34FRBCERCLASF10,622

34FRBCERCLASF10,622

Site Name:	SOUTHERN WOOD PIEDMONT
Subsite:	
Site Name: *Do not enter text.*	NCD058517467
Full Site Name (Subject): *Do not enter text.*	SOUTHERN WOOD PIEDMONT
Document Type:	REMEDIAL INVESTIGATION (RI)
Description:	Remedial Investigation: References I - 15
Report Segment:	6
Date of Document:	6/24/1999
Date Received:	
Box: *Enter SF and # with no spaces.*	SF10,622
Access Level:	PUBLIC
Division:	WASTE MANAGEMENT
Section:	SUPERFUND
Program (Document Group):	FRB CERCLA (FRBCERCLA)
Document Category:	FACILITY

Print Report for Record | Go to New Blank Record | Go to New Record - (default to last record values) | Delete Record

REFERENCE 1

cc/ LMP
MJB
G. Kunz

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

RECEIVED Ref. 1

MAY 25 1999

MAY 17 1999

SOUTHERN WOOD PIEDMONT

4WD

MAY 1999
Received
Waste Management
Division

Mr. William L. Meyer, Director
Division of Waste Management
North Carolina Department of Environment and
Natural Resources
Suite 150
401 Oberlin Road
Raleigh, NC 27605

SUBJ: Deferral Approval for Southern Wood Piedmont Site in Wilmington, North Carolina
(NCD 058 517 467)

Dear Mr. Meyer:

The Environmental Protection Agency (EPA) is in receipt of your request and supporting documentation, dated April 28, 1999, for the deferral of the Southern Wood Piedmont Site in Wilmington (NCD 058 517 467) to the State of North Carolina. Under this deferral, the North Carolina Department of Environment and Natural Resources will take the lead in overseeing the Potentially Responsible Parties in their investigative activities and, if necessary, cleanup of the Site. EPA concurs with the State's request to defer the above referenced Site and will replace Appendix B - Sites Deferred to the State of North Carolina in the Superfund State Deferral Memorandum of Agreement with the amended copy the State supplied. EPA does not intend to pursue listing this Site on the National Priority List while the Site is deferred to the State.

EPA is appreciative of the willingness of the Division of Waste Management, North Carolina Department of Environment and Natural Resources to accept this new challenge. If you have any questions, please contact Luis E. Flores at 404-562-8807.

Sincerely,

Richard D. Green
Director
Waste Management Division

cc/LMP
MJB
G. Kuss

NORTH CAROLINA DEPARTMENT OF
ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF WASTE MANAGEMENT

NCDENR

JAMES B. HUNT JR.
GOVERNOR

WAYNE MCDEVITT
SECRETARY

WILLIAM L. MEYER
DIRECTOR

May 24, 1999

RECEIVED
MAY 25 1999
SOUTHERN WOOD PIEDMONT

VIA UPS OVERNIGHT MAIL

Mr. Jeff Rosbach, President
Southern Wood Piedmont Company
591 Springfield Road
Spartanburg, SC 29304

SUBJECT: Finalized Administrative Order on Consent
Southern Wood Piedmont Site
Wilmington, New Hanover County, NC
USEPA ID Number: NCD 058 517 467

Dear Mr. Rosbach:

I am pleased to inform you that the US EPA has approved our request for deferral of the Southern Wood Piedmont site. Enclosed is a copy of the Administrative Order on Consent (AOC) that was signed today, May 24, 1999.

Pursuant to the execution of this AOC, the next step in the process is the submittal of four (4) copies of the Remedial Investigation Report to the division within thirty (30) days, no later than June 24, 1999. If you have any questions, please contact Stuart Parker at (919) 733-2801, ext. 277.

Sincerely,

William L. Meyer

William L. Meyer, Director
Division of Waste Management

Attachments

cc: Stuart Parker
Pat DeRosa
Rob Gelblum
Bill Arrants, SWP
Layton Bedsole, NC State Ports Authority
Tom Pollard, City of Wilmington
Luis Flores, US EPA
New Hanover County Library, Information Repository

401 OBERLIN ROAD, SUITE 150, RALEIGH, NC 27605
PHONE 919-733-4996 FAX 919-715-3605
AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER - 50% RECYCLED/10% POST-CONSUMER PAPER

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT
AND NATURAL RESOURCES
DIVISION OF WASTE MANAGEMENT
SUPERFUND SECTION

IN RE:	SOUTHERN WOOD PIEDMONT CO. NCD 058 517 467 WILMINGTON, NORTH CAROLINA NEW HANOVER COUNTY	ADMINISTRATIVE ORDER ON CONSENT PURSUANT TO N.C.G.S. 130A-310.9(b) AND SUPERFUND STATE DEFERRAL MEMORANDUM OF AGREEMENT DOCKET NUMBER 97-SF-117

The following constitutes the agreement of the parties hereto. This Administrative Order on Consent (Consent Order) is entered into pursuant to the Superfund State Deferral Memorandum of Agreement between the US EPA Region IV (EPA) and the State of North Carolina. Southern Wood Piedmont Company concurs with the conclusions of law contained herein solely for purposes of this Consent Order.

I. JURISDICTION

This Consent Order is entered into under authority vested in the Secretary of the North Carolina Department of Environment and Natural Resources (Department) by North Carolina's Inactive Hazardous Sites Response Act of 1987 (the Act), which constitutes Part 3, Article 9 of Chapter 130A of the North Carolina General Statutes (N.C.G.S.). N.C.G.S. 130A-310 *et seq.* The Secretary of the Department has delegated this authority to the Director of the North Carolina Division of Waste Management (Director).

II. STATEMENT OF PURPOSE

This Consent Order is entered into for the purpose of addressing the hazardous substance or waste disposal site (the Site) defined in Section III. A. of this Consent Order, which the Department has determined endangers public health or the environment. In entering into this Consent Order, the objective of the Division of Waste Management (Division) and Southern Wood Piedmont Company is for Southern Wood Piedmont Company to implement a voluntary remedial action program approved by the Division involving: (1) preparation of a Remedial Investigation Plan to evaluate the extent of contamination related to wood preserving operations conducted on the Site, whether comingled with other contaminants or not; (2) implementation of the Remedial Investigation Plan; (3) completion of a Remedial Action Plan to evaluate alternatives for meeting cleanup standards; and (4) implementation of the approved Remedial Action Plan.

E. This Consent Order is authorized pursuant to the power of the Secretary under N.C.G.S. 130A-310.9(b), and by delegation the Director, to enter into agreements with owners, operators, or other responsible parties for implementation of voluntary remedial action programs as to inactive hazardous substance or waste disposal sites in accordance with remedial action plans approved by the Department.

V. REIMBURSEMENT OF COSTS

A. As evidenced by Attachment A hereto, Southern Wood Piedmont Company has paid, or agreed to repay, EPA $619,069.84 in past federal response costs which EPA determines are owed in relation to the Site. Those costs shall include, but may not be limited to, the costs of activities conducted by the Division and funded under federal Superfund cooperative agreements.

B. Southern Wood Piedmont Company shall reimburse the Division for all federally funded oversight and enforcement costs the Division incurs pursuant to this Consent Order. The Division will mail Southern Wood Piedmont Company quarterly cost summaries and invoices for these costs. The cost summaries will be of the type provided by the Division to EPA as part of the documentation which the Division provides to EPA for cost recovery purposes. Within sixty (60) days of receiving each invoice, Southern Wood Piedmont Company shall submit full payment to the Division. Payment shall be by certified or cashier's check payable to "NC DENR".

VI. WORK TO BE PERFORMED

All work performed pursuant to plans approved under this Consent Order shall be under the direction and supervision of a professional engineer or a licensed geologist with expertise in hazardous substance site cleanup and comply with the current U.S. Environmental Protection Agency (EPA) Region IV, Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, May 1996.

A. Within thirty (30) days after the execution of this Consent Order, Southern Wood Piedmont Company shall submit to the Division four (4) copies of a Remedial Investigation Report organized in sections corresponding to and including at least the items listed below in Sections VI. D. and G.

B. Within thirty (30) days of receiving notice from the Division of any deficiency in the Remedial Investigation Report, Southern Wood Piedmont Company shall submit to the Division information or material sufficient to correct such deficiency. The Division shall use best efforts to review this submission in a timely manner so that the Division's disapproval or authorization does not affect Southern Wood Piedmont's

5. A description of local geologic and hydrogeologic conditions.

6. Inventory and map of all wells, springs, and surface-water intakes used as sources of potable water within a one-half mile radius of the center of the site. If the site is greater than one hundred (100) acres in size, the inventory and map must cover a one-mile radius from the center of each source area.

7. Identification of environmentally sensitive areas on and adjacent to the Site including:

   Marine Sanctuaries
   National and State Parks
   Designated and proposed Federal and State Wilderness and Natural Areas
   Areas identified under the Coastal Zone Management Act
   Sensitive areas identified under the National Estuary Program or the Near Coastal Waters Program
   Critical areas identified under the Clean Lakes Program
   National Monuments
   National and State Historical Sites
   National and State Seashore, Lakeshore, and River Recreational Areas
   Critical habitats and habitats known to be used by State or Federally designated or proposed endangered or threatened species or species under review as to their endangered or threatened status
   National and State Preserves and Forests
   National and State Wildlife Refuges
   Coastal Barriers and Units of a Coastal Barrier Resources System
   Federal land designated for protection of natural ecosystems
   Spawning areas critical for the maintenance of fish/shellfish species within river, lake or coastal tidal waters
   Migratory pathways and feeding areas critical for maintenance of anadromous fish species within river reaches or areas in lakes or coastal tidal waters in which such fish spend extended periods of time
   Terrestrial areas utilized for breeding by large or dense aggregations of animals
   Rivers State or Federally designated Scenic or Wild
   State lands designated for wildlife or game management
   Areas important to maintenance of unique biotic communities
   State-designated areas for protection or maintenance of aquatic life
   Wetlands

8. A copy of the current owner's(s') deed(s) to the property.

9. A chronological listing of all previous owners and each period of ownership since the property was originally developed from pristine land.

10. Operational history with aerial photographs and Sanborne Fire Insurance maps to support land-use history.

11. A list of all hazardous substances which have been used or stored at the site,

22. Any other information required by the Division or considered relevant by the remediating party.

23. If this document includes any work that would constitute the "practice of engineering" as defined by N.C.G.S. 89C, the signature and seal of a professional engineer must be included. If this document includes any work that would constitute the "public practice of geology" as defined by N.C.G.S. 89E, the signature and seal of a licensed geologist is required.

E. Within thirty (30) days of receiving notice from the Division of any deficiency in the Investigation Plan, Southern Wood Piedmont Company shall submit to the Division information or material sufficient to correct such deficiency. The Division shall use best efforts to review this submission in a timely manner so that the Division's disapproval or authorization does not affect Southern Wood Piedmont's ability to meet any time schedule or deadline in connection with any of its obligations under this Consent Order.

F. When the Division determines that the Investigation Plan is complete, the Division will notify Southern Wood Piedmont Company in writing. Southern Wood Piedmont Company shall begin the Supplemental Remedial Investigation no sooner than receiving written approval of the Investigation Plan from the Division, nor later than thirty (30) days thereafter.

G. Within one hundred twenty (120) days of receiving written approval of the Investigation Plan from the Division, Southern Wood Piedmont Company shall submit to the Division four (4) copies of a Supplemental Remedial Investigation Report documenting implementation of the approved Investigation Plan, organized in sections corresponding to the following items and including at least:

1. A narrative description of how the investigation was conducted, including a discussion of any variances from the approved work plan.

2. A description of groundwater monitoring well design and installation procedures, including drilling methods used, completed drilling logs, "as built" drawings of all monitoring wells, well construction techniques and materials, geologic logs, and copies of all well installation permits.

3. A map, drawn to scale, showing all soil, surface water and sediment sample locations and monitoring well locations in relation to known disposal areas or other sources of contamination. Monitoring wells must be surveyed to a known benchmark. Soil sample locations must be surveyed to a known benchmark or flagged with a secure marker until after the remedial action is completed. Monitoring well locations and elevations must be surveyed by a Registered Land Surveyor.

4. A description of all laboratory quality control and quality assurance

I. Should additional remedial investigation work phases be necessary, Southern Wood Piedmont Company shall submit the subsequent work phase investigation plan within thirty (30) days of receiving notice from the Division of the additional work phase required. The requirements for the submittal and content of plans and reports under Sections VI. D., E., F. G., and H. shall apply to subsequent work plans and reports except where, in the Division's sole discretion, the submission of such would duplicate a previous submittal.

J. If the Division determines that hazardous substances or waste disposed at the Site have affected any drinking water wells, Southern Wood Piedmont Company shall, by a deadline established by the Division, provide an alternate drinking water source for users of those wells.

K. Following Southern Wood Piedmont Company's completion of the Remedial Investigation, the Division will ascertain cleanup standards for each contaminated medium at the Site. The Division shall meet with Southern Wood Piedmont to review the basis for cleanup standards, risk levels, remedial alternatives, design, end use of the site, and institutional controls. Southern Wood Piedmont Company shall use the Division's cleanup standards to develop remedial alternatives in the Remedial Action Plan, as described in Section VI. L. of this Consent Order.

L. Within ninety (90) days of receiving written notice from the Division that the Remedial Investigation is complete, Southern Wood Piedmont Company shall submit to the Division four (4) copies of its proposed Remedial Action Plan (Action Plan) for all contaminated media at the Site that exceed the cleanup standards ascertained by the Division, organized in sections corresponding to the following items and including at least:

1. A statement of objectives for the Remedial Action.

2. A listing of potentially applicable technologies.

3. An evaluation of remedial alternatives using the following feasibility study criteria:

   a. Protection of human health and the environment, including attainment of remediation goals.
   b. Compliance with applicable federal, State and local regulations.
   c. Long-term effectiveness and permanence.
   d. Reduction of toxicity, mobility and volume.
   e. Short-term effectiveness: effectiveness at minimizing the impact of the site remediation on the environment and the local community.
   f. Implementability: technical and logistical feasibility, including an estimate of time required for completion.
   g. Cost.
   h. Community acceptance.

information or material sufficient to correct such deficiency.

O. Southern Wood Piedmont Company shall begin implementation of the Action Plan no sooner than receiving written approval from the Division nor later than sixty (60) days thereafter.

P. Any requests for modifications of the approved Action Plan must be submitted in writing to the Division, and may not be incorporated or implemented unless and until approved in writing by the Division.

Q. Southern Wood Piedmont Company shall provide to the Division: weekly written or telephone progress reports each Friday during the soil and waste remedial action if less than one (1) month in duration; quarterly reports during groundwater remedial action, any soil and waste remedial action greater than one (1) month in duration, and any necessary post-remedial maintenance; and a final report with confirmatory sample data documenting complete implementation of the approved Action Plan. The quarterly reports and final report should include, without limitation, complete "as-built" drawings and specifications of all remedial action systems; tabulated laboratory data; the location and depth of samples collected; a description of all field and laboratory quality control/quality assurance procedures; and legible and complete copies of all records of periodic system inspections, laboratory reports, waste manifests and chain of custody documentation generated during the reporting period. Quarterly reports shall be provided by the tenth day after each quarter concludes, with the first quarter commencing on the date of written approval of the Action Plan by the Division.

The final report shall be provided within one (1) month following complete implementation of the approved Action Plan. The Division shall use best efforts to review this submission in a timely manner so that the Division's disapproval or authorization does not affect Southern Wood Piedmont's ability to meet any time schedule or deadline in connection with any of its obligations under this Consent Order. The report shall include a certification under oath by a corporate official of Southern Wood Piedmont Company in charge of a principal business function stating: "To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this certification is true, accurate and complete." If the document includes any work which would constitute the "practice of engineering" as defined by N.C.G.S. 89C, the signature and seal of a professional engineer must be included. If the document includes any work which would constitute the "public practice of geology" as defined by N.C.G.S. 89E, the signature and seal of a licensed geologist is required.

Within thirty (30) days of receiving notice from the Division of any deficiency in the reports required by this paragraph or in the implementation of the plans required by this Consent Order, Southern Wood Piedmont Company shall submit to the Division information or material sufficient to demonstrate correction of such deficiencies.

and other documents relating in any way to this Consent Order; and otherwise assess Southern Wood Piedmont Company's compliance with this Consent Order. All parties with access to the Site pursuant to this paragraph shall comply with all approved health and safety plans and the current U.S. Environmental Protection Agency (EPA) Region IV, Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, May 1996.

D. Unless a confidentiality claim covering information provided under this Consent Order is made pursuant to law and adequately substantiated when the information is submitted, such information may be made available to the public by the Division without further notice to Southern Wood Piedmont Company. Southern Wood Piedmont Company agrees that under no circumstances shall analytical data generated pursuant to this Consent Order be considered confidential.

E. In any government enforcement action brought against Southern Wood Piedmont Company, Southern Wood Piedmont Company waives any objections to the admissibility into evidence (but not objections as to the weight) of the results of any analyses of sampling conducted by or for Southern Wood Piedmont Company at the Site or of other data gathered pursuant to this Consent Order.

F. If Southern Wood Piedmont Company is unable by reasonable efforts to gain access to other property as necessary pursuant to this Consent Order, the Division shall assist Southern Wood Piedmont Company in obtaining access.

VIII. DELAY IN PERFORMANCE

As soon as Southern Wood Piedmont Company is aware of the potential for delay, it shall submit to the Division written documentation of the reasons for the delay and the efforts made by Southern Wood Piedmont Company to avoid the delay, as well as a time by which such work can be completed. The Division shall review the documentation and shall promptly approve the new schedule if good cause is shown. Good cause may include, but is not limited to, extraordinary weather, natural disasters and national emergencies. At a minimum, good cause does not include normal inclement weather, increases in the cost of work to be performed under this Consent Order, financial difficulty for Southern Wood Piedmont Company in performing such work, failure by Southern Wood Piedmont Company to satisfy its obligations under this Consent Order (whether evidenced by a notice of deficiency or not), the pendency of dispute resolution, acts or omissions of Southern Wood Piedmont Company's contractors or representatives not otherwise constituting good cause, and failure by Southern Wood Piedmont Company or its contractors or representatives to make complete and timely application for any required approval or permit. The burden of demonstrating good cause for delay, and that the delay proposed is warranted, is Southern Wood Piedmont Company's.

C. Southern Wood Piedmont Company shall provide a copy of this Consent Order to each contractor or other person or entity retained to perform any work under this Consent Order within seven (7) days after the effective date of this Consent Order or the date of retaining their services, whichever is later. Southern Wood Piedmont Company shall condition any such contracts upon satisfactory compliance with this Consent Order. Notwithstanding the terms of any contract, Southern Wood Piedmont Company is responsible for compliance with this Consent Order and for ensuring that such contractors or other persons or entities comply with this Consent Order. Submittal by Southern Wood Piedmont Company of each document pursuant to this Consent Order shall constitute certification by the signatory and by Southern Wood Piedmont Company of the truth, accuracy and completeness of the information contained in that document.

D. Subject to the reservation of rights in Section X.E. of this Consent Order, upon payment of the amounts specified in Section V. (Reimbursement of Costs) and upon completion of the work specified in Section VI. (Work to Be Performed) of this Consent Order to the satisfaction of the Division, the Department covenants not to sue or take any other civil or administrative action against Southern Wood Piedmont Company for any and all civil liability for injunctive relief or reimbursement of response costs in relation to the Site.

E. The covenant not to sue set forth in Section X.D. above does not pertain to any matters other than those expressly specified in Section X.D. above. The Department reserves and the Consent Order is without prejudice to all rights against Southern Wood Piedmont Company with respect to all other matters, including but not limited to, the following:

(1) claims based on a failure by Southern Wood Piedmont Company to meet a requirement of this Consent Order, including but not limited to Section V. (Reimbursement of Costs), Section VI. (Work to be Performed), Section VII. (Sampling, Access, and Data/Document Availability), and Section X. (Additional Provisions);

(2) any liability resulting from past or future releases of hazardous substances, pollutants or contaminants, at or from the Site caused or contributed to by Southern Wood Piedmont Company, its successors, assignees, lessees or sublessees;

(3) any liability resulting from exacerbation by Southern Wood Piedmont, its successors, assignees, lessees or sublessees, of contamination at the Site;

(4) any liability relating to hazardous substances, pollutants or contaminants not present or existing on or under the Site as of the effective date of this Consent Order;

(5) criminal liability;

J. Southern Wood Piedmont Company shall preserve, for at least six (6) years after termination of this Consent Order, all records and documents in its possession or in the possession of its divisions, employees, agents, accountants, contractors or attorneys which relate in any way to this Consent Order. After this six (6)-year period, Southern Wood Piedmont Company shall notify the Division at least thirty (30) days prior to the destruction of any such records and documents. Southern Wood Piedmont Company shall comply with any written request by the Division, prior to the day set for destruction, to continue to preserve such records and documents or to provide them to the Division. Southern Wood Piedmont Company may assert any available right to keep particular records and documents, other than analytical data, confidential.

K. Except as otherwise provided herein, this Consent Order shall not constitute a satisfaction of, or release from, liability for any claim arising as a result of operation, ownership or use of the Site by Southern Wood Piedmont Company, its agents, contractors, lessees, successors or assigns.

L This Consent Order may not be modified without the written consent of the parties.

M. Except for obligations under Section X. F., G. and J. above, this Consent Order shall terminate when Southern Wood Piedmont Company receives written notice from the Division that all activities required pursuant to this Consent Order have been completed to the Division's satisfaction.

This Consent Order is entered into on the ___th day of _____1999:

William L Meyer

William L. Meyer, Director
Division of Waste Management
North Carolina Department of Environment
and Natural Resources

By: Jeff Rosbach
(Signature)

Jeff Rosbach, President
Name of Signatory, Title

Southern Wood Piedmont
Company

c\wp60file\deferral\swpfin4.aoc (1/13/99)

ATTACHMENT A:

CERCLA SECTION 122(h)(1) AGREEMENT FOR RECOVERY OF PAST RESPONSE COSTS

IN THE MATTER OF:	)	AGREEMENT FOR RECOVERY OF PAST RESPONSE COSTS
Southern Wood Piedmont Superfund Site Wilmington, New Hanover County North Carolina	)	U.S. EPA Region 4 CERCLA Docket No.99-01-C
Southern Wood Piedmont Co.,and its parent company Rayonier, Inc. Settling Parties.	)	PROCEEDING UNDER SECTION 122(h)(1) OF CERCLA 42 U.S.C. § 9622(h)(1)

CERCLA SECTION 122(h)(1) AGREEMENT
FOR RECOVERY OF PAST RESPONSE COSTS

TABLE OF CONTENTS

I.	JURISDICTION	1
II.	BACKGROUND	1
III.	PARTIES BOUND	2
IV.	DEFINITIONS	2
V.	REIMBURSEMENT OF RESPONSE COSTS	4
VI.	FAILURE TO COMPLY WITH AGREEMENT	4
VII.	COVENANT NOT TO SUE BY EPA	5
VIII.	RESERVATIONS OF RIGHTS BY EPA	5
IX.	COVENANT NOT TO SUE BY SETTLING PARTIES	6
X.	EFFECT OF SETTLEMENT/CONTRIBUTION PROTECTION	6
XI.	RETENTION OF RECORDS	7
XII.	NOTICES AND SUBMISSIONS	9
XIII.	INTEGRATION	9
XIV.	PUBLIC COMMENT	10
XV.	ATTORNEY GENERAL APPROVAL	10
XVI.	EFFECTIVE DATE	10

CERCLA SECTION 122(h)(1) AGREEMENT
FOR RECOVERY OF PAST RESPONSE COSTS

IN THE MATTER OF:	AGREEMENT FOR RECOVERY OF PAST RESPONSE COSTS
Southern Wood Piedmont Superfund Site	
Wilmington, New Hanover County North Carolina	U.S. EPA Region 4 CERCLA Docket No.99-01-C
Southern Wood Piedmont Co. and its parent company, Rayonier, Inc.	PROCEEDING UNDER SECTION 122(h)(1) OF CERCLA 42 U.S.C. § 9622(h)(1)
Settling Parties.	

I. JURISDICTION

1. This Agreement is entered into pursuant to the authority vested in the Administrator of the U.S. Environmental Protection Agency ("EPA") by Section 122(h)(1) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended ("CERCLA"), 42 U.S.C. § 6922(h)(1), which authority has been delegated to the Regional Administrators of the EPA by EPA Delegation No. 14-14-D. This authority has been redelegated through the Director, Waste Management through the Associate Division Director for the Office of Superfund and Emergency Response to the Chief, Waste Programs Division.

2. This Agreement is made and entered into by EPA and the Southern Wood Piedmont Co. and its parent company Rayonier, Inc.("Settling Parties"). The Settling Parties consent to and will not contest EPA's jurisdiction to enter into this Agreement or to implement or enforce its terms.

II. BACKGROUND

3. This Agreement concerns the Southern Wood Piedmont Superfund Site ("Site") located on Greenfield Street, Wilmington, New Hanover County, North Carolina. The Site is located in a light industrial area and was formerly a wood treatment and storage facility operated by the Settling Party. EPA alleges that the Site is a "facility" as defined by Section 101(9) of CERCLA, 42 U.S.C. § 9601(9).

4. During operation of the facility, the Settling Party, Southern Wood Piedmont Co. used creosote, pentachlorophenol and chromated copper arsenate in its wood treating processes at the Site. These identified substances are hazardous substances pursuant CERCLA, 42 U.S.C. Section 9601 *et seq.*

5. In response to the release or threatened release of hazardous substances at or from the Site, EPA undertook response actions at the Site pursuant to Section 104 of CERCLA, 42 U.S.C. § 9604. In January 1985, EPA conducted a Screening Site Investigation which included the collection of groundwater, subsurface soils in land farming areas, surface water, and biological tissue samples. The sample results indicated the presence of organic constituents of creosote and inorganics associated with chromated copper arsenate. Subsequently, EPA conducted an Expanded Site Investigation (ESI) to further determine the nature of the contaminants present at the Site; to confirm if a release occurred and the attribution of those contaminants to the Site; and to identify possible pathways by which contamination could migrate from the Site. During the ESI additional samples were taken including biological tissue and subsurface soil samples. These investigations were detailed in a Report dated July 16, 1997.

6. In performing this response action, EPA incurred response costs at or in connection with the Site.

7. EPA alleges that the Settling Parties are responsible parties pursuant to Section 107(a) of CERCLA, 42 U.S.C. § 9607(a), and is liable for response costs incurred at or in connection with the Site.

8. EPA and the Settling Parties desire to resolve Settling Parties' alleged civil liability for Past Response Costs without litigation and without the admission or adjudication of any issue of fact or law.

III. PARTIES BOUND

9. This Agreement shall be binding upon EPA and upon the Settling Parties and its successors and assigns. Any change in ownership or corporate or other legal status of the Settling Parties, including but not limited to, any transfer of assets or real or personal property, shall in no way alter the Settling Parties' responsibilities under this Agreement. Each signatory to this Agreement certifies that he or she is authorized to enter into the terms and conditions of this Agreement and to bind legally the party represented by him or her.

IV. DEFINITIONS

10. Unless otherwise expressly provided herein, terms used in this Agreement which are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Agreement or in any appendix attached hereto, the following definitions shall apply:

a. "CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. § 9601, et seq.

b. "Agreement" shall mean this Agreement and any attached appendices. In the event of conflict between this Agreement and any appendix, the Agreement shall control.

c. "Day" shall mean a calendar day. In computing any period of time under this Agreement, where the last day would fall on a Saturday, Sunday, or federal holiday, the period shall run until the close of business of the next working day.

d. "EPA" shall mean the United States Environmental Protection Agency and any successor departments, agencies or instrumentalities of the United States.

e. "Interest" shall mean interest at the current rate specified for interest on investments of the Hazardous Substance Superfund established by 26 U.S.C. § 9507, compounded annually on October 1 of each year, in accordance with 42 U.S.C. § 9607(a).

f. "Paragraph" shall mean a portion of this Agreement identified by an arabic numeral or a lower case letter.

g. "Parties" shall mean EPA and the Settling Parties.

h. "Past Response Costs" shall mean all costs, including but not limited to direct and indirect costs, that EPA has paid at or in connection with the Site through April 24, 1998, but do not include Interest accrued on all such costs through such date.

i. "Section" shall mean a portion of this Agreement identified by a roman numeral.

j. "Settling Parties" shall mean Southern Wood Piedmont Company and its parent company, Rayonier, Inc.

k. "Site" shall mean the Southern Wood Piedmont Superfund Site which consists of the areal extent of all groundwater, sediment, soil and surface water contamination emanating from that property. The Site property is located on Greenfield Street in Wilmington, New Hanover County, North Carolina, and encompasses approximately fifty two acres of land bordered by Amerada Hess Petroleum Terminal to the north, the Paktank Petroleum Terminal to the south, the Cape Fear River to the West and the Optimist Park and Front Street to the east. The Site consists of two contiguous properties; currently, thirty five acres in the northern and central portion of the Site are owned by the City of Wilmington and the remaining seventeen acres are owned by the North Carolina State Ports Authority.

1. "United States" shall mean the United States of America, including it departments, agencies and instrumentalities.

V. REIMBURSEMENT OF RESPONSE COSTS

11. Within 30 days of the effective date of this Agreement, the Settling Party shall pay to the EPA Hazardous Substance Superfund $619,069.84, in reimbursement of Past Response Costs.

12. Payments shall be made by certified or cashier's check made payable to "EPA Hazardous Substance Superfund." Each check shall reference the name and address of the party making payment, the Site name, the EPA Region and Site/Spill ID Number 04-48, and the EPA docket number for this action, and shall be sent to:

U.S. EPA Region 4
Attention: Superfund Accounting
P.O. Box 100142
Atlanta, Georgia 30384

13. At the time of payment, the Settling Parties shall send notice that such payment has been made to:

Paula Batchelor
Cost Recovery Section
61 Forsyth Street, SW
Atlanta, Georgia 30365

VI. FAILURE TO COMPLY WITH AGREEMENT

14. In the event that any payment required by Paragraph 11 is not made when due, Interest shall continue to accrue on the unpaid balance through the date of payment.

15. If any amounts due to EPA under Paragraph 11 are not paid by the required date, Settling Parties shall pay to EPA, as a stipulated penalty, in addition to the Interest required by Paragraph 14, $200.00 per day that such payment is late.

16. Stipulated penalties are due and payable within 30 days of the date of demand for payment of the penalties. All payments to EPA under this Paragraph shall be identified as "stipulated penalties" and shall made in accordance with Paragraphs 12 and 13.

17. Penalties shall accrue as provided above regardless of whether EPA has notified the Settling Parties of the violation or made a demand for payment, but need only be paid upon demand. All penalties shall begin to accrue on the day after payment is

due, and shall continue to accrue through the day the U.S. EPA receives full payment.

18. In addition to the Interest and Stipulated Penalty payments required by this Section and any other remedies or sanctions available to EPA by virtue of Settling Parties' failure to comply with the requirements of this Agreement, if Settling Parties fail or refuse to comply with any term or condition of this Agreement it shall be subject to enforcement action pursuant to Section 122(h)(3) of CERCLA, 42 U.S.C. § 9622(h)(3). If the United States, on behalf of EPA, brings an action to enforce this Agreement, Settling Parties shall reimburse the United States for all costs of such action, including but not limited to costs of attorney time.

19. Notwithstanding any other provision of this Section, EPA may, in its unreviewable discretion, waive payment of any portion of the stipulated penalties that have accrued pursuant to this Agreement.

VII. COVENANT NOT TO SUE BY EPA

20. Except as specifically provided in Paragraph 21 (Reservations of Rights by EPA), EPA covenants not to sue Settling Parties pursuant to Section 107(a) of CERCLA, 42 U.S.C. § 9607(a), to recover Past Response Costs. This covenant shall take effect upon receipt by EPA of all amounts required by Section V (Reimbursement of Response Costs) and Section VI, Paragraphs 14 (Interest on Late Payments) and 15 (Stipulated Penalty for Late Payment). This covenant not to sue is conditioned upon the satisfactory performance by Settling Parties of its obligations under this Agreement. This covenant not to sue extends only to Settling Parties and does not extend to any other person.

VIII. RESERVATIONS OF RIGHTS BY EPA

21. The covenant not to sue by EPA set forth in Paragraph 20 does not pertain to any matters other than those expressly identified therein. EPA reserves, and this Agreement is without prejudice to, all rights against the Settling Parties with respect to all other matters, including but not limited to:

a. liability for failure of Settling Parties to meet a requirement of this Agreement;

b. liability for costs incurred or to be incurred by the United States that are not within the definition of Past Response Costs;

c. liability for injunctive relief or administrative order enforcement under Section 106 of CERCLA, 42 U.S.C. § 9606;

d. criminal liability; and

e. liability for damages for injury to, destruction of, or loss of natural resources, and for the costs of any natural resource damage assessments.

22. Nothing in this Agreement is intended to be nor shall it be construed as a release, covenant not to sue, or compromise of any claim or cause of action, administrative or judicial, civil or criminal, past or future, in law or in equity, which the United States may have against any person, firm, corporation or other entity not a signatory to this Agreement.

IX. COVENANT NOT TO SUE BY SETTLING PARTIES

23. The Settling Parties agree not to assert any claims or causes of action against the United States, or its contractors or employees, with respect to Past Response Costs or this Agreement, including but not limited to:

a. any direct or indirect claim for reimbursement from the EPA Hazardous Substance Superfund established by 26 U.S.C. § 9507, based on Sections 106(b)(2), 107, 111, 112, or 113 of CERCLA, 42 U.S.C. §§ 9606(b)(2), 9607, 9611, 9612, or 9613, or any other provision of law;

b. any claims arising out of the response actions at the Site for which the Past Response Costs were incurred; and

c. any claim against the United States pursuant to Sections 107 and 113 of CERCLA, 42 U.S.C. §§ 9607 and 9613, relating to Past Response Costs.

24. Nothing in this Agreement shall be deemed to constitute approval or preauthorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611, or 40 C.F.R. 300.700(d).

X. EFFECT OF SETTLEMENT/CONTRIBUTION PROTECTION

25. Nothing in this Agreement shall be construed to create any rights in, or grant any cause of action to, any person not a Party to this Agreement. EPA and the Settling Parties each reserve any and all rights (including, but not limited to, any right to contribution), defenses, claims, demands, and causes of action which each Party may have with respect to any matter, transaction, or occurrence relating in any way to the Site against any person not a Party hereto.

26. EPA and the Settling Parties agree that the actions undertaken by Settling Parties in accordance with this Agreement do not constitute an admission of any liability by the Settling Party. The Settling Parties do not admit, and retain the right

to controvert in any subsequent proceedings other than proceedings to implement or enforce this Agreement, the validity of the facts or allegations contained in Section II of this Agreement.

27. The Parties agree that Settling Parties are entitled, as of the effective date of this Agreement, to protection from contribution actions or claims as provided by Sections 113(f)(2) and 122(h)(4) of CERCLA, 42 U.S.C. §§ 9613(f)(2) and 9622(h)(4), for "matters addressed" in this Agreement. The "matters addressed" in this Agreement are Past Response Costs.

28. Settling Parties agree that with respect to any suit or claim for contribution brought by it for matters related to this Agreement, they will notify EPA in writing no later than 60 days prior to the initiation of such suit or claim. Settling Parties also agree that, with respect to any suit or claim for contribution brought against them for matters related to this Agreement, they will notify EPA in writing within 10 days of service of the complaint or claim upon them. In addition, Settling Parties shall notify EPA within 10 days of service or receipt of any Motion for Summary Judgment and within 10 days of receipt of any order from a court setting a case for trial, for matters related to this Agreement.

29. In any subsequent administrative or judicial proceeding initiated by EPA, or by the United States on behalf of EPA, for injunctive relief, recovery of response costs, or other appropriate relief relating to the Site, Settling Parties shall not assert, and may not maintain, any defense or claim based upon the principles of waiver, res judicata, collateral estoppel, issue preclusion, claim-splitting, or other defenses based upon any contention that the claims raised in the subsequent proceeding were or should have been brought in the instant case; provided, however, that nothing in this Paragraph affects the enforceability of the covenant not to sue by EPA set forth in Paragraph 20.

XI. RETENTION OF RECORDS

30. Until six years after the effective date of this Agreement, each Settling Party shall preserve and retain all records and documents now in its possession or control, or which come into its possession or control, that relate in any manner to response actions taken at the Site or to the liability of any person for response actions conducted and to be conducted at the Site, regardless of any corporate retention policy to the contrary.

31. After the conclusion of the document retention period in the preceding paragraph, Settling Parties shall notify EPA at least 90 days prior to the destruction of any such records or

documents, and, upon request by EPA, Settling Parties shall deliver any such records or documents to EPA. Settling Parties may assert that certain documents, records, or other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If Settling Parties assert such a privilege, they shall provide EPA with the following: 1) the title of the document, record, or information; 2) the date of the document, record, or information; 3) the name and title of the author of the document, record, or information; 4) the name and title of each addressee and recipient; 5) a description of the subject of the document, record, or information; and 6) the privilege asserted. However, no documents, reports, or other information created or generated pursuant to the requirements of this or any other judicial or administrative settlement with the United States shall be withheld on the grounds that they are privileged. If a claim of privilege applies only to a portion of a document, the document shall be provided to EPA in redacted form to mask the privileged information only. Settling Party shall retain all records and documents that they claim to be privileged until EPA has had a reasonable opportunity to dispute the privilege claim and any such dispute has been resolved in Settling Parties' favor.

32. By signing this Agreement, Settling Parties certify individually that, to the best of their knowledge and belief, it has:

a. not altered, mutilated, discarded, destroyed or otherwise disposed of any records, documents or other information relating to its potential liability regarding the Site, after notification of potential liability or the filing of a suit against the Settling Parties regarding the Site; and

b. fully complied with any and all EPA requests for information regarding the Site pursuant to Sections 104(e) and 122(e) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e)

33. By signing this Agreement, Settling Parties agree to provide EPA with any and all requested non-privilege information currently in its possession, or in the possession of its officers, directors, employees, contractors or agents, which relates in any way to the ownership, operation or control of the Site, or to the ownership, possession, generation, treatment, transportation, storage or disposal of a hazardous substance, pollutant or contaminant at or in connection with the Site available to EPA. Any assertions by Settling Parties that a document is privilege will be subject to the requirements in paragraph 31.

XII. NOTICES AND SUBMISSIONS

34. Whenever, under the terms of this Agreement, notice is

required to be given or a document is required to be sent by one Party to another, it shall be directed to the individuals at the addresses specified below, unless those individuals or their successors give notice of a change to the other Parties in writing. Written notice as specified herein shall constitute complete satisfaction of any written notice requirement of this Agreement with respect to EPA and Settling Parties.

As to EPA:

Marlene J. Tucker
Environmental Accountability Division
Office of Legal Support
61 Forsyth Street, S.W.
Atlanta, Georgia 30303-8960

Luis Flores
North Site Remedial Branch
North Carolina Section
61 Forsyth Street, S.W.
Atlanta, Georgia 30303-8960

As to Settling Parties:

William H. Kitchens, Esq.
Arnall, Golden & Gregory, LLP
2800 One Atlantic Center
1201 W. Peachtree Street
Atlanta, Georgia 30309

Lisa Palumbo
Vice President & General Counsel
Rayonier Inc.
1177 Summer Street
Stamford, Connecticut 06904

XIII. INTEGRATION

35. This Agreement constitutes the final, complete and exclusive agreement and understanding among the Parties with respect to the settlement embodied in this Agreement. The Parties acknowledge that there are no representations, agreements or understandings relating to the settlement other than those expressly contained in this Agreement.

XIV. PUBLIC COMMENT

35. This Agreement shall be subject to a public comment period of not less than 30 days pursuant to Section 122(i) of CERCLA, 42 U.S.C. § 9622(i). In accordance with Section 122(i)(3) of CERCLA, EPA may modify or withdraw its consent to this Agreement if comments received disclose facts or

considerations which indicate that this Agreement is inappropriate, improper or inadequate.

XV. ATTORNEY GENERAL APPROVAL

36. The Attorney General or her designee has approved the settlement embodied in this Agreement in accordance with Section 122(h)(1) of CERCLA, 42 U.S.C. § 9622(h)(1).

XVI. EFFECTIVE DATE

37. The effective date of this Agreement shall be the date upon which EPA issues written notice that the public comment period pursuant to Paragraph 35 has closed and that comments received, if any, do not require modification of or EPA withdrawal from this Agreement.

IT IS SO AGREED:

U.S. Environmental Protection Agency

By: Darce Knight, CHMM 12/31/98
[Name] Date

for Chief, Programs Service Branch

THE UNDERSIGNED SETTLING PARTY enters into this Agreement in the matter of SOUTHERN WOOD PIEDMONT SUPERFUND SITE., U.S. EPA Region 4. CERCLA Docket No. 99-01-C, located in Wilmington, New Hanover County, North Carolina:

FOR SETTLING PARTY: Southern Wood Piedmont
[Name]

P.O. Box 5447
Spartanburg, SC
[Address]

By: _____ Dec 21, 1998
[Name] [Date]

REFERENCE 2

Ref. 2

DATE REPORT ACCEPTED 8-12-97
DISPOSITION Further Action
SAM SIGNATURE Cynthia Finley

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

EPA ID No. NCD058517467
WasteLAN No. 02821

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

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

July 16, 1997

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

Table of Contents

Page Nº

EXECUTIVE SUMMARY ES-1

1.0 Introduction 1

1.1 Objectives 1

1.2 Scope of Work 2

2.0 Location, Site Description, Operational History and Waste Characteristics . 3

2.1 Location 3

2.2 Site Description 3

2.3 Operational History and Waste Characteristics 3

3.0 Field Investigation 9

3.1 Sample Collection 11

3.2 Sample Collection Methodology 11

3.3 Duplicate Samples 14

3.4 Description of Sample Locations 14

3.5 Analytical Support and Methodology 22

3.6 Analytical Data and Data Qualifiers 22

4.0 Waste Sources 24

4.1 Source Descriptions 24

4.2 Source Sample Locations and Analytical Results 24

4.3 Source Sampling Results 24

4.4 Source Conclusions 58

5.0 Groundwater Pathway 59

5.1 Hydrogeologic Setting 59

5.2 Groundwater Pathway Targets 61

5.3 Groundwater Pathway Sample Locations and Analytical Results 68

5.4 Groundwater Pathway Conclusions 81

6.0 Surface Water Pathway 94

6.1 Hydrologic Setting 94

6.2 Surface Water Pathway Targets 94

6.3 Surface Water Pathway Sample Locations 95

6.4 Surface Water Pathway Analytical Results 95

6.5 Surface Water Pathway Conclusions 106

7.0 Soil Exposure and Air Pathways 111

7.1 Physical Conditions 111
7.2 Soil and Air Targets 111
7.3 Soil Exposure and Air Pathway Sample Locations 111
7.4 Soil Exposure and Air Pathway Analytical Results 112
7.5 Soil Exposure and Air Pathway Conclusions 112
8.0 Summary and Conclusions 113
9.0 References 115

Appendices

Appendix A . Analytical Data
Appendix B Photographic Log
Appendix C Boring Logs

Tables

Page Nº

Table 1 Sample Codes, Descriptions, Locations, and Rationale 15
Table 2 Surface Soil Extractable Organic Analytical Results 26
Table 3 Surface Soil Pesticide/PCB Analytical Results 34
Table 4 Surface Soil Dioxin/Furan Analytical Results 35
Table 5 Subsurface Soil Extractable Organic Analytical Results 37
Table 6 Subsurface Soil Purgeable Organic Analytical Results 45
Table 7 Subsurface Soil Pesticide/PCB Analytical Results 49
Table 8 Surface Soil Inorganic Analytical Results, ... 50
Table 9 Subsurface Soil Inorganic Analytical Results 54
Table 10 Groundwater Level Measurements 63
Table 11 Field Measurements of Groundwater Samples 69
Table 12 Shallow Groundwater Organic Analytical Results 71
Table 13 Intermediate Groundwater Organic Analytical Results 82
Table 14 Deep Groundwater Organic Analytical Results 88
Table 15 Shallow Groundwater Inorganic Analytical Results 90
Table 16 Intermediate Groundwater Inorganic Analytical Results 91
Table 17 Deep Groundwater Inorganic Analytical Results 93

Table 18 Sediment Organic Analytical Results 96
Table 19 Sediment Pesticide/PCB Analytical Results 105
Table 20 Surface Water Organic Analytical Results 108
Table 21 Sediment Inorganic Analytical Results 109
Table 22 Surface Water Inorganic Analytical Results 110

Figures

Page №

Figure 1 Site Layout, Southern Wood Piedmont 4
Figure 2 Sample Location Map, Southern Wood Piedmont 5
Figure 3 Monitoring Well Construction Diagram 10
Figure 4 Potentiometric Surface Map-Shallow Wells 65
Figure 5 Potentiometric Surface Map-Intermediate Wells 66
Figure 6 Potentiometric Surface Map-Deep Wells 67

Executive Summary

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

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

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

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

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

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

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

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

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

1.0 Introduction

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

1.1 Objectives

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

Specific elements include:

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

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

1.2 Scope of Work

The scope of this investigation includes the following activities:

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

2.0 Location, Site Description, Operational History and Waste Characteristics

2.1 Location

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

2.2 Site Description

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

2.3 Operational History and Waste Characteristics

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

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

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

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

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

land farm

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

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

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

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

3.0 Field Investigation

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

?

clay layer thin can miss base of upper intervals

artesian so confined

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

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

3.1 Sample Collection

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

3.2 Sample Collection Methodology

3.2.1 Surface Soil and Sediment Samples

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

3.2.2 Subsurface Soil Samples

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

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

3.2.3 Groundwater Samples

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

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

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

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

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

3.2.4 Surface Water Samples

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

3.2.5 Biological Tissue Samples

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

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

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

3.3 Duplicate Samples

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

3.4 Description of Sample Locations

3.4.1 Surface Soil Sampling

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

3.4.2 Subsurface Soil Sampling

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3.4.3 Groundwater Sampling

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

3.4.4 Surface Water Sampling

eight?

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

3.4.5 Sediment Sampling

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

3.4.6 Biological Sampling

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

3.5 Analytical Support and Methodology

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

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

3.6 Analytical Data and Data Qualifiers

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

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

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

4.0 Waste Sources

4.1 Source Descriptions

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

4.2 Source Sample Locations

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

4.3 Source Sampling Results

4.3.1 Source Organic Analytical Results

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

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

less than 20 ppb industrial action level.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

NOTES:

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

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

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

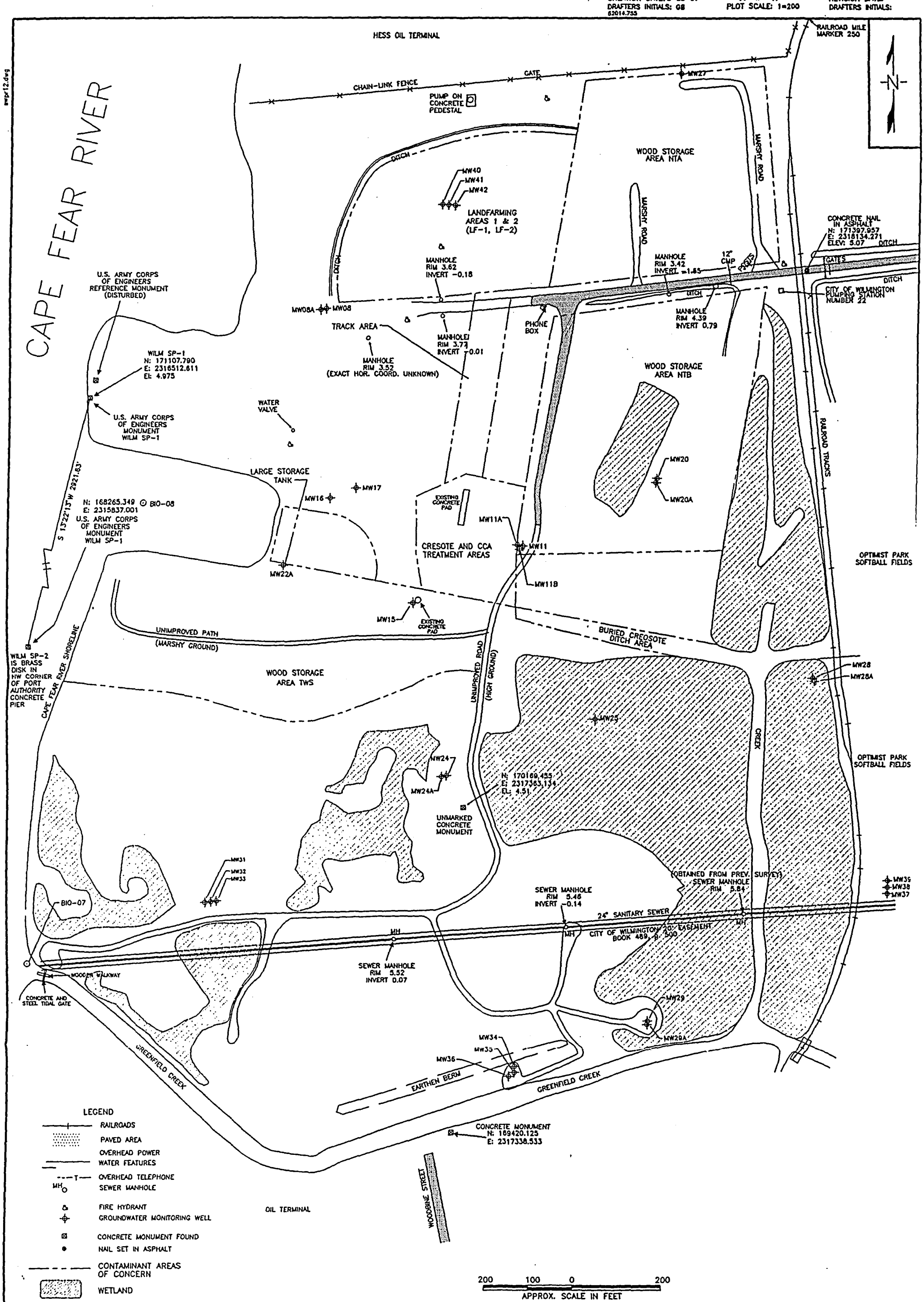
4.3.2 Source Inorganic Analytical Results

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

CAD DWG NO: ESSWLY11
CREATION DATE: 3-25-97
DRAFTERS INITIALS: GB
62014.755

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

MOST RECENT REVISION:
REVISION DATE:
DRAFTERS INITIALS:



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

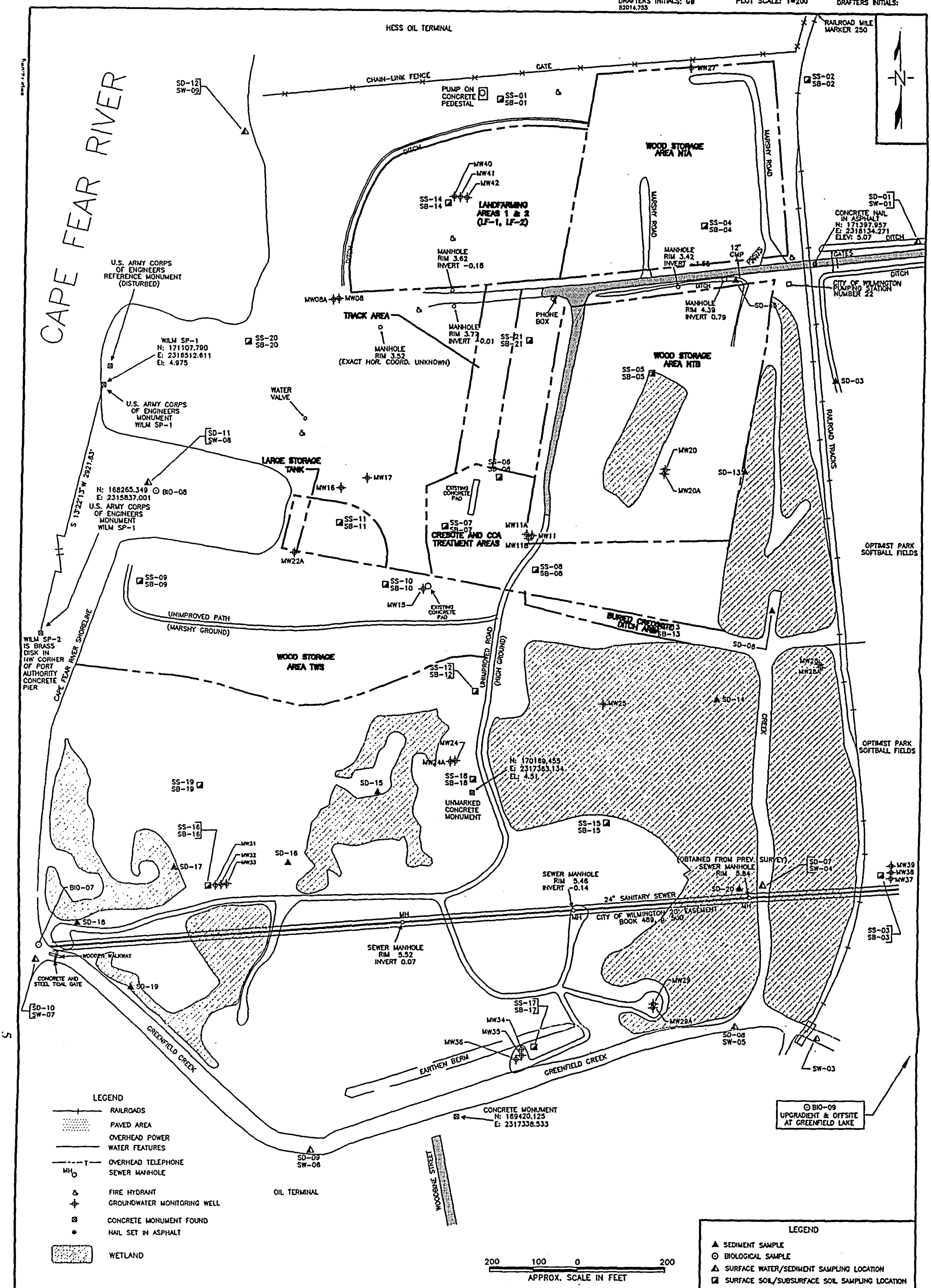
FIGURE 1

swpr12.dwg

CAD DWG NO: ESSWMM11
CREATION DATE: 3-25-97
DRAFTERS INITIALS: GB
52014.755

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

MOST RECENT REVISION:
REVISION DATE:
DRAFTERS INITIALS:



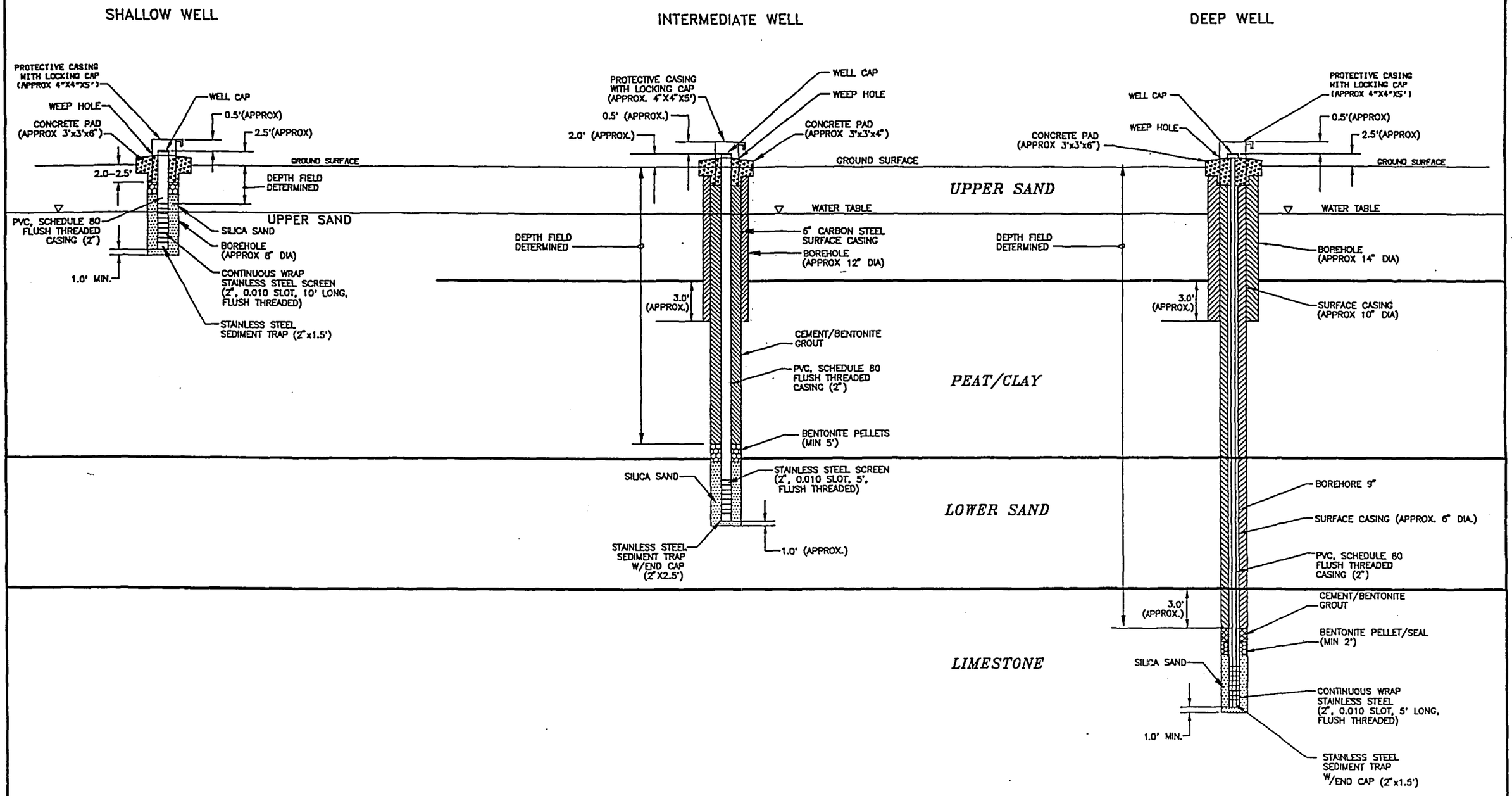
SAMPLE LOCATION MAP
SOUTHERN WOOD PIEDMONT
WILMINGTON, NEW HANOVER COUNTY, NORTH CAROLINA

FIGURE 2

CAD DWG NO: ESSWW001
CREATION DATE: 3-13-96
DRAFTERS INITIALS: GB
52014755

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

MOST RECENT REVISION:
REVISION DATE: 4-16-96
DRAFTERS INITIALS: GB



SOUTHERN WOOD PIEDMONT
WILMINGTON, NEW HANOVER COUNTY, NORTH CAROLINA

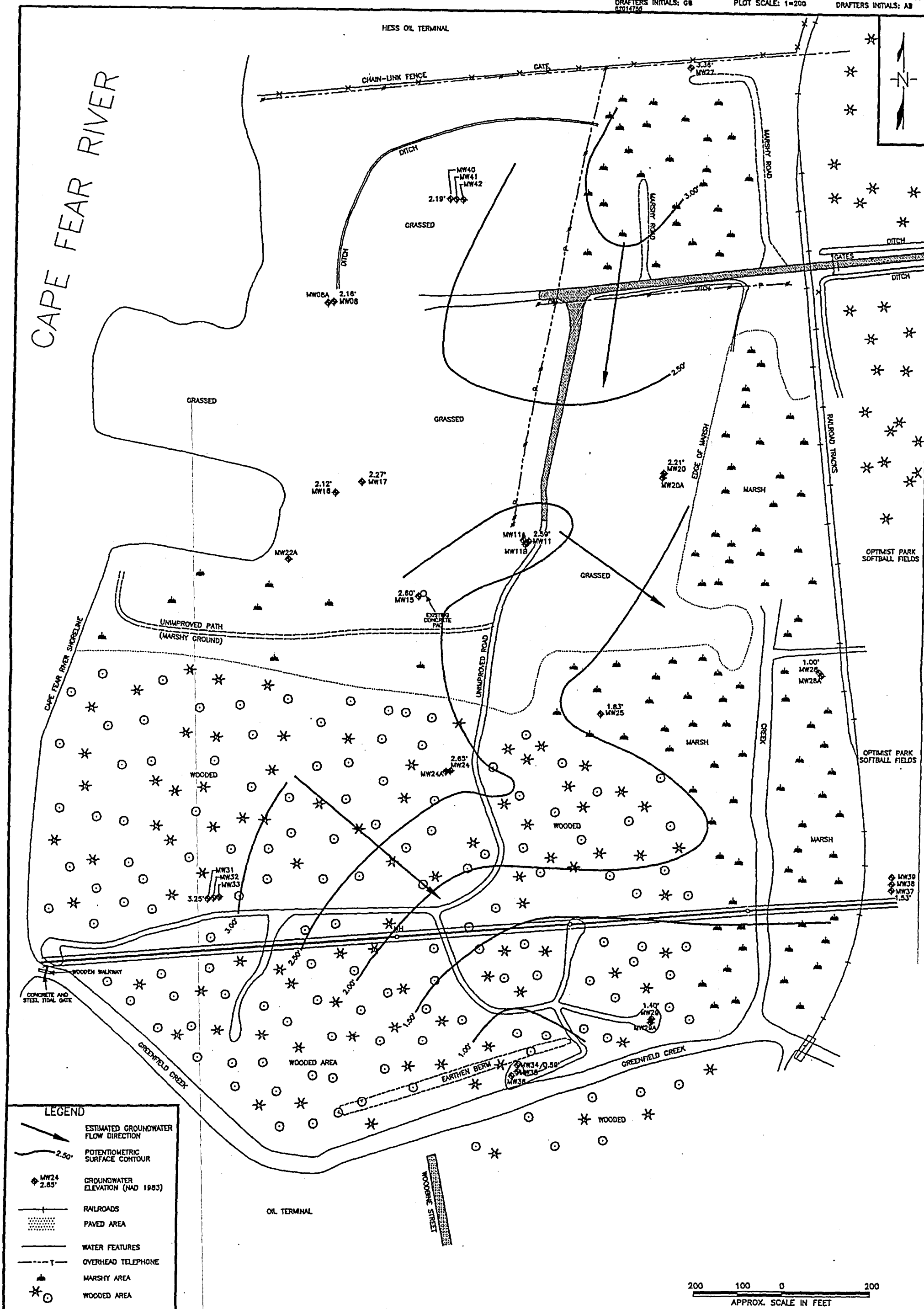
MONITORING WELL CONSTRUCTION DIAGRAM

FIGURE 3

CAD DWG NO: ESSWPSSW
CREATION DATE: 3-24-97
DRAFTERS INITIALS: GB
02014766

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

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



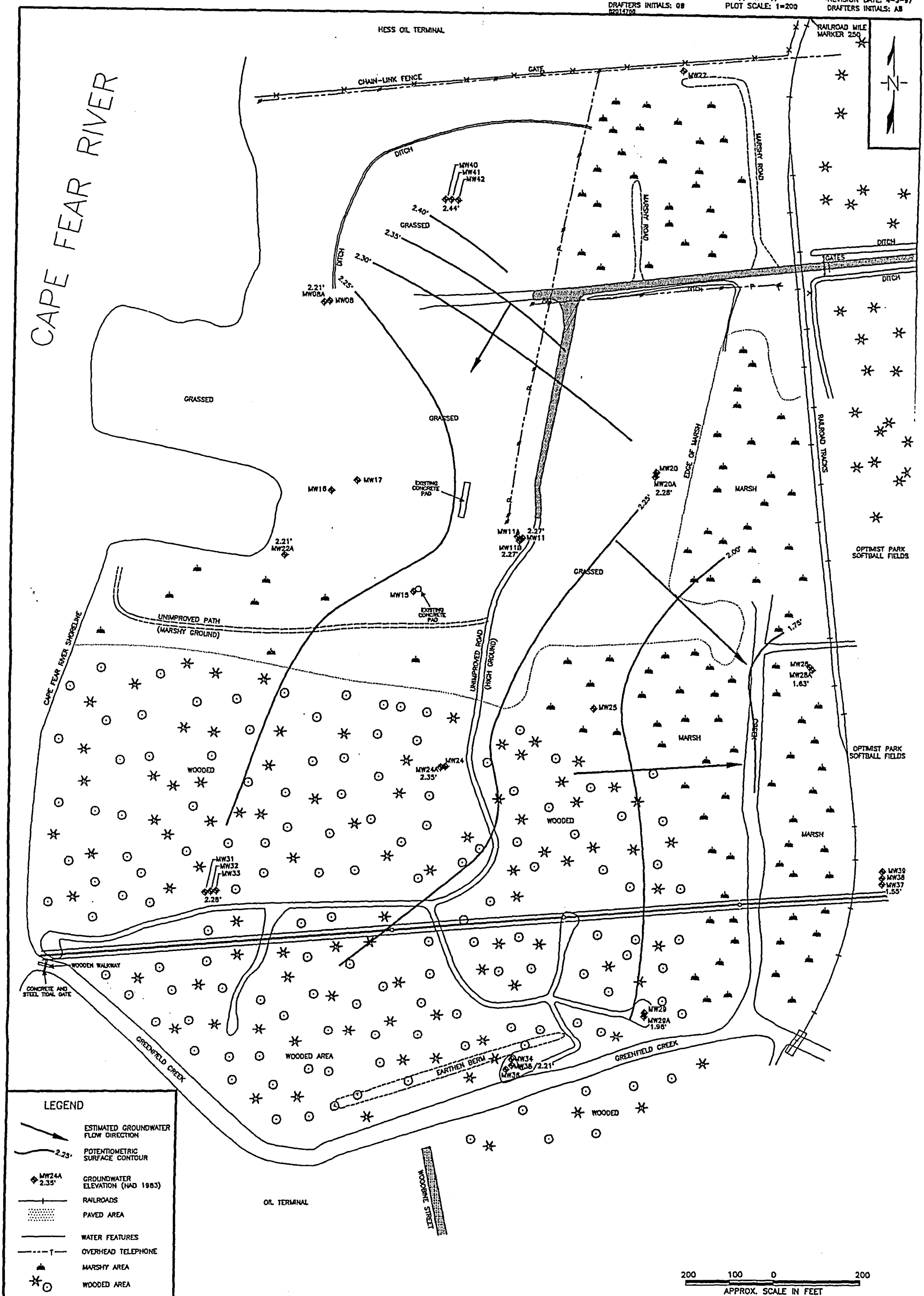
POTENTIOMETRIC SURFACE MAP SHALLOW WELLS ON 1/28/97
SOUTHERN WOOD PIEDMONT
WILMINGTON, NEW HANOVER COUNTY, NORTH CAROLINA

FIGURE 4

CAD DWG NO: ESSWPSIW
CREATION DATE: 3-24-97
DRAFTERS INITIALS: GB
R2014788

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

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



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

FIGURE 5

CAD DWG NO: E33WPSDW
CREATION DATE: 3-24-97
DRAFTERS INITIALS: GB
02014733

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

MOST RECENT REVISION:
REVISION DATE:
DRAFTERS INITIALS:

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

FIGURE 6

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

NOTES

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

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

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

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

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

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

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

Notes:

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

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

J Estimated value

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

\- Not detected

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

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

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

Notes:

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

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

J Estimated value

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

\- Not detected

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

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

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

Notes:

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

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

J Estimated value

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

\- Not detected

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

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

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

Notes:

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

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

J Estimated value

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

\- Not detected

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

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

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

Notes:

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

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

J Estimated value

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

\- Not detected

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

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

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

Notes:

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

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

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

Notes:

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

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

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

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

Notes:

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

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

J Estimated value

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

- Not detected

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

4.4 Source Conclusions

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

5.0 Groundwater Pathway

5.1 Hydrogeologic Setting

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

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

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

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

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

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

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

I saw a layer 1-2 feet everywhere. ? 3 borehole

contradiction

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

4 feet

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

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

Based on the description the deep wells are screened in the 15' confining layer beneath the facility

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

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

5.2 Groundwater Pathway Targets

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

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

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

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

Gradient

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

2.25

-8.57 1"=2

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

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

NOTES:

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

5.3 Groundwater Pathway Sample Locations and Analytical Results

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

5.3.1 Shallow Organic Analytical Results

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

5.3.2 Intermediate Organic Analytical Results

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

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

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

NOTES:

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

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

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

NOTES:

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

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

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

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

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

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

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

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

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

\- Not detected

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

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

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

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

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

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

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

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

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

\- Not detected

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

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

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

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

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

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

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

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

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

Notes:

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

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

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

5.3.3 Deep Organic Analytical Results

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

5.3.4 Shallow Inorganic Analytical Results

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

Total or Dissolved? Doesn't say

5.3.5 Intermediate Inorganic Analytical Results.

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

5.3.6 Deep Inorganic Analytical Results

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

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

5.4 Groundwater Pathway Conclusions

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

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

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

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

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

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

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

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

- Not detected

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

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

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

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

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

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

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

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

- Not detected

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

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

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

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

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

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

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

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

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

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

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

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

ug/L micrograms per liter

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

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

\- Not detected

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

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

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

NOTES:

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

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

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

Notes:

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

J Estimated value

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

\- Not detected

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

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

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

Notes:

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

J Estimated value

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

- Not detected

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

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

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

NOTES:

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

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

6.0 Surface Water Pathway

6.1 Hydrologic Setting

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

6.2 Surface Water Pathway Targets

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

6.3 Surface Water Pathway Sample Locations

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

6.4 Surface Water Pathway Analytical Results

6.4.1 Surface Water/Sediment Organic Analytical Results

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

ug/kg micrograms per kilogram

J Estimated value.

N Presumptive evidence of presence of material.

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

\- Not detected

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

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

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

NOTES:

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

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

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

6.4.2 Surface Water/Sediment Inorganic Analytical Results

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

6.5 Surface Water Pathway Conclusions

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

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

provide culvert along onsite drainage ditch or redirect water along edge of railroad track on optimal park side

Greenfield Creek argue not only contributor SD-09 the highest iron flowing side of creek

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

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

Notes:

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

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

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

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

NOTES:

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

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

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

NOTES:

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

7.0 Soil Exposure and Air Pathways

7.1 Physical Conditions

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

7.2 Soil Exposure and Air Pathway Targets

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

7.3 Soil Exposure and Air Pathway Sample Locations

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

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

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

7.4 Soil Exposure and Air Pathway Analytical Results

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

7.5 Soil Exposure and Air Pathway Conclusions

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

8.0 Summary and Conclusions

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

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

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

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

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

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

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

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

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

NO results from the biological samples matrix here ND

References

1. U.S. Geological Survey, 7.5 minute series Topographic Quadrangle Map of North Carolina: Castle Hayne 1970; Leland 1984; Wilmington 1970 (Photorevised 1979); Winnabow 1990. Scale 1:24,000.

2. Stuart F. Parker, Jr., Hydrogeologist, Division of Solid Waste Management, North Carolina Department of Environment, Health, and Natural Resources (NCDEHNR), Site Inspection Prioritization Report for the Southern Wood Piedmont Company site, January 1995.

3. Robert L. Mangum, Jr., Site Manager, Black and Veatch Special Projects Corp. (BVSPC), Latitude and Longitude Calculations for the Southern Wood Piedmont site, February 23, 1996.

4. U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of New Hanover County, North Carolina, April 1977.

5. U.S. Department of Commerce, Climatic Atlas of the United States, Washington, D.C.: GPO, June 1968, Reprint: 1983, National Oceanic and Atmospheric Administration.

6. U.S. Department of Commerce, Rainfall Frequency Atlas of the United States, Technical Paper Number 40, Washington, D.C.: GPO, 1961.

7. Linda Aller, et. al., DRASTIC: A Standardized System for Evaluating Groundwater Contamination Using Hydrologic Settings, U.S. Environmental Protection Agency (EPA), Robert S. Kerr Environmental Research Laboratory, Ada, Oklahoma, April 1987.

8. Charles Burdell, Technical Services Director, Southern Wood Piedmont Company, letter to William Paige, North Carolina Department of Human Resources, Solid and Hazardous Waste Management Branch, June 8, 1984. Subject: Proposed Cleanup Program for the Southern Wood Piedmont, Wilmington, NC plant site.

9. Frank E. Moore, NCDEHNR Solid and Hazardous Waste Management Branch Environmental Health Section, Transmittal letter to Mr. Walton Jones, USEPA Region IV, August 10, 1984. Subject: Preliminary Assessment Reports for the Southern Wood Piedmont site.

10. Superfund Division, NUS Corporation, Site Screening Investigation Report for the Southern Wood Piedmont Company Facility located in Wilmington, North Carolina, submitted to USEPA, April 18, 1986.

11. North Carolina Department of Human Resources, Department of Health Services, Administrative Consent Order, Southern Wood Piedmont Company site, EPA ID: NCD058517467, May 20, 1985.

12. Geraghty & Miller, Inc., Risk Assessment Report for the Landfarm Areas, Southern Wood Piedmont Company, Wilmington, North Carolina, September 1993.

13. Todd Paddock, Dioxins and Furans: Where They Come From, Academy of Natural Sciences, July 1989.

14. Virogroup, Phase III Groundwater Quality Assessment Report, Wilmington, North Carolina Facility, 1994.

15. BVSPC Field Log Book for the Southern Wood Piedmont Site, Wilmington, North Carolina, Volume I, May 20, 1996 through December 24, 1996.

16. BVSPC Field Log Book for the Southern Wood Piedmont site, Wilmington, North Carolina, Volume II, December 15, 1996 through January 27, 1997.

17. North Carolina Geological Survey, Department of Environment, Health, and Natural Resources, Geologic Map of North Carolina, 1985. Scale 1:500,000.

18. T. M. Robison and L. T. Mann, Jr., USGS, Public Water Supplies of North Carolina, Part 5, Southern Coastal Plain, Raleigh, North Carolina, 1977.

19. George L. Bain, Geology and Groundwater Resources of New Hanover County, North Carolina, U.S. Geological Survey, Groundwater Bulletin Number 17, 1970.

20. G.L. Giese, J.L. Eimers, and R.W. Coble, Simulation of Ground-water Flow in the Coastal Plain Aquifer System of North Carolina, U.S. Geological Survey, Open-File Report Number 90-372, 1991

21. R. Allen Freeze and John A. Cherry, Groundwater, Prentice-Hall, Englewood Cliffs, New Jersey, 1979.

22. Stuart F. Parker, Hydrogeologist, NCDEHNR, memorandum to file, December 12, 1994. Subject: Municipal Drinking Water Supplies within the Wilmington Area.

23. Cindy Treadway, BVSPC, telephone conversation with Ms. Donna Jones, City of Wilmington Water Department, New Hanover County, North Carolina, June 2, 1997. Subject: Water Department Service Area for the City of Wilmington.

24. Paul Moisan, BVSPC, telephone conversation with Ms. Jean Speight, Director, Leland Sanitary and Water District, Leland, North Carolina, May 20, 1997. Subject: Service Area for the Leland Sanitary Water District.

32 25. Stuart F. Parker, Jr., Hydrogeologist, NCDEHNR, memorandum to file, December 1, 1994. Subject: Municipal Drinking Water Supplies in the Wilmington Area, Private well usage, Community Well Usage.

26. Scotti Thomas, B&V Waste Science and Technology Corp. (BVWST), telephone conversation with Diane Fortune, City of Wilmington Utilities Department, April 15, 1993. Subject: City of Wilmington Municipal Water Intake Location and Service Areas.

33 27. Paul Moisan, BVSPC, telephone conversation with Ms. Leslie Royals, Engineering Technician, New Hanover County Engineering Department, New

Hanover County, North Carolina, May 20, 1997. Subject: Groundwater-use Information for the Runnymeade Subdivision.

7 28. U.S. Department of Commerce, Proof Copy of table generated for 1990, Census of Population and Housing (CPH-1): Summary of Population and Housing Characteristics for North Carolina, issued by the Bureau of Census, April, 1991.

34 29. North Carolina Division of Health Services, Water Supply Branch, Environmental Health Section, Public Water Supply Database, Inventory Document Number PWSI.410, May 16, 1990.

30. Jeanette Stanley, Environmental Chemist, North Carolina Superfund Section, NCDEHNR, memorandum to North Carolina Superfund Section Staff, January 10, 1994. Subject: Well Head Protection Programs in North Carolina.

31. Scotti Thomas, BVWST, telephone conversation with Rufus Allen, U.S. Geological Survey, April 29, 1993. Subject: Cape Fear River Gaging Stations and Tidal Influences.

32. Federal Emergency Management Agency, National Flood Insurance Program, Firm Flood Insurance Rate Map for the City of Wilmington, North Carolina, New Hanover County, Panel 5 of 10, Community Panel Number 370171 0005 C, map revised November 4, 1987.

33. Kem Reliford, Black & Veatch Waste Science, Inc. (BVWS), telephone conversation with Dan Emerson, U.S. Army Corps of Engineers, May 5, 1995. Subject: Flow Rate for the Cape Fear River.

34. U.S. Department of the Interior, National Wetlands Inventory Maps and Legend, Wilmington and Castle Hayne Map Series, North Carolina, 1994. Scale 1:24,000.

35. Robert Mangum, BVSPC, Wetlands Acreage Estimate Calculations, June 11, 1997.

36. Susan Reece Giles, North Carolina Department of Environment, Health, and Natural Resources, letter Paul Moisan, BVSPC, May 28, 1997. Subject: Rare Species, High Quality Natural Communities, Critical Habitats, and Significant Natural Areas near the Southern Wood Piedmont Site in Wilmington, New Hanover County, North Carolina, May 28, 1997.

37. Kem Reliford, BVWS, telephone conversation with Randy Wilson, Division of Wildlife and Endangered Species, North Carolina Department of Fish and Game, May 5, 1995. Subject: Alligator Sightings near the Old ATC Refinery site located on the Cape Fear River, just North of the Southern Wood Piedmont site.

38. U. S. Fish and Wildlife, Southeast Region, Endangered and Threatened Species of the Southeastern United States (The Red Book), Volume I, January 1992.

39. Kem Reliford, BVWS, telephone conversation with Fitz Rode, Division of Marine Fisheries, North Carolina Department of Fish and Game, May 5, 1995. Subject: Commercial Fisheries located in the Cape Fear River.

40. Kem Reliford, BVWS, telephone conversation with Fred Harris, Division of Boating and Inland Fisheries, North Carolina Department of Fish and Game, May 5, 1995. Subject: Recreational fishing and Boating on the Cape Fear River.

41. Patricia L. Murphey, Marine Biologist, North Carolina Trip Ticket Program, Division of Marine Fisheries, NCDEHNR, letter and database findings to Paul Moisan, BVSPC, May 22, 1997. Subject: List of Species Landed from the Cape Fear River with Weight and Monetary Values per Species.

42. Robert Mangum, BVSPC, Project Memo, Subject: Greenfield Creek Fishery Documentation, November 6, 1996.

43. Frost Associates, CENTRACTS Population Report for the Southern Wood Piedmont site located in Wilmington, North Carolina, May 22, 1997.

REFERENCE 3

LATITUDE AND LONGITUDE CALCULATION WORKSHEET #2
LI USING ENGINEER'S SCALE (1/60)

SITE NAME: Southern Wood Piedmont Wilmington CERCLIS #: NCD. 058-517.467

AKA: SSID:

ADDRESS: Greenfield Street

CITY: Wilmington NC STATE: NC ZIP CODE: 28401

SITE REFERENCE POINT: Geometric Center

USGS QUAD MAP NAME: Wilmington TOWNSHIP: ___ N/S RANGE: ___ E/W

SCALE: 1:24,000 MAP DATE: 1970/79 SECTION: ___ 1/4 ___ 1/4 ___ 1/4

MAP DATUM: (1927) 1983 (CIRCLE ONE) MERIDIAN:

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 7.5' MAP (attach photocopy):

LONGITUDE: 77 ° 52 ' 30 " LATITUDE: 34 ° 07 ' 30 "

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 2.5' GRID CELL:

LONGITUDE: 77 ° 55 ' 00 " LATITUDE: 34 ° 12 ' 30 "

CALCULATIONS: LATITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM LATITUDE GRID LINE TO SITE REF POINT: 75

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

A x 0.3304 = 24 . 8 "

C) EXPRESS IN MINUTES AND SECONDS (1'= 60"): 0 ' 25 . 0 "

D) ADD TO STARTING LATITUDE: 34 ° 12 ' 30 . 0 " + 0 ' 25 . 0 =

SITE LATITUDE: 34 ° 12 ' 55 . 0 "

CALCULATIONS: LONGITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM RIGHT LONGITUDE LINE TO SITE REF POINT: 367

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

A x 0.3304 = 121 . 3 "

C) EXPRESS IN MINUTES AND SECONDS (1'= 60"): 2 ' 1 . 3 "

D) ADD TO STARTING LONGITUDE: 77 ° 55 ' 00 . 0 " + 2 ' 1 . 3 =

SITE LONGITUDE: 77 ° 57 ' 1 . 5 "

INVESTIGATOR: [illegible] DATE: 7/15/94

REFERENCE 4

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

James B. Hunt, Jr., Governor
Jonathan B. Howes, Secretary
William L. Meyer, Director

DEHNR

January 31, 1995

Ms. Cynthia Gurley
NC CERCLA Project Officer
EPA Region IV Waste Division
345 Courtland Street, NE
Atlanta, Georgia 30365

FEB 07 1995

Subject: Site Inspection Prioritization
Southern Wood Piedmont Co.
Wilmington, New Hanover County, NC
NCD 058 517 467

Dear Ms. Gurley:

The enclosed document summarizes the results of a Site Inspection Prioritization (SIP) of the Southern Wood Piedmont Co. site in Wilmington, NC. This site, owned by the City of Wilmington and the NC State Ports Authority, was formerly used to treat and store wood products. Wood treating materials historically used at the site included creosote and, more recently, pentachlorophenol (PCP) and chromated copper arsenate (CCA). During the mid-to-late 1980s, SWP excavated and landfarmed creosote-contaminated soils from various on-site locations. CCA-contaminated soil either was stabilized onsite or was shipped to a hazardous waste landfill. The landfarming operation concluded in April 1990.

Results of previous investigations at the site indicate detectable soil and groundwater contamination throughout much of the site. The principal contaminants are semi-volatile organic compounds (SVOCs), with traces of volatile aromatic compounds, both of which are associated with creosote. Localized PCP and CCA contamination has also been detected. The areas of contamination include former creosote and CCA storage and treatment areas, outdoor wood storage areas, and a former drainage ditch. The visibly creosote-contaminated soils in these areas were landfarmed in the northern half of the site, where they currently remain as an additional contaminant source.

P.O. Box 27687, Raleigh, North Carolina 27611-7687 Telephone 919-733-4996 FAX 919-715-3605
An Equal Opportunity Affirmative Action Employer 50% recycled/ 10% post-consumer paper

Two sand units directly beneath the site are known to be contaminated by organic and (locally) inorganic wood preserving residuals. These overburden units not used as a drinking water source. The underlying sandy limestone bedrock is a principal confined aquifer in the area, and a second, semi-confined bedrock aquifer to the southeast has been used historically for drinking water, however, most groundwater use in the study area occurs more than 2 miles from the site.

SVOCs attributable to the site have contaminated sediment in an existing drainage ditch and in Greenfield Creek, which connects the ditch to the Cape Fear River. The contaminated sediment samples were located downstream of wetland frontage along the ditch. Surface water has not been sampled in the ditch or Greenfield Creek. To date, no surface water contaminants have been detected in Cape Fear River water, but semi-volatile contaminants were detected adjacent to the site when river sediment was last sampled in 1985. Two other possible sources of semi-volatile contaminants have been identified over 0.5 mile upstream of the site. The Greenfield Creek contaminants, however, are at least partially attributable to the site.

Because of extensive tidal flow reversal in the Cape Fear River and its tributaries, the surface water pathway theoretically extends 15 miles both upstream and downstream from the site. The potential for contaminant transport upstream from the site may be limited, however, by the net seaward transport of sediment in the estuary.

No drinking-water-supply intakes reportedly operate in the pathway, but the Cape Fear and the Northeast Cape Fear River systems are commercial and recreational fisheries. Greenfield Creek is also fished recreationally. As defined in the SIP, the surface water pathway (including tidal tributaries) contains 170 miles of mapped wetland frontage. Wetlands adjacent to the site are within the downstream limits of detected SVOC contamination. Eleven rare animal and 9 rare plant species are identified within the pathway. Three of the animal species are listed as Endangered in NC and/or the US. One animal and 2 plant species are Threatened in NC and/or the US.

Landfarm soils contain residual creosote components, some exceeding their current health-based Cancer Risk Screening Concentrations for human soil exposure. Soil sampling in the former wood storage areas also detected organic and arsenic contamination at levels above Cancer Risk Screening Concentrations. The landfarm area soils also contained detectable polychlorinated dibenzodioxins and dibenzofurans, but soils outside the landfarming areas have not been tested for these two groups of compounds.

The site is accessible on foot or by boat, but has no residential or worker populations. The nearest residences are 400 feet east of the site. No schools or day care facilities are present within 0.2 mile of the site. A railroad grade and dense vegetation separate the site from a nearby recreational park. Surface soil at the site is currently stabilized by vegetation.

Under present circumstances, the site appears to pose a minimal health hazard via soil or by migration of contaminant through air. A Risk Assessment completed at the site concluded that contaminant levels at the site are low enough for future industrial use. Based on the Risk Assessment report, however, the NC Environmental Epidemiology Section has concluded that the site does not currently meet cleanup standards for future residential use, and may pose an increased cancer risk to future workers.

In summary, cumulative evidence indicates that creosote residuals attributable to the site have contaminated downstream wetlands, and possibly a fishery. Dioxins and halogenated dibenzofurans have been detected in the landfarmed soils, but the extent of contamination has not been determined for the remainder of the site. Based on this information, the Southern Wood Piedmont - Wilmington site is recommended as a high priority for an expanded Site Inspection under CERCLA. Additional testing of soil, surface water, and sediment for organic and inorganic wood preservative components, as well as for dioxins and halogenated dibenzofurans, is recommended to evaluate the site's likely impact on public health and the environment. If you have any questions, please contact me at (919) 733-2801

Sincerely,

Stuart F. Parker, Jr.
Hydrogeologist,
NC Superfund Section

STATE OF NORTH CAROLINA

Department of Environment, Health, and Natural Resources
Division of Solid Waste Management
Superfund Section

SITE INSPECTION PRIORITIZATION

Southern Wood Piedmont Company
NCD 058 517 467
Wilmington, New Hanover County, North Carolina
Reference No. 02821

Stuart Parker, Hydrogeologist
Division of Solid Waste Management
Superfund Section

SITE INSPECTION PRIORITIZATION

Southern Wood Piedmont Company
NCD 058 517 467
Wilmington, New Hanover County, North Carolina

January 1995

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

Prepared by:

Stuart Parker
Hydrogeologist

Reviewed by:

Pat DeRosa
CERCLA Branch Head

TABLE OF CONTENTS

EXECUTIVE SUMMARY

1. INTRODUCTION 1

2. SITE DESCRIPTION 1

3. WASTE/SOURCE SAMPLING 8

4. GROUNDWATER PATHWAY 10

5. SURFACE WATER PATHWAY 18

6. SOIL AND AIR PATHWAYS 27

7. SUMMARY AND CONCLUSION 31

LIST OF REFERENCES

PHOTOGRAPHS

REFERENCES

LIST OF TABLES

TABLE 1. GROUNDWATER POPULATION COUNT 14

TABLE 2. GROUNDWATER CONTAMINANT SUMMARY 17

TABLE 3. SURFACE WATER PATHWAY ENDANGERED/
THREATENED SPECIES 23

TABLE 4. SOIL AND SEDIMENT CONTAMINANT SUMMARY 25

TABLE 5. POPULATION DISTRIBUTION 28

LIST OF FIGURES

FIGURE 1 SITE LOCATION PLAN 2

FIGURE 2 SITE PLAN 3

FIGURE 3 SURFACE WATER PATHWAY 20

EXECUTIVE SUMMARY

The Southern Wood Piedmont, Wilmington site, owned by the City of Wilmington and the NC State Ports Authority, was used from 1935 to 1983 to treat and store wood products. Wood treating materials historically used at the site included creosote and, more recently, pentachlorophenol (PCP) and chromated copper arsenate (CCA).

During the mid-to-late 1980s SWP excavated and landfarmed large quantities of contaminated soils from various locations at the site. Much of the soil came from a buried, creosote-contaminated ditch in the southeast part of the site. Visibly discolored soils were stockpiled and then landfarmed on 5 acres of the northern half of the site. Based on arsenic content, CCA-contaminated soils were either stabilized onsite with cement or were shipped to a hazardous waste landfill. Sandy clay from offsite was used to backfill the excavated areas. Excavation and landfarming ended in April 1990.

Investigations completed on site between 1985 and 1993 have documented contamination of surface and subsurface soil and groundwater at the site by wood-treating compounds. Subsurface exploration has revealed both non-aqueous and aqueous phase semi-volatile organic compounds (SVOCs) in groundwater and soils beneath much of the site. Aqueous contaminants in a sandy water-table aquifer beneath the site have migrated through a peat layer and contaminated a deeper, semiconfined sand unit. PCP has not been detected in the groundwater, however, and elevated inorganics have been identified only in monitoring wells adjacent to a former CCA storage area. The contamination appears to have originated at the site's former wood treating areas and at a buried creosote-contaminated ditch at the site. Sampling results do not indicate that contaminants in the site's 5-acre landfarm have migrated to groundwater.

Neither of the contaminated sand units is used as a drinking water source. This overburden is separated from bedrock by a tight, apparently continuous clay layer over 2 feet thick. The sandy limestone formation beneath the clay is a principal aquifer in the region. No groundwater samples were collected from this aquifer, however, groundwater use is very limited within 2 miles of the site.

The site drains to the Cape Fear River directly and via a drainage ditch and Greenfield Creek. Sediment samples collected from the upper end of the ditch and the lower end of the creek contained most of the same SVOCs detected onsite. The detection of tetra- and pentacyclic SVOCs suggests that the contaminant is creosote rather than refined fuel. No surface water samples have been collected in this segment of the pathway. To date, no SVOCs from the site have been detected in Cape Fear River water, however, Cape Fear River sediment adjacent to the site was sampled in 1985 and found to be contaminated with creosote components. Additional potential sources for semi-volatiles exist within 0.7 mile upstream of the site, but the Greenfield Creek contamination is at least partially attributable to the site.

The Cape Fear River and its tributaries, including the Northeast Cape Fear River, undergo tidal flow reversal for more than 15 miles upstream of the site. No surface water intakes for public supply operate within 15 miles upstream or downstream of the site. Wilmington's municipal supply source is a surface water intake located several miles upstream of the pathway.

State Fisheries officials report that both the Cape Fear River and the Northeast Cape Fear River are commercial and sport fisheries. Greenfield Creek is also fished recreationally. Marine Fisheries officials report that the Cape Fear River at Wilmington is a nursery for commercially harvested blue crab, eel, and shrimp.

An approximately 2300 foot frontage of wetland is mapped along the drainage ditch linking the site to Greenfield Creek. Sediment contamination detected in the creek extends beyond the wetland interval. The Cape Fear River system contains approximately 170 miles of additional mapped wetland frontage within 15 miles upstream and downstream of the site. The Natural Heritage Foundation has identified 10 rare animal and 8 rare plant species within the surface water pathway. Three of the animal species are listed as Endangered in NC and/or the US. One animal and 2 plant species are listed as Threatened.

Landfarm soil samples collected in 1990 and 1991 contained residual creosote contamination. In some samples, benzo(a)pyrene and PCP concentrations exceeded their current health-based Cancer Risk Screening Concentrations for human soil exposure. Various dioxins and chlorodibenzofurans were detected in the landfarm areas, also above their benchmarks, however there is some uncertainty in their quantitation. No other dioxin testing has been performed at the site or at any of the off-site sample locations .

Soil sampling in 1991 detected SVOCs in areas which were formerly used for outdoor storage of treated and non-treated wood (TWS, NTA, NTB), but which were never excavated or landfarmed. Benzo(a)pyrene exceeded its Cancer Risk Screening Concentration in these areas as well. All other SVOCs were below their respective benchmarks, but arsenic was detected at elevated levels which exceeded its soil exposure benchmark.

The site is currently uninhabited, but is secured only by a vehicle gate at the entrance, and is accessible by foot or by boat. The nearest residences are located approximately 400 feet east of the site. The nearest school is located 0.45 mile south of the site. The nearest day care facilities are on South 2nd Street, at least 0.2 mile east of the site. A sports field is located directly southeast of the site, but is separated from the site by a railroad grade, by thick vegetation, and by the existing on-site drainage ditch.

A Risk Assessment completed at the site indicated that contaminant levels and exposure levels at the site are low enough for future industrial land use. Based on the Risk Assessment report, however, the NC Environmental Epidemiology Section has indicated that the site does not currently meet cleanup standards for future residential use, and may pose a threat to future on-site employees.

In summary, extensive shallow groundwater contamination has occurred at the site, but does not appear to threaten any drinking water supplies. The likelihood of human exposure to contaminated on-site soil or to contaminants migrating through air is limited by current surface conditions and the lack of an on-site residential or worker population. Semi-volatile organic soil contaminants at the site have apparently migrated to a section of the adjacent surface water pathway containing mapped wetlands. Sampling performed in recent years is insufficient to determine whether sediment contamination has spread to the nearby Cape Fear River, which contains additional wetlands, several rare plant and animal species, fisheries, and a nursery for human food chain organisms. Dioxins and dibenzofurans have been detected in landfarmed soils at the site, but have not been tested elsewhere at the site.

1.0 INTRODUCTION

Under authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), the North Carolina Superfund Section conducted a Site Inspection Prioritization (SIP) at the Southern Wood Piedmont site in Wilmington, New Hanover County, NC. The purpose of this investigation was to collect information concerning conditions at the Southern Wood Piedmont site sufficient to assess the threat posed to human health and the environment, and to determine the need for additional investigation under CERCLA or other authority.

This investigation supplements a Preliminary Assessment (PA) and the Screening Site Investigation (SSI), completed in July 1984 and April 1986, respectively. The scope of this investigation included a file review, and the examination of available analytical data. Waste and environmental media sampling was conducted by Geraghty & Miller in 1990 and 1991, and groundwater, surface water, soil and sediment sampling was conducted by ETE/Virogroup between 1992 and 1994. This report summarizes the findings of the previously completed studies, and updates information on offsite conditions and resource use, in order to satisfy present Hazard Ranking System (HRS) requirements, to test previous conclusions regarding the site, and to document Hazard Ranking System (HRS) factor values and scoring.

2.0 SITE DESCRIPTION

2.1 Site Location

The Southern Wood Piedmont, Wilmington site is located on Greenfield Street in downtown Wilmington, New Hanover County, North Carolina (Ref. 1; Fig. 1). The geographic coordinates of the site are 34° 12' 55" N latitude and 77° 57' 1.5" W longitude (Ref. 2). To access the site from Raleigh, NC, travel southeast on I-40 to US 117. Follow 117 south to 3rd Street and continue south approximately 2 miles. The site is located on the Cape Fear River waterfront at the end of Greenfield Street, 4 blocks west of 3rd Street. (Figs. 1-2).

The climate in the Wilmington area is classified as subtropical and is influenced by proximity to the ocean. Winters are mild, with an average January temperature in excess of 48 F. . Summers are hot and humid with an average July temperature in excess of 80 F (Ref. 3, p. 94, p. 98). Mean annual precipitation is 51 inches and mean annual lake evaporation is 42 inches, therefore, net precipitation for the area is 9 inches per year (Ref. 4). The 2-year, 24-hour rainfall in the study area is 5.0 inches (Ref. 55).

2.2 Site Description

The Southern Wood Piedmont (SWP) Wilmington site consists of 52 acres of vacant land on the Cape Fear River waterfront. Thirty-five acres in the northern and central portion of the site are owned by the City of Wilmington, and the remaining 17 acres are owned by the NC State Ports Authority (Ref. 5, p. 1). Features surrounding the site include 2 petroleum storage facilities on the north and south, and a residential area and the Cape Fear River on the east and west, respectively (Ref. 1; Ref. 7, p. 1; Photos 5-6, 12-14).

The southern portion of the site abuts an undeveloped portion of the State Ports Authority property (Ref. 18). A drainage ditch extends approximately 850 feet south across this area from the site, joining Greenfield Creek. The creek flows westward another 1900 feet, passing the north edge of the Paktank petroleum terminal and a tidal control gate, before emptying into the Cape Fear River (Ref. 1; Ref. 7, Fig. 2; Fig. 2). The river, creek, and drainage ditch are all tidally influenced, undergoing flow reversal during normal tidal cycles (Ref. 6, p. 4; Ref. 8; Photos 15-16).

The site has been cleared of surface structures, storage tanks, and railroad sidings, and is currently vacant. Remaining features visible at the site include an entrance gate, sections of paved and unpaved roadway, scattered concrete foundation slabs, partially buried railroad ties, and drainage ditches (Photos 1-2, 7-8). The Cape Fear riverfront onsite consists of 2 broad slips, which contain the remnants of wooden cribbing and piers (Photos 13-14). The north central portion of the site includes a 5-acre landfarming area surrounded by an earth berm averaging about a foot in height (Photos 9-10) . Most of the land surface at the site is presently covered with short grass (Photos 1-2, 5-11). The site is relatively flat, the ground surface standing approximately 2 to 6 feet above the Cape Fear River at high tide (Ref. 6, pp.2-3).

2.3 Operational History and Waste Characteristics

The site was first developed to construct concrete barges and ships during World War I. The site operated as a wood-treating facility beginning in the early 1930s. Southern Wood Preserving Company (now Southern Wood Piedmont) operated the facility beginning in 1964. Creosote was the only wood preservative reportedly used prior to 1972, when SWP also began using chromated copper arsenate (CCA). In 1980, part of the facility was modified to use pentachlorophenol (PCP) as well. SWP began its first closure procedures at the site in 1975, when the facility reportedly obtained a permit to bury a drainage ditch on the State Ports Authority section. The ditch, which contained creosote sludges, was covered with fill. Wood treatment operations ceased in May of 1983, and removal of plant equipment began at that time (Ref. 9, p. 1) .

During the Preliminary Assessment, completed in July 1984, representatives of the NC Department of Human Resources observed evidence of soil and groundwater contamination at the site. Visible soil staining was observed in the main production areas in the south central portion of the site, around a cluster of creosote storage tanks to the west, and in the vicinity of the buried creosote ditch. Oily sheens were noted on groundwater from 1.5 feet beneath the ground surface, and on surface water at several locations onsite. Disposal of trash, tars and creosote sludge was also reported in earth berms at the 2 slips on the Cape Fear River (Ref. 10, Part 2, pp. 3-5)

On May 20, 1985, SWP signed an Administrative Order of Consent with the State (Ref. 11), in which the company agreed to treat and/or dispose creosote and CCA contaminated soils at wood treating and chemical storage areas at the site. Under the provisions of the Consent Order,, 4 onsite areas of contamination were designated to be treated by excavation and landfarming. These areas included: (1) the buried Creosote Drainage Ditch (a.k.a. Superfund Area I); (2) the Track Area, directly north of the facility's wood treatment areas; (3) the Oil Treating (main production) Area; (4) the Large Storage Tank (creosote) Containment Area, west of the treatment areas. Visibly discolored soils were excavated from these areas (Ref. 11, pp. 3-4). The excavations were backfilled with sandy clay obtained from a borrow pit 10 to 15 miles away (Ref. 57).

The stained soils were applied in a designated landfarm area in the northern part of the site. Application was limited to lifts of 2 inches or less, and land treatment was limited to the uppermost 6 inches of soil. During active landfarming, the area , which was bermed to prevent runoff, was irrigated, fertilized, and tilled weekly to promote degradation of contaminants. Lysimeters were installed to monitor soil moisture, and 1 upgradient and 3 downgradient monitoring wells were installed to monitor for groundwater contamination (Ref. 11, p. 5). Additionally, the former treated wood storage areas outside the landfarm were tilled in place. In accordance with the Consent Order, SWP conducted periodic monitoring of landfarm soil contamination, as well as biannual water quality monitoring on the Cape Fear River (Ref. 11, pp. 5-6).

From mid-1984 through mid-1990, SWP actively landfarmed the excavated soils. The landfarming areas, LF-1 and LF-2, consisted of 2 adjacent bermed areas in the north central portion of the site, with a combined area of 5 acres (Ref. 12, p. 2-1; Ref. 19, p. 2). Based on the reported number of 2-inch lifts emplaced in each of the landfarm areas (17 applications at LF-1 and 20 at LF-2) and assuming uniform coverage by each lift, an estimated 672,000 cubic feet (15.4 acre-feet) of material was landfarmed.

In the CCA area, the Consent Order specified excavation of soils containing 0.5 ppm or more of arsenic, as determined by EP Toxicity testing. Excavation was limited to depths of 5 feet or less. Excavated soils in excess of 5 ppm arsenic were reportedly transported and disposed at the former CSX hazardous waste landfill in Pinewood, South Carolina (Ref. 57). SWP reported that a net 98 cubic yard volume of soil was designated for such removal. Soils with less than 5 ppm arsenic were to be diluted to less than 0.5 ppm EP Toxicity by mixing with Portland cement, then buried onsite. SWP reported that a 93 cubic yard volume was disposed onsite in this manner (Ref. 11, p. 4; Ref. 20, pp. 3-10).

During the landfarming period, SWP collected and submitted 59 composite soil samples from LF-1 and 37 samples from LF-2. Each composite was analyzed for phosphorus, chloride, total organic carbon, soil pH, polynuclear aromatic hydrocarbons (PAH), PCP, phenol, and microbial content. Samples were analyzed by the Mississippi State University Forest Products Research Division Laboratory (MSUFPRD) (Ref. 12, p. 2-2). SWP also contracted Law Environmental Services to install 4 monitoring wells around the perimeter of the landfarming areas in September 1985, and periodically sampled these wells for PCP and semi-volatile organics between 1985 and 1990 (Ref. 13, p. 2-2, p. 7-1).

Several environmental investigations have been completed at the site since wood-treatment operations ceased in 1983. In 1981, prior to shutdown, the City of Wilmington contracted Soil & Materials Engineering to install and sample five monitoring wells (CW-1 through CW-5) around the inner perimeter of the site (Ref. 13, pp. 2-3 to 2-4). Four of the wells were screened in a shallow water table unit, but CW-5 was screened in a deeper sand unit (See Section 4.1) (Ref. 7, p. 3)

NUS Corporation, the US EPA's Field Investigative Team (FIT), performed a Screening Site Investigation (SSI) at the site in January 1985. The FIT resampled 4 of the 5 city monitoring wells, and sampled 1 "artesian" well at Greenfield Lake, approximately 0.5 mile southeast of the site (Ref. 5, pp. 4-7) The FIT collected soil samples in the landfarming areas and on the jetty area adjacent to the Cape Fear River. The FIT also collected 1 surface water and 1 sediment sample adjacent to the site on the Cape Fear River, and collected background samples from the outlet of Greenfield Lake (Ref. 5, pp. 7-12). In 1985, Law Environmental Inc. installed four 20-foot monitoring wells (MW-6 through MW-9) to monitor conditions at the periphery of the landfarming areas (Ref. 7, p. 4; Ref. 13, pp. 2-3 - 2-4).

In 1991, Geraghty & Miller, Inc., completed soils investigations of the 3 outdoor wood storage areas. Soil in these areas was not excavated for landfarming. G & M collected 48 shallow soil samples in the 2 Non-treated Wood Storage areas (NTA, NTB) and in the Treated Wood Storage area (TWS) (Ref. 14, p. 3-1, Figs. 4-1 to 4-3).

G&M reviewed SWP's landfarm sampling results, focussing on data from sequential sampling events which occurred between soil applications. The 4 - 6 month periods which were evaluated for each landfarm area began on June 1986, November 1987, and June 1988. G&M concluded from the analytical data that significant biodegradation of semi-volatile organic compounds (SVOCs) had occurred in the landfarmed soil between applications. Results, however, indicated that some SVOCs broke down at slower rates than others. Most species essentially degraded to non-detect levels after 2 to 4 months, but anthracene, phenanthrene, fluoranthene, pyrene, benzo(a)anthracene, and chrysene persisted beyond 6 months (Ref. 12, pp. 2-3 to 2-6, App. A). The most rapid degradation generally occurred during the warmest months of the year.

G&M conducted 2 sampling events at the landfarming areas, collecting soil composites from 5 borings at each landfarming area in October 1990 and again in October 1991 (Ref. 12, p. 3-1; Ref. 13, p. 3-1). Twice, G&M also sampled MW-6 through MW-9 at the landfarm These landfarm investigations were completed and used in preparation of G & M's December 1993 Risk Assessment report (Ref. 15).

Beginning in February 1992, ETE/Virogroup, of Lexington, SC, conducted a 3-phase groundwater investigation of the site. ETE initially installed and sampled 5 temporary wells (B-2 through B-6) and 8 permanent monitoring wells (MW-10 through MW-17) into the site's water table groundwater unit (Ref. 7, pp. 5-7).

The Phase II investigation in September-October 1992 began with abandonment of the temporary wells and the installation of 9 additional permanent monitoring wells in the water table unit (MW-18 through MW-26) and 3 wells in a deeper, semi-confined groundwater unit (MW-8A, MW-11A, MW-19A) (See Section 4.1). In December 1992, ETE collected soil and sediment samples (SS-1 through SS-11) along surface drainage south from the site, including the on-site drainage ditch and Greenfield Creek (Ref. 7, pp. 8-13).

During ETE's Phase III investigation, which began in October 1993, one monitoring well (MW-24) was relocated and 11 more wells (MW-27 through MW-30, MW-11B, MW-14A, MW-20A, MW-22A, MW-24A, MW-28A, MW-29A) were installed in the 2 sand units (Ref. 7, pp. 13-29). ETE sampled most of the new and existing monitoring wells (including the landfarm wells) during each work phase (Ref. 7, pp. 7, 12, 25) and monitored groundwater elevations in the wells to determine flow direction in the 2 unconsolidated sand units (Ref. 7, pp. 8, 19, 29-30).

3.0 WASTE/SOURCE SAMPLING

3.1 Sample Locations

In 1982, SWP and the NC Division of Health Services collected 4 split soil samples along the Oil Treating and Track areas (Refs 16-17). No other analytical samples apparently were collected directly from the former main production areas or tank storage areas at the site, where contamination was visually identified during excavation. Soils analyzed after landfarming were from multiple source areas at the site.

ETE/Virogroup sampled soils at the former Creosote Ditch area in December 1992 (Ref. 7, p. 11, Fig. 3). In the CCA Area, soil sampling for arsenic EP toxicity was performed by SWP to pre-screen selected areas for soil excavation and disposal (Ref. 20, pp. 4-10).

During the period of active landfarming, SWP collected a total of 96 composite samples of landfarm area soils. In 1985 the EPA FIT collected soil composites from the 2 landfarming plots and a soil stockpile to be landfarmed (Ref. 5, p. 4, p. 8-10, Table I). G&M also sampled the landfarm area soils in 1990 and in 1991 (Refs. 12-13).

In 1985 the EPA FIT collected a composite soil sample from the jetty at the site (near TWS). In February and April, 1991, Geraghty & Miller sampled soil along 100-foot grid patterns in each of the NTW and TWS storage areas (Ref. 14, pp. 3-1, 3-2).

3.2 Analytical Results

Organic compounds: Soil samples collected by Geraghty & Miller and ETE/Virogroup from Landfarms 1 and 2 and from the former Creosote Ditch area contained several semi-volatile organic compounds commonly associated with creosote. Residual creosote contaminants were also detected in soil beneath the former treated and untreated wood storage areas, but at generally lower concentrations than above (Ref. 5. p. 2; Ref. 14, pp. 4-1 - 4-2). Detected compounds included the following:

Acenaphthene	Chrysene
Acenaphthylene	Dibenzo(a,h)anthracene
Benzo(a)anthracene	Fluoranthene (Benzo(j,k)fluorene)
Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene
Benzo(bk)fluoranthene	Phenanthrene

The former Track and Oil Treating (main production) Area and the Large Storage Tank (creosote) Containment Area all contained visible creosote spills at the time operations ceased, indicating extensive source area contamination. Creosote sludges are also reported to have been deposited during filling adjacent to the north and south slips at the Cape Fear River (Ref. 5, p. 2). Based on sampling results from the lower portion of Greenfield Creek, it appears that the same semi-volatile creosote components have migrated downstream from the southeast corner of the site (Ref. 7; Att. A).

In accordance with the EPA's Interim Final SI Guidance, the creosote source areas, despite having been excavated, are still considered sources because 1) their excavated soils were not physically removed from the site, and 2) results of the above investigations indicate release of contaminants from these areas to groundwater and to the surface water environment (See Sections 4.4, 5.4). Additional creosote residues are anticipated to be present in the unexcavated soils within the source areas, as was the case at the Creosote Ditch area. Together, the main source areas and the other areas of known contamination cover over half of the site (Ref. 7, Fig. 4; Ref. 14, Figs. 3-1, 4-1, 4-2, 4-3).

Inorganics: Testing of soils in the CCA area detected arsenic EP Toxicity concentrations in excess of 5 mg/kg (Ref. 19, p. 6). Testing of soils in the NTA, NTB, and TWS areas detected maximum arsenic concentrations of 63 mg/kg, 13 mg/kg, and 41 mg/kg, respectively. Maximum chromium concentrations for the three areas were 15 mg/kg, 22 mg/kg, and 11 mg/kg, respectively. Maximum copper concentrations were 300 mg/kg, 130 mg/kg, and 110 mg/kg, respectively (Ref. 14, Tables 4-1 - 4-3).

ETE/Virogroup sample SS-2, an offsite soil/sediment sample collected from a drainage ditch on the property east of the railroad grade and the site, contained arsenic, chromium and copper concentrations of 5.2 mg/kg, 14 mg/kg, and 46 mg/kg, respectively (Ref. 7, Att. A, p. 7). If SS-2 is considered a background sample, these results indicate that areas NTA and TWS contain arsenic in excess of 3 times the background level, and that area NTA contains copper in excess of 3 times background level. None of the samples contained chromium in excess of 3 times background concentration. The minimum health-based benchmark concentrations for human soil exposure are 0.33 mg/kg for arsenic and 2900 mg/kg for chromium. No such benchmark presently exists for copper (Ref. 20). These results therefore indicate that maximum arsenic levels at the site are in excess of the benchmark level.1

The source areas and contaminants at the site can be summarized as follows:

<u>Track & Treating Areas</u>: est. 13,861 cu. yd; Semi-volatile organics (PAH).

<u>Large Storage Tank (Creosote) Containment Area</u>: est. 800 cu. yd; (same).

<u>Creosote Ditch Area</u>: est. 2315 cu. yd.; (same).

Landfarm Areas 1 & 2: est. 5 acres; (same).

Areas NTA & NTB (Non-treated wood storage): est. 17,708 cu. yd (PAH, Arsenic (NTA)).

Area TWS (Treated wood storage): est. 15,000 cu. yd. (PAH, Arsenic).

Chromated Copper Arsenate (CCA) area: est. 191 cu. yd. (Metals (Arsenic)).

4.0 GROUNDWATER PATHWAY

4.1 Hydrogeologic Setting

The Wilmington area lies within the Coastal Plain Physiographic Province (Ref. 21, p. 3). Bedrock formations in this province consist of a crystalline basement complex, overlain by a thick wedge consisting of a layered series of sedimentary bedrock formations. The sedimentary formations are sands, clays, and limestones, most of which date from the Cretaceous Period. The sedimentary wedge, which contains all the significant potable aquifers in the region, thickens toward the Atlantic coast, measuring 1100 feet in Wilmington (Ref. 21, p. 8). Overlying the sedimentary bedrock formations are unconsolidated surficial units of sediment deposited some time between the Cretaceous Period and the present.

Historically, geologic reports have disagreed on the identity of the bedrock unit beneath the clay. Most sources (Refs. 21-23) place bedrock around the site within the upper Cretaceous Pee Dee Formation, while some (Refs. 26-27) map the area within the younger Tertiary (Eocene) Castle Hayne Formation. The 3 deepest test borings completed at the site encountered "a very dense, light gray, sandy shell-mold limestone", which was interpreted to be the Scotts Hill Member of the upper middle Pee Dee Formation (Ref. 7, p. 17; Ref. 23, pp. 212-215).

At the top of the limestone, ETE's deepest borings encountered a layer of dense, dry, olive-gray clay which measured 2.5 to 4 feet thick. The measured depth to the base of the clay ranged from 43 to 48 feet onsite (Ref. 7, Att. D). Regionally, the upper surface of the clay undulates because of channeling and erosion (Ref. 21, p. 13), and the layer has eroded away completely in areas north and west of the site (Ref. 21, pp. 10, 14). The layer averages 25 feet thick (Ref. 27, pp. 30), but thickens from only 2.5 feet at the site to as much as 60 feet in areas southeast of the site (Ref. 21, p. 14; Ref. 27, p. 30). No clay layer was reported during S&ME's 1982 subsurface exploration program (Ref. 5, p. 3), however, it was encountered in all 9 of ETE's deep borings (Ref. 21, pp. 9-10, p. 13), suggesting that it is continuous beneath the site. The clay layer's hydraulic conductivity is anticipated to be on the order of 10^{-8} cm/sec (Ref. 25, p. 51601).

To the south, east, and northeast of the site, the Pee Dee Formation is overlain by the limestone beds of the Castle Hayne Formation. Like the Pee Dee Formation, the Castle Hayne generally thickens toward the coast. Its thickness varies considerably, however, because of post-depositional solution and erosion at the top of the formation, and because of the irregular surface of the underlying clay (Ref. 21, pp. 15-16).

Between the top of the clay layer and the ground surface at the site, the unconsolidated, post-Cretaceous overburden consist of 2 sand units, separated by a semi-permeable peat layer. The upper unit is 7-16 feet thick and generally consists of loose, light brown sand, locally discolored by creosote. The peat layer is 13 - 16 feet thick and contains varying amounts of clay, wood and root fragments. The lower unit consists of loose, darker brown sand, 14 to 18 feet thick. The upper unit has been excavated in places to depths of several feet, and backfilled with sandy clay soil from offsite(Ref. 57).

Surface soil throughout most of the site is mapped as Urban land, wherein the original soil profile has been disturbed by cutting, filling, and grading to the extent that identification is no longer possible (Ref. 24, p. 6). Although the underlying material is described as sand, ponding of rainwater (possibly due to introduction and compaction of sandy clay fill) occurs on the ground surface over portions of the site (Ref. 6, p. 2; Ref. 51; Photo 11).

The southeast corner of the site, including the existing drainage ditch, is underlain by Dorovan Series soil, characteristic of bays, tidal plains and floodplains. This organic-rich soil typically consists of a 4-inch surface layer of black muck, underlain by 5 feet of dark gray or black muck. This soil type is subject to frequent and prolonged flooding , and the seasonal high water table is very close to the ground surface (Ref. 24, pp. 7, 25). The typical hydraulic conductivity for this type of soil is on the order of 10^{-8} cm/sec (Ref. 25, p. 51601).

Potable groundwater in the Pee Dee Formation is found in the sandy limestone stratum encountered onsite. This aquifer unit is the uppermost of 4 confined water-bearing strata within the formation., The sandy strata are separated from one another by thicker silty clay units. Groundwater in the deeper sand units ranges from brackish to saline, so only the uppermost unit in the Pee Dee is used for drinking.

Historical well records indicate that groundwater wells in Wilmington began penetrating the limestones of the Castle Hayne Formation along a broad, NE-SW trending strip that approaches to within 1 mile south and east of the site. Several of the wells in this zone drew groundwater from both the Castle Hayne and the deeper Pee Dee Formation (Ref. 21, p. 26, pp. 62-71, Fig. 3). In the northern part of the county, the Castle Hayne Formation is locally unconfined. Closer to the coast, the aquifer thickens and becomes confined by Miocene silts (Ref. 21, pp. 18, 26).

Recharge in unconfined units tends to occur in upland or interstream areas, as precipitation percolates downward to the water table. The groundwater eventually discharges to perennial surface water bodies, where the water table approaches the surface (Ref. 26, p. 41). Due to the site's low elevation and proximity to surface water, the water table in the upper sand unit approaches to within 2 feet of the ground surface during high tide (Ref. 7, Atts. D-E).

Measured groundwater elevations indicate the presence of a groundwater mound centered beneath the site in the upper sand unit. Groundwater there is anticipated to flow radially southeast south and west, discharging to the existing drainage ditch, to Greenfield Creek, and to the Cape Fear River. The data indicate that the existing drainage ditch acts as a discharge boundary to southeastward groundwater flow in the upper sand unit (Ref. 7, Figs. 6-9). For this reason, contaminants in the water-table sand unit are not anticipated to migrate beyond the east or south drainage system toward Wilmington, but are more likely to discharge to surface water (Ref. 7, pp. 29-31, Figs. 18-19).

Groundwater flow in the lower sand unit is influenced by the level of the Cape Fear River, to which the unit has apparently been hydraulically connected as a result of dredging in the riverbed. A groundwater mound with a radial flow pattern occurs in this unit during low tide, however, the overall flow direction shifts increasingly to the southeast as the river level rises (Ref. 7, p. 19). Whether groundwater contaminants in the lower sand unit can migrate laterally toward the unconfined areas of the Castle Hayne aquifer is not presently known.

At most of the monitoring well clusters completed on and adjacent to the site, groundwater elevation monitoring has indicated an upward hydraulic gradient across the peat formation which separates the 2 sand units. These upward hydraulic gradients persisted throughout the tidal cycle and indicate that the lower sand unit is partially confined by the peat. No apparent vertical gradient was evident at one south-central cluster. Near the south property line (and away from surface water), groundwater levels indicated a downward hydraulic gradient at 2 clusters (Ref. 7, Att. A, Fig. 3). ETE/Virogroup has indicated that the upward hydraulic gradients tend to persist throughout the tidal cycle near the drainage ditches, but that gradients tend to fluctuate closer to the Cape Fear River (Ref. 7, pp. 21-22). Whether contaminants in the fluctuating areas have migrated vertically to the Pee Dee aquifer is not known.

4.2 Groundwater Targets

No municipal water supply wells are located within 4 miles of the site (Ref. 28). The City of Wilmington's active water source consists of surface water intakes over 15 miles upstream of the site on the Cape Fear River (Refs. 28-29).

The 1994 community well database indicates that 3 community wells supply approximately 680 residents within a 4-mile radius of the site (Ref. 28; Refs. 30-31). Two of the wells, supplying 625 people, are located 1.7 and 3.8 miles east-northeast of the site, in areas where potable wells have historically tapped both the Castle Hayne and the Pee Dee aquifers. The other 55 community -well users are located 1.6 miles west of the site and probably utilize the Pee Dee aquifer (Ref. 21, pp. 62-74, Fig. 3). A house count indicates that approximately 1449 people are supplied by individual domestic wells within a 4-mile radius, the nearest estimated to be 1.6 miles west of the site (Refs. 31-32). All of the domestic wells identified in New Hanover County are located north of Smith Creek, so it is likely that all the domestic wells within 4 miles of the site tap the Pee Dee aquifer (Ref. 1; Ref. 21, pp. 62-74, Fig. 3). The total groundwater population within 4 miles of the site is estimated to be 2129 people (Refs. 31-32; Table 1).

The nearest groundwater supplies to the site are springs which supply outdoor faucets in Greenfield Park, approximately 0.25-0.5 miles southeast of the site. These springs are classified as noncommunity, transient supplies (Ref. 28). The nearest other known groundwater supplies are the community and domestic wells located 1.6 miles west of the site, and the community well located 1.7 miles east of the site (Ref. 1; Refs. 30-31; Fig. 1). No wellhead protection areas (WHPAs) are designated in NC (Ref. 33).

4.3 Sample Locations

No groundwater sampling was conducted at the site by the NC Superfund Section during the SIP. Analytical data from samples collected onsite during recent hydrogeologic evaluations were sufficient to characterize subsurface soil and groundwater conditions beneath the site.

During the January 1985 FIT Screening Site Investigation (SSI), a groundwater sample was collected at one of the non-perennial springs in Greenfield Park, approximately 0.5 mile southeast of the site (Ref. 5). Because this is a non-perennial transient supply, it was not resampled during the SIP.

The FIT performed early sampling at 4 of the original 5 monitoring wells installed at the site. The FIT sampled monitoring wells MW-1 (CW-1, near the Creosote Ditch), MW-2 (CW-2, near the Treatment Areas), MW-4 (CW-4, near the north slip fill area), and MW-5 (CW-5, northeast corner of the site) (Ref. 5, pp. 5-7, Fig. 2).

Geraghty & Miller sampled landfarm monitoring wells MW-6 through MW-9 in October 1990 and again in October 1991 to determine whether the landfarm area had contaminated the upper sand unit at the site. Both G&M sample sets were tested for the semi-volatiles associated with creosote, and the 1991 samples were also tested for copper, chromium, and arsenic (Ref. 12, pp. 3-2 - 3-4, Table 4-4; Ref. 13, p. 3-2 - 3-3, Table 4-3).

TABLE 1
SOUTHERN WOOD PIEDMONT CO.
WILMINGTON, NC.
NCD 058 517 467
GROUNDWATER POPULATION COUNT

Radial Distance (mi.):	Domestic wells		Domestic Well Population		Community Well Population		Total Well Population
	N Han. Co.	Brun. Co.	N Han. Co.	Brun. Co.	N Han. Co.	Brun. Co.	
0.0-0.25	0	0	0	0	0	0	0
0.25-0.5	0	0	0	0	0	0	0
0.5-1.0	0	0	0	0	0	0	0
10.-2.0	0	27	0	73	25	55	153
2.0-3.0	10	60	27	161	0	0	188
3.0-4.0	189	253	507	681	600	0	1788
		Subtotals:	534	915	625	55	2129

1. House count completed by S. F. Parker, NC Superfund Section, using current USGS 7-1/2 minute photoquadrangles. and available information on current water main distribution.
2. Domestic population based on 1990 Census mean household populations for Leland and Wrightsboro, NC (Ref. 32).
3. Approximately 50 % of houses in Brunswick Co. section of study area are reported to use wells (Ref. 31).

Figure 2, adapted from ETE/Virogroup's most recent hydrogeologic report (Ref. 7, Fig. 4), indicates the locations of monitoring wells and monitoring well clusters in relation to the primary contaminant source areas at the site. ETE/Virogroup performed their Phase I, II and III Groundwater Quality Assessments during February 1992, October-November 1992, and October- November 1993, respectively. During Phase I, 5 temporary wells (B2, B3, B4, B5, and B6) and 8 permanent monitoring wells (MW-10 through MW-17) were installed in the upper sand unit and at the top of the underlying peat layer (Ref. 7, p. 6). Monitoring wells MW-10 and MW-13 through MW-17 were sampled in March 1992, along with the 5 temporary wells. Four monitoring wells (MW-6 through MW-9) which had been installed in 1985 by Law Environmental, Inc., were also sampled (Ref. 7, p. 4, Att. A).

During Phase II, 9 additional monitoring wells (MW-18 through MW-26) were installed in the upper sand unit, 3 monitoring wells (MW-8A, MW-11A, and MW-19A) were completed in the lower sand unit, and the 5 temporary wells were abandoned by grouting. In October 1992, a total of 21 groundwater samples were collected from existing wells MW-6 through MW-9, from Phase I wells MW-10 and MW-13 through MW-17, from Phase II shallow wells MW-18 through MW-25, and from Phase II deep wells MW-8A, MW-11A and MW-19A (Ref. 7, pp. 8, 12, Att. A).

Two shallow monitoring wells, MW-27, and MW-28, were installed at the northeast and southeast corners of the site, respectively. MW-29 and MW-30 were completed adjacent to wetlands, in the southeast corner of the NC Ports Authority property south of the site. MW-24 was replaced with MW-24R in response to vandalism. Seven additional deep monitoring wells (MW- 11B, MW-14A, MW-20A, MW-22A, MW-24A, MW-28A, and MW-29A) were completed in the lower sand at their respective cluster locations.

In November 1993, ETE/Virogroup collected 31 groundwater samples from the new and existing monitoring wells. Wells MW-11 and MW-12 were sampled, in addition to those wells previously sampled. Four monitoring wells (MW-11, MW-14, MW-22, and MW-26) were omitted because of the presence of dense nonaqueous-phase product in each well.

4.4 Analytical Results

The 1985 EPA FIT samples from MW-1, MW-2, MW-4 and MW-5 (CW-1, CW-2, CW-4 and CW-5) varied in composition. Contaminants detected in various combinations included benzene, ethyl benzene, and methyl butyl ketone (MW-1 and MW-2), naphthalene, dibenzofuran, and 2-methyl naphthalene (MW-2), arsenic, lead, toluene, acetone, acenaphthene, fluorene, and phenanthrene (MW-2 and MW-4), acenaphthylene, anthracene, fluoranthene, and pyrene (MW-4), chromium (MW-2 and MW-5). Methyl butyl ketone and propene were also detected at MW-5, indicating a possible offsite source for these 2 compounds (Ref. 5, pp. 5-7, Figure 2, Tables 2-3). The results were generally consistent with those of the subsequent Virogroup assessments.

No copper, chromium, arsenic, or semi-volatile organic compounds were detected in Geraghty & Miller's 1990 and 1991 landfarm area groundwater samples. (Ref. 12, p. 4-2, Table 4-4, App D; Ref. 13, p. 4-2, Table 4-3, App. A). The results indicate that the presence of these substances in the landfarm area has not impacted groundwater at the site.

Analytical results from each phase of the Virogroup groundwater investigation are documented and tabulated in Ref. 7, Attachments A and G. Maximum detected concentrations are summarized in Table 2. Several of the groundwater samples collected onsite contained detectable concentrations of volatile aromatic and semi-volatile organic compounds, as well as arsenic, cadmium, chromium, and lead. The semi-volatiles included many polynuclear aromatic hydrocarbons characteristic of creosote, some of which are listed carcinogens (Refs. 34-36; Ref. 44).

Table 2 includes a list of the detected volatile, semivolatile, and inorganic parameters, their maximum detected concentrations, and minimum health-based benchmark concentrations for groundwater. Of the detected contaminants, the maximum detected concentrations for benzene, benzo(a)pyrene, and arsenic exceeded their respective EPA Cancer Risk Screening Concentrations. Acenaphthene and fluoranthene (benzo(j,k)fluorene) exceeded their Reference Dose Screening Concentrations, and the metals chromium and lead exceeded their Maximum Contaminant Level/Maximum Contaminant Level Goals (MCL/MCLG) for groundwater (Ref. 7, Att. A, Att. G; Ref. 20).

The sampling results indicated that a plume of contaminated groundwater exists beneath the site, extending between the Large Storage Tank Area, the CCA and Creosote Treatment Areas, the former Buried Creosote Ditch Area, and the existing onsite drainage ditch. Within each of the principal source areas, Virogroup personnel detected dense, non-aqueous phase creosote in 1 or more of the upper sand unit monitoring wells. Within the upper sand unit, the aqueous contaminant plume extended up to 400 feet north of the source areas (MW-17, MW-20), and was detected to the southeast near the junction of the existing drainage ditch and Greenfield Creek (MW-30). The southern limit of the plume was not precisely defined. The lower sand unit also contained aqueous contaminants, but no apparent free product. Based on Virogroup's interpretation, the deeper plume was centered beneath the path of the former creosote and existing drainage ditch. (Ref. 7, pp 29-31, Figs. 15-16, Atts. A, D, G).

Analysis of the offsite groundwater sample collected by the EPA FIT in 1985 detected several volatile organic compounds, including methylene chloride (37 ug/l), chloroform (63 ug/l), bromoform (tribromomethane, 14 ug/l), carbon tetrachloride (38 ug/l), bromodichloromethane (60 ug/l), dibromochloromethane (38 ug/l), 1,1-dichloroethene (6.6 ug/l), 1,2-dichloroethane (55 ug/l), 1,1,1-trichloroethane (14 ug/l), trichloroethene (15 ug/l), tetrachloroethene (81 ug/l), and toluene (26 ug/l) (Ref. 5, p. 7, Table 3). All of the compounds except 1,1,1-trichloroethane and toluene were in excess of their respective Cancer Risk Screen Concentrations for groundwater (Ref. 20). However, none of the compounds except toluene were detected in groundwater at the site, so it is likely that these contaminants were from another source.

TABLE 2
SOUTHERN WOOD PIEDMONT CO
WILMINGTON, NC
NCD 058 517 467
PHASE I - III GROUNDWATER QUALITY ASSESSMENT
GROUNDWATER CONTAMINANT SUMMARY

Contaminant:	Maximum Detected Concentration (mg/l):	Lowest Health-based Benchmark:	Monitoring Well (Location):
Volatile Organic Compounds:			
Benzene	0.073	1.2 E-3 (C)	MW-13 (Large Storage Tank Area)
Ethyl benzene	0.11	0.7 (M)	B-4 (300 ft S of Treatment Area)
Toluene	0.046	1.0 (M)	MW-14
M/P - Xylene	0.078	10 (M)	*
O - Xylene	0.038	10 (M)	*
Semi-volatile Organic Compounds:			
Acenaphthene	3	2.1 (R)	B-4 (300 ft S of Treatment Area)
Anthracene	0.94	11 (R)	*
Benzo(a)anthracene	0.42	* (M)	*
Benzo(a)pyrene	0.11	4.8 E-6 (C)	*
Benzo(b)fluoranthene (Benzofluoranthene 3-4)	0.21	- -	*
Benzo(k)flouranthene	0.056	* (M)	*
Chrysene	0.34	* (M)	*
Dibenzo(a,h)anthracene	0.011	* (M)	*
2,4-Dimethyl phenol	0.37	0.7 (R)	*
Fluoranthene (Benzo(j,k)fluorene)	2.7	1.4 (R)	B-4 (300 ft S of Treatment Area)
Indeno(1,2,3-cd)pyrene	0.035	* (M)	*
Naphthalene	14	* (R)	*
Phenanthrene	5.8	- -	*
Inorganic Parameters:			
Arsenic	0.14	2 E-5 (C)	MW-17 (150 ft WNW of CCA Treatment Area)
Chromium	0.19 (1)	0.1 (M)	B-4 (300 ft S of Treatment Area)
Copper	0.4	1.3 (M)	MW-17 (150 ft WNW of CCA Treatment Area)
Lead	0.39	0.015 (M)	MW-17 (150 ft WNW of CCA Treatment Area)

Health-based Benchmark Values (1994) from Superfund Chemical Data Matrix, Appendix B:
(C) = Cancer Risk Screening Concentration.
(M) = MCL/MCLG.
(R) = Reference Dose Screening Concentration.

(*) Indicates Benchmark Concentration currently under review by USEPA.
(- -) Indicates No Established Benchmark Concentration.

1. MW-18 (North edge of site) contained 4.6 mg/l Chromium.
2. Concentrations in excess of applicable Health-based Benchmarks for groundwater are shaded.
3. Data obtained from Virogroup (ETE Division) report on Phase III Groundwater Quality Assessment, Wilmington, North Carolina Facility, prepared for Southern Wood Piedmont Company, 1994.

4.5 Groundwater Conclusions

Use and storage of wood-preserving chemicals at the Southern Wood Piedmont Co. site has resulted in extensive groundwater contamination both on site and on the additional State Ports Authority to the southeast. Subsurface exploration and sampling have revealed the presence of both aqueous and nonaqueous organic contaminants in the upper sand unit at the site. The lower sand unit has also been contaminated, apparently by vertical migration of aqueous contaminants through the semi-confining peat layer between the units.

Analytical and hydrogeologic data indicate that lateral migration in both units is influenced by proximity to the on-site drainage ditch, which apparently acts as a discharge boundary to eastward groundwater flow. To the south and west of the site, Greenfield Creek and the Cape Fear River may also act as discharge boundaries to contaminant migration in the unconsolidated sediments.

No groundwater samples have been collected from the Pee Dee Formation beneath the site. The formation is separated from the overlying contaminated groundwater units by a continuous, tight, dry clay layer 2.5 to 4 feet thick. This clay is reported to cap the entire formation, which serves as the regional aquifer northwest of the site. The Castle Hayne Formation, the regional aquifer south and east of the site, is reported to be only partially confined, and receives recharge through overburden units east of the site.

The nearest known domestic or community wells are located 1.5 to 2 miles from the site. An artesian spring used by the public and located less than a mile southeast of the site was reportedly contaminated by toluene and 11 halogenated organic solvents. Because only one of the compounds (toluene) was detected in the SWP groundwater samples, however, the contamination is not considered attributable to the site. Based on the above information, the presence of subsurface contamination at the site is not believed to be a likely threat to any drinking water supplies.

5.0 SURFACE WATER PATHWAY

5.1 Hydrologic Setting

Based on surface topography (Ref. 18), runoff from most of the site is anticipated to flow in a general south-southeasterly direction, toward the wetlands and the existing drainage ditch at the eastern edge of the site. The drainage ditch begins on site, receiving runoff via shallower ditches along the entry road within the site (Photos 3-4, 15-16. The system drains to the Cape Fear River via Greenfield Creek. The main ditch is tidal and is therefore considered perennial. The upper end of the main ditch is one of multiple probable points of entry (PPEs) to the surface water pathway, but it is the primary one, draining the majority of the site (Figs. 2-3).

Greenfield Creek conveys runoff from the main PPE to the Cape Fear River. The Creek flows from freshwater Greenfield Lake, at a dam located approximately 700 feet upstream of where the main drainage ditch enters the creek. Based on topography, the entire creek below the dam may be tidally influenced (Ref. 1; Ref. 18).

Runoff from the jetty area and from most of the on-site Area TWS is expected to flow directly to the Cape Fear River via a second PPE at the southern of the site's 2 former boat slips. A third, minor PPE exists where an intermittent ditch at the site's northern edge directs runoff from the northernmost areas of the site (Ref. 7, Figs. 2-3). Because of the site's history of equipment removal, excavation, and filling, however, its present topography and surface drainage may not be representative of the period in which wood treating occurred.

The site is located in the east bank of the Cape Fear River estuary, approximately 25 miles upstream of the open Atlantic Ocean (Ref. 1; Ref. 37, Fig. 2.3; Photos 12-14)). Within the study area, the river system includes several tributaries, most notably the Northeast Cape Fear River, which joins the Cape Fear River 1.5 miles upstream of the site. Further upstream, flow of the Cape Fear River divides around Eagle Island, which lies westward across the main channel from the site. The alternate channel, known as the Brunswick River, rejoins the Cape Fear River approximately 2 miles downstream of the site (Ref. 1; Fig. 1).

Flow within the Cape Fear estuary is significantly affected by ocean tides. Flow rates are affected several tens of miles upstream on both the Cape Fear and the Northeast Cape Fear rivers. Tidal flow reversal on the Cape Fear River has been documented as far inland as Phoenix, NC, over 14 miles upstream of the site (Ref. 1; Ref. 37, p. 23 (Fig. 2.3)). On the Northeast Cape Fear River, salt water intrusion occurs up to the east-west river section north of Castle Hayne, at least 15 miles upstream from the site (Ref. 37, Plate 1).

Based on this information, the surface water pathway can be characterized to include 1) a 15-mile section of the lower Cape Fear River, 2) a 15-mile upstream section that includes the Cape Fear (and Brunswick) River, and 3) a 15-mile upstream path containing 1.5 miles of the Cape Fear River, and 13.5 miles of the Northeast Cape Fear River. Each also includes the tidally-reversing portions of any tributary streams that fall within the distance limit (Ref. 1; Ref. 8; Fig. 1; Fig. 3).

The peak flow rates of the various pathway segments during tidal reversal are not known. The seaward flow rates of the various pathway segments can be estimated based on their drainage areas and on annual runoff statistics for the region. The existing on-site drainage ditch has a limited drainage area, and is estimated to flow at less than 1 cfs. Based on the data, Greenfield Creek is estimated to flow at 6 cfs. The lower Cape Fear estuary from the Northeast Cape Fear River to 15 miles below the site has a calculated mean flow rate of 16,128 cfs. Further upstream, the Cape Fear River was calculated to flow at 11,778 cfs. Within the distance limit, the calculated mean flow of the Northeast Cape Fear River is 2531 cfs (Refs. 38-39).

Water quality classifications of the various pathway sections differ because of salinity. Upstream of the mouth of Toomers Creek (at the north end of Eagle Island (Ref. 1, Fig. 1)) the Cape Fear River is designated Class "C Sw", meaning that the water is suitable for aquatic life propagation and survival, fishing, wildlife, secondary recreation and agriculture. The Sw modifier indicates low velocity (as in swamps), as the river meanders through wetland . The Northeast Cape Fear River, from Ness Creek upstream to the 15-mile limit, has the same classification. For the remainder of the pathway both rivers are designated "SC", the tidal salt water equivalent of class "C" (Ref. 41). The entire site is mapped within the 100-year floodplain of the Cape Fear River and Greenfield Creek (Ref. 42)

5.2 Surface Water Targets

Two inactive surface water intakes for the City of Wilmington were listed within the 15-mile distance limits from the site. One is located at Toomers Creek and the other is on Smith Creek, both approximately 4 miles upstream of the site during normal flow. Because of salinity problems related to historical droughts, neither intake has been used for several decades except for emergencies. The city's active intake is located at Riegelwood, more than 15 miles upstream of the site on the Cape Fear River. No primary or standby municipal intakes currently operate within 15 miles upstream or downstream of the site (Ref. 21, p. 59; Refs. 28-29).

State fishery biologists report that both the Cape Fear River and the Northeast Cape Fear River support a seasonal commercial fishery. In the Wilmington area, transient american shad, hickory shad, and herring are taken for human consumption. Sport and subsistence fishing also yield resident largemouth and striped bass, flathead and blue catfish, and redbreast sunfish. Marine Fisheries officials report that the Cape Fear River at Wilmington is a nursery for blue crab, eel, and shrimp, which are commercially harvested within 15 miles downstream of the site (Ref. 43). At least 1 species of small crab was observed onsite during the SIP reconnaissance (Ref. 6, p. 2). Fish and wildlife enforcement personnel maintain that any accessible locations on Greenfield Creek or Greenfield Lake would be fished as well.

The site lies directly north, and upgradient, of a mapped wetland area which fronts the main drainage ditch between the main PPE and Greenfield Creek. This wetland frontage totals approximately 0.45 mile. Because of the low topographic relief and tides, wetlands are widespread within the study area. Most of the main Cape Fear and Northeast Cape Fear River channels are lined with mapped wetland frontage. In addition, several of the river systems' small tidal tributaries meander through large wetland areas. In particular, the lower portions of Indian, Sturgeon, Jackeys, Mallory, and Town creeks undergo tidal reversal and contain several miles of frontage. Within intervals subject to tidal reversal, a total of approximately 170 miles of frontage are mapped within 15 miles upstream and downstream of the site (Ref. 8; Ref. 40).

Ten rare animal species and 8 rare plant species have been reported within the surface water pathway. Of these, 4 animal and 2 plant species are listed as endangered or threatened in NC or the US (Fig. 3). These species are summarized in Table 3 (Ref. 45). The nearest (NC) Endangered animal species to the site, Acipensor brevirostrum (Shortnose Sturgeon), was identified 0.5 mile upstream on the Cape Fear River. The (NC and US) Threatened species Alligator mississippiensis (American Alligator) has been identified at 16 locations along the Cape Fear River, Brunswick River, and Northeast Cape Fear River. The (NC) Endangered snail species Planorbella magnifica (Magnificent Ram's Horn) and the (NC and US) Endangered mammal Trichecus manatus (West Indian Manatee) are reported in the Cape Fear estuary, 7.4 and 12 miles downstream of the site, respectively (Refs. 45-46). The (NC) Threatened plant species Lilaeopsis caroliniansis (Carolina Grasswort) and Platanthera nivea (Snowy Orchid) were identified on a tidal flat at locations 2.4 and 3.0 water miles downriver from the site, respectively (Ref. 45; Ref. 47)

5.3 Sample Locations

On 14 occasions between December 1985 and July 1993, SWP personnel collected surface water samples at 4 designated locations along the east bank of the Cape Fear River. The 4 locations included the US Route 74 Bridge, one of the 2 old boat slips west of the site, the mouth of Greenfield Creek, and the State Ports Authority waterfront, locations ranging from approximately 3500 feet upstream to 3500 feet downstream of the site (Ref. 7, Fig. 22; Ref. 49). The samples were tested for semi-volatile organic compounds and metals. Concurrent sediment sampling was not performed at these locations, not having been specified in the Administrative Order of Consent (Ref. 11, p. 6). ETE/Virogroup resampled surface water at these same locations on January 18, 1994 (Ref. 7, p. 29).

The last known sampling and testing of Cape Fear River sediment occurred during the January 1985 SSI. At that time, sediment sample SWP-RB-S was collected from the end of the jetty on the Cape Fear River (Fig. 2). This location lies between the 2 waterfront PPEs. Sediment sample SWP-BK-S1 was collected from Greenfield Creek below Greenfield Lake for comparison (Ref. 5, p. 8, Table 1, Table 5).

In December 1992, during Phase II of their assessment, ETE/Virogroup collected 11 soil and sediment samples both on and offsite, along the existing drainage ditch and the north bank of Greenfield Creek. The samples, numbered SS-1 through SS-11, were collected from 2-foot-deep borings and analyzed for volatile and semi-volatile compounds and inorganic parameters. No surface water sampling was conducted at these locations (Ref. 7, p. 21, Att. A).

Table 3
Southern Wood Piedmont Co.
Wilmington, NC
NCD 058 517 467
Surface Water Pathway - Endangered/Threatened Species

Species Name:	Distance from Site (Downstream)	Status NC	Status US	Rank NC	Rank Global
Animals:					
Trichecus manatus (West Indian Manatee)	12	E	E	S1N	G2?
Planorbella magnifica (Magnificent Ram's Horn (snail))	7.4	E	C2	S1	G1
Acipensor brevirostrum (Shortnose Sturgeon)	0.5	E	--	S1	G3
Alligator mississippiensis (American alligator)	1.4	T	T	S3	G5
Plants:					
Platanthera nivea (Snowy Orchid)	3.0	T	--	S1	G5
Lilaeopsis caroliniansis (Carolina Grasswort)	2.4	T	3C	S3	G3

Status Codes:

US
E = Endangered
T = Threatened

NC
E = Endangered
T = Threatened
C2 = Candidate 2
3C = Candidate 3

Rank Codes:

NC
S1 = Critically Imperiled in NC due to extreme rarity.
S3 = Rare/Uncommon in NC.
N = Nonbreeding, migratory.

5.4 Analytical Results

SWP's Cape Fear water quality results were summarized by ETE/Virogroup in their Phase III report. Some of the analytical lab reports from 1990-1991 were also available from the files of the NC Hazardous Waste Section (Ref. 49). In general, no organic or inorganic parameters were detected in the samples. During June 1989, naphthalene was detected at 0.05 mg/l in a surface water sample from the mouth of Greenfield Creek, but the compound was not detected in a follow-up sample collected the following month. A July 1990 sample from the same location contained chromium at 0.046 mg/l and copper at 0.052 mg/l, but no detected arsenic (Ref. 7, p. 13, Att. A; Ref. 49). The concurrent sample at the old boat slip contained 0.011 mg/l chromium (Ref. 49).

The 1985 sediment sample SWP-RB-S from the Cape Fear River contained several semi-volatile organic compounds, including isophorone, 2-chloronaphthalene, acenaphthylene, phenanthrene, anthracene, fluoranthene (benzo(j,k)fluorene), pyrene, benzo-a-anthracene, chrysene, benzo(b) fluoranthene (benzofluoranthene -3,4), benzo(k)fluoranthene, and benzo-a-pyrene. Sediment sample SWP-BK-S1 from below Greenfield Lake contained isophorone, 2-chloronaphthalene, fluoranthene, and pyrene in similar concentrations , but not the remaining contaminants (Ref. 5, p. 8, Table 5, App. A). Both samples contained lead (6 - 15 mg/kg) and cyanide (0.225 - 0.430 mg/kg), but no detected copper, chromium, or arsenic (Ref. 5, p. 8, Table 4, App. A).

Except for the lack of detected naphthalene, and the presence of some additional components (isophorone, 2-chloronaphthalene, acenaphthylene, and pyrene - the latter 2 being coal tar derivatives), the contaminant composition of the Cape Fear River sediment resembled that of the creosote waste encountered at the site (Ref. 7, Att. A, Att. G; Ref. 34; Ref. 50).

Contaminants were also detected in several of the soil and sediment samples collected from the existing drainage ditch and Greenfield Creek in 1992. Detected volatile organics included 1,2 - dichloropropane, toluene, ethyl benzene, and xylenes. Several semi-volatile organic compounds, including polynuclear aromatic hydrocarbons, were detected in the samples (Ref. 7, p. 11, Att. A; Ref. 50; Table 4). The organic contaminants closely match the composition of the organics encountered at the site (Ref. 7, Att. A, Att. G). SS-7, located within the mapped wetland interval in the ditch, contained elevated semi-volatiles, especially naphthalene and phenanthrene. Contaminants were detected in samples SS-4, SS-5, and SS-6 at the site, and in samples SS-9 and SS-10, near the mouth of Greenfield Creek (Fig. 2). The organic compositions of samples at both locations included a number of compounds associated with creosote and coal tar (Refs. 34-36).

Samples SS-8 and SS-11, located at intermediate positions on the ditch and creek, contained no detected organic compounds other than dichloromethane. SS-8, like SS-7, was within the mapped wetland interval. SS-1, located at an apparent upstream (background) position on Greenfield Creek, contained several of the compounds detected downstream and onsite (Ref. 7, Fig. 2; Ref. 50). However, contaminants might have been transported to this location from downstream during tidal flow reversal. Because of the high semi-volatile concentrations detected in SS-10 (total: 6,110 mg/kg), the location was resampled on November 19, 1993 as SS-10A. This follow-up sample contained a much lower but still detectable concentration of semi-volatiles (total: 45.3 mg/kg) (Ref. 7, p. 11, pp.-24-25, Att. F).

Arsenic was detected in sediment samples SS-1, SS-2, SS-4, SS-5, and SS-7, at a maximum concentration of 5.2 mg/kg. SS-1 was the only lower ditch or creek sample in which arsenic was found. Chromium concentrations in the 11 samples ranged from 1.3 mg/kg to 14.0 mg/kg. Copper concentrations ranged from 1 to 46 mg/kg, and lead ranged from 1.9 to 290 mg/kg. Sample SS-2, located east of the main drainage ditch, contained the highest detected concentrations of all 4 metals. This sample's location, a small ditch connected to the main ditch, appears to be subject to tidal flooding, but may also receive drainage from the adjacent railroad grade (Ref. 7, Fig. 3; Ref. 51).

5.5 Surface Water Conclusions

Sediment sampling results indicate historical release of the site's organic wood-preserving compounds to the surface water pathway. The data indicate the presence of volatile and semi-volatile aromatic compounds in Greenfield Creek sediments, and in the Cape Fear River bed west of the site. Although past investigators have indicated the possibility that nearby petroleum terminals are also potential sources (Ref. 7, p. 13) the presence of tetracyclic and pentacyclic semi-volatiles in the samples indicates creosote or coal tar rather than refined petroleum (Refs. 35-37; Ref. 44). The site's history, and the overall similarity between lower Greenfield Creek contaminants and the organic content of on-site soils, points to the site as a likely source.

Although net sediment transport is toward the Atlantic Ocean, tidal flow reversal occurs as far as 15 miles inland from the site, potentially transporting contaminants for measurable distances upstream from the site as well as downstream. Because of the amount of regional development and the physical complexity of the river system, contamination detected at a significant distance up- or downriver would be more difficult to attribute to the site.

The brackishness of the Cape Fear estuary and lack of active intakes minimizes the surface drinking water threat posed by the site. The river system is a significant commercial and recreational fishery, however, and Greenfield Creek is probably fished as well. Therefore contaminant release to the surface water pathway may have affected fisheries in both surface water pathway segments. Extensive wetland frontage, and several Threatened, Endangered, and other rare species have been identified upstream and downstream of the site in the Cape Fear River system and its tributaries.

Because of the amount of regional development and the physical complexity of the river system, contamination detected at a significant distance would be difficult to attribute to the site. Locally, however, the evidence indicates that creosote contamination has migrated from the site to an adjacent wetland and to the adjacent Cape Fear River bed. The evidence for inorganic contamination at these locations is less conclusive.

6.0 SOIL AND AIR PATHWAYS

6.1 Physical Conditions

The site is currently inactive and vacant of SWP or other employees. All above-grade structures have been removed. Unpaved areas of the site are vegetated with grass. The landfarm areas, which are no longer being actively worked, are bermed to prevent runoff and are also vegetated (Ref. 6, p. 1). Surface soils at the site that were visibly contaminated with creosote were excavated and treated in the landfarming areas. Soils contaminated by chromated copper arsenate in excess of 500 ug/kg were excavated and either disposed offsite or stabilized onsite using concrete. The various excavations were backfilled with soil from an offsite location. In their December 1993 report, Geraghty &Miller reported some creosote staining in the northern part of area NTA, in area NTB and in area TWS (Ref. 14, p. 4-3, Figs. 4-4 to 4-6; Fig. 2).

6.2 Soil and Air Targets

No residents or workers are present at the site (Ref. 6, p. 1). The property is secured only by a vehicle gate at the entrance, and is accessible to local pedestrians or to boaters on the Cape Fear River. During the SIP reconnaissance, no evidence of trespassing was observed, however, vandalism has occurred at a monitoring well accessible via the site (Ref. 7, p. 13) . The nearest residences are located approximately 400 feet east of the site (Ref. 1; Ref. 51). The total population residing within 0.25 mile of the site is estimated at 527. A total of 51,914 people live within 4 miles of the site (Ref. 56; Table 5) .

The nearest workers are anticipated to be at the Hess terminal north of the site and at the Greenfield Transmission Co. and the Locke Industries facilities, located directly east of the site (Ref. 51). The nearest school is located 0.45 mile south of the site (Ref. 1; Refs. 51-52). The nearest day care facilities are on South 2nd, South 3rd, South 4th, and Meares Streets, a minimum distance of 0.2 mile east of the site (Ref. 52-53). A recreational park is located less than 0.25 mile southeast of the site, but is separated from the site by a railroad grade, by vegetation, and by the ditch that drains the site (Ref. 51).

Table 5
Southern Wood Piedmont
Wilmington, NC
Population Distribution

Distance (mi.):	Population:	Cumulative Population:
0.0 - 0.25	527	527
0.25 - 0.5	828	1,355
0.5 - 1.0	7,206	8,561
1.0 - 2.0	16,147	24,708
2.0 - 3.0	12,212	36,920
3.0 - 4.0	14,994	51,914

6.3 Soil Sample Locations

In 1982, prior to any soils excavation or treatment, SWP and the NC Division of Health Services collected 4 split soil sample sets along the Oil Treating and Track areas (Refs 16-17; Fig. 2). In the CCA Area, soil sampling for arsenic EP toxicity was used as a screening tool to guide soil excavation and disposal (Ref. 20, pp. 4-10).

In February and April, 1991, Geraghty & Miller collected 48 soil samples from 35 borings in the NTA, NTB, and TWS areas of the site. Sample depth ranges were 0-6 inches in the 2 Non-treated Wood (NTW) areas, and 0-6 inches and 12-18 inches in the Treated Wood Storage (TWS) area (Ref. 14, p. 3-1, Figs. 4-1 to 4-3).). Soil in these areas had been tilled, but not treated.

G&M conducted 2 sampling events at the landfarming areas, collecting soil composites from 5 borings at each landfarming area in October 1990 and again in October 1991 (Ref. 12, p. 3-1; Ref. 13, p. 3-1). Each sample fraction was a composite from 3 depths within the landfarmed material and 1 depth within the underlying substrate. These samples were tested for pH, various nutrients, and PAH compounds. The 1990 samples were also tested for dioxins and furans. These landfarm investigations were completed in preparation for G & M's December 1993 Risk Assessment report (Ref. 15).

ETE/Virogroup sampled soils at the former Creosote Ditch area in December 1992. These samples were collected from within 2 feet of the ground surface at 3 locations (SS-4 through SS-6) along the former course of the ditch. The samples were tested for volatile and semi-volatile organics and for inorganics (Ref. 7, p. 11, Fig. 3).

6.4 Soil Analytical Results

Soil sample analytical results are outlined in Table 4. Samples of landfarmed soils collected by G&M in 1990 and 1991 contained 24 semi-volatile organic compounds. Several of the detected semi-volatiles are commonly associated with creosote. Pentachlorophenol was among the analytes detected (Ref. 12, pp. 2-3 - 2-6, pp. 4-1 - 4-2, Tables 4-1 - 4-2, App. D).

Polychlorinated dibenzodioxins and polychlorinated dibenzofurans were detected in the landfarm soils. Totals for these compounds, including tetrachlorodibenzodioxins (TCDD), exceeded health-based benchmarks for human soil exposure (Ref. 12, pp. 3-5 - 3-6, Table 4-3, App. D; Ref. 20). One dioxin and 1 furan isomer were detected in the laboratory blank, however, and quantitative interferences for several isomers were reported in the blank and the LF-1 and LF-2 samples, leading G & M to conclude that concentrations of the affected analytes may be considered qualitative (Ref. 12, p. 3-6). These compounds have not been tested for in other soil or sediment samples.

G & M's samples from the former outdoor treated and untreated wood storage areas contained 12 of the same semi-volatile compounds detected in the landfarmed soils. One sample from the TWS area contained 2000 mg/kg acenaphthene, 4000 mg/kg phenanthrene, 2200 mg/kg anthracene, and 3700 mg/kg fluoranthene (benzo(jk)fluorene). Maximum detected semi-volatile concentrations at the NTW areas were considerably less than those in the TWS area (Ref. 14, Table 4). Additional products detected included carbazole and trichlorophenol isomers, which are not included in the Superfund Chemical Data Matrix (Ref. 14, p. 4-1, App. B; Ref. 20).

Some of the compounds detected at the above locations were not tested for during analysis of ETE's soil and sediment samples from the former Creosote Ditch area and Greenfield Creek. The majority of creosote-associated semi-volatiles that were tested, however, were detected in the samples (Ref. 7, p. 11, Att. A; Ref. 50, Att. E; Table 4).

Testing of soils in the CCA area detected arsenic EP Toxicity concentrations in excess of 5 mg/kg (Ref. 19, p. 6). Testing of soils in the NTA, NTB, and TWS areas detected maximum concentrations for total arsenic of 63 mg/kg, 13 mg/kg, and 41 mg/kg, respectively. Maximum total chromium concentrations for these 3 areas were 15 mg/kg, 22 mg/kg, and 11 mg/kg, respectively. Maximum total copper concentrations were 300 mg/kg, 130 mg/kg, and 110 mg/kg, respectively (Ref. 14 , Tables 4-1 - 4-3).

ETE/Virogroup sample SS-2, an offsite soil/sediment sample collected from a drainage ditch on the property east of the railroad grade and the site, contained arsenic, chromium and copper concentrations of 5.2 mg/kg, 14 mg/kg, and 46 mg/kg, respectively (Ref. 7, Att. A, p. 7). If SS-2 is considered a background sample, these results indicate that areas NTA and TWS contain arsenic in excess of 3 times the background level, and that area NTA contains copper in excess of 3 times background level. None of the samples contained chromium in excess of 3 times background concentration. The minimum health-based benchmark concentrations for human soil exposure are 0.33 mg/kg for arsenic and 2900 mg/kg for chromium. No such benchmark presently exists for copper (Ref. 20). The results therefore indicate that arsenic levels at the site are in excess of the EPA benchmark level for soil exposure.

6.5 Air Monitoring

No formal air monitoring was conducted onsite during the SIP reconnaissance. Historical air monitoring has apparently occurred only during active contractor subsurface explorations at the site, when recovered soil samples were screened in the field for the presence of volatile organic compounds (Ref. 7, Att D). Elevated volatiles were detected in the subsurface materials during the explorations. At present, however, the site is vegetated, and no odors, or visual evidence of wood-preserving materials or blowing particulates was detected at the site during the 1994 site reconnaissance.

6.6 Soil and Air Pathway Conclusions

The site is located in an urban industrial area close to residential areas in Wilmington, where it is potentially accessible to the public. Soils at the site contain residual amounts of hazardous wood-preserving materials. Currently, however, the site is vegetated and has no on-site resident or worker populations, limiting the potential for human exposure. Historical vandalism has occurred onsite, however, no evidence of trespassing was seen during the reconnaissance. The predominantly non-volatile nature of the wood-preserving materials, and the present surface conditions at the site, do not indicate a significant vapor or particulate respiratory hazard to individuals on or near the site.

A risk assessment of the landfarm areas of the site was completed by Geraghty & Miller, Inc., in 1993 . The assessment indicated that small mammals, birds and invertebrates at the site might be affected by exposure to soil contaminants at the site, but that little risk to humans or rare species would be incurred by future site development, particularly in the event of additional filling and paving at the site (Ref. 15).

NC DEHNR Environmental Epidemiology Section reviewed the Risk Assessment Report, and noted that the assessment had not addressed all potential future uses of the site, but had instead assumed future industrial, nonresidential use. EES concluded that future site usage would have to be specified, and cited acceptable levels in uncovered industrial soils for pentachlorophenol 6 other PAH species, and TCDD equivalents. Additionally, the NC Hazardous Waste Section, Waste Management Branch listed recommended remediation levels for the same parameters (Ref. 54).

At one or more onsite locations, the maximum soil concentrations of each of the 7 semi-volatile parameters detected exceeded the acceptable levels quoted by EES (Ref. 7; Refs. 12-15; Ref. 54; Table 4). In particular, the maximum concentrations of benzo(a)pyrene exceeded the EES limits in all 3 of the treated and untreated wood storage areas, in both landfarm areas, the drainage ditch, and the mouth of Greenfield Creek. TCDD in the landfarm soils also exceeded the provided TCDD equivalent limits (Ref. 12, pp. 3-5 - 3-6, Table 4-3, App. D).

The above results indicate that the potential remains for human soil exposure to carcinogenic waste materials from wood-treating activities at the site. The potential for exposure may increase in the event of future development of the site, particularly if soil excavation or other construction activity unearths contaminated soil. Under present conditions, however, the threat of human exposure to soil or air contamination at the site appears to be minimal.

7.0 SUMMARY AND CONCLUSIONS

The Southern Wood Piedmont, Wilmington site was used from 1935 to 1983 to treat and store wood products. Wood treating materials used at the site included creosote, pentachlorophenol (PCP) and chromated copper arsenate (CCA). SWP excavated large quantities of creosote contaminated soils from various locations at the site in the 1980s and landfarmed them onsite. Arsenic-contaminated soils were transported to a hazardous waste landfill or were stabilized with cement and reburied in their excavation. Clean fill from offsite was reportedly used to backfill the excavated areas. Excavation and landfarming ended in April 1990.

Investigations completed on site between 1985 and 1993 have documented creosote contamination of surface and subsurface soil and groundwater at the site. Subsurface exploration has revealed both non-aqueous and aqueous phase semi-volatile organic compounds (SVOCs) in groundwater and soils beneath much of the site. Aqueous contaminants in the sandy subsoil have migrated through a peat layer and contaminated a deeper, semiconfined sand unit. PCP has not been detected in the groundwater, and elevated inorganics in groundwater have been identified only in monitoring wells adjacent to a former CCA storage area. Sampling results do not indicate that contaminants have migrated from the 5-acre landfarm to groundwater.

Neither of the contaminated overburden units is used as a drinking water source. The overburden is separated from bedrock by a tight, apparently continuous clay layer 2 feet thick. The sandy limestone formation beneath the clay is a principal aquifer in the region. No groundwater samples were collected from this aquifer, however, groundwater use is very limited within 2 miles of the site, and no municipal groundwater supply wells are located in the study area.

The site drains to the Cape Fear River by direct runoff and via a drainage ditch and Greenfield Creek. Sediment samples collected from the upper ditch and the lower creek contained most of the same SVOCs detected onsite. The detection of tetra- and pentacyclic SVOCs suggests that the contaminant is creosote rather than fuel. No surface water samples have been collected in this segment of the pathway. To date, no SVOCs from the site have been detected in water samples collected from the Cape Fear River, however, Cape Fear River sediment sampled adjacent to the site was found to be contaminated with creosote components. The Cape Fear River and its tributaries undergo tidal flow reversal for more than 15 miles upstream of the site. The amount of upstream migration of contaminated sediment is unknown.

No surface water intakes for public supply operate within 15 miles upstream or downstream of the site. However, the Cape Fear River system is a commercial and sport fishery, and the Cape Fear River at Wilmington is a nursery for commercially harvested blue crab, eel, and shrimp. Greenfield Creek, where sediment sampling has detected SVOC contamination at multiple locations, is reportedly fished as well.

Approximately 2000 feet of wetland frontage is mapped along the drainage ditch linking the site to Greenfield Creek. Detected sediment contamination in the creek extends beyond the wetland interval. The Cape Fear River system contains approximately 170 miles of additional mapped wetland frontage within 15 miles upstream and downstream of the site. The Natural Heritage Foundation has identified 10 rare animal and 8 rare plant species within the surface water pathway.. Four of the animal species are listed as Endangered in NC and/or the US. One animal and 2 plant species are listed as Threatened.

Landfarm soil samples collected in 1990 and 1991 contained residual creosote contamination. In some samples, benzo(a)pyrene and PCP concentrations exceeded their current health-based Cancer Risk Screening Concentrations for human soil exposure. Various dioxins and chlorodibenzofurans were also detected above their benchmarks in the landfarm areas , however there is some uncertainty in their quantifications. No other dioxin testing has been performed at the site or at any of the off-site sample locations.

Soil sampling in 1991 detected SVOCs in areas TWS, NTA and NTB, which were formerly used for outdoor storage of treated and non-treated wood, but were never excavated or landfarmed. Benzo(a)pyrene detection in some locations exceeded its Cancer Risk Screening Concentration for human soil exposure. All other SVOCs were below their respective benchmarks. Arsenic was detected above its soil exposure benchmark in all of the landfarm and wood storage areas.

The site is currently uninhabited, but is accessible on foot or by boat. The nearest residences are located approximately 400 feet east of the site. The nearest school is located 0.45 mile south of the site, and the nearest day care facilities are at least 0.2 mile from the site. A sports field is located directly southeast of the site, but is separated from the site by a railroad grade, by thick vegetation, and by the existing on-site drainage ditch.

A Risk Assessment completed at the site in 1993 indicated that contaminant levels at the site are low enough for future industrial land use. However, based on the Risk Assessment report, the NC Environmental Epidemiology Section has indicated that the site does not currently meet cleanup standards for future residential use. Future site development might also expose workers to unacceptably high carcinogen levels.

In summary, extensive groundwater contamination has occurred at the site, but does not appear to threaten any drinking water supplies. The threat of human soil or respiratory exposure to on-site contaminants is limited by current surface conditions and the lack of an on-site residential or worker population, but could increase with future site development. Semi-volatile organic soil contaminants at the site have historically migrated to sections of the surface water pathway containing mapped wetlands and fisheries. Sampling performed since the mid-1980s is insufficient to determine the full extent of sediment contamination in the surface water pathway. Elevated polychlorinated dibenzodioxin and dibenzofuran concentrations have been detected in landfarmed soils at the site, but current analytical data are insufficient to evaluate the full extent and significance of contamination. Based on the above results and information, the NC Superfund Section recommends the SWP-Wilmington site for an Expanded Site Inspection (ESI) under CERCLA.

Southern Wood Piedmont Co. - Wilmington
NCD 058 517 467
REFERENCES

1. United States Geological Survey 7.5 Minute Quadrangles: Wilmington, NC, 1970 (Photorevised 1988); Castle Hayne, NC, 1970; Leland , NC, 1984; Winnabow, NC, 1990; Carolina Beach, NC, 1970; Rocky Point, NC, 1970, photorevised 1988; 1:24,000.

2. Parker, Stuart F., NC Superfund Section, Latitude and Longitude Worksheet Calculations as per CERCLA, EPA Pub 9345.01A, July 15, 1994.

3. North Carolina Atlas: Portrait of a Changing Southern State. University of North Carolina Press, Chapel Hill, NC, 1975.

4. US Department of Commerce, Climatic Atlas of the United States, Climatic Data Center, Asheville, NC, 1979.

5. (2) NUS Corporation Superfund Division, Site Screening Investigation, Southern Wood Piedmont Facility, Wilmington, North Carolina, April 18, 1986.

6. Parker, Stuart F., NC Superfund Section, Memorandum to File, Site SI Reconnaissance Report, August 3, 1994; Attached Field Notes, August 2, 1994.

7. ETE Division, Virogroup, Inc., Phase III Groundwater Quality Assessment, Wilmington Facility, Prepared for Southern Wood Piedmont Company, Spartanburg, South Carolina, 1994.

8. Parker, Stuart F., NC Superfund Section, Memorandum to File: Surface Water Pathway Definition, October 6, 1994.

9. Burdell, Charles, Technical Services Director, Southern Wood Piedmont Co., Letter to William Paige, NC Department of Human Resources (DHR) Solid and Hazardous Waste Management Branch, Re: Proposed Cleanup Program for Southern Wood Piedmont Wilmington , NC Plant Site; Attached Report, June 8, 1984.

10. (1) Moore, Frank E., NC Division of Health Services (DHS), Environmental Health Section, Transmittal Letter to USEPA Region IV: Preliminary Assessment Reports, August 10, 1984, and Attached PA Form, July 24, 1984.

11. NC DHR, DHS, Administrative Order on Consent, in Re: Southern Wood Piedmont Company, NCD 058 517 467, May 20, 1985

12. Geraghty & Miller, Inc., Data Summary Report for the 1990 Landfarm Area Sampling, Southern Wood Piedmont Company, Wilmington, North Carolina, September 1993.

13. Geraghty & Miller, Inc., Data Summary Report for the 1991 Landfarm Area Sampling, and Comparison of 1990 and 1991 Soil and Groundwater Data, Southern Wood Piedmont Company, Wilmington, North Carolina, September 1993.

14. Geraghty & Miller, Inc., Data Summary Report for the Treated and Non-treated Wood Storage Areas Soil Investigation, Southern Wood Piedmont Company, Wilmington, North Carolina, December 9, 1993.

15. Geraghty & Miller, Inc., Risk Assessment Report for Landfarm Areas, Southern Wood Piedmont Company, Wilmington, North Carolina, September 1993.

16. Church, Ray, NC DHS, Environmental Health Section, Eastern Regional Office, Transmittal Letter to Ed Gibbs, Environmental Manager, Southern Wood Piedmont Co., August 2, 1982, and attached DHS Laboratory Report, May 21, 1982.

17. Gibbs, Edward, Environmental Manager, Southern Wood Piedmont Co., Transmittal Letter to Ray Church, NC DHS, Environmental Health Section, August 20, 1982, and attached Technical Services Inc., Laboratory Report, August 5, 1982.

18. Albritton, Bonnie, NC State Ports Authority, Telecopy to Pat DeRosa, NC Superfund Section Re: Ports Authority Property Map.

19. Davis, T. M., Manager, Environmental Affairs, Southern Wood Piedmont Co., Letter to Doug Holyfield, NC Division of Solid Waste Management, Re: Completion Letter, Administrative Order # NCD 058 517 467, January 3. 1994.

Latham, Douglas E. , Assistant Environmental Manager, Southern Wood Piedmont Co., Letter to Doug Holyfield, NC Division of Solid Waste Management, Re: Areas of Arsenic-contaminated Soil Removal.

20. Superfund Chemical Data Matrix (SCDM), Appendix B, Hazardous Substance Benchmarks (329 Substances), June 1994 Version.

21. Bain, George L., Geology and Ground-water Resources of New Hanover County, North Carolina, US Geological Survey Groundwater Bulletin Number 17, 1970.

22. NC Department of Natural Resources and Community Development, Geological Survey, Geologic Map of North Carolina, 1985.

23. Sohl, Norman F., Owens, James P., Cretaceous Stratigraphy of the Carolina Coastal Plain, IN Horton, J. W., and Zullo, V. A., The Geology of the Carolinas, Univ. of Tennessee Press, Knoxville, 1991.

24. US Department of Agriculture, Soil Conservation Service, Soil Survey of New Hanover County, North Carolina, April 1977..

25. US EPA 40 CFR Part 300, Hazard Ranking System, Final Rule, Federal Register Volume 55, No. 241 Part II, December 14, 1990.

26. Heath, R. C., US Geological Survey, Basic Elements of Groundwater Hydrology with Reference to Conditions in North Carolina, Open-file Report 80-44, Raleigh, NC, 1980.

27. Giese, G. L., Eimers, J. L., Coble, R. W., Simulation of Groundwater Flow in the Coastal Aquifer System of North Carolina, US Geological Survey Open-file Report 90-372, 1991.

28. Parker, Stuart F., NC Superfund Section, Memorandum to File, Municipal Drinking Water Supplies within the Wilmington Area, December 12, 1994.

29. NC Division of Health Services, Environmental Health Section, Water Supply Branch Database, Inventory Document PWSI.410, May 16, 1990.

30. Moore, Martha, NC DEHNR, Division of Environmental Health, Public Water Supply Database, July 28, 1994.

31. Parker, Stuart F., NC Superfund Section, Memorandum to File: Radial House Count, December 1, 1994.

32. US Dept. of Commerce, Bureau of the Census, Census of Population and Housing, Summary Population and Housing Characteristics, North Carolina, 1990.

33. Stanley, Jeanette, NC Superfund Section, Interoffice Memorandum: Update on Status of Well Head Protection Programs in North Carolina, January 10, 1994.

34. Dragun, James, Ph.D., The Soil Chemistry of Hazardous Materials, Hazardous Materials Control Research Institute, Silver Spring, Maryland 1988.

35. Lewis, Richard J., Hawley's Condensed Chemical Dictionary, Twelfth Edition, Van Nostrand Reinhold, 1993.

36. Windholz, Martha, et.al., eds. The Merck Index, Tenth Edition, Merck & Co., Inc., 1983.

37. Giese, G. L., Wilder, H. B., Parker, G. G., Jr., Hydrology of Major Estuaries and Sounds of North Carolina, US Geological Survey Water Supply Paper 2221, 1985.

38. US Geological Survey, Drainage Areas of Selected Sites on Streams in North Carolina, Open-file Report 83-211, 1983.

39. US Geological Survey, Map of Mean Annual Runoff for the Northeastern, Southeastern and Mid-Atlantic United States, Water Years 1951-1981. Water Resources Investigations Report 88-4094, 1990.

40. Parker, Stuart F., NC Superfund Section, Memorandum to File: Wetland Delineation, October 6, 1994.

National Wetlands Inventory 7.5 Minute Quadrangles: Wilmington, NC; Castle Hayne, NC; Leland , NC; Winnabow, NC; Carolina Beach, NC; Rocky Point, NC.

41. NC DEHNR Division of Environmental Management, Classifications and Water Quality Standards Assigned to the Waters of the Cape Fear River Basin, February 1, 1993.

42. National Flood Insurance Program, Flood Insurance Rate Map, City of Wilmington, New Hanover County, North Carolina (Unincorporated Areas), Community-Panel Number: 370171 0010B (Panel 10 of 10), April 2, 1986..

43. Parker, Stuart F., NC Superfund Section, Memorandum to File: Fisheries in the Study Area, January 25, 1995.

44. Parker, Stuart F., NC Superfund Section, Memorandum to File: Analysis of Greenfield Creek Contaminants, September 28, 1994.

45. Parker, Stuart F., NC Superfund Section, Memorandum to File: Review of NC Natural Heritage Program Maps and File Information, December 3, 1994.

46. LeGrand, Harry E., Jr., Hall, Stephen P., Natural Heritage Program List of the Rare Animal Species in North Carolina, NC National Heritage Program, 1990.

47. Weakley, Alan S., Natural Heritage Program List of the Rare Plant Species in North Carolina, NC National Heritage Program, 1990.

48. Stanley, Jeanette, NC Superfund Section, Memorandum to Superfund Section Staff: Endangered Species, June 20, 1994.

Parker, Stuart F., NC Superfund Section, Memorandum to NC Superfund Section Staff: Update on Critical Habitats in NC, April 14, 1994, and attached memoranda.

49. Watson, Sandra, Environmental Chemist, Southern Wood Piedmont Co. Transmittal Letter to Doug Holyfield, NC Division of Solid and Hazardous Waste Management, January 22, 1992; Attached Savannah Laboratories analytical reports, February 1990, August 1990, December 1991.

50. ETE Division, Virogroup, Inc., Phase II Groundwater Quality Assessment, Wilmington Facility, Prepared for Southern Wood Piedmont Company, Spartanburg, South Carolina, 1994.

51. NC Dept. of Transportation, Division of Highways, Photogrammetric Unit, Mission 3241, January 22, 1994.

Oblique Aerial Photograph, Southern Wood Piedmont and neighborhood to north and east (No Date: Source undocumented)

52. American Automobile Association, Wilmington, NC (Street Map, No Date).

53. Division of Facility Services, Child Day Care Section, Monthly Listings of Day Care Centers and Day Care Homes, September 30, 1992.

54. Williams, Luanne K., Toxicologist, NC Environmental Epidemiology Section, memorandum to Doug Holyfield, NC Waste Management Branch Re: Review of risk assessment report, March 17, 1994.

Holyfield, Doug, letter to T. M. Davis, Environmental Affairs. SWP Re: Review of risk assessment report, March 17, 1994.

55. Herschfield, David M., Rainfall Frequency Atlas of the United States for durations from 30 minutes to 24 hours and Return Periods from 1 to 100 years. US Dept. of Commerce Technical Paper # 40, 1961.

56. NC State Center for Geographic Information and Analysis, Data Report on Radial Population Count, Southern Wood Piedmont Co., October 5, 1994.

57. Parker, Stuart F., NC Superfund Section, Memorandum to File: Telecommunication with Chuck Davis, Southern Wood Piedmont Co., September 30, 1994

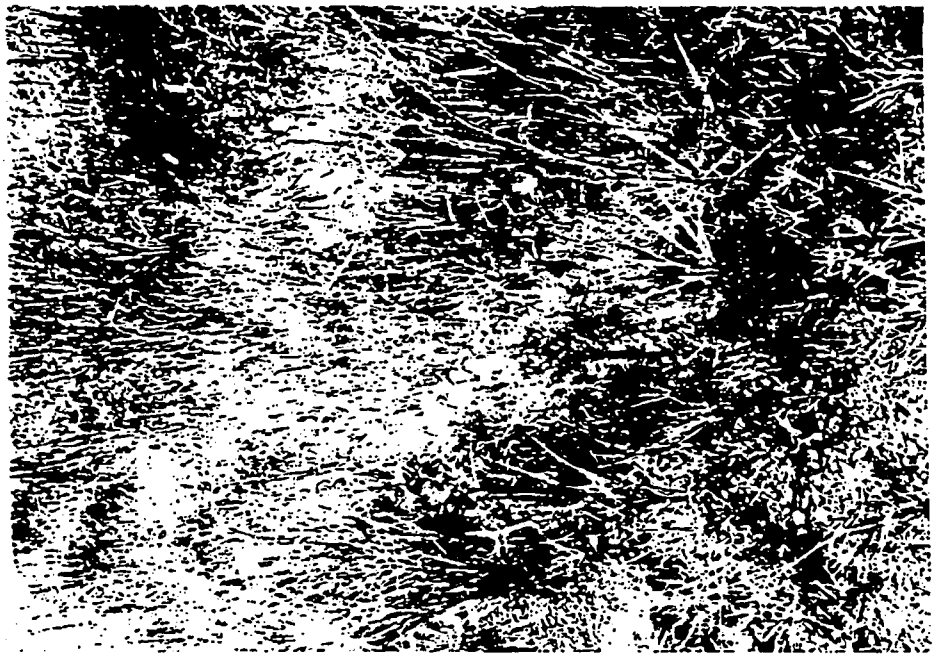
58. B & V Waste Science and Technology Corporation, Final Expanded Site Inspection, Old ATC Refinery, Wilmington, New Hanover County, NC. EPA Contract No. 68-W9-0055, September 2, 1993.

59. NC Superfund Section, Preliminary Assessment, Wilmington Coal Gas Plant, NCD 986 188 910, December, 1991.

60. Parker, Stuart F., NC Superfund Section, Memorandum to File: Source Area Dimensions, December 20, 1994.

Photos 1-2: Views SW and NW across site from site entrance. Note surface vegetation, and small drainage ditch (top photo).

Photos 3-4: Detail of vegetation and recently ponded rainwater in small drainage ditch.



Photos 5-6: Views N and NW toward Hess terminal and Cape Fear River, respectively. Landfarming Areas are in foreground. SWP personnel report that landfarm is no longer actively irrigated.

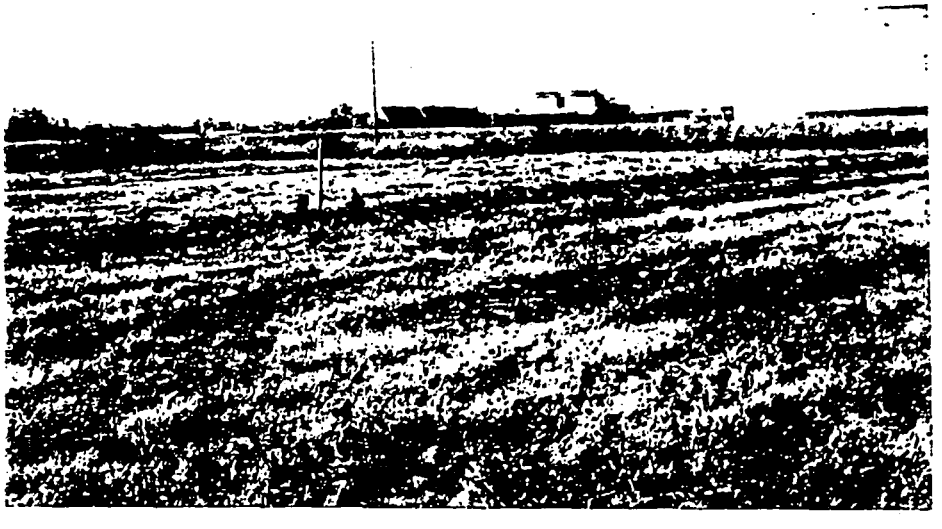


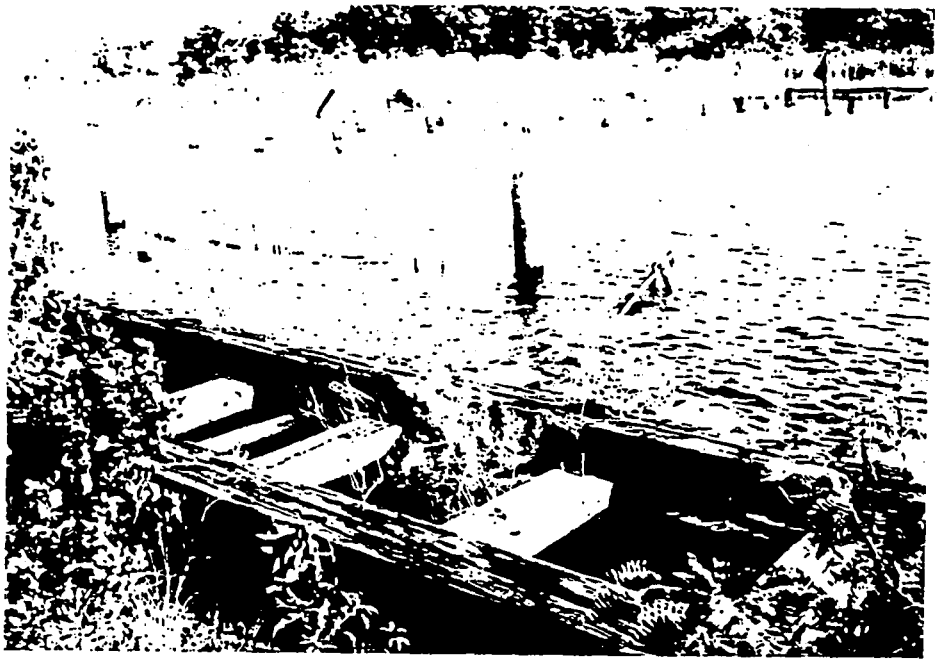
Photo 7: Ground surface detail at edge of Landfarming Area. Berm is at lower right.

Photo 8: Ground surface detail of unexcavated area NW of former Main Production Area. Note railroad ties still in place.

Photos 9-10: W and N berms of former Landfarming Areas, bordered by uncut vegetation. Note apparent surface slopes to S and E.

Photo 11: View E from waterfront showing ponding of rainwater on ground surface in former Treated Wood Storage (TWS) Area.

Photo 12: View SSW from waterfront, south of former boat slips, showing Cape Fear River estuary.



Photos 13-14: Southern and northern former boat slips, respectively, viewed from jetty area.

Photos 15-16: On-site portion of Existing Drainage Ditch (which flows south to Greenfield Creek), viewed during (approximate) high tide.

REFERENCE 5

CHILD DAY CARE SECTION

UNTY: 65 NEW HANOVER MONTHLY ALPHABETIC LISTING AS OF 1992-09-30

FACILITIES

ID/ ABBREV	OPERATION NAME/ OPERATOR NAME	MAILING ADDRESS/ LOCATION ADDRESS	CITY	ST	ZIP/ PHONE	R
55116 C A C	A LITTLE CLASS A LITTLE CLASS, INC.	106 PINE GROVE DRIVE	WILMINGTON	NC	28405 919/452-3433	
55100 C A C	ADVENTURE WORLD DAY CARE CENTER ADVENTURE WORLD INCORPORATED	4604 LONGLEAF HILLS DR.	WILMINGTON	NC	28409 919/392-0868	
55112 C A C	BUILDING BLOCKS CHILD CARE CENTER RHONDA GORE AND KAY LAIRD	P. O. BOX 26 HWY. 17, 5908 CASTLE HAYNE RD.	CASTLE HAYNE CASTLE HAYNE	NC	28429 919/675-3249	
55074 C A C	CAROLINA PRESCHOOL FARMER, SUE	6501 CAROLINA BEACH ROAD HIGHWAY 421 S	WILMINGTON WILMINGTON	NC	28409 919/392-1560 065	
300010 MP C	CAROLINA PRESCHOOL ON MARKET FARMER CYNTHIS A	7409 MARKET STREET	WILMINGTON	NC	28405 919/686-1010 065	
55103 C A C	CARRAWAY FAMILY DAY CARE CARRAWAY, ANNIE	1930 CHURCH STREET	WILMINGTON	NC	28403 919/763-9022 065	
55119 C A C	CHILD DEVELOPMENT CENTER CHILD DEVELOPMENT CENTER, INC.	608 S. COLLEGE ROAD	WILMINGTON	NC	28403 919/392-6417 065	
300012 MP C	CHILD DEVELOPMENT CENTER CHILD DEVELOPMENT CENTER, INC.	608 S. COLLEGE ROAD 4702 S. COLLEGE ROAD	WILMINGTON WILMINGTON	NC	28403 919/392-6417 065	
55117 C A L	CHILD'S PLAY DAY CARE TOZOUR, JACQUELINE J.	619 ALBEMARLE ROAD 619 ALBEMARLE ROAD	WIMINGTON WILMINGTON	NC	28405 919/791-8143 065	
300007 C A L	CHILD'S PLAY DAY CARE SOUTH TOZOUR JACQUELINE	902 SHIPYARD DRIVE 902 SHIPYARD DRIVE	WILMINGTON WILMINGTON	NC	28403 919/350-1272 065	
55113 C A C	CLASSY BEARS DAY CARE & PRESCHOOL CLASSY BEARS PRESCHOOL DAY CARE, INC.	6620 WINDMILL WAY	WILMINGTON	NC	28405 919/791-7872	
53972 C A C	CREATIVE WORLD II CREATIVE WORLD, INC.	2411 FLINT DRIVE	WILMINGTON	NC	28401 919/799-5195 065	
55084 C A C	CREATIVE WORLD II PRIMARY DAY SCHOOL CREATIVE WORLD, INC.	2411 FLINT DRIVE	WILMINGTON	NC	28401 919/799-5195 065	
52015 C A C	CREATIVE WORLD PRESCHOOL CREATIVE WORLD, INC.	4202 WILSHIRE BLVD.	WILMINGTON	NC	28403 919/791-2080 065	
55012 C AA C	CREEKWOOD NORTH DAY CARE CENTER CREEKWOOD NORTH HOMEBUYER ASSOCIATION	1210 KORNEGAY AVENUE 1210 KORNGAY AVENUE	WILMINGTON WILMINGTON	NC	23405 919/762-4546 065	
55081 C A C	DISCOVERY PLACE OF WILMINGTON CIRCLE B CORPORATION	3806 CHERRY AVENUE	WILMINGTON	NC	28403 919/799-0560	
55082 A C	EARLY CHILDHOOD LEARNING CENTER EDUCO, INC.	4102 PEACHTREE AVENUE	WILMINGTON	NC	28403 919/392-4637	

Ref. 5

DIVISION OF FAMILY SERVICES
CHILD DAY CARE SECTION
COUNTY: 65 NEW HANOVER MONTHLY ALPHABETIC LISTING AS OF 1992-09-30
FACILITIES

D/ BREV	OPERATION NAME/ OPERATOR NAME	MAILING ADDRESS/ LOCATION ADDRESS	CITY	ST	ZIP/ PHONE	REN PO
994 A C	EPHESUS DAY CARE CENTER EPHESUS SEVENTH DAY ADVENTIST CHURCH	1002 CASTLE STREET	WILMINGTON			05 06540
110 A C	GORDON ROAD DAY CARE WATSON, MARILYN	6768 GORDON ROAD	WILMINGTON	NC	28405 919/350-0629	06
075 A C	GRANNY'S DAY CARE CENTER GRANNY'S DAY CARE CENTER, INC.	7010 MARKET STREET	WILMINGTON	NC	28405 919/686-4405	12
005 0 C	GREATER LOVE CHAPEL CHURC H OF GOD IN CHRIST GREATER LOVE CHAPEL CHURCH OF GOD IN CHRIST	1105 N. 8TH STREET	WILMINGTON	NC	99999 919/763-4797	11 06540
111 A L	HAPPY KIDS DAY CARE HUMPHREY, NORMA	521 KELLY ROAD	WILMINGTON	NC	28409 919/395-5286	03
080 A C	HEAD START OF NEW HANOVER COUNTY HEAD START OF NEW HANOVER COUNTY	P. O. BOX 3434 507 N. 6TH STREET	WILMINGTON WILMINGTON	NC	28401 919/762-1177	01
0025 C	HELEN A HIGGINS MONTESSORI SCHOOL HIGGINS PEGGY	4915 ORIOLE DRIVE	WILMINGTON	NC	28403 919/392-7007	06
042 A C	HOOD'S DAY CARE HOOD, ELLEN	419 RUTLEDGE DRIVE	WILMINGTON	NC	28412 919/799-6266	06
104 A C	ISLANDER CHILD CARE ISLANDER CHILD CARE, INC.	204 ATLANTA AVENUE	CAROLINA BEACH	NC	28428 919/458-6258	04 06540
062 A C	KINDER CARE KINDER CARE, INC.	2619 NEWKIRK AVENUE	WILMINGTON	NC	28403 919/799-7195	12 06540
056 A C	LITTLE FRIENDS LEARNING CENTER I FINLEY, GALE P. AND JAMES L.	1551 41ST ST.	WILMINGTON	NC	28403 919/395-5400	06 06540
120 A C	LITTLE FRIENDS LEARNING CENTER III LITTLE FRIENDS PRESCHOOL, INC.	1553 41ST STREET 4808 NEW CENTRE DRIVE	WILMINGTON WILMINGTON	NC	28403 919/452-4444	10 06540
091 A C	LITTLE FRIENDS LEARNING CENTER III FINLEY, JAMES L. AND GALE P.	1553 41ST ST. 1553 41ST STREET	WILMINGTON WILMINGTON	NC	28403 919/395-5400	06 06540
025 A C	LITTLE RED SCHOOLHOUSE LITTLE RED SCHOOLHOUSE DAY CARE, INC.	ROUTE 3, BOX 279-A 2931 BLUE CLAY ROAD, SR 1318	CASTLE HAYNE CASTLE HAYNE	NC	28429 919/762-5724	02 06540
0009 A C	MCCLURE PRESBYTERIAN PRESCHOOL CENTER MCCLURE MEMORIAL PRESBYTERIAN CHURCH, INC.	P. O. BOX 26 HWY. 17, 5908 CASTLE HAYNE RD.	CASTLE HAYNE CASTLE HAYNE	NC	28429 919/675-3249	06 06540
118 A C	MCLEAN'S EARLY LEARNING CENTER MCLEAN, MAGNOLIA H.	617 S. 4TH STREET 625 S. 4TH STREET	WILMNGTON WILMINGTON	NC	28401 919/762-4066	07 06540
121 C	MOTHER GOOSE CHILD CARE AND LEARNING CENTER, INC. MOTHER GOOSE CHILD CARE & LRNG. CTR., INC.	7409 MARKET STREET	WILMINGTON	NC	28405 919/686-1010	05 06540

DIVISION OF FA[illegible]Y SERVICES
CHILD DAY [illegible]ECTION
TY: 65 NEW HANOVER MONTHLY ALPHABETIC L[illegible]ING AS OF 1992-09-30
FACILITIES

D/ BREV	OPERATION NAME/ OPERATOR NAME	MAILING ADDRESS/ LOCATION ADDRESS	CITY	ST	ZIP/ PHONE	REN PO
079 A C	MS. PAT'S INFANT CARE AND PRESCHOOL MCCOY, PATRICIA W.	1212 S. EIGHTH STREET	WILMINGTON	NC	28401 919/251-9811	10 06540
004 0 C	MYRTLE GROVE CHRISTIAN SCHOOL MYRTLE GROVE CHRISTIAN SCHOOL, INC.	800 PINER ROAD	WILMINGTON	NC	28409 919/392-2067	02
124 A C	NANCY'S LITTLE JEWELS CHILD DEVELOPMENT CENTER INMAN, NANCY	3504 N. KERR AVENUE	WILMINGTON	NC	28405 919/251-1108	05
115 A C	NOAH'S ARK DAY CARE CENTER MASONBORO BAPTIST CHURCH	1501 BEASELY RD.	WILMINGTON	NC	28409 919/395-0059	08
072 A C	PARK AVENUE SCHOOL YOPP INVESTMENTS, INC.	1306 FLORAL PARKWAY	WILMINGTON	NC	28406 919/791-6217	12 06540
919 A L	PEARSON'S KINDERGARTEN PEARSON, MARY FRANCES	710 SOUTH ELEVENTH STREET	WILMINGTON	NC	28401 919/762-0050	05 06540
021 AA C	PRESCHOOL ENRICHMENT PROGRAM SOUTHEASTERN MENTAL HEALTH CENTER	2023 S. 17TH STREET	WILMINGTON	NC	28401 919/251-6497	07
126 A L	PRIDE & JOY PLAYWORLD PRIDE & JOY PLAYWORLD, INC.	227 DIXIE AVENUE	WILMINGTON	NC	28403 919/395-1055	09
077 A C	SHAW SPEAKS DAY CARE CAPE FEAR AME ZION CHURCH CONFERENCE	718 S. THIRD STREET 718 SOUTH THIRD STREET	WILMINGTON WILMINGTON	NC	28401 919/343-1441	08 06540
057 A C	SOUTHEASTERN PRESCHOOL EDUCATION CENTER SOUTHEASTERN PRESCHOOL EDUCATIONAL CTR., INC.	207 PINE GROVE DRIVE	WILMINGTON	NC	28403 919/799-4140	01 06540
066 A C	SOUTHEASTERN PRESCHOOL EDUCATION CENTER SOUTHEASTERN PRESCHOOL ED. CTR., INC.	207 PINE GROVE DRIVE 3625 S. COLLEGE RD.	WILMINGTON WILMINGTON	NC	28403 919/799-4160	06 06540
992 A C	ST. THOMAS PRESCHOOL ST. MARY CATHOLIC CHURCH - PARISH COUNCIL	109 S. 2ND STREET	WILMINGTON	NC	28401 919/762-7764	05
008 0 C	THE KING'S MEMORIAL CHRISTIAN ACADEMY THE KING'S MEMORIAL CHRISTIAN ACAD. BOARD OF DIREC	1380 N. COLLEGE ROAD	WILMINGTON	NC	28405 919/799-8157	04
045 A C	TINY TOT NURSERY BASS, PEGGY	3910 MARKET STREET	WILMINGTON	NC	28403 919/762-4829	08
125 A C	TOTAL CHILD CARE CENTER, INC. TOTAL CHILD CARE CENTER, INC.	4304 HENSON DRIVE HENSON DRIVE NORTHCHASE	WILMINGTON WILMINGTON	NC	28405 919/799-3556	08 06540
479 AA C	UCP DEVELOPMENTAL CENTER UCP OF NORTH CAROLINA, INC.	P. O. BOX 5003 2035 OLEANDER DRIVE	WILMINGTON WILMINGTON	NC	28403 919/762-7222	05 06520
001 10 C	UNITED ADVENT CHRISTIAN CHURCH PRE. & CH. DEV. PR UNITED ADVENT CHRISTIAN CHURCH PRE. COMM.	4912 SOUTH COLLEGE ROAD	WILMINGTON	NC	28412 919/791-9564	04

ID/ BBREV	OPERATION NAME/ OPERATOR NAME	MAILING ADDRESS/ LOCATION ADDRESS	CITY	ST	ZIP/ PHONE	RE F
9002 10 C	WESLEY MEMORIAL PRESCHOOL DEV. CENTER WESLEY MEMORIAL METHODIST CHURCH	1401 S. COLLEGE ROAD	WILMINGTON	NC	28403 919/791-4002	1
9006 10 C	WILMINGTON CHRISTIAN ACADEMY PRESCHOOL WILMINGTON CHRISTIAN ACADEMY	1401 N. COLLEGE ROAD	WILMINGTON	NC	28405 919/791-4248	1
5069 A C	WINTER PARK BAPTIST PRESCHOOL WINTER PARK BAPTIST CHURCH WEEKDAY ED. COMM.	4700 WRIGHTSVILLE AVENUE 4700 WRIGHTSVILLE AVENUE	WIMINGTON WILMINGTON	NC	28403 919/799-2029	(
4359 A C	WINTER PARK PRESCHOOL I WINTER PARK PRESCHOOL, INC.	4306 LAKE AVENUE	WILMINGTON	NC	28403 919/799-4276 065	(
5037 A C	WINTER PARK PRESCHOOL II WINTER PARK PRESCHOOL II, INC.	19 LENNON DRIVE	WILMINGTON	NC	28405 919/392-3430 065	(
5071 A C	WINTER PARK PRIMARY SCHOOL WINTER PARK PRESCHOOL, INC.	4306 LAKE AVENUE	WILMINGTON	NC	28403 919/395-5818 065	(
5101 A C	YOUNG PARENTS INFANT CARE & PRESCHOOL MCCOY, PATRICIA W.	1912 NUN STREET 1020 MEARES STREET	WILMINGTON WILMINGTON	NC	28403 919/251-6197 065	1
5127 A C	YWCA CENTER AT HOUSTON MOORE YWCA OF WILMINGTON, NC, INC.	1601 S. 13TH STREET	WILMINGTON	NC	28401 919/251-9159 065	(

CHILD DAY CARE SECTION

UNTY: 65 NEW HANOVER MONTHLY ALPHABETIC LISTING AS OF 1992-09-30

HOMES

ID/ ABBREV	OPERATOR NAME/ OPERATION NAME	MAILING ADDRESS/ LOCATION ADDRESS	CITY	ST	ZIP/ PHONE	F
05392 G S	BARNHILL, MARY MARY BARNHILL DAY CARE HOME	4818 W. LORD BYRON RD.	WILMINGTON	NC	28405 919/395-4261	
000002 G S	BLACKWELL, DOTTIE DOTTIE BLACKWELL'S DAY CARE HOME	600 CARVER COURT	CASTLE HAYNE	NC	28429 919/675-9339	
05400 G S	BLANTON, PAULA S. THE LITTLE PLAYROOM	6704 RUSHWOOD CT.	WILMINGTON	NC	28405 919/395-4891	
05409 G S	BOYD, ELIZABETH ELIZABETH BOYD DAY CARE HOME	1910 NUN ST	WILMINGTON	NC	28403 919/251-8223	065
000013 MP S	BOYD, ELIZABETH ELIZABETH BOYD DAY CARE HOME	1306 QUEEN STREET	WILMINGTON	NC	28401 919/251-8223	065
05436 G S	BROWN, KAREN KAREN BROWN DAY CARE HOME	6416 SPICEWOOD ST.	WILMINGTON	NC	28405 919/799-7392	
05417 G S	BUNTING, KATHERINE KATHERINE BUNTING'S CHID DAY CARE HOME	818 SOUTH 10TH ST. 818 SOUTH 10TH STREET	WILMINGTON WILMINGTON	NC	28401 919/762-3516	065
05408 G S	BURNS, KAY G. KAY G. BURNS DAY CARE HOME	383 SHORE POINT DR.	WILMINGTON	NC	28405 919/686-9679	
05407 G S	CANTERBURY, JOAN CANTERBURY, JOAN	105 BUCCANEER RD	WILMINGTON	NC	28409 919/392-2302	
000016 G S	CLARK, THERESA A. THERESA CLARK DAY CARE HOME	801 JENNINGS DR.	WILMINGTON	NC	28403 919/791-0449	
05432 G S	COSLEY, ELMA ELMA COSLEY'S DAY CARE HOME	1009 KENNINGSTON STREET	WILMINGTON	NC	27405 919/791-1570	065
000019 G S	DAVID, RUBY J. HOUSE OF LOVE DAY CARE	1617 N. 26TH ST.	WILMINGTON	NC	28405 919/763-3758	065
05333 G S	DEVANE, ANNIE MAE ANNIE MAE DEVANE'S DAY CARE HOME	1904 CHURCH STREET	WILMINGTON	NC	28403 919/343-8955	065
05356 G S	DUKES, MYRA LITTLE MISS MUFFIN'S	4623 D GREENTREE RD. 4623 D GREENTREE ROAD	WILMINGTON WILMINGTON	NC	28405 919/799-3646	065
05081 G S	ELDER, FRANCES FRANCES ELDER'S DAY CARE HOME	4110 LYNBROOK DRIVE	WILMINGTON	NC	28405 919/799-9443	065
05339 G S	EVERETT, CLARA CLARA EVERETT DAY CARE HOME	2009 CREECY AVE.	WILMINGTON	NC	28403 919/762-0137	065
000008 G S	EVERETT, ELIZABETH ELIZABETH EVERETT DAY CARE HOME	322 SOUTH 17TH STREET	WILMINGTON	NC	28403	065

CHILD DAY CARE SECTION

TY: 65 NEW HANOVER MONTHLY ALPHABETIC LISTING AS OF 1992-09-30

HOMES

D/ BREV	OPERATOR NAME/ OPERATION NAME	MAILING ADDRESS/ LOCATION ADDRESS	CITY	ST	ZIP/ PHONE	REI PC
368 S	FIELDS, KIMBELY KIMBELY FIELDS' CHILD DAY CARE HOME	14 NEIL COURT	WILMINGTON	NC	28405 919/392-3809	02 06570
589 S	FLOWERS, AMANDA AMANDA FLOWERS' CHILD DAY CARE HOME	2324 WRIGHTSVILLE AVE.	WILMINGTON	NC	28403 919/763-0075	01
425 S	FRAMILLA, ROBIN LOVING ARMS CHILD CARE	1436 A HARBOUR DRIVE	WILMINGTON	NC	28401 919/350-0992	06
422 S	FREEMAN, CAROL R. CAROL FREEMAN'S CHILD DAY CARE HOME	117 RAY DR. 117 RAY DRIVE	WILMINGTON WILMINGTON	NC	28405 919/111-1111	03
387 S	GARD, SHELIA F. SHELIA F. GARD'S DAY CARE HOME	918 PARKWAY BOULEVARD	WILMINGTON	NC	28412 919/799-9870	10 06570
388 S	GARDNER, KOKETHA MAE KOKETHA MAE GARDNER'S DAY CARE HOME	11 W. GARDEN LAKE ESTATE	WILMINGTON	NC	28401 919/762-8995	11 06570
307 S	GORE, SHIRLEY SHIRLEY GORE'S CHILD DAY CARE HOME	213 NORMANDY DRIVE	WILMINGTON	NC	28412 919/791-0324	03
1020	GRAY, JUANITA JUANITA GRAY DAY CARE HOME	137 SOUTHWOLD DRIVE	WILMINGTON	NC	28409 919/392-5854	08 06570
1001 S	GREEN, FELICIA FELICIA GREEN DAY CARE HOME	4457 HOLLY TREE ROAD	WILMINGTON	NC	28412 919/392-3054	05 06570
291 S	HAM, ROSE ROSE HAM'S CHILD DAY CARE HOME	722 PORTORS NECK ROAD	WILMINGTON	NC	28405 919/686-4364	12
391 S	HAMMONDS, DEBI DEBI HAMMONDS' DAY CARE HOME	238 YULAN DRIVE	WILMINGTON	NC	28412 919/392-1812	01
18	HARVEY, LINDA LINDA HARVEY'S CHILD DAY CARE HOME	201 TANBRIDGE RD. 201 TANBRIDGE ROAD	WILMINGTON WILMINGTON	NC	28405 919/799-7079	11
022	HARVEY, LINDA LINDA HARVEY'S CHILD DAY CARE HOME	6263 TURTLE HALL DRIVE 6263 TURTLE HALL DRIVE	WILMINGTON WILMINGTON	NC	28409 919/799-7079	09
23	HASAN, AQUEELAH HABEEBAH HASAN FAMILY DAY CARE HOME	1619 NORTH 26TH ST.	WILMINGTON	NC	28405 919/763-0709	09
05	HATCHELL, BRENDA F. BRENDA F. HATCHELL'S DAY CARE HOME	114 DISNEY DRIVE	WILMINGTON	NC	28409 919/395-4297	05
017	HENSON, LINDA J. STEPING STONES DAY CARE HOME	1014 BROWNING DR.	WILMINGTON	NC	28405 919/791-3021	09
65	HOPKINS, IRENE IRENE HOPKINS DAY CARE HOME	206 ROGERSVILLE RD.	WILMINGTON	NC	28403 919/799-0378	04 06570

CHILD DAY CARE SECTION
65 NEW HANOVER MONTHLY ALPHABETIC LISTING AS OF 1992-09-30
HOMES

EV	OPERATOR NAME/ OPERATION NAME	MAILING ADDRESS/ LOCATION ADDRESS	CITY	ST	ZIP/ PHONE	RENEW POCH
3	HUNT, JONNIE JONNIE HUNT'S DAY CARE HOME	635 SPRINGTIME ROAD	WILMINGTON	NC	28405 919/791-0827	05/9
3	JOHNSON, DEBBIE JOE JOHNSON, DEBBIE JOE	706 DOCK ST	WILMINGTON	NC	28401 919/762-9540	04/9 0657005
	JUNIOUS, EARTHA M. EARTHA M. JUNIOUS' DAY CARE HOME	918 S. 14TH STREET	WILMINGTON	NC	28401 919/763-1585	05/9
	KEELS, PATRICIA M. KEEL'S FAMILY DAY CARE HOME	1007 S. 5TH STREET 1007 SOUTH 5TH STREET	WILMINGTON WILMINGTON	NC	28401 919/763-6605	10/9 0657002
	KELLY, CRYSTAL WINNER TENDER LOVING CARE CHRISTIAN HOME PRESCHOOL	4825 STILLWELL RD.	WILMINGTON	NC	28412 919/111-1111	04/9
	KENNEDY, TAMMY E. TAMMY E. KENNEDY'S DAY CARE HOME	2706 DARE STREET	WILMINGTON	NC	28412 919/791-5374	11/9
	KING, CYNTHIA LYNN CYNTHIA LYNN KING'S DAY CARE HOME	921 SPRING VALLEY ROAD	WILMINGTON	NC	28405 919/392-1341	02/9
	KIRBY, ANN ANN KIRBY'S DAY CARE HOME	117 KENNETH COURT	WILMINGTON	NC	28405 919/395-0394	09/93 06570066
	LIVENGOOD, DEBBIE DEBBIE LIVENGOOD'S DAY CARE HOME	214 ROCKWELL ROAD	WILMINGTON	NC	28405 919/452-7296	10/93
	MELVIN, SHIRLEY SHIRLEY MELVIN'S CHILD DAY CARE HOME	1207 KORNEGAY AVE. 1207 KORNEGAY AVENUE	WILMINGTON WILMINGTON	NC	28405 919/762-4716	12/92 06570063
3	MORGAN, SUSAN D. SUSAN MORGAN DAY CARE HOME	3601 BETHEL ROAD	WILMINGTON	NC	28409 919/799-5392	05/94 06570073
3	MUSE, CARRIE MUSE FAMILY DAY CARE HOME	4625 NORWICH ROAD	WILMINGTON	NC	28405 919/452-5517	09/94 06570079
	PARRETT, PATRICIA PATRICIA PARRETT'S DAY CARE HOME	205 LOVE GRASS COURT	WILMINGTON	NC	28405 919/395-0661	05/93
	PATTERSON, HAZEL HAZEL PATTERSON'S DAY CARE HOME	506 GOVERNORS ROAD	WILMINGTON	NC	28405 919/395-1352	11/93 06570069
	REASON, EDITH WEE CARE	2323 OAKLEY ROAD	CASTLE HAYNE	NC	28429 919/763-6169	08/94
	RHODES, KUANGKUM RHODES, KUANGKUM	4817 CALDER CT	WILMINGTON	NC	28405 919/791-5102	03/93
	RILEY, BERNICE BERNICE RILEY'S CHILD DAY CARE HOME	1121 ORANGE ST. 1121 ORANGE STREET	WILMINGTON WILMINGTON	NC	28401 919/762-0035	09/92

V	OPERATOR NAME/ OPERATION NAME	MAILING ADDRESS/ LOCATION ADDRESS	CITY	ST	ZIP/ PHONE	RENEW POCN
	SANDERS, MARY MARY SANDERS DAY CARE HOME	5325 DANDELION DR.	WILMINGTON	NC	28405 919/395-5098	03/9
	SHINGLETON, RACHEL RACHEL SHINGLETON'S DAY CARE HOME	26 STATION ROAD	WILMINGTON	NC	28405 919/791-5898	11/9
	SKIPPER, SHARON SHARON SKIPPER DAY CARE HOME	654 WINDEMERE RD	WILMINGTON	NC	28405 919/395-1561	07/9
5	SMITH, KIM R. KIM SMITH DAY CARE HOME	4620 BARNARDS LANDING ROAD	WILMINGTON	NC	28412 919/452-2945	06/9
	SMITH, SHARRON SMITH, SHARON	510 CLEARBROOK DR	WILMINGTON	NC	28409 919/395-2961	06/9
5	SMITH, TRUDY H. TRUDY SMITH'S DAY CARE HOME	5407 WRIGHTSVILLE AVE.	WILMINGTON	NC	28403 919/392-3361	07/9
	TAYLOR, MARY J. MARY J. TAYLOR'S DAY CARE HOME	6727 OLD BRICK ROAD	WILMINGTON	NC	28412 919/395-0654	02/9 0657005
	THOMAS, DOROTHY THOMAS FAMILY DAY CARE HOME	308 NUN STREET	WILMINGTON	NC	28401 919/762-8355	08/9 0657000
	TYNER, KAREN TYNER, KAREN	142 EL OGDEN DRIVE	WILMINGTON	NC	28405 919/686-9755	10/9
	TYNER, SUSAN SUSAN TYNER'S CHILD DAY CARE HOME	112 RAINTREE COURT 7708 SIDBURY ROAD	WILMINGTON WILMINGTON	NC	28405 919/686-0016	03/9
	WALKER, SARAH J. SARAH J. WALKER DAY CARE HOME	1611 NORTH 26TH ST.	WILMINGTON	NC	28405 919/763-2556	04/9
8	WILLIAMS, PAMELA P. PAMELA WILLIAMS DAY CARE HOME	5827 RENEE COURT	WILMINGTON	NC	28403 919/799-2409	08/9
	WILSON, KATHRYN F. KATHRYN F. WILSON'S DAY CARE HOME	4946 WILDERNESS ROAD	WILMINGTON	NC	28412 919/799-2306	11/9 06570054
	WILSON, LINDA LINDA WILSON DAY CARE HOME	419 S 18TH ST	WILMINGTON	NC	28403 919/763-4466	08/94 06570060
	WRIGHT, LINDA R WRIGHT, LINDA R	1803 ANN ST	WILMINGTON	NC	28403 919/762-6124	10/92
	YATTIE, MEALING MEALING, YATTIE	1017 PRINCESS ST	WILLINGTON	NC	28401 919/762-8090	02/94 06570071
	YOUNG, CYNTHIA YOUNG, CYNTHIA	605 ROSE AVE	WILMINGTON	NC	28403 919/799-9514	08/92

OPERATOR NAME/ OPERATION NAME	MAILING ADDRESS/ LOCATION ADDRESS	CITY	ST	ZIP/ PHONE	RENEW/ POCNO
YOUNG, LYNITA P. LYNITA P. YOUNG DAY CARE HOME	225 GEORGIA AVE.	CAROLINA BEACH	NC	28428 919/458-4627	05/94 06570061
ZYGMUNT, CATHY CATHY ZYGMUNT'S DAY CARE HOME	1214 SIDNEY DRIVE	WILMINGTON	NC	28405 919/799-8084	06/93 06570080

REFERENCE 6

Southern Wood Piedmont Company

RECEIVED
JUN 18 1984
HAZARDOUS WASTE MANAGEMENT BRANCH

11-M-1.10.7
June 8, 1984

Mr. William Paige
Solid and Hazardous Waste Management Branch
N. C. Department of Human Resources
Box 2091
Raleigh, N. C. 27602

Dear Mr. Paige:

Enclosed please find the detailed procedure we plan to follow in cleaning up our former Wilmington, N. C. plant site. As you know, aerobic breakdown of the wood preservatives is accelerated as temperature increases. In order to take advantage of the summer temperatures and the remainder of our lease term we plan to implement the enclosed procedure at once.

The wood preservative wastes we are subjecting to bacterial degradation are not classified as a hazardous waste under the Resource Conservation Recovery Act or North Carolina's solid waste management regulations. Therefore, we are not asking your office to approve this practice or to issue any form of permit. What we do ask, is that you inform us at once if you believe this procedure will violate any laws or regulations. In the absence of such notice we plan to proceed, as we believe this is the best way to clean the site of residual wood preservatives.

You asked Mr. Ned Button about the stage of the tide corresponding to the November 1982 groundwater samples. We did not record the time these samples were taken so we cannot tie them into the tide stage. We did not observe a significant change of water level in the wells as tide level changed. We do not believe that the groundwater is affected by tide change in this area.

In answer to your question regarding the direction of groundwater flow, our groundwater consultant, Law Engineering and Testing Company, believes that it is flowing somewhat parallel but towards the shoreline. This would mean it is flowing from the city parcel towards the port parcel towards the mouth of the creek south of the plant site.

I did meet again with Mr. Farris of the City and explained in more detail our plans.

We have changed the scope of the procedures to be used and modified the methodology to accommodate the suggestions you made with respect to our initial suggestion submitted on February 13, 1984. If you have further suggestions with respect to monitoring of methodology we would be pleased to discuss them with you, but again we need to know about them in the immediate future.

Very truly yours,

SOUTHERN WOOD PIEDMONT COMPANY

Charles A. Burdell

Charles A. Burdell
Director, Technical Services

CAB:bsb

attachments

cc: E. F. Button - Stamford
E. L. Gibbs

0832T

The following is a list of attachments referenced in the attached proposal. Attachments 1 thru 7 were included in the package mailed to you February 13. Please refer to them.

Attachment 1	-	Map with Locations of Various Deposits
Attachment 2	-	Summary of Groundwater Data
Attachment 3	-	Copy of Law Engineering Testing Company's Findings
Attachment 4	-	Map showing Cape Fear Water Locations
Attachment 5	-	Summary Memo Regarding the Monitoring of the NPDES Discharge
Attachment 6	-	University of Florida Study
Attachment 7	-	EPA Submittal by MSU Illustrating the Breakdown of PCP in the Soil

The below listed Attachments 8 thru 10 are included in this package:

Attachment 8	-	Landfarming Areas Diagram
Attachment 9	-	Landfarming Lysimeter Locations
Attachment 10	-	Extraction and Analytical Procedure/Methods

PROPOSED CLEANUP PROGRAM FOR SOUTHERN WOOD PIEDMONT
WILMINGTON, N. C. PLANT SITE

I. Site Description

The plant is located in Wilmington, New Hanover County, N. C. at the end of Greenfield Street on the Cape Fear River (map attached). There are approximately 39 acres leased from the city and about 7 acres leased from the State Port Authority (SPA). The soil is classified as gray clay and sand to a 3.5' depth by Froehling and Robertson, Inc. There was a 24-hour water table of 19" in the treatment room area when sampled in May of 1971.

II. Site History

The site was originally developed during World War I as a plant to construct concrete barges and ships. Northstate Creosote Company constructed a wood treating plant on the site about 1932. This plant was purchased by the Taylor-Colquitt Company in 1935. In 1964, Southern Wood Preserving Company (now SWP) purchased the Taylor-Colquitt Company and has operated it since then. Through 1971, creosote coal tar was the only preservative used. In 1972, a separate treating system was installed to use the water salt preservatives: copper, chromium, and arsenic (known as CCA). In 1980, penta-petroleum preservative treatment was added using an existing creosote treating cylinder.

In 1975, a large area of cull and broken poles along the city/Port District property line was cleaned up. At this time, a permit was obtained to close a surface drainage ditch on the Port District property which contained settled creosote sludge. This buried material was reported under Superfund (see Section A).

There has never been any aeration water treatment at the Wilmington plant. Original waste water treatment was simple settling and discharge. In recent years, process waste water was given thorough settling and discharged to the Wilmington sewage treatment plant (POTW). More recently, since 1980, the settled effluent was further clarified using a Wemco flotation clarification system prior to discharge to the POTW. Oil and float separated in the settling tanks and in WEMCO have been recycled to the process or burned for fuel value in the plant waste wood boiler. No K001 sludge was ever generated by this treatment approach.

III. Current Status of Site

The plant ceased production in May of 1983. Removal of physical inventory and plant equipment started at that time. At present, all material except three rail tracks have been removed from the State Port Authority property. The ditch area covered in 1975 has grass growing on it. SPA personnel have inspected the site and stated it was acceptable for their use. About one-half of the area nearest the river was used for storage of treated poles and piling.

All the wood inventory has been removed from the city's acreage and raked reasonably clean. The CCA treating tanks and cylinder have been removed. The oil preservative tanks have been removed. The pole machine and maintenance equipment have been removed. All of the tanks and equipment used in handling the process waste water have been removed. The tracks in front of the oil preservative cylinder have been removed back to the road crossing (about 200 feet). We are in the process of having the creosote sludge removed from the large storage tanks.

IV. Description of Treating Chemical Deposits

Please see attached map showing location of various deposits (Attachment 1).

A. Deposits Reported Under Superfund

A Superfund report was filed in June of 1982. A copy of this report is attached, listing four deposits. When this report was filed, we were not clear as to what K001 sludge was. We have since learned that it is sludge resulting from the aerobic stabilization of wood preservative waste waters. As mentioned in section II, no such sludge was ever created at the Wilmington plant.

1. Superfund Area I, Covered Sludge Ditch

This area was described in section II above. Creosote sludges from early plant operations were buried when this ditch was filled.

2. Superfund Area II, Trash Dump Area

This area is a general waste landfill used by the plant for many years. It consists almost exclusively of wood waste, dirt, and metal waste. Small amounts of creosote cleanup material were deposited here from time to time. It was listed under Superfund because of the suspected presence of creosote material.

3. Superfund Area III, Dike Area

Old, hard and solid creosote residuals similar to road tar were used to seal some of the earthfilled dike near the south slip.

4. Superfund Area IV, Trash Fill Area

Part of the north slip was filled with trash a number of years ago. This mill waste consisted of mainly wood waste and metal bands. Some creosote sludge was deposited on the top of part of this area.

B. Operating Area Deposits

1. Track Area

The track area in front of the cylinder was inspected in 1982 by your office and Mr. Ray Church. Two soil samplings were made which showed residuals to a depth of 18" about 10 feet in front of the cylinder and to 6" deep about 200 feet out in front of the cylinder.

2. Treating Areas

The soil areas around both oil treating room buildings have treating chemical residuals. Soil around the working tanks is noticeably contaminated with oil to about two feet deep. The soil area around the waste water-oil recovered tank system is noticeably discolored to about a one-foot depth.

3. Large Storage Tank Containment Area

The soil in this area contains creosote residuals to about a foot in depth.

4. Treated Product Storage Areas

Relatively large areas on both Port District and city property have a small degree of creosote residuals in the soil as evidenced by some discoloration. These are areas where the treated poles were stored prior to shipment.

5. CCA Storage Tank Area

Soil around the CCA storage tanks is discolored and has some CCA chemical content.

6. Storage Tank Sludges

Varying amounts of sludge is present in the bottom of the various treating tanks.

V. Proposed General Approach to Cleanup of Chemical Residuals

A. Landfarming of Contaminated Soils

We propose to utilize the landfarming method to reduce the oil preservative residuals in non-hazardous contaminated soils. This landfarming approach has already been recognized by the North Carolina Solid and Hazardous Waste Management Branch for other wood preserving plant locations. We propose to conduct the landfarming on treated pole storage areas at the Wilmington plant where there are already low levels of preservative residuals in the soil.

Monitoring wells have been in place at the Wilmington site since 1981. The effect on groundwater from years of plant operation is therefore known. Preservative chemicals have been detected at low levels in some of the groundwater samples. A summary of groundwater data is attached (Attachment 2). Our groundwater consultant, Law Engineering, is convinced that this groundwater discharges to the Cape Fear River. Further, there are no groundwater uses that would be impacted. A copy of Law Engineering's findings is also attached (Attachment 3). The Cape Fear River has been tested upstream and downstream at the plant. Treating chemicals were not detected indicating no impact by the site (Attachment 4). The surface drainage at the NPDES discharge to ditch drainage to Greenfield Creek has been monitored and reported for several years. This data is on file at your department, a summary memo is attached (Attachment 5).

We realize that some of our contaminated soils contain traces of pentachlorophenol (PCP). For this reason, an acceptable residual concentration for PCP needs to be established. The University of Florida, Gainesville has established 0.475 ppm as such a concentration. We have attached their study used to develop this proposed standard (Attachment 6). We propose to use 0.475 ppm PCP as an acceptable residual level for soil requiring landfarming, and to consider landfarmed soil having less than this concentration to be acceptable (with respect to PCP). We have also attached information submitted to EPA by Mississippi State University illustrating the breakdown of PCP in the soil (Attachment 7).

We propose to landfarm the contaminated soilds from the following areas:

1. Track area.
2. Treating areas.
3. Treated product storage areas.

These areas have been contaminated with treating chemical residues from working solutions and/or treated product drippage. These deposits occurred slowly over many, many years and tended to "weather" as they were deposited. We are convinced that these contaminated soils are not classified as hazardous waste under RCRA definitions. We are, therefore, not proposing to landfarm RCRA hazardous material.

It is our understanding that standards for creosote residuals in landfarmed soil have not been established as yet. As this is somewhat a site specific question, we propose to discuss this with the Agency after the six-month testing program is completed. We have been in contact with Dr. Gary McGinnis of Mississippi State University regarding possible standards. We will be submitting information that he has developed separately.

B. Disposition of Other Contaminated Material

Following is an outline of our planned disposition of other contaminated material present on the site.

1. Superfund Area I, Filled Ditch

We are currently doing further sampling of this area. We will discuss proposed disposition with the owner, the State Port District, prior to finalizing our disposition plans.

2. Superfund Area II, Trash Dump Area

We propose to leave this area as it is since there is very little creosote material here and it is dispersed in large amounts of wood waste.

3. Superfund Area III, Dike Area

We propose to remove the large chunks of creosote contaminated soil; and landfarm in a treated pole storage area.

4. Superfund Area IV, Trashfill Area

We propose to remove the creosote sludge piled on top of the area and send to a permitted hazardous waste landfill.

Plant Operating Areas

1. Track Area

We propose to remove the visually contaminated soil and to landfarm in a treated pole storage area. After removal of the contaminated soil, we would till the underlying soil in place, soil moisture conditions permitting, to obtain the maximum breakdown of any remaining chemicals. We would not follow the full landfarm procedure, but would fertilize, till and retill one to three times.

2. Oil Treating Areas

We propose to handle as described in Section 1 above.

3. Large Storage Tank Containment Area

The visually contaminated soil will be removed and sent to a hazardous waste landfill. If dry enough, we will till the underlying soil as outlined in section 1 above.

4. Treated Product Storage Area

Those treated pole storage areas not used for landfarming of heavily contaminated soil would be tilled in place as outlined in section 1 for the underlying soil.

5. CCA Storage Tank Area

We propose to remove soil containing CCA salts, as determined by the EPA EP toxicity tests. Some soil has been removed and will be sent to a permitted hazardous waste landfill. Further tests will be made to determine if more soil needs to be removed. If we elect to encapsulate some contaminated soil, we will submit a separate proposal.

6. Storage Tank Sludges

The CCA sludge has already been removed and sent to a hazardous waste landfill.

We are in the process of removing the sludges from the bottom of the various oil tanks. These sludges are being burned in one of our pulp mill waste wood boilers (the State of Georgia has approved) to recover heat value. Any sludge that cannot be burned will be sent to a permitted hazardous waste landfill.

VI. Proposed Landfarming Procedure

1. The landfarming will be done in either the Area LF1 or Area LF2, or both, if needed, outlined on the plant layout diagram (Attachment 8). These areas are already lightly contaminated with treating chemical residues from many years use as treated pole storage.

2. The designated landfarm areas will be bermed and ditched to prevent rain runoff or runon.

3. Three to six suction vacuum lysimeters will be installed at one, two, and three foot depths to monitor soil water quality. The proposed lysimeter cluster locations are indicated on the landfarm layout diagram (Attachment 9). These lysimeter clusters will be protected by barricades to prevent damage by tilling equipment. We will install two monitoring wells immediately downgradient of the landfarm areas. We propose to utilize the existing upgradient well. A proposal showing well design and location will be submitted shortly. We are convinced that these samples will demonstrate that the wood treating chemicals are breaking down, not leaching into the groundwater.

4. Contaminated soil from the areas outlined in Section V A above; the treating cylinder track area and treating area; will be spread in a maximum two inch layer over the landfarm area. This will be at a maximum additional rate of 20% of the underlying soil when tilled to a depth of ten to twelve inches. From previous analysis these soils contain less than 5% creosote.

5. Nutrients will be added at an application rate of 200 lbs. per acre as commercial fertilizer (10/10/10 or 10/5/5).

6. The initial application of contaminated soil and fertilizer will be thoroughly tilled into the underlying soil to a depth of ten to twelve inches.

7. The soil will be tilled weekly, weather permitting, to promote biological and photochemical breakdown of treating chemical residuals.

8. Sampling and Testing Schedules

   Extraction and analytical procedures are outlined in Attachment 10.

   a. Lysimeters will be sampled for soil water just prior to application of contaminated soil t the landfarm areas, and every two months thereafter. Soil wat-r will be analyzed for total phenol content using the Standard Methods Test 222 Method and for PCP and the creosote compounds using the gas chromatograph method (G/C), EPA SW8040 through 8100.

   b. Soil will be sampled immediately after the initial tilling is completed. It will be resampled after one, two, four, and six months. Soil samples will be sampled at the points indicated on the landfarm diagram (Attachment 8). Samples will be obtained at 0-3", 9-12", and 21-24" depths. The soil samples from each of the two landfarm areas will be composited for equal depths for analysis

c. All samples will be analyzed for total extractable phenol. The initial samples and the four and six-month samples will be analyzed by G/C for other organics.

9. After the six month sample analyses results are available, all results will be reviewed with the North Carolina agency.

VII. Outline of Tilling Procedure

All lightly contaminated treated product storage areas and the soil underlying areas not utilized for landfarming where heavily contaminated soil is removed will be tilled to encourage breakdown of any residual treating chemicals that might be present. Some of the areas where soil is removed may be too wet to till due to soil moisture conditions.

1. The overlying soil will be removed for landfarming; or for offsite disposal in the case of the soil around the creosote storage tanks. No soil will be removed from the treated pole storage areas.

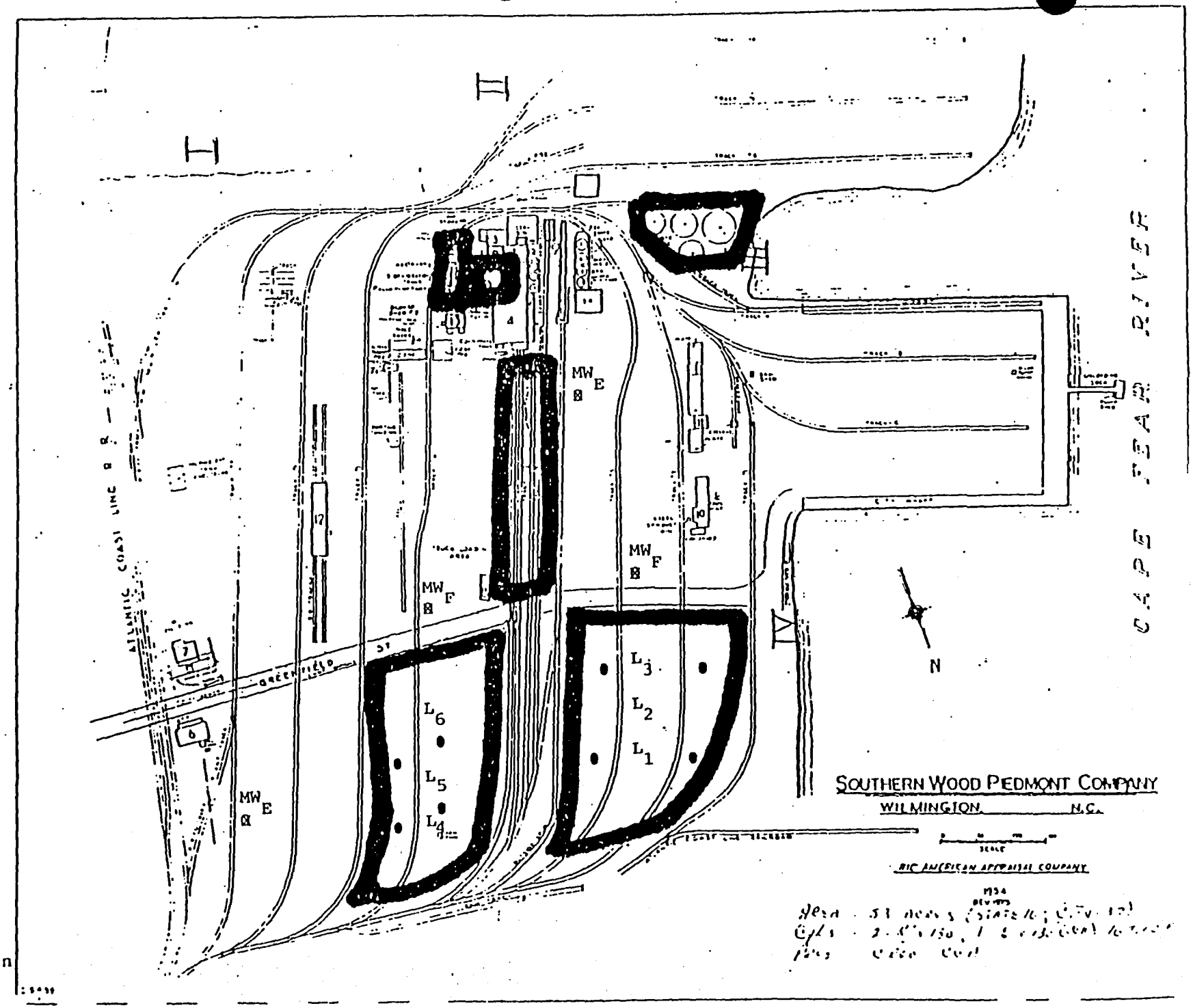
2. Immediately after soil removal, fertilizer will be added at the rate of 200 lbs. per acre and the underlying soil will be tilled, soil moisture content permitting.

3. Tilling will be repeated weekly for the first 12 to 16 weeks, weather permitting, and will be done once per month until the six months.

4. After six months of tilling, soil samples will be obtained at 0-3", 9-12", and 21-24" depths.

5. Soil samples will be composited by depth for each major area and analyzed for organics by G/C.

6. Analytical results will be reviewed with the agency.

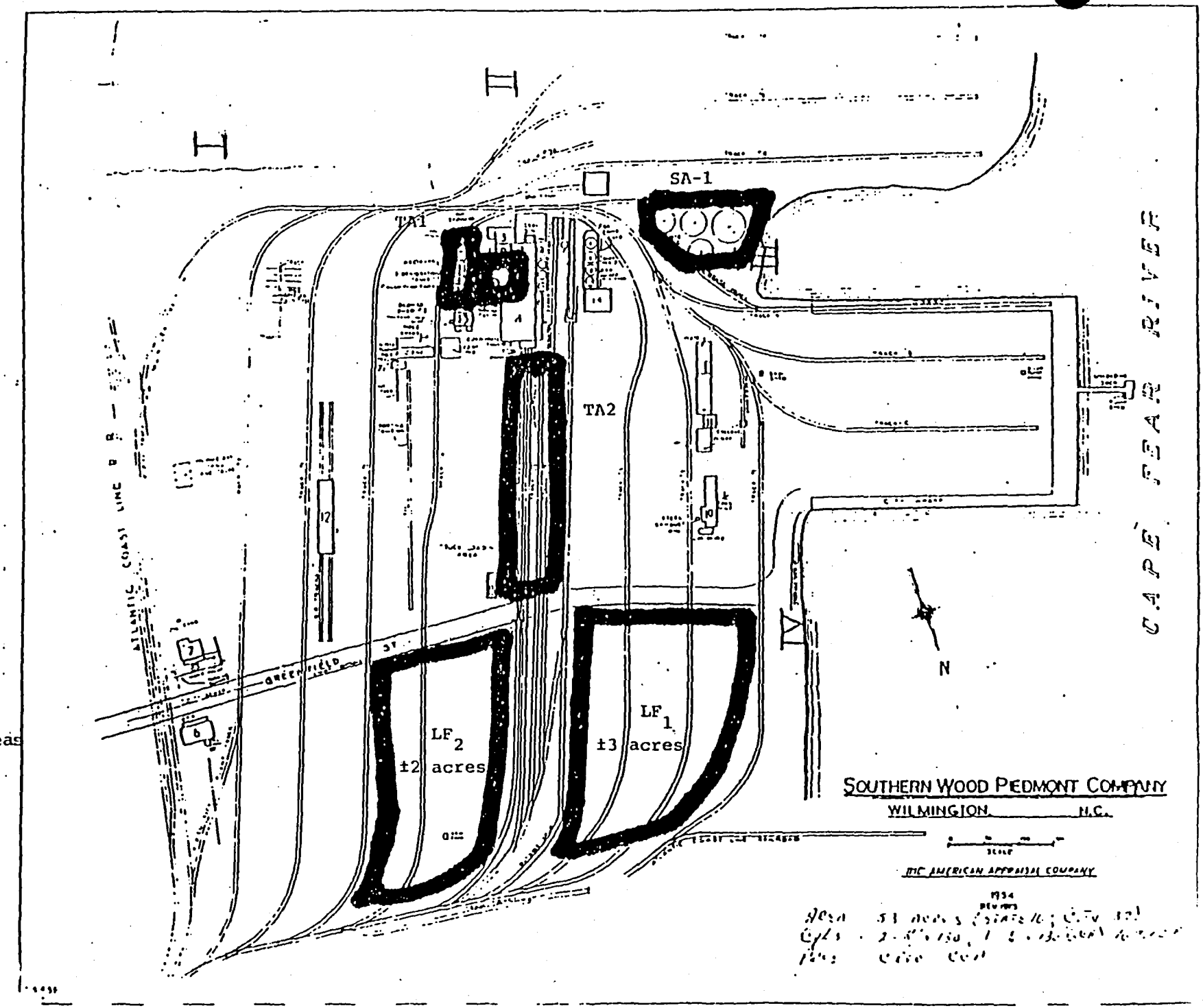


ES:

6=Lysimeters
=Soil Sampling Points
1 =Monitoring Wells
=Existing
=To be added by Law Eng. Recomm la' n

tg. Tank Area
reating Areas
andfarming Areas
±3 acres

±2 acres



METHODS OF ANALYSIS

Phenol - EPA SW846, 261 or Standard Method for Water and Wastes, Method 222

O & G - Standard Method for Water and Wastes, 209A

Organic - Test Methods for Evaluating Solid Waste, SW846, 8040-8100

CCA - Standard Methods for Water and Wastes, 307B (Cu)
104A (As)
308C (Cu)

REFERENCE 7

1. Facility Information

Southern Wood Piedmont
P.O. Box 450 Greenfield Street
Wilmington, NC 28401
New Hanover County
EPA ID# NCD058517467

2. Facility Contact

Henry O. Phillips, Jr., Plant Manager

3. Survey Participants

Henry O. Phillips, Jr., Plant Manager
Raymond L. Church, Jr., District Sanitarian

4. Dates of Inspection

November 19, 1981
November 25, 1981

5. Applicable Regulations

40 CFR Parts 262 and 265, FR May 19, 1980 and Amendments

6. Purpose of Survey

RCRA Interim Status Inspection including review of records and site survey. Regulatory requirments covered included those contained in 40 CFR Part 262 Generator Standards and 40 CFR Part 265 under General Facility Standards, tanks, containers and storage facilities.

7. Facility Description

The Southern Wood Piedmont - Wilmington Plant is located at the foot of Greenfield Street on the bank of the Cape Fear River. The facility is located on a fifty two (52) acre tract of land. Seventeen (17) of those acres being leased from the State of North Carolina Ports Authority and the remaining thirty-five (35) acres is leased from the City of Wilmington.

The Southern Wood Piedmont Company is a wood preserving company, supplying pressure-treated crossties, switch ties, utility poles, lumber, floorblock, cross arms and specialty items. The preservatives used are coal tar creosote (U051), pentachlorophenol (P090) in diesel oil (penta) and chromated copper arsenate ~~arsenic~~ (D007 and D004) (CCA). The facility notified as having a listed process waste (K001), bottom sediment sludges from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol.

The facility operates separate processing production lines, one being the CCA and the other creosote/penta treatment.

The CCA line consists of treatment vessel, diked tank farm with appurtanances and a diked drip area outside and including the treatment vessel. Almost all drippings and spillages within this area are collected by sump and pumped back into the tank farm. Partially filled drums of sorbent contaminated with

CCA are located in this processing area but no shipments of this waste material have been made to date. There was evidence of CCA spillage outside the containment area contaminating the soil.

The creosote-penta line consist of treatment vessel without drip pad, diked tank farm and appartanances, a 54,000 gallon tank with baffels for oil-water separation and a Wemco oil-water separator. The sludge from the 54,000 gallon tank bottom is pumped approximately every five years and is approximately 45,000 pounds. The waste water from this process is batch dumped at a rate of 4,000 - 5,000 gallon/day to the City of Wilmington Waste Water Treatment Plant under waste water treatment permit number 2652. Samples are obtained and analyzed by the POTW prior to the batch dumpings.

The Part A listed a 40,000 gallon surface impoundment. Upon questioning Mr. Phillips it was learned that 40,000 gallons is the approximate volume maintained in the 54,000 gallon tank. He was informed that his Part A should be amended to reflect a 54,000 gallon tank in lieu of a 40,000 gallon suface impoundment. Mr. Phillips was also informed that he should delist as a Transporter since he does not transport waste.

8. Documentation of Site Deficiencies

The Sountern Wood Piedmont Company was deficient in the areas sited below:

1. Failure to inspect the facility for malfunctions and deterioration, operator errors and discharges to the environment. (265.15)
2. Failure to include the job title for each position at the facility related to hazardous waste management, and the name of the employee filling each job. (265.16 (d) (1))
3, Failure to maintain and operate the facility to minimize the possibility of unplanned sudden release of hazardous waste. (Evidence of environmental contamination around processing area.) (265.31)
4. Failure to make arrangements with local authorities to familiarize them with type of waste handled at this facility. (265.37 (a))
5. Failure to include in the contingency plan actions the facility personnel must take to comply with 265.51 and 265.56 in response to fires, explosions, or unplanned sudden or non-sudden release of hazardous waste constituents to air, soil, or surface water at the facility. (265.52 (a))
6. Failure to include in the contingency plan a list of all emergency equipment at the facility. (265.52 (e))
7. Failure to submit copies of the contingency plan to the proper local authorities. (265.53)
8. Failure to include Emergency Procedures in the contingency plan. (265.56)
9. A signed copy of the manifest must be returned from the disposal facility to the generator. Such manifest must be retained by the generator. (262.40 (a))
10. Closure time should be included in the closure plan (265.113)
11. The partially filled containers containing contaminated sorbent should be covered except when necessary to add or remove waste. (265.173)
12. Two feet of freeborad or a containment structure, etc. must be maintained as required under section (265.192 (c)) regulating uncovered tanks containing hazardous waste. (265.192 (c))

REFERENCE 8

DIVISION OF HEALTH SERVICES
P.O. Box 2091
Raleigh, N.C. 27602-2091

August 10, 1984

pf
file

Mr. Walton Jones
EPA 3012 Regional Project Officer
Air and Hazardous Materials Division
345 Courtland Street, N.E.
Atlanta, Georgia 30365

RE: Preliminary Assessment Reports/
Transmittal Letter

Dear Mr. Jones:

Submitted under this cover are the Preliminary Assessment Reports for the following ERRIS List Sites in North Carolina:

North State Chemicals, Inc. — NCD991278839
3301 Spring Garden Street — Guilford County
Greensboro, N. C. 27407

The location noted here is where the facility began operations sometime in 1978 as a processor and reclaimer of industrial chemical wastes. The company had problems with the property owner and moved to another location. The State forced a cleanup of the second location when the company went out of business in 1983. Both sites are "clean" and are not CERCLA hazardous waste disposal sites.

Based on the review of available information we recommend that no further action is required at this site. It is therefore requested that North State Chemicals be placed on the inactive ERRIS List.

Rohm & Haas, Inc. — NCD039047485
Cedar Creek Road — Cumberland County
Fayetteville, N. C. 28302

This listing is an ERRIS List Duplication and therefore request that it be removed from ERRIS. The correct site identification is: Rohm & Haas Co. - Corodel Plant NCD990714479, Cedar Creek Rd, Fayetteville. The correct listing is already on the ERRIS List and a PA is being completed for the site. The RCRA ID number is also NCD990714479.

Note, past disposal activities of Westinghouse may lead to other disposal locations, off-site.

Southern Wood Piedmont Company
Greenfield Street
Wilmington, N. C. 28401

NCD058517467
New Hanover County

This site was the location of a wood treating facility from 1933 to 1983. They used, spilled and disposed on-site creosote residues, pentachlorophenol residues as well as CCA mixtures. The company is trying to address some of the areas of concern under their closure with RCRA. The other areas will not be cleaned-up. The major CERCLA area reported is where creosote sludges and residues were disposed in a lagoon and later buried. The site is on the edge of the Cape Fear River and G-W is reported to be only 18" below the surface. Significant creosote contamination was visible during a site visit on 7-23-84. (Soil & Water)

Based on the review of available information, we recommend a medium priority for site inspection at this site. Therefore it is requested that Southern Wood Piedmont remain on the active ERRIS List as a hazardous waste disposal site.
Note: Site referred to EPA for FIT evaluation and SI.

Southern Wood Piedmont Company
SR #2139
Gulf, N. C. 27256

NCD053488557
Chatham County

This site was reported by the company under a CERCLA 103(c) notification for disposal of creosote, PCP and CCA wood treating residues and sludges on site. The site was recommended for a medium priority for site inspection and referred to EPA for FIT evaluation. It was later learned that a FIT SI had been done in 1983. (Attached)

Based on the review of available information and the FIT SI a low priority for follow-up is recommended. This is based primarily on the conclusion that the FIT SI detected no off-site impact from past disposals. However, it is requested that this site remain on the active ERRIS List.

Note: The company is reportedly planning to do additional site clean-up in the future.

Please find attached the site summary sheet for the above sites.

If you have any questions or comments regarding the contents of this report, please call me.

Sincerely,

Frank E. Moore

Frank E. Moore, Geologist

Solid & Hazardous Waste Management Branch
Environmental Health Section

FEM:jj

PRELIMINARY ASSESSMENTS SUBMITTED TO EPA

Date August 13, 1984

EPA ID NUMBER	SITE NAME	DISPOSITION			
		PRIORITY-INSPECTION			NO FURTHE ACTION
		HIGH	MEDIUM	LOW	
NCD991278839	N. State Chemicals, Inc.				X
NCD039047485	Rohm & Haas, Inc.		(Duplication)		X
NCD990715625	Hoover Universal, Inc.				X
NCD980839757	Indian Grave Gap Drum Disposal		X		
NCD000831065	Photo Chem Systems, Inc.				X
NCD991277807	Woolfolk Chemical Wks.				X
NCD980557920	DuPont/Brevard		(Duplication)		X
NCD003152329	DuPont		X to	X	
NCD080894645	Chloride Automotive Batt.				X
NCD003195963	Westinghouse		X		
NCD058517467	Southern Wood Piedmont		X		
NCD053488557	Southern Wood Piedmont		X to	X	

NCD058517467 NEW HANOVER
SOUTHERN WOOD PIEDMONT CO#
PO BOX 450 GREENFIELD ST
WILMINGTON NC 28401

ASSESSMENT
ION AND ASSESSMENT

01 STATE	02 SITE NUMBER
NC	D058517467

12 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER

04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CC DC
		New Hanover	065	07

09 COORDINATES LATITUDE	LONGITUDE
34 12 45.0	077 57 15.0

10 DIRECTIONS TO SITE (Starting from nearest public road)

Map attached -

III. RESPONSIBLE PARTIES

01 OWNER (If known)	02 STREET (Business, mailing, residential)
City of Wilmington - N.C. Ports Authority	

03 CITY	04 STATE	05 ZIP CODE	06 TELEPHONE NUMBER
Wilmington	NC	28401	( )

07 OPERATOR (If known and different from owner)	08 STREET (Business, mailing, residential)
Southern Wood Piedmont Company	P. O. Box 5447

09 CITY	10 STATE	11 ZIP CODE	12 TELEPHONE NUMBER
Spartanburg	SC	29304	(803) 576-7660

13 TYPE OF OWNERSHIP (Check one)

☒ A. PRIVATE ☐ B. FEDERAL: _____ (Agency name) ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL

☐ F. OTHER: _____ (Specify) ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)

☐ A. RCRA 3001 DATE RECEIVED: / / (MONTH DAY YEAR) ☒ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: / / (MONTH DAY YEAR) ☐ C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 SITE INSPECTION

☒ YES DATE 7 / 23 / 84 (MONTH DAY YEAR)
☐ NO

BY (Check all that apply)

☐ A. EPA ☐ B. EPA CONTRACTOR ☒ C. STATE ☐ D. OTHER CONTRACTOR
☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: _____ (Specify)

CONTRACTOR NAME(S): _____

02 SITE STATUS (Check one)	03 YEARS OF OPERATION
☐ A. ACTIVE ☒ B. INACTIVE ☐ C. UNKNOWN	1933 (BEGINNING YEAR) 1983 (ENDING YEAR) ☐ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED

Creosote, pentachlorophenol (PCP), and CCA wood preserving residues. Severa disposal areas on site, with spills, leaks and drippings in production areas (52 ac. tract)

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION

Surface and G-W contamination known as well as several acres of soil contamination. Part of the area is being addressed under RCRA - Most will not be. This site is adjacent to Cape Fear River. Referred to FIT Gov for SI.

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)

☐ A. HIGH (Inspection required promptly) ☒ B. MEDIUM (Inspection required) ☐ C. LOW (Inspect on time available basis) ☐ D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NUMBE
William Paige	Engr. S& HW Mgt. Br., N. C.	(919) 733-21

PERSON RESPONSIBLE FOR ASSESSMENT	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NUMBER	08 DATE
O. W. Strickland	DHR	S&HW Mgt. Br.	(919) 733-2178	7 / 24 / 84 (MONTH DAY YEAR)

FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

01 STATE	02 SITE NUMBER
NC	D058517467

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- [X] A. SOLID
- [X] POWDER, FINES
- [X] SLUDGE
- [ ] E. SLURRY
- [X] F. LIQUID
- [ ] G. GAS
- [ ] D. OTHER _____ (Specify)

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

TONS _____

CUBIC YARDS Unknown

NO. OF DRUMS _____

03 WASTE CHARACTERISTICS (Check all that apply)

- [X] A. TOXIC
- [ ] B. CORROSIVE
- [ ] C. RADIOACTIVE
- [X] D. PERSISTENT
- [X] E. SOLUBLE
- [ ] F. INFECTIOUS
- [ ] G. FLAMMABLE
- [ ] H. IGNITABLE
- [X] I. HIGHLY VOLATILE
- [ ] J. EXPLOSIVE
- [ ] K. REACTIVE
- [ ] L. INCOMPATIBLE
- [ ] M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE	Yes		~~Several on-site disposal areas~~
OLW	OILY WASTE	500,000	gallons	~~estimate of ditch 500' x 25'x~~
SOL	SOLVENTS			
PSD	PESTICIDES			
CCC	OTHER ORGANIC CHEMICALS	yes		
ICC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS	Yes		~~Chromium from CCA~~

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
SLU	Creosote		Landfill & OD		
OLW	Creosote		Landfill		
	Pentachlorophenol	87-86-5			
CCC	PCP (penta)	87-86-5	OD LF		
MES	CCA Chromated,		OD LF		
	Copper Arsenate				

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., State files, sample analysis, reports)

JRA Files
Site Visit 7-23-84

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	D058517467

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 [X] A. GROUNDWATER CONTAMINATION — 02 [ ] OBSERVED (DATE: 7-23-84) — [X] POTENTIAL — [X] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ---- — 04 NARRATIVE DESCRIPTION

G-W is contaminated - oil sheen visable on water. Water table reported 18" below surface - discharge to Cape Fear River and Greenfield Creek.

01 [X] B. SURFACE WATER CONTAMINATION — 02 [ ] OBSERVED (DATE: 7-23-84) — [X] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: --- — 04 NARRATIVE DESCRIPTION

Observed oily sheen on water in several areas on site.

01 [X] C. CONTAMINATION OF AIR — 02 [ ] OBSERVED (DATE: 7-23-84) — [ ] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: — 04 NARRATIVE DESCRIPTION

Votatiles coming off "tars" in large storage tanks

01 [X] D. FIRE/EXPLOSIVE CONDITIONS — 02 [ ] OBSERVED (DATE:) — [X] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: — 04 NARRATIVE DESCRIPTION

In tank storage area - large tanks were cut open to clean out the bottoms. Very high BTU & votatile.

01 [ ] E. DIRECT CONTACT — 02 [ ] OBSERVED (DATE:) — [ ] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: — 04 NARRATIVE DESCRIPTION

N/A

01 [X] F. CONTAMINATION OF SOIL — 02 [ ] OBSERVED (DATE: 7-23-84) — [ ] POTENTIAL — [ ] ALLEGED
03 AREA POTENTIALLY AFFECTED: 50 ac. (Acres) — 04 NARRATIVE DESCRIPTION

Contamination is greater in tank storage and production areas - less in finished product storage areas - plus disposal sites. (see maps)

01 [ ] G. DRINKING WATER CONTAMINATION — 02 [ ] OBSERVED (DATE:) — [ ] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: — 04 NARRATIVE DESCRIPTION

None reported

01 [ ] H. WORKER EXPOSURE/INJURY — 02 [ ] OBSERVED (DATE:) — [ ] POTENTIAL — [ ] ALLEGED
03 WORKERS POTENTIALLY AFFECTED: — 04 NARRATIVE DESCRIPTION

None reported

01 [ ] I. POPULATION EXPOSURE/INJURY — 02 [ ] OBSERVED (DATE:) — [ ] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: — 04 NARRATIVE DESCRIPTION

N/A

EPA

TENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT

PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	D058517467

II. ARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☒ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: 7-23-84) ☐ POTENTIAL ☐ ALLEGED

04 NARRATIVE DESCRIPTION

Some stressed vegatation in disposal areas.

01 ☒ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) ☒ POTENTIAL ☐ ALLEGED

04 NARRATIVE DESCRIPTION (Include name(s) of species)

Unknown

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: _____) ☒ POTENTIAL ☐ ALLEGED

04 NARRATIVE DESCRIPTION

Unknown

01 ☒ M. UNSTABLE CONTAINMENT OF WASTES (Spills/runoff/standing liquids/leaking drums) — 02 ☐ OBSERVED (DATE: 7-23-84) ☒ POTENTIAL ☐ ALLEGED

03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

Disposal in land filled areas and a ditch area as well as in production areas

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED

04 NARRATIVE DESCRIPTION

Unknown

01 ☒ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☒ ALLEGED

04 NARRATIVE DESCRIPTION

Unknown - materials were discharged to sewer WWTP

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED

04 NARRATIVE DESCRIPTION

Unknown

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: _____

IV. COMMENTS

Although RCRA is trying to address this site many areas of concern will remai untouched.

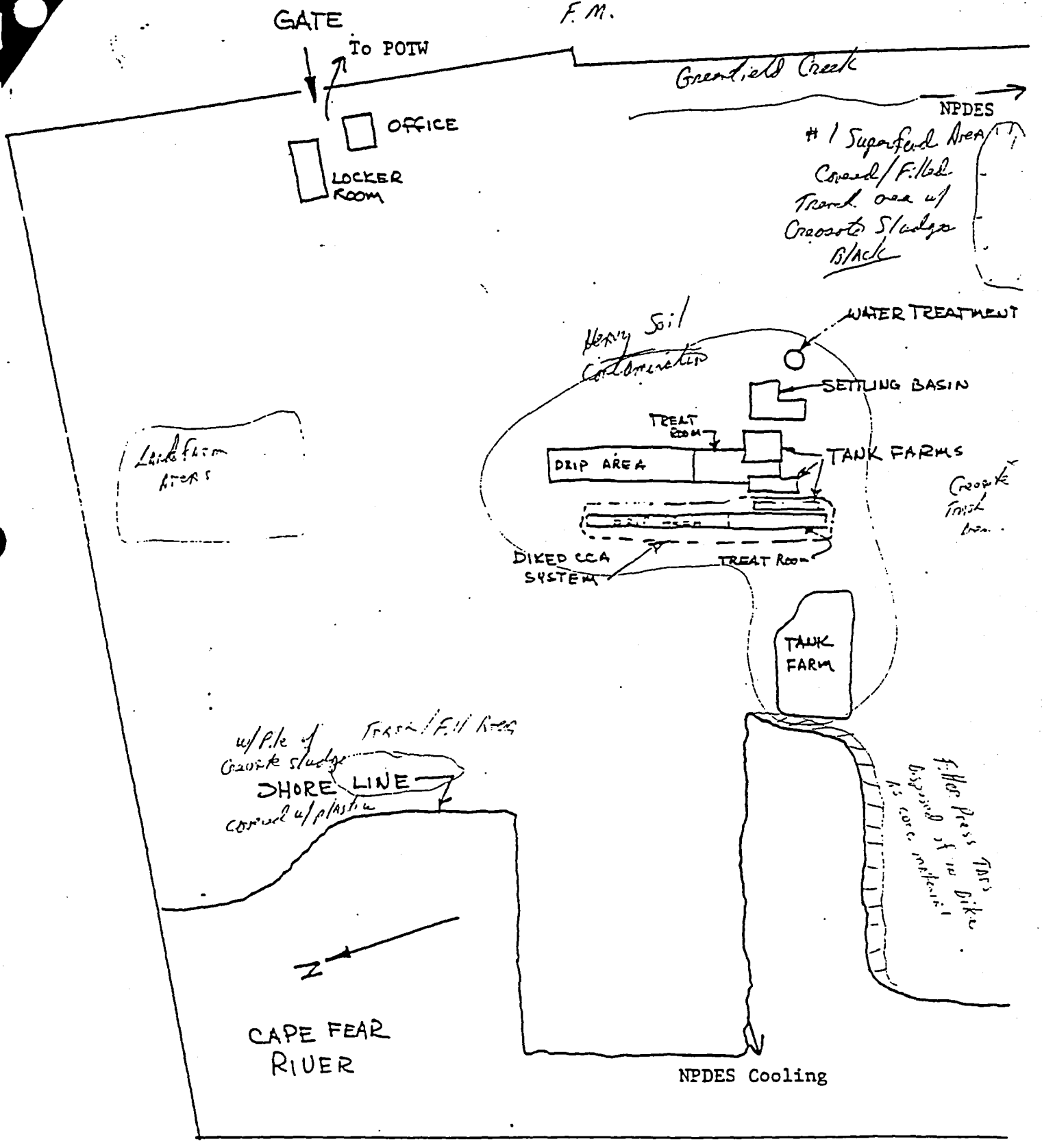
V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Site visit 7-23-84
RCRA Files

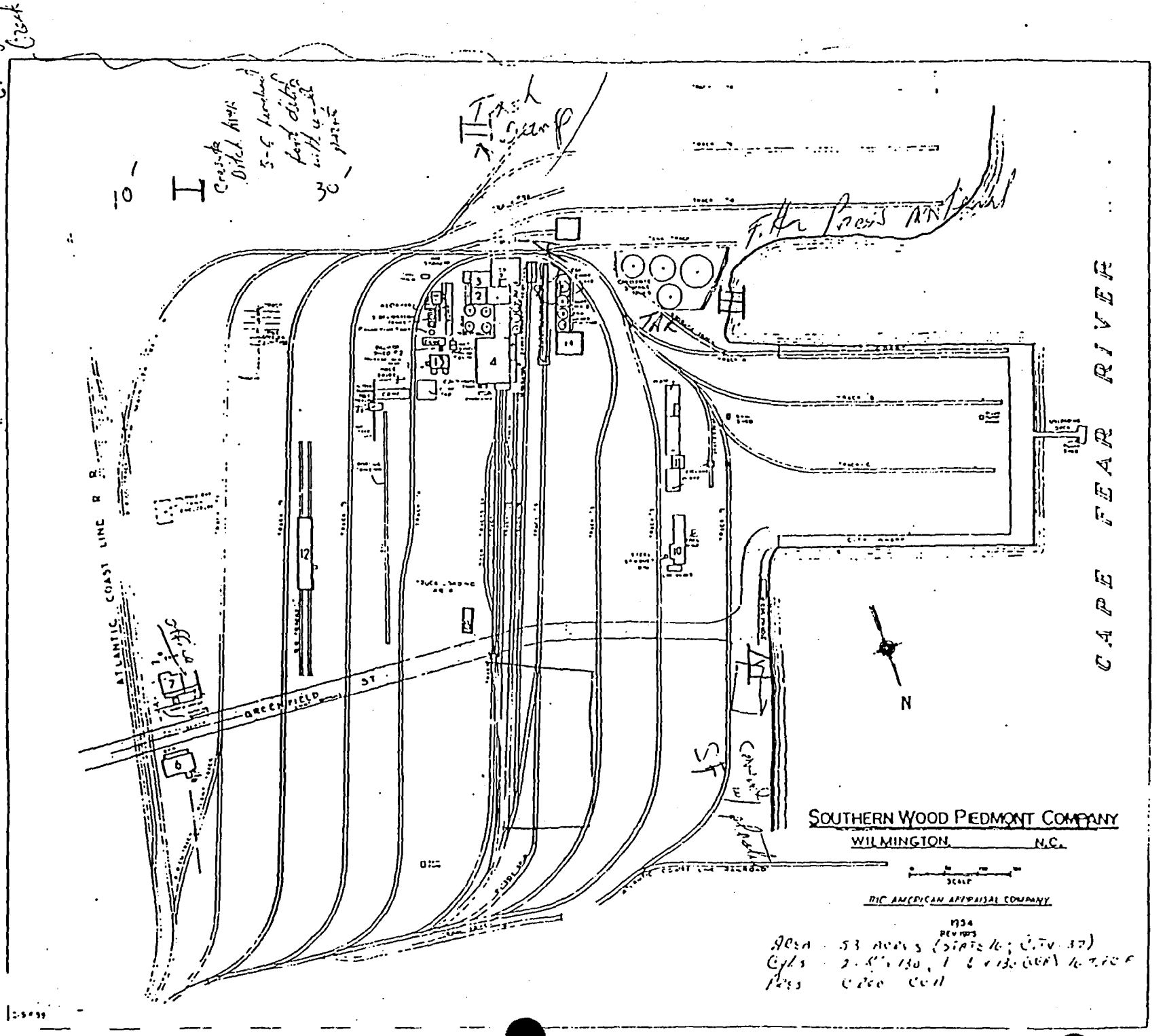
NG (see page 4)

WILMINGTON

Sketch & Notes
Site Visit 7-27-84
F.M.



0 60 120 180'


CAPE FEAR RIVER
ATLANTIC COAST LINE R R
GREENFIELD ST
N
SOUTHERN WOOD PIEDMONT COMPANY
WILMINGTON N.C.
SCALE
THE AMERICAN APPRAISAL COMPANY
1934
REV 1973

PRELIMINARY ASSESSMENTS SUBMITTED TO EPA

Date August 13, 1984

EPA ID NUMBER	SITE NAME	DISPOSITION			
		PRIORITY-INSPECTION			NO FURTHER ACTION
		HIGH	MEDIUM	LOW	
NCD991278839	N. State Chemicals, Inc.				X
NCD039047485	Rohm & Haas, Inc.		(Duplication)		X
NCD990715625	Hoover Universal, Inc.				X
NCD980839757	Indian Grave Gap Drum Disposal		X		
NCD000831065	Photo Chem Systems, Inc.				X
NCD991277807	Woolfolk Chemical Wks.				X
NCD980557920	DuPont/Brevard		(Duplication)		X
NCD003152329	DuPont		X	to X	
NCD080894645	Chloride Automotive Batt.				X
NCD003195963	Westinghouse		X		
NCD058517467	Southern Wood Piedmont		X		
NCD053488557	Southern Wood Piedmont		X	to X	

POTENTIAL HAZARDOUS WASTE SITE
ASSESSMENT
ION AND ASSESSMENT

NCD058517467 NEW HANOVER
SOUTHERN WOOD PIEDMONT CO#
PO BOX 450 GREENFIELD ST
WILMINGTON NC 28401

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	D058517467

02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER

04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
		New Hanover	065	07

09 COORDINATES LATITUDE	LONGITUDE
34 12 45.0	077 57 15.0

10 DIRECTIONS TO SITE (Starting from nearest public road)

Map attached -

III. RESPONSIBLE PARTIES

01 OWNER (If known)	02 STREET (Business, mailing, residential)
City of Wilmington - N.C. Ports Authority	

03 CITY	04 STATE	05 ZIP CODE	06 TELEPHONE NUMBER
Wilmington	NC	28401	( )

07 OPERATOR (If known and different from owner)	08 STREET (Business, mailing, residential)
Southern Wood Piedmont Company	P. O. Box 5447

09 CITY	10 STATE	11 ZIP CODE	12 TELEPHONE NUMBER
Spartanburg	SC	29304	(803) 576-7660

13 TYPE OF OWNERSHIP (Check one)

☒ A. PRIVATE ☐ B. FEDERAL: _____ (Agency name) ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL
☐ F. OTHER: _____ (Specify) ☐ G. UNKNOWN

OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)

☐ A. RCRA 3001 DATE RECEIVED: ___ / ___ / ___ (MONTH DAY YEAR) ☒ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: ___ / ___ / ___ (MONTH DAY YEAR) ☐ C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

ON SITE INSPECTION
☒ YES DATE 7 / 23 / 84 (MONTH DAY YEAR)
☐ NO

BY (Check all that apply)
☐ A. EPA ☐ B. EPA CONTRACTOR ☒ C. STATE ☐ D. OTHER CONTRACTOR
☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: _____ (Specify)

CONTRACTOR NAME(S): _____

02 SITE STATUS (Check one)
☐ A. ACTIVE ☒ B. INACTIVE ☐ C. UNKNOWN

03 YEARS OF OPERATION
1933 (BEGINNING YEAR) | 1983 (ENDING YEAR) ☐ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED

Creosote, pentachlorophenol (PCP), and CCA wood preserving residues. Several disposal areas on site, with spills, leaks and drippings in production areas. (52 ac. tract)

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION

Surface and G-W contamination known as well as several acres of soil contamination. Part of the area is being addressed under RCRA - Most will not be. This site is adjacent to Cape Fear River. Referred to FIT for SI.

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)

☐ A. HIGH (Inspection required promptly) ☒ B. MEDIUM (Inspection required) ☐ C. LOW (Inspect on time available basis) ☐ D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NUMBER
William Paige	Engr. S& HW Mgt. Br.; N. C.	919) 733-217

04 PERSON RESPONSIBLE FOR ASSESSMENT	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NUMBER	08 DATE
O. W. Strickland	DHR	S&HW Mgt. Br.	(919) 733-2178	7 / 24 / 84 (MONTH DAY YEAR)

FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NC	D058517467

II. STATES, QUANTITIES, AND CHARACTERISTICS

01 STATES (Check all that apply)

- ☐ A. SOLID
- ☐ B. POWDER, FINES
- ☐ C. SLUDGE
- ☐ D. OTHER _____ (Specify)
- ☐ E. SLURRY
- ☒ F. LIQUID
- ☐ G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

TONS _____

CUBIC YARDS Unknown

NO. OF DRUMS _____

03 WASTE CHARACTERISTICS (Check all that apply)

- ☒ A. TOXIC
- ☐ B. CORROSIVE
- ☐ C. RADIOACTIVE
- ☒ D. PERSISTENT
- ☒ E. SOLUBLE
- ☐ F. INFECTIOUS
- ☐ G. FLAMMABLE
- ☐ H. IGNITABLE
- ☒ I. HIGHLY VOLATILE
- ☐ J. EXPLOSIVE
- ☐ K. REACTIVE
- ☐ L. INCOMPATIBLE
- ☐ M. NOT APPLICABLE

WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE	Yes		Several on-site disposal areas
OLW	OILY WASTE	500,000	gallons	estimate of ditch 500' x 25'x5
SOL	SOLVENTS			
PSD	PESTICIDES			
CCC	OTHER ORGANIC CHEMICALS	yes		
ICC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS	Yes		Chromium from CCA

III. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
SLU	Creosote		Landfill & OD		
OLW	Creosote		Landfill		
	Pentachlorophenol	87-86-5			
OOC	PCP (penta)	87-86-5	OD LF		
MES	CCA Chromated,		OD LF		
	Copper Arsenate				

IV. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

RCRA Files
Site Visit 7-23-84

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: NC
02 SITE NUMBER: D058517467

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 [X] A. GROUNDWATER CONTAMINATION ---- 02 [ ] OBSERVED (DATE: 7-23-84) [X] POTENTIAL [X] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

G-W is contaminated - oil sheen visable on water. Water table reported 18" below surface - discharge to Cape Fear River and Greenfield Creek.

01 [X] B. SURFACE WATER CONTAMINATION --- 02 [ ] OBSERVED (DATE: 7-23-84) [X] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

Observed oily sheen on water in several areas on site.

01 [X] C. CONTAMINATION OF AIR 02 [ ] OBSERVED (DATE: 7-23-84) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

Votatiles coming off "tars" in large storage tanks

01 [X] D. FIRE/EXPLOSIVE CONDITIONS 02 [ ] OBSERVED (DATE: _____) [X] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

In tank storage area - large tanks were cut open to clean out the bottoms. Very high BTU & votatile.

01 [ ] E. DIRECT CONTACT 02 [ ] OBSERVED (DATE: _____) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

N/A

01 [X] F. CONTAMINATION OF SOIL 02 [ ] OBSERVED (DATE: 7-23-84) [ ] POTENTIAL [ ] ALLEGED
03 AREA POTENTIALLY AFFECTED: 50 ac. (acres) 04 NARRATIVE DESCRIPTION

Contamination is greater in tank storage and production areas - less in finished product storage areas - plus disposal sites. (see maps)

01 [ ] G. DRINKING WATER CONTAMINATION 02 [ ] OBSERVED (DATE: _____) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

None reported

01 [ ] H. WORKER EXPOSURE/INJURY 02 [ ] OBSERVED (DATE: _____) [ ] POTENTIAL [ ] ALLEGED
03 WORKERS POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

None reported

01 [ ] I. POPULATION EXPOSURE/INJURY 02 [ ] OBSERVED (DATE: _____) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

N/A

EPA

TENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NC	D058517467

RDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: 7-23-84) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Some stressed vegatation in disposal areas.

01 ☒ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include name(s) of species)

Unknown

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Unknown

01 ☒ M. UNSTABLE CONTAINMENT OF WASTES (Spills/runoff/standing liquids/flooding/erosion) — 02 ☐ OBSERVED (DATE: 7-23-84) ☒ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

Disposal in land filled areas and a ditch area as well as in production areas

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

nknown

01 ☒ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☒ ALLEGED
04 NARRATIVE DESCRIPTION

Unknown - materials were discharged to sewer WWTP

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Unknown

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: _____

IV. COMMENTS

Although RCRA is trying to address this site many areas of concern will remai untouched.

SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

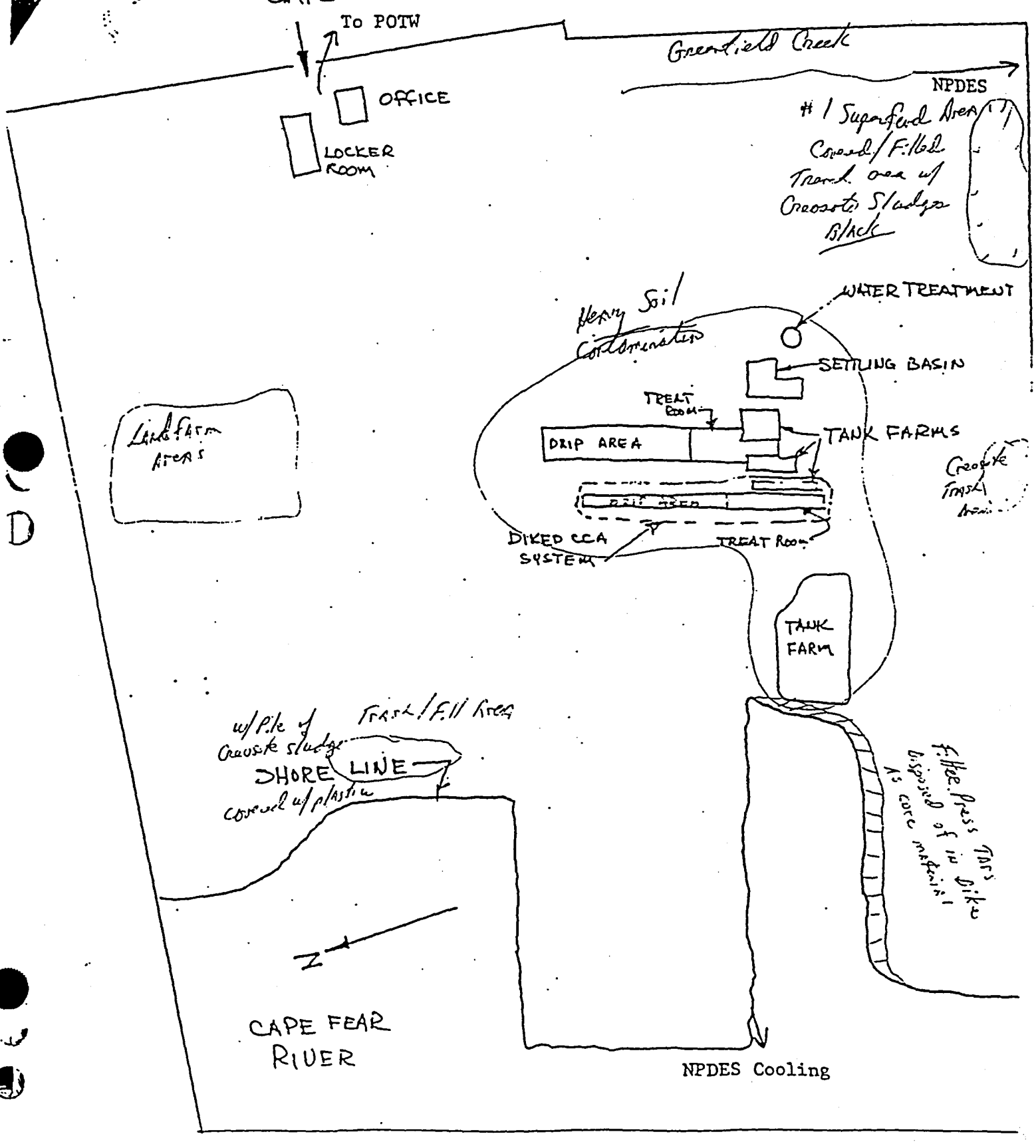
Site visit 7-23-84
RCRA Files

EPA FORM 2070-12 (7-81)

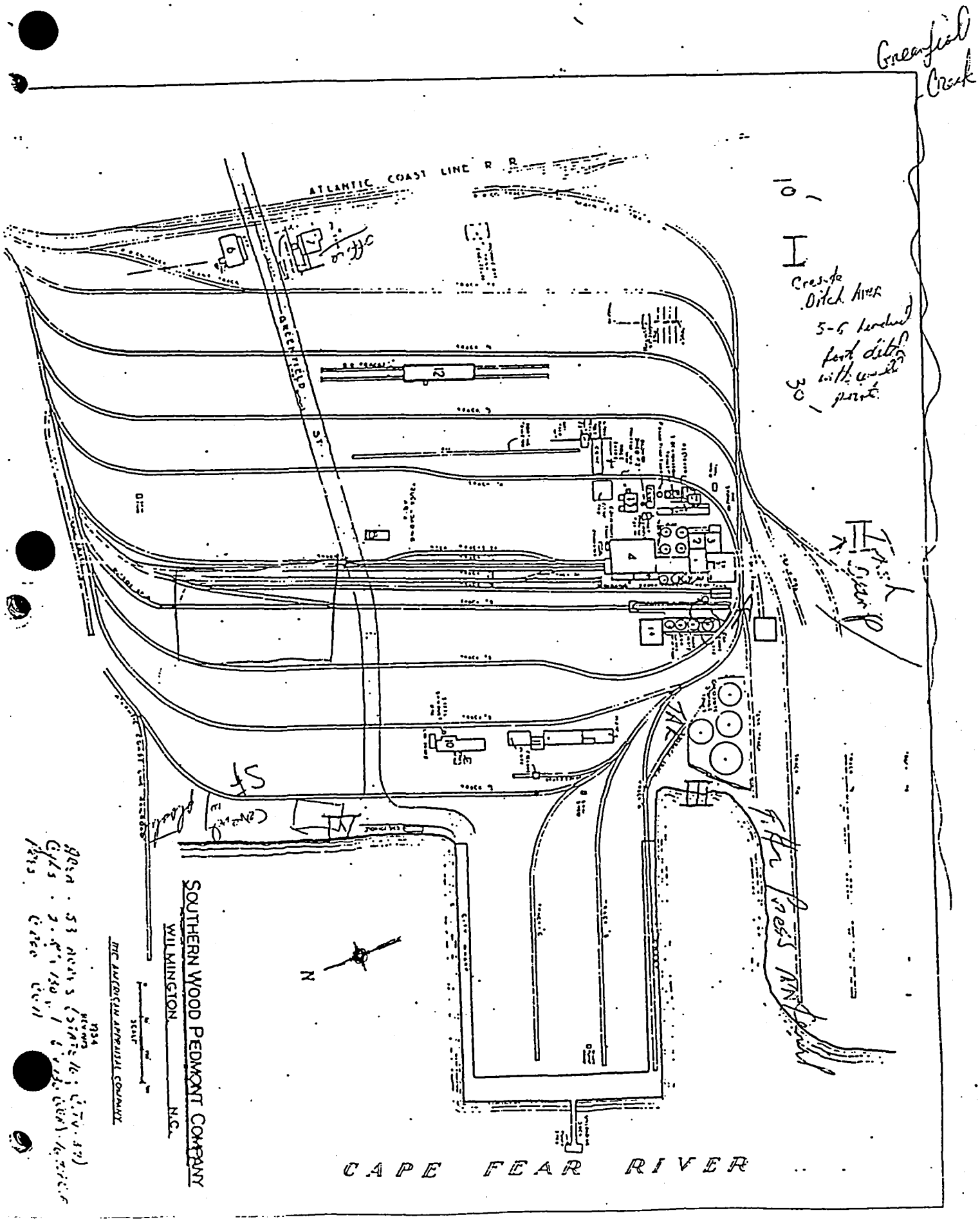
Form Approved OMB No. 158-S80004

WILMINGTON

Sketch & Notes
Site Visit 7-23-84
F.M.



ATTACHMENT 1



REFERENCE 9

STATE OF NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES

DEPARTMENT OF HEALTH SERVICES

In Re: SOUTHERN WOOD PIEDMONT COMPANY NCD058517467	)))	ADMINISTRATIVE ORDER ON CONSENT

BACKGROUND

From about 1964 to 1983, Southern Wood Piedmont Company (Southern Wood), a subsidiary of ITT Rayonier, Inc., a Delaware corporation, owned and operated a plant in Wilmington, North Carolina, which engaged in the business of wood preserving. The preservatives used were creosote coal tar, pentachlorophenol (PCP) in diesel oil and copper, chromate and arsenate (known as CCA). As part of that operation, residues were deposited in several locations on the plant site. The areas, identified in Southern Wood's February 13, 1983, correspondence to Mr. William Paige, Environmental Engineer, are summarized in Attachment I and shown in the map in Attachment II.

AGREEMENT

In order to resolve a dispute regarding the applicability of the Resource Conservation and Recovery Act (RCRA) and the Solid Waste Management Act and rules (N.C.G.S. 130-A, Article 9 and 10 NCAC 10 F), and to avoid costly protracted litigation, Southern Wood and the State do hereby enter into this Administrative Order on Consent (Consent Order).

The purpose of this Order is to address soil and ground water contamination and to provide clean-up/remedial actions which will minimize the site's impact on the environment and public health in a manner which is consistent with the State and Federal hazardous waste laws and rules.

public health and environment, Southern Wood Piedmont and the State, by and through their authorized representatives, do enter into the following Consent Order and agree:

1. That Southern Wood is a Delaware corporation, which rents a plant site in North Carolina at Wilmington owned by the city of Wilmington and the Port Authority of the State.
2. That, to protect the public health and environment, the Solid and Hazardous Waste Management Branch, Environmental Health Section, Department of Human Resources of the State of North Carolina (State) is empowered to implement and seek compliance with the standards for generation, transportation, treatment, storage and disposal of waste pursuant to the Solid Waste Management Act, N.C.G.S. Chapter 130-A (Act), and the rules promulgated thereunder at 40 CFR 260-271, codified at 10 NCAC 10 F (rules). The State has been authorized to implement the State program in lieu of the Federal hazardous waste program under the Resource Conservation and Recovery Act (RCRA). William L. Meyer, Head of the Branch, has been delegated those responsibilities.
3. This Consent Order shall apply and be binding upon Southern Wood, its successors and assigns and upon all persons or firms acting under or for them. Southern Wood shall provide a copy of this Consent Order to each contractor or other person performing any work under this Order and shall condition each contract or agreement for such work upon these Consent Order terms.
4. That nothing in this Consent Order shall be construed as limiting the

5. That nothing herein shall be construed to affect any rights, claims or defenses as may exist between Southern Wood and any other person or entity.

6. That the State shall suspend the Compliance Order and Notice of Penalty, dated September 7, 1984, if compliance with this Consent Order is achieved as set forth herein. If compliance with this Order is not achieved, the September 7, 1984, Order and penalty shall become effective immediately upon written notice.

7. That Southern Wood shall continue with the ongoing remedial action being implemented in the operating areas as set forth in the remedial action plan submitted to the State on July 31, 1984, as modified by the terms of this Order. This action currently consists of land treatment to reduce the oil preservative residuals in contaminated soil to an acceptable residual level. The land treatment shall be conducted on treated pole storage areas where there are presently low levels of preservative residuals in the soil.

The contaminated areas described below shall be addressed in the following manner:

a. Superfund Area I

Excavate this area and landfarm the discolored soil in one of the treated pole storage areas.

b. Track Area

Remove the visually, heavily contaminated soil and landfarm in a treated pole storage area.

c. Oil Treating Areas

Remove the visually, heavily contaminated soil and landfarm in a treated pole storage area.

d. Large Storage Tank Containment Area

Remove the visually, heavily contaminated soil and landfarm in a treated pole storage area.

e. Treated Product Storage Area

The treated pole storage areas not used for landfarming of heavily contaminated soil shall be tilled in place.

f. CCA Storage Tank Area

Soil testing 0.5PPM arsenic or greater on the basis of the EP toxicity test for arsenic will be excavated from the site, but not from a depth in excess of five feet. Soil testing greater than 5.0 PPM arsenic will be sent offsite to a permitted land disposal facility, while soil which contains between 5.00 PPM and 0.5PPM arsenic will be mixed with Portland cement in a ratio which does not allow arsenic to extract above 0.5PPM as determined by the EP toxicity test. The treated material will then be buried on site.

g. Storage Tank Sludges

Remove the CCA sludge for disposal in a hazardous waste landfill. Remove the sludges from the bottom of the various oil tanks for disposal or energy recovery in a State approved landfill, incinerator, or boiler that has no outstanding Class I RCRA violations, or a landfill or combustion process out of the State which is approved by the environmental agency of the state concerned.

h. The landfarming will be done in an area identified as LF1 or LF2, or both, if needed, as outlined on the plant layout diagram (Attachment II).

i. The designated landfarm areas will be bermed and ditched to prevent rain runoff or runon.

j. Lysimeters will be installed at depths sufficient to monitor soil water quality. These lysimeters shall be protected to prevent damage by tilling equipment. Three down gradient monitoring wells and one upgradient monitoring well shall be installed to monitor groundwater quality. Groundwater monitoring devices shall be in accordance with the standards established by the Division of Environmental Management, Department of Natural Resources.

k. Contaminated soil from the areas identified earlier shall be spread not to exceed a maximum two-inch layer over the landfarm area. Land treatment shall be limited to the upper six inches.

l. The application of a commercial fertilizer shall be determined based upon soil analysis.

m. The soil will be tilled weekly, weather permitting, to promote biological and photochemical breakdown of treating chemical residuals.

n. Tillage and aeration of the land treatment areas shall continue until residual concentrations are determined not to have a significant impact on the public health and the environment as determined by the State.

8. That Southern Wood shall adhere to the following sampling and testing schedule:

   a. Lysimeters will be sampled prior to application of contaminated soil to the landfarm areas, and every two months thereafter.

   b. Soil will be sampled immediately after the initial tilling is completed. Samples will be obtained at 0-3", 9-12", and 21-24" depths. The soil sampling will be in accordance with SW 846.

   c. All samples (soil, water) will be analyzed for PCP and the major constituents of creosote.

   d. The sample results shall be submitted to this agency within 7 days after analysis.

9. All sampling and analysis shall be in accordance with EPA Publication, SW-846, "Test Methods for Evaluating Solid Waste" as revised.

10. That the landfarming operation will continue until a concentration of residual PCP and major constituents of creosote is reached which will protect public health and the environment. At this time it is not known what these concentrations are or how long it will take to reach them, but it is possible that up to two years may be required to stabilize the waste taken from Superfund Area I. Nothing in this order shall be interpreted to preclude Southern Wood from exercising its right to challenge any State determination as to safe residual concentrations if the company does not agree with such determination.

11. It is recognized that groundwater flow under the site is towards the Cape Fear River and that any contaminants reaching the groundwater from the site should eventually reach the river. Accordingly, Southern Wood will monitor the Cape Fear River upstream and downstream from the site to see if any water quality standard which could be affected by residues at the site is causing a violation of state water quality standards. Such monitoring shall be done at least twice per year during the time the land treatment operation to which this Order is in process. Further action to protect surface water quality standards or groundwater may be required by the Department of Human Resources or the Department of Natural Resources and Community Devlopment pursuant to Chapter 143, Articles 21, 21A, and Chapter 87, Article 7 of the North Carolina General Statutes and 15 NCAC 2C, 2E, and 2L depending on the results of such monitoring, and the parties expressly reserve their respective rights with respect to such further action.

12. That Southern Wood shall arrange with the owners of the property, City of Wilmington and the State Port Authority, to provide the notice in the deed that the land has been used for hazardous waste as required by 40 CFR 265.120 codified at 10 NCAC 10 F .0033.

13. That Southern Wood shall complete the clean-up remedial steps authorized in the Consent Order and the Plan in paragraph 7(f) & (g) by November 1, 1985, and shall also commence land treatment of contaminated soil from areas a, b, c, d, and e as described in paragraph 7 by November 1, 1985.

14. The scope of the State's overview shall consist of the following:

    a. The option to inspect the work performed and to collect and perform analysis of waste and soil samples upon any phase completion.

    b. A comprehensive site inspection and record review after June 1, 1985 to determine compliance with the approved plan and other terms of the order.

15. The Branch shall designate Mr. William Paige, Environmental Engineer, as the primary contact for technical matters concerning the implementation of the plan. Mr. Jerry Rhodes, Environmental Chemist, will be available upon Mr. Paige's absence. Other Branch resources may be used for review and inspection as determined by Mr. Paige or Mr. Rhodes.

16. Southern Wood will designate one person as the primary contact for technical matters concerning implementation of the plan.

IN WITNESS WHEREOF, the parties have executed this Agreement, on this the 20th day of May, 1985, by their duly authorized representatives.

Solid and Hazardous Waste Management
Branch, Environmental Health Section
Division of Health Services
Department of Human Resources of the
State of North Carolina

By: William L. Meyer
William L. Meyer, Head

Southern Wood Piedmont Company

By: Timothy H. Brannon
Vice President and Chief Operator

Attachment I

DEPOSITS REPORTED UNDER SUPERFUND

1. Superfund Area I, Covered Sludge Ditch
An area described as a covered ditch containing creosote sludges from early plant operations. The location is on property leased fron the State's Port Authority.

2. Superfund Area II. Trash Dump Area
An area described as a general waste landfill used by the plant for many years. It is believed to consist almost exclusively of wood waste, dirt, and metal waste. Small amounts of creosote cleanup material may also have been deposited here.

3. Superfund Area III, Dike Area
An area containing old, hard and solid creosote residuals similar to road tar were disposed of in an area near the south slip.

4. Superfund Area IV, Trash Fill Area
Located in the north slip, this area was filled with mill waste consisting of mainly wood waste and metal bands. Some creosote sludge was deposited on the top of part of this area.

OPERATING AREA DEPOSITS

1. Track Area
An area located in front of a treatment cylinder. Residual samples collected by Southern Wood suggest contamination to a depth of approximately six (6) inches.

2. Oil Treating Areas
The soil areas around both oil treating room buildings contain treating chemical residuals. Soil around the working tanks is noticeably contaminated with oil to a depth of approximately two feet. The soil area around the waste water-oil recovered tank system is noticeably discolored to about a one foot depth.

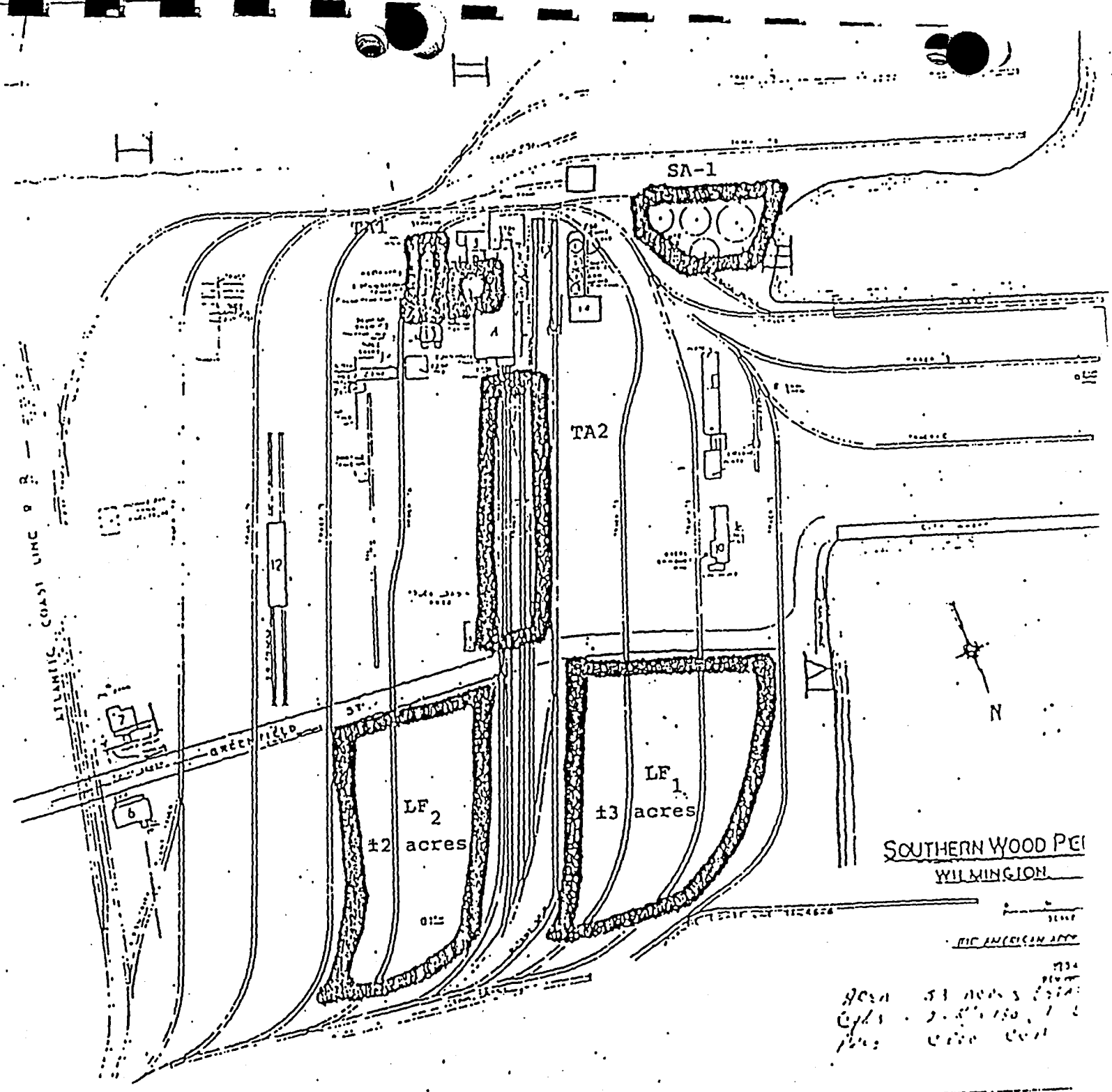
3. Large Storage Tank Containment Area
The soil in this area contains creosote residuals to a depth of approximately one foot.

4. Treated Product Storage Areas
Relatively large areas on both State Port Authority property and City of Wilmington property contain creosote residuals in the soil as evidenced by some discoloration. These are areas where the treated poles were stored prior to shipment.

5. CCA Storage Tank Area
Soil around the CCA storage tanks is discolored due to CCA residuals.

6. Storage Tank Sludges
Varying amounts of sludge is present in the bottom of the various treating tanks.

ATTACHMENT 7



ES:
S..=Stg. Tank Area
TA=Treating Areas
LF=Landfarming Areas
LF_1=±3 acres
LF_2=±2 acres

North Carolina Department of Human Resources
Division of Health Services
P.O. Box 2091 • Raleigh, North Carolina 27602-2091

James G. Martin, Governor
Phillip J. Kirk, Jr., Secretary

Ronald H. Levine, M.D., M.P.H.
State Health Director
919/733-3446

May 22, 1985

Roger H. Watts
Vice President and General Counsel
ITT Rayonier, Inc.
1177 Summer Street
Stamford, CT 06904

Re: Southern Wood Piedmont: NCD058517467
Administrative Order on Consent

Dear Mr. Watts:

On May 20, 1985, Mr. Meyer, Branch Head, signed the Consent Order which was executed earlier by Southern Wood Piedmont. Your re-draft of paragraph 13 was acceptable to him.

As we discussed, Southern Wood will need to withdraw, in writing, their request for an administrative hearing. Partha Howell, of the hearing office, was notified orally of that request on May 20, 1985.

Also, Southern Wood will need to designate one person as the primary contact, referred to in paragraph 16, for ensuring compliance with the Order. Pursuant to our discussions, Mike Pruett will be that contact until further notice.

We look forward to working with you to address conditions at this site. If I can be of assistance, particularly with the recordation issue, please let me know.

Sincerely,

Prentiss Anne Allen

Prentiss Anne Allen, Branch Attorney
Solid & Hazardous Waste Mgt. Branch
Environmental Health Section

PAA/bb/2721
Enclosure

cc: William Paige
Doug Holyfield
Gary Babb
Chris Hoke

An Equal Opportunity / Affirmative Action Employer

STATE OF NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES

DEPARTMENT OF HEALTH SERVICES

In Re: SOUTHERN WOOD PIEDMONT COMPANY NCD058517467	)))	ADMINISTRATIVE ORDER ON CONSENT

BACKGROUND

From about 1964 to 1983, Southern Wood Piedmont Company (Southern Wood), a subsidiary of ITT Rayonier, Inc., a Delaware corporation, owned and operated a plant in Wilmington, North Carolina, which engaged in the business of wood preserving. The preservatives used were creosote coal tar, pentachlorophenol (PCP) in diesel oil and copper, chromate and arsenate (known as CCA). As part of that operation, residues were deposited in several locations on the plant site. The areas, identified in Southern Wood's February 13, 1983, correspondence to Mr. William Paige, Environmental Engineer, are summarized in Attachment I and shown in the map in Attachment II.

AGREEMENT

In order to resolve a dispute regarding the applicability of the Resource Conservation and Recovery Act (RCRA) and the Solid Waste Management Act and rules (N.C.G.S. 130-A, Article 9 and 10 NCAC 10 F), and to avoid costly protracted litigation, Southern Wood and the State do hereby enter into this Administrative Order on Consent (Consent Order).

The purpose of this Order is to address soil and ground water contamination and to provide clean-up/remedial actions which will minimize the site's impact on the environment and public health in a manner which is consistent with the State and Federal hazardous waste laws and rules.

Therefore, in order to further the public interest and to protect the public health and environment, Southern Wood Piedmont and the State, by and through their authorized representatives, do enter into the following Consent Order and agree:

1. That Southern Wood is a Delaware corporation, which rents a plant site in North Carolina at Wilmington owned by the city of Wilmington and the Port Authority of the State.
2. That, to protect the public health and environment, the Solid and Hazardous Waste Management Branch, Environmental Health Section, Department of Human Resources of the State of North Carolina (State) is empowered to implement and seek compliance with the standards for generation, transportation, treatment, storage and disposal of waste pursuant to the Solid Waste Management Act, N.C.G.S. Chapter 130-A (Act), and the rules promulgated thereunder at 40 CFR 260-271, codified at 10 NCAC 10 F (rules). The State has been authorized to implement the State program in lieu of the Federal hazardous waste program under the Resource Conservation and Recovery Act (RCRA). William L. Meyer, Head of the Branch, has been delegated those responsibilities.
3. This Consent Order shall apply and be binding upon Southern Wood, its successors and assigns and upon all persons or firms acting under or for them. Southern Wood shall provide a copy of this Consent Order to each contractor or other person performing any work under this Order and shall condition each contract or agreement for such work upon these Consent Order terms.
4. That nothing in this Consent Order shall be construed as limiting the State from performing its duty to protect the public health and the environment of the State as required by law.

5. That nothing herein shall be construed to affect any rights, claims or defenses as may exist between Southern Wood and any other person or entity.

6. That the State shall suspend the Compliance Order and Notice of Penalty, dated September 7, 1984, if compliance with this Consent Order is achieved as set forth herein. If compliance with this Order is not achieved, the September 7, 1984, Order and penalty shall become effective immediately upon written notice.

7. That Southern Wood shall continue with the ongoing remedial action being implemented in the operating areas as set forth in the remedial action plan submitted to the State on July 31, 1984, as modified by the terms of this Order. This action currently consists of land treatment to reduce the oil preservative residuals in contaminated soil to an acceptable residual level. The land treatment shall be conducted on treated pole storage areas where there are presently low levels of preservative residuals in the soil.

The contaminated areas described below shall be addressed in the following manner:

a. Superfund Area I

Excavate this area and landfarm the discolored soil in one of the treated pole storage areas.

b. Track Area

Remove the visually, heavily contaminated soil and landfarm in a treated pole storage area.

c. Oil Treating Areas

Remove the visually, heavily contaminated soil and landfarm in a treated pole storage area.

d. Large Storage Tank Containment Area

Remove the visually, heavily contaminated soil and landfarm in a treated pole storage area.

e. Treated Product Storage Area

The treated pole storage areas not used for landfarming of heavily contaminated soil shall be tilled in place.

f. CCA Storage Tank Area

Soil testing 0.5PPM arsenic or greater on the basis of the EP toxicity test for arsenic will be excavated from the site, but not from a depth in excess of five feet. Soil testing greater than 5.0 PPM arsenic will be sent offsite to a permitted land disposal facility, while soil which contains between 5.00 PPM and 0.5PPM arsenic will be mixed with Portland cement in a ratio which does not allow arsenic to extract above 0.5PPM as determined by the EP toxicity test. The treated material will then be buried on site.

g. Storage Tank Sludges

Remove the CCA sludge for disposal in a hazardous waste landfill. Remove the sludges from the bottom of the various oil tanks for disposal or energy recovery in a State approved landfill, incinerator, or boiler that has no outstanding Class I RCRA violations, or a landfill or combustion process out of the State which is approved by the environmental agency of the state concerned.

h. The landfarming will be done in an area identified as LF1 or LF2, or both, if needed, as outlined on the plant layout diagram (Attachment II).

i. The designated landfarm areas will be bermed and ditched to prevent rain runoff or runon.

j. Lysimeters will be installed at depths sufficient to monitor soil water quality. These lysimeters shall be protected to prevent damage by tilling equipment. Three down gradient monitoring wells and one upgradient monitoring well shall be installed to monitor groundwater quality. Groundwater monitoring devices shall be in accordance with the standards established by the Division of Environmental Management, Department of Natural Resources.

k. Contaminated soil from the areas identified earlier shall be spread not to exceed a maximum two-inch layer over the landfarm area. Land treatment shall be limited to the upper six inches.

l. The application of a commercial fertilizer shall be determined based upon soil analysis.

m. The soil will be tilled weekly, weather permitting, to promote biological and photochemical breakdown of treating chemical residuals.

n. Tillage and aeration of the land treatment areas shall continue until residual concentrations are determined not to have a significant impact on the public health and the environment as determined by the State.

8. That Southern Wood shall adhere to the following sampling and testing schedule:

   a. Lysimeters will be sampled prior to application of contaminated soil to the landfarm areas, and every two months thereafter.

   b. Soil will be sampled immediately after the initial tilling is completed. Samples will be obtained at 0-3", 9-12", and 21-24" depths. The soil sampling will be in accordance with SW 846.

   c. All samples (soil, water) will be analyzed for PCP and the major constituents of creosote.

   d. The sample results shall be submitted to this agency within 7 days after analysis.

9. All sampling and analysis shall be in accordance with EPA Publication, SW-846, "Test Methods for Evaluating Solid Waste" as revised.

10. That the landfarming operation will continue until a concentration of residual PCP and major constituents of creosote is reached which will protect public health and the environment. At this time it is not known what these concentrations are or how long it will take to reach them, but it is possible that up to two years may be required to stabilize the waste taken from Superfund Area I. Nothing in this order shall be interpreted to preclude Southern Wood from exercising its right to challenge any State determination as to safe residual concentrations if the company does not agree with such determination.

11. It is recognized that groundwater flow under the site is towards the Cape Fear River and that any contaminants reaching the groundwater from the site should eventually reach the river. Accordingly, Southern Wood will monitor the Cape Fear River upstream and downstream from the site to see if any water quality standard which could be affected by residues at the site is causing a violation of state water quality standards. Such monitoring shall be done at least twice per year during the time the land treatment operation to which this Order is in process. Further action to protect surface water quality standards or groundwater may be required by the Department of Human Resources or the Department of Natural Resources and Community Devlopment pursuant to Chapter 143, Articles 21, 21A, and Chapter 87, Article 7 of the North Carolina General Statutes and 15 NCAC 2C, 2E, and 2L depending on the results of such monitoring, and the parties expressly reserve their respective rights with respect to such further action.

12. That Southern Wood shall arrange with the owners of the property, City of Wilmington and the State Port Authority, to provide the notice in the deed that the land has been used for hazardous waste as required by 40 CFR 265.120 codified at 10 NCAC 10 F .0033.

13. That Southern Wood shall complete the clean-up remedial steps authorized in the Consent Order and the Plan in paragraph 7(f) & (g) by November 1, 1985, and shall also commence land treatment of contaminated soil from areas a, b, c, d, and e as described in paragraph 7 by November 1, 1985.

14. The scope of the State's overview shall consist of the following:

    a. The option to inspect the work performed and to collect and perform analysis of waste and soil samples upon any phase completion.

    b. A comprehensive site inspection and record review after June 1, 1985 to determine compliance with the approved plan and other terms of the order.

15. The Branch shall designate Mr. William Paige, Environmental Engineer, as the primary contact for technical matters concerning the implementation of the plan. Mr. Jerry Rhodes, Environmental Chemist, will be available upon Mr. Paige's absence. Other Branch resources may be used for review and inspection as determined by Mr. Paige or Mr. Rhodes.

16. Southern Wood will designate one person as the primary contact for technical matters concerning implementation of the plan.

IN WITNESS WHEREOF, the parties have executed this Agreement, on this the 20th day of May, 1985, by their duly authorized representatives.

Solid and Hazardous Waste Management
Branch, Environmental Health Section
Division of Health Services
Department of Human Resources of the
State of North Carolina

By: William L. Meyer
William L. Meyer, Head

Southern Wood Piedmont Company

By: Timothy H. Brannon
Vice President and Chief Operator

DEPOSITS REPORTED UNDER SUPERFUND

1. Superfund Area I, Covered Sludge Ditch
An area described as a covered ditch containing creosote sludges from early plant operations. The location is on property leased fron the State's Port Authority.

2. Superfund Area II. Trash Dump Area
An area described as a general waste landfill used by the plant for many years. It is believed to consist almost exclusively of wood waste, dirt, and metal waste. Small amounts of creosote cleanup material may also have been deposited here.

3. Superfund Area III, Dike Area
An area containing old, hard and solid creosote residuals similar to road tar were disposed of in an area near the south slip.

4. Superfund Area IV, Trash Fill Area
Located in the north slip, this area was filled with mill waste consisting of mainly wood waste and metal bands. Some creosote sludge was deposited on the top of part of this area.

OPERATING AREA DEPOSITS

1. Track Area
An area located in front of a treatment cylinder. Residual samples collected by Southern Wood suggest contamination to a depth of approximately six (6) inches.

2. Oil Treating Areas
The soil areas around both oil treating room buildings contain treating chemical residuals. Soil around the working tanks is noticeably contaminated with oil to a depth of approximately two feet. The soil area around the waste water-oil recovered tank system is noticeably discolored to about a one foot depth.

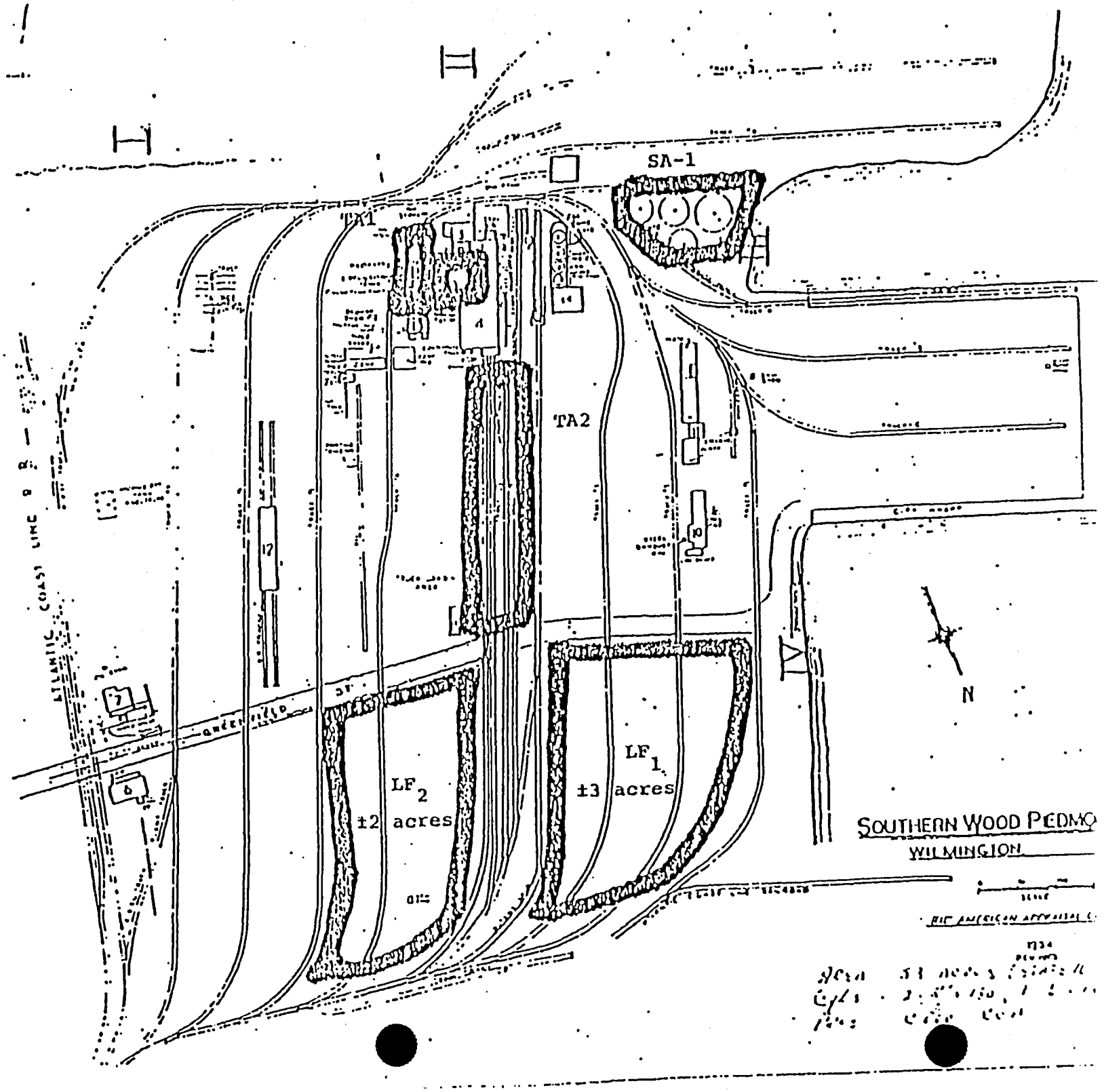
3. Large Storage Tank Containment Area
The soil in this area contains creosote residuals to a depth of approximately one foot.

4. Treated Product Storage Areas
Relatively large areas on both State Port Authority property and City of Wilmington property contain creosote residuals in the soil as evidenced by some discoloration. These are areas where the treated poles were stored prior to shipment.

5. CCA Storage Tank Area
Soil around the CCA storage tanks is discolored due to CCA residuals.

6. Storage Tank Sludges
Varying amounts of sludge is present in the bottom of the various treating tanks.

ATTACHMENT 77



ES:
..=Stg. Tank Area
A=Treating Areas
F=Landfarming Areas
F_1=±3 acres
F_2=±2 acres

06-18-85: 0900-0950

CHARLES BURDELL - SWP

HENRY PHILLIPS - SWP

DOUG LATHAM - SWP

CHUCK DAVIS - SWP

CHARLES SPEEDS - LETCO

DOUG MOLYNEUX - [illegible]

RICK SHIVER

DOUG AND I INSPECTED LAND-
[illegible] SWP [illegible] TO DESIGNATE LA[illegible]
[illegible] ONE
SAMPLE [illegible] WAS AN EMPTY [illegible]
[illegible]

DISCUSSED LOCATION OF FOUR
RCRA WELLS. SPEEDS BELIEVES [illegible]
IS NORTH SOUTH, [illegible]
EAST WEST. WELLS MUST BE LOCATED
PRE. 5-3-85 LETTER TO BURDELL FROM
PAGE. TOWNSEND, SMITH CAN COLLECT
DATA NECESSARY TO [illegible] QUALITY
IS NOT [illegible] [illegible]

BURDELL NEEDS N.C. 2L'S SENT
HIM SAME ON 6-19-85.

North Carolina Department of Human Resources
Division of Health Services
P.O. Box 2091 • Raleigh, North Carolina 27602-2091

James G. Martin, Governor
Phillip J. Kirk, Jr., Secretary

Ronald H. Levine, M.D., M.P.H.
State Health Director
919/733-3446

June 14, 1985

RECEIVED
JUN 17 1985
WILMINGTON REGIONAL OFFICE
DEM

Mr. Rick Shiver
Division of Environmental
Management
7225 Wrightsville Avenue
Wilmington, N.C. 28403

Dear Rick:

Enclosed is a copy of the signed Administrative Order of Consent. I will keep you posted as new information develops.

Sincerely,

William Paige, Environmental Engineer
Solid & Hazardous Waste Management Branch
Environmental Health Section

WP:lp

Enclosure

REFERENCE 10

P. O. Box 5447
Spartanburg, S. C. 29304

Phone 803/576-7660

Ref. 10

RECEIVED
OCT 5 1984
SOLID & HAZARDOUS WASTE MANAGEMENT BRANCH

Southern Wood Piedmont Company

September 21, 1984

Mr. William Paige
Solid and Hazardous Waste
Management Broad
N. C. Department of Human Resources
Box 2091
Raleigh, N.C. 27602

Dear Mr. Paige:

In response to your letter of September 7th on or Wilmington plant site landfarming the following is given to your comments:

1. Comment: "Any additional ground water monitoring wells shall be installed in accordance with schematic enclosed".

   SWP response: The proposal on installation of ground water monitoring wells from Law Engineering is attached. I have talked with Mr. Shiver on this subject and am copying him on the proposal. We will talk further after he has seen the attached. Please review the Law well design. If it does not meet your requirements in some respect, we will make adjustments in the design.

2. Comment: "The soil and water samples collected at the site shall be done in accordance with an approved sampling plan."

   SWP response: We believe that our letter of July 31 page 7 and 8 on landfarming procedures, contains further additional details of 8b. Samples are taken with a clean post hole digger at the four locations in each of the two areas (total 24 (4x2x3)). The samples from each area at each level are placed in a clean bucket and composited into a representative sample for the two areas. The dirt inbetween the three depth levels is carefully set aside and not put into the sample. The frequency of sampling was: (1) before addition of contaminates to the soil (2) immediately after adding contaminate to the soil and tilling. An attempt was made to sample weekly during the first month but due to rain and "Hurricane Diana" only one sample was taken. We will attempt to sample at two, four and six months after startup date. Weather sometimes interrupts exact schedules but as near as possible the above times of compliance will be done.

Samples are placed into clean plastic ziplock type bags and labeled, dated, location and depth of sample noted. The sample locations are marked with wood sticks or pipes to get the same location on each sampling. Sampling and analysis frequency will be according to our July 31 letter.

3. Comment: "Submit data on analysis".

   SWP response: The first set of GC/MS data is attached.

I have discussed with Dr. McGinnis your questions on phenol. Phenols were not run on the GC/MS as it was not requested as it is not a large percentage compound in creosote. A phenol will be run on the next sample for our information. An acid extraction procedure is required in the analysis protocal. The total phenol water extraction, our laboratory is running, covers more than phenol, according to Dr. McGinnis. The Standard Method test may pick up other phenol not necessarily from creosote. The toluene extraction data is included. On both the toluene and phenol extractions we plan to run spiked samples to see if we can qualify % recovery and whether the test are really indicative to what we are seeking.

I would be interested to know what references your toxicologist will review on the allowable levels of residuals. How will the study be approached? Will a risk-benefit issue be considered in his judgement.

Sincerely,
Southern Wood Piedmont

Charles A. Burdell
Technical Service Director

CAB/dm

CC: E. F. Button
E. L. Gibbs
S. R. Crabbe
D. Miller
H. O. Phillips

WILMINGTON, NORTH CAROLINA LANDFARMING

SWP WATER SAMPLES RECEIVED 8/10/84

SAMPLE AREA	INITIAL PREFARM	RIVER AREA	OFFICE AREA				
SAMPLE I.D.	10	40	50	Limit of Detection	Limit of Quantitation	Recover Level	% Recovery
Date Sampled	6-27-84	7-17-84	7-17-84				
	----------Component Concentration in Water (micrograms ppm/gram--dry weight)-----						
NAPHTHALENE	---	---	---	0.0083	0.028	0.100	83
2-METHYLNAPHTHALENE	---	---	---	0.0089	0.029	0.039	92
1-METHYLNAPHTHALENE	---	---	---	0.0066	0.022	0.030	92
BIPHENYL	---	---	---	0.0220	0.055	0.034	75
ACENAPHTHYLENE	---	---	---	0.0080	0.023	0.026	85
ACENAPHTHENE	*	---	---	0.0059	0.022	0.024	87
DIBENZOFURAN	---	---	---	0.0077	0.026	0.021	79
FLUORENE	---	---	---	0.0054	0.016	0.024	76
PHENANTHRENE	---	---	---	0.0100	0.029	0.024	89
ANTHRACENE	---	---	---	0.0080	0.026	0.025	87
CARBAZOLE	---	---	---	0.0190	0.061	0.038	81
FLUORANTHENE	---	---	---	0.0081	0.030	0.025	90
PYRENE	---	---	---	0.0086	0.030	0.028	95
CHRYSENE	---	---	---	0.0130	0.045	0.024	91
PENTACHLOROPHENOL	0.97	0.00027	0.0023	0.00028	0.00092	0.0083	85

--- Not detected

* Detected but not quantitated

Note: Limits of detection and quantitiation are based on 500 ml samples.
L.O.D. = 3 x "background," L.O.Q. = 10 x "background," where "background" is defined as instrument "noise" or water blank levels; whichever is greater.

ANALYSIS BY SOUTHERN WOOD PIEDMONT LABORATORY
S. B. Watson, Analyst

WILMINGTON, NORTH CAROLINA LANDFARM PROJECT

DATE SAMPLED	AREA	DEPTH INCHES	TOTAL PHENOL ppm	TOLUENE EXTRACTION * % Oil	Ph
6-27-84	Total Landfarm Area before Soil addition	0-12"	0.56	0.61	7.29
		12-20"	0.33	2.04	4.68
		20-26"	0.08	1.95	5.37
7-10-84	Area I River Area Track Soil Added	0-3"	4.67	0.75	6.70
		9-12"	0.73	0.00	5.66
		21-24"	0.19	1.09	6.16
7-10-84	Area I Office Area Treating Room Soil Added	0-3"	0.43	0.71	7.12
		9-12"	0.20	0.00	7.00
		21-24"	0.32	0.00	6.33
8-10-84	Area I River Area	0-3"	2.47	1.96	7.12
		9-12"	0.48	0.51	7.00
		21-24"	0.55	0.67	6.33

* Dry Basis

GC/MS ANALYSIS BY MSU

WILMINGTON, NORTH [illegible]ROLINA LANDFARMING

SWP SOIL SAMPLES RECEIVED 8/10/84

SAMPLE AREA	INITIAL PREFARM			RIVER AREA			OFFICE AREA						
SAMPLE I.D.	A	B	C	D	E	F	G	H	I	Limit of Detection	Limit of Quantitation	Recover Level	% Recovery
Depth Sampled	0-12"	12-10"	20-26"	0-3"	4-12"	21-24"	0-3"	9-12"	21-24"				
Date Sampled	6-27-84			7-17-84			7-17-84						
	----------Component Concentration in Soil (micrograms ppm/gram--dry weight)----------												
NAPHTHALENE	---	---	---	*	---	---	*	*	---	1.5	4.9	511	94.9
2-METHYLNAPHTHALENE	---	---	---	*	---	---	*	*	---	1.6	5.5	197	97.1
1-METHYLNAPHTHALENE	---	---	---	*	---	---	*	*	---	1.4	4.8	150	96.7
BIPHENYL	---	---	---	---	---	---	---	---	---	3.8	13.0	170	97.2
ACENAPHTHYLENE	---	---	---	*	---	*	---	---	---	1.6	5.2	128	97.1
ACENAPHTHENE	---	---	---	53	---	---	11.0	---	---	1.5	4.9	122	97.9
DIBENZOFURAN	---	---	---	15	---	---	7.3	---	---	1.9	6.2	105	102.0
FLUORENE	*	---	---	56	*	---	20.0	---	---	1.6	5.4	122	98.7
PHENANTHRENE	*	*	---	170	17.0	---	57.0	12	---	1.8	6.0	122	107.0
ANTHRACENE	*	*	---	100	11.0	---	41.0	14	---	1.8	5.9	123	107.0
CARBAZOLE	---	---	---	9.6	---	---	*	---	---	2.8	9.3	193	100.0
FLUORANTHENE	16	13.0	---	350.0	40.0	*	84.0	15	*	1.8	6.0	127	107.0
PYRENE	17	9.9	---	240.0	18.0	*	49.0	13	*	1.8	5.9	139	107.0
CHRYSENE	11	13.0	---	79.0	9.8	*	23.0	16	*	2.3	7.7	120	119.0
PENTACHLOROPHENOL	1.2	0.60	0.13	63.0	6.4	0.58	2.3	0.60	0.11	0.0089	0.030	41	79.0

--- Not detected

[illegible]etected but not quantitated

[illegible] Limits of detection and quantitiation are based on 10g samples (dry weight).

[illegible] L.O.D. = 3 x "background," L.O.Q. = 10 x "background," where "background" is defined as instrument "noise" or [illegible] whichever is greater

Draft 10/10/84

N. C. DEPARTMENT OF HUMAN RESOURCES

SOLID & HAZARDOUS WASTE MANAGEMENT BRANCH

In Re: SOUTHERN WOOD PIEDMONT COMPANY NCD058517467	))))	ADMINISTRATIVE ORDER ON CONSENT

BACKGROUND

From about 1964 to 1983, Southern Wood Piedmont Company (Southern Wood), a subsidiary of ITT Rayonier, Inc., a _____corporation, owned and operated a plant in Wilmington, North Carolina, which engaged in the business of wood preserving. The preservatives used were creosote coal tar, pentachlorophenol in diesel oil and copper, chromate and arsenate (known as CCA). As part of that operation, residues were deposited in several locations on the plant site. The areas, identified in Southern Wood's February 13, 1983 correspondence to Mr. William Paige, Environmental Engineer, are summarized in Attachment I and shown in the map in attachment II ~~thereto~~.

AGREEMENT

In order to resolve a dispute regarding the applicability of the Resource Conservation and Recovery Act (RCRA) and the Solid Waste Management Act and rules (N.C.G.S. 130-A, Article 9 and 10 NCAC 10F), and to avoid costly protracted litigation, Southern Wood and the State do hereby enter into this Administrative Order on Consent (Consent Order).

The purpose of this Order is to address soil and ground water contamination and to provide clean-up/remedial actions which will minimize the site's impact on the environment and public health in a manner which is consistent with the State and Federal hazardous waste laws and rules.

Therefore, in order to further the public interest and to protect the public health and environment, Southern Wood Piedmont and the State, by and through their authorized representatives, do enter into the following Consent Order and agree:

1. That Southern Wood Piedmont is a _____ corporation, doing business in North Carolina at _____.

2. That, to protect the public health and environment, the Solid and Hazardous Waste Management Branch, Environmental Health Section, Department of Human Resources of the State of North Carolina (State) is empowered to implement and seek compliance with the standards for generation, transportation, treatment, storage and disposal of waste pursuant to the Solid Waste Management Act, N.C.G.S. Chapter 130-A (Act), and the rules promulgated thereunder at 40 CFR 260-271, codified at 10 NCAC 10F (rules). O.W. Strickland, Head of the Branch, has been delegated those responsibilities.

3. This Consent Order shall apply and be binding upon the officers, directors, agents, employees, contractors, successors and assigns of Southern Wood Piedmont and upon all persons or firms acting under or for them. Southern Wood Piedmont shall provide a copy of this Consent Order to each contractor or other person performing any work under this Order and shall condition each contract or agreement for such work upon these Consent Order terms.

4. That nothing in this Consent Order shall be construed as limiting the State of North Carolina from performing its duty to protect the public health and the environment of the State as required by law.

5. That nothing herein shall be construed to affect any rights, claims or defenses as may exist between Southern Wood Piedmont and any other person or entity.

6. That the State will suspend the Compliance Order and Notice of Penalty, dated September 7, 1984, if compliance with this Consent Order is achieved as set forth herein. If compliance with this Order is not achieved, the September 7, 1984, Order and penalty will become effective immediately upon written notice.

7. That Southern Wood shall evaluate and determine the extent if any that those sites identified as Superfund Areas I, II, III and IV have or may have on the environment and public health. The steps to be taken and a schedule for implementation should be described in a plan submitted to this agency for review. The plan should contain a milestone chart showing target dates for individual phases of the project and a completion date of no later than June 1, 1985. The plan should be submitted by December 1, 1984.

8. That Southern Wood shall continue with the ongoing remedial action being implemented in the operating areas. This action currently consists of land treatment to reduce the oil preservative residuals in contaminated soil to an acceptable residual level. The land treatment shall be conducted on treated pole storage areas where there are presently low levels of preservative residuals in the soil.

The contaminated areas described earlier shall be addressed in the manner described below:

a. <u>Superfund Area I</u>

Excavate this area and landfarm the discolored soil in one of the treated pole storage areas.

b. Track Area

Remove the visually, heavily contaminated soil and landfarm in a treated pole storage area.

c. Oil Treating Areas

Remove the visually, heavily contaminated soil and landfarm in a treated pole storage area.

d. Large Storage Tank Containment Area

Remove the visually, heavily contaminated soil and landfarm in a treated pole storage area.

e. Treated Product Storage Area

The treated pole storage areas not used for landfarming of heavily contaminated soil shall be tilled in place.

f. CCA Storage Tank Area

Remove all soil containing CCA salts above 10 times (10 x) drinking water standards, as determined by the EPA EP toxicity tests, for disposal in a State approved hazardous waste landfill that has no outstanding Class I RCRA violations.

g. Storage Tank Sludges

Remove the CCA sludge for disposal in a hazardous waste landfill. Remove the sludges from the bottom of the various oil tanks for disposal or energy recovery in a State approved landfill, incinerator, or boiler that has no outstanding Class I RCRA violations.

9. That Southern Wood shall adhere to the following land treatment procedures:

a. The landfarming will be done in an area identifed as LF1 or LF2, or both, if needed, as outlined on the plant layout diagram (Attachment II).

b. The designated landfarm areas will be bermed and ditched to prevent rain runoff or runon.

c. Lysimeters will be installed at depths sufficient to monitor soil water quality. These lysimeters shall be protected to prevent damage by tilling equipment. Monitoring wells shall be installed to monitor groundwater quality. Groundwater monitoring devices shall be in accordance with the standards established by the Division of Environmental Management.

d. Contaminated soil from the areas identified earlier shall be spread not to exceed a maximum two-inch layer over the landfarm area. Land treatment shall be limited to the upper six inches.

e. The application of a commercial fertilizer shall be determined based upon soil analysis.

f. The soil will be tilled weekly, weather permitting, to promote biological and photochemical breakdown of treating chemical residuals.

g. Tillage and aeration of the land treatment areas shall continue until residual concentrations are determined not to have a significant impact on the public health and the environment.

10. That Southern Wood shall adhere to the following sampling and testing schedule:

a. Lysimeters will be sampled prior to application of contaminated soil to the landfarm areas, and every two months thereafter.

b. Soil will be sampled immediately after the initial tilling is completed. Samples will be obtained at 0-3", 9-12", and 21-24" depths. The soil sampling will be in accordance with SW 846.

c. All samples (soil, water) will be analyzed for PCP and the major constituents of creosote.

d. The sample results shall be submitted to this agency within 7 days after analysis.

11. That Southern Wood shall address remedial actions on the groundwater contamination in accordance with Chapter 143, Articles 21, 21A, and Chapter 87, Article 7 of the North Carolina General Statutes and 15 NCAC 2C, 2E, and 2L as administered by the Department of Natural Resources and Community Development.

12. That Southern Wood shall complete the clean-up/remedial steps authorized in the Consent Order and the Plan in paragraph 7, on or before June 1, 1985

13. The scope of the State's overview shall consist of the following:

a. The option to inspect the work performed and to collect and perform analysis of waste and soil samples upon any phase completion.

b. A comprehensive site inspection and record review after June 1, 1985 to determine compliance with the approved plan and other terms of the order.

14. The Branch shall designate Mr. William Paige, Environmental Engineer, as the primary contact for technical matters concerning the implementation of the plan. Mr. Jerry Rhodes, Environmental Chemist, will be available upon Mr. Paige's absence. Other Branch resources may be used for review and inspection, as determined by Mr. Paige or Mr. Rhodes.

15. Southern Wood will designate one person as the primary contact for technical matters concerning implementation of the plan.

IN WITNESS WHEREOF, the parties have executed this Agreement, on this the _____ day of _____, 1984, by their duly authorized representatives.

Solid and Hazardous Waste Management
Branch, Environmental Health Section
Division of Health Services
Department of Human Resources of the
State of North Carolina

By: _____
O. W. Strickland, Head

Southern Wood Piedmont

By: _____

_____

ATTACHMENT I

DEPOSITS REPORTED UNDER SUPERFUND

1. Superfund Area I, Covered Sludge Ditch
   An area described as a covered ditch containing creosote sludges from early plant operations. The location is on property leased from the State's Port Authority.

2. Superfund Area II, Trash Dump Area
   An area described as a general waste landfill used by the plant for many years. It is believed to consist almost exclusively of wood waste, dirt, and metal waste. Small amounts of creosote cleanup material may also have been deposited here.

3. Superfund Area III, Dike Area
   An area containing old, hard and solid creosote residuals similar to road tar were disposed of in an area near the south slip.

4. Superfund Area IV, Trash Fill Area
   Located in the north slip, this area was filled with mill waste consisting of mainly wood waste and metal bands. Some creosote sludge was deposited on the top of part of this area.

OPERATING AREA DEPOSITS

1. Track Area
   An area located in front of a treatment cylinder. Residual samples collected by Southern Wood suggest contamination to a depth of approximately six (6) inches.

2. Oil Treating Areas
   The soil areas around both oil treating room buildings contain treating chemical residuals. Soil around the working tanks is noticeably contaminated with oil to a depth of approximately two feet. The soil area around the waste water-oil recovered tank system is noticeably discolored to about a one foot depth.

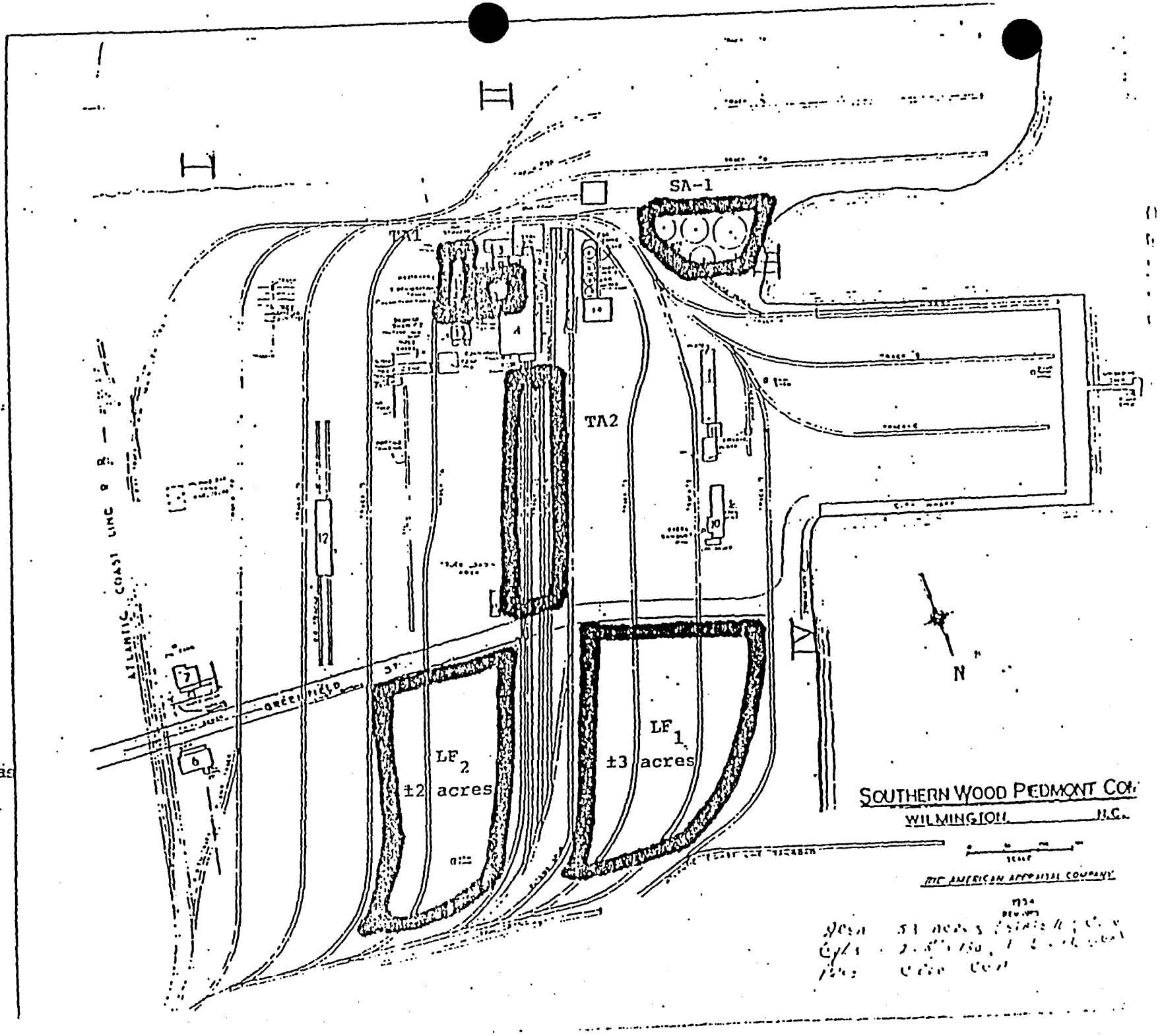
3. Large Storage Tank Containment Area
   The soil in this area contains creosote residuals to a depth of approximately one foot.

4. Treated Product Storage Areas
   Relatively large areas on both State Port Authority property and City of Wilmington property contain creosote residuals in the soil as evidenced by some discoloration. These are areas where the treated poles were stored prior to shipment.

5. CCA Storage Tank Area
   Soil around the CCA storage tanks is discolored due to CCA residuals.

6. Storage Tank Sludges
   Varying amounts of sludge is present in the bottom of the various treating tanks.

ATTACHMENT 77



NOTES:
SA=Stg. Tank Area
TA=Treating Areas
LF=Landfarming Areas
LF_1=±3 acres
LF_2=±2 acres

Ronald H. Levine, M.D., M.P.H.
STATE HEALTH DIRECTOR

DIVISION OF HEALTH SERVICES
P.O. Box 2091
Raleigh, N.C. 27602-2091

RECEIVED
OCT 19 1984
WILMINGTON REGIONAL OFFICE
DEM

October 17, 1984

Mr. Rick Shiver
Division of Environmental
Management
7225 Wrightsville Avenue
Wilmington, N.C. 28403

Dear Rick:

Enclosed is a copy of Burdell's September 21, 1984 correspondence and the recent proposed Administrative Order of Consent. Your comments and recommendation are encouraged. Please notify me in writing of your comments as soon as possible.

Sincerely,

William Paige, Environmental Engineer
Solid & Hazardous Waste Management Branch
Environmental Health Section

WP:lp

10-24-84: [illegible]

REFERENCE 11

MEMORANDUM

To: File
From: Stuart F. Parker, Jr., Hydrogeologist
Date: September 30, 1994
Re: Southern Wood Piedmont Co., Wilmington
NCD 058 517 467
Telecommunication with Chuck Davis, Southern Wood Piedmont Co.

SFP telephoned Chuck Davis, Manager, Environmental Affairs, SWP (803-599-1075) on 9/30/94 with questions to follow up the SIP site reconnaissance.

SFP inquired as to the areas and depths of excavation and filling at the site. According to Chuck Davis, excavated areas (and depths) included the drip track and wood treating areas (3-5 feet deep), the adjacent treating cylinders (12-15 feet), the CCA area (as indicated by the arsenic testing results), the aboveground tank farm by the river (5-8 feet), the aboveground diesel tanks (3 feet, around their concrete slabs) and the former creosote ditch (10-12 feet). The creosote ditch area was 50-75 feet wide, narrowing to 15-20 feet by the plant, and this area contributed the most soil for treatment. The excavations were backfilled with sandy clay brought from a borrow pit 10-15 miles from the site, apparently supplied by a "Billy White". The NTA, NTB, and TWS areas were not excavated.

SFP inquired as to the fate of the CCA area soils that were not stabilized with cement at the site. CD replied that soils exceeding 5 ppm arsenic EP Tox concentration were transported to the GSX (now Laidlaw) hazardous waste landfill in Pinewood, South Carolina.

Site Number: NCD 058 517 46

Site Location: Wilmington, New Hanover County, N.C.

Site Coordinates:

34 13 01.0	77 57 08.5
34 13 01.0	77 56 54.5
34 12 48.0	77 56 52.0
34 12 47.0	77 57 13.0

Date: October 05, 1994

Calculation Results

Distance from Site Location	Population		Number of Households	
	Per Ring	Cumulative	Per Ring	Cumulative
0 to 1/4 mile	527	527	260	260
>1/4 to 1/2 mile	828	1,355	447	707
>1/2 to 1 mile	7,206	8,561	3,445	4,152
>1 to 2 miles	16,147	24,708	7,857	12,009
>2 to 3 miles	12,212	36,920	5,545	17,554
>3 to 4 miles	14,994	51,914	6,592	24,146

Note: The populations and number of households within specified target distance rings were calculated for the NC Superfund Section by the NC State Center for Geographic Information and Analysis using the 1990 US Census data. These values were calculated by summing the population and the number of households data for each census block located within each target ring. For census blocks lying only partially within the ring, the per cent area of the block within the ring was multiplied by the population and household densities of the block.

REFERENCE 12

P.O. Box 5447
Spartanburg, S.C. 29304
Phone: (803) 599-1070
FAX: (803) 599-1087

Ref. 12

17

Southern Wood Piedmont Company

January 3, 1994

North Carolina Dept. of Environment, Health &
Natural Resources
Division of Solid Waste Management
401 Oberlin Road
Raleigh, NC 27605

JAN 1994

Attn: Doug Holyfield

Re: Completion Letter
Southern Wood Piedmont Company
Administrative Order # NCD 058517467
Wilmington, NC

Dear Mr. Holyfield:

Southern Wood Piedmont Company is submitting this letter to provide notice that we have fully completed all actions agreed to by the Department and Southern Wood Piedmont Company contained within the above referenced Administrative Order. Paragraph 9, found on page 5, indicates that "land treatment shall continue until residual concentrations are determined not to have a significant impact on the public health and the environment." You will find enclosed, a report entitled "Risk Assessment Report for Land Farmed Areas, Southern Wood Piedmont Company, Wilmington, N. C." This report has been prepared and submitted to provide the Department with an analyses of Risk that will indicate that we have fully met the letter of the Administrative Order. SWP believes that we have treated the soils to a level that is "Protective of Human Health and the Environment."

To provide further information on the landfarming operation and other points contained within the Administrative Order, the following discussion is provided:

LAND FARMING:

Southern Wood Piedmont Company (SWP) excavated and treated in the approved landfarms, discolored soils from the following areas of the closed plant site.

- Superfund Area I
- Superfund Area III
- Superfund Area IV
- Track Area
- Oil Treating Areas
- Large Storage Tank Containment Area
- Diesel Fueling Area

The Wilmington land farming (LF) project was started in June 1984 after 16 months of negotiations with the State of North Carolina. The Compliance Order provided that the ongoing LF remedial action would be continued as modified in the Administrative Order of Consent. The final signed document was received May 22, 1985 (attached). As noted above, residual soils from the cylinder track, treating tank, storage tank and the old drainage ditch area were land treated as approved. The entire plant, after removal and cleaning of any solid materials, was tilled several times to encourage biological activity. The LF was set up on about 5 acres of the former treated pole storage area. The normal bacteria and fungus present in the soil was given food (preservatives in soil), air, sun, water and fertilizer to breakdown the preservatives to their basic component of carbon, hydrogen, oxygen and chlorine. Confirmation of this has been made with soil and water analysis of polyneculararomatics (creosote) and chlorinated hydrocarbon (penta), (see enclosures for data).

1) Landfarms were located on a 5 acre site of the treated pole storage in the northwest corner of the plant. All rail track within the area was removed. The area was cleaned of solid residuals and divided into two sections (river area about 3 acres and office area about 2 acres).

2) The perimeter of the entire area was ditched and bermed to prevent run off and on of rainwater.

3) Shallow wells (MW-6, MW-7, MW-8, MW-9) were installed. The three monitoring wells downgradient and the one upgradient were installed to monitor ground-water quality.

4) Fertilizer was spread to bring the carbon-nitrogen ratio to 20:1. Lime was spread to adjust the soil pH to about 6.5.

5) Contaminated soil was added to maxing depth of 2" or 5% max. creosote content, whichever is the lesser. Two inches of soil on an acre is 7260 cu. ft. or 269 cu. yds. This gives the LF area a capacity of about 1300 cubic yards. A standard farm manure spreader without the distributor disc was purchased to apply the contaminated soil. The discharge gate on the spreader is adjustable for uniform depth application. A multidisc harrow for tilling was pulled by a medium powered farm tractor.

6) An irrigation system was installed to provide a means for controlling soil moisture.

Plant personnel operated the LF mainly installing the irrigation system, tilling and sampling soil and groundwater. Soil samples were collected approximately at two months intervals, or right after a new soil application. Monitoring wells were sampled regularly. Temperature and rain data was recorded. River samples at four locations were taken twice a year. Mississippi State University analyzed the soil for nutrients, bacteria and PNA, and penta concentrations every two months. Savannah Labs analyzed water samples for PNA, penta and sometimes metals.

Two documents are enclosed which will outline the data from a historical perspective. As you are well aware, SWP regularly submitted reports to Mr. William Paige of your staff outlining progress, current conditions and analytical data. Graphic presentations were also included which indicated breakdown of contaminants and ranges of constituent loading.

RIVER SAMPLING:

SWP also submitted data from semi-annual river samples and the four monitoring wells (shallow) surrounding the landfarms. Both the river samples and data from the shallow wells indicate no detectable levels of wood treating constituents.

CCA AREAS:

You will also find two memos which outline how the CCA contaminated soils were handled. On October 9, 1985, SWP provided William Paige with the scenario to be followed. Soils greater than 5.0 ppm arsenic will be excavated and disposed of off-site, at an approved disposal facility. This was accomplished. Soils with arsenic levels with levels of between .5 ppm and 5.0 ppm will be mixed with concrete and placed on site. This was accomplished with the use of a concrete mixer. A November 27, 1985 memo, addressed to you, outlined the grid system. These figures (figures attached), outline results of sampling and how each area was handled.

It is the belief of SWP that all terms and conditions of the Consent Order have now been met. As discussed, I will be happy to meet with you and your staff should you have any further questions. You may reach me at the address above or call me at (803) 599-1075 at your convenience.

Sincerely,

T. M. Davis
Manager, Environmental Affairs

6805bw

CC: T. H. Brannon
M. D. Pruett
J. L. Shroads
W. P. Arrants
H. O. Phillips w/enclosures
Glenn Dunn - Poyner & Spruill w/enclosures
Bonnie Albritton - NC Ports Authority w/enclosures
Thomas Pollard - City Attorney, Wilmington w/enclosures

REFERENCE 13

Ref. 13

DIVISION OF HEALTH SERVICES
P.O. Box 2091
Raleigh, N.C. 27602-2091

July 6, 1984

Mr. Charles A. Burdell
Southern Wood Piedmont Company
P.O. Box 5447
Spartanburg, SC 29304

Dear Mr. Burdell:

I have reviewed your June 8th remedial action proposal (received June 18, 1984) for the Wilmington site. The following comments must be addressed prior to the implementation of any plan.

1 - Sludge from the wastewater treatment system is considered K001. Any sludge generated at the Wilmington site would thus be classified as such and subject to RCRA.

2 - North Carolina has not recognized landfarming as a suitable method to handle wood preserving waste. The Solid and Hazardous Waste Management Branch has authorized land application in one case which was deemed an imminent hazard and in another case which had suitable geological conditions.

3 - The CCA waste is a RCRA hazardous waste as defined in 40 CFR 261.24 as adopted in 10 NCAC 10F .0029 and is thus subject to a closure plan as defined in 40 CFR 265.110-265.120 as adopted in 10 NCAC 10F .0033.

4 - If landfarming is allowed, any residual levels must be approved by the North Carolina Department of Human Resources. Proposed levels shall be submitted by Southern Wood Piedmont Company.

5 - Landfarming if approved, shall be limited to the upper six inches.

6 - The application rate of a commercial fertilizer shall be determined based upon soil analysis. Analysis can be obtained free through the Department of Agriculture. For additional details, contact me.

7 - The selection of indicator parameters to monitor the degradation process shall occur prior to the implement of the plan. As noted in earlier correspondence, more detail analysis will be required at some point to determine degradation efficiency. Sampling shall be performed to determine initial concentration levels.

8 - Discussion with the Department of Environmental Management's groundwater section suggest that a joint meeting arranged by myself should take place as soon as possible.

Please address the above concerns in a detail written plan (i.e., closure plan for RCRA related activities) and submit to me. Once received, I will begin the review process immediately so that remedial work may begin this summer.

Sincerely,

William Paige, Environmental Engineer
Solid & Hazardous Waste Management Branch
Environmental Health Section

WP:lp

cc: Mr. Jerry Rhodes
Mr. Doug Holyfield

REFERENCE 14

P. O. Box 5447
Spartanburg, S. C. 29304

Phone 803/576-7660

Ref. 14

RECEIVED
AUG 15 1984
SOLID & HAZARDOUS WASTE MANAGEMENT BRANCH

Southern Wood Piedmont Company

July 31, 1984
11-M-1.10.7

Mr. William Paige
Solid and Hazardous Waste Management Board
N.C. Department of Human Resource
Box 2091
Raleigh, N.C. 27402

Dear Mr. Paige

The following is in response to your letter of July 6th and our meeting in Wilmington on July 23rd.

Items:

Question:
1. Sludge from the waste water treatment system is considered K001. Any sludge generated at the Wilmington site would thus be classified as such and subject to RCRA.

SWP Response:
By definition K001 is the bottom sediment sludge from the treatment of waste water from the wood treated with creosote. We never treated the waste water at Wilmington as such. The in plant process handling of water to oil separations were done for recycling and reuse: a modified API steel tank and an air floatation system (Wemco unit). All oils that settled out were recycled in the plant or were sent to our other plant locations. None of this oil was placed into the landfarm area.

Question:
2. North Carolina has not recognized landfarming as a suitable method to handle wood preserving waste. The Solid and Hazardous Waste Management Branch as authorized land application in one case which was deemed an imminent hazard and in another case which had suitable geological conditions.

SWP Response:
This subject was covered verbally at our Wilmington meeting.

Question:
3. The CCA waste is a RCRA hazardous waste as defined in 40 CFR 261.24 as adopted in 10 NCAC 10F .0029 and is thus subject to closure plan as defined in 40 CFR 265.110-265.120 as adopted in 10 NCAC 10F .0033.

SWP Response:
As stated in our June 8th letter, page 6 section S, Southern Wood Piedmont will remove the CCA soil not meeting the EPA toxicity test in 40CFR 261.24. Soil samples are being analyzed now for determining what disposal procedure to use. A disposal proposal on this will follow.

If you have any questions concerning this matter, please contact me at (919) 733-2178.

Sincerely,

William Paige, Environmental Engineer
Solid & Hazardous Waste Management Branch
Environmental Health Section

WP:lp

cc: Mr. Doug Holyfield
Mr. Rick Shiver

Rick Shiver

Ronald H. Levine, M.D., M.P.H.
STATE HEALTH DIRECTOR

DIVISION OF HEALTH SERVICES
P.O. Box 2091
Raleigh, N.C. 27602-2091

RECEIVED
SEP 14 1984
WILMINGTON REGIONAL OFFICE
DEM

September 7, 1984

Mr. Charles A. Burdell
Southern Wood Piedmont Company
P.O. Box 5447
Spartanburg, S.C. 29304

Dear Mr. Burdell:

I have reviewed your July 31 remedial action proposal (received August 15) for the Wilmington site. The correspondence addresses concerns raised during the July 23 meeting in Wilmington along with ones outlined in my July 6 letter. The following items shall be addressed during the remedial period.

(1) Any additional ground water monitoring wells shall be installed in accordance with the schematic enclosed. Due to hydrogeologic conditions present at the Wilmington site, a variance will probably be required from the Division of Environmental Management (DEM). You should therefore consult with Mr. Rick Shiver, a hydrologist with DEM. He is located in the Wilmington office at (919) 256-4161.

(2) The soil and water samples collected at the site shall be done in accordance with an approved sampling plan. No such plan has been provided to the Branch. The plan shall be comprehensive (i.e., depth, method, number, location, sample container) and insure that representative samples are collected. The EPA publication SW-846 should prove useful in developing such a plan.

(3) The data collected in accordance with item (2) shall be submitted after each sampling within ten (10) days of analysis.

Also some type of contingency plan is advised in the event that degradation to acceptable residual concentrations cannot be reached. The six (6) months proposed in your letter to achieve acceptable levels is probably not realistic based upon data available to me. As clearly stated in Wilmington, the concept of establishing acceptable residual concentrations based upon "percent (%) removal" is unacceptable. At the end of the proposed six (6) months, I will have a toxicologist review the data to assist in determining if the remaining residuals afford maximum protection to public health and the environment.

Question:
4. If landfarming is allowed, any residual levels must be approved by the North Carolina Department of Human Resources. Proposed levels shall be submitted by Southern Wood Piedmont Company.

SWP Response:
As is known there is no published criteria on "how clean is clean". In discussing this subject in regard to the oil perservatives with Dr. Gary McGinnis, Mississippi State University, and with our Rayonier Research Center in Shelton, Washington, we propose the following:

a. That in the soil farming project as in our June 8th letter we use as basis the University of Florida study, attachment 6, which level is .475 ppm penta.

b. For creosote components of carbon$_{13}$ and under a 95% removal will be achieved. For carbon$_{14}$ and over a 80% removal will be achieved. The higher carbon compound's solubility, volatility and migration are extremely stable. They will breakdown but at a much slower rate. Initial samples are being analyzed. As soon as we receive the results, we will estimate starting concentrations and will forward them on to you.

Toxicity data: We are reviewing the creosote information available to us. As soon as this is completed the information will be forwarded on to you for toxicological review. A number of the creosote components are listed in N. Ervin Saxs book "Dangerous Properties of Industrial Materials" published by VanNostrum.

Question:
5. Landfarming if approved, shall be limited to the upper six inches.

SWP Response:
As discussed our harrow will be turning the soil to about a 6 to 8 inch depth.

Question:
6. The application rate of a commercial fertilizer shall be determined based upon soil analysis. Analysis can be obtained free through the Department of Agriculture. For additional details, contact me.

SWP Response:
Fertizler was applied at a rate of 200 pounds per acre of a 5, 10, 10 type. The recommended rate by Mississippi State University and EPA Ada Research is a 20 to 1 on a carbon-nitrogen ratio. An initial sample analysis for carbon-nitrogen are now being done by a commerical laboratory. Adjustment of ph was done by addition of lime at about 1 ton per acre to bring the soil to a ph of about 7.

Question:

7. The selection of indicator parameters to monitor the degradation process shall occur prior to the implement of the plan. As noted in earlier correspondence, more detail analysis will be required at some point to determine degradation efficiency. Sampling shall be performed to determine initial concentration levels.

SWP Response:

As covered in section 5 the indicator parameter initial and final parameter will be penta and creosote components: These are the P.N.A.'s that will be read from the GC scan - naphthalene, 2 methylnaphthalene, 1 methylnaphthalene, biphenyl, acenapthlene, dibenzofuran, fluorene, phenanthrene, anthracene, carbazole, fluoranthrene, pyrene, chrysene, penta. Phenol will be used as the initial, interim and final work to tract breakdowns of chemicals.

Question:

8. Discussion with the Department of Environmental Management's ground water section suggest that a joint meeting arranged by myself should take place as soon as possible.

SWP Response:

The suggested meeting took place at our Wilmington plant on July 23rd with you and Messrs. Reynolds, Holyfield, Marsh, Moore, H. O. Phillips, E. F. Button and myself.

During our meeting you asked for our rational concerning the RCRA or non-RCRA nature of the material we are excavating at the former Wilmington plant site. You will readily understand that it is impossible to look back and be certain of the chemical composition of the wood preservatives that have been leaked or released at the plant site in the past. Some enabling assumptions had to be made in order to get on with the aerobic breakdown of these wood preservatives while we still had time on the lease of the plant site and while the weather was warm enough to promote rapid degradation of such residues.

Accordingly, we assumed that the oil residue on the ground, around the tanks which were used to store received creosote, was commercial grade creosote when spilled. Such residue will be sent off site for disposal. Conversely, the oil residue that was on the ground around the working tanks was not commerical grade creosote when spilled. This residue was generated by operator error, that sometimes occurred, when the cylinder was blown back to these tanks at the end of a treating cycle. If the air pressure was not shut off quickly enough the mixture of creosote water and wood sugars, remaining in the cylinder at the end of a treating cycle, would be blown out the top of the tank. The operator would then add commerical grade creosote, from storage, to the working tank before starting the treating cycle on the next charge.

In addition, leaks have occurred around the treating area when a pipe going to the cylinder would break or leak. We have assumed that such oil residue would be commerical grade creosote, and we are going to send such material gathered from under and around the cylinder off site for disposal. The same analysis holds true for Penta.

Pages 7 and 8 of our June 8th letter and attachment 8 and 9 have been updated and modified to final proposed plan. Please send us information on well permitting that Mr. Marsh said was available.

If you have any questions please advise. We will appreciate the comments.

Sincerely,
Southern Wood Piedmont

Charles A. Burdell
Technical Director

CAB/dm

CC: E. F. Button - Stamford
R. H. Watts - Stamford
S. R. Crabbe
E. L. Gibbs
H. O. Phillips - Wilmington

VI. Proposed Landfarming Procedure

1. The landfarming will be done in the Area LF1 and Area LF2, outlined on the plant layout diagram (attachment 8). These areas are already lightly contaminated with treating chemical residues from many years use as treated pole storage.

2. The designated landfarm areas are bermed and ditched to prevent rain runoff or runon.

3. Six suction vacuum lysimeters are installed at one and two foot depths to monitor soil water quality. The proposed lysimeter cluster locations are indicated on the landfarm layout diagram (Attachment 9). These lysimeter clusters will be protected by barricades to prevent damage by tilling equipment. We will install two monitoring wells immediately downgradient of the landfarm areas. We propose to utilize the existing upgradient well. A proposal showing well design and location will be submitted shortly by Law Engineering. We are convinced that these samples will demonstrate that the wood treating chemicals are breaking down, not leaching into the groundwater.

4. Contaminated soil from the areas outlined in Section V-A page 4 above; the treating cylinder track area and treating area; will be spread in a maximum two inch layer over the landfarm area. This will be at a maximum additional rate of 20% of the underlying soil when tilled to a depth of six to eight inches. From previous analysis these soils contain less than 5% creosote.

5. Nutrients will be added at an application rate of 200 lbs. per acre as commercial fertilizer (such as 8-8-8) or a 20 to 1 carbon nitrogen ratio.

6. The initial application of contaminated soil and fertilizer will be thoroughly tilled into the underlying soil to a depth of six to eight inches.

7. The soil will be tilled weekly, weather permitting, to promote biological and photochemical breakdown of treating chemical residuals.

8. Sampling and Testing Schedules

   Extraction and analytical procedures are outlined in Attachment 10.

   a. Lysimeters will be sampled for soil water just prior to application of contaminated soil to the landfarm areas, and every two months thereafter. Soil water will be analyzed for total phenol content using the Standard Methods Test 222 Method and for PCP and the creosote compounds using the gas chromatograph method (G/C), EPA SW8040 through 8100.

   b. Soil will be sampled immediately after the initial tilling is completed. It will be resampled after one, two, four, and six months. Soil samples will be sampled at the points indicated on the landfarm diagram (Attachment 8). Samples will be obtained at 0-3", 9-12", and 21-24" depths. The soil samples from each of the two landfarm areas will be composited for equal depths for analysis.

c. All samples will be analyzed for total extractable phenol. The initial samples and the four and six-month samples will be analyzed by G/C for other organics.

9. After the six month sample analysis results are available, all results will be reviewed with the North Carolina agency.

VII. Outline of Tilling Procedure

All lightly contaminated treated product storage areas and the soil underlying areas not utilized for landfarming where heavily contaminated soil is removed will be tilled to encourage breakdown of any residual treating chemicals that might be present. Some of the areas where soil is removed may be too wet to till due to soil moisture conditions.

1. The overlying soil will be removed for landfarming; or for offsite disposal in the case of the soil around the creosote storage tanks. No soil will be removed from the treated pole storage areas.

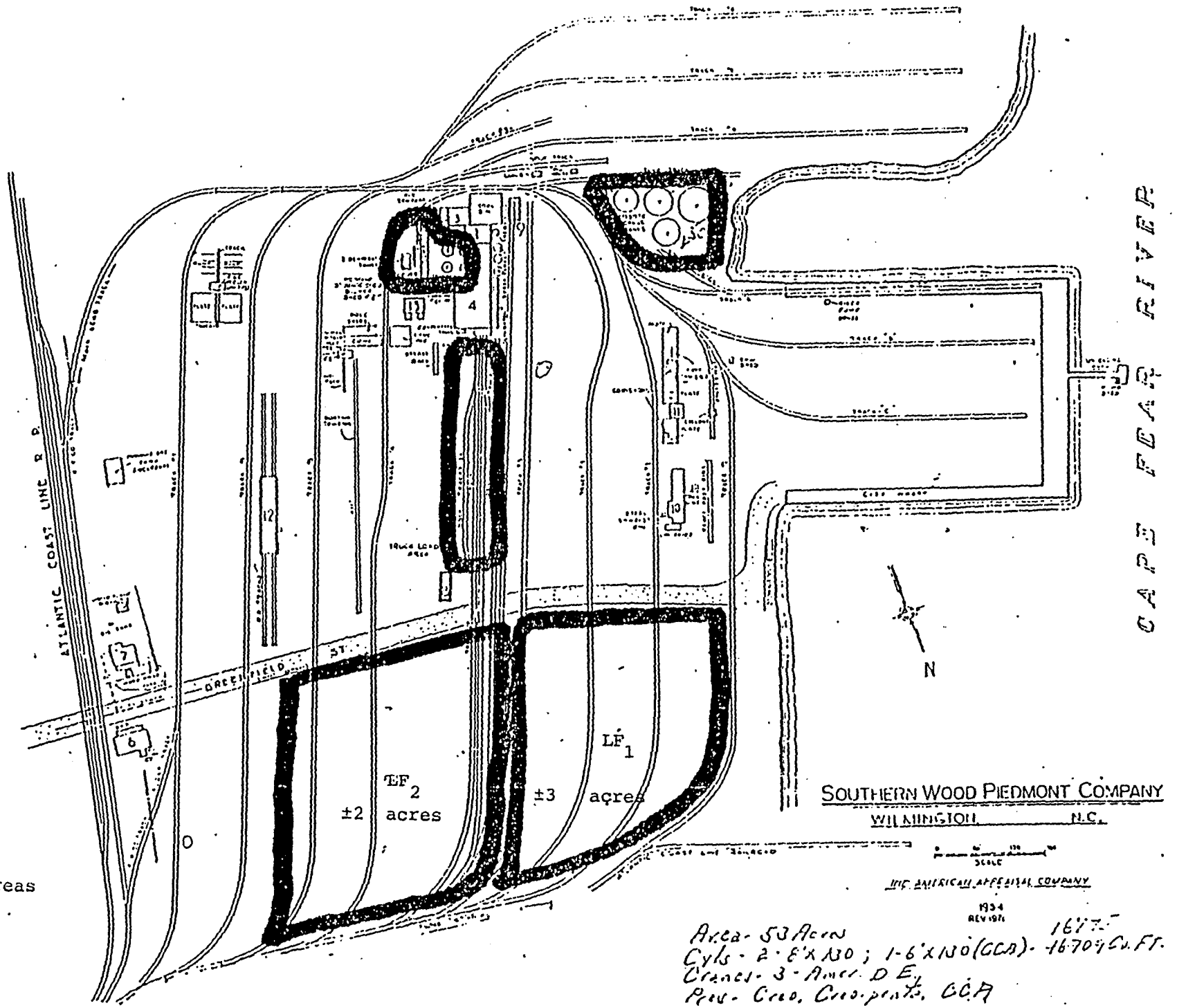
2. Immediately after soil removal, fertilizer will be added at the rate of 200 lbs. per acre (estimate of a ratio suggested by MSU of 20 to 1 in carbon to nitrogen), and the underlying soil will be tilled, soil moisture content permitting.

3. Tilling will be repeated weekly for the first 12 to 16 weeks, weather permitting, and will be done once per month until the six months.

4. After six months of tilling, soil samples will be obtained at 0-3", 9-12", and 21-24" depths.

5. Soil samples will be composited by depth for each major area and analyzed for organics by G/C.

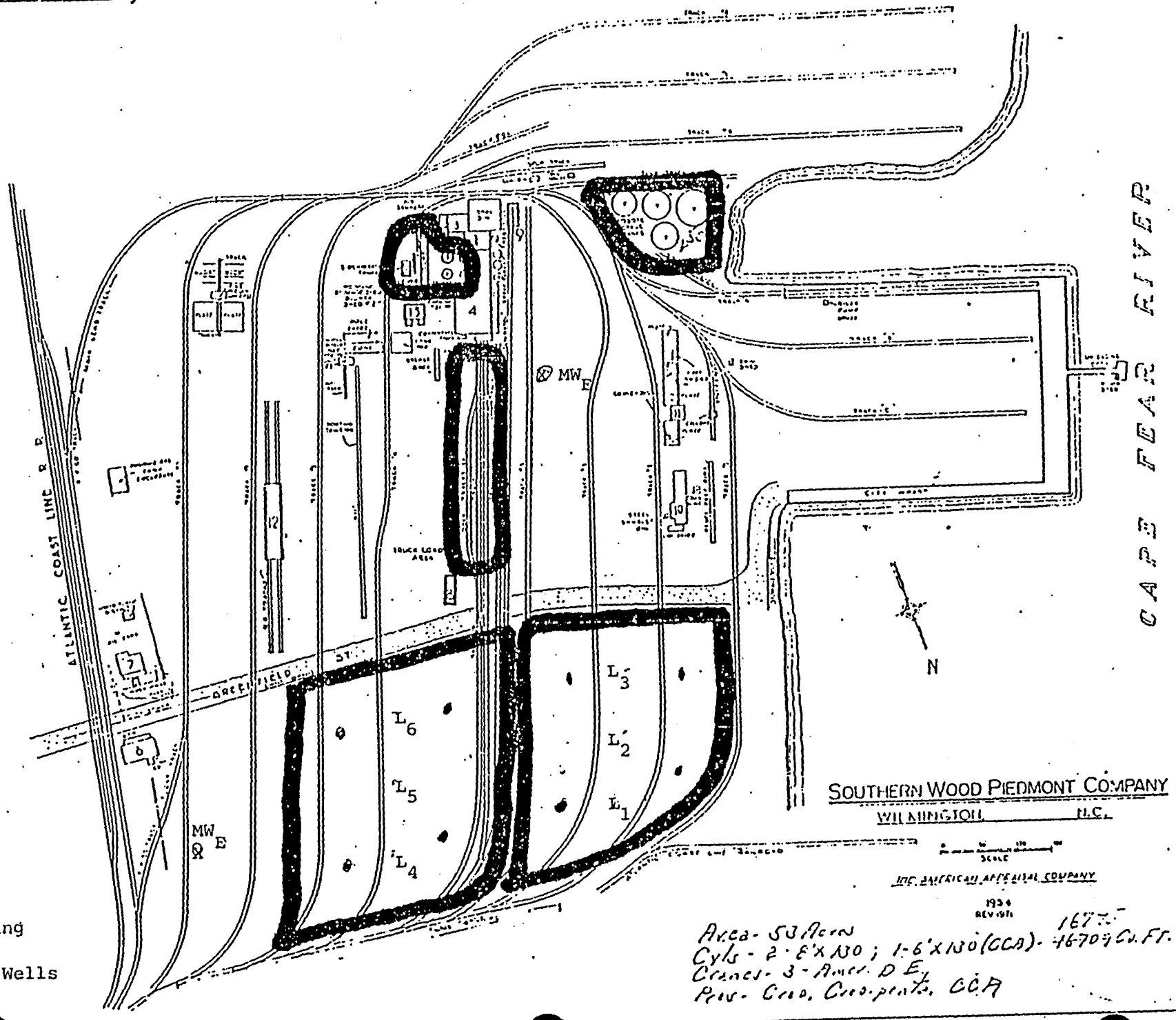
6. Analytical results will be reviewed with the agency.



OTES:

Landfarming Areas
=±3 acres
=±2 acres

ATTACHMENT 9



NOTES:

-6=Lysimeters

=Soil Sampling Points

=Monitoring Wells

Existing

REFERENCE 15

PHASE III GROUNDWATER QUALITY ASSESSMENT WILMINGTON, NORTH CAROLINA FACILITY

Prepared For

SOUTHERN WOOD PIEDMONT COMPANY SPARTANBURG, SOUTH CAROLINA

Prepared By The

ViroGroup
Air • Water • Soil
TECHNOLOGY
ETE Division

ViroGroup Job No. 12-53015.00
530\15\PHASEIII.RPT

TABLE OF CONTENTS

1.0 BACKGROUND 1

1.1 Site History 1

2.0 PREVIOUS SITE ACTIVITIES 1

2.1 City of Wilmington Investigation 2
2.2 State of North Carolina Administrative Order of Consent 2
2.2.1 Landfarm Operation 3
2.2.2 Landfarm Groundwater Monitoring 4
2.2.3 Risk Assessment of Landfarm Areas 4
2.3 Treated and Non-Treated Wood Storage Area Soil Sampling . . 5
2.4 Phase I Groundwater Quality Assessment 5
2.4.1 Monitoring Well Installation 6
2.4.2 Visual Soil Quality 6
2.4.3 Site Geology 6
2.4.4 Site Hydrogeology 7
2.4.5 Groundwater Quality 7
2.5 Phase II Groundwater Quality Assessment 8
2.5.1 Temporary Monitoring Well Abandonment 8
2.5.2 Monitoring Well Installation 8
2.5.3 Site Geology 9
2.5.4 Site Hydrogeology 9
2.5.5 Soil Quality 10
2.5.6 Groundwater Quality 12
2.6 Cape Fear River Surface Water Sampling 12

3.0 PHASE III GROUNDWATER QUALITY ASSESSMENT 13

3.1 Monitoring Well Abandonment 13
3.2 Monitoring Well Installation 14
3.3 Regional and Site Geologic Conditions 16
3.3.1 Regional Geology 16
3.3.2 Site Geology 17
3.4 Site Hydrogeology 18
3.4.1 Aquifers and Confining Units 18
3.4.2 Groundwater Flow Directions 19
3.5 Soil Quality 23
3.6 Groundwater Quality 25
3.7 Surface Water Quality 29

4.0 SUBSURFACE WOOD PRESERVING CONSTITUENT MIGRATION 29

5.0 REFERENCES 32

LIST OF ATTACHMENTS

ATTACHMENTS

ATTACHMENT A - Historical Groundwater and Surface Water Quality Assessment Data

Historical Groundwater Elevation Summary Table
Historical Vertical Hydraulic Gradient Summary Table
Historical Soil Sample Parameter Summary Table - Metals
Historical Soil Sample Parameter Summary Table - Semi-Volatiles
Historical Soil Sample Parameter Summary Table - Volatiles
Historical Groundwater Sample Parameter Summary Table - Metals
Historical Groundwater Sample Parameter Summary Table - Semi-Volatiles
Historical Groundwater Sample Parameter Summary Table - Volatiles
Historical Surface Water Sample Parameter Summary Table - Semi-Volatiles and Metals

ATTACHMENT B - Monitoring Well MW-24 Abandonment Record

ATTACHMENT C - Permits

CSX Transportation Right-of-Entry Permit
Corps of Engineers Wetland Modification Permit

ATTACHMENT D - Soil Boring and Monitoring Well Construction Records

Monitoring Well Log Database
Boring Logs

ATTACHMENT E - Phase III Groundwater Hydraulic Data

Phase III Groundwater Elevation Summary Table
Phase III Vertical Hydraulic Gradient Summary Table

ATTACHMENT F - Phase III Soil Quality Data

Wilmington Site-Specific Soil Constituent List
Soil Sample Collection Summary Sheets
Phase III Soil Sample Parameter Summary Table
Phase III Roll-Off Composite TCLP Analysis Summary Table
Phase III Soil Sample Laboratory Analytical Data and QA/QC

ATTACHMENT G - Phase III Ground Water and Surface Water Quality Data

Wilmington Site-Specific Groundwater Constituent List
Groundwater Sample Collection Summary Sheets
Phase III Groundwater Salinity Summary Table
Phase III Groundwater Parameter Summary Table - Metals
Phase III Groundwater Parameter Summary Table - Semi-Volatiles
Phase III Groundwater Parameter Summary Table - Volatiles
Phase III Groundwater Parameter Summary Table - Hydrocarbons
Phase III Groundwater Sample Laboratory Analytical Data and QA/QC
Phase III Surface Water Sample Parameter Summary Table - Semi-Volatiles and Metals
Phase III Surface Water Sample Laboratory Analytical Data and QA/QC

LIST OF FIGURES

FIGURES

FIGURE 1 Site Location Map
FIGURE 2 Site Topographic Map
FIGURE 3 Scaled Site Map
FIGURE 4 Source Area Location Map
FIGURE 5 Monitoring Well Specification
FIGURE 6 Low Tide Upper Aquifer Water Table Map
FIGURE 7 One-Quarter Low Tide Upper Aquifer Water Table Map
FIGURE 8 Three-Quarter High Tide Upper Aquifer Water Table Map
FIGURE 9 High Tide Upper Aquifer Water Table Map
FIGURE 10 Low Tide Lower Aquifer Potentiometric Map
FIGURE 11 One-Quarter Low Tide Lower Aquifer Potentiometric Map
FIGURE 12 Three-Quarter High Tide Lower Aquifer Potentiometric Map
FIGURE 13 High Tide Lower Aquifer Potentiometric Map
FIGURE 14 Upper Aquifer Salinity Isoconcentration Map
FIGURE 15 Upper Aquifer Organic Wood-Preserving Constituents Isoconcentration Map
FIGURE 16 Lower Aquifer Organic Wood-Preserving Constituents Isoconcentration Map
FIGURE 17 Upper Aquifer Benzene Isoconcentration Map
FIGURE 18 Hydrogeologic Cross-Section A-A'
FIGURE 19 Hydrogeologic Cross-Section B-B'
FIGURE 20 Hydrogeologic Cross-Section C-C'
FIGURE 21 Peaty Clay Surface And Soil Staining Location Map
FIGURE 22 Cape Fear River Surface Water Sample Location Map

PHASE III GROUNDWATER QUALITY ASSESSMENT
SOUTHERN WOOD PIEDMONT
WILMINGTON, NORTH CAROLINA FACILITY

1.0 BACKGROUND

The Southern Wood Piedmont (SWP) facility is located in an industrialized area adjacent to the eastern bank of the Cape Fear River within the city limits of Wilmington, North Carolina (Figure 1). The facility is bounded to the north by Amerada Hess Corporation Fuel Tank Farm and to the south by Greenfield Creek. Across Greenfield Creek from the facility is the Poctank, Inc. Tank Farm. Optimist Park and residential areas are located to the east of the facility and the Cape Fear River is located to the west. Greenfield street, which runs in an east-west direction, terminates at the SWP facility.

The facility is situated on two parcels of land that are currently leased to Southern Wood Piedmont. The southern parcel is owned by the North Carolina Ports Authority and the northern parcel by the City of Wilmington. A topographic map for the site and adjacent properties has been prepared and is presented in Figure 2. Wetland areas and existing structures are shown on the topographic map.

1.1 Site History

Prior to 1921, E.R. Eubank Sawmill may have occupied the site. Early Sanborn maps indicate that Newport Shipbuilding Company was operating on-site in 1921. In 1932, the North State Treating Company leased the property. Taylor Colquitt Company acquired the property in 1935 and continued to treat wood products with creosote. In 1964, Taylor Colquitt Company changed names to Taylor Piedmont. International Telephone & Telegraph (ITT) purchased Taylor Piedmont in 1969. Early in 1971, ITT changed the company name to Southern Wood Piedmont. Southern Wood Piedmont operated the wood preserving facility until June 1983. At this time wood treating operations ceased and closure operations commenced at the facility.

The wood preservatives used during plant operations included creosote coal tar, pentachlorophenol (PCP), and copper, chromate, and arsenate (CCA). Creosote was used throughout wood preserving operations, whereas, CCA treatment was added by SWP in the early 1970's followed by pentachlorophenol in the late 1970's. Wood-preserving chemicals were stored on-site in aboveground storage tanks adjacent to the respective treating facilities. Additional tanks for creosote storage were located in the southwestern portion of the facility adjacent to the Cape Fear River.

2.0 PREVIOUS SITE ACTIVITIES

This section provides an overview of previous site activities. Previous site activities include a soil and groundwater investigation completed by the City of Wilmington on their parcel of land,

the construction and operation of an on-site landfarm by SWP through an Administrative Order of Consent with the North Carolina Department of Health, Environment, and Natural Resources, a site-wide near-surface soil investigation, and Phase I and II groundwater quality investigations at the facility.

2.1 City of Wilmington Investigation

Five soil borings were advanced on the City of Wilmington parcel to a depth of approximately 50 feet below land surface by Soil and Materials Engineers, Inc., (SME) during 1981. Lithologic logs indicate that a surficial aquifer of sandy fill material, which varies from less than 1 foot to 18 feet in thickness, is present beneath the City of Wilmington parcel. Below this sandy material is a layer consisting of dark brown, organic-rich silt and peat, which contains traces of fine sand and roots. This layer ranges in thickness from 5 to 19 feet and increases in thickness towards the Cape Fear River to the west. Fine to medium sands extend from below the organic-rich layer to a depth of 42 to 45.5 feet below land surface. A marl is present below this depth.

Each of the five exploratory soil borings were converted to monitoring wells (designated City monitoring wells [CW] on the site map; Figure 3). Four of the monitoring wells (CW-1, CW-2, CW-3, and CW-4) were screened above the organic layer (peat) and one well (CW-5) was screened in the sand below the organic layer. Groundwater samples were collected for inorganic and volatile priority pollutants. Wood-preserving constituents were detected in CW-2 adjacent to the wood treating facility.

Based on their observations, SME concluded that the dominant direction of shallow groundwater flow at the site was to the south, parallel to the Cape Fear River. For additional information on the City of Wilmington investigation, please refer to the report by Soil and Materials Engineers, Inc. entitled: GEOTECHNICAL INVESTIGATION REPORT, CITY OF WILMINGTON PROPERTY LEASED BY SOUTHERN WOOD PIEDMONT, WILMINGTON, NORTH CAROLINA, dated 1981.

2.2 State of North Carolina Administrative Order of Consent

On May 20, 1985, Southern Wood Piedmont Company and the Solid and Hazardous Waste Management Branch, Environmental Health Section, Division of Health Services, Department of Human Resources of the State of North Carolina entered into an Administrative Order of Consent. The Administrative Order of Consent addressed soil and groundwater contamination at the site and provided clean-up/remedial action which should minimize the site's impact on the environment and public health in a manner which is consistent with the State and Federal hazardous waste laws and rules.

The Administrative Order of Consent allowed land treatment (landfarm) of preservative residuals in contaminated soil to reduce the residuals to an acceptable level. The location of the landfarm was selected to be in a previous treated pole storage area where there are presently low levels of preservative residuals in the soil.

Pursuant to the terms of the Administrative Order of Consent, soil containing preservative residuals were excavated from the covered sludge ditch, the track area in front of the treatment cylinder, the area in the vicinity of the treatment buildings, and the large storage tank containment area and placed in the landfarm for on-site treatment. The treated pole storage areas not used for landfarming were tilled in place. Soil in the vicinity of the CCA storage tank area was excavated and sent off-site to a permitted land disposal facility and the CCA storage tank sludge was disposed in a hazardous waste landfill. The sludge from the bottom of the various oil storage tanks was placed in an approved landfill or burned for fuel recovery in an off-site location.

Once the terms of the Administrative Order of Consent have been met, the properties will be returned to the City of Wilmington and the North Carolina Ports Authority for development.

2.2.1 Landfarm Operation

In cooperation with the North Carolina Department of Human Resources, Solid and Hazardous Waste Management Branch, SWP operated a landfarm to remediate soil containing wood-preserving residuals. Following the removal of the existing railroad spurs and plant buildings at the facility, a 5-acre area was bermed and ditched for landfarm operations. Excavated wood preserving constituent influenced soil was landfarmed between July 1984 and April 1990. Landfarm treatment included the placement of influenced soil in 2-inch lifts on the landfarm. Each lift was treated by weekly tilling and adding irrigation water, fertilizer, and chicken and turkey manure to promote microbial growth and wood preserving constituent degradation. The landfarm is located on the northwest portion of the site in the area bounded by monitoring wells MW-6, MW-7, MW-8, and MW-9 (Figure 3).

Soil samples were collected periodically between September 1985 to April 1990 throughout the active period of landfill operation. The soil samples were analyzed for soil nutrients, pentachlorophenol, PAHs, phenol, and microbial counts. The soil sampling results indicated that the landfarms were effective and that constituents of concern were not leaching into the substrate soils. Subsequent to active landfarm operations, Geraghty & Miller, Inc. collected soil samples in October 1990 and again in October 1991. Analytical results from the post-operational soil sampling indicated minimal migration of constituents of concern into the substrate soils from the landfarm. For further information on the landfarm activities and findings please refer to the reports by Geraghty & Miller, Inc. entitled: DATA SUMMARY REPORT FOR THE 1990 LANDFARM AREA SAMPLING, SOUTHERN WOOD PIEDMONT COMPANY,

WILMINGTON, NORTH CAROLINA and 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 dated September 1993.

2.2.2 Landfarm Groundwater Monitoring

In September, 1985, Law Environmental Services (LES) installed four groundwater monitoring wells around the limits of the landfarm (MW-6, MW-7, MW-8, and MW-9). Each well was installed to an approximate depth of 20 feet below land surface such that the upper portion of the screen bracketed the contact between the fine to medium upper sands and the underlying peat.

In order to evaluate the direction of groundwater flow within the uppermost aquifer LES collected water table elevations from 8 of the existing monitoring wells and the Cape Fear River at the facility. Based on this data groundwater flow around the limits of the landfarm appeared to be northwest, west, and southwest toward the Cape Fear River.

Hydraulic conductivity testing was also conducted by LES on monitoring wells MW-6 through MW-9. Horizontal hydraulic conductivity values ranged from 3×10^{-5} cm/sec to 1×10^{-6} cm/sec, which is typical of silty sediments (the peat unit at the facility is comparable in hydraulic conductivity to silty sediments). Also, the average groundwater flow velocity was evaluated to be 0.1 feet per year for the screened interval.

Additional information on the groundwater monitoring in the landfarm area can be found in the Law Environmental Services report entitled: MONITORING WELL INSTALLATIONS AND HYDROGEOLOGIC REPORT dated November 27, 1985.

2.2.3 Risk Assessment of Landfarm Areas

A risk assessment has been conducted by Geraghty & Miller, Inc. for the two landfarm treatment areas at the former SWP wood treating facility. The purpose of the risk assessment was to evaluate the wood-preserving constituents remaining in the landfarms and any potential risk to public health and/or the environment. It was assumed that the site will be used for future industrial development (deed restriction) and that several feet of fill and/or pavement will cover the landfarm.

As a result of the assumed future site use and development, the only exposure to constituents remaining in the landfarm soils would occur during the construction period. Therefore, the risk assessment evaluated the potential exposure to a site construction worker. Constituent intake was evaluated for incidental soil ingestion, dermal contact, and inhalation of dust. An exposure

period of 13 weeks, 6 days per week, and 8 hours per day was evaluated. Thirteen weeks was selected as a reasonable maximum period required for grading, filling, and paving the site.

Constituents of concern (COCs) included in the risk assessment were PAHs, phenol, dimethylphenol, trichlorophenol, tetrachlorophenol, pentachlorophenol, arsenic, copper and chromium. The analytical results of 70 samples were utilized during the risk assessment.

Risk estimates for the site construction worker were compared to USEPA target risk criteria to determine if the terms of the Administrative Order of Consent had been met. The USEPA currently uses a target excess lifetime cancer risk (ELCR) range of 1×10^{-4} to 1×10^{-6} and a hazard index (HI) of 1 to indicate if remediation is required. The total ELCR for the construction worker was calculated to be 6×10^{-6} and is within the target risk range; the HI is 0.5 and is below the target value of 1. These results indicate that the proposed development of the site could proceed without posing a significant risk to human health and the environment. For additional information regarding the landfarm risk assessment, please refer to the report by Geraghty & Miller, Inc. entitled: RISK ASSESSMENT REPORT FOR LANDFARM AREAS, SOUTHERN WOOD PIEDMONT COMPANY, WILMINGTON, NORTH CAROLINA dated December 1993.

2.3 Treated and Non-Treated Wood Storage Area Soil Sampling

Between February 26 and March 1, 1991, Geraghty & Miller, Inc. completed 92 soil borings and collected 48 soil samples from treated and non-treated wood storage areas at the facility. Each of the soil borings were completed to a depth of 18-inches below land surface and visually assessed for the degree of staining and odor. Randomly selected soil boring locations were sampled for select semi-volatile organic constituents and the metals, arsenic, chromium, and copper at depth intervals of 0- to 6-inches and 12- to 18-inches below land surface. A summary of the results of this investigation can be found in the letter report submitted to SWP on June 17, 1992 entitled: WILMINGTON, NORTH CAROLINA SOIL SAMPLING INVESTIGATION.

2.4 Phase I Groundwater Quality Assessment

During February 1992, Environmental Technology Engineering, Inc. (ETE) initiated field activities directed at characterizing the site hydrogeology and evaluating potential groundwater degradation associated with past wood preserving activities at the site. Activities completed during the Phase I groundwater quality assessment include monitoring well installation, visual soil quality evaluation, lithologic interpretation, groundwater flow/tidal influence evaluation, and groundwater sampling.

2.4.1 Monitoring Well Installation

During the Phase I groundwater quality assessment ETE installed 13 groundwater monitoring wells within the upper aquifer (Figure 3). Five of these monitoring wells (B2, B3, B4, B5, and B6) were installed as temporary monitoring wells to aid in groundwater flow and quality interpretation. The remaining 8 monitoring wells (MW-10 through MW-17) were installed as permanent wells in the upper aquifer. Monitoring well MW-14 brackets the contact between the upper sand and the underlying peat, whereas, the other monitoring wells bracket the water table. The temporary monitoring wells were installed such that the base of the screen rested on top of the peat.

2.4.2 Visual Soil Quality

During installation of the monitoring wells, a log of visibly stained sediments was maintained. No visible staining was observed in boreholes B2, B3, B5, B6, or MW-10. Visible wood preserving constituent staining was observed in the soil from boreholes B4, MW-11, MW-12, MW-13, and MW-14. Borehole B4 has visible wood preserving constituent staining near the surface of the borehole and again near the bottom of the borehole. Boreholes MW-11 and MW-12 were observed to have visible wood preserving constituent staining from approximately 3 feet below land surface to the upper sand and peat contact. Visible wood preserving constituent staining was present only near the surface of borehole MW-13. Visible wood preserving constituent staining was encountered near the surface at MW-14 and continued to be observed below the upper sand and peat contact to a depth approximately 14 feet below land surface.

Diesel stained sediments were observed at MW-15, MW-16, and MW-17 located in the southwestern portion of the site in the vicinity of previous aboveground diesel storage tanks. Soils from boreholes MW-15, MW-16 and MW-17 were diesel stained near the surface of the borehole to a depth of approximately 5 feet below land surface.

2.4.3 Site Geology

Soil borings completed during the Phase I monitoring well installation activities indicate that the site is underlain by a brown, fine to medium sand from the land surface to approximately 10 to 15 feet below land surface. A dark brown to black peat with varying amounts of wood and root fragments is present beneath the sand. Based on a single boring (MW-14), the peat unit appears to be approximately 10 to 11.5 feet thick. Underlying the peat is a brown, medium to coarse sand. The thickness of the underlying sand and the depth to the next confining unit was not evaluated during the Phase I groundwater quality assessment.

2.4.4 Site Hydrogeology

In order to characterize groundwater flow changes due to tidal influences at the site, a 12-hour groundwater elevation evaluation was conducted on April 1, 1992 utilizing all existing monitoring wells and 2 staff gauges, one located in the Cape Fear River and one in the on-site drainage ditch. Water level measurements were taken every 2 hours from each monitoring well and the staff gauges. Please refer to Attachment A for a tabulated historical groundwater elevation summary table.

The groundwater flow evaluation indicated that the tidal cycle does affect the groundwater elevations in the monitoring wells located at the site. At times when the tidal stage exceeds mean sea level (the time interval when the tide is approaching and receding high tide) during the tidal cycle, groundwater "stagnation lines" occur along the bank of the Cape Fear River and along the on-site drainage ditch. This zone of stagnation is the result of the surface water in the Cape Fear River and the on-site drainage ditch moving into the aquifer material (recharge) and becoming opposed by groundwater discharging from the aquifer towards the Cape Fear River and the drainage ditch. When the tidal stage is below mean sea level during the tidal cycle, the groundwater flows in a radial pattern from the center of the site and discharges into the Cape Fear River and the surrounding drainage features the circumscribe the site. The tidal cycle appears to only slightly influence water levels in the center of the site. A delayed effect was observed, in that, the highest groundwater elevation in the center portion of the site occurred at a time after high tide within the Cape Fear River.

2.4.5 Groundwater Quality

The quality of the groundwater was evaluated by collecting groundwater samples from all of the existing monitoring wells at the facility that did not contain separate phase fluids. The monitoring wells were sampled on March 13, 1992 and were analyzed for site-specific metals, semi-volatiles, and volatiles. Please refer to Attachment A for tabulated historical groundwater sample analytical results.

Concentrations of wood-preserving metals were detected in all groundwater samples before filtration. However, after filtration all metal concentrations were below detection limits, except for temporary well B5. Groundwater from this well yielded a concentration of 0.006 mg/l for dissolved copper.

The analytical results indicated that wood-preserving constituents were present in the upper sand beneath the facility. The wood preserving constituent plume was partially defined in the northern, eastern, and western portions of the site. However, the southern edge of the plume was not defined. The total organic wood-preserving constituent concentrations were highest in temporary monitoring well B4 with a value of 28.222 mg/l. Monitoring wells MW-13 and MW-

14 yielded the next highest concentrations with values of 6.335 mg/l and 6.268 mg/l, respectively. Lower concentrations of organic wood-preserving constituents were detected in monitoring wells MW-15, MW-16, MW-17, and temporary well B6. Trace amounts of heavy separate phase fluids were detected in monitoring wells MW-11 and MW-12.

Further information on the Phase I groundwater quality assessment is presented in the ETE, Inc. report entitled: SOUTHERN WOOD PIEDMONT GROUNDWATER QUALITY ASSESSMENT - WILMINGTON NORTH CAROLINA FACILITY dated August 3, 1992.

2.5 Phase II Groundwater Quality Assessment

Data collected during the Phase I groundwater quality assessment was utilized by ETE, Inc. in the preparation of recommendations for a Phase II groundwater quality assessment. The purpose of the Phase II groundwater quality assessment was to further define the hydrogeology and groundwater quality with respect to past wood preserving activities at the facility. Phase II groundwater quality assessment activities included the abandonment of five temporary monitoring wells, installation of 12 monitoring wells, groundwater flow evaluation, groundwater sampling, soil sampling, slug testing, and the preparation of an aerial photograph and topographic map depicting the site. For a complete description of the Phase II groundwater quality assessment proposed activities, please refer to the letter report submitted to SWP entitled: RECOMMENDATIONS FOR A PHASE II GROUNDWATER QUALITY ASSESSMENT - SOUTHERN WOOD PIEDMONT COMPANY-WILMINGTON, NORTH CAROLINA dated August 10, 1992.

2.5.1 Temporary Monitoring Well Abandonment

The five Phase I temporary monitoring wells B2, B3, B4, B5, and B6 were abandoned by over-reaming and pressure grouting the borehole to land surface.

2.5.2 Monitoring Well Installation

Based on the data collected during the Phase I groundwater quality assessment, it was determined that additional monitoring wells were necessary to properly define the horizontal and vertical extent of dissolved and separate phase fluid plumes present beneath the facility. Twelve additional monitoring wells were installed between September 28 and October 8, 1992 as part of Phase II groundwater quality assessment activities.

Nine monitoring wells (MW-18 through MW-26) were completed in the upper aquifer and three monitoring wells (MW-8A, MW-11A, and MW-19A) were completed in the lower aquifer at the site during the Phase II investigation.

2.5.3 Site Geology

The site is underlain by a brown, fine to medium sand (upper sand) to a depth of 7 to 16 feet below land surface. Present beneath the upper sand is a 13 to 15 feet thick, dark brown to black clayey peat to peaty clay (peat) with varying amounts of wood and root fragments. Underlying the peat is a 14 to 18 feet thick, light brown, medium to coarse sand (lower sand). Underlying the lower sand is a 2.5 to 4 feet thick, firm, tight, olive gray silty clay with 5 to 10 percent phosphate and glauconite grains (lower clay). Beneath the lower clay is a very dense, light gray sandy shell mold limestone and sand with alternating cemented shell molds and friable silt to large pebble sand laminae. The thickness of this limestone unit is currently unknown but, based on geologic literature, is estimated to be on the order of 650 to 700 feet in thickness.

2.5.4 Site Hydrogeology

Three aquifers and two confining units have been encountered beneath the facility. The upper sand (upper aquifer) is under water table conditions and, as such, is an unconfined or water table aquifer. The upper aquifer at the site is bounded on all sides by groundwater discharge boundaries (e.g. Cape Fear River, on-site drainage ditches, and Greenfield Creek). Groundwater within the upper aquifer migrates from the center of the facility and discharges to these boundaries. The peat, located beneath the upper aquifer, is a leaky confining unit that separates the upper and lower aquifers at the facility. Visual observation of the peat indicates that it is water saturated throughout its entire thickness. The lower sand (lower aquifer) at the facility is bounded above by the leaky peat and below by the lower silty clay and is therefore, a semi-confined aquifer. The groundwater flow direction within the lower aquifer appears to be controlled by the Cape Fear River. Beneath the lower aquifer at the facility is a silty clay. This silty clay is a confining layer at the facility. The third and lowermost aquifer encountered beneath the SWP facility is the Peedee Limestone Formation. The unit is a confined aquifer and is a major source of groundwater in this area.

Groundwater elevations from all of the monitoring wells and surface water elevations from the staff gauges were collected at low tide at the facility on October 15, 1992 (Attachment A). A water table mound was observed beneath the center of the site in the upper aquifer. From this mound groundwater flows to the east and north towards the on-site drainage ditches, to the south towards Greenfield Creek, and to the west towards the Cape Fear River. The average horizontal hydraulic gradient for the upper aquifer was 0.0015 ft/ft. The potentiometric surface for the lower aquifer beneath the facility was evaluated utilizing the three lower aquifer monitoring wells. The groundwater flow direction in the lower aquifer was to the northwest with a horizontal hydraulic gradient of 0.0002 ft/ft.

The vertical hydraulic gradients between the upper and lower aquifers were evaluated by comparing the groundwater elevations in the three well clusters at the facility. An upward

vertical hydraulic gradient of 0.02 ft/ft exists at the MW-8 well cluster and downward vertical hydraulic gradients of 0.012 ft/ft and 0.003 ft/ft exist at MW-11 and MW-19 well clusters, respectively. Please refer to Attachment A for a tabulated historical vertical hydraulic gradient summary.

Slug tests to evaluate the hydraulic conductivity of the upper aquifer, peat, and lower aquifer were completed at 15 monitoring well locations. The average horizontal hydraulic conductivity measured in the upper aquifer is 5.06×10^{-4} cm/sec, in the peat is 3.2×10^{-5} cm/sec, and in the lower aquifer is 4.05×10^{-3} cm/sec.

The horizontal hydraulic gradient and horizontal hydraulic conductivity were utilized to evaluate the groundwater seepage velocity for the upper aquifer, peat and lower aquifer at the facility. The average seepage velocity for the upper aquifer is 0.8 m/year, for the peat is 0.02 m/year, and for the lower aquifer is 0.85 m/year.

2.5.5 Soil Quality

During installation of the monitoring wells, close attention was given to the condition of the soils encountered. Soil observations included visible staining of the soil, odor, total organic vapor screening (OVA), and laboratory soil sampling. Soil observations during the Phase I and II groundwater quality assessments indicate that three main source areas exist (Figure 4). One source is the wood treatment area, which includes the former creosote treatment area, former CCA treatment area and the former sludge ditch. The second source is the former large storage tank containment area and the third source is the former diesel storage tank areas.

Visible staining of the soils in the vicinity of the wood treatment area was observed from 3 feet below land surface to the top of the peat (13 feet below land surface) at MW-11 and to 8 feet below the top of the peat in MW-14 (16 feet below land surface). At MW-26, visible staining first occurs at a depth of 10 feet below land surface and is present to a depth of 1 foot below the top of the peat (17 feet below land surface).

In the vicinity of the large storage tank source area visibly stained soils are present near MW-13 from 3 feet below land surface to a depth of 8 feet below land surface. Visibly stained soils are present in monitoring well MW-22 from 3 feet below land surface to a depth of 9 feet below land surface.

The diesel tank source areas are indicated by monitoring wells MW-15, MW-16, and MW-17. At MW-16 and MW-17, diesel stained soils were observed from the surface to a depth of 5 feet below land surface with a diesel odor occurring to the top of the peat. In the vicinity of MW-15, diesel stained soils were observed to a depth of 5 feet below land surface. Diesel odors were also observed near the surface in monitoring well MW-22.

On December 9 and 14, 1992, ETE collected 11 soil samples along the on-site drainage ditch and along the north bank of Greenfield Creek (Figure 3). Each boring was advanced to an approximate depth of 2 feet below land surface. The sample retrieved from each borehole was analyzed for the Wilmington site-specific metals, semi-volatiles and volatiles. Please refer to Attachment A for a tabulated historical soil sample summary table.

The highest levels of arsenic detected were present in off-site samples SS-1 at 3.5 mg/kg, SS-2 at 5.2 mg/kg, and on-site samples SS-4 at 3.6 mg/kg, SS-5 at 1.5 mg/kg, and SS-7 at 2.3 mg/kg. The highest detected levels of chromium occurred in off-site samples SS-1 at 5.5 mg/kg, SS-2 at 14 mg/kg and in on-site samples SS-4 at 11 mg/kg and SS-7 at 9.2 mg/kg. The highest detected copper and lead concentrations, respectively, occurred in off-site samples SS-1 at 6.1 and 14 mg/kg, SS-2 at 46 and 290 mg/kg, SS-3 at 8 and 61 mg/kg, and in on-site samples SS-4 at 14 and 25 mg/kg. The two highest lead concentrations, 290 and 61 mg/kg occurred in off-site samples.

The CCA and diesel source areas at the site are located roughly 400 to 600 feet northwest of soil samples SS-5 and SS-6. In all cases, the lowest metal concentrations on-site occurred in soil samples SS-5 and SS-6, which are the closest soil sample locations to the source area. Therefore, the laboratory detected values most probably represent naturally occurring background levels or another off-site source. The on-site soil sampling by Geraghty & Miller in 1991 also suggested that the on-site metal concentration results most probably represented background levels for metals.

The soil samples were also analyzed for semi-volatile and volatile organic wood-preserving constituents. The lowest organic wood preserving constituent concentrations occurred at locations SS-2, SS-3, SS-8 and SS-11 with concentrations of 3.25 mg/kg, ND, 1.0 mg/kg, and ND, respectively. Moderate values occurred in soil samples SS-1 at 9.936 mg/kg and SS-4 at 17.691 mg/kg. High concentrations occurred in SS-5 at 167.0724 mg/kg, SS-6 at 150.4248, SS-7 at 203.259 mg/kg, and SS-9 at 357.3546 mg/kg. The highest concentration of organic wood-preserving constituents occurred in SS-10 with a concentration of 6,110.008 mg/kg. As demonstrated by the detected constituents, wood-preserving activities may have contributed to the observed organics in the soil. The on-site source of wood-preserving constituents is located roughly 400 feet northwest of soil sample location SS-5 and SS-6. High concentrations of detected organics occurred at these locations. Further from the source, at SS-1, SS-2, SS-3, SS-4, and SS-8, the concentrations of organic wood-preserving constituents have decreased considerably. The soil samples along Greenfield Creek (SS-1, SS-9, and SS-10) have detectable organic concentration levels, both upstream and downstream from the on-site drainage ditch. The detection along Greenfield Creek may suggest that additional off-site sources of these compounds are present.

2.5.6 Groundwater Quality

Between October 13 and 16, 1992, ETE collected 21 groundwater samples from the existing monitoring wells at the facility. The groundwater samples were analyzed by the laboratory for dissolved and total arsenic, chromium, copper, and lead and semi-volatile and volatile organics. Please refer to Attachment A for a tabulated historical groundwater sample parameter summary.

All dissolved metal concentrations were listed below detection limits, except for monitoring wells MW-15, MW-17, and MW-22. Groundwater from these wells yielded a dissolved arsenic concentration of 0.023 mg/l, 0.0057 mg/l, and 0.013 mg/l, respectively.

The areas of separate phase fluids and areas of greatest organic wood preserving constituent concentrations occurred in close relation to the source areas (large storage tank area, diesel storage tank area, and the wood treatment area). The greatest concentration of organic wood-preserving constituents occurred at MW-13, MW-14 and MW-22, with concentrations of total PAH's of 8.130 mg/l, 8.973 mg/l, and 13.358 mg/l, respectively. Heavy separate phase fluids were present in MW-11, MW-12, and MW-26. For additional information on the Phase II assessment activities please refer to the report by ViroGroup, Inc. entitled: PHASE II GROUNDWATER QUALITY ASSESSMENT WILMINGTON, NORTH CAROLINA FACILITY, dated February 26, 1993.

2.6 Cape Fear River Surface Water Sampling

Surface water samples have been collected from the Cape Fear River adjacent to the former wood treating facility since December 1985. Two upgradient and two downgradient samples are collected along the east bank of the Cape Fear River during each sampling event (Figure 22). The upgradient surface water samples are located near the U.S. Highway #74 bridge and near an old slip at the former wood treating facility. The downgradient surface water samples are located near the mouth of Greenfield Creek and near the North Carolina State Ports Authority. A total of 14 routine sampling events have occurred through July 1993. One resampling event, to evaluate a detection during the routine June 1989 sampling event occurred in July 1989.

The upgradient sample location near U.S. Highway #74 has been below laboratory detection limits for the Wilmington site-specific constituents since initiation of surface water sampling activities. Surface water samples collected near the old slip have also been below laboratory detections limits for the Wilmington site-specific constituents, except on two occasions. Copper was detected at 0.02 mg/l in June 1988 and chromium was detected at 0.011 mg/l in January 1990 near the old slip.

Wilmington site-specific constituents were detected on two occasions at the downgradient location near the mouth of Greenfield Creek. Naphthalene was detected at a concentration of

0.050 mg/l during the June 1989 sampling event. To evaluate the detection of naphthalene, a second sample was immediately collected near the mouth of Greenfield Creek in July 1989. The July 1989 surface water sample near the mouth of Greenfield Creek was below laboratory detection limits for the Wilmington site-specific constituents. During the July 1990 sampling event chromium was detected at 0.046 mg/l and copper was detected at 0.052 mg/l near the mouth of Greenfield Creek. The downgradient sample location near the North Carolina State Ports Authority has been below laboratory detection limits for the Wilmington site-specific constituents since initiation of sampling in December 1985. Please refer to Attachment A for the historical surface water sample parameter summary table for the Cape Fear River.

Multiple sources of potential contamination to the Cape Fear River exist in this vicinity because of heavy industrialization along its banks and along the banks of tributary creeks. Urbanization along Greenfield Creek, including a City water treatment facility and a fuel tank farm present potential sources of contamination that may discharge to the Cape Fear River. The distribution of various constituents detected in soil samples collected along Greenfield Creek suggested the likelihood that multiple sources exist.

3.0 PHASE III GROUNDWATER QUALITY ASSESSMENT

Data collected during the Phase I and Phase II groundwater quality assessments was utilized in the preparation of recommendations for a Phase III groundwater quality assessment. The purpose of the Phase III groundwater quality assessment was to further define the hydrogeology and groundwater quality with respect to past wood preserving activities at the facility. Phase III activities included the abandonment of one monitoring well, installation of six upper aquifer monitoring wells and seven lower aquifer monitoring wells, groundwater sampling, soil sampling, and collection of sequential groundwater elevations from each monitoring well at the site to evaluate the tidal effects on the upper and lower aquifer flow regimes. For a complete description of the proposed Phase III groundwater quality assessment activities, please refer to the letter submitted to SWP entitled: RECOMMENDATIONS FOR A PHASE III GROUNDWATER QUALITY ASSESSMENT - SOUTHERN WOOD PIEDMONT COMPANY WILMINGTON, NORTH CAROLINA dated February 11, 1993. Presented below is ViroGroup, Inc. - ETE Division's summary of findings for the Phase III groundwater quality assessment.

3.1 Monitoring Well Abandonment

During the Phase II groundwater quality assessment, monitoring well MW-24 was installed adjacent to an on-site road that is used by the public for access to the Cape Fear River. This well was vandalized on several occasions. In order to prevent additional vandalism, this well was abandoned and reinstalled approximately 60 feet west in a less visible, wooded area. The designation for the replacement monitoring well is MW-24R. Monitoring well MW-24 was abandoned by over-reaming to below the well depth and removing all well materials from the

borehole. The resultant borehole was then abandoned by pressure grouting with a cement/bentonite (6% bentonite) grout to land surface using the tremie pipe method. Please refer to Attachment B for the MW-24 well abandonment record.

3.2 Monitoring Well Installation

Phase I and II activities included the installation of 17 upper aquifer and 3 lower aquifer monitoring wells at the facility. Based on this data, additional monitoring wells were necessary to properly define the plumes present within the upper and lower aquifers beneath the site. Twelve additional monitoring wells were installed between October 26 and November 13, 1993 as part of the Phase III groundwater quality assessment activities. Please refer to Figure 3 for the locations of the newly installed monitoring wells.

In order to install the proposed monitoring wells, appropriate permits were required. ViroGroup, Inc. contacted the State of North Carolina Department of Health, Environment, and Natural Resources (NCDHENR) officials to notify them of our intent to install monitoring wells in North Carolina. Diane Rossi of the Wilmington Division of NCDHENR stated that current regulations stipulate that well permits are not required if the monitoring wells are located on-site and are not to be used for production or recovery.

Monitoring wells MW-28 and MW-28A were installed on a parcel of land adjacent to the Atlantic Coast Line Railroad located along the eastern property boundary. Access to this parcel could only be accomplished by driving along the railroad track easement. A right-of-entry permit was acquired through H.C. Worsham, Public Project Engineer of CSX Transportation, allowing the transport of the drilling rig and equipment along the railroad easement for monitoring well installation. Please refer to Attachment C for a copy of the letter requesting the Right-of-Entry permit and a copy of the permit issued by CSX Transportation allowing access to the parcel of land.

One upper aquifer monitoring well (MW-27) was installed in a wetland area. Due to the location of the well, it was necessary to notify the U.S. Army Corps of Engineers of the intent to install the well. Please refer to Attachment C for a copy of the letter notifying the Corps of Engineers and a copy of the letter from the Corps of Engineers approving the installation of the monitoring well.

Arrangements were made with the City of Wilmington to provide potable water for well installation through an on-site water hydrant.

In order to better define the horizontal extent of the plumes in the upper aquifer, ViroGroup, Inc. installed 5 additional monitoring wells during the Phase III assessment. One upper aquifer monitoring well (MW-27) is located in the northern portion of the site, adjacent to the Amerada

Hess facility monitoring well. Three of the monitoring wells, designated MW-28 through MW-30, were installed along the eastern property boundary and the southern perimeter of the wetland area. The fifth monitoring well (MW-24R) was installed as a replacement well for abandoned well MW-24.

ViroGroup, Inc. also completed 7 monitoring wells (MW-11B, MW-14A, MW-20A, MW-22A, MW-24A, MW-28A and MW-29A) in the lower aquifer at the site. These lower aquifer monitoring wells were used to evaluate the thickness of the peat, the nature of the aquifer materials underlying the peat, the presence of a lower confining layer, the groundwater quality within the lower aquifer, and the lower aquifer groundwater flow direction(s) and hydraulic gradients.

The monitoring wells were installed using an all-terrain vehicle (ATV) mounted drilling rig. Using the ATV rig allowed the installation of the monitoring wells without the build up of extensive roadways. To ensure representative soil sample collection, the monitoring wells were installed using the mud-rotary drilling technique. All of the monitoring wells were installed according to SWP specifications (Figure 5) with the exception of not using a surface casing during construction of the upper aquifer monitoring wells. A surface casing was not set during completion of the upper aquifer monitoring wells due to the upper aquifer being less than ten feet thick and the water table being located approximately 1 foot below land surface.

The upper aquifer monitoring wells were installed by advancing the borehole to the top of the peat. Borehole depths ranged from 7 to 14 feet below land surface. The borehole for the lower aquifer monitoring wells was advanced to the top of the lower clay. Borehole depths for the lower aquifer monitoring wells ranged from 40 to 46 feet below land surface.

During advancement of the soil borings, split-spoon samples were collected. A representative sample from each split spoon was placed in a zip-lock bag with adequate head space and screened with a photoionization detector (PID) organic vapor analyzer. All observations were recorded and the soil classified using the Unified Soil Classification System.

Except for monitoring well MW-27, all upper aquifer monitoring wells were installed so the base of the screen rests on top of the peat. The screen of monitoring well MW-27 was installed to bracket the water table.

To install the lower aquifer monitoring wells, a 10-inch diameter borehole was advanced into the underlying peat unit to a depth of approximately 20 feet below land surface. A 6-inch diameter PVC surface casing was installed into the open borehole. A grout mixture of cement and bentonite was placed by the tremie method in the annular space around the surface casing and the grout allowed to set a minimum of 24 hours. Within the surface casing, a 3.875-inch

diameter borehole was drilled to the top of the lower confining clay. Split-spoons were collected continuously to a depth of 20 feet, thereafter, they were collected on five-foot centers.

All monitoring wells were constructed using 2-inch diameter, 10-foot sections of flush joint, threaded, PVC riser with a 5-foot section of factory slotted (0.01 inch) stainless steel well screen. A 10-foot screen was used in the completion of monitoring well MW-27 to allow for bracketing the water table which fluctuates due to tidal influences. Well construction included the placement of a sand filter from the base of the well screen to a height of two feet above the top of the screen. A two-foot bentonite plug was placed on top of the sand pack and a bentonite grout was placed in the remaining annular space to land surface.

To prevent cross-contamination during drilling operations, all construction materials and downhole drill equipment were steam cleaned between each borehole. All decontamination fluids were contained in a lined pit on-site.

To maintain the integrity of the wells after installation, each well was secured with a protective pad, aluminum casing, and keyed-alike locks.

Upon completion, all of the newly installed monitoring wells were developed by the swab and pump method.

All soil removed during the advancement of the boreholes, all decontamination fluids, all development fluids, and other drilling derived waste was disposed in labeled roll-off containers and solidified for proper off-site disposal.

The precise location and elevation of the ground surface and top of casing (TOC) of the newly installed monitoring wells were determined by direct field survey.

A well construction summary table and boring logs illustrating the sediments encountered, OVA screening, visual observations, olfactory observations, and monitoring well construction is presented in Attachment D of this report.

3.3 Regional and Site Geologic Conditions

3.3.1 Regional Geology

The SWP Wilmington, North Carolina facility is situated on relatively flat-lying Cretaceous and younger sediments of the Coastal Plain Physiographic Province that extends from the "Fall Line" to the continental margin (Soller and Mills, 1991). Approximately 1,500 feet of Coastal Plain sediments overlie pre-Mesozoic crystalline basement rock in the vicinity of the site (North

Carolina Geological Survey, 1985). Area lithology consists of sands indicative of Post-Miocene surficial deposits overlying sediments of the Upper Cretaceous Peedee Formation (Berry, 1949).

The surficial soils in the site area typically consist of 5 to 60 feet of fine sands. The sands are tan to white in well-drained upland areas, while they are brown to black and contain several feet of organics in low lying or poorly-drained areas. The soils have been eroded and redeposited many times, resulting in buried stream channels, swamps and marsh areas, often containing soft organic silts, clays, and peat (Berry, 1949).

Beneath the surficial soil are sediments of the Peedee Formation that typically range from 650 to 700 feet in thickness. The Peedee soils generally consist of dense to very dense sand with zones of cemented sands and impure limestones. The sands have a characteristic salt and pepper appearance and the Peedee Formation is considered a major aquifer in this area (Blevins and Bradbourne, 1985).

3.3.2 Site Geology

The site is underlain by a very loose to loose, brown, fine to medium sand with a trace of coarse sand and small pebbles to a depth of 7 to 16 feet below land surface. This unit, for the purpose of this report, will be termed the upper sand. Encountered in every boring beneath the upper sand is a 13 to 16 feet thick, very loose, dark brown to black clayey peat to peaty clay with varying amounts of wood and root fragments. The maximum depth below land surface in which the peat was observed was 27.5 feet in monitoring well MW-11A. This unit will be termed the peat. The contact between the upper sand and the underlying peat is sharp. Underlying the peat is a 14 to 18 feet thick, very loose to loose, light brown to brown, medium to coarse sand. This unit has a sharp contact with the overlying peat and was observed to occur to a maximum depth of 44 feet below land surface at monitoring well MW-11A. For this report the lower sandy unit will be termed the lower sand. Encountered in all deep monitoring well borings beneath the lower sand is a 2.5 to 4 feet thick, firm, tight, olive-gray silty clay with 5 to 10% phosphate and glauconite grains. This unit is termed the lower clay. The contact between the lower sand and the top of the lower clay is also sharp. Beneath the lower clay is a very dense, light gray sandy shell mold limestone and sand with alternating cemented shell molds and friable silt to large pebble sand laminae. The thickness of this limestone unit is currently unknown but, based on geologic literature, is estimated to be on the order of 650 to 700 feet in thickness.

Dr. Victor A. Zullo of the University of North Carolina Geology Department located in Wilmington, North Carolina was contacted on November 9, 1992, to discuss the most likely depositional and age history of the units encountered beneath the facility. In order of decreasing age (decreasing depth), the limestone unit encountered may be the top portion of the middle to upper Peedee Formation (65 millon years before present) and has been named the Scotts Hill Member. These sandy limestones are shelf deposits and contain a large fauna that is usually

dominated by pelecypods. In these limestones, the aragonitic shelled mollusc have either been replaced by calcite or, when dissolved, occur as external molds. The locally occurring olive gray clay that caps the limestone at the site is marine in origin and is also most likely part of the upper Peedee Formation (Sohl and Owens, 1991). The Eocene Castle Hayne Limestone is commonly present on top of the Peedee Formation in the North Carolina coastal plain, however in the Wilmington vicinity of the Cape Fear River, the Castle Hayne Formation is missing (Harris and Zullo, 1991). The lower sand at the site is most likely a Pleistocene (10,000 years before present) fluvial deposit occurring as a point bar, cut-off meander or an old oxbow lake sequence. The peat at the site probably occurred as the result of filling an oxbow lake with marsh and swamp type sediments. As a result, the peat at the facility is probably regionally discontinuous in its lateral extent, even though it appears to be continuous beneath the entire facility (Zullo, verbal communication, 1992). The upper sand appears to have been deposited as aeolian sand dunes during the Holocene (Soller and Mills, 1991) or as fill material.

3.4 Site Hydrogeology

3.4.1 Aquifers and Confining Units

Based on the borehole data collected to date, it appears that three aquifers and two confining units have been encountered beneath the facility. The upper sand (upper aquifer) beneath the SWP facility is under water table conditions and should be termed an unconfined or water table aquifer. This aquifer is not likely to be considered a major source of groundwater, except for minor local uses. The upper aquifer at the site appears to be bounded on all sides by groundwater discharge boundaries as shown by the upper aquifer water table flow map to be discussed later in this section. The upper aquifer discharge boundaries include: the Cape Fear River to the west, the drainage ditches located along the north and east property boundaries, and Greenfield Creek along the southern property boundary at the facility. Groundwater in the upper aquifer migrating from the center of the facility discharges to these boundaries rather than migrating beyond their locations.

The peat is located beneath the upper aquifer. This unit consists of silt and clay with varying amounts of wood and root fragments. The nature of the materials making up the peat suggest that this unit should be termed a leaky confining unit that separates the upper and lower aquifers at the facility. Visual observation of the peat indicates that it is water saturated throughout its entire thickness, thereby demonstrating a hydraulic connection between the upper and lower aquifers.

The lower aquifer at the facility consists of a permeable sand material that should, at the facility, be termed a semi-confined aquifer. This lower aquifer is also probably considered a minor source of groundwater in this area, except for local uses. Evidence that the lower aquifer is semi-confined relative to the upper aquifer is elucidated by the facts that the peat is completely

water saturated; the difference in direction of groundwater flow within the lower aquifer relative to the upper aquifer; and by the differences in the elevation head (vertical hydraulic gradient) of the groundwater in the upper and lower aquifers at the facility. The groundwater flow direction and gradients in the lower aquifer appears to be controlled by the surface water elevation of the Cape Fear River. Conversations with the local Corps of Engineers indicated that the Cape Fear River is dredged to the top of the limestone in the vicinity of Wilmington. This dredging of the river allows the lower aquifer to be in complete hydraulic interconnection with the Cape Fear River. The vertical hydraulic gradients, as will be discussed later in this section, indicate that the upper and lower aquifers are to a small degree hydraulically connected.

Beneath the lower aquifer at the facility is an olive gray silty clay of marine origin that acts as a confining unit. This clay is 4 feet thick and on visual observation appears tight and dry.

The third and lowermost aquifer encountered beneath the facility is the Peedee Limestone Formation. The unit is a confined aquifer and is a major source of groundwater in this area.

3.4.2 Groundwater Flow Directions

Groundwater levels were collected from 35 monitoring wells and surface water levels from 3 staff gauges at the facility on November 16 and again on November 19, 1993. Multiple groundwater levels were collected from each monitoring well and staff gauge to evaluate the effect of tidal influences on the groundwater flow direction(s) in the upper and lower aquifers. In addition, the influence of the installation of a tidal flood-control gate at the confluence of Greenfield Creek and the Cape Fear River located at the southwestern edge of the property was evaluated. One set of groundwater levels was collected at low tide; a second set of levels was collected at a time that represents one quarter of a full tidal cycle (one-quarter low tide); a third set of levels was collected at a time that represents three quarters of a full tidal cycle (three-quarter high tide), and; the last set of levels was collected at high tide (Attachment E). The tidal stage and fluctuation in the Cape Fear River, in Greenfield Creek, and in the on-site drainage ditches do not coincide. Therefore, the tidal stage referred to during this evaluation is the tidal stage in the Cape Fear River.

The collected water level measurements were used to develop a series of water table surface maps for the upper aquifer (Figures 6 through 9). The figures progress from low tide conditions to high tide conditions at the site. The data used to construct the water table maps was collected by measuring the depth to water from the top of casing in all monitoring wells screened in the upper aquifer and the staff gauges that exist in the surface water bodies. The elevation of the top of casing was surveyed by a registered land surveyor to within 0.01 feet mean sea level (MSL). The depth to water in each well was subtracted from the top of casing elevation at each respective well to yield the elevation of the water table at that location. The groundwater elevations were plotted on a scaled site map and contoured. Groundwater flow directions are

depicted by arrows showing flow from areas of higher groundwater elevation to areas of lower groundwater elevation.

As illustrated on the low tide upper aquifer water table map (Figure 6), an elongate water table mound exists that is at its highest elevation in the northeast corner of the site. From this location the groundwater mound extends along the central portion of the site to the south with local highs in the center of the site in the vicinity of MW-12 and along the wetland area to the southeast. From this elongate groundwater mound, the groundwater flows off in all directions toward the on-site drainage ditches, Greenfield Creek, and the Cape Fear River. The horizontal hydraulic gradient at low tide is 0.0015 ft/ft along the northern property boundary toward the Cape Fear River; 0.0032 ft/ft in the central portion of the site toward the on-site drainage ditches; 0.0025 ft/ft in the central portion of the site toward the Cape Fear River, and; 0.0017 ft/ft in the southeastern portion of the site toward Greenfield Creek. Local curvatures in the groundwater isoelevation lines result from the groundwater in the upper aquifer discharging to the on-site drainage ditches, Greenfield Creek, and the Cape Fear River. Groundwater within the upper aquifer from off-site in the vicinity of Optimist Park is flowing to the west towards the on-site drainage ditch near monitoring well MW-28 located to the east of the site. Both the Cape Fear River and the on-site drainage ditch staff gauges are at the lowest elevation observed during this flow evaluation. This suggests that the tidal gate is open allowing Greenfield Creek and the on-site drainage ditches to discharge to the Cape Fear River.

To keep reiteration to a minimum, only changes to the upper aquifer water table maps for the remainder of the tidal cycle will be highlighted in the following discussions. At one-quarter low tide the groundwater mound in the central portion of the site and along the eastern flank adjacent to the on-site drainage ditch has decreased in elevation. Groundwater elevations in the upper aquifer immediately adjacent to the Cape Fear River have begun to increase in elevation. The horizontal hydraulic gradients have remained the same, except for a slight decrease to 0.0016 ft/ft in the central portion of the site toward the Cape Fear River. A groundwater deflection line developed along the on-site drainage ditch. This inflection line occurs when the surface water elevation in the on-site drainage ditch is greater than the groundwater elevation in the upper aquifer adjacent to the ditch due to the rising tide. At this tidal stage, the surface water in the ditch is flowing into the upper aquifer and encountering the groundwater flow from the central groundwater mound. These two opposing forces encounter each other and result in an inflection of approximately 90 degree in flow direction and an order of magnitude decrease in gradient near the drainage ditch. As a result, groundwater and constituents in the groundwater can be smeared with the direction of flow along the inflection line. The surface water elevations in the Cape Fear River and in the on-site drainage ditch are approximately the same indicating that the tide control gate is open.

At three-quarter high tide the central groundwater mound and the eastern flank have begun to increase slightly in elevation. A large increase in groundwater elevation of 0.65 feet has occurred adjacent to the Cape Fear River at monitoring well MW-22. The horizontal hydraulic gradients are approximately the same, except for a decrease in gradient to 0.0005 ft/ft from the central portion of the site toward the Cape Fear River. A groundwater inflection line developed in the upper aquifer that reaches from the northern portion of the site along the Cape Fear River to the southeastern corner of the site along the confluence of Greenfield Creek and the on-site drainage ditch. The elevation of the groundwater along the inflection line is approximately 1.88 feet above mean sea level at MW-18 to the north and approximately 0.96 feet above mean sea level at MW-29 to the southeast. This change in elevation (horizontal hydraulic gradient of 0.0003 ft/ft) along the inflection line indicates that a minor groundwater flow component exists to the south along the Cape Fear River and to the east along Greenfield Creek during the formation of the inflection line. The surface water elevation in the on-site drainage ditch is now much lower than the surface water elevation in the Cape Fear River indicating that the tide control gate is now closed preventing flow from the Cape Fear River to Greenfield Creek.

Groundwater flow at high tide in the upper aquifer is similar to three-quarter high tide. The central groundwater mound has increased in elevation very slightly and the groundwater inflection line has migrated further east into the site. The horizontal hydraulic gradients are the same as the three-quarter high tide. The surface water elevation has increased in the on-site drainage ditch either because of increased discharge flow from the upper aquifer due to increased groundwater elevation or less probable, the tide control gate may have just been opened. An important observation is that the groundwater elevations in the central portion of the site are at their highest during low tide in the Cape Fear River. This most likely is the result of the delayed propagation of increased groundwater elevation from high tide along the Cape Fear River migrating to the central portion of the site.

A series of potentiometric surface maps for the lower aquifer have also been constructed (Figures 10 through 13) to evaluate the tidal effects on the lower aquifer flow regime. At low tide a central groundwater mound is also present in the lower aquifer at the site. Groundwater along this mound is divided and flows off in three directions. Lower aquifer groundwater in the western portion of the site flows toward the Cape Fear River; in the eastern portion of the site toward the drainage ditches, and; the southern portion of the site toward Greenfield Creek. At low tide, horizontal groundwater flow in the lower aquifer discharges to the Cape Fear River in the western portion of the site and flows to the east and south under the on-site drainage ditches and Greenfield Creek in the eastern portion of the site. The horizontal hydraulic gradient to the west is 0.0001 ft/ft, to the east is 0.0008 ft/ft, and to the south is 0.0003 ft/ft. Vertical hydraulic gradients between the upper and lower aquifer are downward along the Cape Fear River and in the central portion of the site ranging between 0.013 ft/ft near the Cape Fear River to 0.016 ft/ft near the wetland area in the central portion of the site (Attachment E). Upward vertical hydraulic gradients are present along the eastern portion of Greenfield Creek and along

the on-site drainage ditches. The upward vertical hydraulic gradients ranged from 0.004 ft/ft near the upper reaches of the on-site drainage ditch to 0.036 ft/ft near the confluence of the on-site drainage ditches.

The vertical hydraulic gradients between the upper and lower aquifers were evaluated by comparing the groundwater elevations in the well clusters at the facility (e.g. MW-28 and MW-28A). The vertical hydraulic gradient is calculated by dividing the difference in groundwater elevation in each well in the well cluster by the difference in the mid-point elevation of each well screen in the well cluster. Downward vertical hydraulic gradients exist in areas of flow from the upper aquifer to the lower aquifer and upward vertical hydraulic gradients exist in areas of flow from the lower aquifer to the upper aquifer.

At one-quarter low tide the potentiometric head along the western flank and the central portion of the groundwater mound have increased. The groundwater divide disappeared and flow in the western portion of the site has reversed and is now flowing toward the southeast. A minor component of flow still exists to the west, however, in a narrow band immediately adjacent to the Cape Fear River. The horizontal gradient across the site to the southeast has decreased to 0.0005 ft/ft. The vertical gradient between the upper and lower aquifer along the western flank has also reversed (MW-8/MW-8A) and is now upward at 0.022 ft/ft. The vertical hydraulic gradient has remained downward in the central portion of the site but has decreased to an average gradient of 0.008 ft/ft. Upward vertical hydraulic gradients are still present along the eastern portion of Greenfield Creek and along the on-site drainage ditches. These upward gradients have increased slightly to an average vertical gradient of 0.029 ft/ft.

During three-quarter high tide the potentiometric head along the Cape Fear River has continued to increase. All flow in the lower aquifer is now to the southeast. The minor flow component to the west toward the Cape Fear River has reversed. The horizontal hydraulic gradient across the site to the southeast has increased to 0.0008 ft/ft. The upward vertical hydraulic gradient has increased to 0.035 ft/ft along the Cape Fear River and has decreased to an average of 0.025 ft/ft along the on-site drainage ditches. Downward vertical hydraulic gradients remain approximately the same in the central portion of the site with an average gradient of 0.008 ft/ft.

The groundwater flow at high tide is similar to three-quarter high tide in the lower aquifer, except that the potentiometric head along the western and central portion of the site has increased. As a result, the horizontal hydraulic gradient to the southeast has also increased to 0.0009 ft/ft. The upward vertical hydraulic gradient increased along the Cape Fear River to 0.042 ft/ft and to an average of 0.027 ft/ft along the on-site drainage ditches. Downward vertical gradients are present in the central portion of the site throughout the tidal cycle with the lowest downward vertical gradients occurring at high tide at an average of 0.005 ft/ft.

3.5 Soil Quality

During installation of the monitoring wells, close attention was given to the condition of the soils encountered. The soil observations were made by collecting split-spoon soil samples continuously from land surface to the bottom of the borehole in the upper aquifer monitoring wells. The soils in the lower aquifer monitoring well boreholes were observed by collecting split-spoon soil samples continuously from land surface to the bottom of the peat, followed by five-foot intervals below the peat to the bottom of the borehole. Soil observations included visible staining of the soil, odor, total organic vapor screening (OVA) using a photoionization detector, and laboratory analyses.

Soil observations during the Phase I and II groundwater quality assessments indicate three main source areas exist (Figure 4). The first area is the wood treatment source area, and includes the former creosote treatment area, former CCA treatment area and the former sludge ditch. The contaminants from these areas appear to have coalesced and are following the same migration pathways in the subsurface. The second source is the large storage tank area. Contaminants from this area are separated from the other areas and appear to be following a different migration pathway. The third source is the diesel storage tank areas. This source can be separated by its location on the site and the physical behavior of the contaminants in the subsurface. The diesel contaminants are less dense than water and tend to float when present as a separate phase. In addition, the dissolved phase associated with diesel does not tend to display a large degree of vertical movement into the subsurface. Wood-preserving constituents are more dense than water and are, therefore, more likely to more downward into the subsurface.

For clarity, soil quality observations will be addressed by source area and will include only observations made during the Phase III groundwater quality assessment. For a review of the observations from previous assessments, please refer to the boring logs in Attachment D or the previously referenced Phase II groundwater quality assessment report.

Visible staining of the soils in the vicinity of the wood treatment source area were further evaluated by Phase III monitoring wells MW-11B, MW-14A, MW-20A, MW-24A, MW-28A, MW-29A, and MW-30. Monitoring well MW-11B is located in the area formerly occupied by the creosote treatment facility. Wood-preserving constituents were observed in the soil from 5 feet below land surface to 17 feet below land surface at this location. Staining was observed to a depth of 1 foot below the top of the peat. Monitoring well MW-14A is located hydraulically downgradient from the former wood treating facility at the upper reaches of the former sludge ditch. Staining was observed at a depth of 3 feet to 22 feet below land surface. Staining was present to a depth of 14.5 feet below the top of peat at MW-14A. Monitoring well MW-20A is located upgradient of the former wood treatment facility. No staining or odors were detected in this boring, however, organic vapors were detected by the OVA in a thin zone on top of the

peat. Monitoring well MW-24A, located downgradient to the south of the former wood treatment facility, had stained sediments from 7 to 12 feet below land surface. Located to the east of the former sludge ditch and across the on-site drainage ditch is monitoring well MW-28A. No staining or odors were detected in this boring. Elevated OVA readings, however, were detected in the upper aquifer and in the peat at this location. Monitoring well MW-29A is located near the confluence of the on-site drainage ditch and Greenfield Creek in the southeastern portion of the property. No visible wood-preserving constituents were present at this location, however, a moderate odor and elevated OVA results were detected in the lower aquifer on top of the lower clay at a depth from 34 to 38 feet below land surface. Monitoring well MW-29A appeared clean until a depth of 34 feet below land surface. This suggests that dissolved constituents have migrated from the wood preserving source area through the upper aquifer, peat, and the upper portion of the lower aquifer and are now being detected downgradient of the source on top of the lower clay. Monitoring well MW-30 is also located downgradient of the wood preserving source area adjacent to the on-site wetland area. No staining was observed, however, a moderate odor and elevated OVA results were detected in the upper aquifer immediately on top of the peat.

Monitoring well MW-22A is completed in the vicinity of the former large storage tank containment area adjacent to the Cape Fear River. Visible staining was observed at a depth from 4 to 6 feet below land surface. A slight diesel odor was observed in the upper 4 feet of the borehole followed by a wood preserving constituent odor from 4 to 14 feet below land surface in the upper aquifer. A slight wood preserving constituent odor and elevated OVA results were also detected in the upper portion of the lower aquifer at MW-22A.

The Amerada Hess Corporation petroleum tank farm is located adjacent to the northern property boundary. A truck fueling and wash area is located near the northeast portion of the City of Wilmington property. Amerada Hess corporation investigated and documented a release in this portion of the site. In addition, Hess installed a monitoring well on the City of Wilmington property. In order to further investigate this release area, monitoring well MW-27 was installed during the Phase III assessment activities. Diesel stained soils, odors, and elevated OVA results were detected to a depth of 6 feet below land surface at this location.

Soil sampling completed during the Phase II groundwater quality assessment indicated high constituent levels in the vicinity of SS-10 along Greenfield Creek (Figure 3). This soil sample was suspect because the laboratory results were a magnitude higher than the other samples collected and the field observations were not indicative of high levels of contamination. Therefore, ViroGroup, Inc. collected a second soil sample (SS-10A) at this location to compare to the original soil sampling results.

To collect the soil sample, a pre-cleaned hand auger was used to advance a borehole into the sediment along the on-site side of Greenfield Creek. The hand auger boring was conducted at

low tide so that the boring could be completed in the creekbed. The boring was advanced to a depth of approximately 2 feet below land surface with the deepest sample retrieved from the borehole sent to the laboratory for analysis of Wilmington site-specific constituents (Attachment F). The sample was removed from the hand auger with a clean stainless-steel spoon and placed in respective clean sample containers provided by the laboratory. All soil excavated during completion of the soil boring was containerized in a roll-off container for proper disposal.

The sediment encountered in the borehole was a fine to very coarse, dark brown sand. No visible staining or odor was present in the soil sample. Please refer to the soil sample collection summary sheet located in Attachment F of this report.

Of the Wilmington site-specific list of constituents analyzed, only a fraction of the constituents were detected. The semi-volatile organics that were detected in the soil included: acenaphthene at 3.3 mg/kg dw, benzo(a)anthracene at 7.3 mg/kg dw, benzo(a)pyrene at 2.6 mg/kg dw, benzo(b)fluoranthene at 6 mg/kg dw, benzo(k)fluoranthene at 2.1 mg/kg dw, chrysene at 9 mg/kg dw, and fluoranthene at 15 mg/kg dw, (7 out of 23 constituents were detected). No volatile organics were detected in soil sample SS-10A. Arsenic was detected at a concentration of 13 mg/kg dw, chromium at 38 mg/kg dw and copper at 34 mg/kg dw. Please refer to Attachment F for a summary of the detected constituents in SS-10A.

Results from the second soil sample collected at location SS-10 are much lower than the first sample collected. The summed total for detected semi-volatile organics in the first sample, SS-10 is 6,110 mg/kg dw and for the second sample SS-10A is 45.3 mg/kg dw. As shown, the first sample is suspect. Please refer to Attachment A for a tabulated historical soil sample parameter summary from the Phase II assessment.

At completion of field activities, the roll-offs containing all assessment derived wastes were solidified by mixing the materials with kiln dust. Following solidification, a composite soil sample was collected for analysis by the Toxicity Characteristic Leaching Procedure (TCLP) to evaluate disposal options for the soil. The soil sample was analyzed for arsenic, chromium, lead, mercury, benzene, methyl ethyl ketone, o-cresol, m+p cresol, hexachlorobenzene, pentachlorophenol, pyridine, 2,4,5-trichlorophenol, and 2,4,6-trichlorophenol. All analytical results were below laboratory detection limits. Please refer to Attachment F for a summary table for the TCLP analysis and for the soil sample collection sheet.

3.6 Groundwater Quality

On November 16 through 19, 1993, ViroGroup collected 31 groundwater samples from the existing monitoring wells at the facility. Groundwater samples were not collected from monitoring wells MW-11, MW-14, MW-22, or MW-26 because a heavy (sinker) separate phase fluid was observed in these monitoring wells. Separate phase fluid thickness measurements were

collected from these monitoring wells using an interface probe. A thickness of 0.01 feet at MW-11, 0.41 feet at MW-14, 0.23 feet at MW-22 and 5.24 feet at MW-26 was measured during the Phase III assessment. A trace of heavy separate phase fluid was present in MW-12. A trace light (floating) sheen was observed in monitoring wells MW-12, MW-13, MW-16, MW-17, and MW-28.

Subsequent to the separate phase fluid evaluation, representative groundwater samples were collected from the remaining monitoring wells utilizing a clean disposable bailer to evacuate a minimum of three well volumes of groundwater from the well. The salinity, pH, conductivity, and temperature of the groundwater at each well were recorded and the groundwater sample placed into respective sterile groundwater sample containers for each well. The containers were labeled according to owner, site name, well number, date, time, and type of analysis to be performed. The collected samples were kept cool by placing the samples immediately into a cooler chilled to 4°C with ice. The sealed samples were then shipped with the appropriate chain-of-custody form via Federal Express overnight to Savannah Laboratories and Environmental Services, Inc. for analysis. The groundwater samples were analyzed for the Wilmington site-specific constituent list (Attachment G). Standard groundwater sampling protocol was followed as documented in the report entitled: SAMPLING AND ANALYSIS PLAN FOR GROUNDWATER MONITORING - SOUTHERN WOOD PIEDMONT COMPANY revised October 1991. Please refer to the groundwater sample collection summary sheets located in Attachment G for a listing of water level, well depth, sample appearance, volume purged, temperature, conductivity, pH, salinity, the presence of separate phase fluids and additional observations made during this groundwater sampling event for each monitoring well at the facility.

All purge water was containerized in a labeled roll-off container for proper disposal.

Temperature-compensated salinity measurements were collected in the field at each monitoring well at the facility using a YSI Model 33 SCT meter. Please refer to Attachment G for the salinity measurement summary table and Figure 14 for the upper aquifer salinity isoconcentration map. The EPA recommended limit for chloride concentration is 250 mg/l. At chloride concentration above 250 mg/l water begins to have an objectional taste. As shown on the upper aquifer salinity isoconcentration map, a mound a fresh water (salinity < 250 mg/l) is present in the northern portion of the site. This mound becomes elongate to the south reaching into the wetland area in the southeastern portion of the property. Brackish water is present in the upper aquifer along the Cape Fear River, Greenfield Creek, and the on-site drainage ditches.

Slightly saline groundwater is also present in the lower aquifer at 200 mg/l in MW-22A adjacent to the Cape Fear River and in MW-29A adjacent to Greenfield Creek. Otherwise, the lower aquifer appears to contain freshwater.

The groundwater samples were analyzed by the laboratory for Wilmington site-specific wood preserving metals, semi-volatiles and volatiles. These constituents were selected to evaluate potential groundwater contamination from the former wood treating facility at the site. Please refer to the groundwater sample parameter summary tables presented in Attachment G for a listing of the individual constituents that were detected at each monitoring well at the facility. Presented below is a summary of the detected constituents at the facility.

The groundwater samples for metals were analyzed after filtration (dissolved metals) and with no filtration (total metals). After filtration, all dissolved arsenic, chromium, and copper concentrations were below laboratory detection limits.

Total arsenic, chromium and copper concentrations were detected in many of the monitoring wells in the upper aquifer at the facility. Total arsenic concentrations in the upper aquifer ranged from ND (non-detected) to 0.088 mg/l. The highest level of total arsenic detected was present at MW-15 in close proximity to the CCA treatment area. Concentrations of total chromium ranged from ND to 4.6 mg/l. The highest detected level of chromium occurred along the northern property boundary at MW-18. Total copper concentrations ranged from ND to 0.058 mg/l. The highest area of detected total copper occurred in the vicinity of the large storage tank area at MW-13. No concentrations of total arsenic, chromium or copper were detected in the lower aquifer at the facility.

Groundwater samples were also analyzed for semi-volatile and volatile organic wood-preserving constituents. Please refer to the Wilmington site-specific groundwater sample list located in Attachment G for a complete listing of the semi-volatile and volatile constituents. From the entire list of constituents analyzed, only a small fraction of the constituents were detected. The semi-volatile organics that were detected in the groundwater included: acenaphthene, anthracene, carbazole, fluoranthene, naphthalene, and phenanthrene (6 out of 23 constituents were detected). The volatile organics that were detected in the groundwater during Phase III include: benzene, ethyl benzene, m/p xylene, o-xylene, and toluene (5 out 30 constituents were detected).

For simplification the organic wood preserving constituent concentrations in each well are summed to arrive at a total organic wood preserving constituent concentration. This total concentration is used to produce organic wood preserving constituent isoconcentration maps for the upper and lower aquifers depicted in Figures 15 and 16.

The areas of separate phase fluid and elevated dissolved constituent concentrations occur in close relation to the source areas (large storage tank area, diesel storage tank area, and the wood treatment area). As demonstrated by the concentration of organic constituents in the source areas, relative to the rest of the site, and by the list of detected constituents, wood-preserving activities most likely contributed to the observed organics in the groundwater at the site.

In the upper aquifer at the facility, heavy separate phase fluids are present in monitoring wells MW-11, MW-14, MW-22, and MW-26. The highest detected dissolved concentrations of total organic wood-preserving constituents are present in MW-12 at 5.155 mg/l and MW-13 at 5.289 mg/l. An east to west trending band of dissolved and free-phase organics occurs along the southern City of Wilmington property boundary between the Cape Fear River to the west and the on-site drainage ditch to the east. Along this band, dissolved organics from the former wood treatment area and sludge ditch migrate to the east toward the on-site drainage ditch and then turn to the south toward Greenfield Creek. Once the dissolved organics approached the area where the stagnation line occurs, the dissolved organics are smeared to the north and south parallel to the on-site drainage ditch. The dissolved organics do not appear to migrate off-site to the east due to the westerly direction of groundwater flow toward the on-site drainage ditch in the vicinity of Optimist Park. Segments of the dissolved plume emanating from the former wood treatment area are also migrating to the southwest toward monitoring well MW-19 and MW-24 and to the west toward MW-17. The dissolved organics in the vicinity of the former diesel storage tanks and the large storage tank area are migrating to the west toward the Cape Fear River.

The lateral extent of the upper aquifer dissolved organic wood preserving constituent plume is defined in the northern portion of the site. The southern portion of the site and the areas off-site to the east of the drainage ditch are defined to low concentrations of wood-preserving constituents.

The dissolved organic wood preserving constituent plume has also migrated vertically through the peat and into the lower aquifer at the facility. Wood-preserving constituents entered the lower aquifer in the vicinity of former wood treatment area, former sludge ditch and the former large storage tank area. In the vicinity of the former wood treatment area and the sludge ditch the dissolved constituents in the lower aquifer have migrated to the east toward the on-site drainage ditch, then to the south toward Greenfield Creek and finally turning southwest toward the Cape Fear River. Near the large storage tank source area, the wood preserving constituents in the lower aquifer are migrating to the west toward the Cape Fear River.

The lateral extent of the lower aquifer dissolved wood preserving constituent plume is defined to the north and west in the central portion of the site and to the east in the vicinity of MW-28A. The downgradient southeastern portion of the site has been defined to low concentrations of wood-preserving constituents.

In order to further investigate the documented release from Amerada Hess Corporation located to the north of the site, groundwater samples for hydrocarbons were collected from monitoring wells MW-6, MW-18, and MW-27. The groundwater samples were analyzed for hydrocarbons as gasoline, as kerosene, as heavy oils, as mineral spirits, as varsol, and as fuel oil/diesel. All

hydrocarbon analyses were below laboratory detection limits for these constituents. Please refer to Attachment G for a summary of the hydrocarbon analyses.

The concentration of each organic wood preserving constituent was compared to the Environmental Protection Agency's Drinking Water Regulations and Health Advisories (EPA, 1993). The EPA lists a maximum contaminant level (MCL) for several of the organic wood-preserving constituents. The MCL for constituents analyzed during the Phase III groundwater quality assessment are: 0.001 mg/l pentachlorophenol, 0.0002 mg/l benzo(a)pyrene, 0.005 mg/l 1,1,2-trichloroethane, 0.002 mg/l vinyl chloride, 0.005 mg/l benzene, 0.005 mg/l carbon tetrachloride, 0.005 mg/l 1,2-dichloroethane, 0.005 mg/l dichloromethane, 0.005 mg/l 1,2-dichloropropane, 0.7 mg/l ethyl benzene, 10 mg/l total xylenes, 1 mg/l toluene, 0.1 mg/l trans-1,2-dichloroethylene, and 0.2 mg/l 1,1,1 trichloroethane. Out of all the constituents analyzed at each monitoring well, only benzene exceeded its MCL. The benzene concentration exceeded the MCL at MW-19 at 0.0055 mg/l and at MW-13 at 0.046 mg/l in the vicinity of the former diesel storage tanks and the former large storage tank area (Figure 17). The laboratory detection limits of 0.05 mg/l pentachlorophenol and 0.01 mg/l benzo(a)pyrene used during the Phase III assessment were not low enough to compare the results to the MCLs for these constituents. However, at the quantitation limit used for the Phase III assessment no pentachlorophenol or benzo(a)pyrene was detected at the facility. Groundwater samples were not collected from monitoring wells that contained separate phase constituents.

3.7 Surface Water Quality

Surface water samples were collected along the east bank of the Cape Fear River adjacent to the former wood treating facility on January 18, 1994. Two upgradient and two downgradient samples were collected. The upgradient surface water samples are located near the U.S. Highway #74 bridge and near the old slip at the former wood treating facility (Figure 22). The downgradient surface water samples are located near the mouth of Greenfield Creek and near the North Carolina State Ports Authority. Both the upgradient and downgradient surface water samples were below laboratory detection limits for the Wilmington site-specific constituents. Please refer to Attachment G for the Phase III surface water sample parameter summary table and laboratory data for the Cape Fear River surface water samples.

4.0 SUBSURFACE WOOD PRESERVING CONSTITUENT MIGRATION

Wood-preserving constituents (creosote/coal tar) are considered to be dense non-aqueous phase liquids (DNAPLS). As a whole, wood-preserving constituents are slightly heavier than water, have a high viscosity, and a low dissolved phase mobility (Cherry, 1992). Because wood-preserving constituents are heavier than water, gravity and interfacial tension between the DNAPL and groundwater play an important role in the migration of the DNAPL. The DNAPL will continue to migrate vertically downward in the subsurface until it intercepts a barrier to its

vertical migration. The barrier to migration could be a fine-grained layer or a clay or any material in which the pore spaces are smaller than that of the host material. If the barrier is flat lying, the DNAPL will begin to pool and spread laterally on this barrier until a critical pool height is encountered. The critical pool height is the height of the DNAPL pool required to exceed the entry pressure (capillary pore pressure and interfacial tension) within the pores of the material restricting the movement of the DNAPL. Once this critical pool height is reached, the DNAPL will then begin to flow through the original barrier to flow (Kueper, 1992). Once the entrance pressure is achieved and flow through the barrier has begun, the reduced interfacial tension can allow the entire free product pool to drain leaving only residual DNAPL behind. If the barrier encountered is sloping, the DNAPL will most likely flow by gravity downslope until another barrier to flow is encountered causing the DNAPL to pool. This can continue until the required entry pressure cannot be met or until the separate phase fluid volume is reduced to residual concentrations.

As the DNAPL is migrating through porous media, residual DNAPL is left behind the trailing edge of the moving DNAPL body due to snap-off and by-passing mechanisms. It can be expected that an estimated 20 percent of the DNAPL body will be left behind as residual during free-phase migration (U.S. EPA, 1993). After a certain distance of migration, the free phase will be reduced to just residual concentrations (Kueper, 1992).

At the Wilmington, North Carolina facility it appears that the concepts presented above exist (Figures 18, 19, 20, and 21). Wood-preserving constituents entered the subsurface at the former wood treatment area (MW-11), along the former sludge ditch (MW-14), and at the confluence of the on-site drainage ditches near (MW-26). In the subsurface, the free-phase wood-preserving constituents migrated to the top of the peat. Once the free-phase wood-preserving constituents encountered the peat, the product began to pool near MW-11 adjacent to a mound in the peat at MW-14. As the pool height increased, its width began to migrate to the northwest toward MW-12 and MW-17, to the southwest toward MW-19 and MW-24, and to the east toward MW-26. For a period of time, the fine-grained nature and the sloping surface of the peat prevented the downward infiltration of free-phase wood-preserving constituents into the peat. However, the pool height continued to increase until the critical pool height was reached. At that time, the free-phase wood-preserving constituents migrated into the peat at MW-11 and MW-14. Because the entry pressure into the peat was exceeded, the pool drained into the peat and migrated to the east toward MW-26 and the on-site drainage ditch. Presently, it appears that the migration of free-phase wood-preserving constituents has reached a standstill by pooling beneath the confluence of the on-site drainage ditches near MW-26. Free-phase measurements indicate that residual concentrations are present in the upper aquifer near MW-11 at 0.01 feet, in MW-12 at trace levels and in the peat near MW-14 at 0.41 feet. Residual concentrations in these areas indicate that the free-phase constituents have migrated from this area leaving a trail of residual concentrations behind. The free-phase constituents appear to have become stationary and are pooled near MW-26 at a thickness of 5.24 feet.

Free-phase wood-preserving constituents also entered the subsurface near the former large storage tank area (MW-13). Once in the subsurface, the free-phase constituents migrated to the west toward the Cape Fear River. It appears that these constituents did not pool on top of the peat as indicated by residual concentrations of 0.23 feet at MW-22.

5.0 REFERENCES

Berry, W. E., 1949, Geologic Map Coastal Plain - North Carolina: United States Geologic Survey.

Blevins, S. E. and Bradbourne, J. T., 1985, Hydrogeologic Report SWP, Law Environmental, Kennesaw, GA. p. 3-4.

Cherry, J.A., 1992, Site Characterization and Remediation of Dense, Immiscible Phase Liquid Contaminants (DNAPLS) in Porous and Fractured Media: Lecture Notes, Short Course Waterloo Centre for Groundwater Research, November 2-5, Chicago, Illinois.

Environmental Technology Engineering, Inc., 1992a, Southern Wood Piedmont Groundwater Quality Assessment - Wilmington North Carolina Facility.

Environmental Technology Engineering, Inc., 1992b, Recommendations for a Phase II Groundwater Quality Assessment - Southern Wood Piedmont Company Wilmington, North Carolina Facility.

Geraghty & Miller, Inc., 1993a, Data Summary Report for the 1990 Landfarm Area Sampling, Southern Wood Piedmont Company, Wilmington, North Carolina.

Geraghty & Miller, Inc., 1993b, Data Summary Report for the 1991 Landfarm Area Sampling and Comparison of 1990 and 1991 Soil and Ground-Water Data, Southern Wood Piedmont, Wilmington, North Carolina.

Geraghty & Miller, Inc., 1993c, Risk Assessment Report for Landfarm Areas, Southern Wood Piedmont Company, Wilmington, North Carolina.

Harris, W.B. and Zullo V. A., 1991, Eocene and Oligocene Stratigraphy of the Outer Coastal Plain: The Geology of the Carolinas, University of Tennessee Press/Knoxville, p. 290-308.

Heath, R.C., 1987, Basic Ground-Water Hydrology: United States Geological Survey Water-Supply Paper 2220, p. 84.

Kueper, B.H., 1992, Site Characterization and Remediation of Dense, Immiscible Phase Liquid Contaminants (DNAPLS) in Porous and Fractured Media: Lecture Notes, Short Course Waterloo Centre for Groundwater Research, November 2-5, Chicago, Illinois.

North Carolina Geological Survey (NCGS), 1985, Geologic Map of North Carolina, Raleigh, North Carolina

Sohl, N.F. and Owens, J. P., 1991, Cretaceous Stratigraphy of the Carolina Coastal Plain: The Geology of the Carolinas, University of Tennessee Press/Knoxville, p. 290-308.

Soil and Material Engineers, Inc. (SME), 1981, Geotechnical Investigation Report, City of Wilmington Property Leased by Southern Wood Piedmont Company, Wilmington, North Carolina.

Soller, D.R. and Mills, H.H., 1991, Surficial Geology and Geomorphology: The Geology of the Carolinas, The University of Tennessee Press/Knoxville, p. 290-308.

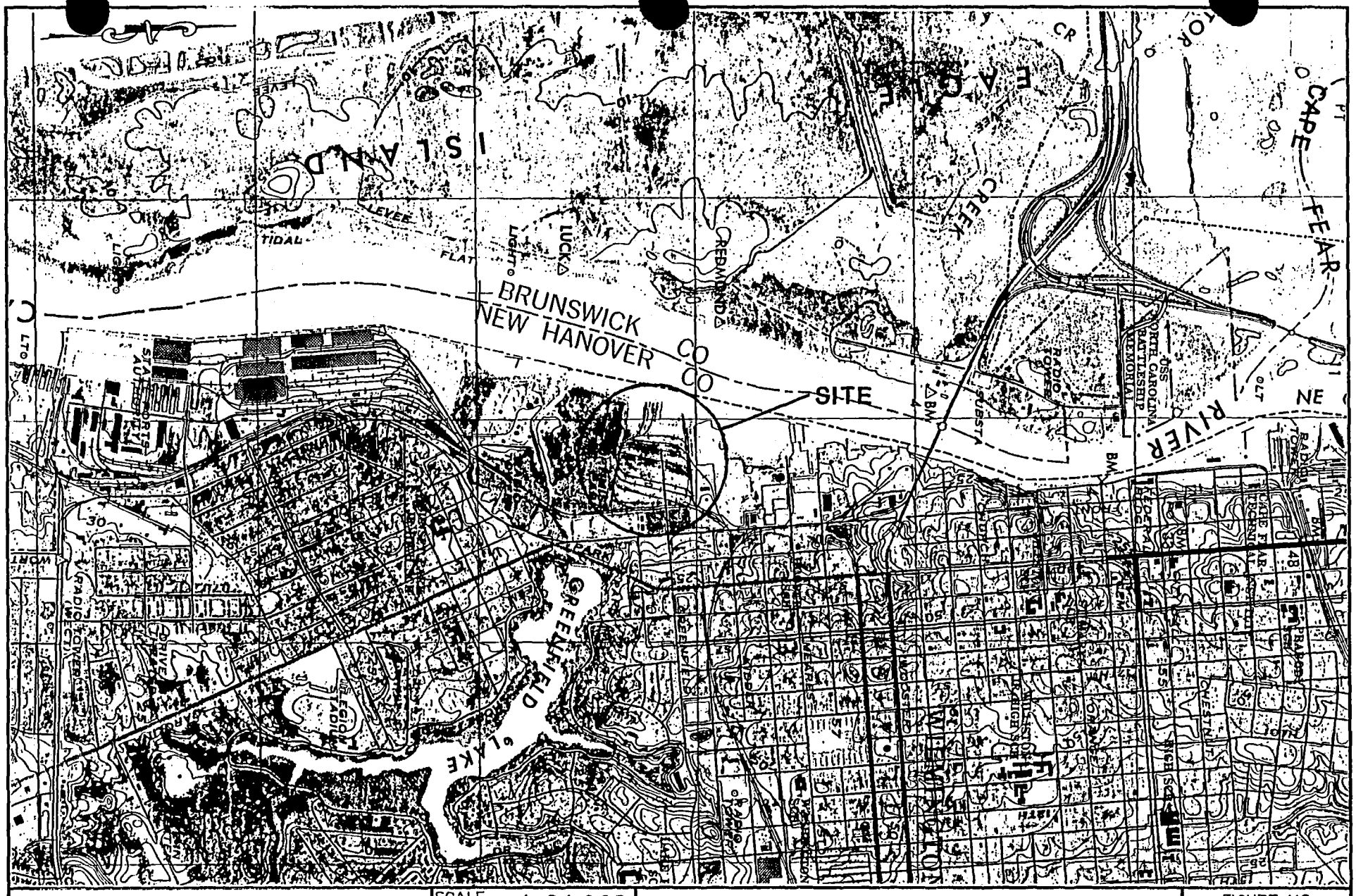
Southern Wood Piedmont Company, 1991, Sampling and Analysis Plan.

U.S. EPA, 1993, DNAPL Site Evaluation, Robert S. Kerr Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Ada, Oklahoma 74820

U.S. EPA, 1994, Drinking Water Regulations and Health Advisors, Office of Water, U.S. Environmental Protection Agency, Washington, D.C.

ViroGroup, Inc. - ETE Division, 1993a, Phase II Groundwater Quality Assessment Wilmington, North Carolina Facility.

ViroGroup, Inc. - ETE Division, 1993b, Recommendations for a Phase III Groundwater Quality Assessment, Southern Wood Piedmont Company Wilmington, North Carolina Facility.



ETE Division
ViroGroup, Inc.
1445 Pisgah Church Road
Lexington, SC 29072
Phone 803-957-6270
FAX 803-957-3845
Watts 1-800-786-0654

ViroGroup
Air • Water • Soil
TECHNOLOGY

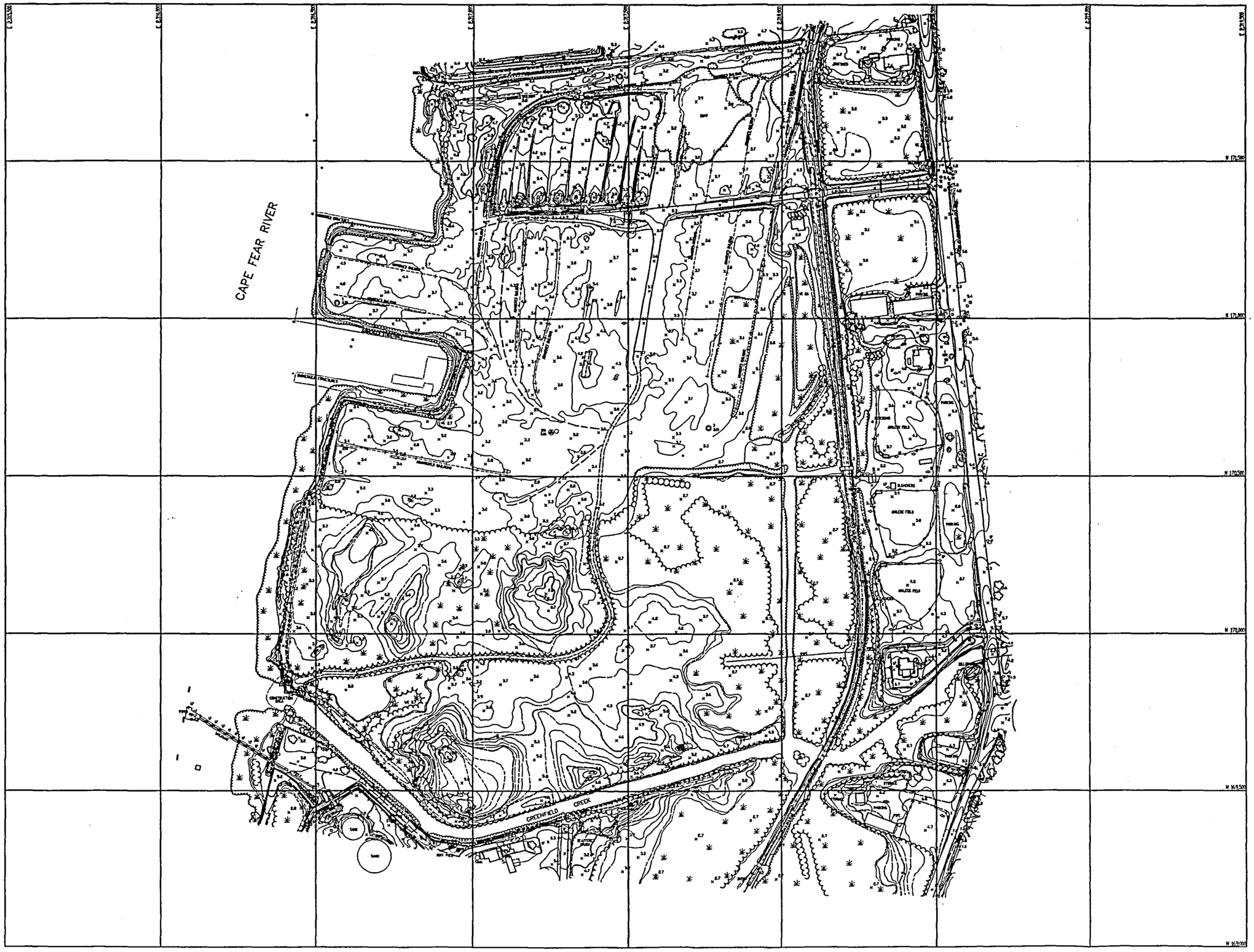
SCALE	1:24,000
DRAWN BY	CAB
CHECKED BY	GBK
DATE	2/11/94

SITE LOCATION MAP
SOUTHERN WOOD PIEDMONT/ WILMINGTON, N.C. FACILITY

FIGURE NO. 1

CADD NO. G: 5301501

PROJECT NO. 12-53015.00



PSI PHOTOGRAMMETRIC SERVICES, INC.
6455 E. LIVINGSTON AVENUE
REYNOLDSBURG, OHIO 43068
614-866-9010

ViroGroup
SSS Division
P.O. Box 1867 • 1440 Pisgah Church Rd. • Lexington, S.C. 29072
(803) 957-6270

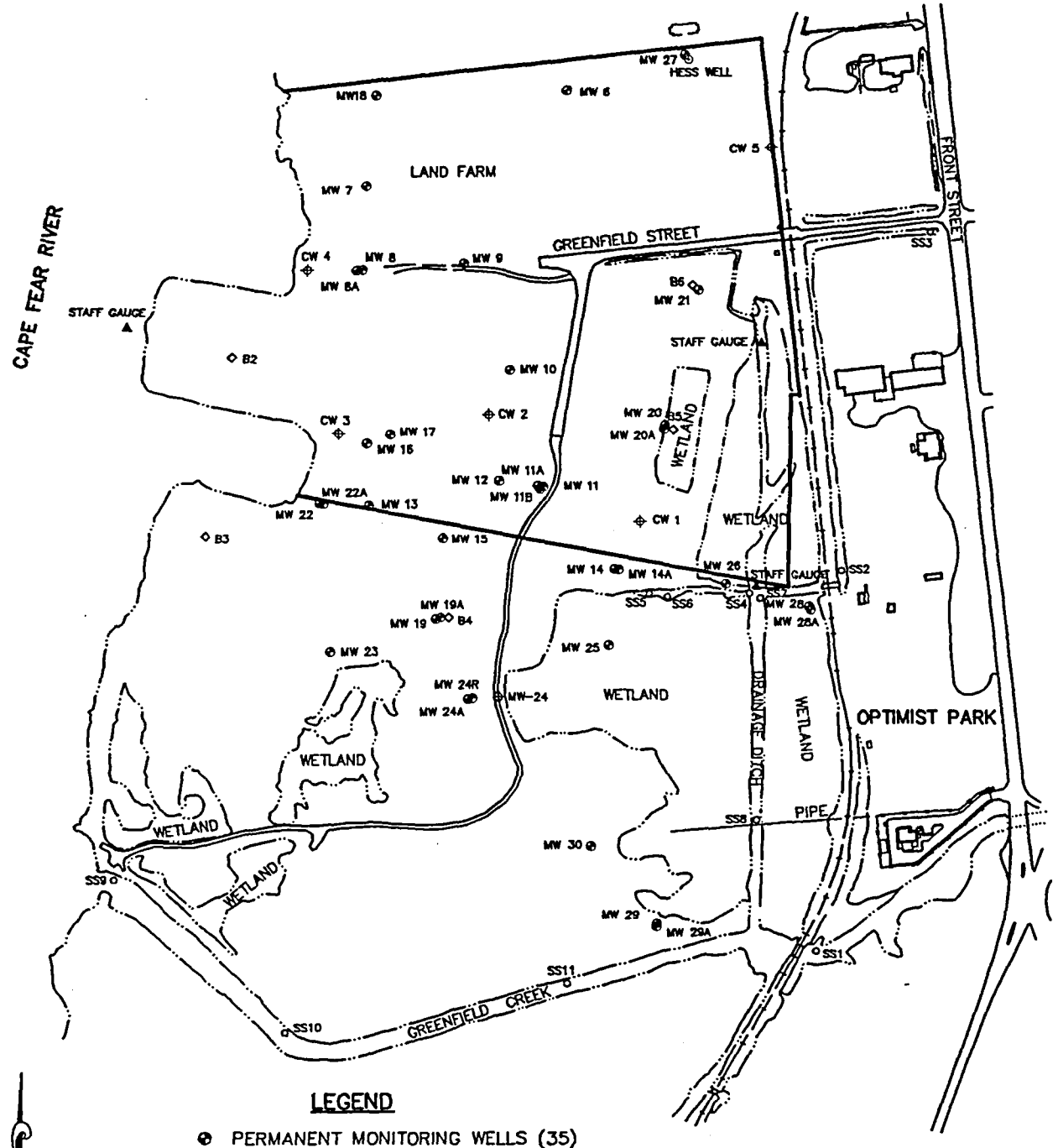
0' 150' 300' 600

SCALE: 1"=300' CONTOUR INTERVAL: 1/2'
DATE OF PHOTOGRAPHY: 24-FEB-93

FIGURE 2

SITE TOPOGRAPHIC MAP

SOUTHERN WOOD PIEDMONT
WILMINGTON, N.C. FACILITY

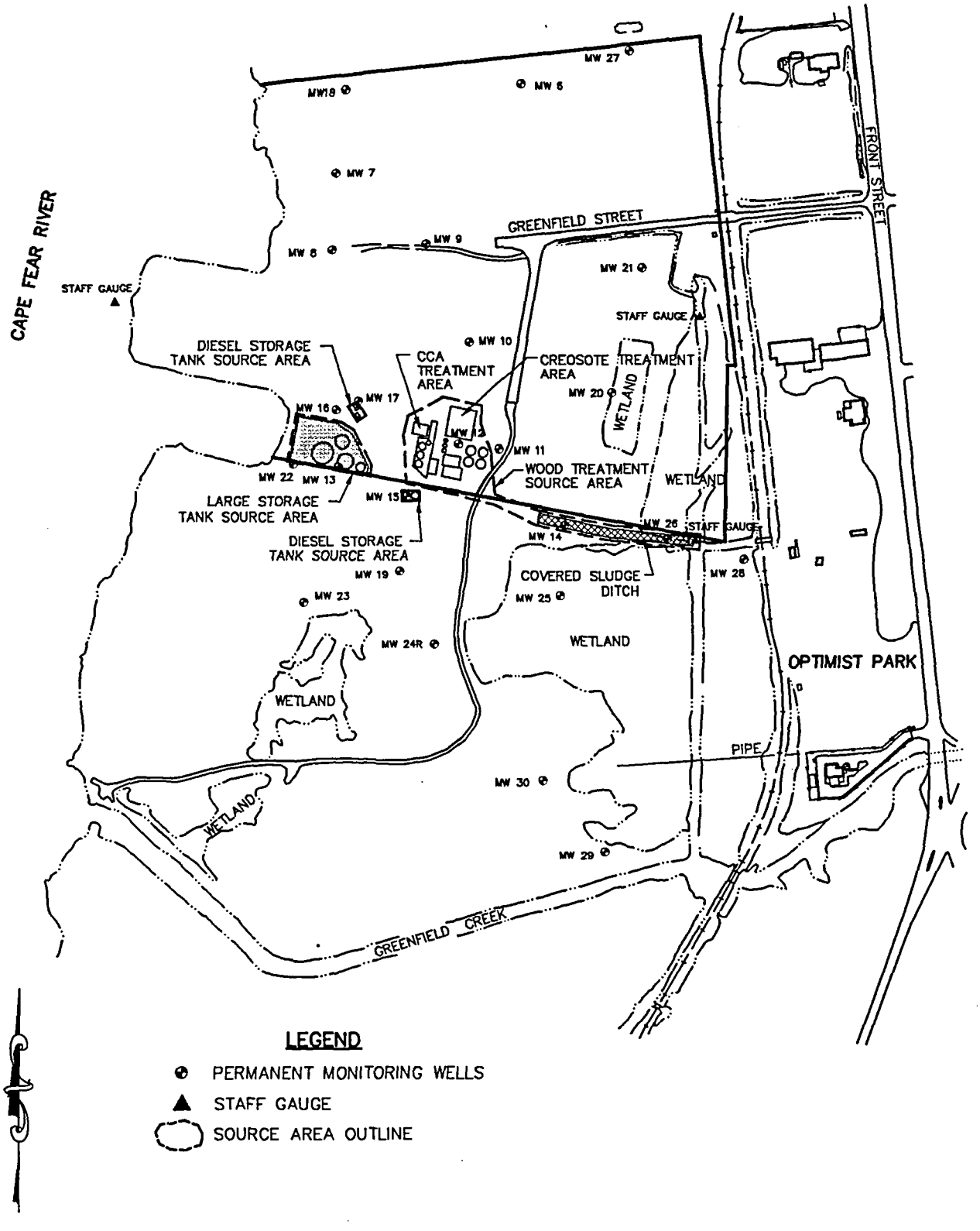


LEGEND

- PERMANENT MONITORING WELLS (35)
- STAFF GAUGE (3)
- SOIL SAMPLES (11)
- ABANDONED TEMPORARY MONITORING WELLS (5)
- CITY WELLS (5)
- HESS WELLS (1)
- ABANDONED MONITORING WELL (1)

ViroGroup
ETE, Division
P.O. Box 1667 • 1445 Plaugh Church Rd. • Lexington, S.C. 29072
(803) 957-6270

SCALE 1"=400'	SITE MAP	FIGURE NO. 3
DRAWN BY CAB	SOUTHERN WOOD PIEDMONT/ WILMINGTON, N.C. FACILITY	CADD NO. G:5301501B
CHECKED BY GBK		PROJECT NO. 12-53015.00
DATE 2/11/94		



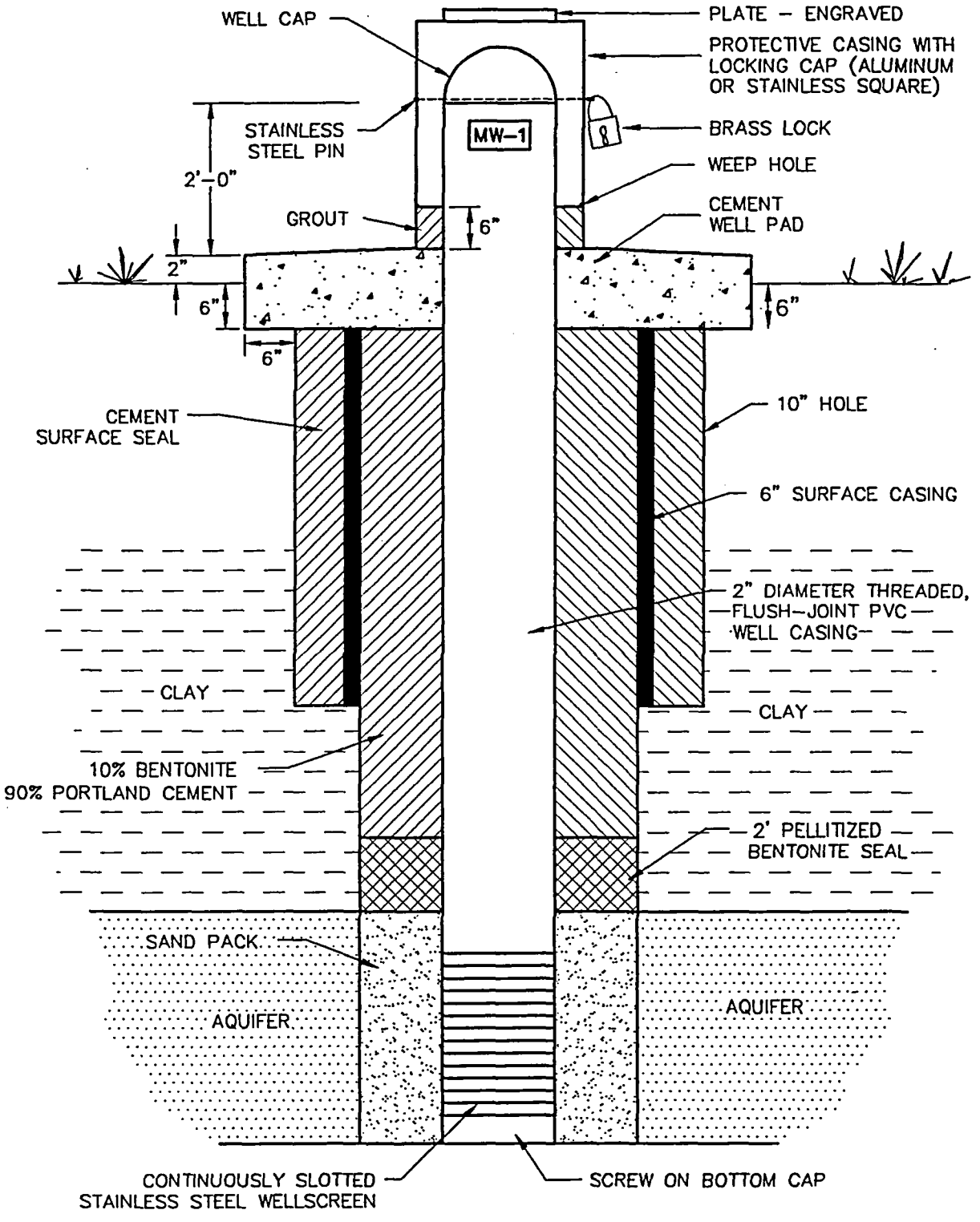
ViroGroup
ETE, Division
P.O. Box 1667 • 1445 Plaugh Church Rd. • Lexington, S.C. 29072
(803) 957-8270

SCALE	1"=400'
DRAWN BY	CAB
CHECKED BY	GBK
DATE	2/11/94

SOURCE AREA LOCATION MAP

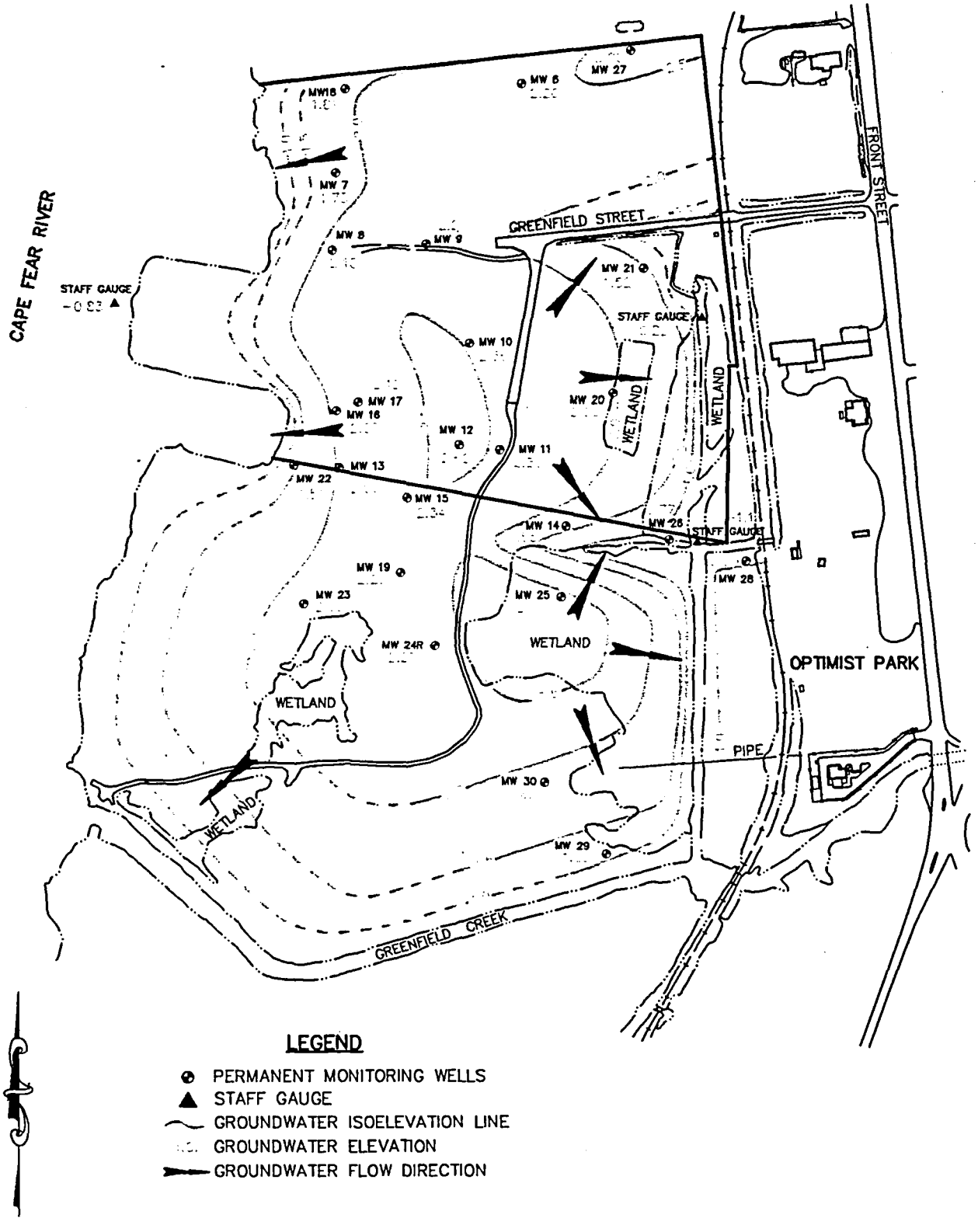
SOUTHERN WOOD PIEDMONT/ WILMINGTON, N.C. FACILITY

FIGURE NO.	4
CADD NO.	G:5301501B
PROJECT NO.	12-53015.00

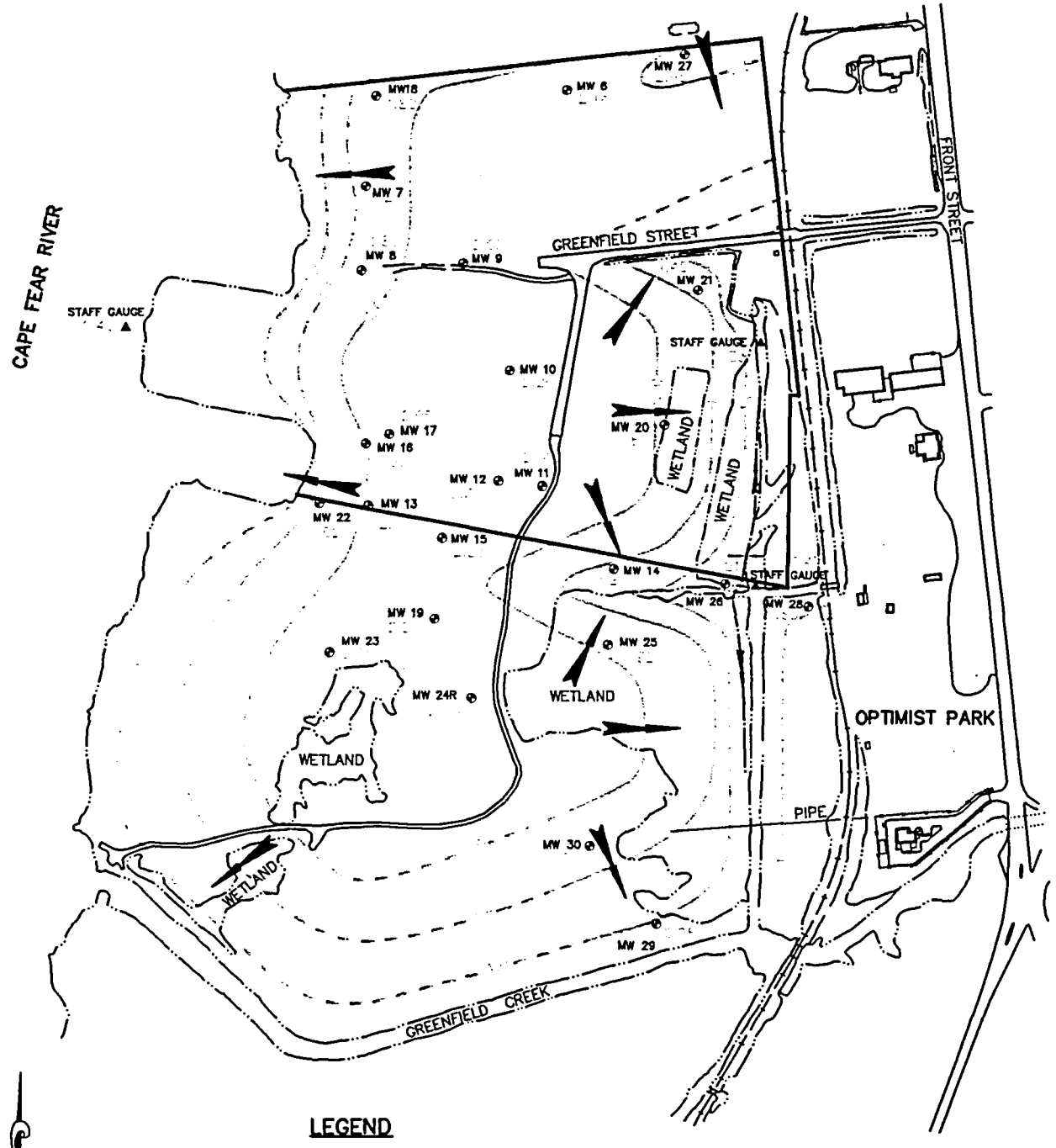


SWP SPECIFICATIONS #7/91
REVISED 3/92

ViroGroup ETE Division P.O. Box 1867 • 1445 Plaugh Church Rd. • Lexington, S.C. 29072 (803) 957-8270	SCALE N.T.S. DRAWN BY CAB CHECKED BY GBK DATE 4/25/94	GROUNDWATER MONITORING WELL SCHEMATIC SOUTHERN WOOD PIEDMONT/ WILMINGTON, N.C. FACILITY	FIGURE NO. 5 CADD NO. 530MWSCH PROJECT NO. 12–53015.00



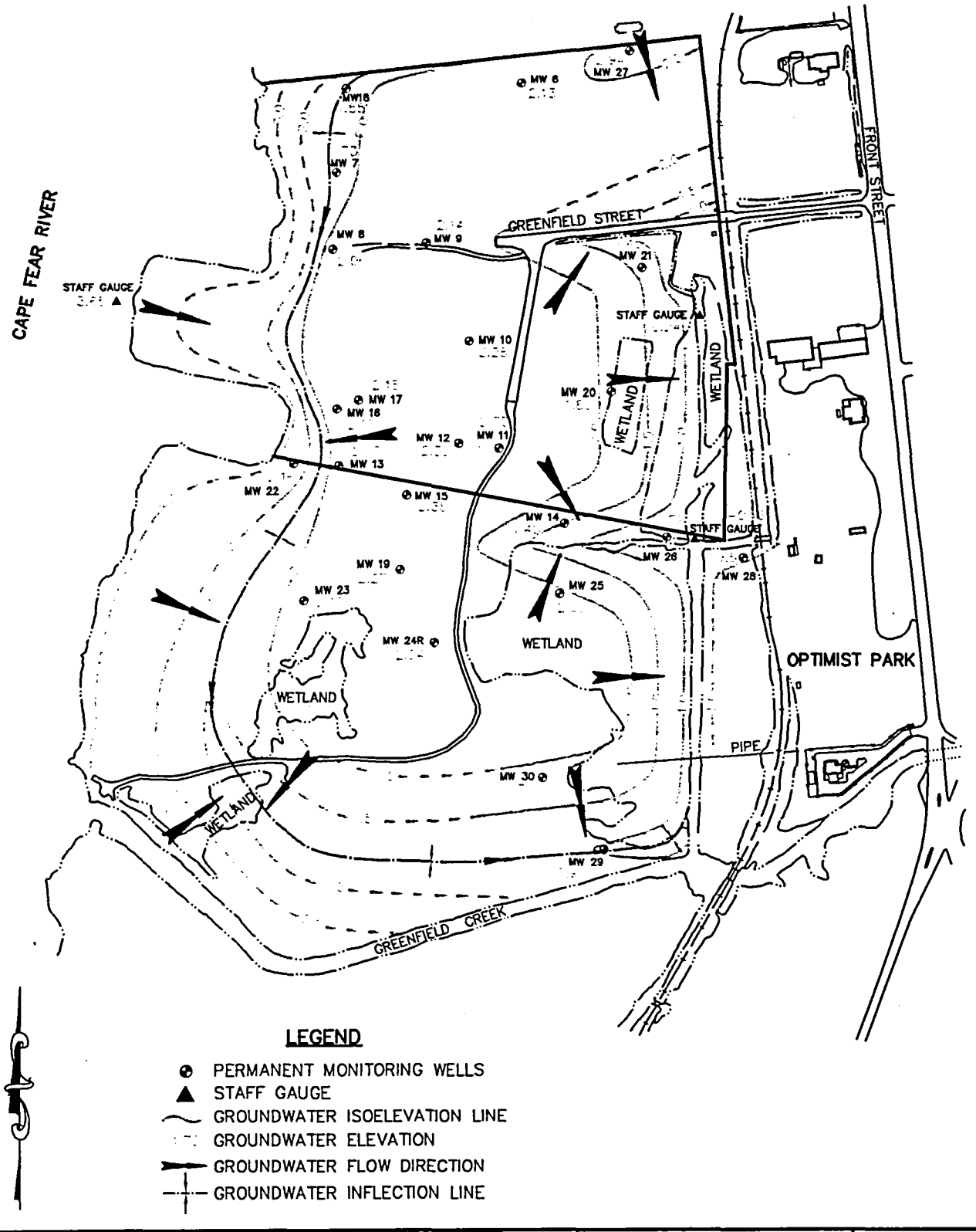
ViroGroup ETE Division P.O. Box 1867 • 1445 Piedmont Church Rd. • Lexington, S.C. 29072 (803) 957-8270	SCALE 1"=400' DRAWN BY CAB CHECKED BY GBK DATE 2/11/94	LOW TIDE UPPER AQUIFER WATER TABLE MAP SOUTHERN WOOD PIEDMONT/ WILMINGTON, N.C. FACILITY	FIGURE NO. 6 CADD NO. G:5301501A PROJECT NO. 12-53015.00



LEGEND

- PERMANENT MONITORING WELLS
- STAFF GAUGE
- GROUNDWATER ISOELEVATION LINE
- GROUNDWATER ELEVATION
- GROUNDWATER FLOW DIRECTION
- GROUNDWATER INFLECTION LINE

ViroGroup ETE, Division P.O. Box 1867 • 1445 Plaugh Church Rd. • Lexington, S.C. 29072 (803) 957-8270	SCALE 1"=400' DRAWN BY CAB CHECKED BY GBK DATE 2/11/94	ONE QUARTER LOW TIDE UPPER AQUIFER WATER TABLE MAP SOUTHERN WOOD PIEDMONT/ WILMINGTON, N.C. FACILITY	FIGURE NO. 7 CADD NO. G:5301501A PROJECT NO. 12-53015.00

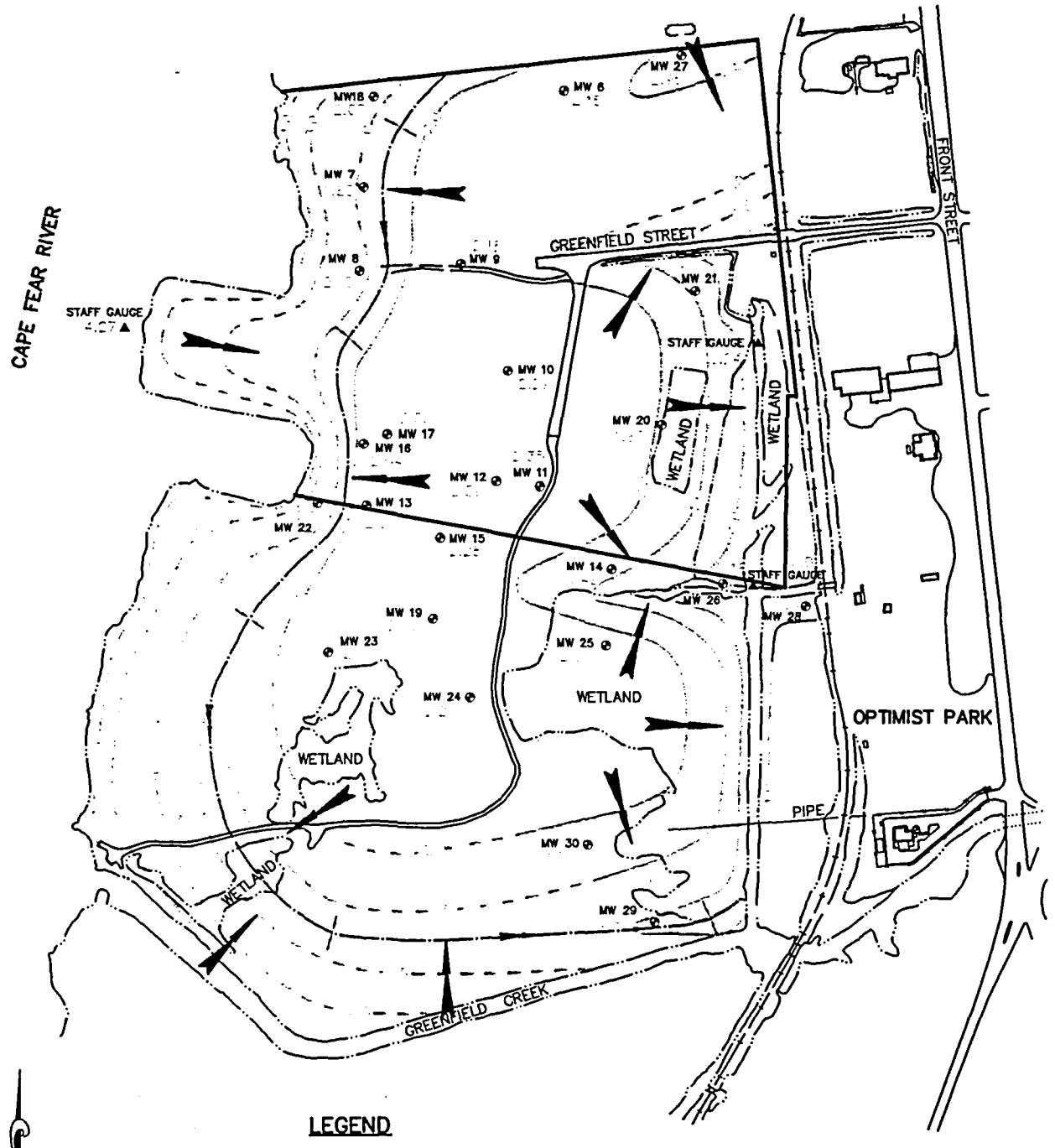


LEGEND

- PERMANENT MONITORING WELLS
- STAFF GAUGE
- GROUNDWATER ISOELEVATION LINE
- GROUNDWATER ELEVATION
- GROUNDWATER FLOW DIRECTION
- GROUNDWATER INFLECTION LINE

ViroGroup
ETE, Division
P.O. Box 1867 • 1445 Plaugh Church Rd. • Lexington, S.C. 29072
(803) 957-6270

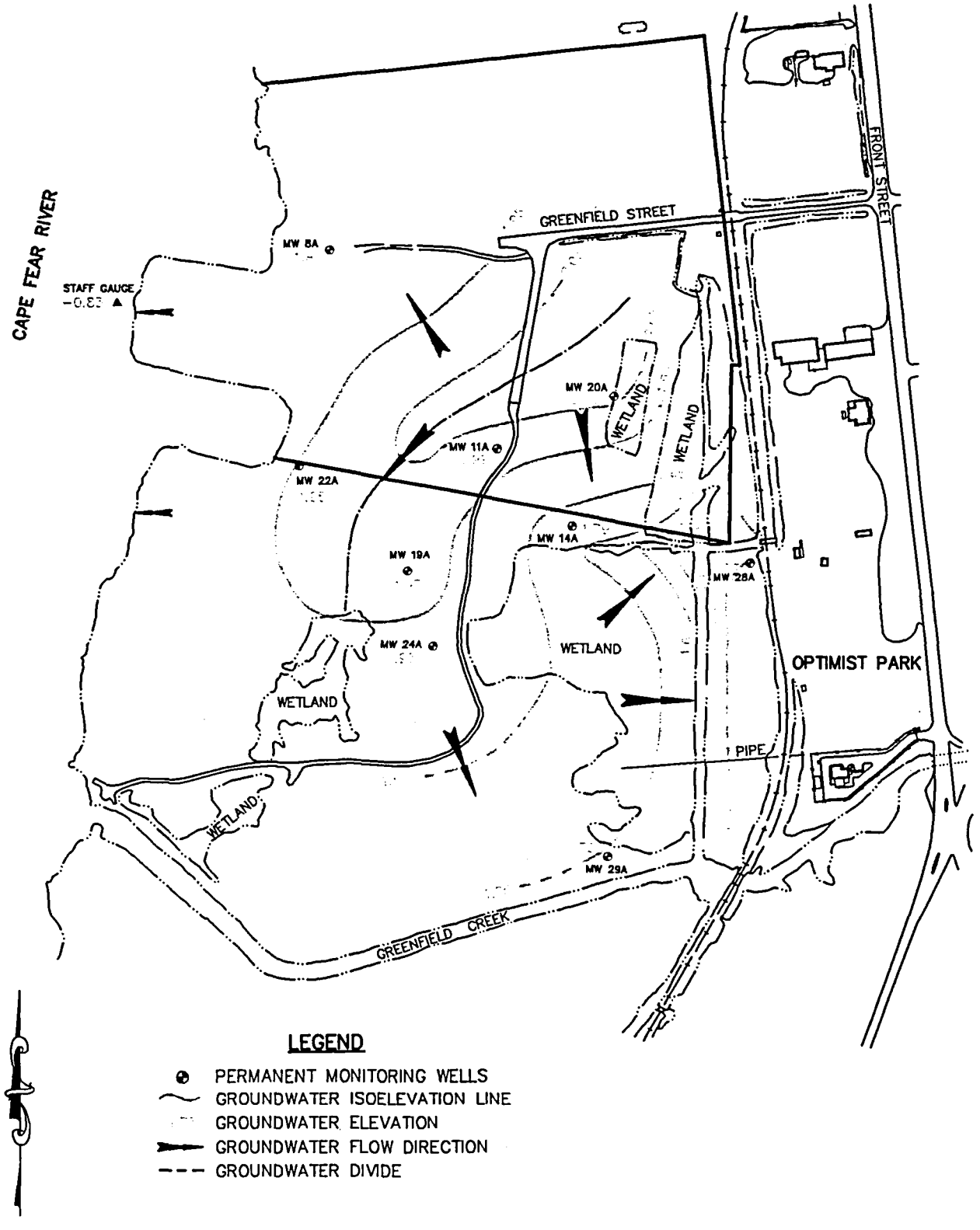
SCALE 1"=400'	THREE QUARTER HIGH TIDE UPPER AQUIFER WATER TABLE MAP	FIGURE NO. 8
DRAWN BY CAB	SOUTHERN WOOD PIEDMONT/ WILMINGTON, N.C. FACILITY	CADD NO. G:5301501A
CHECKED BY GBK		PROJECT NO. 12-53015.00
DATE 2/11/94		



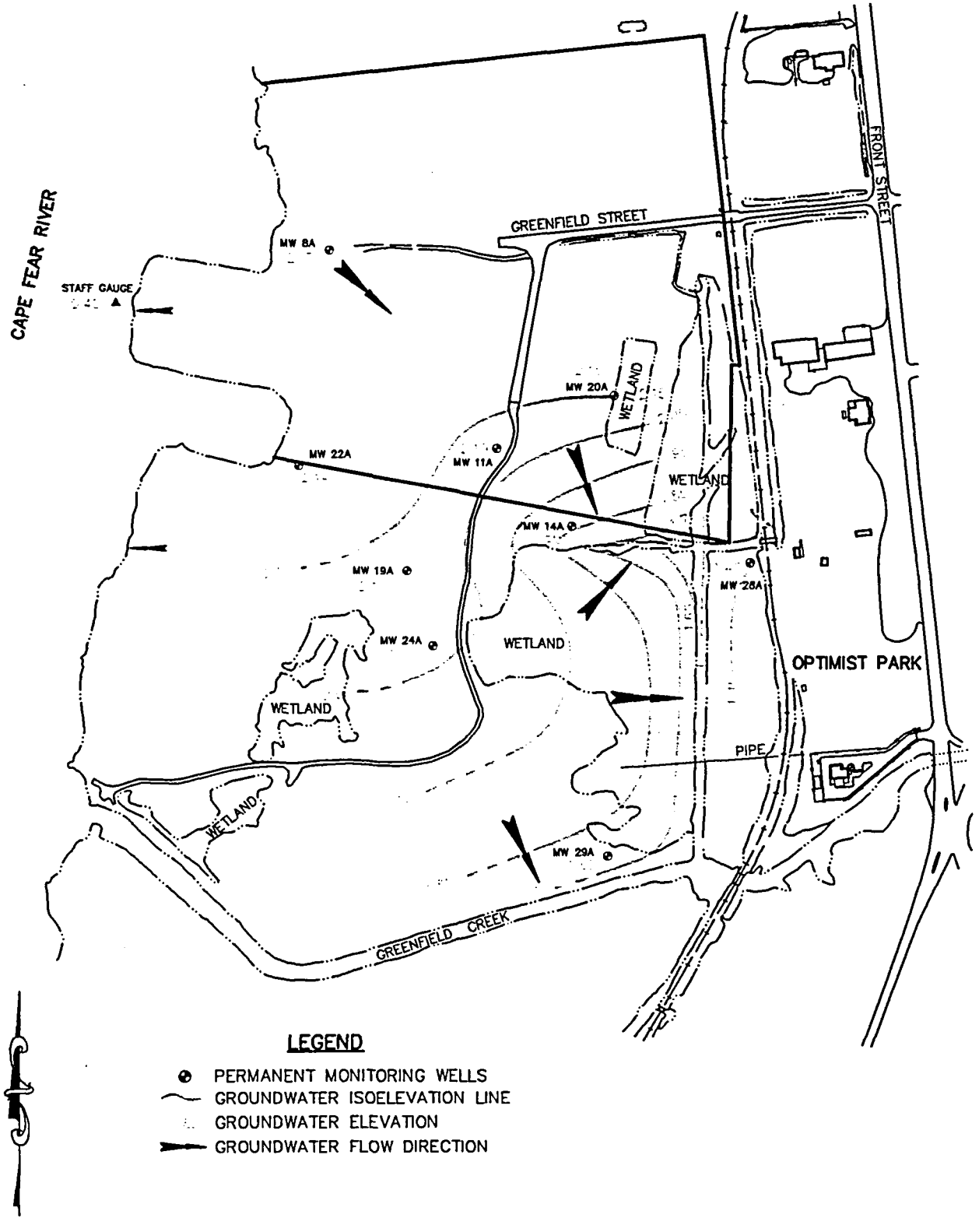
LEGEND

- PERMANENT MONITORING WELLS
- STAFF GAUGE
- GROUNDWATER ISOELEVATION LINE
- GROUNDWATER ELEVATION
- GROUNDWATER FLOW DIRECTION
- GROUNDWATER INFLECTION LINE

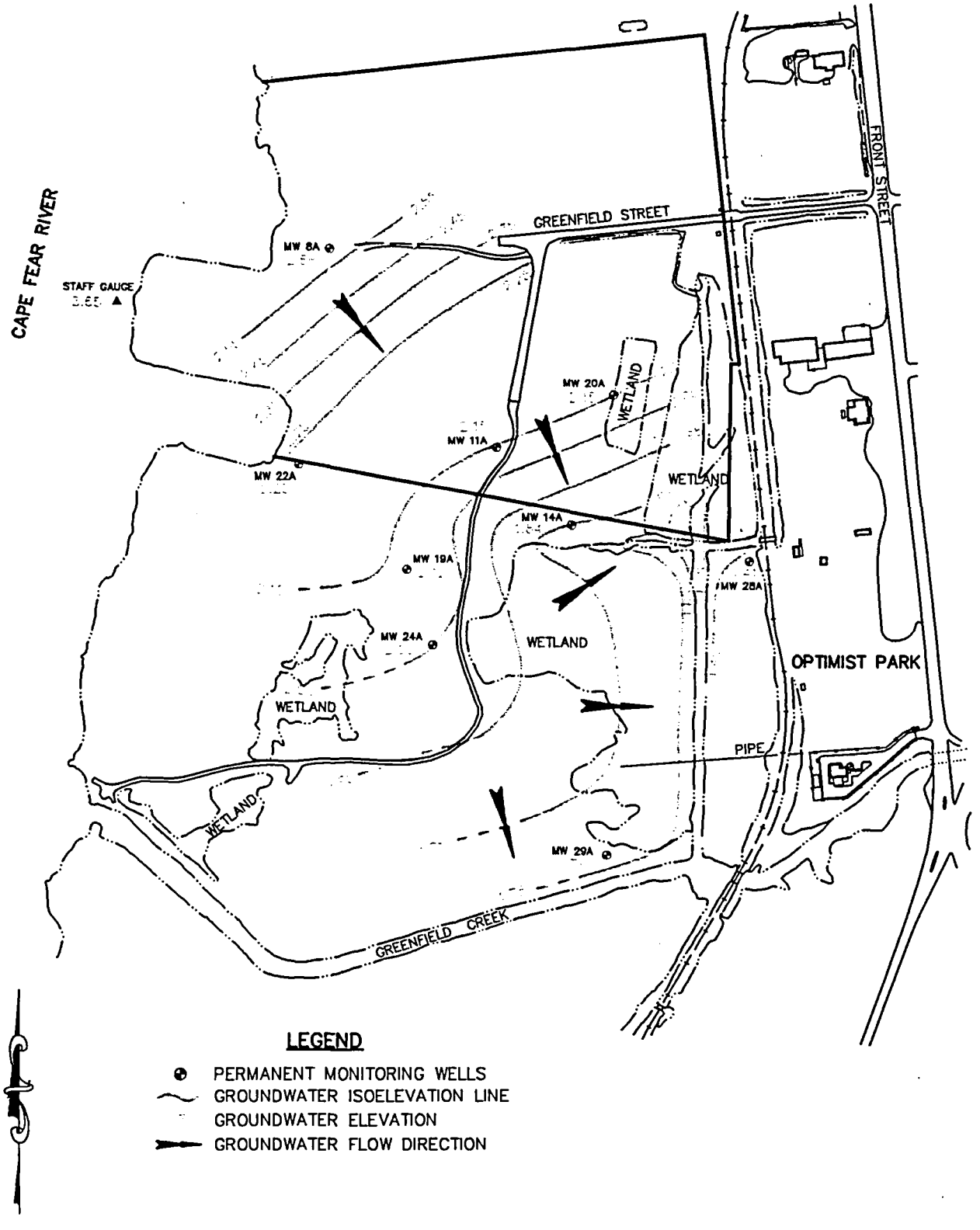
ViroGroup ETE Division P.O. Box 1867 • 1445 Plaugh Church Rd. • Lexington, S.C. 29072 (803) 957-8270	SCALE 1"=400' DRAWN BY CAB CHECKED BY GBK DATE 2/11/94	HIGH TIDE UPPER AQUIFER WATER TABLE MAP SOUTHERN WOOD PIEDMONT/ WILMINGTON, N.C. FACILITY	FIGURE NO. 9 CADD NO. G:5301501A PROJECT NO. 12-53015.00



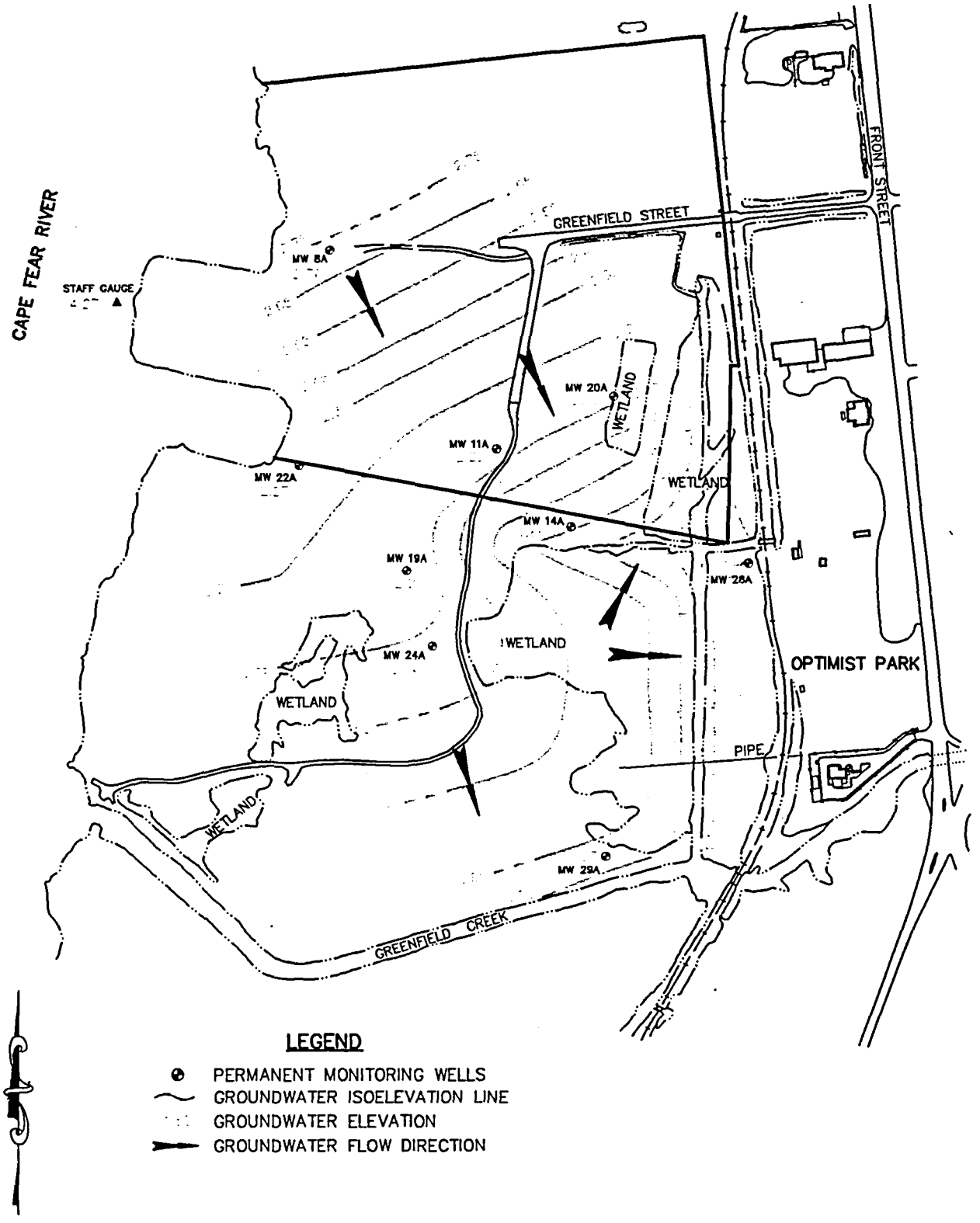
ViroGroup ETE, Division P.O. Box 1867 • 1445 Pleasant Church Rd. • Lexington, S.C. 29072 (803) 957-8270	SCALE 1"=400' DRAWN BY CAB CHECKED BY GBK DATE 2/11/94	LOW TIDE LOWER AQUIFER POTENTIOMETRIC MAP SOUTHERN WOOD PIEDMONT/ WILMINGTON, N.C. FACILITY	FIGURE NO. 10 CADD NO. G: 5301501B PROJECT NO. 12-53015.00



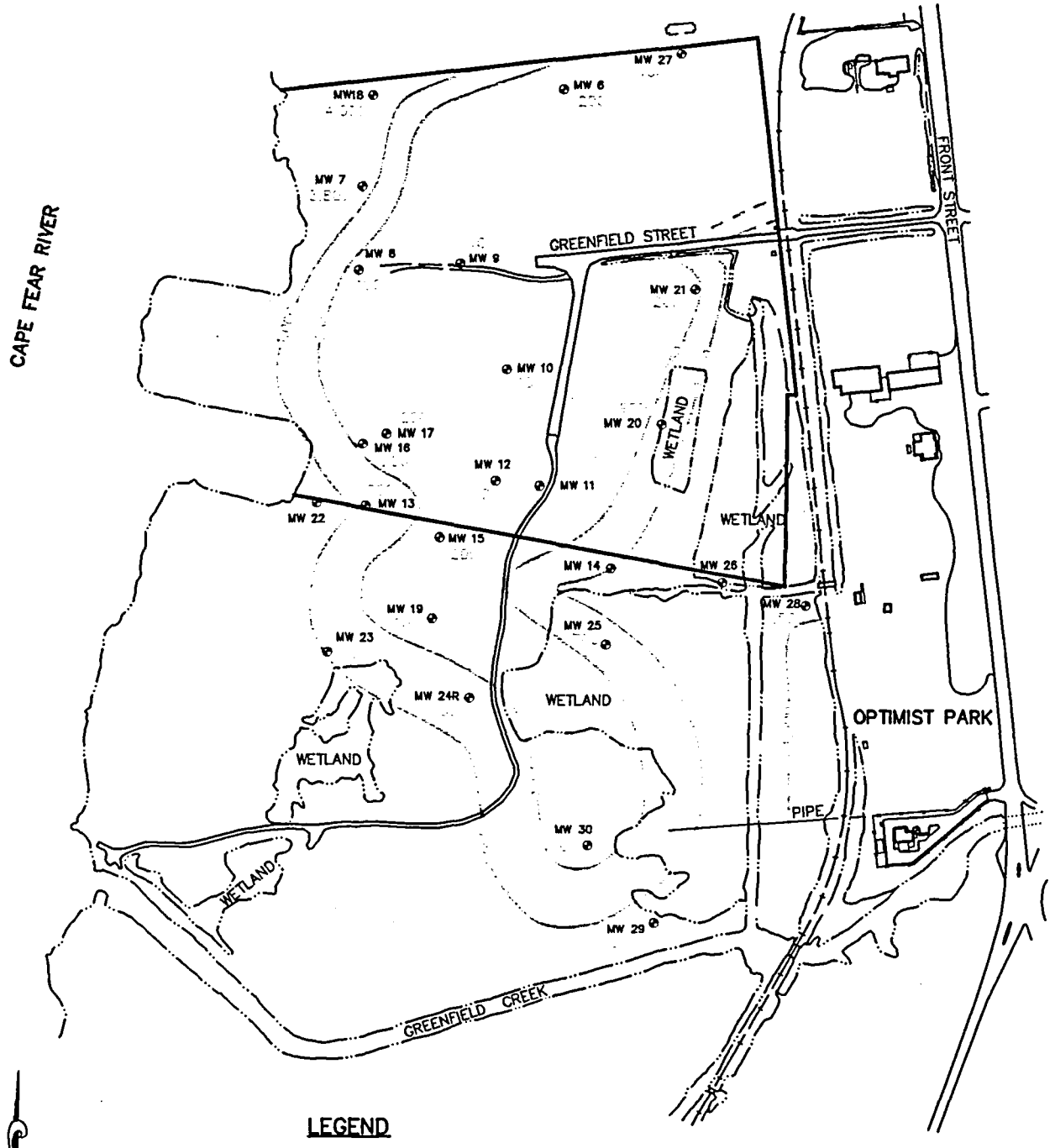
ViroGroup ETE Division P.O. Box 1867 • 1445 Plaugh Church Rd. • Lexington, S.C. 29072 (803) 957-8270	SCALE 1"=400' DRAWN BY CAB CHECKED BY GBK DATE 2/11/94	ONE QUARTER LOW TIDE LOWER AQUIFER POTENTIOMETRIC MAP SOUTHERN WOOD PIEDMONT/ WILMINGTON, N.C. FACILITY	FIGURE NO. 11 CADD NO. G:5301501B PROJECT NO. 12-53015.00



ViroGroup ETE, Division P.O. Box 1867 • 1445 Plaugh Church Rd. • Lexington, S.C. 29072 (803) 957-8270	SCALE 1"=400' DRAWN BY CAB CHECKED BY GBK DATE 2/11/94	THREE QUARTER HIGH TIDE LOWER AQUIFER POTENTIOMETRIC MAP SOUTHERN WOOD PIEDMONT/ WILMINGTON, N.C. FACILITY	FIGURE NO. 12 CADD NO. G:5301501B PROJECT NO. 12-53015.00



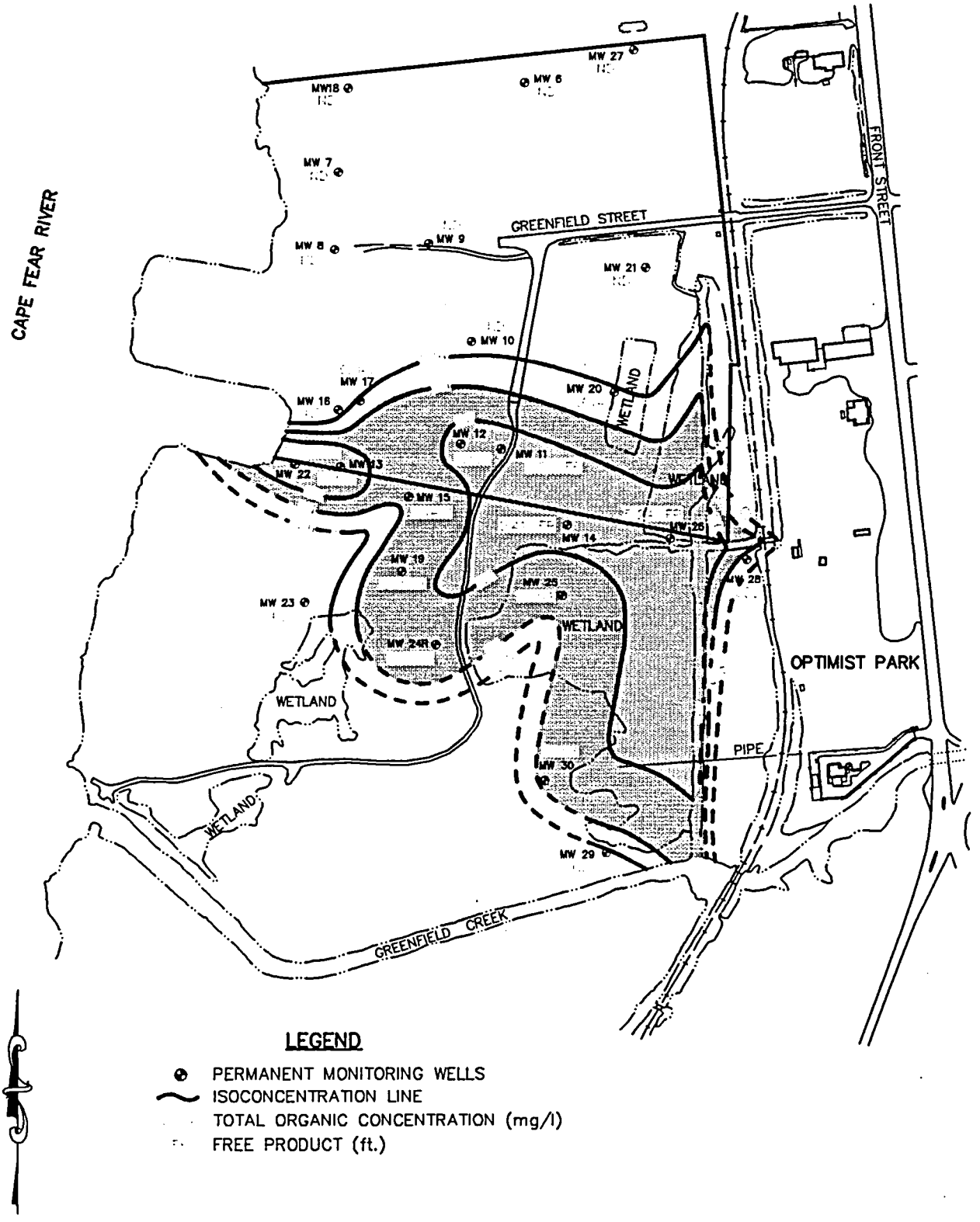
ViroGroup ETE Division P.O. Box 1867 • 1445 Plaugh Church Rd. • Lexington, S.C. 29072 (803) 957-8270	SCALE 1"=400' DRAWN BY CAB CHECKED BY GBK DATE 2/11/94	HIGH TIDE LOWER AQUIFER POTENTIOMETRIC MAP SOUTHERN WOOD PIEDMONT/ WILMINGTON, N.C. FACILITY	FIGURE NO. 13 CADD NO. G:5301501B PROJECT NO. 12-53015.00



LEGEND

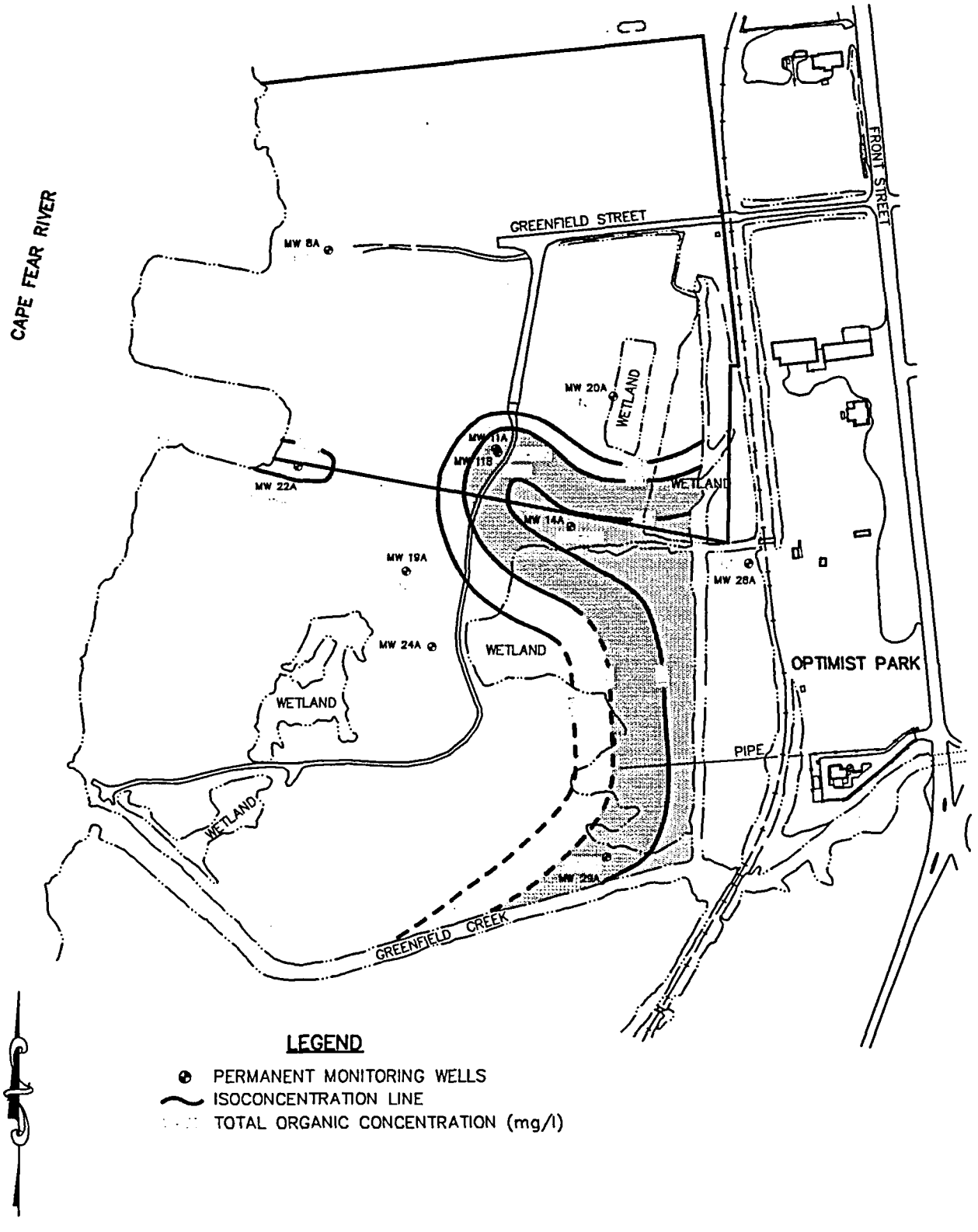
- PERMANENT MONITORING WELLS
- SALINITY ISOCONCENTRATION LINE
- SALINITY CONCENTRATION mg/L

ViroGroup ETE Division P.O. Box 1867 • 1445 Plaugh Church Rd. • Lexington, S.C. 29072 (803) 957-8270	SCALE 1"=400' DRAWN BY CAB CHECKED BY GBK DATE 2/11/94	UPPER AQUIFER SALINITY ISOCONCENTRATION MAP SOUTHERN WOOD PIEDMONT/ WILMINGTON, N.C. FACILITY	FIGURE NO. 14 CADD NO. G:5301501A PROJECT NO. 12-53015.00

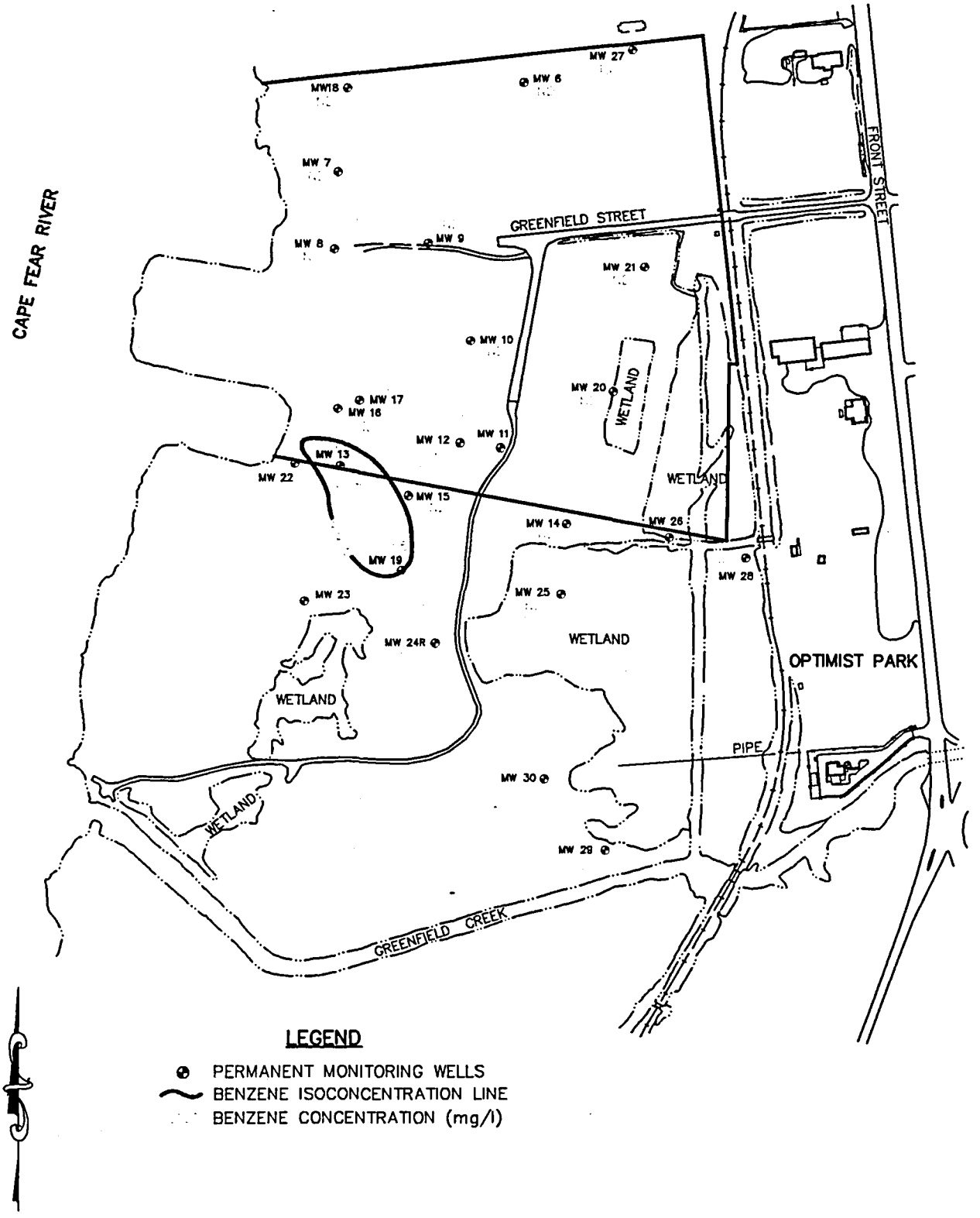


ViroGroup
ETE, Division
P.O. Box 1867 • 1445 Plaugh Church Rd. • Lexington, S.C. 29072
(803) 957-9270

SCALE 1"=400'	UPPER AQUIFER ORGANIC WOOD PRESERVING CONSTITUENTS ISOCONCENTRATION MAP	FIGURE NO. 15
DRAWN BY CAB		CADD NO. G:5301501A
CHECKED BY GBK	SOUTHERN WOOD PIEDMONT/ WILMINGTON, N.C. FACILITY	
DATE 2/11/94		PROJECT NO. 12-53015.00

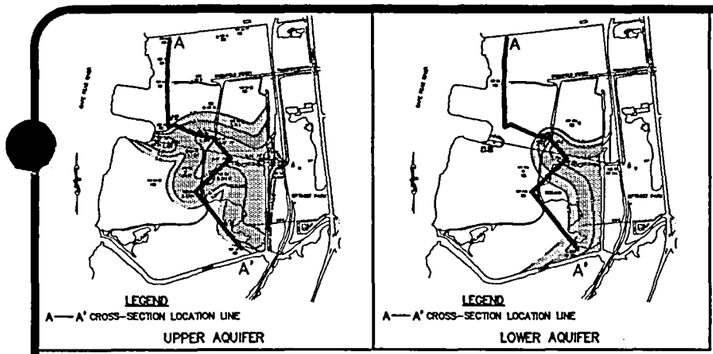


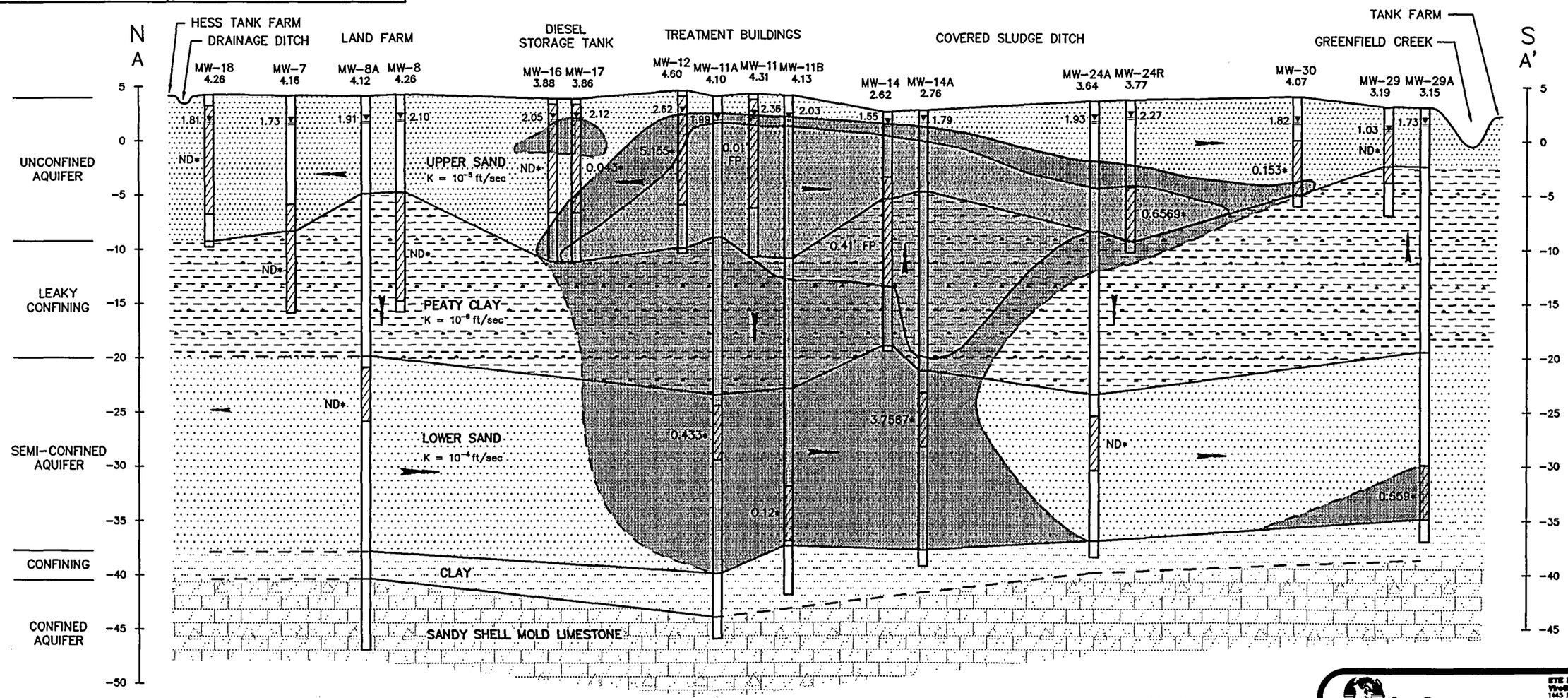
ViroGroup ETE Division P.O. Box 1867 • 1445 Plaqch Church Rd. • Lexington, S.C. 29072 (803) 957-8270	SCALE 1"=400' DRAWN BY CAB CHECKED BY GBK DATE 2/11/94	LOWER AQUIFER ORGANIC WOOD PRESERVING CONSTITUENTS ISOCONCENTRATION MAP SOUTHERN WOOD PIEDMONT/ WILMINGTON, N.C. FACILITY	FIGURE NO. 16 CADD NO. G:5301501B PROJECT NO. 12-53015.00



ViroGroup ETE, Division P.O. Box 1867 • 1445 Plaugh Church Rd. • Lexington, S.C. 29072 (803) 957-8270	SCALE 1"=400' DRAWN BY CAB CHECKED BY GBK DATE 2/11/94	UPPER AQUIFER BENZENE ISOCONCENTRATION MAP SOUTHERN WOOD PIEDMONT/ WILMINGTON, N.C. FACILITY	FIGURE NO. 17 CADD NO. G:5301501A PROJECT NO. 12-53015.00

NO.	REVISION	DATE	BY





LEGEND

- UPPER SAND
- PEATY CLAY
- LOWER SAND
- CLAY
- SANDY SHELL MOLD LIMESTONE
- RESIDUAL & POOLED WOOD PRESERVING CONSTITUENTS
- RESIDUAL DIESEL CONSTITUENTS
- DISSOLVED WOOD PRESERVING CONSTITUENTS ORGANIC PLUME
- SCREEN INTERVAL
- 0.98 ▼ GROUNDWATER ELEVATION
- ND* DISSOLVED ORGANICS (mg/l)
- 0.01' FP FREE PRODUCT (FT.)
- K HYDRAULIC CONDUCTIVITY
- GROUNDWATER GRADIENT

SCALE

HORIZONTAL: 1" = 300'
VERTICAL: 1" = 10'

NOTE:
HORIZONTAL SPACING BETWEEN WELLS IN THE WELL CLUSTERS ARE NOT TO SCALE, (IE: MW-11, MW-11A, & MW-11B).

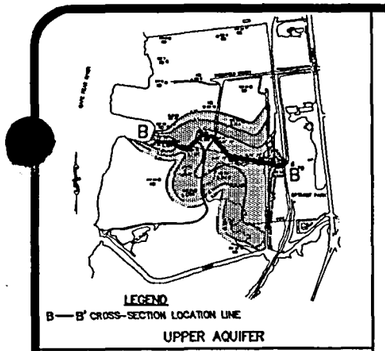
ViroGroup Air•Water•Soil TECHNOLOGY
ETE Division
ViroGroup, Inc.
1445 Pisgah Church Road
Lexington, SC 29072
Phone 803-957-8270
FAX 803-957-3843
Wats 1-800-726-0654

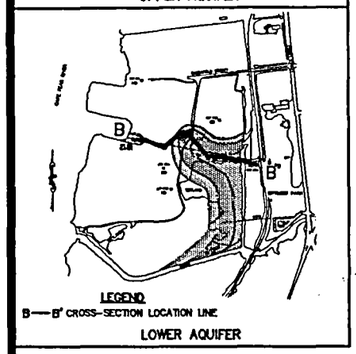
HYDROGEOLOGIC CROSS-SECTION A – A'

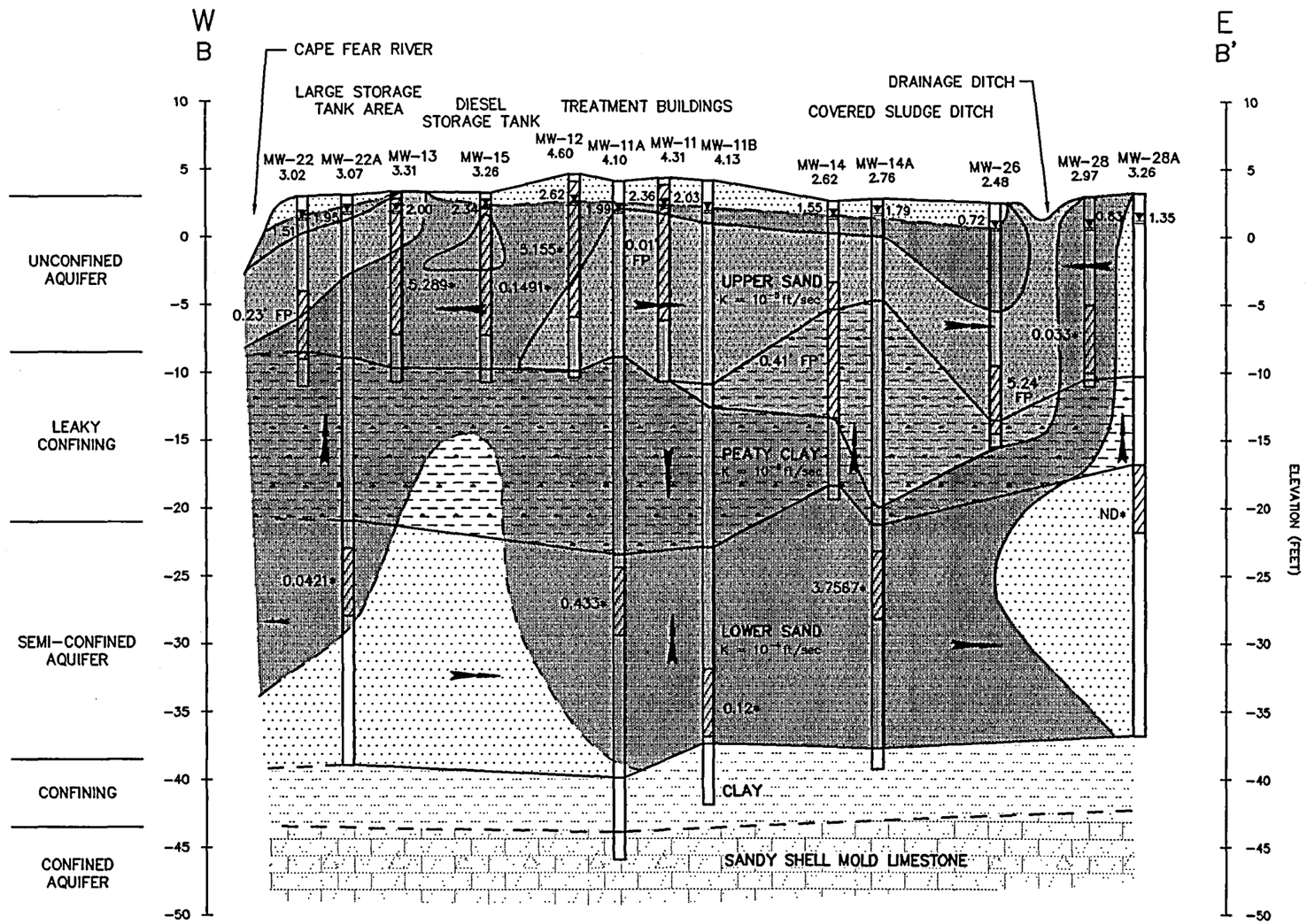
SOUTHERN WOOD PIEDMONT/ WILMINGTON, N.C. FACILITY

DRAWN BY:	CAB	DATE:	3/2/94
DESIGNED BY:	GBK	CADD NO:	G:530AA
APPROVED BY:		PROJECT NO:	12-53015.00
SCALE:	AS SHOWN	FIGURE NO.	18

NO.	REVISION	DATE	BY







LEGEND

- UPPER SAND
- PEATY CLAY
- LOWER SAND
- CLAY
- SANDY SHELL MOLD LIMESTONE
- RESIDUAL & POOLED WOOD PRESERVING CONSTITUENTS
- RESIDUAL DIESEL CONSTITUENTS
- DISSOLVED WOOD PRESERVING CONSTITUENTS ORGANIC PLUME.
- SCREEN INTERVAL
- 0.98 ▼ GROUNDWATER ELEVATION
- ND* DISSOLVED ORGANICS (mg/l)
- 0.01' FP FREE PRODUCT (FT.)
- K HYDRAULIC CONDUCTIVITY
- GROUNDWATER GRADIENT

SCALE

HORIZONTAL: 1" = 300'
VERTICAL: 1" = 10'

NOTE:
HORIZONTAL SPACING BETWEEN WELLS IN THE WELL CLUSTERS ARE NOT TO SCALE. (IE: MW-11, MW-11A, & MW-11B).

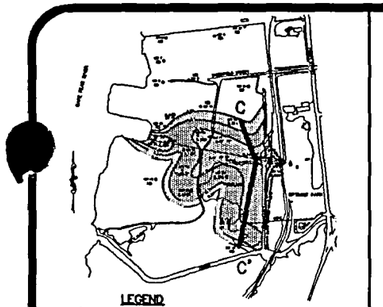
ViroGroup Air•Water•Soil TECHNOLOGY
STE Division
ViroGroup, Inc.
1443 Pisgah Church Road
Lexington, SC 29072
Phone 803-957-8270
FAX 803-957-3843
Write 1-800-786-0654

HYDROGEOLOGIC CROSS-SECTION B – B'

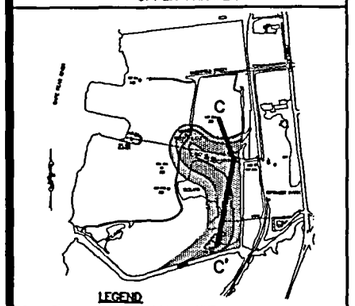
SOUTHERN WOOD PIEDMONT/ WILMINGTON, N.C. FACILITY

DRAWN BY:	CAB	DATE:	3/2/94
DESIGNED BY:	GBK	CADD NO:	G:53068
APPROVED BY:		PROJECT NO:	12-53015.00
SCALE:	AS SHOWN	FIGURE NO:	19

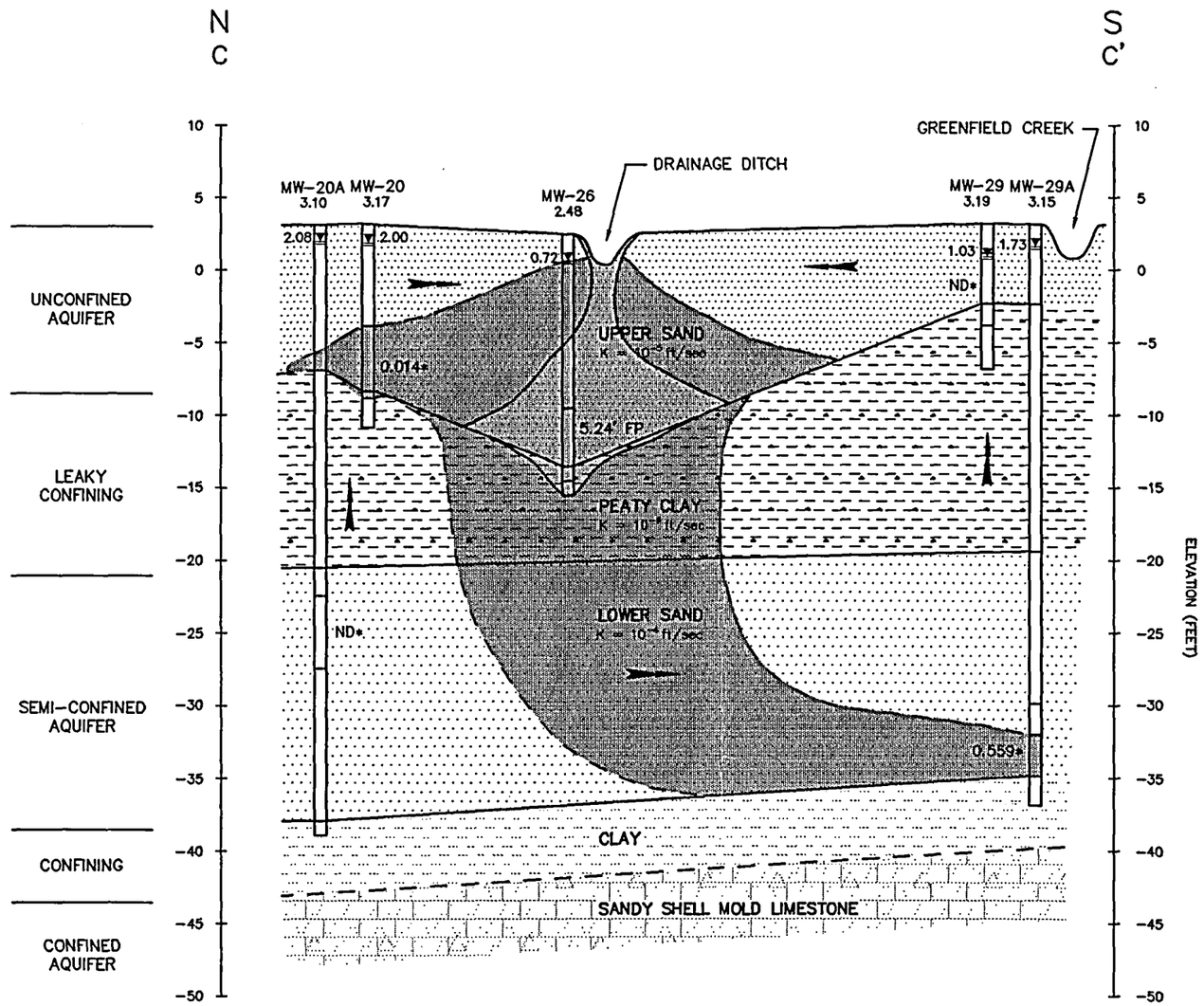
NO.	REVISION	DATE	BY



UPPER AQUIFER



LOWER AQUIFER



LEGEND

- UPPER SAND
- PEATY CLAY
- LOWER SAND
- CLAY
- SANDY SHELL MOLD LIMESTONE
- RESIDUAL & POOLED WOOD PRESERVING CONSTITUENTS
- RESIDUAL DIESEL CONSTITUENTS
- DISSOLVED WOOD PRESERVING CONSTITUENTS ORGANIC PLUME
- SCREEN INTERVAL
- 0.98 ▼ GROUNDWATER ELEVATION
- ND* DISSOLVED ORGANICS (mg/l)
- 0.01' FP FREE PRODUCT (FT.)
- K HYDRAULIC CONDUCTIVITY
- GROUNDWATER GRADIENT

SCALE

HORIZONTAL: 1" = 300'
VERTICAL: 1" = 10'

NOTE:
HORIZONTAL SPACING BETWEEN WELLS IN THE WELL CLUSTERS ARE NOT TO SCALE. (IE: MW-11, MW-11A, & MW-11B).

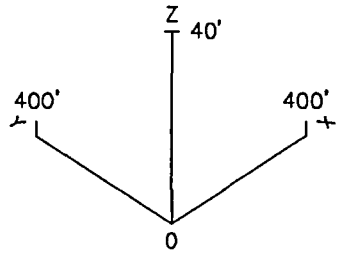
ViroGroup Air•Water•Soil TECHNOLOGY
ETK Division
ViroGroup, Inc.
1445 Pisgah Church Road
Lexington, SC 29072
Phone 803-957-4170
FAX 803-957-3548
Watts 1-800-786-0654

HYDROGEOLOGIC CROSS-SECTION C – C'

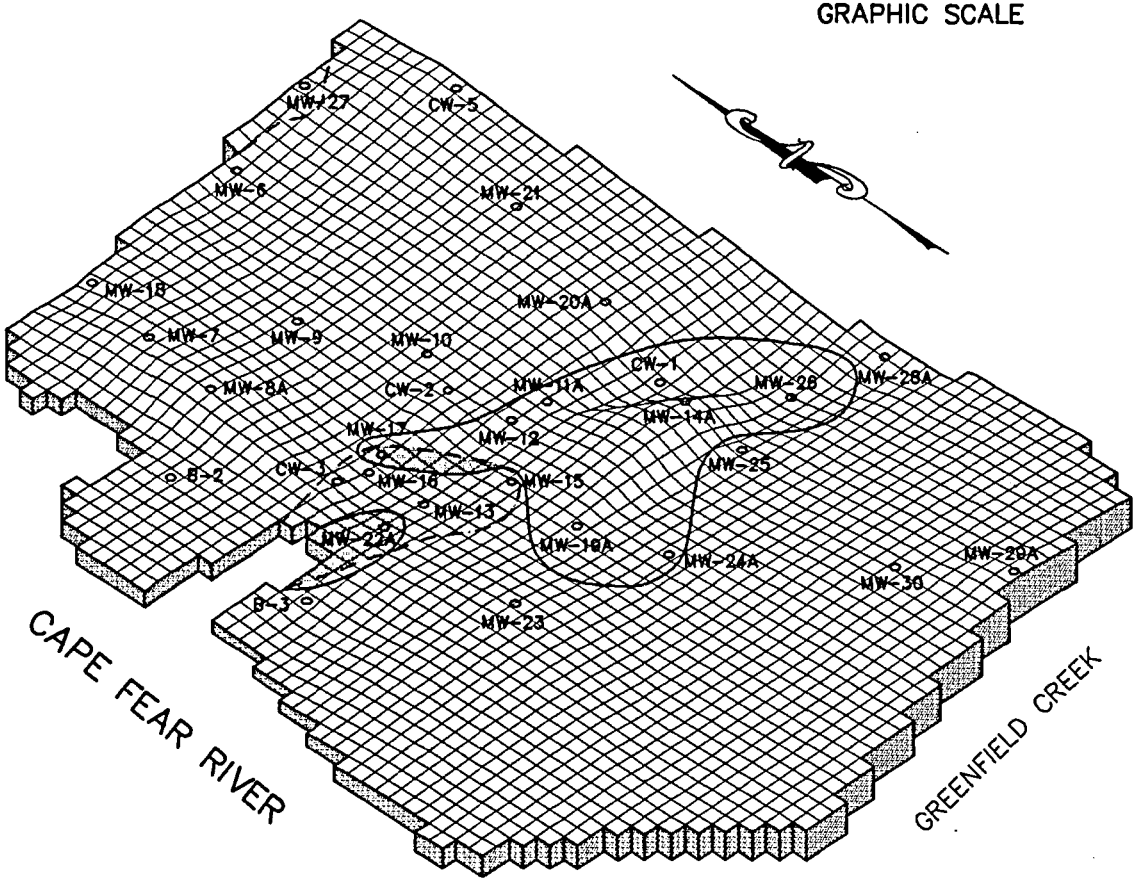
SOUTHERN WOOD PIEDMONT/ WILMINGTON, N.C. FACILITY

DRAWN BY:	CAB	DATE:	3/2/94
DESIGNED BY:	GBK	CADD NO:	G:53OCC
APPROVED BY:		PROJECT NO:	12-53015.00
SCALE:	AS SHOWN	FIGURE NO:	20

NOTE: VERTICAL EXAGGERATION = 10:1

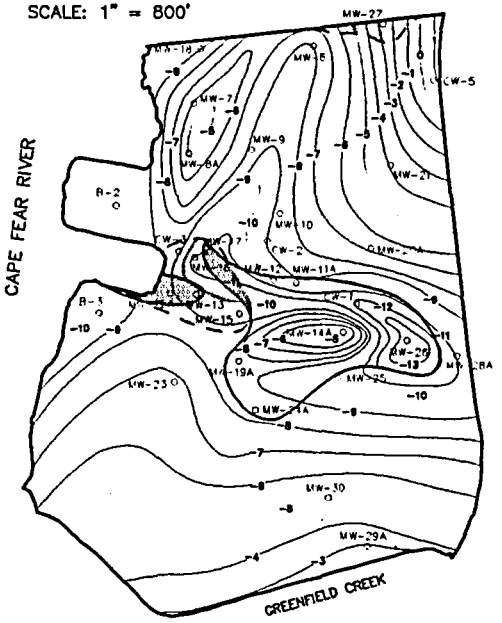


GRAPHIC SCALE



CONTOUR MAP

CONTOUR INTERVAL = 1.0 ft.
SCALE: 1" = 800'



LEGEND

- ☐ TOP OF PEAT
- ☐ POOLED & RESIDUAL WOOD PRESERVING CONSTITUENTS
- ☐ RESIDUAL DIESEL CONSTITUENTS

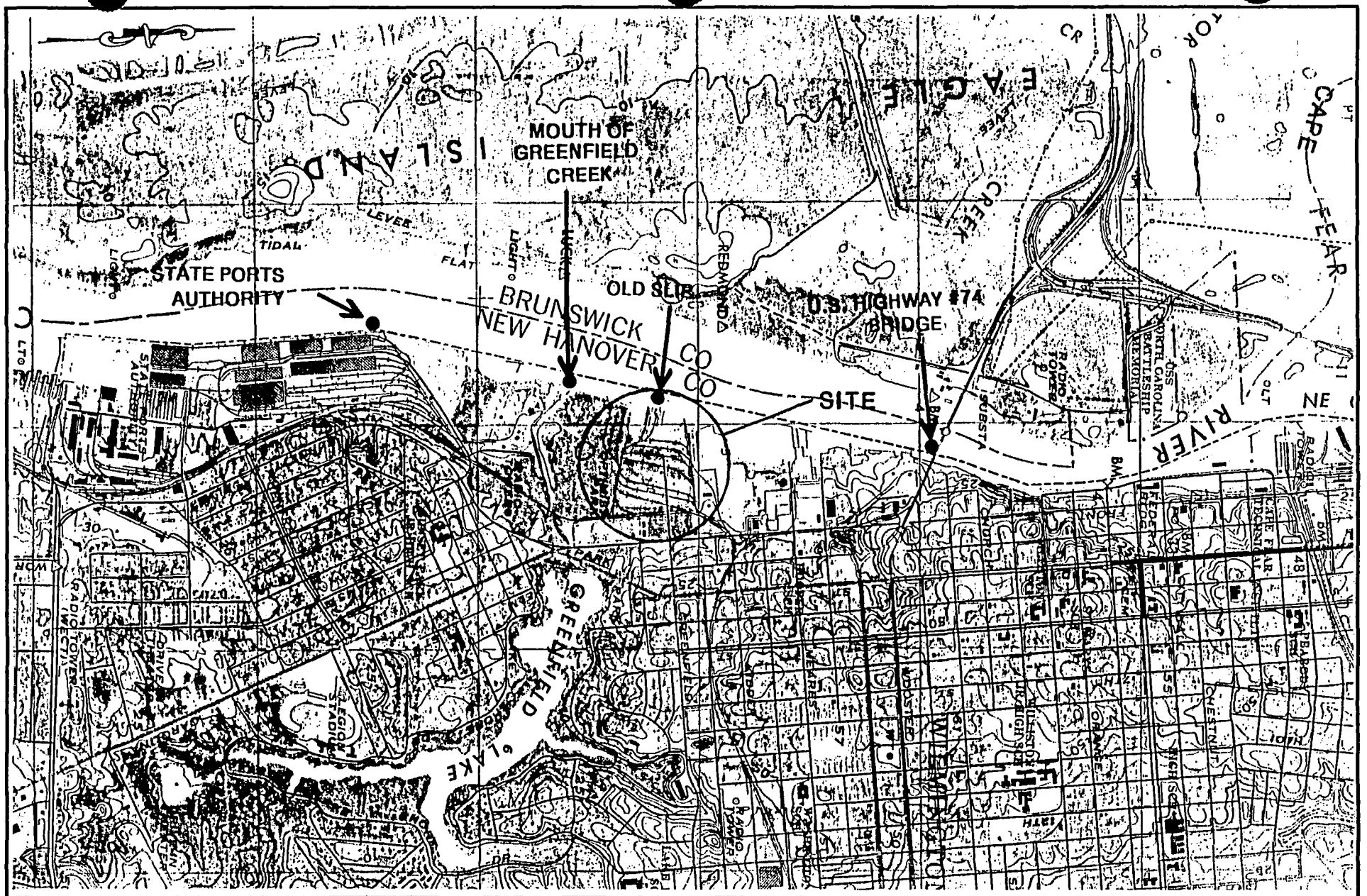
ViroGroup Air•Water•Soil TECHNOLOGY

ETE Division
ViroGroup, Inc.
1445 Piegoh Church Road
Lexington, SC 29072
Phone 803-957-6270
FAX 803-957-3845
Watts 1-800-786-0654

SCALE	AS SHOWN
DRAWN BY	CAB
CHECKED BY	GBK
DATE	4/15/94

PEATY CLAY SURFACE AND SOIL STAINING LOCATION MAP SOUTHERN WOOD PIEDMONT/ WILMINGTON, N.C. FACILITY

FIGURE NO.	21
CADD NO.	530CON3D
PROJECT NO.	12-53015.00



ETE Division ViroGroup, Inc. 1445 Pisgah Church Road Lexington, SC 29072 Phone 803-957-6270 FAX 803-957-3845 Watts 1-800-786-0654	SCALE 1:24,000	CAPE FEAR RIVER SURFACE WATER SAMPLE LOCATION MAP SOUTHERN WOOD PIEDMONT/ WILMINGTON, N.C. FACILITY	FIGURE NO. 22
	DRAWN BY CAB		CADD NO. G:5301501
	CHECKED BY GBK		PROJECT NO. 12-53015.00
	DATE 7/8/94		

Historical Groundwater Elevation Summary Table

HISTORICAL GROUNDWATER ELEVATION SUMMARY TABLE
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

WELL #	DATE	TIME	RISER ELEV	DEPTH TO WATER	GROUNDWATER ELEVATION
Ditch Staff Gauge	4-1-92	7:00	6.64	1.90	1.88
	4-1-92	9:00	6.64	2.40	2.38
	4-1-92	11:00	6.64	2.13	2.11
	4-1-92	13:00	6.64	0.20	0.18
	4-1-92	15:00	6.64	0.10	0.08
	4-1-92	17:00	6.64	0.26	0.24
	4-1-92	19:00	6.64	1.85	1.83
	10-13-92		6.64	-0.05	-0.07
River Staff Gauge	4-1-92	7:00	5.93	4.70	3.97
	4-1-92	9:00	5.93	4.75	4.02
	4-1-92	11:00	5.93	3.20	2.47
	4-1-92	13:00	5.93	1.65	0.92
	4-1-92	15:00	5.93	0.60	-0.13
	4-1-92	17:00	5.93	2.80	2.07
	4-1-92	19:00	5.93	4.80	4.07
	10-13-92		5.93	-0.41	-1.14
B-2	4-1-92	7:00	6.96	5.45	1.51
	4-1-92	9:00	6.96	5.30	1.66
	4-1-92	11:00	6.96	5.45	1.51
	4-1-92	13:00	6.96	5.72	1.24
	4-1-92	15:00	6.96	5.87	1.09
	4-1-92	17:00	6.96	5.78	1.18
	4-1-92	19:00	6.96	5.40	1.56
B-3	4-1-92	7:00	5.13	3.00	2.13
	4-1-92	9:00	5.13	2.67	2.46
	4-1-92	11:00	5.13	3.12	2.01
	4-1-92	13:00	5.13	3.70	1.43
	4-1-92	15:00	5.13	3.96	1.17
	4-1-92	17:00	5.13	3.78	1.35
	4-1-92	19:00	5.13	2.98	2.14
B-4	4-1-92	7:00	4.18	1.47	2.71
	4-1-92	9:00	4.18	1.45	2.73
	4-1-92	11:00	4.18	1.43	2.75
	4-1-92	13:00	4.18	1.40	2.78
	4-1-92	15:00	4.18	1.38	2.80
	4-1-92	17:00	4.18	1.38	2.80
	4-1-92	19:00	4.18	1.41	2.77
B-5	4-1-92	7:00	5.79	3.38	2.41
	4-1-92	9:00	5.79	3.36	2.43
	4-1-92	11:00	5.79	3.41	2.38
	4-1-92	13:00	5.79	3.38	2.41
	4-1-92	15:00	5.79	3.36	2.43
	4-1-92	17:00	5.79	3.36	2.43
	4-1-92	19:00	5.79	3.38	2.41

WELL #	DATE	TIME	RISER ELEV	DEPTH TO WATER	GROUNDWATER ELEVATION
B-6	4-1-92	7:00	6.06	4.20	1.86
	4-1-92	9:00	6.06	4.17	1.89
	4-1-92	11:00	6.06	4.13	1.93
	4-1-92	13:00	6.06	4.12	1.94
	4-1-92	15:00	6.06	4.14	1.92
	4-1-92	17:00	6.06	4.16	1.90
	4-1-92	19:00	6.06	4.19	1.87
MW-6	4-1-92	7:00	5.07	2.78	2.29
	4-1-92	9:00	5.07	2.76	2.31
	4-1-92	11:00	5.07	2.72	2.35
	4-1-92	13:00	5.07	2.72	2.35
	4-1-92	15:00	5.07	2.70	2.37
	4-1-92	17:00	5.07	2.73	2.34
	4-1-92	19:00	5.07	2.74	2.33
	10-13-92		5.07	2.55	2.52
MW-7	4-1-92	7:00	6.03	4.34	1.69
	4-1-92	9:00	6.03	4.22	1.81
	4-1-92	11:00	6.03	4.19	1.84
	4-1-92	13:00	6.03	4.30	1.73
	4-1-92	15:00	6.03	4.37	1.66
	4-1-92	17:00	6.03	4.40	1.63
	4-1-92	19:00	6.03	4.28	1.75
	10-13-92		6.03	3.66	2.37
MW-8	4-1-92	7:00	6.80	4.68	2.12
	4-1-92	9:00	6.80	4.64	2.16
	4-1-92	11:00	6.80	4.62	2.18
	4-1-92	13:00	6.80	4.58	2.22
	4-1-92	15:00	6.80	4.55	2.25
	4-1-92	17:00	6.80	4.55	2.25
	4-1-92	19:00	6.80	4.52	2.28
	10-13-92		6.80	4.22	2.58
MW-8A	10-13-92		6.43	3.43	3.00
MW-9	4-1-92	7:00	6.43	4.28	2.15
	4-1-92	9:00	6.43	4.26	2.17
	4-1-92	11:00	6.43	4.19	2.24
	4-1-92	13:00	6.43	4.16	2.27
	4-1-92	15:00	6.43	4.14	2.29
	4-1-92	17:00	6.43	4.16	2.27
	4-1-92	19:00	6.43	4.19	2.24
	10-13-92		6.43	3.82	2.61
MW-10	4-1-92	7:00	7.41	4.85	2.56
	4-1-92	9:00	7.41	4.84	2.57
	4-1-92	11:00	7.41	4.82	2.59
	4-1-92	13:00	7.41	4.80	2.61
	4-1-92	15:00	7.41	4.78	2.63
	4-1-92	17:00	7.41	4.80	2.61
	4-1-92	19:00	7.41	4.83	2.58
	10-13-92		7.41	4.56	2.85

WELL #	DATE	TIME	RISER ELEV	DEPTH TO WATER	GROUNDWATER ELEVATION
MW-11	4-1-92	7:00	8.02	5.34	2.68
	4-1-92	9:00	8.02	5.33	2.69
	4-1-92	11:00	8.02	5.31	2.71
	4-1-92	13:00	8.02	5.27	2.75
	4-1-92	15:00	8.02	5.22	2.80
	4-1-92	17:00	8.02	5.20	2.82
	4-1-92	19:00	8.02	5.26	2.76
	10-13-92		8.02	5.19	2.83
MW-11A	10-13-92		6.38	3.89	2.49
MW-12	4-1-92	7:00	8.22	5.55	2.67
	4-1-92	9:00	8.22	5.55	2.67
	4-1-92	11:00	8.22	5.51	2.71
	4-1-92	13:00	8.22	5.49	2.73
	4-1-92	15:00	8.22	5.45	2.77
	4-1-92	17:00	8.22	5.45	2.77
	4-1-92	19:00	8.22	5.50	2.72
	10-13-92		8.22	5.46	2.76
MW-13	4-1-92	7:00	6.97	4.75	2.22
	4-1-92	9:00	6.97	4.55	2.42
	4-1-92	11:00	6.97	4.55	2.42
	4-1-92	13:00	6.97	4.65	2.32
	4-1-92	15:00	6.97	4.68	2.29
	4-1-92	17:00	6.97	4.72	2.25
	4-1-92	19:00	6.97	4.65	2.32
	10-13-92		6.97	4.49	2.48
MW-14	4-1-92	7:00	6.30	4.38	1.92
	4-1-92	9:00	6.30	4.28	2.02
	4-1-92	11:00	6.30	4.15	2.15
	4-1-92	13:00	6.30	4.12	2.18
	4-1-92	15:00	6.30	4.09	2.21
	4-1-92	17:00	6.30	4.12	2.18
	4-1-92	19:00	6.30	4.18	2.12
	10-13-92		6.30	4.00	2.30
MW-15	4-1-92	7:00	7.07	4.51	2.56
	4-1-92	9:00	7.07	4.47	2.60
	4-1-92	11:00	7.07	4.43	2.64
	4-1-92	13:00	7.07	4.41	2.66
	4-1-92	15:00	7.07	4.38	2.69
	4-1-92	17:00	7.07	4.38	2.69
	4-1-92	19:00	7.07	4.44	2.63
	10-13-92		7.07	4.50	2.57
MW-16	4-1-92	7:00	7.69	5.50	2.19
	4-1-92	9:00	7.69	5.40	2.29
	4-1-92	11:00	7.69	5.42	2.27
	4-1-92	13:00	7.69	5.50	2.19
	4-1-92	15:00	7.69	5.53	2.16
	4-1-92	17:00	7.69	5.55	2.14
	4-1-92	19:00	7.69	5.50	2.19
	10-13-92		7.69	5.04	2.65

WELL #	DATE	TIME	RISER ELEV	DEPTH TO WATER	GROUNDWATER ELEVATION
MW-17	4-1-92	7:00	7.65	5.40	2.25
	4-1-92	9:00	7.65	5.35	2.30
	4-1-92	11:00	7.65	5.32	2.33
	4-1-92	13:00	7.65	5.35	2.30
	4-1-92	15:00	7.65	5.38	2.27
	4-1-92	17:00	7.65	5.40	2.25
	4-1-92	19:00	7.65	5.35	2.30
	10-13-92		7.65	4.99	2.66
MW-18	10-13-92		6.61	4.14	2.47
MW-19	10-13-92		5.44	2.92	2.52
MW-19A	10-13-92		5.25	2.91	2.34
MW-20	10-13-92		5.44	2.80	2.64
MW-21	10-13-92		5.34	3.22	2.12
MW-22	10-13-92		5.26	3.02	2.24
MW-23	10-13-92		4.96	4.56	0.40
MW-24	10-13-92		5.98	**3.48	5.98
MW-25	10-13-92		4.96	1.63	3.33
MW-26	10-13-92		4.91	4.01	0.90

*Staff Gauge Elevation : Riser Elevation – (6.66 – Depth to Water)

** Well has been abandoned

Historical Vertical Hydraulic Gradient Summary Table

HISTORICAL VERTICAL HYDRAULIC GRADIENT SUMMARY TABLE
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

WELL PAIR	DATE	GW ELEVATION UPPER AQUIFER	GW ELEVATION LOWER AQUIFER	MID SCREEN ELEV. UPPER AQUIFER	MID SCREEN ELEV. LOWER AQUIFER	VERT. HYDRAULIC GRADIENT
MW-8/MW-8A	10/92	2.06	2.34	-9.86	-24.13	-0.020
MW-11/MW-11A	10/92	2.79	2.48	-1.19	-27.29	+0.012
MW-14/MW-14A	10/92	2.57	2.52	-8.38	-25.89	+0.003

NOTE: Vertical Hydraulic Gradient = $\frac{\text{Upper Aquifer Elevation} - \text{Lower Aquifer Elevation}}{\text{Upper Aquifer Mid Screen Elevation} - \text{Lower Aquifer Mid Screen Elevation}}$

- Upward Vertical Hydraulic Gradient
+ Downward Vertical Hydraulic Gradient
All measurements in Feet
Vertical Hydraulic Gradient in ft/ft

Historical Soil Sample Parameter Summary Table - Metals

HISTORICAL SOIL SAMPLE PARAMETER SUMMARY TABLE
METALS
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

	SS-1		SS-2		SS-3		SS-4		SS-5		SS-6		SS-7		SS-8		SS-9		SS-10		SS-11	
METALS	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*
Arsenic	3.5	1.2	5.2	1.2	ND	1.2	3.6	1.2	1.5	1.2	ND	1.2	2.3	1.2	ND	1.2	ND	1.2	ND	1.2	ND	1.2
Chromium	5.5	0.75	14.0	0.75	2.1	0.75	11.0	0.75	5.2	0.75	3.1	0.75	9.2	0.75	4.2	0.75	4.1	0.75	2.6	0.75	1.3	0.75
Copper	6.1	0.75	46.0	0.75	8.0	0.75	14.0	0.75	2.4	0.75	2.8	0.75	5.1	0.75	1.9	0.75	4.4	0.75	3.9	0.75	1.0	0.75
Lead	14.0	5.0	290.0	5.0	61.0	5.0	25.0	5.0	3.4	1.2	3.1	1.1	6.3	5.0	2.3	1.2	6.9	5.0	6.2	5.0	1.9	5.0

NOTE: All units in mg/kg dw
R = Laboratory Analytical Result
DL = Laboratory Detection Limit

Historical Soil Sample Parameter Summary Table - Semi-Volatiles

HISTORICAL SOIL SAMPLE PARAMETER SUMMARY TABLE
SEMI-VOLATILES
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

	SS-1		SS-2		SS-3		SS-4		SS-5		SS-6		SS-7		SS-8		SS-9		SS-10		SS-11	
SEMI-VOLATILES	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*
Acenaphthene	0.51	0.33	ND	0.33	ND	0.33	0.59	0.33	4.4	0.33	2.9	0.33	44.0	0.33	1.0	0.33	32.0	0.33	ND	0.33	ND	0.33
Anthracene	ND	0.33	ND	0.33	ND	0.33	ND	0.33	45.0	0.33	36.0	0.33	10.0	0.33	ND	0.33	49.0	0.33	ND	0.33	ND	0.33
Benzo(a)Anthracene	1.1	0.33	0.54	0.33	ND	0.33	1.1	0.33	5.6	0.33	7.4	0.33	3.2	0.33	ND	0.33	26.0	0.33	730.0	0.33	ND	0.33
Benzo(a)Pyrene	0.42	0.33	ND	0.33	ND	0.33	2.0	0.33	3.1	0.33	1.9	0.33	0.64	0.33	ND	0.33	9.0	0.33	650.0	0.33	ND	0.33
Benzo(b)Fluoranthene	ND	0.33	0.75	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	15.0	0.33	1600.0	0.33	ND	0.33
Benzo(k)Fluoranthene	1.5	0.33	ND	0.33	ND	0.33	4.9	0.33	3.60	0.33	3.6	0.33	1.2	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33
Bis(2-Chloroethyl)Ether	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33
Carbazole	ND	0.33	ND	0.33	ND	0.33	ND	0.33	18.0	0.33	4.4	0.33	17.0	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33
4-Chloro-3-Methylphenol	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33
2-Chlorophenol	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33
Chrysene	1.1	0.33	0.53	0.33	ND	0.33	1.6	0.33	4.5	0.33	5.5	0.33	1.90	0.33	ND	0.33	22.0	0.33	920.0	0.33	ND	0.33
Dibenzo(a,h)Anthracene	ND	0.33	ND	0.33	ND	0.33	3.7	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	0.94	0.33	ND	0.33	ND	0.33
2,4-Dimethylphenol	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33
2,4-Dinitrophenol	ND	1.60	ND	1.60	ND	1.60	ND	1.60	ND	1.60	ND	1.60	ND	1.60	ND	1.60	ND	1.60	ND	1.60	ND	1.60
Fluoranthene	3.6	0.33	0.67	0.33	ND	0.33	1.6	0.33	36.0	0.33	52.0	0.33	26.0	0.33	ND	0.33	130.0	0.33	1300.0	0.33	ND	0.33
Indeno(1,2,3-cd)Pyrene	ND	0.33	ND	0.33	ND	0.33	2.0	0.33	0.67	0.33	0.72	0.33	ND	0.33	ND	0.33	3.4	0.33	650.0	0.33	ND	0.33
Naphthalene	ND	0.33	ND	0.33	ND	0.33	ND	0.33	1.6	0.33	ND	0.33	44.0	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33
Pentachlorophenol	ND	1.60	ND	1.60	ND	1.60	ND	1.60	ND	1.60	ND	1.60	ND	1.60	ND	1.60	ND	1.60	ND	1.60	ND	1.60
Phenanthrene	1.5	0.33	0.56	0.33	ND	0.33	ND	0.33	42.0	0.33	36.0	0.33	55.0	0.33	ND	0.33	70.0	0.33	ND	0.33	ND	0.33
Phenol	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33
Tetrachlorophenol	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33
2,4,5-Trichlorophenol	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33
2,4,6-Trichlorophenol	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33	ND	0.33

NOTE: DL = Laboratory Detection Limit

All units in mg/kg dw

Historical Soil Sample Parameter Summary Table - Volatiles

HISTORICAL SOIL SAMPLE PARAMETER SUMMARY TABLE
VOLATILES
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

	SS-1		SS-2		SS-3		SS-4		SS-5		SS-6		SS-7		SS-8		SS-9		SS-10		SS-11	
VOLATILES	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*
Benzene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Bromodichloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Bromomethane	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.001
Carbon Tetrachloride	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.005
Chlorobenzene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Chloroethane	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.001
2-Chloroethylvinyl Ether	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.005
Chloroform	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Chloromethane	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.001
Cis-1,3-Dichloropropene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.005
Dibromochloromethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
1,2-Dibromomethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.005	ND	0.001	ND	0.005	ND	0.001	ND	0.001
Dichlorodifluoromethane	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005
1,1-Dichloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.005
1,2-Dichloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
1,1-Dichloroethene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Dichloromethane	0.024	0.001	0.0064	0.001	0.015	0.001	0.017	0.001	0.012	0.001	0.014	0.001	0.059	0.001	0.007	0.001	0.020	0.001	0.008	0.001	0.0068	0.001
1,2-Dichloropropane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Ethyl Benzene	ND	0.001	ND	0.001	ND	0.02	ND	0.001	ND	0.001	ND	0.001	0.15	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Fluorotrichloromethane	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.001
M/P-Xylene	0.0025	0.001	ND	0.001	ND	0.02	0.001	0.001	0.0011	0.001	0.0014	0.001	0.084	0.001	ND	0.001	0.0071	0.001	ND	0.001	ND	0.005
Methyl-T-Butyl Ether (Mtbe)	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.001
o-Xylene	0.0011	0.001	ND	0.001	ND	0.02	ND	0.001	ND	0.001	ND	0.001	0.069	0.001	ND	0.001	0.0075	0.001	ND	0.001	ND	0.005
1,1,2,2-Tetrachloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Toluene	0.0024	0.001	ND	0.001	ND	0.001	ND	0.001	0.0013	0.001	0.0034	0.001	0.016	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Trans-1,2-Dichloroethylene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
1,1,1-Trichloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
1,1,2-Trichloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Trichloroethene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Vinyl Chloride	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005

NOTE: DL = Laboratory Detection Limit

All units in mg/kg dw

Historical Groundwater Sample Parameter Summary Table - Metals

HISTORICAL GROUNDWATER SAMPLE PARAMETER SUMMARY TABLE
METALS
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

	B-2		B-3		B-4		B-5		B-6		MW-6			
	3/92		3/92		3/92		3/92		3/92		3/92		10/92	
METALS	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*
Arsenic (Total)	0.11	0.025	0.049	0.005	0.031	0.025	ND	0.005	0.051	0.025	ND	0.005	ND	0.005
Arsenic (Dissolved)	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005
Chromium (Total)	0.10	0.006	0.095	0.006	0.19	0.006	0.006	0.006	0.066	0.006	ND	0.006	ND	0.01
Chromium (Dissolved)	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.01
Copper (Total)	0.05	0.006	0.085	0.006	0.13	0.006	0.014	0.006	0.056	0.006	0.012	0.006	ND	0.025
Copper (Dissolved)	ND	0.006	ND	0.006	ND	0.006	0.0064	0.006	ND	0.006	ND	0.006	ND	0.025
Lead (Total)	0.35	0.25	0.12	0.025	0.21	0.05	0.01	0.005	0.1	0.05	0.0092	0.005	ND	0.005
Lead (Dissolved)	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005

	MW-7				MW-8				MW-8A		MW-9			
	3/92		10/92		3/92		10/92		10/92		3/92		10/92	
METALS	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*
Arsenic (Total)	0.0062	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005
Arsenic (Dissolved)	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005
Chromium (Total)	0.031	0.006	0.014	0.01	0.015	0.006	0.024	0.01	ND	0.01	ND	0.006	ND	0.01
Chromium (Dissolved)	ND	0.006	ND	0.01	ND	0.006	ND	0.01	ND	0.01	ND	0.006	ND	0.01
Copper (Total)	0.012	0.006	ND	0.025	0.012	0.006	0.026	0.025	ND	0.025	0.007	0.006	ND	0.025
Copper (Dissolved)	ND	0.006	ND	0.025	ND	0.006	ND	0.025	ND	0.025	ND	0.006	ND	0.025
Lead (Total)	0.023	0.005	0.0097	0.005	0.016	0.005	0.038	0.01	ND	0.005	ND	0.005	ND	0.005
Lead (Dissolved)	ND	0.005	ND	0.005	ND	0.005	ND	0.01	ND	0.005	ND	0.005	ND	0.005

	MW-10				MW-11A		MW-13				MW-14			
	3/92		10/92		10/92		3/92		10/92		3/92		10/92	
METALS	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL	RESULT	DL*	RESULT	DL*	RESULT	DL*
Arsenic (Total)	0.077	0.05	0.048	0.005	ND	0.005	0.05	0.025	0.048	0.005	0.01	0.005	0.018	0.005
Arsenic (Dissolved)	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005
Chromium (Total)	0.059	0.006	0.019	0.01	0.012	0.01	0.059	0.006	0.039	0.01	0.033	0.006	0.069	0.01
Chromium (Dissolved)	ND	0.006	ND	0.01	ND	0.01	ND	0.006	ND	0.01	ND	0.006	ND	0.01
Copper (Total)	0.091	0.006	ND	0.025	ND	0.025	0.08	0.006	0.061	0.025	0.023	0.006	0.059	0.025
Copper (Dissolved)	ND	0.006	ND	0.025	ND	0.025	ND	0.006	ND	0.025	ND	0.006	ND	0.025
Lead (Total)	0.084	0.05	0.018	0.005	0.0095	0.005	0.14	0.05	0.120	0.05	0.029	0.01	0.05	0.015
Lead (Dissolved)	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.05	ND	0.005	ND	0.015

	MW-15				MW-16				MW-17				MW-18	
	3/92		10/92		3/92		10/92		3/92		10/92		10/92	
METALS	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*
Arsenic (Total)	0.10	0.05	0.110	0.05	0.027	0.005	ND	0.005	0.14	0.05	0.04	0.005	0.0058	0.005
Arsenic (Dissolved)	ND	0.005	0.023	0.05	ND	0.005	ND	0.005	ND	0.005	0.0057	0.005	ND	0.005
Chromium (Total)	0.051	0.006	0.031	0.01	0.120	0.006	ND	0.01	0.18	0.006	0.035	0.01	0.67	0.01
Chromium (Dissolved)	ND	0.006	ND	0.01	ND	0.006	ND	0.01	ND	0.006	ND	0.01	ND	0.01
Copper (Total)	0.086	0.006	0.05	0.025	0.14	0.006	0.03	0.025	0.40	0.006	0.054	0.025	0.051	0.025
Copper (Dissolved)	ND	0.006	ND	0.025	ND	0.006	ND	0.025	ND	0.006	ND	0.025	ND	0.025
Lead (Total)	0.094	0.05	0.042	0.015	0.064	0.025	0.012	0.005	0.39	0.25	0.045	0.01	0.081	0.05
Lead (Dissolved)	ND	0.005	ND	0.015	ND	0.005	ND	0.005	ND	0.005	ND	0.01	ND	0.05

	MW-19		MW-19A		MW-20		MW-21		MW-22		MW-23		MW-24		MW-25	
	10/92		10/92		10/92		10/92		10/92		10/92		10/92		10/92	
METALS	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*
Arsenic (Total)	ND	0.005	0.005	0.005	0.01	0.005	0.028	0.005	0.033	0.005	ND	0.005	0.0064	0.005	0.012	0.005
Arsenic (Dissolved)	ND	0.005	ND	0.005	ND	0.005	ND	0.005	0.013	0.005	ND	0.005	ND	0.005	ND	0.005
Chromium (Total)	0.03	0.01	0.011	0.01	ND	0.01	0.032	0.01	0.200	0.01	ND	0.01	0.018	0.01	0.031	0.01
Chromium (Dissolved)	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Copper (Total)	ND	0.025	ND	0.025	0.032	0.025	0.035	0.025	0.038	0.025	ND	0.025	0.027	0.025	0.041	0.025
Copper (Dissolved)	ND	0.025	ND	0.025	ND	0.025	ND	0.025	ND	0.025	ND	0.025	ND	0.025	ND	0.025
Lead (Total)	0.005	0.005	0.011	0.005	0.012	0.005	0.061	0.05	0.037	0.01	ND	0.005	0.071	0.05	0.036	0.01
Lead (Dissolved)	ND	0.005	ND	0.005	ND	0.005	ND	0.05	ND	0.01	ND	0.005	ND	0.05	ND	0.01

NOTE: DL = Laboratory Detection Limit
All units in mg/l

Historical Groundwater Sample Parameter Summary Table - Semi-Volatiles

HISTORICAL GROUNDWATER SAMPLE PARAMETER SUMMARY TABLE
SEMI-VOLATILES
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

	B-2		B-3		B-4		B-5		B-6		MW-6				MW-7				MW-8				MW-8A	
	3/92		3/92		3/92		3/92		3/92		3/92		10/92		3/92		10/92		3/92		10/92		10/92	
SEMI-VOLATILES	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*
Acenaphthene	ND	0.01	ND	0.01	3.0	0.01	ND	0.01	0.022	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Anthracene	ND	0.01	ND	0.01	0.94	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Benzo(a)Anthracene	ND	0.01	ND	0.01	0.42	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Benzo(a)Pyrene	ND	0.01	ND	0.01	0.11	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Benzo(b)Fluoranthene	ND	0.01	ND	0.01	0.21	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Benzo(k)Fluoranthene	ND	0.01	ND	0.01	0.056	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Bis(2-Chloroethyl)Ether	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Carbazole	ND	0.01	ND	0.01	0.36	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
4-Chloro-3-Methylphenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
2-Chlorophenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Chrysene	ND	0.01	ND	0.01	0.34	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Dibenzo(a,h)Anthracene	ND	0.01	ND	0.01	0.011	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
2,4-Dimethylphenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
2,4-Dinitrophenol	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05
Fluoranthene	ND	0.01	ND	0.01	2.7	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Indeno(1,2,3-cd)Pyrene	ND	0.01	ND	0.01	0.035	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Naphthalene	ND	0.01	ND	0.01	14.0	0.01	ND	0.01	0.052	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Pentachlorophenol	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05
Phenanthrene	ND	0.01	ND	0.01	5.8	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Phenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Tetrachlorophenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
2,4,5-Trichlorophenol	ND	0.01	ND	0.01	ND	0.01	ND	0.05	ND	0.05	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
2,4,6-Trichlorophenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01

NOTE: DL = Laboratory Detection Limit

All units in mg/l

HISTORICAL GROUNDWATER SAMPLE PARAMETER SUMMARY TABLE
SEMI-VOLATILES
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

	MW-9				MW-10				MW-11A		MW-13				MW-14				MW-15				MW-16			
	3/92		10/92		3/92		10/92		10/92		3/92		10/92		3/92		10/92		3/92		10/92		3/92		10/92	
SEMI-VOLATILES	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*
Acenaphthene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	0.05	0.001	1.1	0.01	1.10	0.2	0.74	0.01	0.81	0.01	0.15	0.01	0.14	0.01	ND	0.01	ND	0.01
Anthracene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	0.02	0.001	0.13	0.01	0.26	0.2	0.11	0.01	0.26	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Benzo(a)Anthracene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.005	0.057	0.01	0.12	0.01	0.037	0.01	0.14	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Benzo(a)Pyrene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.001	0.02	0.01	0.04	0.01	0.011	0.01	0.05	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Benzo(b)Fluoranthene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.001	0.037	0.01	0.06	0.01	0.021	0.01	0.11	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Benzo(k)Fluoranthene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.005	0.01	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Bis(2-Chloroethyl)Ether	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.001	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Carbazole	ND	0.01	ND	0.01	ND	0.01	ND	0.01	0.04	0.001	0.067	0.01	0.32	0.2	0.11	0.01	0.19	0.01	0.021	0.01	0.03	0.01	ND	0.01	ND	0.01
4-Chloro-3-Methylphenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.005	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
2-Chlorophenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.001	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Chrysene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.001	0.057	0.01	0.10	0.01	0.036	0.01	0.09	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Dibenzo(a,h)Anthracene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.005	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
2,4-Dimethylphenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.005	0.063	0.01	0.01	0.01	0.37	0.1	ND	0.01	0.044	0.01	0.03	0.01	ND	0.01	ND	0.01
2,4-Dinitrophenol	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.001	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05
Fluoranthene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	0.01	0.001	0.56	0.01	0.76	0.2	0.38	0.01	0.78	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Indeno(1,2,3-cd)Pyrene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.001	ND	0.01	0.02	0.01	ND	0.01	0.02	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Naphthalene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.001	2.6	0.01	3.50	0.2	3.1	0.01	4.90	0.01	0.11	0.01	ND	0.01	ND	0.01	ND	0.01
Pentachlorophenol	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.001	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05
Phenanthrene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	0.06	0.001	1.2	0.01	1.60	0.2	1.1	0.01	1.40	0.01	0.023	0.01	0.05	0.01	ND	0.01	ND	0.01
Phenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.005	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Tetrachlorophenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.001	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
2,4,5-Trichlorophenol	ND	0.05	ND	0.01	ND	0.05	ND	0.01	ND	0.005	ND	0.01	ND	0.01	ND	0.05	ND	0.01	ND	0.05	ND	0.01	ND	0.05	ND	0.01
2,4,6-Trichlorophenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.001	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01

NOTE: DL = Laboratory Detection Limit

All units in mg/l

HISTORICAL GROUNDWATER SAMPLE PARAMETER SUMMARY TABLE
SEMI-VOLATILES
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

	MW-17				MW-18		MW-19		MW-19A		MW-20		MW-21		MW-22		MW-23		MW-24		MW-25	
	3/92		10/92		10/92		10/92		10/92		10/92		10/92		10/92		10/92		10/92		10/92	
SEMI-VOLATILES	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*
Acenaphthene	0.024	0.01	ND	0.01	ND	0.01	0.18	0.01	ND	0.01	0.05	0.01	ND	0.01	2.50	0.01	ND	0.01	0.11	0.01	0.12	0.01
Anthracene	0.023	0.01	0.02	0.01	ND	0.01	0.01	0.01	ND	0.01	ND	0.01	ND	0.01	0.18	0.01	ND	0.01	ND	0.01	0.07	0.01
Benzo(a)Anthracene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	0.13	0.01	ND	0.01	ND	0.01	0.05	0.01
Benzo(a)Pyrene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	0.06	0.01	ND	0.01	ND	0.01	0.02	0.01
Benzo(b)Fluoranthene	ND	0.01	0.01	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	0.12	0.01	ND	0.01	ND	0.01	0.04	0.01
Benzo(k)Fluoranthene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Bis(2-Chloroethyl)Ether	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Carbazole	ND	0.01	ND	0.01	ND	0.01	0.07	0.01	ND	0.01	ND	0.01	ND	0.01	0.19	0.01	ND	0.01	0.03	0.01	0.02	0.01
4-Chloro-3-Methylphenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
2-Chlorophenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Chrysene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	0.10	0.01	ND	0.01	ND	0.01	0.04	0.01
Dibenzo(a,h)Anthracene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
2,4-Dimethylphenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	0.03	0.01	ND	0.01	ND	0.01	ND	0.01
2,4-Dinitrophenol	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05
Fluoranthene	0.065	0.01	0.08	0.01	ND	0.01	0.02	0.01	ND	0.01	0.012	0.01	ND	0.01	1.70	0.01	ND	0.01	ND	0.01	0.16	0.01
Indeno(1,2,3-cd)Pyrene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	0.02	0.01	ND	0.01	ND	0.01	ND	0.01
Naphthalene	ND	0.01	ND	0.01	ND	0.01	0.30	0.1	ND	0.01	0.04	0.01	ND	0.01	4.50	0.01	ND	0.01	ND	0.01	ND	0.01
Pentachlorophenol	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05
Phenanthrene	0.06	0.01	0.08	0.01	ND	0.01	0.08	0.01	ND	0.01	0.05	0.01	ND	0.01	3.70	0.01	ND	0.01	0.02	0.01	0.19	0.01
Phenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Tetrachlorophenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
2,4,5-Trichlorophenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01
2,4,6-Trichlorophenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01

NOTE: DL = Laboratory Detection Limit

All units in mg/l

Historical Groundwater Sample Parameter Summary Table - Volatiles

HISTORICAL GROUNDWATER SAMPLE PARAMETER SUMMARY TABLE
VOLATILES
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

	B-2		B-3		B-4		B-5		B-6		MW-6				MW-7				MW-8				MW-8A	
	3/92		3/92		3/92		3/92		3/92		3/92		10/92		3/92		10/92		3/92		10/92		10/92	
VOLATILES	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*
Benzene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Bromodichloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Bromomethane	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.001	ND	0.005
Carbon Tetrachloride	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.005	ND	0.001
Chlorobenzene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Chloroethane	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.001	ND	0.005
2-Chloroethylvinyl Ether	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.005	ND	0.001
Chloroform	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	0.002	0.001
Chloromethane	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.001	ND	0.005
Cis-1,3-Dichloropropene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.005	ND	0.001
Dibromochloromethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
1,2-Dibromomethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.005	ND	0.001	ND	0.005	ND	0.001	ND	0.001	ND	0.005
Dichlorodifluoromethane	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.001
1,1-Dichloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.005	ND	0.001
1,2-Dichloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
1,1-Dichloroethene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Dichloromethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	0.002	0.001	ND	0.001
1,2-Dichloropropane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Ethyl Benzene	ND	0.001	ND	0.001	0.110	0.02	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Fluorotrichloromethane	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.001	ND	0.005
M/P-Xylene	ND	0.001	ND	0.001	0.09	0.02	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.005	ND	0.001
Methyl-T-Butyl Ether (Mtbe)	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.001	ND	0.005
o-Xylene	ND	0.001	ND	0.001	0.04	0.02	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.005	ND	0.001
1,1,2,2-Tetrachloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Tetrachloroethene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001			ND	0.001			ND	0.001				
Toluene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Trans-1,2-Dichloroethylene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
1,1,1-Trichloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
1,1,2-Trichloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Trichloroethene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Vinyl Chloride	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005

NOTE: DL = Laboratory Detection Limit

All units in mg/l

HISTORICAL GROUNDWATER SAMPLE PARAMETER SUMMARY TABLE
VOLATILES
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

	MW-9				MW-10				MW-11A		MW-13				MW-14				MW-15				MW-16			
	3/92		10/92		3/92		10/92		10/92		3/92		10/92		3/92		10/92		3/92		10/92		3/92		10/92	
VOLATILES	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*
Benzene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	0.003	0.001	0.073	0.01	0.1	0.01	0.03	0.01	0.019	0.005	ND	0.005	0.005	0.001	ND	0.001	ND	0.001
Bromodichloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.01	ND	0.001	ND	0.005	ND	0.005	ND	0.001	ND	0.001	ND	0.001
Bromomethane	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.05	ND	0.005	ND	0.025	ND	0.025	ND	0.005	ND	0.005	ND	0.005
Carbon Tetrachloride	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.01	ND	0.001	ND	0.005	ND	0.005	ND	0.001	ND	0.001	ND	0.001
Chlorobenzene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.01	ND	0.001	ND	0.005	ND	0.005	ND	0.001	ND	0.001	ND	0.001
Chloroethane	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.05	ND	0.005	ND	0.025	ND	0.025	ND	0.005	ND	0.005	ND	0.005
2-Chloroethylvinyl Ether	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.01	ND	0.001	ND	0.005	ND	0.005	ND	0.001	ND	0.001	ND	0.001
Chloroform	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.01	0.0011	0.001	ND	0.005	ND	0.005	ND	0.001	ND	0.001	ND	0.001
Chloromethane	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.05	ND	0.005	ND	0.025	ND	0.025	ND	0.005	ND	0.005	ND	0.005
Cis-1,3-Dichloropropene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.01	ND	0.001	ND	0.005	ND	0.005	ND	0.001	ND	0.001	ND	0.001
Dibromochloromethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.01	ND	0.001	ND	0.005	ND	0.005	ND	0.001	ND	0.001	ND	0.001
1,2-Dibromomethane	ND	0.001	ND	0.005	ND	0.001	ND	0.005	ND	0.005	ND	0.001	ND	0.05	ND	0.001	ND	0.025	ND	0.005	ND	0.005	ND	0.001	ND	0.005
Dichlorodifluoromethane	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.05	ND	0.005	ND	0.025	ND	0.025	ND	0.005	ND	0.005	ND	0.005
1,1-Dichloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.01	ND	0.001	ND	0.005	ND	0.005	ND	0.001	ND	0.001	ND	0.001
1,2-Dichloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.005	ND	0.001	ND	0.001	ND	0.001
1,1-Dichloroethene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.01	ND	0.001	ND	0.005	ND	0.005	ND	0.001	ND	0.001	ND	0.001
Dichloromethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.01	ND	0.001	ND	0.005	ND	0.005	ND	0.001	ND	0.001	0.001	0.001
1,2-Dichloropropane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.01	ND	0.001	ND	0.005	ND	0.005	ND	0.001	ND	0.001	ND	0.001
Ethyl Benzene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	0.004	0.001	0.041	0.01	0.04	0.01	0.067	0.01	0.06	0.005	0.008	0.005	0.006	0.001	0.0027	0.001	ND	0.001
Fluorotrichloromethane	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.05	ND	0.005	ND	0.025	ND	0.025	ND	0.005	ND	0.005	ND	0.005
M/P-Xylene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	0.007	0.001	0.044	0.01	0.05	0.01	0.073	0.01	0.078	0.005	0.008	0.005	0.006	0.001	0.0037	0.001	ND	0.001
Methyl-T-Butyl Ether (Mtbe)	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.05	ND	0.005	ND	0.025	ND	0.025	ND	0.005	ND	0.005	ND	0.005
o-Xylene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	0.003	0.001	0.025	0.01	0.02	0.01	0.036	0.01	0.038	0.005	ND	0.005	0.003	0.001	0.0032	0.001	ND	0.001
1,1,2,2-Tetrachloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.01	ND	0.001	ND	0.005	ND	0.005	ND	0.001	ND	0.001	ND	0.001
Tetrachloroethene	ND	0.001			ND	0.001					ND	0.001			ND	0.001			ND	0.005			ND	0.001		
Toluene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	0.001	0.001	0.031	0.01	0.01	0.01	0.046	0.01	0.028	0.005	0.006	0.005	ND	0.001	ND	0.001	ND	0.001
Trans-1,2-Dichloroethylene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.01	ND	0.001	ND	0.005	ND	0.005	ND	0.001	ND	0.001	ND	0.001
1,1,1-Trichloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.01	ND	0.001	ND	0.005	ND	0.005	ND	0.001	ND	0.001	ND	0.001
1,1,2-Trichloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.01	ND	0.001	ND	0.005	ND	0.005	ND	0.001	ND	0.001	ND	0.001
Trichloroethene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.01	ND	0.001	ND	0.005	ND	0.005	ND	0.001	ND	0.001	ND	0.001
Vinyl Chloride	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.05	ND	0.005	ND	0.025	ND	0.025	ND	0.005	ND	0.005	ND	0.005

NOTE: DL = Laboratory Detection Limit

All units in mg/l

HISTORICAL GROUNDWATER SAMPLE PARAMETER SUMMARY TABLE
VOLATILES
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

	MW-17				MW-18		MW-19		MW-19A		MW-20		MW-21		MW-22		MW-23		MW-24		MW-25	
	3/92		10/92		10/92		10/92		10/92		10/92		10/92		10/92		10/92		10/92		10/92	
VOLATILES	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*
Benzene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	0.005	0.001	ND	0.001	ND	0.001	ND	0.001
Bromodichloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Bromomethane	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005
Carbon Tetrachloride	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Chlorobenzene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Chloroethane	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005
2-Chloroethylvinyl Ether	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Chloroform	ND	0.001	ND	0.001	ND	0.001	ND	0.001	0.001	0.001	ND	0.001	0.001	0.001	0.004	0.001	ND	0.001	ND	0.001	ND	0.001
Chloromethane	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005
Cis-1,3-Dichloropropene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Dibromochloromethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
1,2-Dibromomethane	ND	0.001	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005
Dichlorodifluoromethane	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005
1,1-Dichloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
1,2-Dichloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
1,1-Dichloroethene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Dichloromethane	ND	0.001	0.003	0.001	0.002	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	0.002	0.001	0.003	0.001	ND	0.001	ND	0.001
1,2-Dichloropropane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Ethyl Benzene	0.0039	0.001	0.006	0.001	ND	0.001	0.011	0.001	ND	0.001	ND	0.001	ND	0.001	0.037	0.001	ND	0.001	0.002	0.001	ND	0.001
Fluorotrichloromethane	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005
M/P-Xylene	0.0088	0.001	0.016	0.001	ND	0.001	0.007	0.001	ND	0.001	ND	0.001	ND	0.001	0.048	0.001	ND	0.001	0.002	0.001	ND	0.001
Methyl-T-Butyl Ether (Mtbe)	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005
o-Xylene	0.0046	0.001	0.01	0.001	ND	0.001	0.005	0.001	ND	0.001	ND	0.001	ND	0.001	0.023	0.001	ND	0.001	0.001	0.001	ND	0.001
1,1,2,2-Tetrachloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Tetrachloroethene	ND	0.001																				
Toluene	0.0011	0.001	0.017	0.001	ND	0.001	0.001	0.001	ND	0.001	ND	0.001	ND	0.001	0.011	0.001	ND	0.001	ND	0.001	ND	0.001
Trans-1,2-Dichloroethylene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
1,1,1-Trichloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
1,1,2-Trichloroethane	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Trichloroethene	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Vinyl Chloride	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005

NOTE: DL = Laboratory Detection Limit

All units in mg/l

Historical Surface Water Sample Parameter Summary Table - Semi-Volatile and Metals

HISTORICAL SURFACE WATER SAMPLE PARAMETER SUMMARY TABLE
SEMI–VOLATILES AND METALS
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

	U.S. HIGHWAY #74 BRIDGE																											
	12/85		6/86		1/87		7/87		1/88		6/88		1/89		6/89		1/90		7/90		12/91		6/92		1/93		7/93	
SEMI–VOLATILES	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*
Acenaphthene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Acenaphthylene	NA	--	NA	--	NA	--	NA	--	NA	--	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Anthracene	ND	0.01	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Benzo(a)Anthracene	ND	0.01	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Benzo(a)Pyrene	ND	0.01	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Benzo(b,k)Fluoranthene	ND	0.01	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Carbazole	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
2–Chlorophenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Chrysene	ND	0.01	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Dibenzo(a,h)Anthracene	ND	0.02	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
2,4–Dimethylphenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
2,4–Dinitrophenol	ND	0.02	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.05	ND	0.05	ND	0.050	ND	0.05	ND	0.050	ND	0.050	ND	0.050	ND	0.050	ND	0.050
Fluoranthene	ND	0.01	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Indeno(1,2,3–cd)pyrene	ND	0.02	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Naphthalene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
p–chloro–m–cresol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Pentachlorophenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.050	ND	0.05	ND	0.050	ND	0.050	ND	0.050	ND	0.050	ND	0.050
Phenanthrene	ND	0.01	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Phenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Tetrachlorophenols	ND	0.01	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.050	ND	0.050	ND	0.050
Trichlorophenols	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
METALS																												
Arsenic	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	--	ND	0.010	ND	0.010	ND	0.010
Chromium	ND	0.01	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	--	ND	0.010	ND	0.010	ND	0.010
Copper	ND	0.01	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.025	ND	--	ND	0.025	ND	0.025	ND	0.025

NOTE: R* = Laboratory Result
DL* = Detection Limit
ND = Below Laboratory Detection Limit
NA = Not Analyzed
All units in mg/l

HISTORICAL SURFACE WATER SAMPLE PARAMETER SUMMARY TABLE
SEMI-VOLATILES AND METALS
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

	OLD SLIP																											
	12/85		6/86		1/87		7/87		1/88		6/88		1/89		6/89		1/90		7/90		12/91		6/92		1/93		7/93	
SEMI-VOLATILES	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*
Acenaphthene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Acenaphthylene	NA	--	NA	--	NA	--	NA	--	NA	--	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Anthracene	ND	0.01	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Benzo(a)Anthracene	ND	0.01	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Benzo(a)Pyrene	ND	0.01	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Benzo(b,k)Fluoranthene	ND	0.01	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Carbazole	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
2-Chlorophenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Chrysene	ND	0.01	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Dibenzo(a,h)Anthracene	ND	0.02	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
2,4-Dimethylphenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
2,4-Dinitrophenol	ND	0.02	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.05	ND	0.05	ND	0.050	ND	0.05	ND	0.050	ND	0.050	ND	0.050	ND	0.050	ND	0.050
Fluoranthene	ND	0.01	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Indeno(1,2,3-cd)pyrene	ND	0.02	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Naphthalene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
p-chloro-m-cresol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Pentachlorophenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.050	ND	0.05	ND	0.050	ND	0.050	ND	0.050	ND	0.050	ND	0.050
Phenanthrene	ND	0.01	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Phenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Tetrachlorophenols	ND	0.01	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.050	ND	0.050	ND	0.050
Trichlorophenols	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
METALS																												
Arsenic	ND	0.01	NA	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	--	ND	0.010	ND	0.010	ND	0.010
Chromium	ND	0.01	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.01	ND	0.010	ND	0.010	ND	0.010	0.011	0.010	ND	--	ND	0.010	ND	0.010	ND	0.010
Copper	ND	0.01	ND	0.05	ND	0.05	ND	0.05	ND	0.05	0.02	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.025	ND	--	ND	0.025	ND	0.025	ND	0.025

NOTE: R* = Laboratory Result
DL* = Detection Limit
ND = Below Laboratory Detection Limit
NA = Not Analyzed
All units in mg/l

HISTORICAL SURFACE WATER SAMPLE PARAMETER SUMMARY TABLE
SEMI-VOLATILES AND METALS
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

	GREENFIELD CREEK																													
	12/85		6/86		1/87		7/87		1/88		6/88		1/89		6/89		7/89		1/90		7/90		12/91		6/92		1/93		7/93	
SEMI-VOLATILES	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*
Acenaphthene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Acenaphthylene	NA	--	NA	--	NA	--	NA	--	NA	--	ND	0.01	ND	0.01	ND	0.010	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Anthracene	ND	0.01	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.01	ND	0.01	ND	0.010	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Benzo(a)Anthracene	ND	0.01	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.01	ND	0.01	ND	0.010	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Benzo(a)Pyrene	ND	0.01	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.01	ND	0.01	ND	0.010	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Benzo(b,k)Fluoranthene	ND	0.01	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.01	ND	0.01	ND	0.010	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Carbazole	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
2-Chlorophenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Chrysene	ND	0.01	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.01	ND	0.01	ND	0.010	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Dibenzo(a,h)Anthracene	ND	0.02	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.01	ND	0.01	ND	0.010	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
2,4-Dimethylphenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
2,4-Dinitrophenol	ND	0.02	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.05	ND	0.05	ND	0.050	ND	0.050	ND	0.05	ND	0.050	ND	0.050	ND	0.050	ND	0.050	ND	0.050
Fluoranthene	ND	0.01	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.01	ND	0.01	ND	0.010	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Indeno(1,2,3-cd)pyrene	ND	0.02	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.01	ND	0.01	ND	0.010	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Naphthalene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	0.050	0.010	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
p-chloro-m-cresol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Pentachlorophenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.050	ND	0.050	ND	0.05	ND	0.050	ND	0.050	ND	0.050	ND	0.050	ND	0.050
Phenanthrene	ND	0.01	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.01	ND	0.01	ND	0.010	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Phenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Tetrachlorophenols	ND	0.01	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.01	ND	0.01	ND	0.010	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.050	ND	0.050	ND	0.050
Trichlorophenols	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
METALS																														
Arsenic	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	--	ND	0.010	ND	0.010	ND	0.010
Chromium	ND	0.01	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	0.046	0.010	ND	--	ND	0.010	ND	0.010	ND	0.010
Copper	ND	0.01	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	0.052	0.025	ND	--	ND	0.025	ND	0.025	ND	0.025

NOTE: R* = Laboratory Result
DL* = Detection Limit
ND = Below Laboratory Detection Limit
NA = Not Analyzed
All units in mg/l

HISTORICAL SURFACE WATER SAMPLE PARAMETER SUMMARY TABLE
SEMI–VOLATILES AND METALS
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

	STATE PORTS AUTHORITY																											
	12/85		6/86		1/87		7/87		1/88		6/88		1/89		6/89		1/90		7/90		12/91		6/92		1/93		7/93	
SEMI–VOLATILES	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*	R*	DL*
Acenaphthene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Acenaphthylene	NA	--	NA	--	NA	--	NA	--	NA	--	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Anthracene	ND	0.01	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Benzo(a)Anthracene	ND	0.01	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Benzo(a)Pyrene	ND	0.01	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Benzo(b,k)Fluoranthene	ND	0.01	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Carbazole	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
2–Chlorophenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Chrysene	ND	0.01	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Dibenzo(a,h)Anthracene	ND	0.02	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
2,4–Dimethylphenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
2,4–Dinitrophenol	ND	0.02	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.05	ND	0.05	ND	0.050	ND	0.05	ND	0.050	ND	0.050	ND	0.050	ND	0.050	ND	0.050
Fluoranthene	ND	0.01	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Indeno(1,2,3–cd)pyrene	ND	0.02	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Naphthalene	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
p–chloro–m–cresol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Pentachlorophenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.050	ND	0.05	ND	0.050	ND	0.050	ND	0.050	ND	0.050	ND	0.050
Phenanthrene	ND	0.01	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Phenol	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Tetrachlorophenols	ND	0.01	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.050	ND	0.050	ND	0.050
Trichlorophenols	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010
METALS																												
Arsenic	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	--	ND	0.010	ND	0.010	ND	0.010
Chromium	ND	0.01	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	--	ND	0.010	ND	0.010	ND	0.010
Copper	ND	0.01	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.01	ND	0.010	ND	0.010	ND	0.010	ND	0.025	ND	--	ND	0.025	ND	0.025	ND	0.025

NOTE: R* = Laboratory Result
DL* = Detection Limit
ND = Below Laboratory Detection Limit
NA = Not Analyzed
All units in mg/l

FORM# AB350

WELL ABANDONMENT RECORD

, Inc.
A Division of ViroGroup
P.O. Box 1867 • 1445 Pisgah Church Rd. • Lexington, S.C. 29072
(803) 957-6270

1. WELL LOCATION: (Show a sketch of well loaction.)

Nearest Town: WILMINGTON, NORTH CAROLINA

(Road, Community, Subdivision, Lot No.)

ABANDONMENT DATE 10-30-93

County: NEW HANOVER

Quadrangle Name: WILMINGTON

Well No. MW-24

2. OWNER: SOUTHERN WOOD PIEDMONT

3. ADDRESS: FOOT OF GREENFIELD STREET

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

5. USE OF WELL: MONITORING DATE: 10-30-93

6. TOTAL DEPTH: 11.5 DIAMETER: 2"

7. CASING AND SCREEN REMOVED:

	FEET	DIAMETER
PIT CASING:		
WELL CASING:	6.5	2" PVC RISER
WELL SCREEN:	5' STAINLESS STEEL	2" 0.010 SLOT SCREEN

8. SEALING MATERIAL

Neat Cement

bags of cement: 3

gals. of water: 18

Sand Cement

bags of cement:

yds. of sand:

gals. of water:

Other

Type material: BENTONITE

Amount: 15 POUNDS

9. EXPLAIN METHOD OF GROUT PLACEMENT:

OVER REAM AND TREMIE

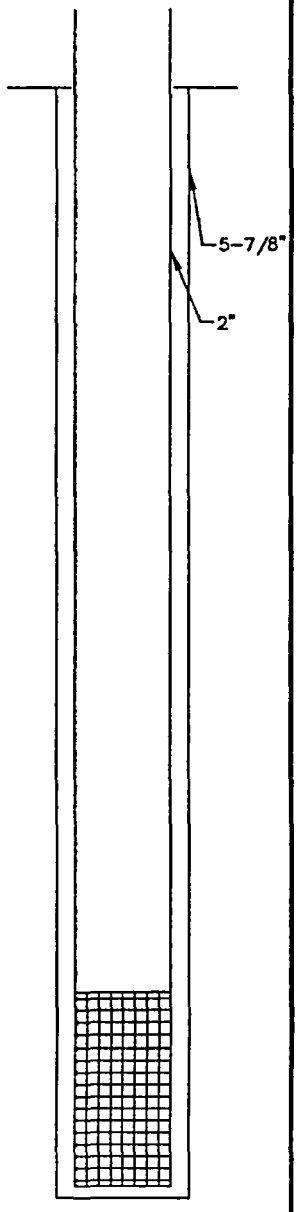
I do hereby certify that this well abandonment record is true and exact.

Signature Gregory B. Kurtz

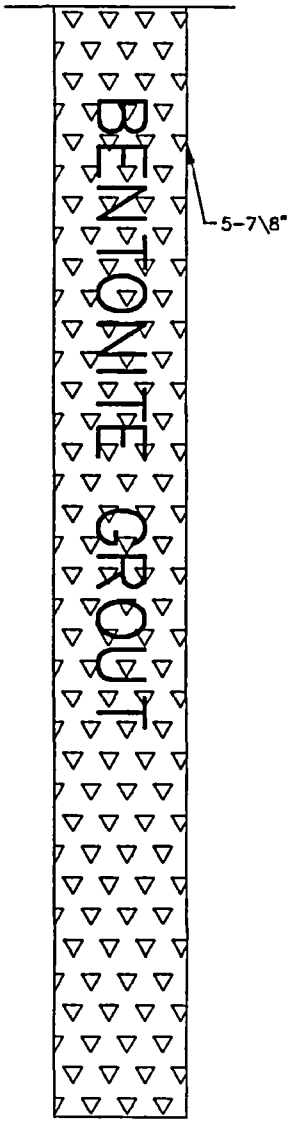
License No. N.C. 1203 Date 10/30/93

WELL DIAGRAM: Draw a detailed sketch of the well showing total depth, diameter and construction details prior to and subsequent to abandonment.

BEFORE



AFTER



CSX Transportation Right-of-Entry Permit

ViroGroup
Air • Water • Soil
TECHNOLOGY

ETE Division
ViroGroup, Inc.
1445 Pisgah Church Road
Lexington, SC 29072
Phone 803-957-6270
FAX 803-957-3845

October 1, 1993

Mr. H.C. Worsham
Public Project Engineer
CSX Transportation
500 Water Street
Jacksonville, Florida 32202

Re: Right-of-Entry Permit
Wilmington, North Carolina
ViroGroup Project #12-53015.00

Dear Mr. Worsham:

ViroGroup, Inc. - ETE Division is requesting a right-of-entry permit along the Atlantic Coast Line Railroad in Wilmington, North Carolina. The purpose of the permit is to provide access to a parcel of property that cannot be reached by any other means.

Planned activities include the installation of two ground water monitoring wells. These monitoring wells will not be installed within the railroad easement. In order to reach the parcel of land for monitoring well installation, it will be necessary for a rubber tire drill rig to drive along the edge of the railroad for approximately 200 yards. At one point, it will be necessary for the drill rig to drive over the tracks and cross a 10-foot wide trestle. Once across the trestle, the drill rig will leave the tracks and exit the railroad easement for the monitoring well installation. Monitoring well installation may take up to 4 days to complete.

The trestle carries two sets of tracks across a small tidal tributary. The trestle is constructed of closely spaced railroad cross-ties that are continuous across the expanse of the trestle. No 2" x 8" walk boards exist between the tracks at this trestle. ViroGroup, Inc. will utilize blocking to cross the rails.

The section of track that will be accessed is located on Map V11NC Sheet 7A of the Atlantic Coast Line Railroad, Wilmington Terminal, New River Spur. The drill rig will enter the railroad easement at Station 14+00 and travel to 24+00. The drill rig will cross the trestle at Station 23+09.

ViroGroup, Inc. appreciates the railroad's assistance in this matter. Monitoring well installation will occur in late October and early November of 1993. So that well installation can proceed as planned, your expedient attention to this matter would be greatly appreciated. If you have any further questions, or need additional information, please feel free to give us a call at 1-800-786-0654.

Sincerely,

ViroGroup, Inc. - ETE Division

Gregory B. Kuntz

Gregory B. Kuntz, P.G.
Hydrogeologist
NC Reg. #1203

cc: T.M. Davis
Pink Frady

CSX
TRANSPORTATION
P.E. VanCleve, P.E.
Chief Engineer
Design & Construction

Engineering Department
P. O. Box 45052
Jacksonville, FL 32232-5052

October 11, 1993

Mr. Gregory B. Kuntz, P.E.
Hydrogelogist
Viro Group, Inc. - ETE Division
1445 Pisgah Church Road
Lexington, SC 40501

Project: Wilmington, NC - Install Two (2) Ground Water Monitoring Wells.

Dear Mr. Kuntz:

This has reference to your request to enter the property of CSX Transportation, Inc. hereinafter called "Railroad", to perform certain work, hereinafter called "Work", in connection with the construction of the captioned project.

Railroad hereby grants to Viro Group, Inc-ETE Division hereinafter called "Agency", the right and permission to enter upon Railroad's property for the purpose of performing said Work as outlined on Agency's letter or plan, made a part hereof by reference, subject to the terms, conditions and provisions hereinbelow set forth:

1. The work shall be performed at the entire cost and expense of Agency, in accordance with good and sound engineering practices, to the satisfaction of Railroad's Chief Engineer, or his duly authorized representative, and in a manner to avoid accidents and damages or unnecessary delays to or interference with train traffic of Railroad.

2. Agency shall notify Railroad's Division Engineer Representative, Mr. R. A. Martin, telephone (919) 371-6081 at least seventy-two (72) hours before proceeding with the Work Railroad property and shall abide by the instructions of said Division Engineer Representative insofar as the safety of the Railroad is concerned. 371-9925

3. No equipment of Agency or of its contractor, shall be placed and operated, nor Work permitted to be performed at a distance closer than eighteen (18) feet from the center of any track. Equipment shall be moved across the Railroad's track(s) only at a public crossing, unless prior arrangements have been made with said Division Engineer Representative. All precautions must be taken by Agency and its contractor to avoid interference with or damage to Railroad's signal and communications facilities during the course of said Work.

4. Railroad shall furnish such personnel, flagman or watchman which in Railroad's opinion may be necessary to protect the facilities and traffic of Railroad during the performance of Railroad during the performance of said Work and Agency,or its contractor, shall reimburse Railroad promptly for the actual cost of said services, including all applicable surcharges, upon receipt of bill or bills therefor.

5. Agency or its Contractor hereby assumes risk of and agrees to indemnify, defend, protect and save Railroad harmless from and against (a) injury to or death of any person or persons whomsoever, including but not limited to the agents, servants or employees of the parties hereto, or (b) the loss or damage to any property whatsoever, including property owned or in the care, custody or control of Railroad, and (c) all claims, demands, suits, judgments or expenses incurred in connection therewith; resulting from or arising out of the sole or concurring negligent or willful acts or omissions of Agency, or its agents, servants or employees, in the performance or execution of the Work performed under this right-of-entry or incidental thereto.

6. Agency or its Contractor shall carry Public Liability or Commercial General Liability Insurance covering Agency's direct and assumed or contractual liability, including liability assumed under this Right-of-Entry Letter Agreement. Coverage of not less than TWO MILLION DOLLARS ($2,000,000.00) Combined Single Limit per occurrence for personal injury and property damage is recommended to Agency as a prudent minimum to protect Agency in connection with liability assumed hereunder. Agency shall provide a Certificate of Insurance naming Railroad as Certificate Holder, the Certificate of Insurance to be sent to Railroad with return of the signed duplicate original of this right-of-entry letter.

7. Agency or its Contractor hereby agrees to pay Railroad a construction risk fee in the amount of FOUR HUNDRED DOLLARS ($400.00), and is thereby relieved of any obligation to purchase Railroad Protective Insurance for the benefit of Railroad for operations covered by this letter agreement. Agency shall send Railroad its check for the above amount, payable to Railroad, with return of the signed duplicate original of this right-of-entry letter.

8. Agency shall, or shall require its contractor to, promptly notify said Division Engineer Representative of any loss, damage, injury or death arising out or in connection with said Work to be performed.

9. It is understood and agreed that, upon completion of said Work, Railroad's property shall be left in a condition satisfactory to Railroad's Chief Engineer or his duly authorized representative.

10. This right-of-entry and the permission conferred and the license granted by it does not constitute a grant of permanent easement and shall terminate upon completion of the Work or at midnight, March 31 1994, whichever occurs first, unless extended in writing by Railroad.

If the provision and terms of the right-of-entry granted by this letter are acceptable to the Agency, please have an authorized official sign both copies in the space provided below, and return on duplicate original to the undersigned.

Yours very truly,

CSX TRANSPORTATION, INC.

P. E. VanCleve By H. Worsham

P. E. VanCleve

ACCEPTED:

Viro Group, Inc.-ETE Division

By: Gregory B. Tuntz

Title: Hydrogeologist

Date: 10-22-, 1993

ACORD. CERTIFICATE OF INSURANCE

ISSUE DATE (MM/DD/YY) 20-OCT-1993

PRODUCER 1840

Willis Corroon Construction Services Corporation
333 New Hyde Park Rd.
Suite 300
P.O. Box 5450
New Hyde Park NY 11040
(516) 365-2100
Contact : Mary Ann Reilly

INSURED

ViroGroup, Inc./ETE Division
1445 Pisgah Church Road
Lexington SC 29072

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

COMPANIES AFFORDING COVERAGE

COMPANY LETTER A	Home Ins. Co. of Illinois
COMPANY LETTER B	Lexington Insurance Co.
COMPANY LETTER C	American International Specialty Lines Ins. Co.
COMPANY LETTER D	
COMPANY LETTER E	

COVERAGES

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED, NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES.

CO LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS	
	GENERAL LIABILITY				BODILY INJURY OCC.	$
	X COMPREHENSIVE FORM				BODILY INJURY AGG.	$
	X PREMISES/OPERATIONS				PROPERTY DAMAGE OCC.	$
	X UNDERGROUND EXPLOSION & COLLAPSE HAZARD				PROPERTY DAMAGE AGG.	$
A	X PRODUCTS/COMPLETED OPER.	SLM9261394	01-JUL-1993	01-JUL-1994	BI & PD COMBINED OCC.	$ 1,000,000
	X CONTRACTUAL				BI & PD COMBINED AGG.	$ 2,000,000
	X INDEPENDENT CONTRACTORS				PERSONAL INJURY AGG.	$
	X BROAD FORM PROPERTY DAMAGE					
	PERSONAL INJURY					
	AUTOMOBILE LIABILITY				BODILY INJURY (Per person)	$
	ANY AUTO					
	ALL OWNED AUTOS (Priv. pass.)				BODILY INJURY (Per accident)	$
	ALL OWNED AUTOS (other than priv. pass.)					
	HIRED AUTOS				PROPERTY DAMAGE	$
	NON-OWNED AUTOS					
	GARAGE LIABILITY				BODILY INJURY & PROPERTY DAMAGE COMBINED	$
	EXCESS LIABILITY				EACH OCCURRENCE	$ 4,000,000
B	X UMBRELLA FORM	5107125	01-JUL-1993	01-JUL-1994	AGGREGATE	$ 4,000,000
	OTHER THAN UMBRELLA FORM					
	WORKER'S COMPENSATION AND EMPLOYERS' LIABILITY				STATUTORY LIMITS	
					EACH ACCIDENT	$
					DISEASE-POLICY LIMIT	$
					DISEASE-EACH EMPLOYEE	$
	OTHER				$5,000,000 Including	
C	Errors and Omissions	7730242	01-JUL-1993	01-JUL-1994	pollution liability	

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/SPECIAL ITEMS

As respects Monitoring Well Installation

CERTIFICATE HOLDER

CSX Transportation
H. C. (Clark) Worsham
Public Project Engineer
500 Water Street
Jacksonville FL 32202

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING COMPANY WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO MAIL SUCH NOTICE SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE COMPANY, ITS AGENTS OR REPRESENTATIVES.

AUTHORIZED REPRESENTATIVE

George J. Ellendile

ACORD. CERTIFICATE OF INSURANCE

ISSUE DATE (MM/DD/YY) 10/20/1993

PRODUCER

Poe & Brown, Inc.
4210 Metro Parkway, Suite 300
Fort Myers, Fl 33916
(813) 278-0278 FAX 278-1994

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

COMPANIES AFFORDING COVERAGE

COMPANY LETTER A

COMPANY LETTER B HARTFORD FIRE INSURANCE CO.

COMPANY LETTER C HARTFORD UNDERWRITERS INS. CO.

COMPANY LETTER D

COMPANY LETTER E

INSURED

VIROGROUP,INC. ETE-DIVISION
P.O.BOX 1867
LEXINGTON, SC 29072

COVERAGES

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED, NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN. THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

CO LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS	
	GENERAL LIABILITY				GENERAL AGGREGATE	$
	COMMERCIAL GENERAL LIABILITY				PRODUCTS-COMP/OP AGG.	$
	CLAIMS MADE / OCCUR.				PERSONAL & ADV. INJURY	$
	OWNER'S & CONTRACTOR'S PROT.				EACH OCCURRENCE	$
					FIRE DAMAGE (Any one fire)	$
					MED. EXPENSE (Any one person)	$
	AUTOMOBILE LIABILITY				COMBINED SINGLE LIMIT	$1,000,000.
X	ANY AUTO	21UENKZ9612	07/01/93	07/01/94		
	ALL OWNED AUTOS				BODILY INJURY (Per person)	$
	SCHEDULED AUTOS					
X	HIRED AUTOS				BODILY INJURY (Per accident)	$
X	NON-OWNED AUTOS					
	GARAGE LIABILITY				PROPERTY DAMAGE	$
	EXCESS LIABILITY				EACH OCCURRENCE	$
	UMBRELLA FORM				AGGREGATE	$
	OTHER THAN UMBRELLA FORM					
	WORKER'S COMPENSATION				X STATUTORY LIMITS	
C	AND	21WBEQ9643	01/01/93	01/01/94	EACH ACCIDENT	$1,000,000.
	EMPLOYERS' LIABILITY				DISEASE - POLICY LIMIT	$1,000,000.
					DISEASE - EACH EMPLOYEE	$1,000,000.
	OTHER					
B	CONTR. EQUIP ALL RISK	UNDER BINDER	07/01/93	07/01/94	DEDUCTIBLE	1,000.

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/SPECIAL ITEMS

30 DAY CANCELLATION FOR WORKERS COMPENSATION.

CERTIFICATE HOLDER

SX TRANSPORTATION INC
IC(CLARK) WORSHAM-PUBLIC PROJ ENG
500 WATER STREET
JACKSONVILLE FL 32202

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING COMPANY WILL ENDEAVOR TO MAIL 10 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO MAIL SUCH NOTICE SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE COMPANY, ITS AGENTS OR REPRESENTATIVES.

AUTHORIZED REPRESENTATIVE

55849

VIROGROUP, INC.
428 PINE ISLAND RD., S.W.
CAPE CORAL, FL 33991

BARNETT BANK
020-001
315 S. CALHOUN ST.
TALLAHASSEE, FL 32301

63-568/631

CHECK DATE	REFERENCE NO.
10-20-93	55849

AMOUNT
400.00

PAY: FOUR HUNDRED DOLLARS ----------

TO: CSX TRANSPORTATION, INC.

VIROGROUP, INC.

R. A. [illegible]

Lee A. Hlozbrack III

⑈055849⑈ ⑆063105683⑆ 2000007036⑈

Corps of Engineers Wetland Modification Permit

ViroGroup
Air • Water • Soil
TECHNOLOGY

ETE Division
ViroGroup, Inc.
1445 Pisgah Church Road
Lexington, SC 29072
Phone 803-957-6270
FAX 803-957-3845

November 5, 1993

Mr. Jeff Richter
Department of the Army Corps of Engineers
Wilmington District
P.O. Box 1890
Wilmington, North Carolina 28402-1890

Re: Monitoring Well Installation Notification
Action ID. 199300253 and Nationwide Permit No. 5
(Scientific Measurement Devices)
ViroGroup Project #12-53015.00

Dear Mr. Richter:

As per our conversation on October 22, 1993, ViroGroup, Inc. is providing notification of monitoring well installation within a wetland area adjacent to the Cape Fear River, at the foot of Greenfield Street in Wilmington, North Carolina. In accordance with Nationwide Permit #5 of the United States Army Corps of Engineers' Regulatory Program, Title 33, CFR 330.6 authorization for monitoring well installation is being requested.

In order to install the monitoring well, no excavation or filling of the wetland area or modification to the existing flow system will be required. At the completion of the monitoring well installation a protective casing set in a 2' x 2' x 8" concrete pad will remain within the wetland area.

In order to confirm notification of the monitoring well installation within a wetland area and to ascertain agreement with Nationwide Permit #5 authorization, ViroGroup, Inc. is requesting a written reply from the United States Army Corps of Engineers acknowledging our request.

If ViroGroup, Inc. can provide you with any additional information concerning this monitoring well installation, please feel free to give us a call at 1-800-786-0654. You expedience in this matter will be greatly appreciated.

Sincerely,

ViroGroup, Inc. - ETE Division

Gregory B. Kuntz

Gregory B. Kuntz, P.G.
Hydrogeologist

Andrew M. Wilson

Andy M. Wilson, P.G.
Senior Hydrogeologist

cc: T.M. Davis
Pink Frady

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
P.O. BOX 1890
WILMINGTON, NORTH CAROLINA 28402-1890

November 30, 1993

IN REPLY REFER TO
Regulatory Branch

Action ID No. 199400253 and Nationwide Permit No. 5 (Scientific Measurement Devices)

ETE Division
Virogroup, Incorporated
Att: Mr. Gregory Kuntz
1445 Pisgah Church Road
Lexington, Kentucky 29072

Dear Mr. Kuntz:

Reference your application of November 10, 1993, for Department of the Army (DA) authorization to install a monitoring well in wetland adjacent the Cape Fear River at the foot of Greenfield Street in Wilmington, New Hanover County, North Carolina.

For the purposes of the Corps of Engineers' Regulatory Program, Title 33, Code of Federal Regulations (CFR), Part 330.6, published in the Federal Register on November 22, 1991, lists nationwide permits. Authorization, pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act, was provided for staff gages, tide gages, water recording devices, water quality testing and improvement devices, and similar scientific structures.

Your work is authorized by this nationwide permit provided it is accomplished in strict accordance with the enclosed conditions and provided you receive a Section 401 water quality certification from the North Carolina Division of Environmental Management (NCDEM) and, in the coastal area, a consistency determination from the North Carolina Division of Coastal Management (NCDCM). You should contact Mr. John Dorney, telephone (919) 733-1786, regarding water quality certification, and Mr. Steve Benton, telephone (919) 733-2293, regarding consistency determination. This nationwide permit does not relieve you of the responsibility to obtain other required State or local approval.

This verification will be valid for two years from the date of this letter unless the nationwide authorization is modified, reissued or revoked. Also, this verification will remain valid for the two years if, during that period, the nationwide permit authorization is reissued without modification or the activity complies with any subsequent modification of the nationwide permit authorization. If during the two years, the nationwide permit authorization expires or is suspended or revoked, or is modified, such that the activity would no longer comply with the terms and conditions of the nationwide permit, activities which have commenced (i.e., are under construction) or are under contract to commence in reliance upon the nationwide permit will remain authorized provided the activity is completed within twelve months of the date of the nationwide permit's expiration, modification or revocation, unless discretionary authority has been exercised on a case-by-case basis to modify, suspend or revoke the authorization.

Questions or comments may be addressed to Mr. Jeffrey Richter, Wilmington Area Field Office, Regulatory Branch, telephone (910) 251-4636.

Sincerely,

G. Wayne Wright
Chief, Regulatory Branch

Enclosure

Copies Furnished (without enclosure):

Mr. Steve Benton
North Carolina Department of
Environment, Health and
Natural Resources
Post Office Box 27687
Raleigh, North Carolina 27611-7687

Mr. John Dorney
Division of Environmental Management
North Carolina Department of
Environment, Health and
Natural Resources
Post Office Box 29535
Raleigh, North Carolina 27626-0535

C. Robert Stroud
Wilmington Regional Office
North Carolina Division of
Coastal Management
127 Cardinal Drive Extension
Wilmington, North Carolina 28405

GENERAL CONDITIONS

1. **Navigation.** No activity may cause more than a minimal adverse effect on navigation.

2. **Proper Maintenance.** Any structure or fill authorized shall be properly maintained, including maintenance to ensure public safety.

3. **Erosion and Siltation Controls.** Appropriate erosion and siltation controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills must be permanently stabilized at the earliest practicable date.

4. **Aquatic Life Movements.** No activity may substantially disrupt the movement of those species of aquatic life indigenous to the waterbody, including those species which normally migrate through the area, unless the activity's primary purpose is to impound water.

5. **Equipment.** Heavy equipment working in wetlands must be placed on mats or other measures must be taken to minimize soil disturbance.

6. **Regional and Case-by-case Conditions.** The activity must comply with any regional conditions which may have been added by the Division Engineer and any case specific conditions added by the Corps.

7. **Wild and Scenic Rivers.** No activity may occur in a component of the National Wild and Scenic River System; or in a river officially designated by Congress as a "study river" for possible inclusion in the system, while the river is in an official study status. Information on Wild and Scenic Rivers may be obtained from the National Park Service and the U.S. Forest Service.

8. **Tribal Rights.** No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

9. **Water Quality Certification.** In certain states, an individual state water quality certification must be obtained or waived.

10. **Coastal Zone Management.** In certain states, an individual state coastal zone management consistency concurrence must be obtained or waived.

11. **Endangered Species.** No activity is authorized under any NWP which is likely to jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act, or which is likely to destroy or adversely modify the critical habitat of such species. Non-Federal permittees shall notify the District Engineer if any listed species or critical habitat might be affected or is in the vicinity of the project and shall not begin work on the activity until notified by the District Engineer that the requirements of

the Endangered Species Act have been satisfied and that the activity is authorized. Information on the location of threatened and endangered species can be obtained from the U.S. Fish and Wildlife Service and National Marine Fisheries Service.

12. **Historic Properties.** No activity which may affect Historic Properties listed, or eligible for listing, in the National Register of Historic Places is authorized, until the District Engineer has complied with the provisions of 33 CFR 325, Appendix C. The prospective permittee must notify the District Engineer if the authorized activity may affect any historic properties listed, determined to be eligible, or which the prospective permittee has reason to believe may be eligible for listing on the National Register of Historic Places, and shall not begin the activity until notified by the District Engineer that the requirements of the National Historic Preservation Act have been satisfied and that the activity is authorized. Information on the location and existence of historic resources can be obtained from the State Historic Preservation Office and the National Register of Historic Places (see 33 CFR 330.4(g)).

13. Notification.

a. Where required by the terms of the NWP, the prospective permittee must notify the District Engineer as early as possible and shall not begin the activity:

(1) until notified by the District Engineer that the activity may proceed under the NWP with any special conditions imposed by the District or Division Engineer; or

(2) if notified by the District or Division Engineer that an individual permit is required; or

(3) Unless 30 days have passed from the District Engineer's receipt of the notification and the prospective permittee has not received notice from the District or Division Engineer. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

b. The notification must be in writing and include the following information and any required fees:

(1) Name, address and telephone number of the prospective permittee;

(2) Location of the proposed project;

(3) Brief description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause; any other NWP(s), regional general permit(s) or individual permit(s) used or intended to be used to authorize any part of the proposed project or related activity;

(4) Where required by the terms of the NWP, a delineation of affected special aquatic sites, including wetlands; and

(5) A statement that the prospective permittee has contacted;

(a) The USFWS/NMFS regarding the presence of any Federally listed (or proposed for listing) endangered or threatened species or critical habitat in the permit area that may be affected by the proposed project; and any available information provided by those agencies. (The prospective permittee may contact Corps District Offices for USFWS/NMFS agency contacts and list of critical habitat.)

(b) The SHPO regarding the presence of any historic properties in the permit area that may be affected by the proposed project; and the available information, if any provided by that agency.

14. **Water Supply Intakes.** No discharge of dredged or fill material may occur in the proximity of a public water supply intake except where the discharge is repair of the public water supply intake structures or adjacent bank stabilization.

15. **Shellfish Production.** No discharge of dredged or fill material may occur in areas of concentrated shellfish production, unless the discharge is directly related to a shellfish harvest activity authorized by nationwide permit.

16. **Suitable Material.** No discharge of dredged or fill material may consist of unsuitable material (e.g., trash, debris, car bodies, etc.) and material discharged must be free from toxic pollutants in toxic amounts.

17. **Mitigation.** Discharges of dredged or fill material into waters of the United States must be minimized or avoided to the maximum extent practicable at the project site (i.e., on-site), unless the District Engineer has approved a compensation mitigation plan for the specific regulated activity.

18. **Spawning Areas.** Discharges in spawning areas during spawning seasons must be avoided to the maximum extent practicable.

19. **Obstructions of High Flows.** To the maximum extent practicable, discharges must not permanently restrict or impede the passage of normal or expected high flows or cause the relocation of the water (unless the primary purpose of the fill is to impound waters).

20. **Adverse Impacts from Impoundments.** If the discharge creates an impoundment of water, adverse impacts on the aquatic system caused by the accelerated passage of water and/or the restriction of its flow shall be minimized to the maximum extent practicable.

21. **Waterfowl Breeding Areas.** Discharges into breeding areas for migratory waterfowl must be avoided to the maximum extent practicable.

22. **Removal of Temporary Fills.** Any temporary fills must be removed in their entirety and the affected areas returned to their preexisting elevation.

NATIONWIDE CONDITION

A 30-day notification to the District Engineer is required for discharges of 10 to 25 cubic yards for small weirs and flumes.

REGIONAL CONDITION

All weirs and flumes authorized by this nationwide permit must be removed immediately upon the completion of their intended use. Weirs and flumes are not allowed in areas identified by the North Carolina Division of Marine Fisheries (NCDMF) and/or the North Carolina Wildlife Resources Commission (NCWRC) as anadromous fish spawning areas.

STATE CONSISTENCY CONDITION

Should all or part of a proposed activity be located within an Area of Environmental Concern (AEC) as designated by the North Carolina Coastal Resources Commission, a Coastal Area Management Act (CAMA) permit is required from the North Carolina Division of Coastal Management (NCDCM). Should an activity within or potentially affecting an AEC be proposed by a Federal agency, a consistency determination pursuant to 15 CFR 930 must be provided to the NCDCM at least 90 days before the onset of the proposed activity.

GENERAL CERTIFICATION CONDITIONS

a. Established sediment and erosion control practices will be utilized to prevent violations of the appropriate turbidity water quality standard (50 NTU's in streams and rivers not designated as trout waters by the North Carolina Division of Environmental Management (NCDEM), 25 NTU's in all saltwater classes and all lakes and reservoirs and 10 NTU's in trout waters).

b. Measures shall be taken to prevent live or fresh concrete from coming into contact with waters of the State until the concrete has hardened.

Monitoring Well Log Database

WELL LOG DATABASE
SOUTHERN WOOD PIEDMONT – WILMINGTON, NORTH CAROLINA FACILITY

PLANT	WELL	INST DAT	BORING TERM	SURFACE ELEV	RISER ELEV	BOTTOM ELEV	WELL DEPTH	RISER DEPTH	COORDINATES NORTHING	COORDINATES EASTING
WIL	MW-6	09/05/85	20.00	3.40	5.07	-16.38	19.78	21.45	171759.04	2317555.49
WIL	MW-7	09/06/85	19.80	3.87	6.03	-15.65	19.52	21.68	171516.87	2317057.66
WIL	MW-8	09/09/85	19.20	4.16	6.80	-14.86	19.02	21.66	171308.46	2317048.69
WIL	MW-8A	10/01/92	51.00	4.12	6.43	-26.63	30.75	33.06	171307.81	2317034.99
WIL	MW-9	09/10/85	19.40	4.26	6.43	-14.96	19.22	21.39	171324.83	2317300.56
WIL	MW-10	02/18/92	13.00	3.63	7.41	-6.87	10.50	14.28	171060.33	2317416.43
WIL	MW-11	02/18/92	13.00	4.31	8.02	-6.19	10.50	14.21	170769.34	2317497.46
WIL	MW-11A	10/01/92	50.00	4.10	6.38	-29.79	33.89	36.17	170771.95	2317484.42
WIL	MW-11B	10/31/93	46.00	4.13	6.26	-38.06	42.19	44.32	170762.69	2317489.76
WIL	MW-12	02/18/92	12.00	4.60	8.22	-5.90	10.50	14.12	170782.73	2317389.15
WIL	MW-13	02/18/92	12.00	3.31	6.97	-7.19	10.50	14.16	170721.30	2317066.52
WIL	MW-14	02/19/92	22.00	2.62	6.30	-13.38	16.00	19.68	170565.41	2317675.19
WIL	MW-14A	11/02/93	42.00	2.76	5.05	-28.39	31.15	33.44	170564.17	2317685.19
WIL	MW-15	02/19/92	13.00	3.26	7.07	-7.24	10.50	14.31	170641.86	2317249.76
WIL	MW-16	02/19/92	13.00	3.88	7.69	-6.62	10.50	14.31	170875.45	2317059.82
WIL	MW-17	02/19/92	15.00	3.86	7.65	-6.64	10.50	14.29	170899.08	2317118.35
WIL	MW-18	10/07/92	14.00	4.26	6.61	-6.87	11.13	13.48	171744.30	2317083.05
WIL	MW-19	10/06/92	14.00	3.19	5.44	-9.68	12.87	15.12	170439.85	2317232.30
WIL	MW-19A	10/02/92	43.17	3.15	5.25	-28.02	31.17	33.27	170443.47	2317244.14
WIL	MW-20	10/07/92	14.00	3.17	5.44	-9.13	12.30	14.57	170921.86	2317799.93
WIL	MW-20A	11/08/93	42.00	3.10	5.23	-27.88	30.98	33.11	170913.19	2317797.41
WIL	MW-21	10/07/92	10.00	3.17	5.34	-3.62	6.79	8.96	171260.09	2317881.59
WIL	MW-22	10/07/92	14.00	3.02	5.26	-8.09	11.11	13.35	170728.25	2316945.44
WIL	MW-22A	11/02/93	42.00	3.07	5.32	-28.79	31.86	34.11	170726.23	2316955.36
WIL	MW-23	10/08/92	12.00	2.67	4.96	-6.39	9.06	11.35	170355.68	2316972.19
WIL	MW-24	10/05/92	12.00	3.58	5.79	-8.02	11.06	13.81	170245.75	2317388.60
WIL	MW-24R	11/12/93	14.00	3.77	5.98	-9.63	13.40	15.61	170242.09	2317324.15
WIL	MW-24A	11/01/93	42.00	3.64	5.81	-30.64	34.28	36.45	170240.18	2317313.97
WIL	MW-25	10/08/92	13.00	1.78	4.96	-10.27	12.05	15.23	170374.77	2317662.47
WIL	MW-26	10/05/92	18.00	2.48	4.91	-15.14	17.62	20.05	170529.26	2317951.33
WIL	MW-27	11/13/93	9.00	3.22	5.41	-1.90	5.12	7.31	171848.14	2317846.63
WIL	MW-28	11/10/93	14.00	2.97	5.18	-8.10	11.07	13.28	170473.09	2318157.25
WIL	MW-28A	11/10/93	40.00	3.26	5.47	-22.42	25.68	27.89	170465.44	2318161.94
WIL	MW-29	11/12/93	7.00	3.19	5.32	-4.04	7.23	9.36	169681.45	2317783.77
WIL	MW-29A	11/09/93	40.00	3.15	5.14	-35.83	38.98	40.97	169673.28	2317782.13
WIL	MW-30	11/12/93	10.00	4.07	6.26	-4.95	9.02	11.21	169874.49	2317618.08
WIL	SG*-Cape Fear	10/12/92			5.93	-0.73			171166.75	2316464.93
WIL	SG*-North	10/12/92			6.64	-0.02			171129.56	2318037.12
WIL	SG*-South	11/09/93			2.13	-1.20			170523.78	2318024.91

* SG = Staff Gauge

Boring Logs

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. B-2

PROJECT: SOUTHERN WOOD PIEDMONNT – WILMINGTON, NC		SHEET NO. 1 OF 1	
CLIENT: SOUTHERN WOOD PIEDMONT	DATE FINISHED 2-19-92	JOB NO. 530-06-501	
BORING CONTRACTOR: ETE	DRILLER C. AARON	ELEVATION	
RIG USED MOBILE B-57	INSPECTOR K. ANDERSON	DATE STARTED 2-19-92	

WELL CONSTRUCTION	DEPTH FEET	SAMPLE: UNIFLAGHT	No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
	0						
			1	SS		Medium to coarse brown SAND	Water saturated OVA = 0.0
CLAY / PLUG	5						
SAND PACK / SAND PACK			2	SS		Same as above	No visual contamination OVA = 0.0
	10						
			3	SS		Brown to black PEAT with root fragments	No visual contamination OVA = 2.0
	15						
	20						
	25						
	30						
	35						
	40						
	45						
	50						

H:530501B2

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. B-3

PROJECT: SOUTHERN WOOD PIEDMONT – WILMINGTON, NC		SHEET NO. 1 OF 1	
CLIENT: SOUTHERN WOOD PIEDMONT	DATE FINISHED 2-20-92	JOB NO. 530-06-501	
BORING CONTRACTOR: ETE	DRILLER C. AARON	ELEVATION	
RIG USED MOBILE B-57	INSPECTOR K. ANDERSON	DATE STARTED 2-20-92	

WELL CONSTRUCTION	DEPTH FEET	SAMPLE: LITHOLOGY	SAMPLE: NO.	SAMPLE: TYPE	SAMPLE: BLOWS PER 6"	CLASSIFICATION	REMARKS
	0						
	5		1	SS		Fine to medium brown SAND with small wood fragments at 4.5 feet	Water saturated OVA = 3.1
CLAY / PLUG			2	SS		Same as above	No visual contamination OVA = 0.9
SAND PACK / SAND PACK	10						
			3	SS		Dark brown to black PEAT with wood fragments	No visual contamination OVA = 0.8
	15						
	20						
	25						
	30						
	35						
	40						
	45						
	50						

H:53050183

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. B-4

PROJECT: SOUTHERN WOOD PIEDMONT – WILMINGTON, NC		SHEET NO. 1 OF 1	
CLIENT: SOUTHERN WOOD PIEDMONT	DATE FINISHED 2-20-92	JOB NO. 530-06-501	
BORING CONTRACTOR: ETE	DRILLER C. AARON	ELEVATION	
RIG USED MOBILE B-57	INSPECTOR K. ANDERSON	DATE STARTED 2-20-92	

WELL CONSTRUCTION	DEPTH FEET	SAMPLE: Recovery	No.	Type	Blows per 6"	CLASSIFICATION	REMARKS
	0						Visual creosote at top of hole
			1	SS		Fine to medium brown SAND with wood fragments	No visual contamination OVA = 1.7
CLAY	5						
PLUG							
SAND PACK			2	SS		Same as above	No visual contamination OVA = 5.1
SAND PACK	10						
			3	SS			Visual creosote in sand above PEAT OVA = 98.9
	15					Dark brown to black PEAT with wood fragments	
	20						
	25						
	30						
	35						
	40						
	45						
	50						

H:530501B4

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. B-5

PROJECT: SOUTHERN WOOD PIEDMONT – WILMINGTON, NC			SHEET NO. 1 OF 1
CLIENT: SOUTHERN WOOD PIEDMONT	DATE FINISHED	2-20-92	JOB NO. 530-06-501
BORING CONTRACTOR: ETE	DRILLER	C. AARON	ELEVATION
RIG USED MOBILE B-57	INSPECTOR	K. ANDERSON	DATE STARTED 2-20-92

WELL CONSTRUCTION: CLAY; PLUG; SAND PACK; SAND PACK

DEPTH FEET	SAMPLE No.	SAMPLE TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0	1	SS		Fine to medium brown SAND	Water saturated No visual contamiation OVA = 54.3
5	2	SS		Same as above	OVA = 21.7
10	3	SS		Dark black to brown PEAT with wood fragments	No visual contamination OVA = 3.9
15					
20					
25					
30					
35					
40					
45					
50					

H:530501B5

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. B-6

PROJECT: SOUTHERN WOOD PIEDMONT – WILMINGTON, NC		SHEET NO. 1 OF 1	
CLIENT: SOUTHERN WOOD PIEDMONT	DATE FINISHED 2-20-923	JOB NO. 530-06-501	
BORING CONTRACTOR: ETE	DRILLER C. AARON	ELEVATION	
RIG USED MOBILE B-57	INSPECTOR K. ANDERSON	DATE STARTED 2-20-92	

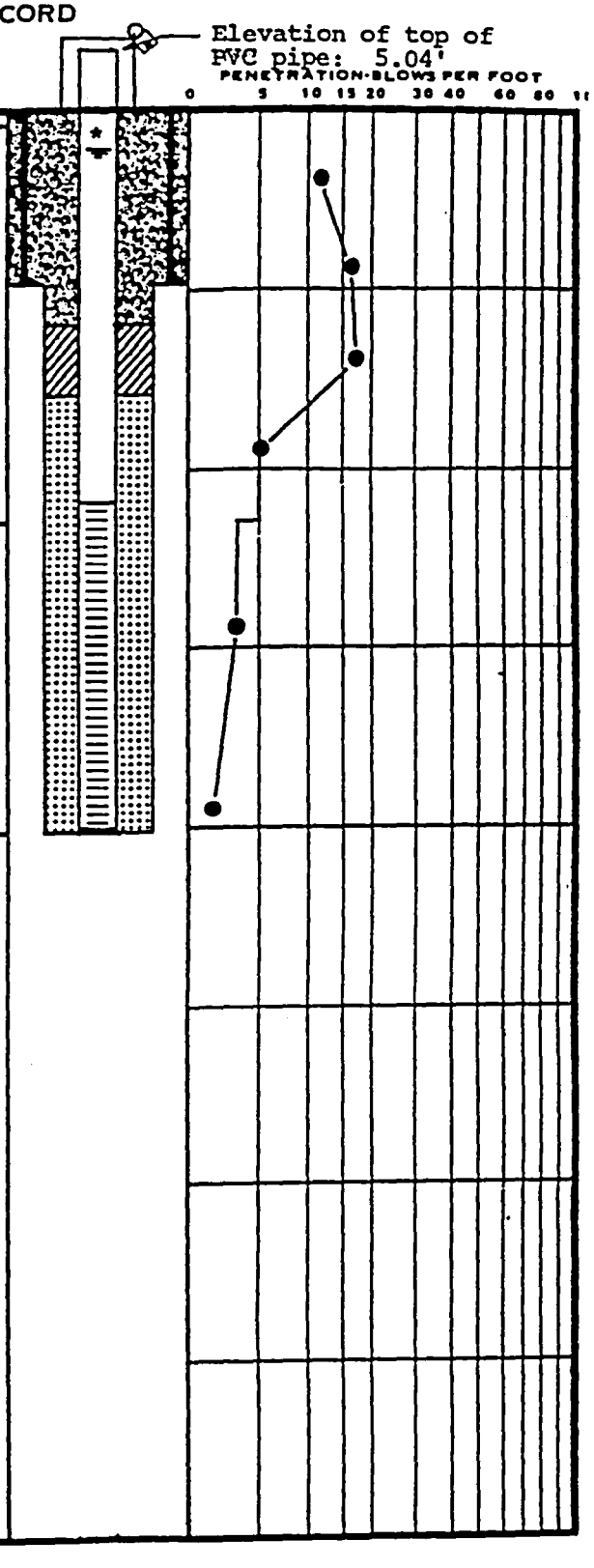
WELL CONSTRUCTION	DEPTH FEET	SAMPLE: LITHOLOGY	No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
CLAY	0						
PLUG			1	SS		Fine to mdedium brown SAND	Water saturated No visual contamination OVA = 1.7
SAND PACK	5						
SAND PACK			2	SS		Dark brown to black PEAT with wood fragments	OVA = 1.0
	10						
	15						
	20						
	25						
	30						
	35						
	40						
	45						
	50						

H:530501B6

TEST BORING RECORD

Elevation of top of PVC pipe: 5.04'

ELEV.	DEPTH FEET	DESCRIPTION
3.46	0.0	FILL: Dark brown and black CINDERS and silty fine to medium SAND
	0.5	
-1.54		Firm to loose dark to light brownish-gray/grayish-brown fine to medium SAND with traces of silt
-6.54		
	11.5	
-11.54		Soft to very soft dark brown PEAT and ORGANIC SILT with wood and root fragments
-16.54	20.0	BORING TERMINATED
-21.54		



REMARKS:

* Water level on 9-19-85

1) Wash drilled with 10-inch wing bit using a bentonite and potable water drilling fluid mixture to 4.8 feet; Wash drilled with 5 7/8-inch rotary bit using a bentonite and potable water drilling fluid mixture from 4.8 to 20.0 feet

2) Well developed on 9-10-85

DRILLED BY L.S.
LOGGED BY J.T.B.
CHECKED BY C.A.S.

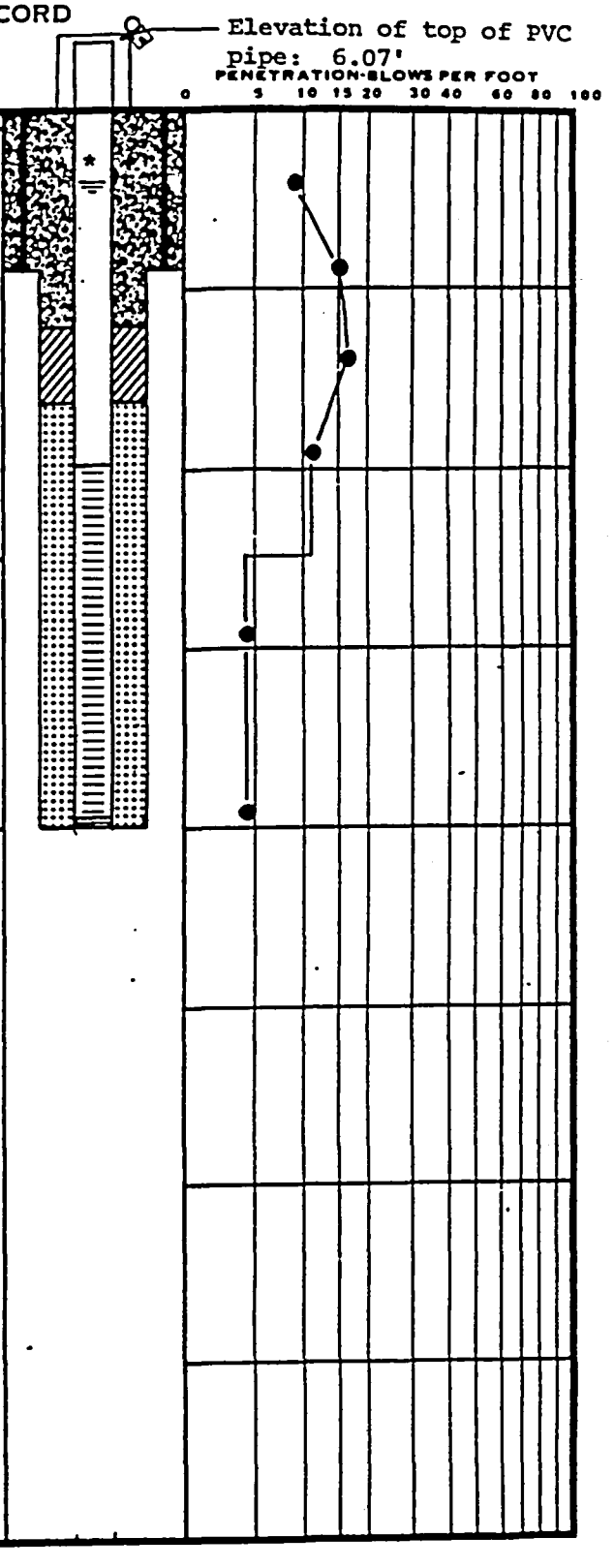
BORING NUMBER MW-6
DATE STARTED 9-4-85
DATE COMPLETED 9-5-85
JOB NUMBER HA-5276

SWP - Wilmington

TEST BORING RECORD

Elevation of top of PVC pipe: 6.07'

ELEV.	DEPTH FEET	DESCRIPTION
4.16	0.0	FILL: Brown slightly silty fine SAND with cinders
	0.5	
-0.84		Loose to firm brown slightly silty fine to medium SAND to fine to medium SAND with traces of silt
-5.84		
	12.5	
-10.84		Soft to firm dark brown PEAT and ORGANIC SILT with wood and root fragments becoming predominantly wood in last sample
-15.84	20.0	BORING TERMINATED
-20.84		



REMARKS:

* Water level on 9-19-85

1) Wash drilled with 10-inch wing bit using a bentonite and potable water drilling fluid mixture to 4.5 feet;wash drilled with 5 7/8-inch roller bit using a bentonite and potable water drilling fluid mixture from 4.5 to 20.0 feet

2) Well developed on 9-11-85

DRILLED BY L.S.
LOGGED BY J.T.B.
CHECKED BY C.A.S.

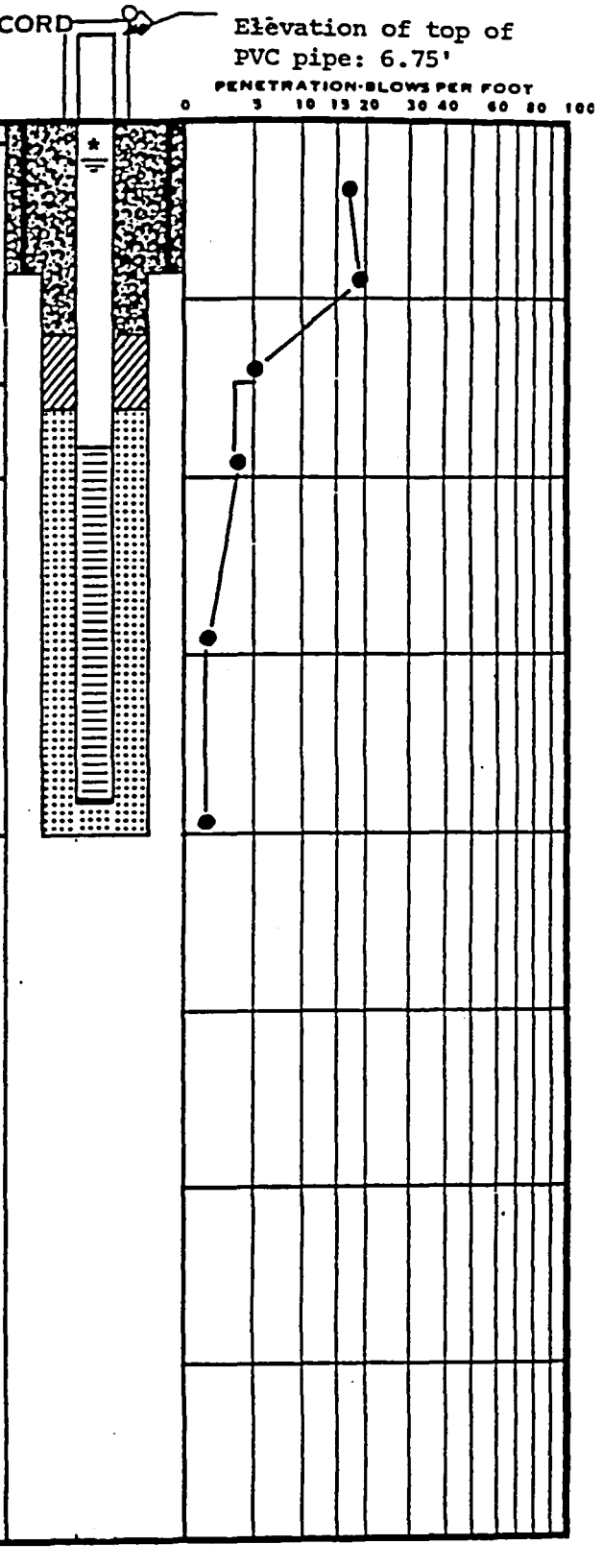
BORING NUMBER MW-7
DATE STARTED 9-4-85
DATE COMPLETED 9-6-85
JOB NUMBER HA-5276

SWP - Wilmington

TEST BORING RECORD

Elevation of top of PVC pipe: 6.75'

ELEV.	DEPTH FEET	DESCRIPTION
4.26	0.7	FILL: Dark brown silty fine SAND with occasional coarse sand
-0.74	7.4	Firm to loose dark brown to grayish-brown and brown slightly silty fine to medium SAND with traces of coarse sand
-5.74	10.0	Buried log from 7.4 to 10.0 feet
-10.74		Very soft to soft dark brown PEAT and ORGANIC SILT with wood and root fragments
-15.74	20.0	BORING TERMINATED
-20.74		



REMARKS:

* Water level on 9-19-85

1) Wash drilled with 10-inch wing bit using a bentonite and potable water drilling fluid mixture to 4.5 feet; wash drilled with 5 7/8-inch roller bit using a bentonite and potable water drilling fluid mixture from 4.5 to 20.0 feet

2) Well developed on 9-11-85

DRILLED BY L.S.
LOGGED BY J.T.B.
CHECKED BY C.A.S.

BORING NUMBER MW-8
DATE STARTED 9-4-84
DATE COMPLETED 9-9-85
JOB NUMBER HA-5276

SWP - Wilmington

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC. CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS HYDROGEOLOGIC SERVICES		TEST BORING LOG BORING NO. MW-8A
PROJECT: SOUTHERN WOOD PIEDMONT-WILMINGTON		SHEET NO. 1 OF 1
CLIENT: CHUCK DAVIS	DATE FINISHED 10-1-92	JOB NO. 530-06-503
BORING CONTRACTOR: ETE	DRILLER T. COPPIN	ELEVATION 4.12
RIG USED ATV MUD ROTARY	INSPECTOR G.KUNTZ	DATE STARTED 9-28-92

WELL CONSTRUCTION: GROUT; 6" PVC CASING; 2" PVC CASING; 6" PVC CASING; GROUT; CLAY; PLUG; SAND PACK; SAND PACK

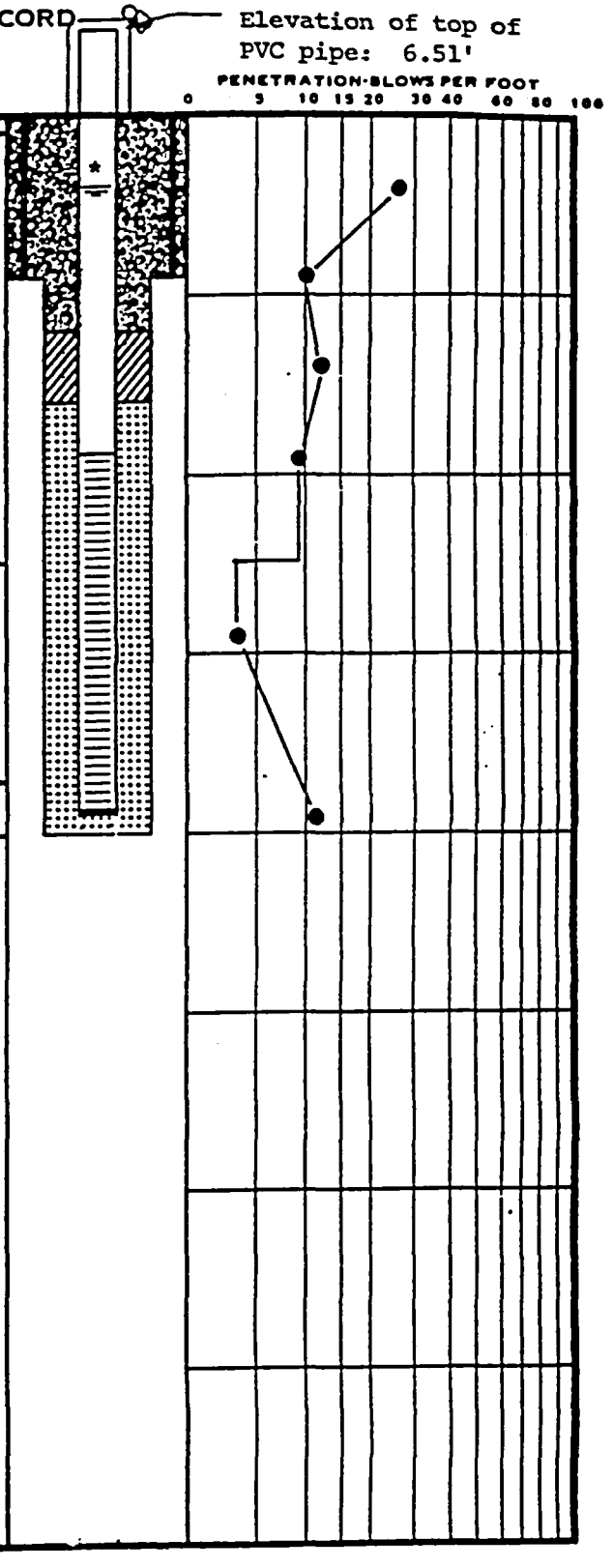
DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0	1	SS	7-6 6-11	Loose, yellowish brown SAND, fine to coarse, 5% clay	16" recovery No odor OVA = 114 ppm
	2	SS	5-10 18-16	Firm, brownish gray SAND, fine to coarse	18" recovery No odor OVA = 38.1 ppm
5	3	SS	14-15 16-20	Firm, brownish black organic rich silty SAND, silt to medium, 10% small pebble, 5% clay, 5% organics	8" recovery No odor OVA = 25.6 ppm
	4	SS	2-3 4-4	Very loose, brown SAND, fine to coarse	8" recovery No odor OVA = 38.6 ppm
	5	SS	1-1 1-1	Very loose, same to 9 feet, then dark brown CLAY, trace coarse to small pebble, 10% wood	12" recovery No odor OVA = 32.7 ppm
10	6	SS	1-1 1-1	Very loose, same as above	8" recovery No odor OVA = 28.4 ppm
	7	SS	1-1 1-2	Very loose, dark brown peaty CLAY, 30% wood	14" recovery No odor OVA = 25.7 ppm
15	8	SS	1-1 1-1	Very loose, same as above, 40% wood	12" recovery No odor OVA = 20.8 ppm
	9	SS	1-1 1-1	Very loose, dark brown peaty CLAY, 50% wood	10" recovery No odor OVA = 6.0 ppm
	10	SS	1-1 6-2	Loose, dark brown clayey PEAT, 35% clay	18" recovery No odor OVA = 14.3 ppm
20	11	SS	1-0 1-1	Very loose, same as above	12" recovery No odor OVA = 3.9 ppm
	12	SS	1-1 1-1	Very loose, PEAT, large wood chunk blocked shoe	2" recovery No odor OVA = 7.3 ppm
25	13	SS	1-5 7-8	Loose, brown SAND, fine to coarse, well sorted coarse	10" recovery Very slight odor OVA = 78.6 ppm
	14	SS	6-7 6-6	Loose, same as above	18" recovery Very slight odor OVA = 99.2 ppm
30	15	SS	1-0 4-5	Very loose, brown SAND, fine to coarse, moderately sorted medium, trace granule, 2% phosphate	16" recovery No odor OVA = 53.7 ppm
35	16	SS	6-4 3-3	Very loose, brown SAND, well sorted medium, 2% phosphate	10" recovery No odor OVA = 42.6 ppm
40	17	SS	2-2 1-1	Very loose, brown SAND, fine to coarse, poorly sorted, 10% granule to medium pebble, 2% phosphate, trace lignite	12" recovery No odor OVA = 9.5 ppm
	18	SS	12-22 36-50	Dense, olive gray CLAY to 44.5 feet with 5% phosphate and glauconite then light gray sandy shell mold LIMESTONE and SAND, alternating cemented shell molds and friable sand laminae, silt to large pebble	24" recovery No odor OVA = 2.5 ppm
45					24" recovery No odor OVA = 1.1 ppm
50	19	SS	15-35 48-15	Dense, same as above	TD = 51 feet

H:530MW8A

TEST BORING RECORD

Elevation of top of PVC pipe: 6.51'

ELEV.	DEPTH FEET	DESCRIPTION
4.46	0.0	
	0.5	FILL: Dark brown silty fine SAND with occasional coarse sand
-0.54		Very firm to loose gray to grayish-brown fine to medium SAND with traces of silt
-5.54		
	12.5	
-10.54		Soft dark brown PEAT and ORGANIC SILT with root and wood fragments
	18.5	
-15.54	20.0	Buried log from 18.5 to 20.0 feet
		BORING TERMINATED
-20.54		



REMARKS:

* Water level on 9-19-85

1) Wash drilled with 10-inch wing bit using a bentonite and potable water drilling fluid mixture to 4.5 feet; wash drilled with 5 7/8-inch roller bit using a bentonite and potable water drilling fluid mixture from 4.5 to 20.0 feet

2) Well developed on 9-11-85

DRILLED BY L.S.
LOGGED BY J.T.B.
CHECKED BY C.A.S.

BORING NUMBER MW-9
DATE STARTED 9-5-85
DATE COMPLETED 9-10-85
JOB NUMBER HA-5276

SWP - Wilmington

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. MW-10

SHEET NO. 1 OF 1

PROJECT: SOUTHERN WOOD PIEDMONT – WILMINGTON, NC		JOB NO.	530-06-501
CLIENT: SOUTHERN WOOD PIEDMONT	DATE FINISHED 2-18-92	ELEVATION	
BORING CONTRACTOR: ETE	DRILLER C. AARON	DATE STARTED	2-18-92
RIG USED MOBILE B-57	INSPECTOR K. ANDERSON		

WELL CONSTRUCTION: CLAY; PLUG; SAND PACK; SAND PACK

DEPTH FEET	SAMPLE URNLNRY	No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0						
5		1	SS	06-10 / 10-15	Black – tan fine to meduium SAND	Saturated with water OVA = 0.0
10		2	SS	04-26 / 50	Tan fine to medium SAND	Saturated with water; OVA = 0.0
15		3	SS		Tan fine to medium SAND in upper portion of spoon; Dark brown to black PEAT at bottom of spoon	Boring terminated at 13.0 ft. OVA = 0.0
20						
25						
30						
35						
40						
45						
50						

H:53050110

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. MW-11

PROJECT: SOUTHERN WOOD PIEDMONT – WILMINGTON, NC		SHEET NO. 1 OF 1	
CLIENT: SOUTHERN WOOD PIEDMONT	DATE FINISHED 2-18-92	JOB NO. 530-06-501	
BORING CONTRACTOR: ETE	DRILLER C. AARON	ELEVATION	
RIG USED MOBILE B-57	INSPECTOR K. ANDERSON	DATE STARTED 2-18-92	

WELL CONSTRUCTION: CLAY; PLUG; SAND PACK; SAND PACK

DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0					
	1	SS		Hit concrete and other buried debris	
5	2	SS	10-05 05-05	Brown-tan fine to medium SAND	Saturated with Creosote from 5 to 7 feet: OVA = 34.1
	3	SS	02-02 02-01	Brown-tan fine to medium SAND	Saturated with Creosote OVA = 38.1
10					
	4	SS		Brown-tan fine to medium SAND in upper spoon; Encountered a dark brown to black PEAT with roots at 15.0'	Sand unit saturated with Creosote; OVA = 69.8
15					
20					
25					
30					
35					
40					
45					
50					

H:53050111

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. MW-11A

PROJECT: SOUTHERN WOOD PIEDMONT-WILMINGTON		SHEET NO. 1 OF 1	
CLIENT: CHUCK DAVIS	DATE FINISHED	10-1-92	JOB NO. 530-06-503
BORING CONTRACTOR: ETE	DRILLER	T. COPPIN	ELEVATION 4.10
RIG USED ATV MUD ROTARY	INSPECTOR	G. KUNTZ	DATE STARTED 9-29-92

WELL CONSTRUCTION: GROUT; 6" PVC CASING; 2" PVC CASING; 6" PVC CASING; GROUT; CLAY; PLUG; SAND PACK; SAND PACK

DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0	1	SS	8-8 10-24	Loose, brown SAND, fine to coarse, well sorted medium	18" recovery No odor OVA = 124 ppm
	2	SS	7-7 10-22	Loose, brown SAND, fine to coarse, 5% wood. At 3 feet visually stained soil.	12" recovery Strong odor OVA = 877
5	3	SS	2-1 1-1	Very loose, brown SAND, fine to coarse, 5% wood, 2" dark brown CLAY layer at 5 feet. Visually stained soil.	8" recovery Strong odor OVA = 89.1 ppm
	4	SS	6-8 1-1	Very loose, brown SAND, fine to coarse, trace wood, 8-inch dark brown peaty CLAY lense at 6 feet. Visually stained soil.	24" recovery Strong odor OVA = 153 ppm
	5	SS	4-4 5-7	Loose, brown SAND, fine to coarse, 5% wood, visually stained soils to 8.5' then 1/4" seams of stained soil	24" recovery Strong odor OVA = 113 ppm
10	6	SS	2-4 5-4	Very loose, brown SAND, fine to coarse. Visually stained soils.	12" recovery Strong odor OVA = 186 ppm
	7	SS	2-2 3-2	Very loose, same as above to 13 feet, then dark brown peaty CLAY, 30% wood. Visually stained soils in sands, no visual staining in peaty clay.	10" recovery Strong odor OVA = 131
15	8	SS	2-3 2-3	Very loose, dark brown PEAT, 20% clay	24" recovery Strong odor OVA = 66.2 ppm
	9	SS	2-4 2-3	Very loose, brownish black peaty CLAY, 30% peat	10" recovery Strong odor OVA = 98.1 ppm
	10	SS	2-2 3-2	Very loose, same as above, 40% wood	16" recovery Strong odor OVA = 113 ppm
20	11	SS	50	Grout	3" recovery
	12	SS	6-2 3-2	Very loose, brownish black peaty CLAY, 25% wood	4" recovery Moderate odor OVA = 112 ppm
25	13	SS	0-0 0-0	Very loose, same as above	24" recovery No odor OVA = 17.3 ppm
	14	SS	2-2 4-6	Very loose, same to 27.5 feet, then dark brown SAND, fine to coarse, well sorted medium	24" recovery Very slight odor OVA = 34.3 ppm
	15	SS	3-4 7-8	Loose, same as above, 10% wood	12" recovery Very slight odor OVA = 26.9 ppm
30	16	SS	5-8 7-14	Loose, light brown SAND, very fine to medium, well sorted fine, 2% phosphate	12" recovery No odor OVA = 18.6 ppm
35	17	SS	4-8 8-12	Loose, brown SAND, fine to granule, poorly sorted, 5% small pebble, 2% phosphate	12" recovery No odor OVA = 12.8 ppm
40	18	SS	25-22 20-28	Firm, brown SAND, fine to granule to 44 feet, then olive gray CLAY, 5% phosphate and glauconite, tight and dry	24" recovery No odor OVA = 7.2 ppm
45				Dense, lt gray shell mold	14" recovery
	19	SS	48-26 50+	LIMESTONE and SAND, alternating lenses of indurated cemented shell molds and friable sand, silt to very coarse, 10% granule	No odor OVA = 10.8 ppm TD = 50 feet
50					

H:530MW11A

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC. CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS HYDROGEOLOGIC SERVICES	TEST BORING LOG BORING NO. MW-11B
PROJECT: SOUTHERN WOOD PIEDMONT-WILMINGTON	SHEET NO. 1 OF 1
CLIENT: T.M. DAVIS — DATE FINISHED 10-31-93	JOB NO. 12-53015.00
BORING CONTRACTOR: ETE — DRILLER LAYNE ENVIRONMENTAL	ELEVATION 4.13
RIG USED ATV MUD ROTARY — INSPECTOR G. KUNTZ	DATE STARTED 10-26-93

WELL CONSTRUCTION: GROUT; 6" PVC; 2" PVC; 6" PVC; GROUT; CLAY; PLUG; SAND PACK; SAND PACK

DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0	1	PH		Loose, brown SAND, fine to coarse, well sorted medium, trace wood & organics	No odor OVA = 0.0 ppm
	2	PH		Loose, brown SAND, fine to coarse, well sorted medium, 5% wood	Slight odor OVA = 87.0 ppm
5	3	SS	2-3 4-6	Loose, brown SAND, fine to coarse, 5% wood. Visual staining starting @ 5'.	14" recovery Strong odor OVA = 177 ppm
	4	SS	5-7 7-8	Firm, brown SAND, fine to coarse, 15% wood, 6" dark brown PEAT lense. Visual staining.	14" recovery Strong odor OVA = 253 ppm
	5	SS	3-4 4-5	Loose, brown SAND, fine to coarse, 5% wood to 9', then peaty CLAY, 50% peat. Visually stained.	14" recovery Strong odor OVA = 405 ppm
10	6	SS	5-6 6-7	Firm, brown SAND, fine to coarse. Visually stained.	14" recovery Strong odor OVA = 418 ppm
	7	SS	3-2 2-2	Very loose, same as above to 13 feet, then dark brown peaty CLAY, 50% peat. Visually stained in sands.	24" recovery Strong odor OVA = 187 ppm
15	8	SS	1-1 1-2	Very loose, dark brown PEAT, 20% clay. 8" sand lense. Visual staining in sand.	14" recovery Strong odor OVA = 592 ppm
	9	SS	2-3 2-2	Very loose, brownish black peaty CLAY, 50% peat. Visual staining to 17'.	18" recovery Strong odor OVA = 370 ppm
	10	SS	2-1 1-4	Loose, same as above, 40% peat Pit casing to 20'	16" recovery Strong odor OVA = 372 ppm
20	11	SS	2-1 1-2	Very loose, brownish black peaty CLAY, 25% peat	4" recovery Slight odor OVA = 139 ppm
	12	SS	1-1 1-3	Very loose, brownish black peaty CLAY, 25% peat	24" recovery Slight odor OVA = 78.7 ppm
25	13	SS	1-1 1-2	Very loose, same as above, 35% peat	8" recovery Slight odor OVA = 40.1 ppm
	14	SS	2-4 4-5	Very loose, same to 27 feet, then dark brown SAND, fine to coarse, trace very coarse to granule	24" recovery Slight odor OVA = 56.9 ppm
30	15	SS	2-4 8-9	Firm, dark brown SAND, fine to medium, well sorted	12" recovery Very slight odor OVA = 65.6 ppm
35	16	SS	2-3 3-7	Loose, brown SAND, fine to coarse, coarse dominant	12" recovery No odor OVA = 58.6 ppm
40	17	SS	6-5 8-7	Firm, brown SAND, fine to granule, 10% granule to small pebble, poorly sorted, to 41.5', then olive gray marine CLAY, 5% phosphate and glauconite. Sheen appeared in drilling mud when hit top of clay	12" recovery No odor OVA = 63.3 ppm
	18	SS	9-15 13-17	Very stiff, olive gray CLAY, 10% phosphate & glauconite, 1% mollusc fragments	24" recovery Slight odor OVA = 78.4 ppm
45	19	SS	15-26 22-24	Hard, olive gray CLAY, 15% silt to very fine sand, 10% phosphate and glauconite	24" recovery No odor OVA = 20.3 ppm TD = 46 feet
50					

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. MW-12

PROJECT: SOUTHERN WOOD PIEDMONT – WILMINGTON, NC		SHEET NO. 1 OF 1	
CLIENT: SOUTHERN WOOD PIEDMONT	DATE FINISHED 2-18-92	JOB NO. 530-06-501	
BORING CONTRACTOR: ETE	DRILLER C. AARON	ELEVATION	
RIG USED MOBILE B-57	INSPECTOR K. ANDERSON	DATE STARTED 2-18-92	

WELL CONSTRUCTION: CLAY; PLUG; SAND PACK; SAND PACK

DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0					
5	1	SS	19-14 / 06-07	Brown-tan fine to medium well sorted SAND	No visual Creosote OVA = 13.3
10	2	SS	03-05 / 10-18	Same as above except Sand is saturated with Creosote	OVA = 72.7
	3	SS	08-11 / 19-28	Same as above	OVA = 45.1
15				Organic rich dark brown to black PEAT with roots	
20					
25					
30					
35					
40					
45					
50					

H:53050112

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. MW-13

PROJECT: SOUTHERN WOOD PIEDMONT – WILMINGTON, NC		SHEET NO. 1 OF 1	
CLIENT: SOUTHERN WOOD PIEDMONT	DATE FINISHED 2-18-92	JOB NO. 530-06-501	
BORING CONTRACTOR: ETE	DRILLER C. AARON	ELEVATION	
RIG USED MOBILE B-57	INSPECTOR K. ANDERSON	DATE STARTED 2-18-92	

WELL CONSTRUCTION: CLAY; SAND PACK; PLUG; SAND PACK

DEPTH FEET	LITHOLOGY	SAMPLE No.	SAMPLE TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0						
5		1	SS	03-01 / 01-0	Brown-tan fine to medium SAND	Visual Creosote encountered in borehole immediately upon drilling OVA = 102.0
10		2	SS	05-07 / 12	Same as above	No visual Creosote; OVA = 47.8
15		3	SS		Dark brown to balck organic rich PEAT	No visual Creosote OVA = 3.0
20						
25						
30						
35						
40						
45						
50						

H:53050113

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. MW-14

PROJECT: SOUTHERN WOOD PIEDMONT – WILMINGTON, NC		SHEET NO. 1 OF 1	
CLIENT: SOUTHERN WOOD PIEDMONT	DATE FINISHED 2-19-92	JOB NO. 530-06-501	
BORING CONTRACTOR: ETE	DRILLER C. AARON	ELEVATION	
RIG USED MOBILE B-57	INSPECTOR K. ANDERSON	DATE STARTED 2-19-92	

WELL CONSTRUCTION: CLAY; PLUG; SAND PACK; SAND PACK

DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0	1	SS	2-5 / 6-5	Dark brown-black Fill material	OVA = 0.0
	2	SS	9-5 / 4-3	Brown-tan fine to medium SAND	Visual Creosote OVA = 0.0
5	3	SS	2-2 / 4-3	Same as above	Visual Creosote OVA = 19.3
	4	SS	3-3 / 4-10	Same as above	Visual Creosote OVA = 34.7
	5	SS		Black-brown organic rich PEAT with roots	Visual Creosote OVA = 27.1
10	6	SS		Same as above with large wood fragments throughout	Visual Creosote OVA = 9.6
	7	SS		Black PEAT with brown-orange wood fragment at end of spoon	Visual Creosote OVA = 25.3
15	8	SS		Black-brown PEAT with root fragments	Visual Creosote OVA = 19.4
	9	SS		No sample retrieved	
	10	SS		Black-brown PEAT with root fragments	No visual Creosote OVA = 8.0
20	11	SS		Black-brown PEAT to approximately 21.5 ft bgs; Brown-tan medium to coarse SAND below peat	No visual Creosote OVA = 5.2
25					
30					
35					
40					
45					
50					

H:53050114

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. MW-14A

PROJECT: SOUTHERN WOOD PIEDMONT-WILMINGTON		SHEET NO. 1 OF 1	
CLIENT: T.M. DAVIS	DATE FINISHED 11-2-93	JOB NO. 12-53015.00	
BORING CONTRACTOR: ETE	DRILLER LAYNE ENVIRONMENTAL	ELEVATION 2.76	
RIG USED ATV MUD ROTARY	INSPECTOR G. KUNTZ	DATE STARTED 10-27-93	

WELL CONSTRUCTION: GROUT; 6" PVC; 2" PVC; 6" PVC; GROUT; CLAY; PLUG; SAND PACK; SAND PACK

DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0	1	PH		Loose, brown SAND, fine to coarse, coarse dominant, fill, trace granule	No odor OVA = 26.1 ppm
	2	PH		Loose, brown SAND, very fine to coarse, medium dominant. Visual staining @ 3'.	Strong odor OVA = 94.3 ppm
5	3	SS	2-8 1-3	Very loose, brown SAND and PEAT, 50% peat, 3" wood fragment. Visual staining.	6" recovery Strong odor OVA = 88.3 ppm
	4	SS	2-1 1-3	Very loose, brown SAND, fine to coarse to 7.5', then dark brown CLAY. Visual staining in sand.	14" recovery Strong odor OVA = 149 ppm
	5	SS	1-1 1-1	Very soft, dark brown CLAY to 8.5', then dark brown PEAT	18" recovery Moderate odor OVA = 85.3 ppm
10	6	SS	1-1 1-1	Very soft, dark brown clayey PEAT, 30% clay	24" recovery Slight odor OVA = 89.5 ppm
	7	SS	1-1 1-1	Very soft, dark brown peaty CLAY, 50% peat	24" recovery Very slight odor OVA = 82.8 ppm
15	8	SS	1-1 3-5	Firm, dark brown peaty CLAY, 35% peat Pit casing to 16'	18" recovery Very slight odor OVA = 65.1
	9	SS	1-1 1-3	Soft, brownish black peaty CLAY, 25% peat	4" recovery Moderate odor OVA = 116 ppm
	10	SS	2-2 2-4	Firm, same as above. Slight sheen in drilling mud.	4" recovery Moderate odor OVA = 88.1 ppm
20	11	SS	3-1 1-2	Soft, same as above. Sheen in drilling mud.	2" recovery Moderate odor OVA = 107 ppm
	12	SS	2-2 3-5	Firm, brownish black peaty CLAY, 50% peat. Little visual staining.	18" recovery Moderate odor OVA = 137 ppm
25	13	SS	3-2 2-3	Loose, brown SAND, fine to coarse, 5% very coarse, trace wood.	18" recovery Moderate odor OVA = 447 ppm
	14	SS	4-5 5-6	Firm, same as above.	18" recovery Moderate odor OVA = 69.4 ppm
30	15	SS	2-1 3-5	Loose, brown SAND, fine to granule, 5% granule to small pebble	18" recovery Slight odor OVA = 62.0 ppm
35	16	SS	3-6 6-6	Firm, brown SAND, fine to coarse, well sorted medium	12" recovery Slight odor OVA = 28.5 ppm
40	17	SS	3-7 6-8	Firm, same sand as above to 40.5', then olive gray CLAY	24' recovery Slight odor OVA = 27.6 ppm TD = 42'
45					
50					

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. MW-15

PROJECT: SOUTHERN WOOD PIEDMONT – WILMINGTON, NC		SHEET NO. 1 OF 2	
CLIENT: SOUTHERN WOOD PIEDMONT	DATE FINISHED 2-19-92	JOB NO. 530-06-501	
BORING CONTRACTOR: ETE	DRILLER C. AARON	ELEVATION	
RIG USED MOBILE B-57	INSPECTOR K. ANDERSON	DATE STARTED 2-19-92	

WELL CONSTRUCTION	DEPTH FEET	SAMPLE: UNCLASS.	No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
CLAY / PLUG; SAND PACK / SAND PACK	0						
	5		1	SS	1-1 / 4-4	Fine to medium, loose to very loose brown SAND	Visual oil; diesel fuel odor OVA = 58.3
	10		2	SS		Fine to medium, brown SAND	No visual oil; OVA = 15.6
	15		3	SS		Fine to medium, brown SAND in upper spoon; Dark brown to black PEAT with root fragments in lower part of spoon	No visual oil OVA = 5.4
	20						
	25						
	30						
	35						
	40						
	45						
	50						

H:53050115

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. MW-16

PROJECT: SOUTHERN WOOD PIEDMONT – WILMINGTON, NC		SHEET NO. 1 OF 1	
CLIENT: SOUTHERN WOOD PIEDMONT	DATE FINISHED 2-19-92	JOB NO. 530-06-501	
BORING CONTRACTOR: ETE	DRILLER C. AARON	ELEVATION	
RIG USED MOBILE B-57	INSPECTOR K. ANDERSON	DATE STARTED 2-19-92	

WELL CONSTRUCTION: CLAY; PLUG; SAND PACK; SAND PACK

DEPTH FEET	SAMPLE No.	SAMPLE TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0					
5	1	SS		Fine to medium, brown SAND	Saturated with diesel fuel OVA = 104
10	2	SS		Medium tan to brown SAND with some wood fragments	Little odor OVA = 42.6
				Same as above	Slight diesel odor OVA = 32.5
15	3	SS		Dark brown to black PEAT contact at 15.0 ft.	
20					
25					
30					
35					
40					
45					
50					

H:53050116

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. MW-17

PROJECT: SOUTHERN WOOD PIEDMONT – WILMINGTON, NC			SHEET NO. 1 OF 1
CLIENT: SOUTHERN WOOD PIEDMONT	DATE FINISHED	2-19-92	JOB NO. 530-06-501
BORING CONTRACTOR: ETE	DRILLER	C. AARON	ELEVATION
RIG USED MOBILE B-57	INSPECTOR	K. ANDERSON	DATE STARTED 2-19-92

WELL CONSTRUCTION: CLAY; PLUG; SAND PACK; SAND PACK

DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0					
	1	SS	10-2 / 2-2	Fine to medium brown SAND with wood fragment at bottom of spoon	Saturated with diesel fuel: OVA = 118
5					
	2	SS	2-2 / 2-2	Wood fragments in upper portion of spoon with a fine to medium brown SAND in bottom of spoon	Diesel fuel odor OVA = 57.1
10					
	3	SS		Fine to medium brown SAND	Saturated with diesel fuel; OVA = 72.3
15	4	SS		Dark Brown PEAT with root fragments	No visual oil OVA = 39.1
20					
25					
30					
35					
40					
45					
50					

H:53050117

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. MW-18

PROJECT: SOUTHERN WOOD PIEDMONT-WILMINGTON		SHEET NO. 1 OF 1	
CLIENT: CHUCK DAVIS	DATE FINISHED	10-7-92	JOB NO. 530-06-503
BORING CONTRACTOR: ETE	DRILLER	T. COPPIN	ELEVATION 4.26
RIG USED ATV MUD ROTARY	INSPECTOR	G. KUNTZ	DATE STARTED 10-6-92

WELL CONSTRUCTION: CLAY PLUG; SAND PACK; SAND PACK

DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0	1	SS	0-0 / 0-0	Very loose, brown SAND, fine to medium, 5% coarse to granule	14" recovery No odor OVA = 30 ppm
	2	SS	4-4 / 10-13	Loose, brown SAND, fine to coarse, 5% granule, poorly sorted	18" recovery Slight diesel odor OVA = 35.3 ppm
5	3	SS	3-2 / 3-2	Very loose, brown SAND, fine to coarse, coarse dominant, 20% very coarse	14" recovery No odor OVA = 27.9 ppm
	4	SS	4-5 / 6-7	Loose, same as above, 35% very coarse to granule, 2% small pebble	18" recovery Slight diesel odor OVA = 20.6 ppm
	5	SS	6-12 / 12-10	Firm, brown pebbly SAND, fine to coarse, 30% granule to small pebble	12" recovery No odor OVA = 9.9 ppm
10	6	SS	4-6 / 5-11	Loose, brown SAND, fine to coarse, medium dominant	18" recovery No odor OVA = 6.6 ppm
	7	SS	6-8 / 10-9	Loose, brown pebbly SAND, very fine to coarse, 30% granule to small pebble to 13.5 feet, then dark brown clayey PEAT, 30% clay	24" recovery No odor OVA = 5.1 ppm TD = 14 feet

15, 20, 25, 30, 35, 40, 45, 50

H:530MW18

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. MW-19

PROJECT: SOUTHERN WOOD PIEDMONT-WILMINGTON		SHEET NO. 1 OF 1	
CLIENT: CHUCK DAVIS	DATE FINISHED	10-6-92	JOB NO. 530-06-503
BORING CONTRACTOR: ETE	DRILLER	T. COPPIN	ELEVATION 3.19
RIG USED ATV MUD ROTARY	INSPECTOR	G. KUNTZ	DATE STARTED 10-6-92

WELL CONSTRUCTION: GROUT; 2" STAINLESS STEEL; GROUT; CLAY; PLUG; SAND PACK; SAND PACK

DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0	1	SS	0-0 / 0-0	Very loose, dark brown SAND, fine to coarse, 5% granule	8" recovery No odor OVA = 201 ppm
	2	SS	4-4 / 5-5	Loose, brown SAND, fine to coarse, poorly sorted	18" recovery No odor OVA = 276 ppm
5	3	SS	6-7 / 5-7	Loose, brown SAND, fine to medium, well sorted medium	12" recovery No odor OVA = 92.4 ppm
	4	SS	5-5 / 6-8	Loose, brown SAND, fine to coarse, poorly sorted	18" recovery No odor OVA = 69.6 ppm
	5	SS	6-7 / 8-9	Loose, same as above, 10% wood	24" recovery Slight odor OVA = 183 ppm
10	6	SS	3-3 / 3-1	Very loose, same as above, 20% wood. Visually stained soil 11.5 to 12 feet.	24" recovery Strong odor OVA = 210 ppm
	7	SS	1-1 / 1-1	Very loose, brownish black clayey PEAT, 25% clay	18" recovery Moderate odor OVA = 45.6 ppm TD = 14 feet
15					
20					
25					
30					
35					
40					
45					
50					

H:530MW19

1125

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. MW-19A

PROJECT: SOUTHERN WOOD PIEDMONT-WILMINGTON		SHEET NO. 1 OF 1	
CLIENT: CHUCK DAVIS	DATE FINISHED 10-2-92	JOB NO. 530-06-503	
BORING CONTRACTOR: ETE	DRILLER T. COPPIN	ELEVATION 3.15	
RIG USED ATV MUD ROTARY	INSPECTOR G. KUNTZ	DATE STARTED 9-30-92	

WELL CONSTRUCTION: GROUT; 6" PVC CASING; 2" PVC CASING; 6" PVC CASING; GROUT; CLAY; PLUG; SAND PACK; SAND PACK

DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0	1	SS	3-2 2-3	Very loose, brown SAND, fine to coarse	16" recovery No odor OVA = 214 ppm
	2	SS	8-7 6-8	Loose, brown pebbly SAND, fine to coarse, 25% small pebble	8" recovery No odor OVA = 290 ppm
5	3	SS	4-5 6-8	No recovery	
	4	SS	6-8 8-9	Loose, brown SAND, fine to coarse, 5% wood	16" recovery No odor OVA = 89.5 ppm
	5	SS	4-4 3-1	Very loose, same as above	12" recovery Slight odor OVA = 183 ppm
10	6	SS	5-4 3-1	Very loose, same as above to 11.5 feet, then 1-inch dark brown clay lense followed by same sand to 12 feet	18" recovery Visual creosote 11.5' to 12' OVA = 210 ppm
	7	SS	1-1 1-2	Very loose, brownish black clayey PEAT, 25% clay	18" recovery Moderate odor OVA = 42.3 ppm
15	8	SS	1-1 1-1	Very loose, brownish black peaty CLAY, 30% peat	24" recovery No odor OVA = 19.0 ppm
	9	SS	1-1 1-1	Very loose, same as above, 50% wood	18" recovery No odor OVA = 10.1 ppm
	10	SS	1-2 1-0	Same as above	14" recovery No odor OVA = 8.6 ppm
20	11	SS	5-1 1-2		No recovery
	12	SS	0-0 2-3	Very loose, dark brown peaty CLAY, 30% wood	12" recovery No odor OVA = 11.9 ppm
25	13	SS	1-2 2-4	Very loose, same as above to 25 feet, then brown SAND, fine to coarse, poorly sorted	24" recovery No odor OVA = 8.6 ppm
30	14	SS	6-9 7-7	Loose, light brown SAND, fine to coarse, well sorted medium	12" recovery No odor OVA = 9.8 ppm
35	15	SS	5-3 3-2	Very loose, brown SAND, fine to granule, moderately sorted medium, 2% phosphate	12" recovery No odor OVA = 4.6 ppm
40	16	SS	0-0 12-16	Firm, olive gray CLAY, 5% phosphate and glauconite, tight and dry	24" recovery No odor OVA = 4.9 ppm
	17	SS	8-27 27-26	Firm, same as above, 10% phosphate and glauconite	24" recovery No odor OVA = 5.2 ppm
45	18	SS	65	Very dense, light gray sandy shell mold LIMESTONE, 35% sand	2" recovery No odor OVA = 3.1 ppm TD = 43 feet 2 inches
50					

H:530MW19A

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. MW-20

PROJECT: SOUTHERN WOOD PIEDMONT-WILMINGTON		SHEET NO. 1 OF 1	
CLIENT: CHUCK DAVIS	DATE FINISHED	10-7-92	JOB NO. 530-06-503
BORING CONTRACTOR: ETE	DRILLER	T. COPPIN	ELEVATION 3.17
RIG USED ATV MUD ROTARY	INSPECTOR	G. KUNTZ	DATE STARTED 10-7-92

WELL CONSTRUCTION: GROUT; CLAY; SAND PACK; 2" PVC CASING; GROUT; PLUG; SAND PACK

DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0	1	SS	1-0, 0-0	Very loose, black clayey PEAT to 1 foot then brown SAND, fine to coarse	18" recovery; Slight odor; OVA = 120 ppm
	2	SS	5-5, 7-11	Loose, brown SAND, fine to coarse, poorly sorted	24" recovery; Very slight odor; OVA = 66.0 ppm
5	3	SS	0-0, 5-5	Very loose, same as above	18" recovery; Very slight odor; OVA = 106 ppm
	4	SS	5-5, 5-6	Loose, same as above	18" recovery; No odor; OVA = 43.5 ppm
	5	SS	4-2, 1-2	Very loose, brown SAND, very fine to medium, 10% coarse, 1/4" dark gray clay lense at 10 feet	14" recovery; No odor; OVA = 57.1 ppm
10	6	SS	1-0, 1-2	Very loose, brownish gray silty SAND, silt to medium, 35% silt, 10% clay, 1-inch dark gray lense at 11.5 feet	20" recovery; No odor; OVA = 9.8 ppm
	7	SS	1-2, 1-2	Very loose, brownish black peaty CLAY, 25% wood	24" recovery; Very slight odor; OVA = 15.7 ppm; TD = 14 feet
15					
20					
25					
30					
35					
40					
45					
50					

H:530MW20

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC. CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS HYDROGEOLOGIC SERVICES		TEST BORING LOG BORING NO. MW-20A
PROJECT: SOUTHERN WOOD PIEDMONT-WILMINGTON		SHEET NO. 1 OF 1
CLIENT: T.M. DAVIS	DATE FINISHED 11-8-93	JOB NO. 12-53015.00
BORING CONTRACTOR: ETE	DRILLER LAYNE ENVIRONMENTAL	ELEVATION 3.10
RIG USED ATV MUD ROTARY	INSPECTOR G. KUNTZ	DATE STARTED 10-29-93

WELL CONSTRUCTION: GROUT; 6" PVC; 2" PVC; 6" PVC; GROUT; CLAY; PLUG; SAND PACK; SAND PACK

DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0	1	PH		Very loose, black clayey PEAT to 1', then brown SAND, fine to coarse, coarse dominant	No odor OVA = 75.8 ppm
	2	PH		Very loose, brown SAND, fine to coarse	No odor OVA = 35.4 ppm
5	3	SS	2-1 1-2	Very loose, brown SAND, fine to coarse	14" recovery No odor OVA = 131 ppm
	4	SS	3-2 2-5	Loose, brown SAND, fine to coarse to 7.5', then brownish gray sandy SILT, 30% very fine to fine sand, 5% clay, trace mica, multiple 1/4" lignite laminae	18" recovery No odor OVA = 225 ppm
	5	SS	4-5 5-4	Loose, same to 9.5', then brownish black peaty CLAY, 40% peat	24" recovery No odor OVA = 190 ppm
10	6	SS	3-5 5-2	Loose, dark brown peaty CLAY, 30% peat	20" recovery No odor OVA = 236 ppm
	7	SS	2-4 2-2	Very loose, brownish black PEAT and CLAY	12" recovery No odor OVA = 164 ppm
15	8	SS	2-2 1-1	Very loose, dark brown peaty CLAY, 30% peat	18" recovery No odor OVA = 121 ppm
	9	SS	2-1 1-3	Pit casing to 16' Grout in spoon	No recovery
	10	SS	3-4 3-3	Grout in spoon	No recovery
20	11	SS	2-2 2-4	Firm, dark brown peaty CLAY, 25% peat	4" recovery No odor OVA = 24.3 ppm
	12	SS	3-7 5-5	Loose, brownish black PEAT to 23.5', then brown SAND, fine to coarse, coarse dominant	18" recovery No odor OVA = 33.0 ppm
25	13	SS	6-3 3-5	Loose, dark brown SAND, fine to very coarse, 10% very coarse, 5% wood	18" recovery No odor OVA = 35.4 ppm
30	14	SS	3-4 4-8	Firm, brown SAND, fine to coarse	10" recovery No odor OVA = 42.4 ppm
35	15	SS	5-6 6-7	Firm, whitish brown SAND, fine to coarse, 2" gray clay lense at 36'	8" recovery No odor OVA = 47.1 ppm
40	16	SS	3-4 5-7	Firm, brown SAND, fine to granule, 25% very coarse to granule to 41', then olive gray CLAY, 10% glauconite and phosphate	18" recovery No odor OVA = 41.1 ppm TD = 42'
45					
50					

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. MW-21

PROJECT: SOUTHERN WOOD PIEDMONT-WILMINGTON		SHEET NO. 1 OF 1	
CLIENT: CHUCK DAVIS	DATE FINISHED	10-7-92	JOB NO. 530-06-503
BORING CONTRACTOR: ETE	DRILLER	T. COPPIN	ELEVATION 3.17
RIG USED ATV MUD ROTARY	INSPECTOR	G. KUNTZ	DATE STARTED 10-7-92

WELL CONSTRUCTION: CLAY; 2" PVC; PLUG; SAND PACK; SAND PACK

DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0	1	SS	1-1 / 1-1	Very loose, brownish black clayey PEAT to 6", then brown SAND, fine to coarse	18" recovery No odor OVA = 43.2 ppm
	2	SS	5-3 / 6-8	Loose, brown SAND, fine to coarse, coarse dominant	18" recovery No odor OVA = 86.6 ppm
5	3	SS	4-2 / 2-2	Very loose, brown SAND, fine to coarse, medium dominant	12" recovery No odor OVA = 52.6 ppm
	4	SS	1-3 / 7-8	Loose, same to 7', then 4" dark gray clay lense, then peaty CLAY, 30% wood	24" recovery No odor OVA = 20.6 ppm
	5	SS	1-1 / 0-1	Very loose, brownish black peaty CLAY, 30% wood	24" recovery No odor OVA = 10.8 ppm TD= 10 feet
10					
15					
20					
25					
30					
35					
40					
45					
50					

H:530MW21

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. MW-22

PROJECT: SOUTHERN WOOD PIEDMONT-WILMINTON			SHEET NO. 1 OF 1
CLIENT: CHUCK DAVIS	DATE FINISHED	10-7-92	JOB NO. 530-06-503
BORING CONTRACTOR: ETE	DRILLER	T. COPPIN	ELEVATION 3.02
RIG USED ATV MUD ROTARY	INSPECTOR	G. KUNTZ	DATE STARTED 10-7-92

WELL CONSTRUCTION: GROUT; 2" STAINLESS STEEL; GROUT; CLAY; PLUG; SAND PACK; SAND PACK

DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0	1	SS	5-4	Loose, black organic rich SAND, silt to coarse, 20% clay, 15% plant and wood material to 1.5', then brown SAND	18" recovery Slight diesel odor OVA = 109 ppm
			6-5		
	2	SS	5-6	Loose, brown SAND, fine to coarse	24" recovery Creosote stained soil at 3' OVA = 87.7 ppm
			6-4		
5	3	SS	4-2	Very loose, same as above	14" recovery Creosote stained soils OVA = 107 ppm
			4-3		
	4	SS	4-2	Loose, brown SAND, fine to coarse, well sorted medium	24" recovery Creosote stained soils OVA = 157 ppm
			6-9		
	5	SS	4-3	Very loose, same as above	20" recovery Creosote stained soils to 9' OVA = 75.6 ppm
			4-4		
10	6	SS	2-3	Loose, brown SAND, fine to coarse, poorly sorted, few 1/2" dark brown clay lenses at 11.5'	18" recovery Moderate odor OVA = 84.7 ppm
			6-7		
	7	SS	1-1	Very loose, brownish black clayey PEAT, 35% clay	24" recovery Slight creosote odor OVA = 25.5 ppm TD = 14 feet
			1-2		
15					
20					
25					
30					
35					
40					
45					
50					

H:530MW22

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. MW-22A

PROJECT: SOUTHERN WOOD PIEDMONT-WILMINGTON		SHEET NO. 1 OF 1	
CLIENT: T.M. DAVIS	DATE FINISHED 11-3-93	JOB NO. 12-53015.00	
BORING CONTRACTOR: ETE	DRILLER LAYNE ENVIRONMENTAL	ELEVATION 3.07	
RIG USED ATV MUD ROTARY	INSPECTOR G. KUNTZ	DATE STARTED 10-29-93	

WELL CONSTRUCTION: GROUT; 6" PVC; 2" PVC; 6" PVC; GROUT; CLAY; PLUG; SAND PACK; SAND PACK

DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0	1	PH		Loose, dark brown SAND, fine to coarse. Diesel staining.	Slight diesel odor OVA = 32.9 ppm
	2	PH		Loose, brown SAND, fine to coarse, trace granule. Visual staining.	Strong odor OVA = 32.5 ppm
5	3	SS	2-3 / 3-8	Firm, grayish brown SAND, very fine to very coarse. Multiple 1/4" visually stained seams.	24" recovery Strong odor OVA = 63.4 ppm
	4	SS	3-2 / 2-4	Loose, brown SAND, very fine to very coarse	18" recovery Moderate odor OVA = 58.6 ppm
	5	SS	3-6 / 4-5	Loose, brown SAND, fine to coarse	12" recovery Slight odor OVA = 25.2 ppm
10	6	SS	2-4 / 3-3	Loose, same, two 1/8" clayey SAND laminae	14" recovery Slight odor OVA = 63.5 ppm
	7	SS	1-1 / 2-1	Very soft, brownish black clayey PEAT, 25% clay	24" recovery Very slight odor OVA = 88.4 ppm
15	8	SS	1-1 / 1-2	Very soft, brownish black peaty CLAY, 45% peat Pit casing to 16'	18" recovery No odor OVA = 86.2 ppm
	9	SS	1-1 / 1-2	Very soft, brownish black peaty CLAY, 25% peat	4" recovery Very slight odor OVA = 68.4 ppm
	10	SS	3-4 / 4-6	Grout in spoon	No recovery
20	11	SS	6-5 / 2-1	Grout in spoon	No recovery
	12	SS	3-5 / 5-5	Loose, brownish black peaty CLAY	12" recovery No odor OVA = 49.3 ppm
25	13	SS	2-3 / 2-4	Loose, brown peaty SAND, fine to coarse, 30% large wood fragments	6" recovery No odor OVA = 108 ppm
	14	SS	4-5 / 4-6	Loose, brown SAND, medium to coarse, well sorted coarse	18" recovery Slight odor OVA = 189 ppm
30	15	SS	3-5 / 5-4	Loose, brown SAND, medium to coarse, 10% very coarse	14" recovery Very slight odor OVA = 159 ppm
35	16	SS	6-5 / 5-3	Loose, brown SAND, medium to coarse, 30% very coarse to small pebble	14" recovery No odor OVA = 165 ppm
40	17	SS	3-7 / 7-9	Firm, brown pebbly SAND, medium to coarse, 30% very coarse to small pebble. Small pebble laminae between 41' and 41'4", then sharp contact to olive gray CLAY at 42'	24" recovery No odor OVA = 105 ppm TD = 42'
45					
50					

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. MW-23

PROJECT: SOUTHERN WOOD PIEDMONT-WILMINGTON		SHEET NO. 1 OF 1	
CLIENT: CHUCK DAVIS	DATE FINISHED	10-8-92	JOB NO. 530-06-503
BORING CONTRACTOR: ETE	DRILLER	T. COPPIN	ELEVATION 2.67
RIG USED ATV MUD ROTARY	INSPECTOR	G. KUNTZ	DATE STARTED 10-8-92

WELL CONSTRUCTION: GROUT; CLAY; 2" PVC; GROUT; PLUG; SAND PACK; SAND PACK

SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
1	SS	2-50	Very loose, brownish black PEAT to 6", then brown SAND, fine to coarse, 5% granule, wood fragment blocked shoe	8" recovery Very slight odor OVA = 12.2 ppm
2	SS	0-2 1-0	Very loose, brownish gray SAND, silt to coarse, 20% clay	12" recovery No odor OVA = 12.7 ppm
3	SS	2-4 3-4	Very loose, brownish gray CLAY to 5', then brown SAND, fine to coarse, well sorted coarse	20" recovery No odor OVA = 14.6 ppm
4	SS	3-4 4-4	Very loose, same as above	24" recovery No odor OVA = 16.2 ppm
5	SS	1-1 1-1	Very loose, same as above to 9', then PEAT, 20% clay	14" recovery No odor OVA = 16.2 ppm
6	SS	2-2 2-2	Very loose, brownish black clayey PEAT, 35% clay	18" recovery No odor OVA =13.4 ppm TD = 12 feet

DEPTH FEET: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50

H:530MW23

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. MW-24

PROJECT: SOUTHERN WOOD PIEDMONT-WILMINGTON		SHEET NO. 1 OF 1	
CLIENT: CHUCK DAVIS	DATE FINISHED	10-5-92	JOB NO. 530-06-503
BORING CONTRACTOR: ETE	DRILLER	T. COPPIN	ELEVATION 3.58
RIG USED ATV MUD ROTARY	INSPECTOR	G. KUNTZ	DATE STARTED 10-5-92

WELL CONSTRUCTION: GROUT; 2" PVC; GROUT; CLAY; PLUG; SAND PACK; SAND PACK

DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0	1	SS	6-8, 8-7	Loose, dark brown with black SAND, silt to coarse, 10% clay, 10% organics, 2% small pebble	18" recovery No odor OVA = 36.2 ppm
	2	SS	7-9, 7-9	Loose, light brown SAND, fine to coarse, 5% clay, trace small pebble	18" recovery No odor OVA = 47.1 ppm
5	3	SS	5-6, 4-3	Very loose, light grayish brown SAND, very fine to medium, 5% heavy minerals	12" recovery No odor OVA = 52.9 ppm
	4	SS	3-3, 3-2	Very loose, brown SAND, fine to coarse	12" recovery Very slight odor OVA = 105 ppm
	5	SS	4-2, 2-1	Very loose, same as above	6" recovery Very slight odor OVA = 71.3 ppm
10	6	SS	4-3, 2-3	Very loose, same as above to 11.5 feet, then brownish black clayey PEAT, 35% clay	18" recovery Very slight odor OVA = 104 ppm TD = 12 feet
15					
20					
25					
30					
35					
40					
45					
50					

H:530MW24

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC. CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS HYDROGEOLOGIC SERVICES	TEST BORING LOG BORING NO. MW-24A

PROJECT: SOUTHERN WOOD PIEDMONT-WILMINGTON			SHEET NO. 1 OF 1
CLIENT: T.M. DAVIS	DATE FINISHED	11-1-93	JOB NO. 12-53015.00
BORING CONTRACTOR: ETE	DRILLER	LAYNE ENVIRONMENTAL	ELEVATION 3.64
RIG USED ATV MUD ROTARY	INSPECTOR	G. KUNTZ	DATE STARTED 10-28-93

WELL CONSTRUCTION: GROUT; 6" PVC; 2" PVC; 6" PVC; GROUT; CLAY; PLUG; SAND PACK; SAND PACK

DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0	1	PH		Very loose, brown SAND, fine to coarse	No odor OVA = 129 ppm
	2	PH		Very loose, same as above	Slight odor OVA = 148 ppm H20 at 3'
5	3	SS	2-2 1-2	Very loose, brown SAND, fine to coarse, multiple 1/4" to 1/8" brown clay laminae	14" recovery Slight odor OVA = 204 ppm
	4	SS	2-3 3-4	Loose, brown SAND as above to 7', then dark gray CLAY to 7.5', then brown SAND, fine to coarse. Visual in lower sand.	24" recovery Moderate odor OVA = 199 ppm
	5	SS	4-5 5-8	Firm, dark gray CLAY with 1/4" wood laminae to 9', then brown SAND, fine to coarse, 1/8" coarse grained sand laminae. Visual staining in wood laminae and in lower sand.	24" recovery Strong odor OVA = 308 ppm
10	6	SS	2-3 2-2	Very loose, brown SAND, fine to coarse to 12', few 1/4" clay laminae	12" recovery Moderate odor OVA = 191 ppm
	7	SS	3-4 4-2	Loose, brownish black peaty CLAY, 30% peat	18" recovery Slight odor OVA = 207 ppm
15	8	SS	2-4 3-5	Loose, brownish black peaty CLAY, 30% peat	10" recovery Very slight odor OVA = 175 ppm
	9	SS	2-4 4-3	No recovery. Grout in spoon. Blow counts suggest PEAT.	Pit casing to 16'
	10	SS	2-8 8-9	Same as above	
20	11	SS	1-1 1-1	Very loose, dark brown peaty CLAY, 25% wood fragments	6" recovery No odor OVA = 58.4 ppm
	12	SS	1-1 1-3	Very loose, dark brown peaty CLAY, 25% wood	18" recovery No odor OVA = 31.8 ppm
25	13	SS	3-4 8-11	Firm, same as above	18" recovery No odor OVA = 52.3 ppm
	14	SS	2-2 4-7	Firm, same to 27', then sharp contact to brown SAND, fine to coarse, 5% very coarse, 5% wood	16" recovery No odor OVA = 54.0 ppm
30	15	SS	2-4 6-8	Firm, brown SAND, fine to coarse, trace very coarse to granule	18" recovery No odor OVA = 45.3 ppm
35	16	SS	3-4 4-6	Loose, brown SAND, very fine to medium, 20% silt	18" recovery No odor OVA = 31.6 ppm
40	17	SS	6-8 8-10	Firm, brown SAND, fine to very coarse, 5% small pebble to 40.5', then sharp contact to olive gray CLAY, 5% phosphate and glauconite, 2% mollusc shells	24" recovery No odor OVA = 11.8 ppm TD = 42'
45					
50					

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. MW-24R

PROJECT: SOUTHERN WOOD PIEDMONT-WILMINGTON		SHEET NO. 1 OF 1	
CLIENT: T.M. DAVIS	DATE FINISHED 11-12-93	JOB NO. 12-53015.00	
BORING CONTRACTOR: ETE	DRILLER LAYNE ENVIRONMENTAL	ELEVATION 3.77	
RIG USED ATV MUD ROTARY	INSPECTOR G. KUNTZ	DATE STARTED 11-12-93	

WELL CONSTRUCTION: GROUT; 2" PVC; GROUT; CLAY; PLUG; SAND PACK; SAND PACK

DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0	1	PH		Very loose, brown SAND, fine to very coarse, 10% very coarse	Slight odor OVA = 2212 ppm
	2	PH		Very loose, grayish brown SAND, fine to coarse	Slight odor OVA = 767 ppm
5	3	SS	2-1, 2-1	Very loose, grayish brown SAND, fine to coarse to 5.5', then brownish black CLAY	24" recovery Slight odor OVA = 570 ppm
	4	SS	1-3, 2-2	Very loose, same CLAY to 7', then brown SAND, fine to coarse. Visual staining beginning in sand at 7'.	18" recovery Moderate odor OVA = 682 ppm
	5	SS	2-3, 3-4	Loose, brown SAND, fine to coarse. No visual.	8" recovery Moderate odor OVA = 699 ppm
10	6	SS	3-4, 2-2	Very loose, grayish brown SAND, fine to coarse. No visual.	24" recovery Moderate odor OVA = 640 ppm
	7	SS	2-2, 3-3	Loose, grayish brown SAND, fine to coarse to 13', then sharp contact to brownish black, clayey, PEAT. Visual staining in SAND, no visual in peat.	24" recovery Moderate odor OVA = 463 ppm TD = 14'
15					
20					
25					
30					
35					
40					
45					
50					

	ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC. CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS HYDROGEOLOGIC SERVICES	TEST BORING LOG BORING NO. MW-25

PROJECT: SOUTHERN WOOD PIEDMONT-WILMINGTON			SHEET NO. 1 OF 1
CLIENT: CHUCK DAVIS	DATE FINISHED	10-8-92	JOB NO. 530-06-503
BORING CONTRACTOR: ETE	DRILLER	J. MASSEY	ELEVATION 1.78
RIG USED HAND AUGER	INSPECTOR	G. KUNTZ	DATE STARTED 10-8-92

WELL CONSTRUCTION	DEPTH FEET	SAMPLE: LITHOLOGY	SAMPLE: No.	SAMPLE: TYPE	SAMPLE: BLOWS PER 6"	CLASSIFICATION	REMARKS
CLAY; PLUG; 2" PVC CASING; NATURAL PACK; NATURAL PACK	0		1	HA		Borehole was hand augered because well location is within a wetland area. Representative samples were not obtained during the augering process because the loose nature of the sediments prevented sample retrival. Sediments encountered are believed to be marsh mud to 2 feet, then loose brown sand to 13 feet, then the peat unit was encountered. The well was hand pushed to 13 feet using a well point and was constructed using a natural filter pack.	
	5						
	10						
	15						
	20						
	25						
	30						
	35						
	40						
	45						
	50						

H:530MW25

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. MW-26

PROJECT: SOUTHERN WOOD PIEDMONT-WILMINGTON		SHEET NO. 1 OF 1	
CLIENT: CHUCK DAVIS	DATE FINISHED	10-5-92	JOB NO. 530-06-503
BORING CONTRACTOR: ETE	DRILLER	T. COPPIN	ELEVATION 2.48
RIG USED ATV MUD ROTARY	INSPECTOR	G. KUNTZ	DATE STARTED 10-5-92

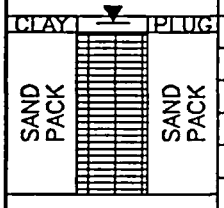
WELL CONSTRUCTION: GROUT; 2" STAINLESS STEEL; GROUT; CLAY; PLUG; SAND PACK; SAND PACK

DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0	1	SS	7-6, 6-5	Loose, brown SAND, fine to coarse, poorly sorted	18" recovery; No odor; OVA = 13.5 ppm
	2	SS	7-6, 6-6	Loose, brown SAND, silt to coarse, well sorted medium	18" recovery; No odor; OVA = 14.6 ppm
5	3	SS	3-3, 2-3	Very loose, brown SAND, very fine to coarse, poorly sorted	8" recovery; No odor; OVA = 14.7 ppm
	4	SS	1-1, 0-1	Very loose, same as above	10" recovery; Very slight odor; OVA = 15.1 ppm
	5	SS	1-1, 6-7	Loose, same as above	14" recovery; Creosote stained soil; OVA = 140 ppm
10	6	SS	4-4, 7-8	Loose, same as above	16" recovery; Creosote stained soil; OVA = 206 ppm
	7	SS	3-7, 50	Loose, dark brown SAND, medium to coarse, 10% wood, wood blocked shoe	14" recovery; Creosote stained soil; OVA = 236 ppm
15	8	SS	2-1, 1-1	Very loose, no recovery, pebble blocked shoe	Creosote stained soils
	9	SS	6-7, 9-8	Loose, dark blackish brown clayey PEAT grading to peaty CLAY, interval between 16' and 17' visually stained with creosote, no staining below 17'	18" recovery; Strong odor; OVA = 110 ppm; TD = 18 feet
20					
25					
30					
35					
40					
45					
50					

H:530MW26

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC. CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS HYDROGEOLOGIC SERVICES		TEST BORING LOG BORING NO. MW-27
PROJECT: SOUTHERN WOOD PIEDMONT-WILMINGTON		SHEET NO. 1 OF 1
CLIENT: T.M. DAVIS	DATE FINISHED 11-13-93	JOB NO. 12-53015.00
BORING CONTRACTOR: ETE	DRILLER LAYNE ENVIRONMENTAL	ELEVATION 3.22
RIG USED ATV MUD ROTARY	INSPECTOR G. KUNTZ	DATE STARTED 11-13-93

WELL CONSTRUCTION



DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0	1	PH		Very loose, dark brown SAND, fine to granule, 10% very coarse to granule. Diesel stained.	Moderate odor OVA = 411 ppm
	2	PH		Very loose, brown SAND, fine to very coarse, 5% very coarse. Little diesel staining.	Slight diesel odor OVA = 834 ppm 20" recovery
	3	SS	2-1 1-1	Very loose, same to 4.5' then grayish brown peaty CLAY, 25% peat. Diesel staining to 3.5'.	Very slight odor OVA = 1577 ppm 24" recovery
5	4	SS	1-1 2-1	Very loose, brown SAND, fine to very coarse, 5% very coarse, diesel stained to 6', then dark gray CLAY. No staining in clay.	Very slight odor OVA = 1237 ppm 18" recovery
	5	SS	2-1 2-1	Very loose, CLAY as above, 10% peat	Very slight odor OVA = 417 ppm TD = 9'
10					
15					
20					
25					
30					
35					
40					
45					
50					

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. MW-28

PROJECT: SOUTHERN WOOD PIEDMONT-WILMINGTON		SHEET NO. 1 OF 1
CLIENT: T.M. DAVIS	DATE FINISHED 11-10-93	JOB NO. 12-53015.00
BORING CONTRACTOR: ETE	DRILLER LAYNE ENVIRONMENTAL	ELEVATION 2.97
RIG USED ATV MUD ROTARY	INSPECTOR G. KUNTZ	DATE STARTED 11-10-93

WELL CONSTRUCTION: GROUT; 2" PVC; GROUT; CLAY; PLUG; SAND PACK; SAND PACK

DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0	1	PH		Loose, blackish brown SAND, fine to coarse, poorly sorted, 15% organics	No odor OVA = 1285 ppm
	2	PH		Loose, brown SAND, fine to coarse	No odor OVA = 2630 ppm
5	3	SS	2-3 3-4	Loose, grayish brown SAND, silt to coarse, 5% clay	18" recovery No odor OVA = 801 ppm
	4	SS	3-2 2-3	Loose, dark brown SAND, fine to coarse, 10% clay, scattered brick fragments	18" recovery No odor OVA = 512 ppm
	5	SS	1-3 3-5	Loose, same as above	24" recovery No odor OVA = 556 ppm
10	6	SS	2-1 3-2	Loose, brown SAND, silt to coarse, well sorted medium, brick fragments	18" recovery No odor OVA = 306 ppm
	7	SS	2-1 3-2	Loose, brown SAND, silt to granule, 5% granule, 5% silt and clay, trace small to large pebble to 13.5', then PEAT, 20% clay	24" recovery No odor OVA = 362 ppm TD = 14'
15					
20					
25					
30					
35					
40					
45					
50					

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC. CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS HYDROGEOLOGIC SERVICES		TEST BORING LOG BORING NO. MW-28A
PROJECT: SOUTHERN WOOD PIEDMONT-WILMINGTON		SHEET NO. 1 OF 1
CLIENT: T.M. DAVIS	DATE FINISHED 11-10-93	JOB NO. 12-53015.00
BORING CONTRACTOR: ETE	DRILLER LAYNE ENVIRONMENTAL	ELEVATION 3.26
RIG USED ATV MUD ROTARY	INSPECTOR G. KUNTZ	DATE STARTED 11-9-93

WELL CONSTRUCTION: GROUT; 6" PVC; 2" PVC; 6" PVC; GROUT; CLAY; PLUG; SAND PACK; SAND PACK

DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0	1	PH		Loose, blackish brown SAND, fine to coarse, poorly sorted, 15% organics	No odor OVA = 1285 ppm
	2	PH		Loose, brown SAND, fine to coarse	No odor OVA = 2630 ppm
5	3	SS	2-3 3-4	Loose, grayish brown SAND, silt to coarse, 5% clay	18" recovery No odor OVA = 801 ppm
	4	SS	3-2 2-3	Loose, dark brown SAND, fine to coarse, 10% clay, scattered brick fragments	18" recovery No odor OVA = 512 ppm
	5	SS	1-3 3-5	Loose, same as above	24" recovery No odor OVA = 556 ppm
10	6	SS	2-1 3-2	Loose, brown SAND, silt to coarse, well sorted medium, brick fragments	18" recovery No odor OVA = 306 ppm
	7	SS	2-1 3-2	Loose, brown SAND, silt to granule, 5% granule, 5% silt and clay, trace small to large pebble to 13.5', then PEAT, 20% clay	24" recovery No odor OVA = 362 ppm
15	8	SS	2-1 2-3	Loose, blackish brown peaty CLAY, 25% peat	24" recovery No odor OVA = 296 ppm
	9	SS	2-3 2-4	Loose, same as above, 6" diameter wood fragment between 17.5' and 18'	24" recovery No odor OVA = 232 ppm Pit casing to 18'
20	10	SS	3-4 4-6	Loose, brown to black SAND, fine to coarse, medium dominant, 15% peat	12" recovery No odor OVA = 244 ppm
	11	SS	6-8 5-4	Loose, brown to black SAND, fine to coarse, medium dominant	20" recovery No odor OVA = 337 ppm
25	12	SS	3-4 4-5	Loose, same to 25', then sharp contact to gray CLAY, wood fragments at contact	24" recovery No odor OVA = 274 ppm
	13	SS	4-5 3-8	Firm, gray CLAY to 27', then gradational contact to gray silty SAND, silt to medium, 30% silt, 5% phosphate grains, fining downward	24" recovery No odor OVA = 267 ppm
	14	SS	6-9 11-13	Firm, greenish gray silty SAND, silt to medium, 30% silt, 5% phosphate	24" recovery No odor OVA = 123 ppm
30	15	SS	10-15 23-35	Very dense, greenish gray silty SAND, silt to medium, 25% silt, 5% phosphate	18" recovery Very slight odor OVA = 290 ppm
	16	SS	8-8 9-5	Firm, grayish brown SAND, very fine to coarse	12" recovery No odor OVA = 84.1 ppm
35	17	SS	3-7 7-8	Firm, brown SAND, very fine to coarse	16" recovery No odor OVA = 162 ppm
	18	SS	6-5 9-10	Firm, brown SAND, very fine to coarse	12" recovery No odor OVA = 137 ppm
	19	SS	8-7 7-16	Firm, same SAND to 40', then greenish gray silty CLAY	24" recovery No odor OVA = 181 ppm TD = 40'
40					
45					
50					

	ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC. CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS HYDROGEOLOGIC SERVICES	TEST BORING LOG BORING NO. MW-29

PROJECT: SOUTHERN WOOD PIEDMONT-WILMINGTON		SHEET NO. 1 OF 1
CLIENT: T.M. DAVIS	DATE FINISHED 11-12-93	JOB NO. 12-53015.00
BORING CONTRACTOR: ETE	DRILLER LAYNE ENVIRONMENTAL	ELEVATION 3.19
RIG USED ATV MUD ROTARY	INSPECTOR G. KUNTZ	DATE STARTED 11-12-93

WELL CONSTRUCTION: CLAY; PLUG; SAND PACK; SAND PACK

DEPTH FEET	LITHOLOGY	SAMPLE No.	SAMPLE TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0		1	PH		Very loose, blackish brown organic SAND and PEAT to 1', then brown SAND, fine to very coarse, medium dominant	No odor OVA = 210 ppm
		2	PH		Very loose, brown SAND, very fine to coarse, fine dominant	No odor OVA = 183 ppm
5		3	SS	2-2 3-3	Loose, light gray SAND, silt to medium, fine dominant, 20% silt to 5.5', then dark brown CLAY, 20% peat	12" recovery No odor OVA = 111 ppm
		4	SS	2-4 2-1	Very loose, dark brown CLAY, 20% peat	18" recovery No odor OVA = 133 ppm
		5	SS	2-1 1-3	Very loose, large wood fragment blocked shoe.	4" recovery No odor OVA = 53.2 ppm TD = 10'
10						
15						
20						
25						
30						
35						
40						
45						
50						

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC. CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS HYDROGEOLOGIC SERVICES	TEST BORING LOG BORING NO. MW-29A
PROJECT: SOUTHERN WOOD PIEDMONT-WILMINGTON	SHEET NO. 1 OF 1
CLIENT: T.M. DAVIS — DATE FINISHED 11-9-93	JOB NO. 12-53015.00
BORING CONTRACTOR: ETE — DRILLER LAYNE ENVIRONMENTAL	ELEVATION 3.15
RIG USED ATV MUD ROTARY — INSPECTOR G. KUNTZ	DATE STARTED 10-30-93

WELL CONSTRUCTION: 6" PVC; 2" PVC; GROUT; CLAY; SAND PACK; 6" PVC; GROUT; PLUG; SAND PACK

DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0	1	PH		Very loose, blackish brown organic SAND and PEAT to 1', then brown SAND, fine to very coarse, medium dominant	No odor OVA = 210 ppm
	2	PH		Very loose, brown SAND, very fine to coarse, fine dominant	No odor OVA = 183 ppm
5	3	SS	2-2 3-3	Loose, light gray SAND, silt to medium, fine dominant, 20% silt to 5.5', then dark brown CLAY, 20% peat	12" recovery No odor OVA = 111 ppm
	4	SS	2-4 2-1	Very loose, dark brown CLAY, 20% peat	18" recovery No odor OVA = 133 ppm
	5	SS	2-1 1-3	Very loose, large wood fragment blocked shoe	4" recovery No odor OVA = 53.2 ppm Pit casing to 10'
10					
	6	SS	2-1 1-3	Grout in spoon. No recovery.	
15	7	SS	2-2 2-4	Loose, dark gray CLAY, 10% peat	18" recovery No odor OVA = 32.7 ppm
	8	SS	2-1 1-2	Very loose, dark gray CLAY, 5% peat	24" recovery No odor OVA = 40.7 ppm
	9	SS	3-2 1-2	Very loose, dark grayish brown peaty CLAY, 25% peat	24" recovery No odor OVA = 37.8 ppm
20	10	SS	3-1 1-2	Very loose, same as above	12" recovery No odor OVA = 44.5 ppm
	12	SS	2-4 4-3	Loose, same to 22.5', then sharp contact to dark brown SAND, silt to medium, 15% peat	20" recovery No odor OVA = 49.5 ppm
25	13	SS	2-4 3-5	Loose, alternating peaty CLAY, 25% peat and brown SAND, fine to coarse to 25', then brown SAND, fine to coarse	18" recovery No odor OVA = 46.8 ppm
	14	SS	4-3 3-7	Loose, brown SAND, fine to coarse, medium dominant	14" recovery No odor OVA = 45.9 ppm
30	15	SS	3-4 4-5	Loose, brownish black peaty CLAY, 25% peat	18" recovery No odor OVA = 46.0 ppm
	16	SS	2-3 1-3	Very loose, brownish black clayey SAND, silt to medium, 25% clay, 5% peat to 33.5' then brown SAND, fine to granule, 10% very coarse to granule	20" recovery Very slight odor OVA = 49.4 ppm
35	17	SS	4-5 3-5	Loose, brown pebbly SAND, fine to granule, 25% granule to small pebble, 1/4" gray clay laminae at 35.5'	15" recovery Very slight odor OVA = 50.6 ppm
	18	SS	6-5 3-1	Very loose, brown SAND, fine to granule, 5% granule alternating with a dark brown silty SAND, 25% silt, 20% peat	24" recovery Moderate odor OVA = 53.4 ppm
	19	SS	3-7 9-5	Firm, brown SAND to 38', then olive gray marine silty CLAY, 25% silt	24" recovery No odor OVA = 57.6 ppm TD = 40'
40					
45					
50					

ENVIRONMENTAL TECHNOLOGY ENGINEERING, INC.
CONSULTING ENGINEERS, SURVEYORS AND HYDROGEOLOGISTS
HYDROGEOLOGIC SERVICES

TEST BORING LOG

BORING NO. MW-30

PROJECT: SOUTHERN WOOD PIEDMONT-WILMINGTON		SHEET NO. 1 OF 1
CLIENT: T.M. DAVIS	DATE FINISHED 11-12-93	JOB NO. 12-53015.00
BORING CONTRACTOR: ETE	DRILLER LAYNE ENVIRONMENTAL	ELEVATION 4.07
RIG USED ATV MUD ROTARY	INSPECTOR G. KUNTZ	DATE STARTED 11-12-93

WELL CONSTRUCTION: GROUT, CLAY, SAND PACK, GROUT, PLUG, SAND PACK

DEPTH FEET	SAMPLE No.	TYPE	BLOWS PER 6"	CLASSIFICATION	REMARKS
0	1	PH		Very loose, brown SAND, fine to very coarse, coarse dominant	No odor OVA = 320 ppm
	2	PH		Very loose, brown SAND, fine to coarse	No odor OVA = 357 ppm
5	3	SS	2-1 1-3	Very loose, brown SAND, very fine to coarse, few 1/8" clay laminae	24" recovery No odor OVA = 345 ppm
	4	SS	2-4 4-3	Loose, brown SAND, fine to coarse, thin organic laminae	20" recovery No odor OVA = 296 ppm
10	5	SS	2-4 4-3	Loose, same as above to 9', then sharp contact to brownish black peaty CLAY, 25% peat	24" recovery Moderate odor OVA = 380 ppm TD = 10'
15					
20					
25					
30					
35					
40					
45					
50					

Phase III Groundwater Elevation Summary Table

PHASE III GROUNDWATER ELEVATION MEASUREMENT SUMMARY
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

WELL	RISER ELEVATION	DATE	DEPTH TO WATER	GROUNDWATER ELEVATION
MW-6	5.07	11/16/93	2.87	2.20
		11/19/93	2.93	2.14
		11/19/93	2.94	2.13
		11/19/93	2.92	2.15
MW-7	6.03	11/16/93	4.30	1.73
		11/19/93	4.32	1.71
		11/19/93	4.30	1.73
		11/19/93	4.20	1.83
MW-8	6.80	11/16/93	4.70	2.10
		11/19/93	4.95	1.85
		11/19/93	4.74	2.06
		11/19/93	4.70	2.10
MW-8A	6.43	11/16/93	4.52	1.91
		11/19/93	4.26	2.17
		11/19/93	3.87	2.56
		11/19/93	3.73	2.70
MW-9	6.43	11/16/93	4.22	2.21
		11/19/93	4.35	2.08
		11/19/93	4.29	2.14
		11/19/93	4.25	2.18
MW-10	7.41	11/16/93	5.05	2.36
		11/19/93	5.15	2.26
		11/19/93	5.13	2.28
		11/19/93	5.12	2.29
MW-11	8.02	11/16/93	5.66	2.36
		11/19/93	5.71	2.31
		11/19/93	5.69	2.33
		11/19/93	5.67	2.35
MW-11A	6.38	11/16/93	4.39	1.99
		11/19/93	4.28	2.10
		11/19/93	4.23	2.15
		11/19/93	4.16	2.22
MW-11B	6.26	11/16/93	4.23	2.03
		11/19/93	4.16	2.10
		11/19/93	4.11	2.15
		11/19/93	4.04	2.22
MW-12	8.22	11/16/93	5.60	2.62
		11/19/93	5.89	2.33
		11/19/93	5.84	2.38
		11/19/93	5.83	2.39
MW-13	6.97	11/16/93	4.97	2.00
		11/19/93	4.96	2.01
		11/19/93	4.90	2.07
		11/19/93	4.88	2.09

PHASE III GROUNDWATER ELEVATION MEASUREMENT SUMMARY
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

WELL	RISER ELEVATION	DATE	DEPTH TO WATER	GROUNDWATER ELEVATION
MW-14	6.30	11/16/93	4.75	1.55
		11/19/93	4.90	1.40
		11/19/93	4.82	1.48
		11/19/93	4.81	1.49
MW-14A	5.05	11/16/93	3.26	1.79
		11/19/93	3.19	1.86
		11/19/93	3.21	1.84
		11/19/93	3.19	1.86
MW-15	7.07	11/16/93	4.73	2.34
		11/19/93	4.84	2.23
		11/19/93	4.69	2.38
		11/19/93	4.79	2.28
MW-16	7.69	11/16/93	5.64	2.05
		11/19/93	5.71	1.98
		11/19/93	5.54	2.15
		11/19/93	5.65	2.04
MW-17	7.65	11/16/93	5.53	2.12
		11/19/93	5.60	2.05
		11/19/93	5.47	2.18
		11/19/93	5.60	2.05
MW-18	6.61	11/16/93	4.80	1.81
		11/19/93	4.81	1.80
		11/19/93	4.73	1.88
		11/19/93	4.54	2.07
MW-19	5.44	11/16/93	3.24	2.20
		11/19/93	3.18	2.26
		11/19/93	3.17	2.27
		11/19/93	3.14	2.30
MW-19A	5.25	11/16/93	3.28	1.97
		11/19/93	3.14	2.11
		11/19/93	3.13	2.12
		11/19/93	3.04	2.21
MW-20	5.44	11/16/93	3.44	2.00
		11/19/93	3.59	1.85
		11/19/93	3.56	1.88
		11/19/93	3.58	1.86
MW-20A	5.23	11/16/93	3.15	2.08
		11/19/93	3.08	2.15
		11/19/93	3.08	2.15
		11/19/93	3.05	2.18
MW-21	5.34	11/16/93	3.82	1.52
		11/19/93	3.89	1.45
		11/19/93	3.89	1.45
		11/19/93	3.89	1.45

PHASE III GROUNDWATER ELEVATION MEASUREMENT SUMMARY
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

WELL	RISER ELEVATION	DATE	DEPTH TO WATER	GROUNDWATER ELEVATION
MW-22	5.26	11/16/93	3.75	1.51
		11/19/93	3.64	1.62
		11/19/93	3.10	2.16
		11/19/93	3.15	2.11
MW-22A	5.32	11/16/93	3.37	1.95
		11/19/93	3.18	2.14
		11/19/93	3.09	2.23
		11/19/93	3.05	2.27
MW-23	4.96	11/16/93	2.86	2.10
		11/19/93	2.81	2.15
		11/19/93	2.86	2.10
		11/19/93	2.80	2.16
MW-24	5.98	11/16/93	3.71	2.27
		11/19/93	3.78	2.20
		11/19/93	3.74	2.24
		11/19/93	3.71	2.27
MW-24A	5.81	11/16/93	3.88	1.93
		11/19/93	3.75	2.06
		11/19/93	3.76	2.05
		11/19/93	3.67	2.14
MW-25	4.96	11/16/93	2.17	2.79
		11/19/93	3.04	1.92
		11/19/93	2.93	2.03
		11/19/93	2.89	2.07
MW-26	4.91	11/16/93	4.14	0.77
		11/19/93	4.70	0.21
		11/19/93	4.62	0.29
		11/19/93	4.73	0.18
MW-27	5.41	11/16/93	2.41	3.00
		11/19/93	2.46	2.95
		11/19/93	2.47	2.94
		11/19/93	2.46	2.95
MW-28	5.18	11/16/93	4.35	0.83
		11/19/93	4.38	0.80
		11/19/93	4.33	0.85
		11/19/93	4.32	0.86
MW-28A	5.47	11/16/93	4.12	1.35
		11/19/93	4.01	1.46
		11/19/93	4.06	1.41
		11/19/93	4.02	1.45
MW-29	5.32	11/16/93	4.29	1.03
		11/19/93	4.34	0.98
		11/19/93	4.36	0.96
		11/19/93	4.36	0.96

PHASE III GROUNDWATER LEVEL MEASUREMENT SUMMARY
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

WELL	RISER ELEVATION	DATE	DEPTH TO WATER	GROUNDWATER ELEVATION
MW-29A	5.14	11/16/93	3.41	1.73
		11/19/93	3.32	1.82
		11/19/93	3.35	1.79
		11/19/93	3.31	1.83
MW-30	6.26	11/16/93	4.44	1.82
		11/19/93	4.51	1.75
		11/19/93	4.51	1.75
		11/19/93	4.51	1.75
Staff Gauge Cape Fear	5.93	11/16/93	-0.1	-0.83
		11/19/93	1.13	0.40
		11/19/93	4.38	3.65
		11/19/93	5.0	4.27
Staff Gauge North Channel	6.64	11/16/93	0.24	0.22
		11/19/93	0.35	0.33
		11/19/93	0.26	0.24
		11/19/93	0.26	0.24
Staff Gauge South Channel	2.13	11/16/93	0.2	-1.18
		11/19/93	1.67	0.47
		11/19/93	1.04	-0.16
		11/19/93	1.21	0.01

NOTE: Top of Staff Gauge at Cape Fear and North Channel is 6.66
Top of Staff Gauge at South Channel is 3.33
Cape Fear River Elevation = 5.93-(6.66-Depth to water)
North Channel Elevation = 6.64-(6.66-Depth to water)
South Channel Elevation = 2.13-(3.33-Depth to water)

Phase III Vertical Hydraulic Gradient Summary Table

PHASE III VERTICAL HYDRAULIC GRADIENT SUMMARY TABLE
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

WELL PAIR	DATE	TIDE	GW ELEVATION UPPER AQUIFER	GW ELEVATION LOWER AQUIFER	MID SCREEN ELEV. UPPER AQUIFER	MID SCREEN ELEV. LOWER AQUIFER	VERT. HYDRAULIC GRADIENT
MW-8/MW-8A	11/93	Low	2.10	1.91	-9.86	-24.13	+0.013
		1/4	1.85	2.17	-9.86	-24.13	-0.022
		3/4	2.06	2.56	-9.86	-24.13	-0.035
		High	2.10	2.70	-9.86	-24.13	-0.042
MW-11/MW-11A	11/93	Low	2.36	1.99	-1.19	-27.29	+0.014
		1/4	2.31	2.10	-1.19	-27.29	+0.008
		3/4	2.33	2.15	-1.19	-27.29	+0.007
		High	2.35	2.22	-1.19	-27.29	+0.005
MW-14/MW-14A	11/93	Low	1.55	1.79	-8.38	-25.89	-0.014
		1/4	1.40	1.86	-8.38	-25.89	-0.026
		3/4	1.48	1.84	-8.38	-25.89	-0.021
		High	1.49	1.86	-8.38	-25.89	-0.021
MW-19/MW-19A	11/93	Low	2.20	1.97	-7.18	-25.52	+0.013
		1/4	2.26	2.11	-7.18	-25.52	+0.008
		3/4	2.27	2.12	-7.18	-25.52	+0.008
		High	2.30	2.21	-7.18	-25.52	+0.005
MW-20/MW-20A	11/93	Low	2.00	2.08	-6.63	-25.38	-0.004
		1/4	1.85	2.15	-6.63	-25.38	-0.016
		3/4	1.88	2.15	-6.63	-25.38	-0.014
		High	1.86	2.18	-6.63	-25.38	-0.017
MW-22/MW-22A	11/93	Low	1.51	1.95	-10.59	-26.29	-0.028
		1/4	1.62	2.14	-10.59	-26.29	-0.033
		3/4	2.16	2.23	-10.59	-26.29	-0.004
		High	2.11	2.27	-10.59	-26.29	-0.010
MW-24/MW-24A	11/93	Low	2.27	1.93	-7.13	-28.14	+0.016
		1/4	2.20	2.06	-7.13	-28.14	+0.007
		3/4	2.24	2.05	-7.13	-28.14	+0.009
		High	2.27	2.14	-7.13	-28.14	+0.006
MW-28/MW-28A	11/93	Low	0.83	1.35	-5.60	-19.92	-0.036
		1/4	0.80	1.46	-5.60	-19.92	-0.046
		3/4	0.85	1.41	-5.60	-19.92	-0.039
		High	0.86	1.45	-5.60	-19.92	-0.041
MW-29/MW-29A	11/93	Low	1.03	1.73	-1.54	-33.33	-0.022
		1/4	0.98	1.82	-1.54	-33.33	-0.026
		3/4	0.96	1.79	-1.54	-33.33	-0.026
		High	0.96	1.83	-1.54	-33.33	-0.027

NOTE: Vertical Hydraulic Gradient = $\frac{\text{Upper Aquifer Elevation} - \text{Lower Aquifer Elevation}}{\text{Upper Aquifer Mid Screen Elevation} - \text{Lower Aquifer Mid Screen Elevation}}$

- Upward Vertical Hydraulic Gradient

+ Downward Vertical Hydraulic Gradient

All Measurements in Feet

Vertical Hydraulic Gradient in ft/ft

Wilmington Site-Specific Soil Constituent List

SITE-SPECIFIC SOIL SAMPLE LIST
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

METALS

Arsenic
Copper
Chromium

SEMI-VOLATILES

Acenaphthene
Benzo(a)anthracene
Benzo(b)fluoranthene
Bis(2-chloroethyl)ether
4-chloro-3-methylphenol
Chrysene
2,4-dimethylphenol
Fluoranthene
Naphthalene
Phenanthrene
Tetrachlorophenol
2,4,6-trichlorophenol
Anthracene
Benzo(a)pyrene
Benzo(k)fluoranthene
Carbazole
2-chlorophenol
Dibenzo(a,h)anthracene
2,4-dinitrophenol
Indeno(1,2,3-cd)pyrene
Pentachlorophenol
Phenol
2,4,5-trichlorophenol

VOLATILES

Benzene
Bromomethane
Chlorobenzene
2-chloroethylvinylether
Cis-1,3-dichloropropene
1,2-dibromomethane (Edb)
1,1-dichloroethane
1,1-dichloroethene
1,2-dichloropropane
Fluorotrichloromethane
Methyl-T-Butyl Ether (Mtbe)
1,1,2,2-tetrachloroethane
Trans-1,2-dichloroethene
1,1,2-trichloroethane
Vinyl Chloride
Bromodichloromethane
Carbon Tetrachloride
Chloroethane
Chloromethane
Dibromochloromethane
Dichlorodifluoromethane
1,2-dichloroethane
Dichloromethane
Ethyl benzene
M/P-Xylene
O-Xylene
Toluene
1,1,1-trichloroethane
Trichloroethene

Soil Sample Collection Summary Sheets

SOIL SAMPLE COLLECTION SHEET

Project Number: 12–53015.00 Date: 11/19/93

Sampled By: Kuntz Time: 10:50

Sampling Point Identification: SS–10A

Site Name/City/County: SWP–Wilmington

Weather Conditions: Clear 65

Sample Type: Soil

Sampling Method: Stainless spoon and stainless steel hand auger

Splits/Spikes/Duplicates:

Sampling Containers: (Number/Size/Type) 1/500ml/G; 2/250ml/G

Appearance of Sample: Dark Brown Sand. No odor or visual staining

Reason for Sampling: Phase III Assessment

Lab Performing Analysis: Savannah Labs

Respiratory Protection: None

SOIL SAMPLE COLLECTION SHEET

Project Number: 12–53015.00 Date: 11/19/93

Sampled By: Kuntz Time: 11:30

Sampling Point Identification: Roll–off

Site Name/City/County: SWP–Wilmington

Weather Conditions: Clear 65

Sample Type: Soil

Sampling Method: Stainless spoon and stainless steel hand auger

Splits/Spikes/Duplicates:

Sampling Containers: (Number/Size/Type) 4/500ml/G

Appearance of Sample: Brown sand and clay

Reason for Sampling: Phase III Assessment

Lab Performing Analysis: Savannah Labs

Respiratory Protection: None

Phase III Soil Sample Parameter Summary Table

PHASE III SOIL SAMPLE PARAMETER SUMMARY TABLE
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

SS-10A

SEMIVOLATILES	DL*	R*	VOLATILES	DL*	R*	METALS	DL*	R*
Bis(2-Chloroethyl)ether	0.33	ND	Chloromethane	0.01	ND	Arsenic	1.0	13.0
Naphthalene	0.33	ND	Bromomethane	0.01	ND	Chromium	1.0	38.0
Acenaphthene	0.33	3.3	Vinyl Chloride	0.01	ND	Copper	2.5	34.0
Phenanthrene	0.33	ND	Chloroethane	0.01	ND			
Anthracene	0.33	ND	Methylene Chloride	0.005	ND	% Solids		24.0
Fluoranthene	0.33	15.0	1,1-Dichloroethene	0.005	ND			
Chrysene	0.33	9.0	1,1-Dichloroethane	0.005	ND			
Benzo(a)Anthracene	0.33	7.3	Trans-1,2-Dichloroethylene	0.005	ND			
Benzo(b)fluoranthene	0.33	6.0	1,2-Dichloroethane	0.005	ND			
Benzo(k)fluoranthene	0.33	2.1	1,1,1-Trichloroethane	0.005	ND			
Benzo(a)pyrene	0.33	2.6	Carbon Tetrachloride	0.005	ND			
Indeno(1,2,3-cd)pyrene	0.33	ND	Bromodichloromethane	0.005	ND			
Dibenz(a,h)anthracene	0.33	ND	1,1,2,2-Tetrachloroethane	0.005	ND			
2-Chlorophenol	0.33	ND	1,2-Dichloropropane	0.005	ND			
Phenol	0.33	ND	Trichloroethene	0.005	ND			
2,4,-Dimethylphenol	0.33	ND	Dibromochloromethane	0.005	ND			
2,4,6-Trichlorophenol	0.33	ND	1,1,2-Trichloroethane	0.005	ND			
4-Chloro-3-methylphenol	0.33	ND	Benzene	0.005	ND			
2,4-Dinitrophenol	1.70	ND	Cis-1,3-Dichloropropene	0.005	ND			
Pentachlorophenol	1.70	ND	2-Chloroethylvinyl Ether	0.05	ND			
2,4,5-Trichlorophenol	1.70	ND	Toluene	0.005	ND			
Carbazole	0.33	ND	Chlorobenzene	0.005	ND			
Tetrachlorophenols	1.70	ND	Ethylbenzene	0.005	ND			
			o-Xylene	0.005	ND			
			m&p-Xylene	0.005	ND			
			1,2-Dibromoethane	0.005	ND			
			Methyl-Tert-Butyl-Ether	0.05	ND			
			Fluorotrichloromethane	0.005	ND			
			Dichlorodifluoromethane	0.005	ND			

NOTE: All units in mg/kg dw
DL = Laboratory Detection Limit
R = Laboratory Analytical Result

Phase III Roll-Off Composite TCLP Analysis Summary Table

PHASE III SOIL SAMPLE PARAMETER SUMMARY TABLE
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

ROLLOFF – TCLP ANALYSIS

PARAMETER	DL*	R*
Arsenic	0.20	ND
Chromium	0.05	ND
Lead	0.20	ND
Mercury	0.02	ND
Benzene	0.02	ND
Methyl ethyl ketone	0.05	ND
Cresol (ortho)	0.05	ND
Cresol m & p	0.05	ND
Hexachlorobenzene	0.05	ND
Pentachlorophenol	0.25	ND
Pyridine	1.00	ND
2,4,5–Trichlorophenol	0.05	ND
2,4,6–Trichlorophenol	0.05	ND

NOTE: All units in mg/l
DL = Laboratory Detection Limit
R = Laboratory Analytical Result

Phase III Soil Sample Laboratory Analytical Data and QA/QC

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

JDW
MAS
Greg K.

RECEIVED
JAN 06 1994
ENVIRONMENTAL AFFAIRS

LOG NO: S3-46613

Received: 20 NOV 93

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

Project: Wilmington
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
46613-1	SS-10A (# 11504)	11-19-93

PARAMETER	46613-1
Semivolatile Organics (8270)	
bis(2-Chloroethyl)ether, mg/kg dw	ND
Naphthalene, mg/kg dw	ND
Acenaphthene, mg/kg dw	3.3
Phenanthrene, mg/kg dw	ND
Anthracene, mg/kg dw	ND
Fluoranthene, mg/kg dw	15
Chrysene, mg/kg dw	9.0
Benzo(a)Anthracene, mg/kg dw	7.3
Benzo(b)fluoranthene, mg/kg dw	6.0
Benzo(k)fluoranthene, mg/kg dw	2.1
Benzo(a)pyrene, mg/kg dw	2.6
Indeno(1,2,3-cd)pyrene, mg/kg dw	ND
Dibenz(a,h)anthracene, mg/kg dw	ND
2-Chlorophenol, mg/kg dw	ND
Phenol, mg/kg dw	ND
2,4-Dimethylphenol, mg/kg dw	ND
2,4,6-Trichlorophenol, mg/kg dw	ND
4-Chloro-3-methylphenol, mg/kg dw	ND
2,4-Dinitrophenol, mg/kg dw	ND
Pentachlorophenol, mg/kg dw	ND
2,4,5-Trichlorophenol, mg/kg dw	ND
Carbazole, mg/kg dw	ND
Tetrachlorophenols, mg/kg dw	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 0 6 1994
ENVIRONMENTAL AFFAIRS

LOG NO: S3-46613

Received: 20 NOV 93

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

Project: Wilmington
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
46613-1	SS-10A (# 11504)	11-19-93

PARAMETER	46613-1
Volatiles by GC/MS	
Chloromethane, mg/kg dw	ND
Bromomethane, mg/kg dw	ND
Vinyl Chloride, mg/kg dw	ND
Chloroethane, mg/kg dw	ND
Methylene Chloride (Dichloromethane), mg/kg dw	ND
1,1-Dichloroethene, mg/kg dw	ND
1,1-Dichloroethane, mg/kg dw	ND
Trans-1,2-Dichloroethylene, mg/kg dw	ND
1,2-Dichloroethane, mg/kg dw	ND
1,1,1-Trichloroethane, mg/kg dw	ND
Carbon Tetrachloride, mg/kg dw	ND
Bromodichloromethane, mg/kg dw	ND
1,1,2,2-Tetrachloroethane, mg/kg dw	ND
1,2-Dichloropropane, mg/kg dw	ND
Trichloroethene, mg/kg dw	ND
Dibromochloromethane, mg/kg dw	ND
1,1,2-Trichloroethane, mg/kg dw	ND
Benzene, mg/kg dw	ND
Cis-1,3-Dichloropropene, mg/kg dw	ND
2-Chloroethylvinyl Ether, mg/kg dw	ND
Toluene, mg/kg dw	ND
Chlorobenzene, mg/kg dw	ND
Ethylbenzene, mg/kg dw	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 06 1994
ENVIRONMENTAL AFFAIRS

LOG NO: S3-46613

Received: 20 NOV 93

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

Project: Wilmington
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
46613-1	SS-10A (# 11504)	11-19-93

PARAMETER	46613-1
o-Xylene, mg/kg dw	ND
m&p-Xylene, mg/kg dw	ND
1,2-Dibromoethane (EDB) , mg/kg dw	ND
Methyl-Tert-Butyl-Ether (MTBE), mg/kg dw	ND
Fluorotrichloromethane, mg/kg dw	ND
Dichlorodifluoromethane, mg/kg dw	ND
Arsenic (7060), mg/kg dw	13
Chromium (6010), mg/kg dw	38
Copper (6010), mg/kg dw	34
Percent Solids, %	24

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 0 6 1994
ENVIRONMENTAL AFFAIRS

LOG NO: S3-46613

Received: 20 NOV 93

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

Project: Wilmington
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
46613-2	Rolloff (# 11483)	11-19-93

PARAMETER	46613-2
Arsenic (TCLP), mg/l	ND
Chromium (TCLP), mg/l	ND
Lead (TCLP), mg/l	ND
Mercury (TCLP - 7470), mg/l	ND
Benzene (TCLP), mg/l	ND
Methyl ethyl ketone (TCLP), mg/l	ND
Cresol (ortho) (TCLP), mg/l	ND
Cresol m & p (TCLP), mg/l	ND
Hexachlorobenzene (TCLP), mg/l	ND
Pentachlorophenol (TCLP), mg/l	ND
Pyridine (TCLP), mg/l	ND
2,4,5-Trichlorophenol (TCLP), mg/l	ND
2,4,6-Trichlorophenol (TCLP), mg/l	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 06 1994
ENVIRONMENTAL AFFAIRS

LOG NO: S3-46613

Received: 20 NOV 93

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

Project: Wilmington
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	DATE SAMPLED
46613-3	Rolloff (# 11483) Matrix Spike % Rec.	11-19-93

PARAMETER	46613-3
Arsenic (TCLP)	99 %
Chromium (TCLP)	83 %
Lead (TCLP)	88 %
Mercury (TCLP - 7470)	89 %
Benzene (TCLP)	88 %
Methyl ethyl ketone (TCLP)	60 %
Cresol (ortho) (TCLP)	94 %
Cresol m & p (TCLP)	---
Hexachlorobenzene (TCLP)	79 %
Pentachlorophenol (TCLP)	56 %
Pyridine (TCLP)	11 %
2,4,5-Trichlorophenol (TCLP)	---
2,4,6-Trichlorophenol (TCLP)	66 %

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 06 1994
ENVIRONMENTAL AFFAIRS

LOG NO: S3-46613

Received: 20 NOV 93

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

Project: Wilmington
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
46613-4	Method Blank Extraction Fluid

PARAMETER	46613-4
Arsenic (TCLP), mg/l	ND
Chromium (TCLP), mg/l	ND
Lead (TCLP), mg/l	ND
Mercury (TCLP - 7470), mg/l	ND
Benzene (TCLP), mg/l	ND
Methyl ethyl ketone (TCLP), mg/l	ND
Cresol (ortho) (TCLP), mg/l	ND
Cresol m & p (TCLP), mg/l	ND
Hexachlorobenzene (TCLP), mg/l	ND
Pentachlorophenol (TCLP), mg/l	ND
Pyridine (TCLP), mg/l	ND
2,4,5-Trichlorophenol (TCLP), mg/l	ND
2,4,6-Trichlorophenol (TCLP), mg/l	ND

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 0 6 1994
ENVIRONMENTAL AFFAIRS

LOG NO: S3-46613

Received: 20 NOV 93

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

Project: Wilmington
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
46613-5	Detection Limits
46613-6	Accuracy (mean % recovery)
46613-7	Precision (% RPD)
46613-8	Analyst Initials
46613-9	EPA Method Numbers

PARAMETER	46613-5	46613-6	46613-7	46613-8	46613-9
Semivolatile Organics (8270)					
bis(2-Chloroethyl)ether, mg/kg dw	0.33	---	---	BK	8270
Naphthalene, mg/kg dw	0.33	---	---	BK	8270
Acenaphthene, mg/kg dw	0.33	---	---	BK	8270
Phenanthrene, mg/kg dw	0.33	---	---	BK	8270
Anthracene, mg/kg dw	0.33	---	---	BK	8270
Fluoranthene, mg/kg dw	0.33	---	---	BK	8270
Chrysene, mg/kg dw	0.33	---	---	BK	8270
Benzo(a)Anthracene, mg/kg dw	0.33	---	---	BK	8270
Benzo(b)fluoranthene, mg/kg dw	0.33	---	---	BK	8270
Benzo(k)fluoranthene, mg/kg dw	0.33	---	---	BK	8270
Benzo(a)pyrene, mg/kg dw	0.33	---	---	BK	8270
Indeno(1,2,3-cd)pyrene, mg/kg dw	0.33	---	---	BK	8270
Dibenz(a,h)anthracene, mg/kg dw	0.33	---	---	BK	8270
2-Chlorophenol, mg/kg dw	0.33	76 %	3.9 %	BK	8270
Phenol, mg/kg dw	0.33	70 %	5.7 %	BK	8270
2,4-Dimethylphenol, mg/kg dw	0.33	---	---	BK	8270
2,4,6-Trichlorophenol, mg/kg dw	0.33	---	---	BK	8270
4-Chloro-3-methylphenol, mg/kg dw	0.33	92 %	4.3 %	BK	8270
2,4-Dinitrophenol, mg/kg dw	1.7	---	---	BK	8270
Pentachlorophenol, mg/kg dw	1.7	96 %	5.1 %	BK	8270
2,4,5-Trichlorophenol, mg/kg dw	1.7	---	---	BK	8270
Tetrachlorophenols, mg/kg dw	1.7	---	---	BK	8270
Carbazole, mg/kg dw	0.33	---	---	BK	8270

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 06 1994
ENVIRONMENTAL Affairs

LOG NO: S3-46613

Received: 20 NOV 93

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

Project: Wilmington
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
46613-5	Detection Limits
46613-6	Accuracy (mean % recovery)
46613-7	Precision (% RPD)
46613-8	Analyst Initials
46613-9	EPA Method Numbers

PARAMETER	46613-5	46613-6	46613-7	46613-8	46613-9
Volatiles by GC/MS					
Chloromethane, mg/kg dw	0.010	---	---	TCS	8240
Bromomethane, mg/kg dw	0.010	---	---	TCS	8240
Vinyl Chloride, mg/kg dw	0.010	---	---	TCS	8240
Chloroethane, mg/kg dw	0.010	---	---	TCS	8240
Methylene Chloride (Dichloromethane), mg/kg dw	0.0050	---	---	TCS	8240
1,1-Dichloroethene, mg/kg dw	0.0050	132 %	0.76 %	TCS	8240
1,1-Dichloroethane, mg/kg dw	0.0050	---	---	TCS	8240
Trans-1,2-Dichloroethylene, mg/kg dw	0.0050	---	---	TCS	8240
1,2-Dichloroethane, mg/kg dw	0.0050	---	---	TCS	8240
1,1,1-Trichloroethane, mg/kg dw	0.0050	---	---	TCS	8240
Carbon Tetrachloride, mg/kg dw	0.0050	---	---	TCS	8240
Bromodichloromethane, mg/kg dw	0.0050	---	---	TCS	8240
1,1,2,2-Tetrachloroethane, mg/kg dw	0.0050	---	---	TCS	8240
1,2-Dichloropropane, mg/kg dw	0.0050	---	---	TCS	8240
Trichloroethene, mg/kg dw	0.0050	134 %	1.5 %	TCS	8240
Dibromochloromethane, mg/kg dw	0.0050	---	---	TCS	8240

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 06 1994
ENVIRONMENTAL AFFAIRS

LOG NO: S3-46613

Received: 20 NOV 93

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

Project: Wilmington
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
46613-5	Detection Limits
46613-6	Accuracy (mean % recovery)
46613-7	Precision (% RPD)
46613-8	Analyst Initials
46613-9	EPA Method Numbers

PARAMETER	46613-5	46613-6	46613-7	46613-8	46613-9
1,1,2-Trichloroethane, mg/kg dw	0.0050	---	---	TCS	8240
Benzene, mg/kg dw	0.0050	125 %	0.76 %	TCS	8240
Cis-1,3-Dichloropropene, mg/kg dw	0.0050	---	---	TCS	8240
2-Chloroethylvinyl Ether, mg/kg dw	0.050	---	---	TCS	8240
Toluene, mg/kg dw	0.0050	132 %	0.76 %	TCS	8240
Chlorobenzene, mg/kg dw	0.0050	134 %	0.75 %	TCS	8240
Ethylbenzene, mg/kg dw	0.0050	---	---	TCS	8240
m&p-Xylene, mg/kg dw	0.0050	---	---	TCS	8240
o-Xylene, mg/kg dw	0.0050	---	---	TCS	8240
Methyl-Tert-Butyl-Ether (MTBE), mg/kg dw	0.050	---	---	TCS	8240
Fluorotrichloromethane, mg/kg dw	0.0050	---	---	TCS	8240
1,2-Dibromoethane (EDB) , mg/kg dw	0.0050	---	---	TCS	8240
Dichlorodifluoromethane, mg/kg dw	0.0050	---	---	TCS	8240
Arsenic (7060), mg/kg dw	1.0	126 %	4.0 %	LR	7060
Chromium (6010), mg/kg dw	1.0	100 %	1.0 %	SD	6010
Copper (6010), mg/kg dw	2.5	102 %	0.98 %	SD	6010
Arsenic (TCLP), mg/l	0.20	94 %	3.2 %	DM	6010

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 06 1994
ENVIRONMENTAL AFFAIRS

LOG NO: S3-46613

Received: 20 NOV 93

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

Project: Wilmington
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
46613-5	Detection Limits
46613-6	Accuracy (mean % recovery)
46613-7	Precision (% RPD)
46613-8	Analyst Initials
46613-9	EPA Method Numbers

PARAMETER	46613-5	46613-6	46613-7	46613-8	46613-9
Chromium (TCLP), mg/l	0.050	94 %	5.3 %	DM	6010
Lead (TCLP), mg/l	0.20	97 %	4.1 %	DM	6010
Mercury (TCLP - 7470), mg/l	0.020	112 %	11 %	BB	7470
Benzene (TCLP), mg/l	0.020	118 %	1.7 %	KA	8240
Methyl ethyl ketone (TCLP), mg/l	0.050	---	---	KA	8240
Cresol (ortho) (TCLP), mg/l	0.050	---	---	RB	8270
Cresol m & p (TCLP), mg/l	0.050	---	---	RB	8270
Hexachlorobenzene (TCLP), mg/l	0.050	---	---	RB	8270
Pentachlorophenol (TCLP), mg/l	0.25	70 %	7.1 %	RB	8270
Pyridine (TCLP), mg/l	1.0	---	---	RB	8270
2,4,5-Trichlorophenol (TCLP), mg/l	0.050	---	---	RB	8270
2,4,6-Trichlorophenol (TCLP), mg/l	0.050	---	---	RB	8270

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 06 1994
ENVIRONMENTAL AFFAIRS

LOG NO: S3-46613

Received: 20 NOV 93

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

Project: Wilmington
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
46613-10	Date Extracted
46613-11	Date Analyzed

PARAMETER	46613-10	46613-11
Semivolatile Organics (8270)		
bis(2-Chloroethyl)ether	11.24.93	11.29.93
Naphthalene	11.24.93	11.29.93
Acenaphthene	11.24.93	11.29.93
Phenanthrene	11.24.93	11.29.93
Anthracene	11.24.93	11.29.93
Fluoranthene	11.24.93	11.29.93
Chrysene	11.24.93	11.29.93
Benzo(a)Anthracene	11.24.93	11.29.93
Benzo(b)fluoranthene	11.24.93	11.29.93
Benzo(k)fluoranthene	11.24.93	11.29.93
Benzo(a)pyrene	11.24.93	11.29.93
Indeno(1,2,3-cd)pyrene	11.24.93	11.29.93
Dibenz(a,h)anthracene	11.24.93	11.29.93
2-Chlorophenol	11.24.93	11.29.93
Phenol	11.24.93	11.29.93
2,4-Dimethylphenol	11.24.93	11.29.93
2,4,6-Trichlorophenol	11.24.93	11.29.93
4-Chloro-3-methylphenol	11.24.93	11.29.93
2,4-Dinitrophenol	11.24.93	11.29.93
Pentachlorophenol	11.24.93	11.29.93
2,4,5-Trichlorophenol	11.24.93	11.29.93
Carbazole	11.24.93	11.29.93
Tetrachlorophenols	11.24.93	11.29.93

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 0 6 1994
ENVIRONMENTAL AFFAIRS

LOG NO: S3-46613

Received: 20 NOV 93

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

Project: Wilmington
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
46613-10	Date Extracted
46613-11	Date Analyzed

PARAMETER	46613-10	46613-11
Volatiles by GC/MS		
Chloromethane	---	12.02.93
Bromomethane	---	12.02.93
Vinyl Chloride	---	12.02.93
Chloroethane	---	12.02.93
Methylene Chloride (Dichloromethane)	---	12.02.93
1,1-Dichloroethene	---	12.02.93
1,1-Dichloroethane	---	12.02.93
Trans-1,2-Dichloroethylene	---	12.02.93
1,2-Dichloroethane	---	12.02.93
1,1,1-Trichloroethane	---	12.02.93
Carbon Tetrachloride	---	12.02.93
Bromodichloromethane	---	12.02.93
1,1,2,2-Tetrachloroethane	---	12.02.93
1,2-Dichloropropane	---	12.02.93
Trichloroethene	---	12.02.93
Dibromochloromethane	---	12.02.93
1,1,2-Trichloroethane	---	12.02.93
Benzene	---	12.02.93
Cis-1,3-Dichloropropene	---	12.02.93
2-Chloroethylvinyl Ether	---	12.02.93
Toluene	---	12.02.93
Chlorobenzene	---	12.02.93

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 06 1994
ENVIRONMENTAL AFFAIRS

LOG NO: S3-46613

Received: 20 NOV 93

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

Project: Wilmington
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
46613-10	Date Extracted
46613-11	Date Analyzed

PARAMETER	46613-10	46613-11
Ethylbenzene	---	12.02.93
m&p-Xylene	---	12.02.93
o-Xylene	---	12.02.93
1,2-Dibromoethane (EDB)	---	12.02.93
Methyl-Tert-Butyl-Ether (MTBE)	---	12.02.93
Dichlorodifluoromethane	---	12.02.93
Fluorotrichloromethane	---	12.02.93
Arsenic (7060)	---	12.04.93
Chromium (6010)	---	12.05.93
Copper (6010)	---	12.05.93
Arsenic (TCLP)	---	12.01.93
Chromium (TCLP)	---	12.01.93
Lead (TCLP)	---	12.01.93
Mercury (TCLP - 7470)	---	11.30.93
Benzene (TCLP)	---	12.12.93
Methyl ethyl ketone (TCLP)	---	12.12.93
Cresol (ortho) (TCLP)	12.01.93	12.02.93
Cresol m & p (TCLP)	12.01.93	12.02.93
Hexachlorobenzene (TCLP)	12.01.93	12.02.93
Pentachlorophenol (TCLP)	12.01.93	12.02.93
Pyridine (TCLP)	12.01.93	12.02.93
2,4,5-Trichlorophenol (TCLP)	12.01.93	12.02.93
2,4,6-Trichlorophenol (TCLP)	12.01.93	12.02.93

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 06 1994
ENVIRONMENTAL AFFAIRS

LOG NO: S3-46613

Received: 20 NOV 93

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

Project: Wilmington
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
46613-12	Report Completion Date

PARAMETER	46613-12
Date Reported	12.30.93

Methods: EPA SW-846
ND = Not Detected

J. W. Andrews

J. W. Andrews, Ph. D.

Final Page Of Report

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

05181

☒ 5102 LaRoche Avenue, Savannah, GA 31404 — Phone: (912) 354-7858 — Fax (912) 352-0165
☐ 2846 Industrial Plaza Drive, Tallahassee, FL 32301 — Phone: (904) 878-3994 — Fax (904) 878-9504
☐ 414 Southwest 12th Avenue, Deerfield Beach, FL 33442 — Phone: (305) 421-7400 — Fax (305) 421-2584
☐ 900 Lakeside Drive, Mobile, AL 36693 — Phone: (205) 666-6633 — Fax (205) 666-6696
☐ 6712 Benjamin Road, Suite 100, Tampa, FL 33634 — Phone: (813) 885-7427 — Fax (813) 885-7049

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

O. NUMBER	PROJECT NUMBER	PROJECT NAME
	12-53015.00	SWP-Wilmington

CLIENT NAME	TELEPHONE/FAX NO.
Hro Group, Inc.	803-957-6270 803-957-3845

CLIENT ADDRESS	CITY, STATE, ZIP CODE
445 Pisgah Church Rd	Lexington, SC 29072

SAMPLER(S) NAME(S)	CLIENT PROJECT MANAGER
Greg Kuntz, James Leaphart	Greg Kuntz

PAGE 1 OF 1

☒ STANDARD TAT
☐ EXPEDITED TAT *

REPORT DUE DATE _____

* SUBJECT TO RUSH FEES

MATRIX TYPE: AQUEOUS MATRIX / NONAQUEOUS MATRIX / OIL MATRIX / AIR MATRIX

REQUIRED ANALYSES: As, Cr, Cu; VOC; SV; *TCLP Site Specific

SAMPLING DATE	SAMPLING TIME	SAMPLE IDENTIFICATION	AQUEOUS MATRIX	NONAQUEOUS MATRIX	OIL MATRIX	AIR MATRIX	As, Cr, Cu	VOC	SV	*TCLP Site Specific
1-19-93	10:50	SS-10A #11504	X				1	1	1	
-19-93	11:30	Roll-off #11483	↓							4

NUMBER OF CONTAINERS SUBMITTED

* TCLP Site Specific List
Arsenic
Benzene
Chromium
O-cresol
m-cresol
p-cresol
hexachlorobenzene
lead
Mercury
Methyl ethyl ketone
pentachlorophenol
pyridine
2,4,5-trichlorophenol
2,4,6-trichlorophenol

RECEIVED JAN 03 1994 ENVIRONMENTAL AFFAIRS

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[signature]	11/1/1	12:00	[signature]	11/19/93	12:57			
RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
Gregory B. Kuntz	11/16/93	7:30	Gregory B. Kuntz	11/19/93	12:58			

FOR SAVANNAH LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	S.L. LOG NO.	LABORATORY REMARKS
[signature]	11/20/93	11:25	☑ YES ☐ NO		46613	

NOV 10 '93 03:57PM SOUTHERN WOOD BOTTLE ORDER 11/18/93

Send bottles to ETE for Mon. 11/15

SITE-SPECIFIC GROUND WATER SAMPLE LIST
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

METALS (Total + Dissolved)

Arsenic
Copper
Chromium

SEMI-VOLATILES

Acenaphthene
Benzo(a)anthracene
Benzo(b)fluoranthene
Bis(2-chloroethyl)ether
4-chloro-3-methylphenol
Chrysene
2,4-dimethylphenol
Fluoranthene
Naphthalene
Phenanthrene
Tetrachlorophenol
2,4,6-trichlorophenol
Anthracene
Benzo(a)pyrene
Benzo(k)fluoranthene
Carbazole
2-chlorophenol
Dibenzo(a,h)anthracene
2,4-dinitrophenol
Indeno(1,2,3-cd)pyrene
Pentachlorophenol
Phenol
2,4,5-trichlorophenol

VOLATILES

Benzene
Bromomethane
Chlorobenzene
2-chloroethylvinylether
Chloromethane
Dibromochloromethane
Dichlorodifluoromethane
1,2-dichloroethane
Dichloromethane
Ethyl benzene
M/P-Xylene
O-Xylene
Toluene
1,1,1-trichloroethane
Trichloroethene
Bromodichloromethane
Carbon Tetrachloride
Chloroethane
MTBE
Cis-1,3-dichloropropene
1,2-dibromomethane (Edb)
1,1-dichloroethane
1,1-dichloroethene
1,2-dichloropropane
Fluorotrichloromethane
Methyl-T-Butyl Ether (Mtbe)
1,1,2,2-tetrachloroethane
Trans-1,2-dichloroethene
1,1,2-trichloroethane
Vinyl Chloride

Postit™ brand fax transmittal memo 7671 | # of pages ▸ 1
To: Debra L. | From: Sandra K.
Co. Southern W. | Co. Site 0
Dept. | Phone #
Fax # | Fax #

36 H_2O's for above constituents
2 Field Blanks
2 Trip Blanks
} for all constituents
3 H_2O's: Total Petroleum Hydrocarbons - gasoline
TPH - Diesel
3 soils for Above site specific list

D00045

Wilmington Site-Specific Groundwater Constituent List

SITE-SPECIFIC GROUNDWATER SAMPLE LIST
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

METALS

Arsenic
Copper
Chromium

SEMI-VOLATILES

Acenaphthene
Benzo(a)anthracene
Benzo(b)fluoranthene
Bis(2-chloroethyl)ether
4-chloro-3-methylphenol
Chrysene
2,4-dimethylphenol
Fluoranthene
Naphthalene
Phenanthrene
Tetrachlorophenol
2,4,6-trichlorophenol
Anthracene
Benzo(a)pyrene
Benzo(k)fluoranthene
Carbazole
2-chlorophenol
Dibenzo(a,h)anthracene
2,4-dinitrophenol
Indeno(1,2,3-cd)pyrene
Pentachlorophenol
Phenol
2,4,5-trichlorophenol

VOLATILES

Benzene
Bromomethane
Chlorobenzene
2-chloroethylvinylether
Cis-1,3-dichloropropene
1,2-dibromomethane (Edb)
1,1-dichloroethane
1,1-dichloroethene
1,2-dichloropropane
Fluorotrichloromethane
Methyl-T-Butyl Ether (Mtbe)
1,1,2,2-tetrachloroethane
Trans-1,2-dichloroethene
1,1,2-trichloroethane
Vinyl Chloride
Bromodichloromethane
Carbon Tetrachloride
Chloroethane
Chloromethane
Dibromochloromethane
Dichlorodifluoromethane
1,2-dichloroethane
Dichloromethane
Ethyl benzene
M/P-Xylene
O-Xylene
Toluene
1,1,1-trichloroethane
Trichloroethene

Groundwater Sample Collection Summary Sheets

ViroGroup
Air•Water•Soil
TECHNOLOGY

ETE Division
PO Box 1867
1445 Pisgah Church Rd.
Lexington, SC 29072
(803) 957-6270

AQUEOUS SAMPLE COLLECTION SUMMARY SHEET

SITE NAME/CITY/COUNTY: SWP – Wilmington PROJECT NUMBER: 12–53015.00

SAMPLED BY: Kuntz & Leaphart WEATHER: Overcast 50 to 75 SAMPLE TYPE: Groundwater

SAMPLING METHOD: Bailer SPLITS/SPIKES/DUPLICATES:

SAMPLING CONTAINERS: (NUMBER/SIZE/TYPE) 6/40ML/GW/TFE; 1/250ML/P 2/L/A; 2/250ml/P; 4/1L/AGW/TFE REASON FOR SAMPLING: Phase III Assessment

PARAMETERS REQUESTED: SV, VOC, Cu, As, Cr TPH Diesel, TPH Gas LAB Performing Analysis: Savannah Labs RESPIRATORY PROTECTION: None

SAMPLE NUMBER	DATE	TIME	(TOC) WELL DEPTH	(TOC) WATER LEVEL	PURGE METHOD	SAMPLE APPEARANCE	(GAL) VOLUME PURGED	(C) TEMP.	PPM COND.	pH	REMARKS
MW–6	11–17–93	14:20	21.74	2.87	Bailer	S.T. Brown	3.07	20	420	6.2	0.2 pptd Salinity
							3.07	20	750	6.2	
							3.07	20	740	6.2	
MW–7	11–17–93	15:10	21.88	4.30	"	S.T. Brown	2.86	19	690	6.0	3.8 pptd Salinity
							2.86	20	>2000	6.1	
							2.86	20	>2000	6.1	
MW–8	11–17–93	15:40	21.98	4.70	"	S.T. Brown	2.76	19	370	6.0	0.01 pptd Salinity
							2.76	20	420	6.0	
							2.76	21	460	5.9	
MW–8A	11–17–93	15:20	33.18	4.52	"	Clear	4.59	19	310	7.2	0 pptd Salinity
							4.59	19	340	6.7	
							4.59	21	330	6.4	

SAMPLE NUMBER	DATE	TIME	(TOC) WELL DEPTH	(TOC) WATER LEVEL	PURGE METHOD	SAMPLE APPEARANCE	(GAL) VOLUME PURGED	(C) TEMP.	PPM COND.	pH	REMARKS
MW-9	11-17-93	15.50	21.71	4.22	Bailer	Clear	2.80	19	380	6.1	0.1 pptd Salinity
							2.80	19	380	6.0	
							2.80	20	410	6.1	
MW-10	11-17-93	16:00	14.39	5.05	"	Clear	1.49	18	310	7.0	0.1 pptd Salinity
							1.49	18	330	7.1	
							1.49	19	340	6.6	
MW-11	11-16-93		13.71	5.66							No Sample Collected
											0.01' Heavy Product
MW-11A	11-18-93	15:15	36.47	4.39	Bailer	S.T. Brown	5.13	19	190	7.1	Slight Odor
							5.13	19	230	6.9	0 pptd Salinity
							5.13	19	220	7.2	
MW-11B	11-18-93	8:45	44.32	4.23	"	S.T. Brown	6.41	21	220	9.3	0 pptd Salinity
							6.41	21	220	10.2	
							6.41	20	200	9.6	
MW-12	11-18-93	15:40	13.91	5.60	"	S.T. Brown	1.33	21	60	7.5	Trace Heavy Product
							1.33	20	60	7.2	0 pptd Salinity
							1.33	20	80	7.1	Trace Light Sheen Moderate Odor
MW-13	11-18-93	16:00	14.20	4.97	"	T. Black	1.47	20	590	7.0	Strong Diesel Odor Slight Creosote Odor
							1.47	19	680	6.7	Trace Light Sheen
							1.47	19	780	6.6	0.5 pptd Salinity

SAMPLE NUMBER	DATE	TIME	(TOC) WELL DEPTH	(TOC) WATER LEVEL	PURGE METHOD	SAMPLE APPEARANCE	(GAL) VOLUME PURGED	(C) TEMP.	PPM COND.	pH	REMARKS
MW-14	11-16-93		17.88	4.75							No Sample Collected
											0.41' Heavy Product
MW-14A	11-18-93	15:25	33.44	3.26	Bailer	S.T. Brown	4.83	22	200	6.7	Moderate Odor
							4.83	20	230	6.5	0 pptd Salinity
							4.83	20	220	6.5	
MW-15	11-18-93	14:20	14.02	4.73	"	Clear	1.49	21	510	6.9	Slight Diesel Odor
							1.49	20	560	6.5	0.2 pptd Salinity
							1.49	20	570	6.5	
MW-16	11-18-93	16:20	14.32	5.64	"	S.T. Brown	1.39	20	420	6.9	Moderate Diesel Odor
							1.39	20	360	6.9	Trace Light Sheen
							1.39	20	300	6.8	0.2 pptd Salinity
MW-17	11-18-93	16:10	14.64	5.53	"	S.T. Brown	1.46	20	380	6.9	Moderate Diesel Odor
							1.46	20	370	6.5	Trace Light Sheen
							1.46	19	270	6.7	0.2 pptd Salinity
MW-18	11-17-93	14:50	13.62	4.80	"	V.T. Rust	1.41	20	>2000	7.0	4.0 pptd Salinity
							1.41	20	>2000	6.9	
							1.41	20	>2000	6.8	
MW-19	11-18-93	14:50	15.24	3.24	"	Clear	1.92	20	680	6.4	Slight Odor
							1.92	20	750	6.6	0.1 pptd Salinity
							1.92	20	860	6.6	
MW-19A	11-18-93	9:10	33.61	3.28	"	Clear	4.85	19	290	7.0	Sulphur Odor
							4.85	19	320	6.9	
							4.85	19	290	6.9	

SAMPLE NUMBER	DATE	TIME	(TOC) WELL DEPTH	(TOC) WATER LEVEL	PURGE METHOD	SAMPLE APPEARANCE	(GAL) VOLUME PURGED	(C) TEMP.	PPM COND.	pH	REMARKS
MW-20	11-18-93	8:30	14.66	3.44	Bailer	S.T. Brown	1.80	20	1220	6.4	Very Slight Odor
							1.80	21	1040	6.2	0.9 pptd Salinity
							1.80	21	1040	6.2	
MW-20A	11-17-93	16:15	33.11	3.15	"	Clear	4.79	19	290	6.9	0 pptd Salinity
							4.79	18	290	7.1	
							4.79	18	260	7.1	
MW-21	11-17-93	16:30	9.92	3.82	"	S.T. Brown	0.98	18	430	6.5	0.2 pptd Salinity
							0.98	18	430	6.3	
							0.98	18	410	6.3	
MW-22	11-16-93		13.76	3.75							0.23' Heavy Product
											No Sample Collected
MW-22A	11-18-93	14:05	34.11	3.37	Bailer	Clear	4.92	20	230	6.3	0 pptd Salinity
							4.92	19	270	6.4	
							4.92	19	240	6.4	
MW-23	11-17-93	16:40	11.84	2.86	"	S.T. Brown	1.44	19	1350	6.2	1 pptd Salinity
							1.44	19	1240	6.3	
							1.44	19	1160	6.4	
MW-24	11-18-93	15:05	15.61	3.71	"	T. Brown	1.90	19	1200	6.0	Slight Odor
							1.90	19	1150	6.1	0.8 pptd Salinity
							1.90	19	1140	6.2	
MW-24A	11-17-93	16:50	36.45	3.88	"	Clear	5.21	18	320	6.8	Sulphur Odor
							5.21	18	320	6.9	0.1 pptd Salinity
							5.21	18	270	6.9	

SAMPLE NUMBER	DATE	TIME	(TOC) WELL DEPTH	(TOC) WATER LEVEL	PURGE METHOD	SAMPLE APPEARANCE	(GAL) VOLUME PURGED	(C) TEMP.	PPM COND.	pH	REMARKS
MW-25	11-18-93	8:15	14.91	2.17	Bailer	T. Brown	2.04	20	700	6.2	0.7 pptd Salinity
							0.96	19	770	6.0	Dry 3 Gallons
											Slight Odor
MW-26	11-16-93		20.54	4.14							5.24' Heavy Product
											No Sample Collected
MW-27	11-18-93	14:25	7.31	2.41	Bailer	S.T. Brown	0.78	20	400	6.4	V. Slight Diesel Odor
							0.78	19	410	6.4	0.1 pptd Salinity
							0.78	19	420	6.5	
MW-28	11-18-93	15:40	13.28	4.35	"	S.T. Brown	1.43	18	1470	7.3	Slight Odor
							1.43	18	1960	6.9	Trace Light ~~Product~~ sheen
							1.43	18	1890	6.9	1.5 pptd Salinity
MW-28A	11-18-93	13:50	27.89	4.12	"	Clear	3.80	19	190	7.5	0 pptd Salinity
							3.80	18	280	9.1	
							3.80	18	250	8.5	
MW-29	11-18-93	7:20	9.36	4.29	"	S.T. Yellow	0.81	18	>2000	5.8	Sulphur Odor
							0.81	18	>2000	6.0	2.0 pptd Salinity
							0.81	18	>2000	6.0	
MW-29A	11-18-93	7:40	40.97	3.41	"	Clear	6.01	19	320	7.2	Slight Odor
							6.01	19	260	9.3	0.2 pptd Salinity
							6.01	19	300	8.3	
MW-30	11-18-93	8:00	11.21	4.44	"	S.T. Brown	1.08	19	350	7.1	0.1 pptd Salinity
							1.08	19	650	6.6	
							1.08	19	890	6.4	

Phase III Groundwater Salinity Summary Table

PHASE III GROUNDWATER SALINITY SUMMARY TABLE
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

WELL	DATE	SALINITY
6	11–16–93	200
7	11–16–93	3800
8	11–16–93	100
8A	11–16–93	0
9	11–16–93	100
10	11–16–93	100
11	11–16–93	NA
11A	11–16–93	0
11B	11–16–93	0
12	11–16–93	0
13	11–16–93	500
14	11–16–93	NA
14A	11–16–93	0
15	11–16–93	200
16	11–16–93	200
17	11–16–93	200
18	11–16–93	4000
19	11–16–93	100
19A	11–16–93	0
20	11–16–93	900
20A	11–16–93	0
21	11–16–93	200
22	11–16–93	NA
22A	11–16–93	200
23	11–16–93	1000
24	11–16–93	800
24A	11–16–93	100
25	11–16–93	700
26	11–16–93	NA
27	11–16–93	100
28	11–16–93	1500
28A	11–16–93	0
29	11–16–93	2000
29A	11–16–93	200
30	11–16–93	100

NA – Salinity not collected
Salinity measurements are in parts per million (ppm).

Phase III Groundwater Parameter Summary Table - Metals

PHASE III GROUNDWATER SAMPLE PARAMETER SUMMARY TABLE
METALS
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

METALS	DL*	MW-6	MW-7	MW-8	MW-8A	MW-9	MW-10	MW-11A	MW-11B	MW-12	MW-13
Arsenic	0.01	ND	ND	ND	ND	0.049	0.05	ND	ND	0.029	0.049
Arsenic (Dissolved)	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	0.01	ND	ND	ND	ND	ND	ND	ND	ND	0.024	0.04
Chromium (Dissolved)	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper	0.025	ND	ND	ND	ND	ND	ND	ND	ND	0.043	0.058
Copper (Dissolved)	0.025	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

METALS	DL*	MW-14A	MW-15	MW-16	MW-17	MW-18	MW-19	MW-19A	MW-20	MW-20A	MW-21
Arsenic	0.01	ND	0.088	ND	0.023	0.016	ND	ND	ND	ND	0.019
Arsenic (Dissolved)	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	0.01	ND	ND	ND	0.012	4.6	ND	ND	ND	ND	0.016
Chromium (Dissolved)	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper	0.025	ND	ND	ND	0.025	0.05	ND	ND	ND	ND	ND
Copper (Dissolved)	0.025	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

METALS	DL*	MW-22A	MW-23	MW-24	MW-24A	MW-25	MW-27	MW-28	MW-28A	MW-29	MW-29A	MW-30
Arsenic	0.01	ND	ND	ND	ND	ND	0.014	ND	ND	ND	ND	ND
Arsenic (Dissolved)	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	0.01	ND	ND	0.01	ND	0.011	ND	ND	ND	ND	ND	0.024
Chromium (Dissolved)	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper	0.025	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper (Dissolved)	0.025	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

NOTE: DL = Laboratory Detection Limit
All units in mg/l.

Phase III Groundwater Parameter Summary Table - Semi-Volatiles

PHASE III GROUNDWATER SAMPLE PARAMETER SUMMARY TABLE
SEMI-VOLATILES
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

SEMI-VOLATILES	DL*	MW-6	MW-7	MW-8	MW-8A	MW-9	MW-10	MW-11A	MW-11B	MW-12	MW-13
Acenaphthene	0.01	ND	ND	ND	ND	ND	ND	0.076	0.081	0.77	0.8
Anthracene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)Anthracene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)Pyrene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)Fluoranthene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)Fluoranthene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bis(2-Chloroethyl)Ether	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbazole	0.01	ND	ND	ND	ND	ND	ND	ND	ND	0.21	0.22
4-Chloro-3-Methylphenol	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorophenol	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenz(a,h)Anthracene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dinitrophenol	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	0.31	0.3
Indeno(1,2,3-Cd)Pyrene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Napthalene	0.01	ND	ND	ND	ND	ND	ND	0.31	ND	3.1	3.1
Pentachlorophenol	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	0.01	ND	ND	ND	ND	ND	ND	0.047	0.039	0.74	0.77
Phenol	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachlorophenols	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4,5-Trichlorophenol	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

NOTE: DL = Laboratory Detection Limit

All units in mg/l.

PHASE III GROUNDWATER SAMPLE PARAMETER SUMMARY TABLE
SEMI–VOLATILES
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

SEMI–VOLATILES	DL*	MW–14A	MW–15	MW–16	MW–17	MW–18	MW–19	MW–19A	MW–20	MW–20A	MW–21
Acenaphthene	0.01	0.41	0.074	ND	0.016	ND	0.27	ND	0.014	ND	ND
Anthracene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)Anthracene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)Pyrene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)Fluoranthene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)Fluoranthene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bis(2–Chloroethyl)Ether	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbazole	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4–Chloro–3–Methylphenol	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2–Chlorophenol	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenz(a,h)Anthracene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4–Dimethylphenol	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4–Dinitrophenol	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	0.01	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND
Indeno(1,2,3–Cd)Pyrene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Napthalene	0.01	3.3	0.055	ND	ND	ND	0.29	ND	ND	ND	ND
Pentachlorophenol	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	0.01	ND	0.015	ND	0.017	ND	0.077	ND	ND	ND	ND
Phenol	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachlorophenols	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4,5–Trichlorophenol	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4,6–Trichlorophenol	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

NOTE: DL = Laboratory Detection Limit

All units in mg/l.

PHASE III GROUNDWATER SAMPLE PARAMETER SUMMARY TABLE
SEMI-VOLATILES
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

SEMI-VOLATILES	DL*	MW-22A	MW-23	MW-24	MW-24A	MW-25	MW-27	MW-28	MW-28A	MW-29	MW-29A	MW-30
Acenaphthene	0.01	0.012	ND	0.29	ND	0.043	ND	0.012	ND	ND	0.54	0.04
Anthracene	0.01	ND	ND	ND	ND	0.025	ND	ND	ND	ND	ND	0.026
Benzo(a)Anthracene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)Pyrene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)Fluoranthene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)Fluoranthene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bis(2-Chloroethyl)Ether	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbazole	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.019	0.013
4-Chloro-3-Methylphenol	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorophenol	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenz(a,h)Anthracene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dinitrophenol	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	0.01	ND	ND	ND	ND	0.034	ND	ND	ND	ND	ND	0.016
Indeno(1,2,3-Cd)Pyrene	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Napthalene	0.01	0.018	ND	0.29	ND	ND	ND	ND	ND	ND	ND	ND
Pentachlorophenol	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	0.01	ND	ND	0.068	ND	0.062	ND	0.021	ND	ND	ND	0.058
Phenol	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachlorophenols	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4,5-Trichlorophenol	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

NOTE: DL = Laboratory Detection Limit

All units in mg/l.

Phase III Groundwater Parameter Summary Table - Volatiles

PHASE III GROUNDWATER SAMPLE PARAMETER SUMMARY TABLE
VOLATILES
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

VOLATILES	DL*	MW-6	MW-7	MW-8	MW-8A	MW-9	MW-10	MW-11A	MW-11B	MW-12	MW-13
Benzene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.046
Bromodichloroethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethylvinyl Ether	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cis-1,3-Dichloropropene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromomethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichloromethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl Benzene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.026
Fluorotrichloromethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
M/P-Xylene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	0.011	0.014
Methyl-T-Butyl Ether (Mtbe)	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-Xylene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	0.0066	0.013
1,1,2,2-Tetrachloroethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	0.0074	ND
Trans-1,2-Dichloroethylene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

NOTE: DL = Laboratory Detection Limit
All units in mg/l

PHASE III GROUNDWATER SAMPLE PARAMETER SUMMARY TABLE
VOLATILES
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

VOLATILES	DL*	MW-14A	MW-15	MW-16	MW-17	MW-18	MW-19	MW-19A	MW-20	MW-20A	MW-21
Benzene	0.005	ND	ND	ND	ND	ND	0.0055	ND	ND	ND	ND
Bromodichloroethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethylvinyl Ether	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cis-1,3-Dichloropropene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromomethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichloromethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl Benzene	0.005	0.018	0.0051	ND	ND	ND	0.0058	ND	ND	ND	ND
Fluorotrichloromethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
M/P-Xylene	0.005	0.02	ND	ND	ND	ND	0.0054	ND	ND	ND	ND
Methyl-T-Butyl Ether (Mtbe)	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-Xylene	0.005	0.0087	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trans-1,2-Dichloroethylene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

NOTE: DL = Laboratory Detection Limit
All units in mg/l

PHASE III GROUNDWATER SAMPLE PARAMETER SUMMARY TABLE
VOLATILES
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

VOLATILES	DL*	MW-22A	MW-23	MW-24	MW-24A	MW-25	MW-27	MW-28	MW-28A	MW-29	MW-29A	MW-30
Benzene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloroethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethylvinyl Ether	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cis-1,3-Dichloropropene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromomethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichloromethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl Benzene	0.005	ND	ND	0.0089	ND	ND	ND	ND	ND	ND	ND	ND
Fluorotrichloromethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
M/P-Xylene	0.005	0.0061	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl-T-Butyl Ether (Mtbe)	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-Xylene	0.005	0.006	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trans-1,2-Dichloroethylene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

NOTE: DL = Laboratory Detection Limit

All units in mg/l

Phase III Groundwater Parameter Summary Table - Hydrocarbons

PHASE III GROUNDWATER SAMPLE PARAMETER SUMMARY TABLE
HYDROCARBONS
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

HYDROCARBONS	DL*	MW-6	MW-18	MW-27
Hydrocarbons as Gasoline	0.05	ND	ND	ND
Hydrocarbons as Kerosene	0.3	ND	ND	ND
Hydrocarbons as Heavy Oils	1.0	ND	ND	ND
Hydrocarbons as Mineral Spirits	0.3	ND	ND	ND
Hydrocarbons as Varsol	0.3	ND	ND	ND
Hydrocarbons as Fuel Oil/Diesel	0.3	ND	ND	ND

NOTE: DL = Laboratory Detection Limit
All units in mg/l

Phase III Groundwater Sample Laboratory Analytical Data and QA/QC

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

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

MAS
G. Kurtz - ETC

RECEIVED
JAN 0 3 1994
ENVIRONMENTAL

LOG NO: S3-46553

Received: 18 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46553-1	MW-7 (# 11437)	11-17-93
46553-2	MW-8A (# 11438)	11-17-93
46553-3	MW-8 (# 11439)	11-17-93
46553-4	MW-9 (# 11440)	11-17-93
46553-5	MW-10 (# 11441)	11-17-93

PARAMETER	46553-1	46553-2	46553-3	46553-4	46553-5
Semivolatile Organics (8270)					
bis(2-Chloroethyl)ether, mg/l	ND	ND	ND	ND	ND
Naphthalene, mg/l	ND	ND	ND	ND	ND
Acenaphthene, mg/l	ND	ND	ND	ND	ND
Phenanthrene, mg/l	ND	ND	ND	ND	ND
Anthracene, mg/l	ND	ND	ND	ND	ND
Fluoranthene, mg/l	ND	ND	ND	ND	ND
Chrysene, mg/l	ND	ND	ND	ND	ND
Benzo(a)Anthracene, mg/l	ND	ND	ND	ND	ND
Benzo(b)fluoranthene, mg/l	ND	ND	ND	ND	ND
Benzo(k)fluoranthene, mg/l	ND	ND	ND	ND	ND
Benzo(a)pyrene, mg/l	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene, mg/l	ND	ND	ND	ND	ND
Dibenz(a,h)anthracene, mg/l	ND	ND	ND	ND	ND
2-Chlorophenol, mg/l	ND	ND	ND	ND	ND
Phenol, mg/l	ND	ND	ND	ND	ND
2,4-Dimethylphenol, mg/l	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol, mg/l	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol, mg/l	ND	ND	ND	ND	ND
2,4-Dinitrophenol, mg/l	ND	ND	ND	ND	ND
Pentachlorophenol, mg/l	ND	ND	ND	ND	ND
2,4,5-Trichlorophenol, mg/l	ND	ND	ND	ND	ND
Carbazole, mg/l	ND	ND	ND	ND	ND
Tetrachlorophenols, mg/l	ND	ND	ND	ND	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

LOG NO: S3-46553

Received: 18 NOV 93

RECEIVED
JAN 0 3 1994
ENVIRONMENTAL

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46553-1	MW-7 (# 11437)	11-17-93
46553-2	MW-8A (# 11438)	11-17-93
46553-3	MW-8 (# 11439)	11-17-93
46553-4	MW-9 (# 11440)	11-17-93
46553-5	MW-10 (# 11441)	11-17-93

PARAMETER	46553-1	46553-2	46553-3	46553-4	46553-5
Volatiles by GC/MS					
Chloromethane, mg/l	ND	ND	ND	ND	ND
Bromomethane, mg/l	ND	ND	ND	ND	ND
Vinyl Chloride, mg/l	ND	ND	ND	ND	ND
Chloroethane, mg/l	ND	ND	ND	ND	ND
Methylene Chloride (Dichloromethane), mg/l	ND	ND	ND	ND	ND
1,1-Dichloroethene, mg/l	ND	ND	ND	ND	ND
1,1-Dichloroethane, mg/l	ND	ND	ND	ND	ND
Trans-1,2-Dichloroethylene, mg/l	ND	ND	ND	ND	ND
1,2-Dichloroethane, mg/l	ND	ND	ND	ND	ND
1,1,1-Trichloroethane, mg/l	ND	ND	ND	ND	ND
Carbon Tetrachloride, mg/l	ND	ND	ND	ND	ND
Bromodichloromethane, mg/l	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane, mg/l	ND	ND	ND	ND	ND
1,2-Dichloropropane, mg/l	ND	ND	ND	ND	ND
Trichloroethene, mg/l	ND	ND	ND	ND	ND
Dibromochloromethane, mg/l	ND	ND	ND	ND	ND
1,1,2-Trichloroethane, mg/l	ND	ND	ND	ND	ND
Benzene, mg/l	ND	ND	ND	ND	ND

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

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

RECEIVED JAN 03 1994 ENVIRONMENTAL

LOG NO: S3-46553

Received: 18 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46553-1	MW-7 (# 11437)	11-17-93
46553-2	MW-8A (# 11438)	11-17-93
46553-3	MW-8 (# 11439)	11-17-93
46553-4	MW-9 (# 11440)	11-17-93
46553-5	MW-10 (# 11441)	11-17-93

PARAMETER	46553-1	46553-2	46553-3	46553-4	46553-5
Cis-1,3-Dichloropropene, mg/l	ND	ND	ND	ND	ND
2-Chloroethylvinyl Ether, mg/l	ND	ND	ND	ND	ND
Toluene, mg/l	ND	ND	ND	ND	ND
Chlorobenzene, mg/l	ND	ND	ND	ND	ND
Ethylbenzene, mg/l	ND	ND	ND	ND	ND
Methyl-Tert-Butyl-Ether (MTBE), mg/l	ND	ND	ND	ND	ND
Dichlorodifluoromethane, mg/l	ND	ND	ND	ND	ND
m&p-Xylene, mg/l	ND	ND	ND	ND	ND
o-Xylene, mg/l	ND	ND	ND	ND	ND
Fluorotrichloromethane, mg/l	ND	ND	ND	ND	ND
1,2-Dibromoethane (EDB) , mg/l	ND	ND	ND	ND	ND
Arsenic, mg/l	ND	ND	ND	0.049	0.050
Arsenic (Dissolved), mg/l	ND	ND	ND	ND	ND
Chromium, mg/l	ND	ND	ND	ND	ND
Chromium (Dissolved), mg/l	ND	ND	ND	ND	ND
Copper, mg/l	ND	ND	ND	ND	ND
Copper (Dissolved), mg/l	ND	ND	ND	ND	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 03 1994
ENVIRONMENTAL ...

LOG NO: S3-46553

Received: 18 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46553-6	MW-20A (# 11442)	11-17-93
46553-7	MW-21 (# 11443)	11-17-93
46553-8	MW-23 (# 11444)	11-17-93
46553-9	MW-24A (# 11445)	11-17-93
46553-10	Trip Blank	11-17-93

PARAMETER	46553-6	46553-7	46553-8	46553-9	46553-10
Semivolatile Organics (8270)					
bis(2-Chloroethyl)ether, mg/l	ND	ND	ND	ND	ND
Naphthalene, mg/l	ND	ND	ND	ND	ND
Acenaphthene, mg/l	ND	ND	ND	ND	ND
Phenanthrene, mg/l	ND	ND	ND	ND	ND
Anthracene, mg/l	ND	ND	ND	ND	ND
Fluoranthene, mg/l	ND	ND	ND	ND	ND
Chrysene, mg/l	ND	ND	ND	ND	ND
Benzo(a)Anthracene, mg/l	ND	ND	ND	ND	ND
Benzo(b)fluoranthene, mg/l	ND	ND	ND	ND	ND
Benzo(k)fluoranthene, mg/l	ND	ND	ND	ND	ND
Benzo(a)pyrene, mg/l	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene, mg/l	ND	ND	ND	ND	ND
Dibenz(a,h)anthracene, mg/l	ND	ND	ND	ND	ND
2-Chlorophenol, mg/l	ND	ND	ND	ND	ND
Phenol, mg/l	ND	ND	ND	ND	ND
2,4-Dimethylphenol, mg/l	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol, mg/l	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol, mg/l	ND	ND	ND	ND	ND
2,4-Dinitrophenol, mg/l	ND	ND	ND	ND	ND
Pentachlorophenol, mg/l	ND	ND	ND	ND	ND
2,4,5-Trichlorophenol, mg/l	ND	ND	ND	ND	ND
Carbazole, mg/l	ND	ND	ND	ND	ND
Tetrachlorophenols, mg/l	ND	ND	ND	ND	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 0 3 1994
ENVIRONMENTAL ...

LOG NO: S3-46553

Received: 18 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46553-6	MW-20A (# 11442)	11-17-93
46553-7	MW-21 (# 11443)	11-17-93
46553-8	MW-23 (# 11444)	11-17-93
46553-9	MW-24A (# 11445)	11-17-93
46553-10	Trip Blank	11-17-93

PARAMETER	46553-6	46553-7	46553-8	46553-9	46553-10
Volatiles by GC/MS					
Chloromethane, mg/l	ND	ND	ND	ND	ND
Bromomethane, mg/l	ND	ND	ND	ND	ND
Vinyl Chloride, mg/l	ND	ND	ND	ND	ND
Chloroethane, mg/l	ND	ND	ND	ND	ND
Methylene Chloride (Dichloromethane), mg/l	ND	ND	ND	ND	ND
1,1-Dichloroethene, mg/l	ND	ND	ND	ND	ND
1,1-Dichloroethane, mg/l	ND	ND	ND	ND	ND
Trans-1,2-Dichloroethylene, mg/l	ND	ND	ND	ND	ND
1,2-Dichloroethane, mg/l	ND	ND	ND	ND	ND
1,1,1-Trichloroethane, mg/l	ND	ND	ND	ND	ND
Carbon Tetrachloride, mg/l	ND	ND	ND	ND	ND
Bromodichloromethane, mg/l	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane, mg/l	ND	ND	ND	ND	ND
1,2-Dichloropropane, mg/l	ND	ND	ND	ND	ND
Trichloroethene, mg/l	ND	ND	ND	ND	ND
Dibromochloromethane, mg/l	ND	ND	ND	ND	ND
1,1,2-Trichloroethane, mg/l	ND	ND	ND	ND	ND
Benzene, mg/l	ND	ND	ND	ND	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 0 3 1994
ENVIRONMENTAL ...

LOG NO: S3-46553

Received: 18 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46553-6	MW-20A (# 11442)	11-17-93
46553-7	MW-21 (# 11443)	11-17-93
46553-8	MW-23 (# 11444)	11-17-93
46553-9	MW-24A (# 11445)	11-17-93
46553-10	Trip Blank	11-17-93

PARAMETER	46553-6	46553-7	46553-8	46553-9	46553-10
Cis-1,3-Dichloropropene, mg/l	ND	ND	ND	ND	ND
2-Chloroethylvinyl Ether, mg/l	ND	ND	ND	ND	ND
Toluene, mg/l	ND	ND	ND	ND	ND
Chlorobenzene, mg/l	ND	ND	ND	ND	ND
Ethylbenzene, mg/l	ND	ND	ND	ND	ND
Methyl-Tert-Butyl-Ether (MTBE), mg/l	ND	ND	ND	ND	ND
Dichlorodifluoromethane, mg/l	ND	ND	ND	ND	ND
m&p-Xylene, mg/l	ND	ND	ND	ND	ND
o-Xylene, mg/l	ND	ND	ND	ND	ND
Fluorotrichloromethane, mg/l	ND	ND	ND	ND	ND
1,2-Dibromoethane (EDB) , mg/l	ND	ND	ND	ND	ND
Arsenic, mg/l	ND	0.019	ND	ND	ND
Arsenic (Dissolved), mg/l	ND	ND	ND	ND	ND
Chromium, mg/l	ND	0.016	ND	ND	ND
Chromium (Dissolved), mg/l	ND	ND	ND	ND	ND
Copper, mg/l	ND	ND	ND	ND	ND
Copper (Dissolved), mg/l	ND	ND	ND	ND	ND

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 0 3 1994
ENVIRONMENTAL

LOG NO: S3-46553

Received: 18 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46553-11	Field Blank	11-17-93

PARAMETER	46553-11
Semivolatile Organics (8270)	
bis(2-Chloroethyl)ether, mg/l	ND
Naphthalene, mg/l	ND
Acenaphthene, mg/l	ND
Phenanthrene, mg/l	ND
Anthracene, mg/l	ND
Fluoranthene, mg/l	ND
Chrysene, mg/l	ND
Benzo(a)Anthracene, mg/l	ND
Benzo(b)fluoranthene, mg/l	ND
Benzo(k)fluoranthene, mg/l	ND
Benzo(a)pyrene, mg/l	ND
Indeno(1,2,3-cd)pyrene, mg/l	ND
Dibenz(a,h)anthracene, mg/l	ND
2-Chlorophenol, mg/l	ND
Phenol, mg/l	ND
2,4-Dimethylphenol, mg/l	ND
2,4,6-Trichlorophenol, mg/l	ND
4-Chloro-3-methylphenol, mg/l	ND
2,4-Dinitrophenol, mg/l	ND
Pentachlorophenol, mg/l	ND
2,4,5-Trichlorophenol, mg/l	ND
Carbazole, mg/l	ND
Tetrachlorophenols, mg/l	ND

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

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

RECEIVED JAN 03 1994

LOG NO: S3-46553

Received: 18 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46553-11	Field Blank	11-17-93

PARAMETER	46553-11
Volatiles by GC/MS	
Chloromethane, mg/l	ND
Bromomethane, mg/l	ND
Vinyl Chloride, mg/l	ND
Chloroethane, mg/l	ND
Methylene Chloride (Dichloromethane), mg/l	ND
1,1-Dichloroethene, mg/l	ND
1,1-Dichloroethane, mg/l	ND
Trans-1,2-Dichloroethylene, mg/l	ND
1,2-Dichloroethane, mg/l	ND
1,1,1-Trichloroethane, mg/l	ND
Carbon Tetrachloride, mg/l	ND
Bromodichloromethane, mg/l	ND
1,1,2,2-Tetrachloroethane, mg/l	ND
1,2-Dichloropropane, mg/l	ND
Trichloroethene, mg/l	ND
Dibromochloromethane, mg/l	ND
1,1,2-Trichloroethane, mg/l	ND
Benzene, mg/l	ND
Cis-1,3-Dichloropropene, mg/l	ND
2-Chloroethylvinyl Ether, mg/l	ND
Toluene, mg/l	ND
Chlorobenzene, mg/l	ND
Ethylbenzene, mg/l	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 0 3 1994
ENVIRONMENTAL

LOG NO: S3-46553

Received: 18 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46553-11	Field Blank	11-17-93

PARAMETER	46553-11
Methyl-Tert-Butyl-Ether (MTBE), mg/l	ND
Dichlorodifluoromethane, mg/l	ND
m&p-Xylene, mg/l	ND
o-Xylene, mg/l	ND
Fluorotrichloromethane, mg/l	ND
1,2-Dibromoethane (EDB) , mg/l	ND
Arsenic, mg/l	ND
Arsenic (Dissolved), mg/l	ND
Chromium, mg/l	ND
Chromium (Dissolved), mg/l	ND
Copper, mg/l	ND
Copper (Dissolved), mg/l	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 03 1994
ENVIRONMENTAL

LOG NO: S3-46553

Received: 18 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46553-12	MW-6 (# 11435)	11-17-93
46553-13	MW-18 (# 11436)	11-17-93

PARAMETER	46553-12	46553-13
Semivolatile Organics (8270)		
bis(2-Chloroethyl)ether, mg/l	ND	ND
Naphthalene, mg/l	ND	ND
Acenaphthene, mg/l	ND	ND
Phenanthrene, mg/l	ND	ND
Anthracene, mg/l	ND	ND
Fluoranthene, mg/l	ND	ND
Chrysene, mg/l	ND	ND
Benzo(a)Anthracene, mg/l	ND	ND
Benzo(b)fluoranthene, mg/l	ND	ND
Benzo(k)fluoranthene, mg/l	ND	ND
Benzo(a)pyrene, mg/l	ND	ND
Indeno(1,2,3-cd)pyrene, mg/l	ND	ND
Dibenz(a,h)anthracene, mg/l	ND	ND
2-Chlorophenol, mg/l	ND	ND
Phenol, mg/l	ND	ND
2,4-Dimethylphenol, mg/l	ND	ND
2,4,6-Trichlorophenol, mg/l	ND	ND
4-Chloro-3-methylphenol, mg/l	ND	ND
2,4-Dinitrophenol, mg/l	ND	ND
Pentachlorophenol, mg/l	ND	ND
2,4,5-Trichlorophenol, mg/l	ND	ND
Carbazole, mg/l	ND	ND
Tetrachlorophenols, mg/l	ND	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 0 3 1994
ENVIRONMENTAL

LOG NO: S3-46553

Received: 18 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46553-12	MW-6 (# 11435)	11-17-93
46553-13	MW-18 (# 11436)	11-17-93

PARAMETER	46553-12	46553-13
Volatiles by GC/MS		
Chloromethane, mg/l	ND	ND
Bromomethane, mg/l	ND	ND
Vinyl Chloride, mg/l	ND	ND
Chloroethane, mg/l	ND	ND
Methylene Chloride (Dichloromethane), mg/l	ND	ND
1,1-Dichloroethene, mg/l	ND	ND
1,1-Dichloroethane, mg/l	ND	ND
Trans-1,2-Dichloroethylene, mg/l	ND	ND
1,2-Dichloroethane, mg/l	ND	ND
1,1,1-Trichloroethane, mg/l	ND	ND
Carbon Tetrachloride, mg/l	ND	ND
Bromodichloromethane, mg/l	ND	ND
1,1,2,2-Tetrachloroethane, mg/l	ND	ND
1,2-Dichloropropane, mg/l	ND	ND
Trichloroethene, mg/l	ND	ND
Dibromochloromethane, mg/l	ND	ND
1,1,2-Trichloroethane, mg/l	ND	ND
Benzene, mg/l	ND	ND
Cis-1,3-Dichloropropene, mg/l	ND	ND
2-Chloroethylvinyl Ether, mg/l	ND	ND
Toluene, mg/l	ND	ND
Chlorobenzene, mg/l	ND	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 03 1994
ENVIRONMENTAL

LOG NO: S3-46553

Received: 18 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46553-12	MW-6 (# 11435)	11-17-93
46553-13	MW-18 (# 11436)	11-17-93

PARAMETER	46553-12	46553-13
Ethylbenzene, mg/l	ND	ND
Methyl-Tert-Butyl-Ether (MTBE), mg/l	ND	ND
Dichlorodifluoromethane, mg/l	ND	ND
m&p-Xylene, mg/l	ND	ND
o-Xylene, mg/l	ND	ND
Fluorotrichloromethane, mg/l	ND	ND
1,2-Dibromoethane (EDB) , mg/l	ND	ND
Arsenic, mg/l	ND	0.016
Arsenic (Dissolved), mg/l	ND	ND
Chromium, mg/l	ND	4.6
Chromium (Dissolved), mg/l	ND	ND
Copper, mg/l	ND	0.050
Copper (Dissolved), mg/l	ND	ND
Hydrocarbons (Modified 8015 - Ext.)		
Hydrocarbons as Kerosene, mg/l	ND	ND
Hydrocarbons as Heavy Oils, mg/l	ND	ND
Hydrocarbons as Mineral Spirits, mg/l	ND	ND
Hydrocarbons as Varsol, mg/l	ND	ND
Hydrocarbons as Fuel Oil/Diesel, mg/l	ND	ND
Hydrocarbons (Modified 8015)		
Hydrocarbons as Gasoline, mg/l	ND	ND

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

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

LOG NO: S3-46553

RECEIVED JAN 03 1994 ENVIRONMENTAL

Received: 18 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
46553-14	Detection Limits
46553-15	Accuracy (mean % recovery)
46553-16	Precision (% RPD)
46553-17	Analyst Initials)
46553-18	EPA Method Numbers

PARAMETER	46553-14	46553-15	46553-16	46553-17	46553-18
Semivolatile Organics (8270)					
1,4-Dichlorobenzene, mg/l	0.010	85 %	14 %	BK	8270
bis(2-Chloroethyl)ether, mg/l	0.010	---	---	BK	8270
N-Nitrosodi-N-Propylamine, mg/l	0.010	115 %	10 %	BK	8270
1,2,4-Trichlorobenzene, mg/l	0.010	93 %	13 %	BK	8270
Naphthalene, mg/l	0.010	---	---	BK	8270
Acenaphthene, mg/l	0.010	96 %	10 %	BK	8270
2,4-Dinitrotoluene, mg/l	0.010	116 %	12 %	BK	8270
Phenanthrene, mg/l	0.010	---	---	BK	8270
Anthracene, mg/l	0.010	---	---	BK	8270
Fluoranthene, mg/l	0.010	---	---	BK	8270
Pyrene, mg/l	0.010	113 %	11 %	BK	8270
Chrysene, mg/l	0.010	---	---	BK	8270
Benzo(a)Anthracene, mg/l	0.010	---	---	BK	8270
Benzo(b)fluoranthene, mg/l	0.010	---	---	BK	8270
Benzo(k)fluoranthene, mg/l	0.010	---	---	BK	8270
Benzo(a)pyrene, mg/l	0.010	---	---	BK	8270
Indeno(1,2,3-cd)pyrene, mg/l	0.010	---	---	BK	8270
Dibenz(a,h)anthracene, mg/l	0.010	---	---	BK	8270
2-Chlorophenol, mg/l	0.010	85 %	14 %	BK	8270

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 03 1994
ENVIRONMENTAL

LOG NO: S3-46553

Received: 18 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
46553-14	Detection Limits
46553-15	Accuracy (mean % recovery)
46553-16	Precision (% RPD)
46553-17	Analyst Initials)
46553-18	EPA Method Numbers

PARAMETER	46553-14	46553-15	46553-16	46553-17	46553-18
Phenol, mg/l	0.010	86 %	13 %	BK	8270
2,4-Dimethylphenol, mg/l	0.010	---	---	BK	8270
2,4,6-Trichlorophenol, mg/l	0.010	---	---	BK	8270
4-Chloro-3-methylphenol, mg/l	0.010	89 %	10 %	BK	8270
2,4-Dinitrophenol, mg/l	0.050	---	---	BK	8270
Pentachlorophenol, mg/l	0.050	61 %	16 %	BK	8270
4-Nitrophenol, mg/l	0.050	78 %	13 %	BK	8270
2,4,5-Trichlorophenol, mg/l	0.010	---	---	BK	8270
Carbazole, mg/l	0.010	---	---	BK	8270
Tetrachlorophenols, mg/l	0.010	---	---	BK	8270

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

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

LOG NO: S3-46553

RECEIVED JAN 03 1994

Received: 18 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
46553-14	Detection Limits
46553-15	Accuracy (mean % recovery)
46553-16	Precision (% RPD)
46553-17	Analyst Initials)
46553-18	EPA Method Numbers

PARAMETER	46553-14	46553-15	46553-16	46553-17	46553-18
Volatiles by GC/MS					
Chloromethane, mg/l	0.010	---	---	KA	8240
Bromomethane, mg/l	0.010	---	---	KA	8240
Vinyl Chloride, mg/l	0.010	---	---	KA	8240
Chloroethane, mg/l	0.010	---	---	KA	8240
Methylene Chloride (Dichloromethane), mg/l	0.0050	---	---	KA	8240
1,1-Dichloroethene, mg/l	0.0050	80 %	8.7 %	KA	8240
1,1-Dichloroethane, mg/l	0.0050	---	---	KA	8240
Trans-1,2-Dichloroethylene, mg/l	0.0050	---	---	KA	8240
1,2-Dichloroethane, mg/l	0.0050	---	---	KA	8240
1,1,1-Trichloroethane, mg/l	0.0050	---	---	KA	8240
Carbon Tetrachloride, mg/l	0.0050	---	---	KA	8240
Bromodichloromethane, mg/l	0.0050	---	---	KA	8240
1,1,2,2-Tetrachloroethane, mg/l	0.0050	---	---	KA	8240
1,2-Dichloropropane, mg/l	0.0050	---	---	KA	8240
Trichloroethene, mg/l	0.0050	95 %	11 %	KA	8240
Dibromochloromethane, mg/l	0.0050	---	---	KA	8240
1,1,2-Trichloroethane, mg/l	0.0050	---	---	KA	8240
Benzene, mg/l	0.0050	107 %	15 %	KA	8240

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

LOG NO: S3-46553

Received: 18 NOV 93

RECEIVED
JAN 03 1994
ENVIRONMENTAL

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
46553-14	Detection Limits
46553-15	Accuracy (mean % recovery)
46553-16	Precision (% RPD)
46553-17	Analyst Initials)
46553-18	EPA Method Numbers

PARAMETER	46553-14	46553-15	46553-16	46553-17	46553-18
Cis-1,3-Dichloropropene, mg/l	0.0050	---	---	KA	8240
2-Chloroethylvinyl Ether, mg/l	0.050	---	---	KA	8240
Toluene, mg/l	0.0050	103 %	9.3 %	KA	8240
Chlorobenzene, mg/l	0.0050	112 %	8.0 %	KA	8240
Ethylbenzene, mg/l	0.0050	---	---	KA	8240
Methyl-Tert-Butyl-Ether (MTBE), mg/l	0.010	---	---	KA	8240
Dichlorodifluoromethane, mg/l	0.0050	---	---	KA	8240
m&p-Xylene, mg/l	0.0050	---	---	KA	8240
o-Xylene, mg/l	0.0050	---	---	KA	8240
Fluorotrichloromethane, mg/l	0.0050	---	---	KA	8240
1,2-Dibromoethane (EDB) , mg/l	0.0050	---	---	KA	8240
Arsenic, mg/l	0.010	103 %	2.3 %	CH	7060
Arsenic (Dissolved), mg/l	0.010	110 %	1.5 %	CH	7060
Chromium, mg/l	0.010	100 %	0.39 %	AL	6010
Chromium (Dissolved), mg/l	0.010	99 %	0.26 %	AL	6010
Copper, mg/l	0.025	100 %	0.60 %	AL	6010
Copper (Dissolved), mg/l	0.025	99 %	0.14 %	AL	6010

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 03 1994
ENVIRONMENTAL

LOG NO: S3-46553

Received: 18 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
46553-14	Detection Limits
46553-15	Accuracy (mean % recovery)
46553-16	Precision (% RPD)
46553-17	Analyst Initials)
46553-18	EPA Method Numbers

PARAMETER	46553-14	46553-15	46553-16	46553-17	46553-18
Hydrocarbons (Modified 8015 - Ext.)					
Hydrocarbons as Kerosene, mg/l	0.30	---	---	LM	8015
Hydrocarbons as Heavy Oils, mg/l	1.0	---	---	LM	8015
Hydrocarbons as Mineral Spirits, mg/l	0.30	---	---	LM	8015
Hydrocarbons as Varsol, mg/l	0.30	---	---	LM	8015
Hydrocarbons as Fuel Oil/Diesel, mg/l	0.30	78 %	15 %	LM	8015
Hydrocarbons (Modified 8015)					
Hydrocarbons as Gasoline, mg/l	0.050	94 %	2.1 %	SLG	8015

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

LOG NO: S3-46553

Received: 18 NOV 93

RECEIVED
JAN 03 1994
ENVIRONMENTAL

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
46553-19	Dates Extracted
46553-20	Dates Analyzed

PARAMETER	46553-19	46553-20
Semivolatile Organics (8270)		
bis(2-Chloroethyl)ether	11.23.93	12.02.93
Naphthalene	11.23.93	12.02.93
Acenaphthene	11.23.93	12.02.93
Phenanthrene	11.23.93	12.02.93
Anthracene	11.23.93	12.02.93
Fluoranthene	11.23.93	12.02.93
Chrysene	11.23.93	12.02.93
Benzo(a)Anthracene	11.23.93	12.02.93
Benzo(b)fluoranthene	11.23.93	12.02.93
Benzo(k)fluoranthene	11.23.93	12.02.93
Benzo(a)pyrene	11.23.93	12.02.93
Indeno(1,2,3-cd)pyrene	11.23.93	12.02.93
Dibenz(a,h)anthracene	11.23.93	12.02.93
2-Chlorophenol	11.23.93	12.02.93
Phenol	11.23.93	12.02.93
2,4-Dimethylphenol	11.23.93	12.02.93
2,4,6-Trichlorophenol	11.23.93	12.02.93
4-Chloro-3-methylphenol	11.23.93	12.02.93
2,4-Dinitrophenol	11.23.93	12.02.93
Pentachlorophenol	11.23.93	12.02.93
2,4,5-Trichlorophenol	11.23.93	12.02.93

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 0 3 1994
ENVIRONMENTAL

LOG NO: S3-46553

Received: 18 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
46553-19	Dates Extracted
46553-20	Dates Analyzed

PARAMETER	46553-19	46553-20
Volatiles by GC/MS		
Chloromethane	---	11.25.93
Bromomethane	---	11.25.93
Vinyl Chloride	---	11.25.93
Chloroethane	---	11.25.93
Methylene Chloride (Dichloromethane)	---	11.25.93
1,1-Dichloroethene	---	11.25.93
1,1-Dichloroethane	---	11.25.93
Trans-1,2-Dichloroethylene	---	11.25.93
1,2-Dichloroethane	---	11.25.93
1,1,1-Trichloroethane	---	11.25.93
Carbon Tetrachloride	---	11.25.93
Bromodichloromethane	---	11.25.93
1,1,2,2-Tetrachloroethane	---	11.25.93
1,2-Dichloropropane	---	11.25.93
Trichloroethene	---	11.25.93
Dibromochloromethane	---	11.25.93
1,1,2-Trichloroethane	---	11.25.93
Benzene	---	11.25.93
Cis-1,3-Dichloropropene	---	11.25.93
2-Chloroethylvinyl Ether	---	11.25.93
Toluene	---	11.25.93
Chlorobenzene	---	11.25.93

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 0 3 1994
ENVIRONMENTAL ...

LOG NO: S3-46553

Received: 18 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
46553-19	Dates Extracted
46553-20	Dates Analyzed

PARAMETER	46553-19	46553-20
Ethylbenzene	---	11.25.93
Methyl-Tert-Butyl-Ether (MTBE)	---	11.25.93
Dichlorodifluoromethane	---	11.25.93
m&p-Xylene	---	11.25.93
o-Xylene	---	11.25.93
Fluorotrichloromethane	---	11.25.93
1,2-Dibromoethane (EDB)	---	11.25.93
Fluorotrichlorome	---	---
M/P-Xylenes	---	---
O-Xylenes	---	---
Arsenic	---	12.07.93
Arsenic (Dissolved)	---	12.07.93
Chromium	---	12.07.93
Chromium (Dissolved)	---	12.08.93
Copper	---	12.07.93
Copper (Dissolved)	---	12.08.93
Hydrocarbons (Modified 8015 - Ext.)		
Hydrocarbons as Kerosene	11.23.93	12.05.93
Hydrocarbons as Heavy Oils	11.23.93	12.05.93
Hydrocarbons as Mineral Spirits	11.23.93	12.05.93
Hydrocarbons as Varsol	11.23.93	12.05.93
Hydrocarbons as Fuel Oil/Diesel	11.23.93	12.05.93

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

LOG NO: S3-46553

RECEIVED
JAN 0 3 1994
ENVIRONMENTAL

Received: 18 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
46553-19	Dates Extracted
46553-20	Dates Analyzed

PARAMETER	46553-19	46553-20
Hydrocarbons (Modified 8015)		
Hydrocarbons as Gasoline	---	11.24.93

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

LOG NO: S3-46553

RECEIVED
JAN 0 3 1994
ENVIRONMENTAL

Received: 18 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
46553-21	Report Completion Date

PARAMETER	46553-21
Date Reported	12.30.93

Methods: EPA SW-846
ND = Not Detected

J. W. Andrews, Ph. D.

Final Page Of Report

SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

05184

☒ 5102 LaRoche Avenue, Savannah, GA 31404 — Phone: (912) 354-7858 — Fax (912) 352-0165
☐ 2846 Industrial Plaza Drive, Tallahassee, FL 32301 — Phone: (904) 878-3994 — Fax (904) 878-9504
☐ 414 Southwest 12th Avenue, Deerfield Beach, FL 33442 — Phone: (305) 421-7400 — Fax (305) 421-2584
☐ 900 Lakeside Drive, Mobile, AL 36693 — Phone: (205) 666-6633 — Fax (205) 666-6696
☐ 6712 Benjamin Road, Suite 100, Tampa, FL 33634 — Phone: (813) 885-7427 — Fax (813) 885-7049

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Wilmington Site Specific

P.O. NUMBER	PROJECT NUMBER	PROJECT NAME	PAGE	OF
	12-53015.00	SWP-Wilmington	1	1

CLIENT NAME	TELEPHONE/FAX NO.
ViroGroup, Inc.	803-957-6270 / 803-957-3845

CLIENT ADDRESS / CITY, STATE, ZIP CODE: 1445 Pisgah Church Rd Lexington, SC 29072

SAMPLER(S) NAME(S): Greg Kuntz, James Leaphart

CLIENT PROJECT MANAGER: Greg Kuntz

☒ STANDARD TAT
☐ EXPEDITED TAT *

REPORT DUE DATE _____

* SUBJECT TO RUSH FEES

SAMPLING DATE	SAMPLING TIME	SAMPLE IDENTIFICATION	AQUEOUS MATRIX	NONAQUEOUS MATRIX	OIL MATRIX	AIR MATRIX	SV	VOC	Total Cr, Cu, As	Dissolved Cr, Cu, As	TPH Diesel	TPH GAS & MTBE
11-17-93	2:20	MW-6 SWP Log# 11435	X				2	3	1	1	2	3
	2:50	MW-18 11436										
	3:10	MW-7 11437										
	3:20	MW-8A 11438										
	3:40	MW-8 11439										
	3:50	MW-9 11440										
	4:00	MW-10 11441										
	4:15	MW-20A 11442										
	4:30	MW-21 11443										
	4:40	MW-23 11444										
	4:50	MW-24A 11445										
	5:15	Field Blank Trip Blank										

NUMBER OF CONTAINERS SUBMITTED

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
Bacon	11/17	12:00	Gregory B. Kuntz	11/16/93	7:30			
RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
			Gregory B. Kuntz	11/17/93	6:20	Catherine Nilker	11.17.93	6:20

FOR SAVANNAH LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	S.L. LOG NO.	LABORATORY REMARKS
J. Baker	11/18/93	10:20	☑ YES ☐ NO		46553	

RECEIVED JAN 03 1994 ENVIRONMENTAL

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

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

JW
MAS
G. Kurtz - ETE

LOG NO: S3-46595

Received: 19 NOV 93

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

RECEIVED
JAN 03 1994
ENVIRONMENTAL

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46595-1	MW-29 (# 11484)	11-18-93
46595-2	MW-29A (# 11485)	11-18-93
46595-3	MW-30 (# 11486)	11-18-93
46595-4	MW-25 (# 11487)	11-18-93
46595-5	MW-20 (# 11488)	11-18-93

PARAMETER	46595-1	46595-2	46595-3	46595-4	46595-5
Semivolatile Organics (8270)					
bis(2-Chloroethyl)ether, mg/l	ND	ND	ND	ND	ND
Naphthalene, mg/l	ND	ND	ND	ND	ND
Acenaphthene, mg/l	ND	0.54	0.040	0.043	0.014
Phenanthrene, mg/l	ND	ND	0.058	0.062	ND
Anthracene, mg/l	ND	ND	0.026	0.025	ND
Fluoranthene, mg/l	ND	ND	0.016	0.034	ND
Chrysene, mg/l	ND	ND	ND	ND	ND
Benzo(a)Anthracene, mg/l	ND	ND	ND	ND	ND
Benzo(b)fluoranthene, mg/l	ND	ND	ND	ND	ND
Benzo(k)fluoranthene, mg/l	ND	ND	ND	ND	ND
Benzo(a)pyrene, mg/l	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene, mg/l	ND	ND	ND	ND	ND
Dibenz(a,h)anthracene, mg/l	ND	ND	ND	ND	ND
2-Chlorophenol, mg/l	ND	ND	ND	ND	ND
Phenol, mg/l	ND	ND	ND	ND	ND
2,4-Dimethylphenol, mg/l	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol, mg/l	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol, mg/l	ND	ND	ND	ND	ND
2,4-Dinitrophenol, mg/l	ND	ND	ND	ND	ND
Pentachlorophenol, mg/l	ND	ND	ND	ND	ND
2,4,5-Trichlorophenol, mg/l	ND	ND	ND	ND	ND
Tetrachlorophenols, mg/l	ND	ND	ND	ND	ND
Carbazole, mg/l	ND	0.019	0.013	ND	ND

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

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

LOG NO: S3-46595

RECEIVED JAN 0 3 1994

Received: 19 NOV 93

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

Environmental Services

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46595-1	MW-29 (# 11484)	11-18-93
46595-2	MW-29A (# 11485)	11-18-93
46595-3	MW-30 (# 11486)	11-18-93
46595-4	MW-25 (# 11487)	11-18-93
46595-5	MW-20 (# 11488)	11-18-93

PARAMETER	46595-1	46595-2	46595-3	46595-4	46595-5
Volatiles by GC/MS					
Chloromethane, mg/l	ND	ND	ND	ND	ND
Bromomethane, mg/l	ND	ND	ND	ND	ND
Vinyl Chloride, mg/l	ND	ND	ND	ND	ND
Chloroethane, mg/l	ND	ND	ND	ND	ND
Methylene Chloride (Dichloromethane), mg/l	ND	ND	ND	ND	ND
1,1-Dichloroethene, mg/l	ND	ND	ND	ND	ND
1,1-Dichloroethane, mg/l	ND	ND	ND	ND	ND
Trans-1,2-Dichloroethylene, mg/l	ND	ND	ND	ND	ND
1,2-Dichloroethane, mg/l	ND	ND	ND	ND	ND
1,1,1-Trichloroethane, mg/l	ND	ND	ND	ND	ND
Carbon Tetrachloride, mg/l	ND	ND	ND	ND	ND
Bromodichloromethane, mg/l	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane, mg/l	ND	ND	ND	ND	ND
1,2-Dichloropropane, mg/l	ND	ND	ND	ND	ND
Trichloroethene, mg/l	ND	ND	ND	ND	ND
Dibromochloromethane, mg/l	ND	ND	ND	ND	ND
1,1,2-Trichloroethane, mg/l	ND	ND	ND	ND	ND
Benzene, mg/l	ND	ND	ND	ND	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

LOG NO: S3-46595

Received: 19 NOV 93

RECEIVED
JAN 03 1994
ENVIRONMENTAL

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46595-1	MW-29 (# 11484)	11-18-93
46595-2	MW-29A (# 11485)	11-18-93
46595-3	MW-30 (# 11486)	11-18-93
46595-4	MW-25 (# 11487)	11-18-93
46595-5	MW-20 (# 11488)	11-18-93

PARAMETER	46595-1	46595-2	46595-3	46595-4	46595-5
Cis-1,3-Dichloropropene, mg/l	ND	ND	ND	ND	ND
2-Chloroethylvinyl Ether, mg/l	ND	ND	ND	ND	ND
Toluene, mg/l	ND	ND	ND	ND	ND
Chlorobenzene, mg/l	ND	ND	ND	ND	ND
Ethylbenzene, mg/l	ND	ND	ND	ND	ND
Dichlorodifluoromethane, mg/l	ND	ND	ND	ND	ND
Methyl-Tert-Butyl-Ether (MTBE), mg/l	ND	ND	ND	ND	ND
1,2-Dibromomethane, mg/l	ND	ND	ND	ND	ND
o-Xylene, mg/l	ND	ND	ND	ND	ND
m&p-Xylene, mg/l	ND	ND	ND	ND	ND
Fluorotrichloromethane, mg/l	ND	ND	ND	ND	ND
Arsenic, mg/l	ND	ND	ND	ND	ND
Arsenic (Dissolved), mg/l	ND	ND	ND	ND	ND
Chromium, mg/l	ND	ND	0.024	0.011	ND
Chromium (Dissolved), mg/l	ND	ND	ND	ND	ND
Copper, mg/l	ND	ND	ND	ND	ND
Copper (Dissolved), mg/l	ND	ND	ND	ND	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

LOG NO: S3-46595

Received: 19 NOV 93

RECEIVED
JAN 03 1994
ENVIRONMENTAL

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46595-6	MW-11B (# 11489)	11-18-93
46595-7	MW-19A (# 11490)	11-18-93
46595-8	MW-28A (# 11491)	11-18-93
46595-9	MW-22A (# 11492)	11-18-93
46595-10	MW-15 (# 11493)	11-18-93

PARAMETER	46595-6	46595-7	46595-8	46595-9	46595-10
Semivolatile Organics (8270)					
bis(2-Chloroethyl)ether, mg/l	ND	ND	ND	ND	ND
Naphthalene, mg/l	ND	ND	ND	0.018	0.055
Acenaphthene, mg/l	0.081	ND	ND	0.012	0.074
Phenanthrene, mg/l	0.039	ND	ND	ND	0.015
Anthracene, mg/l	ND	ND	ND	ND	ND
Fluoranthene, mg/l	ND	ND	ND	ND	ND
Chrysene, mg/l	ND	ND	ND	ND	ND
Benzo(a)Anthracene, mg/l	ND	ND	ND	ND	ND
Benzo(b)fluoranthene, mg/l	ND	ND	ND	ND	ND
Benzo(k)fluoranthene, mg/l	ND	ND	ND	ND	ND
Benzo(a)pyrene, mg/l	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene, mg/l	ND	ND	ND	ND	ND
Dibenz(a,h)anthracene, mg/l	ND	ND	ND	ND	ND
2-Chlorophenol, mg/l	ND	ND	ND	ND	ND
Phenol, mg/l	ND	ND	ND	ND	ND
2,4-Dimethylphenol, mg/l	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol, mg/l	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol, mg/l	ND	ND	ND	ND	ND
2,4-Dinitrophenol, mg/l	ND	ND	ND	ND	ND
Pentachlorophenol, mg/l	ND	ND	ND	ND	ND
2,4,5-Trichlorophenol, mg/l	ND	ND	ND	ND	ND
Tetrachlorophenols, mg/l	ND	ND	ND	ND	ND
Carbazole, mg/l	ND	ND	ND	ND	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 03 1994
ENVIRONMENTAL

LOG NO: S3-46595

Received: 19 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46595-6	MW-11B (# 11489)	11-18-93
46595-7	MW-19A (# 11490)	11-18-93
46595-8	MW-28A (# 11491)	11-18-93
46595-9	MW-22A (# 11492)	11-18-93
46595-10	MW-15 (# 11493)	11-18-93

PARAMETER	46595-6	46595-7	46595-8	46595-9	46595-10
Volatiles by GC/MS					
Chloromethane, mg/l	ND	ND	ND	ND	ND
Bromomethane, mg/l	ND	ND	ND	ND	ND
Vinyl Chloride, mg/l	ND	ND	ND	ND	ND
Chloroethane, mg/l	ND	ND	ND	ND	ND
Methylene Chloride (Dichloromethane), mg/l	ND	ND	ND	ND	ND
1,1-Dichloroethene, mg/l	ND	ND	ND	ND	ND
1,1-Dichloroethane, mg/l	ND	ND	ND	ND	ND
Trans-1,2-Dichloroethylene, mg/l	ND	ND	ND	ND	ND
1,2-Dichloroethane, mg/l	ND	ND	ND	ND	ND
1,1,1-Trichloroethane, mg/l	ND	ND	ND	ND	ND
Carbon Tetrachloride, mg/l	ND	ND	ND	ND	ND
Bromodichloromethane, mg/l	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane, mg/l	ND	ND	ND	ND	ND
1,2-Dichloropropane, mg/l	ND	ND	ND	ND	ND
Trichloroethene, mg/l	ND	ND	ND	ND	ND
Dibromochloromethane, mg/l	ND	ND	ND	ND	ND
1,1,2-Trichloroethane, mg/l	ND	ND	ND	ND	ND
Benzene, mg/l	ND	ND	ND	ND	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 0 3 1994
ENVIRONMENTAL

LOG NO: S3-46595

Received: 19 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46595-6	MW-11B (# 11489)	11-18-93
46595-7	MW-19A (# 11490)	11-18-93
46595-8	MW-28A (# 11491)	11-18-93
46595-9	MW-22A (# 11492)	11-18-93
46595-10	MW-15 (# 11493)	11-18-93

PARAMETER	46595-6	46595-7	46595-8	46595-9	46595-10
Cis-1,3-Dichloropropene, mg/l	ND	ND	ND	ND	ND
2-Chloroethylvinyl Ether, mg/l	ND	ND	ND	ND	ND
Toluene, mg/l	ND	ND	ND	ND	ND
Chlorobenzene, mg/l	ND	ND	ND	ND	ND
Ethylbenzene, mg/l	ND	ND	ND	ND	0.0051
Dichlorodifluoromethane, mg/l	ND	ND	ND	ND	ND
Methyl-Tert-Butyl-Ether (MTBE), mg/l	ND	ND	ND	ND	ND
1,2-Dibromomethane, mg/l	ND	ND	ND	ND	ND
o-Xylene, mg/l	ND	ND	ND	0.0060	ND
m&p-Xylene, mg/l	ND	ND	ND	0.0061	ND
Fluorotrichloromethane, mg/l	ND	ND	ND	ND	ND
Arsenic, mg/l	ND	ND	ND	ND	0.088
Arsenic (Dissolved), mg/l	ND	ND	ND	ND	ND
Chromium, mg/l	ND	ND	ND	ND	ND
Chromium (Dissolved), mg/l	ND	ND	ND	ND	ND
Copper, mg/l	ND	ND	ND	ND	ND
Copper (Dissolved), mg/l	ND	ND	ND	ND	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 0 3 1994
ENVIRONMENTAL

LOG NO: S3-46595

Received: 19 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46595-11	MW-19 (# 11495)	11-18-93
46595-12	MW-24 (# 11496)	11-18-93
46595-13	MW-11A (# 11497)	11-18-93
46595-14	MW-14A (# 11498)	11-18-93
46595-15	MW-28 (# 11499)	11-18-93

PARAMETER	46595-11	46595-12	46595-13	46595-14	46595-15
Semivolatile Organics (8270)					
bis(2-Chloroethyl)ether, mg/l	ND	ND	ND	ND	ND
Naphthalene, mg/l	0.29	0.29	0.31	3.3	ND
Acenaphthene, mg/l	0.27	0.29	0.076	0.41	0.012
Phenanthrene, mg/l	0.077	0.068	0.047	ND	0.021
Anthracene, mg/l	ND	ND	ND	ND	ND
Fluoranthene, mg/l	ND	ND	ND	ND	ND
Chrysene, mg/l	ND	ND	ND	ND	ND
Benzo(a)Anthracene, mg/l	ND	ND	ND	ND	ND
Benzo(b)fluoranthene, mg/l	ND	ND	ND	ND	ND
Benzo(k)fluoranthene, mg/l	ND	ND	ND	ND	ND
Benzo(a)pyrene, mg/l	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene, mg/l	ND	ND	ND	ND	ND
Dibenz(a,h)anthracene, mg/l	ND	ND	ND	ND	ND
2-Chlorophenol, mg/l	ND	ND	ND	ND	ND
Phenol, mg/l	ND	ND	ND	ND	ND
2,4-Dimethylphenol, mg/l	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol, mg/l	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol, mg/l	ND	ND	ND	ND	ND
2,4-Dinitrophenol, mg/l	ND	ND	ND	ND	ND
Pentachlorophenol, mg/l	ND	ND	ND	ND	ND
2,4,5-Trichlorophenol, mg/l	ND	ND	ND	ND	ND
Tetrachlorophenols, mg/l	ND	ND	ND	ND	ND
Carbazole, mg/l	ND	ND	ND	ND	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

LOG NO: S3-46595

RECEIVED JAN 03 1994 ENVIRONMENTAL ...

Received: 19 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46595-11	MW-19 (# 11495)	11-18-93
46595-12	MW-24 (# 11496)	11-18-93
46595-13	MW-11A (# 11497)	11-18-93
46595-14	MW-14A (# 11498)	11-18-93
46595-15	MW-28 (# 11499)	11-18-93

PARAMETER	46595-11	46595-12	46595-13	46595-14	46595-15
Volatiles by GC/MS					
Chloromethane, mg/l	ND	ND	ND	ND	ND
Bromomethane, mg/l	ND	ND	ND	ND	ND
Vinyl Chloride, mg/l	ND	ND	ND	ND	ND
Chloroethane, mg/l	ND	ND	ND	ND	ND
Methylene Chloride (Dichloromethane), mg/l	ND	ND	ND	ND	ND
1,1-Dichloroethene, mg/l	ND	ND	ND	ND	ND
1,1-Dichloroethane, mg/l	ND	ND	ND	ND	ND
Trans-1,2-Dichloroethylene, mg/l	ND	ND	ND	ND	ND
1,2-Dichloroethane, mg/l	ND	ND	ND	ND	ND
1,1,1-Trichloroethane, mg/l	ND	ND	ND	ND	ND
Carbon Tetrachloride, mg/l	ND	ND	ND	ND	ND
Bromodichloromethane, mg/l	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane, mg/l	ND	ND	ND	ND	ND
1,2-Dichloropropane, mg/l	ND	ND	ND	ND	ND
Trichloroethene, mg/l	ND	ND	ND	ND	ND
Dibromochloromethane, mg/l	ND	ND	ND	ND	ND
1,1,2-Trichloroethane, mg/l	ND	ND	ND	ND	ND
Benzene, mg/l	0.0055	ND	ND	ND	ND

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

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

LOG NO: S3-46595

Received: 19 NOV 93

RECEIVED JAN 03 1994 ENVIRONMENTAL ...

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46595-11	MW-19 (# 11495)	11-18-93
46595-12	MW-24 (# 11496)	11-18-93
46595-13	MW-11A (# 11497)	11-18-93
46595-14	MW-14A (# 11498)	11-18-93
46595-15	MW-28 (# 11499)	11-18-93

PARAMETER	46595-11	46595-12	46595-13	46595-14	46595-15
Cis-1,3-Dichloropropene, mg/l	ND	ND	ND	ND	ND
2-Chloroethylvinyl Ether, mg/l	ND	ND	ND	ND	ND
Toluene, mg/l	ND	ND	ND	ND	ND
Chlorobenzene, mg/l	ND	ND	ND	ND	ND
Ethylbenzene, mg/l	0.0058	0.0089	ND	0.018	ND
Dichlorodifluoromethane, mg/l	ND	ND	ND	ND	ND
Methyl-Tert-Butyl-Ether (MTBE), mg/l	ND	ND	ND	ND	ND
1,2-Dibromomethane, mg/l	ND	ND	ND	ND	ND
o-Xylene, mg/l	ND	ND	ND	0.0087	ND
m&p-Xylene, mg/l	0.0054	ND	ND	0.020	ND
Fluorotrichloromethane, mg/l	ND	ND	ND	ND	ND
Arsenic, mg/l	ND	ND	ND	ND	ND
Arsenic (Dissolved), mg/l	ND	ND	ND	ND	ND
Chromium, mg/l	ND	0.010	ND	ND	ND
Chromium (Dissolved), mg/l	ND	ND	ND	ND	ND
Copper, mg/l	ND	ND	ND	ND	ND
Copper (Dissolved), mg/l	ND	ND	ND	ND	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 0 3 1994

LOG NO: S3-46595

Received: 19 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46595-16	MW-12 (# 11500)	11-18-93
46595-17	MW-13 (# 11501)	11-18-93
46595-18	MW-17 (# 11502)	11-18-93
46595-19	MW-16 (# 11503)	11-18-93
46595-20	Trip Blank	11-18-93

PARAMETER	46595-16	46595-17	46595-18	46595-19	46595-20
Semivolatile Organics (8270)					
bis(2-Chloroethyl)ether, mg/l	ND	ND	ND	ND	ND
Naphthalene, mg/l	3.1	3.1	ND	ND	ND
Acenaphthene, mg/l	0.77	0.80	0.016	ND	ND
Phenanthrene, mg/l	0.74	0.77	0.017	ND	ND
Anthracene, mg/l	ND	ND	ND	ND	ND
Fluoranthene, mg/l	0.31	0.30	0.010	ND	ND
Chrysene, mg/l	ND	ND	ND	ND	ND
Benzo(a)Anthracene, mg/l	ND	ND	ND	ND	ND
Benzo(b)fluoranthene, mg/l	ND	ND	ND	ND	ND
Benzo(k)fluoranthene, mg/l	ND	ND	ND	ND	ND
Benzo(a)pyrene, mg/l	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene, mg/l	ND	ND	ND	ND	ND
Dibenz(a,h)anthracene, mg/l	ND	ND	ND	ND	ND
2-Chlorophenol, mg/l	ND	ND	ND	ND	ND
Phenol, mg/l	ND	ND	ND	ND	ND
2,4-Dimethylphenol, mg/l	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol, mg/l	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol, mg/l	ND	ND	ND	ND	ND
2,4-Dinitrophenol, mg/l	ND	ND	ND	ND	ND
Pentachlorophenol, mg/l	ND	ND	ND	ND	ND
2,4,5-Trichlorophenol, mg/l	ND	ND	ND	ND	ND
Tetrachlorophenols, mg/l	ND	ND	ND	ND	ND
Carbazole, mg/l	0.21	0.22	ND	ND	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

LOG NO: S3-46595

Received: 19 NOV 93

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

RECEIVED
JAN 0 3 1994
ENVIRONMENTAL DIVISION

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46595-16	MW-12 (# 11500)	11-18-93
46595-17	MW-13 (# 11501)	11-18-93
46595-18	MW-17 (# 11502)	11-18-93
46595-19	MW-16 (# 11503)	11-18-93
46595-20	Trip Blank	11-18-93

PARAMETER	46595-16	46595-17	46595-18	46595-19	46595-20
Volatiles by GC/MS					
Chloromethane, mg/l	ND	ND	ND	ND	ND
Bromomethane, mg/l	ND	ND	ND	ND	ND
Vinyl Chloride, mg/l	ND	ND	ND	ND	ND
Chloroethane, mg/l	ND	ND	ND	ND	ND
Methylene Chloride (Dichloromethane), mg/l	ND	ND	ND	ND	ND
1,1-Dichloroethene, mg/l	ND	ND	ND	ND	ND
1,1-Dichloroethane, mg/l	ND	ND	ND	ND	ND
Trans-1,2-Dichloroethylene, mg/l	ND	ND	ND	ND	ND
1,2-Dichloroethane, mg/l	ND	ND	ND	ND	ND
1,1,1-Trichloroethane, mg/l	ND	ND	ND	ND	ND
Carbon Tetrachloride, mg/l	ND	ND	ND	ND	ND
Bromodichloromethane, mg/l	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane, mg/l	ND	ND	ND	ND	ND
1,2-Dichloropropane, mg/l	ND	ND	ND	ND	ND
Trichloroethene, mg/l	ND	ND	ND	ND	ND
Dibromochloromethane, mg/l	ND	ND	ND	ND	ND
1,1,2-Trichloroethane, mg/l	ND	ND	ND	ND	ND
Benzene, mg/l	ND	0.046	ND	ND	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

LOG NO: S3-46595

RECEIVED JAN 03 1994 ENVIRONMENTAL

Received: 19 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46595-16	MW-12 (# 11500)	11-18-93
46595-17	MW-13 (# 11501)	11-18-93
46595-18	MW-17 (# 11502)	11-18-93
46595-19	MW-16 (# 11503)	11-18-93
46595-20	Trip Blank	11-18-93

PARAMETER	46595-16	46595-17	46595-18	46595-19	46595-20
Cis-1,3-Dichloropropene, mg/l	ND	ND	ND	ND	ND
2-Chloroethylvinyl Ether, mg/l	ND	ND	ND	ND	ND
Toluene, mg/l	0.0074	ND	ND	ND	ND
Chlorobenzene, mg/l	ND	ND	ND	ND	ND
Ethylbenzene, mg/l	ND	0.026	ND	ND	ND
Dichlorodifluoromethane, mg/l	ND	ND	ND	ND	ND
Methyl-Tert-Butyl-Ether (MTBE), mg/l	ND	ND	ND	ND	ND
1,2-Dibromomethane, mg/l	ND	ND	ND	ND	ND
o-Xylene, mg/l	0.0066	0.013	ND	ND	ND
m&p-Xylene, mg/l	0.011	0.014	ND	ND	ND
Fluorotrichloromethane, mg/l	ND	ND	ND	ND	ND
Arsenic, mg/l	0.029	0.049	0.023	ND	ND
Arsenic (Dissolved), mg/l	ND	ND	ND	ND	ND
Chromium, mg/l	0.024	0.040	0.012	ND	ND
Chromium (Dissolved), mg/l	ND	ND	ND	ND	ND
Copper, mg/l	0.043	0.058	0.025	ND	ND
Copper (Dissolved), mg/l	ND	ND	ND	ND	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 0 3 1994
ENVIRONMENTAL ...

LOG NO: S3-46595

Received: 19 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46595-21	Field Blank	11-18-93

PARAMETER	46595-21
Semivolatile Organics (8270)	
bis(2-Chloroethyl)ether, mg/l	ND
Naphthalene, mg/l	ND
Acenaphthene, mg/l	ND
Phenanthrene, mg/l	ND
Anthracene, mg/l	ND
Fluoranthene, mg/l	ND
Chrysene, mg/l	ND
Benzo(a)Anthracene, mg/l	ND
Benzo(b)fluoranthene, mg/l	ND
Benzo(k)fluoranthene, mg/l	ND
Benzo(a)pyrene, mg/l	ND
Indeno(1,2,3-cd)pyrene, mg/l	ND
Dibenz(a,h)anthracene, mg/l	ND
2-Chlorophenol, mg/l	ND
Phenol, mg/l	ND
2,4-Dimethylphenol, mg/l	ND
2,4,6-Trichlorophenol, mg/l	ND
4-Chloro-3-methylphenol, mg/l	ND
2,4-Dinitrophenol, mg/l	ND
Pentachlorophenol, mg/l	ND
2,4,5-Trichlorophenol, mg/l	ND
Tetrachlorophenols, mg/l	ND
Carbazole, mg/l	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 03 1994
ENVIRONMENTAL

LOG NO: S3-46595

Received: 19 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46595-21	Field Blank	11-18-93

PARAMETER	46595-21
Volatiles by GC/MS	
Chloromethane, mg/l	ND
Bromomethane, mg/l	ND
Vinyl Chloride, mg/l	ND
Chloroethane, mg/l	ND
Methylene Chloride (Dichloromethane), mg/l	ND
1,1-Dichloroethene, mg/l	ND
1,1-Dichloroethane, mg/l	ND
Trans-1,2-Dichloroethylene, mg/l	ND
1,2-Dichloroethane, mg/l	ND
1,1,1-Trichloroethane, mg/l	ND
Carbon Tetrachloride, mg/l	ND
Bromodichloromethane, mg/l	ND
1,1,2,2-Tetrachloroethane, mg/l	ND
1,2-Dichloropropane, mg/l	ND
Trichloroethene, mg/l	ND
Dibromochloromethane, mg/l	ND
1,1,2-Trichloroethane, mg/l	ND
Benzene, mg/l	ND
Cis-1,3-Dichloropropene, mg/l	ND
2-Chloroethylvinyl Ether, mg/l	ND
Toluene, mg/l	ND
Chlorobenzene, mg/l	ND
Ethylbenzene, mg/l	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

LOG NO: S3-46595

RECEIVED
JAN 0 3 1994
ENVIRONMENTAL

Received: 19 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46595-21	Field Blank	11-18-93

PARAMETER	46595-21
Dichlorodifluoromethane, mg/l	ND
Methyl-Tert-Butyl-Ether (MTBE), mg/l	ND
1,2-Dibromomethane, mg/l	ND
o-Xylene, mg/l	ND
m&p-Xylene, mg/l	ND
Fluorotrichloromethane, mg/l	ND
Arsenic, mg/l	ND
Arsenic (Dissolved), mg/l	ND
Chromium, mg/l	ND
Chromium (Dissolved), mg/l	ND
Copper, mg/l	ND
Copper (Dissolved), mg/l	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

LOG NO: S3-46595

Received: 19 NOV 93

RECEIVED
JAN 03 1994
ENVIRONMENTAL

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46595-22	MW-27 (# 11494)	11-18-93

PARAMETER	46595-22
Semivolatile Organics (8270)	
bis(2-Chloroethyl)ether, mg/l	ND
Naphthalene, mg/l	ND
Acenaphthene, mg/l	ND
Phenanthrene, mg/l	ND
Anthracene, mg/l	ND
Fluoranthene, mg/l	ND
Chrysene, mg/l	ND
Benzo(a)Anthracene, mg/l	ND
Benzo(b)fluoranthene, mg/l	ND
Benzo(k)fluoranthene, mg/l	ND
Benzo(a)pyrene, mg/l	ND
Indeno(1,2,3-cd)pyrene, mg/l	ND
Dibenz(a,h)anthracene, mg/l	ND
2-Chlorophenol, mg/l	ND
Phenol, mg/l	ND
2,4-Dimethylphenol, mg/l	ND
2,4,6-Trichlorophenol, mg/l	ND
4-Chloro-3-methylphenol, mg/l	ND
2,4-Dinitrophenol, mg/l	ND
Pentachlorophenol, mg/l	ND
2,4,5-Trichlorophenol, mg/l	ND
Tetrachlorophenols, mg/l	ND
Carbazole, mg/l	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 03 1994
ENVIRONMENTAL

LOG NO: S3-46595

Received: 19 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46595-22	MW-27 (# 11494)	11-18-93

PARAMETER	46595-22
Volatiles by GC/MS	
Chloromethane, mg/l	ND
Bromomethane, mg/l	ND
Vinyl Chloride, mg/l	ND
Chloroethane, mg/l	ND
Methylene Chloride (Dichloromethane), mg/l	ND
1,1-Dichloroethene, mg/l	ND
1,1-Dichloroethane, mg/l	ND
Trans-1,2-Dichloroethylene, mg/l	ND
1,2-Dichloroethane, mg/l	ND
1,1,1-Trichloroethane, mg/l	ND
Carbon Tetrachloride, mg/l	ND
Bromodichloromethane, mg/l	ND
1,1,2,2-Tetrachloroethane, mg/l	ND
1,2-Dichloropropane, mg/l	ND
Trichloroethene, mg/l	ND
Dibromochloromethane, mg/l	ND
1,1,2-Trichloroethane, mg/l	ND
Benzene, mg/l	ND
Cis-1,3-Dichloropropene, mg/l	ND
2-Chloroethylvinyl Ether, mg/l	ND
Toluene, mg/l	ND
Chlorobenzene, mg/l	ND
Ethylbenzene, mg/l	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 0 3 1994
ENVIRONMENTAL ...

LOG NO: S3-46595

Received: 19 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46595-22	MW-27 (# 11494)	11-18-93

PARAMETER	46595-22
Dichlorodifluoromethane, mg/l	ND
Methyl-Tert-Butyl-Ether (MTBE), mg/l	ND
1,2-Dibromomethane, mg/l	ND
o-Xylene, mg/l	ND
m&p-Xylene, mg/l	ND
Fluorotrichloromethane, mg/l	ND
Arsenic, mg/l	0.014
Arsenic (Dissolved), mg/l	ND
Chromium, mg/l	ND
Chromium (Dissolved), mg/l	ND
Copper, mg/l	ND
Copper (Dissolved), mg/l	ND
Hydrocarbons (Modified 8015)	
Hydrocarbons as Gasoline, mg/l	ND
Hydrocarbons (Modified 8015 - Ext.)	
Hydrocarbons as Kerosene, mg/l	ND
Hydrocarbons as Heavy Oils, mg/l	ND
Hydrocarbons as Mineral Spirits, mg/l	ND
Hydrocarbons as Varsol, mg/l	ND
Hydrocarbons as Fuel Oil/Diesel, mg/l	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 0 3 1994
ENVIRONMENTAL ...

LOG NO: S3-46595

Received: 19 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
46595-23	Detection Limits
46595-24	Accuracy (mean % recovery)
46595-25	Precision (% RPD)
46595-26	Analyst Initials
46595-27	EPA Method Numbers

PARAMETER	46595-23	46595-24	46595-25	46595-26	46595-27
Semivolatile Organics (8270)					
Bis(2-chloroisopropyl)ether, mg/l	0.010	---	---	RB	8270
Naphthalene, mg/l	0.010	---	---	RB	8270
Acenaphthene, mg/l	0.010	88 %	8.0 %	RB	8270
Phenanthrene, mg/l	0.010	---	---	RB	8270
Anthracene, mg/l	0.010	---	---	RB	8270
Fluoranthene, mg/l	0.010	---	---	RB	8270
Chrysene, mg/l	0.010	---	---	RB	8270
Benzo(a)Anthracene, mg/l	0.010	---	---	RB	8270
Benzo(b)fluoranthene, mg/l	0.010	---	---	RB	8270
Benzo(k)fluoranthene, mg/l	0.010	---	---	RB	8270
Benzo(a)pyrene, mg/l	0.010	---	---	RB	8270
Indeno(1,2,3-cd)pyrene, mg/l	0.010	---	---	RB	8270
Dibenz(a,h)anthracene, mg/l	0.010	---	---	RB	8270
2-Chlorophenol, mg/l	0.010	98 %	7.1 %	RB	8270
Phenol, mg/l	0.010	82 %	6.1 %	RB	8270
2,4-Dimethylphenol, mg/l	0.010	---	---	RB	8270
2,4,6-Trichlorophenol, mg/l	0.010	---	---	RB	8270
4-Chloro-3-methylphenol, mg/l	0.010	88 %	5.7 %	RB	8270
2,4-Dinitrophenol, mg/l	0.050	---	---	RB	8270
Pentachlorophenol, mg/l	0.050	64 %	1.5 %	RB	8270
2,4,5-Trichlorophenol, mg/l	0.010	---	---	RB	8270
Tetrachlorophenols, mg/l	0.050	---	---	RB	8270
Carbazole, mg/l	0.010	---	---	RB	8270

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

LOG NO: S3-46595

RECEIVED

Received: 19 NOV 93

JAN 0 3 1994

ENVIRONMENTAL

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
46595-23	Detection Limits
46595-24	Accuracy (mean % recovery)
46595-25	Precision (% RPD)
46595-26	Analyst Initials
46595-27	EPA Method Numbers

PARAMETER	46595-23	46595-24	46595-25	46595-26	46595-27
Volatiles by GC/MS					
Chloromethane, mg/l	0.010	---	---	TCS	8240
Bromomethane, mg/l	0.010	---	---	TCS	8240
Vinyl Chloride, mg/l	0.010	---	---	TCS	8240
Chloroethane, mg/l	0.010	---	---	TCS	8240
Methylene Chloride (Dichloromethane), mg/l	0.0050	---	---	TCS	8240
1,1-Dichloroethene, mg/l	0.0050	133 %	3.0 %	TCS	8240
1,1-Dichloroethane, mg/l	0.0050	---	---	TCS	8240
Trans-1,2-Dichloroethylene, mg/l	0.0050	---	---	TCS	8240
1,2-Dichloroethane, mg/l	0.0050	---	---	TCS	8240
1,1,1-Trichloroethane, mg/l	0.0050	---	---	TCS	8240
Carbon Tetrachloride, mg/l	0.0050	---	---	TCS	8240
Bromodichloromethane, mg/l	0.0050	---	---	TCS	8240
1,1,2,2-Tetrachloroethane, mg/l	0.0050	---	---	TCS	8240
1,2-Dichloropropane, mg/l	0.0050	---	---	TCS	8240
Trichloroethene, mg/l	0.0050	129 %	1.6 %	TCS	8240
Dibromochloromethane, mg/l	0.0050	---	---	TCS	8240
1,1,2-Trichloroethane, mg/l	0.0050	---	---	TCS	8240
Benzene, mg/l	0.0050	131 %	1.5 %	TCS	8240

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 03 1994
ENVIRONMENTAL ...

LOG NO: S3-46595

Received: 19 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
46595-23	Detection Limits
46595-24	Accuracy (mean % recovery)
46595-25	Precision (% RPD)
46595-26	Analyst Initials
46595-27	EPA Method Numbers

PARAMETER	46595-23	46595-24	46595-25	46595-26	46595-27
Cis-1,3-Dichloropropene, mg/l	0.0050	---	---	TCS	8240
2-Chloroethylvinyl Ether, mg/l	0.0050	---	---	TCS	8240
Toluene, mg/l	0.0050	130 %	0.77 %	TCS	8240
Chlorobenzene, mg/l	0.0050	132 %	0.76 %	TCS	8240
Ethylbenzene, mg/l	0.0050	---	---	TCS	8240
Dichlorodifluoromethane, mg/l	0.0050	---	---	TCS	8240
Methyl-Tert-Butyl-Ether (MTBE), mg/l	0.050	---	---	TCS	8240
1,2-Dibromomethane, mg/l	0.0050	---	---	TCS	8240
o-Xylene, mg/l	0.0050	---	---	TCS	8240
m&p-Xylene, mg/l	0.0050	---	---	TCS	8240
Fluorotrichloromethane, mg/l	0.0050	---	---	TCS	8240
Arsenic, mg/l	0.010	107 %	2.6 %	JS	7060
Arsenic (Dissolved), mg/l	0.010	91 %	2.6 %	JS	7060
Chromium, mg/l	0.010	93 %	0.34 %	AL	6010
Chromium (Dissolved), mg/l	0.010	93 %	0.34 %	AL	6010
Copper, mg/l	0.025	93 %	0.17 %	AL	6010
Copper (Dissolved), mg/l	0.025	93 %	0.17 %	AL	6010
Hydrocarbons (Modified 8015)					
Hydrocarbons as Gasoline, mg/l	0.050	94 %	2.1 %	SLG	8015

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 03 1994
ENVIRONMENTAL ...

LOG NO: S3-46595

Received: 19 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
46595-23	Detection Limits
46595-24	Accuracy (mean % recovery)
46595-25	Precision (% RPD)
46595-26	Analyst Initials
46595-27	EPA Method Numbers

PARAMETER	46595-23	46595-24	46595-25	46595-26	46595-27
Hydrocarbons (Modified 8015 - Ext.)					
Hydrocarbons as Kerosene, mg/l	0.30	---	---	LM	8015
Hydrocarbons as Heavy Oils, mg/l	1.0	---	---	LM	8015
Hydrocarbons as Mineral Spirits, mg/l	0.30	---	---	LM	8015
Hydrocarbons as Varsol, mg/l	0.30	---	---	LM	8015
Hydrocarbons as Fuel Oil/Diesel, mg/l	0.30	78 %	15 %	LM	8015

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 0 3 1994
ENVIRONMENTAL ...

LOG NO: S3-46595

Received: 19 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
46595-28	Date Extracted
46595-29	Date Analyzed

PARAMETER	46595-28	46595-29
Semivolatile Organics (8270)		
Bis(2-chloroisopropyl)ether	11.24.93	12.1/9.93
Naphthalene	11.24.93	12.1/9.93
Acenaphthene	11.24.93	12.1/9.93
Phenanthrene	11.24.93	12.1/9.93
Anthracene	11.24.93	12.1/9.93
Fluoranthene	11.24.93	12.1/9.93
Chrysene	11.24.93	12.1/9.93
Benzo(a)Anthracene	11.24.93	12.1/9.93
Benzo(b)fluoranthene	11.24.93	12.1/9.93
Benzo(k)fluoranthene	11.24.93	12.1/9.93
Benzo(a)pyrene	11.24.93	12.1/9.93
Indeno(1,2,3-cd)pyrene	11.24.93	12.1/9.93
Dibenz(a,h)anthracene	11.24.93	12.1/9.93
2-Chlorophenol	11.24.93	12.1/9.93
Phenol	11.24.93	12.1/9.93
2,4-Dimethylphenol	11.24.93	12.1/9.93
2,4,6-Trichlorophenol	11.24.93	12.1/9.93
4-Chloro-3-methylphenol	11.24.93	12.1/9.93
2,4-Dinitrophenol	11.24.93	12.1/9.93
Pentachlorophenol	11.24.93	12.1/9.93
2,4,5-Trichlorophenol	11.24.93	12.1/9.93
Tetrachlorophenols	11.24.93	12.1/9.93
Carbazole	11.24.93	12.1/9.93

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

LOG NO: S3-46595

RECEIVED JAN 03 1994 ENVIRONMENTAL

Received: 19 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
46595-28	Date Extracted
46595-29	Date Analyzed

PARAMETER	46595-28	46595-29
Volatiles by GC/MS		
Chloromethane	---	12.01.93
Bromomethane	---	12.01.93
Vinyl Chloride	---	12.01.93
Chloroethane	---	12.01.93
Methylene Chloride (Dichloromethane)	---	12.01.93
1,1-Dichloroethene	---	12.01.93
1,1-Dichloroethane	---	12.01.93
Trans-1,2-Dichloroethylene	---	12.01.93
1,2-Dichloroethane	---	12.01.93
1,1,1-Trichloroethane	---	12.01.93
Carbon Tetrachloride	---	12.01.93
Bromodichloromethane	---	12.01.93
1,1,2,2-Tetrachloroethane	---	12.01.93
1,2-Dichloropropane	---	12.01.93
Trichloroethene	---	12.01.93
Dibromochloromethane	---	12.01.93
1,1,2-Trichloroethane	---	12.01.93
Benzene	---	12.01.93
Cis-1,3-Dichloropropene	---	12.01.93
2-Chloroethylvinyl Ether	---	12.01.93
Toluene	---	12.01.93
Chlorobenzene	---	12.01.93

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

LOG NO: S3-46595

RECEIVED JAN 0 3 1994 ENVIRON...

Received: 19 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
46595-28	Date Extracted
46595-29	Date Analyzed

PARAMETER	46595-28	46595-29
Ethylbenzene	---	12.01.93
Dichlorodifluoromethane	---	12.01.93
Methyl-Tert-Butyl-Ether (MTBE)	---	12.01.93
1,2-Dibromomethane	---	12.01.93
o-Xylene	---	12.01.93
m&p-Xylene	---	12.01.93
Fluorotrichloromethane	---	12.01.93
Arsenic	---	12.10.93
Arsenic (Dissolved)	---	12.08.93
Chromium	---	12.09.93
Chromium (Dissolved)	---	12.09.93
Copper	---	12.09.93
Copper (Dissolved)	---	12.09.93
Hydrocarbons (Modified 8015)		
Hydrocarbons as Gasoline	---	11.26.93
Hydrocarbons (Modified 8015 - Ext.)		
Hydrocarbons as Kerosene	11.23.93	12.05.93
Hydrocarbons as Heavy Oils	11.23.93	12.05.93
Hydrocarbons as Mineral Spirits	11.23.93	12.05.93
Hydrocarbons as Varsol	11.23.93	12.05.93
Hydrocarbons as Fuel Oil/Diesel	11.23.93	12.05.93

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
JAN 03 1994
ENVIRONMENTAL

LOG NO: S3-46595
Received: 19 NOV 93

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

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
46595-30	Report Completion Date

PARAMETER	46595-30
Date Reported	12.22.93

Methods: EPA SW-846
ND = Not Detected

J. W. Andrews, Ph. D.

Final Page Of Report

SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

05183

☒ 5102 LaRoche Avenue, Savannah, GA 31404 — Phone: (912) 354-7858 — Fax (912) 352-0165
☐ 2846 Industrial Plaza Drive, Tallahassee, FL 32301 — Phone: (904) 878-3994 — Fax (904) 878-9504
☐ 414 Southwest 12th Avenue, Deerfield Beach, FL 33442 — Phone: (305) 421-7400 — Fax (305) 421-2584
☐ 900 Lakeside Drive, Mobile, AL 36693 — Phone: (205) 666-6633 — Fax (205) 666-6696
☐ 6712 Benjamin Road, Suite 100, Tampa, FL 33634 — Phone: (813) 885-7427 — Fax (813) 885-7049

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Wilmington Site Specific

P.O. NUMBER	PROJECT NUMBER	PROJECT NAME	PAGE	OF
	12-53015.00	SWP-Wil	1	2

CLIENT NAME	TELEPHONE/FAX NO.
VIRO Group, Inc	803-957-6270 / 803-957-3845

CLIENT ADDRESS	CITY, STATE, ZIP CODE
1445 Pisgah Church Rd.	Lexington, SC 29073

SAMPLER(S) NAME(S)	CLIENT PROJECT MANAGER
Greg Kurtz James Leaphart	Greg Kurtz

☒ STANDARD TAT
☐ EXPEDITED TAT *
REPORT DUE DATE _____
* SUBJECT TO RUSH FEES

MATRIX TYPE: AQUEOUS MATRIX, NONAQUEOUS MATRIX, OIL MATRIX, AIR MATRIX

REQUIRED ANALYSES / NUMBER OF CONTAINERS SUBMITTED

SAMPLING DATE	SAMPLING TIME	SAMPLE IDENTIFICATION	AQUEOUS MATRIX	NONAQUEOUS MATRIX	OIL MATRIX	AIR MATRIX	SV	VOC	Total Metals Cr Cu As	Dissolved Metals Cr Cu As	TPH-Diesel	TPH-Gas + MTBE					
11-18-93	7:20	MW-29 SWP Log# 11484	X				2	3	1	1	~~2~~	~~3~~					
	7:40	MW-29A 11485															
	8:00	MW-30 11486															
	8:15	MW-25 11487															
	8:30	MW-20 11488															
	8:45	MW-11B 11489															
	9:10	MW-19A 11490															
	1:50	MW-28A 11491															
	2:05	MW-22A 11492															
	2:20	MW-15 11493															
	2:35	MW-27 11494									2	3					
	2:50	MW-19 11495															

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[signature]	11/11	12:00	[signature]	11.18	1618			
RECEIVED BY: (SIGNATURE)	**DATE**	**TIME**	**RELINQUISHED BY: (SIGNATURE)**	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**
[signature]	11/16/93	7:30	[signature]	11/18/93	1618			

FOR SAVANNAH LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	S.L. LOG NO.	LABORATORY REMARKS
[signature]	11-19-93	10:15	☑ YES ☐ NO		46595	

RECEIVED JAN 03 1994 ENVIRONMENTAL

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC. 05182

☒ 5102 LaRoche Avenue, Savannah, GA 31404 — Phone: (912) 354-7858 — Fax (912) 352-0165
☐ 2846 Industrial Plaza Drive, Tallahassee, FL 32301 — Phone: (904) 878-3994 — Fax (904) 878-9504
☐ 414 Southwest 12th Avenue, Deerfield Beach, FL 33442 — Phone: (305) 421-7400 — Fax (305) 421-2584
☐ 900 Lakeside Drive, Mobile, AL 36693 — Phone: (205) 666-6633 — Fax (205) 666-6696
☐ 6712 Benjamin Road, Suite 100, Tampa, FL 33634 — Phone: (813) 885-7427 — Fax (813) 885-7049

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

P.O. NUMBER	PROJECT NUMBER	PROJECT NAME	PAGE	OF
	12-53015.00	SWP-W.1	2	2

CLIENT NAME: ViroGroup, Inc.
TELEPHONE/FAX NO.: 803-957-6270 / 803-957-3845
CLIENT ADDRESS: 1415 Pisgah Church Rd.
CITY, STATE, ZIP CODE: Lexington, SC 29072
SAMPLER(S) NAME(S): Greg Kuntz, James Leaphart
CLIENT PROJECT MANAGER: Greg Kuntz

☒ STANDARD TAT
☐ EXPEDITED TAT *
REPORT DUE DATE: _____
* SUBJECT TO RUSH FEES

MATRIX TYPE: AQUEOUS MATRIX / NONAQUEOUS MATRIX / OIL MATRIX / AIR MATRIX

REQUIRED ANALYSES: Wilmington Site Specific

NUMBER OF CONTAINERS SUBMITTED

SAMPLING DATE	SAMPLING TIME	SAMPLE IDENTIFICATION	AQUEOUS MATRIX	NONAQUEOUS MATRIX	OIL MATRIX	AIR MATRIX	SV	VOC	Total Metal Cr, Cu, Ag	Dissolved Metals Cr, Cu, Ag							
11-18-93	3:05	MW-24 SWP Log# 11496	X				2	3	1	1							
	3:15	MW-11A 11497															
	3:25	MW-14A 11498															
	3:40	MW-28 11499															
	3:50	MW-12 ~~14~~ 11500															
	4:00	MW-13 11501															
	4:10	MW-17 11502															
	4:20	MW-16 11503															
	5:00	Field Blank															
		Trip Blank															

RECEIVED JAN 03 1994 Environmental

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[signature]	11/11	12:00	[signature]	11/18	1618			
RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
Gregory B. Kuntz	11/16/93	7:30	Gregory B. Kuntz	11/18/93	1618			

FOR SAVANNAH LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	S.L. LOG NO.	LABORATORY REMARKS
[signature]	11-19-93	10:13	☑ YES ☐ NO		46595	

Phase III Surface Water Sample Parameter Summary Table - Semi-Volatiles and Metals

PHASE III SURFACE WATER SAMPLE PARAMETER SUMMARY TABLE
SEMI-VOLATILES AND METALS
SOUTHERN WOOD PIEDMONT FACILITY
WILMINGTON, NORTH CAROLINA

	U.S. HIGHWAY #74 BRIDGE		OLD SLIP		GREENFIELD CREEK		STATE PORTS AUTHORITY	
	1/94		1/94		1/94		1/94	
SEMI-VOLATILES	RESULT	DL*	RESULT	DL*	RESULT	DL*	RESULT	DL*
Acenaphthene	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Acenaphthylene	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Anthracene	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Benzo(a)Anthracene	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Benzo(a)Pyrene	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Benzo(b,k)Fluoranthene	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Carbazole	ND	0.010	ND	0.010	ND	0.010	ND	0.010
2-Chlorophenol	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Chrysene	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Dibenzo(a,h)Anthracene	ND	0.010	ND	0.010	ND	0.010	ND	0.010
2,4-Dimethylphenol	ND	0.010	ND	0.010	ND	0.010	ND	0.010
2,4-Dinitrophenol	ND	0.050	ND	0.050	ND	0.050	ND	0.050
Fluoranthene	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Indeno(1,2-cd)pyrene	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Naphthalene	ND	0.010	ND	0.010	ND	0.010	ND	0.010
p-chloro-m-cresol	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Pentachlorophenol	ND	0.050	ND	0.050	ND	0.050	ND	0.050
Phenanthrene	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Phenol	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Tetrachlorophenols	ND	0.050	ND	0.050	ND	0.050	ND	0.050
Trichlorophenols	ND	0.010	ND	0.010	ND	0.010	ND	0.010
METALS								
Arsenic	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Chromium	ND	0.010	ND	0.010	ND	0.010	ND	0.010
Copper	ND	0.025	ND	0.025	ND	0.025	ND	0.025

NOTE: DL = Detection Limit
ND = Below Laboratory Detection Limit
All units in mg/l

Phase III Surface Water Sample Laboratory Analytical Data and QA/QC

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
FEB 28 1994
ENVIRONMENTAL AFFAIRS

LOG NO: S4-40324

Received: 20 JAN 94

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

CC: Greg Kuntz-ETE

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
40324-1	States Port Authority C/F River Sample # 60 (# 11743)	01-18-94
40324-2	Greenfield Creek # 61 (# 11744)	01-18-94
40324-3	SWP Old Slip # 62 (# 11745)	01-18-94
40324-4	US #74 New Bridge #63 (# 11746)	01-18-94

PARAMETER	40324-1	40324-2	40324-3	40324-4
K001 (Method 8270)				
2-Chlorophenol, mg/l	ND	ND	ND	ND
Phenol, mg/l	ND	ND	ND	ND
2,4-Dimethylphenol, mg/l	ND	ND	ND	ND
Trichlorophenols, mg/l	ND	ND	ND	ND
p-Chloro-m-cresol, mg/l	ND	ND	ND	ND
Tetrachlorophenols, mg/l	ND	ND	ND	ND
2,4-Dinitrophenol, mg/l	ND	ND	ND	ND
Pentachlorophenol, mg/l	ND	ND	ND	ND
Naphthalene, mg/l	ND	ND	ND	ND
Acenaphthene, mg/l	ND	ND	ND	ND
Acenaphthylene, mg/l	ND	ND	ND	ND
Phenanthrene, mg/l	ND	ND	ND	ND
Anthracene, mg/l	ND	ND	ND	ND
Fluoranthene, mg/l	ND	ND	ND	ND
Chrysene, mg/l	ND	ND	ND	ND
Benzo(a)Anthracene, mg/l	ND	ND	ND	ND
Benzo(b,k)fluoranthene, mg/l	ND	ND	ND	ND
Benzo(a)pyrene, mg/l	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene, mg/l	ND	ND	ND	ND
Dibenzo(a,h)anthracene, mg/l	ND	ND	ND	ND
Carbazole, mg/l	ND	ND	ND	ND
Dilution factor	1	1	1	1

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.
5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

RECEIVED
FEB 28 1994
ENVIRONMENTAL

LOG NO: S4-40324

Received: 20 JAN 94

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

CC: Greg Kuntz-ETE

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
40324-1	States Port Authority C/F River Sample # 60 (# 11743)	01-18-94
40324-2	Greenfield Creek # 61 (# 11744)	01-18-94
40324-3	SWP Old Slip # 62 (# 11745)	01-18-94
40324-4	US #74 New Bridge #63 (# 11746)	01-18-94

PARAMETER	40324-1	40324-2	40324-3	40324-4
Arsenic (7060), mg/l	ND	ND	ND	ND
Chromium (6010), mg/l	ND	ND	ND	ND
Copper (6010), mg/l	ND	ND	ND	ND

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED

FEB 28 '94

LOG NO: S4-40324

Received: 20 JAN 94

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

CC: Greg Kuntz-ETE

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
40324-5	Detection Limits
40324-6	Accuracy (mean % recovery)
40324-7	Precision (% RPD)
40324-8	Analyst Initials
40324-9	EPA Method Numbers

PARAMETER	40324-5	40324-6	40324-7	40324-8	40324-9
K001 (Method 8270)					
2-Chlorophenol, mg/l	0.010	108 %	4.6 %	ML	8270
Phenol, mg/l	0.010	110 %	0 %	ML	8270
2,4-Dimethylphenol, mg/l	0.010	120 %	0.83 %	ML	8270
Trichlorophenols, mg/l	0.010	72 %	4.2 %	ML	8270
p-Chloro-m-cresol, mg/l	0.010	116 %	0 %	ML	8270
Tetrachlorophenols, mg/l	0.050	73 %	5.5 %	ML	8270
2,4-Dinitrophenol, mg/l	0.050	102 %	2.9 %	ML	8270
Pentachlorophenol, mg/l	0.050	66 %	29 %	ML	8270
Naphthalene, mg/l	0.010	90 %	2.2 %	ML	8270
Acenaphthene, mg/l	0.010	77 %	7.8 %	ML	8270
Acenaphthylene, mg/l	0.010	88 %	3.4 %	ML	8270
Phenanthrene, mg/l	0.010	86 %	4.6 %	ML	8270
Anthracene, mg/l	0.010	94 %	5.3 %	ML	8270
Fluoranthene, mg/l	0.010	88 %	1.1 %	ML	8270
Chrysene, mg/l	0.010	94 %	3.2 %	ML	8270
Benzo(a)Anthracene, mg/l	0.010	106 %	2.8 %	ML	8270
Benzo(b,k)fluoranthene, mg/l	0.010	99 %	11 %	ML	8270
Benzo(a)pyrene, mg/l	0.010	98 %	10 %	ML	8270
Indeno(1,2,3-cd)pyrene, mg/l	0.010	106 %	4.7 %	ML	8270
Dibenzo(a,h)anthracene, mg/l	0.010	110 %	0.91 %	ML	8270
Carbazole, mg/l	0.010	60 %	12 %	ML	8270

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
FEB 28 1994
ENVIRONMENTAL AFFAIRS

LOG NO: S4-40324

Received: 20 JAN 94

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

CC: Greg Kuntz-ETE

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
40324-5	Detection Limits
40324-6	Accuracy (mean % recovery)
40324-7	Precision (% RPD)
40324-8	Analyst Initials
40324-9	EPA Method Numbers

PARAMETER	40324-5	40324-6	40324-7	40324-8	40324-9
Arsenic (7060), mg/l	0.010	99 %	6.1 %	PG	7060
Chromium (6010), mg/l	0.010	100 %	3.0 %	JM	6010
Copper (6010), mg/l	0.025	100 %	3.0 %	JM	6010

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
FEB 28 1994
ENVIRONMENTAL Affairs

LOG NO: S4-40324

Received: 20 JAN 94

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

CC: Greg Kuntz-ETE

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
40324-10	Dates Extracted
40324-11	Dates Analyzed

PARAMETER	40324-10	40324-11
K001 (Method 8270)		
2-Chlorophenol	01.24.94	02.17.94
Phenol	01.24.94	02.17.94
2,4-Dimethylphenol	01.24.94	02.17.94
Trichlorophenols	01.24.94	02.17.94
p-Chloro-m-cresol	01.24.94	02.17.94
Tetrachlorophenols	01.24.94	02.17.94
2,4-Dinitrophenol	01.24.94	02.17.94
Pentachlorophenol	01.24.94	02.17.94
Naphthalene	01.24.94	02.17.94
Acenaphthene	01.24.94	02.17.94
Acenaphthylene	01.24.94	02.17.94
Phenanthrene	01.24.94	02.17.94
Anthracene	01.24.94	02.17.94
Fluoranthene	01.24.94	02.17.94
Chrysene	01.24.94	02.17.94
Benzo(a)Anthracene	01.24.94	02.17.94
Benzo(b,k)fluoranthene	01.24.94	02.17.94
Benzo(a)pyrene	01.24.94	02.17.94
Indeno(1,2,3-cd)pyrene	01.24.94	02.17.94
Dibenzo(a,h)anthracene	01.24.94	02.17.94
Carbazole	01.24.94	02.17.94
Arsenic (7060)	---	01.21.94
Chromium (6010)	---	01.24.94
Copper (6010)	---	01.24.94

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

RECEIVED
FEB 28 1994
ENVIRONMENTAL AFFAIRS

LOG NO: S4-40324

Received: 20 JAN 94

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

CC: Greg Kuntz-ETE

Project: Wilmington, NC
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
40324-12	Report Completion Date

PARAMETER	40324-12
Date Reported	02.23.94

Methods: EPA SW-846
ND = Not Detected

J. W. Andrews

J. W. Andrews, Ph. D.

Final Page Of Report

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

14754

5102 LaRoche Avenue, Savannah, GA 31404 — Phone: (912) 354-7858 — Fax: (912) 352-0165
2846 Industrial Plaza Drive, Tallahassee, FL 32301 — Phone: (904) 878-3994 — Fax (904) 878-9504
414 Southwest 12th Avenue, Deerfield Beach, FL 33442 — Phone: (305) 421-7400 — Fax (305) 421-2584
900 Lakeside Drive, Mobile, AL 36693 — Phone: (205) 666-6633 — Fax (205) 666-6696
6712 Benjamin Road, Suite 100, Tampa, FL 33634 — Phone: (813) 885-7427 — Fax (813) 885-7049

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

1-910-791-2706

P.O. NUMBER	PROJECT NUMBER	PROJECT NAME	MATRIX TYPE	REQUIRED ANALYSES	PAGE	OF
		Southern Wood Piedmont				

CLIENT NAME	TELEPHONE/FAX NO.
Southern Wood Piedmont	1-910-791-2706

CLIENT ADDRESS	CITY, STATE, ZIP CODE
P.O. Box 450	Wilmington NC. 28402

SAMPLER(S) NAME(S)	CLIENT PROJECT MANAGER
H.O. Phillips	H.O. Phillips

☐ STANDARD TAT

☐ EXPEDITED TAT *

REPORT DUE DATE _____

* SUBJECT TO RUSH FEES

SAMPLING DATE	SAMPLING TIME	SAMPLE IDENTIFICATION	AQUEOUS MATRIX	NONAQUEOUS MATRIX	OIL MATRIX	AIR MATRIX	K-001	CCA									
			NUMBER OF CONTAINERS SUBMITTED														
1/18/94	9 00 Am	State Ports Authy c/Drive #23	3				2	1									
		Sample # 60															
		Log No 11743															
1/18/94	915 Am	Green Field Creek #61	3				2	1									
		Log No-11744															
		SWP. old Slip #62	3				2	1									
1/18/94	930 Am	Log No - 1174[illegible]															
1/18/94	10 00 Am	US #74 New Bridge #63	3				2	1									
		Log No - 11746															
		All Samples Cape Fear River					LM/M Glass 250 ml Plastic										

RECEIVED FEB 28 1994 ENVIRONMENTAL AFFAIRS

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
S Samuel	1/6/94	9:00						
RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
[illegible]	1/18/94	8 00 Am	[illegible]	1/18/94	Am			

FOR SAVANNAH LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	S.L. LOG NO.	LABORATORY REMARKS
L. Baker	1/18/94	1:10	☑ YES ☐ NO		40324	