	Site Drainage Ditch; Upstream View from PPE
8	Eastern Edge of Former Northern Ponds Area; South View
9	Soil Sample Location SW-017-SL/SW-018-SL at Former Northern Ponds Area
10	Soil Sample Location SW-019-SL/SW-020-SL at Former Northern Ponds Area
11	Surface Water Pathway Sample Location SW-029-SW/SD at Site Drainage Ditch Mouth
12,13	Surface Water Pathway Background Sample Location SW-025-SW/SD
14,15	Cedar Creek Fishery Sample Location SW-034-SW/ SW-034-SD at SR 2145 Bridge
16	Surface Water Pathway Sample Location SW-032-SW/SD; South view from Tributary Towards Cedar Cr.

PHOTO LOG
Southern Wood Piedmont Co.
Gulf, Chatham County, NC
NCD 053 488 557

Photograph # 1

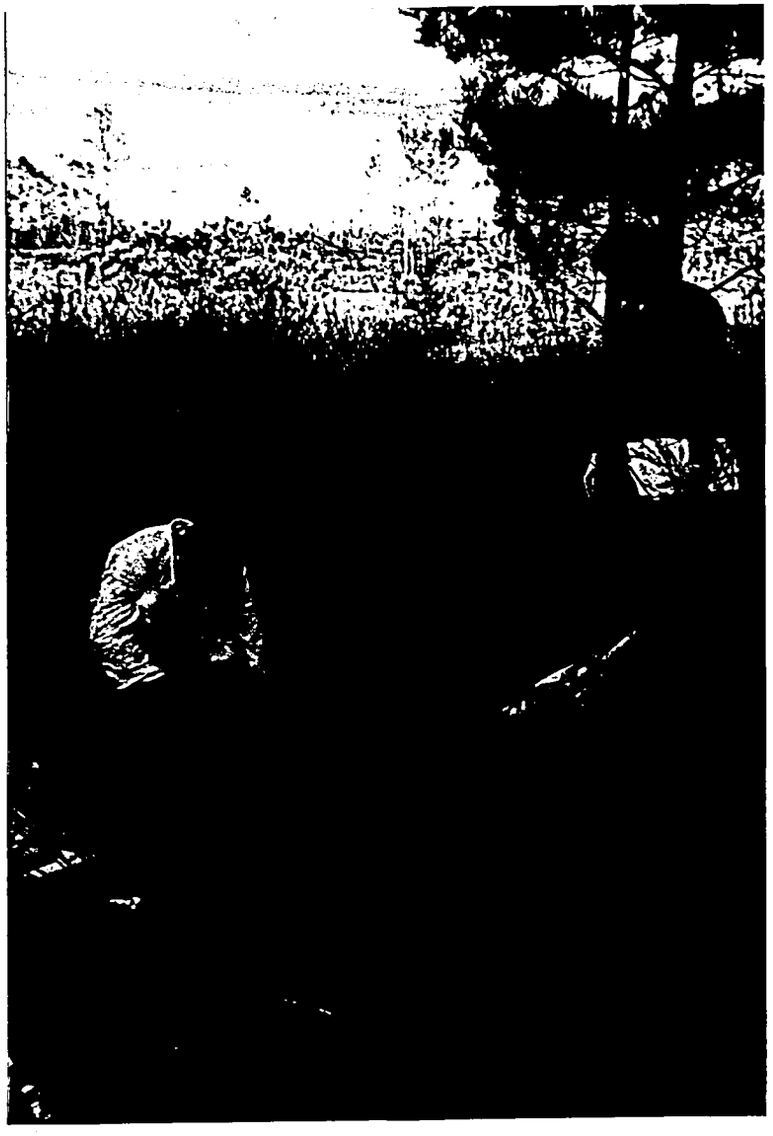
Photograph # 2

PHOTO LOG
Southern Wood Piedmont Co.
Gulf, Chatham County, NC
NCD 053 488 557

Photograph # 3

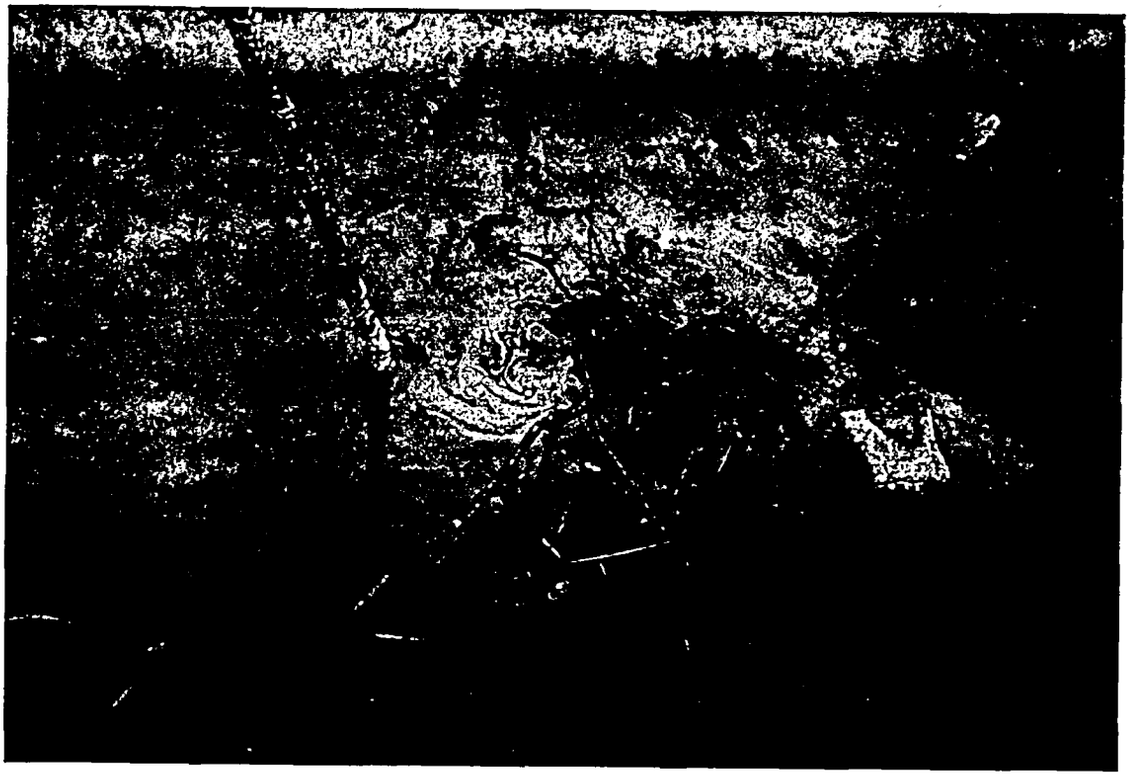
Photograph # 5

PHOTO LOG
Southern Wood Piedmont Co.
Gulf, Chatham County, NC
NCD 053 488 557



Photograph # 4

PHOTO LOG
Southern Wood Piedmont Co.
Gulf, Chatham County, NC
NCD 053 488 557



Photograph # 6

Photograph # 8

PHOTO LOG
Southern Wood Piedmont Co.
Gulf, Chatham County, NC
NCD 053 488 557

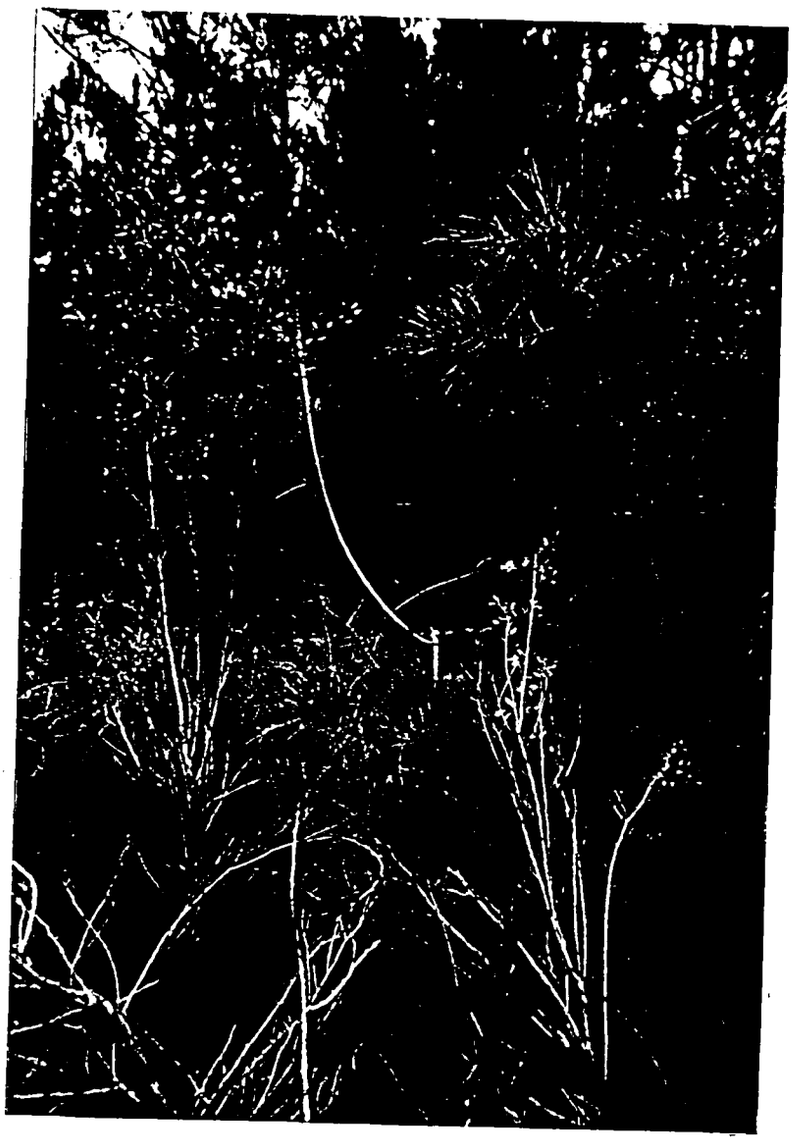
Photograph # 7

PHOTO LOG
Southern Wood Piedmont Co.
Gulf, Chatham County, NC
NCD 053 488 557

Photograph # 9

Photograph # 11

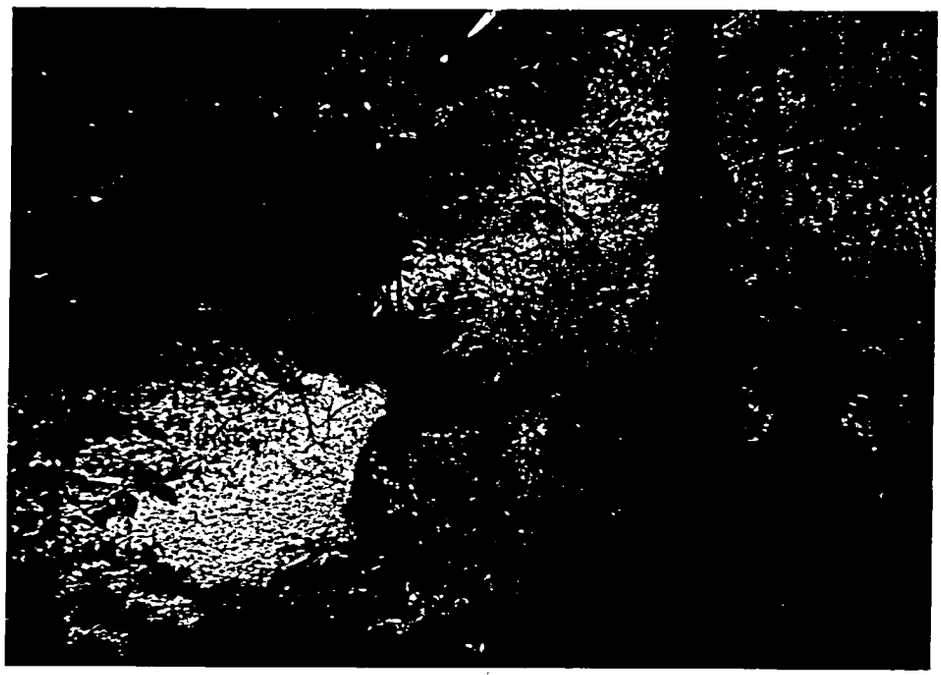
PHOTO LOG
Southern Wood Piedmont Co.
Gulf, Chatham County, NC
NCD 053 488 557



Photograph # 10

PHOTO LOG
Southern Wood Piedmont Co.
Gulf, Chatham County, NC
NCD 053 488 557

Photograph # 12



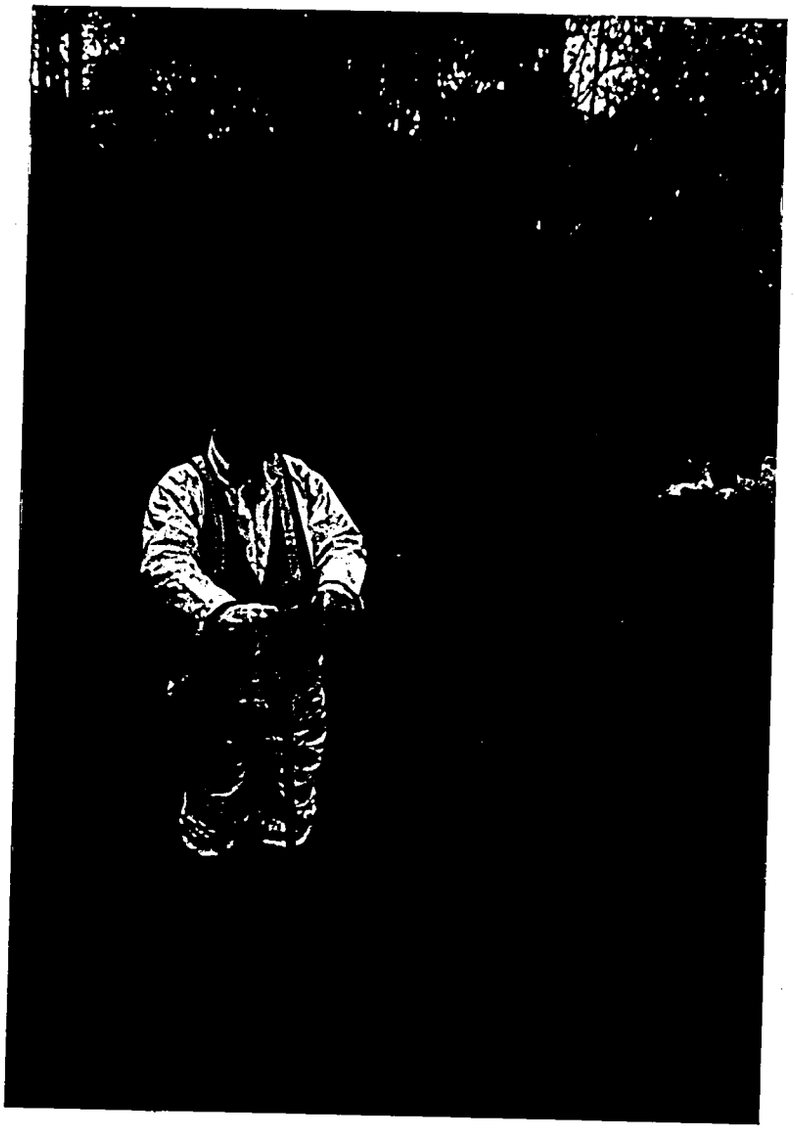
Photograph # 13

PHOTO LOG
Southern Wood Piedmont Co.
Gulf, Chatham County, NC
NCD 053 488 557

Photograph # 14

Photograph # 15

PHOTO LOG
Southern Wood Piedmont Co.
Gulf, Chatham County, NC
NCD 053 488 557



Photograph # 16

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NCD 053 488 557
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