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DATA SUMMARY REPORT FOR THE 1991 LANDFARM AREA SAMPLING AND COMPARISON OF 1990 AND 1991 SOIL AND GROUND-WATER DATA SOUTHERN WOOD PIEDMONT COMPANY WILMINGTON, NORTH CAROLINA

September 1993

Prepared for

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September 1993

Geraghty & Miller, Inc., is submitting this report to Southern Wood Piedmont Company for work performed at the landfarm areas in Wilmington, North Carolina. The report was prepared in conformance with Geraghty & Miller's strict quality assurance/quality control procedures to ensure that the report meets industry standards in terms of the methods used and the information presented. If you have any questions or comments concerning this report, please contact one of the individuals listed below.

Respectfully submitted,

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DATA SUMMARY REPORT FOR THE 1991 LANDFARM AREA SAMPLING AND COMPARISON OF 1990 AND 1991 SOIL AND GROUND-WATER DATA SOUTHERN WOOD PIEDMONT COMPANY WILMINGTON, NORTH CAROLINA

1.0 INTRODUCTION

Geraghty & Miller, Inc., was retained by the Southern Wood Piedmont Company (SWP) to conduct a study of current conditions in the two landfarm areas at the SWP Wilmington former wood-treatment facility. Soil samples were collected on October 15, 1991, from the same landfarm locations sampled in October 1990 (Geraghty & Miller, 1993a). The purpose of the sampling was to provide baseline data with which to conduct a risk assessment. This risk assessment was to evaluate whether a "concentration of residual pentachlorophenol (PCP) and major constituents of creosote is reached which will protect public-health and the environment," according to the terms of the Administrative Order of Consent Agreement (North Carolina Department of Human Resources, 1985), paragraph 10.

This report presents a brief history of the landfarming operations at the site, a discussion of the site environmental setting, the sampling and analysis methodologies used, and a discussion of the results. The analytical data for the 1990 and 1991 sampling events were also compared to evaluate changes in constituent levels attributable to physical, chemical, and biological degradation.

2.0 SITE HISTORY AND ENVIRONMENTAL SETTING

This section gives of brief description of the history of the site and landfarming operations and a review of historical landfarm sampling data. Land use for the surrounding area and regional/local geology and hydrogeology are also discussed.

2.1 SITE HISTORY

SWP and its predecessors leased and operated a wood-treatment facility in Wilmington, North Carolina, from approximately 1932 to 1983. In 1932 the North State Company leased the property previously operated by Liberty Shipyards. The North State Company purchased and sold non-treated wood from 1932 to 1935. In 1935, the Taylor Colquitt Company leased the property to establish a wood-preserving facility to treat piling and poles with creosote. ITT, of which SWP is a subsidiary, acquired the company in 1969. SWP added chromated copper arsenate (CCA) to the wood-treatment process in the early 1970s and pentachlorophenol (PCP) in the late 1970s. Each of the three preservatives was stored on site in tanks adjacent to the respective treating facility. Additional creosote storage was in the southwestern property corner. In June 1983, the SWP facility ceased its wood-treatment operations and began closure procedures.

2.2 HISTORY OF LANDFARMING OPERATIONS AND PREVIOUS SAMPLING

In the northwest corner of the SWP property, a 5-acre area was bermed and ditched following the removal of rails and crossties and was divided into two landfarm areas: Landfarm 1 (LF1) and Landfarm 2 (LF2) (Figure 2-1). This area was formerly used as the treated wood storage area.

During the period July 1984 through April 1990, soil material originating from the spoil pile area was applied at regular intervals. Over the period, approximately 17 different soil amendments occurred for LF1 and 20 for LF2. Each amendment consisted of a 2-inch-thick layer of spoil pile material being added to the surface of the landfarm. During the landfarm operation, irrigation water, 10-10-10 fertilizer, and chicken and turkey manure were added to promote and enhance microbial growth and polycyclic aromatic hydrocarbon (PAH) degradation. The two landfarm areas were tilled to a depth of 6 inches weekly, promoting biological and photochemical treatment of residual chemicals.

Two composite sets of soil samples were taken by a SWP representative. A composite sample was taken for each of the following depths: 0 to 3 inches, 9 to 12 inches, and 21 to 24 inches. Soil from the four corners of each landfarm was mixed to make up the two composite samples for each depth. Each landfarm was sampled separately. The initial sampling began in September 1985 for LF2 and in November 1985 for LF1. Over the time period of operation, 59 sets of samples were taken from LF2 and 37 from LF1.

The samples were analyzed for total nitrogen, total phosphorus, chloride, total organic carbon, soil pH, PAH, PCP, phenol, and microbial counts by the Mississippi State Unviersity Forest Products Research Division Laboratory (MSUFPRD) in State College, Mississippi. A discussion of results of these sampling events is provided in the 1990 Data Summary Report (Geraghty & Miller, 1993a).

The quality of ground water in the two landfarmed areas was monitored during the landfarm operations. Four monitor wells were installed in September 1985 on the perimeter of the landfarm area. Ground-water samples from the upgradient (MW-6) and three downgradient (MW-7, -8, and -9) monitor wells initially were collected biannually and subsequently annually and analyzed for PCP and the major constituents of creosote. Composite soil samples were also taken directly from the spoil pile and analyzed for PAH constituents.

Cultivation and fertilization treatments were ended in May 1990. On October 9 and 10, 1990, the four monitor wells and the two landfarms, LF1 and LF2, were sampled by Geraghty & Miller for the MSUFPRD list of constituents to establish a baseline of current conditions (Table 2-1) (Geraghty & Miller, 1993a). The four monitor wells and two landfarms were resampled by Geraghty & Miller on October 14 and 15, 1991.

2.3 SURROUNDING LAND USE

The SWP facility, which measures approximately 1,000 feet east to west by 1,600 feet north to south, lies within an industrialized area of Wilmington, North Carolina. Industry in the vicinity includes the Hess Fuel Tank Farms separated from the SWP property by a ditch on the north side and the Poctank, Inc., plant separated by an undeveloped lot on the south side of the SWP property. The major roads in the vicinity of the plant are Greenfield and Surrey Street. Greenfield Street runs in an east-west direction and dead ends into the center of the facility. Surrey Street runs in a north-south direction and is situated east of the property. The Cape Fear River borders the property on the west.

2.4 REGIONAL AND SITE GEOLOGY AND HYDROLOGY

The Wilmington site is located in the Coastal Plain Physiographic Province of North Carolina, a region underlain by Cretaceous and Cenozoic marine and non-marine sedimentary sequences. Approximately 1500 feet of Coastal Plain sediments overlie pre-Mesozoic crystalline basement rock in the Wilmington area (NCGS, 1985). The site is directly underlain by the Cretaceous-age Pee Dee Formation (NCGS, 1985), which consists predominantly of unconsolidated, dark green to gray, clay-rich, marine sand and which may contain calcareous sandstone ledges (Sohl and Owens, 1991).

Five soil borings were advanced at the site to a maximum depth of approximately 50 feet by Soil and Material Engineers, Inc., during 1981 and an additional four borings (to a maximum

depth of 20 feet) were drilled by Law Environmental in 1985. Lithologic logs (presented in Soil and Material Engineers, 1981, and Law Environmental, 1985) indicate that a surficial layer of sandy fill material or sand is present at the site, which varies from less than 1 foot to 18 feet in thickness. This layer, which appears to be thickest in the northern part of the site, is described as consisting of fine to medium sand, with wood, roots, or other material occasionally found. Below this sandy material is a layer consisting of dark brown, organic-rich silt or peat, which may contain traces of fine sand, roots, and wood fragments. This layer ranges in thickness from 5 to 19 feet.in the soil boring locations, and apparently increases in thickness toward the Cape Fear River to the west. Fine to medium sands extend from below the organic rich layers to a depth of 42 to 45.5 feet, below which a gray marl is encountered (Soil and Material Engineers, Inc., 1981).

Based on their observations, Soil and Material Engineers (1981) concluded that the dominant direction of shallow ground-water flow at the site was to the south, parallel to the Cape Fear River. Water table maps prepared by Law Environmental (1985) indicate westward to southwestward flow (toward the river) near the Landfarm areas, and generally southward flow at the eastern part of the site. Tidal influences may cause temporary alterations or reversals in these flow directions. Hydraulic conductivities ranging from 3×10^{-5} centimeters/second (cm/sec) to 10^{-6} cm/sec were determined based on in-situ monitor well tests, and an average ground-water flow velocity of 0.10 feet/year was calculated (Law Environmental, 1985).

3.0 INVESTIGATIVE METHODS

A soil and ground-water sampling program was conducted in October 1991 within the two landfarmed areas, LF1 and LF2, to provide data on current conditions. The soil sampling locations and depths were selected to assess the presence of PAHs, CCA, and nutrients within the landfarmed material. The samples were collected from the ten locations previously sampled in 1990 (Figure 3-1). The sampling depths, however, were modified to include only the upper and lower layers of landfarmed material. The landfarmed material center and underlying substrate were not sampled since the 1990 sampling program indicated the PAH concentrations in the landfarmed material to be consistent with depth and to be significantly lower in the underlying substrate (Geraghty & Miller, 1993).

The soil samples were collected in the landfarmed material in accordance with standard operating procedures presented in the Work Plan. Ground-water samples were collected from the four monitor wells bordering LF1 and LF2. All samples were analyzed by Savannah Laboratories and Environmental Services, Inc., Savannah, Georgia, for the expanded list of constituents presented in Table 2-1 in accordance with U.S. Environmental Protection Agency (USEPA) methodologies. All field records and analytical data were reviewed and validated by a Geraghty & Miller Quality Assurance/Quality Control Manager.

3.1 SOIL SAMPLING

Soil samples were collected on October 15, 1991, from the five locations sampled on October 10, 1990, within the two landfarmed areas as illustrated in Figure 3-1. At each location, two samples were collected within the landfarmed material and analyzed for pH and the expanded list of wood-preserving constituents and nutrients (Table 2-1).

A small-diameter (<4-inch), stainless steel, hand-held bucket auger was used to determine the depth of the underlying substrate soil at each sampling location prior to collecting soil samples. Following this preliminary activity, the auger was decontaminated with a laboratory-grade soap solution and rinsed three times with distilled water. The depth of the landfarmed material in LF1 and LF2 ranged from 15 to 26 inches and 15 to 20.5 inches, respectively. These depths are on the average less than those recorded in 1990 (12 to 30 inches).

The two soil samples within the landfarmed material were collected at each sampling location by means of a hand-held bucket auger. Each borehole consisted of a sample taken at the surface and above the substrate layer. The upper and lower sections of the individual soil cores were removed and discarded to prevent potential contamination between subsequent samples. The landfarmed soil was black, friable, and had a moist consistency. Bricks and glass were encountered at the landfarmed material-substrate interface at several borehole locations. The samples were placed in stainless steel bowls and thoroughly mixed prior to being stored in sample containers on ice at 4°C. Following the collection of the samples and the removal of the intermediate soil layers, the bucket auger was decontaminated with a laboratory grade soap solution and rinsed three times with distilled water.

3.2 GROUND-WATER SAMPLING

The three downgradient (MW-7, MW-8, and MW-9) and upgradient (MW-6) monitor wells on the perimeter of LF1 and LF2 were sampled on October 14 and 15 for total suspended solids and for the expanded list of nutrients and wood-preserving constituents (Table 2-1). Plastic sheeting was placed around the wells to protect the sampling equipment from potential contamination prior to determining the well depth and water elevation using an electronic water-level meter. The wells were evacuated and sampled with disposable polyethylene bailers in accordance with standard operating procedures outlined in the Work Plan (Geraghty & Miller,

1990). The ground-water samples were placed in appropriate sample containers and stored on ice at 4°C. Ground-water sampling logs are included in Appendix A.

3.3 LABORATORY ANALYSES AND QUALITY ASSURANCE/QUALITY CONTROL PRACTICES

All soil and ground-water samples were analyzed by Savannah Laboratories and Environmental Services, Inc., Savannah, Georgia, for nutrients (total nitrogen, total phosphorus, total organic carbon, and chloride) and wood-preserving constituents in accordance with USEPA-approved methodologies. The 1991 list of constituents was expanded to include the PAHs and metals detected during the former treated and non-treated wood storage area sampling programs (Table 2-1). The 1990 analytical data for these additional PAHs were requested from Savannah Laboratories and Environmental Services, Inc., to permit a more comprehensive comparison between the two data sets. Several field quality control samples were collected during the ground-water and soil sampling programs to assess field techniques and laboratory performance. These samples included rinsate blanks (RB-1 and RB-2) and field blanks (FB-1 and FB-2). Sample RB-1was collected using a clean disposable polyethylene bailer whereas sample RB-2 was collected using the decontaminated bucket auger and stainless steel bowl following the collection of sample LF2ALS. Samples FB-1 and FB-2 were taken concurrently. The quality control samples were prepared in accordance with standard operating procedures.

3.4 CHAIN OF CUSTODY

Samples collected in the field remained in the presence of a project representative at all times until they were shipped to the analytical laboratory. The transfer for the samples to the laboratory was accomplished by means of chain-of-custody records. The placement of the custody seals ensured the integrity of the samples and prevented potential tampering. Chain-of-custody records are included in Appendix A.

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3.5 DATA VALIDATION

The purpose of this section is to evaluate the field data for its adherence to the approved Work Plan (Geraghty & Miller, 1990) and to ensure the completion of required documentation. Additionally, the analytical laboratory data were reviewed for the completeness of the data package deliverables and the achievement of project-specific data quality objectives.

All field activities were appropriately documented. Field and rinsate blanks for nutrient and wood-preserving constituent analysis were taken at a frequency of 1 for every 20 samples collected using procedures described in the Work Plan (Geraghty & Miller, 1990). Blank sample results are presented in Table 3-1. Total organic carbon was detected at concentrations ranging from 1.8 to 2.4 milligrams per liter (mg/L) in samples RB-1, RB-2, FB-1, and FB-2. Nitrate-nitrite was detected at 0.10 mg/L in RB-2. This constituent was not found in FB-2.

The requested detection limits for the wood-preserving constituents analyzed in the soil samples were not achieved for the majority of the soil samples. The samples were diluted due to PAH concentrations above the calibration range of the gas chromatography/mass spectroscopy (GC/MS) detection system. These dilutions accounted for the absence of surrogate recoveries for sample LF1ALS. The remaining quality control (QC) data, however, were within established control limits. Matrix spike and matrix spike duplicate recoveries were not reported for many PAHs due to the abundance of a target constituent in this sample. Relative percent differences above established control limits were also reported for several PAHs, phenolic constituents, and arsenic. Estimated constituent concentrations (J qualified) were reported for levels below the practical quantitation limits (PQL) where applicable.

All soil, ground-water, and QC samples collected were analyzed within the required holding times. With the exception of the deviation reported herein, all QC samples were found to be within established control limits.

4.0 SAMPLING RESULTS

4.1 SOIL SAMPLE RESULTS

The wood-preserving constituent, pH, and nutrient results for soil samples collected from LF1 and LF2 in 1991 are presented in Tables 4-1 and 4-2, respectively. Sample results are identified with a unique sample ID consisting of the landfarm (LF1 or LF2), the location (A through E), and the sampling depth (US [upper sample] or LS [lower sample]). For example, sample LF2BUS was the upper sample collected from location B in LF2. Laboratory data reports are included in Appendix A.

A total of 20 semi-volatile organic compounds (semi-VOCs) were detected above their respective practical quantitation limits (PQLs) in the landfarm samples. Sixteen are PAHs: naphthalene; 2-methylnaphthalene; acenaphthene; acenaphthylene; fluorene; phenanthrene; anthracene; pyrene; benzo(a)anthracene; chrysene; benzo(a)pyrene; benzo(g,h,i)perylene; fluoranthene; benzo(b,k)fluoranthene (the laboratory could not resolve the two isomers and reported them together); indeno(1,2,3-cd)pyrene; and dibenzo(a,h)anthracene. Two of the constituents are heterocyclic organics: carbazole and dibenzofuran. Pentachlorophenol and 1,1-biphenyl were also detected. An additional 7 semi-VOCs were detected in the landfarm samples, but the concentrations were below the PQLs: 1,1-methylnaphthalene; phenol; 2,4-dimethylphenol; trichlorophenols; cresols (o, m, & p); and tetrachlorophenols. All except the first constituent are phenolic compounds. 1,1-Methylnaphthalene is a PAH. Compounds detected below PQLs are "J"-qualified on the data tables.

Pyrene, a 4-ring PAH, had the highest concentration of the semi-VOCs: 980 milligrams per kilogram (mg/kg) in the lower sample from location D in LF2. Fluoranthene occurred in the second-highest concentration: up to 500 mg/kg in the same sample. Generally, there was no observable trending in semi-VOC constituent concentrations between the upper and lower

samples from the landfarm areas. For example, chrysene (a 4-ring PAH) occurred in concentrations of 11 and 150 mg/kg for the upper and lower samples, respectively, from location D in LF2. However, anthracene (a 3-ring PAH) occurred in concentrations of 310 and 19 mg/kg for the upper and lower samples, respectively, from location B in LF2. Analyses of variance (ANOVA) performed on the data indicate no significant difference in constituent concentrations between the upper and lower samples.

Arsenic, chromium, and copper were detected in all of the landfarm samples, with maximum concentrations of 84, 100, and 150 mg/kg, respectively. The maximum arsenic and chromium concentrations occurred in the lower sample from location B in LF2 (copper occurred at a concentration of 140 mg/kg in this sample). The maximum concentration of copper occurred in the lower sample from location D in LF2. Chromium and copper levels are within naturally-occurring ranges for the eastern U.S. soils of up to 1,000 and 700 mg/kg, respectively (USGS, 1984). The maximum naturally-occurring concentration of arsenic has been reported to be 73 mg/kg (USGS, 1984).

4.2 GROUND-WATER SAMPLE RESULTS

The wood-preserving constituent, pH, suspended solids, and nutrient results for ground-water samples collected from monitor wells MW-6, MW-7, MW-8, and MW-9 are presented in Table 4-3. None of the wood-preserving constituents were detected in any of the ground-water samples.

5.0 ANALYSIS OF 1990 AND 1991 LANDFARM SAMPLING DATA

Data used in this assessment include 30 soil samples collected in 1990 and 20 soil samples collected in 1991 from LF1 and LF2 at the former SWP facility in Wilmington, North Carolina. Data for 1990 are presented in the 1990 Landfarm Data Summary Report (Geraghty & Miller, 1993a).

5.1 DATA REDUCTION

Data were reduced according to current USEPA guidelines (USEPA, 1989a). The frequency of detection, maximum detected value, mean, and 95 percent upper confidence limit (UCL) of the mean for soil samples were determined. If a constituent concentration was below the PQL, one-half the PQL was entered into the data to calculate the mean. Estimated (J qualified) values were also used to calculate the means.

PAHs were divided into two classes: carcinogenic (cPAHs) and total PAHs (tPAHs) for the risk assessment (Geraghty & Miller, 1993b). tPAH and cPAH data for 1990 are listed by sample number in Appendix B (Tables B-1 and B-2). tPAH and cPAH data for 1991 are listed in Tables B-3 and B-4, respectively. cPAH data were further reduced according to a toxicity equivalency factor (TEF) scheme (USEPA, 1989b). Because cancer slope factors (CSFs) required for quantitative cancer risk assessments were only available for benzo(a)pyrene and carbazole, all the other cPAHs were reduced to benzo(a)pyrene equivalents. Dibenzo(a)anthracene was considered equally potent compared to benzo(a)pyrene. 1-, and 2-Methylnaphthalene, benzo(a)anthracene, chrysene, benzo(b,k)fluoranthene, benzo(g,h,i)perylene, and indo(1,2,3-c,d)pyrene were considered to be one/one-hundredth (0.01) as potent as benzo(a)pyrene (USEPA, 1989b). Therefore, concentrations of the cPAHs were multiplied by TEFs (1 or 0.01) and summed together to derive the total benzo(a)pyrene equivalent cPAH

concentration. The tPAH concentration was calculated as the total of all PAH concentrations. TEF values were not used to derive tPAH concentrations.

The 1990 data indicated no statistical differences in constituent concentrations with sampling depth. Likewise, the 1991 data were examined for differences between the two sampling depths. The landfarms had not been tilled for about a year prior to the 1991 sampling event. The landfarm soils had settled and weeds were present. Mean tPAH concentrations were 531 milligrams per kilogram (mg/kg) in the lower zone and 385 mg/kg in the upper zone (Tables B-5 and B-6). Two sampling points were primarily responsible for the apparent higher concentrations in the lower zone. Sampling point LF2D had tPAH concentrations of 2,573 and 273 mg/kg in the lower and upper zones, respectively, and sampling point LF2E had tPAH concentrations of 1,146 and 273 mg/kg in the lower and upper zones, respectively. Conversely, sampling points LF1C, D, and E, and LF2B had much higher tPAH concentrations in the upper zone. Statistical comparisons of the data in the lower and upper zones did not indicate a significant difference.

5.2 DATA COMPARISON

The results from the 1991 soil sampling program are shown by sample number in Table B-7. Soil data for 1990 and 1991 are compared in Table 4-4. Because of the differences in the analyses requested for the two sets of data, temporal comparisons are limited to PCP and PAHs. The data were log-normally distributed; therefore, statistical comparisons were based on log transformations of the data. A non-parametric test (Mann-Whitney) was also used because the samples were not randomly selected. The sampling plan was not specifically designed to determine PAH degradation rates; therefore, results of these statistical tests are tentative.

PCP was detected in only 1 of 30 samples in 1990 because of the high PQL. A lower PQL was obtained for the 1991 samples, and PCP was detected in 16 of 20 samples, although most concentrations were estimated values which were lower than the PQL. The maximum PCP

concentration was 150 mg/kg in 1991. The UCL (which is used in risk calculations) increased from 19 mg/kg in 1990 to 29 mg/kg in 1991.

PAHs were detected in all samples collected in 1990 and 1991; however, all PAHs were not detected in all samples. Although the highest tPAH concentration (2,572 mg/kg) was detected in the 1991 data, the mean concentrations for both tPAHs and cPAHs showed a slight decrease. Mean tPAH concentrations declined from 527 mg/kg to 458 mg/kg; however, UCL concentrations were essentially the same (733 mg/kg in 1990 and 726 mg/kg in 1991) because of higher variability in the 1991 data. Both mean and UCL cPAH concentrations declined by about 24 percent (25.9 mg/kg to 19.8 mg/kg) and 16 percent (30.9 mg/kg to 25.7 mg/kg), respectively, between 1990 and 1991. However, statistical analyses of the data generally did not indicate that the concentrations reported in 1991 were significantly different than 1990 concentrations. A t-test of the log-transformed data for cPAHs indicated that 1991 concentrations were slightly lower ($P = 0.041$) than 1990 concentrations. The non-parametric test (Mann-Whitney) did not indicate a significant difference in cPAH concentrations. However, the sampling plan was not specifically designed to examine site-specific degradation rates; therefore, the statistical power of the tests was low. In other words, large differences would be necessary in order to detect a significant difference.

More detailed comparisons of the PAH data are shown in Tables 4-5 and 4-6. PAHs have variable degradation rates which are closely correlated with the number of rings in the chemical structure of the compound. PAHs with two or three rings are expected to degrade faster than those with four or more rings. The site data are consistent with this expectation (Table 4-5). Two- and three-ring PAHs decreased from 9 to 88 percent between 1990 and 1991. The average decrease was about 33 percent. Concentrations of four-, five-, and six-ring PAHs had a net average increase of 4.5 percent. However, the data for the PAHs with more than four rings was highly variable. For example, pyrene (four rings) had an increase of more than 40 percent while dibenzo(a)anthracene (five rings) and benzo(g,h,i)perylene (six rings) decreased by about 40 percent (Table 4-5).

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Relative degradation percentages were also examined for the cPAHs because they were more important to the risk assessment than tPAHs (Table 4-6). cPAH concentrations decreased by an average of 14.5 percent between 1990 and 1991. This was not significantly different from the 13.1 percent decline for tPAHs. Eliminating the methylnaphthalenes (the only two-ring PAHs with a TEF) resulted in a 10.8 percent average decrease in cPAH concentrations. Benzo(b)fluoranthene and benzo(k)fluoranthene were the only cPAHs which had higher concentrations in the 1991 data (Table 4-6). Benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)anthracene, chrysene, and benzo(a)pyrene were the predominant cPAHs detected at the site and therefore control the risk. The average decrease was about 9.4 percent for these compounds. These degradation rates are consistent with the reported literature values; however, conclusive statements about the site-specific degradation rates cannot be made because of statistical limitations.

Using constituent-specific degradation half-life values from the literature, concentrations of organic wood-preserving constituents estimated to occur in landfarm soils after a period of 30 years were calculated. Most of the constituents will be degraded to less than 0.001 mg/kg, and the 4- and 5-ring PAHs will have concentrations of 2 mg/kg or less, based on these calculations (Geraghty & Miller, 1993b).

6.0 FINDINGS AND RECOMMENDATIONS

After reviewing the data, Geraghty & Miller makes the following findings: mean PAH concentrations showed an overall decrease between the 1990 and 1991 sampling events, especially PAHs having two and three rings in their structures. Although the overall decrease was not statistically significant, this does not necessarily mean that the PAHs are not degrading. Rather, the failure to detect a significant decrease in PAH concentrations was more likely related to the power of the statistical tests and analytical procedures.

Calculations of constituent degradation over a 30-year period show that most of the constituents will be degraded to less than 0.001 mg/kg after 30 years, based on constituent-specific half-lives from the literature (Geraghty & Miller, 1993b). Those constituents estimated to still occur after 30 years (all are four- and five-ring PAHs) have calculated concentrations of 2 mg/kg or less.

Geraghty & Miller recommends consideration of an anerobic approach to accelerate degradation of PAHs with four or more aromatic rings.

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TABLES

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Table 2-1. Constituents Analyzed for in Landfarm Soil and Ground-Water Samples Collected at the Southern Wood Piedmont Facility, Wilmington, North Carolina, (1991).

- Base Neutral Acid Extractable Constituents

Naphthalene*	Benzo(g,h,i)perylene*
2-Methylnaphthalene*	Pentachlorophenol*
1-Methylnaphthalene*	Fluoranthene*
1,1-Biphenyl*	2-Chlorophenol
Acenaphthylene*	Phenol
Acenaphthene*	2,4-Dimethylphenol
Dibenzofuran*	Trichlorophenols
Fluorene*	o-Cresol
Phenanthrene*	m & p-Cresol
Anthracene*	p-Chloro-m-cresol
Carbazole*	Tetrachlorophenols
Pyrene*	2,4-Dinitrophenol
Benzo(a)anthracene*	Benzo(b,k)fluoranthene
Chrysene*	Indeno(1,2,3-c,d)pyrene
Benzo(a)pyrene*	Dibenzo(a,h)anthracene

- Metals

  Arsenic
  Copper
  Chromium

- Nitrogen Series

  Total Kjeldahl Nitrogen-N*
  Nitrate + Nitrite-N*
  Total Nitrogen*

- Total phosphorus*
  Total Organic Carbon*
  Chloride*

- pH*

* 1990 Mississippi State University Forest Product Research Division (MSUFPRD) Constituent List (also included polychlorinated dibenzodioxins and polychlorinated dibenzofurans). Data for other constituents (1990 sampling program) were requested in 1991.

Table 3-1. Analytical Results for Quality Control Samples Associated with Ground-Water Samples Collected in 1991, Southern Wood Piedmont Site, Wilmington, North Carolina.

Sample Identification #	FB-1	FB-2	RB-1 (a)	RB-2 (b)
Constituents (mg/L)				
Semi-Volatile Organic Constituents (8270)				
Naphthalene	ND	ND	ND	ND
2-Methylnaphthalene	ND	ND	ND	ND
1-Methylnaphthalene	ND	ND	ND	ND
1,1-Biphenyl	ND	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND
Dibenzofuran	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND
Carbazole	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND
Benzo(a)Anthracene	ND	ND	ND	ND
Chrysene	ND	ND	ND	ND
Benzo(a)pyrene	ND	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	ND	ND
Pentachlorophenol	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND
2-Chlorophenol	ND	ND	ND	ND
Phenol	ND	ND	ND	ND
2,4-Dimethylphenol	ND	ND	ND	ND
Trichlorophenols	ND	ND	ND	ND
Creosol (ortho)	ND	ND	ND	ND
Creosol m&p	ND	ND	ND	ND
P-chloro-m-cresol	ND	ND	ND	ND
Tetrachlorophenols	ND	ND	ND	ND
2,4-Dinitrophenol	ND	ND	ND	ND
Benzo(b,k)fluoranthene	ND	ND	ND	ND
Ideno(1,2,3-cd)pyrene	ND	ND	ND	ND
Dibenzo(a,h)anthracene	ND	ND	ND	ND
Metals				
Arsenic (7060)	ND	ND	ND	ND
Chromium (6010)	ND	ND	ND	ND
Copper (6010)	ND	ND	ND	ND
Nitrogen Series				
Total Kjeldahl Nitrogen-N	ND	ND	ND	ND
Nitrate + Nitrite-N	ND	ND	ND	0.10
Total Nitrogen	ND	ND	ND	0.10
Total Phosphorous	ND	ND	ND	ND
Total Organic Carbon	2.3	2.1	1.8	2.4
Chloride	ND	ND	ND	ND
pH (150.1)	5.0	NA	5.4	NA

RB Rinsate blank.
FB Field blank.
ND Compound was not detected.
NA pH was not analyzed.
(a) Rinsate of bailer
(b) Rinsate of bucket auger soil sampler

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Table 4-1. Analytical Results for Soil Samples Collected in 1991 within the River Landfarm 1 at the Southern Wood Piedmont Site, Wilmington, North Carolina.

Sample Identification # /1	LF1AUS 9663A	LF1ALS 9663B	LF1BUS 9664A	LF1BLS 9664B	LF1CUS 9665A	LF1CLS 9665B	LF1DUS 9666A	LF1DLS 9666B	LF1EUS 9667A	LF1ELS 9667B
Constituents (mg/kg dw)										
Semi-Volatile Organic Compounds (8270)										
Naphthalene	2.8	0.56J	1.1J	0.27J	3.4J	0.23J	1.0	0.088J	4.7J	0.13J
2-Methylnaphthalene	2.7	0.29J	0.93J	0.18J	6.4J	0.14J	1.1	0.070J	7.7	0.11J
1-Methylnaphthalene	0.22J	0.17J	0.27J	0.11J	4.0J	0.097J	0.14J	0.067J	0.56J	0.063J
1,1-Biphenyl	0.42	0.092J	0.23J	0.066J	0.90J	0.040J	0.24J	0.022J	2.1J	0.028J
Acenaphthylene	3.8	0.59J	1.7J	4.1J	2.1J	0.58	1.4	0.13J	1.4J	0.35
Acenaphthene	0.95	1.9J	0.52J	1.1J	0.62J	0.15J	0.36	0.18J	0.78J	0.070J
Dibenzofuran	2.7	0.89J	1.2J	0.31J	5.6J	0.18J	1.6	0.21J	9.3	0.14J
Fluorene	6.9	2.4J	2.6J	1.1J	14	0.20J	4.9	0.21J	25	0.18J
Phenanthrene	16	15	6.4	17	21	1.4	7.7	3.3	34	0.98
Anthracene	54	5.7	23	16	140	2.3	36	1.0	350	1.8
Carbazole	23	1.1J	7	5.4J	38	0.97	8.2	0.98	98	1.1
Pyrene	20	69	18	62	34	10	28	5.7	25	4.2
Benzo(a)Anthracene	11	24	10	31	11	5.7	15	2.1	9.6	2.0
Chrysene	12	28	13	36	15	8.9	18	3.0	3.6J	2.9
Benzo(a)pyrene	13	14	11	21	14	4.1	11	1.8	11	1.5
Benzo(g,h,i)perylene	7.4	6.5	4.6	9.1	6.4J	1.8	2.1	0.70	4.3J	0.6
Pentachlorophenol	1.2	3.9J	1.6J	4.3J	ND	1.3J	0.79J	ND	ND	0.70J
Fluoranthene	22	77	17	72	15	12	24	4.7	22	3.7
2-Chlorophenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	0.060J	ND	ND	0.057J	0.86J	0.050J	0.028J	ND	0.14J	ND
Trichlorophenols	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Creosol (ortho)	ND	ND	ND	ND	0.023J	ND	ND	ND	ND	ND
Creosol m&p	0.044J	ND	ND	0.047J	ND	ND	ND	ND	ND	ND
P-chloro-m-cresol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachlorophenols	0.19J	ND	0.31J	0.44J	ND	0.13J	ND	ND	ND	0.045J
2,4-Dinitrophenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b,k)fluoranthene	30	36	31	61	43	18	32	3.4	30	4.4
Ideno(1,2,3-cd)pyrene	9.6	9.2	5.6	12	7.9	1.9	4.4	0.74	5.3J	0.7
Dibenzo(a,h)anthracene	3.4	2.9J	ND	2.3J	ND	0.58	1.1	0.26J	ND	ND
Metals										
Arsenic (7060)	6.5	23	7.9	13	2.5	4.9	4.9	15	6.9	9.9
Chromium (6010)	6.2	14	8.2	7.9	12	5.4	5.5	1.9	6.7	2.8
Copper (6010)	37	70	30	35	39	38	22	12	44	17
Nitrogen Series										
Total Kjeldahl Nitrogen-N	1,500	980	5,000	1,000	1,100	1,000	1,200	290	1,600	300
Nitrate + Nitrite-N	ND	ND	ND	ND	7	ND	14	6.3	ND	ND
Total Nitrogen	1,500	980	5,000	1,000	1,100	1,000	1,200	300	1,600	300
Total Phosphorous	730	980	920	460	1,000	520	700	240	1,300	270
Total Organic Carbon	33,000	24,000	27,000	22,000	35,000	16,000	21,000	5,000	31,000	5,900
Chloride	ND	ND	29	ND	ND	ND	ND	ND	ND	ND
pH	6.3	6.9	7.1	7.4	6.6	7.6	6.3	6.7	7	7.4
Percent Solids %	86	89	88	88	84	92	92	94	88	95

1 Represents Landfarm 1 location (A, B, C, D, or E) depth sampled (US or LS).
J Estimated concentration below the practical quantitation limit.
ND Compound was not detected.

Table 4-2. Analytical Results for Soil Samples Collected in 1991 within the Office Landfarm 2 at the Southern Wood Piedmont Site, Wilmington, North Carolina.

Sample Identification # /1	LF2AUS 9668A	LF2ALS 9668B	LF2BUS 9669A	LF2BLS 9669B	LF2CUS 9670A	LF2CLS 9670B	LF2DUS 9671A	LF2DLS 9671B	LF2EUS 9672A	LF2ELS 9672B
Constituents (mg/kg dw)										
Semi-Volatile Organic Compounds (8270)										
Naphthalene	2.2J	0.36J	11J	1.4J	4.3J	1.9J	3.4J	14J	3.5J	2.5J
2-Methylnaphthalene	2.1J	0.22J	16J	0.88J	4.6J	0.85J	4.4J	8.0J	5.1	2.4J
1-Methylnaphthalene	0.22J	0.13J	0.59J	0.29J	0.46J	0.34J	0.26J	1.6J	0.26J	0.41J
1,1-Biphenyl	0.37J	0.078J	2.1J	0.18J	0.91J	0.27J	0.64J	2.3J	0.66J	0.59J
Acenaphthylene	5.2	2.4J	5.0J	2.4J	4.7J	4.3J	3.7J	5.4J	3.8J	5.0J
Acenaphthene	1.0J	0.62J	2.5J	1.6J	5.5J	1.7J	1.3J	92	1.0J	8.1J
Dibenzofuran	2.6J	0.49J	20	1.7J	8.4	2.2J	5.0J	21J	5.1	5.6J
Fluorene	7.1	1.2J	62	2.8J	26	7.2J	14	59J	13	19J
Phenanthrene	12	4.1	87	13	38	21	20	91	21	45
Anthracene	41	9.5	310	19	120	84	75	170	64	93
Carbazole	18	3.1J	170	6.8	60	15	34	46J	37	28J
Pyrene	21	25	64	25	35	74	17	980	19	310
Benzo(a)Anthracene	13	12	25	12	17	28	8.6	130	11	63
Chrysene	15	18	31	15	20	41	11	150	12	69
Benzo(a)pyrene	16	9.6	23	9.2	20	27	12	61J	12	29J
Benzo(g,h,i)perylene	7.2	3.7J	10J	5.5	6.0J	5.6J	7.0J	6.7J	5.1	8.3J
Pentachlorophenol	3.8J	2.8J	ND	10	4.6J	22J	6.4J	150J	4.1J	19J
Fluoranthene	20	24	78	30	37	83	19	520	20	350
2-Chlorophenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenol	ND	ND	ND	ND	ND	ND	ND	2.2J	ND	ND
2,4-Dimethylphenol	0.092J	0.082J	ND	0.037J	0.087J	0.12J	ND	ND	0.081J	ND
Trichlorophenols	ND	ND	ND	0.048J	ND	ND	ND	ND	ND	ND
Creosol (ortho)	0.024J	ND	ND	0.040J	0.028J	0.026J	ND	ND	0.022J	ND
Creosol m&p	0.10J	0.070J	ND	ND	ND	ND	ND	ND	0.087J	ND
P-chloro-m-cresol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachlorophenols	0.48J	0.25J	ND	0.52J	ND	0.85J	0.34J	3.5J	0.47J	1.1J
2,4-Dinitrophenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b,k)fluoranthene	34	32	55	21	37	81	26	190	30	90
Ideno(1,2,3-cd)pyrene	9.2	5.2	13J	6.8	9.1	9.8	8.8	18J	7.3	12J
Dibenzo(a,h)anthracene	2.0J	1.2J	3.4J	2.6J	3.4J	4.0J	2.0J	6.6J	2.5J	5.1J
Metals										
Arsenic (7060)	7.9	18	8.3	84	5.6	14	6.4	22	6.7	9.5
Chromium (6010)	15	12	11	100	6.2	9.8	7.1	21	7.8	15
Copper (6010)	42	120	44	140	41	41	35	150	39	51
Nitrogen Series										
Total Kjeldahl Nitrogen-N	1,300	1,900	1,900	840	1,600	1,100	1,200	4,900	1,700	1,300
Nitrate + Nitrite-N	6.9	6.1	ND	12	ND	ND	ND	ND	7.2	ND
Total Nitrogen	1,300	1,900	1,900	850	1,600	1,100	1,200	4,900	1,700	1,300
Total Phosphorous	580	470	760	440	580	280	490	610	200	200
Total Organic Carbon	26,000	21,000	34,000	21,000	26,000	28,000	32,000	47,000	32,000	23,000
Chloride	ND	ND	ND	ND	ND	ND	46	100	ND	ND
pH	6.7	6.8	6.8	7.5	6.4	6.5	6.9	7.1	6.7	6.9
Percent Solids %	83	82	86	89	86	88	83	80	85	89

1 Represents Landfarm 2 location (A, B, C, D, or E) depth sampled (US or LS).
J Estimated concentration below the practical quantitation limit.
ND Compound was not detected.

Table 4-3. Analytical Results for Ground-Water Samples Collected in 1991 from the Upgradient Monitor Well (W-6) and Three Downgradient Monitor Wells (W-7, W-8, and W-9) Located on the Perimeter of Landfarms 1 and 2 at the Southern Wood Piedmont Site, Wilmington, North Carolina.

Sample Identification #	MW-6 9673	MW-7 9674	MW-8 9675	MW-9 9676
Constituents (mg/L)				
Semi-Volatile Organic Compounds (8270)				
Naphthalene	ND	ND	ND	ND
2-Methylnaphthalene	ND	ND	ND	ND
1-Methylnaphthalene	ND	ND	ND	ND
1,1-Biphenyl	ND	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND
Dibenzofuran	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND
Carbazole	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND
Benzo(a)Anthracene	ND	ND	ND	ND
Chrysene	ND	ND	ND	ND
Benzo(a)pyrene	ND	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	ND	ND
Pentachlorophenol	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND
2-Chlorophenol	ND	ND	ND	ND
Phenol	ND	ND	ND	ND
2,4-Dimethylphenol	ND	ND	ND	ND
Trichlorophenols	ND	ND	ND	ND
Creosol (ortho)	ND	ND	ND	ND
Creosol m&p	ND	ND	ND	ND
P-chloro-m-cresol	ND	ND	ND	ND
Tetrachlorophenols	ND	ND	ND	ND
2,4-Dinitrophenol	ND	ND	ND	ND
Benzo(b,k)fluoranthene	ND	ND	ND	ND
Ideno(1,2,3-cd)pyrene	ND	ND	ND	ND
Dibenzo(a,h)anthracene	ND	ND	ND	ND
Metals				
Arsenic (7060)	ND	ND	ND	ND
Chromium (6010)	ND	ND	ND	ND
Copper (6010)	ND	ND	ND	ND
Total Suspended Solids (160.2)	34	20	ND	ND
Nitrogen Series				
Total Kjeldahl Nitrogen-N	11	8.3	9.7	6.3
Nitrate + Nitrite-N	ND	ND	ND	ND
Total Nitrogen	11	8.3	9.7	6.3
Total Phosphorous	2.0	0.72	0.78	0.89
Total Organic Carbon	16	22	27	20
Chloride	310	200	130	120

ND Compound was not detected.

Table 4-4. Comparison of Constituents Detected in Both 1990 and 1991 in Soil, Southern Wood Piedmont Facility, Wilmington, North Carolina.

Constituent	Frequency of Detects (%)*		Maximum Concentration		Mean		UCL	
	1990	1991	1990	1991	1990	1991	1990	1991
Phenols and Cresols								
o-Cresol	0	30	NA	0.04	NA	4.39	NA	8.14
m,p-Cresol	0	25	NA	0.1	NA	4.81	NA	8.52
2,4-Dimethylphenol	0	60	NA	0.86	NA	3.96	NA	7.76
Pentachlorophenol	3	80	20	150	19	16.22	19.00	29.21
Phenol	0	5	NA	2.2	NA	3.35	NA	4.98
Tetrachlorophenols	0	60	NA	3.5	NA	1.61	NA	2.54
Trichlorophenols	0	5	NA	0.048	NA	5.19	NA	8.85
PAHs								
tPAHs	100	100	2064.2	2572.6	527.51	458.18	732.88	725.82
cPAHs	100	100	78.4	72.64	25.9	19.78	30.90	25.73
Carbazole	100	100	270	170	43.2	30.08	63.20	45.99
Inorganics								
Arsenic	0	100	NA	84	NA	13.85	NA	20.60
Chromium	0	100	NA	100	NA	13.78	NA	21.82
Copper	0	100	NA	150	NA	53.40	NA	68.31

Concentrations are given in milligrams per kilogram (mg/kg).

* 1990 data included 30 samples; 1991 data included 20 samples.

NA Not available.

UCL 95 percent upper confidence limit of the mean.

Table 4-5. Degradation of Polycyclic Aromatic Hydrocarbons Based on Ring Number, Landfarms 1 and 2, Southern Wood Piedmont Facility, Wilmington, North Carolina.

# Rings	Constituent		Mean Concentration (mg/kg) 1990	1991	1990-1991	% Change
2	1,1-Biphenyl		3.77	0.61	3.16	-83.82
2	1-Methylnaphthalene		4.3	0.51	3.79	-88.14
2	2-Methylnaphthalene		6.05	3.21	2.84	-46.94
2	Naphthalene		5.18	2.94	2.24	-43.24
3	Acenaphthene		6.72	6.1	0.62	-9.23
3	Acenaphthylene		3.77	2.9	0.87	-23.08
3	Anthracene		117.66	80.77	36.89	-31.35
3	Carbazole		43.19	30.08	13.11	-30.35
3	Dibenzofuran		7.16	4.71	2.45	-34.22
3	Fluorene		15.53	13.44	2.09	-13.46
3	Phenanthrene		37.53	23.74	13.79	-36.74
		Total	250.86	169.01	81.85	-32.63
		Mean	22.81	15.36	7.44	-32.63
4	Benzo(a)anthracene		23.57	22.05	1.52	-6.45
4	Chrysene		32.14	26.12	6.02	-18.73
4	Fluoranthene		71.45	72.52	-1.07	1.50
4	Pyrene		65.76	92.3	-26.54	40.36
5	Benzo(a)pyrene		20.32	16.06	4.26	-20.96
5	Benzo(b,k)fluoranthene		40.7	44.24	-3.54	8.70
5	Dibenzo(a,h)anthracene		4.37	2.62	1.75	-40.05
6	Benzo(g,h,i)perylene		8.96	5.43	3.53	-39.40
6	Indeno(1,2,3-c,d)pyrene		9.38	7.83	1.55	-16.52
		Total	276.65	289.17	-12.52	4.53
		Mean	30.74	32.13	-1.39	4.53

mg/kg Milligrams per kilogram.

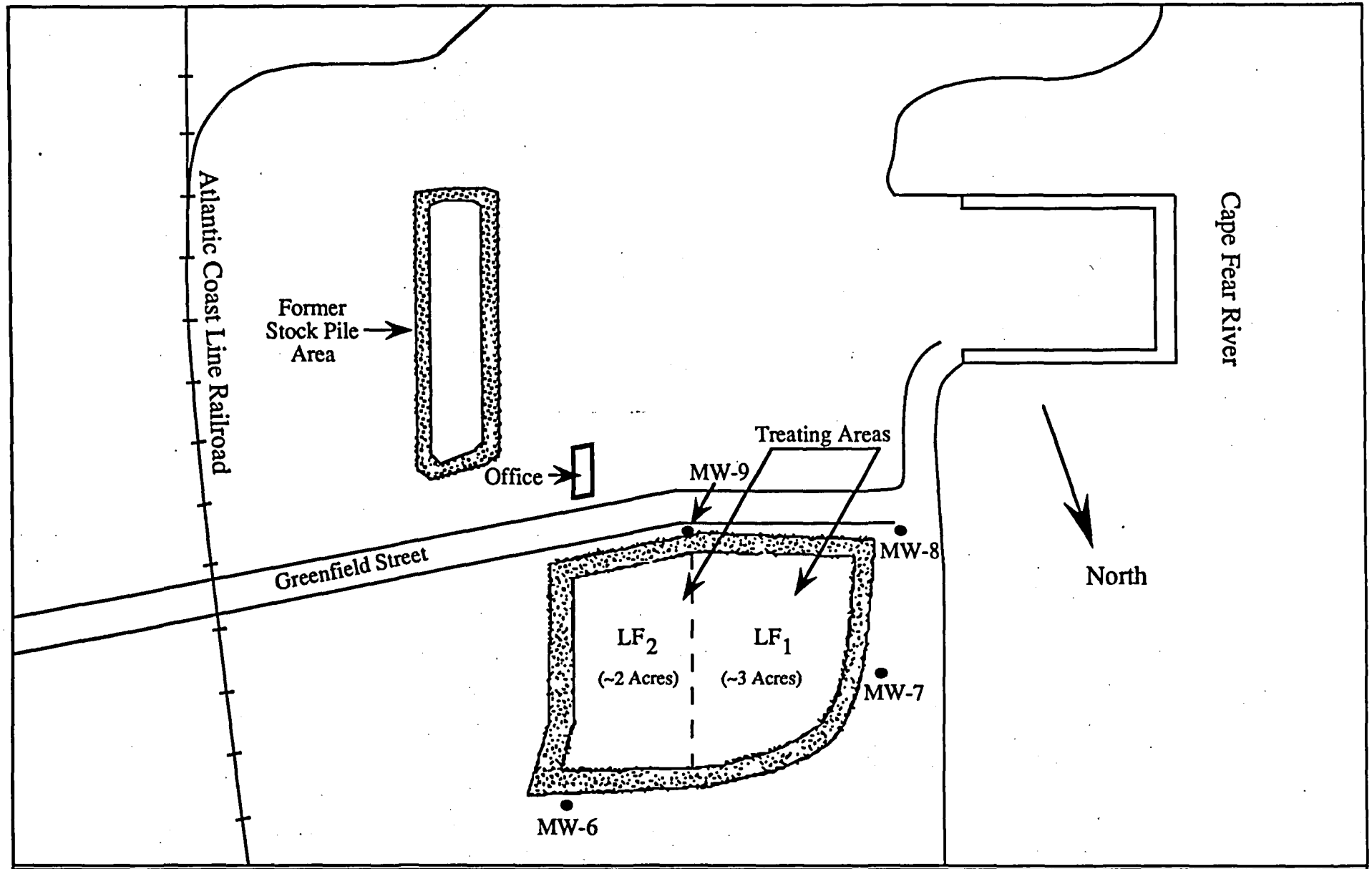
Table 4-6. Data Comparison for Polycyclic Aromatic Hydrocarbons, Landfarms 1 and 2, Southern Wood Piedmont Facility, Wilmington, North Carolina.

# Rings	Constituent	Mean Concnetration (mg/kg) 1990	1991	1990-1991	% Change
2	1,1-Biphenyl	3.77	0.61	3.16	-83.82
2	Naphthalene	5.18	2.94	2.24	-43.24
3	Acenaphthene	6.72	6.1	0.62	-9.23
3	Acenaphthylene	3.77	2.9	0.87	-23.08
3	Anthracene	117.66	80.77	36.89	-31.35
3	Carbazole*	43.19	30.08	13.11	-30.35
3	Dibenzofuran	7.16	4.71	2.45	-34.22
3	Fluorene	15.53	13.44	2.09	-13.46
3	Phenanthrene	37.53	23.74	13.79	-36.74
4	Fluoranthene	71.45	72.52	-1.07	1.50
4	Pyrene	65.76	92.3	-26.54	40.36
	Subtotal	377.72	330.11	47.61	-12.60
	Mean	34.34	30.01	4.33	-12.60
	cPAHs				
2	1-Methylnaphthalene	4.3	0.51	3.79	-88.14
2	2-Methylnaphthalene	6.05	3.21	2.84	-46.94
4	Benzo(a)anthracene	23.57	22.05	1.52	-6.45
4	Chrysene	32.14	26.12	6.02	-18.73
5	Benzo(a)pyrene	20.32	16.06	4.26	-20.96
5	Benzo(b,k)fluoranthene	40.7	44.24	-3.54	8.70
5	Dibenzo(a,h)anthracene	4.37	2.62	1.75	-40.05
6	Benzo(g,h,i)perylene	8.96	5.43	3.53	-39.40
6	Indeno(1,2,3-c,d)pyrene	9.38	7.83	1.55	-16.52
	Total cPAHs	149.79	128.07	21.72	-14.50
	Mean	16.64	14.23	2.41	-14.50
	Without 2-ring PAHs	139.44	124.35	15.09	-10.82
	tPAHs	527.51	458.18	69.33	-13.14

* Carbazole is also a cPAH but was considered separately from the other cPAHs.
cPAHs Carcinogenic polycyclic aromatic hydrocarbons included in the TEF scheme.
mg/kg Milligrams per kilogram.
TEF Toxicity equivalency factor based on benzo(a)pyrene (USEPA, 1989b).
tPAHs Total of all polycyclic aromatic hydrocarbons.

FIGURES

1395swp

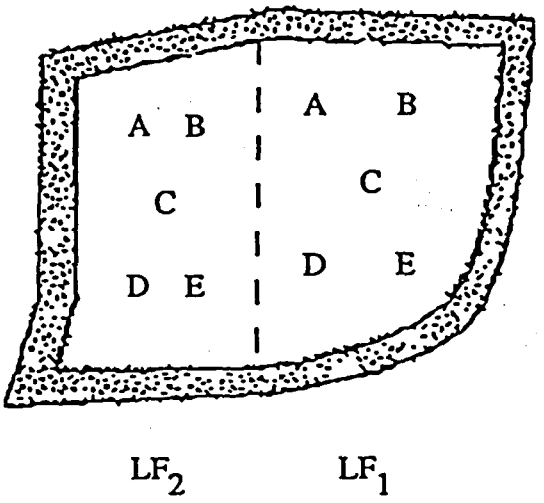


GERAGHTY & MILLER, INC.
Environmental Services

GENERALIZED SITE MAP
Southern Wood Piedmont, Wilmington, North Carolina
(Not to Scale)

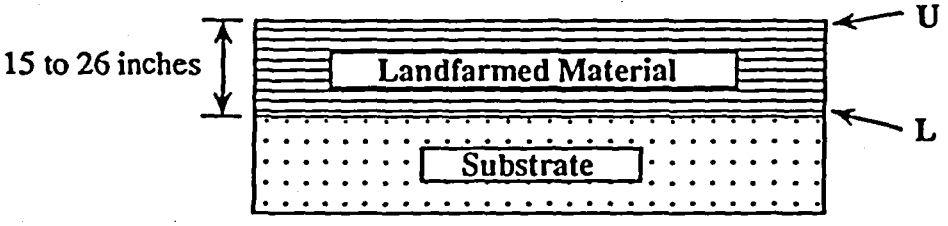
Figure 2-1

Plan View



Soil Sampling Locations in Landfarm Areas 1 and 2 Southern Wood Piedmont, Wilmington

Cross-Sectional View



U Upper soil sample taken approximately 3" below landfarm surface.

L Lower soil sample taken within the bottom 6" of the landfarmed material.

GERAGHTY & MILLER, INC. *Environmental Services*	Soil Sampling Locations within the Landfarm Areas at Southern Wood Piedmont's Former Wood-Treatment Facility - Wilmington, North Carolina (Not to Scale)	Figure 3-1

APPENDIX A
1991 DATA SHEETS
SOUTHERN WOOD PIEDMONT FACILITY, WILMINGTON, NORTH CAROLINA

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

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LOG NO: S1-36568

Received: 15 OCT 91

Ms. Sandra Watson
Southern Wood Piedmont (WI)
P.O. Box 5477, I-85 and Sigsbee Rd.
Spartanburg, SC 29304

CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
36568-1	MW-6/9673	10-14-91
36568-2	MW-7/9674	10-14-91
36568-3	MW-8/9675	10-14-91

PARAMETER	36568-1	36568-2	36568-3
Semi-Volatiles (8270)			
Naphthalene, ug/l	<10	<10	<10
1-Methylnaphthalene, ug/l	<10	<10	<10
2-Methylnaphthalene, ug/l	<10	<10	<10
1,1-Biphenyl, ug/l	<10	<10	<10
Acenaphthylene, ug/l	<10	<10	<10
Acenaphthene, ug/l	<10	<10	<10
Dibenzofuran, ug/l	<10	<10	<10
Fluorene, ug/l	<10	<10	<10
Phenanthrene, ug/l	<10	<10	<10
Anthracene, ug/l	<10	<10	<10
Carbazole, ug/l	<10	<10	<10
Pyrene, ug/l	<10	<10	<10
Benzo(a)Anthracene, ug/l	<10	<10	<10
Chrysene, ug/l	<10	<10	<10
Benzo(a)pyrene, ug/l	<10	<10	<10
Benzo(g,h,i)perylene, ug/l	<10	<10	<10
Pentachlorophenol, ug/l	<50	<50	<50
Fluoranthene, ug/l	<10	<10	<10
2-Chlorophenol, ug/l	<10	<10	<10
Phenol, ug/l	<10	<10	<10
2,4-Dimethylphenol, ug/l	<10	<10	<10

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
36568-1	MW-6/9673	10-14-91
36568-2	MW-7/9674	10-14-91
36568-3	MW-8/9675	10-14-91

PARAMETER	36568-1	36568-2	36568-3
Trichlorophenols, ug/l	<10	<10	<10
Cresol (ortho), ug/l	<10	<10	<10
Cresol m & p, ug/l	<10	<10	<10
p-Chloro-m-cresol, ug/l	<10	<10	<10
Tetrachlorophenols, ug/l	<10	<10	<10
2,4-Dinitrophenol, ug/l	<50	<50	<50
Benzo(b,k)fluoranthene, ug/l	<10	<10	<10
Indeno(1,2,3-cd)pyrene, ug/l	<10	<10	<10
Dibenzo(a,h)anthracene, ug/l	<10	<10	<10
Surrogate-2FP (CL 21-110)	46 %	38 %	50 %
Surrogate-PHL (CL 10-110)	38 %	30 %	43 %
Surrogate-NBZ (CL 35-114)	84 %	68 %	91 %
Surrogate-TBP (CL 10-123)	34 %	37 %	54 %
Surrogate-TPH (CL 33-141)	78 %	56 %	72 %
Surrogate-FBP (CL 43-116)	72 %	55 %	70 %
Date Extracted	10.18.91	10.18.91	10.18.91
Date Analyzed	10.23.91	10.24.91	10.24.91
Chloride (325.2)			
Chloride (325.2), mg/l	310	200	130
Date Analyzed	10.22.91	10.23.91	10.22.91

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
36568-1	MW-6/9673	10-14-91
36568-2	MW-7/9674	10-14-91
36568-3	MW-8/9675	10-14-91

PARAMETER	36568-1	36568-2	36568-3
Nitrogen Series			
Total Kjeldahl Nitrogen-N, mg/l	11	8.3	9.7
Nitrate + Nitrite-N, mg/l	<0.050	<0.050	<0.050
Total Nitrogen, mg/l	11	8.3	9.7
Date Analyzed	10.23.91	10.23.91	10.23.91
Total Phosphorus (365.1)			
Total Phosphorus, mg/l	2.0	0.72	0.78
Date Analyzed	10.23.91	10.23.91	10.23.91
Total Organic Carbon (415.1)			
Total Organic Carbon , mg/l	16	22	27
Date Analyzed	10.15.91	10.15.91	10.15.91

Laboratory locations in Savannah, GA • Tallahassee, FL • Mobile, AL • Deerfield Beach, FL • Tampa, FL

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
36568-4	MW-9/9676	10-14-91

PARAMETER	36568-4
Semi-Volatiles (8270)	
Naphthalene, ug/l	<10
1-Methylnaphthalene, ug/l	<10
2-Methylnaphthalene, ug/l	<10
1,1-Biphenyl, ug/l	<10
Acenaphthylene, ug/l	<10
Acenaphthene, ug/l	<10
Dibenzofuran, ug/l	<10
Fluorene, ug/l	<10
Phenanthrene, ug/l	<10
Anthracene, ug/l	<10
Carbazole, ug/l	<10
Pyrene, ug/l	<10
Benzo(a)Anthracene, ug/l	<10
Chrysene, ug/l	<10
Benzo(a)pyrene, ug/l	<10
Benzo(g,h,i)perylene, ug/l	<10
Pentachlorophenol, ug/l	<50
Fluoranthene, ug/l	<10
2-Chlorophenol, ug/l	<10
Phenol, ug/l	<10
2,4-Dimethylphenol, ug/l	<10
Trichlorophenols, ug/l	<10
Cresol (ortho), ug/l	<10

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
36568-4	MW-9/9676	10-14-91

PARAMETER	36568-4
Cresol m & p, ug/l	<10
p-Chloro-m-cresol, ug/l	<10
Tetrachlorophenols, ug/l	<10
2,4-Dinitrophenol, ug/l	<50
Benzo(b,k)fluoranthene, ug/l	<10
Indeno(1,2,3-cd)pyrene, ug/l	<10
Dibenzo(a,h)anthracene, ug/l	<10
Surrogate-2FP (CL 21-110)	47 %
Surrogate-PHL (CL 10-110)	37 %
Surrogate-NBZ (CL 35-114)	86 %
Surrogate-TBP (CL 10-123)	50 %
Surrogate-TPH (CL 33-141)	68 %
Surrogate-FBP (CL 43-116)	69 %
Date Extracted	10.18.91
Date Analyzed	10.24.91
Suspended Solids (160.2)	
Suspended Solids, mg/l	<5.0
Date Analyzed	10.17.91
Chloride (325.2)	
Chloride (325.2), mg/l	120
Date Analyzed	10.22.91
Nitrogen Series	
Total Kjeldahl Nitrogen-N, mg/l	6.3
Nitrate + Nitrite-N, mg/l	<0.050
Total Nitrogen, mg/l	6.3
Date Analyzed	10.23.91

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Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
36568-4	MW-9/9676	10-14-91

PARAMETER	36568-4
Total Phosphorus (365.1)	
Total Phosphorus, mg/l	0.89
Date Analyzed	10.23.91
Total Organic Carbon (415.1)	
Total Organic Carbon , mg/l	20
Date Analyzed	10.15.91
Copper (6010)	
Copper, mg/l	<0.025
Date Analyzed	10.23.91
Chromium (6010)	
Chromium, mg/l	<0.010
Date Analyzed	10.23.91
Arsenic (7060)	
Arsenic, mg/l	<0.010
Date Analyzed	10.30.91

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
36568-5	RB-1	10-14-91
36568-6	FB-1	10-14-91

PARAMETER	36568-5	36568-6
Semi-Volatiles (8270)		
Naphthalene, ug/l	<10	<10
1-Methylnaphthalene, ug/l	<10	<10
2-Methylnaphthalene, ug/l	<10	<10
1,1-Biphenyl, ug/l	<10	<10
Acenaphthylene, ug/l	<10	<10
Acenaphthene, ug/l	<10	<10
Dibenzofuran, ug/l	<10	<10
Fluorene, ug/l	<10	<10
Phenanthrene, ug/l	<10	<10
Anthracene, ug/l	<10	<10
Carbazole, ug/l	<10	<10
Pyrene, ug/l	<10	<10
Benzo(a)Anthracene, ug/l	<10	<10
Chrysene, ug/l	<10	<10
Benzo(a)pyrene, ug/l	<10	<10
Benzo(g,h,i)perylene, ug/l	<10	<10
Pentachlorophenol, ug/l	<50	<50
Fluoranthene, ug/l	<10	<10
2-Chlorophenol, ug/l	<10	<10
Phenol, ug/l	<10	<10
2,4-Dimethylphenol, ug/l	<10	<10
Trichlorophenols, ug/l	<10	<10

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
36568-5	RB-1	10-14-91
36568-6	FB-1	10-14-91

PARAMETER	36568-5	36568-6
Cresol (ortho), ug/l	<10	<10
Cresol m & p, ug/l	<10	<10
p-Chloro-m-cresol, ug/l	<10	<10
Tetrachlorophenols, ug/l	<10	<10
2,4-Dinitrophenol, ug/l	<50	<50
Benzo(b,k)fluoranthene, ug/l	<10	<10
Indeno(1,2,3-cd)pyrene, ug/l	<10	<10
Dibenzo(a,h)anthracene, ug/l	<10	<10
Surrogate-2FP (CL 21-110)	37 %	37 %
Surrogate-PHL (CL 10-110)	26 %	26 %
Surrogate-NBZ (CL 35-114)	79 %	81 %
Surrogate-TBP (CL 10-123)	74 %	76 %
Surrogate-TPH (CL 33-141)	82 %	76 %
Surrogate-FBP (CL 43-116)	77 %	78 %
Date Extracted	10.18.91	10.18.91
Date Analyzed	10.24.91	10.24.91
pH (150.1)		
pH, units	5.4	5.0
Date Analyzed	10.15.91	10.15.91
Chloride (325.2)		
Chloride (325.2), mg/l	<1.0	<1.0
Date Analyzed	10.22.91	10.22.91

Laboratory locations in Savannah, GA • Tallahassee, FL • Mobile, AL • Deerfield Beach, FL • Tampa, FL

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REPORT OF RESULTS

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36568-5	RB-1	10-14-91
36568-6	FB-1	10-14-91

PARAMETER	36568-5	36568-6
Nitrogen Series		
Total Kjeldahl Nitrogen-N, mg/l	<0.10	<0.10
Nitrate + Nitrite-N, mg/l	<0.050	<0.050
Total Nitrogen, mg/l	<0.15	<0.15
Date Analyzed	10.24.91	10.24.91
Total Phosphorus (365.1)		
Total Phosphorus, mg/l	<0.10	<0.10
Date Analyzed	10.24.91	10.24.91
Total Organic Carbon (415.1)		
Total Organic Carbon , mg/l	1.8	2.3
Date Analyzed	10.15.91	10.15.91
Copper (6010)		
Copper, mg/l	<0.025	<0.025
Date Analyzed	10.23.91	10.23.91
Chromium (6010)		
Chromium, mg/l	<0.010	<0.010
Date Analyzed	10.23.91	10.23.91
Arsenic (7060)		
Arsenic, mg/l	<0.010	<0.010
Date Analyzed	10.30.91	10.30.91

Laboratory locations in Savannah, GA • Tallahassee, FL • Mobile, AL • Deerfield Beach, FL • Tampa, FL

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Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36568-7	Detection Limits
36568-8	Method Blank (MB) Results
36568-9	Lab Control Standard (LCS) Result
36568-10	LCS Expected Value
36568-11	LCS % Recovery

PARAMETER	36568-7	36568-8	36568-9	36568-10	36568-11
Semi-Volatiles (8270)					
Naphthalene, ug/l	10	<10	101	100	101 %
1-Methylnaphthalene, ug/l	10	<10	---	---	---
2-Methylnaphthalene, ug/l	10	<10	---	---	---
1,1-Biphenyl, ug/l	10	<10	---	---	---
Acenaphthylene, ug/l	10	<10	114	100	114 %
Acenaphthene, ug/l	10	<10	105	100	105 %
Dibenzofuran, ug/l	10	<10	---	---	---
Fluorene, ug/l	10	<10	---	---	---
Phenanthrene, ug/l	10	<10	92	100	92 %
Anthracene, ug/l	10	<10	96	100	96 %
Carbazole, ug/l	10	<10	---	---	---
Pyrene, ug/l	10	<10	---	---	---
Benzo(a)Anthracene, ug/l	10	<10	87	100	87 %
Chrysene, ug/l	10	<10	83	100	83 %
Benzo(a)pyrene, ug/l	10	<10	79	100	79 %
Benzo(g,h,i)perylene, ug/l	10	<10	---	---	---
Pentachlorophenol, ug/l	50	<50	69	100	69 %
Fluoranthene, ug/l	10	<10	98	100	98 %
2-Chlorophenol, ug/l	10	<10	92	100	92 %

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36568-7	Detection Limits
36568-8	Method Blank (MB) Results
36568-9	Lab Control Standard (LCS) Result
36568-10	LCS Expected Value
36568-11	LCS % Recovery

PARAMETER	36568-7	36568-8	36568-9	36568-10	36568-11
Phenol, ug/l	10	<10	36	100	36 %
2,4-Dimethylphenol, ug/l	10	<10	90	100	90 %
Trichlorophenols, ug/l	10	<10	83	100	83 %
Cresol (ortho), ug/l	10	<10	---	---	---
Cresol m & p, ug/l	10	<10	---	---	---
p-Chloro-m-cresol, ug/l	10	<10	90	100	90 %
Tetrachlorophenols, ug/l	10	<10	109	100	109 %
2,4-Dinitrophenol, ug/l	50	<50	52	100	52 %
Benzo(b,k)fluoranthene, ug/l	10	<10	82	100	82 %
Indeno(1,2,3-cd)pyrene, ug/l	10	<10	79	100	79 %
Dibenzo(a,h)anthracene, ug/l	10	<10	74	100	74 %
Surrogate-2FP (CL 21-110)	---	57 %	53 %	---	---
Surrogate-PHL (CL 10-110)	---	41 %	39 %	---	---
Surrogate-NBZ (CL 35-114)	---	106 %	99 %	---	---
Surrogate-TBP (CL 10-123)	---	69 %	64 %	---	---
Surrogate-TPH (CL 33-141)	---	101 %	93 %	---	---
Surrogate-FBP (CL 43-116)	---	94 %	89 %	---	---
Date Extracted	---	10.18.91	10.18.91	---	---
Date Analyzed	---	10.23.91	10.28.91	---	---
Suspended Solids (160.2)					
Suspended Solids, mg/l	5.0	<5.0	92	100	92 %
Date Analyzed	---	10.17.91	10.17.91	---	---

Laboratory locations in Savannah, GA • Tallahassee, FL • Mobile, AL • Deerfield Beach, FL • Tampa, FL

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36568-7	Detection Limits
36568-8	Method Blank (MB) Results
36568-9	Lab Control Standard (LCS) Result
36568-10	LCS Expected Value
36568-11	LCS % Recovery

PARAMETER	36568-7	36568-8	36568-9	36568-10	36568-11
pH (150.1)					
pH, units	---	---	---	---	---
Chloride (325.2)					
Chloride (325.2), mg/l	1.0	<1.0	7.46	7.7	97 %
Date Analyzed	---	10.22.91	10.22.91	---	---
Nitrogen Series					
Total Kjeldahl Nitrogen-N, mg/l	0.10	<0.10	0.43	0.50	86 %
Nitrate + Nitrite-N, mg/l	0.050	<0.050	0.397	0.375	106 %
Total Nitrogen, mg/l	0.15	<0.15	---	---	---
Date Analyzed	---	10.23.91	10.23.91	---	---
Total Phosphorus (365.1)					
Total Phosphorus, mg/l	0.10	<0.10	0.702	0.75	94 %
Date Analyzed	---	10.23.91	10.23.91	---	---
Total Organic Carbon (415.1)					
Total Organic Carbon , mg/l	1.0	<1.0	22.4	23.0	97 %
Date Analyzed	---	10.15.91	10.15.91	---	---
Copper (6010)					
Copper, mg/l	0.025	<0.025	0.981	1.00	98 %
Date Analyzed	---	10.23.91	10.23.91	---	---
Chromium (6010)					
Chromium, mg/l	0.010	<0.010	0.993	1.01	98 %
Date Analyzed	---	10.23.91	10.23.91	---	---

Laboratory locations in Savannah, GA • Tallahassee, FL • Mobile, AL • Deerfield Beach, FL • Tampa, FL

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S1-36568

Received: 15 OCT 91

Ms. Sandra Watson
Southern Wood Piedmont (WI)
P.O. Box 5477, I-85 and Sigsbee Rd.
Spartanburg, SC 29304

CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36568-7	Detection Limits
36568-8	Method Blank (MB) Results
36568-9	Lab Control Standard (LCS) Result
36568-10	LCS Expected Value
36568-11	LCS % Recovery

PARAMETER	36568-7	36568-8	36568-9	36568-10	36568-11
Arsenic (7060)					
Arsenic, mg/l	0.010	<0.010	0.051	50	102 %
Date Analyzed	---	10.30.91	10.30.91	---	---

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CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36568-12	LCS % Recovery Limits
36568-13	Matrix Spike (MS) Result/Duplicate
36568-14	MS Expected Value
36568-15	MS % Recovery/Duplicate
36568-16	MS % Recovery Limits

PARAMETER	36568-12	36568-13	36568-14	36568-15	36568-16
Semi-Volatiles (8270)					
Naphthalene, ug/l	21-133 %	100/100	100	100/100 %	21-133 %
Acenaphthylene, ug/l	33-145 %	108/108	100	108/108 %	33-145 %
Acenaphthene, ug/l	47-145 %	100/100	100	100/100 %	47-145 %
Phenanthrene, ug/l	54-120 %	92/92	100	92/92 %	54-120 %
Anthracene, ug/l	27-133 %	92/92	100	92/92 %	27-133 %
Benzo(a)Anthracene, ug/l	33-143 %	44/44	100	44/44 %	33-143 %
Chrysene, ug/l	17-168 %	80/80	100	80/80 %	17-168 %
Benzo(a)pyrene, ug/l	17-163 %	28/28	100	28/28 %	17-163 %
Pentachlorophenol, ug/l	14-176 %	31/29	100	31/29 %	14-176 %
Fluoranthene, ug/l	26-137 %	88/88	100	88/88 %	26-137 %
2-Chlorophenol, ug/l	23-134 %	32/36	100	32/36 %	23-134 %
Phenol, ug/l	5-112 %	18/11	100	18/11 %	5-112 %
2,4-Dimethylphenol, ug/l	32-119 %	60/48	100	60/48 %	32-119 %
Trichlorophenols, ug/l	37-144 %	128/112	100	128/112 %	37-144 %
p-Chloro-m-cresol, ug/l	22-147 %	56/44	100	56/44 %	22-147 %
Tetrachlorophenols, ug/l	10-130 %	15/19	100	15/19 %	10-130 %
2,4-Dinitrophenol, ug/l	10-191 %	11/10	100	11/10 %	10-191 %
Benzo(b,k)fluoranthene, ug/l	24-159 %	68/68	100	68/68 %	24-159 %
Indeno(1,2,3-cd)pyrene, ug/l	10-171 %	32/32	100	32/32 %	10-171 %

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LOG NO: S1-36568

Received: 15 OCT 91

Ms. Sandra Watson
Southern Wood Piedmont (WI)
P.O. Box 5477, I-85 and Sigsbee Rd.
Spartanburg, SC 29304

CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36568-12	LCS % Recovery Limits
36568-13	Matrix Spike (MS) Result/Duplicate
36568-14	MS Expected Value
36568-15	MS % Recovery/Duplicate
36568-16	MS % Recovery Limits

PARAMETER	36568-12	36568-13	36568-14	36568-15	36568-16
Dibenzo(a,h)anthracene, ug/l	10-227 %	26/28	100	26/28 %	10-227 %
Surrogate-2FP (CL 21-110)	---	35/21	100	35/21 %	21-110 %
Surrogate-PHL (CL 10-110)	---	23/15	100	23/15 %	10-110 %
Surrogate-NBZ (CL 35-114)	---	51/50	50	102/100 %	35-114 %
Surrogate-TBP (CL 10-123)	---	57/56	100	57/56 %	35-114 %
Surrogate-TPH (CL 33-141)	---	43/44.5	50	86/89 %	33-141 %
Surrogate-FBP (CL 43-116)	---	45/44.5	50	90/89 %	43-116 %
Date Extracted	---	10.18.91	---	---	---
Date Analyzed	---	10.23.91	---	---	---
Suspended Solids (160.2)					
Suspended Solids, mg/l	75-125 %	---	---	---	---
Date Analyzed	---	---	---	---	---
pH (150.1)					
pH, units	---	---	---	---	---
Chloride (325.2)					
Chloride (325.2), mg/l	90-110 %	5.17/5.08	5.0	103/102 %	75-125 %
Date Analyzed	---	10.22.91	---	---	---
Nitrogen Series					
Total Kjeldahl Nitrogen-N, mg/l	75-125 %	1.14/1.21	1.0	114/121 %	75-125 %
Nitrate + Nitrite-N, mg/l	90-110 %	.208/.204	0.20	104/102 %	75-125 %
Date Analyzed	---	10.23.91	---	---	---

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CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36568-12	LCS % Recovery Limits
36568-13	Matrix Spike (MS) Result/Duplicate
36568-14	MS Expected Value
36568-15	MS % Recovery/Duplicate
36568-16	MS % Recovery Limits

PARAMETER	36568-12	36568-13	36568-14	36568-15	36568-16
Total Phosphorus (365.1)					
Total Phosphorus, mg/l	60-140 %	0.89/0.92	1.0	89/92 %	60-140 %
Date Analyzed	---	10.23.91	---	---	---
Total Organic Carbon (415.1)					
Total Organic Carbon , mg/l	60-140 %	103/105	100	103/105 %	60-140 %
Date Analyzed	---	10.15.91	---	---	---
Copper (6010)					
Copper, mg/l	75-125 %	.991/.947	1.00	99/95 %	75-125 %
Date Analyzed	---	10.23.91	---	---	---
Chromium (6010)					
Chromium, mg/l	75-125 %	.949/.995	1.01	95/99 %	75-125 %
Date Analyzed	---	10.23.91	---	---	---
Arsenic (7060)					
Arsenic, mg/l	75-125 %	51/51	50	102/102 %	75-125 %
Date Analyzed	---	10.30.91	---	---	---

Laboratory locations in Savannah, GA • Tallahassee, FL • Mobile, AL • Deerfield Beach, FL • Tampa, FL

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Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36568-17	ICVS/CCVS Control Limits
36568-18	ICVS/CCVS Source Lot
36568-19	ICVS/CCVS Expected Value
36568-20	ICVS Result
36568-21	ICVS % Recovery

PARAMETER	36568-17	36568-18	36568-19	36568-20	36568-21
Arsenic (7060)					
Arsenic, mg/l	90-110 %	3-87/SPEX	50.1	48.4	97 %
Date Analyzed	---	---	---	10.30.91	---
Chromium (6010)					
Chromium, mg/l	90-110 %	3-87/SPEX	1.01	0.971	96 %
Date Analyzed	---	---	---	10.23.91	---
Copper (6010)					
Copper, mg/l	90-110 %	3-87/SPEX	1.00	0.960	96 %
Date Analyzed	---	---	---	10.23.91	---

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CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36568-22	CCVS Result
36568-23	CCVS % Recovery

PARAMETER	36568-22	36568-23
Arsenic (7060)		
Arsenic, mg/l	48	96 %
Date Analyzed	10.30.91	---
Chromium (6010)		
Chromium, mg/l	0.989	98 %
Date Analyzed	10.23.91	---
Copper (6010)		
Copper, mg/l	0.969	97 %
Date Analyzed	10.23.91	---

Laboratory locations in Savannah, GA • Tallahassee, FL • Mobile, AL • Deerfield Beach, FL • Tampa, FL

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Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36568-24	CCVS Result
36568-25	CCVS % Recovery

PARAMETER	36568-24	36568-25
Arsenic (7060)		
Arsenic, mg/l	47.1	94 %
Date Analyzed	10.30.91	---
Chromium (6010)		
Chromium, mg/l	1.01	100 %
Date Analyzed	10.23.91	---
Copper (6010)		
Copper, mg/l	0.998	100 %
Date Analyzed	10.23.91	---

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Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36568-26	CCVS Result
36568-27	CCVS % Recovery
36568-28	CCVS Result
36568-29	CCVS % Recovery
36568-30	CCVS Result

PARAMETER	36568-26	36568-27	36568-28	36568-29	36568-30
Chromium (6010)					
Chromium, mg/l	1.02	101 %	0.991	98 %	0.966
Date Analyzed	10.23.91	---	10.23.91	---	10.23.91
Copper (6010)					
Copper, mg/l	1.00	100 %	0.977	98 %	0.957
Date Analyzed	10.23.91	---	10.23.91	---	10.23.91

Methods: EPA SW-846

SL SAVANNAH LABORATORIES
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Spartanburg, SC 29304

CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36568-31	CCVS % Recovery
36568-32	CCVS Result
36568-33	CCVS % Recovery

PARAMETER	36568-31	36568-32	36568-33
Chromium (6010)			
Chromium, mg/l	96 %	0.940	93 %
Date Analyzed	---	10.23.91	---
Copper (6010)			
Copper, mg/l	96 %	0.944	94 %
Date Analyzed	---	10.23.91	---

Methods: EPA SW-846

Laboratory locations in Savannah, GA • Tallahassee, FL • Mobile, AL • Deerfield Beach, FL • Tampa, FL

SL SAVANNAH LABORATORIES
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CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES

36568-34 MS % RPD (Limit)

PARAMETER	36568-34
Chloride (325.2)	
Chloride (325.2)	.97(<30) %
Nitrogen Series	
Total Kjeldahl Nitrogen-N	6.0(<30) %
Nitrate + Nitrite-N	1.9(<30) %
Total Phosphorus (365.1)	
Total Phosphorus	3.3(<40) %
Total Organic Carbon (415.1)	
Total Organic Carbon	1.9(<40) %
Copper (6010)	
Copper	4.1(<20) %
Chromium (6010)	
Chromium	4.1(<20) %
Arsenic (7060)	
Arsenic	0(<20) %

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Sampled By: Client

REPORT OF RESULTS

LOG NO SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES

36568-34 MS % RPD (Limit)

PARAMETER	36568-34
Semi-Volatiles (8270)	
Naphthalene	0(<40) %
Acenaphthylene	0(<40) %
Acenaphthene	0(<31) %
Phenanthrene	0(<40) %
Anthracene	0(<40) %
Benzo(a)Anthracene	0(<40) %
Chrysene	0(<48) %
Benzo(a)pyrene	0(<40) %
Pentachlorophenol	6.7(<50) %
Fluoranthene	0(<40) %
2-Chlorophenol	12(<40) %
Phenol	48(<42) %
2,4-Dimethylphenol	22(<40) %
Trichlorophenols	13(<50) %
p-Chloro-m-cresol	24(<40) %
Tetrachlorophenols	24(<50) %
2,4-Dinitrophenol	9.5(<50) %
Benzo(b,k)fluoranthene	0(<40) %
Indeno(1,2,3-cd)pyrene	0(<45) %
Dibenzo(a,h)anthracene	7.4(<70) %

J. W. Andrews.

J. W. Andrews, Ph. D.

GERAGHTY & MILLER, INC.
Environmental Services

Laboratory Task Order No. N/A

CHAIN-OF-CUSTODY RECORD

Project Number NC09005

Project Location SWP Wilmington, NC

Laboratory SAVANNAH LABORATORIES

Sampler(s)/Affiliation M. RADECKE (G&M)
P. JACOBS (G&M)

SAMPLE BOTTLE / CONTAINER DESCRIPTION

SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID	1 Liter amber glass Semi volatiles Conductivity (8270) 4°C	100ml plastic TSS 4°C	100ml plastic pH 4°C	100ml plastic Cl⁻ 4°C	250ml plastic TP TP 4°C H2SO4	125ml amber glass TOC 4°C H2SO4	250ml plastic Cu, Cr, As metals 4°C HNO3			TOTAL
MW-6/9673	L	10-14-91 17:20		1	X MR		1	1	1				4
MW-7/9674	L	10-14-91 15:38		1			1	1	1				4
MW-8/9675	L	10-14-91 15:18		1			1	1	1				4
MW-9/9676	L	10-14-91 13:10		1	1		1	1	1	1			6
RB-1	L	10-14-91 16:50		1		1	1	1	1	1			6
FB-1	L	10-14-91 16:50		1		1	1	1	1	1			6

Sample Code: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers: 30

Relinquished by: Mark E Radecke Organization: Geraghty & Miller, Inc. 10-14-91 19:00
Received by: Organization: Date / / Time

Seal Intact? Yes No N/A

Relinquished by: Organization:
Received by: L. Johnson SL#36568 Organization: SAV LABS Date 10/15/91 Time 9:30

Seal Intact? (Yes) No N/A

Special Instructions/Remarks: MW-9/9676 constituents were sampled at 1310 with the exception of TSS and Cu, Cr & As which were sampled at 1610

Delivery Method: ☐ In Person ☒ Common Carrier FEDERAL EXPRESS (SPECIFY) ☐ Lab Courier ☐ Other (SPECIFY)

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RECEIVED DEC 11 1991 G & M RALEIGH

LOG NO: S1-36592

Received: 16 OCT 91

Ms. Sandra Watson
Southern Wood Piedmont (WI)
P.O. Box 5477, I-85 and Sigsbee Rd.
Spartanburg, SC 29304

CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
36592-1	LF1AUS/9663A	10-15-91
36592-2	LF1ALS/9663B	10-15-91
36592-3	LF1DUS/9666A	10-15-91
36592-4	LF1DLS/9666B	10-15-91
36592-5	LF1CUS/9665A	10-15-91

PARAMETER	36592-1	36592-2	36592-3	36592-4	36592-5
Semi-Volatiles (8270)					
Naphthalene, mg/kg dw	2.8	0.56J	1.0	0.088J	3.4J
1-Methylnaphthalene, mg/kg dw	0.22J	0.17J	0.14J	0.070J	4.0J
2-Methylnaphthalene, mg/kg dw	2.7	0.29J	1.1	0.067J	6.4J
1,1-Biphenyl, mg/kg dw	0.42	0.092J	0.24J	0.022J	0.90J
Acenaphthylene, mg/kg dw	3.8	0.59J	1.4	0.13J	2.1J
Acenaphthene, mg/kg dw	0.95	1.9J	0.36	0.18J	0.62J
Dibenzofuran, mg/kg dw	2.7	0.89J	1.6	0.21J	5.6J
Fluorene, mg/kg dw	6.9	2.4J	4.9	0.21J	14
Phenanthrene, mg/kg dw	16	15	7.7	3.3	21
Anthracene, mg/kg dw	54	5.7	36	1.0	140
Carbazole, mg/kg dw	23	1.1J	8.2	0.98	38
Pyrene, mg/kg dw	20	69	28	5.7	34
Benzo(a)Anthracene, mg/kg dw	11	24	15	2.1	11
Chrysene, mg/kg dw	12	28	18	3.0	15
Benzo(a)pyrene, mg/kg dw	13	14	11	1.8	14
Benzo(g,h,i)perylene, mg/kg dw	7.4	6.5	2.1	0.70	6.4J
Pentachlorophenol, mg/kg dw	1.2	3.9J	0.79J	<1.8	<39
Fluoranthene, mg/kg dw	22	77	24	4.7	15
2-Chlorophenol, mg/kg dw	<0.38	<3.7	<0.36	<0.35	<7.8

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LOG NO: S1-36592

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CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
36592-1	LF1AUS/9663A	10-15-91
36592-2	LF1ALS/9663B	10-15-91
36592-3	LF1DUS/9666A	10-15-91
36592-4	LF1DLS/9666B	10-15-91
36592-5	LF1CUS/9665A	10-15-91

PARAMETER	36592-1	36592-2	36592-3	36592-4	36592-5
Phenol, mg/kg dw	<0.38	<3.7	<0.36	<0.35	<7.8
2,4-Dimethylphenol, mg/kg dw	0.06J	<3.7	0.028J	<0.35	0.86J
Trichlorophenols, mg/kg dw	<0.38	<3.7	<0.36	<0.35	<7.8
Cresol (ortho), mg/kg dw	<0.38	<3.7	<0.36	<0.35	0.023J
Cresol m & p, mg/kg dw	0.044J	<3.7	<0.36	<0.35	<7.8
p-Chloro-m-cresol, mg/kg dw	<0.38	<3.7	<0.36	<0.35	<7.8
Tetrachlorophenols, mg/kg dw	0.19J	<3.7	<0.36	<0.35	<7.8
2,4-Dinitrophenol, mg/kg dw	<1.9	<19	<1.8	<1.8	<39
Benzo(b,k)fluoranthene, mg/kg dw	30	36	32	3.4	43
Indeno(1,2,3-cd)pyrene, mg/kg dw	9.6	9.2	4.4	0.74	7.9
Dibenzo(a,h)anthracene, mg/kg dw	3.4	2.9J	1.1	0.26J	<7.8
Surrogate-2FP (CL 25-121)	66 %	*F33	60 %	72 %	64 %
Surrogate-PHL (CL 24-113)	59 %	*F33	54 %	75 %	78 %
Surrogate-NBZ (CL 23-120)	54 %	*F33	60 %	78 %	68 %
Surrogate-TBP (CL 19-122)	70 %	*F33	71 %	58 %	83 %
Surrogate-TPH (CL 18-137)	159 %	*F33	179 %	119 %	120 %
Surrogate-FBP (CL 30-115)	65 %	*F33	65 %	75 %	61 %
Date Extracted	10.17.91	10.17.91	10.17.91	10.17.91	10.17.91
Date Analyzed	10.21-22	10.23-25	10.21-25	10.21-25	10.21-25
Arsenic (7060)					
Arsenic, mg/kg dw	6.5	23	4.9	15	2.5
Date Analyzed	10.29.91	10.30.91	10.29.91	10.30.91	10.29.91

Laboratory locations in Savannah, GA • Tallahassee, FL • Mobile, AL • Deerfield Beach, FL • Tampa, FL

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S1-36592

Received: 16 OCT 91

Ms. Sandra Watson
Southern Wood Piedmont (WI)
P.O. Box 5477, I-85 and Sigsbee Rd.
Spartanburg, SC 29304

CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
36592-1	LF1AUS/9663A	10-15-91
36592-2	LF1ALS/9663B	10-15-91
36592-3	LF1DUS/9666A	10-15-91
36592-4	LF1DLS/9666B	10-15-91
36592-5	LF1CUS/9665A	10-15-91

PARAMETER	36592-1	36592-2	36592-3	36592-4	36592-5
Chromium (6010)					
Chromium, mg/kg dw	6.2	14	5.5	1.9	12
Date Analyzed	10.30.91	10.30.91	10.30.91	10.30.91	10.30.91
Copper (6010)					
Copper, mg/kg dw	37	70	22	12	39
Date Analyzed	10.30.91	10.30.91	10.30.91	10.30.91	10.30.91
Nitrogen Series					
Total Kjeldahl Nitrogen-N, mg/kg dw	1500	980	1200	290	1100
Nitrate + Nitrite-N, mg/kg dw	<5.8	<5.6	14	6.3	7.0
Total Nitrogen, mg/kg dw	1500	980	1200	300	1100
Date Analyzed	10.30.91	10.30.91	10.30.91	10.30.91	10.30.91
Total Phosphorus (365.1)					
Total Phosphorus, mg/kg dw	730	980	700	240	1000
Date Analyzed	10.31.91	10.31.91	10.31.91	10.31.91	10.31.91
Total Organic Carbon (415.1)					
Total Organic Carbon , mg/kg dw	33000	24000	21000	5000	35000
Date Analyzed	10.17.91	10.17.91	10.17.91	10.17.91	10.17.91
Chloride (325.2)					
Chloride (325.2), mg/kg dw	<23	<22	<22	<22	<24
Date Analyzed	10.30.91	10.30.91	10.30.91	10.30.91	10.30.91

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36592-2	LF1ALS/9663B	10-15-91
36592-3	LF1DUS/9666A	10-15-91
36592-4	LF1DLS/9666B	10-15-91
36592-5	LF1CUS/9665A	10-15-91

PARAMETER	36592-1	36592-2	36592-3	36592-4	36592-5
pH in Soil (9045)					
pH-soil (9045), units	6.3	6.9	6.3	6.7	6.6
Date Analyzed	10.17.91	10.17.91	10.17.91	10.17.91	10.17.91
Percent Solids, %	86	89	92	94	84

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
36592-6	LF1CLS/9665B	10-15-91
36592-7	LF1EUS/9667A	10-15-91
36592-8	LF1ELS/9667B	10-15-91
36592-9	LF1BUS/9664A	10-15-91
36592-10	LF1BLS/9664B	10-15-91

PARAMETER	36592-6	36592-7	36592-8	36592-9	36592-10
Semi-Volatiles (8270)					
Naphthalene, mg/kg dw	0.23J	4.7J	0.13J	1.1J	0.27J
1-Methylnaphthalene, mg/kg dw	0.097J	0.56J	0.063J	0.27J	0.11J
2-Methylnaphthalene, mg/kg dw	0.14J	7.7	0.11J	0.93J	0.18J
1,1-Biphenyl, mg/kg dw	0.040J	2.1J	0.028J	0.23J	0.066J
Acenaphthylene, mg/kg dw	0.58	1.4J	0.35	1.7J	4.1J
Acenaphthene, mg/kg dw	0.15J	0.78J	0.070J	0.52J	1.1J
Dibenzofuran, mg/kg dw	0.18J	9.3	0.14J	1.2J	0.31J
Fluorene, mg/kg dw	0.20J	25	0.18J	2.6J	1.1J
Phenanthrene, mg/kg dw	1.4	34	0.98	6.4	17
Anthracene, mg/kg dw	2.3	350	1.8	23	16
Carbazole, mg/kg dw	0.97	98	1.1	7.0	5.4J
Pyrene, mg/kg dw	10	25	4.2	18	62
Benzo(a)Anthracene, mg/kg dw	5.7	9.6	2.0	10	31
Chrysene, mg/kg dw	8.9	3.6J	2.9	13	36
Benzo(a)pyrene, mg/kg dw	4.1	11	1.5	11	21
Benzo(g,h,i)perylene, mg/kg dw	1.8	4.3J	0.60	4.6	9.1
Pentachlorophenol, mg/kg dw	1.3J	<37	0.70J	1.6J	4.3J
Fluoranthene, mg/kg dw	12	22	3.7	17	72
2-Chlorophenol, mg/kg dw	<0.36	<7.4	<0.35	<3.7	<7.4

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Spartanburg, SC 29304

CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
36592-6	LF1CLS/9665B	10-15-91
36592-7	LF1EUS/9667A	10-15-91
36592-8	LF1ELS/9667B	10-15-91
36592-9	LF1BUS/9664A	10-15-91
36592-10	LF1BLS/9664B	10-15-91

PARAMETER	36592-6	36592-7	36592-8	36592-9	36592-10
Phenol, mg/kg dw	<0.36	<7.4	<0.35	<3.7	<7.4
2,4-Dimethylphenol, mg/kg dw	0.050J	0.14J	<0.35	<3.7	0.057J
Trichlorophenols, mg/kg dw	<0.36	<7.4	<0.35	<3.7	<7.4
Cresol (ortho), mg/kg dw	<0.36	<7.4	<0.35	<3.7	<7.4
Cresol m & p, mg/kg dw	<0.36	<7.4	<0.35	<3.7	0.047J
p-Chloro-m-cresol, mg/kg dw	<0.36	<7.4	<0.35	<3.7	<7.4
Tetrachlorophenols, mg/kg dw	0.13J	<7.4	0.045J	0.31J	0.44J
2,4-Dinitrophenol, mg/kg dw	<1.8	<37	<1.8	<19	<37
Benzo(b,k)fluoranthene, mg/kg dw	18	30	4.4	31	61
Indeno(1,2,3-cd)pyrene, mg/kg dw	1.9	5.3J	0.70	5.6	12
Dibenzo(a,h)anthracene, mg/kg dw	0.58	<7.4	<0.35	<3.7	2.3J
Surrogate-2FP (CL 25-121)	54 %	72 %	73 %	80 %	48 %
Surrogate-PHL (CL 24-113)	47 %	81 %	54 %	83 %	36 %
Surrogate-NBZ (CL 23-120)	56 %	76 %	66 %	80 %	36 %
Surrogate-TBP (CL 19-122)	64 %	168 %	77 %	99 %	50 %
Surrogate-TPH (CL 18-137)	93 %	127 %	111 %	156 %	137 %
Surrogate-FBP (CL 30-115)	60 %	71 %	87 %	84 %	46 %
Date Extracted	10.17.91	10.17.91	10.17.91	10.17.91	10.17.91
Date Analyzed	10.22-23	10.22-25	10.22-25	10.22/25	10.21/22
Arsenic (7060)					
Arsenic, mg/kg dw	4.9	6.9	9.9	7.9	13
Date Analyzed	10.30.91	10.29.91	10.30.91	10.31.91	10.30.91

Laboratory locations in Savannah, GA • Tallahassee, FL • Mobile, AL • Deerfield Beach, FL • Tampa, FL

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Spartanburg, SC 29304

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Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
36592-6	LF1CLS/9665B	10-15-91
36592-7	LF1EUS/9667A	10-15-91
36592-8	LF1ELS/9667B	10-15-91
36592-9	LF1BUS/9664A	10-15-91
36592-10	LF1BLS/9664B	10-15-91

PARAMETER	36592-6	36592-7	36592-8	36592-9	36592-10
Chromium (6010)					
Chromium, mg/kg dw	5.4	6.7	2.8	8.2	7.9
Date Analyzed	10.30.91	10.30.91	10.31.91	10.30.91	10.30.91
Copper (6010)					
Copper, mg/kg dw	38	44	17	30	35
Date Analyzed	10.30.91	10.30.91	10.30.91	10.30.91	10.30.91
Nitrogen Series					
Total Kjeldahl Nitrogen-N, mg/kg dw	1000	1600	300	5000	1000
Nitrate + Nitrite-N, mg/kg dw	<5.4	<5.7	<5.3	<5.7	<5.7
Total Nitrogen, mg/kg dw	1000	1600	300	5000	1000
Date Analyzed	10.30.91	10.30.91	10.30.91	10.30.91	10.30.91
Total Phosphorus (365.1)					
Total Phosphorus, mg/kg dw	520	1300	270	920	460
Date Analyzed	10.31.91	10.31.91	10.31.91	10.31.91	10.31.91
Total Organic Carbon (415.1)					
Total Organic Carbon , mg/kg dw	16000	31000	5900	27000	22000
Date Analyzed	10.17.91	10.17.91	10.17.91	10.17.91	10.17.91
Chloride (325.2)					
Chloride (325.2), mg/kg dw	<22	<23	<21	29	<23
Date Analyzed	10.30.91	10.30.91	10.30.91	10.30.91	10.30.91

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36592-8	LF1ELS/9667B	10-15-91
36592-9	LF1BUS/9664A	10-15-91
36592-10	LF1BLS/9664B	10-15-91

PARAMETER	36592-6	36592-7	36592-8	36592-9	36592-10
pH in Soil (9045)					
pH-soil (9045), units	7.6	7.0	7.4	7.1	7.4
Date Analyzed	10.17.91	10.17.91	10.17.91	10.17.91	10.17.91
Percent Solids, %	92	88	95	88	88

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
36592-11	LF2BLS/9669B	10-15-91
36592-12	LF2BUS/9669A	10-15-91
36592-13	LF2DUS/9671A	10-15-91
36592-14	LF2DLS/9671B	10-15-91
36592-15	LF2EUS/9672A	10-15-91

PARAMETER	36592-11	36592-12	36592-13	36592-14	36592-15
Semi-Volatiles (8270)					
Naphthalene, mg/kg dw	1.4J	11J	3.4J	14J	3.5J
1-Methylnaphthalene, mg/kg dw	0.29J	0.59J	0.26J	1.6J	0.26J
2-Methylnaphthalene, mg/kg dw	0.88J	16J	4.4J	8.0J	5.1
1,1-Biphenyl, mg/kg dw	0.18J	2.1J	0.64J	2.3J	0.66J
Acenaphthylene, mg/kg dw	2.4J	5.0J	3.7J	5.4J	3.8J
Acenaphthene, mg/kg dw	1.6J	2.5J	1.3J	92	1.0J
Dibenzofuran, mg/kg dw	1.7J	20	5.0J	21J	5.1
Fluorene, mg/kg dw	2.8J	62	14	59J	13
Phenanthrene, mg/kg dw	13	87	20	91	21
Anthracene, mg/kg dw	19	310	75	170	64
Carbazole, mg/kg dw	6.8	170	34	46J	37
Pyrene, mg/kg dw	25	64	17	980	19
Benzo(a)Anthracene, mg/kg dw	12	25	8.6	130	11
Chrysene, mg/kg dw	15	31	11	150	12
Benzo(a)pyrene, mg/kg dw	9.2	23	12	61J	12
Benzo(g,h,i)perylene, mg/kg dw	5.5	10J	7.0J	6.7J	5.1
Pentachlorophenol, mg/kg dw	10	<98	6.4J	150J	4.1J
Fluoranthene, mg/kg dw	30	78	19	520	20
2-Chlorophenol, mg/kg dw	<3.7	<20	<8.0	<82	<3.9

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36592-12	LF2BUS/9669A	10-15-91
36592-13	LF2DUS/9671A	10-15-91
36592-14	LF2DLS/9671B	10-15-91
36592-15	LF2EUS/9672A	10-15-91

PARAMETER	36592-11	36592-12	36592-13	36592-14	36592-15
Phenol, mg/kg dw	<3.7	<20	<8.0	2.2J	<3.9
2,4-Dimethylphenol, mg/kg dw	0.037J	<20	<8.0	<82	0.081J
Trichlorophenols, mg/kg dw	0.048J	<20	<8.0	<82	<3.9
Cresol (ortho), mg/kg dw	0.040J	<20	<8.0	<82	0.022J
Cresol m & p, mg/kg dw	<3.7	<20	<8.0	<82	0.087J
p-Chloro-m-cresol, mg/kg dw	<3.7	<20	<8.0	<82	<3.9
Tetrachlorophenols, mg/kg dw	0.52J	<20	0.34J	3.5J	0.47J
2,4-Dinitrophenol, mg/kg dw	<19	<98	<40	<410	<20
Benzo(b,k)fluoranthene, mg/kg dw	21	55	26	190	30
Indeno(1,2,3-cd)pyrene, mg/kg dw	6.8	13J	8.8	18J	7.3
Dibenzo(a,h)anthracene, mg/kg dw	2.6J	3.4J	2.0J	6.6J	2.5J
Surrogate-2FP (CL 25-121)	57 %	63 %	54 %	31 %	59 %
Surrogate-PHL (CL 24-113)	45 %	64 %	48 %	37 %	67 %
Surrogate-NBZ (CL 23-120)	44 %	60 %	50 %	34 %	57 %
Surrogate-TBP (CL 19-122)	59 %	104 %	65 %	164 %	51 %
Surrogate-TPH (CL 18-137)	142 %	210 %	140 %	84 %	127 %
Surrogate-FBP (CL 30-115)	57 %	64 %	56 %	58 %	59 %
Date Extracted	10.17.91	10.17.91	10.17.91	10.17.91	10.17.91
Date Analyzed	10.21/22	10.21/22	10.21/22	10.23/25	10.21/25
Arsenic (7060)					
Arsenic, mg/kg dw	84	8.3	6.4	22	6.7
Date Analyzed	10.30.91	10.29.91	10.29.91	10.30.91	10.29.91

Laboratory locations in Savannah, GA • Tallahassee, FL • Mobile, AL • Deerfield Beach, FL • Tampa, FL

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REPORT OF RESULTS

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36592-12	LF2BUS/9669A	10-15-91
36592-13	LF2DUS/9671A	10-15-91
36592-14	LF2DLS/9671B	10-15-91
36592-15	LF2EUS/9672A	10-15-91

PARAMETER	36592-11	36592-12	36592-13	36592-14	36592-15
Chromium (6010)					
Chromium, mg/kg dw	100	11	7.1	21	7.8
Date Analyzed	10.30.91	10.30.91	10.30.91	10.30.91	10.30.91
Copper (6010)					
Copper, mg/kg dw	140	44	35	150	39
Date Analyzed	10.30.91	10.30.91	10.30.91	10.30.91	10.30.91
Nitrogen Series					
Total Kjeldahl Nitrogen-N, mg/kg dw	840	1900	1200	4900	1700
Nitrate + Nitrite-N, mg/kg dw	12	<5.8	<6.0	<6.3	7.2
Total Nitrogen, mg/kg dw	850	1900	1200	4900	1700
Date Analyzed	10.30.91	10.30.91	10.30.91	10.30.91	10.30.91
Total Phosphorus (365.1)					
Total Phosphorus, mg/kg dw	440	760	490	610	200
Date Analyzed	10.31.91	10.31.91	10.31.91	10.31.91	10.31.91
Total Organic Carbon (415.1)					
Total Organic Carbon , mg/kg dw	21000	34000	32000	47000	32000
Date Analyzed	10.17.91	10.17.91	10.17.91	10.17.91	10.17.91
Chloride (325.2)					
Chloride (325.2), mg/kg dw	<23	<23	46	100	<24
Date Analyzed	10.30.91	10.30.91	10.30.91	10.30.91	10.30.91

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36592-13	LF2DUS/9671A	10-15-91
36592-14	LF2DLS/9671B	10-15-91
36592-15	LF2EUS/9672A	10-15-91

PARAMETER	36592-11	36592-12	36592-13	36592-14	36592-15
pH in Soil (9045)					
pH-soil (9045), units	7.5	6.8	6.9	7.1	6.7
Date Analyzed	10.17.91	10.17.91	10.17.91	10.17.91	10.17.91
Percent Solids, %	89	86	83	80	85

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LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
36592-16	LF2ELS/9672B	10-15-91
36592-17	LF2AUS/9668A	10-15-91
36592-18	LF2ALS/9668B	10-15-91
36592-19	LF2CUS/9670A	10-15-91
36592-20	LF2CLS/9670B	10-15-91

PARAMETER	36592-16	36592-17	36592-18	36592-19	36592-20
Semi-Volatiles (8270)					
Naphthalene, mg/kg dw	2.5J	2.2J	0.36J	4.3J	1.9J
1-Methylnaphthalene, mg/kg dw	0.41J	0.22J	0.13J	0.46J	0.34J
2-Methylnaphthalene, mg/kg dw	2.4J	2.1J	0.22J	4.6J	0.85J
1,1-Biphenyl, mg/kg dw	0.59J	0.37J	0.078J	0.91J	0.27J
Acenaphthylene, mg/kg dw	5.0J	5.2	2.4J	4.7J	4.3J
Acenaphthene, mg/kg dw	8.1J	1.0J	0.62J	5.5J	1.7J
Dibenzofuran, mg/kg dw	5.6J	2.6J	0.49J	8.4	2.2J
Fluorene, mg/kg dw	19J	7.1	1.2J	26	7.2J
Phenanthrene, mg/kg dw	45	12	4.1	38	21
Anthracene, mg/kg dw	93	41	9.5	120	84
Carbazole, mg/kg dw	28J	18	3.1J	60	15
Pyrene, mg/kg dw	310	21	25	35	74
Benzo(a)Anthracene, mg/kg dw	63	13	12	17	28
Chrysene, mg/kg dw	69	15	18	20	41
Benzo(a)pyrene, mg/kg dw	29J	16	9.6	20	27
Benzo(g,h,i)perylene, mg/kg dw	8.3J	7.2	3.7J	6.0J	5.6J
Pentachlorophenol, mg/kg dw	19J	3.8J	2.8J	4.6J	22J
Fluoranthene, mg/kg dw	350	20	24	37	83
2-Chlorophenol, mg/kg dw	<37	<4.0	<4.1	<7.6	<9.3

Laboratory locations in Savannah, GA • Tallahassee, FL • Mobile, AL • Deerfield Beach, FL • Tampa, FL

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S1-36592

Received: 16 OCT 91

Ms. Sandra Watson
Southern Wood Piedmont (WI)
P.O. Box 5477, I-85 and Sigsbee Rd.
Spartanburg, SC 29304

CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
36592-16	LF2ELS/9672B	10-15-91
36592-17	LF2AUS/9668A	10-15-91
36592-18	LF2ALS/9668B	10-15-91
36592-19	LF2CUS/9670A	10-15-91
36592-20	LF2CLS/9670B	10-15-91

PARAMETER	36592-16	36592-17	36592-18	36592-19	36592-20
Phenol, mg/kg dw	<37	<4.0	<4.1	<7.6	<9.3
2,4-Dimethylphenol, mg/kg dw	<37	0.092J	0.082J	0.087J	0.12J
Trichlorophenols, mg/kg dw	<37	<4.0	<4.1	<7.6	<9.3
Cresol (ortho), mg/kg dw	<37	0.024J	<4.1	0.028J	0.026J
Cresol m & p, mg/kg dw	<37	0.10J	0.070J	<7.6	<9.3
p-Chloro-m-cresol, mg/kg dw	<37	<4.0	<4.1	<7.6	<9.3
Tetrachlorophenols, mg/kg dw	1.1J	0.48J	0.25J	<7.6	0.85J
2,4-Dinitrophenol, mg/kg dw	<190	<20	<21	<38	<46
Benzo(b,k)fluoranthene, mg/kg dw	90	34	32	37	81
Indeno(1,2,3-cd)pyrene, mg/kg dw	12J	9.2	5.2	9.1	9.8
Dibenzo(a,h)anthracene, mg/kg dw	5.1J	2.0J	1.2J	3.4J	4.0J
Surrogate-2FP (CL 25-121)	57 %	72 %	56 %	65 %	58 %
Surrogate-PHL (CL 24-113)	66 %	74 %	31 %	67 %	54 %
Surrogate-NBZ (CL 23-120)	53 %	65 %	52 %	60 %	60 %
Surrogate-TBP (CL 19-122)	173 %	81 %	57 %	112 %	86 %
Surrogate-TPH (CL 18-137)	199 %	211 %	137 %	195 %	189 %
Surrogate-FBP (CL 30-115)	67 %	79 %	61 %	68 %	62 %
Date Extracted	10.17.91	10.17.91	10.17.91	10.17.91	10.17.91
Date Analyzed	10.21/23	10.21/25	10.21/25	10.21/25	10.21.91
Arsenic (7060)					
Arsenic, mg/kg dw	9.5	7.9	18	5.6	14
Date Analyzed	10.30.91	10.30.91	10.30.91	10.29.91	10.30.91

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
36592-16	LF2ELS/9672B	10-15-91
36592-17	LF2AUS/9668A	10-15-91
36592-18	LF2ALS/9668B	10-15-91
36592-19	LF2CUS/9670A	10-15-91
36592-20	LF2CLS/9670B	10-15-91

PARAMETER	36592-16	36592-17	36592-18	36592-19	36592-20
Chromium (6010)					
Chromium, mg/kg dw	15	15	12	6.2	9.8
Date Analyzed	10.30.91	10.30.91	10.30.91	10.30.91	10.30.91
Copper (6010)					
Copper, mg/kg dw	51	42	120	41	62
Date Analyzed	10.30.91	10.30.91	10.30.91	10.30.91	10.30.91
Nitrogen Series					
Total Kjeldahl Nitrogen-N, mg/kg dw	1300	1300	1900	1600	1100
Nitrate + Nitrite-N, mg/kg dw	<5.6	6.9	6.1	<5.8	<5.7
Total Nitrogen, mg/kg dw	1300	1300	1900	1600	1100
Date Analyzed	10.30.91	10.30.91	10.30.91	10.30.91	10.30.91
Total Phosphorus (365.1)					
Total Phosphorus, mg/kg dw	200	580	470	580	280
Date Analyzed	10.31.91	10.31.91	10.31.91	10.31.91	10.31.91
Total Organic Carbon (415.1)					
Total Organic Carbon , mg/kg dw	23000	26000	21000	26000	28000
Date Analyzed	10.17.91	10.17.91	10.17.91	10.18.91	10.18.91
Chloride (325.2)					
Chloride (325.2), mg/kg dw	<22	<24	<24	<23	<22
Date Analyzed	10.30.91	10.30.91	10.30.91	10.30.91	10.30.91

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36592-19	LF2CUS/9670A	10-15-91
36592-20	LF2CLS/9670B	10-15-91

PARAMETER	36592-16	36592-17	36592-18	36592-19	36592-20
pH in Soil (9045)					
pH-soil (9045), units	6.9	6.7	6.8	6.4	6.5
Date Analyzed	10.17.91	10.17.91	10.17.91	10.17.91	10.17.91
Percent Solids, %	89	83	82	86	88

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
36592-21	Detection Limits
36592-22	Method Blank (MB) Result
36592-23	Lab Control Standard (LCS) Result
36592-24	LCS Expected Value
36592-25	LCS % Recovery

PARAMETER	36592-21	36592-22	36592-23	36592-24	36592-25
Semi-Volatiles (8270)					
Naphthalene, mg/kg dw	0.33	<0.33	2.51	3.30	76 %
1-Methylnaphthalene, mg/kg dw	0.33	<0.33	---	---	---
2-Methylnaphthalene, mg/kg dw	0.33	<0.33	---	---	---
1,1-Biphenyl, mg/kg dw	0.33	<0.33	---	---	---
Acenaphthylene, mg/kg dw	0.33	<0.33	2.87	3.30	87 %
Acenaphthene, mg/kg dw	0.33	<0.33	2.41	3.30	73 %
Dibenzofuran, mg/kg dw	0.33	<0.33	---	---	---
Fluorene, mg/kg dw	0.33	<0.33	---	---	---
Phenanthrene, mg/kg dw	0.33	<0.33	2.48	3.30	75 %
Anthracene, mg/kg dw	0.33	<0.33	2.64	3.30	80 %
Carbazole, mg/kg dw	0.33	<0.33	---	---	---
Pyrene, mg/kg dw	0.33	<0.33	---	---	---
Benzo(a)Anthracene, mg/kg dw	0.33	<0.33	2.57	3.30	78 %
Chrysene, mg/kg dw	0.33	<0.33	2.28	3.30	69 %
Benzo(a)pyrene, mg/kg dw	0.33	<0.33	2.77	3.30	84 %
Benzo(g,h,i)perylene, mg/kg dw	0.33	<0.33	---	---	---
Pentachlorophenol, mg/kg dw	1.7	<1.7	1.06	3.30	32 %
Fluoranthene, mg/kg dw	0.33	<0.33	2.41	3.30	73 %
2-Chlorophenol, mg/kg dw	0.33	<0.33	2.87	3.30	87 %

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
36592-21	Detection Limits
36592-22	Method Blank (MB) Result
36592-23	Lab Control Standard (LCS) Result
36592-24	LCS Expected Value
36592-25	LCS % Recovery

PARAMETER	36592-21	36592-22	36592-23	36592-24	36592-25
Phenol, mg/kg dw	0.33	<0.33	3.27	3.30	99 %
2,4-Dimethylphenol, mg/kg dw	0.33	<0.33	2.77	3.30	84 %
Trichlorophenols, mg/kg dw	0.33	<0.33	2.11	3.30	64 %
Cresol (ortho), mg/kg dw	0.33	<0.33	---	---	---
Cresol m & p, mg/kg dw	0.33	<0.33	---	---	---
p-Chloro-m-cresol, mg/kg dw	0.33	<0.33	2.81	3.30	85 %
Tetrachlorophenols, mg/kg dw	0.33	<0.33	2.08	3.30	63 %
2,4-Dinitrophenol, mg/kg dw	1.7	<1.7	0.99	3.30	30 %
Benzo(b,k)fluoranthene, mg/kg dw	0.33	<0.33	2.64	3.30	80 %
Indeno(1,2,3-cd)pyrene, mg/kg dw	0.33	<0.33	3.23	3.30	98 %
Dibenzo(a,h)anthracene, mg/kg dw	0.33	<0.33	2.84	3.30	86 %
Surrogate-2FP (CL 25-121)	---	72 %	75 %	---	---
Surrogate-PHL (CL 24-113)	---	73 %	75 %	---	---
Surrogate-NBZ (CL 23-120)	---	63 %	64 %	---	---
Surrogate-TBP (CL 19-122)	---	64 %	62 %	---	---
Surrogate-TPH (CL 18-137)	---	74 %	70 %	---	---
Surrogate-FBP (CL 30-115)	---	64 %	68 %	---	---
Date Extracted	---	10.17.91	10.17.91	---	---
Date Analyzed	---	10.21/25	10.21.91	---	---
Arsenic (7060)					
Arsenic, mg/kg dw	1.0	<1.0	9.7	9.9	98 %
Date Analyzed	---	10.29.91	10.31.91	---	---

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CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
36592-21	Detection Limits
36592-22	Method Blank (MB) Result
36592-23	Lab Control Standard (LCS) Result
36592-24	LCS Expected Value
36592-25	LCS % Recovery

PARAMETER	36592-21	36592-22	36592-23	36592-24	36592-25
Copper (6010)					
Copper, mg/kg dw	2.5	<2.5	15.0	15.2	99 %
Date Analyzed	---	10.30.91	10.30.91	---	---
Chromium (6010)					
Chromium, mg/kg dw	1.0	<1.0	29.6	31.5	94 %
Date Analyzed	---	10.30.91	10.30.91	---	---
Nitrogen Series					
Total Kjeldahl Nitrogen-N, mg/kg dw	25	<25	1262	1375	92 %
Nitrate + Nitrite-N, mg/kg dw	5.0	<5.0	21.6	20	108 %
Total Nitrogen, mg/kg dw	30	<30	---	---	---
Date Analyzed	---	10.30.91	10.30.91	---	---
Total Phosphorus (365.1)					
Total Phosphorus, mg/kg dw	25	<25	485	569	85 %
Date Analyzed	---	10.31.91	10.31.91	---	---
Total Organic Carbon (415.1)					
Total Organic Carbon , mg/kg dw	50	<50	284760	226000	126 %
Date Analyzed	---	10.18.91	10.18.91	---	---
Chloride (325.2)					
Chloride (325.2), mg/kg dw	20	<20	99.6	100	100 %
Date Analyzed	---	10.30.91	10.30.91	---	---
pH in Soil (9045)					
pH-soil (9045), units	---	---	---	---	---

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
36592-26	LCS % Recovery Limits
36592-27	Matrix Spike (MS) Result/Duplicate
36592-28	MS Expected Value
36592-29	MS % Recovery/Duplicate
36592-30	MS % Recovery Limits

PARAMETER	36592-26	36592-27	36592-28	36592-29	36592-30
Semi-Volatiles (8270)					
Naphthalene, mg/kg dw	21-133 %	2.08/2.74	3.30	63/83 %	21-133 %
Acenaphthylene, mg/kg dw	33-145 %	2.61/2.18	3.30	79/66 %	33-145 %
Acenaphthene, mg/kg dw	47-145 %	5.05/2.15	3.30	153/65 %	47-145 %
Phenanthrene, mg/kg dw	54-120 %	*F61	3.30	*F61	---
Anthracene, mg/kg dw	27-133 %	*F61	3.30	*F61	---
Benzo(a)Anthracene, mg/kg dw	33-143 %	*F61	3.30	*F61	---
Chrysene, mg/kg dw	17-168 %	*F61	3.30	*F61	---
Benzo(a)pyrene, mg/kg dw	17-163 %	*F61	3.30	*F61	---
Pentachlorophenol, mg/kg dw	14-176 %	3.60/1.52	3.30	109/46	14-176 %
Fluoranthene, mg/kg dw	26-137 %	*F61	3.30	*F61	---
2-Chlorophenol, mg/kg dw	23-134 %	2.24/2.34	3.30	68/71 %	23-134 %
Phenol, mg/kg dw	5-112 %	2.21/2.24	3.30	67/68 %	5-112 %
2,4-Dimethylphenol, mg/kg dw	32-119 %	2.11/2.34	3.30	64/71 %	32-119 %
Trichlorophenols, mg/kg dw	37-144 %	2.05/2.15	3.30	62/65 %	37-144 %
p-Chloro-m-cresol, mg/kg dw	22-147 %	2.08/2.34	3.30	63/71 %	22-147 %
Tetrachlorophenols, mg/kg dw	10-130 %	0.40/1.85	3.30	12/56 %	10-130 %
2,4-Dinitrophenol, mg/kg dw	10-191 %	0.79/0.33	3.30	24/10 %	10-191 %
Benzo(b,k)fluoranthene, mg/kg dw	24-159 %	*F61	3.30	*F61	---

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Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
36592-26	LCS % Recovery Limits
36592-27	Matrix Spike (MS) Result/Duplicate
36592-28	MS Expected Value
36592-29	MS % Recovery/Duplicate
36592-30	MS % Recovery Limits

PARAMETER	36592-26	36592-27	36592-28	36592-29	36592-30
Indeno(1,2,3-cd)pyrene, mg/kg dw	10-171 %	5.12/2.90	3.30	155/88 %	10-171 %
Dibenzo(a,h)anthracene, mg/kg dw	10-227 %	1.98/1.75	3.30	60/53 %	10-227 %
Surrogate-2FP (CL 25-121)	---	69/69 %	---	---	---
Surrogate-PHL (CL 24-113)	---	70/70 %	---	---	---
Surrogate-NBZ (CL 23-120)	---	56/63 %	---	---	---
Surrogate-TBP (CL 19-122)	---	220/72 %	---	---	---
Surrogate-TPH (CL 18-137)	---	190/165 %	---	---	---
Surrogate-FBP (CL 30-115)	---	64/65 %	---	---	---
Date Extracted	---	10.17.91	---	---	---
Date Analyzed	---	10.21/25	---	---	---
Arsenic (7060)					
Arsenic, mg/kg dw	70-130 %	5.6/3.7	5.2	108/71 %	75-125 %
Date Analyzed	---	10.31.91	---	---	---
Copper (6010)					
Copper, mg/kg dw	70-130 %	115/112	110	105/102 %	75-125 %
Date Analyzed	---	10.30.91	---	---	---
Chromium (6010)					
Chromium, mg/kg dw	70-130 %	108/110	111	97/99 %	75-125 %
Date Analyzed	---	10.30.91	---	---	---

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
36592-26	LCS % Recovery Limits
36592-27	Matrix Spike (MS) Result/Duplicate
36592-28	MS Expected Value
36592-29	MS % Recovery/Duplicate
36592-30	MS % Recovery Limits

PARAMETER	36592-26	36592-27	36592-28	36592-29	36592-30
Nitrogen Series					
Total Kjeldahl Nitrogen-N, mg/kg dw	75-125 %	151/103	250	60/41 %	75-125 %
Nitrate + Nitrite-N, mg/kg dw	90-110 %	25.5/25.0	20	128/125 %	75-125 %
Date Analyzed	---	10.30.91	---	---	---
Total Phosphorus (365.1)					
Total Phosphorus, mg/kg dw	60-140 %	142/95	250	57/38 %	75-125 %
Date Analyzed	---	10.31.91	---	---	---
Total Organic Carbon (415.1)					
Total Organic Carbon , mg/kg dw	60-140 %	---	---	---	---
Date Analyzed	---	---	---	---	---
Chloride (325.2)					
Chloride (325.2), mg/kg dw	90-110 %	120/120	100	120/120 %	75-125 %
pH in Soil (9045)					
pH-soil (9045), units	---	---	---	---	---

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
36592-31	MW-6/9673	10-15-91
36592-32	MW-7/9674	10-15-91
36592-33	MW-8/9675	10-15-91

PARAMETER	36592-31	36592-32	36592-33
Copper (6010)			
Copper, mg/l	<0.025	<0.025	<0.025
Date Analyzed	10.23.91	10.23.91	10.23.91
Chromium (6010)			
Chromium, mg/l	<0.010	<0.010	<0.010
Date Analyzed	10.23.91	10.23.91	10.23.91
Arsenic (7060)			
Arsenic, mg/l	<0.010	<0.010	<0.010
Date Analyzed	10.29.91	10.29.91	10.31.91
Suspended Solids (160.2)			
Suspended Solids, mg/l	34	20	<5.0
Date Analyzed	10.17.91	10.17.91	10.17.91

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LOG NO: S1-36592

Received: 16 OCT 91

Ms. Sandra Watson
Southern Wood Piedmont (WI)
P.O. Box 5477, I-85 and Sigsbee Rd.
Spartanburg, SC 29304

CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
36592-34	RB-2	10-15-91
36592-35	FB-2	10-15-91

PARAMETER	36592-34	36592-35
Chromium (6010)		
Chromium, mg/l	<0.010	<0.010
Date Analyzed	10.23.91	10.23.91
Copper (6010)		
Copper, mg/l	<0.025	<0.025
Date Analyzed	10.24.91	10.23.91
Arsenic (7060)		
Arsenic, mg/l	<0.010	<0.010
Date Analyzed	10.29.91	10.29.91

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
36592-34	RB-2	10-15-91
36592-35	FB-2	10-15-91

PARAMETER	36592-34	36592-35
Semi-Volatiles (8270)		
Naphthalene, ug/l	<10	<10
1-Methylnaphthalene, ug/l	<10	<10
2-Methylnaphthalene, ug/l	<10	<10
1,1-Biphenyl, ug/l	<10	<10
Acenaphthylene, ug/l	<10	<10
Acenaphthene, ug/l	<10	<10
Dibenzofuran, ug/l	<10	<10
Fluorene, ug/l	<10	<10
Phenanthrene, ug/l	<10	<10
Anthracene, ug/l	<10	<10
Carbazole, ug/l	<10	<10
Pyrene, ug/l	<10	<10
Benzo(a)Anthracene, ug/l	<10	<10
Chrysene, ug/l	<10	<10
Benzo(a)pyrene, ug/l	<10	<10
Benzo(g,h,i)perylene, ug/l	<10	<10
Pentachlorophenol, ug/l	<50	<50
Fluoranthene, ug/l	<10	<10
2-Chlorophenol, ug/l	<10	<10
Phenol, ug/l	<10	<10
2,4-Dimethylphenol, ug/l	<10	<10
Trichlorophenols, ug/l	<10	<10

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
36592-34	RB-2	10-15-91
36592-35	FB-2	10-15-91

PARAMETER	36592-34	36592-35
Cresol (ortho), ug/l	<10	<10
Cresol m & p, ug/l	<10	<10
p-Chloro-m-cresol, ug/l	<10	<10
Tetrachlorophenols, ug/l	<10	<10
2,4-Dinitrophenol, ug/l	<50	<50
Benzo(b,k)fluoranthene, ug/l	<10	<10
Indeno(1,2,3-cd)pyrene, ug/l	<10	<10
Dibenzo(a,h)anthracene, ug/l	<10	<10
Surrogate-2FP (CL 21-110)	49 %	48 %
Surrogate-PHL (CL 10-110)	39 %	39 %
Surrogate-NBZ (CL 35-114)	93 %	86 %
Surrogate-TBP (CL 10-123)	61 %	30 %
Surrogate-TPH (CL 33-141)	84 %	77 %
Surrogate-FBP (CL 43-116)	77 %	72 %
Date Extracted	10.22.91	10.22.91
Date Analyzed	10.23.91	10.23.91
Nitrogen Series		
Total Kjeldahl Nitrogen-N, mg/l	<0.10	<0.10
Nitrate + Nitrite-N, mg/l	0.10	<0.050
Total Nitrogen, mg/l	<0.20	<0.15
Date Analyzed	10.23.91	10.23.91
Total Phosphorus (365.1)		
Total Phosphorus, mg/l	<0.10	<0.10
Date Analyzed	10.23.91	10.23.91

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
36592-34	RB-2	10-15-91
36592-35	FB-2	10-15-91

PARAMETER	36592-34	36592-35
Chloride (325.2)		
Chloride (325.2), mg/l	<1.0	<1.0
Date Analyzed	10.22.91	10.22.91
Total Organic Carbon (415.1)		
Total Organic Carbon , mg/l	2.4	2.1
Date Analyzed	10.16.91	10.16.91

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
36592-36	9677	10-15-91

PARAMETER	36592-36
K001 (Method 8270)	
2-Chlorophenol, ug/l	<10
Phenol, ug/l	<10
2,4-Dimethylphenol, ug/l	<10
Trichlorophenols, ug/l	<10
p-Chloro-m-cresol, ug/l	<10
Tetrachlorophenols, ug/l	<10
2,4-Dinitrophenol, ug/l	<50
Pentachlorophenol, ug/l	<50
Naphthalene, ug/l	<10
Acenaphthene, ug/l	<10
Acenaphthylene, ug/l	<10
Phenanthrene, ug/l	<10
Anthracene, ug/l	<10
Fluoranthene, ug/l	<10
Chrysene, ug/l	<10
Benzo(a)Anthracene, ug/l	<10
Benzo(b,k)fluoranthene, ug/l	<10
Benzo(a)pyrene, ug/l	<10
Indeno(1,2,3-cd)pyrene, ug/l	<10
Dibenzo(a,h)anthracene, ug/l	<10
Carbazole, ug/l	<10
Surrogate-2FP (CL 21-110)	55 %
Surrogate-PHL (CL 10-110)	48 %

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
36592-36	9677	10-15-91

PARAMETER	36592-36
Surrogate-NBZ (CL 35-114)	90 %
Surrogate-TBP (CL 10-123)	81 %
Surrogate-TPH (CL 33-141)	79 %
Surrogate-FBP (CL 43-116)	70 %
Date Extracted	10.22.91
Date Analyzed	10.28.91

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36592-37	Detection Limits
36592-38	Method Blank (MB) Result
36592-39	Lab Control Standard (LCS) Result
36592-40	LCS Expected Value
36592-41	LCS % Recovery

PARAMETER	36592-37	36592-38	36592-39	36592-40	36592-41
Copper (6010)					
Copper, mg/l	0.025	<0.025	0.981	1.00	98 %
Date Analyzed	---	10.23.91	10.23.91	---	---
Chromium (6010)					
Chromium, mg/l	0.010	<0.010	0.993	1.01	98 %
Date Analyzed	---	10.23.91	10.23.91	---	---
Arsenic (7060)					
Arsenic, mg/l	0.010	<0.010	0.057	0.050	114 %
Date Analyzed	---	10.29.91	10.29.91	---	---
Suspended Solids (160.2)					
Suspended Solids, mg/l	5.0	<5.0	92	100	92 %
Date Analyzed	---	10.17.91	10.17.91	---	---

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LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36592-37	Detection Limits
36592-38	Method Blank (MB) Result
36592-39	Lab Control Standard (LCS) Result
36592-40	LCS Expected Value
36592-41	LCS % Recovery

PARAMETER	36592-37	36592-38	36592-39	36592-40	36592-41
Semi-Volatiles (8270)					
Naphthalene, ug/l	10	<10	101	100	101 %
1-Methylnaphthalene, ug/l	10	<10	---	---	---
2-Methylnaphthalene, ug/l	10	<10	---	---	---
1,1-Biphenyl, ug/l	10	<10	---	---	---
Acenaphthylene, ug/l	10	<10	114	100	114 %
Acenaphthene, ug/l	10	<10	105	100	105 %
Dibenzofuran, ug/l	10	<10	---	---	---
Fluorene, ug/l	10	<10	---	---	---
Phenanthrene, ug/l	10	<10	92	100	92 %
Anthracene, ug/l	10	<10	96	100	96 %
Carbazole, ug/l	10	<10	---	---	---
Pyrene, ug/l	10	<10	---	---	---
Benzo(a)Anthracene, ug/l	10	<10	87	100	87 %
Chrysene, ug/l	10	<10	83	100	83 %
Benzo(a)pyrene, ug/l	10	<10	79	100	79 %
Benzo(g,h,i)perylene, ug/l	10	<10	---	---	---
Pentachlorophenol, ug/l	50	<50	69	100	69 %
Fluoranthene, ug/l	10	<10	98	100	98 %
2-Chlorophenol, ug/l	10	<10	92	100	92 %

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36592-37	Detection Limits
36592-38	Method Blank (MB) Result
36592-39	Lab Control Standard (LCS) Result
36592-40	LCS Expected Value
36592-41	LCS % Recovery

PARAMETER	36592-37	36592-38	36592-39	36592-40	36592-41
Phenol, ug/l	10	<10	36	100	36 %
2,4-Dimethylphenol, ug/l	10	<10	90	100	90 %
Trichlorophenols, ug/l	10	<10	83	100	83 %
Cresol (ortho), ug/l	10	<10	---	---	---
Cresol m & p, ug/l	10	<10	---	---	---
p-Chloro-m-cresol, ug/l	10	<10	90	100	90 %
Tetrachlorophenols, ug/l	10	<10	109	100	109 %
2,4-Dinitrophenol, ug/l	50	<50	52	100	52 %
Benzo(b,k)fluoranthene, ug/l	10	<10	82	100	82 %
Indeno(1,2,3-cd)pyrene, ug/l	10	<10	79	100	79 %
Dibenzo(a,h)anthracene, ug/l	10	<10	74	100	74 %
Surrogate-2FP (CL 21-110)	---	57 %	53 %	---	---
Surrogate-PHL (CL 10-110)	---	41 %	39 %	---	---
Surrogate-NBZ (CL 35-114)	---	106 %	99 %	---	---
Surrogate-TBP (CL 10-123)	---	69 %	64 %	---	---
Surrogate-TPH (CL 33-141)	---	101 %	93 %	---	---
Surrogate-FBP (CL 43-116)	---	94 %	89 %	---	---
Date Extracted	---	10.22.91	10.22.91	---	---
Date Analyzed	---	10.23.91	10.28.91	---	---

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36592-37	Detection Limits
36592-38	Method Blank (MB) Result
36592-39	Lab Control Standard (LCS) Result
36592-40	LCS Expected Value
36592-41	LCS % Recovery

PARAMETER	36592-37	36592-38	36592-39	36592-40	36592-41
Nitrogen Series					
Total Kjeldahl Nitrogen-N, mg/l	0.10	<0.10	0.43	0.50	86 %
Nitrate + Nitrite-N, mg/l	0.050	<0.050	0.397	0.375	106 %
Total Nitrogen, mg/l	0.15	<0.15	---	---	---
Date Analyzed	---	10.23.91	10.23.91	---	---
Total Phosphorus (365.1)					
Total Phosphorus, mg/l	0.10	<0.10	0.702	0.75	94 %
Date Analyzed	---	10.23.91	10.23.91	---	---
Chloride (325.2)					
Chloride (325.2), mg/l	1.0	<1.0	7.46	7.7	97 %
Date Analyzed	---	10.22.91	10.22.91	---	---
Total Organic Carbon (415.1)					
Total Organic Carbon , mg/l	1.0	<1.0	23.2	23.0	101 %
Date Analyzed	---	10.16.91	10.16.91	---	---

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36592-42	LCS % Recovery Limits
36592-43	Matrix Spike (MS) Result/Duplicate
36592-44	MS Expected Value
36592-45	MS % Recovery/Duplicate
36592-46	MS % Recovery Limits

PARAMETER	36592-42	36592-43	36592-44	36592-45	36592-46
Copper (6010)					
Copper, mg/l	75-125 %	.991/.947	1.00	99/95 %	75-125 %
Date Analyzed	---	10.23.91	---	---	---
Chromium (6010)					
Chromium, mg/l	75-125 %	.995/.949	1.01	99/94 %	75-125 %
Date Analyzed	---	10.23.91	---	---	---
Arsenic (7060)					
Arsenic, mg/l	75-125 %	.058/.059	0.050	116/118 %	75-125 %
Date Analyzed	---	10.31.91	---	---	---
Suspended Solids (160.2)					
Suspended Solids, mg/l	75-125 %	---	---	---	---
Date Analyzed	---	---	---	---	---

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36592-42	LCS % Recovery Limits
36592-43	Matrix Spike (MS) Result/Duplicate
36592-44	MS Expected Value
36592-45	MS % Recovery/Duplicate
36592-46	MS % Recovery Limits

PARAMETER	36592-42	36592-43	36592-44	36592-45	36592-46
Semi-Volatiles (8270)					
Naphthalene, ug/l	21-133 %	100/100	100	100/100 %	21-133 %
Acenaphthylene, ug/l	33-145 %	108/108	100	108/108 %	33-145 %
Acenaphthene, ug/l	47-145 %	100/100	100	100/100 %	47-145 %
Phenanthrene, ug/l	54-120 %	92/92	100	92/92 %	54-120 %
Anthracene, ug/l	27-133 %	92/92	100	92/92 %	27-133 %
Benzo(a)Anthracene, ug/l	33-143 %	44/44	100	44/44 %	33-143 %
Chrysene, ug/l	17-168 %	80/80	100	80/80 %	17-168 %
Benzo(a)pyrene, ug/l	17-163 %	28/28	100	28/28 %	17-163 %
Pentachlorophenol, ug/l	14-176 %	31/29	100	31/29 %	14-176 %
Fluoranthene, ug/l	26-137 %	88/88	100	88/88 %	26-137 %
2-Chlorophenol, ug/l	23-134 %	32/36	100	32/36 %	23-134 %
Phenol, ug/l	5-112 %	18/11	100	18/11 %	5-112 %
2,4-Dimethylphenol, ug/l	32-119 %	60/48	100	60/48 %	32-119 %
Trichlorophenols, ug/l	37-144 %	128/112	100	128/112 %	37-144 %
p-Chloro-m-cresol, ug/l	22-147 %	56/44	100	56/44 %	22-147 %
Tetrachlorophenols, ug/l	10-130 %	15/19	100	15/19 %	10-130 %
2,4-Dinitrophenol, ug/l	10-191 %	11/10	100	11/10 %	10-191 %
Benzo(b,k)fluoranthene, ug/l	24-159 %	68/68	100	68/68 %	24-159 %
Indeno(1,2,3-cd)pyrene, ug/l	10-171 %	32/32	100	32/32 %	10-171 %

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36592-42	LCS % Recovery Limits
36592-43	Matrix Spike (MS) Result/Duplicate
36592-44	MS Expected Value
36592-45	MS % Recovery/Duplicate
36592-46	MS % Recovery Limits

PARAMETER	36592-42	36592-43	36592-44	36592-45	36592-46
Dibenzo(a,h)anthracene, %	10-227 %	26/28	100	26/28 %	10-227 %
Surrogate-2FP (CL 21-110)	---	35/21	100	35/21 %	---
Surrogate-PHL (CL 10-110)	---	23/15	100	23/15 %	---
Surrogate-NBZ (CL 35-114)	---	51/50	50	102/100 %	---
Surrogate-TBP (CL 10-123)	---	57/56	100	57/56 %	---
Surrogate-TPH (CL 33-141)	---	43/44.5	50	86/89 %	---
Surrogate-FBP (CL 43-116)	---	45/44.5	50	90/89 %	---
Date Extracted	---	10.22.91	---	---	---
Date Analyzed	---	10.23.91	---	---	---
Nitrogen Series					
Total Kjeldahl Nitrogen-N, mg/l	75-125 %	0.93/0.90	1.0	93/90 %	75-125 %
Nitrate + Nitrite-N, mg/l	90-110 %	.179/.183	0.20	90/92 %	75-125 %
Date Analyzed	---	10.23.91	---	---	---
Total Phosphorus (365.1)					
Total Phosphorus, mg/l	60-140 %	0.89/0.92	1.0	89/92 %	60-140 %
Date Analyzed	---	10.23.91	---	---	---
Chloride (325.2)					
Chloride (325.2), mg/l	90-110 %	5.17/5.08	5.0	103/102 %	75-125 %
Date Analyzed	---	10.23.91	---	---	---

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36592-42	LCS % Recovery Limits
36592-43	Matrix Spike (MS) Result/Duplicate
36592-44	MS Expected Value
36592-45	MS % Recovery/Duplicate
36592-46	MS % Recovery Limits

PARAMETER	36592-42	36592-43	36592-44	36592-45	36592-46
Total Organic Carbon (415.1)					
Total Organic Carbon , mg/l	60-140 %	103/105	100	103/105 %	60-140 %
Date Analyzed	---	10.16.91	---	---	---

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S1-36592

Received: 16 OCT 91

Ms. Sandra Watson
Southern Wood Piedmont (WI)
P.O. Box 5477, I-85 and Sigsbee Rd.
Spartanburg, SC 29304

CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36592-47	ICVS/CCVS Control Limits
36592-48	ICVS/CCVS Source Lot
36592-49	ICVS/CCVS Expected Value
36592-50	ICVS Result
36592-51	ICVS % Recovery

PARAMETER	36592-47	36592-48	36592-49	36592-50	36592-51
Arsenic (7060)					
Arsenic, mg/l	90-110 %	3-87/SPEX	0.0501	0.050	100 %
Date Analyzed	---	---	---	10.29.91	---
Chromium (6010)					
Chromium, mg/l	90-110 %	3-87/SPEX	1.01	1.02	101 %
Date Analyzed	---	---	---	10.23.91	---
Copper (6010)					
Copper, mg/l	90-110 %	3-87/SPEX	1.00	1.02	102 %
Date Analyzed	---	---	---	10.23.91	---

Laboratory locations in Savannah, GA • Tallahassee, FL • Mobile, AL • Deerfield Beach, FL • Tampa, FL

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Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36592-52	CCVS Result
36592-53	CCVS % Recovery

PARAMETER	36592-52	36592-53
Arsenic (7060)		
Arsenic, mg/l	0.0487	97 %
Date Analyzed	10.29.91	---
Chromium (6010)		
Chromium, mg/l	1.04	103 %
Date Analyzed	10.23.91	---
Copper (6010)		
Copper, mg/l	1.02	102 %
Date Analyzed	10.23.91	---

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Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36592-54	CCVS Result
36592-55	CCVS % Recovery
36592-56	CCVS Result
36592-57	CCVS % Recovery
36592-58	CCVS Result

PARAMETER	36592-54	36592-55	36592-56	36592-57	36592-58
Arsenic (7060)					
Arsenic, mg/l	0.0534	107 %	0.0539	108 %	0.0536
Date Analyzed	10.29.91	---	10.29.91	---	10.29.91
Chromium (6010)					
Chromium, mg/l	1.04	103 %	1.05	104 %	1.04
Date Analyzed	10.23.91	---	10.23.91	---	10.23.91
Copper (6010)					
Copper, mg/l	1.01	101 %	1.01	101 %	1.01
Date Analyzed	10.23.91	---	10.23.91	---	10.23.91

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Spartanburg, SC 29304

CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36592-59	CCVS % Recovery
36592-60	CCVS Result
36592-61	CCVS % Recovery
36592-62	CCVS Result
36592-63	CCVS % Recovery

PARAMETER	36592-59	36592-60	36592-61	36592-62	36592-63
Arsenic (7060)					
Arsenic, mg/l	107 %	0.0491	98 %	0.0504	101 %
Date Analyzed	---	10.29.91	---	10.29.91	---
Chromium (6010)					
Chromium, mg/l	103 %	1.04	103 %	1.03	102 %
Date Analyzed	---	10.23.91	---	10.23.91	---
Copper (6010)					
Copper, mg/l	101 %	1.00	100 %	0.999	100 %
Date Analyzed	---	10.23.91	---	10.23.91	---

Laboratory locations in Savannah, GA • Tallahassee, FL • Mobile, AL • Deerfield Beach, FL • Tampa, FL

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Spartanburg, SC 29304

CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36592-64	CCVS Result
36592-65	CCVS % Recovery
36592-66	CCVS Result
36592-67	CCVS % Recovery
36592-68	CCVS Result

PARAMETER	36592-64	36592-65	36592-66	36592-67	36592-68
Arsenic (7060)					
Arsenic, mg/l	0.0489	98 %	0.0484	97 %	0.0454
Date Analyzed	10.29.91	---	10.29.91	---	10.29.91
Chromium (6010)					
Chromium, mg/l	1.01	100 %	1.02	101 %	0.997
Date Analyzed	10.23.91	---	10.23.91	---	10.23.91
Copper (6010)					
Copper, mg/l	0.992	99 %	0.992	99 %	0.968
Date Analyzed	10.23.91	---	10.23.91	---	10.23.91

Laboratory locations in Savannah, GA • Tallahassee, FL • Mobile, AL • Deerfield Beach, FL • Tampa, FL

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Spartanburg, SC 29304

CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36592-69	CCVS % Recovery

PARAMETER	36592-69
Arsenic (7060)	
Arsenic, mg/l	91 %
Chromium (6010)	
Chromium, mg/l	99 %
Copper (6010)	
Copper, mg/l	97 %

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Spartanburg, SC 29304

CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36592-70	CCVS Result
36592-71	CCVS % Recovery
36592-72	CCVS Result
36592-73	CCVS % Recovery

PARAMETER	36592-70	36592-71	36592-72	36592-73
Arsenic (7060)				
Arsenic, mg/l	0.0542	108 %	0.0460	92 %
Date Analyzed	10.29.91	---	10.29.91	---

Methods: EPA SW-846

F33 - Surrogates were not reported due to sample dilution required prior to analysis.

F61 - MS/MSD were not recovered due to the abundance of a target analyte in the sample.

Laboratory locations in Savannah, GA • Tallahassee, FL • Mobile, AL • Deerfield Beach, FL • Tampa, FL

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Spartanburg, SC 29304

CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36592-74	MS % RPD (Limit) - Liquid

PARAMETER	36592-74
Copper (6010)	
Copper	4.1(<20) %
Chromium (6010)	
Chromium	5.2(<20) %
Arsenic (7060)	
Arsenic	1.7(<20) %

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CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES

36592-74 MS % RPD (Limit) - Liquid

PARAMETER	36592-74
Semi-Volatiles (8270)	
Naphthalene	0(<40) %
Acenaphthylene	0(<40) %
Acenaphthene	0(<31) %
Phenanthrene	0(<40) %
Anthracene	0(<40) %
Benzo(a)Anthracene	0(<40) %
Chrysene	0(<48) %
Benzo(a)pyrene	0(<40) %
Pentachlorophenol	6.6(<50) %
Fluoranthene	0(<40) %
2-Chlorophenol	12(<40) %
Phenol	48(<42) %
2,4-Dimethylphenol	22(<40) %
Trichlorophenols	13(<50) %
p-Chloro-m-cresol	24(<40) %
Tetrachlorophenols	24(<50) %
2,4-Dinitrophenol	9.5(<50) %
Benzo(b,k)fluoranthene	0(<40) %
Indeno(1,2,3-cd)pyrene	0(<45) %
Dibenzo(a,h)anthracene	7.4(<70) %
Nitrogen Series	
Total Kjeldahl Nitrogen-N	3.3(<30) %
Nitrate + Nitrite-N	2.2(<30) %
Total Phosphorus (365.1)	
Total Phosphorus	3.3(<40) %

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Log No.: 91-36592

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Ms. Sandra Watson
Southern Wood Piedmont (WI)
P.O. Box 5477, I-85 and Sigsbee Rd.
Spartanburg, SC 29304

CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
36592-74	MS % RPD (Limit) - Liquid

PARAMETER	36592-74
Chloride (325.2)	
Chloride (325.2)	.97(<30) %
Total Organic Carbon (415.1)	
Total Organic Carbon , mg/l	1.9(<40) %

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LOG NO: S1-36592

Received: 16 OCT 91

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Southern Wood Piedmont (WI)
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Spartanburg, SC 29304

CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
36592-75	MS % RPD (Limit) - Soil

PARAMETER	36592-75
Semi-Volatiles (8270)	
Naphthalene	27(<40) %
Acenaphthylene	18(<40) %
Acenaphthene	80(<19) %
Phenanthrene	*F61
Anthracene	*F61
Benzo(a)Anthracene	*F61
Chrysene	*F61
Benzo(a)pyrene	*F61
Pentachlorophenol	81(<47) %
Fluoranthene	*F61
2-Chlorophenol	4.3(<50) %
Phenol	1.5(<35) %
2,4-Dimethylphenol	10(<26) %
Trichlorophenols	4.7(<40) %
p-Chloro-m-cresol	12(<40) %
Tetrachlorophenols	129(<50) %
2,4-Dinitrophenol	82(<50) %
Benzo(b,k)fluoranthene	*F61
Indeno(1,2,3-cd)pyrene	55(<45) %
Dibenzo(a,h)anthracene	12(<70) %
Arsenic (7060)	
Arsenic	41(<30) %
Copper (6010)	
Copper	5.1(<30) %

Laboratory locations in Savannah, GA • Tallahassee, FL • Mobile, AL • Deerfield Beach, FL • Tampa, FL

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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LOG NO: S1-36592

Received: 16 OCT 91

Ms. Sandra Watson
Southern Wood Piedmont (WI)
P.O. Box 5477, I-85 and Sigsbee Rd.
Spartanburg, SC 29304

CC: Mark Radecke

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
36592-75	MS % RPD (Limit) - Soil

PARAMETER	36592-75
Chromium (6010)	
Chromium	2.0(<30) %
Nitrogen Series	
Total Kjeldahl Nitrogen-N	38(<30) %
Nitrate + Nitrite-N	2.4(<30) %
Total Phosphorus (365.1)	
Total Phosphorus	40(<40) %
Total Organic Carbon (415.1)	
Total Organic Carbon	---
Chloride (325.2)	
Chloride (325.2)	0(<30) %

J. W. Andrews

J. W. Andrews, Ph. D.

Laboratory locations in Savannah, GA • Tallahassee, FL • Mobile, AL • Deerfield Beach, FL • Tampa, FL

& MILLER, INC.
Environmental Services

Laboratory Task Order No. N/A

CHAIN-OF-CUSTODY RECORD

Project Number NC0900S SWP

Project Location Wilmington, NC

Laboratory SAVANNAH LABORATORIES

Sampler(s)/Affiliation M. RADECKE (G&M)
P. JACKOS (G&M)

SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID	500ml w/m glass (G2a) Semi Volatile contaminants 4°C	1 liter w/m plastic pH, metals (Cu, Cr, Ni) TOC, TP, TN, Cl⁻ 4°C								TOTAL
LF1AUS/9663A	S	10-15-91 10134		1	1								2
LF1ALS/9663B	S	10-15-91 10141		1	1								2
LF1DUS/9666A	S	10-15-91 11118		1	1								2
LF1DLS/9666B	S	10-15-91 11121		1	1								2
LF1CUS/9665A	S	10-15-91 12156		1	1								2
LF1CLS/9665B	S	10-15-91 13101		1	1								2
LF1EUS/9667A	S	10-15-91 12118		1	1								2
LF1ELS/9667A	S	10-15-91 12123		1	1								2

Sample Code: L = Liquid; S = Solid; A = Air

Temp: 5.0

Total No. of Bottles/Containers 16

Relinquished by: Mark E. Radecke	Organization: Geraghty & Miller, Inc.	10-15-91 19:00	Seal Intact?
Received by: T. Bonds	Organization: SL 36592	Date 10/16/91 Time 10:00 am	(Yes) No N/A
Relinquished by:	Organization:		Seal Intact?
Received by:	Organization:	Date / / Time	Yes No N/A

Special Instructions/Remarks:

Delivery Method: ☐ In Person ☒ Common Carrier Federal Express (SPECIFY) ☐ Lab Courier ☐ Other (SPECIFY)

G&M Form 09 1-90

Southwest 90-0136

& MILLER, INC.
Environmental Services

Laboratory Task Order No. N/A

CHAIN-OF-CUSTODY RECORD

Project Number NC09005

Project Location SWP WILMINGTON, NC

Laboratory SAVANNAH LABS

Sampler(s)/Affiliation M. RADECKE (G&M)
P. JACOBS (G&M)

SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID	500 ml w/m Blake Semivolatile constituents (8270) 4°C	1 liter w/m plastic pH, TOC, TS, TP Cl-, metals (Cu, Cr, Ni) 4°C								TOTAL
LF1BUS/9664A	S	10-15-91 13:27		1	1								2
LF1BLS/9664B	S	10-15-91 13:32		1	1								2
LF2BUS/9669B	S	10-15-91 14:45		1	1								2
LF2BUS/9669A	S	10-15-91 14:39		1	1								2
LF2DUS/9671A	S	10-15-91 15:28		1	1								2
LF2DLS/9671B	S	10-15-91 15:40		1	1								2
LF2EUS/9672A	S	10-15-91 15:05		1	1								2
LF2ELS/9672B	S	10-15-91 15:10		1	1								2

Sample Code: L = Liquid; S = Solid; A = Air

Temp 4.9

Total No. of Bottles/Containers 16

Relinquished by: [signature] Organization: Geraghty & Miller, Inc. 10-15-91 19:00
Received by: [signature] Organization: SL 36592 Date 10/16/91 Time 10:012 am
Seal Intact? (Yes) No N/A

Relinquished by: Organization:
Received by: Organization: Date / / Time
Seal Intact? Yes No N/A

Special Instructions/Remarks:

Delivery Method: ☐ In Person ☒ Common Carrier Federal Express (SPECIFY) ☐ Lab Courier ☐ Other (SPECIFY)

G&M Form 09 1-90

Southprint 90-0136

[redacted]

& MILLER, INC.
Environmental Services

Laboratory Task Order No. N/A

CHAIN-OF-CUSTODY RECORD

Page ___ of ___

Project Number NC09005

Project Location SWP Wilmington, NC

Laboratory Savannah Laboratories

Sampler(s)/Affiliation M. Radecke (G&M)
P. Jacobs (G&M)

SAMPLE BOTTLE / CONTAINER DESCRIPTION

SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID	250ml plastic metals (Cu, Cr, As) 4°C H_2SO_3	100ml plastic TSS 4°C	1 liter amber glass semi-volatile compounds (8270) 4°C	Keep plastic pH NOT SAMPLED HERE 4°C	250ml m/r plastic TN, TP 4°C H_2SO_4	100ml plastic Cl^- 4°C	125ml amber glass TOC 4°C H_2SO_4	1 liter amber glass KOOL constituents 4°C		TOTAL
MW-6/9673	L	10-15-91 9120		1	1								2
MW-7/9674	L	10-15-91 9110		1	1								2
MW-8/9675	L	10-15-91 8155		1	1								2
RB-2	L	10-15-91 16135		1		1	* MR	1	1	1			MR ~~8~~ 5
FB-2	L	10-15-91 16135		1		1	* MR	1	1	1			MR ~~8~~ 5
9677	L	10-15-91 17130									1		1

Sample Code: L = Liquid; S = Solid; A = Air

Temp. 4.5

Total No. of Bottles/Containers 17

Relinquished by: Mark E. Radecke Organization: Geraghty & Miller, Inc 10-15-91 19:00
Received by: [illegible] Organization: SL 36592 Date 10/16/91 Time 10:00 am
Seal Intact? (Yes) No N/A

Relinquished by: ___ Organization: ___
Received by: ___ Organization: ___ Date / / Time ___
Seal Intact? Yes No N/A

Special Instructions/Remarks: ___

Delivery Method: ☐ In Person ☒ Common Carrier Federal Express (SPECIFY) ☐ Lab Courier ☐ Other ___ (SPECIFY)

G&M Form 09 1.00 Southprint 90-0136

G & MILLER, INC.
Environmental Services

Laboratory Task Order No. NA

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Project Number NC09005

Project Location SWP Lowlington, NC

Laboratory Savannah Labs

Sampler(s)/Affiliation M. Radecke (G&M)
P. Jacobs (G&M)

SAMPLE BOTTLE / CONTAINER DESCRIPTION

SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID	500 ml glass semi volatile contaminants (8270) w/c	1 liter w/m plastic pH TOC, TSS, TP Cl, metal (Cu, Cr, Ni, Zn) w/c								TOTAL
LF2AUS/9668A	S	10-15-91 16102		1	1								2
LF2ALS/9668B	S	10-15-91 16110		1	1								2
LF2CUS/9670A	S	10-15-91 16144		1	1								2
LF2CLS/9670B	S	10-15-91 16150		1	1								2

Sample Code: L = Liquid; S = Solid; A = Air

Temp. 9.0

Total No. of Bottles/Containers: 8

Relinquished by: Mark E. Radecke	Organization: Geraghty & Miller, Inc	10-15-91 19:00	Seal Intact? (Yes) No N/A
Received by: A. Bonds	Organization: SLJ 36592	Date 10/16/91 Time 10:00 am	
Relinquished by:	Organization:		Seal Intact? Yes No N/A
Received by:	Organization:	Date / / Time	

Special Instructions/Remarks: Refer to other chain of custody forms submitted on 10-15-91 for complete list of semi volatile constituents

Delivery Method: ☐ In Person ☒ Common Carrier Federal Express (SPECIFY) ☐ Lab Courier ☐ Other _____ (SPECIFY)

G&M Form 09 1-90

Southprint 90-0136

1990 ANALYTICAL DATA
SUPPLEMENTAL EXPANDED CONSTITUENT LIST
SOUTHERN WOOD PIEDMONT, WILMINGTON, NORTH CAROLINA

RECEIVED
DEC 16 1991
G & M RALEIGH

12822	-1	-2	-3	-4	-5
	9101C	9101A	9101B	9101D	9104D
2-Chlorophenol	<7.3	<7.4	<7.8	<0.35	<0.34
Phenol	↓	↓	↓	↓	↓
2,4-Dimethylphenol	↓	↓	↓	↓	↓
Trichlorophenols	↓	↓	↓	↓	↓
p-chloro-m-cresol	↓	↓	↓	↓	↓
Tetrachlorophenols	↓	↓	↓	↓	↓
2,4-Dinitrophenol	<37	<7	<39	<1.8	<1.7
Benzo(b,k)Fluoranthene	27J	43J	19J	<0.35	1.1J
Indeno(1,2,3-cd)pyrene	5.2J	10J	4.9J	↓	<0.34
Dibenzo(a,h)anthracene	2.3J	4.3J	2.7J	↓	↓
o-cresol	<7.3	<7.4	<7.8	↓	↓
m+p-cresol	↓	↓	↓	↓	↓

12822	-11	-12	-13	-14	-15
	9102C	9102D	9100A	9100B	9100C
2-Chlorophenol	<7.5	<0.36	<8.0	<7.3	<7.3
Phenol	↓	↓	↓	↓	↓
2,4-Dimethylphenol	↓	↓	↓	↓	↓
Trichlorophenols	↓	↓	↓	↓	↓
p-chloro-m-cresol	↓	↓	↓	↓	↓
Tetrachlorophenols	↓	↓	↓	↓	↓
2,4-Dinitrophenol	<38	<1.8	<40	<37	<37
Benzo(b,k)fluoranthene	68 J	<0.36	35 J	19 J	100 J
Indeno(1,2,3-cd)pyrene	9.3 J	↓	10 J	5.2 J	17 J
Dibenzo(a,h)anthracene	4.7 J	↓	4.2 J	2.2 J	7.5 J
o-cresol	<7.5	↓	<8.0	<7.3	<7.3
m+p-cresol	↓	↓	↓	↓	↓

12822	-6	-7	-8	-9	-10
	9104B	9104C	9104A	9102A	9102B
2-Chlorophenol	<7.4	<7.2	<7.5	<9.4	<7.4
Phenol	↓	↓	↓	↓	↓
2,4-Dimethylphenol	↓	↓	↓	↓	↓
Trichlorophenols	↓	↓	↓	↓	↓
p-chloro-m-cresol	↓	↓	↓	↓	↓
Tetrachlorophenols	↓	↓	↓	↓	↓
2,4-Dinitrophenol	<37	<36	<38	<47	<37
Benzo(b,k)fluoranthene	120J	9.1J	29J	49J	14J
Indeno(1,2,3-cd)pyrene	14J	2.0J	8.1J	11J	3.3J
Dibenzo(a,h)anthracene	4.2J	0.76J	3.2J	5.0J	1.6J
o-cresol	<7.4	<7.4	<7.5	<9.4	<7.4
m+p-cresol	↓	↓	↓	↓	↓

12822	-16	-17	-18	-19	-20
	9100D	9106A	9106B	9106C	9106D
2-Chlorophenol	<0.35	<7.7	<7.8	<7.6	<0.37
Phenol	↓	↓	↓	↓	↓
2,4-Dimethylphenol	↓	↓	↓	↓	↓
Trichlorophenols	↓	↓	↓	↓	↓
p-Chloro-m-cresol	↓	↓	↓	↓	↓
Tetrachlorophenols	↓	↓	↓	↓	↓
2,4-Dinitrophenol	<1.8	<39	<39	<38	<1.9
Benzo(b,k)Fluoranthene	<0.35	43 J	24 J	17 J	0.78 J
Indeno(1,2,3-cd)pyrene	↓	11 J	<7.8	<7.6	0.18 J
Dibenzo(a,h)anthracene	↓	<7.7	↓	↓	<0.37
o-cresol	↓	↓	↓	↓	↓
m+p cresol	↓	↓	↓	↓	↓

12822	-21	-22	-23	-24	-25
	9109A	9109B	9109C	9109D	9105A
2-Chlorophenol	<7.4	<7.5	<4.1	<0.36	<7.8
Phenol	↓	↓	↓	↓	↓
2,4-Dimethylphenol					
Trichlorophenols					
p-chloro-m-cresol					
Tetrachlorophenols	↓	↓	↓	↓	↓
2,4-Dinitrophenol	<37	<38	<21	<1.8	<39
Benzo(b,k)fluoranthene	35J	32J	31J	<0.36	33J
Indeno(1,2,3-cd)pyrene	9.6J	8.3J	9.4J	↓	8.6J
Dibenzo(a,h)anthracene	4.4J	3.2J	3.9J		3.9J
o-cresol	<7.4	<7.5	<4.1		<7.8
m+p-cresol	↓	↓	↓	↓	↓

12822	-26	-27	-28	-29	-30
	9105B	9105C	9105D	9107B	9107A
2-Chlorophenol	<8.3	<7.1	<0.45	<7.3	<7.6
Phenol	↓	↓	↓	↓	↓
2,4-Dimethylphenol					
Trichlorophenols					
p-chloro-m-cresol					
Tetrachlorophenols	↓	↓	↓	↓	↓
2,4-Dinitrophenol	<42	<36	<2.3	<37	<38
Benzo(b,k)fluoranthene	89J	6.2J	2.6J	5.7J	43J
Indeno(1,2,3-cd)pyrene	18J	1.1J	<0.45	14J	11J
Dibenzo(a,h)anthracene	<8.3	<7.1	↓	6.2J	5.3J
o-cresol	↓	↓	↓	<7.3	<7.6
m+p-cresol				↓	↓

39

	-31	-32	-33	-34	-35
	9107C	9107D	9108D	9108A	9108C
2-Chlorophenol (128)	<7.5	<0.39	<0.42	<0.39	<8.5
Phenol	↓	↓	↓	↓	↓
2,4-Dimethylphenol					
Trichlorophenols					
p-chloro-m-cresol					
Tetrachlorophenols	↓	↓	↓	↓	1.2J
2,4-Dinitrophenol	<38	<2.0	<2.1	<2.0	<43
Benzo(b,k)fluoranthene	38J	<0.39	2.3J	1.4J	99J
Indeno(1,2,3-cd)pyrene	23J	↓	0.53J	<0.39	19J
Dibenzo(a,h)anthracene	15J		0.23J	↓	9.4J
o-cresol	<7.5		<0.42		<8.5
m+p-cresol	↓	↓	↓	↓	↓

12822	-36	-37	-38	-39	-40
	9108B	9108C	9103A	9103B	9103D
2-Chlorophenol	<7.8	<7.6	<7.6	<7.3	<7.6
Phenol	↓	↓	↓	↓	↓
2,4-Dimethylphenol	↓	↓	↓	↓	↓
Trichlorophenols	↓	↓	↓	↓	↓
p-chloro-m-cresol	↓	↓	↓	↓	↓
Tetrachlorophenols	↓	↓	↓	↓	↓
2,4-Dinitrophenol	<39	<38	<38	<37	<38
Benzo(b,k)fluoranthene	82J	52J	31J	14J	18J
Indeno(1,2,3-cd)pyrene	19J	8.7J	8.0J	4.9J	4.1J
Dibenzo(a,h)anthracene	8.0J	3.9J	4.3J	1.6J	1.8J
o-cresol	<7.8	<7.6	<7.6	<7.3	<7.6
m+p-cresol	↓	↓	↓	↓	↓

	-41	-42	-43
	RB1	FB1	TB2
2-Chlorophenol	<0.010	<0.010	<0.010
Phenol	↓	↓	↓
2,4-Dimethylphenol	↓	↓	↓
Trichlorophenols	↓	↓	↓
p-chloro-m-cresol	↓	↓	↓
Tetrachlorophenols	↓	↓	↓
2,4-Dinitrophenol	<0.050	<0.050	<0.050
Benzo(b,k)Fluoranthene	<0.010	<0.010	<0.010
Indeno(1,2,3-cd)pyrene	↓	↓	↓
Dibenzo(a,h)anthracene	↓	↓	↓
o-cresol	↓	↓	↓
m+p-cresol	↓	↓	↓

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

Project/No. SWP NC09005 Date 10-14-91
Site Location LF Area SWP Wilmington, NC Site
Site/Well No. MW-6/9673 ~~Rep.~~/Field Blank No. RB-1 & FB-1 Collected prior to Sampling MW-6
Weather Cloudy, Cool & windy Sampling Began _____ Ended _____
Description of Measuring Point (MP) _____
MP Elevation _____ Water Level Elevation _____

Evacuation Data

Height of MP _____
Depth of Well Below MP 21.40
Held _____ Depth to Water Below MP - 2.62
Wet _____ Water Column in Well = 18.78
Casing Diameter 2" Gal./ft. x 0.16
Gallons in Well = 3.00
Evacuation Volume x 3 = 9.00

Gallons	3.00	6.00	9.00		*	
pH	6.25	6.15	6.15		6.1	
Spec. Conductance µmhos	700	915	970		800	
Temperature (°C/°F)	20.0	21.0	21.0		21	
	17:05	17:20	17:25		9:20	

Sampling Data/Field Parameters

Color orange brown Odor vague sulfide odor Appearance slightly silty cloudy
Comments: _____
Spec. Cond. (umhos/cm) 1000 pH 6.30 T(°C/°F) 20.0 17:35
Sampling Method DISPOSABLE BAILER

Analyses	Container Type (Lab X G&M ___)	Preservative
TOC / TP, TN	125 ml amber glass / 250 ml m/m plastic	4°C H_2SO_4
TSS / Cl^-	100 ml plastic / 100 ml plastic	4°C
Cu, Cr, As	250 ml plastic	4°C HNO_3
SV	1 liter amber glass	4°C

Remarks: * Readings taken after TSS + metals on 10-15-91 9:20 slightly cloudy

Sampling Personnel: M. RADECKE, P. JACOBS (G&M)

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

Project/No. SWP NC09005 Date 10-14-91
Site Location SWP LF areas, Wilmington, NC Site -
Site/Well No. MW-7/9674 Rep./Field Blank No. _____
Weather Sunny mid 70's windy Sampling Began _____ Ended _____
Description of Measuring Point (MP) _____
MP Elevation _____ Water Level Elevation _____

Evacuation Data

Height of MP			_____
Depth of Well Below MP			21.38
Held _____ Depth to Water Below MP		-	3.95
Wet _____ Water Column in Well		=	17.43
Casing Diameter 2"	Gal./ft.	x	0.16
Gallons in Well		=	2.79
Evacuation Volume	x 3	=	8.40

Gallons	2.80	5.60	8.40		*	
pH	6.20	6.35	6.40		6.3	
Spec. Conductance µmhos	780	830	830		760	
Temperature (°C/°F)	22.0	22.0	22.5		22	
	14:39	15:05	15:30		9:10	

Sampling Data/Field Parameters

Color Brown Odor Sulfides Appearance Silty
Comments: _____
Spec. Cond. (umhos/cm) 840 pH 6.45 T (°C/°F) 22.0 15:40
Sampling Method DISPOSABLE BAILER

Analyses	Container Type (Lab X G&M ___)	Preservative
TOC / TP, TN	125 ml amber glass / 250 ml m/m plastic	4°C H_2SO_4
TSS / Cl^-	100 ml plastic / 100 ml plastic	4°C
Cu, Cr, As	250 ml plastic	4°C HNO_3
SV	1 liter amber glass	4°C

Remarks: well was slow to recharge
Readings were taken after TSS + metals on 10-15-91 slightly cloudy
Sampling Personnel: M. RADECKE P. JACOBS (G&M)

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

Project/No. SWP NC0900S Date 10-14-91
Site Location LF Areas SWP Wilmington, NC Site
Site/Well No. MW-8/9675 Rep./Field Blank No. _____
Weather Sunny Mid 70's Sampling Began _____ Ended _____
Description of Measuring Point (MP) _____
MP Elevation _____ Water Level Elevation _____

Evacuation Data

Height of MP			_____
Depth of Well Below MP			21.40
Held _____ Depth to Water Below MP		-	4.40
Wet _____ Water Column in Well		=	17
Casing Diameter 2"	Gal./ft.	x	0.16
Gallons in Well		=	2.72
Evacuation Volume	x 3	=	8.16

Gallons	2.75	5.50			* slightly cloudy	
pH	6.00	6.05	6.15		5.7	
Spec. Conductance µmhos	510	510	495		480	
Temperature (°C/°F)	20.05	20.05	20.00		22.0	
	13:50	14:15	15:10		~~1628~~ MER 8:55	

Sampling Data/Field Parameters

Color brown Odor Silty Appearance Silty then clear
Comments: _____
Spec. Cond. (umhos/cm) 485 pH 6.10 T(°C/°F) 20.0 15:22
Sampling Method DISPOSABLE BAILER

Analyses	Container Type (Lab X G&M ___)	Preservative
TOC / TP, TN	125ml amber glass / 250ml m/m plastic	4°C H_2SO_4
TSS / Cl^-	100 ml plastic / 100 ml plastic	4°C
Cu, Cr, As	250 ml plastic	4°C HNO_3
SV	1 liter amber glass	4°C

Remarks: well was slow to recharge.
* Readings taken after TSS & Metals on 10-15-91 8:55 Sample collection
Sampling Personnel: M. RADECKE, P. JACOBS (G&M)

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

Project/No. SWP NC09005 Date 10-14-91
Site Location LF areas SWP Wilmington, NC Site
Site/Well No. MW-9 / 9676 Rep./Field Blank No. N/A
Weather Sunny 70's Sampling Began 1305 Ended 1310
Description of Measuring Point (MP)
MP Elevation Water Level Elevation

Evacuation Data

Height of MP
Depth of Well Below MP 21.40
Held Depth to Water Below MP - 3.98
Wet Water Column in Well = 17.42
Casing Diameter 2" Gal./ft. x 0.16
Gallons in Well = 2.78
Evacuation Volume x 3 = 8.36

Gallons	2.75	5.50	8.25		*	
pH	5.95	5.95	5.95		6.40	
Spec. Conductance µmhos	480	465	470		520	
Temperature (°C/°F)	22.0	20.0	20.0		22.0	
	12:36	12:43	13:00		16:10 clear	

Sampling Data/Field Parameters

Color Light-brown Odor Sulfides Appearance Silty - cloudy
Comments:
Spec. Cond. (umhos/cm) 530 pH 6.15 T(°C/°F) 21.0 13:12 Light brown/clear
Sampling Method DISPOSABLE BAILER

Analyses	Container Type (Lab X G&M)	Preservative
TOC/TP,TN	125ml amber glass / 250 ml m/m plastic	4°C H_2SO_4
TSS / Cl^-	100 ml plastic / 100ml plastic	4°C
Cu, Cr, As	250 ml plastic	4°C HNO_3
SV	1 liter amber glass	4°C

Remarks: Well was slow to recharge
* readings were taken after TSS + metals on 10-14-91
Sampling Personnel: M. RADECKE P. JACOBS (G&M)

APPENDIX B
DATA REDUCTION TABLES, 1990 AND 1991
SOUTHERN WOOD PIEDMONT FACILITY,
WILMINGTON, NORTH CAROLINA

Table B-1. Total Polycyclic Aromatic Hydrocarbons in Soil in 1990, Southern Wood Piedmont Facility, Wilmington, North Carolina.

Constituent	LF1AU (mg/kg)	LF1AM (mg/kg)	LF1AL (mg/kg)	LF1BU (mg/kg)	LF1BM (mg/kg)	LF1BL (mg/kg)	LF1CU (mg/kg)	LF1CM (mg/kg)	LF1CL (mg/kg)	LF1DU (mg/kg)	LF1DM (mg/kg)
PAHs											
Acenaphthene	4	3.65	3.65	3.7	3.9	3.65	4.7	3.7	3.75	3.8	3.65
Acenaphthylene	4	3.65	3.65	3.7	3.9	3.65	4.7	3.7	3.75	3.8	3.65
Anthracene	88	3.4	3.7	230	200	4.6	29	58	6.8	35	4.7
Benzo(a)anthracene	20	5.8	39	19	8.6	10	32	3.7	42	11	3.4
Benzo(a)pyrene	19	7.3	32	20	9.4	10	24	6.5	22	16	7.3
Benzo(b,k)fluoranthene	35	19	100	43	19	27	49	14	68	31	14
Benzo(g,h,i)perylene	8.8	5	16	7.4	3.9	3.9	10	3.7	6.5	6.3	4.8
1,1-Biphenyl	4	3.65	3.65	3.7	3.9	3.65	4.7	3.7	3.75	3.8	3.65
Carbazole	26	3.65	3.65	46	90	3.65	43	9.6	3.75	3.8	3.65
Chrysene	22	9.5	59	27	15	18	42	8.9	59	17	7.3
Dibenzo(a,h)anthracene	4.2	2.2	7.5	4.3	2.7	2.3	5	1.6	4.7	4.3	1.6
Dibenzofuran	5	3.65	3.65	6.7	11	3.65	6.6	3.7	3.75	3.8	3.65
Fluoranthene	58	13	80	19	34	20	140	8.9	120	29	9.5
Fluorene	14	3.65	3.65	4.9	27	3.65	20	5.8	3.75	5	3.65
Indeno(1,2,3-c,d)pyrene	10	5.2	17	10	4.9	5.2	11	3.3	9.3	8	4.9
1-Methylnaphthalene	4	3.65	3.65	3.7	3.9	3.65	4.7	3.7	3.75	3.8	3.65
2-Methylnaphthalene	4	3.65	3.65	5.9	15	3.65	4.7	3.7	3.75	3.8	3.65
Naphthalene	3.8	3.65	3.65	4.4	12	3.65	4.8	3.7	3.75	3.8	3.65
Phenanthrene	25	3.9	6.2	36	41	3.65	130	8.1	13	11	3.65
Pyrene	44	13	80	50	27	20	150	11	110	28	9.5
tPAHs	402.80	120.15	473.25	548.40	536.10	157.50	719.90	169.00	495.05	232.00	103.50

Footnotes appear on page 3.

Table B-1. Total Polycyclic Aromatic Hydrocarbons in Soil in 1990, Southern Wood Piedmont Facility, Wilmington, North Carolina.

Constituent	LF1DL (mg/kg)	LF1EU (mg/kg)	LF1EM (mg/kg)	LF1EL (mg/kg)	LF2AU (mg/kg)	LF2AM (mg/kg)	LF2AL (mg/kg)	LF2BU (mg/kg)	LF2BM (mg/kg)	LF2BL (mg/kg)	LF2CU (mg/kg)
PAHs											
Acenaphthene	3.8	3.75	3.7	3.6	3.9	28	3.55	49	3.9	3.8	3.8
Acenaphthylene	3.8	3.75	3.7	3.6	3.9	4.15	3.55	3.85	3.9	3.8	3.8
Anthracene	3.6	70	5	3.6	100	280	3.55	350	400	66	900
Benzo(a)anthracene	18	21	7.4	3.6	20	110	3.55	33	13	21	43
Benzo(a)pyrene	16	18	8.1	3.5	16	46	3.55	24	30	41	41
Benzo(b,k)fluoranthene	52	29	120	9.1	33	89	6.2	43	24	17	43
Benzo(g,h,i)perylene	7.4	3.75	3.7	3.6	7.8	17	3.55	12	3.9	16	17
1,1-Biphenyl	3.8	3.75	3.7	3.6	3.9	4.15	3.55	3.85	3.9	3.8	3.8
Carbazole	3.8	23	3.7	3.6	45	200	3.55	100	160	30	270
Chrysene	40	22	8.1	3.7	21	120	3.6	35	18	31	58
Dibenzo(a,h)anthracene	3.9	3.2	4.2	0.76	3.9	4.15	3.55	3.85	3.9	3.8	5.3
Dibenzofuran	3.8	3.75	3.7	3.6	22	26	3.55	19	20	5.6	3.8
Fluoranthene	71	51	4.4	6.8	35	300	5	92	27	82	110
Fluorene	3.8	6	3.7	3.6	22	91	3.55	42	57	12	12
Indeno(1,2,3-c,d)pyrene	8.7	8.1	14	2	8.6	18	1.1	11	3.9	3.8	11
1-Methylnaphthalene	3.8	3.75	3.7	3.6	3.9	4.15	3.55	3.85	20	3.8	3.8
2-Methylnaphthalene	3.8	3.75	3.7	3.6	3.9	10	3.55	3.85	41	3.8	3.8
Naphthalene	3.8	3.6	3.7	3.6	3.9	4.15	3.55	3.85	30	3.8	3.8
Phenanthrene	14	20	4.6	3.6	34	200	3.55	82	86	24	99
Pyrene	68	41	6	6.5	26	200	4.7	55	23	78	130
tPAHs	336.80	342.15	218.80	79.16	417.70	1,755.75	73.85	970.10	972.40	454.00	1,765.90

Footnotes appear on page 3.

Table B-1. Total Polycyclic Aromatic Hydrocarbons in Soil in 1990, Southern Wood Piedmont Facility, Wilmington, North Carolina.

Constituent	LF2CM (mg/kg)	LF2CL (mg/kg)	LF2DU (mg/kg)	LF2DM (mg/kg)	LF2DL (mg/kg)	LF2EU (mg/kg)	LF2EM (mg/kg)	LF2EL (mg/kg)	Mean (mg/kg)	UCL (mg/kg)
PAHs										
Acenaphthene	3.65	3.75	3.95	3.9	24	3.7	3.75	2.05	6.72	9.76
Acenaphthylene	3.65	3.75	3.95	3.9	4.25	3.7	3.75	2.05	3.77	3.89
Anthracene	72	3.75	170	15	290	70	50	14	117.66	175.46
Benzo(a)anthracene	19	18	18	27	100	13	13	11	23.57	31.26
Benzo(a)pyrene	16	11	19	33	65	18	15	12	20.32	24.66
Benzo(b,k)fluoranthene	5.7	38	14	82	99	35	32	31	40.70	50.03
Benzo(g,h,i)perylene	13	4.2	7.9	34	14	8.1	7.1	8.6	8.96	10.96
1,1-Biphenyl	3.65	3.75	3.95	3.9	4.25	3.7	3.75	2.05	3.77	3.89
Carbazole	23	3.75	67	4.6	75	24	17	1.9	43.19	63.18
Chrysene	22	32	22	40	150	18	19	16	32.14	42.10
Dibenzo(a,h)anthracene	6.2	15	0.195	8	9.4	4.4	3.2	3.9	4.37	5.24
Dibenzofuran	3.8	3.75	3.95	3.9	20	3.7	3.75	2.05	7.16	9.25
Fluoranthene	38	47	74	65	500	36	36	32	71.45	102.35
Fluorene	3.65	3.75	37	3.9	54	3.7	6.1	2.05	15.53	22.04
Indeno(1,2,3-c,d)pyrene	14	23	0.195	19	19	9.6	8.3	9.4	9.38	11.15
1-Methylnaphthalene	3.65	3.75	3.95	3.9	4.25	3.7	3.75	2.05	4.30	5.23
2-Methylnaphthalene	3.65	3.75	9.5	3.9	11	3.7	3.75	2.05	6.05	8.27
Naphthalene	5.1	3.75	3.95	3.7	11	3.5	3.75	2.1	5.18	6.76
Phenanthrene	17	6	70	12	130	19	14	5.7	37.53	52.53
Pyrene	36	41	51	66	500	34	34	30	65.76	94.83
tPAHs	312.70	272.70	583.49	436.60	2,084.15	318.50	280.95	191.95	527.51	732.87

mg/kg Milligrams per kilogram.
tPAHs Total polycyclic aromatic hydrocarbons.
UCL 95 percent upper confidence limit of the mean.

Table B-2. Carcinogenic PAHs in Soil in 1990, Southern Wood Piedmont Facility, Wilmington, North Carolina.

Constituent	TEF	LF1AU (mg/kg)	BAP= LF1AU (mg/kg)	LF1AM (mg/kg)	BAP= LF1AM (mg/kg)	LF1AL (mg/kg)	BAP= LF1AL (mg/kg)	LF1BU (mg/kg)	BAP= LF1BU (mg/kg)	LF1BM (mg/kg)	BAP= LF1BM (mg/kg)	LF1BL (mg/kg)
PAHs												
Benzo(a)anthracene	0.01	20	0.2	5.8	0.058	39	0.39	19	0.19	8.6	0.086	10
Benzo(a)pyrene	1	19	19	7.3	7.3	32	32	20	20	9.4	9.4	10
Benzo(b,k)fluoranthene	0.01	35	0.35	19	0.19	100	1	43	0.43	19	0.19	27
Benzo(g,h,i)perylene	0.01	8.8	0.088	5	0.05	16	0.16	7.4	0.074	3.9	0.039	3.9
Chrysene	0.01	22	0.22	9.5	0.095	59	0.59	27	0.27	15	0.15	18
Dibenzo(a,h)anthracene	1	4.2	4.2	2.2	2.2	7.5	7.5	4.3	4.3	2.7	2.7	2.3
Indeno(1,2,3-c,d)pyrene	0.01	10	0.1	5.2	0.052	17	0.17	10	0.1	4.9	0.049	5.2
1-Methylnaphthalene	0.01	4	0.04	3.65	0.0365	3.65	0.0365	3.7	0.037	3.9	0.039	3.65
2-Methylnaphthalene	0.01	4	0.04	3.65	0.0365	3.65	0.0365	5.9	0.059	15	0.15	3.65
BAP equivalents			24.2		10.0		41.9		25.5		12.8	
Total cPAH		127.0		61.3		277.8		140.3		82.4		83.7
Carbazole		26		3.65		3.65		46		90		3.65

Footnotes appear on page 6.

Table B-2. Carcinogenic PAHs in Soil in 1990, Southern Wood Piedmont Facility, Wilmington, North Carolina.

Constituent	TEF	BAP= LF1BL (mg/kg)	LF1CU (mg/kg)	BAP= LF1CU (mg/kg)	LF1CM (mg/kg)	BAP= LF1CM (mg/kg)	LF1CL (mg/kg)	BAP= LF1CL (mg/kg)	LF1DU (mg/kg)	BAP= LF1DU (mg/kg)	LF1DM (mg/kg)	BAP= LF1DM (mg/kg)
PAHs												
Benzo(a)anthracene	0.01	0.1	32	0.32	3.7	0.037	42	0.42	11	0.11	3.4	0.034
Benzo(a)pyrene	1	10	24	24	6.5	6.5	22	22	16	16	7.3	7.3
Benzo(b,k)fluoranthene	0.01	0.27	49	0.49	14	0.14	68	0.68	31	0.31	14	0.14
Benzo(g,h,i)perylene	0.01	0.039	10	0.1	3.7	0.037	6.5	0.065	6.3	0.063	4.8	0.048
Chrysene	0.01	0.18	42	0.42	8.9	0.089	59	0.59	17	0.17	7.3	0.073
Dibenzo(a,h)anthracene	1	2.3	5	5	1.6	1.6	4.7	4.7	4.3	4.3	1.6	1.6
Indeno(1,2,3-c,d)pyrene	0.01	0.052	11	0.11	3.3	0.033	9.3	0.093	8	0.08	4.9	0.049
1-Methylnaphthalene	0.01	0.0365	4.7	0.047	3.7	0.037	3.75	0.0375	3.8	0.038	3.65	0.0365
2-Methylnaphthalene	0.01	0.0365	4.7	0.047	3.7	0.037	3.75	0.0375	3.8	0.038	3.65	0.0365
BAP equivalents		13.0		30.5		8.5		28.6		21.1		9.3
Total cPAH			182.4		49.1		219.0		101.2		50.6	
Carbazole			43		9.6		3.75		3.8		3.65	

Footnotes appear on page 6.

Table B-2. Carcinogenic PAHs in Soil in 1990, Southern Wood Piedmont Facility, Wilmington, North Carolina.

Constituent	TEF	LF1DL (mg/kg)	BAP= LF1DL (mg/kg)	LF1EU (mg/kg)	BAP= LF1EU (mg/kg)	LF1EM (mg/kg)	BAP= LF1EM (mg/kg)	LF1EL (mg/kg)	BAP= LF1EL (mg/kg)	LF2AU (mg/kg)	BAP= LF2AU (mg/kg)	LF2AM (mg/kg)
PAHs												
Benzo(a)anthracene	0.01	18	0.18	21	0.21	7.4	0.074	3.6	0.036	20	0.2	110
Benzo(a)pyrene	1	16	16	18	18	8.1	8.1	3.5	3.5	16	16	46
Benzo(b,k)fluoranthene	0.01	52	0.52	29	0.29	120	1.2	9.1	0.091	33	0.33	89
Benzo(g,h,i)perylene	0.01	7.4	0.074	3.75	0.0375	3.7	0.037	3.6	0.036	7.8	0.078	17
Chrysene	0.01	40	0.4	22	0.22	8.1	0.081	3.7	0.037	21	0.21	120
Dibenzo(a,h)anthracene	1	3.9	3.9	3.2	3.2	4.2	4.2	0.76	0.76	3.9	3.9	4.15
Indeno(1,2,3-c,d)pyrene	0.01	8.7	0.087	8.1	0.081	14	0.14	2	0.02	8.6	0.086	18
1-Methylnaphthalene	0.01	3.8	0.038	3.75	0.0375	3.7	0.037	3.6	0.036	3.9	0.039	4.15
2-Methylnaphthalene	0.01	3.8	0.038	3.75	0.0375	3.7	0.037	3.6	0.036	3.9	0.039	10
BAP equivalents			21.2		22.1		13.9		4.6		20.9	
Total cPAH		153.6		112.6		172.9		33.5		118.1		418.3
Carbazole		3.8		23		3.7		3.6		45		200

Footnotes appear on page 6.

Table B-2. Carcinogenic PAHs in Soil in 1990, Southern Wood Piedmont Facility, Wilmington, North Carolina.

Constituent	TEF	BAP= LF2AM (mg/kg)	LF2AL (mg/kg)	BAP= LF2AL (mg/kg)	LF2BU (mg/kg)	BAP= LF2BU (mg/kg)	LF2BM (mg/kg)	BAP= LF2BM (mg/kg)	LF2BL (mg/kg)	BAP= LF2BL (mg/kg)	LF2CU (mg/kg)	BAP= LF2CU (mg/kg)
PAHs												
Benzo(a)anthracene	0.01	1.1	3.55	0.0355	33	0.33	13	0.13	21	0.21	43	0.43
Benzo(a)pyrene	1	46	3.55	3.55	24	24	30	30	41	41	41	41
Benzo(b,k)fluoranthene	0.01	0.89	6.2	0.062	43	0.43	24	0.24	17	0.17	43	0.43
Benzo(g,h,i)perylene	0.01	0.17	3.55	0.0355	12	0.12	3.9	0.039	16	0.16	17	0.17
Chrysene	0.01	1.2	3.6	0.036	35	0.35	18	0.18	31	0.31	58	0.58
Dibenzo(a,h)anthracene	1	4.15	3.55	3.55	3.85	3.85	3.9	3.9	3.8	3.8	5.3	5.3
Indeno(1,2,3-c,d)pyrene	0.01	0.18	1.1	0.011	11	0.11	3.9	0.039	3.8	0.038	11	0.11
1-Methylnaphthalene	0.01	0.0415	3.55	0.0355	3.85	0.0385	20	0.2	3.8	0.038	3.8	0.038
2-Methylnaphthalene	0.01	0.1	3.55	0.0355	3.85	0.0385	41	0.41	3.8	0.038	3.8	0.038
BAP equivalents		53.8		7.4		29.3		35.1		45.8		48.1
Total cPAH			32.2		169.6		157.7		141.2		225.9	
Carbazole			3.55		100		160		30		270	

Footnotes appear on page 6.

Table B-2. Carcinogenic PAHs in Soil in 1990, Southern Wood Piedmont Facility, Wilmington, North Carolina.

Constituent	TEF	LF2CM (mg/kg)	BAP= LF2CM (mg/kg)	LF2CL (mg/kg)	BAP= LF2CL (mg/kg)	LF2DU (mg/kg)	BAP= LF2DU (mg/kg)	LF2DM (mg/kg)	BAP= LF2DM (mg/kg)	LF2DL (mg/kg)	BAP= LF2DL (mg/kg)	LF2EU (mg/kg)
PAHs												
Benzo(a)anthracene	0.01	19	0.19	18	0.18	18	0.18	27	0.27	100	1	13
Benzo(a)pyrene	1	16	16	11	11	19	19	33	33	65	65	18
Benzo(b,k)fluoranthene	0.01	5.7	0.057	38	0.38	14	0.14	82	0.82	99	0.99	35
Benzo(g,h,i)perylene	0.01	13	0.13	4.2	0.042	7.9	0.079	34	0.34	14	0.14	8.1
Chrysene	0.01	22	0.22	32	0.32	22	0.22	40	0.4	150	1.5	18
Dibenzo(a,h)anthracene	1	6.2	6.2	15	15	0.195	0.195	8	8	9.4	9.4	4.4
Indeno(1,2,3-c,d)pyrene	0.01	14	0.14	23	0.23	0.195	0.00195	19	0.19	19	0.19	9.6
1-Methylnaphthalene	0.01	3.65	0.0365	3.75	0.0375	3.95	0.0395	3.9	0.039	4.25	0.0425	3.7
2-Methylnaphthalene	0.01	3.65	0.0365	3.75	0.0375	9.5	0.095	3.9	0.039	11	0.11	3.7
BAP equivalents			23.0		27.2		20.0		43.1		78.4	
Total cPAH		103.2		148.7		94.7		250.8		471.7		113.5
Carbazole		23		3.75		67		4.6		75		24

Footnotes appear on page 6.

Table B-2. Carcinogenic PAHs in Soil in 1990, Southern Wood Piedmont Facility, Wilmington, North Carolina.

Constituent	TEF	BAP= LF2EU (mg/kg)	LF2EM (mg/kg)	BAP= LF2EM (mg/kg)	LF2EL (mg/kg)	BAP= LF2EL (mg/kg)	Mean (mg/kg)	UCL (mg/kg)
PAHs								
Benzo(a)anthracene	0.01	0.13	13	0.13	11	0.11		
Benzo(a)pyrene	1	18	15	15	12	12		
Benzo(b,k)fluoranthene	0.01	0.35	32	0.32	31	0.31		
Benzo(g,h,i)perylene	0.01	0.081	7.1	0.071	8.6	0.086		
Chrysene	0.01	0.18	19	0.19	16	0.16		
Dibenzo(a,h)anthracene	1	4.4	3.2	3.2	3.9	3.9		
Indeno(1,2,3-c,d)pyrene	0.01	0.096	8.3	0.083	9.4	0.094		
1-Methylnaphthalene	0.01	0.037	3.75	0.0375	2.05	0.0205		
2-Methylnaphthalene	0.01	0.037	3.75	0.0375	2.05	0.0205		
BAP equivalents		23.3		19.1		16.7	25.9	30.9
Total cPAH			105.1		96.0		149.8	181.9
Carbazole			17		1.9		43.2	63.2

BAP Benzo(a)pyrene.
cPAH Carcinogenic polycyclic aromatic hydrocarbon.
mg/kg Milligrams per kilogram.
TEF Toxicity equivalency factor.
UCL 95 percent upper confidence limit of the mean.

Table B-3. Total PAHs in Soil in 1991, Southern Wood Piedmont Facility, Wilmington, North Carolina.

Constituent	LF1AU (mg/kg)	LF1AL (mg/kg)	LF1DU (mg/kg)	LF1DL (mg/kg)	LF1CU (mg/kg)	LF1CL (mg/kg)	LF1EU (mg/kg)	LF1EL (mg/kg)	LF1BU (mg/kg)	LF1BL (mg/kg)	LF2BL (mg/kg)
PAHs											
Acenaphthene	0.95	1.9	0.36	0.18	0.62	0.15	0.78	0.07	0.52	1.1	1.6
Acenaphthylene	3.8	0.59	1.4	0.13	2.1	0.58	1.4	0.35	1.7	4.1	2.4
Anthracene	54	5.7	36	1	140	2.3	350	1.8	23	16	19
Benzo(a)anthracene	11	24	15	2.1	11	5.7	9.6	2.0	10	31	12
Benzo(a)pyrene	13	14	11	1.8	14	4.1	11	1.5	11	21	9.2
Benzo(b,k)fluoranthene	30	36	32	3.4	43	18	30	4.4	31	61	21
Benzo(g,h,i)perylene	7.4	6.5	2.1	0.7	6.4	1.8	4.3	0.6	4.6	9.1	5.5
1,1-Biphenyl	0.42	0.092	0.24	0.022	0.9	0.04	2.1	0.028	0.23	0.066	0.18
Carbazole	23	1.1	8.2	0.98	38	0.97	98	1.1	7	5.4	6.8
Chrysene	12	28	18	3.0	15	8.9	3.6	2.9	13	36	15
Dibenzo(a,h)anthracene	3.4	2.9	1.1	0.26	3.9	0.58	3.7	0.175	1.35	2.3	2.6
Dibenzofuran	2.7	0.89	1.6	0.21	5.6	0.18	9.3	0.14	1.2	0.31	1.7
Fluoranthene	22	77	24	4.7	15	12	22	3.7	17	72	30
Fluorene	6.9	2.4	4.9	0.21	14	0.2	25	0.18	2.6	1.1	2.8
Indeno(1,2,3-c,d)pyrene	9.6	9.2	4.4	0.74	7.9	1.9	5.3	0.7	5.6	12	6.8
1,-Methylnaphthalene	0.22	0.17	0.14	0.07	4.0	0.097	0.56	0.063	0.27	0.11	0.29
2-Methylnaphthalene	2.7	0.29	1.1	0.067	6.4	0.14	7.7	0.11	0.93	0.18	0.88
Naphthalene	2.8	0.56	1	0.088	3.4	0.23	4.7	0.13	1.1	0.27	1.4
Phenanthrene	16	15	7.7	3.3	21	1.4	34	0.98	6.4	17	13
Pyrene	20	69	28	5.7	34	10	25	4.2	18	62	25
tPAHs	241.89	295.29	198.24	28.66	386.22	69.27	648.04	25.13	156.50	352.04	177.15

Footnotes appear on page 2.

Table B-3. Total PAHs in Soil in 1991, Southern Wood Piedmont Facility, Wilmington, North Carolina.

Constituent	LF2BU (mg/kg)	LF2DU (mg/kg)	LF2DL (mg/kg)	LF2EU (mg/kg)	LF2EL (mg/kg)	LF2AU (mg/kg)	LF2AL (mg/kg)	LF2CU (mg/kg)	LF2CL (mg/kg)	Mean (mg/kg)	UCL (mg/kg)
PAHs											
Acenaphthene	2.5	1.3	92	1	8.1	1	0.62	5.5	1.7	6.10	13.95
Acenaphthylene	5	3.7	5.4	3.8	5	5.2	2.4	4.7	4.3	2.90	3.60
Anthracene	310	75	170	64	93	41	9.5	120	84	80.77	118.77
Benzo(a)anthracene	25	8.6	130	11	63	13	12	17	28	22.05	33.17
Benzo(a)pyrene	23	12	61	12	29	16	9.6	20	27	16.06	21.05
Benzo(b,k)fluoranthene	55	26	190	30	90	34	32	37	81	44.24	59.91
Benzo(g,h,i)perylene	10	7	6.7	5.1	8.3	7.2	3.7	6	5.6	5.43	6.45
1,1-Biphenyl	2.1	0.64	2.3	0.66	0.59	0.37	0.078	0.91	0.27	0.61	0.89
Carbazole	170	34	46	37	28	18	3.1	60	15	30.08	45.99
Chrysene	31	11	150	12	69	15	18	20	41	26.12	38.90
Dibenzo(a,h)anthracene	3.4	2.0	6.6	2.5	5.1	2	1.2	3.4	4	2.62	3.26
Dibenzofuran	20	5	21	5.1	5.6	2.6	0.49	8.4	2.2	4.71	7.05
Fluoranthene	78	19	520	20	350	20	24	37	83	72.52	122.54
Fluorene	62	14	59	13	19	7.1	1.2	26	7.2	13.44	20.39
Indeno(1,2,3-c,d)pyrene	13	8.8	18	7.3	12	9.2	5.2	9.1	9.8	7.83	9.48
1,-Methylnaphthalene	0.59	0.26	1.6	0.26	0.41	0.22	0.13	0.46	0.34	0.51	0.86
2-Methylnaphthalene	16	4.4	8.0	5.1	2.4	2.1	0.22	4.6	0.85	3.21	4.75
Naphthalene	11	3.4	14	3.5	2.5	2.2	0.36	4.3	1.9	2.94	4.34
Phenanthrene	87	20	91	21	45	12	4.1	38	21	23.74	33.52
Pyrene	64	17	980	19	310	21	25	35	74	92.30	176.97
tPAHs	988.59	273.10	2572.60	273.32	1146.00	229.19	152.90	457.37	492.16	458.18	725.81

mg/kg Milligrams per kilogram.
tPAHs Total polycyclic aromatic hydrocarbons.
UCL 95 percent upper confidence limit of the mean.

Table B-4. Carcinogenic PAHs in Soil in 1991, Southern Wood Piedmont Facility, Wilmington, North Carolina.

Constituent	TEF	LF1AU (mg/kg)	BAP= LF1AU (mg/kg)	LF1AL (mg/kg)	BAP= LF1AL (mg/kg)	LF1DU (mg/kg)	BAP= LF1DU (mg/kg)	LF1DL (mg/kg)	BAP= LF1DL (mg/kg)	LF1CU (mg/kg)	BAP= LF1CU (mg/kg)	LF1CL (mg/kg)
PAHs												
Benzo(a)anthracene	0.01	11	0.11	24	0.24	15	0.15	2.1	0.021	11	0.11	5.7
Benzo(a)pyrene	1.0	13	13	14	14	11	11	1.8	1.8	14	14	4.1
Benzo(b,k)fluoranthene	0.01	30	0.3	36	0.36	32	0.32	3.4	0.034	43	0.43	18
Benzo(g,h,i)perylene	0.01	7.4	0.074	6.5	0.065	2.1	0.021	0.7	0.007	6.4	0.064	1.8
Chrysene	0.01	12	0.12	28	0.28	18	0.18	3.0	0.03	15	0.15	8.9
Dibenzo(a,h)anthracene	1.0	3.4	3.4	2.9	2.9	1.1	1.1	0.26	0.26	3.9	3.9	0.58
Indeno(1,2,3-c,d)pyrene	0.01	9.6	0.096	9.2	0.092	4.4	0.044	0.74	0.0074	7.9	0.079	1.9
1,-Methylnaphthalene	0.01	0.22	0.0022	0.17	0.0017	0.14	0.0014	0.07	0.0007	4.0	0.04	0.097
2-Methylnaphthalene	0.01	2.7	0.027	0.29	0.0029	1.1	0.011	0.067	0.00067	6.4	0.064	0.14
BAP equivalents			17.13		17.94		12.83		2.16		18.84	
Total cPAH		89.32		121.06		84.84		12.14		111.60		41.22
Carbazole		23		1.1		8.2		0.98		38		0.97

Footnotes appear on page 4.

Table B-4. Carcinogenic PAHs in Soil in 1991, Southern Wood Piedmont Facility, Wilmington, North Carolina.

Constituent	TEF	BAP= LF1CL (mg/kg)	LF1EU (mg/kg)	BAP= LF1EU (mg/kg)	LF1EL (mg/kg)	BAP= LF1EL (mg/kg)	LF1BU (mg/kg)	BAP= LF1BU (mg/kg)	LF1BL (mg/kg)	BAP= LF1BL (mg/kg)	LF2BL (mg/kg)	BAP= LF2BL (mg/kg)
PAHs												
Benzo(a)anthracene	0.01	0.057	9.6	0.096	2.0	0.02	10	0.1	31	0.31	12	0.12
Benzo(a)pyrene	1.0	4.1	11	11	1.5	1.5	11	11	21	21	9.2	9.2
Benzo(b,k)fluoranthene	0.01	0.18	30	0.3	4.4	0.044	31	0.31	61	0.61	21	0.21
Benzo(g,h,i)perylene	0.01	0.018	4.3	0.043	0.6	0.006	4.6	0.046	9.1	0.091	5.5	0.055
Chrysene	0.01	0.089	3.6	0.036	2.9	0.029	13	0.13	36	0.36	15	0.15
Dibenzo(a,h)anthracene	1.0	0.58	3.7	3.7	0.175	0.175	1.35	1.35	2.3	2.3	2.6	2.6
Indeno(1,2,3-c,d)pyrene	0.01	0.019	5.3	0.053	0.7	0.007	5.6	0.056	12	0.12	6.8	0.068
1,-Methylnaphthalene	0.01	0.00097	0.56	0.0056	0.063	0.00063	0.27	0.0027	0.11	0.0011	0.29	0.0029
2-Methylnaphthalene	0.01	0.0014	7.7	0.077	0.11	0.0011	0.93	0.0093	0.18	0.0018	0.88	0.0088
BAP equivalents		5.05		15.31		1.78		13.00		24.79		12.41
Total cPAH			75.76		12.45		77.75		172.69		73.27	
Carbazole			98		1.1		7		5.4		6.8	

Footnotes appear on page 4.

Table B-4. Carcinogenic PAHs in Soil in 1991, Southern Wood Piedmont Facility, Wilmington, North Carolina.

Constituent	TEF	LF2BU (mg/kg)	BAP= LF2BU (mg/kg)	LF2DU (mg/kg)	BAP= LF2DU (mg/kg)	LF2DL (mg/kg)	BAP= LF2DL (mg/kg)	LF2EU (mg/kg)	BAP= LF2EU (mg/kg)	LF2EL (mg/kg)	BAP= LF2EL (mg/kg)	LF2AU (mg/kg)
PAHs												
Benzo(a)anthracene	0.01	25	0.25	8.6	0.086	130	1.3	11	0.11	63	0.63	13
Benzo(a)pyrene	1.0	23	23	12	12	61	61	12	12	29	29	16
Benzo(b,k)fluoranthene	0.01	55	0.55	26	0.26	190	1.9	30	0.3	90	0.9	34
Benzo(g,h,i)perylene	0.01	10	0.1	7	0.07	6.7	0.067	5.1	0.051	8.3	0.083	7.2
Chrysene	0.01	31	0.31	11	0.11	150	1.5	12	0.12	69	0.69	15
Dibenzo(a,h)anthracene	1.0	3.4	3.4	2.0	2	6.6	6.6	2.5	2.5	5.1	5.1	2
Indeno(1,2,3-c,d)pyrene	0.01	13	0.13	8.8	0.088	18	0.18	7.3	0.073	12	0.12	9.2
1,-Methylnaphthalene	0.01	0.59	0.0059	0.26	0.0026	1.6	0.016	0.26	0.0026	0.41	0.0041	0.22
2-Methylnaphthalene	0.01	16	0.16	4.4	0.044	8.0	0.08	5.1	0.051	2.4	0.024	2.1
BAP equivalents			27.91		14.66		72.64		15.21		36.55	
Total cPAH		176.99		80.06		571.90		85.26		279.21		98.72
Carbazole		170		34		46		37		28		18

Footnotes appear on page 4.

Table B-4. Carcinogenic PAHs in Soil in 1991, Southern Wood Piedmont Facility, Wilmington, North Carolina.

Constituent	TEF	BAP= LF2AU (mg/kg)	LF2AL (mg/kg)	BAP= LF2AL (mg/kg)	LF2CU (mg/kg)	BAP= LF2CU (mg/kg)	LF2CL (mg/kg)	BAP= LF2CL (mg/kg)	Mean (mg/kg)	UCL (mg/kg)
PAHs										
Benzo(a)anthracene	0.01	0.13	12	0.12	17	0.17	28	0.28		
Benzo(a)pyrene	1.0	16	9.6	9.6	20	20	27	27		
Benzo(b,k)fluoranthene	0.01	0.34	32	0.32	37	0.37	81	0.81		
Benzo(g,h,i)perylene	0.01	0.072	3.7	0.037	6	0.06	5.6	0.056		
Chrysene	0.01	0.15	18	0.18	20	0.2	41	0.41		
Dibenzo(a,h)anthracene	1.0	2	1.2	1.2	3.4	3.4	4	4		
Indeno(1,2,3-c,d)pyrene	0.01	0.092	5.2	0.052	9.1	0.091	9.8	0.098		
1,-Methylnaphthalene	0.01	0.0022	0.13	0.0013	0.46	0.0046	0.34	0.0034		
2-Methylnaphthalene	0.01	0.021	0.22	0.0022	4.6	0.046	0.85	0.0085		
BAP equivalents		18.81		11.51		24.34		32.67	19.78	25.73
Total cPAH			82.05		117.56		197.59		123.61	175.22
Carbazole			3.1		60		15		30.08	45.99

BAP Benzo(a)pyrene.
cPAH Carcinogenic polycyclic aromatic hydrocarbon.
mg/kg Milligrams per kilogram.
TEF Toxicity equivalency factor.
UCL 95 percent upper confidence limit of the mean.

Table B-5. Total PAHs in Lower Soil Zone in 1991, Land Farms 1 and 2, Southern Wood Piedmont Facility, Wilmington, North Carolina.

Constituent	LF1AL (mg/kg)	LF1DL (mg/kg)	LF1CL (mg/kg)	LF1EL (mg/kg)	LF1BL (mg/kg)	LF2BL (mg/kg)	LF2DL (mg/kg)	LF2EL (mg/kg)	LF2AL (mg/kg)	LF2CL (mg/kg)	Mean (mg/kg)	UCL (mg/kg)
PAHs												
Acenaphthene	1.9	0.18	0.15	0.07	1.1	1.6	92	8.1	0.62	1.7	10.74	27.35
Acenaphthylene	0.59	0.13	0.58	0.35	4.1	2.4	5.4	5	2.4	4.3	2.53	3.72
Anthracene	5.7	1	2.3	1.8	16	19	170	93	9.5	84	40.23	73.23
Benzo(a)anthracene	24	2.1	5.7	2.0	31	12	130	63	12	28	30.98	53.78
Benzo(a)pyrene	14	1.8	4.1	1.5	21	9.2	61	29	9.6	27	17.82	28.32
Benzo(b,k)fluoranthene	36	3.4	18	4.4	61	21	190	90	32	81	53.68	86.46
Benzo(g,h,i)perylene	6.5	0.7	1.8	0.6	9.1	5.5	6.7	8.3	3.7	5.6	4.85	6.61
1,1-Biphenyl	0.092	0.022	0.04	0.028	0.066	0.18	2.3	0.59	0.078	0.27	0.37	0.77
Carbazole	1.1	0.98	0.97	1.1	5.4	6.8	46	28	3.1	15	10.85	19.57
Chrysene	28	3.0	8.9	2.9	36	15	150	69	18	41	37.18	62.99
Dibenzo(a,h)anthracene	2.9	0.26	0.58	0.175	2.3	2.6	6.6	5.1	1.2	4	2.57	3.82
Dibenzofuran	0.89	0.21	0.18	0.14	0.31	1.7	21	5.6	0.49	2.2	3.27	7.01
Fluoranthene	77	4.7	12	3.7	72	30	520	350	24	83	117.64	218.81
Fluorene	2.4	0.21	0.2	0.18	1.1	2.8	59	19	1.2	7.2	9.33	19.98
Indeno(1,2,3-c,d)pyrene	9.2	0.74	1.9	0.7	12	6.8	18	12	5.2	9.8	7.63	10.91
1,-Methylnaphthalene	0.17	0.07	0.097	0.063	0.11	0.29	1.6	0.41	0.13	0.34	0.33	0.60
2-Methylnaphthalene	0.29	0.067	0.14	0.11	0.18	0.88	8.0	2.4	0.22	0.85	1.31	2.74
Naphthalene	0.56	0.088	0.23	0.13	0.27	1.4	14	2.5	0.36	1.9	2.14	4.61
Phenanthrene	15	3.3	1.4	0.98	17	13	91	45	4.1	21	21.18	37.32
Pyrene	69	5.7	10	4.2	62	25	980	310	25	74	156.49	332.21
tPAHs	295.29	28.66	69.27	25.13	352.04	177.15	2,572.60	1,146.00	152.90	492.16	531.12	1,000.79

mg/kg Milligrams per kilogram.
tPAHs Total polycyclic aromatic hydrocarbons.
UCL 95 percent upper confidence limit of the mean.

Table B-6. Total PAHs in Upper Soil Zone in 1991, Land Farms 1 and 2, Southern Wood Piedmont Facility, Wilmington, North Carolina.

Constituent	LF1AU (mg/kg)	LF1DU (mg/kg)	LF1CU (mg/kg)	LF1EU (mg/kg)	LF1BU (mg/kg)	LF2BU (mg/kg)	LF2DU (mg/kg)	LF2EU (mg/kg)	LF2AU (mg/kg)	LF2CU (mg/kg)	Mean (mg/kg)	UCL (mg/kg)
PAHs												
Acenaphthene	0.95	0.36	0.62	0.78	0.52	2.5	1.3	1	1	5.5	1.45	2.35
Acenaphthylene	3.8	1.4	2.1	1.4	1.7	5	3.7	3.8	5.2	4.7	3.28	4.15
Anthracene	54	36	140	350	23	310	75	64	41	120	121.30	188.68
Benzo(a)anthracene	11	15	11	9.6	10	25	8.6	11	13	17	13.12	15.96
Benzo(a)pyrene	13	11	14	11	11	23	12	12	16	20	14.30	16.71
Benzo(b,k)fluoranthene	30	32	43	30	31	55	26	30	34	37	34.80	39.72
Benzo(g,h,i)perylene	7.4	2.1	6.4	4.3	4.6	10	7	5.1	7.2	6	6.01	7.25
1,1-Biphenyl	0.42	0.24	0.9	2.1	0.23	2.1	0.64	0.66	0.37	0.91	0.86	1.26
Carbazole	23	8.2	38	98	7	170	34	37	18	60	49.32	78.44
Chrysene	12	18	15	3.6	13	31	11	12	15	20	15.06	19.19
Dibenzo(a,h)anthracene	3.4	1.1	3.9	3.7	1.35	3.4	2.0	2.5	2	3.4	2.68	3.26
Dibenzofuran	2.7	1.6	5.6	9.3	1.2	20	5	5.1	2.6	8.4	6.15	9.38
Fluoranthene	22	24	15	22	17	78	19	20	20	37	27.40	38.27
Fluorene	6.9	4.9	14	25	2.6	62	14	13	7.1	26	17.55	27.69
Indeno(1,2,3-c,d)pyrene	9.6	4.4	7.9	5.3	5.6	13	8.8	7.3	9.2	9.1	8.02	9.48
1,-Methylnaphthalene	0.22	0.14	4.0	0.56	0.27	0.59	0.26	0.26	0.22	0.46	0.70	1.38
2-Methylnaphthalene	2.7	1.1	6.4	7.7	0.93	16	4.4	5.1	2.1	4.6	5.10	7.67
Naphthalene	2.8	1	3.4	4.7	1.1	11	3.4	3.5	2.2	4.3	3.74	5.38
Phenanthrene	16	7.7	21	34	6.4	87	20	21	12	38	26.31	40.01
Pyrene	20	28	34	25	18	64	17	19	21	35	28.10	36.31
tPAHs	241.89	198.24	386.22	648.04	156.50	988.59	273.10	273.32	229.19	457.37	385.25	552.55

mg/kg Milligrams per kilogram.
tPAHs Total polycyclic aromatic hydrocarbons.
UCL 95 percent upper confidence limit of the mean.

Table B-7. 1991 Soil Data Summary by Sample Number, Southern Wood Piedmont Facility, Wilmington, North Carolina.

Constituent	LF1AU (mg/kg)	LF1AL (mg/kg)	LF1DU (mg/kg)	LF1DL (mg/kg)	LF1CU (mg/kg)	LF1CL (mg/kg)	LF1EU (mg/kg)	LF1EL (mg/kg)	LF1BU (mg/kg)	LF1BL (mg/kg)	LF2BL (mg/kg)	LF2BU (mg/kg)
Phenols and Cresols												
o-Cresol	.04U	.04U	.04U	.04U	0.023	.04U	.04U	.04U	.04U	.04U	0.04	.04U
m,p-Cresol	0.044	.1U	.1U	.1U	.1U	.1U	.1U	.1U	.1U	0.047	.1U	.1U
2,4-Dimethylphenol	0.06	.86U	0.028	0.175U	0.86	0.05	0.14	0.175U	.86U	0.057	0.037	.86U
Pentachlorophenol	1.2	3.9	0.79	.9U	19.5U	1.3	18.5U	0.7	1.6	4.3	10	49U
Phenol	0.19U	1.85U	0.18U	0.175U	2.2U	0.18U	2.2U	0.175U	1.85U	2.2U	1.85U	2.2U
Tetrachlorophenols	0.19U	1.85U	0.18U	0.175U	3.9U	0.13	3.7U	0.045	0.31	0.44	0.52	10U
Trichlorophenols	.048U	.048U	.048U	.048U	.048U	.048U	.048U	.048U	.048U	.048U	0.048	.048U
PAHs												
tPAHs	241.89	295.292	198.24	28.657	386.22	69.267	648.04	25.126	156.5	352.036	177.15	988.59
cPAHs	17.13	17.94	12.83	2.16	18.84	5.05	15.31	1.78	13.00	24.79	12.41	27.91
Carbazole	23	1.1	8.2	0.98	38	0.97	98	1.1	7	5.4	6.8	170
Inorganics												
Arsenic	6.5	23	4.9	15	2.5	4.9	6.9	9.9	7.9	13	84	8.3
Chromium	6.2	14	5.5	1.9	12	5.4	6.7	2.8	8.2	7.9	100	11
Copper	37	70	22	12	39	38	44	17	30	35	140	44

Footnotes appear on page 2.

Table B-7. 1991 Soil Data Summary by Sample Number, Southern Wood Piedmont Facility, Wilmington, North Carolina.

Constituent	LF2DU (mg/kg)	LF2DL (mg/kg)	LF2EU (mg/kg)	LF2EL (mg/kg)	LF2AU (mg/kg)	LF2AL (mg/kg)	LF2CU (mg/kg)	LF2CL (mg/kg)	Mean (mg/kg)	UCL (mg/kg)
Phenols and Cresols										
o-Cresol	.04U	.04U	0.022	.04U	0.024	.04U	0.028	0.026	0.04	0.04
m,p-Cresol	.1U	.1U	0.087	.1U	0.1	0.07	.1U	.1U	0.1	0.1
2,4-Dimethylphenol	.86U	.86U	0.081	.86U	0.092	0.082	0.087	0.12	0.36	0.51
Pentachlorophenol	6.4	150	4.1	19	3.8	2.8	4.6	22	16.22	29.21
Phenol	2.2U	2.2	1.95U	2.2U	2U	2.05U	2.2U	2.2U	1.61	1.94
Tetrachlorophenols	0.34	3.5	0.47	1.1	0.48	0.25	3.8U	0.85	1.61	2.54
Trichlorophenols	.048U	.048U	.048U	.048U	.048U	.048U	.048U	.048U	0.048	0.048
PAHs										
tPAHs	273.1	2572.6	273.32	1146	229.19	152.898	457.37	492.16	458.18	681.28
cPAHs	14.66	72.64	15.21	36.55	18.81	11.51	24.34	32.67	19.78	25.73
Carbazole	34	46	37	28	18	3.1	60	15	30.08	45.99
Inorganics										
Arsenic	6.4	22	6.7	9.5	7.9	18	5.6	14	13.85	20.60
Chromium	7.1	21	7.8	15	15	12	6.2	9.8	13.78	21.82
Copper	35	150	39	51	42	120	41	62	53.40	68.31

mg/kg Milligrams per kilogram.
cPAHs Carcinogenic polycyclic aromatic hydrocarbons.
tPAHs Total polycyclic aromatic hydrocarbons.
U Value is one half the practical quantitation limit.
UCL 95 percent upper confidence limit of the mean.