25244

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1117 PERIMETER CENTER WEST
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Boreman

REC'D.
NOV 04 1992
WPB-SAS

US EPA
ARCS IV Site Assessment

BVWST Project 52012.040
BVWST File E.1
October 30, 1992

Mr Al Hanke
Cheif, Site Assessment Section
US Environmental Protection Agency
345 Courtland Street NE
Atlanta, Georgia 30365

Subject: Transmittal of Final
SIP Report
American Color & Chemical

Dear Mr. Hanke:

Please find attached two complete copies of the final Site Inspection Prioritization report and an additional copy of the report itself for the American Color & Chemical site, located in Lobeco, Beaufort County, South Carolina; EPA ID №SCD046507018. Should you have any questions, please feel free to call.

Very truly yours,

B&V WASTE SCIENCE AND TECHNOLOGY CORP.

Bryan J. Williams

Bryan J. Williams
Project Scientist

Enclosures

cc: Doug Thompson, EPA PO wo/ enclosures
Keith Mills, EPA CO wo/ enclosures
Hubert Wieland, BVWST w/o enclosures

Site Inspection Prioritization Report

REC'D.

NOV 0 4 1992

WPB-SAS

American Color & Chemical

Lobeco, Beaufort County, South Carolina
EPA ID Nº SCD046507018

SEA 9/24/92 Earl Bozeman

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

Prepared By:
B&V Waste Science and Technology Corp.
BVWST Project Nº 52012.040

October 30, 1992

Prepared by:	Reviewed by:	Approved by:
Bryan J. Williams Site Manager	Brooke B. Bittinger Technical Reviewer	Hubert Wieland Project Manager

SITE ASSESSMENT
Site Inspection Prioritization
American Color & Chemical/ Venture Chemical
Lobeco, Beaufort County, South Carolina
SCD046507018
WasteLAN Reference Nº03291

1.0 Introduction

B&V Waste Science and Technology was tasked to conduct a Site Investigation Prioritization (SIP) for the American Color & Chemical/ Venture Chemical facility in Lobeco, Beaufort County, South Carolina. This study was performed under the authorization of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendment Reauthorization Act of 1986 (SARA).

The SIP will update the Site Investigation conducted by the NUS Corporation on September 13-15, 1989, which was performed prior to the implementation of the revised Hazard Ranking System. Sources of information used in this evaluation were State of South Carolina and USEPA Superfund file material. The SIP will quantify threats posed by the site and provide sufficient documentation in order to decide on the appropriate future course of action.

2.0 Site Description and History

The entire American Color & Chemical/Venture Chemical facility (AC&C) consists of approximately 250 acres of land southeast of the intersection of Highways 38 and 480. More specifically, the facility is located at 32° 33' 21.0" N latitude and 80° 43' 43.0" W longitude at an altitude ranging from 10 to 20 feet above mean sea level (amsl) (Refs. 1, 2, 3) (Figure 1). The facility is active, and located in a mostly rural area of little residential use, and even less industrial (Refs. 2; 3, p. 7) (Figure 2). The ACC facility includes several buildings and various components of a permitted NPDES water treatment system that consists of an equalization basin, an aeration basin, a digester basin, two clarifiers, drying beds, and two holding ponds (east and west). In addition to the active portions of the property, there are four areas of contamination that are of concern: an abandoned lagoon, an old drum storage area, a burn site, and an area of stressed vegetation; there is no evidence of liners present for these units. The facility is entirely fenced with the exception of the stressed vegetation area (Ref. 3, pp. 4, 5).

American Color & Chemical began operations in 1967 as the Tenneco Chemical Company. In 1974 the plant was sold to the American Color & Chemical Company, and then once again to the Venture Chemical Company in October of 1982. Venture Chemical has since then changed their name to the Lobeco Products, Inc. (Ref. 5, p. 1).

The Lobeco Products facility primarily manufactures agricultural products, dye intermediates, and drilling fluid chemicals for the oil industry. Chemicals used and produced onsite are primarily organic compounds. Acidic industrial wastewater is generated as a byproduct of the manufacturing process. This wastewater is neutralized in the onsite water treatment plant and then discharged into Campbell Creek (Ref. 5, 1-2).

Prior to the installation of the waste-water treatment system, American Color & Chemical used the lagoon, burn site, and drum storage area to manage their facility waste. The lagoon was used as a settling basin for process washes and cooling waters mixed with sanitary wastes. Off-grade products and other specific process wastes were stored at the drum storage area prior to incineration at the burn site (Ref. 6, p.9, 10). Some of these materials were known to have contained PCBs, naphthalene, or toluene (Ref. 6, p. 11,12). The chemical plant also ran a hot oil circulating system for reactions that required higher than normal temperatures. Occasional leaks were handled by collecting as much of the spill as possible into drums; any residual oil was washed into the facility's floor drain system. From there, drainage went to the effluent system and eventually to the lagoon. The heating oil initially used was Arochlor 1248, a PCB supplied by Monsanto (Ref. 6, p. 10)

Lobeco Products filed a Part A application for interim status as a treatment facility; precisely, their tanks and the old lagoon. However, it was later determined that the tanks were exempt under a wastewater treatment exclusion. Also, further analysis determined that the waste in the lagoon was not hazardous (Refs. 4, p. 2; 7).

2.1 Waste Characteristics and Sampling Data

One hundred and ninety-seven samples were evaluated in the September 1990 Site Inspection performed by NUS Corporation. This data was compilated from an earlier, November 1986 G & E report and consisted of surface, subsurface, groundwater, product, sediment, sludge, and surface water samples collected from various locations on and around the facility. For the purposes of this prioritization samples pertaining to the drainage ditch will not be evaluated, as the only parameter detected in this area was total organic carbon (Ref. 3, pp. 13, 14). Data tables and sampling location maps are included as Attachment A at the end of this report.

Results from the abandoned lagoon area indicate that the soil and groundwater in this area are contaminated with chlorinated organics and metals primarily, such as

PCBs, naphthalene, and 1,2,4-trichlorobenzene, chromium, lead, and mercury. Contamination in the lagoon was detected at a depth of 14 feet below land surface (bls) with average concentrations of 750 mg/kg PCBs (Ref. 3, p. 17). Contamination at the burn site also centered around chlorinated organics and metals, with methylene chloride, PCBs, and trichloroethene being the most prevalent compounds All three of the previously mentioned contaminants were detected in groundwater, with one water sample having a TCE concentration of 12 mg/l. PCB concentrations were found in the soil at depths ranging from 1 to 6 feet, and at concentrations of up to 250 mg/kg (Ref. 3, p. 17, Table 2). Chromium and lead were detected in the stressed vegetation area at concentrations of 3.3 mg/kg and 3.8 mg/kg respectively, however these concentrations are not well beyond naturally occuring levels. Ethylbenzene was also detected, at a concentration of 0.013 mg/l in groundwater from this area (Ref. 3, p. 20).

Groundwater was the only media sampled from the old drum storage area (barring product sampling), and indicated that chlorinated organics are the primary contaminants here. The most significant organic detected was carbon tetrachloride, with concentrations ranging from 12 to 39 mg/l in the various wells (Ref. 3, pp. 18, 19).

Of the four source areas to be considered in this report only one, an area of stressed vegetation, is found outside a fenced portion of the facility. Further, the old drum storage area is partially covered by a concrete pad, effectively covering roughly half of its area. None of these source areas had a liner of any sort (Ref. 3, pp. 4-6).

A study performed by the State of South Carolina on September 27 and October 10, 1985, indicated that edible crabmeat collected from blue crabs (Callinectes sapidus) in the AC&C area showed elevated levels of PCBs. In particular, tissue samples from crabs collected on Campbell Creek at the AC&C wastewater treatment facility discharge averaged 0.949 mg/kg PCB's, noticeably elevated values even by comparison to the samples collected elsewhere on Campbell Creek, Whale Branch, Huspa Creek, and the Coosaw River (Ref. 8). It should be noted that a more current study has been performed, but was not available at the time of this evaluation (Ref. 9).

3.0 Groundwater Pathway

American Color & Chemical is located in the lower part of the Coastal Plain Physiographic Province (Refs. 10, p. 9). The topography of the surrounding area is characterized by low relief, lagoons, tidal swamps, and salt marshes (Ref. 11, 4-1). The region is underlain by a thick wedge of sedimentary rocks, which unconformably overlie crystalline igneous and metamorphic rocks equivalent to rocks of the Piedmont Physiographic Province (Ref. 12, pp. 22-23). The average annual rainfall for the study area is 50 inches. The annual evapotranspiration is 44 inches, yielding a net annual precipitation of 6 inches (Ref. 13). The two year, 24 hour rainfall is 5.0 inches (Ref. 14).

The soil beneath the facility is part of the Yemassee soil series, a deep, somewhat poorly drained, moderately permeable, loamy sand with a slope generally less than 1 percent (Ref. 15, p. 86, Sheet 29).

The formations within the upper portion of the sedimentary wedge comprise the aquifers that are used in the study area (Refs. 10, p. 32; 12, p. 23; 11, p. 4-1). The uppermost of these is the Pamlico formation (Ref. 12, p. 25). The Pamlico consists of quartz sand and clay, with some glauconite, shells, and heavy minerals. In the vicinity of the facility, the Pamlico Formation is approximately 30 to 40 feet thick (Ref. 11, p. 4-1). Underlying units in descending order are the Hawthorne Formation, the Ocala and Santee limestones, and the Black Mingo Formation (Ref. 12, pp. 23, 25; 16, pp. 380-381).

The uppermost hydrogeologic unit found in the study area is the unconfined surficial or water table aquifer (Ref. 17, p. 25). The water table aquifer is comprised of alluvial and fluvial deposits. This unit consists primarily of quartz sand and lenses of clay with an estimated hydraulic conductivity of approximately 10^{-4} cm/sec, and is found to a depth of 35 to 40 feet below land surface (bls) (Refs. 11, p. 4-1; 17, appendix D). Although the saturated thickness of this unit is dependant on climatic conditions, elevations of nearby streams indicate the water table is between 5 and 10 feet bls (Refs. 12; 16, p. 379). Recharge to this aquifer is from local rainfall (Refs. 12, p.4-5; 16, p. 379).

The water table aquifer is underlain by the Hawthorne Formation (Refs. 11, pp. 4-2; 17, p. 26). Based on boring logs from two production wells onsite the Hawthorne Formation is approximately 50 feet thick beneath the site, with the upper portion consisting of stiff green clay (Refs. 11, p. 4-2; 17, p. 26). This unit has an estimated hydraulic conductivity of 10^{-7} cm/sec and serves as an aquitard that separates the overlying unit and the deeper Tertiary Limestone System (Refs. 11, p. 6-31; 17, p. 50). The Tertiary Limestone aquifer system is about 900 feet thick in Beaufort County and is divided into an upper and lower hydrologic unit (Refs. 12, p. 276; 18, p. 47). The upper unit consists of highly permeable fossiliferous limestone and is the primary source of groundwater in Beaufort County (Refs. 10, pp. 31-32; 16, p. 380; 18, p. 47). The lower unit is moderately productive and is not used as extensively as the upper unit (Ref. 18, p. 55). Recharge to the Tertiary Limestone is primarily through downward leakage through overlying units (Ref. 18 p. 73). The Tertiary Limestone Aquifer System is underlain by the 400 foot thick Black Mingo Formation, which consists of partly indurated fine sand, sandstone or diclastic limestone, and acts as a confining layer (Refs. 12, p. 23; 16, p. 381; 18, p. 27). This unit has an estimated hydraulic conductivity ranging from 10^{-4} to 10^{-6} cm/sec for limestone (Ref. 19, p. 29).

The surficial aquifer, which is the aquifer of concern, is used for drinking purposes (Ref. 3, p. 3; 16, 379). Groundwater in the surficial aquifer system flows south toward Campbell Creek, reflecting the general influence of topography on the water table (Ref. 11, p. 6-9). In the Tertiary Limestone aquifer, groundwater flow is regionally toward the east (Ref. 10, pp. 53-54). Within two miles of the site, however, an induced cone of depression exists in the potentiometric surface of the Tertiary Limestone aquifer (Ref. 10, figure 19). This occurs because two closely spaced production wells on the Lobeco property pump sizable quantities (about 500,000 gal/day each) from an area in the aquifer where the transmissivity is relatively low (less than 5,000 ft^2/d) compared to other locations in the region (Ref. 10, p. 56). Within the cone of depression, the groundwater flow is toward the Lobeco pumping center. A local well driller estimated that this aquifer only supplies five percent of the wells found within the study area (Ref. 20). This corresponds to 5 people between 0 and 0.25 mile radius; 8 between 0.25 and 0.5 miles; 15 between 0.5 and 1.0 miles; 70 between 1 mile and 2 miles; 114 between 2 and 3 miles; and 56 between 3 and 4 miles, based on a USGS topographic map house count and a reconnaissance survey. A total of 103 residences were identified between the one and four mile radii of AC&C at an average population of 2.59 people per household, based on the U.S. Department of Commerce Bureau of Census (Refs. 2, 21). There are no public water systems associated with the surficial aquifer in the study area, and the nearest potable private well is located 600 feet to the southeast (Refs. 3, 4, p. 5; 10, p. 27).

4.0 Surface Water Pathway

Surface water runoff at AC&C would be collected in the onsite drainage ditch system. Water in this system flows south and eventually empties into the tidally influenced marsh area surrounding Campbell Creek (Refs. 2, 13, p. 24; 22, p. 17-19). During ebb tide, Campbell Creek flows southeasterly 0.75 miles into Whale Branch, and a further 5.75 miles into the Coosaw River. The 15-mile surface water pathway expires on the Coosaw River without encountering any surface water intakes (Refs. 2, 23). During flood tide however, flow direction is reversed, and the migration pathway flows upstream to include several other tributaries of Whale Branch and the Coosaw River. (Ref. 24). The AC&C facility is located within a 100 year floodplain (Ref. 25).

Sensitive environments found in the study area are the ranges of several federally endangered species. These are the Bald eagle, the shortnose sturgeon, and the West Indian Manatee. There are no critical habitats within the State of South Carolina (Refs. 26, 27). Also, all surface water bodies lie contiguous to coastal wetlands. These wetlands and their associated drainageways serve as a breeding ground and nursery for the eastern oyster (Crassostrea virginica) (Ref. 26). Most area wetlands provide a habitat for numerous fish species, and recently Whale Branch has been re-approved for the harvest of shellfish. Prior to this time, Whale Branch shellfish could be used to restock other tributaries, but could not be directly harvested. It should be noted that Campbell Creek, Halfmoon Creek and several other tributaries of the Coosaware still closedto harvestingof shellfish (Ref. 8). At that time, ACC wasthe only apparent sourceof PCBs in the area.

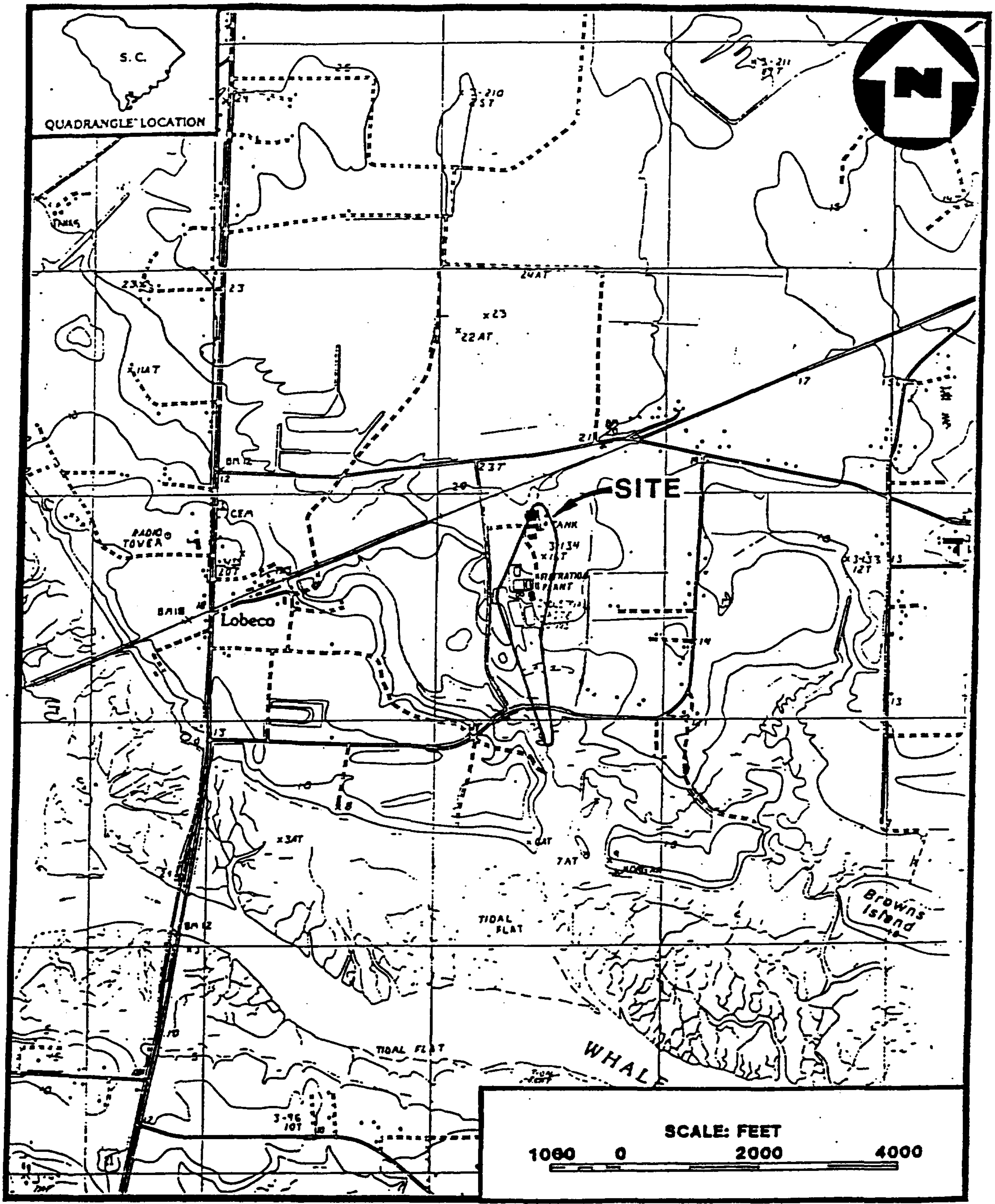
5.0 Air and Soil Exposure Pathway

The population within a 4-mile radius of the ACC site is 2,956 (Refs. 2, 20). The facility is active and currently has 75 employees onsite; the nearest residence is located approximately 0.11 miles to the southeast. The active portion of the ACC property is fenced; however, the area of stressedvegetation is located outside their fenced portion of the facility. Land use in the area is extremely sparse,with little recreational value within a 0.5 mile radius. The nearest schoolis located 0.85 miles to the west. The town of Lobeco is located 0.7 miles to the west of the facility (Refs. 2, 4).

Sensitive environments found in the study area are the rangesof several federally endangeredspecies. These are the Bald eagle, shortnose sturgeon, and the West Indian Manatee. There are no critical habitats within the State of South Carolina (Refs. 26, 27).

6.0 Conclusion

The American Color & Chemical facility was assessedo identify potential threats posed to human health and the environment and to determine the need for additional investigation. The surfacewater pathwayis the pathwayof concernfor the ACC facility, owing to the potential for contamination to surroundingwetlands and fisheries. However, the size of the potentially affected water bodies,and the fact that they are tidally influenced hasan ameliorating affect on the situation. It is therefore recommendedthat no further remedial action be planned for this facility.

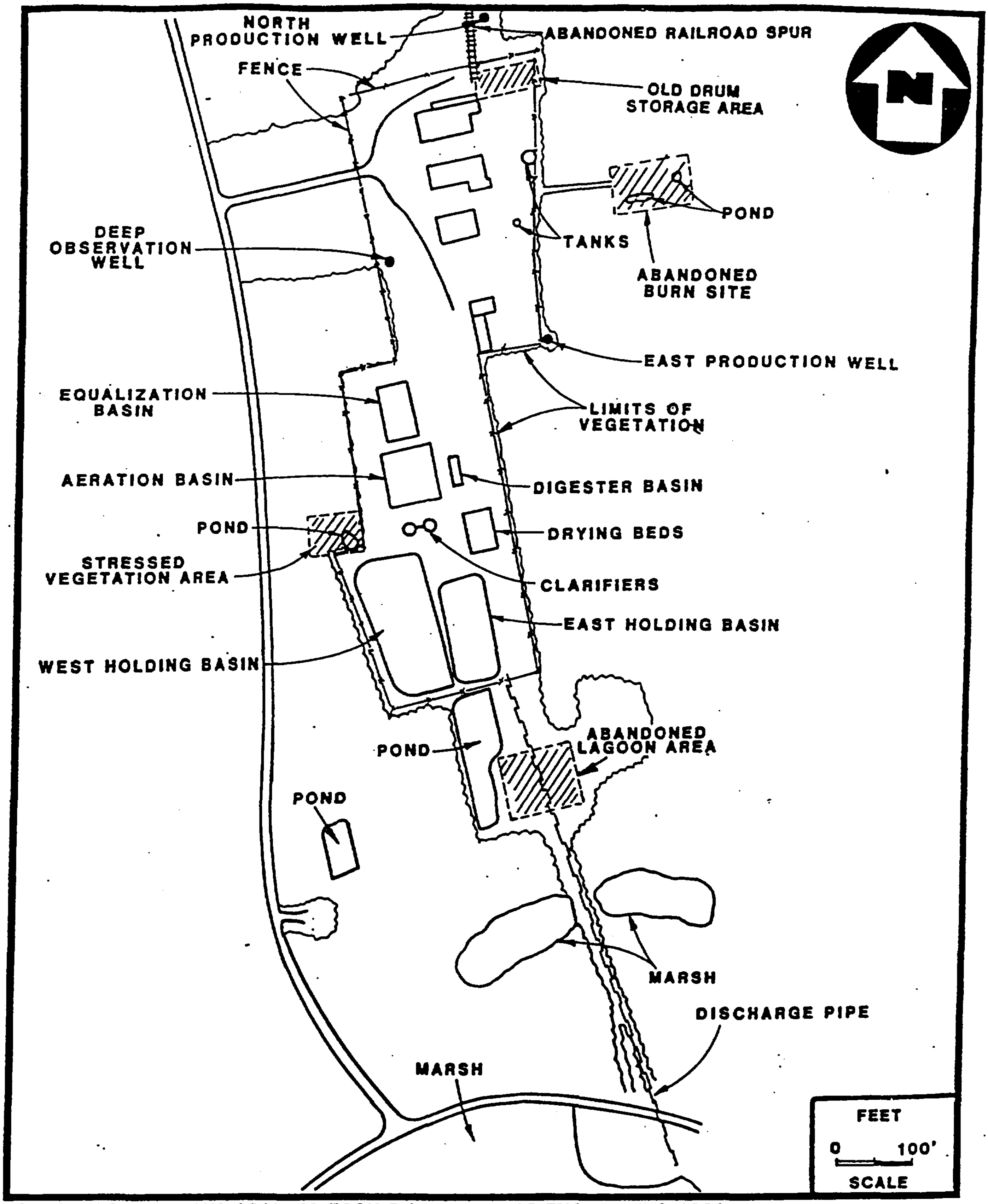


BASE MAP IS A PORTION OF THE U.S.G.S. 7.5 MINUTE QUADRANGLE DALE 1988, SHELDON 1988, FLORIDA.

SITE LOCATION MAP
AMERICAN COLOR AND CHEMICAL / VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

FIGURE 1

BAKER ENVIRONMENTAL SCIENCE AND TECHNOLOGY CORP.



SOURCE: REDRAWN AND ADAPTED FROM FIGURE 3A, G&E ENGINEERING 1986.

SITE LAYOUT MAP
AMERICAN COLOR AND CHEMICAL / VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

FIGURE 2

RECONNAISSANCE CHECKLIST FOR HRS2 CONCERNS

Instructions: Obtain as much "up front" information as possible prior to conducting fieldwork. Complete the form in as much detail as you can, providing attachments as necessary. Cite the source for all information obtained.

Site Name: American Color and Chemical/Venture Chemical
City, County, State: Lobeco, Beaufort County, South Carolina
EPA ID No.: SCD046507018
Person responsible for form: James Miller
Date: September 14, 1989

Air Pathway

Describe any potential air emission sources onsite: Eight volatile organics were detected in the facility's effluent during a previous sampling investigation (Ref. 27, p. 1).

Identify any sensitive environments within 4 miles: There are no land-related sensitive environments within a 4-mile radius of the site (Refs. 13, p. 11; 17).

Identify the maximally exposed individual (nearest residence or regularly occupied building - workers do count): There are currently 75 employees at the Lobeco plant who regularly occupy buildings that are located adjacent to the abandoned burn site and the old drum storage area (Ref. 13, p. 3; Appendix B, figure 3a).

Groundwater Pathway

Identify any areas of karst terrain: None (Appendix C, p. 4-1).

Identify additional population due to consideration of wells completed in overlying aquifers to the AOC: NA; the AOC is a surficial aquifer (Ref. 3, p. 3).

Do significant targets exist between 3 and 4 miles from the site? There are probably about 10 homes or 38 people (10 houses x 3.8 people/house) relying on groundwater from the surficial aquifer between 3 and 4 miles from the site (Ref. 31; Appendix D).

Is the AOC a sole source aquifer according to Safe Drinking Water Act? (i.e. is the site located in Dade, Broward, Volusia, Putnam, or Flagler County, Florida): No.

Surface Water Pathway

Are there intakes located on the extended 15-mile migration pathway? No (Ref. 23).

Are there recreational areas, sensitive environments, or human food chain targets (fisheries) along the extended pathway? All of the potentially affected water bodies provide a habitat for numerous commercial fish species and most areas have been approved for shellfish harvesting (Refs. 17, 24). Other sensitive environments along the surface water migration pathway include a major breeding and nursery area, and two federally designated endangered species (Refs. 17; 25, section 6).

Onsite Exposure Pathway

Is there waste or contaminated soil onsite at 2 feet below land surface or higher? There are uncontained, contaminated soils at the burn site and the stressed vegetation area.

Is the site accessible to non-employees (workers do <u>not</u> count)? Only the stressed vegetation area is located outside of the fence that surrounds the facility and this is accessible to non-employees (Appendix B, figure 3a).

Are there residences, schools, or day care centers onsite or in close proximity? The nearest residence is located 500 feet east of the site (Appendix D). No day care centers are located onsite or in close proximity (Ref. 13, p. 11). The nearest school is James Davis Elementary, which is located approximately 1 mile east of the site (Appendix D).

Are there barriers to travel (e.g., a river) within one mile? The Whale Branch of the Coosaw River and several salt marshes are located within 1 mile of the site (Appendix D).

* All references and appendices cited on this form correlate to the Phase II, SSI report.

CERCLA ELIGIBILITY QUESTIONNAIRE

Site Name: American Color and Chemical/Venture Chemical

City: Lobeco State: South Carolina

EPA ID Number: SCD046507018

		Yes	No
I.	CERCLA ELIGIBILITY		
	Did the facility cease operations prior to November 19, 1980?	___	✓
	If answer YES, STOP, facility is probably a CERCLA site.		
	If answer NO, Continue to Part II.		
II.	RCRA ELIGIBILITY		
	Did the facility file a RCRA Part A application?	✓	___
	If YES:		
	1. Does the facility currently have interim status?	___	✓
	2. Did the facility withdraw its Part A application?	✓	___
	3. Is the facility a known or possible protective filer? (facility filed in error)	✓	___
	4. Type of facility: Generator ✓ Transporter ✓ Recycler ___ TSD (Treatment/Storage/Disposal) ___		
	Does the facility have a RCRA operating or post closure permit?	___	✓
	Is the facility a late (after 11/19/80) or non-filer that has been identified by the EPA or the State? (facility did not know it needed to file under RCRA)	___	✓
	If all answers to questions in Part II are NO, STOP, the facility is a CERCLA eligible site.		
	If answer to #2 or #3 is YES, STOP, the facility is a CERCLA eligible site.		
	If answer #2 and #3 are NO and any OTHER answer is YES, site is RCRA, continue to Part III.		
III.	RCRA SITES ELIGIBLE FOR NPL		
	Has the facility owner filed for bankruptcy under federal or state laws?	___	___
	Has the facility lost RCRA authorization to operate or shown probable unwillingness to carry out corrective action?	___	___
	Is the facility a TSD that converted to a generator, transporter or recycler facility after November 19, 1980?	___	___

HAZARD RANKING SYSTEM SCORING SUMMARY

FOR

AMERICAN COLOR & CHEMICAL/VENTURE CHEMIC
EPA SITE NUMBER SCD046507018
LOBECO
BEAUFORT COUNTY, SC
EPA REGION: 4

SCORE STATUS: SUBMITTED TO REGION

SCORED BY JAMES MILLER
OF NUS CORPORATION
ON 12/13/89

DATE OF THIS REPORT: 04/16/90
DATE OF LAST MODIFICATION: 04/16/90

GROUND WATER ROUTE SCORE	:	59.18
SURFACE WATER ROUTE SCORE	:	21.82
AIR ROUTE SCORE	:	0.00
MIGRATION SCORE	:	36.46

This score was generated assuming that the confining layer separating the surficial and Tertiary Limestone aquifers is effective within a 2-mile site radius.

HRS GROUND WATER ROUTE SCORE

CATEGORY/FACTOR	RAW DATA	ASN. VALUE	SCORE
1. OBSERVED RELEASE	YES	45	45
2. ROUTE CHARACTERISTICS			
DEPTH TO WATER TABLE			
DEPTH TO BOTTOM OF WASTE			
DEPTH TO AQUIFER OF CONCERN			
PRECIPITATION			
EVAPORATION			
NET PRECIPITATION			
PERMEABILITY			
PHYSICAL STATE			
TOTAL ROUTE CHARACTERISTICS SCORE:			N/A
3. CONTAINMENT			N/A
4. WASTE CHARACTERISTICS			
TOXICITY/PERSISTENCE:POLYCHLORINATED BIPHENYLS,NOS			18
WASTE QUANTITY CUBIC YDS	2501		
DRUMS	0		
GALLONS	0		
TONS	0		
TOTAL	2501 CU. YDS	8	8
TOTAL WASTE CHARACTERISTICS SCORE:			26
5. TARGETS			
GROUND WATER USE		3	9
DISTANCE TO NEAREST WELL	1000 FEET		
AND	MATRIX VALUE	20	20
TOTAL POPULATION SERVED	144 PERSONS		
NUMBER OF HOUSES	38		
NUMBER OF PERSONS	0		
NUMBER OF CONNECTIONS	0		
NUMBER OF IRRIGATED ACRES	0		
TOTAL TARGETS SCORE:			29

GROUND WATER ROUTE SCORE (Sgw) = 59.18

HRS SURFACE WATER ROUTE SCORE

CATEGORY/FACTOR	RAW DATA	ASN. VALUE	SCORE
1. OBSERVED RELEASE	YES	45	45
2. ROUTE CHARACTERISTICS			
SITE LOCATED IN SURFACE WATER			
SITE WITHIN CLOSED BASIN			
FACILITY SLOPE			
INTERVENING SLOPE			
24-HOUR RAINFALL			
DISTANCE TO DOWN-SLOPE WATER			
PHYSICAL STATE			
TOTAL ROUTE CHARACTERISTICS SCORE:			N/A
3. CONTAINMENT			N/A
4. WASTE CHARACTERISTICS			
TOXICITY/PERSISTENCE:POLYCHLORINATED BIPHENYLS,NOS			18
WASTE QUANTITY CUBIC YDS	2501		
DRUMS	0		
GALLONS	0		
TONS	0		
TOTAL	2501 CU. YDS	8	8
TOTAL WASTE CHARACTERISTICS SCORE:			26
5. TARGETS			
SURFACE WATER USE		2	6
DISTANCE TO SENSITIVE ENVIRONMENTS		3	6
COASTAL WETLANDS	0 FEET		
FRESH-WATER WETLANDS	NONE		
CRITICAL HABITAT	NONE		
DISTANCE TO STATIC WATER	> 3 MILES		
DISTANCE TO WATER SUPPLY INTAKE	> 3 MILES		
AND	MATRIX VALUE	0	0
TOTAL POPULATION SERVED	0		
NUMBER OF HOUSES	0		
NUMBER OF PERSONS	0		
NUMBER OF CONNECTIONS	0		
NUMBER OF IRRIGATED ACRES	0		
TOTAL TARGETS SCORE:			12

SURFACE WATER ROUTE SCORE (Ssw) = 21.82

HRS AIR ROUTE SCORE

CATEGORY/FACTOR	RAW DATA	ASN. VALUE	SCORE
1. OBSERVED RELEASE	NO	0	0

2. WASTE CHARACTERISTICS

REACTIVITY: MATRIX VALUE

INCOMPATIBILITY

TOXICITY

WASTE QUANTITY CUBIC YARDS
DRUMS
GALLONS
TONS

TOTAL

TOTAL WASTE CHARACTERISTICS SCORE: N/A

3. TARGETS

POPULATION WITHIN 4-MILE RADIUS
0 to 0.25 mile
0 to 0.50 mile
0 to 1.0 mile
0 to 4.0 miles

DISTANCE TO SENSITIVE ENVIRONMENTS
COASTAL WETLANDS
FRESH-WATER WETLANDS
CRITICAL HABITAT

DISTANCE TO LAND USES
COMMERCIAL/INDUSTRIAL
PARK/FOREST/RESIDENTIAL
AGRICULTURAL LAND
PRIME FARMLAND
HISTORIC SITE WITHIN VIEW?

TOTAL TARGETS SCORE: N/A

AIR ROUTE SCORE (Sa) = 0.00

HAZARD RANKING SYSTEM SCORING CALCULATIONS
FOR
SITE: AMERICAN COLOR & CHEMICAL/VENTURE CHEMIC
AS OF 04/16/90

GROUND WATER ROUTE SCORE

OBSERVED RELEASE		45
WASTE CHARACTERISTICS	X	26
TARGETS	X	29

= 33930 /57,330 X 100 = 59.18 = S_{gw}

SURFACE WATER ROUTE SCORE

OBSERVED RELEASE		45
WASTE CHARACTERISTICS	X	26
TARGETS	X	12

= 14040 /64,350 X 100 = 21.82 = S_{sw}

AIR ROUTE SCORE

OBSERVED RELEASE 0 /35,100 X 100 = 0.00 = S_{air}

SUMMARY OF MIGRATION SCORE CALCULATIONS

	S	S^2
GROUND WATER ROUTE SCORE (S_{gw})	59.18	3502.27
SURFACE WATER ROUTE SCORE (S_{sw})	21.82	476.11
AIR ROUTE SCORE (S_{air})	0.00	0.00
$S^2_{gw} + S^2_{sw} + S^2_{air}$		3978.38
$\sqrt{(S^2_{gw} + S^2_{sw} + S^2_{air})}$		63.07
$S_M = \sqrt{(S^2_{gw} + S^2_{sw} + S^2_{air})}/1.73$		36.46

HAZARD RANKING SYSTEM SCORING SUMMARY

FOR

AMERICAN COLOR & CHEMICAL/VENTURE CHEMIC
EPA SITE NUMBER SCD046507018
LOBECO
BEAUFORT COUNTY, SC
EPA REGION: 4

SCORE STATUS: SUBMITTED TO REGION

SCORED BY JAMES MILLER
OF NUS CORPORATION
ON 12/13/89

DATE OF THIS REPORT: 04/16/90
DATE OF LAST MODIFICATION: 04/16/90

GROUND WATER ROUTE SCORE	:	89.80
SURFACE WATER ROUTE SCORE	:	21.82
AIR ROUTE SCORE	:	0.00
MIGRATION SCORE	:	53.42

This score was generated assuming that the confining layer separating the surficial and Tertiary Limestone aquifers is leaky within a 2-mile site radius.

HRS GROUND WATER ROUTE SCORE

CATEGORY/FACTOR		RAW DATA	ASN. VALUE	SCORE
1. OBSERVED RELEASE		YES	45	45
2. ROUTE CHARACTERISTICS				
DEPTH TO WATER TABLE				
DEPTH TO BOTTOM OF WASTE				
DEPTH TO AQUIFER OF CONCERN				
PRECIPITATION				
EVAPORATION				
NET PRECIPITATION				
PERMEABILITY				
PHYSICAL STATE				
TOTAL ROUTE CHARACTERISTICS SCORE:				N/A
3. CONTAINMENT				N/A
4. WASTE CHARACTERISTICS				
TOXICITY/PERSISTENCE:POLYCHLORINATED BIPHENYLS,NOS				18
WASTE QUANTITY	CUBIC YDS	2501		
	DRUMS	0		
	GALLONS	0		
	TONS	0		
	TOTAL	2501 CU. YDS	8	8
TOTAL WASTE CHARACTERISTICS SCORE:				26
5. TARGETS				
GROUND WATER USE			3	9
DISTANCE TO NEAREST WELL		150 FEET		
AND		MATRIX VALUE	35	35
TOTAL POPULATION SERVED		3437 PERSONS		
NUMBER OF HOUSES		770		
NUMBER OF PERSONS		511		
NUMBER OF CONNECTIONS		0		
NUMBER OF IRRIGATED ACRES		0		
TOTAL TARGETS SCORE:				44

GROUND WATER ROUTE SCORE (Sgw) = 89.80

HRS SURFACE WATER ROUTE SCORE

CATEGORY/FACTOR	RAW DATA	ASN. VALUE	SCORE
1. OBSERVED RELEASE	YES	45	45
2. ROUTE CHARACTERISTICS			
SITE LOCATED IN SURFACE WATER			
SITE WITHIN CLOSED BASIN			
FACILITY SLOPE			
INTERVENING SLOPE			
24-HOUR RAINFALL			
DISTANCE TO DOWN-SLOPE WATER			
PHYSICAL STATE			
TOTAL ROUTE CHARACTERISTICS SCORE:			N/A
3. CONTAINMENT			N/A
4. WASTE CHARACTERISTICS			
TOXICITY/PERSISTENCE:POLYCHLORINATED BIPHENYLS,NOS			18
WASTE QUANTITY CUBIC YDS	2501		
DRUMS	0		
GALLONS	0		
TONS	0		
TOTAL	2501 CU. YDS	8	8
TOTAL WASTE CHARACTERISTICS SCORE:			26
5. TARGETS			
SURFACE WATER USE		2	6
DISTANCE TO SENSITIVE ENVIRONMENTS		3	6
COASTAL WETLANDS	0 FEET		
FRESH-WATER WETLANDS	NONE		
CRITICAL HABITAT	NONE		
DISTANCE TO STATIC WATER	> 3 MILES		
DISTANCE TO WATER SUPPLY INTAKE	> 3 MILES		
AND	MATRIX VALUE	0	0
TOTAL POPULATION SERVED	0		
NUMBER OF HOUSES	0		
NUMBER OF PERSONS	0		
NUMBER OF CONNECTIONS	0		
NUMBER OF IRRIGATED ACRES	0		
TOTAL TARGETS SCORE:			12

SURFACE WATER ROUTE SCORE (Ssw) = 21.82

HRS AIR ROUTE SCORE

CATEGORY/FACTOR	RAW DATA	ASN. VALUE	SCORE
1. OBSERVED RELEASE	NO	0	0

2. WASTE CHARACTERISTICS

REACTIVITY: MATRIX VALUE

INCOMPATIBILITY

TOXICITY

WASTE QUANTITY CUBIC YARDS
DRUMS
GALLONS
TONS

TOTAL

TOTAL WASTE CHARACTERISTICS SCORE: N/A

3. TARGETS

POPULATION WITHIN 4-MILE RADIUS
0 to 0.25 mile
0 to 0.50 mile
0 to 1.0 mile
0 to 4.0 miles

DISTANCE TO SENSITIVE ENVIRONMENTS
COASTAL WETLANDS
FRESH-WATER WETLANDS
CRITICAL HABITAT

DISTANCE TO LAND USES
COMMERCIAL/INDUSTRIAL
PARK/FOREST/RESIDENTIAL
AGRICULTURAL LAND
PRIME FARMLAND
HISTORIC SITE WITHIN VIEW?

TOTAL TARGETS SCORE: N/A

AIR ROUTE SCORE (Sa) = 0.00

HAZARD RANKING SYSTEM SCORING CALCULATIONS
FOR
SITE: AMERICAN COLOR & CHEMICAL/VENTURE CHEMIC
AS OF 04/16/90

GROUND WATER ROUTE SCORE

OBSERVED RELEASE		45
WASTE CHARACTERISTICS	X	26
TARGETS	X	44

$= 51480 / 57{,}330 \times 100 = 89.80 = S_{gw}$

SURFACE WATER ROUTE SCORE

OBSERVED RELEASE		45
WASTE CHARACTERISTICS	X	26
TARGETS	X	12

$= 14040 / 64{,}350 \times 100 = 21.82 = S_{sw}$

AIR ROUTE SCORE

OBSERVED RELEASE $0 / 35{,}100 \times 100 = 0.00 = S_{air}$

SUMMARY OF MIGRATION SCORE CALCULATIONS

	S	S^2
GROUND WATER ROUTE SCORE (S_{gw})	89.80	8064.04
SURFACE WATER ROUTE SCORE (S_{sw})	21.82	476.11
AIR ROUTE SCORE (S_{air})	0.00	0.00
$S^2_{gw} + S^2_{sw} + S^2_{air}$		8540.15
$\sqrt{(S^2_{gw} + S^2_{sw} + S^2_{air})}$		92.41
$S_M = \sqrt{(S^2_{gw} + S^2_{sw} + S^2_{air})}/1.73$		53.42

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REFERENCE 1

LAW ENVIRONMENTAL SERVICES

PRELIMINARY HYDROGEOLOGIC ASSESSMENT

for

VENTURE CHEMICALS INC.

LOBECO, SOUTH CAROLINA

JUNE 21, 1985

LAW ENVIRONMENTAL SERVICES
DIVISION OF LAW ENGINEERING TESTING COMPANY
2749 DELK ROAD, S.E.
MARIETTA, GEORGIA 30067
(404) 952-9005

July 2, 1985

Venture Chemicals, Inc.
P.O. Box 815
South Carolina Highway 38
Lobeco, South Carolina 29931

Attention: Mr. John M. Meeks

Subject: Preliminary Hydrogeologic Assessment
Venture Chemical Plant
Lobeco, South Carolina
Law Environmental Services Project No. AE5238

Dear Mr. Meeks:

Law Environmental Services is pleased to submit this preliminary hydrogeologic assessment report of Venture Chemicals, Lobeco, South Carolina plant site. Our services were performed in general accordance with the scope of work outlined in the March 18, 1985 Ground-Water Detection Monitoring Plan. Our services were authorized by your Purchase Order No. 6676 dated April 8, 1985.

Our services as described in this report include the installation and development of six (6) Type II ground water quality monitoring wells, permeability testing of selected wells, water-level measurements, evaluation of hydrogeologic data, and preparation of a report. Ground-water sampling and chemical analyses were performed by others.

RE... JUL 05 1985

We appreciate the opportunity to assist Venture Chemicals with this important project. Please call us if you have any questions about this report.

Sincerely yours,

LAW ENVIRONMENTAL SERVICES

William G. Gierke
Staff Hydrogeologist

Charles A. Spiers, P.G.
Project Hydrogeologist

Thomas L. Cross, P.E.
Senior Hydrologist

Enclosure

WGG:CAS:TLC:ds

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RE
JUL 0 5 1985

INTRODUCTION

Venture Chemicals, Inc. reached an agreement with the South Carolina Department of Health and Environmental Control (DHEC) to implement a ground-water monitoring program at Venture Chemical's Lobeco, South Carolina facility. The proposed monitoring well plan was reviewed and approved by Mr. Charles Clymer of DHEC as stated in his April 8, 1985 letter. However, several exceptions to the plan were noted in Mr. Clymer's letter. Most of these dealt with sampling and analyses of ground water from monitoring wells, which was performed by Davis and Floyd.

Other concerns noted in DHEC's letter are addressed in this report. This report discusses the installation of six monitoring wells and data generated from the wells, along with other pertinent site hydrogeologic data.

LOCATION AND DESCRIPTION

Venture Chemicals, Inc. operates a plant located in Lobeco, South Carolina approximately 12 miles northwest of the town of Beaufort, South Carolina (Figure 1). The site is located approximately one mile north of the Whale Branch of the Coosaw River and 0.75 miles east of U.S. Route 21. The facility property comprises about 250 acres and the plant occupies about 50 acres. Figure 2 illustrates the layout of the facility.

The plant primarily manufactures agri-products, dye intermediates, and drilling fluid chemicals for the oil industry. Chemicals used and produced on-site consist primarily of organic compounds. Acidic industrial waste water from the plant is treated and neutralized on-site, prior to discharge to Campbell's Creek (see inset on Figure 1) in accordance with NPDES permit requirements. All wastes treated on-site are considered non-hazardous. Sludge from the bio-treatment area is disposed of off-site in a DHEC approved landfill. Venture Chemicals transports liquid hazardous wastes off-site.

Previous tenants at this site include Tenneco Company from 1967 to 1974 and American Color Chemical Company from 1974 to 1982.

REGIONAL HYDROGEOLOGY

The Lobeco, South Carolina area is underlain by sedimentary rocks that range in age from late Cretaceous to Holocene, comprising an overall thicknes of about 3,500 feet. This sequence of sedimentary rocks supplies all of the ground water used in the area (Hayes, 1979).

The principal aquifer beneath the site is composed of the Santee Limestone and basal portion of the Cooper Marl. These stratigraphic units form the principal artesian aquifer that supplies the majority of ground water in Beaufort County. A gamma ray log (Figure 4) of the deep observation well at the site shows that the top of the principal artesian aquifer is about 80 feet below land surface.

Specific yields of wells open to the principal artesian aquifer range from about 50 gallons per minute (gpm) to about 2,500 gpm (Hayes, 1979). Two deep production water wells exist at the site (Figure 2). These wells are 263 and 307 feet deep and periodically pump about 350 gpm each. The well sare screened at various intervals in the principal artesian aquifer (see Appendix for well details and logs). The most productive interval screened in these wells is the upper permeable zone of the principal artesian aquifer which extends from about 80 to 150 feet below land surface (Figure 4). Pumping of the two wells has caused a cone of depression of about 10 feet in the principal artesian aquifer as indicated on the regional potentiometric map published by The South Carolina Water Resources Commission (SCWRC) in June, 1984. The water level of the on-site SCWRC observation well was measured at 11.71 feet below mean sea level on March 27, 1985 (Table 1).

Overlying the principal aquifer is the Hawthorn formation which is composed of phosphatic, clayey sand and sandy clay with occasional zones of dolomitic, sandy to clayey limestone. The upper and lower sections of the Hawthorn formation act as confining beds. The middle section of the Hawthorn formation may be an aquifer (Hawthorn aquifer) in some areas; however, published

(21.6 feet), suggests that there is little or no hydraulic connection between the "uppermost" unconfined aquifer and the underlying principal artesian aquifer, even though the deeper aquifer is heavily pumped. This lack of hydraulic connection implies that downward seepage from the "uppermost" aquifer to the lower principal artesian aquifer is not likely to occur. As previously mentioned, the two aquifers are separated by the Hawthorn formation which is considered to be a confining bed.

Water elevations of the east and west holding basins were measured at 12.02 and 12.75 feet NGVD, respectively. These elevations are 6.43 and 7.16 feet higher than the water level in well V-5 which is directly downgradient (~ 10 feet) from the holding basins. This difference in water levels suggests that mounding of ground water caused by the holding basins is negligible.

A potentiometric map (Figure 2) derived from water levels obtained from site monitoring wells on April 27, 1985 shows that the direction of ground-water flow in the "uppermost" aquifer is to the south, toward Campbells Creek. In the "uppermost" aquifer, a slight hydraulic gradient of 0.003 ft/ft exists across the site.

Field permeability tests (found in the Appendix) performed on monitoring wells V-1, V-3, V-4, and V-6 yielded hydraulic conductivity (k) values ranging from 1.6×10^{-4} centimeters per second (cm/s) in well V-6 to 1.3×10^{-3} cm/s in well V-3 (Table 2). An average k-value for the permeability tests is 4.8×10^{-4} cm/s. This value is representative of the silty fine sands found in test holes at each monitoring well location.

The velocity of ground-water flow at the site can be estimated by using the formula V=Ki/Ne (Darcy's Law)

where; V = Velocity (cm/sec)

K = hydraulic conductivity (cm/sec)

i = hydraulic gradient (ft/ft)

Ne = effective porosity (dimensionless)

An estimated ground-water flow velocity was estimated by using the following data:

K = 4.8×10^{-4} cm/s

i = 0.003 ft/ft

Ne = 0.20 (assumed)

Based on the above data, an estimated flow velocity of 7.2×10^{-6} cm/s (7.4 feet/year) is calculated for ground water in the uppermost aquifer at the site.

CONCLUSIONS

Based on existing data, the following conclusions are presented:

1. The ground-water flow direction in the "uppermost" aquifer at the Venture Chemical's facility is from north to south, toward Campbells Creek.

2. An estimated ground-water flow velocity in the site area is 7.2×10^{-6} cm/s or 7.4 feet/year.

3. Significant differences between water levels in the holding basins and nearby monitoring wells suggests that mounding of ground water caused by the basins is negligible.

4. The "uppermost" unconfined aquifer and the underlying principal artesian aquifer do not appear to be hydraulically connected. Evidence supporting this lack of connection includes the presence of the Hawthorn Formation (a confining bed) and water level differences of 21.6 feet or more between the two aquifers.

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OVERSIZED

DOCUMENT

REFERENCE 3

R-586-9-0-27

approved 10/30/90 Recommend SIP E. Bozeman

FINAL REPORT

SCREENING SITE INSPECTION, PHASE II
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA
EPA ID #SCD046507018

Prepared Under
TDD No. F4-8904-54
CONTRACT NO. 68-01-7346

Revision 0

FOR THE

WASTE MANAGEMENT DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

SEPTEMBER 21, 1990

NUS CORPORATION
SUPERFUND DIVISION

Prepared By
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NOTICE

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EXECUTIVE SUMMARY

American Color and Chemical/Venture Chemical is located near the Coosaw River, about 12 miles northwest of Beaufort, South Carolina. The 26-acre site is currently owned by Lobeco Products, Inc. Previous tenants at the site include the Tenneco Chemical Company and the American Color and Chemical Company. The facility has primarily manufactured dye chemicals and intermediates during its more than 20-year history. Prior to February 1977, a lagoon, burn site, and drum storage area were used to manage waste at the facility. These areas have consistently shown elevated concentrations of chlorinated organics and heavy metals in environmental samples collected during previous investigations. The facility is currently under a consent order with the state to remediate the lagoon and burn site by December 1990.

Lobeco, South Carolina, is situated within the Coastal Plain Physiographic Province in a region that is characterized by low flatland inundated with water. The geology of the study area involves a thick wedge of sedimentary rocks, which can be divided into several hydrologic units based on differences in permeability and hydrologic characteristics. The uppermost hydrologic unit at this facility is the surficial aquifer, which consists of intermixed sand and clay layers. It is underlain by a thick sequence of green clay, which acts as an aquitard that separates the overlying unit from the deeper Tertiary Limestone Aquifer System. There are no wells in the Lobeco area that penetrate the full thickness of the Tertiary Limestone Aquifer System.

The surface water, groundwater, air, and onsite exposure pathways are of concern at American Color and Chemical/Venture Chemical. The surface water pathway was determined to be of primary concern. Several previous sampling investigations have shown that the sediment and fauna of nearby Campbell Creek are contaminated with polychlorinated biphenyls (PCBs). Numerous commercial fish species are considered at risk from releases of contaminants to the surface water pathway. The groundwater pathway is the next most significant pathway of concern at this site. There are approximately 182 people using the surficial aquifer within 4 miles of the site, and at least one of these users is located directly downgradient of the burn site. The air and onsite exposure pathways are of concern due to the presence of uncontained, contaminated soils. Potentially affected targets include local students, employees, and residents.

In November 1986, G & E Engineering, Inc. conducted a study at American Color and Chemical/Venture Chemical which involved a geophysical screening and the evaluation of analytical data from 197 samples. The geophysical instrument that was utilized delineated several zones of higher conductivity, which are interpreted to represent areas containing contaminated soil and groundwater. The analytical test results verify that the same areas are primarily contaminated with chlorinated organics and/or metals. The constituents, which are of primary concern, include: PCBs, trichloroethene (TCE), methylene chloride, lead, and mercury. All of these were found in soil and groundwater samples at concentrations significantly over background and are known components of waste deposited at this site. Also, the same type of contamination was found in several downgradient wells, which suggests that contaminants are migrating from this site.

Although extensive contamination has been documented in soil, groundwater, and sediment at and near the site, the facility is under a consent order with the state for remediation. Should all wastes and contaminated soils be removed, this site would not be a viable candidate for a Listing Site Inspection (LSI). Therefore, FIT 4 recommends that consideration of any further action at this site be contingent upon results of the ongoing remediation.

1.0 INTRODUCTION

The NUS Corporation Region 4 Field Investigation Team (FIT) was tasked by the U.S. Environmental Protection Agency (EPA), Waste Management Division to conduct a Phase II Screening Site Inspection (SSI) at the American Color and Chemical/Venture Chemical site in Lobeco, Beaufort County, South Carolina. The investigation 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). The task was performed to satisfy the requirements stated in Technical Directive Document (TDD) number F4-8904-54. At EPA's directive, FIT conducted no field activities for this SSI; analytical data incorporated into this report were generated during two previous studies at the site.

1.1 OBJECTIVES

The objectives of this investigation were to determine the nature of contaminants present at the site and to determine if a release of these substances has occurred or may occur. Further, this investigation sought to determine the possible pathways by which contamination could migrate from the site and the populations and environments it would potentially affect. Through these objectives, a recommendation was made regarding future activities at the site.

1.2 SCOPE OF WORK

The objectives were achieved through the completion of a number of specific tasks. These activities were to:

- Obtain and review background material relevant to HRS scoring of the site;
- Obtain maps of site;
- Obtain information on local water systems;
- Evaluate target population within a 4-mile radius of the site with regard to the groundwater and air pathways, and the possibility of direct contact, and within 15 downstream miles with regard to surface water use;

- Conduct a survey for private wells;
- Determine location and distance to nearest potable well;
- Develop a site sketch to scale;
- Reevaluate previous field investigations performed by Davis & Floyd, Inc. and G & E Engineering, Inc.; and
- Complete a Site Inspection Report, provided as Appendix A in this report.

2.0 SITE CHARACTERIZATION

2.1 SITE BACKGROUND AND HISTORY

American Color and Chemical/Venture Chemical is located just north of the Coosaw River, approximately 12 miles northwest of the town of Beaufort (Ref. 1, p. 1). Specifically, the site is located southeast of the intersection of highways 38 and 480 (Ref. 2). It is presently owned and operated by Lobeco Products, Inc. (Ref. 3, p. 1).

The plant was originally built by Tenneco Chemical Company in 1967. It was sold to American Color and Chemical Company in January 1974, and then resold to Venture Chemical Company in October 1982. Venture Chemical Company has since then changed its name to Lobeco Products, Inc. (Ref. 3, p. 1).

Lobeco primarily manufactures agric-products, dye intermediates, and drilling fluid chemicals for the oil industry. The chemicals used and produced on site consist mostly of organic compounds. Acidic industrial wastewater is generated as a by-product of the manufacturing process. This wastewater is neutralized in an onsite water treatment plant and then discharged into nearby Campbell Creek (Ref. 3, pp. 1-2).

Prior to the installation of the wastewater treatment system, a lagoon, drum storage area, and burn site were used to manage waste at the facility. These areas have consistently shown elevated concentrations of chlorinated organics (especially polychlorinated biphenyls) and/or heavy metals in environmental samples collected thus far (Ref. 3, p. 2). The samples were collected during three previous investigations: in September 1985, between January and May of 1986, and in March and April of 1988 (Appendices B, spread sheet; C, p. 1-5). The 1985 and 1986 sampling investigations were conducted by Davis & Floyd, Inc. and G & E Engineering, Inc., respectively. Both studies were performed because the South Carolina Department of Health and Environmental Control (DHEC) suspected contamination based upon previous water quality studies in nearby Campbell Creek (Appendix C, pp. 1-3, 1-4). G & E evaluated both sets of data in their November 1986 report entitled, Ongoing Soil and Groundwater Study and Conceptualized Cleanup Plan, Venture Chemicals, Inc., Lobeco, South Carolina (Appendix B, p. 31). The 1988 investigation was initiated by RMT, Inc. to fulfill the requirements of a DHEC Consent Order (No. 87-65-W) dated June 25, 1987 (Appendix C, pp. 1-4, 1-5). The findings of this study are presented in RMT's Lobeco Site Environmental Assessment, Results and Proposed Remedial Action Plans for American Color and Chemical Corporation and Tenneco Resins, Inc., dated September 1988 (Appendix C).

Consent Order 87-65-W was amended on October 11, 1989 (Ref. 4). The amendment was incorporated into the original order and requires that the present and past owner(s) of the chemical plant are to remove "high level" contamination at the abandoned lagoon and burn site (Ref. 5, pp. 1, 3). The latter document also includes a provision which specifies that the extent of groundwater contamination for "certain" areas on the property be delineated during future studies (Ref. 5, p. 1). This stipulation was intended to expedite implementation of the clean-up plan, which is targeted for completion in December of 1990 (Refs. 5, p. 1; 6; Appendix C, p. 10-2).

Lobeco Products, Inc. was also issued consent orders for two separate violations of its National Pollution Discharge Elimination System (NPDES) permit (no. SC0000914). The first consent order (86-94-W) was issued on September 29, 1986 for a violation of the toxicity limit (Ref. 7). The company also violated the toxicity limit, in addition to the limits for biochemical oxygen demand, total coliform, and ultimate oxygen demand, which initiated the issuance of the second order (88-37-W) (Ref. 8, p. 5). The August 8, 1988 document ordered Lobeco to "immediately begin and continue to properly operate and maintain its waste treatment facilities so as to maximize treatment" (Ref. 8, pp. 6-7). The only other permit violation that is known to have occurred at this facility is for failure to monitor polychlorinated biphenyls (PCBs) on a weekly basis. Venture Chemicals, Inc. received a Notice of Violation on December 18, 1985 for this infraction, but no enforcement action was ever taken (Ref. 9).

Lobeco Products, Inc. filed a part A application under the Resource Conservation and Recovery Act (RCRA) for waste treatment in tanks and the old lagoon. The tank treatment was later given exclusion under RCRA because it was a Waste Water Treatment Unit. Also, the waste in the lagoon was determined to be nonhazardous. Because of this, the Part A application was withdrawn on October 18, 1984 (Ref. 3, p. 2).

2.2 SITE DESCRIPTION

2.2.1 Site Features

The facility property consists of approximately 250 acres (Ref. 1, p. 1). Within these 250 acres, five contaminated areas connect to form an elongated, 26-acre parcel of land, which is considered the site (Figure 1). The contaminated areas include: the abandoned lagoon, the sediments and marsh near the Lobeco outfall, the old drum storage area, the old burn site, and an area of stressed vegetation (Ref. 3, pp. 2-3, 5). The site has an average downward slope of 0.006 ft/ft (Appendix B, p. 24).

Several active waste management facilities are located in the site area. These are part of the NPDES water treatment system and consist of the following: an equalization basin, an aeration basin, a digester basin, clarifiers (two), drying beds, and holding ponds (east and west ponds) (Ref. 3, p. 2). All of the active waste management facilities, and one of the inactive waste sites (drum storage area), are completely surrounded by a fence. A gate at the northwest corner provides the only security access. The site layout is depicted in Figure 2.

2.2.2 Waste Characteristics

Historical effluent and solid waste management practices at this facility involved the lagoon, drum storage area, and burn site. The lagoon was used as a settling basin for process effluent, which consisted of aqueous product extractions (washes) and cooling water mixed in with sanitary waste. Off-grade products and other process wastes were kept at the drum storage area prior to being incinerated at the burn site (Ref. 10, p. 9). Several of these materials are known to have contained either PCB, naphthalene, or toluene (Ref. 10, pp. 11-12). No known waste quantity information exists for inactive waste management facilities at this site (Ref. 10, p. 12).

The chemical plant also operated a hot oil circulating system for certain reactions that require higher than normal temperature. The hot oil system operated on electric heaters in a pump-around loop. On occasion, pump leaks developed and/or electric heating tubes failed, which resulted in spills onto the plant floor. When this happened, the standard clean-up procedure was to scoop up as much as possible into drums. The residue was then washed into the floor drain system, which ultimately led into the effluent system and then to the lagoon. The heating oil that was initially used was a PCB (Arochlor 1248) supplied by Monsanto (Ref. 10, p. 10).

Historical aerial photographs show that the new wastewater treatment facilities were installed between September 1975 and February 1977 (Appendix B, p. 12). The plant currently utilizes the activated sludge method to treat wastes (Refs. 3, p. 2; 11). Only non-hazardous wastes undergo treatment (Ref. 1, p. 2). Sludge solids from the bio-treatment area are landfilled at an offsite location (Refs. 1, p. 2; 11). Lobeco Products, Inc. transports liquid hazardous wastes off site (Ref. 1, p. 2).

Various types of containment exist at each of the former disposal areas. A PCB contaminated sludge layer at the bottom (8 feet) of the old lagoon was covered by a 1- to 2-foot natural earth cap and then backfilled (Ref. 10, p. 11; Appendices B, pp. 13, 39; C, p. 2-2). The old drum storage area has been partially covered with a concrete pad (Appendix B, p. 6). There is no artificial cover on the burn site, but the area is completely overgrown with groundcover-type vegetation (Appendix B, pp. 13-14, 39). Finally, all of the former disposal areas are unlined (Refs. 10, p. 12; 12).

3.0 REGIONAL POPULATIONS AND ENVIRONMENTS

3.1 POPULATION AND LAND USE

3.1.1 Demography

American Color and Chemical/Venture Chemical is in a moderately populated rural area approximately 12 miles northwest of Beaufort, South Carolina (Ref. 3, p. 3; Appendix B, p. 24). Most of the population in the area consists of full-time residents. A house count on USGS topographic maps covering the area indicated that 4,313 people (1,135 houses x 3.8 people/house) live within 4 miles of the site; 380 people (100 houses x 3.8 people/house) were counted within 1 mile. The nearest residence is located 500 feet east of the site (Appendix D).

There are very few work areas and schools in the study area. The only major work area known to exist within 4 miles of the site is the Marine Corps Air Station on Port Royal Island (Appendix D). Also, there are currently 75 employees at the Lobeco plant (Ref. 13, p. 3). No schools or day-care centers are located adjacent to the site (Ref. 13, p. 11; Appendix D). The nearest school is James Davis Elementary, which is located approximately 1 mile east of the site (Appendix D). There are 436 students attending this school (Ref. 14).

3.1.2 Land Use

The area within a 4-mile radius of the site is characterized by low flatland inundated with surface water (Ref. 15, pp. 5, 13). Because of this, the majority of land surrounding American Color and Chemical/Venture Chemical is sparsely settled (Ref. 15, p. 13). Nevertheless, agriculture plays an important role in the economy of the area (Ref. 15, p. 16).

Agricultural uses include livestock and crop production. Crops grown include corn, soybeans, small grains, fruits, and vegetables (Ref. 16). There are no parks or land-related sensitive environments within 4 miles of the site (Refs. 13, p. 11; 17; Appendix D).

3.2 SURFACE WATER

3.2.1 Climatology

Beaufort County is characterized by a subtropical climate with hot and humid summers and mild winters. The annual rainfall is approximately 50 inches with the greatest precipitation occurring from June to August (Ref. 15, pp. 5, 9). Annual evapotranspiration is 44 inches, making net annual precipitation approximately 6 inches (Ref. 18). Mean annual temperature for the Lobeco area is approximately 66°F (Ref. 15, p. 10).

3.2.2 Overland Drainage

Surface water runoff from the property collects in an onsite drainage ditch system (Appendix B, p. 24). The water in the ditch flows south and eventually empties into a tidally influenced marsh area that surrounds Campbell Creek (Ref. 19, p. 17; Appendix B, p. 24).

3.2.3 Potentially Affected Water Bodies

Overland drainage discharges into the tidal marsh surrounding Campbell Creek. During ebb tide, Campbell Creek flows southeasterly into Whale Branch of the Coosaw River (Ref. 20; Appendix D). The surface water migration pathway ends in the Coosaw River, approximately 9 miles downstream from its confluence with Whale Branch (Ref. 17). During flood tide, however, flow direction is reversed, and the migration pathway extends to include several additional tributaries of Whale Branch and the Coosaw River (Refs. 17; 20; 21; Appendix D).

Along the surface water migration pathway, the waters are designated Class SA (Ref. 22, pp. 272, 277). This is indicative of saltwaters suitable for harvesting of clams, mussels, and oysters for human consumption (Ref. 22, p. 272). There are no drinking water intakes downstream from the site (Ref. 23).

Numerous sensitive environments are present along the surface water migration pathway. All of the potentially affected water bodies lie contiguous to coastal wetlands (Ref. 17; Appendix D). These wetlands, and their associated drainageways, serve as a nursery and breeding ground for the eastern oyster (Crassostrea virginica) (Ref. 17). The drainageways also provide a habitat for numerous commercial fish species and most areas have been approved for shellfish harvesting (Refs. 17, 24). Minor exceptions basically include Campbell Creek, a portion of Whale Branch near its confluence with the creek, and several tributaries to the Coosaw River that are hydrologically interconnected with the nearby Beaufort River (Ref. 24). Finally, the Florida manatee (Trichechus manatus) and shortnose sturgeon (Acipenser brevirostrum) are designated as federally endangered and may be found along the migration pathway (Refs. 17; 25, section 6). These species have no critical habitats in the state of South Carolina (Ref. 25, section 7).

A significant amount of analytical data has been generated from previous water quality studies along the surface water migration pathway. The earliest samples were collected in August 1983 as part of an evaluation for the facility's discharge permit. At this time, the Chemical Oceanography Section of the Marine Resources Research Institute collected oyster samples from Campbell Creek. The samples contained very complex mixtures of organic compounds and showed elevated concentrations of lead (>2.0 ppm). Subsequent to these findings, DHEC conducted an assessment of the creek area in order to further evaluate the influence of the plant's discharge on the environment (Ref. 26). Samples that were collected in November 1983 showed sixty-six (66) organic chemical compounds in oyster tissue, sediment, and the Lobeco plant effluent (Ref. 27, p. 1). The investigation concluded that the fauna in Campbell Creek had been moderately to severely impacted due to the discharge of wastewater from the facility. However, the study did not present any direct evidence of fish kills in the creek (Ref. 27, p. 2).

The November 1983 sampling investigation led to several additional water quality studies in the Campbell Creek area. The testing was conducted in 1984 by both DHEC and an outside consultant to the chemical plant. The results from these studies showed an improvement in the water quality and biota of Campbell Creek, although PCBs were detected in the sediment near the Lobeco outfall. Analysis for PCBs was not performed during previous testing (Appendix C, p. 1-3).

The remaining water quality studies that have been conducted along the surface water migration pathway basically involve the monitoring of PCBs. DHEC collected samples of blue crabs (Callinectes sapidus) from Campbell Creek and its associated water bodies during September and October of 1985 (Ref. 28; Appendix C, p. 1-3). Detectable levels of PCBs were found in nearly all the samples (Ref. 28). The samples that showed the highest concentrations (mean = 0.949 ppm) were those collected near the discharge pipe (Ref. 28; Appendix C, pp. 1-3, 1-4). Other PCB monitoring was performed by the Marine Resources Division between June and October of 1985. During this time, they collected crab, oyster, and sediment samples along Campbell Creek and Whale Branch. The results from this analyses were similar to previous DHEC findings. The highest concentration detected (25.21 ppm) was from a sediment sample collected at the Lobeco outfall (Ref. 26). Finally, the facility is required to monitor PCBs on a weekly basis as part of their NPDES permit (Refs. 9; 19, p. 18). The permit also requires that several types of biological studies be conducted on a regular basis, but discussion of these studies is outside the scope of this investigation (Ref. 19, pp. 18-19).

3.3 GROUNDWATER

3.3.1 Hydrogeology

American Color and Chemical/Venture Chemical is located in the lower part of the Coastal Plain Physiographic Province (Refs. 15, pp. 5, 9; 29, p. 379; Appendix D). The topography of the surrounding area is characterized by low relief, lagoons, tidal swamps, and salt marshes (Appendix C, p. 4-1). The region is underlain by a thick wedge of sedimentary rocks, which unconformably overlie crystalline igneous and metamorphic rocks equivalent to rocks of the Piedmont Physiographic Province (Ref. 22, pp. 22-23).

The formations within the upper portion of this sedimentary wedge comprise the aquifers that are used in the study area (Refs. 15, p. 32; 22, p. 23; Appendix C, p. 4-1). The youngest of these is the Pamlico Formation, which represents the surface geology at the site (Appendix B, p. 25). Underlying units in descending order include: the Hawthorn and Cooper formations, the Ocala and Santee limestones, and the Black Mingo Formation (Refs. 22, pp. 23, 25; 29, pp. 380-381; Appendix B, pp. 25-26). These formations may be divided into several hydrologic units based on differences in permeability and hydrologic characteristics.

The uppermost hydrogeologic unit at American Color and Chemical/Venture Chemical is the unconfined surficial or water-table aquifer (Appendix B, p 25). This unit consists primarily of quartz sand and lenses of clay to a depth of 35 to 40 feet below land surface (bls) (Appendices B, p. 4-1; C, p. 25). Although the saturated thickness of this unit is dependent on climatic conditions, elevations of nearby streams indicate the water table is between 5 and 10 feet bls (Refs. 3, p. 3; 29, p. 379). Recharge to this aquifer is from local rainfall (Ref. 29, p. 379; Appendix C, p. 4-5).

The water-table aquifer is underlain by approximately 50 feet of green clay from the Hawthorn and Cooper formations (Appendices B, p. 26; C, p. 4-2). This unit has a hydraulic conductivity of 10^{-7} cm/sec and serves as an aquitard that separates the overlying unit and the deeper Tertiary Limestone Aquifer System (Appendices B, p. 50; C, p. 6-31). The Tertiary Limestone aquifer is about 900 feet thick and is divided into an upper and a lower hydrologic unit (Refs. 22, p. 276; 30, p. 47). The upper unit consists of highly permeable fossiliferous limestone and is the primary source of groundwater in Beaufort County (Refs. 15, pp. 31-32; 29, p. 380; 30, p. 47). The lower unit is moderately productive and is not used as extensively as the upper unit (Ref. 30, p. 55). Recharge to the Tertiary Limestone aquifer is primarily through downward leakage from overlying units (Ref. 30, p. 73). The Tertiary Limestone Aquifer System is underlain by the Black Mingo Formation, which acts as a 400-foot thick confining layer (Refs. 22, p. 23; 29, p. 381; 30, p. 27).

Groundwater in the surficial, water-table aquifer system flows south toward Campbell Creek, reflecting the general influence of topography on the water table (Appendices B, pp. 28-29; C, p. 6-9). In the Tertiary Limestone aquifer, groundwater flow is regionally toward the east (Ref. 15, pp. 53-54). Within 2 miles of the site, however, an induced cone of depression exists in the potentiometric surface of the Tertiary Limestone aquifer (Ref. 15, figure 19; Appendix B, p. 27). This occurs because two closely spaced production wells on the Lobeco property pump sizable quantities (about 500,000 gal/d each) from an area in the aquifer where the transmissivity is relatively low (less than 5,000 ft^2/d) compared to other locations in the region (Ref. 15, p. 56). Within the cone of depression, the groundwater flow direction is toward the Lobeco pumping center.

The production wells at the chemical plant have depths of 263 and 307 feet and are open to both the upper and lower units of the Tertiary Limestone Aquifer System. The upper unit is the most productive interval screened in these wells, and it extends from about 90 to 150 feet bls (Ref. 1, p. 3). It is also the unit in which most of the remaining wells in the Lobeco area are completed (Refs. 15, p. 32; 31; Appendix B, p. 27). These wells commonly yield between 100 and 300 gallons per minute (Ref. 29, p. 380).

3.3.2 <u>Aquifer Use</u>

The surficial aquifer, which is also the aquifer of concern, is used for drinking purposes (Refs. 3, p. 3; 29, p. 379). However, a local well driller estimated that it supplies water to only 5 percent of the wells found within the study area (Ref. 31). This corresponds to 38 homes within 3 miles of the site, since approximately 770 private well owners were identified on the USGS topographic maps covering the area; an additional 10 (0.05 x 193) are included when considering a 4-mile radius. This gives a total of 48 homes or 182 people (48 houses x 3.8 people/house) relying on groundwater from the surficial aquifer within 4 miles of the site. There are no public water systems associated with the surficial aquifer (Refs. 3, p. 4; 13, pp. 4-5; Appendix B, p. 27).

DHEC conducted all of the previous studies on potable groundwater near the site area. The only available analytical data are from a July 1989 report, which gives the results of samples taken from six nearby private water supply wells. These samples were analyzed for volatile organics, priority pollutant metals, selected secondary metals, acid base and neutral extractable components, PCBs, alkalinity, and total dissolved solids. The analytical test results show that the groundwater surrounding the American Color and Chemical/Venture Chemical site is not contaminated. However, the report indicates that PCBs were detected in one of the wells during an earlier study. This well, owned by Mr. Ronald Glenn, is screened in the Tertiary Limestone aquifer. It serves 5 people and is located about 800 feet from the abandoned lagoon. The Anderson well is located adjacent to the Glenn well and is the only well within one-quarter mile of the site that is completed in the surficial aquifer. The shallow well was one of the six wells sampled during the 1989 investigation (Ref. 32).

3.4 SUMMARY OF POTENTIALLY AFFECTED POPULATIONS AND ENVIRONMENTS

There are four pathways of concern at the site: the surface water, groundwater, air, and onsite exposure pathways. Each of these has been deemed a potential contaminant migration route because each pathway is viable and targets are associated with each pathway.

Surface water is the primary pathway of concern. It has been demonstrated from several previous sampling investigations that the sediment and fauna of Campbell Creek are contaminated with PCBs. The creek serves as a habitat for numerous commercial fish species and would be open to shellfish harvesting if it were not for the influence of the chemical plant's wastewater discharge. Also, there are at least two endangered species that may be present along the migration pathway.

The groundwater pathway is less significant but also of concern. Although the target population associated with the surficial aquifer is small, there is at least one shallow well located downgradient from the burn site which may eventually become contaminated. Furthermore, there has been evidence of possible PCB contamination in a nearby private well that is screened in the deeper Tertiary Limestone aquifer. If the two aquifers were considered as a single hydrologic unit, the target population would increase significantly from 182 people to about 4,170 people.

The air and onsite exposure pathways are of concern due to the presence of uncontained, contaminated soils. Potentially affected targets within a 4-mile site radius include students, employees, and residents. The population of residents within 4 miles of the site is estimated at 4,313. Targets for onsite exposure include 75 employees at the subject facility and 380 residents located within a 1-mile radius of the site.

4.0 FIELD INVESTIGATION

The data presented in this section was obtained from the G & E Engineering, Inc. report entitled Ongoing Soil and Groundwater Study and Conceptualized Cleanup Plan, Venture Chemicals, Inc., Lobeco, South Carolina. The G & E report provides analyses for nearly all environmental samples collected at the site prior to November 1986 (Appendix B, pp. 8, 31, spread sheet). The analytical results from the most recent sampling investigation by RMT, Inc. (Appendix C) are not discussed in this section because those samples were tested for only a limited number of constituents (Appendix C, p. 6-17). The G & E report also provides data from a geophysical survey that was conducted in March and April of 1986 (Appendix B, p. 15). This survey appears to have been utilized as a screening tool that aided in the selection of locations for subsequent sampling events. The results of the survey are presented in section 4.1; sampling information is presented in sections 4.2 and 4.3.

4.1 GEOPHYSICAL INVESTIGATION

A geophysical survey was conducted by G & E during their assessment of the subject site. The survey was performed to detect and map contaminated soil and groundwater by delineating zones of lower and higher conductivity around areas of concern (Appendix B, pp. 2, 15). The zones of higher conductivity are interpreted to represent areas where contaminants have escaped into the soil or groundwater systems (Appendix B, p. C). These contaminants produce an increase in free ion concentration (measured as conductivity) when introduced into the underlying media (Appendix B, p. 15). The zones of lower conductivity are indicative of natural background (Appendix B, p. C).

Background conductivity values ranged between 20 and 25 millimhos/meter (mmhos/m). Several areas at the facility showed conductivity values much greater than these background levels (Appendix B, p. 15). The old drum storage area, the abandoned lagoon, the burn site, and the stressed vegetation areas had anomalously high conductivities (50 to 80 mmhos/m or greater) relative to the background levels (Appendix B, pp. 15-16, figure 5a). The most anomalous area (150 mmhos/m) is that area just south of the abandoned lagoon, thought to be the location of runoff between the lagoon and marsh (Appendix B, pp. 15-16). The locations of all anomalous areas are depicted in Figure 3.

4.2 SAMPLE COLLECTION

The analytical data presented in the G & E report was collected during two previous sampling investigations: on September 18, 1985 and between January 13 and May 1 of 1986 (Appendix B, spread sheet). The earlier samples were collected to perform preliminary evaluations of the groundwater conditions at the site (Appendices B, p. 6; C, p. 1-3). To accomplish this, Davis & Floyd, Inc. sampled six permanent monitoring wells, the two plant production wells, and one deep observation well (Appendix B, p. 6). The latter samples were collected "to determine the source, nature and extent of zones of surface and subsurface contamination" (Appendix B, p. 1). To accomplish this, G & E collected product, sludge, soil, surface water, and groundwater samples from a number of strategic locations (Appendix B, spread sheet). These locations were selected based on previous monitoring well data, historical aerial photographs, an onsite reconnaissance, and the geophysical survey (Appendix B, p. 14). A total of 197 samples were collected between the two investigations (Appendix B, p. G, spread sheet). Only the background samples and samples that showed significant contamination will be discussed in this report.

4.2.1 Sample Collection Methodology

All sample collection, sample preservation, and chain-of-custody procedures used during these investigations were in accordance with standard operating procedures as specified in Sections 3 and 4 of the Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual; United States Environmental Protection Agency, Region IV, Environmental Services Division (ESD), April 1, 1986 (Appendix B, p. G).

4.2.2 Description of Samples and Sample Locations

One hundred and ninety-seven samples were evaluated in the November 1986 G & E report: 91 from the abandoned lagoon, 31 near the discharge pipe, 21 from the old drum storage area, 31 from the burn site, 8 from the stressed vegetation area, 7 from miscellaneous locations, and 8 from background locations (Appendix B, spread sheet). The miscellaneous locations represent groundwater samples collected by Davis & Floyd that are outside the confines of the contaminated areas (Appendix B, figure 4). Other samples (6) collected at the site include product, sludge, and surface water samples. These were taken from either the ponds at the burn site or the eastern part of the marsh area at the discharge pipe (Appendix B, p. 19, spread sheet). The remaining 184 (197-7-6) samples (soil and groundwater) were collected from numerous hand and truck-mounted auger borings that were converted into either temporary or permanent monitoring wells (Appendix B, pp. 16, 18-19, spread sheet). Sample locations for each of the five contaminated areas are shown in Figures 4 through 8.

The auger borings for the G & E investigation were drilled as either part of the "waste facility sampling program" or a program for "soil exploration." Under the waste facility sampling program, the borings were placed within areas of known contamination and advanced to shallow depths (<8 feet) (Appendix B, pp. 18-19). The samples obtained from these borings were collected at specified depths and used for analytical testing (Appendix B, p. 18, spread sheet). The test results provided important information concerning the vertical extent of contamination beneath each "source" area. The soil exploration borings are different because these were drilled adjacent to areas of known or suspected contamination (Appendix B, p. 17). This was done in order to determine the horizontal extent of contaminated media so that some of the borings could be converted into upgradient and downgradient permanent monitoring wells (Appendix B, pp. 2, 17). In addition to analytical testing, laboratory tests were performed on selected soil samples to determine permeability and engineering properties (Appendix B, p. 18). The final difference is that the soil exploration borings involved continuous split-spoon sampling (Appendix B, p. 17).

4.2.3 Field Measurements

Water level elevations were recorded by both G & E and Law Environmental Services during field activities. The measurements were used to generate water table maps (Ref. 1, p. 7; Appendix B, figures 11a, 11b). Also, each consultant conducted in-situ permeability tests (slug tests) on selected groundwater monitoring wells. The slug tests were performed to calculate hydraulic conductivities of the monitored soil strata (Ref. 1, p. 7; Appendix B, p. 20). Water level and time measurements were recorded during each slug test (Appendix B, pp. 20-21).

4.3 SAMPLE ANALYSIS

4.3.1 Analytical Support and Methodology

There are differences in the parameters tested and the analytical support for each investigation. Davis & Floyd performed their own analyses and tested each groundwater sample for the following parameters:

- temperature;
- pH;
- specific conductance;
- Total Organic Carbon (TOC);
- chloride;
- priority pollutant analysis for volatile organics (32 compounds);
- 1-aminoanthraquinone;
- aniline;
- dimethyl amine;
- p-chlorophenol;
- n-cyanoethyl-n-ethyl-m-toluidene (CEET); and
- metals (Appendix B, pp. 6-7).

Samples collected by G & E were analyzed for a variety of parameters including:

- pH;
- specific conductance;
- TOC;
- Volatile Organic Analysis (VOA);
- selected chlorinated organics (TCE, TCB, etc.);
- naphthalene;
- phenolic compounds;
- PCB; and
- metals including lead, mercury, arsenic, cadmium, and chromium (Appendix B, p. 22).

However, not every sample was tested for each parameter listed above (Appendix B, p. 45, spread sheet). Initial samples collected during G & E's investigation were analyzed by J.L. Rogers & Callcott Engineers, Inc. of Greenville, South Carolina; subsequent analyses were performed by West-Paine Laboratories, Inc. from Baton Rouge, Louisiana (Appendix B, p. E, spread sheet).

A variety of EPA approved analytical methods and procedures were utilized for the Davis & Floyd and G & E samples. The specific methods and procedures are listed on the individual analytical reports which are contained in Volume II of Appendix B.

4.3.2 Analytical Data Quality

All analyses are reported to have been performed by EPA approved methods. Only limited information on data quality is available. There is no evidence of independent quality assurance (QA) review or data validation. The data packages presented do not include sufficient information for complete QA review of the data. Individual analytical reports and data spread sheets are provided in Appendix B.

4.3.3 Presentation of Analytical Results

This section discusses the results from the analyses of samples collected by Davis & Floyd in 1985 and G & E in 1986. The discussion is broken into subheads for each of the five contaminated areas. Separate tables (2 through 6) have been generated to present the analytical data for each area. Table 1 is also included and this presents the data from a background location. Only the significant results are shown on the tables.

4.3.3.1 Abandoned Lagoon

Analytical test results from the abandoned lagoon (Table 2) indicate that the soil and groundwater are primarily contaminated with chlorinated organics and metals. The chlorinated organic of greatest concern is Arochlor 1248, which is a PCB that was detected in both media. Chromium, lead, and mercury account for the most significant metal contamination. None of the above-mentioned constituents are known to have been detected in background samples.

Samples from C-1, W-3, W-4, V-6, and B-1 (6-8 ft, 10-12 ft, 14-16 ft, 43-45 ft) indicate that the PCB soil and groundwater contamination is restricted to the areal extent of the lagoon. The lagoon soils are contaminated at depths of up to 14 feet bls with average PCB concentrations of 750 mg/kg. The most significant PCB soil contamination was found in a sludge layer that varies in depth from about 4 to 7 feet bls. The depth to the contaminated sludge is greatest in the center of the lagoon. The highest concentration detected in the sludge layer was from sample G&E-3 (4-5 ft), which showed a PCB concentration of 6,750 mg/kg. The groundwater at the abandoned lagoon showed an Arochlor 1248 concentration of 6.02 mg/l (L-1, L-2, L-3 composite).

Other organic compounds found in environmental samples include 1,2,4-trichlorobenzene (1,2,4-TCB) and naphthalene. Naphthalene was detected at a maximum concentration of 122 mg/kg in soil boring L-33 (12-14 ft) and in the groundwater composited from L-1, L-2, and L-3 at 2.340 mg/l. Similar concentrations (103 mg/kg and 3.470 mg/l) of 1,2,4-TCB were detected in the same samples.

The soil samples from the old lagoon showed elevated levels of chromium, lead, and mercury. These constituents were detected at maximum concentrations in borings L-1 and G&E-3. The maximum levels are as follows: 46 mg/kg for chromium and 2,286 mg/kg for lead in boring G&E-3 (4-5 ft) and 19 mg/kg of mercury in boring L-1 (1 ft). The lowest levels were generally found in boring G&E-5. Concentrations for the sample taken 4-5 feet bls range from not detected for lead and mercury to 4.9 mg/kg for chromium.

Chromium, lead, and mercury were also detected at relatively high levels in groundwater samples collected from the abandoned lagoon. The groundwater composited from G&E borings 1 and 5 showed a lead concentration of 34 mg/l, which is 680 times greater than the EPA maximum contaminant level (MCL). The other constituents were detected at lesser amounts, but their concentrations are still well above the MCL (Ref. 33). Also, the presence of chromium and lead in downgradient wells (W-3, V-6) suggests that the contaminants are migrating from the lagoon.

Monitoring wells W-3 and V-6 also indicate chloride and organic contamination. The organic compounds that were detected include chlorotoluene and trichloroethene (TCE). All of these constituents were found at concentrations significantly greater than the concentrations detected in background samples.

4.3.3.2 Discharge Pipe

TOC is the only parameter that was detected along the discharge pipe south of the abandoned lagoon (Table 3). Concentrations ranging from 50 to 100 mg/l were revealed in groundwater samples obtained from borings A-3, A-5, and A-6. These concentrations are significantly greater than the values obtained from background wells. There was no TOC analysis performed on soil samples collected from this area.

4.3.3.3 Old Drum Storage

Analytical results for groundwater samples collected from the old drum storage area indicate that the major contaminants of concern are chlorinated organics. TOC and chloride are also of concern. Selected analytical data for this area are presented in Table 4.

TOC and chloride were present at elevated levels in groundwater samples collected at the old drum storage area. Samples A-9, A-10, and A-11 showed TOC concentrations of 30, 20, and 30 mg/l, respectively. The chloride concentrations for the same samples ranged from 115 to 595 mg/l. Only the chloride concentrations are significantly greater than the values reported from any of the background wells.

The most significant chlorinated organic is carbon tetrachloride. This constituent was detected in all groundwater samples collected within the boundaries, and downgradient, of the source area. Within the source area, soil borings A-9 through A-11 showed carbon tetrachloride concentrations ranging from 12 to 39 mg/l. Monitoring well W-7, located slightly downgradient from the source area, revealed the highest concentration (89 mg/l) of carbon tetrachloride. There are no other downgradient wells that monitor the old drum storage area (Appendix C, plate 7). Carbon tetrachloride was not detected in any of the background groundwater samples.

Monitoring well W-7 also showed a TOC concentration of 150 mg/l. This concentration is significantly greater than any of the values detected in background wells.

4.3.3.4 Burn Site

The contamination at the burn site mainly involves chlorinated organics and metals (Table 5). Methylene chloride, PCBs, and TCE account for the most significant organic contamination. These constituents were found at relatively high levels in several groundwater samples. The same samples also showed elevated concentrations for cadmium, chromium, lead, and mercury. None of the above mentioned constituents are known to have been detected in background samples.

Within the confines of the burn site area, methylene chloride, PCBs, and TCE were detected in the groundwater. Methylene chloride was detected at a maximum concentration of 6.40 mg/l in a water sample obtained from boring G&E-10. Monitoring wells W-10 and W-11 showed PCB (Arochlor 1242) and TCE concentrations of 0.012 mg/l and 12 mg/l, respectively. The PCBs were also detected in the soil at depths ranging from 1 to 6 feet bls. The highest concentration was detected in sample BS-3 (3-4 ft), which showed an Arochlor 1248 concentration of 250 mg/kg.

Mercury is the only other contaminant that was detected within the confines of the burn site at significant levels. A concentration of 0.24 mg/l was found in a surface water sample obtained from a lagoon that is located within the burn site. A solid sample removed from a product bag that was located within the same lagoon revealed a mercury concentration of 19.0 mg/kg.

Groundwater monitoring well W-9, located near the burn site, showed a PCB concentration of 0.114 mg/l, a TCE concentration of 180 mg/l, and concentrations for chromium and lead that significantly exceed the MCL (Ref. 33). Cadmium and mercury were also detected although at much lower levels. These findings suggest a definite contaminant migration trend since the well is located hydraulically downgradient from the burn site.

The furthest downgradient well (W-13) that monitors the burn site showed elevated levels of cadmium, chromium, and lead. There were no PCBs detected in this well, or in any other wells located downgradient from W-9.

4.3.3.5 Stressed Vegetation

The only contamination at the stressed vegetation area is with chromium and lead, which were detected in a soil sample. Chromium and lead were detected in sample D-1 (1-2 ft) at concentrations of 3.3 mg/kg and 3.8 mg/kg, respectively. Selected analytical data for this area are presented in Table 6.

4.4 SUMMARY OF FIELD INVESTIGATION

G & E's geophysical investigation provided the necessary data needed to detect and map contaminated soil and groundwater at this site. Several zones of higher conductivity were delineated during the investigation, and these are thought to be representative of contaminated areas. The geophysical results were then utilized to determine optimum sampling locations.

One hundred and ninety-seven samples were collected by G & E and Davis & Floyd during 1985 and 1986. Soil and groundwater samples account for the majority of samples that were collected. These were mostly taken within and adjacent to areas of concern. The samples were analyzed for total organic carbon (TOC), volatiles, acid and base neutrals, polychlorinated biphenyls (PCBs), and metals.

The findings of the geophysical investigation are supported by the analytical test results for environmental samples collected at this site. The areas that showed anomalously high conductivity values are primarily contaminated with chlorinated organics and/or metals. The chlorinated organic of greatest concern is PCB. This constituent is present in the lagoon soil at an average concentration of 750 mg/kg and in the lagoon groundwater at 6.02 mg/l. The PCBs were also detected at the burn site, along with trichloroethene (TCE) and methylene chloride. All three of these constituents were detected in groundwater samples at concentrations of 0.012 mg/l or greater. The burn site and lagoon also account for the most significant metal contamination. Several soil and groundwater samples showed relatively high levels of lead and mercury.

There is a strong correlation between the sample results and the wastes disposed of at American Color and Chemical/Venture Chemical. The PCB contamination is present because the effluent that was treated during the active life of the lagoon occasionally contained PCBs from in-plant spill incidents; PCBs were also constituents of a waste incinerated at the burn site. Much of the other organic contamination can also be attributed to incineration at the burn site, or to spills and leaks that occurred in the associated drum storage area (Ref. 10, pp. 9, 11-12). The only strong correlation that can be made for metals is that the product bags found at the burn site were the source of mercury contamination in environmental samples collected at the same location.

5.0 SUMMARY

The surface water, groundwater, air, and onsite exposure pathways are of concern at American Color and Chemical/Venture Chemical. The surface water pathway is of primary concern. Polychlorinated biphenyls (PCBs) are known to have been introduced into Campbell Creek, which receives both runoff and processed wastewater from this facility. These constituents are known to be accumulating in the food chain. The creek and associated waters have already been closed to shellfish harvesting because of this contamination. The groundwater pathway is also of concern. There is at least one shallow well located downgradient of the site. Also, potential users could be seriously endangered. The air and onsite exposure pathways are of lesser concern.

A total of 197 previously collected samples were reevaluated in this report. The samples were collected within and adjacent to areas of concern which include: the abandoned lagoon, the sediments and marsh near the plant's discharge pipe, the old drum storage area, the old burn site, and an area of stressed vegetation. The abandoned lagoon and burn site are by far the most contaminated areas. Significantly high concentrations of PCB, trichloroethene (TCE), methylene chloride, lead, and mercury were detected in soil and groundwater samples collected from these areas. All of these constituents are known components of waste deposited at the site. Also, several of the downgradient wells that are monitoring the abandoned lagoon and burn site are contaminated with the same constituents, which suggests a definite migration trend.

Although extensive contamination has been documented in soil, groundwater, and sediment at and near the site, the facility is under a consent order with the state for remediation. Should all wastes and contaminated soils be removed, this site would not be a viable candidate for a Listing Site Inspection (LSI). Therefore, FIT 4 recommends that consideration of any further action at this site be contingent upon results of the ongoing remediation.

19. South Carolina Department of Health and Environmental Control Water Pollution Control Permit (Number SC0000914) issued to Venture Chemicals, Inc., May 23, 1985, pp. 17-19.

20. George Nelson, Low Country District, South Carolina Department of Health and Environmental Control, telephone conversation with James Miller, NUS Corporation, December 14, 1989 Subject: Flow reversals in Campbell Creek and associated water bodies.

21. Russell E. Berry, Shellfish Manager, Low Country District, interoffice memorandum to Luke Hause, Director of Shellfish & Recreational Waters, South Carolina Department of Health and Environmental Control, April 10, 1984. Subject: Source of contamination in Whale Branch and the Huspah Creek area, p. 2.

22. H. Stephen Snyder, et al., South Carolina State Water Assessment, Water Resources Commission Report Number 140 (State of South Carolina, September 1983), pp. 22-23, 25, 272, 276-277.

23. Map of Surface Water Treatment Plant Intakes for South Carolina; obtained from state file.

24. Bill Seaborn, South Carolina Department of Health and Environmental Control, telephone conversation with James Miller, NUS Corporation, December 27, 1989. Subject: Closure zones for shellfish harvesting along the surface water migration pathway.

25. U.S. Fish and Wildlife Service, Endangered and Threatened Species of the Southeastern United States, (Atlanta, Georgia, 1988), sections 6-7.

26. Marine Resources Division, Polychlorinated Phenyls (PCB's) in the Campbell Creek System, received by Low Country District, South Carolina Department of Health and Environmental Control on November 5, 1985.

27. J.M. Marcus and G.R. Swearingen, A Water Quality Assessment of Campbell Creek, Beaufort County, South Carolina, Bureau of Water Pollution Control Technical Report No. 037-83, (Columbia, South Carolina, 1984), pp. 1-2.

28. Glenda R. Swearingen, Biological Services Section, interoffice memorandum to Russell W. Sherer, Director, Division of Water Quality Assessment and Enforcement, South Carolina Department of Health and Environmental Control, October 28, 1985. Subject: Crab Tissue Analyses for PCBs at Venture Chemicals, Incorporated, p. 1.

REFERENCES

1. William G. Gierke, Charles A. Spiers, and Thomas L. Cross, "Preliminary Hydrogeologic Assessment for Venture Chemicals Inc., Lobeco, South Carolina," prepared under Project No. AE5238 for Venture Chemicals, Inc. (Marietta, Georgia: Law Environmental Services, June 1985), pp. 1-3, 7.

2. Map of Beaufort County, South Carolina (Charlotte, North Carolina: Champion Map Corporation, 1988).

3. Updated Preliminary Assessment Report for American Color and Chemical/Venture Chemical. Prepared by Charles Strange, South Carolina Department of Health and Environmental Control, December 2, 1988, pp. 1-5.

4. Tom Knight, Division of Water Quality Assessment and Enforcement, South Carolina Department of Health and Environmental Control, telephone conversation with James Miller, NUS Corporation, February 8, 1990. Subject: Amendment to Consent Order 87-65-W.

5. South Carolina Department of Health and Environmental Control, Columbia Office, Amendment to Consent Order 87-65-W: South Carolina DHEC vs. Tenneco Resins, Inc., American Color and Chemical Corporation, and Lobeco Products, Inc., pp. 1, 3.

6. Sandra Hursey, Division of Water Quality Assessment and Enforcement, South Carolina Department of Health and Environmental Control, telephone conversation with James Miller, NUS Corporation, February 7, 1990. Subject: Scheduled completion date for remediation activities at American Color and Chemical/Venture Chemical.

7. South Carolina Department of Health and Environmental Control, Columbia Office, Consent Order 86-94-W: South Carolina DHEC vs. Lobeco Products, Inc., issued September 29, 1986, pp. 3-4.

8. South Carolina Department of Health and Environmental Control, Columbia Office, Consent Order 88-37-W: South Carolina DHEC vs. Lobeco Products, Inc., issued August 8, 1988, pp. 5-7.

9. Sandra L. Hursey, Environmental Quality Manager, Division of Water Quality Assessment and Enforcement, South Carolina Department of Health and Environmental Control, letter to J.M. Meeks, Plant Manager, Venture Chemicals, Inc., December 18, 1985. Subject: Notice of Violation, Venture Chemicals, Inc., NPDES Permit #SC0000914.

10. Lane Environmental Services Corporation, "Historical Operational Survey of the Lobeco Products, Incorporated Lobeco, South Carolina Plant," (February 1988), pp. 9-12.

11. Nelson L. Nemerow, "Wastes, Industrial," Kirk-Othmer Encyclopedia of Chemical Technology, 3rd ed., Vol. 24 (New York: John Wiley & Sons, 1984), p. 248.

12. Potential Hazardous Waste Site Identification and Preliminary Assessment (EPA Form T2070-2), Part IV--Characterization of Site Activity for American Color and Chemical. Filed by B.J. Garland, Ecology and Environment, January 14, 1981.

13. NUS Corporation Field Logbook No. F4-1608 for American Color and Chemical/Venture Chemical, TDD No. F4-8904-54. Documentation of facility reconnaissance, September 13-15, 1989, pp. 3-5, 11.

14. Darryl Owens, James Davis Elementary, telephone conversation with James Miller, NUS Corporation, February 8, 1990. Subject: Student population of school.

15. Larry R. Hayes, The Ground-Water Resources of Beaufort, Colleton, Hampton, and Jasper Counties, South Carolina, Water Resources Commission Report Number 9 (State of South Carolina, 1979), pp. 5, 9-10, 13, 16, 31-32, 53-54, 56, figure 19.

16. U.S. Dept. of Agriculture, Soil Conservation Service, Soil Survey of Beaufort and Jasper Counties, South Carolina (January 1980), p. 2.

17. U.S. Fish and Wildlife Service, Atlantic Coast Ecological Inventory Map, Savannah, Georgia - South Carolina, (U.S. Geological Survey, 1980).

18. U.S. Dept. of Commerce, Climatic Atlas of the United States (Washington, D.C.: GPO, June 1968) Reprint: 1983, National Oceanic and Atmospheric Administration, p. 63.

29. U.S. Geological Survey, National Water Summary 1984: Hydrologic Events, Selected Water-Quality Trends, and Ground-Water Resources, Water Supply Paper 2275 (1984), pp. 379-381.

30. B.C. Spigner and Camille Ransom, Report on Ground-Water Conditions in the Low Country Area, South Carolina, Water Resources Commission Report Number 132 (State of South Carolina, December 1979), pp. 27, 47, 55, 73.

31. Henry Walker, Dickenson Well Drilling & Pump Service, telephone conversation with James Miller, NUS Corporation, December 13, 1989. Subject: Use of surficial aquifer in the Lobeco area.

32. Clyde M. Livingston, Manager, Geohydrologic Section, Water Pollution Control Bureau, interoffice memorandum to George Nelson, Director, Low Country District, South Carolina Department of Health and Environmental Control, July 25, 1989. Subject: Private well water quality reconnaissance near Lobeco Products, Inc.

33. Steve Pardieck, Chief, Drinking Water Branch (W-6), interoffice memorandum to Regional Drinking Water Branch Chiefs, Regions I-VIII, X, U.S. Environmental Protection Agency, October 6, 1987. Subject: Updated Drinking Water Standards and Health Advisory Table.

REFERENCE 4

"Rite in the Rain"®

ALL-WEATHER

LEVEL

Notebook No. 311

F4-1608

TDD # F4-8904-54

American Color & Chemical / Ventura Chemical

Lobeco, Beaufort Co., SC

Project Manager: James Miller

34

LOGBOOK REQUIREMENTS
REVISED - NOVEMBER 28, 1988

NOTE: ALL LANGUAGE SHOULD BE FACTUAL AND OBJECTIVE

1. Record on front cover of the Logbook: TDO No., Site Name, Site Location, Project Manager.
2. All entries are made using ink. Draw a single line through errors. Initial and date corrections.
3. Statement of Work Plan, Study Plan, and Safety Plan discussion and distribution to field team with team members' signatures.
4. Record weather conditions and general site information.
5. Sign and date each page. Project Manager is to review and sign off on each logbook daily.
6. Document all calibration and pre-operational checks of equipment. Provide serial numbers of equipment used onsite.
7. Provide reference to Sampling Field Sheets for detailed sampling information.
8. Describe sampling locations <u>in detail</u> and document all changes from project planning documents.
9. Provide a site sketch with sample locations and photo locations.
10. Maintain photo log by completing the stamped information at the end of the logbook.
11. If no site representative is on hand to accept the receipt for samples, an entry to that effect must be placed in the logbook.
12. Record I.D. numbers of COC and receipt for sample forms used. Also record numbers of destroyed documents.
13. Complete SMO information in the space provided.

My signature indicates that I have read and understand the work plan for American Color & Chemical / Venture Chemical in Lobeco, Beaufort County, South Carolina.

James Miller James Miller
Mark Adams Mark A. Adams

All equipment used on this site is identified in the Equipment Location Log for TDD # F4-8904-54 and will be retained in the project file.

1130 We are going to the Lobeco Company's Carolina Cove Office on Highway 21 to return their copies of the November 1986 G & E report and the September 1988 RAIT report.

James Miller (J.M.) 2/15/89

000001

We have just met with John Hicks, the Vice President of the company, and he had a few general questions about the type of investigation we are conducting. He also requested a copy of the final report when it is completed and offered to answer any questions. The questions and their corresponding answers are as follows:

- Is the Consent Order requiring that the site be remediated? Remediation at the site is required and the representatives from several companies will meet on September [illegible] to bid for the work.

- Could you tell me about the onsite community well? There are actually two wells that supply drinking water

G. H. 2/15/81

G.H. 2/15/81 ~~to plant employees: the north production well and the east production well. The water~~

to plant employees: the north production well and the east production well. The water obtained from these wells is mixed, treated, and then distributed throughout the plant.

- How deep are the wells? Greater than 200 feet.

- How many workers are currently employed at the Kobeco plant? Seventy-five.

1315 We are going to pick-up city maps at the Chamber of Commerce.

G.H. 2/15/81

We are eating lunch and we are going to spend the rest of the day obtaining public drinking water information.

Vyke Spencer, from the Beaufort-Jasper Water Authority (BJWA), is showing us where municipal and county hookups are in the area. I showed him the 4-mile radius map, and a map of water lines we had previously drawn for nearby Beaufort County Landfill. Mr. Spencer stated that there were no more water lines in my study area. I asked him about the source for BJWA. He said that BJWA obtains their water from several surface water intakes along an intake canal on the Savannah River. The intake canal is located 25 miles from the site. Also, Mr. Spencer indicated that there is currently no hookup for the Marine Corps Air Station located on

J.M. 01/13/87

the south side of the study area. They obtain their water from deep wells.

J.M. 01/13/87

[illegible] We have just arrived at the site. The weather is overcast and the temperature is in the mid-70's.

[illegible] We are riding around the site taking pictures. The area of stressed vegetation, as indicated on O&E's Figure [illegible], does not appear to be stressed. Also, this is the only source area at the site that is not fenced in. The other source areas at the site are completely fenced in and there are warning signs posted that indicate the environmental hazards which exist.

[illegible] We are at the intersection of the discharge pipe and Highway [illegible]. No state health department signs warning against harvesting shellfish in the area are visible.

[illegible] We are beginning the well survey of

J. M. [illegible]

the area and all information gathered will be recorded on the water use survey forms which are an extension to this logbook.

1115 Ms. Sally Burgess, who is located 600 feet southeast of the burn site, told us that she obtains her drinking water from a drilled well of unknown depth. According to Ms. Burgess, the only problem with the water is that it ~~takes~~ J.M. 04/14/89 tastes like sulfur. Ms. Burgess has no municipal water from alternate untreated sources presently available.

1200 We have knocked on several doors (Anderson, Glenn, etc.), but none of these residents were home.

J. M. 04/14/89

000008

[illegible] We are trying to speak with Mr. Fred Graham, who is located 500 feet southeast of the abandoned lagoon. Mr. Graham opened his door and he was drunk. Mr. Graham was not sure how he obtained his drinking water or who we were.

[illegible] The remainder of the water use survey will be postponed until tomorrow evening because that is when most residents will be home. Also, we will need the remainder of this day and most of tomorrow to speak with state officials who are familiar with this site and to complete the state file search. The state file for this site at the Low Country Office is reportedly about 3-feet-thick.

[illegible] We are eating lunch.

[illegible] We are reviewing the file for

J. H. [illegible]/84

this site at the Low Country Office for the South Carolina Department of Health and Environmental Control (DHEC).

[illegible] Ms. Penny Cornett, from DHEC, introduces herself and she is familiar with the Lobeco site. I asked Ms. Cornett some questions about the site. The questions and their corresponding answers are as follows:

- What are the present effluent parameters for this facility? Biochemical oxygen demand (BOD), total suspended solids (TSS), ammonia, ultimate oxygen demand (UOD), total chlorine, total coliform, and toxicity studies three times a year on fish. No heavy metals or [illegible] are

000009

J. H. 04/14/84

allowed in the discharge.

— Are all of the former waste disposal areas unlined? Ms. Cornett was not positive about this, but she indicated they were unlined.

..00 We are spending the rest of the day reviewing and copying file material.

J.M. 04/14/84

... We are reviewing and copying file material at the DHEC office.

1215 We are eating lunch.

1330 We are driving back to the site to finish the well survey. The weather is sunny and the temperature is in the high-70's.

1530 There are no land-related sensitive environments such as national or state wildlife refuges, national monuments, or national parks within 4 miles of this site. Also, there are no day care centers located onsite or in close proximity. The nearest school is James Davis Elementary, and this is shown on the topographic quadrangle maps that cover the area.

J.M. 04/15/84

We stopped at Ms. Earnestine Coney's trailer which is located south of the facility across Highway 301. Mr. and Mrs. Coney were not available, so we talked with their children. The children stated that they obtain their water from a Mr. Gilbert who lives next door. As we were leaving the ~~property~~ of Ms. Coney property, Mr. Gilbert drove in with his truck. We told Mr. Gilbert who we were, explained the type of investigation we were conducting, and asked about his water source. Mr. Gilbert stated that he obtains his drinking water from a drilled well that is between 80 and 90 feet deep. The well is also used for household purposes and serves a total of 15 people. This includes the number of occupants residing at the Coney property. Mr. Gilbert also stated that he previously owned 30 cattle, until 10 of them died suddenly. At the time,

J.M. 01/10/89

local health officials sent several meat samples away for PCB analysis, but PCBs were determined not to be the cause of death. Mr. Gilbert sold the remaining 18 cattle shortly after this incident occurred.

1630 We returned to the Anderson and Glenn residences, and also visited the nearby Lane household. None of these residents were available for the survey.

✱ A site layout map with picture locations is shown at the back of this logbook.

J.M. 01/15/89

UPDATED PRELIMINARY ASSESSMENT REPORT
American Color and Chemical/Venture Chemical
SCD 046 507 018
Beaufort County

Completed by: Charles Strange
Date completed: December 2, 1988

I. INTRODUCTION/EXECUTIVE SUMMARY

The American Color and Chemical/Venture Chemical site is now owned by Lobeco Products, Inc. The Lobeco Products, Inc. facility is located in Beaufort County, South Carolina, approximately 12 miles northwest of the town of Beaufort, near the Coosaw River.

The plant was built by Tenneco Chemical Company (later Tenneco Resins, Inc.) in 1967, but was purchased by American Color and Chemical Company in January, 1974. American Color and Chemical Company subsequently sold the facility to Venture Chemical Company (now Lobeco Products) in October, 1982. Lobeco has operated the facility since that time (Ref. No. 6, pg. 2).

The plant primarily manufactures agric-products, dye intermediates and drilling fluid chemicals for the oil industry. Chemicals used and produced on-site consist primarily of organic compounds. Acidic industrial wastewater from the plant is treated and neutralized on-site, prior to discharge to Campbell's Creek. Elevated chlorides and volatile organics have been detected in the groundwater on site. PCBs and Hg have also been detected in the groundwater. An area of stressed vegetation was found to have elevated levels of chromium and lead. A high priority for a screening site inspection is assigned.

II. SITE BACKGROUND AND HISTORY

A. Ownership History

The plant was originally owned by Tenneco Chemical Company (later Tenneco Resins, Inc.) but was later purchased by American Color and Chemical Company in January, 1974. American Color and Chemical subsequently sold the facility to Venture Chemical Company (now Lobeco Products) in October, 1982. Lobeco Products, Inc. has operated the facility since that time.

B. Site Description

The facility is located in Beaufort County, South Carolina, approximately 12 miles northwest of the town of Beaufort, near the Coosaw River. No schools or Day Care Centers were noted in the vicinity of the site by reviewing topographic quadrangle maps. The geographical coordinates of the site are latitude 32 degrees, 33 minutes, 03.0 seconds and longitude 80 degrees, 43 minutes, 46.0 seconds (Ref. No. 8).

C. Regulatory History/RCRA Summary

The Lobeco site is under a Consent Order dated August 8, 1988 for violation of its NPDES permit (Permit #SC 0000914) by discharging waste into the environment in violation of the discharge permit, specifically in violation of the toxicity, biochemical oxygen demand, total coliform and ultimate oxygen demand limits. Lobeco was ordered to immediately begin and continue to properly operate and maintain its waste treatment facilities so as to maximize treatment.

Lobeco Products, Inc. were protective filers under RCRA. Lobeco Products, Inc. submitted their part A application under RCRA because of treatment in tanks and surface impoundments. It was later determined that the tank treatment was not under RCRA as it was a Waste Water Treatment Unit. Additionally the waste in the surface impoundment was determined to be non-hazardous. Lobeco requested withdrawal of their RCRA notification/application. The withdrawal was approved on October 18, 1984.

D. Process and Waste Disposal History

Active waste management facilities at the site are part of the NPDES water treatment system (extended aeration and activated sludge) and consists of the following:

- Equalization basin
- Aeration basin
- Digester basin
- Clarifiers (two)
- Drying beds
- Holding ponds (east and west ponds)

Inactive or abandoned waste sites on the property include the following: (Ref. No. 5, pp. 12,13,14 & 15).

1. Abandoned Lagoon Site - Soil samples have shown contamination of 6750 ppm of Pb and 54 ppm of TCB (Ref. No. 7, p. 37).

2. Burn Site - Soil samples have shown 250 ppm of PCB's and 19 ppm of Hg and groundwater monitoring wells have shown 114 ppm PCB's and 180 ppm of Trichloroethene (Ref. No. 7, p. 47).

3. Drum Storage Area - Carbon Tetrachloride found at 89 ppm in monitoring well (Ref. No. 7, p. 47).

4. Stressed Vegative Area - Elevated chromium and lead found in soil (Ref. No. 3).

On November 14-15, 1983, the department conducted an assessment of the ambient water quality of Campbell Creek, into which the Lobeco plant effluent discharges. Analysis of water samples for dissolved oxygen, pH, temperature, salinity and specific conductance indicated satisfactory water quality within the context of the parameters examined. However, a total of sixty-six (66) organic chemical compounds were detected in oyster tissue samples, sediment samples and the Lobeco plant effluent. The community structure of hard substrate and soft substrate fauna in Campbell Creek was found to have been moderately to severely impacted, and significantly fewer oysters were observed, relative to the control station. Also, a department study done December 5, 1984 detected PCB's in sediment at the Lobeco outfall and downstream of the outfall (Ref. No. 6, p. 2).

E. Remedial and Removal Actions

To the department's knowledge no removal/remedial actions have taken place to date at the site.

F. Demography/Regional Setting

The Lobeco Products, Inc. site is located in a moderately populated rural area. The area is characterized by mostly flat land (Ref. No. 8).

III. GROUNDWATER PATHWAY

A. Regional Hydrogeology

The results of the hydrogeologic review are as follows:

1. The depth to the water table is five to ten feet based on elevations of nearby streams determined from topographic maps.

2. The aquifer of concern is the (1) Hawthorne - Recent and (2) Tertiary Limestone which is composed of sandy limey clays and light colored fossiliferous clayey limestone. The depth to the aquifer of concern is the same as the depth to the ground water (Ref. No. 2).

3. The composition of the unsaturated zone is Chisolm loamy fine sands containing ten to twenty-five percent clay according to the 1980 Soil Survey of Beaufort County. Soils of this type have an approximate hudraulic conductivity of > 10^{-3} cm/s.

4. A well inventory within a radius of four miles of the site reveals that ground water is used for drinking purposes in the aquifer of concern, with no other source presently available.

5. The nearest domestic well developed within the aquifer of concern is 0.3 mile to the south of the site, whereas the nearest community well is on the site.

B. Ground Water Use

The use made of ground water in the area is drinking water with no other source presently available.

The number of homes within a four mile radius of the site with domestic wells, as identified from topographic quadrangles, are as follows:

Radius	Number of Houses
0-1 Mile	35
1-2 Miles	122
2-3 Miles	176
3-4 Miles	236
	569

C. Ground-Water Impact

Sample analyses from monitoring wells on site indicate contamination of the aquifer of concern with PCB's and volatile organic compounds (Ref. No. 4).

IV. SURFACE WATER PATHWAY/SURFACE WATER CONCERNS

The surface water has been contaminated with PCB's which have been detected in sediment at the Lobeco outfall and downstream from it.

There are no surface water intakes located downstream from the facility, however, recreational use is made of the surface water including fishing and swimming. Additionally, the possibility exists for the contamination of the human food chain due to contamination of hard substrate and soft substrate fauna in Campbell Creek which receives plant effluent discharges from Lobeco (Ref. No's 1 & 3).

VII. CONCLUSIONS AND RECOMMENDATIONS

A high priority for a screening site inspection is recommended due to the potential for contamination of area domestic drinking water wells. Further sampling of the stressed vegetation area is recommended to determine if the dead vegetation was caused by elevated levels of heavy metals or other contaminants. Further conductivity studies are recommended for mapping contaminant plumes that may affect nearby domestic wells. Sampling of off-site wells that may be endangered is also recommended. Additionally, a magnetometer survey of the "Burn Site" should be done to identify any waste burial sites that may exist. Any other suspected burial sites should also be surveyed.

VIII. REFERENCES

1. Map of Water Intakes for S.C. (Copy attached).

2. Memo from Judy Canova to John Cresswell, dated September 14, 1988 (Copy attached).

3. SCDHEC Industrial Wastewater Files.

4. SCDHEC Groundwater Protection Division Files.

5. Historical Operational Survey of the Lobeco Products, Incorporated, Lobeco, South Carolina plant, February, 1988 (referenced pages attached).

6. Plan of Study, Lobeco Products, Inc. Manufacturing site, January 20, 1987 (referenced material attached).

7. Ongoing Soil and Groundwater Study and Conceptualized Cleanup Plan, Venture Chemicals, Inc., April 1986 (referenced pages attached).

8. Four mile radius map compiled from topographic quadrangle maps.

REFERENCE 6

HISTORICAL OPERATIONAL SURVEY

of the

LOBECO PRODUCTS, INCORPORATED

LOBECO, SOUTH CAROLINA PLANT

February, 1988

LANE
ENVIRONMENTAL SERVICES CORPORATION

RECEIVED
MAR 7 1988
BUREAU OF WATER
POLLUTION CONTROL

TABLE OF CONTENTS

1.0 SUMMARY

A comprehensive search of the operating files at Lobeco Products, Inc., Lobeco, S. C. has been performed to identify chemicals used, stored and manufactured at the Lobeco plant and to determine past waste management and health and safety practices. Similar searches have been conducted of SCDHEC files and the retained files of Tenneco, Inc. and American Color and Chemicals, Inc.

Chemicals used and manufactured have been identified and are listed herein. Historical effluent and solid waste management practices have been established and the source of PCBs found at the site is discussed, as these items relate to the site investigation to be performed.

Fifteen chemical materials are identified as having possibly been associated with the so called "burn site". These are listed in Section 5.2, and are the only materials which are likely to be encountered in undiluted form during the Lobeco Investigation.

Potential hazards are discussed and the limited analytical protocol available is presented.

4.0 WASTES AND DISPOSAL PRACTICES

4.1 Effluent Systems

Plant operations were initially designed to have process wastes, consisting primarily of aqueous product extractions (washes) and cooling water, combine with a low flow sanitary waste stream en route to a settling basin (lagoon), and then discharge to a tidal creek. Discharge into the creek, as approved by the South Carolina Pollution Control Authority, was designed to be only on ebb tide, to assure effective dilution of the effluent stream.

Subsequently, pH neutralization, carbon adsorption, and biological treatment were added to the effluent system as the National Environmental Policy Act and the Federal Water Pollution Control Act (and amendments) required more sophisticated effluent treatment throughout the U.S.

4.2 Solid Wastes

Plant trash was initially burned in a small area to the east of the plant operating area, and later was sent to a local sanitary landfill.

Off-grade products and other process wastes were drummed and stored temporarily in what is now referred to as the "drum storage area". Subsequently, the contents of these drums were incinerated at the "burn area" and the empty containers were disposed of at approved sanitary landfills (Beaufort County Landfill and Hickory Hill Landfill). Empty raw material containers (drums and bags) were likewise sent to these landfills.

4.3 Polychlorinated Biphenyls (PCBs)

Certain of the Lobeco manufacturing processes require higher reaction temperatures than can be obtained with normal steam heating. To provide for these special reaction temperatures, the plant was designed and constructed to use a hot oil circulating system. Initially, as was the "state of the art", the heating oil used was a polychlorinated biphenyl; in this case Arochlor 1248 supplied by Monsanto. Later, the Arochlor 1248 was replaced with a non-PCB containing heating oil.

The Lobeco hot oil system utilized electric heaters in a pump-around loop. Occasionally pump leaks developed and/or electric heating tubes failed, resulting in spills onto the plant floor. When this occurred, the standard procedure was to scoop up as much as possible into drums and flush the residue into the floor drain system which ultimately fed into the effluent system and hence to the lagoon.

5.0 LOBECO SITE STUDY AREAS

As a result of prior concerns and investigations, and as set forth in Consent Agreement 87-65-W between the South Carolina Department of Health and Environmental Control and the present and prior owners, certain portions of the plant site have been designated for further study. These areas are discussed in the following paragraphs.

5.1 Abandoned Lagoon Area

Subsection 4.1 and 4.3 describe the Lobeco effluent handling system and potential chemical constituents. During the active life of the lagoon the process effluent may have contained product and raw material residues extracted in the aqueous wash cycles, and, on occasion, PCBs from in-plant spill incidents.

In addition to providing the holding time necessary to allow the prescribed ebb-tide discharge, the lagoon also served as a settling basin to permit any undissolved particles to settle out. This "settling out" formed a sediment layer on the lagoon bottom which was clearly visible (by color) in the core samples obtained during the G&E Engineering preliminary investigation. It is probable that this sediment layer, which will be defined during the current study, may contain PCB residues.

5.2 Burn Site Area

A list of materials possibly associated with the Burn Site Area (e.g., burned, stored, etc.) has been compiled. These materials are:

Material*	Chemical Name
Amino G	7-amino-1,3-napthalene disulfonic acid
Gamma Acid	2-amino-8-naphthol-6-sulfonic acid
G-Salt	2-naphthol-6,8-disulfonic acid
PNTS	4-nitrotoluene-2-sulfonic acid
R-Salt	2-amino-8-naphthol-6-sulfonic acid
Anthrarufin	1,5-dihydroxy anthraquinone

Cassella Acid	2-naphthylamine-4,8-disulfonic acid
J Acid	2-amino-5-naphthol-7-sulfonic acid
Peri Acid	1-naphthylamine-8-sulfonic acid
CUP	Copper phthalocyanine
DMS	4,4'-dinitrostilbene disulfonic acid
Heat Transfer Oil/Residue	Arochlor 1248
Iron Filings	______
Recovered Aniline	Aniline Oil
Chloral	Trichloroacetaldehyde

*It should be noted that the source of information linking these materials to the Burn Area is employee recollection except for Chloral (which information was found during records search).

5.3 Old Drum Storage Area

As discussed in Subsection 4.2, off-grade products and other process wastes were drummed and temporarily stored in this area. Any chemicals which may be contained in the soil or groundwater at this site would be due to spills or drum leaks and are not likely to be present in any major quantity.

No specific list of such chemicals can be developed, but would likely be similar to the list in 5.2.

5.4 Campbell Creek/Marsh Area

Prior SCDHEC and Venture Chemical studies of the Campbell Creek

REFERENCE 7

RCRA Notifiers List State: TN Region IV Merge Dat. 3.13.09 11/13/91

Facility/ID Leg. Dist			Contact - Name	- Phone	Notif.Date	ITSD	GEN	TRNS	BBL	REC
LIFE CYCLE ENGINEERING, INC.			WILLIAM KLEIN	(803)556-7110	08/22/90	-	CEG	-	-	-
SCD987573847	Facil.:	2205-A LEEDS AVENUE	N. CHARLESTON	SC	29405 CHARLESTON CO.					
	Mail:	1 POSTON R. SUITE 300	CHARLESTON	SC	29407					
LIFETIME DOORS INC			THOMAS CUNNINGHAM	(313)851-7700	08/18/80	-	-N-	-	-	-
SCD003361664	Facil.:	MAYFIELD ST	DENMARK	SC	29042 BAMBERG CO.					
LS	Mail:	30700 NORTHWESTERN HIGHWAY	FARMINGTON HILLS	MI	48018					
LIL CARS			JUDY-OWNER LOVELADY	(803)571-2032	08/30/90	-	SQG	-	-	-
SCD987574175	Facil.:	2473 SAVANNAH HIGHWAY	CHARLESTON	SC	29417 CHARLESTON CO.					
	Mail:	PO BOX 30596	CHARLESTON	SC	29417					
LINDAU CHEMICALS INC			ROBERT ROBINSON	(803)799-6863	08/18/80	-	LQG	-	-	-
SCD044942670	Facil.:	750 GRANBY LANE	COLUMBIA	SC	29201 RICHLAND CO.					
CM	Mail:	PO BOX 641	COLUMBIA	SC	29202					
LIPE-ROLLWAY CORP LIPE CLUTCH ROEBUCK			THOMAS BELL	(315)488-5411	08/18/80	-	-N-	-	-	-
SCD078047941	Facil.:	OLD AIRPORT ROAD	ROEBUCK	SC	29376 SPARTANBURG CO.					
A3	Mail:	DRAWER 296	ROEBUCK	SC	29376					
LIQUID AIR CORPORATION INDUSTRIAL GAS			HANS DOMSCHEIT	(803)579-4695	10/17/84	-	LQG	-	-	-
SCD077991818	Facil.:	BROOKS BLVD & HWY 57	SPARTANBURG	SC	29303 SPARTANBURG CO.					
A3	Mail:	PO BOX 6367	SPARTANBURG	SC	29304					
LIQUID TRANSPORT CORP			JOHN WILSON	(803)277-0422	10/29/91	-	-	TRNS	-	-
SCD987583689	Facil.:	1331 BARCELONA DRIVE	GREENVILLE	SC	29605 GREENVILLE CO.					
	Mail:	1331 BARCELONA DRIVE	GREENVILLE	SC	29605					
LITTLE RIVER CLEANERS INC			NORMAN LITTLE	(803)249-3559	04/29/88	-	LQG	-	-	-
SCD982120701	Facil.:	HWY 17	LITTLE RIVER	SC	29566 HORRY CO.					
	Mail:	PO BOX 335	NORTH MYRTLE BEACH	SC	29597					
LITTON INDUSTRIES HEWITT ROBINS DIV			WILLIAM TERRY	(803)788-1424	07/21/80	-	LQG	-	-	-
SCD054247051	Facil.:	US HWY 1 NORTH	COLUMBIA	SC	29202 RICHLAND CO.					
CM	Mail:	PO BOX 1481	COLUMBIA	SC	29202					
LM INDUSTRIES INC.			ROBERT ALVERSON	(803)242-4760	08/22/89	-	LQG	-	-	-
SCD987571130	Facil.:	1881 SUBER MILL ROAD	GREER	SC	29652 GREENVILLE CO.					
	Mail:	P.O. BOX 5876	GREENVILLE	SC	29606					
LO-STATE TRACTOR INC			JAN THOMAS	(803)632-3391	10/22/86	-	SQG	-	-	-
SCD981758915	Facil.:	HWY 321 SOUTH	FAIRFAX	SC	29827 ALLENDALE CO.					
	Mail:	P O BOX 68	FAIRFAX	SC	29827					
LOBECO PRODUCTS, INC.			JOHN MEEKS	(803)846-8171	08/18/80	-	LQG	-	-	-
SCD046507018	Facil.:	SC HWY 38	LOBECO	SC	29931 BEAUFORT CO.					
LC	Mail:	HWY 38 PO BX 815	LOBECO	SC	29931					

FILE - VENTURE WW

REFERENCE 8

2600 Bull Street
Columbia, S.C. 29201

Commissioner
Robert S. Jackson, M.D.

Board
Moses H. Clarkson, Jr., Chairman
Gerald A. Kaynard, Vice-Chairman
Oren L. Brady, Jr., Secretary
Barbara P. Nuessle
James A. Spruill, Jr.
William H. Hester, M.D.
Euta M. Colvin, M.D.

MEMORANDUM

TO: Russell W. Sherer, Director
Division of Water Quality Assessment and Enforcement

THRU: Harry L. Gaymon, Manager *Harry L. Gaymon*
Biological Services Section

FROM: Glenda R. Swearingen *Glenda R Swearingen*
Biological Services Section

SUBJECT: Crab Tissue Analyses for PCBs at Venture Chemicals, Incorporated, Beaufort County, NPDES #SC0000914

DATE: October 28, 1985

On September 27, 1985, the Biological Services Section with assistance from the South Carolina Wildlife and Marine Resources collected legally harvestable (≥12.7 cm/5 inches) blue crabs, Callinectes sapidus, from seven locations (Table 1, Figure 1) in the vicinity of Venture Chemicals, Incorporated, Beaufort County for the purpose of polychlorinated biphenyl (PCBs) analyses of edible meat. The crab pots in Campbell Creek and Huspah Creek were not recovered, therefore, on October 10, 1985, the Biological Services Section collected crabs from MD-664, the station lost earlier in Campbell Creek and two additional stations in Campbell Creek.

Immediately after collection, crabs were placed on ice and transported live to the Biological Services Section for meat extraction. Individual samples consisted of composited backfin tissue from three crabs with three replicates per station. All sampling procedures and chain-of-custody of samples conformed to all applicable sections in The Standard Operating Procedures Manual and Quality Assurance Procedures Plan (SCDHEC) and Procedures and Quality Control Manual for Chemistry Laboratories.

Results of the analyses showed detectable levels of PCBs in nearly all samples (Table 2) which is not unexpected due to the ubiquitous nature of PCBs in the environment (National Academy of Sciences, 1979). However, PCBs in crab tissue from MD-664, at Venture Chemicals, Incorporated, outfall were elevated above values reported elsewhere for crab tissue (Table 3). The mean level of .949 ppm PCBs in crab muscle from MD-664 was significantly higher ($p<.05$, Kruskal-Wallis H test) than Stations MD-665 ($\bar{x}$ = .061) and MD-634 ($\bar{x}$ = .036). Although the other stations sampled were not significantly less than MD-664, all the values except for the 1.479 ppm level at MD-631 were comparable to levels seen elsewhere in crab muscle (Table 3). The one high PCB level at MD-631, a control station, indicates that contamination of the sample may have occurred during meat extraction. The heptaopancreas of the crab concentrates PCBs, frequently to levels of 20 ppm, and contamination of muscle tissue during dissection for meat extraction is quite possible and probably

RECEIVED NOV 06 1985

occurred in this case (personal communication, Dr. Ron Sloan, New York Toxics Monitoring Program, New York Department of Environmental Conservation).

However, all levels of PCBs in the crab tissue analyzed are below the 2.0 ppm tolerance level recommended by the Food and Drug Administration (Federal Register 21 CFR Part 109, Volume 49, No 100).

HLG/GRS/al

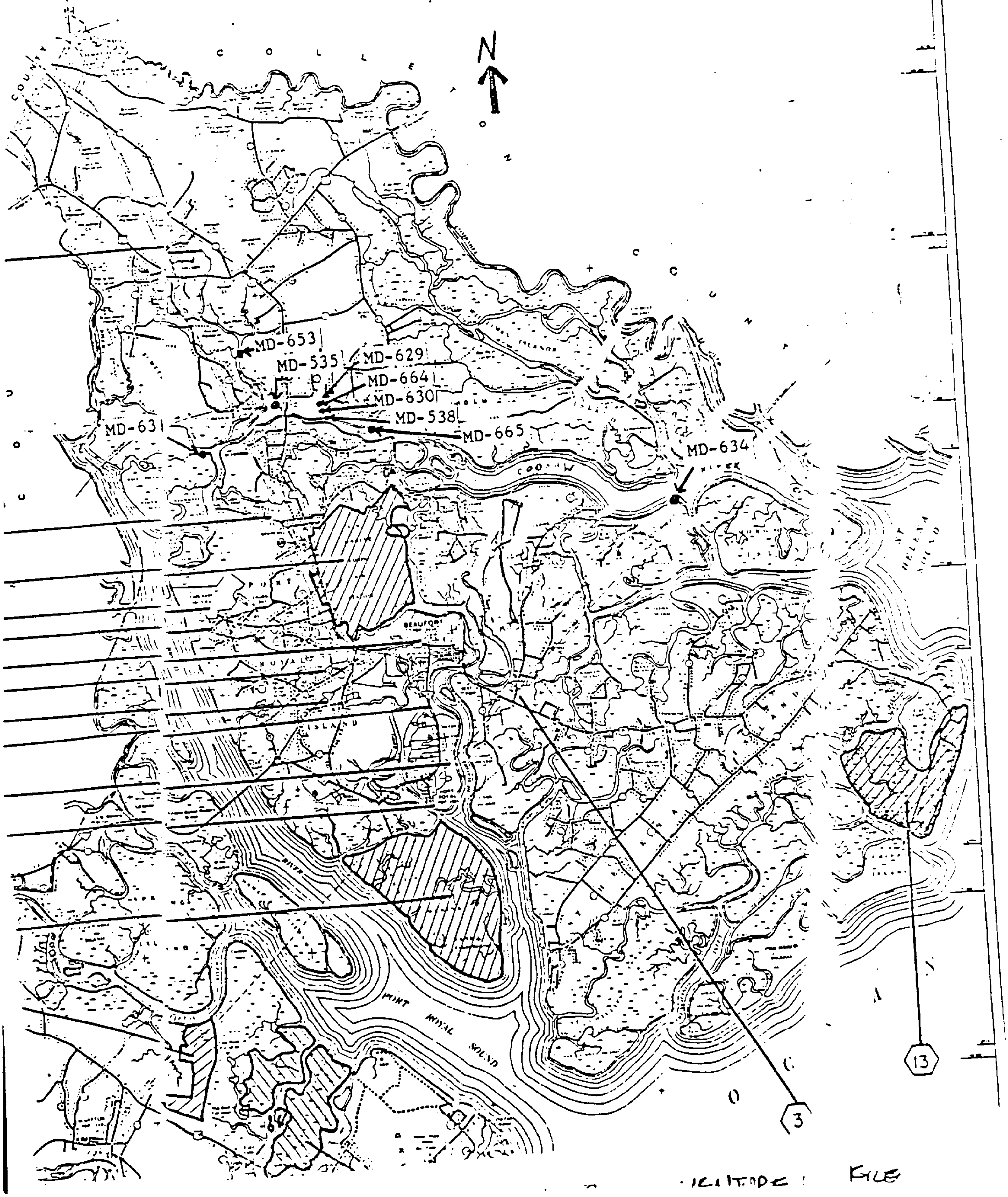
cc: Bob Gross
Jim Joy
George Nelson
Luke Hause
Lewis Shaw
Bob King
Tom Berry

attachments

Table 1: Sampling locations and Station descriptions for crab tissue sampling, September 27, 1985, and October 10, 1985.

Station	Location
MD-535	Whale Branch approximately 15 meters west of US 21 bridge
MD-538	Campbell Creek at confluence with Whale Branch
MD-664	Campbell Creek immediately at the Venture Chemicals, Incorporated, wastewater treatment facility discharge
MD-629	Campbell Creek approximately 50 meters upstream from Venture Chemicals, Incorporated, wastewater outfall
MD-630	Campbell Creek approximately 300 meters downstream of Venture Chemicals, Incorporated, wastewater outfall.
MD-631	Unnamed tributary to Haulover Creek, approximately 25 meters upstream from confluence with Haulover Creek
MD-634	Cossaw River at western point of Morgan Island where Bull River and Parrot Creek enter the Coosaw
MD-653	Huspah Creek at mouth of Field Creek
MD-665	North bank of Whale Branch at Stuarts Point

Figure 1: Sampling locations for crab tissue analysis for PCBs, September 27, 1985 and October 10, 1985, Beaufort County, S.C.



Cancer Risk
.00017 mg/kg

Table 2: Total PCBs detected in muscle tissue of Callinectes sapidus in the vicinity of Venture Chemicals, Incorporated, September 27, 1985 and October 10, 1985. All values in ppm.

Replicate	MD-629	MD-664	MD-630	MD-538	MD-535	MD-653	MD-631	MD-665	MD-634
1	.1627	.606	.189	.121	.207		1.479	<.05[a]	.036
2	.216	.952	.027	.286	.027		.253	<.05	<.05
3	.302	1.025	.258	.212	.057		.098	.085	.022
4[b]		1.215				.157			
Mean	.227	.949	.158	.206	.097		.61	.061	.036
Standard Deviation	.070	.254	.119	.083	.096		.757	.02	.014

a = Non-detectable values treated as .049

b = Values in Replicate row 4 collected September 27, 1985

Table 3: PCBs (ppm) in Crab Muscle Tissue from various locations.

Location	Species	Levels	Reference
Chesapeake Bay, MD	C. sapidus	N.D. -.08	Eisenberg and Topping, 1984
Hudson River, NY	C. sapidus	0.16-0.29 ppm	NY Dept. of Environ. Cons., 1981
Palos Verdes, CA	crab	.019	Young, 1982
Whale Branch, SC	C. sapidus	.014 - 1.479	Present study

References

Eisenberg, M. and J.J. Topping. 1984. Organochlorine residues in shellfish from Maryland waters, 1976-1980. J. Environ. Sci. Health, B19 (7), 673-688.

National Academy of Sciences. 1979. Polychlorinated Biphenyls. Washington, D.C.

New York State Department of Environmental Conservation. 1981. Toxic Substances in Fish and Wildlife: 1979 and 1980 Annual Reports. Vol. 4. No. 1. 50 Wolf Road, Albany, N.Y. 12233

Young, D.R. 1982. Chlorinated hydrocarbon contaminants in the Southern California and New York Bights. IN Ecological Stress and the New York Bight: Science and Management (ed) G.F. Mayer. Estuarine Research Federation, Columbia, S.C.

REFERENCE 9

BLACK & VEATCH

TELEPHONE MEMORANDUM

USEPA
Site Inspection Prioitization
Shellfish harvesting in the
Lobeco, South Carolina area

B&V Project 52012.040
B&V File
February 4, 1992
9:00 A.M.

To: Terry Yarborough
Company: SCDHEC Shellfish Section
Phone No.: (803)522-9097

Recorded by: Bryan J. Williams

I spoke with Terry Yarborough, Manager of the shellfish section. He said that based on samples collected for a recent study performed this past July (1991), SCDHEC had decided to open Whale Branch to harvest. Untill this it was possible to use shellfish from here to stock other areas, but not to use them for human consumption. Terry said their decision to open Whale Branch was based on the same PCB cancer rate that we use for HRS. He also said that Halfmoon Creek and Campbell Creek are still closed to harvest.

THE GROUND-WATER RESOURCES OF BEAUFORT, COLLETON, HAMPTON, AND JASPER COUNTIES SOUTH CAROLINA

REFERENCE 10

By
Larry R. Hayes

SOUTH CAROLINA
WATER RESOURCES COMMISSION

REPORT NUMBER 9
1979

The Ground-Water Resources of Beaufort, Colleton, Hampton and Jasper Counties, South Carolina

by

Larry R. Hayes
Hydrologist

U. S. Geological Survey
Water Resources Division

Prepared by
U. S. Geological Survey
in cooperation with
South Carolina Water Resources Commission
Columbia, South Carolina

1979

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The Ground-Water Resources of Beaufort, Colleton, Hampton and Jasper Counties, South Carolina

by

Larry R. Hayes

ABSTRACT

In 1976, Beaufort, Colleton, Hampton, and Jasper Counties used an estimated 7.6 billion gallons of ground water, with about 6.2 billion gallons coming from the principal artesian aquifer. Southwest of the study area the city of Savannah, Georgia and nearby industries pump 75 Mgal/d (million gallons per day) from the principal artesian aquifer. As a result of these withdrawals, water level declines of 20 to about 100 feet have occurred.

With the exception of the Savannah River, the surface water in Beaufort and Jasper Counties is generally too salty for human consumption. In Hampton and Colleton Counties fresh surface water is available but it is not used to any significant extent. The Beaufort-Jasper Water Authority supplies about 5 Mgal/d of treated Savannah River water to the military installations in Beaufort, the residents of the Beaufort-Port Royal area, and some of the residents of Ladies Island.

Sedimentary rocks, ranging in age from Late Crétaceous to Holocene and ranging in thickness from about 2,500 feet in the northern part to about 3,500 feet in the southern part of the study area, store and supply all the ground water used in the area.

Rocks of Tertiary age, consisting of the Black Mingo Formation, Santee Limestone, Cooper Marl, and Hawthorn Formation, are the chief sources of ground-water supplies in the study area. The Black Mingo aquifer is a source of 50 to 250 gal/min (gallons per minute) of good quality water in Colleton and Hampton Counties, but is not used in Beaufort or Jasper Counties.

The Santee Limestone and lower part of the Cooper Marl form the principal artesian aquifer and furnish most of the ground water used in the area.

The principal artesian aquifer is divided into (1) an upper permeable zone, which furnishes about 75 percent of the water pumped from this aquifer in Hampton County and nearly all of the water pumped from this aquifer in Beaufort and Jasper Counties; (2) a middle zone of relatively low permeability, which yields small amounts of water to wells in Hampton and Colleton Counties; and (3) a lower permeable zone, which provides most of the water pumped from this aquifer in Colleton County.

The average transmissivity of the upper permeable zone ranges from about 10,000 ft^2/d (square feet per day) to about 50,000 ft^2/d. The transmissivity of the lower permeable zone ranges from about 500 ft^2/d to about 5,000 ft^2/d. The transmissivity of both zones decreases to the north and east. Yields of wells open to the principal artesian aquifer range from about 50 gal/min to about 2,500 gal/min. Except where saltwater contamination occurs, water from the principal artesian aquifer is usually of good quality. Saltwater contamination of the principal artesian aquifer is usually of good quality occurs from two sources: (1) sea water entering the aquifer through breaks or in areas of relatively high permeability in the overlying confining bed and (2) conate salty water present in underlying formations and in the lower two zones of the aquifer moving upward into the upper permeability zone.

Water containing more than 1,500 mg/L (milligrams per liter) of chloride is present throughout the aquifer at Parris Island, Fripp Island, Edisto Beach, and probably other small sea islands southeast of Beaufort. Salty water is present in the middle and lower permeable zones of the principal artesian aquifer in Beaufort County, in southern Colleton County, and maybe in southern Jasper County.

Water containing about 50 mg/L of chloride is present in the upper permeable zone of the principal artesian aquifer at Hilton Head Island. Salty water is moving laterally toward Hilton Head Island from the northeast and east and vertically upward from the middle and lower permeable zones. Estimates of the rate of saltwater movement towards Hilton Head Island range from 140 to 360 ft/yr (feet per year).

The upper and lower sections of the Hawthorn Formation act as confining beds. The middle section of the Hawthorn is a fairly persistent, sandy, dolomitic limestone (Hawthorn aquifer) and is a source of 50 to 200 gal/min of fairly good quality water in western Beaufort County and in Jasper County.

INTRODUCTION

Ground water is used throughout Beaufort, Colleton, Hampton, and Jasper Counties for domestic, public, agricultural, and industrial purposes. While ground water of sufficient quality and quantity is available almost everywhere in this area, previous investigations have shown that progressive lowering of water levels, impairment of quality, and decrease of quantity in some areas have raised concern that over-pumping or improper development might be depleting the aquifers and aggravating the saltwater contamination problem.

The Ground Water Use Act of 1969 [Section 4.(a)] requires that: "The South Carolina Water Resources Commission (SCWRC) upon the request of a county, municipality or other political subdivision of State government, may declare and delineate from time to time, and may modify, capacity use areas of the State where it finds that the use of ground water requires coordination and limited regulation for protection of the interest and rights of residents or property owners of such areas or of the public interest." Prior to declaring a capacity use area, the act requires that an investigation be made to determine if the water problems are significant enough to warrant such an action.

The implementation of such a study was requested by the public officials of Beaufort, Colleton, Hampton, and Jasper Counties. These officials believed that present as well as projected use and development of the ground-water resources had reached a point where assessment and management were necessary. They also believed that a properly designed and implemented ground-water investigation was needed to determine what must be done to insure the availability of water of sufficient quantity and quality for meeting increasing water demands. The SCWRC agreed that a comprehensive ground-water investigation was needed and asked the U.S. Geological Survey to participate in a cooperative study as a part of the Survey's nationwide interest in coastal aquifers.

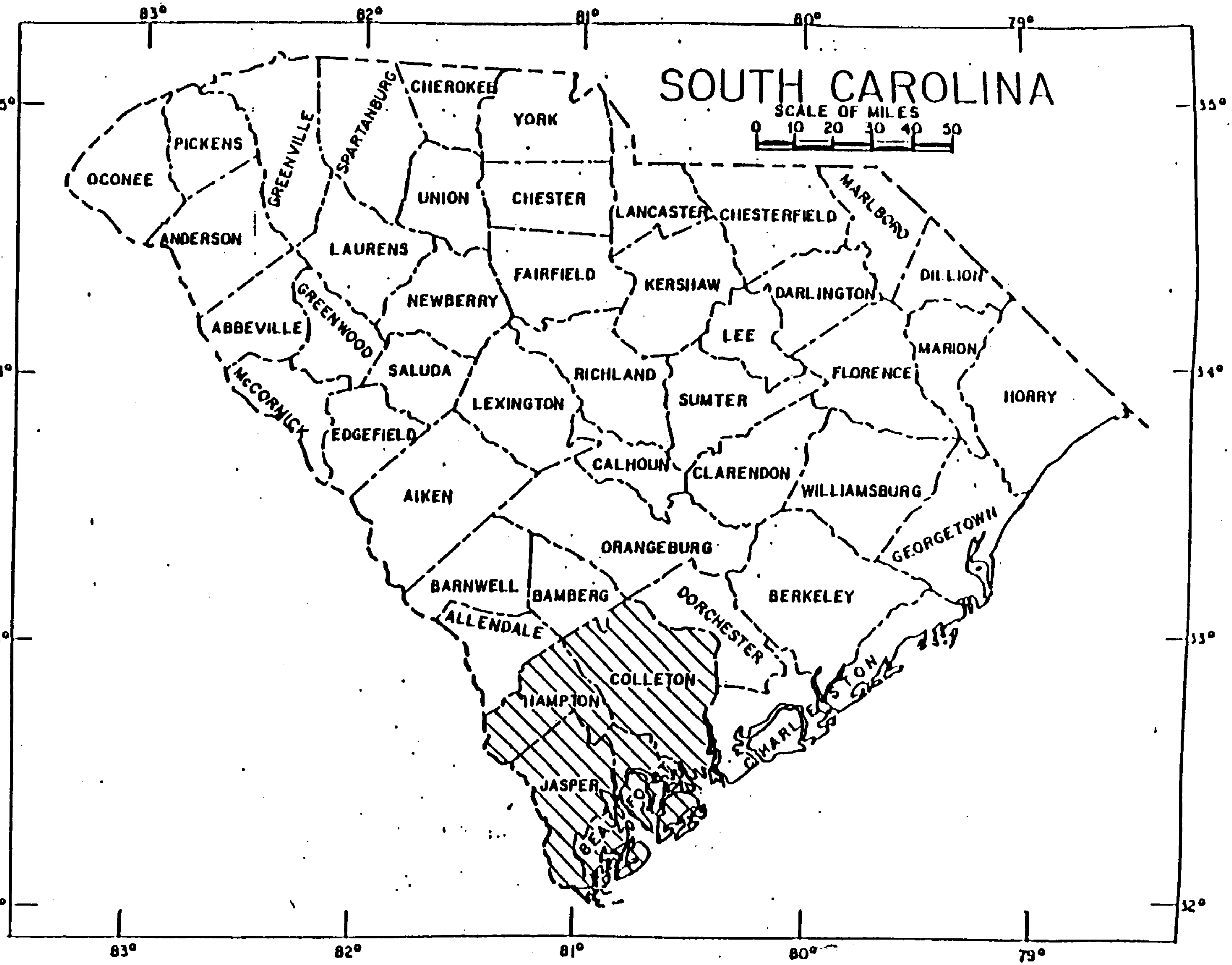

Figure 11. Area of investigation

ACKNOWLEDGMENTS

The author is greatly indebted to representatives of industries, to the well owners, and to water well contractors for their cooperation in supplying information on their ground-water developments and water use. Special thanks is due to Mr. Robert Glover, Hilton Head Plantation, for the lease of a plot of land upon which to drill test wells Bft 786, Bft 787, and Bft 788. Thanks also is due to the officials of Beaufort, Colleton, Hampton, and Jasper Counties as well as the staff of the Lowcountry Council of Governments for their help with this investigation. The assistance provided by South Carolina Development Board, Division of Geology, Shell Oil Co. and Texaco Oil Co. in describing the paleontology and lithology of drill cuttings is greatly appreciated.

A very special note of thanks is due to Louis Nexsen, Larry Drolet, Camille Ransom, Daisy Sammons, and B. C. Spigner, SCWRC, for their valuable assistance with all phases of the study.

GEOGRAPHY

CLIMATE

The climate of the study area is subtropical with hot and humid summers and mild winters. These climatic conditions contribute to a long growing season that, when coupled with the availability of rich land and considerable rain, makes the area agriculturally active. The average length of the freeze-free period is about 280 days.

Maximum temperatures range from 95° to 100°F during July and August; minimum temperatures occasionally range from 20° to 30°F during December, January, and February. The average annual temperature was 65° to 66°F for the period 1972 to 1976 (table 1 and fig. 2). The average annual precipitation for the period of 1972 to 1976 was 50 inches. Precipitation is well distributed; the largest amounts of precipitation occur during June, July and August (fig. 3) primarily as a result of thunderstorm and shower activity.

PHYSIOGRAPHY

The South Carolina Coastal Plain, which lies in the central part of the Atlantic Coastal States, is divided into three regional belts. These belts are roughly parallel to the Atlantic Ocean, extending from the Fall Line to the Atlantic Ocean. The study area lies within the Lower Coastal Plain which is characterized by a series of terraces, ranging from sea level to about 270 feet above sea level. These terraces are highly dissected by numerous streams and contain many shallow depressions. In the study area these depressions may be sinkholes caused either by solution of underlying limestone or by surficial irregularities

Table I. Average monthly and annual temperature (°F) at Beaufort, Hampton, Hilton Head, Ridgeland, Walterboro, and Yemassee, 1972-76.

Month	Beaufort	Hampton	Hilton Head	Ridgeland	Walterboro	Yemassee
January	54.3	52.8	54.7	52.5	52.1	53.0
February	52.9	52.8	52.2	52.1	50.6	52.3
March	60.1	61.2	60.4	60.5	60.5	60.4
April	64.4	64.7	63.8	62.3	63.7	63.9
May	73.1	71.9	72.0	71.5	71.4	70.5
June	77.3	76.5	76.3	76.2	76.1	76.8
July	81.0	80.2	79.7	79.3	79.7	80.2
August	80.7	79.4	79.2	78.8	79.4	80.0
September	77.2	75.6	76.2	75.2	75.6	75.3
October	66.6	64.1	66.4	65.2	65.0	64.6
November	57.3	56.0	57.3	56.3	55.9	53.5
December	52.1	51.2	51.8	50.4	50.1	50.5
Average Annual	66.4	65.5	65.8	65.0	65.0	65.3

'Modified from' U. S. National Weather Service National Oceanic and Atmospheric Administration, 1977, Climatological Summary for South Carolina.

that were formed on the floor of the ocean or in the shallow water of tidal marshes when the sea stood at a higher level.

Much of the study area is characterized by low flatland inundated with water; by numerous streams, rivers, marshes and lakes; and by moss covered woodland. The area is relatively isolated and is sparsely settled. Transportation within the region is severely restricted by marshes and waterways that impede rapid access from outside of the region. Of the 69 islands in Beaufort County, 20 are inhabited, 18 of which are accessible by bridges or causeways.

POPULATION AND ECONOMY

The Lowcountry area is the least populated region of South Carolina. The 1970 population of 106,521 persons ranked the area lowest in population density with 37.2 persons per square mile. The study area was classified as 32.6 percent urban in 1970. With the exception of Beaufort County, the population of the area has not changed significantly in this century (fig. 4).

Beaufort County is 637 square miles in size and contains four incorporated communities and ten small unincorporated communities. The incorporated area of Beaufort and Port Royal, with a combined population of over 12,000, has the highest population density and the largest industrial and business concentration in the study area. The unincorporated Hilton Head Island resort community, with a 1976 population of about 8,000 persons, is the next largest urban area in Beaufort County.

Colleton County, covering more than 1,000 square miles, is the largest county in the study area. Five incorporated towns and eleven small unincorporated communities are located in the county. With the exception of Walterboro, which has a population of 7,500, the towns are small and rural in nature with less than 500 persons in each.

Hampton County has an area of 562 square miles and contains 15 small towns and communities. The largest town is Hampton, the county seat, with a population of about 3,000 persons.

Jasper County has an area of 662 square miles and contains two small towns, Ridgeland and Hardeeville, and seven community settlements. The town of Ridgeland, the county seat, has only about 1,200 persons. Jasper County is the only county within the study area that is classified as 100 percent rural.

The study area has the lowest average per capita personal income in the state. The largest employment segment in 1970 was federal and local government with 7,130 employees (table 2). From 1965 to 1970, the fastest employment growth in absolute terms was government with 1,600 new positions.

since before the turn of the century and is expected to decline even more in the future (South Carolina Employment Security Commission, 1971). Nevertheless income derived from farm products is still substantial to the economy of the area since total farm income is increasing as a result of improved farming methods and higher prices for products sold. Income from agriculture was up 51.4 percent in 1970 over 1964 (table 5).

Table 5. Value of all farm products of the study area.

VALUE ADDED BY FARM PRODUCTS ($000)

	Value all farm products sold		Value all crops sold		Value all livestock products sold		Percentage change all farm products sold
	1964	1970	1964	1970	1964	1970	
Beaufort	4,778	7,330	3,776	5,569	924	1,761	53.4
Colleton	4,528	7,408	2,735	3,497	1,783	3,911	63.6
Hampton	6,056	8,073	4,512	4,929	1,540	3,144	33.3
Jasper	1,512	2,740	796	1,390	706	1,350	81.2
TOTAL	16,874	25,551	11,819	15,385	4,953	10,166	51.4

Source: U. S. Department of Commerce, 1964 Census of Agriculture, and Department of Agricultural Economics, S. C. Agricultural Experiment Station, Clemson University in Cooperation with U. S. Department of Agriculture, South Carolina, Cash Receipts From Farm Marketing, 1971.

Income from livestock products was up 105.2 percent during this six-year period and value added by crops sold was up only 30 percent. If past trends hold up, the study area's farm economy will soon be dominated by livestock products as opposed to the current domination of crop products.

Soybeans, the biggest money crop in the area, accounted for 36.2 percent of all crop sales in 1970, followed by the production of vegetables at 22.6 percent. Forest products, peaches, corn, tobacco, and cotton account for 9.8, 5.6, 5.0, 4.0, and 2.9 percent of crop sales, respectively.

quality and quantity for domestic or small agricultrual and industrial needs. The yield and quality vary considerably from place to place. Water from these formations may be hard and may contain high concentrations of iron and hydrogen sulfide. Near the coast or saltwater estuaries, water from these deposits may be salty.

HYDROGEOLOGY OF THE PRINCIPAL ARTESIAN AQUIFER

Underlying the study area is an artesian aquifer composed of a series of limestones ranging from Eocene to Oligocene in age. This aquifer extends into southeastern Georgia, Florida, and adjacent parts of Alabama. The aquifer is referred to as the Ocala or principal artesian aquifer in Georgia, as the Floridan aquifer in Florida, and as the principal artesian aquifer in South Carolina.

In the Lowcountry area, the principal artesian aquifer ranges in thickness from less than 400 feet to more than 1,000 feet. The uppermost section of the underlying Black Mingo Formation (which consists of fine, white to yellow sand and red to brown, sandy clay) acts as the lower confining bed. The upper Oligocene (?) section consisting of sandy, calcareous, phosphatic clay and the lower Miocene section consisting of fine, sandy, greenish clay together act as the upper confining bed. The upper confining bed varies in thickness from zero to more than 50 feet. In parts of southern Beaufort County where the upper confining bed is absent, the Hawthorn aquifer is contiguous and hydraulically connected to the principal artesian aquifer.

WATER YIELDING ZONES

The principal artesian aquifer is divided into an upper permeable zone, a middle zone of relatively low yield, and a lower permeable zone. Geohydrologic sections AA' and BB' (fig. 7), CC' (fig. 8), and DD' (fig. 9) show the top of the principal artesian aquifer and the stratigraphic positions of the upper and lower permeable zones. These zones were determined on the basis of lithology, geophysical response, aquifer tests, and current meter tests. The permeable zones as defined herein include all the smaller zones of different yields and no attempt has been made to delineate them. All the smaller wateryielding zones have been combined into one relatively high wateryielding section or "permeable zone."

The upper permeable zone consists of white to light-gray calcitized, indurated, very fossiliferous limestone and varies considerably in thickness and lateral extent. It is more than 200 feet thick in southern Jasper County and western Beaufort County and thins toward the north and northeast, pinching out near the Beaufort-Colleton County line (figs. 7, 8, and 9). The upper permeable zone is very thin in eastern Beaufort County over the Beaufort arch where the top of the principal artesian aquifer is within 25 feet of land surface (figs. 7 and 8). Throughout

Beaufort and Jasper Counties and much of Hampton County, the upper permeable zone of the principal artesian aquifer is the primary source of ground water.

The upper permeable zone is separated from the lower permeable zone by a middle zone of low permeability, consisting of a soft, sandy, clayey limestone ranging in thickness from 200 feet or less in the northwestern part of the study area to more than 700 feet in the southeastern part of the study area (figs. 8 and 9).

The lower permeable zone consists of an indurated, siliceous, slightly-glauconitic, light-gray to creamy-yellow limestone. It ranges in thickness from less than 30 feet in parts of Beaufort County to more than 90 feet in Colleton and Hampton Counties (fig. 8 and 9). This lower permeability zone is the primary source of ground water in Colleton County (except for the city of Walterboro, which obtains water from the Black Creek and Middendorf aquifers) and in northeastern Hampton County, where the upper permeable zone is missing or is very thin.

Eight wells in Beaufort County are known to be open to both the lower and the upper permeable zones. No wells have been found in Jasper County that penetrate below the upper permeable zone; consequently the extent, thickness, and water-bearing characteristics of the lower permeable zone is unknown in Jasper County.

A map showing the top of the principal artesian aquifer in the area was constructed using natural gamma radiation, electric, and lithologic logs (fig. 10). Point C, shown in figure 6, represents the top of the principal artesian aquifer. This point is the top of the water-yielding Oligocene section of the principal artesian aquifer and in most cases the top of the upper permeable zone. The top of the principal artesian aquifer is a highly irregular surface that ranges from less than 20 feet below msl in the Beaufort arch to more than 200 feet below msl in the Ridgeland Trough (fig. 10).

The irregular surface of the top of the principal artesian aquifer may reflect solution occurring as a result of advance and recessions of the Pleistocene Sea. During Pleistocene time when the sea level was much lower than now, the land area extended to the edge of the Continental Shelf and the upper Tertiary sediments were above sea level. At this time, solution cavities and sinkholes were probably formed in the limestone. Numerous circular depressions in the topography of the Beaufort area appear to be the result of settling of sediment filled sinkholes.

HYDRAULIC PROPERTIES

Ground-water hydraulics is concerned with the natural or induced movement of water through permeable formations. Knowledge of the geologic framework and of the hydraulic properties of the formation

Beaufort County accounts for over 75 percent of the total ground-water withdrawal from the principal artesian aquifer in the Lowcountry, with Hilton Head Island accounting for over half of the ground water used in Beaufort County.

Ground-water use in Beaufort County is predominately concentrated in the eastern part of the county and on Hilton Head Island, with golf courses and crop irrigation accounting for over half of the ground water used. Golf course irrigation is heaviest from March through October, and crop irrigation takes place almost exclusively in the months of May, June, September, and October.

The estimated 1976 withdrawal of 650 Mgal in Jasper County was primarily for rural domestic use and for public-supply use in Ridgeland and Hardeeville. Ground-water use in Hampton County is almost equally divided between rural domestic, public supply, and stock use. In Colleton County the largest pumping center is at Walterboro, which pumps about 150 Mgal/yr for public supply and industrial use.

The Savannah area, which includes the City of Savannah and nearby industries, is the largest user of ground water from the principal artesian aquifer in this part of the Coastal Plain area. According to Counts and Krause (1976) the Savannah area pumped an average of 75 Mgal/d in 1970.

POTENTIOMETRIC SURFACE AND GROUND-WATER FLOW

In an artesian aquifer, ground water is always under pressure and moves from points of higher hydraulic pressure to points of lower hydraulic pressure. The rate of movement of water between two points depends upon the hydraulic conductivity and porosity of the aquifer, upon the viscosity of the water, and upon the difference in head pressure between the two points. The slope of the water surface or head change between the two points, generally expressed in feet per mile, is called the hydraulic gradient. By contouring or connecting the heights of measured water levels in feet above or below a common datum in wells tapping an artesian aquifer an imaginary surface is developed which indicates the height to which water will rise in tightly cased wells open only to that particular artesian aquifer.

Before withdrawal of large amounts of water from the principal artesian aquifer, the potentiometric surface was controlled mainly by the hydraulic characteristics of the aquifer and the overlying and underlying confining beds, by the topography and altitude of the outcrop areas, and by natural recharge and discharge. The potentiometric map of 1880 constructed by Warren (1944, p. 26) showed an easterly hydraulic gradient of about 1 ft/mi, with natural discharge occurring in the Port Royal Sound and Parris Island area.

While the potentiometric contour map may be used to determine the general direction of ground-water flow, the actual movement of a single water molecule is very complex and may differ considerably from that which is implied by the two dimensional potentiometric map. The actual flow of ground water is three dimensional and is affected not only by hydraulic gradient but also by changes in aquifer characteristics (such as permeability, porosity, and thickness) and by boundary effects between fluids of different densities (such as a freshwater-saltwater interface). Furthermore, flow characteristics in a limestone aquifer vary widely depending upon the hydrogeologic characteristics of the aquifer.

White (1969) proposed a three part classification of carbonate aquifers based upon recognizable physical features: (1) a diffuse-flow aquifer in which the carbonate rocks have been affected the least by solutional modification; (2) a free-flow aquifer in which ground-water flow paths have been localized by solutional modification into well integrated systems of conduits; and (3) a confined-flow aquifer in which geologic boundaries are the flow-limiting factors rather than hydraulics. Ground-water movement through the diffused-flow system is analagous to flow in a homogeneous aquifer and more nearly follows the "basic" assumptions upon which ground-water flow equations are based. In a free-flow system, flow occurs in distinct conduits or channels while nearby rock may have little porosity or permeability. Flows in these conduits often have high velocities and may be turbulent.

The principal artesian aquifer generally functions as a confined diffuse-flow aquifer. Consequently, flow equations that assume laminar flow in an isotropic and homogeneous medium cannot be rigorously applied to the principal artesian aquifer. Nevertheless, if the limitations of basic flow equations as regards a particular set of geohydrologic conditions are considered, these flow equations and potentiometric maps may be used to indicate the general direction and average velocity of ground-water flow.

Calculations of the average velocity of ground-water movement indicate that water moves very slowly in the principal artesian aquifer. The average velocity of ground-water flow may be computed by the following equation:

$$\bar{v} = \frac{-K\ dh/dl}{\theta} \qquad \text{(Lohman, 1972)}$$

where:

$\bar{v}$ = average velocity, in feet per day
K = hydraulic conductivity, in feet per day
dh/dl = change in head with respect to change in distance, in feet per foot
θ = porosity, as a decimal fraction
\- = the minus sign indicates that flow is in direction of decreasing head

The potentiometric map of December 1976 (fig. 19) is similar to Siple's map of June 1959 with the exceptions: (1) the cone of depression centered at the Burton Well Field is absent; (2) the potentiometric high at the Marine Corps Air Station has changed in shape and increased in size; (3) the regional zero potentiometric contour has moved about three miles to the northeast; and, (4) a small but relatively deep cone of depression is present southeast of Lobeco.

The cone of depression that was present in the vicinity of the Burton Well Field in 1959 is no longer present because the pumpage in this area ceased almost entirely when the U.S. Marine Corps facilities at Parris Island, the Marine Corps Air Station, and Capehart Housing changed from ground-water to surface-water use in January 1965. The regional zero contour has moved to the northeast as a result of increased pumpage at Hilton Head and Savannah, and has been accompanied by a gradual steepening of the slope of the potentiometric surface toward Savannah and of a gradual increase in the size of the cone of depression. The small but relatively deep cone of depression near Lobeco occurs as a result of large withdrawals (about 500,000 gal/d) from two closely spaced wells where the principal artesian aquifer has a relatively low transmissivity (less than 5,000 ft^2/d).

Since 1880, the potentiometric surface in the area east and southeast of Burton (which includes Beaufort, Ladies Island, St. Helena Island, and numerous small sea islands) has shown little change, with water levels generally ranging between zero and 5 feet above msl. This suggests that recharge has been balanced by discharge for some time. It also suggests that, since very little pumping was taking place in this vicinity before the 1960's, natural discharge from the aquifer must have taken place through breaks in the confining bed or in regions where the hydraulic conductivity of the confining bed is relatively high. Evidence of this is shown by test drilling at Brickyard Point on the northern end of Ladies Island. Also, numerous wells in the vicinity of Brickyard Point and near the estuaries separating the sea islands contain salty water (fig. 22). This salty water is probably entering the aquifer where the confining bed is either thin or missing, and pumping has locally reduced the potentiometric surface below msl.

WATER QUALITY

The quality of ground water is largely controlled by the soluble minerals of the aquifer. Materials lying above or below the aquifer may also contribute dissolved substances. The concentrations of dissolved substances generally increase with greater depths and greater distances from recharge areas.

Ground water is generally more highly mineralized than surface water because of the relatively slow movement of ground water and because of its more intimate contact with soluble minerals. Surface water always contains some suspended inorganic sediment and varying amounts of organic

A main conclusion of this study concerning the saltwater encroachment in the upper permeable zone of the principal artesian aquifer is that the contamination at Hilton Head and Parris Island results primarily from ocean water entering the aquifer. If this conclusion is correct, analyses of aquifer water showing different degrees of contamination plotted on the trilinear diagram should generally not deviate too far from the predicted theoretical positon, or if they do deviate, these deviations should be explainable.

Points 2, 3, 4, 11, 12, and 13 fall reasonably close to a straight line plot (line A-B, fig. 28) and indicate a simple mixture of water from the upper permeable zone and water from Port Royal Sound. Points 1, 5, 9, and 10 fall somewhat above line A-B and points 6, 7, and 8 fall below line A-B.

Point 1 represents an analysis of water from a well in an area receiving local recharge from the overlying water table aquifer. Point 5 represents a water analysis from a well showing contamination, in part, from the vertical movement of salty water from below. Points 9 and 10 represent analyses of water from wells that are near the saltwater recharge areas underlying Battery Creek. Point 6 represents an analysis of water from a well that is open to the middle zone of the aquifer immediately underlying the upper permeable zone, and point 8 represents an analysis of water from a well that is receiving recharge from Coosaw River and from the overlying water table. Point 7 represents the typical sodium-bicarbonate type water from the Middendorf aquifer at Parris Island. None of these points represents a simple mixture of water from the upper permeable zone and water from Port Royal Sound. Consequently the points deviate from line A-B.

Analyses of water quality data plotted on the trilinear diagram does in part support the conclusion that saltwater contamination in the upper permeable zone of the principal artesian aquifer primarily results from a mixing of ocean water with aquifer water. However, the plotted data also indicate that in some cases the source of the salty water is not simply modern ocean water or else that there has been alteration of the chemical quality of the mixture of modern ocean water and aquifer water by ion exchange.

SUMMARY AND CONCLUSIONS

The Lowcountry area is characterized by low flat land, much of which is inundated with water; by numerous streams, rivers, marshes and lakes; and by moss covered woodland. It is relatively isolated and sparsely settled. Average per capita personal income is the lowest in the State.

Water in quantities adequate for most domestic, public-supply, and agricultural needs is generally available from one or more aquifers. In 1976 Beaufort, Colleton, Hampton, and Jasper Counties used an estimated

7,600 Mgal of ground water. About 6,200 Mgal or 82 percent of the ground water used by these four counties came from the principal artesian aquifer. Of this water, about 77 percent or 4,800 Mgal were used in Beaufort County, with Hilton Head Island accounting for about 64 percent of the water use in Beaufort County. Golf course and crop irrigation accounted for over half of the water usage from the principal artesian aquifer. To the southwest of the study area, the City of Savannah, Georgia and industries in the Savannah area pump more than 25,000 Mgal/yr from the principal artesian aquifer.

As a result of the large ground water use in Savannah, water-level declines of more than 100 feet have occurred in the extreme southwestern tip of Jasper County. Throughout most of Jasper County and western Beaufort County, the decline has been more than 20 feet. In Hampton County and eastern Beaufort County, the decline generally has been less than 10 feet; around Walterboro, Colleton County, declines of 10 to 30 feet have occurred; declines in the rest of Colleton County are less than 10 feet.

Surface water is abundant throughout the area, but in Beaufort and Jasper Counties (with the exception of the Savannah River) this surface water is generally too salty for human consumption. In Hampton and Colleton Counties fresh surface water is available but is not used to any significant extent. The Beaufort-Jasper Water Authority supplies the military installations in Beaufort, the Beaufort-Port Royal area, and some residents of Ladies Island with treated surface water from the Savannah River.

Underlying the study area are a series of unconsolidated and semi-consolidated sedimentary rocks ranging in age from Late Cretaceous to Holocene. These rocks, which range in thickness from less than 2,500 feet in the northern part to more than 3,500 feet in the southern part of the study area, store and transmit all the ground water used in the area.

The oldest penetrated rocks in the study area were formed during Late Cretaceous time. These Upper Cretaceous deposits are, in ascending order, the Middendorf Formation (equivalent to and locally known as the Tuscaloosa Formation), the Black Creek Formation, and the Peedee Formation. No wells have penetrated the Upper Cretaceous section in Hampton and Jasper Counties. Consequently, the geohydrology of the Cretaceous rocks is unknown in these two counties.

Walterboro, Colleton County has two wells open to the upper part of the Middendorf Formation that have natural flows at the land surface of 1,200 gal/min and 1,400 gal/min of high quality water. Wells open to the Middendorf Formation at Parris Island, Hilton Head Island, and Fripp Island have natural flows at land surface of about 75 gal/min of highly mineralized water that has a temperature of around 38°C.

Although the Black Creek Formation is a productive aquifer in other parts of the state, its potential as an aquifer in the study area is unknown. A water sample taken during drilling of well 3ft 457 contained 1,100 mg/L of chloride. While it appears unlikely that this formation will yield significant quantities of freshwater in Beaufort County and possibly Jasper County, the Black Creek Formation may be capable of yielding large quantities of good quality water in Colleton and Hampton Counties.

The Peedee Formation is an important aquifer in Georgetown and Horry Counties, but does not appear to be of significant value as an aquifer in the study area.

The Tertiary System consists, in ascending order, of the Black Mingo Formation of Paleocene and Early Eocene (Wilcox) age, the Santee Limestone of Middle and Late Eocene (Claiborne and Jackson) age, the Cooper Marl of late Eocene and Oligocene age, the Hawthorn Formation of Miocene age, and the Duplin Marl of Pliocene age. The Tertiary formations are the chief sources of ground-water supplies in the study area.

The Black Mingo aquifer is a source of moderate quantities of good quality water in Colleton and Hampton Counties. Wells open to this aquifer in these counties have natural flows of 50-250 gal/min at land surface. The water-bearing characteristics of this formation are unknown in Jasper County. In Beaufort County the Black Mingo Formation is unlikely to yield large quantities of fresh water.

The Santee Limestone is part of the principal artesian aquifer and furnishes much of the ground water used in the area. Except where salt-water contamination has taken place, the Santee Limestone is capable of yielding from 200 to more than 2,000 gal/min of good quality water.

In Colleton County and in parts of northeastern Hampton County, the Cooper Marl is not used extensively as an quifer. In much of Hampton, Beaufort and Jasper Counties, however, the lower part of the Cooper Marl is considered to be part of the principal artesian aquifer and capable of yielding more than 200 gal/min of good quality water.

The upper and lower sections of the Hawthorn Formation act as confining beds. The middle section of the Hawthorn is a fairly persistent, sandy, dolomitic limestone (Hawthorn aquifer) and is a source of 50 to 200 gal/min of good quality water in western Beaufort County and in Jasper County.

The water-bearing characteristics of the Pliocene to Holocene deposits are not known. Wells tapping the Pliocene-Holocene deposits are reported to yield water of acceptable quality and quantity for domestic or small agricultural and industrial need. The yield and quality vary considerably from place to place. Water from these formations may be hard and contain high concentrations of iron and hydrogen sulfide. Near the coast or saltwater estuaries, water from these deposits may be salty.

About 82 percent of the ground water used comes from the principal artesian aquifer, which is composed mainly of rocks of the Santee Limestone and lower part of the Cooper Marl. The principal artesian aquifer is divided into three zones: (1) the upper permeable zone, which furnishes most of the water pumped from the aquifer in Hampton County and almost all of the water pumped from the aquifer in Beaufort and Jasper Counties; (2) a middle zone of relatively low hydraulic conductivity, which yields small amounts of water to wells; and (3) the lower permeable zone, which provides about all of the water pumped from the aquifer in Colleton County.

Aquifer tests show that, in general, transmissivities of the principal artesian aquifer decrease to the north and northeast and increase toward the southwest. Transmissivities range from about 30,000 ft^2/d to 50,000 ft^2/d west of Broad River and range from about 2,000 ft^2/d to 15,000 ft^2/d east of Broad River.

The average transmissivity of the upper permeable zone of the principal artesian aquifer in western Beaufort County and southern Jasper County is about 50,000 ft^2/d; in eastern Beaufort County the average transmissivity is probably less than 10,000 ft^2/d.

The transmissivity of the upper permeable zone in northern Jasper County and southwestern and southeastern Hampton County ranges from 10,000 ft^2/d to 30,000 ft^2/d, with transmissivity decreasing to the northeast and east.

The transmissivity of the lower permeable zone of the principal artesian aquifer in northern Colleton County and northeastern Hampton County ranges from 5,000 ft^2/d to as low as 500 ft^2/d, with transmissivity generally decreasing to the north. The average transmissivity of the lower permeable zone of the principal artesian aquifer in southern Colleton County is estimated to be 5,000 ft^2/d.

The coefficient of storage of the principal artesian aquifer ranges from 3×10^{-5} to 3×10^{-3}. The higher values generally occur where the overlying confining material is thin or relatively permeable, allowing leakage into the principal artesian aquifer from the overlying Hawthorn aquifer. Consequently the higher storage values are apparent values and should be considered as upper limit figures only, and subject to considerable error.

Yields of wells open to the principal artesian aquifer vary from less than 50 gal/min to more than 2,500 gal/min. The specific capacities of wells in the study area range from more than 250 (gal/min)/ft at Hilton Head Island to less than 5 (gal/min)/ft in Colleton County.

It is estimated that about 40 Mgal/day of recharge enters the principal artesian aquifer in the outcrop area 30 to 40 miles to the west and northwest of the study area. Approximately 5 to 10 Mgal/day of recharge is believed to be entering the principal artesian aquifer within the boundaries of the study area by leakage through overlying or underlying confining beds.

Water from the principal artesian aquifer is generally of suitable quality for most uses. In Beaufort County, however, the chloride concentration usually ranges between 25 to 75 mg/L and in more seriously contaminated areas may range from 500 to more than 5,000 mg/L.

Saltwater contamination is believed to be occurring from two sources: (1) sea water entering the aquifer through breaks in, or in areas of relatively high hydraulic conductivity of, the overlying confining material and (2) unflushed salty water in the lower part of the aquifer moving upward into the upper permeable zone. Saltwater contamination has also occurred as a result of the movement of saltwater into defective or improperly cased wells located near saltwater bodies.

Analyses of water quality data suggest that saltwater contamination in the upper permeable zone of the principal artesian aquifer primarily results from a mixing of modern ocean water with aquifer water. However, the data also indicate that in some cases contamination results from a source of salty water other than modern ocean water or else that there has been alteration of the chemical quality of the aquifer water by ion exchange.

Water containing more than 1,500 mg/L of chloride is present throughout the aquifer at Parris Island, Fripp Island, Edisto Beach, and probably other small sea islands southeast of Beaufort. Salty water is present in the lower part of the principal artesian aquifer in Beaufort County, in southern Colleton County, and probably in southern Jasper County.

Slightly salty water (chloride concentration generally between 50 and 100 mg/L) is present in the upper part of the principal artesian aquifer at Hilton Head Island. Salty water is moving laterally towards Hilton Head Island from the northeast and possibly from the Atlantic Ocean, where saltwater may be entering the aquifer along the sea bottom. Also, salty water present in the sediments underlying the upper permeable zone is moving upward into the upper permeable zone of the aquifer in response to heavy pumping at Hilton Head Island. The salty water entering the upper permeable zone is diluted by freshwater recharge. With the present rate of pumping and existing hydraulic gradients, it probably will be many years before the freshwater resources of Hilton Head Island will be grossly contaminated by saltwater. However, increased pumping at Hilton Head Island and to the north and west of the Island would increase the rate of encroachment and lessen the time before the ground-water resources became seriously contaminated.

Estimates of the rate of saltwater movement at hilton Head Island based on regional and local hydraulic gradients range from 140 to 370 feet per year. The lower rate is believed to approximate the rate of regional encroachment, on the assumption that all calculated movement represents encroachment. The higher rate may occur near centers of heavy pumping for a few months each year, but during the remainder of the year the rate is probably lower.

In general the actual depth to a freshwater-saltwater contact is greater than that predicted by the Ghyben-Herttzberg principle. Hubbert's modified version of the Ghyben-Herttzberg equation may under certain conditions give a reasonable approximation of the depth to a freshwater-saltwater contact. However, the only accurate way to define the interface between freshwater and saltwater is through a set of test wells all located at the same site but open to the aquifer at different depths.

The effects of additional development of the ground-water resources on water levels and on saltwater contamination require careful consideration. The following suggests some of the management considerations that would aid in the long-range protection of the ground-water resources of the study area.

The ground-water problems in the study area warrant consideration of comprehensive and positive water management. The success of any planning and management programs, however, will depend upon continued availability of reliable data. The continued collection of pumpage data throughout the area and periodic water-level measurements in the existing network of observation wells will aid in monitoring changes in water levels due to pumping. The periodic collection and analysis of representative water samples from varying depths in the principal artesian aquifer would provide data about the zone of diffusion and the movement of salty water in the aquifer.

Numerous methods have been used to control saltwater encroachment. These include (1) reduction of pumping, (2) redistribution of major pumping centers, (3) water conservation and economical use, (4) artificial recharge, and (5) conjunctive use of water from different sources. The simplest solution would be to reduce pumping, but this may not be possible to any large extent because of existing water demands. However, the use of treated sewage effluent for irrigation use (if acceptable from a health standpoint) might be one way of reducing pumpage. This, combined with water conservation, may be the most economical and practical way of reducing saltwater encroachment in the study area.

Recharge to an aquifer with water pumped from surface-water sources has been used widely in California and to a lesser extent in other parts of the United States. Methods range from collecting storm runoff in pits to construction of channels and pipelines from distant streams to the recharge basins or injection wells. Because recharge would have to be accomplished through injection wells and because there are no nearby freshwater recharge sources in Beaufort County, artificial recharge would be an expensive undertaking.

It might be feasible in a limited area, such as Hilton Head Island, to use water from the Middendorf aquifer for recharge into the upper permeable zone of the principal artesian aquifer to form a hydraulic barrier between the Hilton Head Island wells and the source of salty water. The hydraulic barrier thus generated may prevent salty water from entering the aquifer. The relatively high hydraulic head in the Middendorf aquifer would eliminate the need for any pumping mechanism. A properly constructed and developed well in the Middendorf aquifer might supply a natural recharge flow of about 1 Mgal/d. On the negative side, however, the water from the Middendorf aquifer is high in some mineral constituents and has a high temperature; consequently, the quality of water from the principal artesian aquifer would be adversely affected.

Predicting the changes in water quality and water levels in response to changes in recharge and discharge is one of the most important aspects of ground-water management. This may be accomplished by the use of analytical or computer modeling techniques. Models are designed to establish a reasonable correspondence between their properties and those of the prototype aquifers; they can simulate ground-water flow, storage, recharge, pumping, natural discharge, impervious boundaries, and transport of solutes in ground water. Electric analog and digital computer models have been used for ground-water management studies. In recent years, the electric analog model has been supplanted by the digital computer, which uses essentially the same logic as the analog model. The principal difference is that a digital computer calculates values, whereas an electric analog measures the same values. The computer technique has generally been found more desirable than the electric analog method, mainly because it is more flexible, more convenient, and less expensive.

The usefulness of the digital model as a management tool is well documented in many ground-water reports, and the use and development of such a model should be considered for the study area. The digital model developed by Counts for the Savannah area, which includes part of the present study area, could probably be adapted for use in the entire Lowcountry study area.

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REFERENCE 11

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LOBECO SITE ENVIRONMENTAL ASSESSMENT RESULTS AND PROPOSED REMEDIAL ACTION PLANS FOR AMERICAN COLOR AND CHEMICAL CORPORATION AND TENNECO RESINS, INC.

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4. ENVIRONMENTAL SETTING

4.1 Regional Setting

The Lobeco site is located in Sheldon Township, Beaufort County, South Carolina, approximately one (1) mile north of the Whale Branch of the Coosaw River. The Lobeco site is situated in the lower coastal plain physiographic province which is characterized by low relief, lagoons, tidal swamps and salt marshes.

The Beaufort, South Carolina area is underlain by limestone and unconsolidated sands and clay. The rocks and soils beneath the site range in age from late Cretaceous to recent. The primary aquifer in the region is the Floridan, which is composed of the Santee Limestone and the basal portion of the Cooper Marl. The Santee Limestone is primarily a bioclastic limestone. In the Beaufort area the Floridan is several hundred feet thick and is overlain by the Hawthorn Formation. The Hawthorn is characterized by sand, silt and clay with phosphatic pebbles. In the Beaufort area the Hawthorn is found at depths ranging from approximately 50 feet below ground surface to nearly 80 feet. In the Beaufort area the Hawthorn is typically a low permeability clay which serves as the lower confining layer for the Pamlico Formation. The Pamlico Formation is exposed at the surface throughout most of the region. The Pamlico consists of quartz sand and clay, with some glauconite, broken shells and heavy minerals. In the vicinity of the Lobeco Facility, the Pamlico Formation is approximately thirty (30) to forty (40) feet thick.

4.2 Site Geology

Clastic sediments of the Pamlico and Hawthorn formations were sampled during drilling operations at the Lobeco site. The data point location map is included as Plate 1. A cross-section illustrating site geology is presented as Plate 2.

The Hawthorn Formation was encountered in all three reference borings at depths ranging from 26.0 feet in RB-3 to 38.0 feet in RB-2. Only the upper two (2) to three (3) feet of the Hawthorn beneath the Lobeco site was penetrated by any of these borings. However, based on the boring logs for the two production wells on site the Hawthorn formation is approximately forty (40) to fifty (50) feet thick. Split spoon and Shelby tube samples of the Hawthorn Formation were described as green clay with trace amounts of silt and broken shells.

Overlying the Hawthorn is the Pamlico Formation. The Pamlico ranges in thickness from 26.0 feet in RB-3 to 38.0 feet in RB-2. The formation is generally composed of tan and grey silty, fine sand containing varying amounts of clay, alternating with layers of sandy silts with varying amounts of clay. Grey-green medium sand with broken shells were observed between 22.0 feet in RB-3 and 26.0 feet in RB-2 and L-1.

4.2.1 Abandoned Lagoon

Unconsolidated deposits of the Pamlico Formation were encountered during drilling activities in the Abandoned Lagoon Area. Boring and temporary well locations are shown on Plate 3. The soils are generally

Boring logs for drilling activities conducted during the Lobeco Site Environmental Assessment are included in Appendix A.

4.3 Site Hydrogeology

Topographic relief at the Lobeco facility is 20 feet. Ground surface generally slopes to the south at a rate of 0.005 feet per foot. Local variations in response to cultural features are common.

Ground water at the Lobeco site generally occurs under unconfined conditions. However, the soil types identified during drilling activities in the vicinity of the Old Burn Site suggest the potential for localized confined or semi-confined conditions. In addition, perched ground water was noted in the vicinity of the Old Burn Site. The unconfined aquifer is recharged from precipitation on the site.

Surface water, except in curbed containment areas, enters into a ditch drainage system, which appears to be related to pre-plant agricultural activities. These drainage channels eventually drain into the marshy area near Campbell Creek or pool in shallow depressions at the site before entering into the ground water system or evaporating.

There are no known public or private water wells downgradient of the Lobeco site.

low. The high may be due to assorted permanently magnetized objects, or it may in fact represent an induced magnetic maximum. The absence of a well-defined minimum could be the result of measurement difficulties encountered 5-15 feet north of the maximum where a steep topographic grade caused readings to be somewhat unstable. Maximum F is probably real and likely overlies some sort of metal. Areal extent and depth of the buried objects, however, are less certain than in the cases of maxima A-E and no location rectangle is indicated in Plate 14.

6.5.2 Physical Soils Testing

In addition to the chemical analyses previously described, one undisturbed sample from the top of the Hawthorn Formation and three (3) split-spoon samples from the overlying soils were collected from each of the reference borings. The undisturbed samples were collected to determine the vertical permeability of the lower confining layer and the split-spoon samples were collected for physical characterization.

The vertical permeability test results as well as the physical soils characterization data are included as Appendix D.

The undisturbed samples were collected in accordance with ASTM-D1587. Permeabilities were determined using the procedures outlined in the U.S. Army Corps of Engineers Manual EM 1110-2-1906, Appendix VII, Permeability Tests. Test results indicate vertical permeability ranges from $1.67x10^{-7}$ cm/sec in boring L-1 to $5.14x10^{-7}$ in boring RB-2.

REFERENCE 12

South Carolina
State Water Assessment

South Carolina

STATE WATER ASSESSMENT

Report No. 140

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Summary

South Carolina's average streamflow is about 33 billion gallons per day. This water, along with the water stored in surface reservoirs and underground aquifers, must be properly managed to meet the State's current and future water needs. Good water availability data, water quality data, and water use data are necessary for responsible water resource management. In addition, the proper legal and institutional framework must be in place to utilize these data. Currently, the quality and extent of South Carolina's water data base varies considerably with the type and source of the data and the geographic location of the resource. Utilization of these data for planning and management purposes is also difficult.

Water law in South Carolina is relatively undeveloped; lacks a coherent policy in regards to water resource management; and is widely dispersed throughout State and Federal constitutions, statutes, regulations, and common law. The riparian reasonable use doctrine is the basis for surface-water law and is inappropriate in many respects for settling water use conflicts. Some of the more consistent water law concerns include: 1) insecurity of riparian rights; 2) limitations on water use (interbasin transfer); 3) protection of the resource for public interests; and 4) adequate legislation for responsible water management during droughts and other water crises. To date, no law has defined the extent of riparian lands or the authority to make interbasin transfers of water. Except for the Ground Water Use Act of 1969, South Carolina has no statutory or case law delineating ground-water rights.

Examination of water availability data reveals several broad trends. Both surface and ground-water availability correlate with the general physiography and geology of South Carolina. Streams in the Blue Ridge and Upper Coastal Plain Provinces tend to have well-sustained base flows with only moderate variability; streams in the lower Piedmont and Lower Coastal Plain generally have poorly sustained base flows and are highly variable. Ground-water yields in the Blue Ridge and Piedmont Provinces are usually low except along poorly identified fracture zones; however, well yields throughout the Coastal Plain are good to excellent with variable water quality.

The State's surface-water data base is relatively good. However, ground-water data are extremely limited throughout the Blue Ridge and Piedmont, the northern Pee Dee area, and some Upper Coastal Plain counties. This problem is compounded by the lack of coordination among agencies which collect ground-water data and the need to compile and analyze the large quantity of raw data already collected. Only portions of Horry, Beaufort, Jasper, Barnwell, and Aiken Counties have a sufficient data base to permit meaningful ground-water management efforts.

The quality of our waters is relatively good. An estimated 84 percent of the State's major river miles meet Federal water quality goals and 86 percent meet State water quality standards most of the time. The most widespread water quality problem is fecal coliform bacteria contamination with 74 percent of the State's water quality monitoring stations indicating unacceptable levels. This problem has caused the closing of 33 percent of the State's estuarine shellfishing waters. Other water quality problems include low dissolved oxygen concentrations in Coastal Plain streams, high suspended solids levels in Piedmont streams, and elevated nutrient levels and eutrophic conditions in lakes throughout South Carolina.

Between 1970 and 1980, gross water use in South Carolina almost doubled to its present 5,780 mgd. About 437 mgd, or 7.6 percent, of this water is consumed (not returned to available supplies). The largest gross use is for cooling water in the production of thermoelectric power (4,370 mgd or 75.6 percent), followed by self-supplied industry (905 mgd or 15.7 percent) and public supply (380 mgd or 6.6 percent). Ninety-six percent of the State's water needs are supplied by surface waters. Excluding the large use by thermoelectric power plants, surface water still supplies 85 percent of the State's total water needs. The largest consumer of water is self-supplied industry which accounts for 38 percent of total consumption, followed by public supply (24 percent) and agricultural irrigation (13 percent).

Statewide gross water use is projected to increase 48 percent to about 8,550 mgd by 2020. The largest increases are expected in agricultural irrigation and thermoelectric power production. These two uses, particularly irrigation, are also expected to play a significant role in a projected 300 percent increase in consumptive water use. Irrigated cropland is expected to increase from its present 120,000 acres to about 600,000 acres by 2020.

Various regional and local water problems exist, or have the potential to occur, throughout the State. All current and projected surface-water needs may not be adequately met by surface-water supplies during low flows in the Saluda, Catawba-Wateree, and Combahee-Coosawhatchie River Sub-basins. Heavy ground-water withdrawals are causing water level declines in the vicinities of the cities of Florence, Darlington, Sumter, Georgetown, Myrtle Beach, Charleston, and Beaufort, South Carolina and Savannah, Georgia. Projected large increases in ground-water use for agricultural irrigation may strain currently productive aquifer systems and cause water level declines in the counties of Dillon, Marion, Florence, Orangeburg, and Aiken. In addition, without proper management, saltwater could contaminate all coastal aquifer systems.

The Saluda River Sub-basin exhibits the most numerous and widespread water resource problems of all sub-basins in the State. Current surface-water demand periodically exceeds available supplies and rapidly growing water demands coupled with limited surface and ground-water availability indicate potential water use conflicts in the future. Variable and frequently low streamflows in the Saluda River below Lake Greenwood restrict navigation, fish migration, and fish habitat. Surface water quality problems are widespread with high levels of fecal coliform bacteria, nutrients, biochemical oxygen demand, and turbidity the major contributors. Lake Greenwood has been identified as the most eutrophic lake in the State. The Little Saluda River and Reedy River exhibit poor water quality and have been identified as two of the worst water quality problem areas in South Carolina. Hydrogeologic knowledge for most of the sub-basin is at the field data level. In general, ground-water yields in the Saluda River Sub-basin are limited. Ground-water quality problems exist in numerous wells due to high levels of iron, copper, and lead. In the vicinity of Leesville, water from the Tertiary Sands Aquifer System contains naturally-occurring radioactivity at levels in excess of acceptable drinking water standards.

Hydroelectric power comprises about 25 percent of total generating capacity and provides seven percent of all electricity in South Carolina. In 1980, this non-withdrawal use used about 63,200 mgd; more than ten times all withdrawal uses combined. Numerous potential hydropower sites have been identified in the State with most occurring in the Broad River Sub-basin. Although hydroelectric power is important to current and future development in South Carolina, permanent impoundment of low-lying lands and highly fluctuating discharges may adversely impact the environment and some water and land use activities.

Commercial navigation, once existing practically statewide, is now limited to coastal waters. Heavy shoaling in harbors and inlets due to shifting sands and sedimentation requires continuous and costly dredging. In addition, suitable dredge material disposal sites are few and decreasing in number.

The maintenance of sufficient instream flow enhances water quantity and quality and benefits fish and wildlife populations and instream uses such as navigation, hydropower generation, and recreation. Minimal discharges from hydroelectric power facilities on the Saluda and Catawba-Wateree Rivers and heavy irrigation water withdrawals on the Edisto River and tributaries of the Salkehatchie River cause occasional low flows which restrict some water use activities. Projected increases in water use coupled with a general lack of recognition and understanding of minimum flow requirements, may increase instream flow problems in the future.

Large quantities of sediment enter South Carolina's surface waters each year filling navigation channels and lakes. Excessive sedimentation impairs municipal, industrial, and recreational water use; destroys aquatic habitat; and adversely impacts desirable aquatic organisms. Over 18 million tons of soil are eroded each year in South Carolina and contribute to the sedimentation problem. Agriculture, silviculture, mining, and construction activities increase soil erosion. Agriculture contributes about 85 percent of total soil loss. Most erosion in the State occurs in the Piedmont. While "best management practices" have been developed to control erosion caused by several land use activities, implementation is primarily voluntary and adequate legislation to properly control erosion and sedimentation has not been developed.

Large populations of noxious aquatic plants infest about 50,000 acres of rivers and lakes throughout the State and are especially troublesome in Coastal Plain waters. These nuisance weeds are able to out compete desirable native species and can interfere with almost all withdrawal and instream water use activities. Hydrilla, an extremely prolific and difficult to control submersed aquatic plant, was recently discovered in Lake Marion and poses a serious threat to all waters of the State. Control of aquatic weeds in public waters is coordinated and funded through the South Carolina Aquatic Plant Management Council. However, sufficient funds are not available to properly control the spreading aquatic weed problem in South Carolina.

South Carolina's coastal waters are an important and increasingly popular resource for municipal, industrial, and recreational uses. Increased development in coastal areas has resulted in limited available waterfront space, increased point and non-point sources of pollution, limited access points to public waterfront areas, and development in unstable erosion-prone beachfront areas. The South Carolina Coastal Council has developed and implemented a Federally approved Coastal Zone Management Program to protect and manage coastal resources.

Numerous lakes, rivers, and coastal waters provide a wide variety of water-based recreational opportunities with the coastal Grand Strand area being the most popular followed by other coastal areas and the major lakes. The Santee-Cooper Lakes, Lake Murray, and Lake Wylie are the most popular major lakes in the State. Fecal coliform bacteria contamination, high levels of PCB's, extremely low streamflows, aquatic weed infestations, and limited public access restrict recreational use of some public water bodies in the State.

Rivers or portions of rivers with outstanding scenic, recreational, geological, fish and wildlife, historical, or cultural values can be protected under the State Scenic Rivers Program or the National Wild and Scenic Rivers Program. The Chattooga River in Oconee County is the State's only National Wild and Scenic River and a five-mile stretch of the Middle Saluda River in Greenville County is the only State Scenic River. Portions of the Congaree, Little Pee Dee, and Ashley Rivers are eligible for inclusion in the State Scenic Rivers Program, and a portion of the lower Saluda River is under study. The inclusion of an eligible river in the State Scenic Rivers Program is primarily dependent on the voluntary granting of scenic easements by riparian landowners. This factor has probably limited the number of State Scenic Rivers.

Wetlands are important natural areas which help maintain water quality, modify flooding, and act as feeding, nesting, and nursery areas for fish and wildlife. Most wetland areas in South Carolina are in the Coastal Plain and an unknown quantity of these important areas are lost each year due to increased development. Some unique wetland areas have been identified and are protected under the South Carolina Wildlife and Marine Resources Department's Heritage Trust Program. However, the extent of wetland loss, the rate at which it is taking place, and the possible consequences to the State's ecology and economy are not known.

Water use in South Carolina is projected to increase substantially, reducing available supplies and increasing competition. Use of water conservation measures can save water; reduce water, energy, and treatment costs; and reduce water use conflicts. Numerous water saving devices and methods are now available for residential, municipal, agricultural, and industrial water uses.

While 213 communities in South Carolina have identified flood prone areas, 166 of these communities participate in the National Flood Insurance Program. The U.S. Geological Survey, U.S. Army Corps of Engineers, and the Federal Emergency Management Agency provide flood insurance studies to local communities. The Federal Emergency Management Agency monitors construction activities in flood plains to ensure local government compliance with Flood Damage Reduction Ordinances. Most flood related programs in South Carolina are run by Federal agencies and no comprehensive statewide flood-plain management program currently exists. The State government has severely limited authority over flood-plain management and other flood related matters and the need for increased State involvement has not been fully assessed.

Introduction

"On a major low country stream, three proposals are being considered at present.

(a) A municipality anticipates eventually using about one third the flow of a stream for domestic consumption.

(b) A proposed group irrigation project involving upwards of 35,000 acres would need to use a substantial portion of the streamflow.

(c) A farmer owning about 7,500 acres would also like to develop an irrigation program from the same stream.

There may be many other water users similarly situated above these. How can the needs of these interests best be met? By what legal means can each of them be assured a dependable water right to protect his supply? If there isn't enough for all, what rights, if any, are superior to others."

-The Beneficial Use of Water
in South Carolina, 1952

These words, written over thirty years ago (Busby, 1952) and based on an actual situation, could just as easily have been in yesterday's newspaper. The facts may be different, but the questions would be the same. What are our water rights in South Carolina? Can investors in our water resources be assured of an adequate yield for their investment? Who has priority of water use? Many other questions surely come to mind to the large water user. South Carolina is still operating under the same principles of water law that guided our decisions 30 years ago, and a hundred years before that.

You may be assured, however, that although our basic water laws have not changed, our water usage has. In 1955 South Carolina used about 950 million gallons of water per day (mgd). By 1980 the figure had grown six-fold to almost 5,800 mgd, earning the State the dubuous title of the "second fastest growing water use state in the Nation", second only to Florida (Viessman and Demoncada, 1980). During almost the same period (1960-1980), water consumption increased over 200 percent.

South Carolina is not running out of water. The State is faced, however, with the task of supplying rapidly increasing numbers of municipal, industrial, recreational, electric power, and agricultural water users with the required quantity and quality of water at the right time and right place. Moreover, this must be accomplished with an uncodified legal framework which originated under circumstances far different than today's acute demands on our natural resource base. The State can no longer afford to allow our unguided momentum to carry us into the future. Rather, South Carolina must have an established water resource policy and plan, based on current data and backed by adequate laws, to guide our progress through the upcoming decades.

This report represents the first of two phases in the development of a State Water Plan for South Carolina. Phase I is an inventory of South Carolina's water resources. Water quantity and quality, current uses, future demands, and problems and opportunities are assessed. Phase II will develop a State program to address known and potential problems and opportunities.

This report has five major sections. The first is a brief socio-economic and physical environmental overview of South Carolina. The second is a discussion of South Carolina's water law which points out specific problems and advantages in the State's current legal framework. The third is a statewide hydrologic overview addressing water availability and use within the State. The fourth is a detailed hydrologic description which analyzes the water supply and demand for each of the State's fifteen river sub-basins. The fifth section discusses special water resource topics including navigation, water conservation, hydropower production, aquatic weeds, water-based recreation, and scenic rivers.

Many regional and local water resource studies have been completed in South Carolina. Background studies have been completed by the South Carolina Water Resources Commission and the U.S. Department of Agriculture for the Ashley-Combahee-Edisto River Basin and Santee River Basin and both a background study and management plan have been developed for the Pee Dee River Basin. A comprehensive master water plan has been prepared for the Savannah River Basin by the U.S. Army Corps of Engineers. Water quality management plans have been developed for all major river basins by the South Carolina Department of Health and Environmental Control. Groundwater management plans have been developed and implemented by the South Carolina Water Resources Commission in Beaufort, Colleton, Jasper, Horry, and Georgetown Counties and a portion of Marion County. In addition, there have been many studies and plans addressing site-specific water resource concerns. However, a need existed to coalesce these many diverse and often independent studies to provide a better statewide perspective of South Carolina's water resources. This document attempts to meet that need. More specifically, this study attempts to increase the State's water resource management capabilities by:

- Assessing State water law.
- Assessing the surface- and ground-water resources of the State.
- Projecting future water resource use and demands.
- Identifying statewide and regional water resource problems and opportunities.

AUTHORITY

The South Carolina Water Resources Planning and Coordination Act of 1967 contains broad policies and goals with respect to water resource planning, development, and use. The General Assembly found in part:

> ...that it is in the interest of the public welfare that a coordinated, integrated state water resources policy be formulated and means provided for its enforcement, that plans and programs for the development and enlargement of the water resources of the State be devised and promoted and that other activities designed to encourage, promote, and secure the maximum beneficial use and control of such water resources be coordinated by a commission which, in carrying out its functions, shall give proper and adequate consideration to the multiple aspects of the beneficial use and control of such water resources with an impartiality of interest except that which is designed to best protect and promote the public welfare generally (Act 62, Section 2(b), 1967 Acts and Joint Resolutions).

The Act established the South Carolina Water Resources Commission and made that agency responsible for implementing the policies declared in the Act, including the development and coordination of State water policy. In addition, several other State agencies have statutory responsibilities in specific areas of State water policy, including the Department of Health and Environmental Control, the Coastal Council, the Land Resources Conservation Commission, and the Wildlife and Marine Resources Department. Other State and Federal agencies have interests in the State's water resources and have been consulted during the preparation of this document.

CONDUCT OF THE PROJECT

The State Water Assessment was prepared under the general guidance of the South Carolina Water Resources Commission, which is composed of 18 members. Ten of the members are appointed by the Governor for staggered three year terms: three members representing agriculture, three representing industry, three representing municipalities, and one representing saltwater interests. The remaining eight members of the Commission represent the executive offices of various State agencies and institutions: Department of Agriculture, Clemson University, Department of Health and Environmental Control, Department of Highways and Public Safety, Forestry Commission, Development Board, Land Resources Conservation Commission, and the Wildlife and Marine Resources Department.

A State Water Plan Policy Committee was appointed by the Commission to work more directly with the project staff to establish direction and resolve issues. The Committee was composed of four appointed Commissioners and a representative each from the Land Resources Conservation Commission and the Department of Health and Environmental Control. The project staff consisted of a project manager and of water resource professionals and technicians from the staff of the South Carolina Water Resources Commission.

Assisting the Policy Committee and the project staff was a Technical Advisory Committee composed of representatives from the following State and Federal agencies with interests in water resources planning and management:

S.C. Coastal Council
S.C. Wildlife and Marine Resources Department
S.C. Department of Health and Environmental Control
S.C. Land Resources Conservation Commission
Governor's Office
State Development Board
State Forestry Commission
Clarks-Hill Russell Authority
S.C. Department of Agriculture
U.S. Geological Survey
U.S. Army Corps of Engineers
Soil Conservation Service
U.S. Fish and Wildlife

while the Lower Coastal Plain lies between the Surry escarpment and the present coastline (Fig. 5). These latter two regions exhibit moderate to low relief and are marked by several terraces (Brandywine, Coharie, Sunderland, Wicomio, Penholoway, Talbot, Pamlico, and Recent), each representing former sea levels (Cooke, 1936).

Metamorphic and igneous rocks similar in type and age to those in the Blue Ridge and Piedmont underlie the sediments of the Coastal Plain as an irregular surface that dips to the south and southeast (Fig. 7). These rocks include granite, diorite, chlorite, hornblende schist, quartz-feldspar gneiss, and hornblende gneiss of Pre-cambrian to Permian age. Subsurface data indicate several major structural features of the basement rock, the most prominent of which is the Cape Fear Arch. This structure is a southeastward plunging basement anticline with an axis roughly paralleling the North Carolina-South Carolina border and intersecting the North Carolina coast at Cape Fear. Buried saprolite of variable thickness separates the crystalline rock from the overlying sedimentary rocks throughout the Coastal Plain. The saprolite layer in the southwestern portion of the Coastal Plain ranges from 40 to 80 feet thick. Several troughs composed of Triassic sediments have been identified in the crystalline bedrock beneath Coastal Plain sediments. One trough, the Dunbarton Basin, is located beneath the Savannah River Plant in Aiken and Barnwell Counties (Siple, 1967; Marine and Siple, 1974). The sediments in this basin consist of clastic red siltstone, sandstone, and some limestone pebbles and are overlain by Coastal Plain deposits (Fig. 7).

Coastal Plain deposits consist of consolidated and unconsolidated sediments of alluvial and marine origin which thicken from a few feet at the Fall Line to over 4,000 feet at the coast near Beaufort (Fig. 8 and Table 7).

Three formations of late Cretaceous age are recognized over a large part of the Coastal Plain--the Middendorf*, Black Creek, and Peedee Formations.

The Black Creek Formation is composed of two members, the upper Snow Hill Marl member and the lower member which has not been named. The Snow Hill Marl is composed of light gray sand interbedded with dark gray marine clays and some green sands. The lower member is composed of dark gray to black laminated clays with white to gray phosphatic, lignitic, and glauconitic sand. The formation is exposed along Black Creek a few miles above Darlington. Elsewhere in the northwestern Coastal Plain the formation lies buried beneath thin (1 to 30 feet) deposits of Pleistocene age. The Black Creek Formation near Sumter occurs between the elevations of approximately 50 feet above mean sea level to 200 feet below mean sea level. In Orangeburg, the Black Creek Formation lies between approximately 300 to 550 feet below mean sea level. Its maximum thickness elsewhere ranges from about 600 to 800 feet. The formation dips generally to the southeast (Fig. 7).

The Peedee Formation is the youngest of the Upper Cretaceous formations in South Carolina. This formation crops out in Florence, Williamsburg, Horry, and Georgetown Counties with the best exposures along the Pee Dee River. The Peedee Formation consists of dark gray clay interbedded with fine to medium micaceous and glauconitic sand and streaks of hard shelly limestone and siltstone. The top of the formation ranges from about 100 feet below mean sea level in the Orangeburg area to more than 1,600 feet below mean sea level in Beaufort County. The thickness of the formation ranges from a few feet near the updip limit to 600 feet in the Beaufort area. In the Charleston area, data indicate that the thickness is 500 to 700 feet.

Due to limited available data, the Ellenton Formation is of uncertain age and geographical extent. When first described in 1967, this formation was thought to be of Late Cretaceous age based on its stratigraphic position (Siple, 1967a). Subsequent investigations indicate that this formation is possibly of Early Paleocene age, equivolent to deposits of Midway age extending from Aiken County to the coast (David Prowell, U.S. Geological Survey, Atlanta, Georgia, personal communications, February 1983). The Ellenton Formation consists of dark gray to black mica-

* In previous reports of the S.C. Water Resources Commission, the name Tuscaloosa was preferred over that of the Middendorf, principally because the former was the more widely recognized and accepted name and because of inconsistent assumptions offered in support of the latter. However, the type section of the Middendorf Formation located in Chesterfield County, South Carolina does not include lithic units typical of the Tuscaloosa Formation in the southern and western parts of the southeastern Coastal Plain, including in part the Hamburg beds of Sloan (1904, 1908). Therefore, the authors of this report recognize the Middendorf as a distinct formation similar to, but different from, the more widespread Tuscaloosa Formation. Formations and aquifer systems in South Carolina identified as the Tuscaloosa in earlier reports are synonymous to the Middendorf as used in this report. In addition, in down-dip areas near the coast, deposits older than Middendorf (i.e. Early and Late Cretaceous age) are included in the Middendorf for purposes of ground-water analysis.

The Middendorf Formation is composed of light-colored crossbedded kaolinitic sands with lenses of white, tan, red, and purple kaolinitic clays exposed at the surface in South Carolina in Marlboro, Chesterfield, northern Darlington, northern Lee, Kershaw, western Sumter, Richland, northern Calhoun, eastern Lexington, and northern Aiken Counties. The thickness of the Middendorf Formation ranges from a few feet at the Fall Line to 1,500 feet in Beaufort County. The top of the unit occurs at a depth of about 50 to 100 feet below land surface in the northern part of the Coastal Plain to 2,500 feet below land surface in Beaufort County. This indicates a coastward dip and general thickening of the sediments from northwest to southeast across the Coastal Plain.

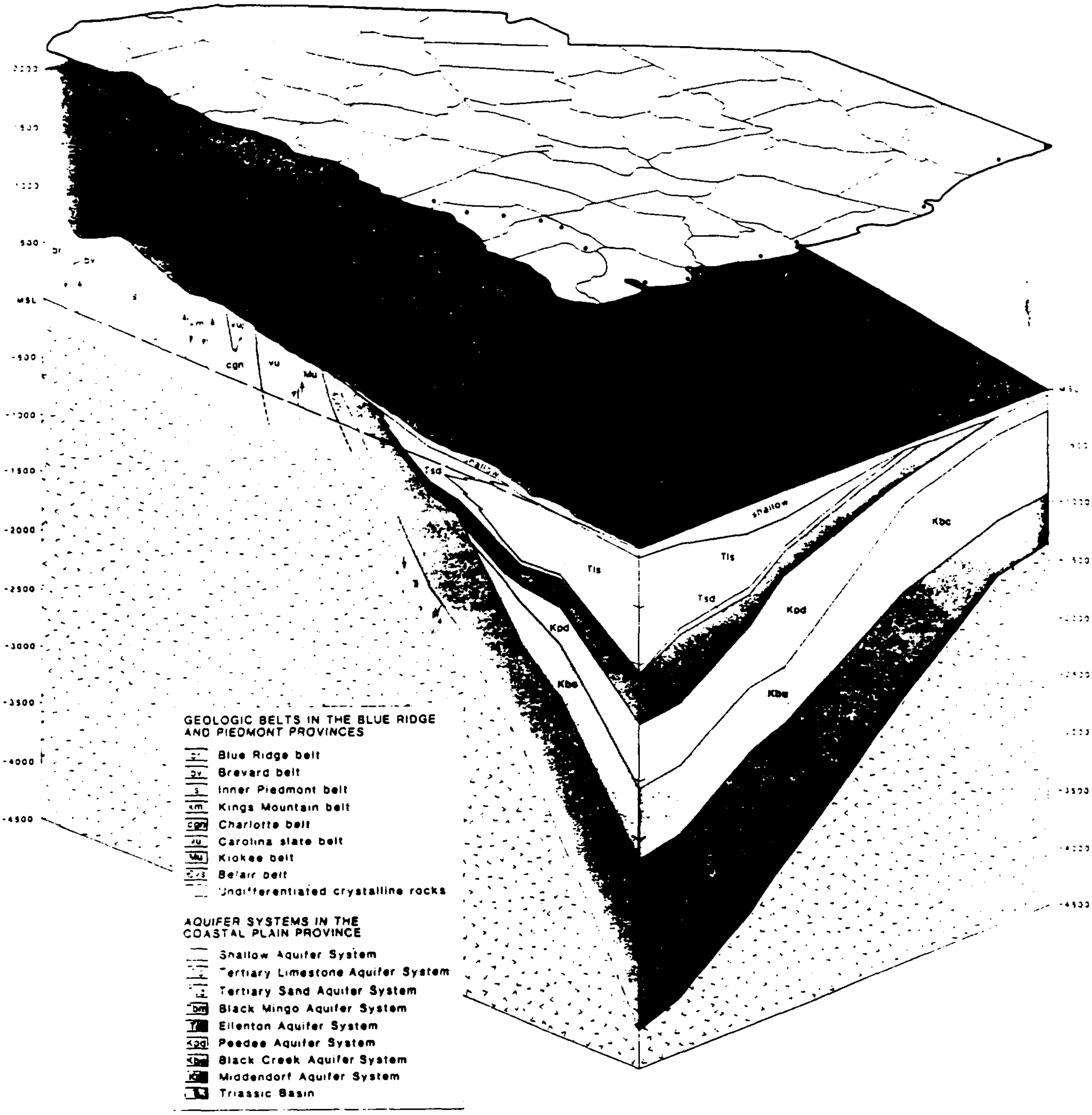

Figure 7.
Generalized structure of formational units and aquifer systems in South Carolina.

Table 7.

Description of geologic formations in the Coastal Plain.

SYSTEM	SERIES	GROUP	FORMATION	DESCRIPTION OF FORMATION	AQUIFER SYSTEM NAME	DESCRIPTION OF AQUIFER POTENTIAL AND WATER CHARACTERISTICS
Quaternary	Recent		Recent	Light-gray and tan fine to coarse lenticular sand and interbedded clay of marine and continental origin.	Shallow Aquifer System (in Lower Coastal Plain)	Water occurs primarily under water-table conditions and semi-confined conditions locally of minor importance as an aquifer. Water may be high in iron, sulfate, or nitrate, but is generally soft. High yields from river terrace deposits may be developed. Usually this unit supplies ground water to shallow (<100 feet) drilled and dug wells primarily in rural areas for domestic use. Minor to limited ground-water source.
	Pleistocene		Pamlico Talbot Penholoway Wicomico Sunderland Coharie Brandywine	Light-gray, tan, orange, red and black clay, interbedded with sand and gravel. Deposits form a thin cover over a large portion of the Coastal Plain.		
Tertiary	Pliocene		Waccamaw	Blue-gray to yellow and brown sandy shell marl and fine sand.		Supplies ground water to shallow (less than 100 ft.) wells for domestic use in the rural areas in the northeastern part of the State. Poor to minor ground-water source.
			Duplin Marl*	Buff sandy, friable shell marl occurring in isolated patches in lower half of Coastal Plain.		Minor ground-water source because of its limited extent and thickness. Water is moderately hard and may be high in iron.
	Miocene		Hawthorne	Hard brittle shale resembling silicified fuller's earth, with fine sandy phosphatic marl and soft limestone.		Because of its low permeability is not considered a major aquifer. However, it does provide sufficient water for domestic purposes and for limited industrial use. Water is hard. Minor ground-water source.
	Oligocene		Cooper	Light-brown to grayish-green phosphatic marl, heavily microfossiliferous, with fine grained sand. Basal part may be Jackson in age.		Principally a confining bed. The lower section acts as a poor aquifer in the southeastern part of the State. Water is quite hard and high in iron low in fluoride. Minor ground-water source.
	Eocene	Jackson	Barnwell	The Barnwell consists typically of deep-red to brown fine to coarse massive sandy clay and clayey sand. It appears to represent a residuum derived from solution of a sandy limestone.	Tertiary Sand Aquifer System	Does not yield large quantities of water. Can be used for domestic needs where the sand is sufficiently coarse and free from silt and clay. Water is soft. Minor ground-water source.
		Claiborne (Upper)	Castle Hayne Limestone	Buff-gray tough or crumbly fossiliferous limestone underlain by soft fine-grained granular limestone. Equivalent in down-dip areas to the Ocala Formation in extreme southern S.C., along with Georgia and Florida.	Tertiary Limestone Aquifer System	A major source of water in Beaufort and Jasper Counties. Yields of 500 to 2000 gpm. Water is moderately hard, low in iron and chloride. Water from lower part of of aquifer may be high in chloride.
		Claiborne (Middle)	McBean	The McBean Formation consists of fine to medium grained massive greenish-yellow and red quartz sand, green glauconitic marl, silicified beds of coquina, and clayey sand interbedded with red, brown, ochre, and yellow clay laminae. Littoral to neritic environment gradational with some estuarine or continental.	Tertiary Sand Aquifer System / Tertiary Limestone Aquifer System	The beds of sands and limestone in the lower part in Aiken and Barnwell Counties are fairly permeable and yield moderate quantities of water to industrial and municipal wells. Water is soft but may be high in iron content. Moderate to major ground-water source.
		Claiborne (Middle)	Santee Limestone	The Santee limestone is a nearly pure white to creamy-yellow fossiliferous and partly glauconitic limestone containing numerous Bryozoa.	Tertiary Limestone Aquifer System	In the southeastern part of the State yields 500 gpm in eastern Colleton County to 2000 gpm in western Hampton, Jasper, and western Beaufort Counties. Water is moderately hard to hard with pH 7.1–7.9; salt water intrusion is thought to be occurring at places near the coast. Major ground-water source.
		Claiborne (Middle)	Warley Hill Marl	Fine green to yellow glauconitic sand overlain by yellow to reddish-yellow sandy clay	Tertiary Sand Aquifer System	Minor to poor ground-water source because of its small extent and low permeability.
		Claiborne (Lower)	Congaree	Well to poorly sorted sand, fuller's earth, brittle siltstone, and light-gray to green shale alternating with thin-bedded fine-grained sandstone.		The Congaree is the basal, and most productive unit of the Orangeburg Group (including the Barnwell, McBean, and Wharly Hill formations, northwest of the Citronelle Scarp). Yields range from 100 to 600 gpm, and the water is generally soft high in iron, low in fluoride with a pH between 4.3 and 7.9
		Wilcox	Black Mingo	Partly indurated fine white to yellow sand and sugary sandstone or bioclastic limestone. Cement is white and calcareous to siliceous. Underlain by gray to black laminated shales containing numerous macro-fossils in some areas. Basal beds may be Midway in age.	Black Mingo	Yields are uncertain, but some permeable layers may produce up to 200 gpm in Clarendon, Williamsburg and Berkeley Counties. Mainly a confining bed. Water is moderately to very hard and low in iron, chloride, fluoride and the pH is 7.3 to 7.[illegible] Limited to minor ground-water source.
	Paleocene	Midway	Ellenton	Dark-gray to black sandy lignitic micaceous clay containing disseminated crystals of gypsum. Medium to coarse sand and gravel.	Ellenton	Geographic distribution not fully mapped. Known to occur from Savannah to Edisto basins and southeast Allendale County. Water is generally high in sulfate and iron. Moderate to major ground-water source.
Cretaceous	Upper Cretaceous	Navarro	Peedee	Dark-green to gray micaceous glauconitic argillaceous sand interbedded with impure limestones and massive dark clays. Deposited under open marine conditions probably at depths of not less than 100 fathoms.	Peedee	Several hundred gpm have been reported around the City of Orangeburg. In the Low Country, yields up to 500 gpm have been reported. Water is generally soft, but high in iron and sulfate. Limited to moderate ground-water source.
		Taylor	Black Creek: Snow Hill Marl	Light-gray sand and dark clays interbedded with green sand and marine clay. Transitional zone between the deeper marine Peedee Formation and the more shallow marine Black Creek deposits.	Black Creek	This is a major aquifer of public and industrial supply within Orangeburg, Florence, eastern Marion, Clarendon, Williamsburg, Horry, and Georgetown Counties. Yields range from 400 to 1100 gpm. Water is soft with an excess of iron. Excessive fluoride is present in the coastal region. Excessive chlorides are present in the lower part of the Black Creek Aquifer System, along the coast. Major ground-water source.
		Austin	Black Creek: Unnamed	Dark-gray to black laminated lignitic clays interbedded with white to gray phosphatic, glauconitic sand. Deposited in shallow marine estuarine, and paludal environment.		
		Eagleford to Woodbine	Middendorf (Tuscaloosa)	Gray, buff and red arcosic cross-bedded sand and gravel, interbedded with lenses of white and purple clay and kaolin. Mixed continental and marine environment characterized by fluvial, deltaic, and littoral deposits.	Middendorf (Tuscaloosa)	A potential source of large quantities of water in the coastal plain. The permeability is relatively high and yields up to 3400 gpm can be obtained from individual wells. Water is soft and low in total solids in Aiken, Barnwell, Richland, Sumter, Florence, Marion, and Dillon Counties. In the Low Country area it is covered by 2000 to 2600 ft. of younger formations. The water is higher in total dissolved solids near the Coast, more than 1000 mg/L, and fluoride, more than 4.0 mg/L. In the Coastal regions of the State the water becomes excessively salty. Extensive major aquifer.

* Previously considered as Miocene in age.

Combahee-Coosawhatchie River Sub-basin

GENERAL OVERVIEW

The Combahee-Coosawhatchie River Sub-basin is located in the southern Coastal Plain region of the State. The sub-basin extends approximately 95 miles inland from the Atlantic Ocean and includes all of Beaufort County and portions of Aiken, Allendale, Bamberg, Barnwell, Colleton, Hampton, and Jasper Counties (Fig. 129). The areal extent of the basin is approximately 3,270 square miles, 10.5 percent of State land area.

Population

The 1980 population of the sub-basin was estimated at 139,400, 4.5 percent of the State's total population (Table 119). By the year 2020 the sub-basin population is expected to reach 233,400, an increase of 67.4 percent. The highest rate of population growth during this time period is anticipated for Beaufort County, with a projected increase of 97 percent.

In general, this is a rural area with the exception of Beaufort County which is more urbanized and contains the affluent retirement and resort community of Hilton Head Island.

The major centers of 1980 population in the sub-basin were Hilton Head Island (11,344), Beaufort (8,651), Walterboro (5,914), Barnwell (5,556), Laurel Bay (5,238), Allendale (4,362), Denmark (4,138), Bamberg (3,633), and Hampton (3,086).

Economy

The counties in the region had an average median family income of $12,484 in 1980, which was $4,000 lower than the State average. The per capita income of the region in 1979 ranged from $8,720 in Beaufort County which ranked first among the State's 46 counties, to $4,543 in Allendale County, which ranked 45th. None of the remaining sub-basin counties had a per capita income as high as the State average.

During 1979, the annual average employment of non-agricultural wage and salary workers in the sub-basin totaled 50,500. The percentage breakdown by type of employment was: manufacturing, 27 percent; government, 23 percent; wholesale and retail trade, 19 percent; services and mining, 16 percent; construction, 7 percent; finance, insurance, and real estate, 5 percent; and transportation and public utilities, 4 percent.

In the sectors of manufacturing, mining, and public utilities, the sub-basin counties had a relatively low annual product value of $632 million during fiscal year 1978-79, which was 2.9 percent of the State total.

Agricultural productivity is not as pronounced in this portion of the State. Only Hampton County ranked in the top one-third of South Carolina counties for cash crop receipts from farm marketing in 1979, with a total value of almost $16 million. Of the remaining sub-basin counties, all but Jasper ranked in the top 50 percent of cash crop receipts.

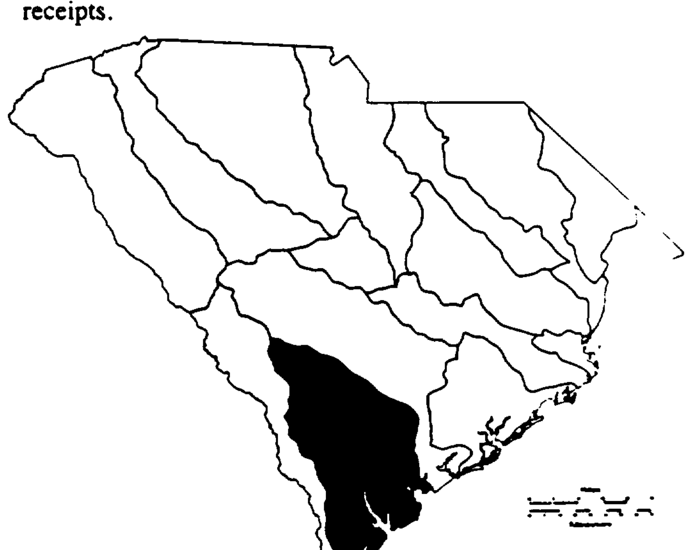

Figure 129.
Location of the Combahee-Coosawhatchie River Sub-basin in South Carolina.

Table 120.

Selected streamflow characteristics at U.S. Geological Survey gaging stations in the Combahee-Coosawhatchie River Sub-basin. South Carolina.

Gaging Station		Drainage Area	Period of Record		Average Flow				
							90%[a]	7Q10[b]	
Number	*Name/Location*	*(mi²)*	*Dates*	*Total Years*	*cfs*	*cfs/mi²*	*cfs*	*cfs*	*cfs/mi²*
1755	Salkehatchie River near Miley	341	Feb 1951-Present	29	356	1.04	95	33	0.10
1765	Coosawhatchie River near Hampton	203	Feb 1951-Present	29	189	0.93	3.7	0.03	0.0001
1768.75	Great Swamp near Ridgeland	48.8	Oct 1977-Present	3	42.8	0.88	*[e]	*	*

[a] Flow equaled or exceeded 90 percent of the time
[b] Seven day low flow with a 10 year recurrence interval
[c] Minimum daily flow for period of record
[d] Instantaneous maximum flow for period of record
[e] * Indicates statistic not calculated

of 600 acres and a volume of 3,600 acre-feet. These and all other lakes larger than 200 acres are presented in Table 121. The total surface area of all lakes larger than ten acres is about 7,000 acres and total volume is approximately 29,000 acre-feet.

Currently, no hydroelectric power sites exist in the sub-basin and no potential sites have been identified.

The U.S. Army Corps of Engineers has been involved in numerous navigation projects within the sub-basin (Table 122). These projects were concentrated primarily in coastal waters; however, none are currently active.

The Willow Swamp region of Colleton and Bamberg Counties is the site of the only completed Soil Conservation Service flood control project within the sub-basin. It includes 37.1 miles of channel improvement. The Upper New River of Beaufort and Jasper Counties is the site of construction which will include 28 miles of channel improvement. These projects and other problem areas are presented in Table 123 and Figure 132.

Water Quality

The major portion of freshwaters in this sub-basin have Class A water use designations, suitable for primary contact recreation (Fig. 133). All other freshwater bodies are designated Class B. Coastal waters are primarily designated Class SA, indicating saltwaters suitable for harvesting of clams, mussels, and oysters for human consumption. All other tidal waters in this sub-basin are designated Class SB. Water quality limited segments which require advanced treatment of wastewater discharges include all or part of the Coosawhatchie River, Black Creek, Lemon Creek, Buckhead Creek, Inland Creek, Great Swamp and several minor tributary streams (Fig. 134). Water quality in the Combahee-Coosawhatchie Sub-basin is generally adequate for most designated water use activities. However, due to natural conditions, such as drainage from extensive swamplands, high summer water temperatures, and slow moving waters, water bodies throughout this sub-basin experience chronic low dissolved oxygen concentrations.

The Coosawhatchie River exhibits generally satisfactory conditions with lower water quality during portions of the year (S.C. Department of Health and Environmental Control, 1980b). Water quality problems in this river include high mercury and fecal coliform bacteria concentrations and low dissolved oxygen levels. While the source of mercury contamination is unknown, dissolved oxygen and fecal coliform bacteria problems are attributed to natural conditions and/or non-point source pollution. Contraventions of State dissolved oxygen standards in this river often occur during the summer months (U.S. Geological Survey, 1979, 1980, 1981; S.C. Department of Health and Environmental Control, 1980b). A fish kill in July 1980 of about 1,200 eel, bream, and catfish was attributed to low dissolved oxygen concentrations in this river (S.C. Department of Health and Environmental Control, unpublished fish kill records).

The Salkehatchie River has in the past experienced depressed dissolved oxygen levels and elevated fecal coliform bacteria concentrations (S.C. Department of Health and Environmental Control, 1975c). These water quality problems were attributed primarily to non-point sources and some municipal point source discharges. Current assessments, however, indicate that this river has generally good water quality and has exhibited a slight improvement in dissolved oxygen levels during recent years (S.C. Department of Health and Environmental Control, 1980b).

Chemical and physical water quality parameters indicate that water quality in the tidally influenced coastal waters is satisfactory with decreased quality during portions of the year. Problem conditions include high concentrations of metals and fecal coliform bacteria and low dissolved oxygen values. These problem conditions have been attributed primarily to natural conditions and non-point source runoff. Biological data from these coastal waters indicate fair to good conditions with no noticeable trends (S.C. Department of Health and Environmental Control, 1980b). High concentrations of fecal coliform bacteria levels have resulted in the closing of shellfish grounds in waters near Beaufort, Hilton Head Island, and Turtle Island (Fig. 134).

Table 123.
Flood control projects in the Combahee-Coosawhatchie River Sub-basin, South Carolina.

Map No.	*Project/Watershed Name*	*County*	*Responsible Agency*[a]	*Status*
13	Willow Swamp	Colleton/Bamberg	SCS	Completed 1974
14	Upper New River	Beaufort/Jasper	SCS	Under construction
15	Sanders Branch/ Crooked Creek	Hampton	SCS	Terminated
16	Sheldon Watershed	Beaufort	SCS	Terminated
17	Ehrhardt	Bamberg	SCS	Identified problem area
18	North Hilton Head	Beaufort	SCS	Identified problem area

[a] SCS indicates Soil Conservation Service

Sources: U.S. Department of Agriculture, 1980, 1983
U.S. Army Corps of Engineers, 1982c

occurs at a depth of 830 feet in Colleton County and about 1,500 feet near Beaufort. The aquifer is about 300 and 500 feet thick, respectively. Fine grained sediments, such as clay or clayey limestone within the Peedee, function more as confining beds than as aquifers and probably contain mineralized water in coastal Beaufort and southern Colleton and Jasper Counties. The occurrence of freshwater in the Peedee Aquifer System was reported in a well in northern Beaufort County (Siple, 1960). This well has been subsequently filled in and duplicate analyses of freshwater from the Peedee Aquifer have not been obtained.

The top of the Black Mingo Aquifer System in Hampton and Colleton Counties occurs at a depth of approximately 600 feet, and in Beaufort County at depths of 860 to 1,100 feet. The thickness of sediments is about 400 feet. Wells thought to be screened in the Black Creek or Ellenton Aquifer Systems have natural flows of 50 to 250 gpm of good quality water in Hampton and Colleton Counties. In Beaufort and Jasper Counties, the water-bearing properties of the Black Mingo System are not known.

The Tertiary Limestone Aquifer System is the main source of ground water in the sub-basin. More than 4,000 wells approximately 50 to 250 feet deep tap this aquifer system and provide over 80 percent of the ground water used in this area. The thickness of the Tertiary Limestone Aquifer System ranges from 400 feet in Hampton and Colleton Counties to more than 900 feet in Beaufort County, and probably more than 1,000 feet in southern Jasper County.

The Tertiary Limestone Aquifer System in the southern coastal counties was differentiated by Hayes (1979) into two permeable zones, the Upper Unit and the Lower Unit, separated by a zone of low permeability. The Lower Unit is about 30 feet thick in Beaufort and Colleton Counties. In Jasper County, the thickness and water bearing characteristics of the Lower Unit are unknown. The transmissivity of the Lower Unit in northern Colleton and Hampton Counties is estimated to range from 500 to 5,000 ft^2/day. Wells drilled into the Lower Unit are usually open to the Upper Unit. The Upper Unit of the Tertiary Limestone Aquifer System is the major source of ground water in the sub-basin. Wells which tap this unit range from 50 feet deep in the vicinity of Beaufort to more than 200 feet deep in Jasper County. The hydraulic properties of this unit vary considerably. The permeability of the aquifer system as a whole decreases from southwest (Jasper County) to the northeast (southern Colleton County) where the Upper Unit is absent.

The large volume of water pumped from the Tertiary Limestone Aquifer System by the City of Savannah has lowered water levels in the aquifer from the original potentiometric surface of 10 to 35 feet above mean sea level in 1880, to approximately 150 feet below mean sea level in 1980. The decline of water levels has changed or reversed the original direction of ground-water movement from a direction toward Port Royal Sound to one toward the center of pumpage at Savannah. Continued dewatering of the Tertiary Limestone Aquifer System will affect the area near the cone of depression, centered at Savannah, by causing compaction of overlying confining beds and possibly land-surface collapse.

The Shallow Aquifer System (Hawthorne, Duplin, and Pleistocene sediments) occurs discontinuously throughout the sub-basin. Wells less than 25 feet to about 100 feet deep tap these sediments. The hydrologic characteristics of the Shallow Aquifer System are unknown; however, this system is an important source for domestic water supplies in coastal areas.

Water Quality

In general, water quality from all aquifer systems in the northern extremes of the sub-basin is good and suitable for most uses. However, as these systems down dip toward the coast, water quality generally deteriorates. High water temperatures, chlorides, and dissolved solids in the deep-lying Middendorf and Black Creek Aquifer Systems make these systems undesirable sources of ground water in the southern portion of the sub-basin. Brackish water in the Peedee Aquifer System also discourages use of this ground-water source. The Black Mingo Aquifer System exhibits occasional high iron concentrations which affect the taste and use of this water in some areas of the sub-basin.

The most utilized aquifer system in the sub-basin is the Tertiary Limestone Aquifer System. The concentration of major chemical constituents varies among wells. Hardness is usually below 140 mg/L, total dissolved solids below 200 mg/L, and pH ranges from 7.5 to 8. Chloride concen-

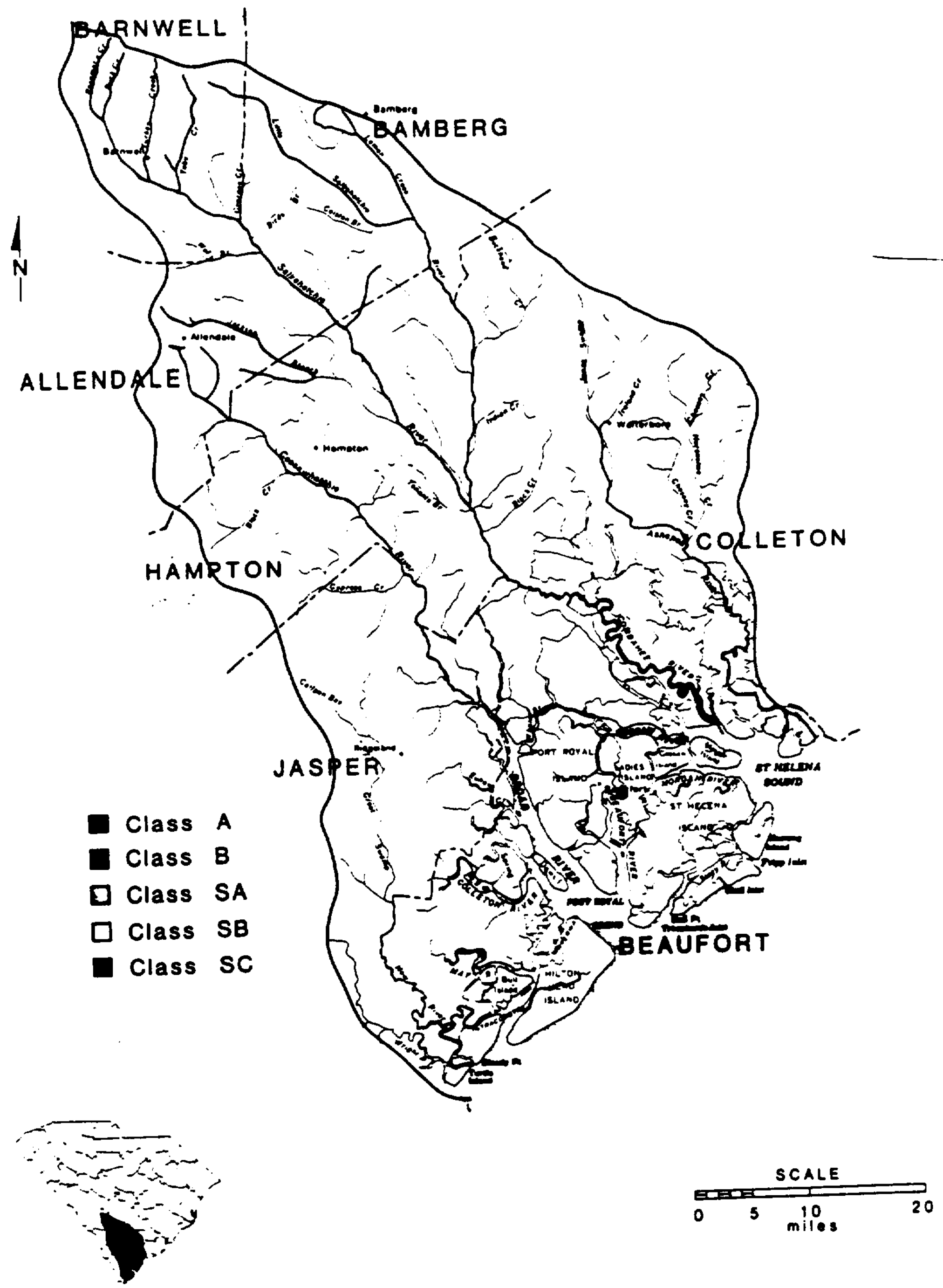

Figure 133.
Surface-water quality classifications in the Combahee-Coosawhatchie River Sub-basin, South Carolina (S. C. Department of Health and Environmental Control, 1980a).

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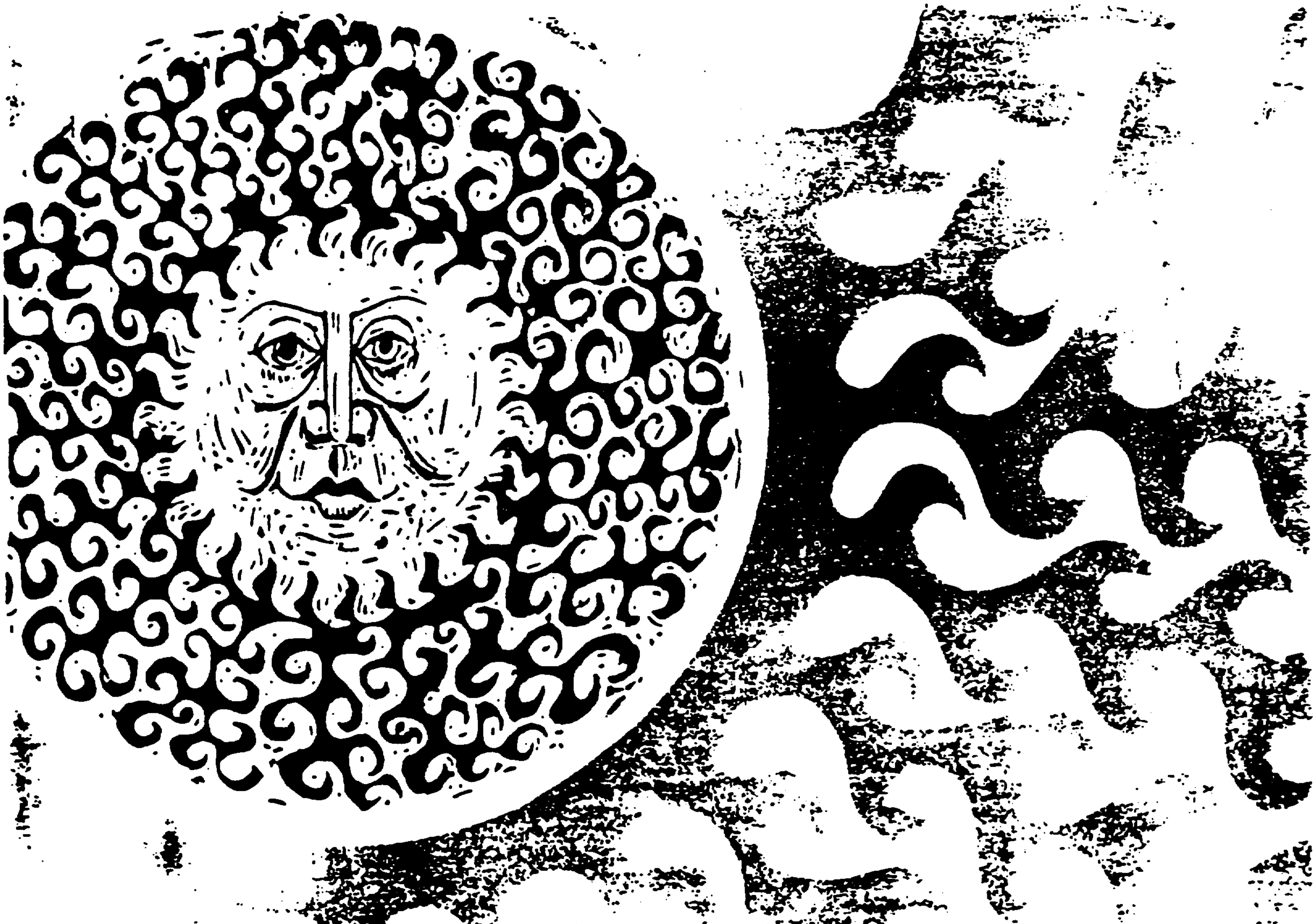


LIMATIC
ATLAS
OF THE
UNITED
STATES

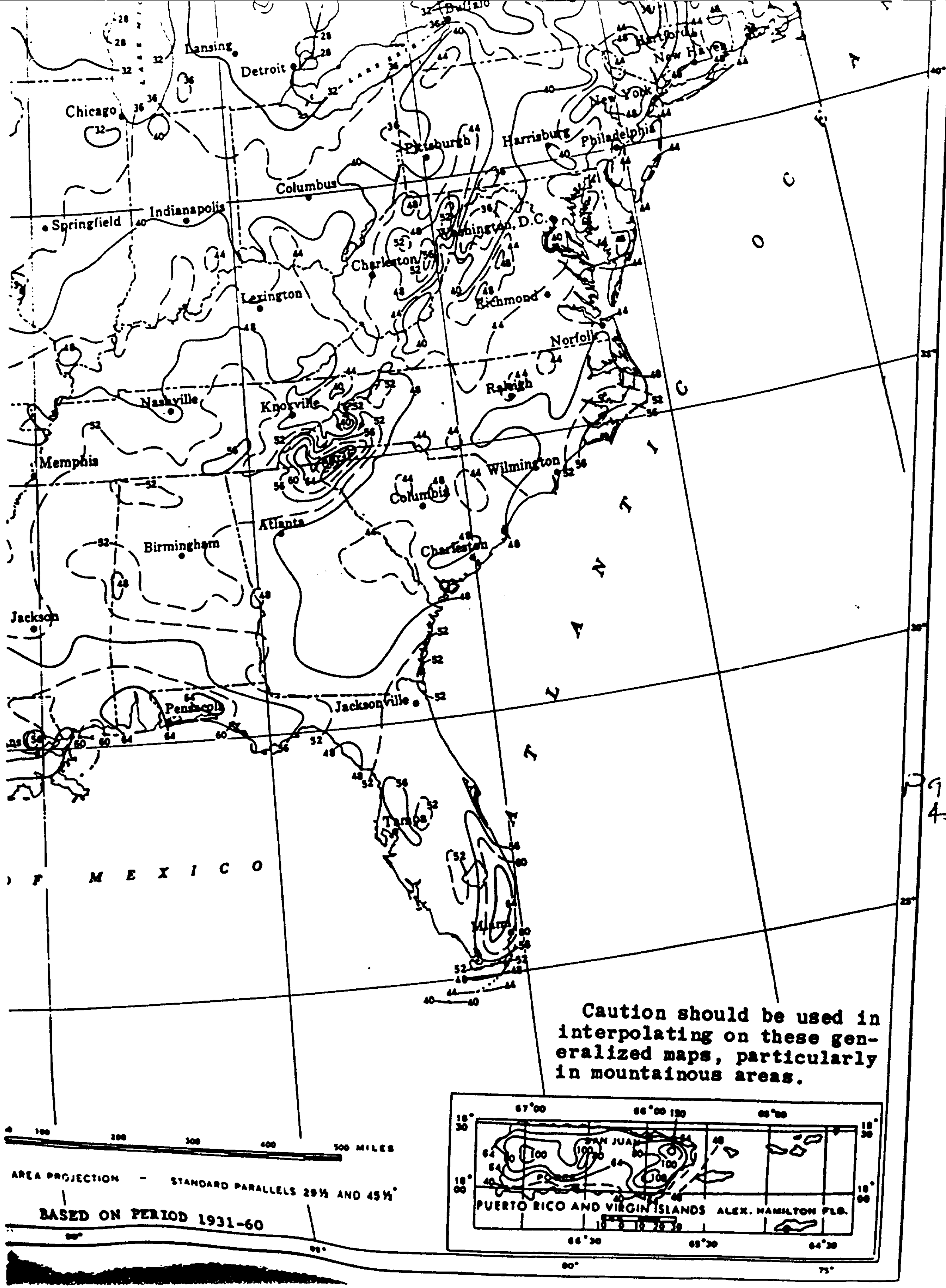
U.S. DEPARTMENT OF COMMI
C. R. Smith, Secretary

ENVIRONMENTAL SCIENCE SERVICES ADMI
Robert M. White, Administrator

ENVIRONMENTAL DATA SERVICE
Woodrow C. Jacobs, Director

JUNE 1968

REPRINTED BY THE
NATIONAL OCEANIC AND ATMOSPHERIC ADM
1983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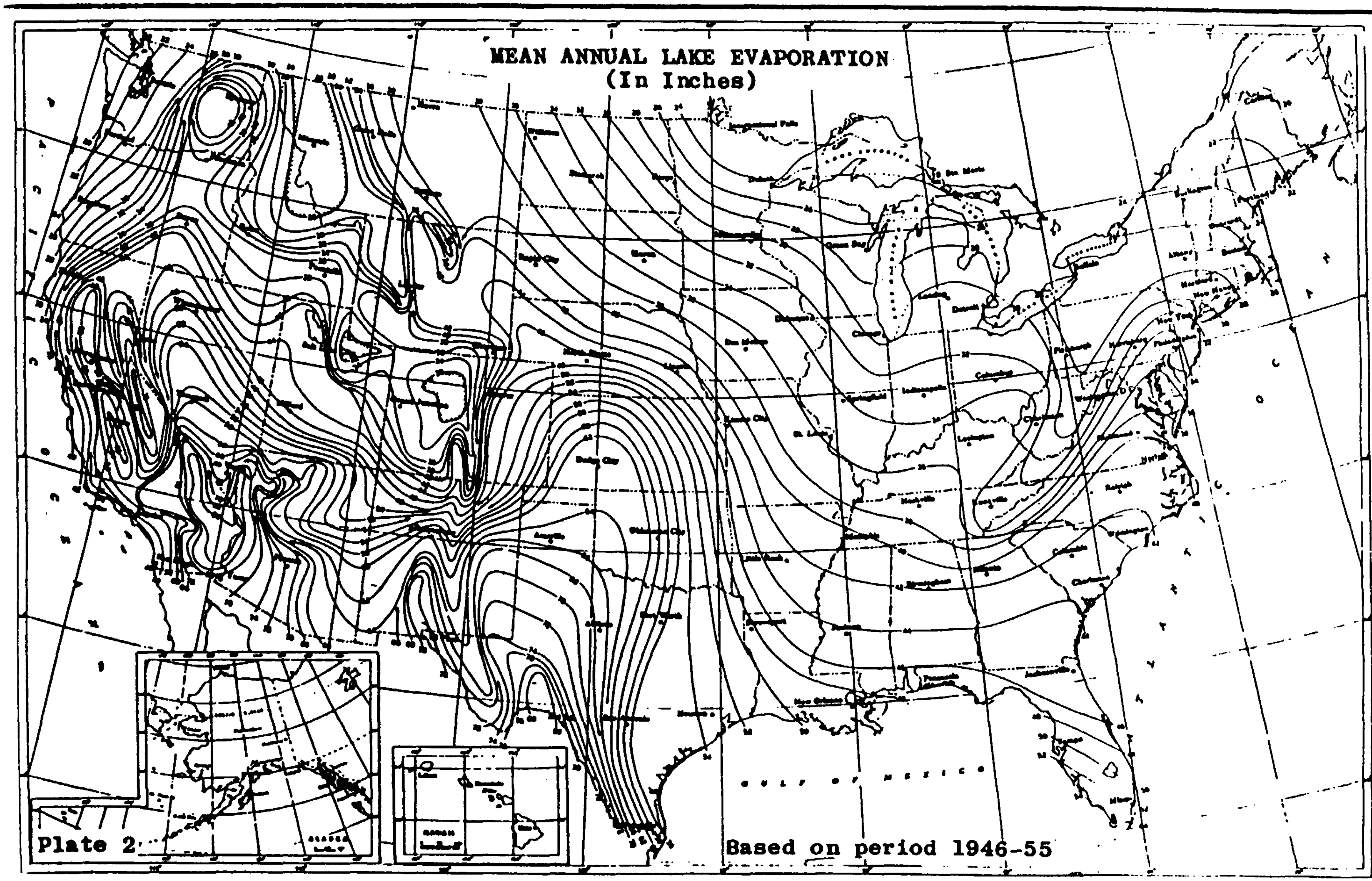
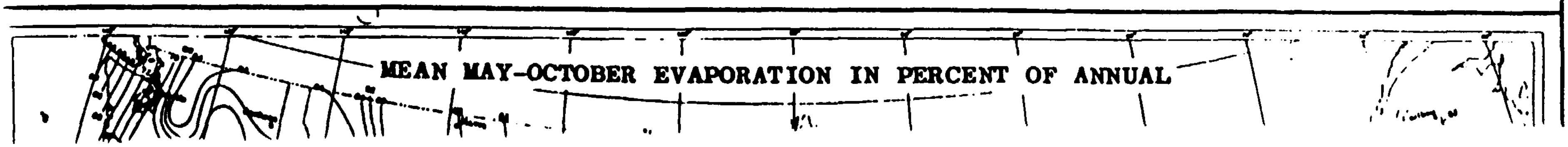
Norfolk
Raleigh
Knoxville
Nashville
Memphis
Wilmington
Columbia
Atlanta
Birmingham
Charleston
Jackson
Jacksonville
Pensacola
Tampa
Miami
M E X I C O
A T L A N T I C O C E A N
Caution should be used in interpolating on these generalized maps, particularly in mountainous areas.
100
200
300
400
500 MILES
AREA PROJECTION - STANDARD PARALLELS 29½ AND 45½°
BASED ON PERIOD 1931-60
PUERTO RICO AND VIRGIN ISLANDS
ALEX. HAMILTON FLD.
SAN JUAN
67°00
66°00
65°00
66°30
65°30
64°30
40°
35°
30°
25°
90°
85°
80°
75°

LAKE EVAPORATION





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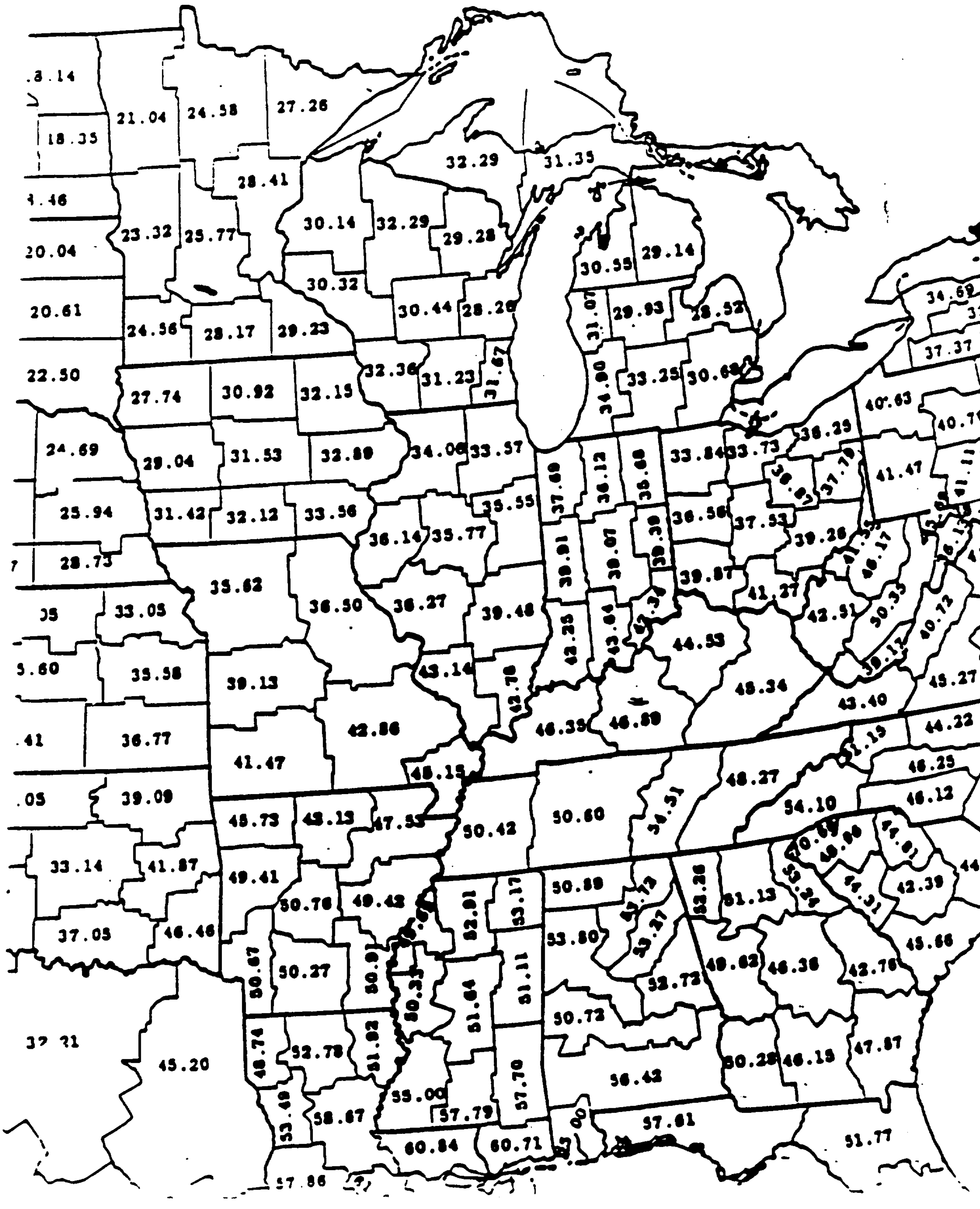

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60.84
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51.77
57.86

WEATHER BUREAU
F. W. Reichelderfer, Chief

TECHNICAL PAPER NO. 40

RAINFALL FREQUENCY ATLAS OF THE UNITED STATES

for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years

Prepared by
DAVID M. HERSHFIELD
Cooperative Studies Section, Hydrologic Services Division
for
Engineering Division, Soil Conservation Service
U.S. Department of Agriculture

REFERENCE 14

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FIT IV

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, Secretary

WEATHER BUREAU
F. W. Reichelderfer, Chief

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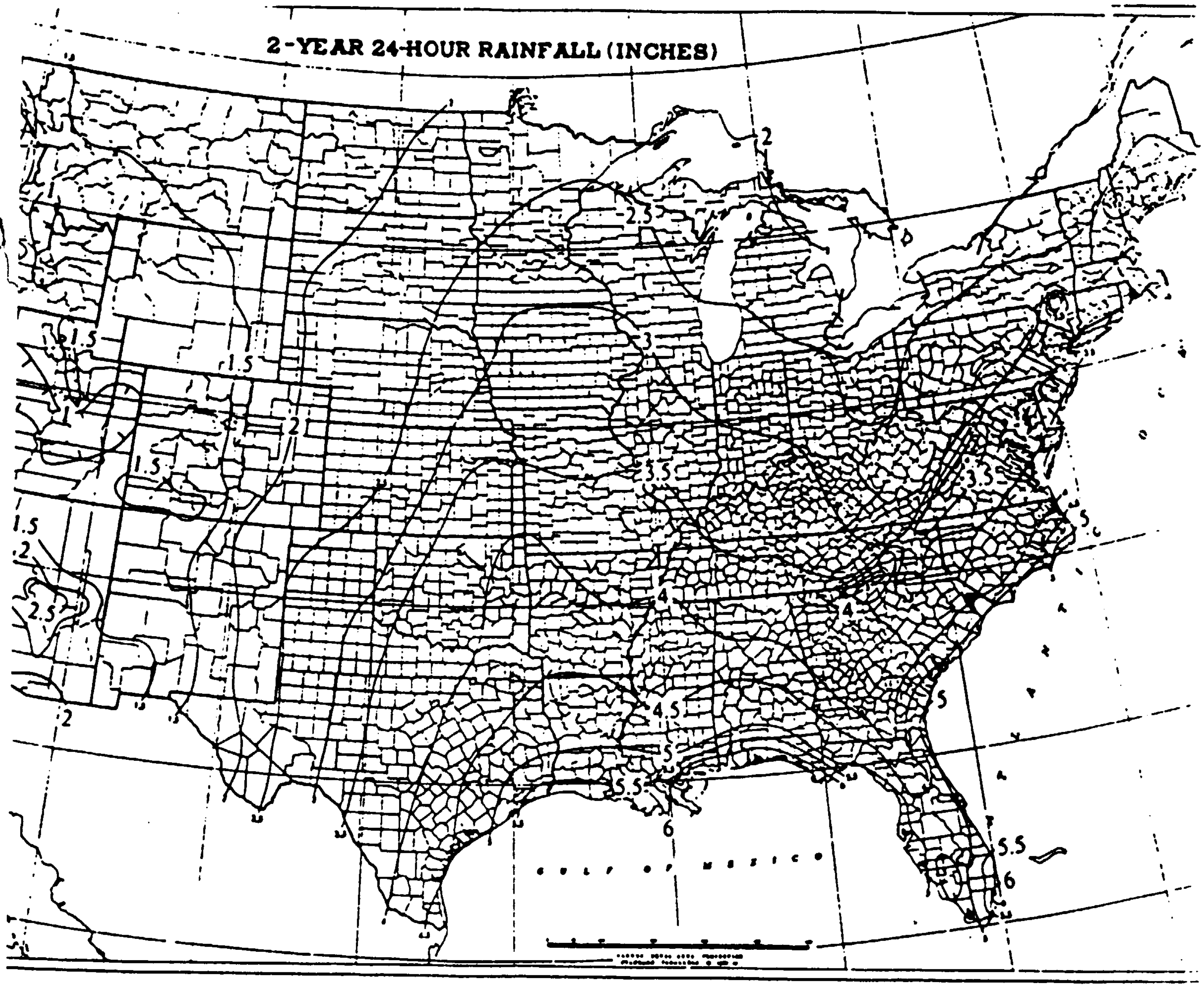
2-YEAR 24-HOUR RAINFALL (INCHES)
GULF OF MEXICO
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1
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6
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6

SOIL SURVEY OF

Beaufort and Jasper Counties South Carolina

REFERENCE 15

United States Department of Agriculture
Soil Conservation Service

In cooperation with

South Carolina Agricultural Experiment Station and
South Carolina Land Resources Conservation Commission

Typical pedon of Williman loamy fine sand, 13 miles northwest of Beaufort, 3.6 miles south of Sheldon, 2,400 feet northwest of railroad crossing at Coosaw, 850 feet north of Seaboard Coastline Railroad, 175 feet west of farm road on edge of woods:

A1—0 to 5 inches; very dark gray (10YR 3/1) loamy fine sand; moderate medium granular structure; very friable; many fine and medium roots; many fine uncoated sand grains; very strongly acid; clear smooth boundary.

A21—5 to 15 inches; dark grayish brown (10YR 4/2) loamy fine sand; common medium faint grayish brown (10YR 5/2) and few fine distinct light brownish gray mottles; weak medium subangular blocky structure; very friable; common fine and medium roots; few fine pores; very strongly acid; gradual smooth boundary.

A22—15 to 26 inches; light brownish gray (10YR 6/2) loamy fine sand; many coarse faint light yellowish brown (2.5Y 6/4), common fine distinct strong brown, and few fine prominent yellowish red mottles; weak medium subangular blocky structure; very friable; few fine and medium roots; few fine pores; common fine uncoated sand grains; very strongly acid; gradual wavy boundary.

B1g—26 to 30 inches; light brownish gray (10YR 6/2) fine sandy loam; common medium distinct strong brown (7.5YR 5/6) and light yellowish brown (2.5YR 6/4), and common fine prominent yellowish red mottles; weak medium subangular blocky structure; friable; few fine and medium roots; few fine pores; common fine uncoated sand grains; very strongly acid; clear wavy boundary.

B21tg—30 to 47 inches; gray (10YR 5/1) sandy clay loam; common medium distinct strong brown (7.5YR 5/6) and brownish yellow (10YR 6/8), and common fine prominent yellowish red mottles; weak medium subangular blocky structure; friable; few fine and medium roots; thin patchy clay films in old root channels and on faces of peds; some peds bridged with light brownish gray loamy fine sand; few medium streaks of light gray fine sand; very strongly acid; gradual wavy boundary.

B22tg—47 to 59 inches; light brownish gray (10YR 6/2) sandy clay loam; many medium faint pale olive (5Y 6/3), common fine distinct strong brown, and few fine prominent yellowish red mottles; weak medium subangular blocky structure; friable; few fine roots; thin patchy clay films in old root channels and on faces of some peds; few fine streaks of light gray fine sand; few fine flakes of mica; very strongly acid; clear wavy boundary.

B31g—59 to 73 inches; light brownish gray (10YR 6/2) sandy clay loam; many medium prominent yellowish red (5YR 4/8), common medium distinct yellowish brown (10YR 5/6), and common medium faint pale olive (5Y 6/4) mottles; massive; friable; common dark reddish brown pebbles of ironstone, 1 to 2 cm in size; few fine streaks of light gray fine sand; few fine flakes of mica; very strongly acid; clear wavy boundary.

B32g—73 to 80 inches; light brownish gray (2.5Y 6/2) sandy clay loam; common medium distinct strong brown (7.5YR 5/6), brownish yellow (10YR 6/6), and greenish gray (5GY 6/1), and few medium prominent yellowish red (5YR 4/6) mottles; massive; friable; few fine streaks of light gray fine sand; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Cg—80 to 90 inches; light brownish gray (2.5Y 6/2) fine sandy loam; many coarse distinct greenish gray (5GY 6/1) and brownish yellow (10YR 6/6), and few fine yellowish red mottles; massive; friable; pockets of loamy fine sand and sandy clay loam; weakly stratified; few fine flakes of mica; very strongly acid.

The thickness of the solum ranges from 55 to more than 90 inches. Reaction is extremely acid to strongly acid in the A and B horizons, and it is very strongly acid to neutral in the C horizon.

The A horizon is 22 to 38 inches thick. The A1 or Ap horizon is 5 to 13 inches thick. It is dark gray, very dark gray, or black. Where values are less than 3.5, thickness is less than 10 inches. The A2 horizon is 9 to 32 inches thick. It is dark grayish brown, gray, grayish brown, light brownish gray, light gray, or light yellowish brown. Mottles in shades of gray, yellow, and brown are in some pedons. Texture of the A horizon is loamy fine sand, loamy sand, or fine sand.

The B1g horizon, where present, is 3 to 6 inches thick. It is gray, grayish brown, or light brownish gray and has few to many mottles in shades of yellow, brown, and red. Texture is fine sandy loam or sandy loam.

The B2tg horizon is 8 to 42 inches thick. The upper part is gray, grayish brown, or light brownish gray and has few to many mottles in shades of gray, yellow, brown, and red. The lower part is gray, light gray, light brownish gray, or pale olive and has few to many mottles in shades of gray, yellow, brown, and red. Texture of the B2tg horizon commonly is sandy clay loam but includes fine sandy loam and sandy loam.

The B3g horizon is 4 to 38 inches thick. It has dominant gray colors and has common to many mottles in shades of gray, olive, yellow, brown, and red. Texture is fine sandy loam or sandy clay loam.

The C horizon is light gray, light brownish gray, light olive gray, greenish gray, very pale brown, or pale brown. It commonly is loamy fine sand but includes sandy clay loam, fine sandy loam, loamy sand, fine sand, and sand.

Yemassee series

The Yemassee series consists of deep, somewhat poorly drained, moderately permeable soils that formed in thick loamy Coastal Plain sediment on the lower marine terraces. These nearly level soils are on low ridges. The water table is within 1 to 1.5 feet of the surface for about 4 months during most years. Slopes are generally less than 1 percent.

Yemassee soils are geographically associated with the Bertie, Coosaw, Deloss, Tomotley, and Williman soils. Bertie soils are on higher ridges and are moderately well drained. Coosaw soils are on intermediate ridges, are somewhat poorly drained, and have an A horizon that is 20 to 40 inches thick. Deloss soils are in depressions and drainageways, are very poorly drained and have a thick, dark colored surface layer. Tomotley soils are in low areas and are poorly drained. Williman soils are in low areas, are poorly drained, and have an A horizon that is 20 to 40 inches thick.

Typical pedon of Yemassee loamy fine sand, 2.5 miles north of Dale, 1,750 feet north of the junction of South Carolina Secondary Highway 238 and South Carolina Secondary Highway 43, 100 feet east of South Carolina Secondary Highway 43:

Ap—0 to 8 inches; dark gray (10YR 4/1) loamy fine sand; weak medium granular structure; very friable; many fine and medium roots; strongly acid; clear smooth boundary.

A2—8 to 15 inches; light yellowish brown (2.5Y 6/4) loamy fine sand; few fine distinct yellowish brown and few fine faint light brownish gray mottles; weak medium subangular blocky structure; very friable; common fine and medium roots; common fine pores; strongly acid; clear wavy boundary.

B1—15 to 19 inches; pale brown (10YR 6/3) fine sandy loam; common medium distinct yellowish brown (10YR 5/6), common medium faint light brownish gray (10YR 6/2), and few medium prominent yellowish red (5YR 4/6) mottles; weak medium subangular blocky structure; friable; few fine and medium roots; common fine pores; strongly acid; clear wavy boundary.

B21tg—19 to 35 inches; light brownish gray (10YR 6/2) sandy clay loam; common medium distinct yellowish brown (10YR 5/4), few medium prominent red (2.5YR 4/6), and common fine distinct strong brown mottles; weak medium subangular blocky structure; friable; few fine roots; common fine pores; thin patchy clay films in old root channels and on faces of some peds; few thin vertical streaks of light gray fine sand; very strongly acid; gradual wavy boundary.

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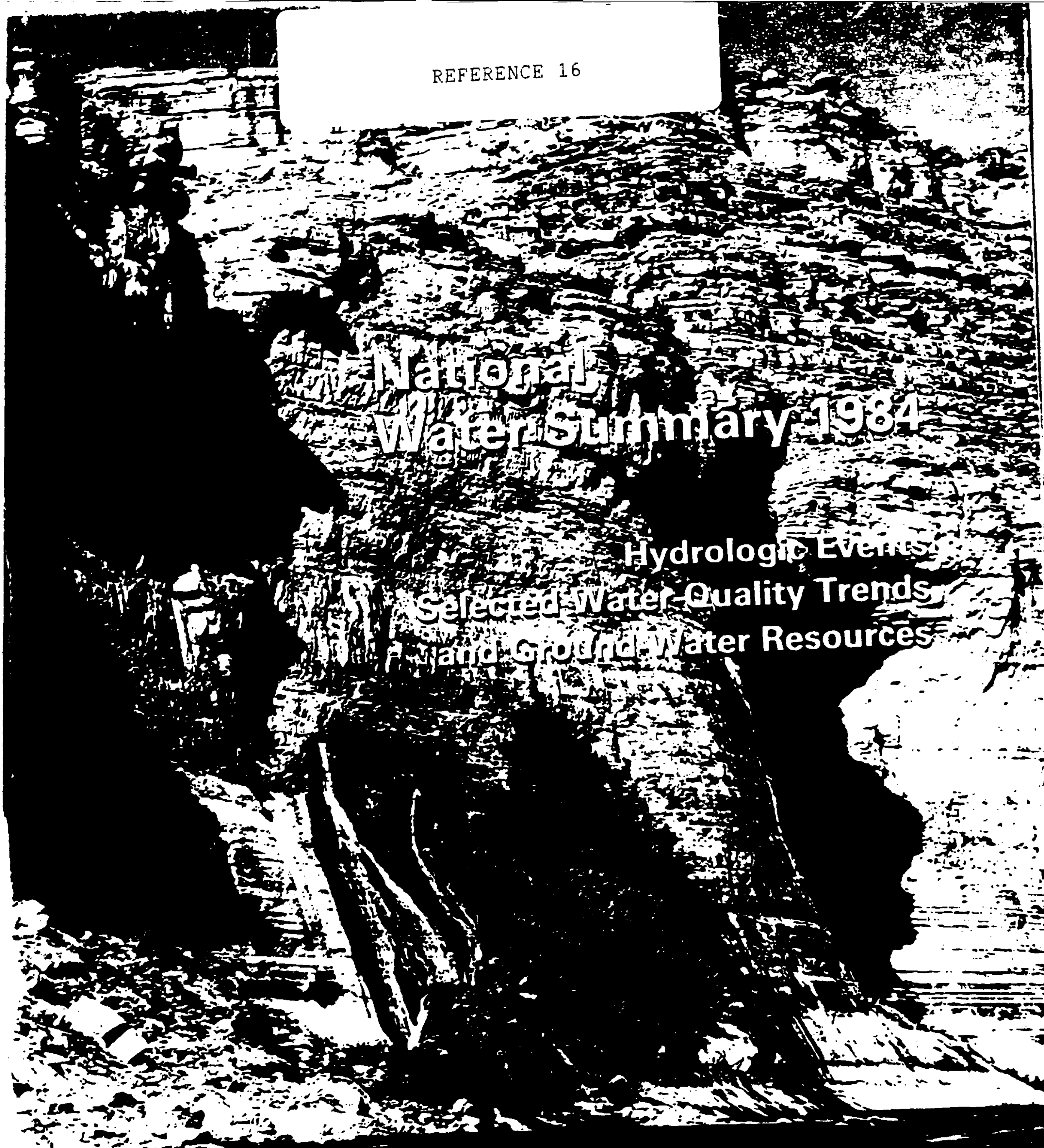

National Water Summary 1984

Hydrologic Events, Selected Water-Quality Trends, and Ground-Water Resources

United States Geological Survey
Water-Supply Paper 2275

National Water Summary 1984

Hydrologic Events, Selected Water-Quality Trends, and Ground-Water Resources

By United States Geological Survey

United States Geological Survey
Water-Supply Paper 2275

DEPARTMENT OF THE INTERIOR
DONALD PAUL HODEL, Secretary

U.S. GEOLOGICAL SURVEY
Dallas L. Peck, Director

UNITED STATES GOVERNMENT PRINTING OFFICE: 1985

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Figures—Continued

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Page 7, San Luis Drain to Kesterson National Wildlife Refuge, San Joaquin Valley, Calif. (Photograph by S. J. Deverel.)

Page 47, Analyst operating automated wet chemical analyzer for nitrogen at U.S. Geological Survey's Denver Central Laboratory. (Photograph by D. E. Reed.)

Page 117, Old pump, east of Brighton, Colo. (Photograph by D. E. Reed.)

INTRODUCTION TO NATIONAL WATER SUMMARY 1984

By David W. Moody and Edith B. Chase

The initial volume in the annual National Water Summary series (U.S. Geological Survey, 1984) introduced a chronology of hydrologic and water-related events to document their importance to human activities and also outlined a number of water issues of concern to the Nation. This second volume, *National Water Summary 1984—Hydrologic Events, Selected Water-Quality Trends*, and *Ground-Water Resources*, continues the chronology of events and presents additional information on several issues discussed in the 1983 volume. The 1984 *National Water Summary* is organized in three parts.

The first part, "Hydrologic Conditions and Water-Related Events, Water Year 1984," provides a synopsis of the hydrologic conditions and water-related events that occurred during the 1984 water year (October 1, 1983-September 30, 1984). Streamflow variations are compared to precipitation, temperature, and upper-air atmospheric pressure for the four seasonal quarters of the year to relate surface-water flows to climatic conditions.

The second part, "Hydrologic Perspectives on Water Issues," contains two sections. In the section titled "Water-Quality Issues," the occurrence of sediment, dissolved solids, nutrients, and pesticides in the Nation's streams are discussed. Recently compiled information is used to show the distribution and trends of these constituents and to relate them to various natural sources and human activities. The occurrence and sources of nitrate in ground water also are discussed. The section entitled "Water-Availability Issues" provides hydrologic explanations for changes in ground-water levels in several areas of the country.

The articles in this part of the report complement a number of other reports, published during the past year, which provide information on the water quality of the Nation's rivers. The 1982 *National Fisheries Survey* (Judy and others, 1984), cosponsored by the U.S. Fish and Wildlife Service and the U.S. Environmental Protection Agency, provides an assessment of biological conditions in a statistical sample of river segments throughout the United States. The U.S. Environmental Protection Agency also sponsored an evaluation of the progress of water-pollution control efforts (Association of State and Interstate Water Pollution Control Administrators, 1984), an overview of nonpoint-source pollution (U.S. Environmental Protection Agency, 1984a), and the 1982 *National Water Quality Inventory* (U.S. Environmental Protection Agency, 1984b). Other recent studies that examine water resources from a national perspective include the 14th annual report of the U.S. Council on Environmental Quality (1983), the Conservation Foundation's (1984) *State of the Environment* report, and the Office of Technology Assessment's (1984) *Protecting the Nation's Groundwater from Contamination*.

The third and final part of the report, "State Summaries of Ground-Water Resources," summarizes for each State, the District of Columbia (combined with Maryland), Puerto Rico, the U.S. Virgin Islands, the Trust Territory of the Pacific Islands, Saipan, Guam, and American Samoa, the distribution, characteristics, and uses of principal aquifers. (The term "State" as used throughout the report is all inclusive of these geographic areas.) Each summary contains maps that show the location of aquifers and major areas of ground-water withdrawals and tables that describe the characteristics of the aquifers and present data on ground-water withdrawals. These descriptions of ground-water resources were prepared by the U.S. Geological Survey offices in each State.

Technical terms used in the report are defined in the Glossary. Selected references are given at the end of each article and State summaries to supplement the information provided. Numerous references are made to the National Drinking-Water Regulations; as an aid to the reader, these regulations follow the Glossary. A conversion table of water measurements and a geologic age chart also are provided for the reader's convenience.

ACKNOWLEDGMENTS

National Water Summary reports, because of their scope, are necessarily the work of many individuals. The coordinators of the 1984 *National Water Summary* wish to acknowledge the assistance of water-resources organizations in each State for their review of the descriptions of State ground-water resources and the assistance of the following Federal agencies, who provided unpublished data and advice in preparing parts of this report:

National Oceanic and Atmospheric Administration,
  National Weather Service
Tennessee Valley Authority
U.S. Army Corps of Engineers
U.S. Bureau of Reclamation
U.S. Bureau of Land Management
U.S. Coast Guard, National Response Center
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Soil Conservation Service

The authors of individual articles and State ground-water summaries are identified within the report. Richard H. Johnson, John S. McLean, Andrew

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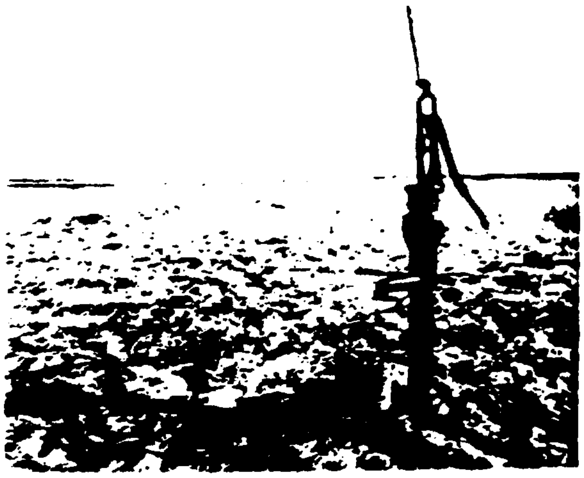
State Summaries of Ground-Water Resources



INTRODUCTION TO STATE SUMMARIES OF GROUND-WATER RESOURCES

By Ralph C. Heath

The "State Summaries of Ground-Water Resources" part of the 1984 *National Water Summary* contains descriptions of the occurrence, use, and general quality of the ground-water resources of each State, the District of Columbia (combined with Maryland), Puerto Rico, the U.S. Virgin Islands, and the Trust Territory of the Pacific Islands, Saipan, Guam, and American Samoa. (Hereafter, the term "State" is used for all geographic areas.) Each summary contains the following components:

- General setting—Highlights of the physiographic, hydrologic, and geologic framework of the ground-water system.
- Principal aquifers—A description of location, geology, and use of the aquifers.
- Ground-water withdrawals and water-level trends—A description of the location and purpose of major ground-water withdrawals and the trends in water levels.
- Ground-water management—A description of ground-water related laws and regulations and an identification of management agencies.
- Selected references—A listing of relevant reports on ground-water resources.
- Table 1, Ground-water facts—A tabulation of ground-water withdrawals for various uses in relation to total water withdrawals. (Not included with the Trust Territory of the Pacific Islands, Saipan, Guam, and American Samoa.)
- Table 2, Aquifer and well characteristics—A listing of important characteristics of the principal aquifers and of the water-supply wells drilled in the aquifers. (Table 1 in Trust Territory of the Pacific Islands, Saipan, Guam, and American Samoa.)
- Figure 1, Principal aquifers—A map showing geographic distribution of the principal aquifers.
- Figure 2, Areal distribution of major ground-water withdrawals and trends in ground-water levels—A map showing areas of withdrawals, hydrographs showing the long-term water level trends of aquifers, and a tabulation of areas of withdrawals and use of the water.

In the State summaries, common ground-water terms are used, and reference is made, without explanation, to basic ground-water principles. Some of those terms and principles are described briefly in the glossary at the end of the report. Additional discussions of basic ground-water terms and principles and of the general features of ground-water occurrence in the United States are found in Heath (1983, 1984).

IMPORTANCE OF GROUND WATER TO THE NATION

Ground water is available in at least small amounts at nearly every point on the Earth's surface, making it one of the most widely available of all natural resources. It serves as the only, or the dominant, source of drinking water for most rural areas, as the largest source of water for irrigation and other purposes in arid and most semiarid regions, and as an important source of water for urban, industrial, and supplemental irrigation purposes in humid areas. The importance of ground water in the United States is shown graphically in figure 67. Nationwide, ground-water withdrawals in 1980 (excluding those for thermoelectric power) range from less than 1 percent of the total water withdrawal in the District of Columbia to 85 percent of that in Kansas. In 10 States, ground water represents more than one-half of the total withdrawal.

By far the largest use of ground water is for irrigation. States with the largest ground-water use are those in the western part of the conterminous United States—Arizona, California, Idaho, Kansas, Nebraska, and Texas—where irrigated agriculture is a major activity. In the eastern part of the country, States that use large amounts of ground water for irrigation include Arkansas, Florida, Louisiana, and Mississippi.

The importance of fresh ground water to the different States readily can be seen by comparing ground-water withdrawals to total fresh surface-and ground-water withdrawals (table 9). Total withdrawals, as given in water use reports, usually include thermoelectric power withdrawals mainly for condenser and reactor cooling and related purposes. Because water used for thermoelectric power must be available in very large quantities, 99 percent of it is obtained from surface-water sources, of which 30 percent is from saline surface-water bodies. Thus, the inclusion of thermoelectric power in total withdrawals tends to obscure the relative importance of ground and surface water for other uses, such as for public supplies, irrigation, and industrial usage (exclusive of thermoelectric power). For this reason, the ground-water facts table in each State summary shows total withdrawals including and excluding thermoelectric power.

DELINEATION OF PRINCIPAL AQUIFERS IN THE STATE SUMMARIES

In each State summary, the aquifers that are developed most intensively for water supplies are identified, and their areal extents are shown on a map (fig. 1 in each summary). Areas in many of the States, and especially those that occupy parts of the Atlantic and Gulf Coastal Plains, are underlain by two or more aquifers separated by confining beds. In most instances, the maps show the uppermost of these multiple aquifers, although the maps for some States delineate the most-used aquifers. The relative vertical positions of the aquifers and of the intervening confining beds are indicated on cross sections or in block diagrams which show schematically the arrangement of the aquifers and confining beds along vertical slices through the Earth's

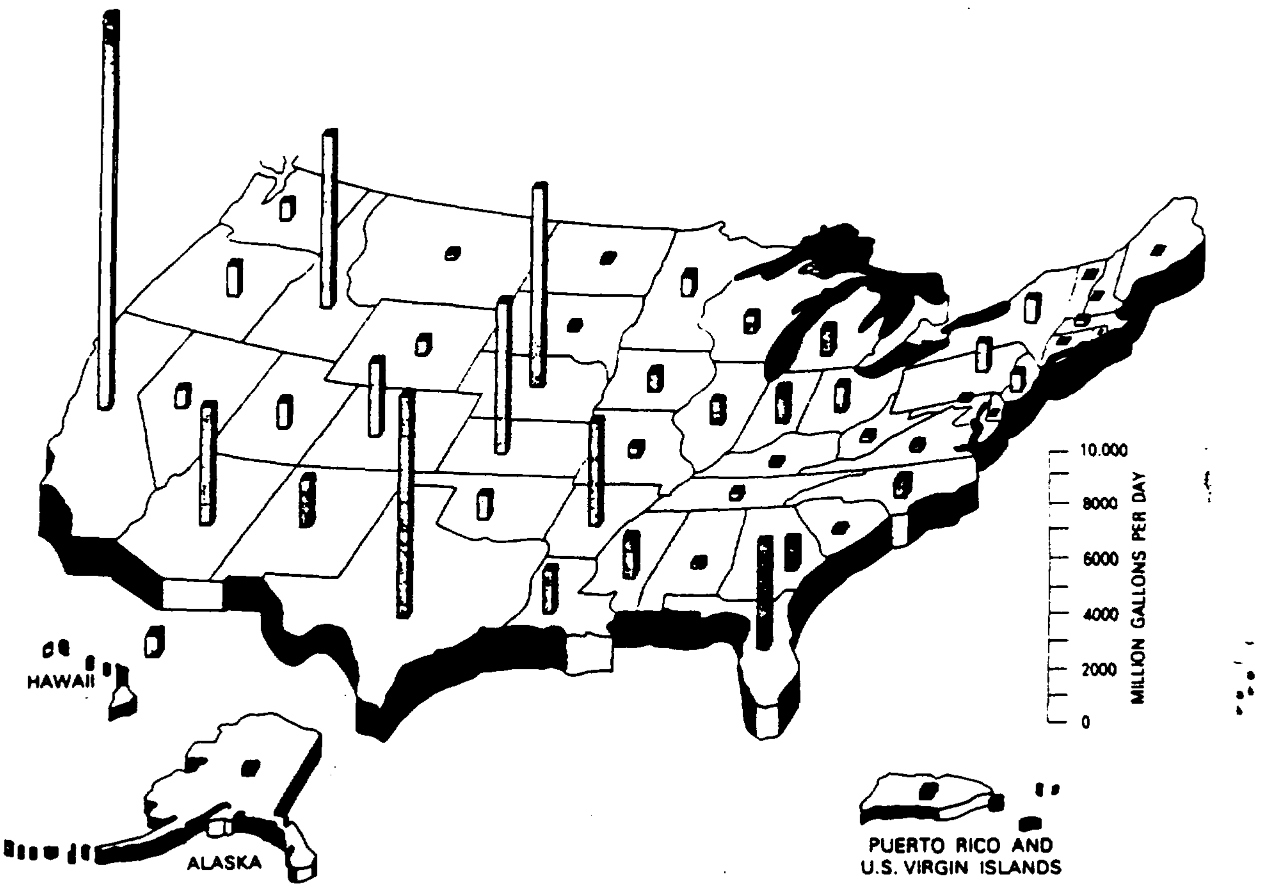


Figure 67. Ground-water withdrawals in 1980 for the United States, Puerto Rico, and U.S. Virgin Islands. (Source: Modified from Solley and others, 1983.)

crust. To help the reader visualize the aquifer distribution in relation to land forms, figure 1 also has a small map showing the physiographic divisions of the State.

The relative vertical positions of the aquifers in each State also are indicated in a table of aquifer and well characteristics (table 2 in each summary). Thus, it will be useful to refer to this table while scanning the aquifer map and the cross section or block diagram.

In some areas, an aquifer occurring in the same geologic formation is identified by one name in one State and by another in an adjacent State. In preparing this report, attempts were made to resolve these differences in names; however, several remain. Where appropriate, the corresponding name(s) of the aquifer in the adjacent State is given in the table 2 "Remarks" column to aid in understanding aquifer nomenclature.

The importance of an aquifer as a source of water may change from one State to another because of changes in demands for freshwater, variations in ground-water quality, and differences in the hydrogeologic characteristics of the aquifer. The differences may be of such magnitude that an aquifer that serves as a principal source of supply in one State may not be intensively developed in a neighboring State. For these reasons, the aquifer boundaries depicted in figure 1 of each State summary may not match at State boundaries.

RESPONSE OF AQUIFERS TO WITHDRAWALS

A map showing the location of major withdrawals and, through the use of symbols, the magnitude of the withdrawals, is given for each State (fig. 2 in each summary). Also included in this figure are hydrographs that show, in some cases, the effects of climatic changes and, in others, the long-term effect of withdrawals on ground-water levels; the hydrograph data are the annual greatest depth to water. A list of the withdrawal points, the name of the aquifer, and the principal uses of withdrawals also is provided.

Changes in the position of the water level in wells reflect changes in the amount of ground water in storage in aquifers, and, where these changes are due to withdrawals, they also may reflect changes in flow direction. Thus, the measurement of the position of the water levels in wells is an important part of most ground-water investigative programs. These water-level measurements are most readily understandable in the form of hydrographs as given in the State summaries and in the form of water-level maps, which can be used to determine directions of flow. The hydrographs included in the State summaries were selected, in most instances, to show the effect of withdrawing ground water from the most intensively developed aquifers.

Table 9. Summary of fresh ground-water withdrawals as a percentage of total fresh surface- and ground-water withdrawals for all categories of use and for specific categories of use, by State

[Data rounded to two significant figures. Data not included for Trust Territory of the Pacific Islands, Saipan, Guam, and American Samoa. Mgal = million gallons. Sources: State data from table 1 in respective State summary, *National Water Summary 1984*; total data from Solley, Chase, and Mann, 1983]

State	Total surface- and ground-water withdrawals per day (Mgal)	Percentage of population served by ground water	Ground-water withdrawals per day (Mgal)	Ground-water withdrawals as a percentage of total fresh surface- and ground-water withdrawals for— All categories of use[1]	Specific categories of use: Public supply	Rural supply: Domestic	Rural supply: Livestock	Industrial self-supplied[1]	Irrigation
Alabama	8,700	52	290	3 (14)	28	100	34	0.6 (4)	30
Alaska	220	69	49	22 (26)	43	99	0	9 (11)	0
Arizona	7,300	65	4,200	58 (57)	54	100	82	72 (88)	58
Arkansas	33,000	50	4,300	13 (81)	42	100	36	1 (55)	86
California	38,000	46	14,600	39 (38)	46	93	41	54 (89)	39
Colorado	16,000	15	2,800	18 (18)	8	36	18	2 (1)	19
Connecticut	1,300	32	150	11 (20)	17	100	18	3 (10)	8
Delaware	140	60	82	59 (57)	38	100	100	68 (73)	63
District of Columbia	340	0	.8	.2 (.4)	0	0	0	.6 (57)	0
Florida	7,300	90	3,800	52 (69)	86	100	66	27 (82)	53
Georgia	6,700	48	1,200	18 (52)	29	100	61	8 (57)	66
Hawaii	1,700	95	710	41 (37)	90	90	96	73 (20)	93
Idaho	18,000	88	6,300	35 (35)	94	96	42	95 (95)	25
Illinois	18,000	49	980	5 (24)	27	97	100	1 (10)	100
Indiana	14,000	32	1,200	11 (30)	41	90	18	8 (18)	98
Iowa	3,200	82	900	28 (81)	81	100	100	13 (71)	84
Kansas	6,600	49	5,600	85 (89)	48	86	43	35 (77)	92
Kentucky	4,600	31	180	4 (22)	13	91	5	2 (25)	6
Louisiana	12,000	69	1,800	14 (27)	44	100	70	5 (12)	47
Maine	850	57	80	9 (10)	19	98	59	5 (5)	3
Maryland	1,400	30	175	13 (17)	9	100	54	6 (18)	54
Massachusetts	2,500	33	320	13 (28)	24	100	58	6 (30)	28
Michigan	15,000	43	530	4 (18)	17	100	77	1 (3)	37
Minnesota	3,100	75	670	22 (48)	52	100	85	5 (20)	88
Mississippi	2,900	93	1,500	54 (82)	18	100	77	21 (61)	35
Missouri	6,900	34	470	7 (34)	22	74	26	2 (39)	75
Montana	11,000	54	200	2 (2)	39	94	38	20 (52)	1
Nebraska	12,000	82	7,100	59 (73)	77	100	80	3 (85)	67
Nevada	3,600	50	710	20 (20)	40	94	31	30 (45)	17
New Hampshire	380	60	65	17 (21)	48	98	25	5 (6)	0
New Jersey	2,900	45	730	25 (37)	40	100	67	10 (20)	73
New Mexico	3,900	89	1,800	47 (47)	90	97	50	25 (98)	44
New York	7,900	35	970	12 (28)	23	89	65	4 (11)	46
North Carolina	8,100	55	770	10 (20)	12	100	85	6 (17)	30
North Dakota	1,000	62	110	11 (11)	54	100	40	.3 (25)	37
Ohio	13,000	42	740	6 (32)	27	90	60	2 (16)	36
Oklahoma	1,700	41	960	56 (61)	28	83	12	23 (35)	84
Oregon	6,800	61	1,100	17 (17)	29	87	27	15 (16)	14
Pennsylvania	16,000	44	1,000	6 (16)	16	100	88	4 (15)	14
Puerto Rico	1,100	26	246	22 (35)	22	42	50	3 (21)	34
Rhode Island	170	24	37	22 (21)	15	100	50	36 (36)	9
South Carolina	5,800	42	210	4 (21)	22	100	55	1 (5)	27
South Dakota	690	77	330	48 (48)	68	94	88	54 (55)	33
Tennessee	10,000	51	460	5 (21)	40	100	17	2 (11)	51
Texas	16,000	47	9,700	61 (62)	46	84	49	23 (24)	70
Utah	4,300	63	770	18 (18)	66	90	80	14 (16)	10
U.S. Virgin Islands	6	42	1.1	18 (18)	12	100	0	0 (0)	0
Vermont	340	54	45	13 (50)	35	85	62	2 (35)	19
Virginia	5,600	41	370	7 (30)	17	100	10	2 (24)	29
Washington	8,200	71	750	9 (9)	37	78	67	15 (15)	4
West Virginia	5,600	53	220	4 (22)	27	95	13	3 (18)	8
Wisconsin	5,900	70	580	10 (46)	48	100	96	1 (15)	97
Wyoming	5,300	54	540	10 (11)	33	92	21	34 (76)	8
Total or percentage	380,000	51	88,000	23 (38)	35	97	55	6 (26)	40

[1]Number in parentheses was calculated excluding thermoelectric power.

These hydrographs represent only a small sample of those available from the U.S. Geological Survey and State ground-water agencies. The response of water levels in aquifers to ground-water withdrawals is described in detail in the 1983 *National Water Summary* (U.S. Geological Survey, 1984, p. 36–45).

Estimates of well yields for each aquifer are given in table 2 of each State summary. These yields are the amounts of water per minute that can be obtained when an effort is made to design and construct wells to obtain large supplies of water, such as are needed for agricultural, public supply, or industrial uses. For most aquifers, they do not represent the average yield of all wells, which may include many small-yield rural domestic wells. A range of yields reflects the effect of areal differences in aquifer thickness or composition. The yields listed in the "May exceed" column are obtainable where conditions are especially favorable; for example, where an aquifer has its greatest thickness or is most permeable. All yields represent the rates at which individual wells can be pumped continuously for long periods. They do not, however, include the possible influence of interference from nearby wells and do not indicate the "safe" or sustained yields of the aquifer.

GROUND-WATER MANAGEMENT

The Nation's freshwater needs are met by withdrawals from streams, lakes, reservoirs, and ground-water systems. Trends in water developments over the last 30 years show that the use of ground water for all purposes, exclusive of thermoelectric power, has been increasing at a faster rate than has the use of surface water for the same purposes. Several factors may cause this trend to continue or accelerate in the future. First, the most cost-effective surface reservoir sites already have been developed (U.S. Geological Survey, 1984, p. 33) and the sustained yields of existing reservoirs are decreasing due to sedimentation. Second, the cost of storage at the remaining reservoir sites is becoming increasingly expensive. And third, public opposition is increasing to reservoir construction because of potential environmental damages. Thus, the development of alternative ground-water supplies and the protection of ground-water quality are management issues of critical importance.

Discussion of the quality of ground water is limited in this report to identifying the natural condition of the water in those instances where it influences the use of the water. For the most part, data are available to assess the common constituents that influence the quality of the Nation's ground water. However, much less is known about ground-water constituents that occur naturally in trace concentrations and about the degree and extent of contamination by human activities. Investigations by Federal and State agencies, universities, and other groups are underway to address these technical aspects of ground-water management.

To ensure that the Nation's future water demands are met, it is important that an infrastructure exists within each State to utilize the technical information and manage the ground-water resources. To achieve these ends, many States have enacted ground-water laws and regulations and have established organizations to implement them. A description of these management initiatives constitutes the final section of each State summary.

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SOUTH CAROLINA
Ground-Water Resources

Fresh ground water is available in most of South Carolina. Although it provides only about 4 percent of total water used in the State, it serves 42 percent of the population, or about 1.33 million people. Most large withdrawals of ground water are obtained from Coastal Plain aquifers in the southeastern two-thirds of the State. Ground-water withdrawals in 1980 for various uses and related statistics are given in table 1.

Table 1. Ground-water facts for South Carolina

[Withdrawal data rounded to two significant figures and may not add to totals because of independent rounding. Mgal/d = million gallons per day; gal/d = gallons per day. Source: Lonon and others, 1983]

Population served by ground water, 1980	
Number (thousands)	1,330
Percentage of total population	42
From public water-supply systems:	
Number (thousands)	530
Percentage of total population	17
From rural self-supplied systems:	
Number (thousands)	800
Percentage of total population	25
Freshwater withdrawals, 1980	
Surface water and ground water, total (Mgal/d)	5,800
Ground water only (Mgal/d)	210
Percentage of total	4
Percentage of total excluding withdrawals for thermoelectric power	21
Category of use	
Public-supply withdrawals:	
Ground water (Mgal/d)	82
Percentage of total ground water	40
Percentage of total public supply	22
Per capita (gal/d)	155
Rural-supply withdrawals:	
Domestic:	
Ground water (Mgal/d)	57
Percentage of total ground water	28
Percentage of total rural domestic	100
Per capita (gal/d)	71
Livestock:	
Ground water (Mgal/d)	6
Percentage of total ground water	3
Percentage of total livestock	55
Industrial self-supplied withdrawals:	
Ground water (Mgal/d)	46
Percentage of total ground water	22
Percentage of total industrial self-supplied:	
Including withdrawals for thermoelectric power	1
Excluding withdrawals for thermoelectric power	5
Irrigation withdrawals:	
Ground water (Mgal/d)	15
Percentage of total ground water	7
Percentage of total irrigation	27

GENERAL SETTING

South Carolina is located in three physiographic provinces (fig. 1)—the Coastal Plain province, which occupies approximately the southeastern 63 percent of the State; the Piedmont province, which occupies roughly 35 percent of the State; and the Blue Ridge province, which occupies about 2 percent of the State (Fenneman, 1938). Coastal Plain deposits consist of consolidated and unconsolidated sediments of continental and marine origin that thicken from a few feet at the Fall Line to more than 4,000 feet (ft) at the southern tip of the State. The Piedmont and Blue Ridge provinces are underlain by metamorphosed sedimentary, volcanic, and igneous rocks. Most of the area is mantled by a layer of chemically weathered bedrock called saprolite, which ranges in thickness from a few feet to about 100 ft, but generally is less than 50 ft thick.

Recharge to the ground-water system in South Carolina is from precipitation. Statewide average annual precipitation is slightly more than 48 inches (in.) (Snyder and others, 1983) and ranges from an average of 46 in. in part of the central area of the State to 80 in. in the Blue Ridge province. Ground-water recharge ranges from less than 1 in. in parts of the Piedmont-Blue Ridge to about 15 in. in parts of the Coastal Plain.

PRINCIPAL AQUIFERS

Principal aquifers in South Carolina consist of unconsolidated to partly consolidated sediments of the Coastal Plain province and igneous and metamorphic rocks of the Blue Ridge and Piedmont provinces. The aquifer names commonly used in South Carolina are, for the most part, synonymous with the names of geologic formations that contain the principal water-bearing materials. The aquifers are described below and in table 2; their areal distribution is shown in figure 1.

COASTAL PLAIN AQUIFERS

The formations of the Coastal Plain consist of unconsolidated or partly consolidated sediments, including sand, gravel, clay, limestone, marl, coquina, and shale. Many of the formations of the Coastal Plain are excellent aquifers that are able to store and transmit large quantities of water.

Shallow Aquifer

A shallow aquifer occurs throughout the Coastal Plain but is not mapped in figure 1. In general, the aquifer consists of deposits that range in age from Cretaceous to Holocene, is less than 100 ft thick, and contains water under unconfined conditions, although semiconfined conditions may be present locally. The aquifer is used mostly for domestic and other small supplies, but, in some areas, such as North Myrtle Beach where very permeable beds of coquina are present, yields can exceed 500 gallons per minute (gal/min). Water quality is extremely variable, as are yields, but the aquifer is a valuable resource in many areas, particularly for rural domestic use. Recharge is from local rainfall; therefore, water levels tend to fluctuate seasonally.

Table 2. Aquifer and well characteristics in South Carolina

[Ft = feet; gal/min = gallons per minute; mg/L = milligrams per liter. Sources: Reports of the U.S. Geological Survey and several State agencies]

Aquifer name and description	Well characteristics: Depth (ft) Common range	Yield (gal/min) Common range	Yield (gal/min) May exceed	Remarks
Coastal Plain aquifers:				
Shallow aquifer: Sand, gravel, and coquina. Unconfined. (Not shown in fig. 1).	20 - 100	5 - 10	500	Tapped mostly for domestic use. Variable water quality with local problems. Concentrations of iron greater than 1 mg/L, and pH less than 5.5 in many areas.
Floridan aquifer system: Fossiliferous limestone. Confined.	80 - 250	100 - 300	2,000	Principal aquifer in southern South Carolina. Saltwater encroachment a potential problem. Water predominantly calcium bicarbonate type except in coastal areas where it is salty.
Tertiary sand aquifer: Fine to course quartzose sand. Confined to unconfined.	100 - 300	50 - 200	700	Interfingers with limestone in southern Barnwell County. Concentrations of dissolved solids less than 50 mg/L near recharge areas; water predominantly a sodium bicarbonate type downdip except near the coast where it is salty.
Black Creek aquifer: Thinly laminated sand and clay lenses. Confined.	200 - 700	50 - 400	900	Principal source of ground water in Horry and Georgetown Counties (Myrtle Beach area). Water predominantly calcium carbonate type with concentrations of iron greater than 3 mg/L near recharge areas, a sodium bicarbonate type downdip, and salty in northeast Horry County and along southern coast. Equivalent to Cretaceous aquifer in North Carolina.
Middendorf aquifer: White and gray sand and gravel. Confined.	200 - 2,000	200 - 700	2,000	Most intensively used in the upper Coastal Plain. Concentrations of dissolved solids are less than 50 mg/L; concentrations of iron greater than 1 mg/L in the upper Coastal Plain. Water predominantly sodium bicarbonate type downdip, and salty in northeast Horry County. Equivalent to Cretaceous aquifer in North Carolina.
Piedmont and Blue Ridge aquifers: Fractured igneous and metamorphic rocks and saprolite. Confined to unconfined.	50 - 300	10 - 30	300	Small yields and areal variability limit large-scale use. Water quality variable in dissolved solids and major constituents.

Floridan Aquifer System

The Floridan aquifer system in South Carolina includes parts of some Miocene formations, but the principal water-bearing units are the Santee and Ocala Limestones of Eocene age. These formations consist of creamy-white to yellow fossiliferous limestone. Typically, the upper part of each unit, particularly the Ocala Limestone, contains extensive loosely cemented shell deposits. These limestones are the facies equivalents of the Eocene sands of the Tertiary sand aquifer. The Floridan aquifer system extends over a wide triangle in the southern part of South Carolina (fig. 1). It is capable of yielding as much as 2,000 gal/min of water suitable for public supply, but common yields range from 100 to 300 gal/min.

Tertiary Sand Aquifer

The Tertiary sand aquifer includes permeable parts of the Congaree, the Warley Hill, the McBean, and the Barnwell Formations, listed in ascending order. The water-bearing sands have limited extent and are present mostly in the upper part of the Coastal Plain between the Savannah and Congaree Rivers. Well yields range from 50 to 200 gal/min but may exceed 700 gal/min.

Black Creek Aquifer

The Black Creek aquifer, of Cretaceous age, ranges in thickness from a few feet in updip areas to about 400 ft in coastal areas. The Black Creek aquifer is the most important source of ground water in Horry and Georgetown Counties. Wells in the two-county area yield 50 to 400 gal/min but may exceed 900 gal/min. The quality of the water in the Black Creek aquifer in Horry and Georgetown Counties generally is acceptable for drinking water except for fluoride concentrations of as much as 7 milligrams per liter (mg/L), chloride concentrations that exceed the 250 mg/L national drinking-water regulation (U.S. Environmental Protection Agency, 1982a, b) in some areas, and dissolved-solids concentrations of as much as 1,800 mg/L in some areas. The large fluoride concentrations in the water are believed to be caused by shark teeth in the Black Creek Formation (Zack, 1980). Saltwater is present in parts of the Black Creek aquifer but is not precisely

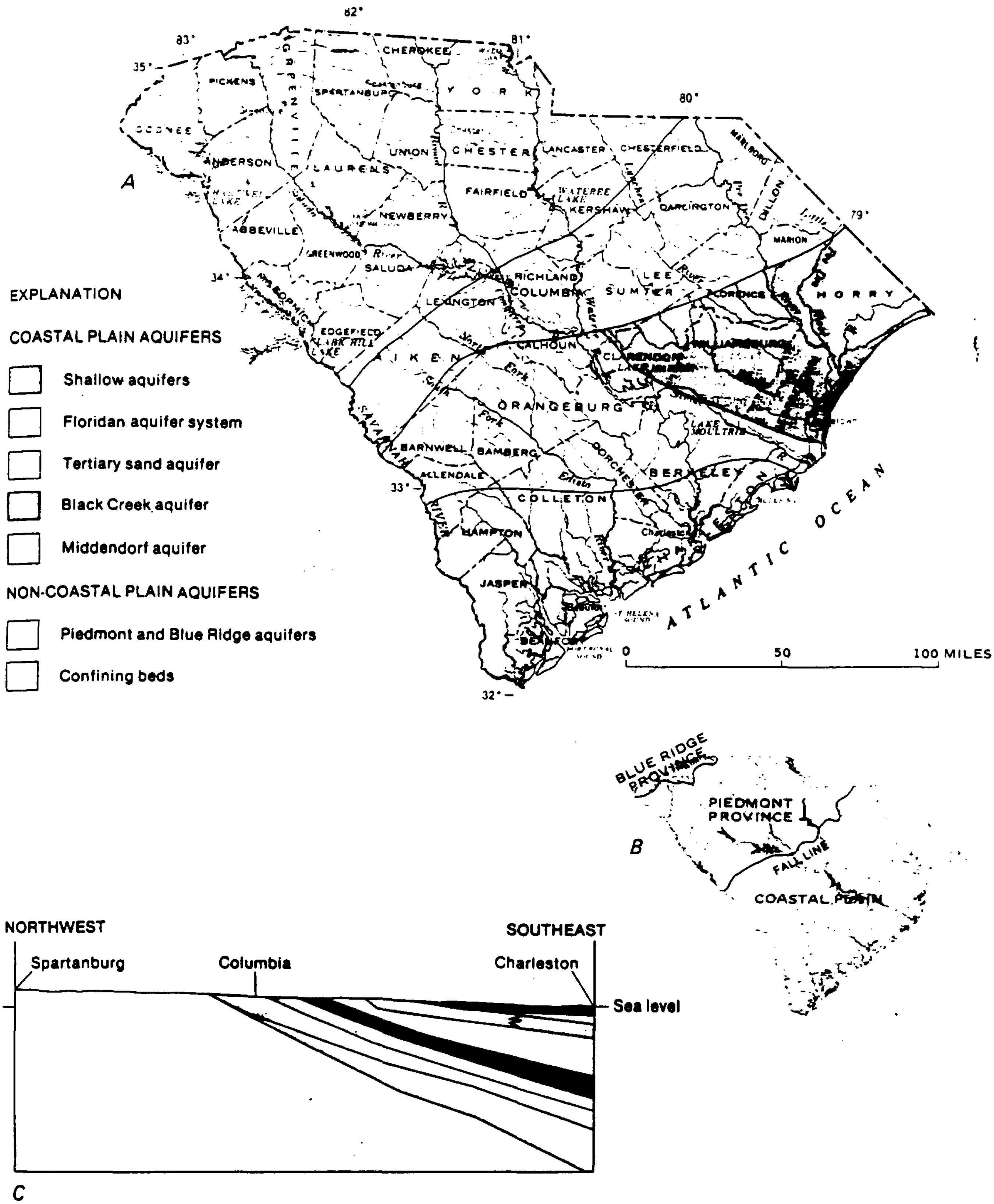

Figure 1. Principal aquifers in South Carolina. *A*, Delineations indicating the most widely used aquifers. *B*, Physiographic diagram and divisions. *C*, Generalized cross section. (See table 2 for a more detailed description of the aquifers. Sources: *A, C,* Compiled by W. R. Aucott from U.S. Geological Survey files. *B*, Fenneman, 1938; Raisz, 1954.)

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REPORT OF

ONGOING SOIL AND GROUNDWATER STUDY
AND CONCEPTUALIZED CLEANUP PLAN
VENTURE CHEMICALS, INC.
LOBECO, SOUTH CAROLINA

VOLUME II (APPENDICES)

PREPARED FOR

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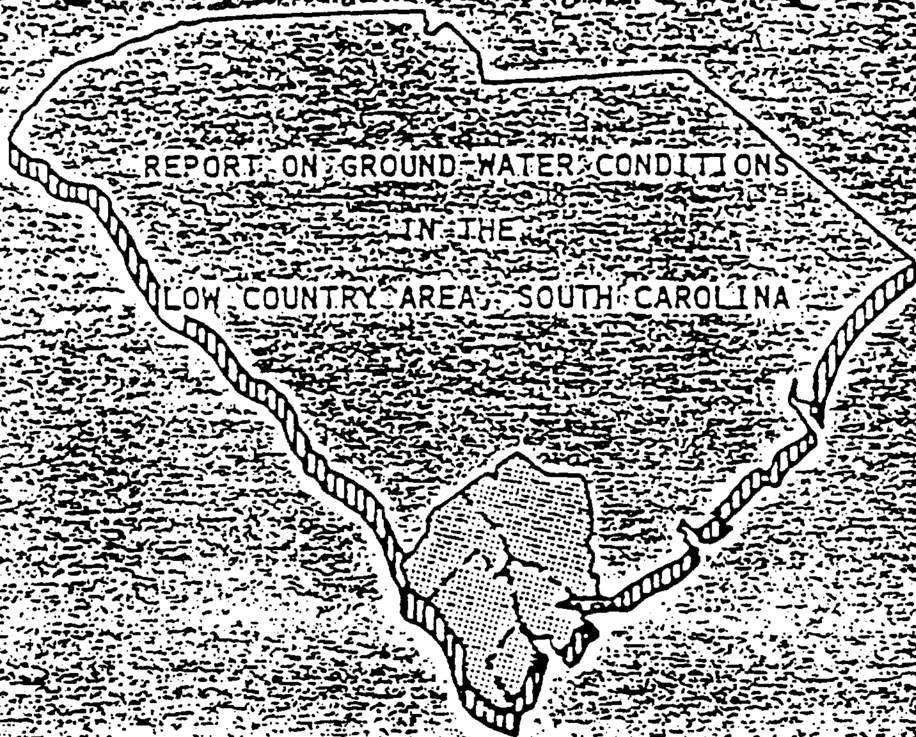

REPORT ON GROUND-WATER CONDITIONS IN THE LOW COUNTRY AREA, SOUTH CAROLINA

BY
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Beaufort, South Carolina

SOUTH CAROLINA WATER RESOURCES COMMISSION
REPORT NUMBER 132
December, 1979

REPORT ON GROUND-WATER CONDITIONS

IN THE

LOW COUNTRY AREA, SOUTH CAROLINA

A Capacity Use Investigation

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ABSTRACT

The Low Country Capacity Use Investigation was initiated by the S. C. Water Resources Commission (SCWRC) in 1973 at the request of legislative and local officials in the four-county area. As required by the S. C. Ground Water Use Act of 1969, the SCWRC must report on ground-water problems in a capacity use study area. The results of a technical ground-water investigation, made by the U. S. Geological Survey (WRD) in cooperation with the SCWRC, are contained in SCWRC Report Number 9 entitled, "The Ground-Water Resources of Beaufort, Colleton, Hampton, and Jasper Counties, South Carolina". Therefore, this report and SCWRC Report Number 9 are submitted to fulfill the requirement of the Act, and to make the findings of the investigation available to the public.

Ground water is the most important source of water supplies in the Low Country area. Six major aquifer systems have been identified. From the surface downward, these are: (1) the Hawthorn-Recent, (2) the Tertiary Limestone, (3) the Black Mingo, (4) the Peedee, (5) the Black Creek, and (6) the Tuscaloosa Aquifer Systems. Approximately 50 million gallons per day (Mgd) of ground water are withdrawn daily from these aquifer systems. The largest withdrawals, approximately 35 Mgd, are from the Tertiary Limestone Aquifer. In the adjacent Savannah area, approximately 75 Mgd to 90 Mgd of ground water are being pumped from this aquifer system for industrial and municipal water supplies.

There are several major ground-water problems that are occurring now in the Low Country area, and other problems that are likely to become major problems unless a comprehensive management program is initiated. Documented problems include:

(1) Regional water-level declines (loss of artesian pressure) throughout large areas of the Low Country and adjacent counties in Georgia.

(2) Salt-water contamination of the Tertiary Limestone Aquifer in the coastal area, primarily in Beaufort County.

(3) Local well interference, where water levels have been lowered below some pump intakes.

(4) Interaquifer transfer, resulting in artesian pressure losses and(or) water quality impairment.

(5) Inadequate requirements relating to well location, spacing, construction, and abandonment.

(6) No requirements for proper water-use, well-construction, and hydraulic data reporting.

Potential problems include:

(1) Subsidence of the land surface (compaction subsidence) caused by excessive, concentrated ground-water withdrawals,

(2) Local dewatering of the Tertiary Limestone Aquifer,

(3) Land-surface subsidence and collapse, if certain conditions are created by improperly-planned well location and spacing, or by dewatering operations, and

(4) Ground-water pollution of aquifers within the Hawthorn-Recent and in the Tertiary Limestone Aquifer Systems.

There are several administrative problems that have a bearing on an effective ground-water management program. These are:

(1) Technical data acquisition and technology transfer.

(2) Uncoordinated water resources development, and

(3) Economics and financing of ground-water management.

An assessment of these technical and administrative problems indicates that:

- The major technical problems are related to ground-water withdrawals from the Tertiary Limestone Aquifer.
- Many of the problems are interrelated, and the solution of one problem would permit the solution of another problem.
- There is no local, state, or federal regulation which is capable of providing appropriate remedies for all of these ground-water problems.
- A ground-water management program is urgently needed that will provide for the proper development of the ground-water resources, and aid in eliminating some of the current problems.
- *The uses of ground water in the Low Country area have developed to a degree which requires coordination and regulation. Therefore, it is recommended that the Low Country area, which includes all of Beaufort, Jasper, Colleton, and Hampton Counties and Edisto Island in Charleston County, be declared a capacity use area.*

If the Low Country area is declared a capacity use area, the SCWRC would have the authority to promulgate regulations concerning the drilling of wells and the withdrawal of ground water in the capacity use area. The following ground-water management methods are needed to protect the aquifers and ground-water users in the Low Country area.

1. *Coordinated water-supply planning.*

The major problem in the Low Country is uncoordinated pumpage, a water-supply management problem. In the past, ground-water development activities have been undertaken without proper consideration of existing ground-water withdrawals, both on a local and on a regional scale. Ground-water withdrawals from the Tertiary Limestone Aquifer in the Low Country area and the adjacent Savannah area now exceed a daily average of 110 Mgd. Throughout the Low Country area as a whole, greater ground-water withdrawals from this aquifer can be made. However, a comprehensive ground-water management program is needed to insure that the proper planning precedes additional pumpage from this important aquifer. This program must consider existing and future water-supply needs of both the Low Country and the adjacent Savannah area. Therefore, it is recommended that officials in South Carolina and Georgia establish a formal Interstate Ground Water Committee. With the proper coordination of ground-water management programs, existing water-supply problems could be realistically addressed. More importantly, emerging or possible future water-supply problems could be addressed before the problems become serious.

2. *Regulations to limit ground-water withdrawals in areas where the supply is limited or where the movement of poor-quality water is degrading a fresh-water aquifer.*

In some areas, it will become necessary to limit the quantity of ground water withdrawn from the Tertiary Limestone Aquifer in order to protect the aquifer from salt-water contamination. Currently, the most critical area is in southwestern Beaufort County where salt water is slowly moving into this aquifer. With the proper management of this aquifer, greater quantities of ground water can be withdrawn without immediate danger to fresh water. However, it is especially important that additional ground-water withdrawals be carefully planned, and that wells be properly designed and constructed.

3. *Regulations related to well spacing, well construction and abandonment.*

The proper location and construction of wells, and proper well-abandonment procedures are ground-water management methods, or "tools", that can be successfully employed in preventing excessive water-level declines, inter-aquifer transfer, salt-water contamination, and other problems outlined in this report.

4. *Regulations related to proper testing of aquifers during well-construction operations, and the proper reporting of this information.*

Certain types of information must be collected prior to, during, and after well-construction operations in order to insure the proper development (utilization) of ground-water resources. Prior to issuing a water use permit, the SCWRC would evaluate the effects of a proposed ground-water withdrawal in order to avoid or minimize adverse effects on the aquifer or existing users.

5. *Best Practical Management of Ground-Water Systems.*

In order to protect existing ground-water users, measures should be instituted that would provide for the best practical management of a ground-water system. Such measures would include careful consideration and evaluation of well placement, proper well spacing, and the establishment of "optimum practical" pumping rates and pumping water levels.

6. *Water Conservation and Alternative Water-Source Selection.*

Water users and prospective water users would be required to use the water of lowest quality available that is suitable, or can feasibly be made suitable, for a particular purpose. If necessary, water users would be required to utilize water-conservation measures where necessary to protect an aquifer or other water users. The selection of these water-management measures would be made on the basis of the best available technical information.

7. *Proper Ground-Water Monitoring.*

One of the most important ground-water management "tools" is the continual collection of ground-water data, including water levels, water quality, geophysical and well-construction data, and water-use information. Without these technical data, a ground-water management program can not be effective. Accordingly, it is recommended that the Regional Office of the SCWRC be maintained to collect and evaluate these data on a continuing basis. These data will insure that the proper technical assistance can be rendered to existing and prospective ground-water users.

Although ground-water problems are emphasized in this report, this report should not be used to suggest that ground water is an undependable resource. To the contrary, the ground-water resources of the area can sustain much greater development. Artesian aquifers in the Black Mingo, Black Creek, and Tuscaloosa Aquifer Systems are capable of supplying large quantities of good-quality water in much of Hampton and Colleton Counties, and possibly in northern Jasper and Beaufort Counties. The Tertiary Limestone Aquifer is also capable of supplying much greater quantities of water, providing wells are properly located and constructed.

The S. C. Ground Water Use Act of 1969 must be regarded as a ground-water management "tool" which can be utilized to insure the proper development and management of ground-water resources. If many of the ground-water management measures outlined in this report are not initiated, and ground-water problems become critical, certain management options may not be available over the long term.

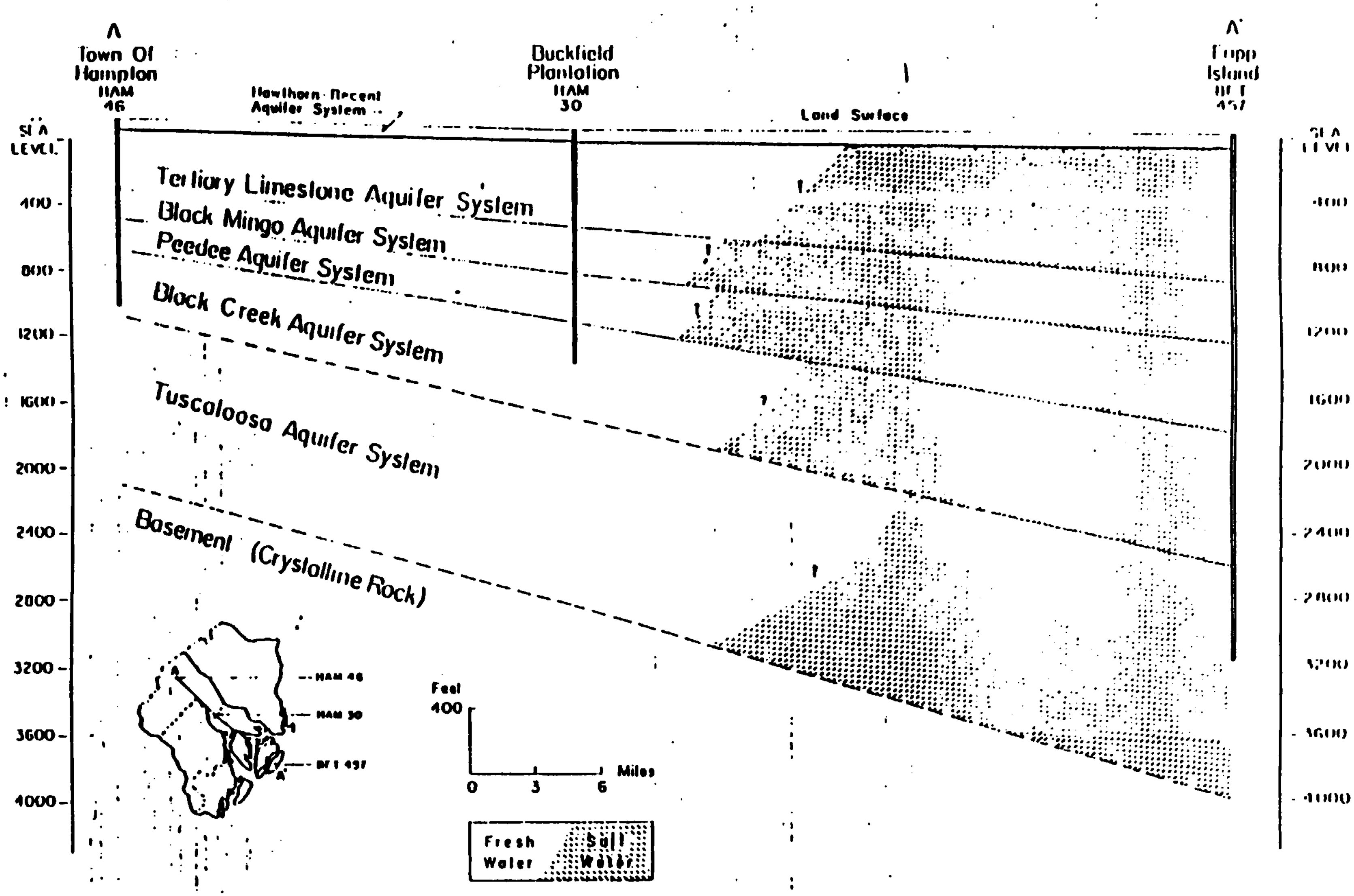

FIGURE 3. GENERALIZED HYDROGEOLOGIC CROSS-SECTION OF THE LOW COUNTRY AREA

geologic unit (or 'formation') boundaries. This parallelism of water-bearing zones and geologic units is important in understanding and 'mapping' hydrogeologic units throughout the Low Country area.

Using information from project test holes, other test holes, and water wells, the Tertiary Limestone Aquifer has been subdivided, for the purposes of this report, into two major hydrogeologic units in the Low Country area (see figs. 7 and 8). The delineation of these hydrogeologic units was based on lithologic, geophysical, and water-bearing (hydrologic) characteristics and current-meter tests run in selected test holes. These data were then correlated with lithologic and geophysical data in wells where current meter data were unavailable. These two hydrogeologic units consist of (1) an *Upper Hydrogeologic Unit* that contains an upper permeable zone delineated by Hayes (1979); and (2) a thick *Lower Hydrogeologic Unit* that is partly water-bearing but has relatively low permeability compared to the Upper Unit. Based on current-meter tests, Hayes (1979) identified a lower permeable zone near the base of the Lower Hydrogeologic Unit that is water-bearing but has a low permeability compared to the upper permeable zone. data?

The division of the Tertiary Limestone Aquifer into two major hydrogeologic units is done informally for the purpose of this report as an aid in explaining the water-bearing properties, use, and water-quality characteristics of this aquifer system. The division of a limestone aquifer system on the basis of permeable and impermeable 'zones' is a well-accepted practice in limestone hydrology where sufficient hydraulic (permeability) data are available. However, in the case where insufficient data exist (such as in Jasper County where few wells penetrate below the upper part of the Tertiary Limestone Aquifer System), it is rather difficult to discuss 'permeable' zones. Thus, we prefer to call this lower part of the Tertiary Limestone Aquifer the Lower Hydrogeologic Unit.

The Upper Hydrogeologic Unit is composed primarily of the upper part or unit of the Santee Limestone, but it also contains limestones of Oligocene and Miocene age, mainly in southwestern Beaufort County. As pointed out by Hayes, few wells in Jasper County penetrate below the Upper Unit; thus, *the hydrogeologic properties of the Lower Hydrogeologic Unit of the Tertiary Limestone Aquifer are unknown in Jasper County.*

As shown in figures 7 and 8, most of the Tertiary Limestone Aquifer is composed of the Lower Hydrogeologic Unit. Thus, permeable zones (aquifers) constitute a small part of the total thickness of the Tertiary Limestone Aquifer. *Although the Lower Unit is water-bearing in many places, the Upper Unit generally has a greater overall permeability and will yield much greater quantities of ground water to wells.*

According to Hayes (1979), the upper permeable zone is not present in southern Colleton County, and wells withdraw ground water from the Lower Hydrogeologic Unit. Therefore, in figure 7 (which is modified from Hayes' figure 8) we have extended the Upper Hydrogeologic Unit into southern Colleton County, but not the upper permeable zone.

and no water wells are known that are open only to the lower permeable zone in the Lower Hydrogeologic Unit.

The Lower Hydrogeologic Unit is not a single hydrogeologic unit. It is a thick complex unit that is composed of both aquifers and confining beds. However, the water-bearing zones (aquifers) within the Lower Unit are relatively thin and not as permeable as those in the Upper Unit. Prolific aquifers do not occur in the Lower Unit because these rocks are primarily 'impure' limestone or marl. Therefore, water-bearing solution cavities in this unit are not as thick and laterally extensive as those in the Upper Unit. Consequently, the large well yields that can be obtained from the Upper Unit (especially from the Upper permeable zone) in many areas generally cannot be obtained from the Lower Unit.

Lower Permeable Zone.--Currently the hydrogeologic characteristics of this zone are poorly known. Since no wells are known to be open only to this zone, additional knowledge must be obtained from current-meter and downhole sample tests before reasonable interpretations of the hydrogeology of this zone can be made.

As shown in several multi-zone test wells, aquifers in the Lower Unit contain saline formation water in the coastal parts of the Low Country (see, for example, fig. 6). Chloride and dissolved solids generally increase with depth in these zones; therefore, drilling a well deeper into the Lower Unit of the Tertiary Limestone Aquifer in these areas will not obtain better quality water.

Inland from the coastal area in northern Beaufort County and in Hampton and Colleton Counties, Lower Unit aquifers contain fresh water. However, as previously mentioned, water-quality data on these aquifers are poor, especially in Jasper County. Presumably, fresh water could be obtained from Lower Unit aquifers, at least in northern Jasper County.

In some areas of Hampton and Colleton Counties and possibly in northern Beaufort County, potentiometric head (or 'artesian pressure') of aquifers in the Lower Hydrogeologic Unit is believed to be greater than the potentiometric head of the Upper Unit. This belief is based on the fact that increases in artesian pressure were noted as some test holes penetrated deeper; and the potentiometric head of the Upper Unit has been reduced as a result of ground-water withdrawals. Thus, in some areas, it may be possible to obtain flowing artesian wells by tapping aquifers in the Lower Unit, whereas shallower wells completed in the Upper Unit no longer flow. In some cases, if a well penetrates and is uncased through both the Upper and Lower Units, ground water could flow upward from a Lower Unit aquifer and into the lower-head Upper Unit. This probably would also occur in open-hole wells drilled in much of Jasper County where the potentiometric head of the Upper Unit has been substantially reduced as a result of large ground-water withdrawals from this unit at Savannah (see fig. 14). It must be emphasized that hydraulic data on Lower Unit aquifers is so limited that upward movement of ground water from the Lower Unit is more speculation than documented fact.

A comparison of the potentiometric map (fig. 12) with an 1880 potentiometric map constructed by Warren (1944) indicates an overall water-level decline of approximately 185 feet at the center of the cone of depression at Savannah (fig. 13). Figure 13, a net water-level decline map, shows the approximate total net decline of water level in the Tertiary Limestone Aquifer since 1880. This map indicates that ground-water withdrawals, primarily from the Upper Unit, in the Savannah-Low Country area have lowered water levels from 70 to 100 feet in the southern portion of Jasper County and from 30 to 50 feet in southwestern Beaufort County. Water levels in Hampton, northern Jasper, northern Beaufort, and Colleton Counties have declined nearly 10 feet.

In an area surrounding the City of Walterboro, water-level declines have been about 10 to 30 feet. In this area, Hayes (1979) suggested that the upper permeable zone of the Upper Hydrogeologic Unit is absent or very thin and most wells withdraw water from the Lower Hydrogeologic Unit. According to Hayes, the lower permeability of the Lower Hydrogeologic Unit combined with the volume of water being withdrawn in the vicinity of Walterboro probably accounts for the greater water-level declines near Walterboro.

The decline of water levels in the Tertiary Limestone Aquifer has changed the original direction of ground-water movement which was generally toward Port Royal Sound, as indicated from a map constructed by Warren (1944). The 1976 potentiometric map (fig. 12), like earlier maps, shows how the heavy pumpage at Savannah has displaced the original configuration of the potentiometric contours and has shifted the direction of ground-water movement from Port Royal Sound toward the center of pumpage at Savannah. The effects of these water-level declines are discussed in the following section.

RECHARGE-DISCHARGE RELATIONSHIPS

The Upper Hydrogeologic Unit of the Tertiary Limestone Aquifer in the Low Country is recharged primarily from precipitation in the outcrop area, mainly in southern Allendale, Bamberg, and Orangeburg Counties; by vertical leakage from overlying aquifers; and by some upward leakage from underlying Lower Unit aquifers. *Both Nuzman (1972) and Hayes (1979) estimated that recharge from the outcrop areas amounted to about 45 Mgd.*

There are many areas where recharge takes place by vertical downward leakage from the overlying shallow aquifers in the Hawthorn-Recent Aquifer System. Hayes estimated that this leakage amounts to 5 to 10 Mgd within the boundaries of the study area. The most prominent area of downward leakage is centered near the Marine Corps Auxiliary Air Station (MCAAS) on Port Royal Island (fig. 12). In this area, downward leakage is significant and water levels in the Upper Hydrogeologic Unit (-25 feet msl) are higher than those normally occurring in the surrounding area. Siple (1960b) suggested that these comparatively high water levels in the aquifer resulted from downward leakage through the overlying confining beds which, in this of other fresh-water aquifers or saline-water aquifers for a particular purpose, requiring conjunctive use of surface-and ground-water resources, plugging and abandonment of wells, and other factors. As outlined previously in this report, the control of salt-water contamination of an aquifer may be fairly simple or extremely complicated. The primary factor in the control of salt-water contamination is the control of hydraulic gradient which is related directly to ground-water withdrawals.

CONCLUSIONS AND RECOMMENDATIONS

After careful consideration of the data collected during the Low Country Capacity Use Investigation, and data collected by the SCWRC, USGS, and others prior to this investigation, the following conclusions and recommendations are submitted to the Commission for consideration.

Surface water is currently not utilized to a large extent for water supplies in the Low Country area. Since most streams in the coastal area either contain salty water or have insufficient fresh-water discharge, there are few withdrawal uses of fresh water from these streams. Thus, several water users have had to resort to interbasin transfers from the Savannah or Edisto Rivers. Approximately 5 Mgd are withdrawn from the Savannah River and transported via canal to the Beaufort area by the Beaufort-Jasper Water Authority; and approximately 75 Mgd are withdrawn from the Edisto River and transported via underground tunnels to the Charleston area by the Charleston Water Works.

Ground water is by far the most important source of water supplies for public, rural-domestic (private), industrial, and agricultural supplies in the Low Country area. This ground water is obtained from six major aquifer systems that are now supplying or are capable of supplying from small to large ground-water supplies. These are, from the surface downward, (1) shallow aquifers within the Hawthorn Formation and unnamed Pleistocene deposits, included in the Hawthorn-Recent Aquifer System in this report; (2) the Tertiary Limestone Aquifer; (3) the Black Mingo Aquifer System; (4) the Peedee Aquifer System; (5) the Black Creek Aquifer System; and (6) the Tuscaloosa Aquifer System.

In order of their current utilization for ground-water supplies, the most important are the Tertiary Limestone, the Black Creek, the Black Mingo, and the Tuscaloosa Aquifer Systems. The Tertiary Limestone Aquifer is currently the most heavily developed aquifer system throughout the area as a whole. Aquifers within the deeper artesian aquifer systems are primarily utilized in Hampton and Colleton Counties, and to a much lesser extent in coastal Beaufort County. The Peedee Aquifer System is not known to yield large quantities of ground water to wells in the area; and if used at all, it is probably developed with overlying or underlying aquifer systems. Shallow aquifers occur in some areas in the Hawthorn Formation and (or) Pleistocene deposits and are tapped by small-diameter, shallow wells used primarily for rural-domestic supplies in Jasper County and in some areas of Beaufort County; however, these shallow aquifers are relatively thin, laterally discontinuous, and relatively untapped. The major functions of these shallow sediments are as a confining bed over the underlying Tertiary Limestone Aquifer, and as a source of recharge by the process of downward leakage.

The estimated total ground-water withdrawals in the four-county area is an average of about 50 Mgd. However, much of this total includes ground water withdrawn for commercial and agricultural irrigation, and only a fraction of the flowing artesian wells in the area have been properly inventoried. Thus, the total ground-water withdrawals during certain periods could easily range from about 30 Mgd to as much as 70 Mgd. It is believed that most of the flowing artesian wells that have been inventoried in Hampton and Colleton Counties tap the Black Mingo Aquifer System. However, in some areas, these wells tap water-bearing (permeable) zones in the middle and lower parts of the Tertiary Limestone Aquifer.

The largest ground-water withdrawals (approximately 35 Mgd) in the Low Country area are from the Tertiary Limestone Aquifer. This aquifer is the most economical source of large quantities of good-quality water throughout much of the area. Present information indicates that there is no alternative source of good quality ground water in much of Beaufort County and the southern portions of Jasper and Colleton Counties. Deeper artesian aquifers are utilized to some extent in Hampton and Colleton Counties, primarily by industries and municipalities. However, in Beaufort and southern Colleton Counties, these deeper aquifers either contain mineralized water; are not as productive; or they occur at greater depths and their utilization is not as economical as that of the Tertiary Limestone Aquifer. *Therefore, the Tertiary Limestone Aquifer is almost exclusively utilized as a source of fresh-water supplies in much of the Low Country.* The largest withdrawals from this aquifer (25 Mgd) are in Beaufort County, where approximately 10 to 15 Mgd are used for commercial and agricultural irrigation. The Tertiary Limestone Aquifer is also extensively (many wells) but not heavily utilized throughout the remainder of the Low Country area. In the Savannah area, approximately 75 to 90 Mgd of ground water are withdrawn from the Tertiary Limestone Aquifer by 21 water users, mainly for industrial and public water supplies. Contacts with Georgia and USGS ground-water officials indicate a lack of accurate water-use reporting, and to date they have not conducted a thorough water-use inventory. Thus, pumpage from the Tertiary Limestone Aquifer in Chatham County alone may periodically exceed 90 Mgd.

There are several major problems occurring now in the Low Country area, and others that are likely to become serious if the ground-water resources are not properly managed. These problems have been categorized as 'technical' and 'administrative' in this report, but their separation has been primarily to facilitate orderly discussion. They are, in fact, closely interrelated.

As summarized in this report, the major technical problems are related to ground-water withdrawals from the Tertiary Limestone Aquifer. Documented problems that are directly related to these withdrawals include (1) regional water-level declines (loss of artesian pressure) throughout large areas of the Low Country and adjacent counties in Georgia, (2) progressive salt-water contamination of this aquifer in parts of the coastal area, (3) local well interference where water levels are lowered below some pump intakes, (4) interaquifer transfer resulting in local artesian pressure losses in wells and water quality impairment. Potential problems that could result from improper well design, location, and spacing include (1) subsidence of the land surface, which has occurred in the Savannah area, (2) local dewatering of the Tertiary Limestone Aquifer, and (3) land-surface subsidence and collapse if certain conditions are created.

The problems are related to varying degrees, and the solution of one problem would permit the solution of another problem. *The one factor common to all of the problems is hydraulic gradient, which is related to ground-water withdrawals.* Of course, some of these problems have been more serious in some areas than in others. As summarized in this report, the 'seriousness' of a ground-water problem ranges from loss of a ground-water supply to little more than aggravation. Recognizing that the degree of 'seriousness' of a water problem is highly subjective, we have tried to evaluate the degree of seriousness on the basis of technically-documented facts rather than speculation.

Ground-water pollution of shallow aquifers has occurred in some areas and locally poses a potential threat to the Tertiary Limestone Aquifer. Several cases of ground-water pollution have been intensively investigated by the SCDHEC, and other cases are being investigated at the present time. The final results of these investigations have not been released by the SCDHEC. Therefore, we have not speculated in this report on the results of these investigations.

The major problem in the Low Country area is unregulated, uncoordinated pumpage. Closely linked to the 'technical' problems associated with this pumpage are several 'administrative' problems. In effect, there is no ground-water management in the Low Country area.

At the present time, almost anyone can drill a well pretty much where they wish and pump how much they wish. There is essentially no control on well depths and type of well construction. There are no controls on amount of ground-water pumpage, water levels, and well location and spacing. The only existing controls on well location or construction are for wells utilized for public drinking-water supplies. These requirements pertain primarily to the quality (potability) of ground water which must meet certain minimum drinking-water standards established by the U. S. Environmental Protection Agency.

There are no requirements, or minimal requirements for collecting and reporting certain technical data to a state agency. Many types of data should be submitted prior to any well-construction activity so that a prospective withdrawal can be evaluated as to its possible effects on existing water users or on the aquifer.

Other types of hydrogeologic data should be collected and submitted to the proper authority, either during or immediately after well-construction operations. These requirements are important for several reasons: (1) In many cases, the collection of proper data by a prospective water user, his consultant, or well-drilling contractor prior to beginning a proposed withdrawal will save a prospective water user hundreds or perhaps even thousands of dollars for an unnecessary expense. (2) The collection of proper hydrogeologic data during well-construction operations would save the well owner money; it would insure protection for the well owner and well-drilling contractor should questions arise concerning the adequacy of well-construction in obtaining the desired quantity and quality of ground water. (3) Accumulated hydrogeologic and well-construction data will be properly stored and evaluated so it can be utilized by the water users, consultants, future water users, well-drilling contractors, or any other individual requesting the information. (4) The continual evaluation of these data by state hydrologists would insure that ground-water knowledge of the area is accumulated for utilization by the general public, prospective water users, and others.

As required by the S. C. Ground Water Use Act, an assessment has been made of existing methods to solve or minimize water-use problems short of declaring a capacity use area. These ground-water management methods consist of both regulatory and voluntary methods.

There is no local, state, or federal law or regulation which is capable of providing appropriate remedies for the ground-water use and management problems outlined in this report. Contacts with local government agencies indicate a lack of authority, funding, personnel, and technical expertise to carry out a ground-water managment program. There have been no substantiative changes in state or federal law since completion of our first capacity-use report that merit detailed review in this report, because none that we know of would be unnecessarily duplicative of authorities granted to the SCWRC by the S. C. Ground Water Use Act.

In connection with voluntary ground-water management methods, it would indeed be a fortunate circumstance if all ground-water users and potential ground-water users in both South Carolina and Georgia, and others involved in designing and constructing wells, could agree on proper ground-water development and management methods. While 'voluntary' sounds good (and indeed proper coordination among various ground-water users would be ideal), it has not been done in the past. However, we believe it must be done in the future.

One aspect of 'voluntary' ground-water managment is a sound technical assistance program, and the SCWRC, SCDHEC, and USGS are committed, in our opinion, to providing the best technical assistance possible in assisting existing and prospective ground-water users. Indeed, these technical assistance efforts have in the past prevented many problems. However, the State can only do so much in terms of technical assistance; and the State can not and should not be reasonably expected to provide all services that logically must be provided by the water user or potential water user. Thus, *our conclusion regarding voluntary ground-water management methods is that they could not possibly provide solutions to all of the problems and potential problems identified in this report.*

A ground-water management program is urgently needed in the Low Country that will provide for the orderly development of the ground-water resources, and aid in eliminating some of the current problems, or preventing them from becoming worse; and in preventing future water-use conflicts, waste, and overdevelopment. We believe the following specific recommendations are needed to help solve or, at least, alleviate the problems arising from the development of the ground-water resources and are herein submitted for consideration by the Commission.

Declaration of a Capacity Use Area: which would include all of Beaufort, Jasper, Hampton, and Colleton Counties, and Edisto Island (Charleston County). Recommended boundaries of the proposed Low Country Capacity Use Area are shown on figure 20.

Much consideration has been given to recommending the declaration of a larger capacity use area to include recharge areas of the Tertiary Limestone Aquifer in adjacent Allendale, Bamberg, and southern Orangeburg Counties. There would be several advantages to doing this in regard to ground-water management. However, there are several reasons, both technical and administrative, why we do not recommend the declaration of a larger capacity use area at this time: (1) With the technical data presently available on these recharge areas, we do not feel that ground-water development from the Tertiary Limestone Aquifer in Allendale, Bamberg, and southern Orangeburg Counties 'significantly' affects artesian pressures of this aquifer in the Low Country area at this time. We are now in the process of refining hydrogeologic data in these areas, and we believe that through a good technical assistance program, potential problems can be avoided. In addition, the high-capacity wells in these areas are primarily completed in deeper artesian aquifers. Ground-water development from these deeper aquifers should have little effect on the overlying Tertiary Limestone Aquifer, unless interaquifer transfer becomes a problem. (2) Administratively, with the current level of funding for our Capacity Use Program, funding and personnel constraints would limit the effort needed to manage a larger capacity use area. (3) The current needs of ground-water management efforts in the Low Country area, especially in the coastal area, are so great that a large area could not be managed without additional funding and manpower. Therefore, the recommended boundaries are somewhat of a compromise between good ground-water management practices and current administrative constraints. However, we believe our recommendations are adequate to provide for proper ground-water management.

Although not specifically required by the S. C. Ground Water Use Act for this report, we would recommend that the following ground-water management methods be instituted if a capacity use area is declared. If the Low Country area is declared a capacity use area, we would recommend adoption of the same type of ground-water management regulations that have been promulgated for the Waccamaw Capacity Use Area. Copies of these regulations, which were approved on June 22, 1979, are available from the SCWRC upon request.

1. *Regulations to limit ground-water withdrawals in areas where the supply is limited or where it has been documented that the movement of poor quality water is degrading a fresh-water aquifer:*

As discussed and illustrated in this report, there is no question that in some areas it will become necessary to limit the quantity of ground water withdrawn from the Tertiary Limestone Aquifer in order to protect the aquifer from further salt-water contamination, and (or) to protect water users. The State of Georgia has already established pumpage limitations in the Savannah area of Chatham County, and Georgia officials are not permitting additional ground-water withdrawals in that area.

2. *Regulations related to well spacing, construction, and abandonment; proper testing of aquifers during well-construction operations; and the proper reporting of all such data:*

Reasonable application of these ground-water management "tools" would be of enormous benefit in preventing further salt-water contamination, and interaquifer transfer; and in preventing needless expenditures for unnecessary ground-water or surface-water development activities. By controlling well spacing and design, excessive water-level declines can often be prevented, thus decreasing the threat of salt-water contamination by lateral encroachment and intrusion, upconing, and interaquifer transfer. Improper well abandonment may not be completely stopped by requiring well-abandonment permits, but it can at least be reduced in the most critical areas. The proper reporting of hydrogeologic data will enable the ground-water data base to be refined and expanded so as to insure the most reliable information.

3. *Ground-water monitoring program:* A ground-water monitoring program is needed to measure continuing changes in water levels and water quality. Long-term records of these measurements, correlated with accurate water-use and other data, provide the most reliable information on the capacity of aquifers to sustain long-term withdrawals. The SCWRC test wells completed during phase I of the Low Country Capacity Use Investigation are available for future monitoring. However, it is estimated that a minimum of an additional 20 properly constructed multi-aquifer test wells will be necessary to establish an adequate ground-water monitoring network in the coastal area of the Low Country. These test wells would be in addition to test wells needed for special studies in local areas.

4. *Water conservation measures:* Each ground-water user should be encouraged to limit ground-water development activities to actual needs, and to make concerted efforts to reduce water requirements as much as technically and economically feasible. The State of Georgia has already done so in the Savannah area, encouraging water-requirement reduction and the recycling of water.

5. *Water users should be required to use the water of lowest quality available that is, or can feasibly be made, suitable for a particular purpose.* For example, for certain water uses that do not require drinking-water quality, a ground water of lower quality could be utilized and thus conserve higher-quality ground water.

6. *Measures should be instituted that would provide for the best practical management of the ground-water system and cause the least interference with existing water users.* Such measures would include careful consideration of well or well-field placement, proper well spacing, and the establishment of "optimum practical" pumping rates and pumping water levels. In short, prior to permitting a certain withdrawal, the water user should be required to consider the best location for a well, which may not necessarily be his most economic location. One area in particular which this is already critical is in southwestern Beaufort County (specifically on Hilton Head Island). The concentration of extremely large-capacity wells without proper spacing and depth control that are to be completed in the Tertiary Limestone Aquifer should be prohibited. Again, prohibition of future ground-water withdrawals from this aquifer, even in coastal Beaufort County, is unrealistic and not supported by the technical data. We are recommending careful consideration of these withdrawals. For example, if it is shown that two properly-spaced lower capacity wells can replace one large-capacity well, then this would be the proper alternative.

7. *If a capacity use area is declared, we would recommend that no well in coastal Beaufort County (especially southeast of the Coosaw River), regardless of capacity or purpose, should be drilled without first obtaining a permit from the SCWRC under the provisions of Section 49-5-40(a)(2) of the Ground Water Use Act.* The primary concern is not necessarily the quantity that may be withdrawn through a small-diameter well, but the possible contribution to salt-water contamination if the well were improperly constructed. If a reasonable need could not be shown, and the proper well-construction criteria could not be adherred to then the well should not be permitted.

8. *Measures for proper monitoring:* There are some areas, southwest of the Broad River for example, where prospective water users wishing to install a large-capacity well or well field should bear the cost of one or more observation wells if it is deemed necessary. For example, if a water user wished to locate a large-capacity well in close proximity (within 2,000 feet) of a known fresh-salt-water interface (or a suspected interface), he should be required to install a minimum of one salt-water monitor well. The State of S.C. should not be expected to do this; we have neither the funding, equipment, nor the personnel budget to do so. Obviously, the greater the quantity of ground-water use requested, the greater the need for monitoring. It is entirely possible, or even probable, that one relatively inexpensive small-diameter (four inch) test well may save a prospective water user from an unnecessary large expense.

Two other recommendations should be considered, and are strongly recommended whether or not a capacity use area is declared.

1. *Maintain the SCWRC Regional Office in Beaufort, South Carolina:* This office will serve the proposed Low Country Capacity Use Area (if declared) as well as Allendale, Bamberg, and Barnwell Counties. The duties of personnel assigned to this office will include carrying out the administrative responsibilities necessary to manage the proposed capacity use area (if declared) as well as carrying out a comprehensive ground-water research and technology transfer program to assist existing and prospective ground-water users. The ground-water program conducted from this office will be directed towards providing an adequate ground-water research program consisting of the collection and evaluation of basic hydrogeologic data pertaining to the occurrence, movement, availability, and chemical quality of ground water. As such data become available, they will be interpreted and evaluated and reported immediately by direct oral communication, and letter-type reports; and these data will be published by the SCWRC on a regular basis.

2. *Establish a formal Interstate Ground-Water Committee composed of representatives from South Carolina and Georgia:* Insomuch as the impact of ground-water withdrawals does not stop at state boundaries, a technical ground-water committee, composed of hydrologists from South Carolina and Georgia, should be created immediately. Because both Georgia and South Carolina rely heavily on the Tertiary Limestone Aquifer in the Low Country-Savannah area, several problems involving water rights are becoming more apparent as the demand for ground water increases. A Technical Ground-Water Committee could serve as a source of communication whereby joint efforts could be made by qualified ground-water personnel to seek practical solutions to present technical problems and future water-supply needs of the area.

It should be re-emphasized that the ground-water resources of the Low Country area, as a whole, can sustain much greater development. Deep artesian aquifers below the Tertiary Limestone Aquifer in Hampton County, much of Colleton County, and possibly in northern Beaufort and Jasper Counties are capable of supplying much greater quantities of fresh, good-quality ground water to properly constructed wells. If the ground-water resources of the Tertiary Limestone Aquifer are properly managed, this aquifer system is also capable of additional development. As mentioned in the "Introduction", this report, as required by a State law, has concentrated on problems that require the application of proper ground-water management. *Therefore, it would be erroneous and totally misleading for this report to be utilized to suggest that ground water is an undependable resource.* On the other hand, we hope that we have not left the reader with the impression that the problems are not serious. *To the contrary, without proper management, ground-water management options now available may not be available in the short term and certainly not over the long term.*

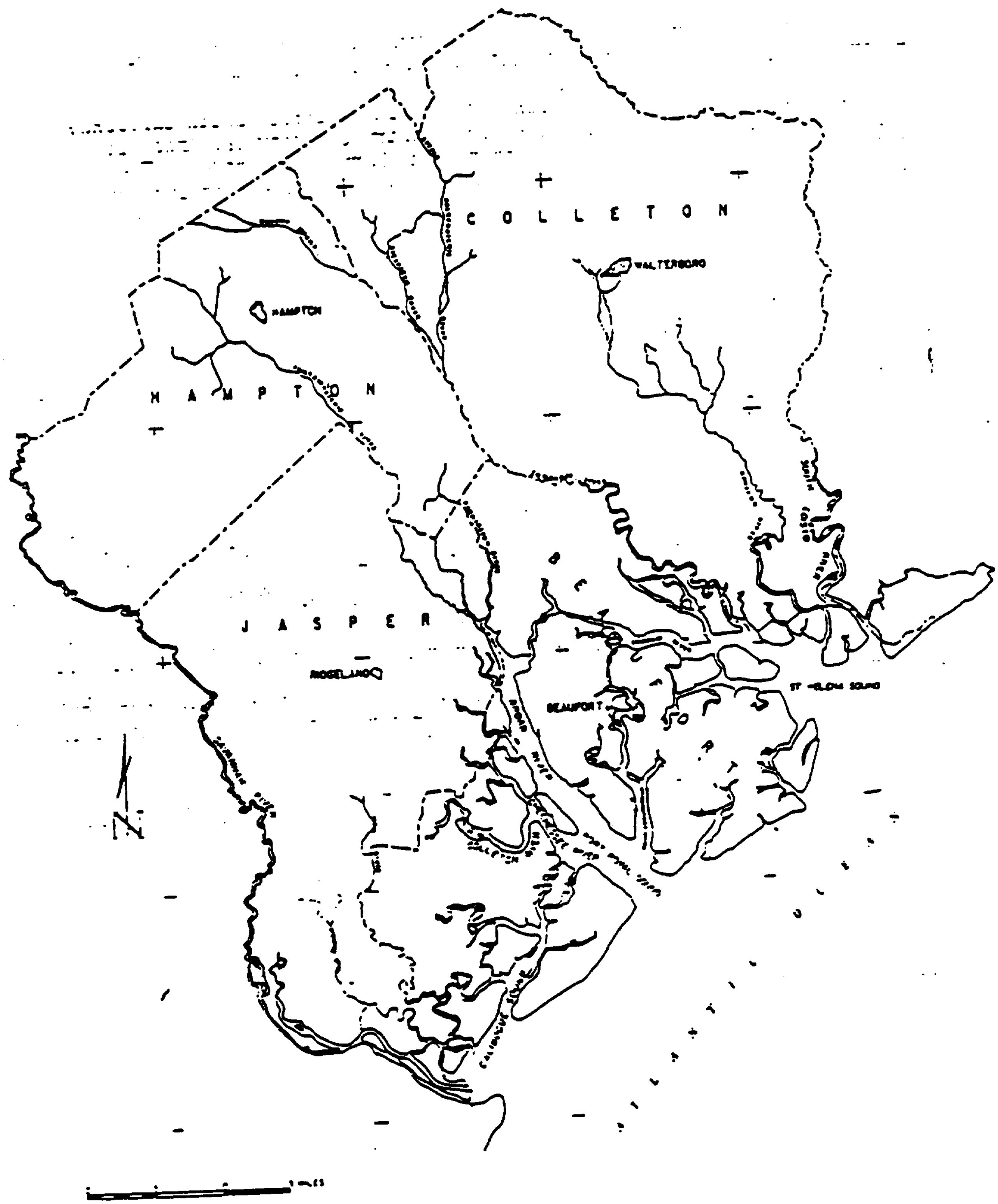

FIGURE 3?. BOUNDARY OF PROPOSED LOW COUNTRY CAPACITY USE AREA.

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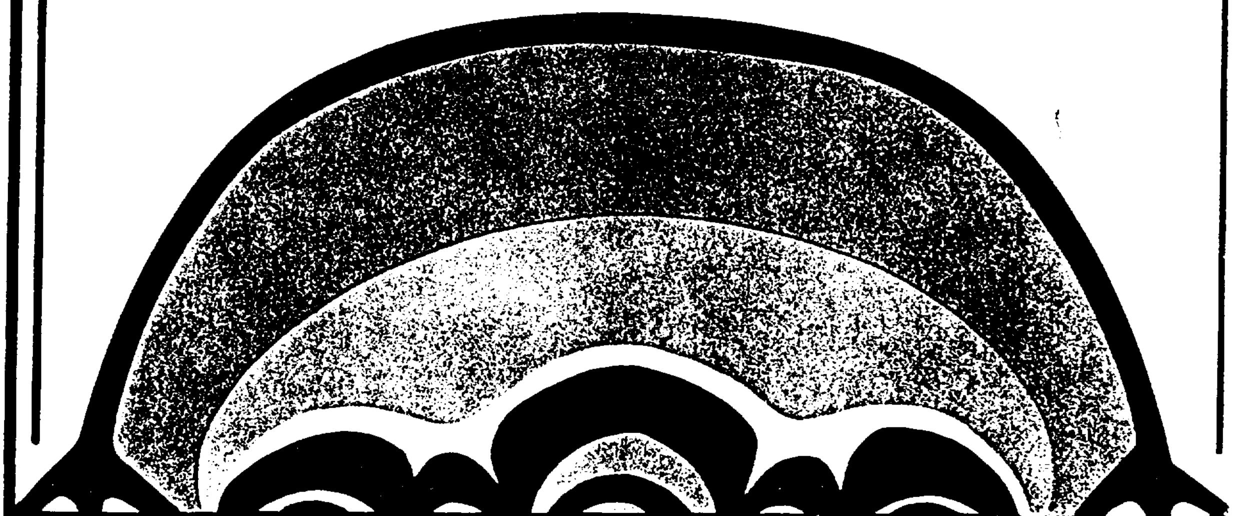
REFERENCE 19

GROUNDWATER



R. Allan Freeze/John A. Cherry

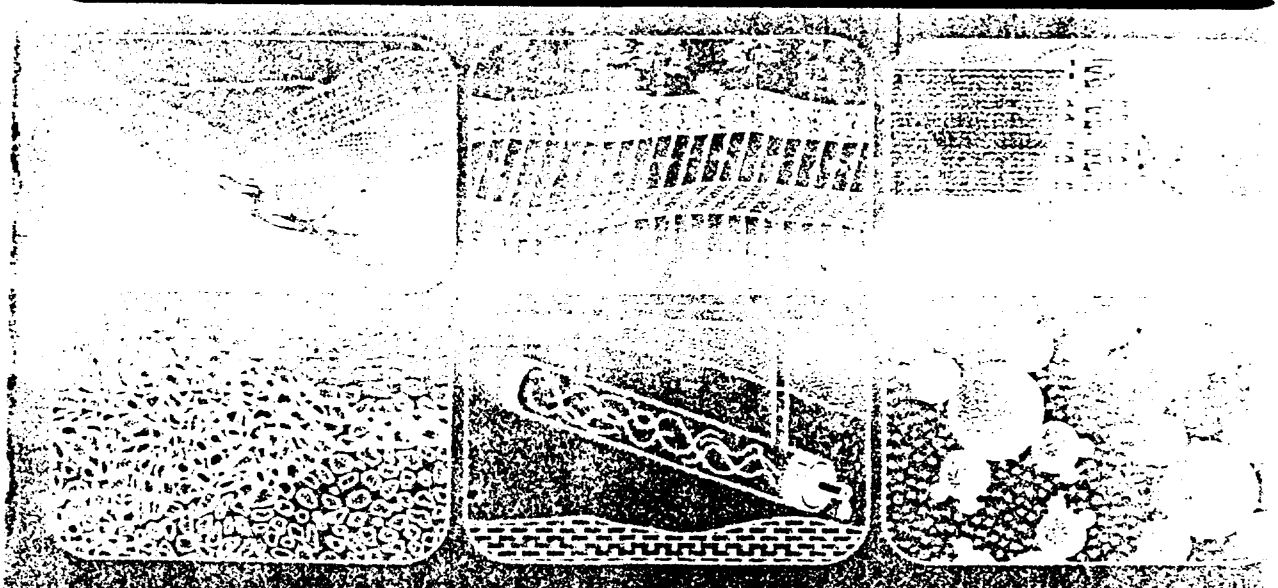


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Table 2.2 Range of Values of Hydraulic Conductivity and Permeability

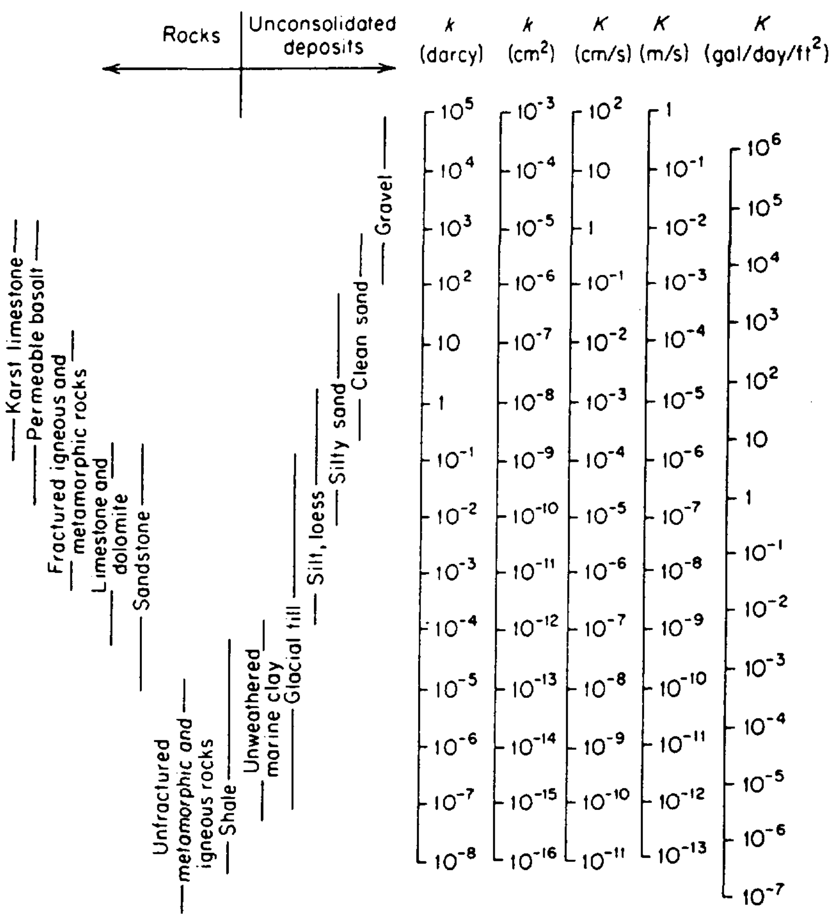


Table 2.3 Conversion Factors for Permeability and Hydraulic Conductivity Units

	Permeability, k*			Hydraulic conductivity, K		
	cm²	ft²	darcy	m/s	ft/s	U.S. gal/day/ft²
cm²	1	1.08×10^{-3}	1.01×10^{8}	9.80×10^{2}	3.22×10^{3}	1.85×10^{9}
ft²	9.29×10^{2}	1	9.42×10^{10}	9.11×10^{5}	2.99×10^{6}	1.71×10^{12}
darcy	9.87×10^{-9}	1.06×10^{-11}	1	9.66×10^{-6}	3.17×10^{-5}	1.82×10^{1}
m/s	1.02×10^{-3}	1.10×10^{-6}	1.04×10^{5}	1	3.28	2.12×10^{6}
ft/s	3.11×10^{-4}	3.35×10^{-7}	3.15×10^{4}	3.05×10^{-1}	1	6.46×10^{5}
U.S. gal/day/ft²	5.42×10^{-10}	5.83×10^{-13}	5.49×10^{-2}	4.72×10^{-7}	1.55×10^{-6}	1

*To obtain k in ft², multiply k in cm² by 1.08×10^{-3}.

NUS CORPORATION A. REFERENCE 20 **TELECON NOTE**

CONTROL NO. F4-8904-54	**DATE:** December 13, 1989	**TIME:** 1140
DISTRIBUTION: American Color andChemical/Venture Chemical File		
BETWEEN: Mr. Henry Walker	**OF:** Dickenson Well Drilling & Pump Service	**PHONE:** (803) 524-2274
AND: James Miller, NUS Corporation J.M.		

DISCUSSION:

Called Henry Walker, a local water well driller, and asked about aquifer use within 4 miles of Lobeco Products, Inc. Mr. Walker stated that about 95% of the groundwater supply for this area is obtained from the Tertiary Limestone aquifer. The wells completed within this unit are normally about 80 feet deep. All other groundwater supplies are obtained from shallow (18-25 feet below land surface) wells screened in the surficial aquifer.

REFERENCE 21

Table 6. Household, Family, and Group Quarters Characteristics: 1990

[For definitions of terms and meanings of symbols, see text]

State / County / Place and [In Selected States] County Subdivision	Persons in households	All households	Family households: Total	Family households: Married-couple family	Family households: Female householder, no husband present	Nonfamily households: Total	Householder living alone: Total	Householder living alone, 65 years and over: Total	Householder living alone, 65 years and over: Female	Persons per— Household	Persons per— Family	Persons in group quarters: Total	Persons in group quarters: Institutionalized persons	Persons in group quarters: Other persons in group quarters
The State	3 370 160	1 258 044	928 206	710 089	176 204	329 838	281 347	109 012	86 912	2.68	3.16	116 543	44 134	72 409
COUNTY														
Abbeville County	23 216	8 780	6 560	5 003	1 248	2 220	2 070	1 093	871	2.64	3.14	646	209	437
Aiken County	119 250	44 883	33 450	26 436	5 614	11 433	10 113	3 814	2 964	2.66	3.13	1 690	1 272	418
Allendale County	10 646	3 791	2 720	1 581	976	1 071	986	472	343	2.81	3.43	1 076	1 044	32
Anderson County	143 558	55 481	41 495	33 272	6 474	13 986	12 579	5 865	4 721	2.59	3.04	1 638	931	707
Bamberg County	15 891	5 587	4 118	2 733	1 160	1 469	1 359	663	498	2.84	3.41	1 011	112	899
Barnwell County	19 996	7 100	5 369	3 836	1 274	1 731	1 586	713	536	2.82	3.31	297	236	61
Beaufort County	79 834	30 712	22 854	18 433	3 602	7 858	6 286	2 215	1 710	2.59	3.01	6 791	261	6 530
Berkeley County	127 656	42 386	34 083	28 025	4 619	8 303	6 657	1 785	1 364	3.01	3.38	1 120	937	183
Calhoun County	12 645	4 487	3 396	2 507	705	1 091	1 004	511	387	2.82	3.34	108	88	20
Charleston County	278 920	107 069	73 392	53 579	16 142	33 677	26 434	7 982	6 232	2.61	3.16	16 119	1 923	14 196
Cherokee County	44 009	16 456	12 353	9 386	2 343	4 103	3 757	1 708	1 388	2.67	3.15	497	241	256
Chester County	32 052	11 448	8 658	6 231	2 006	2 790	2 574	1 306	1 035	2.80	3.31	118	118	-
Chesterfield County	38 197	14 047	10 571	7 807	2 233	3 476	3 193	1 516	1 190	2.72	3.21	380	370	10
Clarendon County	28 212	9 544	7 414	5 121	1 895	2 130	1 964	1 006	740	2.96	3.45	238	217	21
Colleton County	34 095	12 040	9 220	6 803	1 934	2 820	2 583	1 248	956	2.83	3.31	282	220	62
Darlington County	60 797	21 999	16 684	11 939	3 908	5 315	4 855	2 158	1 758	2.76	3.24	1 054	829	225
Dillon County	28 819	9 887	7 423	4 936	2 090	2 464	2 264	1 052	848	2.91	3.47	295	224	71
Dorchester County	80 968	28 213	22 317	18 165	3 247	5 896	4 805	1 537	1 241	2.87	3.25	2 092	1 717	375
Edgefield County	18 107	6 424	4 904	3 702	922	1 520	1 406	644	510	2.82	3.31	268	165	103
Fairfield County	21 860	7 467	5 698	3 977	1 395	1 769	1 634	798	558	2.93	3.45	435	407	28
Florence County	111 645	40 217	30 175	21 839	6 947	10 042	8 773	3 495	2 850	2.78	3.27	2 699	1 662	1 037
Georgetown County	46 097	16 275	12 536	9 557	2 436	3 739	3 354	1 502	1 156	2.83	3.31	205	165	40
Greenville County	311 951	122 878	87 897	69 531	14 856	34 981	30 345	11 110	9 075	2.54	3.05	8 216	3 104	5 112
Greenwood County	57 937	22 730	16 300	12 396	3 188	6 430	5 745	2 557	2 094	2.55	3.06	1 630	686	944
Hampton County	18 125	6 322	4 766	3 420	1 117	1 556	1 438	721	566	2.87	3.41	66	64	2
Horry County	140 490	55 764	40 450	32 537	6 273	15 314	12 434	4 152	3 258	2.52	2.97	3 563	752	2 811
Jasper County	15 221	5 298	4 033	2 749	1 027	1 265	1 152	541	396	2.87	3.36	266	126	140
Kershaw County	43 190	15 810	12 214	9 660	2 029	3 596	3 221	1 393	1 101	2.73	3.17	409	384	25
Lancaster County	54 117	19 778	15 313	11 877	2 750	4 465	3 983	1 874	1 516	2.74	3.16	399	265	134
Laurens County	55 423	20 660	15 584	11 889	2 929	5 076	4 611	2 187	1 745	2.68	3.16	2 669	1 648	1 021
Lee County	18 284	6 054	4 683	3 073	1 361	1 371	1 277	610	470	3.02	3.53	153	132	21
Lexington County	166 222	61 633	47 274	38 822	6 807	14 359	11 622	3 599	2 920	2.70	3.10	1 389	1 198	191
McCormick County	7 501	2 731	2 054	1 481	471	677	620	315	230	2.75	3.25	1 367	1 361	6
Marion County	33 634	11 766	8 899	5 852	2 635	2 867	2 662	1 284	1 025	2.86	3.39	265	242	23
Marlboro County	28 677	10 163	7 513	4 910	2 145	2 650	2 441	1 156	898	2.82	3.38	684	590	94
Newberry County	32 406	12 314	9 005	6 706	1 848	3 309	3 066	1 604	1 291	2.63	3.15	766	288	478
Oconee County	57 050	22 358	16 875	13 891	2 235	5 483	4 922	2 093	1 664	2.55	2.98	444	406	38
Orangeburg County	81 133	28 909	21 565	14 879	5 576	7 344	6 565	2 920	2 266	2.81	3.33	3 670	816	2 854
Pickens County	86 388	33 422	24 159	20 278	2 932	9 263	7 136	2 882	2 371	2.58	3.02	7 506	672	6 834
Richland County	259 829	101 590	67 604	48 859	15 453	33 986	26 886	7 361	5 972	2.56	3.15	26 091	11 144	14 947
Saluda County	16 046	5 824	4 485	3 511	748	1 339	1 231	658	524	2.76	3.20	311	201	110
Spartanburg County	220 739	84 503	62 663	48 679	11 099	21 840	19 014	8 058	6 539	2.61	3.07	6 061	3 806	2 255
Sumter County	95 063	32 723	25 673	19 121	5 480	7 050	6 221	2 539	2 017	2.91	3.34	7 574	1 345	6 229
Union County	30 109	11 407	8 519	6 277	1 829	2 888	2 696	1 402	1 163	2.64	3.13	228	221	7
Williamsburg County	36 860	12 108	9 380	6 442	2 484	2 728	2 555	1 309	1 034	3.03	3.56	155	155	-
York County	127 895	47 006	35 908	28 381	5 962	11 098	9 204	3 602	2 921	2.72	3.14	3 602	1 180	2 422
PLACE AND COUNTY SUBDIVISION														
Abbeville city, Abbeville County	5 674	2 282	1 546	973	501	736	685	359	303	2.49	3.11	104	104	-
Aiken city, Aiken County	19 245	7 749	5 341	4 139	1 025	2 408	2 132	872	712	2.48	3.05	627	582	45
Allendale town, Allendale County	4 356	1 566	1 110	562	479	456	417	201	152	2.78	3.40	54	22	32
Anderson city, Anderson County	24 819	10 509	6 645	4 428	1 895	3 864	3 497	1 759	1 479	2.36	3.03	1 365	680	685
Andrews town	3 050	1 024	767	526	211	257	238	130	108	2.98	3.58	-	-	-
Georgetown County	3 038	1 019	764	523	211	255	236	129	108	2.98	3.58	-	-	-
Williamsburg County	12	5	3	3	-	2	2	1	-	2.40	3.33	-	-	-
Arcadia Lakes town, Richland County	899	360	275	251	22	85	70	27	19	2.50	2.87	-	-	-
Arial CDP, Pickens County	2 604	998	765	637	94	233	208	96	79	2.61	3.02	-	-	-
Atlantic Beach town, Horry County	446	189	119	50	62	70	60	15	9	2.36	2.98	-	-	-
Aynor town, Horry County	470	182	136	106	28	46	40	23	22	2.58	2.96	-	-	-
Bamberg town, Bamberg County	3 564	1 332	952	603	306	380	349	180	136	2.68	3.26	279	76	203
Barnwell city, Barnwell County	5 157	1 916	1 371	909	399	545	487	206	161	2.69	3.25	98	98	-
Batesburg town	4 058	1 470	1 103	699	349	367	331	183	152	2.76	3.21	24	-	24
Lexington County	3 673	1 354	999	648	303	355	320	176	147	2.71	3.19	24	-	24
Saluda County	385	116	104	51	46	12	11	7	5	3.32	3.44	-	-	-
Beaufort city, Beaufort County	9 367	3 807	2 624	1 885	622	1 183	1 032	423	353	2.46	3.00	209	207	2
Belton city, Anderson County	4 646	1 932	1 358	1 027	274	574	536	298	251	2.40	2.92	-	-	-
Belvedere CDP, Aiken County	6 123	2 245	1 754	1 438	258	491	428	144	112	2.73	3.14	10	-	10
Bennettsville city, Marlboro County	9 329	3 451	2 451	1 530	790	1 000	936	462	389	2.70	3.32	16	15	1
Berea CDP, Greenville County	13 283	5 382	3 892	3 098	641	1 490	1 242	384	329	2.47	2.91	252	252	-
Bethune town, Kershaw County	405	165	115	96	13	50	48	35	32	2.45	3.06	-	-	-
Bishopville town, Lee County	3 430	1 307	915	515	354	392	376	203	178	2.62	3.24	130	113	17
Blacksburg town, Cherokee County	1 907	770	526	347	145	244	233	122	110	2.48	3.07	-	-	-
Blackville town, Barnwell County	2 688	915	675	376	258	240	228	115	82	2.94	3.52	-	-	-
Blenheim town, Marlboro County	191	79	51	36	14	28	26	16	13	2.42	3.08	-	-	-
Bluffton town, Beaufort County	738	284	206	162	42	76	67	34	26	2.60	3.09	-	-	-

South Carolina Department of Health and Environmental Control

Water Pollution Control

PERMIT

TO DISCHARGE WASTEWATER IN ACCORDANCE WITH THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

THIS CERTIFIES THAT

Venture Chemicals, Inc.

has been granted permission to discharge wastewater from a facility located at

Lobeco, South Carolina, Beaufort County

to receiving waters named

Campbell Creek to Whale Branch to Coosaw River

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II, and III hereof. This permit is issued in accordance with the provisions of the Pollution Control Act of South Carolina (S.C. Code Sections 48-1-10 *et seq.*, 1976) and with the provisions of the Federal Clean Water Act (PL 92-500), as amended, 33 U.S.C. 1251 *et seq.*, the "Act."

James A. Joy, Jr., P. E.

DIRECTOR, DIVISION OF INDUSTRIAL & AGRICULTURAL WASTEWATER
BUREAU OF WATER POLLUTION CONTROL

Issued: MAY 23 1985

Expires: JUN 30 1990

Effective: JUL 1 1985

Permit No.: SC0000914

MAY 28 1985

materials, a method for containment, a description of training, inspection and security procedures, and emergency response measures to be taken in the event of a discharge to surface waters or plans and/or procedures which constitute an equivalent BMP. Sources of such discharges may include materials storage areas; in-plant transfer, process and material handling areas; loading and unloading operations; plant site runoff; and sludge and waste disposal areas. The BMP plan shall be developed in accordance with good engineering practices, shall be documented in narrative form, and shall include any necessary plot plans, drawings, or maps. The BMP plan shall be maintained at the plant site and shall be available for inspection by EPA and Permit Issuing Authority personnel.

7. If this permit requires continuous measuing of the pH of the effluent, the permittee shall maintain the pH of such effluent within the range set in the permit, except excursions from the range are permitted subject to the following limitations:

   a. The total time during which the pH values are outside the required range shall not exceed 7 hours and 26 minutes in any calendar month; and,

   b. No individual excursion from the range of pH values shall exceed 60 minutes.

8. The permittee shall notify the Agency at least 30 days before the intended manufacture of a new product or use of a new raw material. If such new product or raw material is to enter the wastewater stream, approval shall be obtained from the Agency before beginning operations, and the permit may be modified to include monitoring requirements and/or limits for the new chemical.

9. The discharge is to occur only on outgoing tide and is not to enter the stream less than ½ hour after tidal outflows begin. It is to be terminated early enough during the tidal cycle that the plume of the discharge is washed completely into Whale Branch. Adequate monitoring and timing equipment, with recording, must be maintained to show that the discharge meets the above.

10. Ultimate oxygen demand (UOD) is defined for this permit as 1.5 times 5-day BOD plus 4.5 times total ammonia. UOD is to be reported as pounds per tidal cycle, with BOD_5 and ammonia composited over one complete tidal cycle (about 12 consecutive hours).

11. The permittee shall monitor all parameters consistent with conditions established by this permit on the first Wednesday of every calendar month, unless otherwise approved by the Department. Additional monitoring necessary to meet the frequency requirements of this permit (Part I.A.- Effluent Limitations and Monitoring Requirements) shall be performed by the permittee.

12. Waste activated sludge, after drying, shall be disposed of in an Agency approved landfill as authorized by the Department.

13. The Company shall carry out monitoring, with results reported with Discharge Monitoring Reports, for the following:

    a. Quarterly:

    2-amino-9,10-anthracenedione
    aniline
    9,10-anthracenedione
    arsenic
    benzene
    cadmium
    copper
    Dichloromethane(methylene chloride)
    Diphenylhydrazine
    formaldehyde
    mercury
    1,1'-sulfonyl bis(4-chloro)benzene
    1,2,3-trichlorobenzene

    b. Weekly, until questions about sources are resolved, then quarterly:

    PCB's

    The permit may be reopened to revise monitoring or to add limits if so indicated by analyses.

14. Toxicity shall be measured using Mysidopsis bahia in accordance with the U.S. Environmental Protection Agency document, Methods for Measuring the Acute Toxicity of Effluent to Aquatic Organisms or other method approved by this office; testing shall be conducted annually during February, June and October. Toxicity shall not occur at less than an effluent concentration of 66 percent. Reports are to be submitted no later than 30 days after completion of tests, except that a violation is to be reported within 5 days after completing the test. Revision of these requirements may be made administratively after 1 year, if appropriate after review of all biological information required by the permit.

15. The Company shall develop and submit a program to improve effluent quality and thereby eliminate adverse effects in Campbell Creek and receiving waters. Study plans shall be submitted for approval for each aspect of the program. The program shall include:

    a. Monthly effluent toxicity tests on oyster larvae, consisting of 48-hour static tests, to begin in May, 1985.

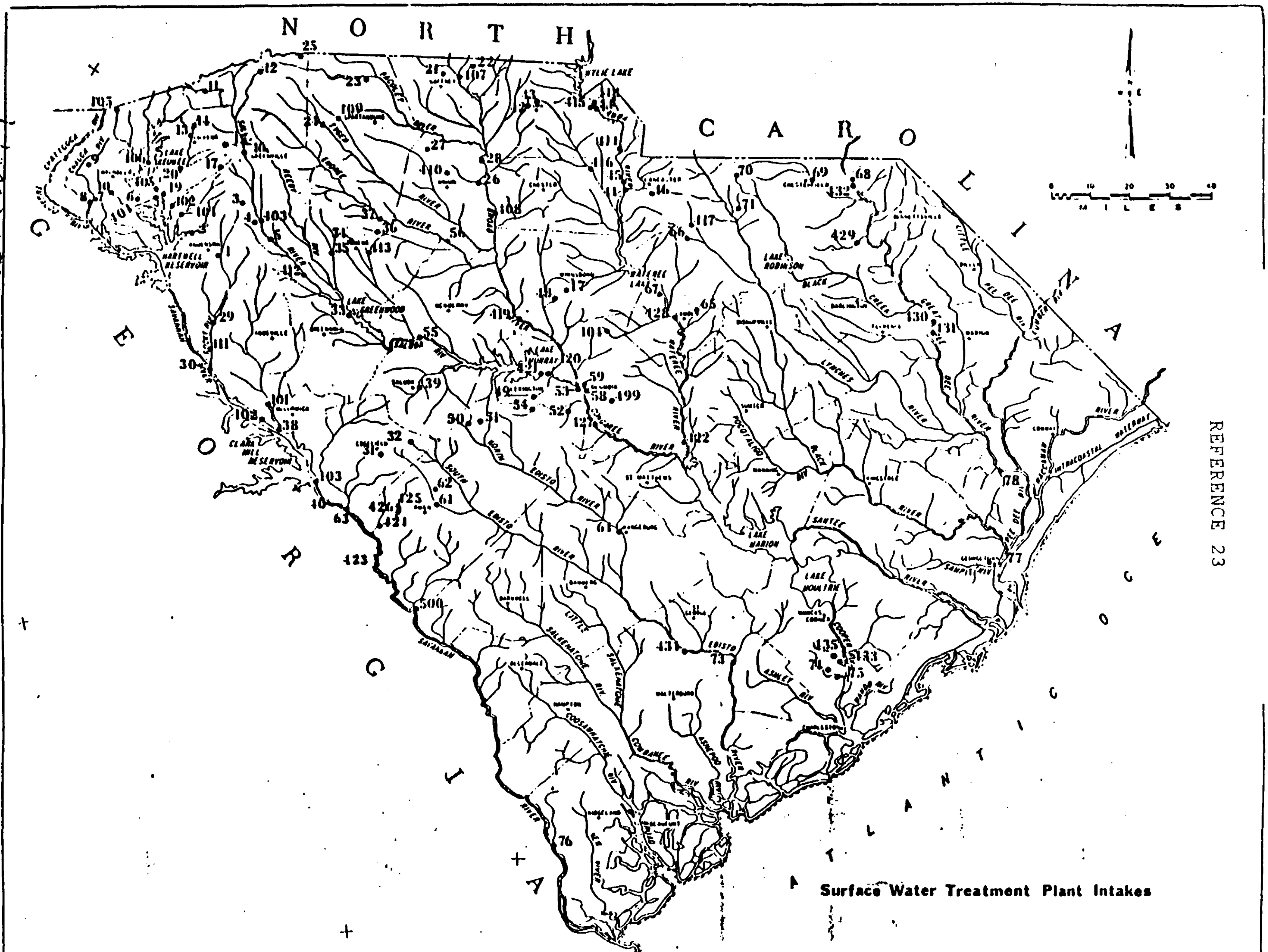
    b. A survey of oyster spat recruitment in Campbell Creek, along with control stations, during June or July of each year, beginning in 1985.

    c. A study plan to reduce discharge toxicity, to be submitted by May 31, 1985. The study is to evaluate methods of reduction, including chlorine-related toxicity, and to develop an engineering report proposing any needed facilities. The chlorine toxicity evaluation is to be submitted by September 30, 1985, and the overall report of evaluation and recommendations by October 31, 1985. The reports are to include schedules for placing proposed systems into operation, and an approved schedule shall become a part of this permit.

    d. A complete macroinvertebrate assessment of Campbell Creek, along with control stations, to be conducted annually in November or December, beginning in 1985.

e. The South Carolina Department of Health and Environmental Control and the permittee acknowledge that the methods of testing and evaluating as defined in paragraphs a. and b. above are new requirements not heretofore imposed by the Agency on any permittee in South Carolina. Amendments to or modifications of testing methodology and or frequency may be necessary as experience is gained and effluent quality is improved; and, after a year of monitoring, the requirements may be revised administratively as indicated by the biological evaluations.

16. The company shall perform analyses of oysters for organics (volatiles and acid and base/neutral extractables) and metals (arsenic, cadmium, chromium, copper, lead, and nickel) each year in September and report the results to DHEC within 45 days after sampling. Samples shall be taken from the mouth of Campbell Creek, near the confluence of Huspah Creek and Whale Branch, and from the mouth of Haulover Creek.



Surface Water Treatment Plant Intakes

REFERENCE 23

NUS CORPORATION AND **TELECON NOTE**

REFERENCE 24

CONTROL NO. F4-8904-54	**DATE:** December 14, 1989	**TIME:** 1020
DISTRIBUTION: American Color and Chemical/Venture Chemical File		
BETWEEN: Mr. George Nelson	**OF:** Low Country District, SC Dept. of Health & Env. Control	**PHONE:** (803) 522-9097
AND: James Miller, NUS Corporation J.M.		

DISCUSSION:

Called George Nelson, who is familiar with tidal flow in the Lobeco area (see attached memorandum), for flow reversal information in Campbell Creek and associated water bodies. Mr. Nelson stated that flow reversals are common in these water bodies because there is very little, if any, freshwater input involved. The reversals occur in the Coosaw River, the Broad River, Whale Branch, and in all tributaries that are hydrologically interconnected. The area at the mouth of Huspa Creek is a tidal node, and tidal water from both sections of Whale Branch backs up into Huspa Creek during each flood tide.

South Carolina Department of Health and Environmental Control

Lobeco file

2600 Bull Street
Columbia, S.C. 29201

Commissioner
Michael D. Jarrett

Board
Moses H. Clarkson, Jr., Chairman
Gerald A. Kaynard, Vice-Chairman
Oren L. Brady, Jr., Secretary
Barbara P. Nuessle
James A. Spruill, Jr.
William H. Hester, M.D.
Euta M. Colvin, M.D.

Low Country District
Environmental Quality Control
149 Ribaut Square
Beaufort, S.C. 29902
(803) 524-9760

July 14, 1988

M E M O R A N D U M

TO: Andy Yasinsac

FROM: George Nelson

RE: Lobeco Products - your letter of 7-8-88 to Granquist - Tidal Flow

Please keep in mind that the tidal flow for Port Royal Sound, St.Helena Sound and Calibogue Sound is different from most other estuaries in the state. Ours have very little or no fresh water flow into them so that the flushing action is decreased. Even though the tidal velocities are high the water remains in the system for a longer period of time. I suggest we require Lobeco to demonstrate what the true dilution is based on residence time if you don't have that information already.

This concern becomes even more critical when one remembers that they apparently have authorization to use the wastewater treatment facility for incidental spills(see attached). How much of this occurs and of what magnitude we don't know as they apparently don't have to keep records. I dont't think we have any records of Lobeco Products reporting any spills in the past 2 1/2 years.

I don't believe that their biological plant can do more than dilute some of the material on hand. I think it would be prudent for the Department to require them to keep records of spills even though enforcement may be impracticable.

cc: Russ Sherer
Sandra Hursey

ɜrmine if flood insurance is available in this community, your insurançe agent, or call the National Flood Insurance ı, at (800) 638-6620.

REFERENCE 25

APPROXIMATE SCALE

1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

BEAUFORT COUNTY, SOUTH CAROLINA
(UNINCORPORATED AREAS)

PANEL 25 OF 163
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
450025 0025 D

MAP REVISED:
SEPTEMBER 29, 1986

Federal Emergency Management Agency

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ENDANGERED AND THREATENED SPECIES

REFERENCE 27

U.S. FISH AND WILDLIFE SERVICE

REGION 4 - ATLANTA

ATTACHMENT A

TABLES
&
FIGURES

TABLE 1 (PART 1 OF 3)

SELECTED ANALYTICAL DATA
BACKGROUND
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Soil				Groundwater		
	W-1 (4-6 ft.)	W-2 (10-12 ft.)	W-1 (14-16 ft.)	W-1 (38-40 ft.)	W-1	W-1	W-2
VOLATILES							
VINYL CHLORIDE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
CHLOROETHANE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,1-DICHLOROETHENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
TRANS-1,2-DICHLOROETHENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,1-DICHLOROETHANE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
CHLOROFORM	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
CHLOROTOLUENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,2-DICHLOROBENZENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,4-DICHLOROBENZENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,3-DICHLOROBENZENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
DICHLOROBROMOMETHANE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,2-DICHLOROETHANE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,1,1-TRICHLOROETHANE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
CARBON TETRACHLORIDE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,2-DICHLOROPROPANE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
CIS-1,3-DICHLOROPROPENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)

ND None Detected
\- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN

TABLE 1 (PART 2 OF 3)

SELECTED ANALYTICAL DATA
BACKGROUND
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Soil				Groundwater		
	W-1 (4-6 ft.)	W-2 (10-12 ft.)	W-1 (14-16 ft.)	W-1 (38-40 ft.)	W-1	W-1	W-2
TRICHLOROETHENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
TRICHLOROFLOURMETHANE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,1,2-TRICHLOROETHANE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
BENZENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
TRANS-1,3-DICHLOROPROPENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
2-CHLOROETHYL VINYL ETHER	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
BROMOFORM	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
TETRACHLOROETHENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,1,2,2-TETRACHLOROETHANE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
TOLUENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
CHLOROBENZENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
CHLORODIBROMOMETHANE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
ETHYLBENZENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
METHYLBROMIDE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
METHYLCHLORIDE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
METHYLENE CHLORIDE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
TOTAL XYLENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)

ND None Detected
\- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN

TABLE 1 (PART 3 OF 3)

SELECTED ANALYTICAL DATA
BACKGROUND
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Soil				Groundwater		
	W-1 (4-6 ft.)	W-2 (10-12 ft.)	W-1 (14-16 ft.)	W-1 (38-40 ft.)	W-1	W-1	W-2
POLYCHLORINATED BIPHENYLS							
AROCHLOR 1248	-	-	-	-	-	ND(<0 001)	ND(<0.001)
TOTAL POLYCHLORINATED	-	-	-	-	-	-	-
METALS							
CADMIUM	-	-	-	-	-	ND(<0 005)	ND(<0 005)
CHROMIUM	-	-	-	-	-	ND(<0.01)	ND(<0 01)
LEAD	-	-	-	-	-	ND(<0.04)	ND(<0 04)
MERCURY	-	-	-	-	-	ND(<0 0002)	ND(<0 0002)
OTHER							
TOTAL ORGANIC CARBON	-	-	-	-	21	5	9
CHLORIDE	-	-	-	-	79	15	13.4
SAMPLING DATE	03/11/86	03/12/86	03/11/86	03/12/86	03/12/86	03/22/86	03/22/86

ND None Detected
- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN

TABLE 6 (PART 1 OF 2)

SELECTED ANALYTICAL DATA
STRESSED VEGETATION
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Soil	Groundwater	
	D-1 (1-2ft.)	D-1	D-2
VOLATILES			
VINYL CHLORIDE	ND(<0.100)	ND(<0.010)	ND(<0.010)
CHLOROETHANE	ND(<0.100)	ND(<0.010)	ND(<0.010)
1,1-DICHLOROETHENE	ND(<0.100)	ND(<0.010)	ND(<0.010)
TRANS-1,2-DICHLOROETHENE	ND(<0.100)	ND(<0.010)	ND(<0.010)
1,1-DICHLOROETHANE	ND(<0.100)	ND(<0.010)	ND(<0.010)
CHLOROFORM	ND(<0 100)	ND(<0 010)	ND(<0.010)
CHLOROTOLUENE	ND(<0 100)	ND(<0 010)	-
1,2-DICHLOROBENZENE	ND(<0 100)	ND(<0.010)	ND(<0.010)
1,4-DICHLOROBENZENE	ND(<0.100)	ND(<0.010)	ND(<0.010)
1,3-DICHLOROBENZENE	ND(<0.100)	ND(<0.010)	ND(<0.010)
DICHLOROBROMOMETHANE	ND(<0.100)	ND(<0.010)	ND(<0.010)
1,2-DICHLOROETHANE	ND(<0.100)	ND(<0.010)	ND(<0.010)
1,1,1-TRICHLOROETHANE	ND(<0.100)	ND(<0.010)	ND(<0.010)
CARBON TETRACHLORIDE	ND(<0.100)	ND(<0.010)	ND(<0.010)
1,2-DICHLOROPROPANE	ND(<0.100)	ND(<0.010)	ND(<0.010)
CIS-1,3-DICHLOROPROPENE	ND(<0.100)	ND(<0.010)	ND(<0.010)
TRICHLOROETHENE	ND(<0.100)	ND(<0.010)	ND(<0.010)
TRICHLOROFLOURMETHANE	ND(<0.100)	ND(<0.010)	ND(<0.010)
1,1,2-TRICHLOROETHANE	ND(<0.100)	ND(<0.010)	ND(<0.010)
BENZENE	ND(<0.100)	ND(<0.010)	ND(<0.010)
TRANS-1,3-DICHLOROPROPENE	ND(<0.100)	ND(<0.010)	ND(<0.010)
2-CHLOROETHYL VINYL ETHER	ND(<0.100)	ND(<0.010)	ND(<0.010)
BROMOFORM	ND(<0.100)	ND(<0.010)	ND(<0.010)
TETRACHLOROETHENE	ND(<0.100)	ND(<0.010)	ND(<0.010)
1,1,2,2-TETRACHLOROETHANE	ND(<0.100)	ND(<0.010)	ND(<0.010)
TOLUENE	ND(<0.100)	ND(<0.010)	ND(<0.010)
CHLOROBENZENE	ND(<0.100)	ND(<0.010)	ND(<0.010)

ND None Detected
- *Material not analyzed for or data were not available for inclusion*
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN ON MARCH 26 AND MARCH 27 OF 1986

TABLE 6 (PART 2 OF 2)

SELECTED ANALYTICAL DATA
STRESSED VEGETATION
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Soil	Groundwater	
	D-1 (1-2ft.)	D-1	D-2
CHLORODIBROMOMETHANE	ND(<0.100)	ND(<0.010)	ND(<0.010)
ETHYLBENZENE	ND(<0.100)	ND(<0.010)	0.013 ●
METHYLBROMIDE	ND(<0.100)	ND(<0.010)	ND(<0.010)
METHYLCHLORIDE	ND(<0.100)	ND(<0.010)	ND(<0.010)
METHYLENE CHLORIDE	ND(<0.100)	ND(<0.010)	ND(<0.010)
TOTAL XYLENE	ND(<0.100)	ND(<0.010)	ND(<0.010)
POLYCHLORINATED BIPHENYLS			
TOTAL POLYCHLORINATED	-	ND(<0.001)	-
METALS			
CHROMIUM	3.3 ●	ND(<0.01)	ND(<0.01)
LEAD	3.8 ●	ND(<0.04)	ND(<0.04)

ND None Detected

\- Material not analyzed for or data were not available for inclusion

NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN ON MARCH 26 AND MARCH 27 OF 1986

● Sample parameter is an observed release

TABLE 2 (PART 1 OF 5)

SELECTED ANALYTICAL DATA
ABANDONED LAGOON
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Soil							
	L-1 (1 ft.)	L-9 (2-3 ft.)	L-1 (2.5 ft.)	L-3 (2.5 ft.)	L-28 (3-4 ft.)	L-10 (3.5-4 ft.)	L-3 (4 ft.)	G&E-3 (4-5 ft.)
VOLATILES								
CHLOROTOLUENE	-	ND(<0.100)	-	-	-	ND(<0.100)	-	-
TRICHLOROETHENE	-	ND(<0.100)	-	-	-	ND(<0 100)	-	-
ACID & BASE NEUTRALS								
1,2,4-TRICHLOROBENZENE	-	-	-	-	-	-	-	24 0 ●
NAPHTHALENE	-	-	-	-	-	-	-	12 0 ●
POLYCHLORINATED BIPHENYLS								
AROCHLOR 1248	-	-	-	-	250 ●	-	-	-
TOTAL POLYCHLORINATED BIPHENYLS	112 ●	140 ●	108 ●	39 ●	-	17 ●	122 ●	6750 ●
METALS								
CADMIUM	-	-	-	-	-	-	-	ND(<0 5)
CHROMIUM	-	-	-	-	-	-	-	46 ●
LEAD	698 ●	-	500 ●	42 ●	-	-	90 ●	2286 ●
MERCURY	19 ●	-	4.3 ●	0 63 ●	-	-	1.9 ●	13
OTHER								
CHLORIDE	-	-	-	-	-	-	-	-
SAMPLING DATE	03/18/86	03/21/86	03/18/86	03/18/86	04/03/86	03/21/86	03/18/86	01/13/86

ND None detected
SZ Saturation Zone
C Composite
\- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN
● **Sample parameter is an observed release**

TABLE 2 (PART 2 OF 5)

SELECTED ANALYTICAL DATA
ABANDONED LAGOON
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Soil							
	G&E-4 (4-5 ft.)	G&E-5 (4-5 ft.)	L-13 (4-6.5 ft.)	L-2 (4.5 ft.)	G&E-1 (5-6 ft.)	L-3 (6 ft.)	L-24 (6-6.5 ft.)	G&E-4 (6-7 ft.)
VOLATILES								
CHLOROTOLUENE	-	-	ND(<0.100)	-	-	-	ND(<0 100)	-
TRICHLOROETHENE	-	-	ND(<0.100)	-	-	-	ND(<0.100)	-
ACID & BASE NEUTRALS								
1,2,4-TRICHLOROBENZENE	ND(<0.330)	ND(<0.330)	-	-	54.0 ●	-	-	7.4 ●
NAPHTHALENE	ND(<0.330)	ND(<0.330)	-	-	17.0 ●	-	-	1 10 ●
POLYCHLORINATED BIPHENYLS								
AROCHLOR 1248	-	-	-	-	-	-	-	52 ●
TOTAL POLYCHLORINATED BIPHENYLS	-	-	ND(<2.0)	497 ●	680 ●	2460 ●	369 ●	-
METALS								
CADMIUM	ND(<0.5)	ND(<0.5)	-	-	ND(<0.5)	-	-	ND(<0 5)
CHROMIUM	16 ●	4.9 ●	-	-	13 ●	-	-	11 ●
LEAD	46 ●	ND(<3.3)	-	528 ●	942 ●	55 ●	-	144 ●
MERCURY	0.11 ●	ND(<0.05)	-	3.8 ●	1.1 ●	0.09 ●	-	3.2 ●
OTHER								
CHLORIDE	-	-	-	-	-	-	-	-
SAMPLING DATE	01/13/86	01/13/86	03/21/86	03/18/86	01/13/86	03/18/86	03/21/86	01/13/86

ND None detected
SZ Saturation Zone
C Composite
\- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN

● **Sample parameter is an observed release**

TABLE 2 (PART 3 OF 5)

SELECTED ANALYTICAL DATA
ABANDONED LAGOON
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l,mg/kg)	Soil							
	B-1 (6-8 ft.)	L-1 (6.5 ft.)	L-2 (6.5 ft.)	L-2 (6.5-7 ft.)	L-7 (8 ft.)	L-33 (10-12 ft.)	B-1 (10-12 ft.)	L-33 (12-14 ft.)
VOLATILES								
CHLOROTOLUENE	-	-	-	-	6 0 ●	-	-	-
TRICHLOROETHENE	-	-	-	-	ND(<0.100)	-	-	-
ACID & BASE NEUTRALS								
1,2,4-TRICHLOROBENZENE	-	-	-	-	-	ND(<10)	-	103 ●
NAPHTHALENE	-	-	-	-	-	ND(<10)	-	122 ●
POLYCHLORINATED BIPHENYLS								
AROCHLOR 1248	-	-	-	-	-	70 ●	-	2139 ●
TOTAL POLYCHLORINATED BIPHENYLS	ND(<1.0)	676 ●	196 ●	582 ●	369 ●	-	ND(<1 0)	-
METALS								
CADMIUM	-	-	-	-	-	-	-	-
CHROMIUM	-	-	-	-	-	-	-	-
LEAD	-	283 ●	109 ●	76 ●	-	-	-	-
MERCURY	-	1 6 ●	0.82 ●	0 88 ●	-	-	-	-
OTHER								
CHLORIDE	-	-	-	-	-	-	-	-
SAMPLING DATE	03/13/86	03/18/86	03/18/86	03/18/86	03/21/86	04/13/86	03/13/86	04/13/86

ND None detected
SZ Saturation Zone
C Composite
\- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN
● Sample parameter is an observed release

TABLE 2 (PART 4 OF 5)

SELECTED ANALYTICAL DATA
ABANDONED LAGOON
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Soil			Groundwater						
	L-33 (14-16 ft.)	B-1 (14-16 ft.)	B-1 (43-45 ft.)	L-1 (SZ)	L-2 (SZ)	L-3 (SZ)	L1, L2, L3 (SZ, C)	L-7 (SZ)	L-18 (SZ)	G&E-1-S (SZ, C)
VOLATILES										
CHLOROTOLUENE	-	-	-	-	-	-	-	1.20	1.70	-
TRICHLOROETHENE	-	-	-	-	-	-	0.150	0.04	0.05	-
ACID & BASE NEUTRALS										
1,2,4-TRICHLOROBENZENE	-	-	-	-	-	-	3.470	-	-	0.460
NAPHTHALENE	-	-	-	-	-	-	2.340	-	-	0.380
POLYCHLORINATED BIPHENYLS										
AROCHLOR 1248	-	-	-	-	-	-	6.02	-	-	-
TOTAL POLYCHLORINATED BIPHENYLS	ND(<1.0)	ND(<1.0)	ND(<1.0)	-	-	-	-	-	-	-
METALS										
CADMIUM	-	-	-	-	-	-	-	0.02 ●	0.03	ND(<0.0
CHROMIUM	-	-	-	-	-	-	-	0.65	1.9	5.4
LEAD	-	-	-	11	0.19	0.14	-	1.5	7.0	34
MERCURY	-	-	-	0.23	ND(<0.002)	ND(<0.002)	-	0.05	0.12	0.614
OTHER										
CHLORIDE	-	-	-	-	-	-	-	-	-	-
SAMPLING DATE	04/13/86	03/13/86	03/13/86	03/18/86	03/18/86	03/18/86	03/18/86	03/21/86	03/21/86	01/14/86

ND None detected
SZ Saturation Zone
C Composite
\- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN

● **Sample parameter is an observed release**

TABLE 2 (PART 5 OF 5)

SELECTED ANALYTICAL DATA
ABANDONED LAGOON
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Groundwater				
	C-1	W-3	W-3	W-4	V-6
VOLATILES					
CHLOROTOLUENE	ND(<0.010)	-	0 200	ND(<0 010)	-
TRICHLOROETHENE	ND(<0.010)	0.047	0 355	ND(<0 010)	0.235
ACID & BASE NEUTRALS					
1,2,4-TRICHLOROBENZENE	-	-	-	-	-
NAPHTHALENE	-	-	-	-	-
POLYCHLORINATED BIPHENYLS					
AROCHLOR 1248	-	-	-	-	-
TOTAL POLYCHLORINATED BIPHENYLS	ND(<0.001)	ND(<0.001)	ND(<0 005)	ND(<0.001)	ND(<0 001)
METALS					
CADMIUM	ND(<0.005)	-	0.02 ●	ND(<0 005)	-
CHROMIUM	ND(<0.01)	-	0.13 ●	ND(<0.01)	-
LEAD	ND(<0.04)	-	0 13 ●	ND(<0 04)	0.32 ●
MERCURY	ND(<0.0002)	-	ND(<0.002)	ND(<0.0002)	-
OTHER					
CHLORIDE	2.5	-	1650	34	2900
SAMPLING DATE	03/25/86	03/12/86	03/26/86	03/25/86	03/13/86

ND None detected
SZ Saturated Zone
C Composite
\- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN
● **Sample parameter is an observed release**

TABLE 5 (PART 1 OF 2)

SELECTED ANALYTICAL DATA
BURN SITE
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Soil				Groundwater
	S-1 (depth unk.)	G&E-9 (1 ft.)	BS-3 (3-4 ft.)	G&E-6 (3-4 ft.)	G&E-10
VOLATILES					
METHYLENE CHLORIDE	-	-	-	-	640 ●
TRICHLOROETHENE	-	-	-	-	-
ACID & BASE NEUTRALS					
1,2,4-TRICHLOROBENZENE	ND(<10)	0.610 ●	-	ND(<0 330)	ND(<0 010)
NAPHTHALENE	ND(<10)	0.750 ●	-	ND(<0.330)	ND(<0.010)
POLYCHLORINATED BIPHENYLS					
AROCHLOR 1242	-	-	-	ND(<1 0)	-
AROCHLOR 1248	-	169 ●	250	-	-
TOTAL POLYCHLORINATED BIPHENYLS	-	155	-	-	-
METALS					
CADMIUM	0.1 ●	ND(<0.5)	-	ND(<0.5)	ND(<0.01)
CHROMIUM	2.0 ●	565 ●	-	5.4	1.7 ●
LEAD	6.9 ●	53 ●	-	4.7	0 4 ●
MERCURY	0 04 ●	0 18 ●	-	ND(<0 5)	0 0017 ●
OTHER					
TOTAL ORGANIC CARBON	-	-	-	-	-
CHLORIDE	-	-	-	-	-

ND None Detected

\- Material not analyzed for or data were not available for inclusion

NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN BETWEEN JANUARY 14 AND MAY 1 OF 1986

● **Sample parameter is an observed release**

TABLE 5 (PART 2 OF 2)

SELECTED ANALYTICAL DATA
BURN SITE
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Groundwater					Surface Water	Product
	W-9	W-10	W-11	W-12	W-13	LAGOON	LAGOON
VOLATILES							
METHYLENE CHLORIDE	ND(<0.010)	ND(<0.010)	ND(<0 010)	ND(<0.010)	ND(<0 010)	-	-
TRICHLOROETHENE	180 ●	0.025 ●	12 ●	0.073 ●	ND(<0 010)	-	-
ACID & BASE NEUTRALS							
1,2,4-TRICHLOROBENZENE	ND(<0.010)	ND(<0.010)	-	-	-	-	-
NAPHTHALENE	ND(<0.010)	ND(<0.010)	-	-	-	-	-
POLYCHLORINATED BIPHENYLS							
AROCHLOR 1242	-	0.012 ●	-	-	-	-	-
AROCHLOR 1248	0.114 ●	-	-	-	-	0 0027	-
TOTAL POLYCHLORINATED BIPHENYLS	-	-	ND(<0.001)	ND(<0.001)	ND(<0.001)	-	-
METALS							
CADMIUM	0.03 ●	-	ND(<0.005)	ND(<0 005)	0.02 ●	ND(<0 005)	-
CHROMIUM	0.67 ●	-	-	-	0 75 ●	ND(<0 01)	-
LEAD	0.94 ●	-	ND(<0.04)	ND(<0.04)	0.6 ●	1.5	-
MERCURY	0.004 ●	-	ND(<0.002)	ND(<0.0002)	ND(<0.002)	0.24	19
OTHER							
TOTAL ORGANIC CARBON	70 ●	38 ●	350 ●	-	-	40	-
CHLORIDE	-	-	1100 ●	57 9 ●	40 0 ●	-	-

ND None Detected
- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN BETWEEN JANUARY 14 AND MAY 1 OF 1986
● **Sample parameter is an observed release**

TABLE 4 (PART 1 OF 2)

SELECTED ANALYTICAL DATA
OLD DRUM STORAGE
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l)	Groundwater				
	A-9	A-10	A-11	W-6	W-7
VOLATILES					
VINYL CHLORIDE	ND	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND
1,1-DICHLOROETHANE	ND	ND	ND	ND	0 030
CHLOROFORM	ND	ND	ND	ND	0 025
CHLOROTOLUENE	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND	-
1,4-DICHLOROBENZENE	ND	ND	ND	ND	0 160
1,3-DICHLOROBENZENE	ND	ND	ND	ND	-
DICHLOROBROMOMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROETHANE	ND	ND	ND	ND	ND
1,1,1-TRICHLOROETHANE	ND	ND	0.04	ND	ND
CARBON TETRACHLORIDE	19	12	39	ND	89
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND
CIS-1,3-DICHLOROPROPENE	ND	ND	ND	ND	ND
TRICHLOROETHENE	ND	ND	ND	ND	0 110
TRICHLOROFLOURMETHANE	ND	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND
BENZENE	ND	ND	ND	ND	0 017

ND None Detected (<0.010 mg/l)
\- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN BETWEEN MARCH 13 AND MARCH 17 OF 1986

TABLE 4 (PART 2 OF 2)

SELECTED ANALYTICAL DATA
OLD DRUM STORAGE
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l)	Groundwater				
	A-9	A-10	A-11	W-6	W-7
TRANS-1,3-DICHLOROPROPENE	ND	ND	ND	ND	ND
2-CHLOROETHYL VINYL ETHER	ND	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND	ND
TETRACHLOROETHENE	ND	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
TOLUENE	0.26	0.04	5.70	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	0 190
CHLORODIBROMOMETHANE	ND	ND	ND	ND	ND
ETHYLBENZENE	ND	ND	ND	ND	ND
METHYLBROMIDE	ND	ND	ND	ND	ND
METHYLCHLORIDE	ND	ND	ND	ND	ND
METHYLENE CHLORIDE	ND	ND	ND	ND	ND
TOTAL XYLENE	ND	ND	ND	ND	ND
OTHER					
TOTAL ORGANIC CARBON	30	20	30	14	150
CHLORIDE	595	165	115	-	-

ND None Detected (<0.010 mg/l)
- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN BETWEEN MARCH 13 AND MARCH 17 OF 1986

TABLE 3 (PART 1 OF 2)

SELECTED ANALYTICAL DATA
DISCHARGE PIPE
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Soil					
	A-8 (2 ft.)	A-3 (3 ft.)	A-6 (3 ft.)	A-7 (3-4.5 ft. C)	A-6 (6 ft.)	A-3 (6.5-7 ft.)
VOLATILES						
VINYL CHLORIDE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
CHLOROETHANE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
1,1-DICHLOROETHENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
TRANS-1,2-DICHLOROETHENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
1,1-DICHLOROETHANE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
CHLOROFORM	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
CHLOROTOLUENE	ND(<0.100)	ND(<0.100)	-	-	-	ND(<0.100)
1,2-DICHLOROBENZENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
1,4-DICHLOROBENZENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
1,3-DICHLOROBENZENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
DICHLOROBROMOMETHANE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
1,2-DICHLOROETHANE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
1,1,1-TRICHLOROETHANE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
CARBON TETRACHLORIDE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
1,2-DICHLOROPROPANE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
CIS-1,3-DICHLOROPROPENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
TRICHLOROETHENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
TRICHLOROFLOURMETHANE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
1,1,2-TRICHLOROETHANE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
BENZENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
TRANS-1,3-DICHLOROPROPENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
2-CHLOROETHYL VINYL ETHER	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
BROMOFORM	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
TETRACHLOROETHENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
1,1,2,2-TETRACHLOROETHANE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
TOLUENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
CHLOROBENZENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
CHLORODIBROMOMETHANE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
ETHYLBENZENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
METHYLBROMIDE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
METHYLCHLORIDE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
METHYLENE CHLORIDE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
TOTAL XYLENE (SEMIQUANTITATIVE)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
POLYCHLORINATED BIPHENYLS						
TOTAL POLYCHLORINATED BIPHENYLS	ND(<1.0)	ND(<1.0)	ND(<1.0)	ND(<1.0)	ND(<1.0)	ND(<1.0)
SAMPLING DATE	03/12/86	03/13/86	03/13/86	03/12/86	03/13/86	03/13/86

ND None Detected

C Composite

\- *Material not analyzed for or data were not available for inclusion*

NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN

TABLE 3 (PART 2 OF 2)

SELECTED ANALYTICAL DATA
DISCHARGE PIPE
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

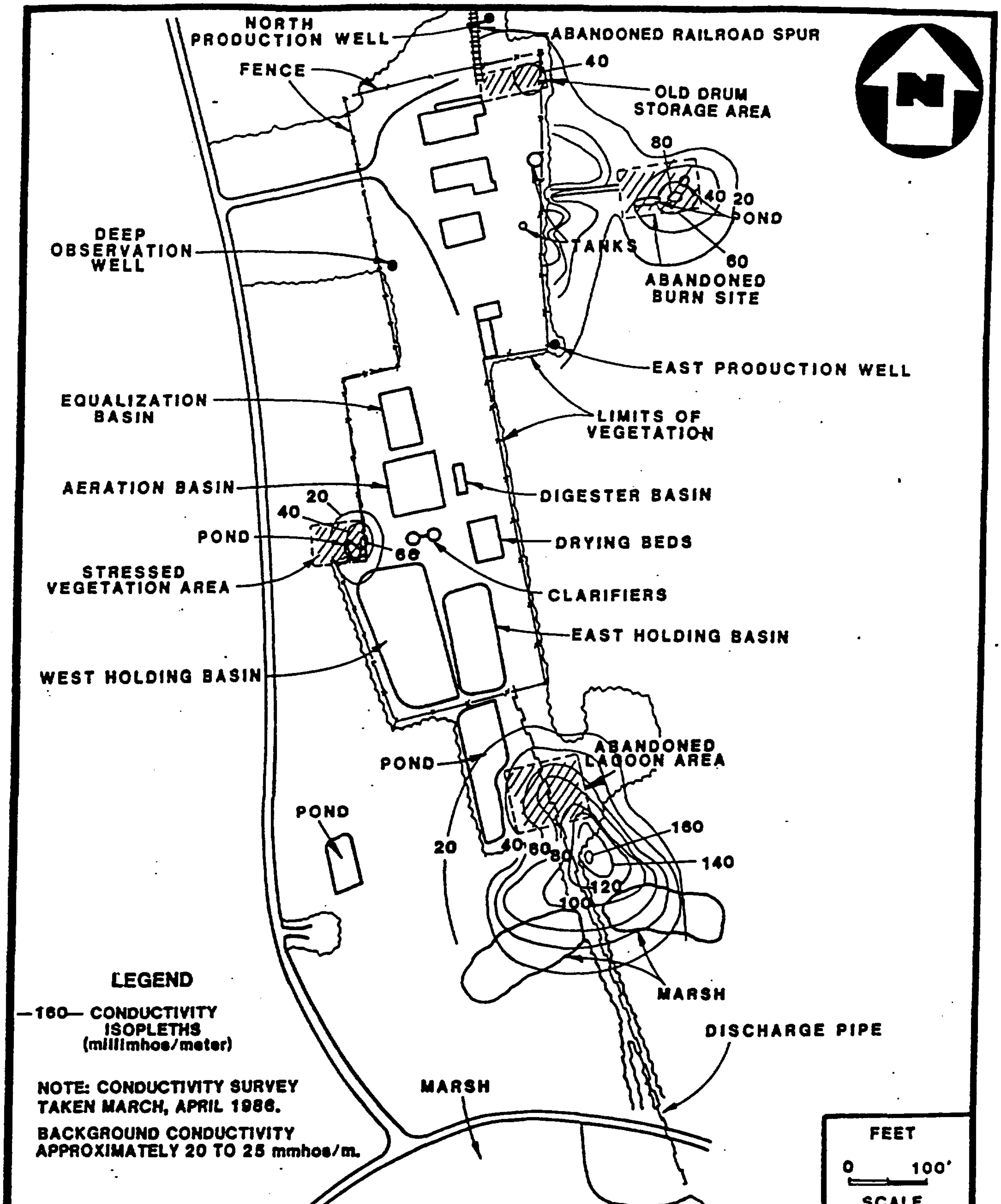
PARAMETERS (mg/l, mg/kg)	Groundwater				
	A-3	A-5	A-6	W-5	W-5
VOLATILES					
VINYL CHLORIDE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
CHLOROETHANE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,1-DICHLOROETHENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
TRANS-1,2-DICHLOROETHENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,1-DICHLOROETHANE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
CHLOROFORM	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
CHLOROTOLUENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	-
1,2-DICHLOROBENZENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,4-DICHLOROBENZENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,3-DICHLOROBENZENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
DICHLOROBROMOMETHANE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,2-DICHLOROETHANE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,1,1-TRICHLOROETHANE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
CARBON TETRACHLORIDE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,2-DICHLOROPROPANE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
CIS-1,3-DICHLOROPROPENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
TRICHLOROETHENE	ND(<0.010)	ND(<0.010)	0.056	ND(<0.010)	ND(<0.010)
TRICHLOROFLOURMETHANE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,1,2-TRICHLOROETHANE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
BENZENE	ND(<0.010)	ND(<0.010)	0.010	ND(<0.010)	ND(<0.010)
TRANS-1,3-DICHLOROPROPENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
2-CHLOROETHYL VINYL ETHER	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
BROMOFORM	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
TETRACHLOROETHENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,1,2,2-TETRACHLOROETHANE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
TOLUENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
CHLOROBENZENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
CHLORODIBROMOMETHANE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
ETHYLBENZENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
METHYLBROMIDE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
METHYLCHLORIDE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
METHYLENE CHLORIDE	ND(<0.010)	ND(<0.010)	ND(<0.010)	0.080	ND(<0.010)
TOTAL XYLENE (SEMIQUANTITATIVE)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
POLYCHLORINATED BIPHENYLS					
TOTAL POLYCHLORINATED BIPHENYLS	-	-	-	ND(<0.001)	ND(<0.001)
OTHER					
TOTAL ORGANIC CARBON	100	60	50	-	-
SAMPLING DATE	03/13/86	03/13/86	03/13/86	04-04-86	05-01-86

ND None Detected

C Composite

\- Material not analyzed for or data were not available for inclusion

NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN

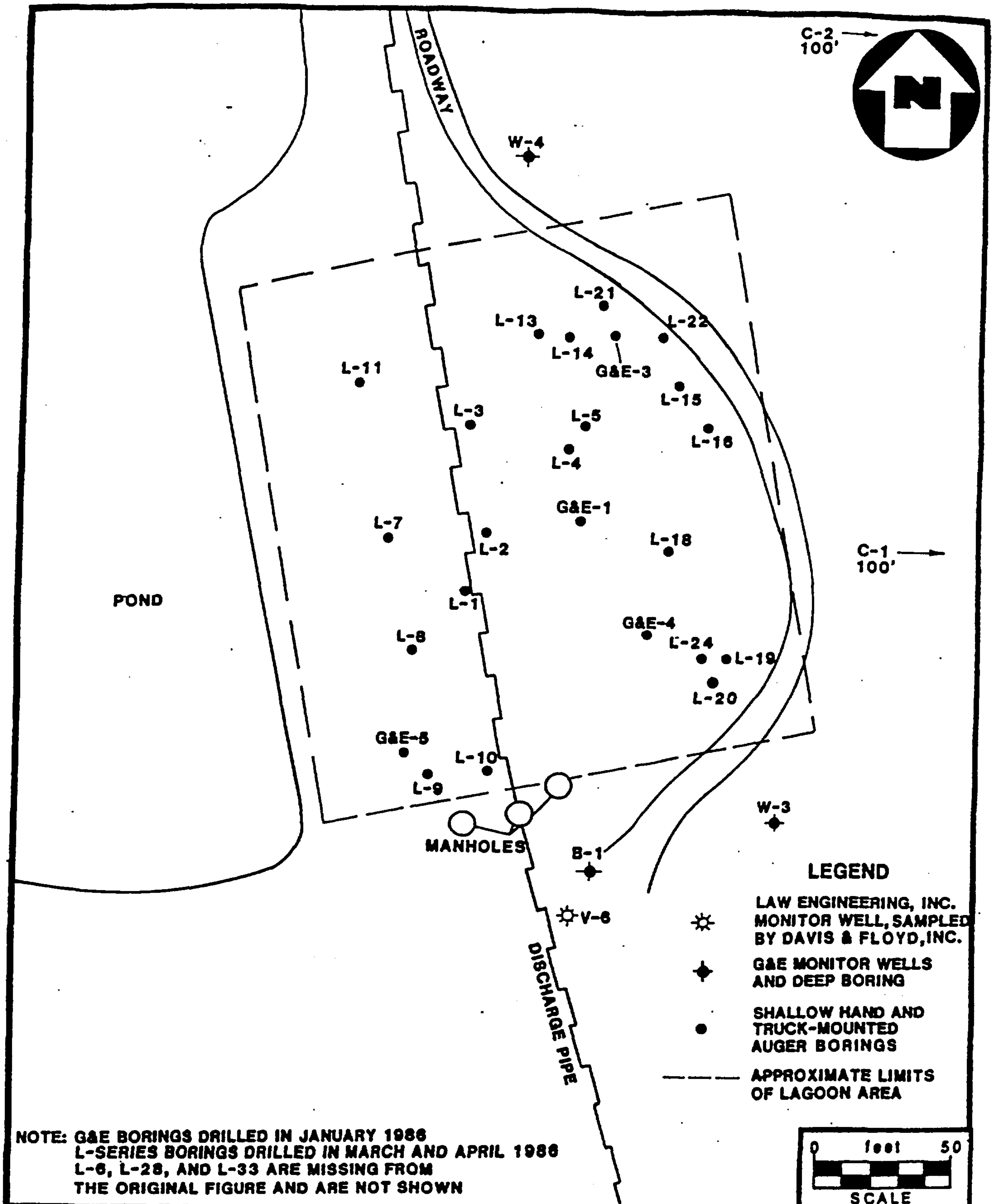


SOURCE: REDRAWN AND ADAPTED FROM FIGURE 5B, G&E ENGINEERING 1986.

GEOPHYSICAL (CONDUCTIVITY) SURVEY
AMERICAN COLOR AND CHEMICAL / VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

FIGURE 3

SCIENCE AND TECHNOLOGY CORP.

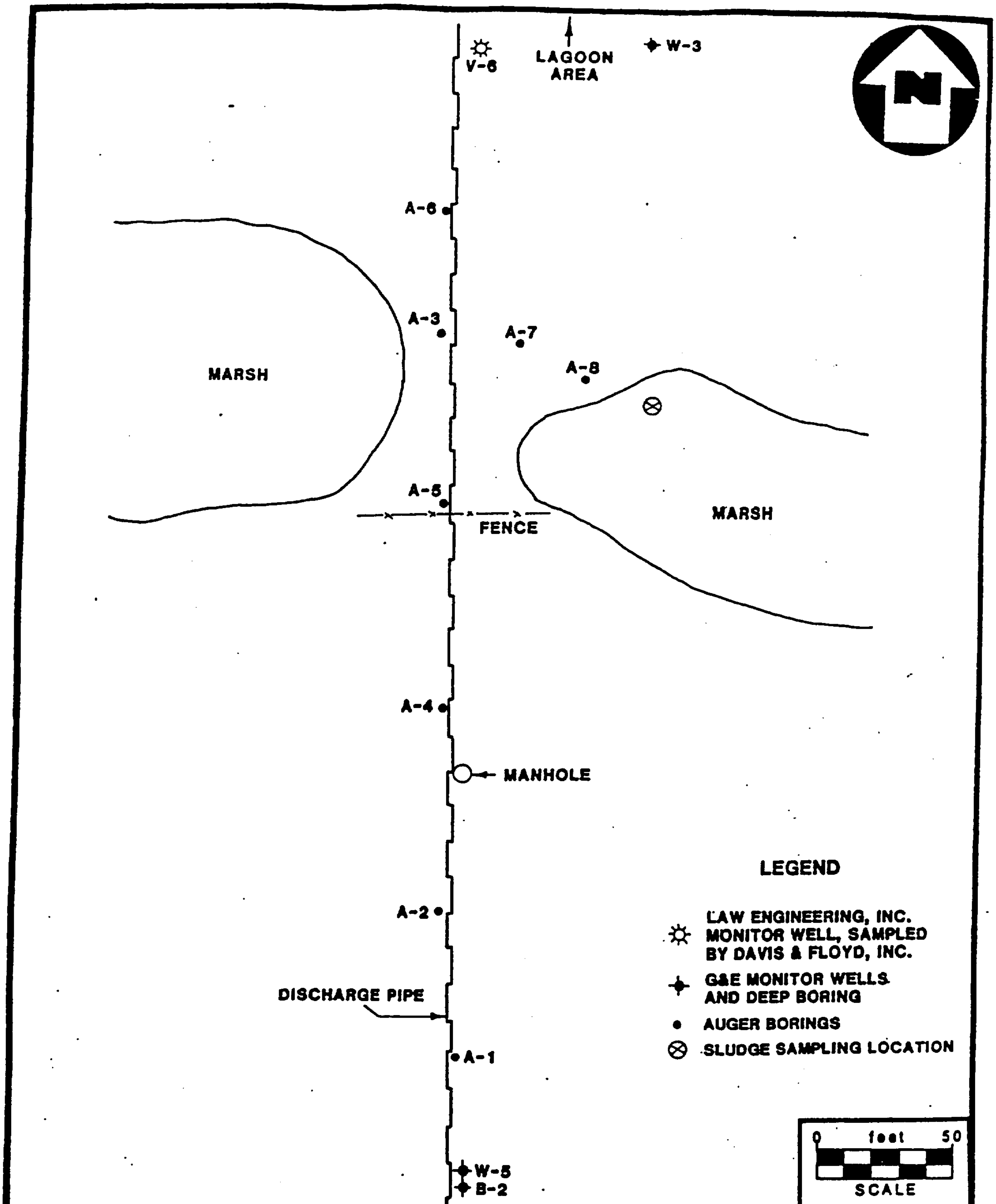


SOURCE: REDRAWN AND ADAPTED FROM FIGURE 6A, G&E ENGINEERING 1986.

SAMPLE LOCATION MAP
ABANDONED LAGOON AREA
AMERICAN COLOR AND CHEMICAL / VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

FIGURE 4

SCIENCE AND TECHNOLOGY CORP.

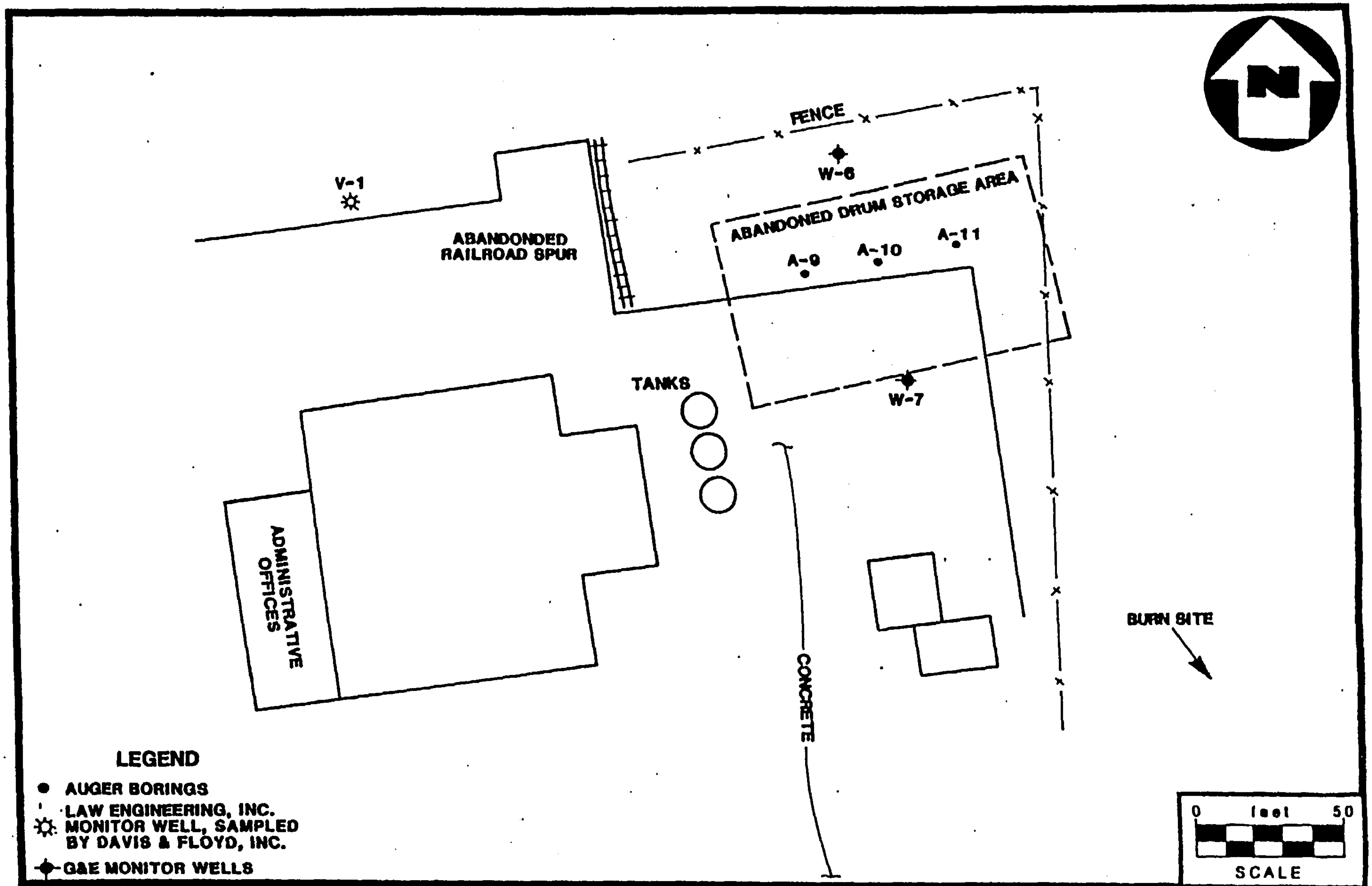


SOURCE: REDRAWN AND ADAPTED FROM FIGURE 6E, G&E ENGINEERING 1986.

SAMPLE LOCATION MAP
DISCHARGE PIPE
AMERICAN COLOR AND CHEMICAL / VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

FIGURE 5

ARTIC SCIENCE AND TECHNOLOGY CORP.

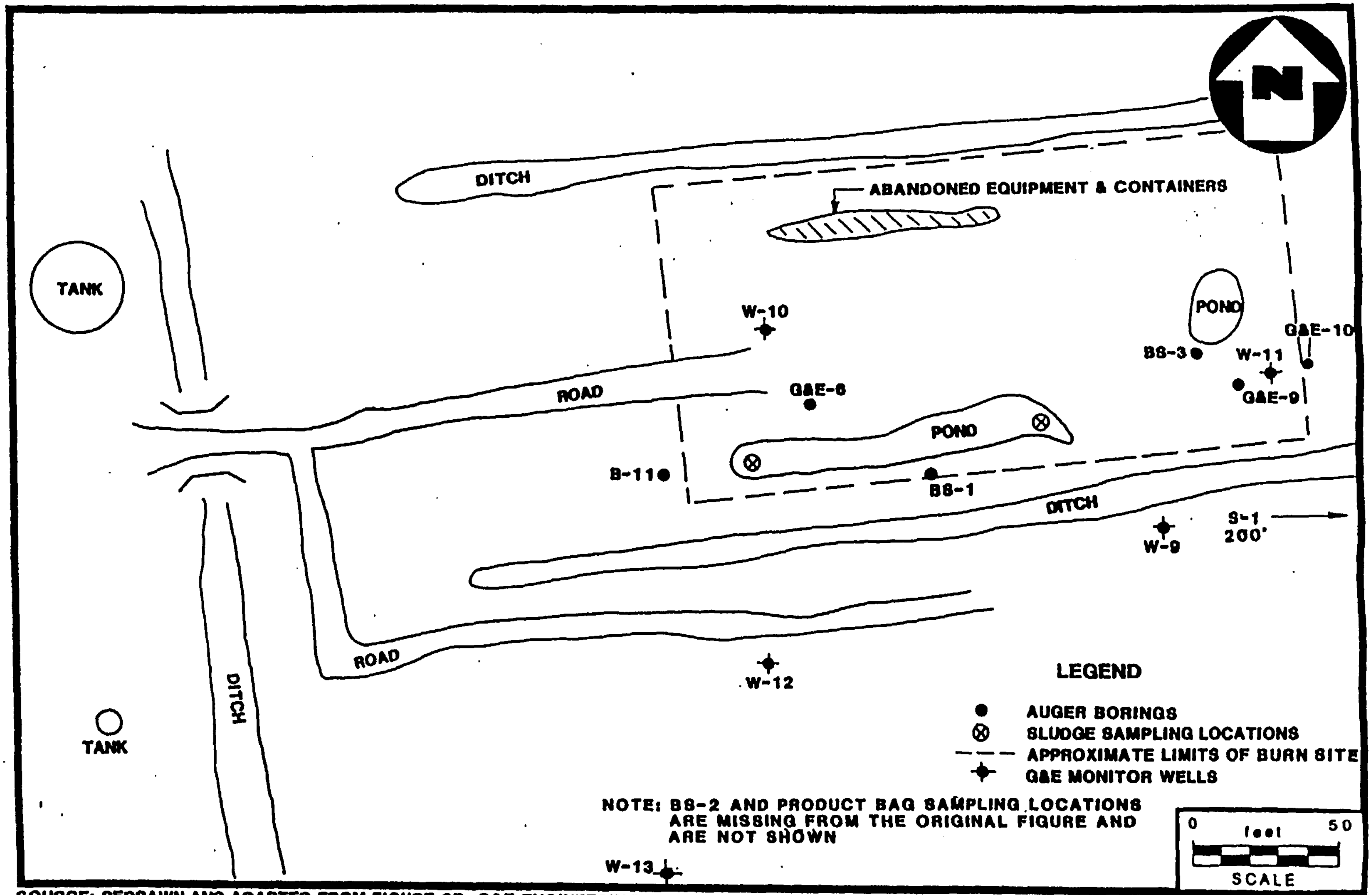


SOURCE: REDRAWN AND ADAPTED FROM FIGURE 6C, G&E ENGINEERING 1986.

SAMPLE LOCATION MAP
OLD DRUM STORAGE AREA
AMERICAN COLOR AND CHEMICAL / VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

FIGURE 6

SCIENCE AND TECHNOLOGY CORP.

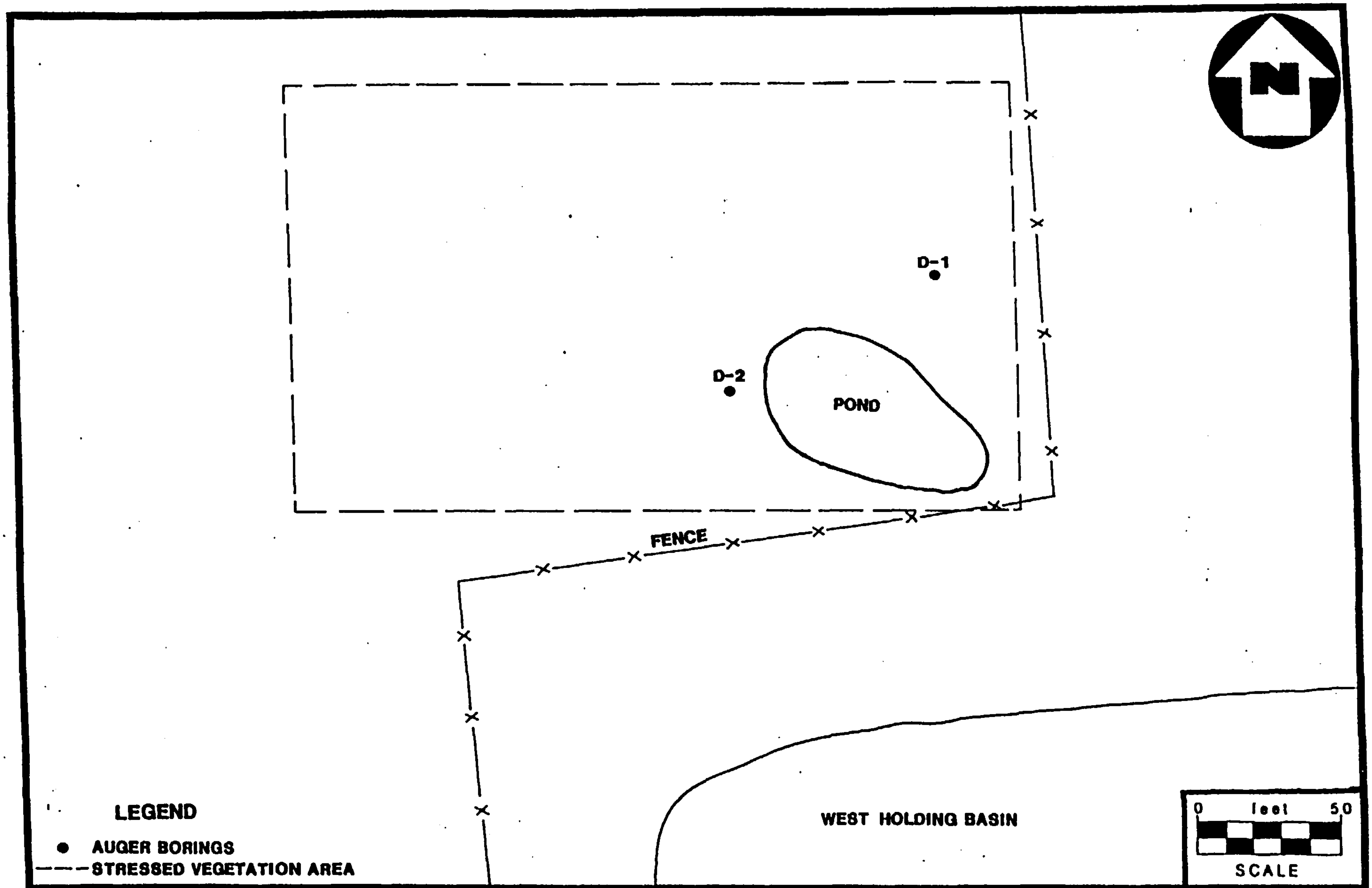


SOURCE: REDRAWN AND ADAPTED FROM FIGURE 6B, G&E ENGINEERING 1986.

SAMPLE LOCATION MAP
BURN SITE
AMERICAN COLOR AND CHEMICAL / VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

FIGURE 7

...SCIENCE AND TECHNOLOGY CORP.



SOURCE: REDRAWN FROM FIGURE 6D, G&E ENGINEERING 1986.

SAMPLE LOCATION MAP
STRESSED VEGETATION AREA
AMERICAN COLOR AND CHEMICAL / VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

FIGURE 8

BASTE SCIENCE AND TECHNOLOGY CORP.

R-586-9-0-27

Approved 10/30/90 Recommend SIP G. Bozeman

FINAL REPORT

SCREENING SITE INSPECTION, PHASE II
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA
EPA ID #SCD046507018

Prepared Under
TDD No. F4-8904-54
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Revision 0

FOR THE

WASTE MANAGEMENT DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

SEPTEMBER 21, 1990

NUS CORPORATION
SUPERFUND DIVISION

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NOTICE

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EXECUTIVE SUMMARY

American Color and Chemical/Venture Chemical is located near the Coosaw River, about 12 miles northwest of Beaufort, South Carolina. The 26-acre site is currently owned by Lobeco Products, Inc. Previous tenants at the site include the Tenneco Chemical Company and the American Color and Chemical Company. The facility has primarily manufactured dye chemicals and intermediates during its more than 20-year history. Prior to February 1977, a lagoon, burn site, and drum storage area were used to manage waste at the facility. These areas have consistently shown elevated concentrations of chlorinated organics and heavy metals in environmental samples collected during previous investigations. The facility is currently under a consent order with the state to remediate the lagoon and burn site by December 1990.

Lobeco, South Carolina, is situated within the Coastal Plain Physiographic Province in a region that is characterized by low flatland inundated with water. The geology of the study area involves a thick wedge of sedimentary rocks, which can be divided into several hydrologic units based on differences in permeability and hydrologic characteristics. The uppermost hydrologic unit at this facility is the surficial aquifer, which consists of intermixed sand and clay layers. It is underlain by a thick sequence of green clay, which acts as an aquitard that separates the overlying unit from the deeper Tertiary Limestone Aquifer System. There are no wells in the Lobeco area that penetrate the full thickness of the Tertiary Limestone Aquifer System.

The surface water, groundwater, air, and onsite exposure pathways are of concern at American Color and Chemical/Venture Chemical. The surface water pathway was determined to be of primary concern. Several previous sampling investigations have shown that the sediment and fauna of nearby Campbell Creek are contaminated with polychlorinated biphenyls (PCBs). Numerous commercial fish species are considered at risk from releases of contaminants to the surface water pathway. The groundwater pathway is the next most significant pathway of concern at this site. There are approximately 182 people using the surficial aquifer within 4 miles of the site, and at least one of these users is located directly downgradient of the burn site. The air and onsite exposure pathways are of concern due to the presence of uncontained, contaminated soils. Potentially affected targets include local students, employees, and residents.

In November 1986, G & E Engineering, Inc. conducted a study at American Color and Chemical/Venture Chemical which involved a geophysical screening and the evaluation of analytical data from 197 samples. The geophysical instrument that was utilized delineated several zones of higher conductivity; which are interpreted to represent areas containing contaminated soil and groundwater. The analytical test results verify that the same areas are primarily contaminated with chlorinated organics and/or metals. The constituents, which are of primary concern, include: PCBs, trichloroethene (TCE), methylene chloride, lead, and mercury. All of these were found in soil and groundwater samples at concentrations significantly over background and are known components of waste deposited at this site. Also, the same type of contamination was found in several downgradient wells, which suggests that contaminants are migrating from this site.

Although extensive contamination has been documented in soil, groundwater, and sediment at and near the site, the facility is under a consent order with the state for remediation. Should all wastes and contaminated soils be removed, this site would not be a viable candidate for a Listing Site Inspection (LSI). Therefore, FIT 4 recommends that consideration of any further action at this site be contingent upon results of the ongoing remediation.

1.0 INTRODUCTION

The NUS Corporation Region 4 Field Investigation Team (FIT) was tasked by the U.S. Environmental Protection Agency (EPA), Waste Management Division to conduct a Phase II Screening Site Inspection (SSI) at the American Color and Chemical/Venture Chemical site in Lobeco, Beaufort County, South Carolina. The investigation 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). The task was performed to satisfy the requirements stated in Technical Directive Document (TDD) number F4-8904-54. At EPA's directive, FIT conducted no field activities for this SSI; analytical data incorporated into this report were generated during two previous studies at the site.

1.1 OBJECTIVES

The objectives of this investigation were to determine the nature of contaminants present at the site and to determine if a release of these substances has occurred or may occur. Further, this investigation sought to determine the possible pathways by which contamination could migrate from the site and the populations and environments it would potentially affect. Through these objectives, a recommendation was made regarding future activities at the site.

1.2 SCOPE OF WORK

The objectives were achieved through the completion of a number of specific tasks. These activities were to:

- Obtain and review background material relevant to HRS scoring of the site;
- Obtain maps of site;
- Obtain information on local water systems;
- Evaluate target population within a 4-mile radius of the site with regard to the groundwater and air pathways, and the possibility of direct contact, and within 15 downstream miles with regard to surface water use;

- Conduct a survey for private wells;
- Determine location and distance to nearest potable well;
- Develop a site sketch to scale;
- Reevaluate previous field investigations performed by Davis & Floyd, Inc. and G & E Engineering, Inc.; and
- Complete a Site Inspection Report, provided as Appendix A in this report.

2.0 SITE CHARACTERIZATION

2.1 SITE BACKGROUND AND HISTORY

American Color and Chemical/Venture Chemical is located just north of the Coosaw River, approximately 12 miles northwest of the town of Beaufort (Ref. 1, p. 1). Specifically, the site is located southeast of the intersection of highways 38 and 480 (Ref. 2). It is presently owned and operated by Lobeco Products, Inc. (Ref. 3, p. 1).

The plant was originally built by Tenneco Chemical Company in 1967. It was sold to American Color and Chemical Company in January 1974, and then resold to Venture Chemical Company in October 1982. Venture Chemical Company has since then changed its name to Lobeco Products, Inc. (Ref. 3, p. 1).

Lobeco primarily manufactures agric-products, dye intermediates, and drilling fluid chemicals for the oil industry. The chemicals used and produced on site consist mostly of organic compounds. Acidic industrial wastewater is generated as a by-product of the manufacturing process. This wastewater is neutralized in an onsite water treatment plant and then discharged into nearby Campbell Creek (Ref. 3, pp. 1-2).

Prior to the installation of the wastewater treatment system, a lagoon, drum storage area, and burn site were used to manage waste at the facility. These areas have consistently shown elevated concentrations of chlorinated organics (especially polychlorinated biphenyls) and/or heavy metals in environmental samples collected thus far (Ref. 3, p. 2). The samples were collected during three previous investigations: in September 1985, between January and May of 1986, and in March and April of 1988 (Appendices B, spread sheet; C, p. 1-5). The 1985 and 1986 sampling investigations were conducted by Davis & Floyd, Inc. and G & E Engineering, Inc., respectively. Both studies were performed because the South Carolina Department of Health and Environmental Control (DHEC) suspected contamination based upon previous water quality studies in nearby Campbell Creek (Appendix C, pp. 1-3, 1-4). G & E evaluated both sets of data in their November 1986 report entitled, Ongoing Soil and Groundwater Study and Conceptualized Cleanup Plan, Venture Chemicals, Inc., Lobeco, South Carolina (Appendix B, p. 31). The 1988 investigation was initiated by RMT, Inc. to fulfill the requirements of a DHEC Consent Order (No. 87-65-W) dated June 25, 1987 (Appendix C, pp. 1-4, 1-5). The findings of this study are presented in RMT's Lobeco Site Environmental Assessment, Results and Proposed Remedial Action Plans for American Color and Chemical Corporation and Tenneco Resins, Inc., dated September 1988 (Appendix C).

Consent Order 87-65-W was amended on October 11, 1989 (Ref. 4). The amendment was incorporated into the original order and requires that the present and past owner(s) of the chemical plant are to remove "high level" contamination at the abandoned lagoon and burn site (Ref. 5, pp. 1, 3). The latter document also includes a provision which specifies that the extent of groundwater contamination for "certain" areas on the property be delineated during future studies (Ref. 5, p. 1). This stipulation was intended to expedite implementation of the clean-up plan, which is targeted for completion in December of 1990 (Refs. 5, p. 1; 6; Appendix C, p. 10-2).

Lobeco Products, Inc. was also issued consent orders for two separate violations of its National Pollution Discharge Elimination System (NPDES) permit (no. SC0000914). The first consent order (86-94-W) was issued on September 29, 1986 for a violation of the toxicity limit (Ref. 7). The company also violated the toxicity limit, in addition to the limits for biochemical oxygen demand, total coliform, and ultimate oxygen demand, which initiated the issuance of the second order (88-37-W) (Ref. 8, p. 5). The August 8, 1988 document ordered Lobeco to "immediately begin and continue to properly operate and maintain its waste treatment facilities so as to maximize treatment" (Ref. 8, pp. 6-7). The only other permit violation that is known to have occurred at this facility is for failure to monitor polychlorinated biphenyls (PCBs) on a weekly basis. Venture Chemicals, Inc. received a Notice of Violation on December 18, 1985 for this infraction, but no enforcement action was ever taken (Ref. 9).

Lobeco Products, Inc. filed a part A application under the Resource Conservation and Recovery Act (RCRA) for waste treatment in tanks and the old lagoon. The tank treatment was later given exclusion under RCRA because it was a Waste Water Treatment Unit. Also, the waste in the lagoon was determined to be nonhazardous. Because of this, the Part A application was withdrawn on October 18, 1984 (Ref. 3, p. 2).

2.2 SITE DESCRIPTION

2.2.1 Site Features

The facility property consists of approximately 250 acres (Ref. 1, p. 1). Within these 250 acres, five contaminated areas connect to form an elongated, 26-acre parcel of land, which is considered the site (Figure 1). The contaminated areas include: the abandoned lagoon, the sediments and marsh near the Lobeco outfall, the old drum storage area, the old burn site, and an area of stressed vegetation (Ref. 3, pp. 2-3, 5). The site has an average downward slope of 0.006 ft/ft (Appendix B, p. 24).

Several active waste management facilities are located in the site area. These are part of the NPDES water treatment system and consist of the following: an equalization basin, an aeration basin, a digester basin, clarifiers (two), drying beds, and holding ponds (east and west ponds) (Ref. 3, p. 2). All of the active waste management facilities, and one of the inactive waste sites (drum storage area), are completely surrounded by a fence. A gate at the northwest corner provides the only security access. The site layout is depicted in Figure 2.

2.2.2 Waste Characteristics

Historical effluent and solid waste management practices at this facility involved the lagoon, drum storage area, and burn site. The lagoon was used as a settling basin for process effluent, which consisted of aqueous product extractions (washes) and cooling water mixed in with sanitary waste. Off-grade products and other process wastes were kept at the drum storage area prior to being incinerated at the burn site (Ref. 10, p. 9). Several of these materials are known to have contained either PCB, naphthalene, or toluene (Ref. 10, pp. 11-12). No known waste quantity information exists for inactive waste management facilities at this site (Ref. 10, p. 12).

The chemical plant also operated a hot oil circulating system for certain reactions that require higher than normal temperature. The hot oil system operated on electric heaters in a pump-around loop. On occasion, pump leaks developed and/or electric heating tubes failed, which resulted in spills onto the plant floor. When this happened, the standard clean-up procedure was to scoop up as much as possible into drums. The residue was then washed into the floor drain system, which ultimately led into the effluent system and then to the lagoon. The heating oil that was initially used was a PCB (Arochlor 1248) supplied by Monsanto (Ref. 10, p. 10).

Historical aerial photographs show that the new wastewater treatment facilities were installed between September 1975 and February 1977 (Appendix B, p. 12). The plant currently utilizes the activated sludge method to treat wastes (Refs. 3, p. 2; 11). Only non-hazardous wastes undergo treatment (Ref. 1, p. 2). Sludge solids from the bio-treatment area are landfilled at an offsite location (Refs. 1, p. 2; 11). Lobeco Products, Inc. transports liquid hazardous wastes off site (Ref. 1, p. 2).

Various types of containment exist at each of the former disposal areas. A PCB contaminated sludge layer at the bottom (8 feet) of the old lagoon was covered by a 1- to 2-foot natural earth cap and then backfilled (Ref. 10, p. 11; Appendices B, pp. 13, 39; C, p. 2-2). The old drum storage area has been partially covered with a concrete pad (Appendix B, p. 6). There is no artificial cover on the burn site, but the area is completely overgrown with groundcover-type vegetation (Appendix B, pp. 13-14, 39). Finally, all of the former disposal areas are unlined (Refs. 10, p. 12; 12).

3.0 REGIONAL POPULATIONS AND ENVIRONMENTS

3.1 POPULATION AND LAND USE

3.1.1 Demography

American Color and Chemical/Venture Chemical is in a moderately populated rural area approximately 12 miles northwest of Beaufort, South Carolina (Ref. 3, p. 3; Appendix B, p. 24). Most of the population in the area consists of full-time residents. A house count on USGS topographic maps covering the area indicated that 4,313 people (1,135 houses x 3.8 people/house) live within 4 miles of the site; 380 people (100 houses x 3.8 people/house) were counted within 1 mile. The nearest residence is located 500 feet east of the site (Appendix D).

There are very few work areas and schools in the study area. The only major work area known to exist within 4 miles of the site is the Marine Corps Air Station on Port Royal Island (Appendix D). Also, there are currently 75 employees at the Lobeco plant (Ref. 13, p. 3). No schools or day-care centers are located adjacent to the site (Ref. 13, p. 11; Appendix D). The nearest school is James Davis Elementary, which is located approximately 1 mile east of the site (Appendix D). There are 436 students attending this school (Ref. 14).

3.1.2 Land Use

The area within a 4-mile radius of the site is characterized by low flatland inundated with surface water (Ref. 15, pp. 5, 13). Because of this, the majority of land surrounding American Color and Chemical/Venture Chemical is sparsely settled (Ref. 15, p. 13). Nevertheless, agriculture plays an important role in the economy of the area (Ref. 15, p. 16).

Agricultural uses include livestock and crop production. Crops grown include corn, soybeans, small grains, fruits, and vegetables (Ref. 16). There are no parks or land-related sensitive environments within 4 miles of the site (Refs. 13, p. 11; 17; Appendix D).

3.2 SURFACE WATER

3.2.1 Climatology

Beaufort County is characterized by a subtropical climate with hot and humid summers and mild winters. The annual rainfall is approximately 50 inches with the greatest precipitation occurring from June to August (Ref. 15, pp. 5, 9). Annual evapotranspiration is 44 inches, making net annual precipitation approximately 6 inches (Ref. 18). Mean annual temperature for the Lobeco area is approximately 66°F (Ref. 15, p. 10).

3.2.2 Overland Drainage

Surface water runoff from the property collects in an onsite drainage ditch system (Appendix B, p. 24). The water in the ditch flows south and eventually empties into a tidally influenced marsh area that surrounds Campbell Creek (Ref. 19, p. 17; Appendix B, p. 24).

3.2.3 Potentially Affected Water Bodies

Overland drainage discharges into the tidal marsh surrounding Campbell Creek. During ebb tide, Campbell Creek flows southeasterly into Whale Branch of the Coosaw River (Ref. 20; Appendix D). The surface water migration pathway ends in the Coosaw River, approximately 9 miles downstream from its confluence with Whale Branch (Ref. 17). During flood tide, however, flow direction is reversed, and the migration pathway extends to include several additional tributaries of Whale Branch and the Coosaw River (Refs. 17; 20; 21; Appendix D).

Along the surface water migration pathway, the waters are designated Class SA (Ref. 22, pp. 272, 277). This is indicative of saltwaters suitable for harvesting of clams, mussels, and oysters for human consumption (Ref. 22, p. 272). There are no drinking water intakes downstream from the site (Ref. 23).

Numerous sensitive environments are present along the surface water migration pathway. All of the potentially affected water bodies lie contiguous to coastal wetlands (Ref. 17; Appendix D). These wetlands, and their associated drainageways, serve as a nursery and breeding ground for the eastern oyster (Crassostrea virginica) (Ref. 17). The drainageways also provide a habitat for numerous commercial fish species and most areas have been approved for shellfish harvesting (Refs. 17, 24). Minor exceptions basically include Campbell Creek, a portion of Whale Branch near its confluence with the creek, and several tributaries to the Coosaw River that are hydrologically interconnected with the nearby Beaufort River (Ref. 24). Finally, the Florida manatee (Trichechus manatus) and shortnose sturgeon (Acipenser brevirostrum) are designated as federally endangered and may be found along the migration pathway (Refs. 17; 25, section 6). These species have no critical habitats in the state of South Carolina (Ref. 25, section 7).

A significant amount of analytical data has been generated from previous water quality studies along the surface water migration pathway. The earliest samples were collected in August 1983 as part of an evaluation for the facility's discharge permit. At this time, the Chemical Oceanography Section of the Marine Resources Research Institute collected oyster samples from Campbell Creek. The samples contained very complex mixtures of organic compounds and showed elevated concentrations of lead (>2.0 ppm). Subsequent to these findings, DHEC conducted an assessment of the creek area in order to further evaluate the influence of the plant's discharge on the environment (Ref. 26). Samples that were collected in November 1983 showed sixty-six (66) organic chemical compounds in oyster tissue, sediment, and the Lobeco plant effluent (Ref. 27, p. 1). The investigation concluded that the fauna in Campbell Creek had been moderately to severely impacted due to the discharge of wastewater from the facility. However, the study did not present any direct evidence of fish kills in the creek (Ref. 27, p. 2).

The November 1983 sampling investigation led to several additional water quality studies in the Campbell Creek area. The testing was conducted in 1984 by both DHEC and an outside consultant to the chemical plant. The results from these studies showed an improvement in the water quality and biota of Campbell Creek, although PCBs were detected in the sediment near the Lobeco outfall. Analysis for PCBs was not performed during previous testing (Appendix C, p. 1-3).

The remaining water quality studies that have been conducted along the surface water migration pathway basically involve the monitoring of PCBs. DHEC collected samples of blue crabs (Callinectes sapidus) from Campbell Creek and its associated water bodies during September and October of 1985 (Ref. 28; Appendix C, p. 1-3). Detectable levels of PCBs were found in nearly all the samples (Ref. 28). The samples that showed the highest concentrations (mean = 0.949 ppm) were those collected near the discharge pipe (Ref. 28; Appendix C, pp. 1-3, 1-4). Other PCB monitoring was performed by the Marine Resources Division between June and October of 1985. During this time, they collected crab, oyster, and sediment samples along Campbell Creek and Whale Branch. The results from this analyses were similar to previous DHEC findings. The highest concentration detected (25.21 ppm) was from a sediment sample collected at the Lobeco outfall (Ref. 26). Finally, the facility is required to monitor PCBs on a weekly basis as part of their NPDES permit (Refs. 9; 19, p. 18). The permit also requires that several types of biological studies be conducted on a regular basis, but discussion of these studies is outside the scope of this investigation (Ref. 19, pp. 18-19).

3.3 GROUNDWATER

3.3.1 Hydrogeology

American Color and Chemical/Venture Chemical is located in the lower part of the Coastal Plain Physiographic Province (Refs. 15, pp. 5, 9; 29, p. 379; Appendix D). The topography of the surrounding area is characterized by low relief, lagoons, tidal swamps, and salt marshes (Appendix C, p. 4-1). The region is underlain by a thick wedge of sedimentary rocks, which unconformably overlie crystalline igneous and metamorphic rocks equivalent to rocks of the Piedmont Physiographic Province (Ref. 22, pp. 22-23).

The formations within the upper portion of this sedimentary wedge comprise the aquifers that are used in the study area (Refs. 15, p. 32; 22, p. 23; Appendix C, p. 4-1). The youngest of these is the Pamlico Formation, which represents the surface geology at the site (Appendix B, p. 25). Underlying units in descending order include: the Hawthorn and Cooper formations, the Ocala and Santee limestones, and the Black Mingo Formation (Refs. 22, pp. 23, 25; 29, pp. 380-381; Appendix B, pp. 25-26). These formations may be divided into several hydrologic units based on differences in permeability and hydrologic characteristics.

The uppermost hydrogeologic unit at American Color and Chemical/Venture Chemical is the unconfined surficial or water-table aquifer (Appendix B, p. 25). This unit consists primarily of quartz sand and lenses of clay to a depth of 35 to 40 feet below land surface (bls) (Appendices B, p. 4-1; C, p. 25). Although the saturated thickness of this unit is dependent on climatic conditions, elevations of nearby streams indicate the water table is between 5 and 10 feet bls (Refs. 3, p. 3; 29, p. 379). Recharge to this aquifer is from local rainfall (Ref. 29, p. 379; Appendix C, p. 4-5).

The water-table aquifer is underlain by approximately 50 feet of green clay from the Hawthorn and Cooper formations (Appendices B, p. 26; C, p. 4-2). This unit has a hydraulic conductivity of 10^{-7} cm/sec and serves as an aquitard that separates the overlying unit and the deeper Tertiary Limestone Aquifer System (Appendices B, p. 50; C, p. 6-31). The Tertiary Limestone aquifer is about 900 feet thick and is divided into an upper and a lower hydrologic unit (Refs. 22, p. 276; 30, p. 47). The upper unit consists of highly permeable fossiliferous limestone and is the primary source of groundwater in Beaufort County (Refs. 15, pp. 31-32; 29, p. 380; 30, p. 47). The lower unit is moderately productive and is not used as extensively as the upper unit (Ref. 30, p. 55). Recharge to the Tertiary Limestone aquifer is primarily through downward leakage from overlying units (Ref. 30, p. 73). The Tertiary Limestone Aquifer System is underlain by the Black Mingo Formation, which acts as a 400-foot thick confining layer (Refs. 22, p. 23; 29, p. 381; 30, p. 27).

Groundwater in the surficial, water-table aquifer system flows south toward Campbell Creek, reflecting the general influence of topography on the water table (Appendices B, pp. 28-29; C, p. 6-9). In the Tertiary Limestone aquifer, groundwater flow is regionally toward the east (Ref. 15, pp. 53-54). Within 2 miles of the site, however, an induced cone of depression exists in the potentiometric surface of the Tertiary Limestone aquifer (Ref. 15, figure 19; Appendix B, p. 27). This occurs because two closely spaced production wells on the Lobeco property pump sizable quantities (about 500,000 gal/d each) from an area in the aquifer where the transmissivity is relatively low (less than 5,000 ft^2/d) compared to other locations in the region (Ref. 15, p. 56). Within the cone of depression, the groundwater flow direction is toward the Lobeco pumping center.

The production wells at the chemical plant have depths of 263 and 307 feet and are open to both the upper and lower units of the Tertiary Limestone Aquifer System. The upper unit is the most productive interval screened in these wells, and it extends from about 90 to 150 feet bls (Ref. 1, p. 3). It is also the unit in which most of the remaining wells in the Lobeco area are completed (Refs. 15, p. 32; 31; Appendix B, p. 27). These wells commonly yield between 100 and 300 gallons per minute (Ref. 29, p. 380).

3.3.2 Aquifer Use

The surficial aquifer, which is also the aquifer of concern, is used for drinking purposes (Refs. 3, p. 3; 29, p. 379). However, a local well driller estimated that it supplies water to only 5 percent of the wells found within the study area (Ref. 31). This corresponds to 38 homes within 3 miles of the site, since approximately 770 private well owners were identified on the USGS topographic maps covering the area; an additional 10 (0.05 x 193) are included when considering a 4-mile radius. This gives a total of 48 homes or 182 people (48 houses x 3.8 people/house) relying on groundwater from the surficial aquifer within 4 miles of the site. There are no public water systems associated with the surficial aquifer (Refs. 3, p. 4; 13, pp. 4-5; Appendix B, p. 27).

DHEC conducted all of the previous studies on potable groundwater near the site area. The only available analytical data are from a July 1989 report, which gives the results of samples taken from six nearby private water supply wells. These samples were analyzed for volatile organics, priority pollutant metals, selected secondary metals, acid base and neutral extractable components, PCBs, alkalinity, and total dissolved solids. The analytical test results show that the groundwater surrounding the American Color and Chemical/Venture Chemical site is not contaminated. However, the report indicates that PCBs were detected in one of the wells during an earlier study. This well, owned by Mr. Ronald Glenn, is screened in the Tertiary Limestone aquifer. It serves 5 people and is located about 800 feet from the abandoned lagoon. The Anderson well is located adjacent to the Glenn well and is the only well within one-quarter mile of the site that is completed in the surficial aquifer. The shallow well was one of the six wells sampled during the 1989 investigation (Ref. 32).

3.4 SUMMARY OF POTENTIALLY AFFECTED POPULATIONS AND ENVIRONMENTS

There are four pathways of concern at the site: the surface water, groundwater, air, and onsite exposure pathways. Each of these has been deemed a potential contaminant migration route because each pathway is viable and targets are associated with each pathway.

Surface water is the primary pathway of concern. It has been demonstrated from several previous sampling investigations that the sediment and fauna of Campbell Creek are contaminated with PCBs. The creek serves as a habitat for numerous commercial fish species and would be open to shellfish harvesting if it were not for the influence of the chemical plant's wastewater discharge. Also, there are at least two endangered species that may be present along the migration pathway.

The groundwater pathway is less significant but also of concern. Although the target population associated with the surficial aquifer is small, there is at least one shallow well located downgradient from the burn site which may eventually become contaminated. Furthermore, there has been evidence of possible PCB contamination in a nearby private well that is screened in the deeper Tertiary Limestone aquifer. If the two aquifers were considered as a single hydrologic unit, the target population would increase significantly from 182 people to about 4,170 people.

The air and onsite exposure pathways are of concern due to the presence of uncontained, contaminated soils. Potentially affected targets within a 4-mile site radius include students, employees, and residents. The population of residents within 4 miles of the site is estimated at 4,313. Targets for onsite exposure include 75 employees at the subject facility and 380 residents located within a 1-mile radius of the site.

4.0 FIELD INVESTIGATION

The data presented in this section was obtained from the G & E Engineering, Inc. report entitled Ongoing Soil and Groundwater Study and Conceptualized Cleanup Plan, Venture Chemicals, Inc., Lobeco, South Carolina. The G & E report provides analyses for nearly all environmental samples collected at the site prior to November 1986 (Appendix B, pp. 8, 31, spread sheet). The analytical results from the most recent sampling investigation by RMT, Inc. (Appendix C) are not discussed in this section because those samples were tested for only a limited number of constituents (Appendix C, p. 6-17). The G & E report also provides data from a geophysical survey that was conducted in March and April of 1986 (Appendix B, p. 15). This survey appears to have been utilized as a screening tool that aided in the selection of locations for subsequent sampling events. The results of the survey are presented in section 4.1; sampling information is presented in sections 4.2 and 4.3.

4.1 GEOPHYSICAL INVESTIGATION

A geophysical survey was conducted by G & E during their assessment of the subject site. The survey was performed to detect and map contaminated soil and groundwater by delineating zones of lower and higher conductivity around areas of concern (Appendix B, pp. 2, 15). The zones of higher conductivity are interpreted to represent areas where contaminants have escaped into the soil or groundwater systems (Appendix B, p. C). These contaminants produce an increase in free ion concentration (measured as conductivity) when introduced into the underlying media (Appendix B, p. 15). The zones of lower conductivity are indicative of natural background (Appendix B, p. C).

Background conductivity values ranged between 20 and 25 millimhos/meter (mmhos/m). Several areas at the facility showed conductivity values much greater than these background levels (Appendix B, p. 15). The old drum storage area, the abandoned lagoon, the burn site, and the stressed vegetation areas had anomalously high conductivities (50 to 80 mmhos/m or greater) relative to the background levels (Appendix B, pp. 15-16, figure 5a). The most anomalous area (150 mmhos/m) is that area just south of the abandoned lagoon, thought to be the location of runoff between the lagoon and marsh (Appendix B, pp. 15-16). The locations of all anomalous areas are depicted in Figure 3.

4.2 SAMPLE COLLECTION

The analytical data presented in the G & E report was collected during two previous sampling investigations: on September 18, 1985 and between January 13 and May 1 of 1986 (Appendix B, spread sheet). The earlier samples were collected to perform preliminary evaluations of the groundwater conditions at the site (Appendices B, p. 6; C, p. 1-3). To accomplish this, Davis & Floyd, Inc. sampled six permanent monitoring wells, the two plant production wells, and one deep observation well (Appendix B, p. 6). The latter samples were collected "to determine the source, nature and extent of zones of surface and subsurface contamination" (Appendix B, p. 1). To accomplish this, G & E collected product, sludge, soil, surface water, and groundwater samples from a number of strategic locations (Appendix B, spread sheet). These locations were selected based on previous monitoring well data, historical aerial photographs, an onsite reconnaissance, and the geophysical survey (Appendix B, p. 14). A total of 197 samples were collected between the two investigations (Appendix B, p. G, spread sheet). Only the background samples and samples that showed significant contamination will be discussed in this report.

4.2.1 Sample Collection Methodology

All sample collection, sample preservation, and chain-of-custody procedures used during these investigations were in accordance with standard operating procedures as specified in Sections 3 and 4 of the Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual; United States Environmental Protection Agency, Region IV, Environmental Services Division (ESD), April 1, 1986 (Appendix B, p. G).

4.2.2 Description of Samples and Sample Locations

One hundred and ninety-seven samples were evaluated in the November 1986 G & E report: 91 from the abandoned lagoon, 31 near the discharge pipe, 21 from the old drum storage area, 31 from the burn site, 8 from the stressed vegetation area, 7 from miscellaneous locations, and 8 from background locations (Appendix B, spread sheet). The miscellaneous locations represent groundwater samples collected by Davis & Floyd that are outside the confines of the contaminated areas (Appendix B, figure 4). Other samples (6) collected at the site include product, sludge, and surface water samples. These were taken from either the ponds at the burn site or the eastern part of the marsh area at the discharge pipe (Appendix B, p. 19, spread sheet). The remaining 184 (197-7-6) samples (soil and groundwater) were collected from numerous hand and truck-mounted auger borings that were converted into either temporary or permanent monitoring wells (Appendix B, pp. 16, 18-19, spread sheet). Sample locations for each of the five contaminated areas are shown in Figures 4 through 8.

The auger borings for the G & E investigation were drilled as either part of the "waste facility sampling program" or a program for "soil exploration." Under the waste facility sampling program, the borings were placed within areas of known contamination and advanced to shallow depths (<8 feet) (Appendix B, pp. 18-19). The samples obtained from these borings were collected at specified depths and used for analytical testing (Appendix B, p. 18, spread sheet). The test results provided important information concerning the vertical extent of contamination beneath each "source" area. The soil exploration borings are different because these were drilled adjacent to areas of known or suspected contamination (Appendix B, p. 17). This was done in order to determine the horizontal extent of contaminated media so that some of the borings could be converted into upgradient and downgradient permanent monitoring wells (Appendix B, pp. 2, 17). In addition to analytical testing, laboratory tests were performed on selected soil samples to determine permeability and engineering properties (Appendix B, p. 18). The final difference is that the soil exploration borings involved continuous split-spoon sampling (Appendix B, p. 17).

4.2.3 Field Measurements

Water level elevations were recorded by both G & E and Law Environmental Services during field activities. The measurements were used to generate water table maps (Ref. 1, p. 7; Appendix B, figures 11a, 11b). Also, each consultant conducted in-situ permeability tests (slug tests) on selected groundwater monitoring wells. The slug tests were performed to calculate hydraulic conductivities of the monitored soil strata (Ref. 1, p. 7; Appendix B, p. 20). Water level and time measurements were recorded during each slug test (Appendix B, pp. 20-21).

4.3 SAMPLE ANALYSIS

4.3.1 Analytical Support and Methodology

There are differences in the parameters tested and the analytical support for each investigation. Davis & Floyd performed their own analyses and tested each groundwater sample for the following parameters:

- temperature;
- pH;
- specific conductance;
- Total Organic Carbon (TOC);
- chloride;
- priority pollutant analysis for volatile organics (32 compounds);
- 1-aminoanthraquinone;
- aniline;
- dimethyl amine;
- p-chlorophenol;
- n-cyanoethyl-n-ethyl-m-toluidene (CEET); and
- metals (Appendix B, pp. 6-7).

Samples collected by G & E were analyzed for a variety of parameters including:

- pH;
- specific conductance;
- TOC;
- Volatile Organic Analysis (VOA);
- selected chlorinated organics (TCE, TCB, etc.);
- naphthalene;
- phenolic compounds;
- PCB; and
- metals including lead, mercury, arsenic, cadmium, and chromium (Appendix B, p. 22).

However, not every sample was tested for each parameter listed above (Appendix B, p. 45, spread sheet). Initial samples collected during G & E's investigation were analyzed by J.L. Rogers & Callcott Engineers, Inc. of Greenville, South Carolina; subsequent analyses were performed by West-Paine Laboratories, Inc. from Baton Rouge, Louisiana (Appendix B, p. E, spread sheet).

A variety of EPA approved analytical methods and procedures were utilized for the Davis & Floyd and G & E samples. The specific methods and procedures are listed on the individual analytical reports which are contained in Volume II of Appendix B.

4.3.2 Analytical Data Quality

All analyses are reported to have been performed by EPA approved methods. Only limited information on data quality is available. There is no evidence of independent quality assurance (QA) review or data validation. The data packages presented do not include sufficient information for complete QA review of the data. Individual analytical reports and data spread sheets are provided in Appendix B.

4.3.3 Presentation of Analytical Results

This section discusses the results from the analyses of samples collected by Davis & Floyd in 1985 and G & E in 1986. The discussion is broken into subheads for each of the five contaminated areas. Separate tables (2 through 6) have been generated to present the analytical data for each area. Table 1 is also included and this presents the data from a background location. Only the significant results are shown on the tables.

4.3.3.1 Abandoned Lagoon

Analytical test results from the abandoned lagoon (Table 2) indicate that the soil and groundwater are primarily contaminated with chlorinated organics and metals. The chlorinated organic of greatest concern is Arochlor 1248, which is a PCB that was detected in both media. Chromium, lead, and mercury account for the most significant metal contamination. None of the above-mentioned constituents are known to have been detected in background samples.

Samples from C-1, W-3, W-4, V-6, and B-1 (6-8 ft, 10-12 ft, 14-16 ft, 43-45 ft) indicate that the PCB soil and groundwater contamination is restricted to the areal extent of the lagoon. The lagoon soils are contaminated at depths of up to 14 feet bls with average PCB concentrations of 750 mg/kg. The most significant PCB soil contamination was found in a sludge layer that varies in depth from about 4 to 7 feet bls. The depth to the contaminated sludge is greatest in the center of the lagoon. The highest concentration detected in the sludge layer was from sample G&E-3 (4-5 ft), which showed a PCB concentration of 6,750 mg/kg. The groundwater at the abandoned lagoon showed an Arochlor 1248 concentration of 6.02 mg/l (L-1, L-2, L-3 composite).

Other organic compounds found in environmental samples include 1,2,4-trichlorobenzene (1,2,4-TCB) and naphthalene. Naphthalene was detected at a maximum concentration of 122 mg/kg in soil boring L-33 (12-14 ft) and in the groundwater composited from L-1, L-2, and L-3 at 2.340 mg/l. Similar concentrations (103 mg/kg and 3.470 mg/l) of 1,2,4-TCB were detected in the same samples.

The soil samples from the old lagoon showed elevated levels of chromium, lead, and mercury. These constituents were detected at maximum concentrations in borings L-1 and G&E-3. The maximum levels are as follows: 46 mg/kg for chromium and 2,286 mg/kg for lead in boring G&E-3 (4-5 ft) and 19 mg/kg of mercury in boring L-1 (1 ft). The lowest levels were generally found in boring G&E-5. Concentrations for the sample taken 4-5 feet bls range from not detected for lead and mercury to 4.9 mg/kg for chromium.

Chromium, lead, and mercury were also detected at relatively high levels in groundwater samples collected from the abandoned lagoon. The groundwater composited from G&E borings 1 and 5 showed a lead concentration of 34 mg/l, which is 680 times greater than the EPA maximum contaminant level (MCL). The other constituents were detected at lesser amounts, but their concentrations are still well above the MCL (Ref. 33). Also, the presence of chromium and lead in downgradient wells (W-3, V-6) suggests that the contaminants are migrating from the lagoon.

Monitoring wells W-3 and V-6 also indicate chloride and organic contamination. The organic compounds that were detected include chlorotoluene and trichloroethene (TCE). All of these constituents were found at concentrations significantly greater than the concentrations detected in background samples.

4.3.3.2 Discharge Pipe

TOC is the only parameter that was detected along the discharge pipe south of the abandoned lagoon (Table 3). Concentrations ranging from 50 to 100 mg/l were revealed in groundwater samples obtained from borings A-3, A-5, and A-6. These concentrations are significantly greater than the values obtained from background wells. There was no TOC analysis performed on soil samples collected from this area.

4.3.3.3 Old Drum Storage

Analytical results for groundwater samples collected from the old drum storage area indicate that the major contaminants of concern are chlorinated organics. TOC and chloride are also of concern. Selected analytical data for this area are presented in Table 4.

TOC and chloride were present at elevated levels in groundwater samples collected at the old drum storage area. Samples A-9, A-10, and A-11 showed TOC concentrations of 30, 20, and 30 mg/l, respectively. The chloride concentrations for the same samples ranged from 115 to 595 mg/l. Only the chloride concentrations are significantly greater than the values reported from any of the background wells.

The most significant chlorinated organic is carbon tetrachloride. This constituent was detected in all groundwater samples collected within the boundaries, and downgradient, of the source area. Within the source area, soil borings A-9 through A-11 showed carbon tetrachloride concentrations ranging from 12 to 39 mg/l. Monitoring well W-7, located slightly downgradient from the source area, revealed the highest concentration (89 mg/l) of carbon tetrachloride. There are no other downgradient wells that monitor the old drum storage area (Appendix C, plate 7). Carbon tetrachloride was not detected in any of the background groundwater samples.

Monitoring well W-7 also showed a TOC concentration of 150 mg/l. This concentration is significantly greater than any of the values detected in background wells.

4.3.3.4 Burn Site

The contamination at the burn site mainly involves chlorinated organics and metals (Table 5). Methylene chloride, PCBs, and TCE account for the most significant organic contamination. These constituents were found at relatively high levels in several groundwater samples. The same samples also showed elevated concentrations for cadmium, chromium, lead, and mercury. None of the above mentioned constituents are known to have been detected in background samples.

Within the confines of the burn site area, methylene chloride, PCBs, and TCE were detected in the groundwater. Methylene chloride was detected at a maximum concentration of 6.40 mg/l in a water sample obtained from boring G&E-10. Monitoring wells W-10 and W-11 showed PCB (Arochlor 1242) and TCE concentrations of 0.012 mg/l and 12 mg/l, respectively. The PCBs were also detected in the soil at depths ranging from 1 to 6 feet bls. The highest concentration was detected in sample BS-3 (3-4 ft), which showed an Arochlor 1248 concentration of 250 mg/kg.

Mercury is the only other contaminant that was detected within the confines of the burn site at significant levels. A concentration of 0.24 mg/l was found in a surface water sample obtained from a lagoon that is located within the burn site. A solid sample removed from a product bag that was located within the same lagoon revealed a mercury concentration of 19.0 mg/kg.

Groundwater monitoring well W-9, located near the burn site, showed a PCB concentration of 0.114 mg/l, a TCE concentration of 180 mg/l, and concentrations for chromium and lead that significantly exceed the MCL (Ref. 33). Cadmium and mercury were also detected although at much lower levels. These findings suggest a definite contaminant migration trend since the well is located hydraulically downgradient from the burn site.

The furthest downgradient well (W-13) that monitors the burn site showed elevated levels of cadmium, chromium, and lead. There were no PCBs detected in this well, or in any other wells located downgradient from W-9.

4.3.3.5 Stressed Vegetation

The only contamination at the stressed vegetation area is with chromium and lead, which were detected in a soil sample. Chromium and lead were detected in sample D-1 (1-2 ft) at concentrations of 3.3 mg/kg and 3.8 mg/kg, respectively. Selected analytical data for this area are presented in Table 6.

4.4 SUMMARY OF FIELD INVESTIGATION

G & E's geophysical investigation provided the necessary data needed to detect and map contaminated soil and groundwater at this site. Several zones of higher conductivity were delineated during the investigation, and these are thought to be representative of contaminated areas. The geophysical results were then utilized to determine optimum sampling locations.

One hundred and ninety-seven samples were collected by G & E and Davis & Floyd during 1985 and 1986. Soil and groundwater samples account for the majority of samples that were collected. These were mostly taken within and adjacent to areas of concern. The samples were analyzed for total organic carbon (TOC), volatiles, acid and base neutrals, polychlorinated biphenyls (PCBs), and metals.

The findings of the geophysical investigation are supported by the analytical test results for environmental samples collected at this site. The areas that showed anomalously high conductivity values are primarily contaminated with chlorinated organics and/or metals. The chlorinated organic of greatest concern is PCB. This constituent is present in the lagoon soil at an average concentration of 750 mg/kg and in the lagoon groundwater at 6.02 mg/l. The PCBs were also detected at the burn site, along with trichloroethene (TCE) and methylene chloride. All three of these constituents were detected in groundwater samples at concentrations of 0.012 mg/l or greater. The burn site and lagoon also account for the most significant metal contamination. Several soil and groundwater samples showed relatively high levels of lead and mercury.

There is a strong correlation between the sample results and the wastes disposed of at American Color and Chemical/Venture Chemical. The PCB contamination is present because the effluent that was treated during the active life of the lagoon occasionally contained PCBs from in-plant spill incidents; PCBs were also constituents of a waste incinerated at the burn site. Much of the other organic contamination can also be attributed to incineration at the burn site, or to spills and leaks that occurred in the associated drum storage area (Ref. 10, pp. 9, 11-12). The only strong correlation that can be made for metals is that the product bags found at the burn site were the source of mercury contamination in environmental samples collected at the same location.

5.0 SUMMARY

The surface water, groundwater, air, and onsite exposure pathways are of concern at American Color and Chemical/Venture Chemical. The surface water pathway is of primary concern. Polychlorinated biphenyls (PCBs) are known to have been introduced into Campbell Creek, which receives both runoff and processed wastewater from this facility. These constituents are known to be accumulating in the food chain. The creek and associated waters have already been closed to shellfish harvesting because of this contamination. The groundwater pathway is also of concern. There is at least one shallow well located downgradient of the site. Also, potential users could be seriously endangered. The air and onsite exposure pathways are of lesser concern.

A total of 197 previously collected samples were reevaluated in this report. The samples were collected within and adjacent to areas of concern which include: the abandoned lagoon, the sediments and marsh near the plant's discharge pipe, the old drum storage area, the old burn site, and an area of stressed vegetation. The abandoned lagoon and burn site are by far the most contaminated areas. Significantly high concentrations of PCB, trichloroethene (TCE), methylene chloride, lead, and mercury were detected in soil and groundwater samples collected from these areas. All of these constituents are known components of waste deposited at the site. Also, several of the downgradient wells that are monitoring the abandoned lagoon and burn site are contaminated with the same constituents, which suggests a definite migration trend.

Although extensive contamination has been documented in soil, groundwater, and sediment at and near the site, the facility is under a consent order with the state for remediation. Should all wastes and contaminated soils be removed, this site would not be a viable candidate for a Listing Site Inspection (LSI). Therefore, FIT 4 recommends that consideration of any further action at this site be contingent upon results of the ongoing remediation.

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TABIES

TABLE 1 (PART 1 OF 3)

SELECTED ANALYTICAL DATA
BACKGROUND
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Soil				Groundwater		
	W-1 (4-6 ft.)	W-2 (10-12 ft.)	W-1 (14-16 ft.)	W-1 (38-40 ft.)	W-1	W-1	W-2
VOLATILES							
VINYL CHLORIDE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
CHLOROETHANE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,1-DICHLOROETHENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
TRANS-1,2-DICHLOROETHENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,1-DICHLOROETHANE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
CHLOROFORM	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
CHLOROTOLUENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,2-DICHLOROBENZENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,4-DICHLOROBENZENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,3-DICHLOROBENZENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
DICHLOROBROMOMETHANE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,2-DICHLOROETHANE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,1,1-TRICHLOROETHANE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
CARBON TETRACHLORIDE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,2-DICHLOROPROPANE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
CIS-1,3-DICHLOROPROPENE	-	-	-		ND(<0.010)	ND(<0.010)	ND(<0.010)

ND None Detected
- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN

TABLE 1 (PART 2 OF 3)

SELECTED ANALYTICAL DATA
BACKGROUND
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Soil				Groundwater		
	W-1 (4-6 ft.)	W-2 (10-12 ft.)	W-1 (14-16 ft.)	W-1 (38-40 ft.)	W-1	W-1	W-2
TRICHLOROETHENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
TRICHLOROFLOURMETHANE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,1,2-TRICHLOROETHANE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
BENZENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
TRANS-1,3-DICHLOROPROPENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
2-CHLOROETHYL VINYL ETHER	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
BROMOFORM	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
TETRACHLOROETHENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,1,2,2-TETRACHLOROETHANE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
TOLUENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
CHLOROBENZENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
CHLORODIBROMOMETHANE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
ETHYLBENZENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
METHYLBROMIDE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
METHYLCHLORIDE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
METHYLENE CHLORIDE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)
TOTAL XYLENE	-	-	-	-	ND(<0.010)	ND(<0.010)	ND(<0.010)

ND None Detected
\- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN

TABLE 1 (PART 3 OF 3)

SELECTED ANALYTICAL DATA
BACKGROUND
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Soil				Groundwater		
	W-1 (4-6 ft.)	W-2 (10-12 ft.)	W-1 (14-16 ft.)	W-1 (38-40 ft.)	W-1	W-1	W-2
POLYCHLORINATED BIPHENYLS							
AROCHLOR 1248	-	-	-	-	-	ND(<0 001)	ND(<0 001)
TOTAL POLYCHLORINATED	-	-	-	-	-	-	-
METALS							
CADMIUM	-	-	-	-	-	ND(<0 005)	ND(<0 005)
CHROMIUM	-	-	-	-	-	ND(<0 01)	ND(<0 01)
LEAD	-	-	-	-	-	ND(<0 04)	ND(<0 04)
MERCURY	-	-	-	-	-	ND(<0 0002)	ND(<0 0002)
OTHER							
TOTAL ORGANIC CARBON	-	-	-	-	21	5	9
CHLORIDE	-	-	-	-	79	15	13 4
SAMPLING DATE	03/11/86	03/12/86	03/11/86	03/12/86	03/12/86	03/22/86	03/22/86

ND None Detected
- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN

TABLE 2 (PART 1 OF 5)

SELECTED ANALYTICAL DATA
ABANDONED LAGOON
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Soil							
	L-1 (1 ft.)	L-9 (2-3 ft.)	L-1 (2.5 ft.)	L-3 (2.5 ft.)	L-28 (3-4 ft.)	L-10 (3.5-4 ft.)	L-3 (4 ft.)	G&E-3 (4-5 ft.)
VOLATILES								
CHLOROTOLUENE	-	ND(<0.100)	-	-	-	ND(<0.100)	-	-
TRICHLOROETHENE	-	ND(<0 100)	-	-	-	ND(<0 100)	-	-
ACID & BASE NEUTRALS								
1,2,4-TRICHLOROBENZENE	-	-	-	-	-	-	-	24 0
NAPHTHALENE	-	-	-	-	-	-	-	12 0
POLYCHLORINATED BIPHENYLS								
AROCHLOR 1248	-	-	-		250	-	-	-
TOTAL POLYCHLORINATED BIPHENYLS	112	140	108	39	-	17	122	6750
METALS								
CADMIUM	-	-	-	-	-	-	-	ND(<0 5)
CHROMIUM	-	-	-	-	-	-	-	46
LEAD	698	-	500	42	-	-	90	2286
MERCURY	19	-	4 3	0 63	-	-	1 9	13
OTHER								
CHLORIDE	-	-	-	-	-	-	-	-
SAMPLING DATE	03/18/86	03/21/86	03/18/86	03/18/86	04/03/86	03/21/86	03/18/86	01/13/86

ND None detected
SZ Saturation Zone
C Composite
\- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN

TABLE 2 (PART 2 OF 5)

SELECTED ANALYTICAL DATA
ABANDONED LAGOON
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Soil							
	G&E-4 (4-5 ft.)	G&E-5 (4-5 ft.)	L-13 (4-6.5 ft.)	L-2 (4.5 ft.)	G&E-1 (5-6 ft.)	L-3 (6 ft.)	L-24 (6-6.5 ft.)	G&E-4 (6-7 ft.)
VOLATILES								
CHLOROTOLUENE	-	-	ND(<0 100)	-	-	-	ND(<0 100)	-
TRICHLOROETHENE	-	-	ND(<0 100)	-	-	-	ND(<0 100)	-
ACID & BASE NEUTRALS								
1,2,4-TRICHLOROBENZENE	ND(<0.330)	ND(<0.330)	-	-	54 0	-	-	7 4
NAPHTHALENE	ND(<0 330)	ND(<0 330)	-	-	17 0	-	-	1 10
POLYCHLORINATED BIPHENYLS								
AROCHLOR 1248	-	-	-	-	-	-	-	52
TOTAL POLYCHLORINATED BIPHENYLS	-	-	ND(<2 0)	497	680	2460	369	-
METALS								
CADMIUM	ND(<0.5)	ND(<0.5)	-	-	ND(<0 5)	-	-	ND(<0 5)
CHROMIUM	16	4.9	-	-	13	-	-	11
LEAD	46	ND(<3.3)	-	528	942	55	-	144
MERCURY	0.11	ND(<0.05)	-	3 8	1 1	0 09	-	3 2
OTHER								
CHLORIDE	-	-	-	-	-	-	-	-
SAMPLING DATE	01/13/86	01/13/86	03/21/86	03/18/86	01/13/86	03/18/86	03/21/86	01/13/86

ND None detected
SZ Saturation Zone
C Composite
- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN

TABLE 2 (PART 3 OF 5)

SELECTED ANALYTICAL DATA
ABANDONED LAGOON
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l,mg/kg)	Soil							
	B-1 (6-8 ft.)	L-1 (6.5 ft.)	L-2 (6.5 ft.)	L-2 (6.5-7 ft.)	L-7 (8 ft.)	L-33 (10-12 ft.)	B-1 (10-12 ft.)	L-33 (12-14 ft.)
VOLATILES								
CHLOROTOLUENE	-	-	-	-	6 0	-	-	-
TRICHLOROETHENE	-	-	-	-	ND(<0 100)	-	-	-
ACID & BASE NEUTRALS								
1,2,4-TRICHLOROBENZENE	-	-	-	-	-	ND(<10)	-	103
NAPHTHALENE	-	-	-	-	-	ND(<10)	-	122
POLYCHLORINATED BIPHENYLS								
AROCHLOR 1248	-	-	-	-	-	70	-	2139
TOTAL POLYCHLORINATED BIPHENYLS	ND(<1 0)	676	196	582	369	-	ND(<1 0)	-
METALS								
CADMIUM	-	-	-	-	-	-	-	-
CHROMIUM	-	-	-	-	-	-	-	-
LEAD	-	283	109	76	-	-	-	-
MERCURY	-	1 6	0 82	0 88	-	-	-	-
OTHER								
CHLORIDE	-	-	-	-	-	-	-	-
SAMPLING DATE	03/13/86	03/18/86	03/18/86	03/18/86	03/21/86	04/13/86	03/13/86	04/13/86

ND None detected
SZ Saturation Zone
C Composite
\- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN

TABLE 2 (PART 4 OF 5)

SELECTED ANALYTICAL DATA
ABANDONED LAGOON
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Soil			Groundwater						
	L-33 (14-16 ft.)	B-1 (14-16 ft.)	B-1 (43-45 ft.)	L-1 (SZ)	L-2 (SZ)	L-3 (SZ)	L1, L2, L3 (SZ, C)	L-7 (SZ)	L-18 (SZ)	G&E-1-5 (SZ, C)
VOLATILES										
CHLOROTOLUENE	-	-	-	-	-	-	-	1.20	1.70	-
TRICHLOROETHENE	-	-	-	-	-	-	0.150	0.04	0.05	-
ACID & BASE NEUTRALS										
1,2,4-TRICHLOROBENZENE	-	-	-	-	-	-	3.470	-	-	0.460
NAPHTHALENE	-	-	-	-	-	-	2.340		-	0.380
POLYCHLORINATED BIPHENYLS										
AROCHLOR 1248	-	-	-	-	-	-	6.02	-	-	-
TOTAL POLYCHLORINATED BIPHENYLS	ND(<1.0)	ND(<1.0)	ND(<1.0)	-	-	-	-	-	-	-
METALS										
CADMIUM	-	-	-	-	-	-	-	0.02	0.03	ND(<0.01)
CHROMIUM	-	-	-	-	-		-	0.65	1.9	5.4
LEAD	-	-	-	11	0.19	0.14	-	1.5	7.0	34
MERCURY	-	-	-	0.23	ND(<0.002)	ND(<0.002)	-	0.05	0.12	0.614
OTHER										
CHLORIDE	-	-	-	-	-	-	-	-	-	-
SAMPLING DATE	04/13/86	03/13/86	03/13/86	03/18/86	03/18/86	03/18/86	03/18/86	03/21/86	03/21/86	01/14/86

ND None detected
SZ Saturation Zone
C Composite
\- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN

TABLE 2 (PART 5 OF 5)

SELECTED ANALYTICAL DATA
ABANDONED LAGOON
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Groundwater				
	C-1	W-3	W-3	W-4	V-6
VOLATILES					
CHLOROTOLUENE	ND(<0.010)	-	0 200	ND(<0 010)	-
TRICHLOROETHENE	ND(<0.010)	0 047	0 355	ND(<0 010)	0.235
ACID & BASE NEUTRALS					
1,2,4-TRICHLOROBENZENE	-	-	-	-	-
NAPHTHALENE	-	-		-	-
POLYCHLORINATED BIPHENYLS					
AROCHLOR 1248	-	-	-	-	-
TOTAL POLYCHLORINATED BIPHENYLS	ND(<0 001)	ND(<0 001)	ND(<0 005)	ND(<0 001)	ND(<0 001)
METALS					
CADMIUM	ND(<0 005)	-	0.02	ND(<0 005)	-
CHROMIUM	ND(<0.01)	-	0 13	ND(<0.01)	-
LEAD	ND(<0.04)	-	0 13	ND(<0 04)	0 32
MERCURY	ND(<0.0002)	-	ND(<0.002)	ND(<0 0002)	-
OTHER					
CHLORIDE	2.5	-	1650	34	2900
SAMPLING DATE	03/25/86	03/12/86	03/26/86	03/25/86	03/13/86

ND — None detected
SZ — Saturated Zone
C — Composite
\- — Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN

TABLE 3 (PART 1 OF 2)

SELECTED ANALYTICAL DATA
DISCHARGE PIPE
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Soil					
	A-8 (2 ft.)	A-3 (3 ft.)	A-6 (3 ft.)	A-7 (3-4.5 ft., C)	A-6 (6 ft.)	A-3 (6.5-7 ft.)
VOLATILES						
VINYL CHLORIDE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
CHLOROETHANE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
1,1-DICHLOROETHENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
TRANS-1,2-DICHLOROETHENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
1,1-DICHLOROETHANE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
CHLOROFORM	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
CHLOROTOLUENE	ND(<0.100)	ND(<0.100)	-	-	-	ND(<0.100)
1,2-DICHLOROBENZENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
1,4-DICHLOROBENZENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
1,3-DICHLOROBENZENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
DICHLOROBROMOMETHANE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
1,2-DICHLOROETHANE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
1,1,1-TRICHLOROETHANE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
CARBON TETRACHLORIDE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
1,2-DICHLOROPROPANE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
CIS-1,3-DICHLOROPROPENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
TRICHLOROETHENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
TRICHLOROFLOURMETHANE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
1,1,2-TRICHLOROETHANE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
BENZENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
TRANS-1,3-DICHLOROPROPENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
2-CHLOROETHYL VINYL ETHER	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
BROMOFORM	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
TETRACHLOROETHENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
1,1,2,2-TETRACHLOROETHANE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
TOLUENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
CHLOROBENZENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
CHLORODIBROMOMETHANE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
ETHYLBENZENE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
METHYLBROMIDE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
METHYLCHLORIDE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
METHYLENE CHLORIDE	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
TOTAL XYLENE (SEMIQUANTITATIVE)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)	ND(<0.100)
POLYCHLORINATED BIPHENYLS						
TOTAL POLYCHLORINATED BIPHENYLS	ND(<1.0)	ND(<1.0)	ND(<1.0)	ND(<1.0)	ND(<1.0)	ND(<1.0)
SAMPLING DATE	03/12/86	03/13/86	03/13/86	03/12/86	03/13/86	03/13/86

ND None Detected
C Composite
\- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN

TABLE 3 (PART 2 OF 2)

SELECTED ANALYTICAL DATA
DISCHARGE PIPE
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Groundwater				
	A-3	A-5	A-6	W-5	W-5
VOLATILES					
VINYL CHLORIDE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
CHLOROETHANE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,1-DICHLOROETHENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
TRANS-1,2-DICHLOROETHENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,1-DICHLOROETHANE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
CHLOROFORM	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
CHLOROTOLUENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	-
1,2-DICHLOROBENZENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,4-DICHLOROBENZENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,3-DICHLOROBENZENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
DICHLOROBROMOMETHANE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,2-DICHLOROETHANE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,1,1-TRICHLOROETHANE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
CARBON TETRACHLORIDE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,2-DICHLOROPROPANE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
CIS-1,3-DICHLOROPROPENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
TRICHLOROETHENE	ND(<0.010)	ND(<0.010)	0.056	ND(<0.010)	ND(<0.010)
TRICHLOROFLOURMETHANE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,1,2-TRICHLOROETHANE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
BENZENE	ND(<0.010)	ND(<0.010)	0.010	ND(<0.010)	ND(<0.010)
TRANS-1,3-DICHLOROPROPENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
2-CHLOROETHYL VINYL ETHER	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
BROMOFORM	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
TETRACHLOROETHENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
1,1,2,2-TETRACHLOROETHANE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
TOLUENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
CHLOROBENZENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
CHLORODIBROMOMETHANE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
ETHYLBENZENE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
METHYLBROMIDE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
METHYLCHLORIDE	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
METHYLENE CHLORIDE	ND(<0.010)	ND(<0.010)	ND(<0.010)	0.080	ND(<0.010)
TOTAL XYLENE (SEMIQUANTITATIVE)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)	ND(<0.010)
POLYCHLORINATED BIPHENYLS					
TOTAL POLYCHLORINATED BIPHENYLS	-	-	-	ND(<0.001)	ND(<0.001)
OTHER					
TOTAL ORGANIC CARBON	100	60	50	-	-
SAMPLING DATE	03/13/86	03/13/86	03/13/86	04/04/86	05/01/86

ND None Detected

C Composite

\- Material not analyzed for or data were not available for inclusion

NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN

TABLE 4 (PART 1 OF 2)

SELECTED ANALYTICAL DATA
OLD DRUM STORAGE
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l)	Groundwater				
	A-9	A-10	A-11	W-6	W-7
VOLATILES					
VINYL CHLORIDE	ND	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND
1,1-DICHLOROETHANE	ND	ND	ND	ND	0 030
CHLOROFORM	ND	ND	ND	ND	0 025
CHLOROTOLUENE	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND	-
1,4-DICHLOROBENZENE	ND	ND	ND	ND	0 160
1,3-DICHLOROBENZENE	ND	ND	ND	ND	-
DICHLOROBROMOMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROETHANE	ND	ND	ND	ND	ND
1,1,1-TRICHLOROETHANE	ND	ND	0 04	ND	ND
CARBON TETRACHLORIDE	19	12	39	ND	89
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND
CIS-1,3-DICHLOROPROPENE	ND	ND	ND	ND	ND
TRICHLOROETHENE	ND	ND	ND	ND	0 110
TRICHLOROFLOURMETHANE	ND	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND
BENZENE	ND	ND	ND	ND	0 017

ND None Detected (<0.010 mg/l)
\- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN BETWEEN MARCH 13 AND MARCH 17 OF 1986

TABLE 4 (PART 2 OF 2)

SELECTED ANALYTICAL DATA
OLD DRUM STORAGE
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l)	Groundwater				
	A-9	A-10	A-11	W-6	W-7
TRANS-1,3-DICHLOROPROPENE	ND	ND	ND	ND	ND
2-CHLOROETHYL VINYL ETHER	ND	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND	ND
TETRACHLOROETHENE	ND	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
TOLUENE	0.26	0.04	5.70	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	0.190
CHLORODIBROMOMETHANE	ND	ND	ND	ND	ND
ETHYLBENZENE	ND	ND	ND	ND	ND
METHYLBROMIDE	ND	ND	ND	ND	ND
METHYLCHLORIDE	ND	ND	ND	ND	ND
METHYLENE CHLORIDE	ND	ND	ND	ND	ND
TOTAL XYLENE	ND	ND	ND	ND	ND
OTHER					
TOTAL ORGANIC CARBON	30	20	30	14	150
CHLORIDE	595	165	115	-	-

ND None Detected (<0.010 mg/l)
- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN BETWEEN MARCH 13 AND MARCH 17 OF 1986

TABLE 5 (PART 1 OF 2)

SELECTED ANALYTICAL DATA
BURN SITE
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Soil				Groundwater
	S-1 (depth unk.)	G&E-9 (1 ft.)	BS-3 (3-4 ft.)	G&E-6 (3-4 ft.)	G&E-10
VOLATILES					
METHYLENE CHLORIDE	-	-	-	-	640
TRICHLOROETHENE	-	-	-	-	-
ACID & BASE NEUTRALS					
1,2,4-TRICHLOROBENZENE	ND(<10)	0 610	-	ND(<0 330)	ND(<0 010)
NAPHTHALENE	ND(<10)	0.750	-	ND(<0.330)	ND(<0 010)
POLYCHLORINATED BIPHENYLS					
AROCHLOR 1242	-	-	-	ND(<1 0)	-
AROCHLOR 1248	-	169	250	-	-
TOTAL POLYCHLORINATED BIPHENYLS	-	155	-	-	-
METALS					
CADMIUM	0.1	ND(<0.5)	-	ND(<0.5)	ND(<0.01)
CHROMIUM	2.0	565	-	5.4	1.7
LEAD	6.9	53	-	4.7	0.4
MERCURY	0 04	0 18	-	ND(<0 5)	0 0017
OTHER					
TOTAL ORGANIC CARBON	-	-	-	-	-
CHLORIDE	-	-	-	-	-

ND None Detected
\- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN BETWEEN JANUARY 14 AND MAY 1 OF 1986

TABLE 5 (PART 2 OF 2)

SELECTED ANALYTICAL DATA
BURN SITE
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Groundwater					Surface Water	Product
	W-9	W-10	W-11	W-12	W-13	LAGOON	LAGOON
VOLATILES							
METHYLENE CHLORIDE	ND(<0.010)	ND(<0.010)	ND(<0 010)	ND(<0 010)	ND(<0.010)	-	-
TRICHLOROETHENE	180	0.025	12	0.073	ND(<0 010)	-	-
ACID & BASE NEUTRALS							
1,2,4-TRICHLOROBENZENE	ND(<0.010)	ND(<0 010)	-	-	-	-	-
NAPHTHALENE	ND(<0.010)	ND(<0 010)	-	-	-	-	-
POLYCHLORINATED BIPHENYLS							
AROCHLOR 1242	-	0.012	-	-	-	-	-
AROCHLOR 1248	0.114	-	-	-	-	0 0027	-
TOTAL POLYCHLORINATED BIPHENYLS	-	-	ND(<0 001)	ND(<0 001)	ND(<0.001)	-	-
METALS							
CADMIUM	0 03	-	ND(<0.005)	ND(<0 005)	0.02	ND(<0 005)	-
CHROMIUM	0.67	-	-	-	0 75	ND(<0 01)	-
LEAD	0.94	-	ND(<0.04)	ND(<0 04)	0 6	1.5	-
MERCURY	0 004	-	ND(<0 002)	ND(<0 0002)	ND(<0.002)	0.24	19
OTHER							
TOTAL ORGANIC CARBON	70	38	350	-	-	40	-
CHLORIDE	-	-	1100	57 9	40 0	-	-

ND None Detected
- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN BETWEEN JANUARY 14 AND MAY 1 OF 1986

TABLE 6 (PART 1 OF 2)

SELECTED ANALYTICAL DATA
STRESSED VEGETATION
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Soil	Groundwater	
	D-1 (1-2ft.)	D-1	D-2
VOLATILES			
VINYL CHLORIDE	ND(<0.100)	ND(<0.010)	ND(<0.010)
CHLOROETHANE	ND(<0.100)	ND(<0.010)	ND(<0.010)
1,1-DICHLOROETHENE	ND(<0.100)	ND(<0.010)	ND(<0.010)
TRANS-1,2-DICHLOROETHENE	ND(<0.100)	ND(<0.010)	ND(<0.010)
1,1-DICHLOROETHANE	ND(<0.100)	ND(<0.010)	ND(<0.010)
CHLOROFORM	ND(<0.100)	ND(<0.010)	ND(<0.010)
CHLOROTOLUENE	ND(<0.100)	ND(<0.010)	-
1,2-DICHLOROBENZENE	ND(<0.100)	ND(<0.010)	ND(<0.010)
1,4-DICHLOROBENZENE	ND(<0.100)	ND(<0.010)	ND(<0.010)
1,3-DICHLOROBENZENE	ND(<0.100)	ND(<0.010)	ND(<0.010)
DICHLOROBROMOMETHANE	ND(<0.100)	ND(<0.010)	ND(<0.010)
1,2-DICHLOROETHANE	ND(<0.100)	ND(<0.010)	ND(<0.010)
1,1,1-TRICHLOROETHANE	ND(<0.100)	ND(<0.010)	ND(<0.010)
CARBON TETRACHLORIDE	ND(<0.100)	ND(<0.010)	ND(<0.010)
1,2-DICHLOROPROPANE	ND(<0.100)	ND(<0.010)	ND(<0.010)
CIS-1,3-DICHLOROPROPENE	ND(<0.100)	ND(<0.010)	ND(<0.010)
TRICHLOROETHENE	ND(<0.100)	ND(<0.010)	ND(<0.010)
TRICHLOROFLOURMETHANE	ND(<0.100)	ND(<0.010)	ND(<0.010)
1,1,2-TRICHLOROETHANE	ND(<0.100)	ND(<0.010)	ND(<0.010)
BENZENE	ND(<0.100)	ND(<0.010)	ND(<0.010)
TRANS-1,3-DICHLOROPROPENE	ND(<0.100)	ND(<0.010)	ND(<0.010)
2-CHLOROETHYL VINYL ETHER	ND(<0.100)	ND(<0.010)	ND(<0.010)
BROMOFORM	ND(<0.100)	ND(<0.010)	ND(<0.010)
TETRACHLOROETHENE	ND(<0.100)	ND(<0.010)	ND(<0.010)
1,1,2,2-TETRACHLOROETHANE	ND(<0.100)	ND(<0.010)	ND(<0.010)
TOLUENE	ND(<0.100)	ND(<0.010)	ND(<0.010)
CHLOROBENZENE	ND(<0.100)	ND(<0.010)	ND(<0.010)

ND None Detected
\- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN ON MARCH 26 AND MARCH 27 OF 1986

TABLE 6 (PART 2 OF 2)

SELECTED ANALYTICAL DATA
STRESSED VEGETATION
AMERICAN COLOR AND CHEMICAL/VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

PARAMETERS (mg/l, mg/kg)	Soil	Groundwater	
	D-1 (1-2ft.)	D-1	D-2
CHLORODIBROMOMETHANE	ND(<0.100)	ND(<0 010)	ND(<0 010)
ETHYLBENZENE	ND(<0 100)	ND(<0.010)	0 013
METHYLBROMIDE	ND(<0.100)	ND(<0.010)	ND(<0 010)
METHYLCHLORIDE	ND(<0 100)	ND(<0.010)	ND(<0 010)
METHYLENE CHLORIDE	ND(<0.100)	ND(<0 010)	ND(<0 010)
TOTAL XYLENE	ND(<0.100)	ND(<0.010)	ND(<0 010)
POLYCHLORINATED BIPHENYLS			
TOTAL POLYCHLORINATED	-	ND(<0.001)	-
METALS			
CHROMIUM	3.3	ND(<0.01)	ND(<0 01)
LEAD	3.8	ND(<0.04)	ND(<0.04)

ND None Detected
\- Material not analyzed for or data were not available for inclusion
NOTE: G & E ENGINEERING, INC. COLLECTED ALL SAMPLES SHOWN ON MARCH 26 AND MARCH 27 OF 1986

RECONNAISSANCE CHECKLIST FOR HRS2 CONCERNS

Instructions: Obtain as much "up front" information as possible prior to conducting fieldwork. Complete the form in as much detail as you can, providing attachments as necessary. Cite the source for all information obtained.

Site Name: American Color and Chemical/Venture Chemical
City, County, State: Lobeco, Beaufort County, South Carolina
EPA ID No.: SCD046507018
Person responsible for form: James Miller
Date: September 14, 1989

Air Pathway

Describe any potential air emission sources onsite: Eight volatile organics were detected in the facility's effluent during a previous sampling investigation (Ref. 27, p. 1).

Identify any sensitive environments within 4 miles: There are no land-related sensitive environments within a 4-mile radius of the site (Refs. 13, p. 11; 17).

Identify the maximally exposed individual (nearest residence or regularly occupied building - workers do count): There are currently 75 employees at the Lobeco plant who regularly occupy buildings that are located adjacent to the abandoned burn site and the old drum storage area (Ref. 13, p. 3; Appendix B, figure 3a).

Groundwater Pathway

Identify any areas of karst terrain: None (Appendix C, p. 4-1).

Identify additional population due to consideration of wells completed in overlying aquifers to the AOC: NA; the AOC is a surficial aquifer (Ref. 3, p. 3).

Do significant targets exist between 3 and 4 miles from the site? There are probably about 10 homes or 38 people (10 houses x 3.8 people/house) relying on groundwater from the surficial aquifer between 3 and 4 miles from the site (Ref. 31; Appendix D).

Is the AOC a sole source aquifer according to Safe Drinking Water Act? (i.e. is the site located in Dade, Broward, Volusia, Putnam, or Flagler County, Florida): No.

Surface Water Pathway

Are there intakes located on the extended 15-mile migration pathway? No (Ref. 23).

Are there recreational areas, sensitive environments, or human food chain targets (fisheries) along the extended pathway? All of the potentially affected water bodies provide a habitat for numerous commercial fish species and most areas have been approved for shellfish harvesting (Refs. 17, 24). Other sensitive environments along the surface water migration pathway include a major breeding and nursery area, and two federally designated endangered species (Refs. 17; 25, section 6).

Onsite Exposure Pathway

Is there waste or contaminated soil onsite at 2 feet below land surface or higher? There are uncontained, contaminated soils at the burn site and the stressed vegetation area.

Is the site accessible to non-employees (workers do not count)? Only the stressed vegetation area is located outside of the fence that surrounds the facility and this is accessible to non-employees (Appendix B, figure 3a).

Are there residences, schools, or day care centers onsite or in close proximity? The nearest residence is located 500 feet east of the site (Appendix D). No day care centers are located onsite or in close proximity (Ref. 13, p. 11). The nearest school is James Davis Elementary, which is located approximately 1 mile east of the site (Appendix D).

Are there barriers to travel (e.g., a river) within one mile? The Whale Branch of the Coosaw River and several salt marshes are located within 1 mile of the site (Appendix D).

* All references and appendices cited on this form correlate to the Phase II, SSI report.

CERCLA ELIGIBILITY QUESTIONNAIRE

Site Name: American Color and Chemical/Venture Chemical

City: Lobeco State: South Carolina

EPA ID Number: SCD046507018

I. CERCLA ELIGIBILITY	Yes	No
Did the facility cease operations prior to November 19, 1980?	___	✓

If answer YES, STOP, facility is probably a CERCLA site.

If answer NO, Continue to Part II.

II. RCRA ELIGIBILITY	Yes	No
Did the facility file a RCRA Part A application?	✓	___
If YES:		
1. Does the facility currently have interim status?	___	✓
2. Did the facility withdraw its Part A application?	✓	___
3. Is the facility a known or possible protective filer? (facility filed in error)	✓	___
4. Type of facility: Generator ✓ Transporter ✓ Recycler ______ TSD (Treatment/Storage/Disposal) ________		
Does the facility have a RCRA operating or post closure permit?	___	✓
Is the facility a late (after 11/19/80) or non-filer that has been identified by the EPA or the State? (facility did not know it needed to file under RCRA)	___	✓

If all answers to questions in Part II are NO, STOP, the facility is a CERCLA eligible site.

If answer to #2 or #3 is YES, STOP, the facility is a CERCLA eligible site.

If answer #2 and #3 are NO and any OTHER answer is YES, site is RCRA, continue to Part III.

III. RCRA SITES ELIGIBLE FOR NPL	Yes	No
Has the facility owner filed for bankruptcy under federal or state laws?	___	___
Has the facility lost RCRA authorization to operate or shown probable unwillingness to carry out corrective action?	___	___
Is the facility a TSD that converted to a generator, transporter or recycler facility after November 19, 1980?	___	___

CERCLA ELIGIBILITY QUESTIONNAIRE

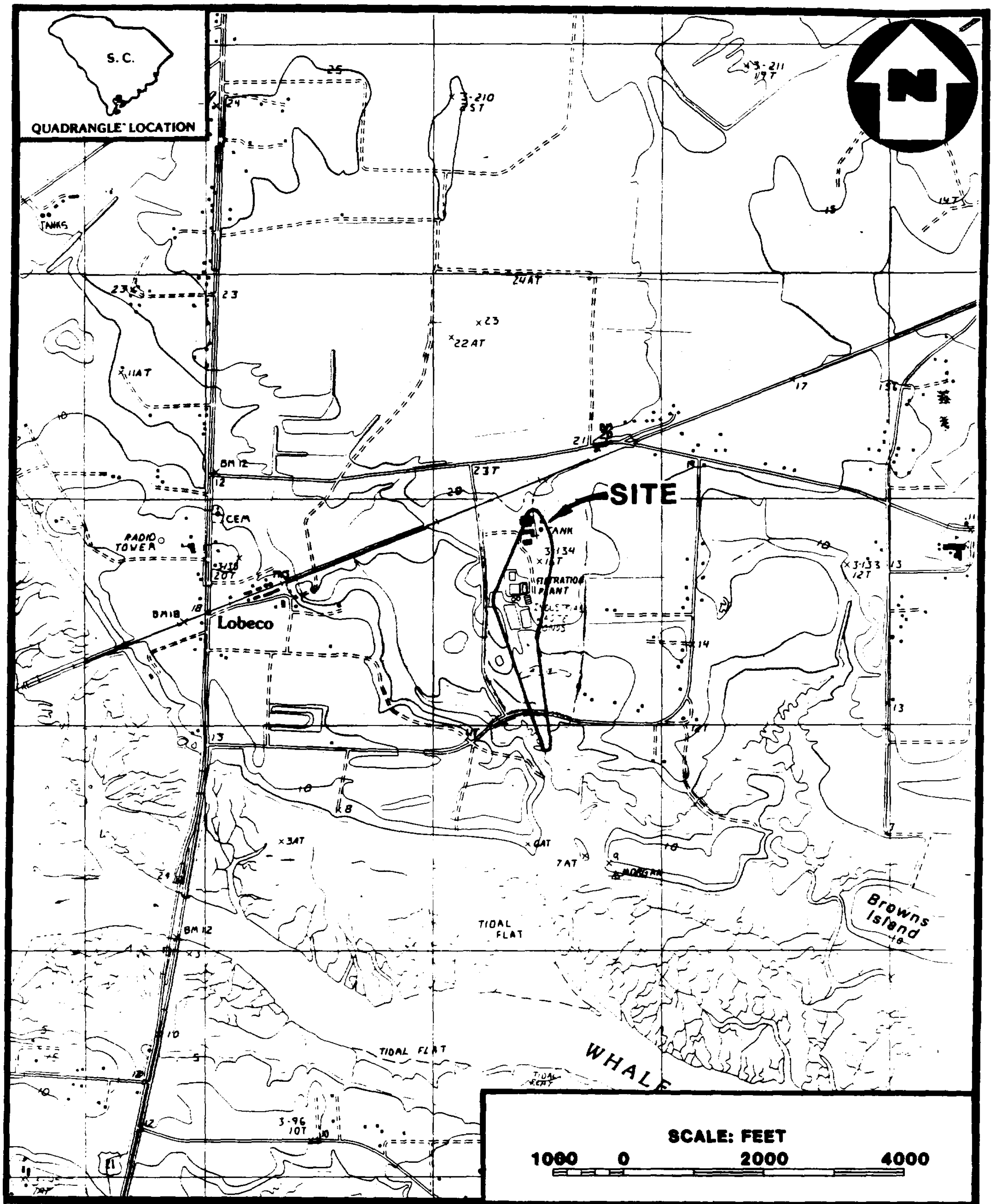
Site Name: American Color and Chemical/Venture Chemical

City: Lobeco State: South Carolina

EPA ID Number: SCD046507018

		Yes	No
I.	CERCLA ELIGIBILITY		
	Did the facility cease operations prior to November 19, 1980?	___	✓
	If answer YES, STOP, facility is probably a CERCLA site.		
	If answer NO, Continue to Part II.		
II.	RCRA ELIGIBILITY		
	Did the facility file a RCRA Part A application?	✓	___
	If YES:		
	1. Does the facility currently have interim status?		✓
	2. Did the facility withdraw its Part A application?	✓	___
	3. Is the facility a known or possible protective filer? (facility filed in error)	✓	___
	4. Type of facility: ✓ Generator ✓ Transporter ✓ Recycler ___ TSD (Treatment/Storage/Disposal) ___		
	Does the facility have a RCRA operating or post closure permit?	___	✓
	Is the facility a late (after 11/19/80) or non-filer that has been identified by the EPA or the State? (facility did not know it needed to file under RCRA)	___	✓
	If all answers to questions in Part II are NO, STOP, the facility is a CERCLA eligible site.		
	If answer to #2 or #3 is YES, STOP, the facility is a CERCLA eligible site.		
	If answer #2 and #3 are NO and any OTHER answer is YES, site is RCRA, continue to Part III.		
III.	RCRA SITES ELIGIBLE FOR NPL		
	Has the facility owner filed for bankruptcy under federal or state laws?	___	___
	Has the facility lost RCRA authorization to operate or shown probable unwillingness to carry out corrective action?	___	___
	Is the facility a TSD that converted to a generator, transporter or recycler facility after November 19, 1980?	___	___

FIGURES

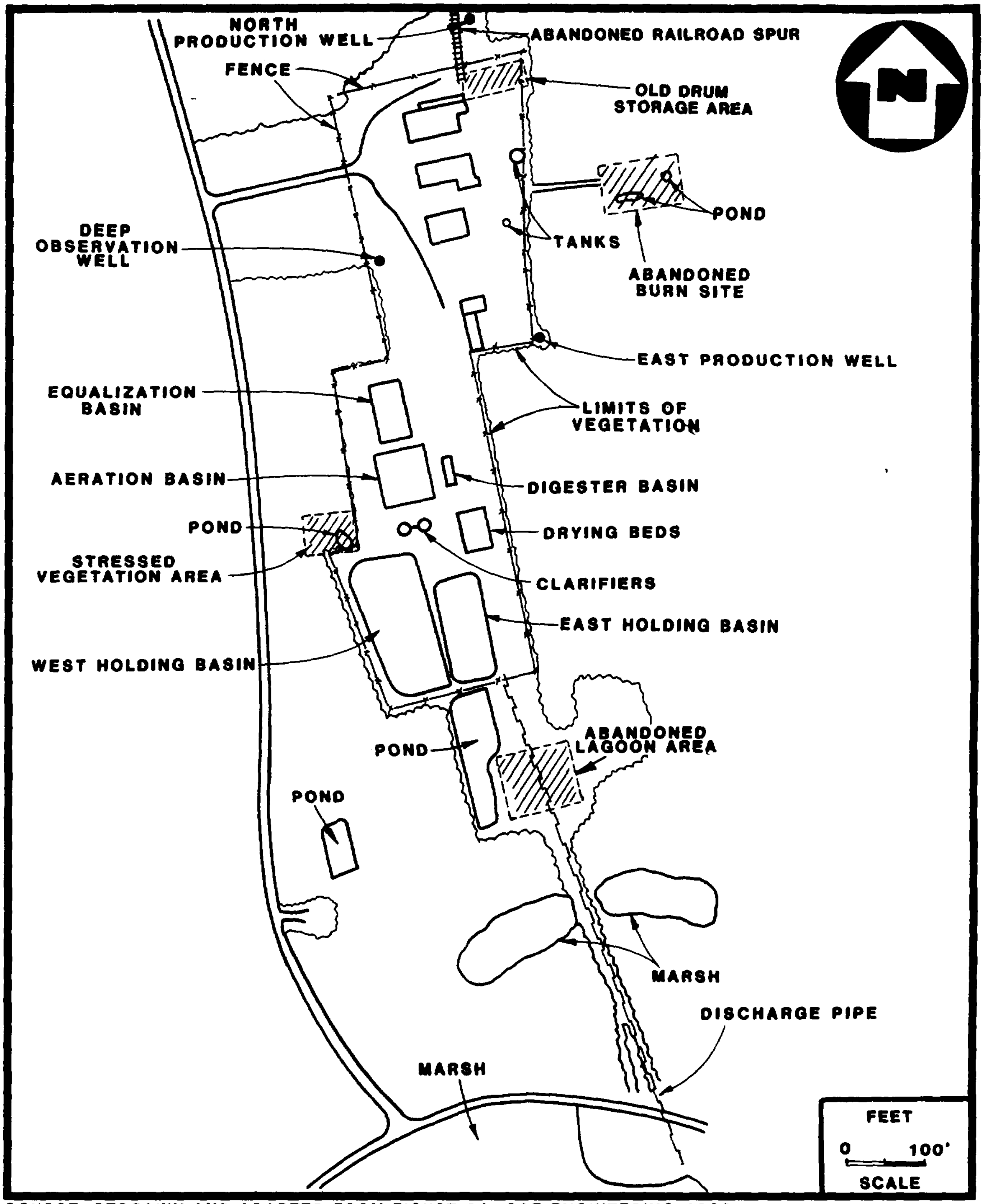


BASE MAP IS A PORTION OF THE U.S.G.S. 7.5 MINUTE QUADRANGLE DALE 1988, SHELDON 1988, FLORIDA.

SITE LOCATION MAP
AMERICAN COLOR AND CHEMICAL / VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

FIGURE 1

NUS CORPORATION

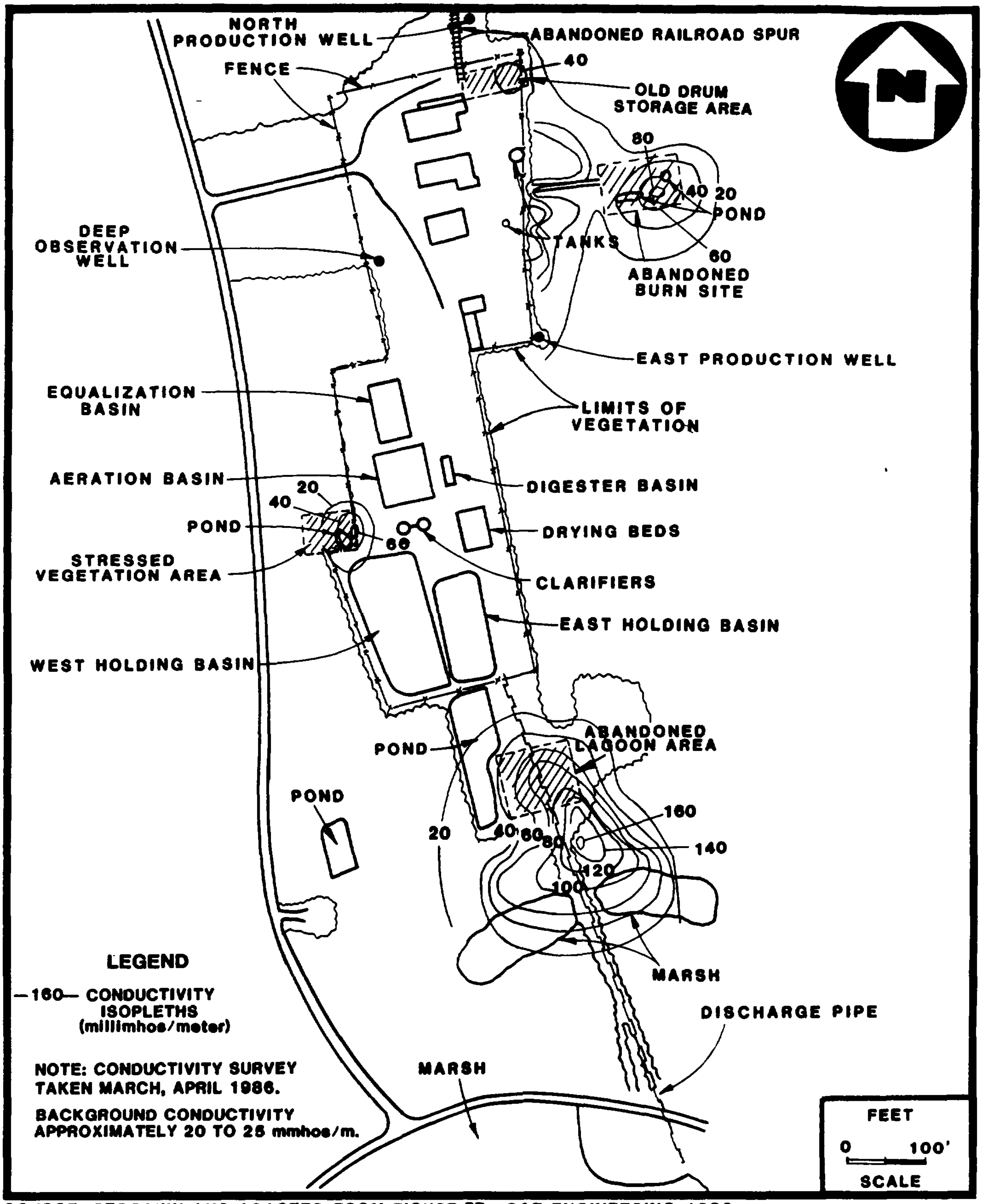


SOURCE: REDRAWN AND ADAPTED FROM FIGURE 3A, G&E ENGINEERING 1986.

SITE LAYOUT MAP
AMERICAN COLOR AND CHEMICAL / VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

FIGURE 2

NUS CORPORATION

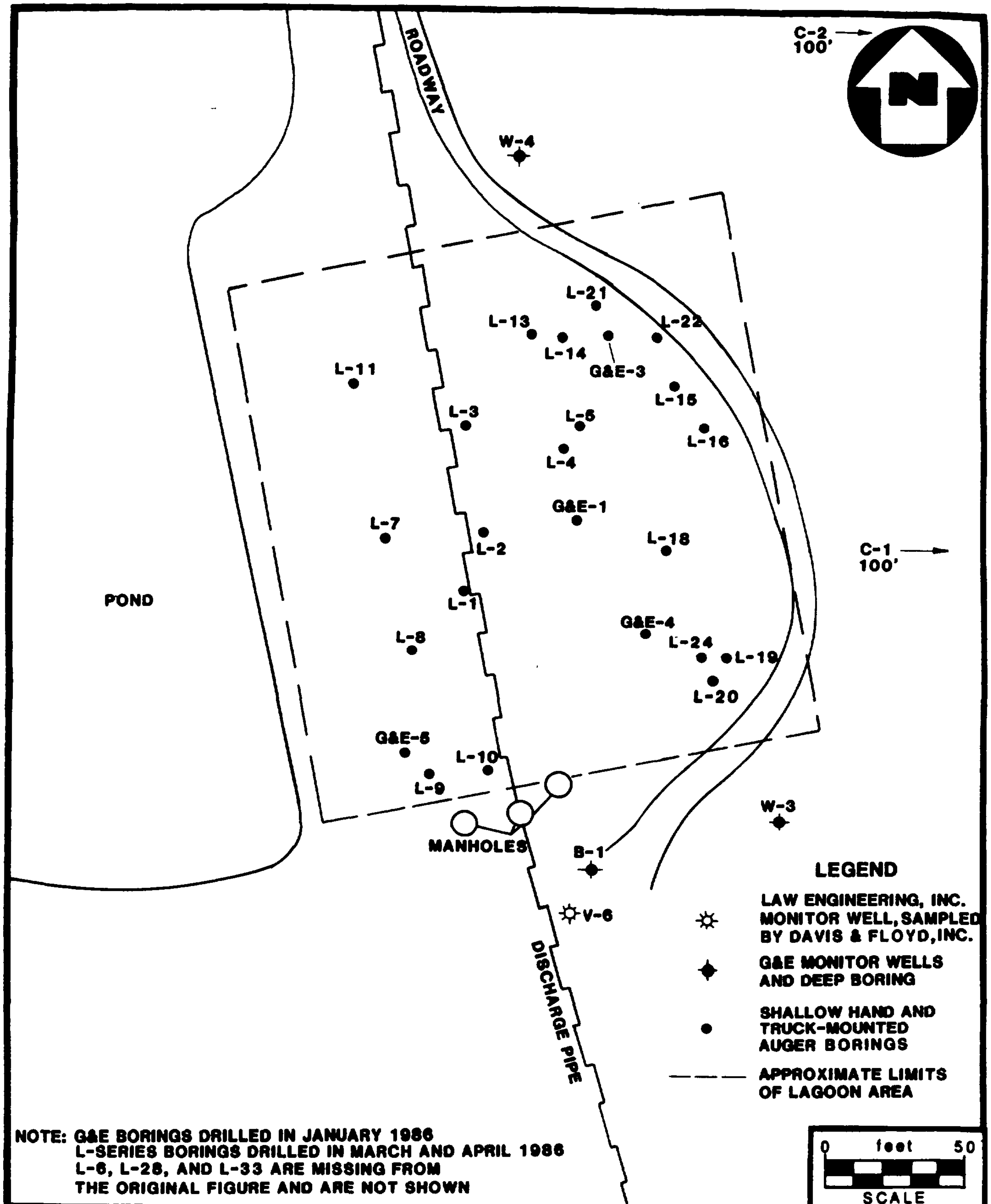


SOURCE: REDRAWN AND ADAPTED FROM FIGURE 5B, G&E ENGINEERING 1986.

GEOPHYSICAL (CONDUCTIVITY) SURVEY
AMERICAN COLOR AND CHEMICAL / VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

FIGURE 3

NUS CORPORATION

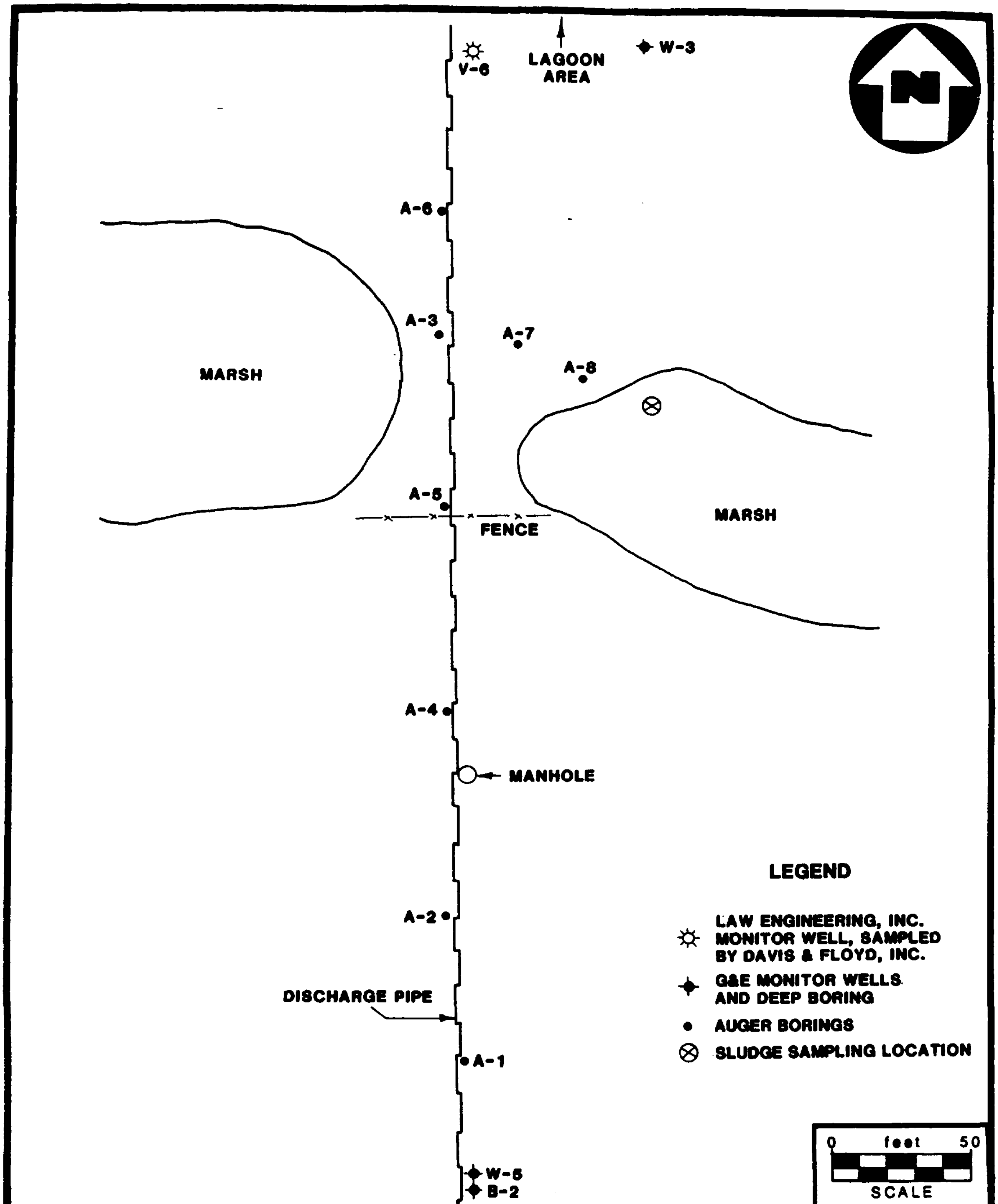


SOURCE: REDRAWN AND ADAPTED FROM FIGURE 6A, G&E ENGINEERING 1986.

SAMPLE LOCATION MAP
ABANDONED LAGOON AREA
AMERICAN COLOR AND CHEMICAL / VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

FIGURE 4

NUS CORPORATION

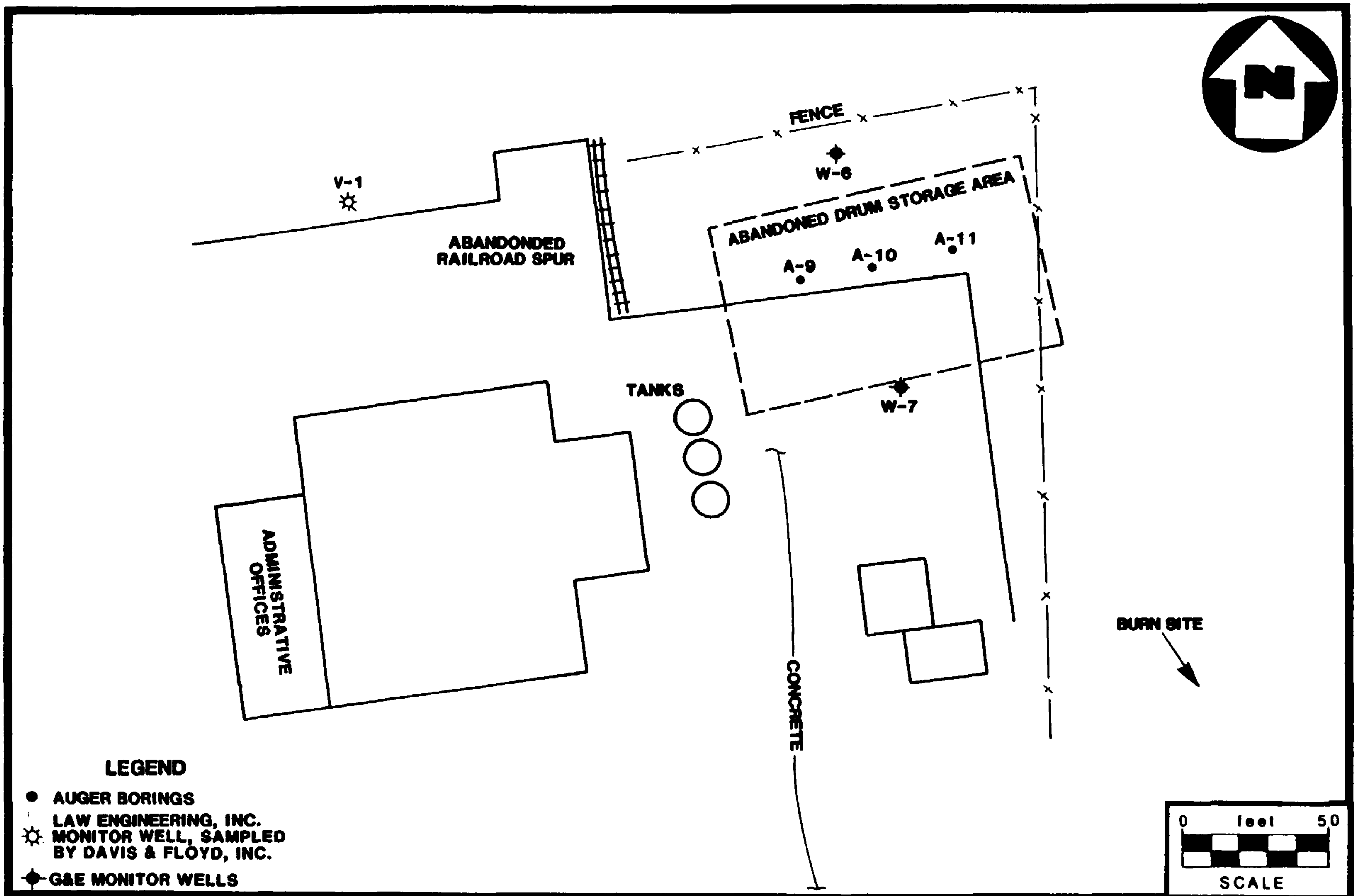


SOURCE: REDRAWN AND ADAPTED FROM FIGURE 6E, G&E ENGINEERING 1986.

SAMPLE LOCATION MAP
DISCHARGE PIPE
AMERICAN COLOR AND CHEMICAL / VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

FIGURE 5

NUS CORPORATION

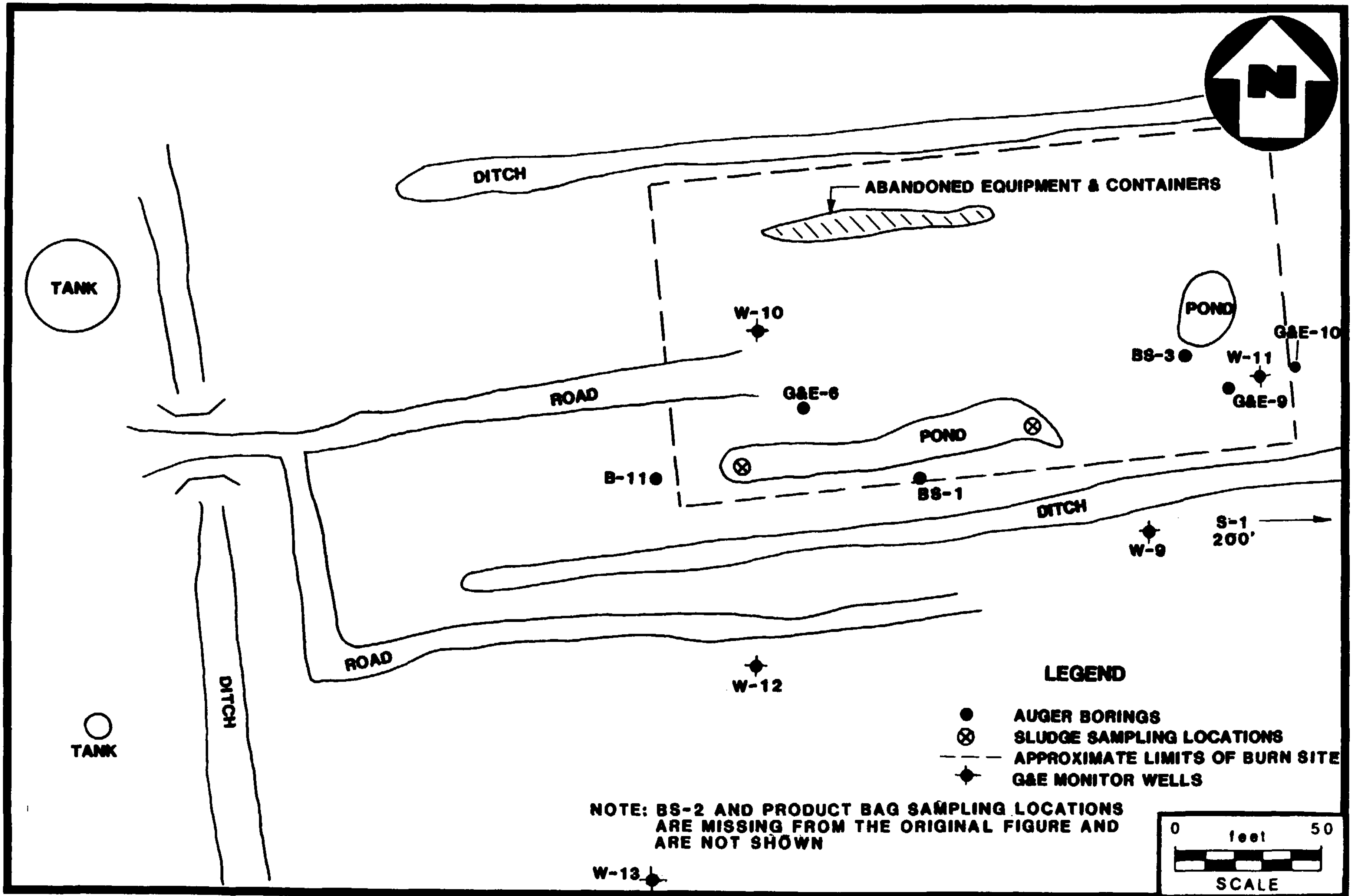


SOURCE: REDRAWN AND ADAPTED FROM FIGURE 6C, G&E ENGINEERING 1986.

SAMPLE LOCATION MAP
OLD DRUM STORAGE AREA
AMERICAN COLOR AND CHEMICAL / VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

FIGURE 6

NUS CORPORATION

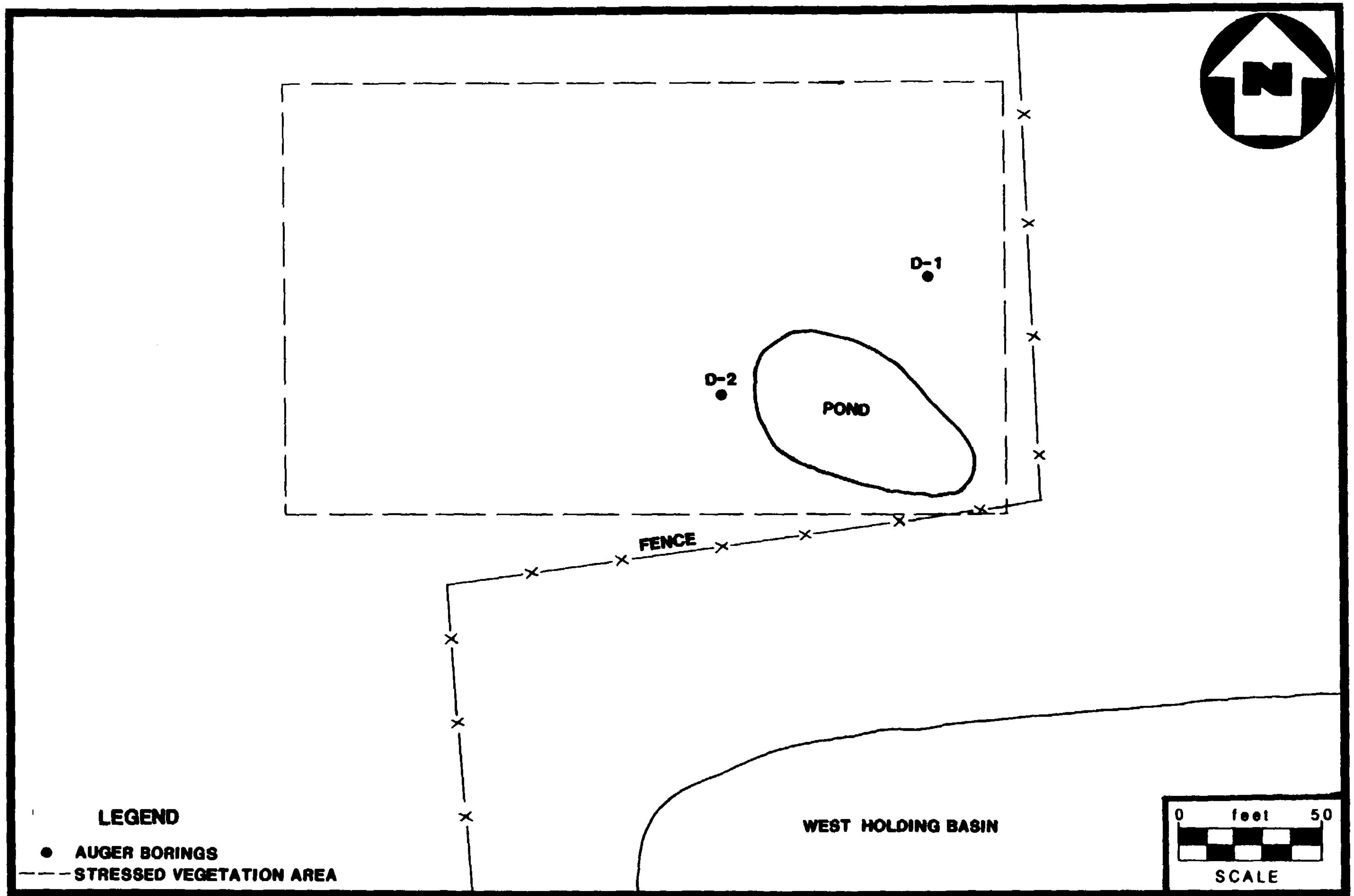


SOURCE: REDRAWN AND ADAPTED FROM FIGURE 6B, G&E ENGINEERING 1986.

SAMPLE LOCATION MAP
BURN SITE
AMERICAN COLOR AND CHEMICAL / VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

FIGURE 7

NUS CORPORATION



SOURCE: REDRAWN FROM FIGURE 6D, G&E ENGINEERING 1986.

SAMPLE LOCATION MAP
STRESSED VEGETATION AREA
AMERICAN COLOR AND CHEMICAL / VENTURE CHEMICAL
LOBECO, BEAUFORT COUNTY, SOUTH CAROLINA

FIGURE 8

NUS CORPORATION

APPENDICES

APPENDIX A

Site Inspection Report

EPA

POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
SC	D046507018

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site): American Color and Chemical / Venture Chemical	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER: SC Hwy. 38
03 CITY: Lobeco	04 STATE: SC; 05 ZIP CODE: 29931; 06 COUNTY: Beaufort; 07 COUNTY CODE: 13; 08 CONG DIST:
09 COORDINATES LATITUDE: 32° 33' 21.0" LONGITUDE: 80° 43' 43.0"	10 TYPE OF OWNERSHIP (Check one): ☑ A. PRIVATE ☐ B. FEDERAL ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL ☐ F. OTHER ☐ G. UNKNOWN

III. INSPECTION INFORMATION

01 DATE OF INSPECTION	02 SITE STATUS	03 YEARS OF OPERATION
09 14 89 (MONTH DAY YEAR)	☑ ACTIVE ☐ INACTIVE	1967 (BEGINNING YEAR) / present (ENDING YEAR) ___ UNKNOWN

04 AGENCY PERFORMING INSPECTION (Check all that apply)

☐ A. EPA ☑ B. EPA CONTRACTOR NUS Corporation (Name of firm) ☐ C. MUNICIPAL ☐ D. MUNICIPAL CONTRACTOR ______ (Name of firm)

☐ E. STATE ☐ F. STATE CONTRACTOR ______ (Name of firm) ☐ G. OTHER ______ (Specify)

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO
James Miller	Geologist	NUS	(404) 938-7710
09 OTHER INSPECTORS	**10 TITLE**	**11 ORGANIZATION**	**12 TELEPHONE NO**
Mark Adams	Draftsmen	NUS	(404) 938-7710
			( )
* drive-by reconnaissance only			( )
			( )
			( )

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	15 ADDRESS	16 TELEPHONE NO
John Meeks	Vice President	P.O. Box 815 Lobeco, SC 29931	(803) 525-6611
			( )
			( )
			( )
			( )
			( )

17 ACCESS GAINED BY (Check one)	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
☐ PERMISSION ☐ WARRANT	1015	overcast; mid-70's

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO
Earl Bozeman	USEPA, Region IV	(404) 347-5065

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE
James Miller		NUS	(404) 938-7710	02 15 90 (MONTH DAY YEAR)

EPA

POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
SC	D046507018

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply): ✓ A. SOLID; ✓ B. POWDER, FINES; ✓ C. SLUDGE; ✓ E. SLURRY; ✓ 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): ✓ 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

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE	40,000	CY	this is the 3-foot-thick PCB
OLW	OILY WASTE			contaminated sludge layer at the
SOL	SOLVENTS			bottom of the old lagoon
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS	UNKNOWN		
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS	UNKNOWN		

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	Aroclor 1248	12672-29-6	SI	6.02	mg/l
OCC	1,2,4-trichlorobenzene	120-82-1	SI	3.470	mg/l
OCC	naphthalene	91-20-3	SI	2.340	mg/l
OCC	chlorotoluene	25168-05-2	SI	0.200	mg/l
OCC	trichloroethane	79-01-6	OD	180	mg/l
OCC	carbon tetrachloride	56-23-5	DR	29	mg/l
OCC	methylene chloride	75-09-2	OD	6.40	mg/l
MES	cadmium	7440-43-9	SI & OD	0.03	mg/l
MES	chromium	7440-47-3	SI	54	mg/l
MES	lead	7439-92-1	SI	34	mg/l
MES	mercury	7439-97-6	SI	0.614	mg/l

V. FEEDSTOCKS (See Appendix for CAS Numbers) NA

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)

See reference list and Appendix B which are attached, Kirk-Othmer Encyclopedia of Chemical Technology, and p. 3 of DHEC's April 17, 1989 memorandum concerning an April 13, 1989 meeting

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

EPA

I. IDENTIFICATION
01 STATE: SC | 02 SITE NUMBER: D046507018

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☑ A. GROUNDWATER CONTAMINATION — 02 ☐ OBSERVED (DATE ______) ☑ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 182 — 04 NARRATIVE DESCRIPTION
There are 48 homes or 182 people (48 houses x 3.8 people/house) relying on groundwater from the aquifer of concern within 4 miles of the site.

01 ☑ B. SURFACE WATER CONTAMINATION — 02 ☐ OBSERVED (DATE 11/83) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 0 — 04 NARRATIVE DESCRIPTION
Although PCB contamination exists along the surface water migration pathway, there are no drinking water intakes downstream from the site.

01 ☑ C. CONTAMINATION OF AIR — 02 ☐ OBSERVED (DATE ______) ☑ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ — 04 NARRATIVE DESCRIPTION
Eight volatile organics were detected in the facility's effluent during a previous sampling investigation.

01 ☑ D. FIRE/EXPLOSIVE CONDITIONS — 02 ☐ OBSERVED (DATE 12/87) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 376 — 04 NARRATIVE DESCRIPTION
Part of the burn site exploded in December 1987. There are 376 people (99 houses x 3.8 people/house) within 1 mile of the site that may have been affected.

01 ☑ E. DIRECT CONTACT — 02 ☐ OBSERVED (DATE ______) ☑ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: unknown — 04 NARRATIVE DESCRIPTION
There are uncontained, contaminated soils at the burn site and the stressed vegetation area which could affect employees and/or local residents.

01 ☑ F. CONTAMINATION OF SOIL — 02 ☐ OBSERVED (DATE 1986) ☐ POTENTIAL ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: UNKNOWN (Acres) — 04 NARRATIVE DESCRIPTION
The soils at this site are contaminated with PCBs, trichlorobenzene, naphthalene, chromium, lead, and mercury.

01 ☑ G. DRINKING WATER CONTAMINATION — 02 ☐ OBSERVED (DATE ______) ☑ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 182 — 04 NARRATIVE DESCRIPTION
The contaminants at this site are migrating in the surficial aquifer and local shallow wells may become affected. There is at least one shallow drinking water well located downgradient of the site.

01 ☑ H. WORKER EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE ______) ☑ POTENTIAL ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: 75 — 04 NARRATIVE DESCRIPTION
There are currently 75 employees at the Lobeco plant who regularly occupy buildings that are located adjacent to the abandoned burn site and the old drum storage area.

01 ☑ I. POPULATION EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE ______) ☑ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: UNKNOWN — 04 NARRATIVE DESCRIPTION
Exposure to local residents through either direct contact or contamination in nearby drinking water wells is a possibility. Also, recreational users may become exposed to contaminants from the surrounding surface water bodies.

Wastewater from this facility. ←

EPA

POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: SC | 02 SITE NUMBER: D046507018

II. HAZARDOUS CONDITIONS AND INCIDENTS (continued)

01 ☑ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: 4/15-16/88) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
Herbaceous vegetation samples collected by RMT, Inc. showed Arochlor 1248 concentrations of 1.0 mg/Kg and 2.9 mg/Kg in the abandoned lagoon and burn site, respectively.

01 ☑ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: 11/83) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (include name(s) of species)
The South Carolina Department of Health and Environmental Control (DHEC) concluded in a 1984 water quality assessment report that the fauna in Campbell Creek had been moderately to severely impacted due to the discharge of → wastewater from this facility.

01 ☑ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: ______) ☑ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
Thirty-four (34) organic chemical compounds (including PCBs) have been detected in oyster (Crassostrea virginica) and blue crab (Callinectes sapidus) samples previously collected in Campbell Creek. Although the creek is currently closed → to shellfish harvesting, there are approved shellfish harvest areas located further downstream and these could eventually be affected.

01 ☑ M. UNSTABLE CONTAINMENT OF WASTES (Spills, Runoff, Standing liquids, Leaking drums) — 02 ☐ OBSERVED (DATE: 1986) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 182
04 NARRATIVE DESCRIPTION
All of the inactive waste management facilities (lagoon, burn site, and drum storage area) at this site are UNLINED and have contaminated the surficial aquifer.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
None reported.

01 ☑ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: 11/83) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
DHEC detected eight volatile organics in the facility's effluent during a November 1983 water quality assessment of Campbell Creek.

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☑ ALLEGED
04 NARRATIVE DESCRIPTION
The burn site was probably never approved by DHEC.

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS
None reported.

III. TOTAL POPULATION POTENTIALLY AFFECTED: unknown

IV. COMMENTS
The contamination in the surficial aquifer is the most hazardous condition at this site. The contaminants are known to be migrating in groundwater and it is recommended that the site be remediated as quickly as possible.

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)
See other appendices and the reference list which are attached, and p. 3 of DHEC's April 17, 1989 memorandum concerning an April 13, 1989 meeting.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION
PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
SC	D046507018

II. PERMIT INFORMATION

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
☑ A. NPDES	SC0000914	05/23/85	06/30/90	
☐ B. UIC				
☐ C. AIR				
☐ D. RCRA				
☐ E. RCRA INTERIM STATUS				
☐ F. SPCC PLAN				
☐ G. STATE (Specify)				
☐ H. LOCAL (Specify)				
☐ I. OTHER (Specify)				
☐ J. NONE				

III. SITE DESCRIPTION

01 STORAGE DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE
☑ A. SURFACE IMPOUNDMENT	40,000	CY
☐ B. PILES		
☑ C. DRUMS, ABOVE GROUND	UNKNOWN	
☐ D. TANK, ABOVE GROUND		
☐ E. TANK, BELOW GROUND		
☐ F. LANDFILL		
☐ G. LANDFARM		
☐ H. OPEN DUMP		
☐ I. OTHER (Specify)		

04 TREATMENT (Check all that apply)

- ☑ A. INCENERATION
- ☐ B. UNDERGROUND INJECTION
- ☐ C. CHEMICAL/PHYSICAL
- ☐ D. BIOLOGICAL
- ☐ E. WASTE OIL PROCESSING
- ☐ F. SOLVENT RECOVERY
- ☐ G. OTHER RECYCLING/RECOVERY
- ☐ H. OTHER (Specify)

05 OTHER

- ☑ A. BUILDINGS ON SITE

06 AREA OF SITE

26 Acres

07 COMMENTS

The gross amount of waste associated with the surface impoundment was derived by calculating the volume of the PCB contaminated sludge layer at the bottom of the impoundment.

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

☐ A. ADEQUATE, SECURE ☐ B. MODERATE ☐ C. INADEQUATE, POOR ☑ D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC.

All of the former disposal areas are unlined and there is no artificial cover at either the burn site or the stressed vegetation area.

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE ☐ YES ☑ NO

02 COMMENTS

Although there is no hazardous waste that is easily accessible, contaminated surface soil media may become a problem at the burn site and/or the stressed vegetation area.

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

See reference list and Appendix B which are attached private well owners were identified on the USGS topographic maps covering the area.

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION
01 STATE: SC 02 SITE NUMBER: D046507018

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as applicable)

	SURFACE	WELL
COMMUNITY	A ☐	B ☑
NON-COMMUNITY	C ☐	D ☑

02 STATUS

ENDANGERED	AFFECTED	MONITORED
A. ☑	B. ☐	C. ☐
D. ☑	E. ☐	F. ☐

03 DISTANCE TO SITE
A. 0.0284 (mi)
B. 0.0947 (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)
☑ A. ONLY SOURCE FOR DRINKING
☐ B. DRINKING (Other sources available) COMMERCIAL, INDUSTRIAL, IRRIGATION (No other water sources available)
☐ C. COMMERCIAL, INDUSTRIAL, IRRIGATION (Limited other sources available)
☐ D. NOT USED, UNUSEABLE

3,659 + 436 + 75
02 POPULATION SERVED BY GROUND WATER 4,170
03 DISTANCE TO NEAREST DRINKING WATER WELL 0.0284 (mi)

04 DEPTH TO GROUNDWATER 5-10 (ft)
05 DIRECTION OF GROUNDWATER FLOW S
06 DEPTH TO AQUIFER OF CONCERN 5-10 (ft)
07 POTENTIAL YIELD OF AQUIFER 14,400 (gpd)
08 SOLE SOURCE AQUIFER ☐ YES ☑ NO

09 DESCRIPTION OF WELLS (including useage, depth, and location relative to population and buildings)
About 95 percent of the wells in the Lobeco area are completed in the Tertiary Limestone aquifer; all others are completed in the aquifer of concern. This corresponds to 38 homes within 3 miles of the site since approximately 770 private well owners were identified on the USGS topographic maps covering the area.

10 RECHARGE AREA
☐ YES
☐ NO
COMMENTS The site may be located in a recharge area because the hydraulic head in the Tertiary Limestone Aquifer has been reduced by pumping at the facility.

11 DISCHARGE AREA
☐ YES
☐ NO
COMMENTS

IV. SURFACE WATER

01 SURFACE WATER USE (Check one)
☐ A. RESERVOIR, RECREATION DRINKING WATER SOURCE
☑ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES
☐ C. COMMERCIAL, INDUSTRIAL
☐ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

NAME:	AFFECTED	DISTANCE TO SITE
Campbell Creek	☑	0 (mi)
Whale Branch	☑	0.6818 (mi)
Coosaw River	☐	6 (mi)

V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN

ONE (1) MILE OF SITE	TWO (2) MILES OF SITE	THREE (3) MILES OF SITE
380 + 75	455 + 1,034 + 436	3,215 + 436 + 75
A. 455 NO. OF PERSONS	B. 1,925 NO. OF PERSONS	C. 3,726 NO. OF PERSONS

02 DISTANCE TO NEAREST POPULATION 0.0947 (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE 1

04 DISTANCE TO NEAREST OFF-SITE BUILDING 1 (mi)

05 POPULATION WITHIN VICINITY OF SITE (Provide narrative description of nature of population within vicinity of site, e.g., rural, village, densely populated urban area)
The site is located in a moderately populated rural area.

![EPA]

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION
01 STATE: SC
02 SITE NUMBER: D046507018

VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Check one)
☐ A. 10^{-6} – 10^{-8} cm/sec ☐ B. 10^{-4} – 10^{-6} cm/sec ☐ C. 10^{-4} – 10^{-3} cm/sec ☑ D. GREATER THAN 10^{-3} cm/sec

02 PERMEABILITY OF BEDROCK (Check one)
☐ A. IMPERMEABLE (Less than 10^{-6} cm/sec) ☐ B. RELATIVELY IMPERMEABLE (10^{-4} – 10^{-6} cm/sec) ☑ C. RELATIVELY PERMEABLE (10^{-2} – 10^{-4} cm/sec) ☐ D. VERY PERMEABLE (Greater than 10^{-2} cm/sec)

03 DEPTH TO BEDROCK: 90 (ft)
04 DEPTH OF CONTAMINATED SOIL ZONE: 14 (ft)
05 SOIL pH: ______

06 NET PRECIPITATION: ≅50 (in)
07 ONE YEAR 24 HOUR RAINFALL: 3.5 (in)
08 SLOPE — SITE SLOPE: 0.6 % — DIRECTION OF SITE SLOPE: S — TERRAIN AVERAGE SLOPE: 1 %

09 FLOOD POTENTIAL: SITE IS IN ______ YEAR FLOODPLAIN
10 ☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS (5 acre minimum)
ESTUARINE: A. 0 (mi)
OTHER: B. ______ (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species): NA (mi)
ENDANGERED SPECIES: ______

13 LAND USE IN VICINITY
DISTANCE TO:
COMMERCIAL/INDUSTRIAL: A. 12 (mi)
RESIDENTIAL AREAS; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES: B. 0.5 (mi)
AGRICULTURAL LANDS — PRIME AG LAND: C. ______ (mi) — AG LAND: D. ______ (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

Site is in an area characterized by low flatland inundated with surface water.

VII. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

See reference list and appendices B and D which are attached, and p. 93 of the Rainfall Frequency Atlas of the United States

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 6 - SAMPLE AND FIELD INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
SC	D046507018

II. SAMPLES TAKEN NA

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER			
SURFACE WATER			
WASTE			
AIR			
RUNOFF			
SPILL			
SOIL			
VEGETATION			
OTHER			

III. FIELD MEASUREMENTS TAKEN NA

01 TYPE	02 COMMENTS

IV. PHOTOGRAPHS AND MAPS

01 TYPE ☑ GROUND ☑ AERIAL

02 IN CUSTODY OF NUS Corporation (Name of organization or individual)

03 MAPS ☑ YES ☐ NO

04 LOCATION OF MAPS attached

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

None

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

See text

EPA FORM 2070-13 (7-81)

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 7 - OWNER INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
SC	D046507018

II. CURRENT OWNER(S)			PARENT COMPANY (if applicable)		
01 NAME: Lobeco Products, Inc.		02 D+B NUMBER	08 NAME: Enterra Corporation		09 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.): P.O. Box 815		04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)		11 SIC CODE
05 CITY: Lobeco	06 STATE: SC	07 ZIP CODE: 29931	12 CITY: Philadelphia	13 STATE: PA	14 ZIP CODE
01 NAME		02 D+B NUMBER	08 NAME		09 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)		11 SIC CODE
05 CITY	06 STATE	07 ZIP CODE	12 CITY	13 STATE	14 ZIP CODE
01 NAME		02 D+B NUMBER	08 NAME		09 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)		11 SIC CODE
05 CITY	06 STATE	07 ZIP CODE	12 CITY	13 STATE	14 ZIP CODE
01 NAME		02 D+B NUMBER	08 NAME		09 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)		11 SIC CODE
05 CITY	06 STATE	07 ZIP CODE	12 CITY	13 STATE	14 ZIP CODE

III. PREVIOUS OWNER(S) (List most recent first)			IV. REALTY OWNER(S) (If applicable, list most recent first) NA		
01 NAME: American Color and Chemical Company		02 D+B NUMBER	01 NAME		02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.): P.O. Box 88 Mt. Vernon Street		04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE
05 CITY: Lock Haven	06 STATE: PA	07 ZIP CODE: 17745	05 CITY	06 STATE	07 ZIP CODE
01 NAME: Tenneco Chemical Company		02 D+B NUMBER	01 NAME		02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.): P.O. Box 2511		04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE
05 CITY: Houston	06 STATE: TX	07 ZIP CODE: 77001	05 CITY	06 STATE	07 ZIP CODE
01 NAME		02 D+B NUMBER	01 NAME		02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

See reference list which is attached; August 16, 1988 DHEC letter to John Meeks; Newspaper article from the Post-Courier; January 28, 1981 letter from J.F. Jacobetz to DHEC; and June 12, 1989 DHEC letter to R.D. Pruessner

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 8 - OPERATOR INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
SC	D046507018

II. CURRENT OPERATOR (Provide if different from owner) NA

01 NAME		02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE
08 YEARS OF OPERATION	09 NAME OF OWNER	

OPERATOR'S PARENT COMPANY (If applicable) NA

10 NAME		11 D+B NUMBER
12 STREET ADDRESS (P.O. Box, RFD #, etc.)		13 SIC CODE
14 CITY	15 STATE	16 ZIP CODE

III. PREVIOUS OPERATOR(S) (List most recent first; provide only if different from owner) NA

01 NAME		02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE
08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD	
01 NAME		02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE
08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD	
01 NAME		02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE
08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD	

PREVIOUS OPERATORS' PARENT COMPANIES (If applicable) NA

10 NAME		11 D+B NUMBER
12 STREET ADDRESS (P.O. Box, RFD #, etc.)		13 SIC CODE
14 CITY	15 STATE	16 ZIP CODE
10 NAME		11 D+B NUMBER
12 STREET ADDRESS (P.O. Box, RFD #, etc.)		13 SIC CODE
14 CITY	15 STATE	16 ZIP CODE
10 NAME		11 D+B NUMBER
12 STREET ADDRESS (P.O. Box, RFD #, etc.)		13 SIC CODE
14 CITY	15 STATE	16 ZIP CODE

IV. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

See Appendix B which is attached

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
SC	D046507018

II. ON-SITE GENERATOR NA

01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE

III. OFF-SITE GENERATOR(S) NA

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE
01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE

IV. TRANSPORTER(S) NA

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE
01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, ...)

See reference list which is attached

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
SC	D046507018

II. PAST RESPONSE ACTIVITIES

01 ☐ A. WATER SUPPLY CLOSED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ B. TEMPORARY WATER SUPPLY PROVIDED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ C. PERMANENT WATER SUPPLY PROVIDED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ D. SPILLED MATERIAL REMOVED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ E. CONTAMINATED SOIL REMOVED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ F. WASTE REPACKAGED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☑ G. WASTE DISPOSED ELSEWHERE — 02 DATE 2/77 03 AGENCY American Color & Chemical Co.
04 DESCRIPTION
Sludge solids from the bio-treatment area are landfilled at an offsite location.

01 ☐ H. ON SITE BURIAL — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ I. IN SITU CHEMICAL TREATMENT — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ J. IN SITU BIOLOGICAL TREATMENT — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ K. IN SITU PHYSICAL TREATMENT — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ L. ENCAPSULATION — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ M. EMERGENCY WASTE TREATMENT — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ N. CUTOFF WALLS — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ O. EMERGENCY DIKING/SURFACE WATER DIVERSION — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ P. CUTOFF TRENCHES/SUMP — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ Q. SUBSURFACE CUTOFF WALL — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

EPA

I. IDENTIFICATION
01 STATE: SC
02 SITE NUMBER: D046507018

II PAST RESPONSE ACTIVITIES (Continued)

01 ☐ R. BARRIER WALLS CONSTRUCTED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ✓ S. CAPPING COVERING — 02 DATE 3/78 — 03 AGENCY American Color & Chem. Co.
04 DESCRIPTION
The PCB contaminated sludge layer at the bottom of the old lagoon was covered by a 1-to 2-foot natural earth cap and then backfilled.

01 ☐ T. BULK TANKAGE REPAIRED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ U. GROUT CURTAIN CONSTRUCTED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ V. BOTTOM SEALED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ W. GAS CONTROL — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ X. FIRE CONTROL — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ Y. LEACHATE TREATMENT — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ Z. AREA EVACUATED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ 1. ACCESS TO SITE RESTRICTED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ 2. POPULATION RELOCATED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ 3. OTHER REMEDIAL ACTIVITIES — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

See reference list and Appendix B which are attached

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 11 - ENFORCEMENT INFORMATION

EPA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
SC	D046507018

II. ENFORCEMENT INFORMATION

01 PAST REGULATORY ENFORCEMENT ACTION ✓ YES NO

02 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY ENFORCEMENT ACTION

All past regulatory enforcement action for this site is at the state level. DHEC has already issued three consent orders because of activities at the facility. Two of the consent orders (86-94-W and 88-37-W) were issued for separate violations of the facility's NPDES permit and required an upgrade in the wastewater treatment system. The third consent order (87-65-W) was issued because of contaminated soil and groundwater at the site. An amendment to this order is requiring that "high level" contamination at the abandoned lagoon and burn site be removed by December 1990.

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

See reference list which is attached and Consent Order 87-65-W

EPA FORM 2070-13 (7-81)

APPENDIX

I. FEEDSTOCKS

CAS Number	Chemical Name
1. 7664-41-7	Ammonia
2. 7440-36-0	Antimony
3. 1309-64-4	Antimony Trioxide
4. 7440-38-2	Arsenic
5. 1327-53-3	Arsenic Trioxide
6. 21109-95-5	Barium Sulfide
7. 7726-95-6	Bromine
8. 106-99-0	Butadiene
9. 7440-43-9	Cadmium
10. 7782-50-5	Chlorine
11. 12737-27-8	Chromite
12. 7440-47-3	Chromium
13. 7440-48-4	Cobalt
14. 1317-38-0	Cupric Oxide
15. 7758-98-7	Cupric Sulfate
16. 1317-39-1	Cuprous Oxide
17. 74-85-1	Ethylene
18. 7647-01-0	Hydrochloric Acid
19. 7664-39-3	Hydrogen Fluoride
20. 1335-25-7	Lead Oxide
21. 7439-97-6	Mercury
22. 74-82-8	Methane
23. 91-20-3	Napthalene
24. 7440-02-0	Nickel
25. 7697-37-2	Nitric Acid
26. 7723-14-0	Phosphorus
27. 7778-50-9	Potassium Dichromate
28. 1310-58-3	Potassium Hydroxide
29. 115-07-1	Propylene
30. 10588-01-9	Sodium Dichromate
31. 1310-73-2	Sodium Hydroxide
32. 7646-78-8	Stannic Chloride
33. 7772-99-8	Stannous Chloride
34. 7664-93-9	Sulfuric Acid
35. 108-88-3	Toluene
36. 1330-20-7	Xylene
37. 7646-85-7	Zinc Chloride
38. 7733-02-0	Zinc Sulfate

II. HAZARDOUS SUBSTANCES

CAS Number	Chemical Name
1. 75-07-0	Acetaldehyde
2. 64-19-7	Acetic Acid
3. 108-24-7	Acetic Anhydride
4. 75-86-5	Acetone Cyanohydrin
5. 506-96-7	Acetyl Bromide
6. 75-36-5	Acetyl Chloride
7. 107-02-8	Acrolein
8. 107-13-1	Acrylonitrile
9. 124-04-9	Adipic Acid
10. 309-00-2	Aldrin
11. 10043-01-3	Aluminum Sulfate
12. 107-18-6	Allyl Alcohol
13. 107-05-1	Allyl Chloride
14. 7664-41-7	Ammonia
15. 631-61-8	Ammonium Acetate
16. 1863-63-4	Ammonium Benzoate
17. 1066-33-7	Ammonium Bicarbonate
18. 7789-09-5	Ammonium Bichromate
19. 1341-49-7	Ammonium Bifluoride
20. 10192-30-0	Ammonium Bisulfite
21. 1111-78-0	Ammonium Carbamate
22. 12125-02-9	Ammonium Chloride
23. 7788-98-9	Ammonium Chromate
24. 3012-65-5	Ammonium Citrate, Dibasic
25. 13826-83-0	Ammonium Fluoborate
26. 12125-01-8	Ammonium Fluoride
27. 1336-21-6	Ammonium Hydroxide
28. 6009-70-7	Ammonium Oxalate
29. 16919-19-0	Ammonium Silicofluoride
30. 7773-06-0	Ammonium Sulfamate
31. 12135-76-1	Ammonium Sulfide
32. 10196-04-0	Ammonium Sulfite
33. 14307-43-8	Ammonium Tartrate
34. 1762-95-4	Ammonium Thiocyanate
35. 7783-18-8	Ammonium Thiosulfate
36. 628-63-7	Amyl Acetate
37. 62-53-3	Aniline
38. 7647-18-9	Antimony Pentachloride
39. 7789-61-9	Antimony Tribromide
40. 10025-91-9	Antimony Trichloride
41. 7783-56-4	Antimony Trifluoride
42. 1309-64-4	Antimony Trioxide
43. 1303-32-8	Arsenic Disulfide
44. 1303-28-2	Arsenic Pentoxide
45. 7784-34-1	Arsenic Trichloride
46. 1327-53-3	Arsenic Trioxide
47. 1303-33-9	Arsenic Trisulfide
48. 542-62-1	Barium Cyanide
49. 71-43-2	Benzene
50. 65-85-0	Benzoic Acid
51. 100-47-0	Benzonitrile
52. 98-88-4	Benzoyl Chloride
53. 100-44-7	Benzyl Chloride
54. 7440-41-7	Beryllium
55. 7787-47-5	Beryllium Chloride
56. 7787-49-7	Beryllium Fluoride
57. 13597-99-4	Beryllium Nitrate
58. 123-86-4	Butyl Acetate
59. 84-74-2	n-Butyl Phthalate
60. 109-73-9	Butylamine
61. 107-92-6	Butyric Acid
62. 543-90-8	Cadimium Acetate
63. 7789-42-6	Cadmium Bromide
64. 10108-64-2	Cadmium Chloride
65. 7778-44-1	Calcium Arsenate
66. 52740-16-6	Calcium Arsenite
67. 75-20-7	Calcium Carbide
68. 13765-19-0	Calcium Chromate
69. 592-01-8	Calcium Cyanide
70. 26264-06-2	Calcium Dodecylbenzene Sulfonate
71. 7778-54-3	Calcium Hypochlorite
72. 133-06-2	Captan
73. 63-25-2	Carbaryl
74. 1563-66-2	Carbofuran
75. 75-15-0	Carbon Disulfide
76. 56-23-5	Carbon Tetrachloride
77. 57-74-9	Chlordane
78. 7782-50-5	Chlorine
79. 108-90-7	Chlorobenzene
80. 67-66-3	Chloroform
81. 7790-94-5	Chlorosulfonic Acid
82. 2921-88-2	Chlorpyrifos
83. 1066-30-4	Chromic Acetate
84. 7738-94-5	Chromic Acid
85. 10101-53-8	Chromic Sulfate
86. 10049-05-5	Chromous Chloride
87. 544-18-3	Cobaltous Formate
88. 14017-41-5	Cobaltous Sulfamate
89. 56-72-4	Coumaphos
90. 1319-77-3	Cresol
91. 4170-30-3	Crotonaldehyde
92. 142-71-2	Cupric Acetate
93. 12002-03-8	Cupric Acetoarsenite
94. 7447-39-4	Cupric Chloride
95. 3251-23-8	Cupric Nitrate
96. 5893-66-3	Cupric Oxalate
97. 7758-98-7	Cupric Sulfate
98. 10380-29-7	Cupric Sulfate Ammoniated
99. 815-82-7	Cupric Tartrate
100. 506-77-4	Cyanogen Chloride
101. 110-82-7	Cyclohexane
102. 94-75-7	2,4-D Acid
103. 94-11-1	2,4-D Esters
104. 50-29-3	DDT
105. 333-41-5	Diazinon
106. 1918-00-9	Dicamba
107. 1194-65-6	Dichlobenil
108. 117-80-6	Dichlone
109. 25321-22-6	Dichlorobenzene (all isomers)
110. 266-38-19-7	Dichloropropane (all isomers)
111. 26952-23-8	Dichloropropene (all isomers)
112. 8003-19-8	Dichloropropene-Dichloropropane Mixture
113. 75-99-0	2-2-Dichloropropionic Acid
114. 62-73-7	Dichlorvos
115. 60-57-1	Dieldrin
116. 109-89-7	Diethylamine
117. 124-40-3	Dimethylamine
118. 25154-54-5	Dinitrobenzene (all isomers)
119. 51-28-5	Dinitrophenol
120. 25321-14-6	Dinitrotoluene (all isomers)
121. 85-00-7	Diquat
122. 298-04-4	Disulfoton
123. 330-54-1	Diuron
124. 27176-87-0	Dodecylbenzenesulfonic Acid
125. 115-29-7	Endosulfan (all isomers)
126. 72-20-8	Endrin and Metabolites
127. 106-89-8	Epichlorohydrin
128. 563-12-2	Ethion
129. 100-41-4	Ethyl Benzene
130. 107-15-3	Ethylenediamine
131. 106-93-4	Ethylene Dibromide
132. 107-06-2	Ethylene Dichloride
133. 60-00-4	EDTA
134. 1185-57-5	Ferric Ammonium Citrate
135. 2944-67-4	Ferric Ammonium Oxalate
136. 7705-08-0	Ferric Chloride

II. HAZARDOUS SUBSTANCES

CAS Number	Chemical Name
137. 7783-50-8	Ferric Fluoride
138. 10421-48-4	Ferric Nitrate
139. 10028-22-5	Ferric Sulfate
140. 10045-89-3	Ferrous Ammonium Sulfate
141. 7758-94-3	Ferrous Chloride
142. 7720-78-7	Ferrous Sulfate
143. 206-44-0	Fluoranthene
144. 50-00-0	Formaldehyde
145. 64-18-6	Formic Acid
146. 110-17-8	Fumaric Acid
147. 98-01-1	Furfural
148. 86-50-0	Guthion
149. 76-44-8	Heptachlor
150. 118-74-1	Hexachlorobenzene
151. 87-68-3	Hexachlorobutadiene
152. 67-72-1	Hexachloroethane
153. 70-30-4	Hexachlorophene
154. 77-47-4	Hexachlorocyclopentadiene
155. 7647-01-0	Hydrochloric Acid (Hydrogen Chloride)
156. 7664-39-3	Hydrofluoric Acid (Hydrogen Fluoride)
157. 74-90-8	Hydrogen Cyanide
158. 7783-06-4	Hydrogen Sulfide
159. 78-79-5	Isoprene
160. 42504-46-1	Isopropanolamine Dodecylbenzenesulfonate
161. 115-32-2	Kelthane
162. 143-50-0	Kepone
163. 301-04-2	Lead Acetate
164. 3687-31-8	Lead Arsenate
165. 7758-95-4	Lead Chloride
166. 13814-96-5	Lead Fluoborate
167. 7783-46-2	Lead Fluoride
168. 10101-63-0	Lead Iodide
169. 18256-98-9	Lead Nitrate
170. 7428-48-0	Lead Stearate
171. 15739-80-7	Lead Sulfate
172. 1314-87-0	Lead Sulfide
173. 592-87-0	Lead Thiocyanate
174. 58-89-9	Lindane
175. 14307-35-8	Lithium Chromate
176. 121-75-5	Malthion
177. 110-16-7	Maleic Acid
178. 108-31-6	Maleic Anhydride
179. 2032-65-7	Mercaptodimethur
180. 592-04-1	Mercuric Cyanide
181. 10045-94-0	Mercuric Nitrate
182. 7783-35-9	Mercuric Sulfate
183. 592-85-8	Mercuric Thiocyanate
184. 10415-75-5	Mercurous Nitrate
185. 72-43-5	Methoxychlor
186. 74-93-1	Methyl Mercaptan
187. 80-62-6	Methyl Methacrylate
188. 298-00-0	Methyl Parathion
189. 7786-34-7	Mevinphos
190. 315-18-4	Mexacarbate
191. 75-04-7	Monoethylamine
192. 74-89-5	Monomethylamine
193. 300-76-5	Naled
194. 91-20-3	Naphthalene
195. 1338-24-5	Naphthenic Acid
196. 7440-02-0	Nickel
197. 15699-18-0	Nickel Ammonium Sulfate
198. 37211-05-5	Nickel Chloride
199. 12054-48-7	Nickel Hydroxide
200. 14216-75-2	Nickel Nitrate
201. 7786-81-4	Nickel Sulfate
202. 7697-37-2	Nitric Acid
203. 98-95-3	Nitrobenzene
204. 10102-44-0	Nitrogen Dioxide
205. 25154-55-6	Nitrophenol (all isomers)
206. 1321-12-6	Nitrotoluene
207. 30525-89-4	Paraformaldehyde
208. 56-38-2	Parathion
209. 608-93-5	Pentachlorobenzene
210. 87-86-5	Pentachlorophenol
211. 85-01-8	Phenanthrene
212. 108-95-2	Phenol
213. 75-44-5	Phosgene
214. 7664-38-2	Phosphoric Acid
215. 7723-14-0	Phosphorus
216. 10025-87-3	Phosphorus Oxychloride
217. 1314-80-3	Phosphorus Pentasulfide
218. 7719-12-2	Phosphorus Trichloride
219. 7784-41-0	Potassium Arsenate
220. 10124-50-2	Potassium Arsenite
221. 7778-50-9	Potassium Bichromate
222. 7789-00-6	Potassium Chromate
223. 7722-64-7	Potassium Permanganate
224. 2312-35-8	Propargite
225. 79-09-4	Propionic Acid
226. 123-62-6	Propionic Anhydride
227. 1336-36-3	Polychlorinated Biphenyls
228. 151-50-8	Potassium Cyanide
229. 1310-58-3	Potassium Hydroxide
230. 75-56-9	Propylene Oxide
231. 121-29-9	Pyrethrins
232. 91-22-5	Quinoline
233. 108-46-3	Resorcinol
234. 7446-08-4	Selenium Oxide
235. 7761-88-8	Silver Nitrate
236. 7631-89-2	Sodium Arsenate
237. 7784-46-5	Sodium Arsenite
238. 10588-01-9	Sodium Bichromate
239. 1333-83-1	Sodium Bifluoride
240. 7631-90-5	Sodium Bisulfite
241. 7775-11-3	Sodium Chromate
242. 143-33-9	Sodium Cyanide
243. 25155-30-0	Sodium Dodecylbenzene Sulfonate
244. 7681-49-4	Sodium Fluoride
245. 16721-80-5	Sodium Hydrosulfide
246. 1310-73-2	Sodium Hydroxide
247. 7681-52-9	Sodium Hypochlorite
248. 124-41-4	Sodium Methylate
249. 7632-00-0	Sodium Nitrate
250. 7558-79-4	Sodium Phosphate, Dibasic
251. 7601-54-9	Sodium Phosphate, Tribasic
252. 10102-18-8	Sodium Selenite
253. 7789-06-2	Strontium Chromate
254. 57-24-9	Strychnine and Salts
255. 100-42-5	Styrene
256. 12771-08-3	Sulfur Monochloride
257. 7664-93-9	Sulfuric Acid
258. 93-76-5	2,4,5-T Acid
259. 2008-46-0	2,4,5-T Amines
260. 93-79-8	2,4,5-T Esters
261. 13560-99-1	2,4,5-T Salts
262. 93-72-1	2,4,5-TP Acid
263. 32534-95-5	2,4,5-TP Acid Esters
264. 72-54-8	TDE
265. 95-94-3	Tetrachlorobenzene
266. 127-18-4	Tetrachloroethane
267. 78-00-2	Tetraethyl Lead
268. 107-49-3	Tetraethyl Pyrophosphate
269. 7446-18-6	Thallium (I) Sulfate
270. 108-88-3	Toluene
271. 8001-35-2	Toxaphene
272. 12002-48-1	Trichlorobenzene (all isomers)
273. 52-68-6	Trichlorfon
274. 25323-89-1	Trichloroethane (all isomers)
275. 79-01-6	Trichloroethylene
276. 25167-82-2	Trichlorophenol (all isomers)
277. 27323-41-7	Triethanolamine Dodecylbenzenesulfonate
278. 121-44-8	Triethylamine
279. 75-50-3	Trimethylamine
280. 541-09-3	Uranyl Acetate
281. 10102-06-4	Uranyl Nitrate
282. 1314-62-1	Vanadium Pentoxide
283. 27774-13-6	Vanadyl Sulfate
284. 108-05-4	Vinyl Acetate
285. 75-35-4	Vinylidene Chloride
286. 1300-71-6	Xylenol
287. 557-34-6	Zinc Acetate
288. 52628-25-8	Zinc Ammonium Chloride
289. 1332-07-6	Zinc Borate
290. 7699-45-8	Zinc Bromide
291. 3486-35-9	Zinc Carbonate
292. 7646-85-7	Zinc Chloride
293. 557-21-1	Zinc Cyanide
294. 7783-49-3	Zinc Fluoride
295. 557-41-5	Zinc Formate
296. 7779-86-4	Zinc Hydrosulfite
297. 7779-88-6	Zinc Nitrate
298. 127-82-2	Zinc Phenolsulfonate
299. 1314-84-7	Zinc Phosphide
300. 16871-71-9	Zinc Silicofluoride
301. 7733-02-0	Zinc Sulfate
302. 13746-89-9	Zirconium Nitrate
303. 16923-95-8	Zirconium Potassium Fluoride
304. 14644-61-2	Zirconium Sulfate
305. 10026-11-6	Zirconium Tetrachloride

APPENDIX B

This is available upon request.

REPORT OF

ONGOING SOIL AND GROUNDWATER STUDY
AND CONCEPTUALIZED CLEANUP PLAN
VENTURE CHEMICALS, INC.
LOBECO, SOUTH CAROLINA

VOLUME I

PREPARED FOR

VENTURE CHEMICALS, INC.

LOBECO, SOUTH CAROLINA

NOVEMBER 1986

PREPARED BY

G & E
ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL
CONSULTANTS

SUMMARY

An assessment of groundwater contamination at the Venture Chemicals, Inc. plant site in Lobeco, South Carolina has been ongoing since March 1986. The following key points have been determined during the course of the assessment.

1. Three areas have been identified as significant sources of soil and groundwater contamination.

2. Two of these areas, an old burn site and an abandoned (and covered) lagoon, contain polychlorinated biphenyls (PCBs) in the soil. The PCB concentrations encountered in the soil samples from the old lagoon averaged approximately 750 mg/kg (ppm). The data indicate there has been no groundwater contamination with polychlorinated biphenyls (PCBs) outside the old lagoon. However, in the burn site area, PCB concentrations as high as 114 ug/l (ppb) were encountered in a monitor well in the shallow unconfined aquifer. The other notable constituent found in the groundwater at the burn site area is trichloroethene found at 180 mg/l (ppm). The third area, a former storage area for drums, showed carbon tetrachloride levels of 89 mg/l (ppm) and other chlorinated organics in concentrations less than 1 mg/l in a shallow monitoring well in the area.

3. Historical aerial photography confirms the abandoned lagoon was being closed in the February 1977 to October 1979 time frame. The burn pit was clearly active in 1972. The activities at the burn site between 1972 and 1979 are not known, however, the site was clearly not in use in October 1979.

4. None of the contaminated groundwater has moved off site and the underlying aquitard (Hawthorn/Cooper formation) provides a barrier to vertical migration to a useable aquifer. No PCBs have been encountered in the groundwater monitor wells immediately adjacent, to or those hydraulically further downstream from, the old lagoon.

5. Cleanup of groundwater contaminated with PCBs can be performed in-situ. However, for PCB contaminated soil, some degree of source removal will be required. The PCB species (Aroclor 1248) found in the soil at the site is difficult to treat or degrade in-situ. The trichloroethene and carbon tetrachloride encountered in the shallow groundwater zone can be readily treated with conventional in-situ techniques.

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VOLUME II

APPENDICES

SECTION 1
INTRODUCTION

1.1 General. Venture Chemicals, Inc. (Venture) owns a specialty chemicals plant near Lobeco, South Carolina (Figure 1). The facility is located about twelve miles northwest of Beaufort, South Carolina near the Coosaw River. Products presently manufactured at the plant include agri-products, dye intermediates, and drilling fluid chemicals for the oil and gas industry.

The facility was constructed by Tenneco in 1967 and has been in operation as a chemical manufacturing plant since that time. American Color purchased the plant in January 1974 and retained ownership of the site until it was purchased by Venture in October 1982.

Six groundwater monitor wells were installed in 1985. Elevated chlorides and some organics were detected in several of the monitor wells. G&E Engineering, Inc. (G&E) was retained by Venture and American Color to prepare an environmental assessment plan for the plant to determine the nature, extent and significance of the contamination present. The South Carolina Department of Health and Environmental Control (SCDHEC) was apprised of the preliminary findings and of Venture's intent to proceed with an extended assessment program.

1.2 Scope of Service. The scope of G&E's environmental assessment was to include efforts to determine the source, nature and extent of zones of surface and subsurface contamination and to develop cost-effective remedial response options. Based on discussions involving Venture, American Color and G&E, and a meeting with the SCDHEC, it was agreed that a phased approach would be taken.

The initial work phase consisted of:

1) Compilation and review of information regarding site history and land use. This involved a historical photo search, review of plant-related records to determine the nature and sources of possible contamination, and interviews with plant personnel.

2) Drilling and sampling three soil borings penetrating to a depth of 10 feet into the confining unit (Hawthorn Clay) anticipated to be at a depth of about 35 feet. One borehole was to be completed as a groundwater monitor well in the Hawthorn Formation.

   Drilling and sampling a sufficient number of shallow borings (15 to 20 feet deep) upgradient and downgradient of the areas of concern, and completing these boreholes as groundwater monitor wells to monitor the shallow water table.

3) Sampling soil materials (utilizing hollow stem auger equipment to the extent possible) in areas of known contamination.

4) Performing conductivity surveys with an EM-31 instrument to delineate zones of high and low conductivity around areas of concern.

5) Conducting appropriate analytical testing to determine the nature and concentrations of contaminants and geotechnical testing to establish the subsurface soil conditions.

6) Assessing the findings of Tasks 1) through 5) and submitting a preliminary report which would include conclusions and recommendations for the next phase of work.

This report presents the results of the preliminary site assessment to date and identifies activities yet to be completed. It is intended to serve as a basis for obtaining approval from the SCDHEC for the next phase of work. Because of the significant PCB contamination encountered during the field investigation, SCDHEC has also requested development of a conceptualized cleanup plan which is included in this report.

It should be noted that since December 1985, when a groundwater assessment plan was initially requested by SCDHEC, three meetings have been held with representatives of the regulatory agency to keep them informed of major findings at the site.

SECTION 2
BACKGROUND INFORMATION

2.1 General. The facility was built by Tenneco in 1967 and sold to American Color in January 1974. Venture acquired the property in October 1982.

Active waste management facilities at the site are part of the NPDES water treatment system and consist of:

- o Equalization basin
- o Aeration basin
- o Digester basin
- o Clarifiers (two)
- o Drying beds
- o Holding ponds (East and West ponds)

A review of historical aerial photography and interviews with plant personnel indicated that inactive or abandoned waste sites on the property include:

- o Abandoned lagoon
- o Old burn site
- o Old drum storage area

In addition, an area of stressed vegetation was indicated on the historical aerial photographs. Subsequent testing revealed no contamination. Figure 2 is an aerial photograph with these areas clearly marked. A site plan is presented on Figure 3a and a grid system used to locate site features is presented as Figure 3b, and locations of facilities of interest are identified thereon.

2.2 Description of Waste Facilities. Based on a review of aerial photography and a preliminary field survey, it became evident that the areas of greatest potential environmental impact were the abandoned lagoon and the burn site. The old drum storage area was also considered a potential source for groundwater contamination. As will be discussed later in this report, the field investigation confirmed that all three areas are sources or potential sources of groundwater contamination. The abandoned lagoon and the burn site are the most significant areas of contamination.

Section 3 contains a detailed interpretation of historical aerial photography which traces the development and use of the plant site and all waste areas from 1968 to the present.

From the historical aerial photography, it appears that the abandoned lagoon (Figures 2, 3a and 3b) functioned as an active facility from 1968 to late 1977. The facility was used as a holding pond prior to discharge to the marsh. Apparently no treatment occurred in the lagoon. When active, the abandoned lagoon covered an area approximately 200' by 200' in size. It appears that the lagoon was closed by pushing in the old levees. The field investigation indicates that the area impacted by the lagoon now covers approximately the same area. The zone of contamination within the lagoon area appears fairly homogeneous although there are some variations in the depth of the waste material probably caused by the method of closure. The most severe contamination appears to be located in the center of the lagoon.

Historical aerial photography indicates that the burn site was in use as early as May 1968. The burn site was clearly in use in 1972, and not in use in 1979. The activities at the site between 1972 and 1979 are not known at this time. The field investigation has disclosed that the ponds in the burn site area (See Figure 2) contain a variety of waste drums and plastic liner inserts which appear to contain discarded chemical products. Discarded plant equipment and machinery are also present in the area. Small areas showing evidence of burning activities are visible. Personnel familiar with the past plant operations (prior to Venture) tentatively identified some of the waste material as 1,5 dihydroxyanthraquinone, a dye intermediate. Laboratory analyses indicate this material also contains approximately 20 mg/kg of mercury.

Wet conditions and thick vegetation prevented a drilling rig from entering the area until very recently. As a result, it has not been possible to obtain sufficient soil and groundwater analytical data to estimate the extent of contamination in this area.

The old drum storage site was used to store drums of chemicals used in the production processes. The drum storage area was clearly active in 1972. The area has been partially covered with a concrete pad.

2.3 Prior Studies. In mid-1985 Law Environmental Services (Law) conducted a preliminary site investigation (report dated July 2, 1985). This work involved installation of six groundwater monitor wells designated V-1 through V-6 (see Figure 4 for well locations). The monitor wells were installed in borings 23 to 29 feet deep. Screen depths of the wells began approximately 7 to 11 feet beneath the surface and terminated at 23 to 28 feet. The monitor wells, two plant production wells, and one deep observation well were sampled and analyzed for selected parameters by Davis & Floyd (report dated November 15, 1985). The parameters tested consisted of:

- Priority Pollutant Analysis for Volatile Organics (32 Compounds)
- Temperature
- pH
- Specific Conductance

- Total Organic Carbon (TOC)
- Chloride
- Metals
- 1-Aminoanthraquinone
- Aniline
- Dimethyl Amine
- p-Chlorophenol
- n-cyanoethyl-n-ethyl-m-Toluidene (CEET)

Well V-1. Well V-1 was installed as a background well (upgradient of the plant proper) and showed what appear to be background conditions.

Well V-2. A low concentration (56 ug/l) of Chloroethane was detected in the well V-2 sample; otherwise the sample reflected background values.

Well V-3 and V-6. Analyses of water samples from wells V-3 and, to a lesser extent V-6, indicated the presence of priority pollutant volatile organics and concentrations of chlorides, TOC and certain metals in excess of values found in well V-1.

Well V-4. Analyses of the sample from well V-4 indicated background or near background conditions.

Well V-5. TOC and chloride values for the well V-5 sample were in excess of background, but less than found for wells V-3 and V-6. Otherwise, the V-5 sample indicated background conditions.

The two plant production water wells, installed in 1966, to finished depths of 307 feet (West Production Well) and 263 feet (East Production Well), and the deep observation well with a depth of 262 feet, did not shown any contamination.

Copies of the Davis and Floyd analytical reports are attached as Appendix A.

Law described site geologic conditions based on soil exploration borings which were completed as monitor wells. According to the Law report, the geologic characteristics of the site, based on field observations, consist of a very loose to firm, gray to tan slightly clayey, silty fine sand. Silty medium sand was found at depths greater than 23.5 feet. In some borings, silty sandy clays interbedded with silty fine sand were reported. Sandy clayey silt was encountered in one boring at a depth of 18 to 23 feet.

Groundwater conditions were evaluated by Law based on data obtained from measurements of static water tables in the monitoring wells (see Law report Table No. 1 in Appendix A). Law described the elevation of the water table as ranging from 10.38 feet (NGVD) to 3.47 feet (NGVD) from north to south. Field permeability tests performed by Law in the groundwater monitoring wells yielded hydraulic conductivities ranging from 1.6×10^{-4} cm/sec to 1.3×10^{-3} cm/sec.

Extensive sampling of the NPDES train for PCBs has been completed at the facility by Venture personnel. The data from those sampling efforts have shown no PCB's in the plant's wastestreams. However, low levels of (1-2 ppm) PCB's were detected in sediment in the holding ponds located south of the aeration basin and clarifiers. PCBs were also found in the sediments in the vicinity of the NPDES discharge point.

In January 1986, G&E drilled ten shallow hand auger sample borings; five borings (G&E-1 through G&E-5) in the abandoned lagoon area and five borings (G&E-6 through G&E-10) in the burn site area. Samples from these borings were analyzed for priority pollutants. The results are discussed in Section 6.

SECTION 3

REMOTE SENSING INTERPRETATION

3.1 Aerial Photography. A historical aerial photography search and a recent (March 1986) aerial photographic mission were conducted for the Venture, Lobeco, South Carolina plant site. The historical search revealed that extensive aerial photography is available for the area dating back to 1938. G&E obtained numerous historical photographs for review, of which twelve were selected for presentation in this report (Exhibits 1 - 12). Figure 2 presents photographs from the recent photo mission; the waste facilities are clearly labeled.

The aerial photographic series presented in Exhibits 1 through 12 begins in November 1965 (prior to plant construction) and concludes in January 1983 (three months after Venture purchased the property from American Color). Because different organizations obtained the aerial photographs for various uses (i.e. crop assessment, mapping, etc.) the resolutions and formats of the photographs contained in Exhibits 1 through 12 are not uniform. Sources of the photography included the following:

1) U.S. Department of the Interior
   Geological Survey
   EROS Data Center
   Sioux Falls, South Dakota

2) U.S. Department of Agriculture
   Agriculture Stabilization & Conservation Service-ASCS
   Aerial Photography Field Office
   Salt Lake City, Utah

3) U.S. Department of Commerce
   National Oceanic and Atmospheric Administration
   National Ocean Service
   Rockville, Maryland

4) Aerial Surveys
   Rochester, New York

5) South Carolina Coastal Council
   Charleston, South Carolina

6) South Carolina Forestry Commission
   Columbia, South Carolina

7) Beaufort County Tax Assessor
   Beaufort, South Carolina

A listing of the date, source, and a brief description of each aerial photograph (film type, original scale, etc.) in Exhibits 1 through 12 is presented on a summary sheet preceding Exhibit 1.

<u>3.2 Historical Aerial Photography Interpretation</u>. The G&E data base of aerial photography for the Venture site was carefully reviewed to establish time-frames of various site activities. Figure 2 and Exhibits 1 through 12 were selected from the photographic data base to provide a site history from the time prior to plant construction to the present. The resolution and scale of the photographs presented in Exhibits 1 through 12 are not sufficient to clearly identify individual objects such as drums, vehicles, and other debris. The photographs also do not identify precisely when noted changes occurred (i.e. construction activities, waste deposition, etc.) due to the nature of the photographs representing a single point in time. What these photographs do provide, when studied individually and collectively, is an identification of the initial site conditions, the approximate time frames of land use and on-site construction activities, and the health of vegetation (i.e. increased growth, revegetation, vegetation stress, etc.).

Exhibits 1 through 12 are oriented with north to the left and south to the right of the photographs. The entrance to the plant is from the west (bottom of photographs) and the back of the plant is to the east (top of the photographs).

The following are brief interpretations of the aerial photographs presented in Exhibits 1 through 12:

Exhibit 1 (November 1, 1965) shows that the area was used for agricultural production prior to construction of the Tenneco plant. The connection that now exists between the roads to the north and south of the plant was not present.

Exhibit 2 (May 1, 1968) shows the Tenneco plant and a north-south roadway to the west of the plant (bottom of photograph). Items of special interest that can be seen in this photograph include the following:

1) The burn site behind the plant.
2) The waste lagoon to the south of plant.
3) The wastewater discharge line from the plant to the marsh.

The "white" areas around the plant and the waste lagoon are probably attributable to clearing and construction activities. It is not evident from this photograph that any facilities other than the waste lagoon were utilized for wastewater treatment prior to discharge (i.e. aeration basins, stabilization ponds, etc.).

Exhibit 3 (April 12, 1972) is an oblique, low level, color aerial photograph of the Tenneco plant which clearly shows drums and other materials in the burn site and a large drum storage area at the northeast corner of the plant.

Exhibit 4 (May 4, 1972) shows that the burn site has nearly doubled in size since 1968. A path leading from the plant to the burn site is clearly visible. The drum storage area noted in Exhibit 3 is also visible in this photograph. Patches of vegetation are present in the "white" areas noted in Exhibit 2.

Exhibit 5 (September 22, 1972) is a color infrared (CIR) photograph which had an original scale of 1:131,000, making the resolution of this enlargement very poor. However, the benefit of CIR photography is that stressed vegetation and water/land boundaries are highlighted. The burn site and waste lagoon are still visible. Two small dark areas along the "white" borders of the burn site suggest the presence of impounded water.

Exhibit 6 (May 13, 1974) is a black and white infrared photograph taken five months after transfer of ownership of the plant from Tenneco to American Color (January 1974). The site conditions are not clearly visible on this exhibit due to the large original scale of the photograph (1:76,000) and the film format, black and white infrared. Close inspection of this photograph does reveal that the burn site and the waste lagoon are still visible.

Exhibit 7 (September 27, 1975) shows that the burn site and the waste lagoon are visible at the site. The old drum storage area at the northeast corner of the plant identified in the 1972 photography (Exhibits 3 and 4) does not appear to be in use in this photograph.

Exhibit 8 (February 8, 1977) shows that considerable construction activities at the site have occurred since 1975 (Exhibit 7). The new site facilities include the equalization, aeration, and digestion basins and the clarifiers, all located south of the plant. The ground has been cleared from this new construction south to the waste lagoon and a drainage feature is visible in the center of this cleared area from the clarifiers south to the roadway. The burn site is still visible and two water bodies ("black" areas) are evident along the south and east borders of the burn site clearing.

Exhibit 9 (March 18, 1978) shows that construction activities at the site have continued. The new site features include the sludge drying beds and the east and west holding basins. An additional pond south of the east holding basin is also visible. It appears that the waste lagoon is in the process of being closed by backfilling.

Exhibit 10 (October 27, 1979) shows that groundcover type vegetation has covered the majority of the burn pit area and a trail from the plant is no longer visible. The waste lagoon has been almost completely covered.

Exhibit 11 (March 11, 1982) shows numerous trails leading from the plant through and south of the burn site to the tree line behind the plant. Similar trails are also seen north of the plant. The area of the waste lagoon is completely covered. A new clearing northwest of the west holding basin is visible in Exhibit 11. The southeastern portion of this cleared area appears to be retaining some water.

Exhibit 12 (January 18, 1983) shows the site conditions three months after Venture purchased the plant from American Color (October 1982). The burn site is still visible but the trails noted in Exhibit 11 are overgrown with vegetation. The clearing west of the aeration basin is still present and lacking vegetation.

The current site conditions are depicted on the March 4, 1986 aerial photograph shown on Figure 2. The burn site can still be seen due to a lack of complete vegetative cover. Vegetation has nearly covered both the abandoned lagoon and the cleared area northwest of the west holding basin.

SECTION 4
FIELD INVESTIGATION AND LABORATORY TESTING

4.1 General. This section addresses the site investigation activities completed to date. G&E's preliminary site investigation is addressing 1) the old drum storage area, 2) the burn site, 3) the abandoned lagoon, 4) the area surrounding the wastewater discharge pipe, and 5) the stressed vegetation area (see Figures 2 and 3). The investigation was designed to determine the soil and groundwater conditions, and the characteristics and extent of any surface and subsurface contamination. Prior to initiating geotechnical borings or sampling efforts, a detailed site reconnaissance was performed. In conjunction with previous monitoring well data, and the site historical photograph record, the site reconnaissance provided a firm basis for the subsequent field investigation.

The burn site (see Figures 2 and 3) was completely overgrown and not accessible by equipment in early March 1986. A path was cut by hand, and as drier weather allowed, a hasty access route was prepared.

The burn site has several areas where, old plant debris, equipment and containers have been deposited. The debris is deposited throughout an area of approximately two acres. Several of the containers (primarily plastic inserts) contain unknown materials.

The site investigation has included a series of conductivity measurements at various locations, a program of soil exploration borings, and the installation and sampling of groundwater monitor wells. Field permeability tests were performed in selected groundwater monitor wells to determine the hydraulic conductivities of the monitored soil strata.

Analytical tests were performed on soil and groundwater samples obtained from the monitoring wells, the shallow auger borings and the deep borings. Appendix B contains the field investigation specifications, soil boring logs and geotechnical testing results, monitor well installation details, well cross sections, and a summary of all shallow auger borings. Appendix C contains details regarding the conductivity survey including data sheets with the conductivity measurements.

4.2 Geophysical (Conductivity) Survey. Conductivity measurements were obtained in various areas of the site, including the five mentioned above in Section 4.1. Measurements were also taken outside the contaminated areas to define "background" conductivities. As described in Appendix C, many contaminants will produce an increase in free ion concentration (measured as conductivity) when introduced to the soil or groundwater. This increase over background conductivity levels enables detection and mapping of contaminated soil and groundwater.

The "background" conductivities in the area were found to be approximately 20 to 25 millimhos/meter (mmhos/m). As shown on Figures 5a and 5b, the area of the old drum storage area, the burn site, the abandoned lagoon, and the stressed vegetation areas exhibit conductivities significantly greater than those considered "background".

The area just south of the abandoned lagoon exhibited the highest conductivities with levels greater than 150 mmhos/m measured (Figure 5a). This location is believed to be a runoff area between the abandoned lagoon and the marsh at a lower elevation southeast and southwest of the abandoned lagoon. Salts on the ground and vegetation stress were visually noted in this runoff area. Figure 5b shows distinct plumes of high conductivities radiating toward the marsh areas from the abandoned lagoon.

Conductivities greater than 80 mmhos/m (significantly higher than background levels) were measured at the burn site (see Figure 5a). Figure 5b depicts a center of high conductivity in the middle of the burn site with decreasing conductivities radiating outward.

Conductivity measurements at the old drum storage area and the stressed vegetation area ranged from 30 to 50 mmhos/m (Figure 5a).

4.3 Soil Exploration. Seven truck-mounted soil exploration borings were drilled and sampled to define the site subsurface conditions. One shallow hand auger soil exploration boring was drilled in the burn site. (Drilling rigs were not able to enter the burn site area until the first week in April. No deeper borings will be placed in the burn site until potential contaminants are defined.) The location of these borings are shown on the soil boring and monitor well plan, Figure 4, and are tabulated as follows:

BORINGS*	GRID SYSTEM	LOCATIONS
W-1	N5+30, E2+00	Southwest of "farm pond"
B-1	N8+20, E8+30	Near abandoned lagoon
W-3	N8+10, E8+90	Near abandoned lagoon
W-4	N10+20, E7+80	Near abandoned lagoon
B-2	N10+90, E1+00	Near pipe discharge
W-6	N28+00, E6+70	Old drum storage area
W-7	N26+90, E7+00	Old drum storage area
W-9	N23+80, E10+80	Near burn site
W-10	N24+60, E10+10	Near burn site
W-11	N24+50, E11+60	Near burn site
W-12	N22+50, E10+00	Near burn site
W-13	N21+70, E9+40	Near burn site

* W - denotes boring converted to monitor well.

* B - denotes geotechnical boring (grouted upon completion).

With the exception of W-1, the above soil borings were located adjacent to known or suspected areas of contamination, to establish boundary conditions (limits beyond which no contamination would be found). W-1 was located in an area not suspected of being contaminated and represents background soil conditions.

All borings, with the exception of W-9, were drilled with a truck-mounted rig equipped with a continuous-flight, hollow stem augers. W-9 was hand augered due to wet conditions and lack of accessibility for truck-mounted equipment. A new auger bit was used to drill W-9. None of the shaft connections used to drill W-9 had been previously used on the Venture site. W-9 was placed in an area expected to be outside of the burn site contamination zone. Care was taken in inspecting the auger cuttings for signs of contamination. No visual signs of contamination were detected. Specific details of the installation of W-9 are included in Appendix B.

Excess auger cuttings from borings located near areas of known or suspected contamination were gathered in plastic bags and placed in drums. These cuttings were left on site until analytical tests could be performed on the collected soil samples. The analytical tests showed no significant contamination in the collected soil samples.

The shallow soil borings were sampled continuously to boring termination. The deep holes were sampled continuously to a depth of 20 feet and on five foot centers thereafter. The borings were dry augered until groundwater was encountered, and initial and static water levels were measured in the borings. Soil samples were collected using split-spoon samplers and the samples were sealed to prevent moisture loss. Upon completion of the drilling activities, the soil samples were delivered to a geotechnical laboratory for testing. Where appropriate, split samples were taken for analytical testing. All boreholes not developed for use as groundwater monitor wells were carefully grouted with a thick bentonite and cement mix upon completion.

Selected samples from the soil exploration borings were tested to determine soil classification. The tests included moisture content, dry density, particle size analysis, and Atterberg limits. The results of these tests, along with visual field classification, were used to classify the soil samples in accordance with the Unified Soil Classification System.

In addition to the soil classification testing, laboratory permeability tests (constant head) were performed on selected soil samples. The permeability test values indicate vertical hydraulic conductivities in the various strata as follows:

Boring Number	Depth (ft)	Soil Class.	Hydraulic Conductivity cm/sec
W-1	16-18	SC	3.2×10^{-8}
B-1	45-47	CH	2.7×10^{-8}
B-2	23-25	SP-SC/SM	1.8×10^{-5}

The hydraulic conductivity for W-1 (16-18 foot zone) is indicative of fine-grained soils. The soil stratum from which this sample was obtained is classified as clayey sand, a predominantly coarse-grained soil, with numerous clay pockets. The permeability test was performed on material from one of these clay pockets.

4.4 Waste Facility Sampling Program. Shallow hand and truck-mounted auger borings were drilled within the areas of known contamination in order to obtain samples for analytical testing. Safety precautions were enforced when drilling and sampling within these areas. Chemical resistant suits were worn over clothing, along with latex gloves, and steel-toed rubber boots. Respirators were on hand and were used when required. For more detail on the safety precautions, see Appendix F.

Twenty-five shallow hand-auger borings were placed within the confines of the abandoned lagoon area. Six hand-auger borings for sample collection were drilled within the burn site, three were drilled within the old drum storage area, two were drilled within the stressed vegetation area, and eight were drilled along the discharge pipe. These auger borings were typically advanced to depths ranging from 5 to 8 feet. Locations of all the sampling borings are shown on Figures 6a through 6e. Summary logs of all auger borings are presented on Figure B-1 at the back of Appendix B.

In addition to the samples obtained from the hand-auger borings, two sludge samples were taken from the western pond on the burn site as shown on Figure 6b. One sludge sample was also obtained from the eastern part of the marsh area shown on Figure 6e.

4.5 Groundwater Monitoring Well Program. Three deep groundwater monitoring wells (W-1, W-8 and W-13) and ten shallow monitoring wells (W-2 through W-7 and W-9 through W-12) were installed at the site. These two-inch diameter monitoring wells are intended to remain in place until cleanup of the site is completed. The locations of all G&E and Law monitor wells are shown on Figure 4 and their screened intervals are as follows:

Well ID	Screened Interval Below Ground Surface (feet)
W-1	20 - 30
W-2	2 - 12
W-3	5 - 15
W-4	5 - 15
W-5	2 - 12
W-6	3 - 13

Well ID	Screened Interval Below Ground Surface (feet)
W-7	2 - 12
W-8	40 - 45
W-9	3 - 13
W-10	3 - 13
W-11	3 - 13
W-12	3 - 13
W-13	25 - 35
V-1	18 - 28
V-2	10 - 25
V-3	8 - 23
V-4	10 - 25
V-5	7 - 22
V-6	10 - 25

Monitor wells W-1, W-2, and W-8 comprise a three-well cluster. This cluster was installed to monitor the groundwater conditions in three different soil strata which are typically encountered at the site.

Installation details and cross sections of the G&E wells are contained in Appendix B. The construction details of each well include sand packing around the screen, a bentonite seal above the sand packing, and a thick bentonite and cement grout from the bentonite seal to the ground surface. The monitoring wells were installed with concrete pads, steel shrouds, and locking caps to protect against damage from site activities.

4.6 Field Measurements, Sampling, and Analysis Program. In-situ permeability tests (slug tests) were conducted on groundwater monitoring wells W-1, W-2, W-4, W-5, W-6 and W-8. The slug test was used to determine the hydraulic conductivities of the monitored soil strata. A sealed PVC pipe of known weight and volume was lowered into each well casing to displace the groundwater (slug in test) and then the PVC pipe was removed (slug out test). Measurements were made on the decreasing and increasing water level in each monitoring well versus the elapsed time from the start of each test. Hydraulic conductivities were calculated from the obtained data using the Hvorslev (1951) method for determining hydraulic conductivity (see Appendix D). Use of this slug test, as opposed to a pump or drawdown test, ensures that no contaminated groundwater is withdrawn from the well, thereby eliminating any surface spills or the need to dispose of pumped water which may be contaminated. The calculated hydraulic conductivities of the soil section screened by the tested monitor well are presented as follows:

Well ID	Calculated Hydraulic Conductivity (cm/sec)
W-1	1.4×10^{-4}
W-2	4.2×10^{-4}
W-4	3.5×10^{-4}
W-5	5.5×10^{-4}
W-6	4.3×10^{-4}
W-8	4.1×10^{-6}

The values for W-1, W-2, W-4, W-5, and W-6 reflect hydraulic conductivities of coarse-grained soils, while that of W-8 reflects the hydraulic conductivity of a fine-grained soil. Because of the nature of soil deposition in roughly horizontal layers, the above conductivities represent predominantly horizontal conductivity characteristics. This is especially true for the fine-grained soil strata. Vertical hydraulic conductivity in the Hawthorn/Cooper clay, screened by W-8, is likely to be considerably lower (on the order of 10^{-7} to 10^{-8} cm/sec).

The following water level measurements were taken on four occasions in the three clustered wells.

Well I.D.	Screened* Depth(ft)	Screened Elevation(ft)	Water Level Ele. (ft) 3/27 1986	4/1 1986	4/8 1986	5/1 1986
W-2	2.5 to 12.5	7.6 to -2.4	6.55	6.30	5.95	4.72
W-1	20.0 to 30.0	-10.2 to -20.2	6.36	6.06	5.78	4.56
W-8	40.0 to 45.0	-30.8 to -35.8	5.80	5.60	5.28	4.09

*Depth below ground surface

These data consistently show about a 0.2 foot head loss between W-2 and W-1 and a 0.5 foot head loss between W-1 and W-8. The relationship of the various well screen depths is shown graphically on Figure 7.

During the drilling operations and subsequent waste facility sampling activities, G&E collected groundwater and soil samples to determine the nature and extent of subsurface contamination.

Selected soil and groundwater samples were analyzed for a variety of parameters including:

- pH
- Specific Conductance
- Total Organic Carbon (TOC)
- Volatile Organic Analysis (VOA)
- Napthalene
- Polychlorinated Biphenyls (PCB)
- Phenolic Compounds
- Metals including lead (Pb), mercury (Hg), arsenic (As), cadmium (Cd), and chromium (Cr)
- Selected Chlorinated Organics (TCE, TCB, etc.)

The summary tables and the individual analytical reports are presented in Appendix E, which is contained in Volume II. A data summary included in Volume I contains figures indicating zones of major contamination as determined by G&E, tables summarizing analytical data, and a spread sheet showing the results of all analyses performed on samples obtained from the site. These three methods of data presentation facilitate easier comprehension of the large amount of data produced by the investigation.

<u>4.7 Leak Testing on Discharge Pipe</u>. SCDHEC raised a concern

that some residual PCB contamination could be entrained in the discharge water through leaks in the pipe which runs through the old lagoon. To address this concern a leak test was performed on this pipe. The details of this leak test are contained in a separate report. However, it is worth noting in this report that the integrity of the pipe was confirmed. No leakage was observed during the test period.

SECTION 5
SITE CHARACTERISTICS

5.1 Location and Topography. Venture's property is located in an agricultural area approximately one mile north of the Whale Branch of the Coosaw River in Lobeco, South Carolina (See Figure 1), about 12 miles north of Beaufort, South Carolina. The site is in Sheldon Township with approximate coordinates of Latitude 32° 33' 21" North and Longitude 80° 43' 43" West. The site investigation includes an area roughly 1500 by 3000 feet in plan (100 acres).

The site decreases in elevation from north to south with a maximum elevation of 21 feet (National Geodetic Vertical Datum) and a minimum elevation of 8 feet (NGVD) and an average downward slope of 0.006 ft/ft. The land surface contains localized depressions which contain standing water following rainfall except where drained by a ditch system along the roadway and fenceline (See Figure 2). Surface water enters the ditch drainage system and eventually flows southward, emptying into the marsh surrounding Whale Branch (Figure 1).

5.2 Regional Hydrogeology. The vicinity hydrogeological conditions have been evaluated based on the following sources:

1) "The Ground-Water Resources of Beaufort, Colleton, Hampton, and Jasper Counties", South Carolina Water Resources Commission Report No. 9, Larry R. Hayes 1979;
2) "Economic and Environmental Impact of Land Disposal of Wastes in the Shallow Aquifers of the Lower Coastal Plain of South Carolina", South Carolina Department of Health and Environmental Control, Office of Environmental Quality Control, Ground-Water Protection Division, June 1980;

3) "Groundwater Flow in the Coastal Plain Aquifers of South Carolina", W.R Aucott and G.K. Spieran, United States Geologic Survey in Columbia, South Carolina and published in the November-December 1985 issue of "Ground Water" magazine; and,

4) Personal communications with G.K. Spieran of USGS and Jeff Hassen of Water Resources Commission of South Carolina, April 1986.

Based on the above publications and personal communications, the geology of the Lobeco area to a depth of approximately 3000 feet consists of sedimentary deposits that are Cretaceous to Recent in age. The general lithology of the area is shown on Figure 8.

The major formations of interest below the site are the Pamlico, the Hawthorn, and the Cooper. The Pamlico formation, which represents the surface geology at the site, is the oldest, thickest, and most dominant of the terrace deposits in the Lobeco vicinity. This Pleistocene age formation is an unconfined water table aquifer and ranges in thickness from 35 to 40 feet in the site vicinity. The formation consists of quartz sand containing clay lenses, glauconite, broken shells, and some heavy minerals. It is underlain in the site area by confining formations (Hawthorn and Cooper) which restrict the vertical intermixing of water.

The Hawthorn Formation appears to be a down-dip facies of the Cooper formation. It consists of sand, silt and clay, phosphatic pebbles, and montmorillonitic clays. The Hawthorn's thickness in the Lobeco area is reported to range from 0 to 6 feet. In the Lobeco area, where the formation consists primarily of low permeability clay and silt, it acts as an aquitard restricting the vertical mixing of interstitial water between the surface aquifer and lower aquifers.

The Cooper Formation is found in the Lobeco area as a thin remnant deposited on the Ocala Limestone in a shallow marine environment. The Cooper consists of olive green, shallow, open shelf deposits of calcite cemented forminifera and abundant silt-size quartz. It has been considered to be the transitional up-dip facies of the Hawthorn Formation. In areas where this formation is present, it acts as an aquiclude, restricting the vertical mixing of interstitial water.

The Cooper Formation is not readily distinguishable from the Hawthorn Formation in the area of the site. The formations are similar and appear as a single soil stratum exhibiting characteristics of both.

The aquifer system beneath the site includes the surficial aquifer, the Floridian aquifer system, and the deeper aquifer system (Black Creek, Middendorf, and Cape Fear). See Figure 7 for details.

The surficial aquifer (Pamlico) is a water-table aquifer and is present throughout the area.

The Floridian aquifer system consists of carbonate sediments. The formation units that compose this aquifer are the McBean, Ocala Limestone, and the Santee Limestone. The Floridian aquifer system supplies much of the groundwater in the Lobeco area. Logs of borings from the deep production wells on site and the deep observation well, all screened in this aquifer, show that the top of the principal artesian aquifer is about 70 to 80 feet below the land surface. Logs of the two production wells and a gamma log from the deep observation well are presented at the end of Appendix B.

Specific yields of wells drawing from the Floridian aquifer range from 50 gallons per minute (gpm) to about 2500 gpm.

The two production wells at the site pump an average of 350 gpm each. Pumping of the two wells has caused a cone of depression of about 12 feet in the principal artesian aquifer.

The location of groundwater wells screened in the Floridian aquifer within one mile of the site are presented in Figure 9. Information obtained from the Water Resources Commission revealed a total of 18 wells in the immediate area. Two of the eighteen wells are used for industrial purposes. The remaining 16 wells are used for observation and testing purposes by the Water Resources Commission and by SCDHEC. There were no state records for domestic or industrial wells screened in the surficial aquifer.

5.3 Site Soil Conditions. Based on the soil exploration program, the subsurface soil conditions across the site are relatively uniform. A graphical illustration of these conditions is shown on the isometric soil profile presented as Figure 10. A generalization of soil conditions at the site is as follows:

STRATUM	TOP DEPTH (feet)	THICKNESS (feet)	DESCRIPTION
I	0	0 to 7	Loose to firm tan & gray CLAYEY to VERY CLAYEY SAND (SC) with roots, silt and sand layers.
II	0 to 7	2 to 13	Loose to very loose poorly graded gray SAND (SP-SC/SM) with silt and clay layers.
III	6 to 13	4 to 7	Loose to very loose gray CLAYEY SAND (SC) with stiff clay layers.

STRATUM	TOP DEPTH (feet)	THICKNESS (feet)	DESCRIPTION
IV	10 to 20	9 to 25	Loose to very loose poorly graded gray SAND (SP-SC/SM) with silt and clay layers.
V	29 to 43	Unknown	Stiff to very stiff green and gray CLAY (CH) with sand and silt dustings.

The generalization of soil conditions is based upon widely-spaced boreholes and does not define continuity between borehole locations; actual conditions may vary. For details, refer to the individual logs of the borings, which are attached in Appendix B.

5.4 Site Groundwater Conditions. The depth at which groundwater was first encountered during the G&E soil investigation ranged from five to nine feet below the ground surface. The stabilized water table beneath the site was found to vary from two to five feet below the ground surface.

Water levels within the monitor wells were measured by G&E in March and May 1986. Groundwater contours generated from wells monitoring the water table are presented on Figures 11a and 11b. Generally, the shallow groundwater contours follow the topography of the site. Figure 11a, depicting the March sampling event, shows inferred contour lines near the burn site. The May sampling event (see Figure 11b) shows contours which have more curve near the burn site. This is explained by the fact that water levels had not been obtained for wells W-9 through W-13 during the March sampling event because they had not yet been drilled and/or surveyed. Figure 11b includes groundwater data for these burn site areas wells.

The shallow water table groundwater elevations decrease from 18 feet (NGVD) to 5 feet (NGVD) in a southerly direction (toward the marsh) in the March sampling. In the May sampling these elevations decrease from 15 feet (NGVD) to 3 feet (NGVD). The difference in groundwater elevations between March and May (2 to 3 feet lower in May) reflects the lack of significant precipitation in the area. Based on the these data, the groundwater flow direction is south to southwesterly, with a gradient on the order of 0.006 ft/ft. The groundwater conditions, as shown, will be subject to rainfall and other seasonal variations.

The static water level measurements taken in the three clustered wells (W-1, W-2 and W-8) indicate that the Stratum II sand is not directly connected with the Stratum IV sand. The head loss is attributable to the clayey sand (with clay layers) of Stratum III. There is also a distinct head loss between the sand of Stratum IV and the clay of Stratum V (Hawthorn/Cooper Formation), indicating the absence of direct hydraulic connection.

A bail drawdown test was performed on W-8 in May 1986. The drawdown test was used to determine if the groundwater table in the area surrounding the test well was influenced by drawing down the water level in the test well. W-8 was evacuated and the water level was measured in W-8, W-1 and W-2. W-1 and W-2 exhibited no evidence of being influenced by the evacuation of W-8 (the static water levels in W-1 and W-2 remained constant). This further supports the conclusion that the strata monitored are not directly connected hydraulically at this location.

The static water level was measured in SCDHEC's deep observation well (Figure 3) in April 1986 and was observed to be at an elevation of 5.9 feet below NGVD. The difference between this water level and the levels in the G&E wells supports the conclusion in referenced literature that the Hawthorn/Cooper formation is an aquitard and there exists no direct hydraulic connection between the shallow surface aquifer and the Floridian aquifer in the Lobeco vicinity.

SECTION 6
PRELIMINARY CONTAMINATION ASSESSMENT

6.1 General. As discussed in Section 5, G&E drilled numerous shallow hand and truck-mounted borings in areas of known or suspected contamination. Samples were taken and analyzed for a variety of parameters to determine the nature, source and extent of contamination. Specific areas of concern included (see Figures 2, 3a and 3b):

1) Abandoned lagoon and associated discharge pipe
2) Burn site
3) Old drum storage area
4) Stressed vegetation area

In addition to information obtained from G&E's sampling and analysis program, G&E also evaluated data collected in the past by Venture and Law Environmental Services. Law reported analytical results of samples from wells V-1 through V-6, the plant production wells and the deep observation wells (sampled and analyzed by Davis & Floyd) during their preliminary site assessment efforts. The Data Summary included in Volume I presents a useful summary of all analytical data in several easy to follow formats. Individual analytical reports are also included in Appendices A and E.

6.2 Nature, Source and Extent of Contamination. The following is a presentation of the key contamination features at the site. This tabulation is useful in summarizing the nature and extent of contamination associated with the waste units and monitoring points of concern. The figures presented in the Data Summary in Volume I (also contained as E1 and E2 in Appendix E) should be referenced with the following table. These figures depict the areal distribution of PCB and other contamination.

AREA	MAJOR CONSTITUENTS AND CONCENTRATIONS	EXTENT CONTAMIN.
Abandoned Lagoon	- PCB (Aroclor 1248) in the soil at maximum concentrations of 6750 ppm. PCB in a sludge/water composite at a concentration of 6 ppm.	Depth is f. 2 - 14'.*
	- Pb in the soil up to 2286 ppm. Pb in the sludge/water up to 34 ppm.	Areal extent is approx. one acre.
	- 1,2,4-TCB in the soil up to 54 ppm.	
	- Napthalene in the soil up to 17 ppm.	

*Comments: 1) Typical depth of PCB sludge contamination is 4 - 7 feet. The depth of contamination is greatest in the center of the lagoon.

2) Auger borings and monitor wells hydraulically downstream of the lagoon and along the discharge show no PCB contamination.

AREA	MAJOR CONSTITUENTS AND CONCENTRATIONS	EXTENT CONTAMIN.
Burn Site	- PCB (Aroclor 1248) in the soil at maximum concentration of 250 ppm. The water sample from W-9 had a PCB concentration of 114 ppb.	Depth appears to be from 1 - 6' in the soils.
	- Trichloroethene at a maximum concentration of 180 ppm in groundwater.	Depth of groundwater contamination has not been determined. Areal extent appears to be approximately 1/2 acre.
	- Hg was detected in a solid** at a maximum concentration of 19 ppm in the soil and at 24 ppb in a water composite.	
	- 1,1,2 - Trichloroethane was detected at a maximum concentration of 1513 ppb in a water sample.	

AREA	MAJOR CONSTITUENTS AND CONCENTRATIONS	EXTENT OF CONTAMINATION
Burn Site (cont-)	- Methylene Chloride was detected at a maximum concentration of 6400 ppb in a water sample.	

** The solid was taken from a product bag.
** There are numerous containers and bags which contain unknown chemicals.

AREA	MAJOR CONSTITUENTS AND CONCENTRATIONS	EXTENT OF CONTAMINATION
Drum Storage	- Carbon Tetrachloride at a maximum concentration of 89 ppm in a monitor well on the southern edge of this area. - Lesser concentrations of other chlorinated organics were detected in the water samples.	Areal extent appears to be confined to the old drum storage area. Maximum depth of contamination has not yet been determined and the southern extent has to be confirmed. Some analyses are in progress.
Stressed Vegetation Area	- The area of stressed vegetation was sampled extensively and has shown no evidence of PCB or other organic contamination. Elevated levels of Cr and Pb were detected.	Depth is from 1 - 2 feet.

Presented below is a more detailed discussion on the nature and extent of contamination in the three key areas.

a. Abandoned Lagoon. Analytical results for sludge/ water and soil samples from the abandoned lagoon indicate that chlorinated organics including polychlorinated biphenyls (PCBs) are present at relatively high concentrations. Metals, including mercury (Hg), lead (Pb) chromium (Cr) and cadmium (Cd) were detected as well. Soil and water (referred to as sludge/water) samples were taken from hand-auger borings (G&E 1-5 and L 1-7) and from truck-mounted auger borings (L series 8 through 25). Refer to Figure 6a for boring locations in the abandoned lagoon.

PCB (Aroclor 1248) contamination appears to occur throughout the areal extent of the lagoon. PCB concentrations of <2.0 to 6750 mg/kg (ppm) were found in the soil at 1 to 14 foot depths. The highest concentrations were found in borings L-1, L-2, L-3, and G&E-3 (6 to 7 foot depths). PCB analysis on the sludge and water composited from L-1, L-2, and L-3 (1 to 7 foot depths) indicated an Aroclor 1248 concentration of 6.02 mg/l (ppm).

Other organic compounds detected include naphthalene and 1,2,4 trichlorobenzene (1,2,4 - TCB). Naphthalene in the range of 1.10 to 122 mg/kg (ppm) was found in G&E 1, 3 and 4 borings (5 to 7 foot depths) and L-33 (12-14'). In the same borings, 1,2,4 - TCB was found in concentrations of 7.4 to 103 mg/kg (ppm).

Mercury (Hg) and lead (Pb) were found in relatively high concentrations in soil samples from the lagoon. Hg concentrations of 0.09 to 19.0 mg/kg were found in soil from L-1, L-2, and L-3 in the 1 to 7 foot depths. Hg concentrations of <0.002 to 0.23 mg/l (ppm) were found in the sludge/water (L-1, L-2, & L-3) and in the sludge/water from L-7 and L-18. Pb concentrations of <3.3 to 2286 mg/kg (ppm) were detected in the soils and sludges of G&E 1, 3, 4, & 5 in the 4 to 7 foot depths. Pb concentrations of 0.14 to 11.0 mg/l (ppm) were detected in the sludge/water from the L-1, L-2, L-7, and L-18 borings.

Chromium (Cr) and cadmium (Cd) were also detected although at much lower levels. Cr concentrations of 0.65 to 3.2 mg/l (ppm) were detected in the sludge/water from the L-7 and L-18 borings. Cd concentrations of 0.02 to 0.03 mg/l (ppm) were detected in the sludge/ water from the L-7 and L-18 borings.

PCB, metals, and volatile organics analyses are being conducted at this time on the soil samples from L-11 and L-20 and on the sludge/water samples from L-19.

Analytical test results from soil and water samples taken from hand auger borings (A 1 through 8) along the discharge pipe south of the abandoned lagoon (Figure 2) indicate that total organic carbon (TOC) levels are above background (approximately 15 ppm). TOC analyses from borings A-3, A-5, and A-6 (water) show TOC levels at 100, 60, & 50 mg/l (ppm) respectively. Results from analyses for volatile organic compounds indicate levels below the detection limits. Importantly, PCBs were not detected along the pipeline.

Monitoring wells W-3 and V-6 (see Figure 4) which are hydraulically down gradient from the abandoned lagoon indicate chloride and organic contamination but no PCB contamination.

W-5, which is located approximately 300 meters south of the lagoon along the pipeline before the discharge point to the marsh, showed no PCB contamination. Likewise, W-4, located hydraulically upgradient from the abandoned lagoon, showed no evidence of contamination. Hand auger borings, C-1 and C-2, located approximately 100 feet east of the abandoned lagoon showed no evidence of contamination from organic compounds or metals. No PCBs were encountered in these samples.

b. Burn Site. The analytical test results for groundwater and soil samples in the burn site (Figures 2 & 3) indicate that the contaminants of concern are chlorinated organics including PCBs, trichlorobenzene (TCB) and trichloroethene (TCE). Mercury (Hg) and lead (Pb) were also found in relatively high concentrations. Soil and water samples were taken from hand auger borings (G&E-6, 7, 8, 9, 10; BS-1, 2, 3; B-11, 12, 13) and from truck mounted auger borings (W-10, 11, 12). Refer to Figures 4 and 6b for well and boring locations in the burn site area.

PCB (Aroclor 1248) concentrations of 169 & 250 mg/kg (ppm) were detected in the G&E-9 (0 to 1 foot depth) and the BS-3 (3 to 4 foot depth) soil samples, respectively. Naphthalene was detected in the BS-9 boring at a concentration of 0.750 mg/kg (ppm). 1,2,4-TCB was detected in the BS-9 soil at a concentration of 0.610 mg/kg (ppm). 0.55 mg/l (ppm) of TCE was detected in the BS-Lagoon water.

Monitoring wells W-11 and W-12, installed within the burn site area, have shown no PCB contamination, and relatively low concentrations of some volatile organics. W-11 has a relatively high TOC, 360 mg/l (ppm), and high chloride concentrations.

Monitoring well 13, a deeper well located hydraulically downstream of the burn site, and screened just above the confining Hawthorn unit at a depth of 35 feet, showed no contamination. This well is an essential feature in the monitoring program since it would detect heavy organics (i.e. TCE) which could potentially move down to and across the top of the Hawthorn.

Hg was detected in the BS-lagoon water and in a solid sample removed from a product bag (in the lagoon within the burn site) at concentrations of 0.24 mg/l and 19.0 mg/Kg respectively. Pb was detected in G&E-6 (solid), G&E-9 (soil) & BS-Lagoon (water) at concentrations of 4.7 mg/Kg, 53 mg/Kg and 1.5 mg/l respectively.

Groundwater samples from W-9, located near the burn site, showed PCB (Aroclor 1248) concentrations of 114 ug/l (ppb) and TOC levels of 70 mg/l (ppm). Low concentrations of soluble metals were also detected. 180 mg/l (ppm) of TCE was detected.

Twelve ug/l (ppb) of PCB (Aroclor 1242) was detected in groundwater from W-10 located outside of the burn site area.

S-1 a hand auger boring located approximately 200 feet east of the burn site area in the ditch that traverses the area, showed no organic contamination (all values less than the detection limit). 6.9 mg/kg (ppm) of Pb and 2.0 mg/kg (ppm) of Cr were detected in the sample. PCB analysis has not been completed.

c. Drum Storage Area. The analytical test results for groundwater and soil samples taken from A-9, A-10 and A-11 (hand-auger borings shown on Figure 6c) in the drum storage area (Figures 2 & 3) indicate elevated total organic carbon (TOC) and chloride levels. Also detected in this area were toluene, carbon tetrachloride, and 1,1,1 TCE.

TOC analyses from borings A-9, A-10, A-11 show TOC levels at 30, 20, & 30 mg/l (ppm) respectively. Chloride concentrations reported from the same borings were 595, 165, and 115 mg/l (ppm) respectively. Carbon tetrachloride concentrations found in the borings ranged from 12 to 39 mg/l (ppm).

W-6, an upgradient well, showed no volatile organic concentrations. PCB and metals analyses are being completed.

W-7, located near the southern edge of the old drum storage area, elevated TOC levels and the presence of organic compounds including benzene, carbon tetrachloride (CCl_4), chlorobenzene, chloroform and dichlorobenzene. The most significant constituent is CCl_4 at 89 mg/l (ppm). Other chlorinated organic species were less than 1 mg/l (ppm) in this well.

d. Stressed Vegetation Area. The analytical test results for soil and water samples taken from hand augered borings D-1 and D-2 in the stressed vegetation area (Figure 3) indicate that there are no volatile organic contaminants at detectable concentrations. No PCBs were seen in these samples.

6.3 Site/Contamination Interaction. The mobility (ability to move through soil and groundwater) of PCBs, the contaminant of greatest concern at this site, is limited. The PCBs do have an affinity for soils and the higher chlorinated species, such as those found at this site, are not readily degraded by naturally occurring bacteria (Zagi and Sudo, JWPCF, Vol. 52, No. 5, May 1980). The mobility of PCBs is also restricted by a relatively low solubility. The solubility of Aroclor 1248 in water is approximately 0.10 mg/l (Verschueren, 1983).

These factors help explain the relative persistence and the lack of significant movement of the PCBs from the original areas of contamination. The only area where any genuine migration of PCBs has occurred is in the burn pit area. Here the absence of an earthen cover and the presence of solvent contaminants (trichloroethene at 180 mg/l) have created an ideal situation for the migration of PCBs into the shallow groundwater zone.

By contrast, groundwater samples from the old lagoon show no solvent reacting constituent concentration above 0.5 mg/l (ppm). It should be noted that the PCB contaminated sludge was covered by a 1 to 2 foot natural earth cap. The soil cap, and the lack of sufficient solvent forces seem to have prevented migration of PCBs from the old lagoon.

The only significant questions remaining with respect to the PCBs relate to the depth of contamination and distribution of PCBs in low concentrations outside of the confines of the lagoon. Because the specific gravity of the Aroclor 1248 is approximately 1.41 (Verschueren, 1983), there is the potential for migration to a lower zone for the Aroclor that is still free liquid. Data from the deep boring (B-1) immediately outside and downgradient of the old lagoon suggest there has been no significant vertical migration. Subsequent field activities will further address the issues of contaminant depth and distribution.

The trichloroethene (TCE) in the burn site area and the carbon tetrachloride (CCl_4) in the old drum storage area are the next most significant contaminants present at the site, identified to date. The TCE is more soluble (approximately 4500 mg/l), than the CCl_4 (1160 mg/l), however, the specific gravity of the CCl_4 is greater (1.60 vs 1.35). Thus, TCE and CCl_4 will move preferentially down and into solution in groundwater systems. Both components are degradable but are unlikely to be affected by naturally occurring bacteria, particularly in the anaerobic zones encountered below the vadose. It appears the TCE and CCl_4 could move laterally at the rate of approximately 10 to 15 feet per year through the shallow aquifer.

In general, clays will adsorb the chlorinated organics better than the sands and silts so it is possible that the sandy clay observed in the 14 to 20 foot zone may retard migration more than the hydraulic conductivity data suggest.

Extensive soil and water sampling hydraulically downstream of the old lagoon indicates no PCB migration to this area, however, other constituents have been observed. Based on these data, it appears the discharge pipe running south from the lagoon has not been a source of migration of PCBs into the surrounding soil and water. The presence of PCBs in the marsh (5 to 20 mg/kg) at the discharge point is most likely related to past activities (prior to the closing of the lagoon). PCB concentrations in the old lagoon as high as 6,750 mg/kg (ppm), and the fact that discharge of untreated wastes directly from the lagoon to the marsh occurred, support this argument. As discussed in Section 4.7, the leak test conducted on the pipe running through the old lagoon verified the system's integrity. This test result appears to eliminate the possibility of on going PCB migration to the marsh. In combination with other data, this test result strongly suggests that the PCB contamination observed in the marsh was related to discharges which occurred prior to 1979.

Another consideration in site/waste interaction is that of food chain uptake. Again the PCBs would be the components of greatest concern. Fortunately the PCBs are restricted to the old lagoon, which has been covered, and a small area of shallow soil and groundwater contamination at the burn site. There is little connection to surface waters.

Perhaps the most mobile components at the site are the chlorides (and other salts) which move with relative ease in the unconfined aquifer. The high conductivity values and the vegetation stress in the burn site and, particularly, downgradient from the abandoned lagoon reflect salt stress. In fact, the salt deposits are visible on the surface on the southern edge of the old lagoon levee. Salts (chlorides) do move faster than most organics in groundwater and are normally easily traced with conductivity instruments.

SECTION 7

PLANS FOR COMPLETING SITE ASSESSMENT

7.1 Site Assessment Activities. As mentioned in the introduction, the nature and extent of contamination and the site features dictated that the site assessment begin prior to submission of this report. The SCDHEC has been apprised of all field activities to date and been provided status reports on the investigation. A major portion of the site assessment has been completed. However, additional tasks necessary to complete the investigation are described below:

a. Given the nature of contaminants encountered to date, further assessment activities must be accompanied by appropriate concern for personnel safety. Appendix F contains the safety briefing which G&E recommends for all personnel who will enter the burn site and abandoned lagoon areas. In addition, appropriate contamination and decontamination zones must be established and marked.

b. Appropriate parties should be encouraged to help identify and determine the nature of materials and equipment that have been placed at the burn site, the abandoned lagoon, and the old drum storage area. Careful screening and evaluation of potential waste constituents should occur prior to any type of significant site disturbance.

c. To further determine the extent of groundwater contamination at the burn site and the abandoned lagoon, as well as to monitor potential migration, deep wells will be established south of these areas. The proposed deep boring/well locations for these two sites are shown on Figure 12.

d. Additional sampling and analyses will be required in the immediate vicinity of the burn site. Shallow auger borings and probing in the two ponds are anticipated, as well as sampling of abandoned containers. Clearing of vegetation and underbrush in the vicinity of the burn site needs to be completed. No equipment should move through the area until the nature and extent of contamination are established.

e. The discharge pipe running through the abandoned lagoon should be relocated so that cleanup activities can proceed, and the potential of leaks from the lagoon area can be eliminated.

f. The extent of PCB contamination in the abandoned lagoon and burn site areas needs to be clearly defined to allow development of detailed contamination contours both laterally and vertically. This will require additional shallow auger borings. It will eliminate unnecessary removal of soils and resolve regulatory concerns about the extent of groundwater contamination.

g. Given the concentration and persistence of the PCBs encountered in the abandoned lagoon, and the considerable earthwork occurring in the vicinity of this site prior to 1979, sampling of the sediments in adjacent ponds at the site should be completed.

h. Lateral and vertical extent of contaminants in the vicinity of the old drum storage area must be determined. A deep boring/well, another shallow monitor well, and some shallow auger borings are anticipated in this area. Additionally, a deep boring/well will be installed adjacent to the existing V-3 monitor well. (See Figure 12 for locations of deep borings/wells.)

The findings from the deep borings/wells (wells screened just above the Hawthorn confining unit) will determine if any further assessment of vertical contaminant migration is warranted.

7.2 Groundwater Monitoring Plan. The site assessment groundwater monitoring plan includes the collection of samples from each groundwater monitoring well within two weeks of installation. If analyses indicate that a well is contaminated, samples will be collected on a quarterly basis starting at the next quarterly sampling period (March, June, September, and December) until the site assessment is complete. The on-site wells (see Figure 4) which already have shown contamination, and will continue to be sampled quarterly include:

Abandoned Lagoon Area: W-3, W-4, and V-6
Old Drum Storage Area: W-7
Burn Site: W-9, W-10, W-11, and W-12

Upon completion of the site assessment activities at the Venture site, a detailed groundwater monitoring plan will be developed and submitted to SCDHEC. This plan will comply with the requirements of Section R.61-79.264 Subpart F "Ground-Water Protection" of the South Carolina Hazardous Waste Management Act.

7.3 Sampling and Analyses. The groundwater sampling procedures utilized at the Venture site are described in detail in Appendix G. These procedures are written for a bailer system (current sampling procedure) and include protocol for purging, sampling, field analyses, equipment clean-up, chain-of-custody control and field notes. If well-dedicated sampling systems are utilized, these procedures will be appropriately updated.

The analyses conducted on collected groundwater samples are determined on a case-by-case basis. Typically the collected samples are analyzed in the field for indicator parameters (pH, temperature, specific conductance, etc.) and analyzed in the laboratory for total organic carbon (TOC), volatile organic analysis (VOA), acid & base neutrals, polychlorinated biphenyls (PCBs) and metals.

SECTION 8

CONCEPTUALIZED CLEANUP

8.1 General. The cleanup discussion presented in this section is a conceptual plan developed after the preliminary site assessment. The plan is presented in this report in response to a request by the SCDHEC. A final proposed cleanup plan, supported by engineering details and additional data, will be presented at a later date.

The two major areas of contamination addressed by the cleanup plan are the old burn site and the abandoned lagoon. Of these sites, the burn site presents the most immediate threat to the environment as PCBs have been detected in the groundwater at this area. The data indicate that the abandoned lagoon area is not releasing PCB contamination to the groundwater. The old drum storage area, where chlorinated organic compounds were found, will be briefly discussed.

8.2 Burn Site. Corrective action at the burn site will require removal of underbrush, removal of discarded plant equipment and bagged chemicals, removal and disposal of PCB contaminated soils, and recovery and treatment of groundwater contaminated by PCBs and volatile organic compounds.

The area of contamination appears to be limited to approximately 1/2 acre. An important factor to cleanup success in this area is to control and minimize disturbance of the site as much as possible. Careful planning of each task and evaluation of potential risks associated with each task will assure the most successful and cost-effective remedial action. (A simplified block diagram outlining general cleanup tasks for the burn site is presented as Figure 13.)

Underbrush removal will be done manually or with only limited use of equipment. This is to reduce disturbance to the top layers of soil which have been shown to be PCB contaminated. Once removed, all underbrush material is to be piled and destroyed by burning on site.

Discarded plant equipment that is not buried and not contaminated can be retrieved and disposed of locally. Bags of discarded chemicals or product that can be easily recovered will be removed and disposed off-site.

The PCB contaminated shallow soils will be excavated, solidified, if necessary, and disposed off-site. Any buried equipment and discarded chemicals will also be removed and disposed.

A recovery trench or one or more recovery sumps will be installed to recover the contaminated groundwater. The groundwater will be pumped to a small on-site treatment plant. Chemical treatment will be necessary to adjust the pH and facilitate precipitation of soluble metals out of solution. It is anticipated that an air stripping system will be installed to remove the volatile organics followed by a small activated carbon unit designed to remove the PCBs. Figure 14 is a schematic diagram showing a conceptualized groundwater recovery and treatment system.

After the necessary removal of contaminated soil and waste products, and the installation of the groundwater treatment system, the area will be filled and graded to return it to the approximate surrounding surface elevation. The area will be revegetated to control erosion.

8.3 Abandoned Lagoon. Remedial action for the abandoned lagoon will consist of solids treatment and disposal and contaminated water treatment. Presently, the discharge pipe from Venture's wastewater treatment facility crosses through the center of the contaminated lagoon area. Prior to initiation of work in the area, a new temporary discharge pipe and pumping station should be constructed well clear of the contaminated site where cleanup activities will occur. This will provide Venture with uninterrupted discharge service for their present treatment facility. After remedial action is complete in the lagoon area, a permanent discharge line may be reinstalled as desired by Venture.

A major portion of the cleanup effort in the lagoon area will consist of solids removal and disposal. Excavation of solids most heavily contaminated with PCBs will be required. Solidification and/or dewatering will be performed, as necessary, prior to transportation to an off-site disposal area. The volume of contaminated solids requiring excavation, solidification and disposal directly influences the cost of cleanup for this area. Careful consideration is being given to the method of removal as well as to evaluating the methods to minimize the volume of contaminated solids requiring excavation. This will be discussed in greater detail in the cleanup plan to be prepared and presented at a later date.

It is apparent from the site assessment that some of the contaminated solids present at this site include a substantial amount of liquid. Additional liquids will be produced if dewatering procedures are utilized to reduce the volume of sludge requiring solidification and disposal. Also as excavation proceeds, water intrusion into the site is anticipated. Methods of limiting the volume of water intrusion into the excavation site, and to contain recovered liquids, are under consideration.

Treatment of recovered liquids will be necessary to remove soluble contaminants. A small treatment plant with a capacity of 25 to 50 gallons per minute is anticipated. As at the burn site, chemical treatment for removal of the metals, followed by air stripping to remove volatile organics, is envisioned. Activated carbon treatment will be used to remove the soluble PCB contamination.

A block diagram showing the tasks for the abandoned lagoon, and their order of completion, is presented on Figure 15. A process flow diagram detailing the water treatment and recovery system is included as Figure 16.

8.4 Old Drum Storage Area. Although less critical than the other areas of major contamination, the old drum storage site requires some remedial action. One or more well screens placed downgradient of the site should be sufficient to recover groundwater contaminated with chlorinated organics. A system consisting of an air stripping unit should provide an acceptable level of treatment. A process flow diagram for the treatment system is shown on Figure 17.

The remedial actions as presented in this section are preliminary and conceptual. Engineering details will be developed as more information becomes available.

SECTION 9
CONCLUSION AND RECOMMENDATIONS

9.1 Conclusions. Based on the results of the investigation to date, the following conclusions are made:

a. Geotechnical borings, soil testing, well installation and water level measurements confirm that the Hawthorn/Cooper formation encountered at approximately the 35 to 40 foot depth is an aquitard. They also confirm that there is no direct hydraulic connection between the shallow unconfined aquifer and the Floridian aquifer in the Lobeco vicinity. The groundwater flow in the shallow unconfined aquifer is south to southwesterly with a gradient of approximately 0.006 ft/ft.

b. Historical aerial photography reveals that three areas were used for waste storage and disposal. These are identified as the burn site, the abandoned lagoon and the old drum storage area.

c. PCBs (predominantly Aroclor 1248) have been disposed at the facility in the burn site and the abandoned lagoon. Historical aerial photographs indicate that disposal occurred prior to October 1979. No documents indicating precise dates of disposal have been found.

d. The PCB contaminants in the burn site appear to be confined to shallow soil (1 to 6 feet) in an area of approximately five thousand square feet, and to groundwater in the shallow unconfined aquifer. There does not appear to be significant lateral migration.

e. The presence of PCBs in the groundwater in the area of the burn site is likely due to the elevated concentrations of solvents (TCE) detected in the area, which enable the relatively insoluble PCBs to move into solution. The concentration of TCE in W-9, located in the burn pit area, is 180 mg/l (ppm). There were no such solvent concentrations detected in the abandoned lagoon groundwater samples. The fact that W-13, a deeper well, hydraulically downstream of the burn site area is free of contamination is significant. This suggests that no migration of contaminants to a deeper zone and then offsite along the top of the Hawthorn has occurred.

f. The PCBs associated with the abandoned lagoon appear to be contained in the general area of the lagoon. Extensive auger boring and monitor well sampling hydraulically downstream of the lagoon show no PCBs. A deep boring (to the Hawthorn formation) immediately adjacent to the lagoon showed no soil contamination by PCBs or volatile organics.

g. The groundwater beneath the old drum storage area is contaminated with carbon tetrachloride at concentrations up to 89 mg/l. The southern extent and the depth of contamination in this zone has not been determined.

h. For cleanup and closure purposes it appears that some degree of source removal of the PCB contaminated soils in the abandoned lagoon and burn site will be required. Aroclor 1248 is stable, persistent and not readily amenable to in-situ biodegradation techniques. Contaminated liquids for the two areas can be treated in-situ.

i. There does not appear to be any imminent threat to man or the environment at the site (if proper safety precautions are taken in contaminated areas). The main contaminant of concern is PCB. At the abandoned lagoon area, the PCBs appear to be confined to a relatively small area and do not appear to have contaminated the groundwater. The PCB contamination at the burn site includes the shallow soils and the shallow groundwater. However, its migration appears to be confined to a relatively small area at present. The depth and lateral extent of groundwater contamination in this area will have to be determined.

j. Considering the relatively high concentrations of PCBs in the abandoned lagoon, and the significant earthwork conducted (aerial photographs are an excellent indicator) in this area before and after closure (in the 1978 and 1979 time frame), the presence of low (under 1 mg/kg) concentrations of PCBs in the sediment of adjacent lagoons is not surprising.

k. The extensive sampling at the site and the leak test performed on the discharge pipe, through the old lagoon, confirm no ongoing migration of PCBs to the marsh. The data support that contamination in the marsh is related to discharge activities from the old lagoon prior to 1979.

9.2 Recommendations.

a. The thick vegetation surrounding the burn pit area needs to be carefully cleared (mainly by hand) so that a complete assessment and inventory of disposed equipment and chemicals can be completed.

b. The discharge pipe running through the old lagoon needs to be taken out of service so that cleanup in that area can proceed and any potential for leaks into the pipe can be eliminated.

c. Deep borings completed as monitor wells need to be placed, as shown on Figure 12, to help define the vertical extent of contamination. Shallow auger borings and shallow wells will be necessary to delineate lateral extent of contamination.

d. While there appears to be no imminent threat to the environment, the nature and extent of the contamination in the abandoned lagoon and the burn site warrant timely corrective action.

e. Lists of all possible disposed materials, particularly in the burn site area, need to be obtained. This would help identify personnel safety requirements and limit the resources expended in sampling and laboratory analyses.

f. Detailed site decontamination and cleanup plans should be developed. The conceptualized cleanup plan presented in this report forms the basis for such plans.

GLOSSARY
EXPLANATION OF TERMS

<u>Aquifer:</u> Zone below the surface of the earth capable of producing water (as from a well).

<u>Aquitard:</u> Any layer in an aquifer or aquifer system that is much less permeable than the aquifers themselves, but is not impermeable.

<u>Aroclor 1248:</u> A polychlorinated biphenyl, produced by Monsanto. The last two digits of a numerical designation (Aroclor 12<u>48</u>) indicates the percent of chlorine.

<u>Conductivity:</u> Is a numerical expression of the ability of a substance or mixture to carry on electric current.

<u>Groundwater:</u> Water in the saturated zone beneath the land surface.

<u>Grout:</u> The cement-bentonite mixture used to seal the annular space between the outside of the well and the borehole in which the well is placed, or to seal an open borehole. The grout prevents migration of contaminants into the sealed area.

<u>Hydraulic Conductivity:</u> A constant (K) that serves as a measure of the permeability of a porous medium. For example, for fine sand, $K = 1 \times 10^{-3}$ cm/sec.

<u>Polychlorinated Biphenyl (PCB):</u> A class of nonpolar chlorinated hydrocarbons with the molecular structure of two joined phenyl rings which are chlorinated to various degrees at different positions on the rings. PCB's are characterized by extreme chemical stability, low solubility and low vapor pressure. PCB's are highly persistent in the environment and can bioaccumulate in animals through respiration and from food.

<u>Unconfined Aquifer:</u> A surface aquifer with no overlying clay or other resisting material. Levels are free to rise or fall. The top of an unconfined aquifer is the water table.

REFERENCES

1. Aucott, W. R. and Speiran, G. K., "Groundwater Flow in the Coastal Plain Aquifers of South Carolina", United States Geologic Survey in Columbia, South Carolina and published in the November-December 1985 issue of Groundwater.

2. Personal communications with G.K. Spieran of USCG and Jeff Hassen of Water Resources Commission of South Carolina, April 1986.

3. South Carolina Department of Health and Environmental Control, "Economic and Environmental Impact of Land Disposal of Wastes in the Shallow Aquifers of the Lower Coastal Plain of South Carolina", Office of Environmental Quality Control, Ground-Water Protection Division, June 1980.

4. Hayes, L. R., "The Ground-Water Resources of Beaufort, Colleton, Hampton, and Jasper Counties", Report No. 9, South Carolina Water Resources Commission, 1979.

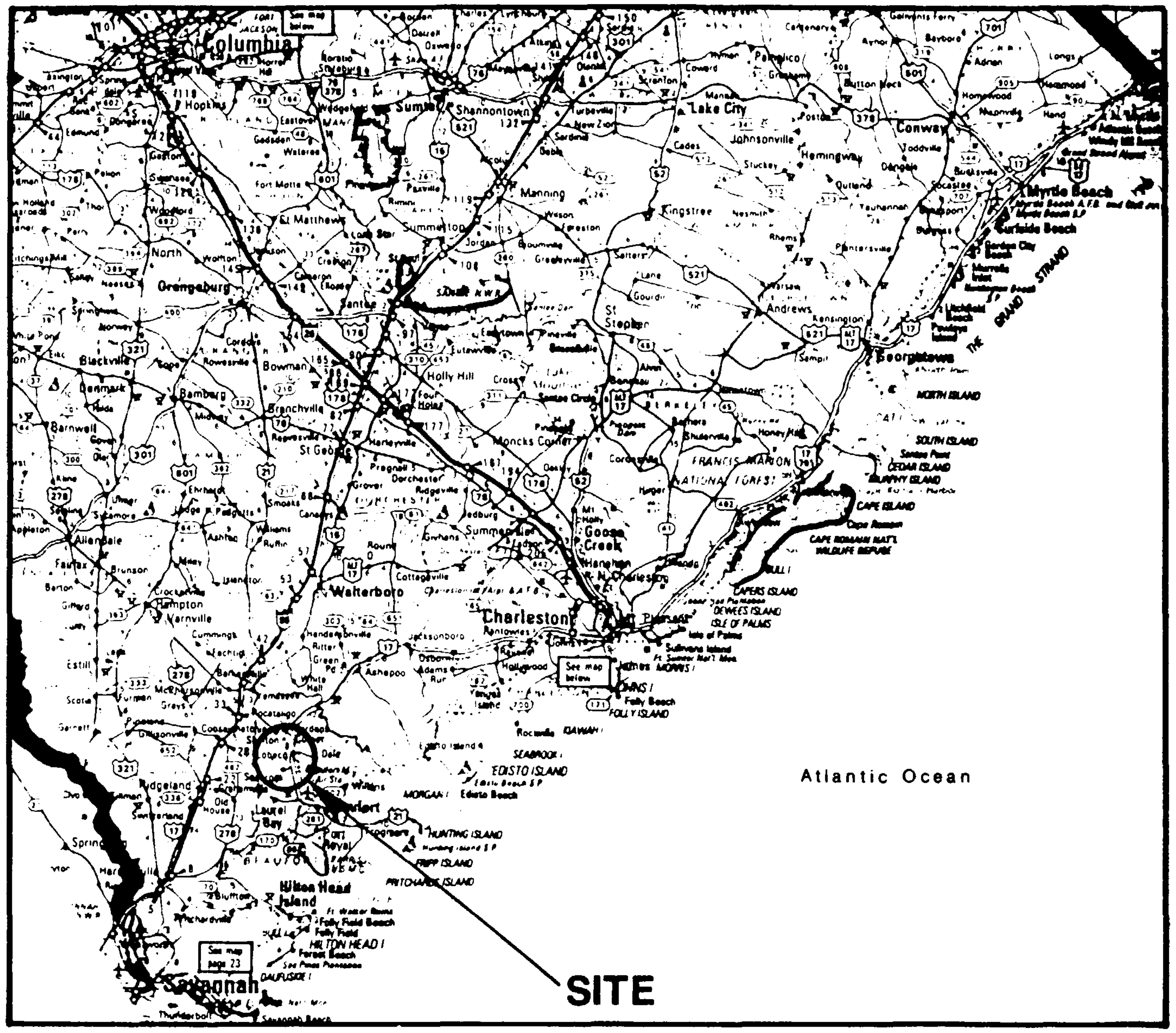
5. Hvorslev, M.J., "Time lag and soil permeability in groundwater observations", Bull. 36, U.S. Army Corps Engrs. Waterways Exp. Sta., Vicksberg, Miss, 1951.

6. Zagi and Sudo, JWPCF, Vol. 52, No. 5, May 1980.

7. Verschueren, K., "Handbook of Environmental Data on Organic Chemicals", 2nd Ed., 1983.

The T. L. Rogers and Callcott data will be presented in the final report to the state.

FIGURES

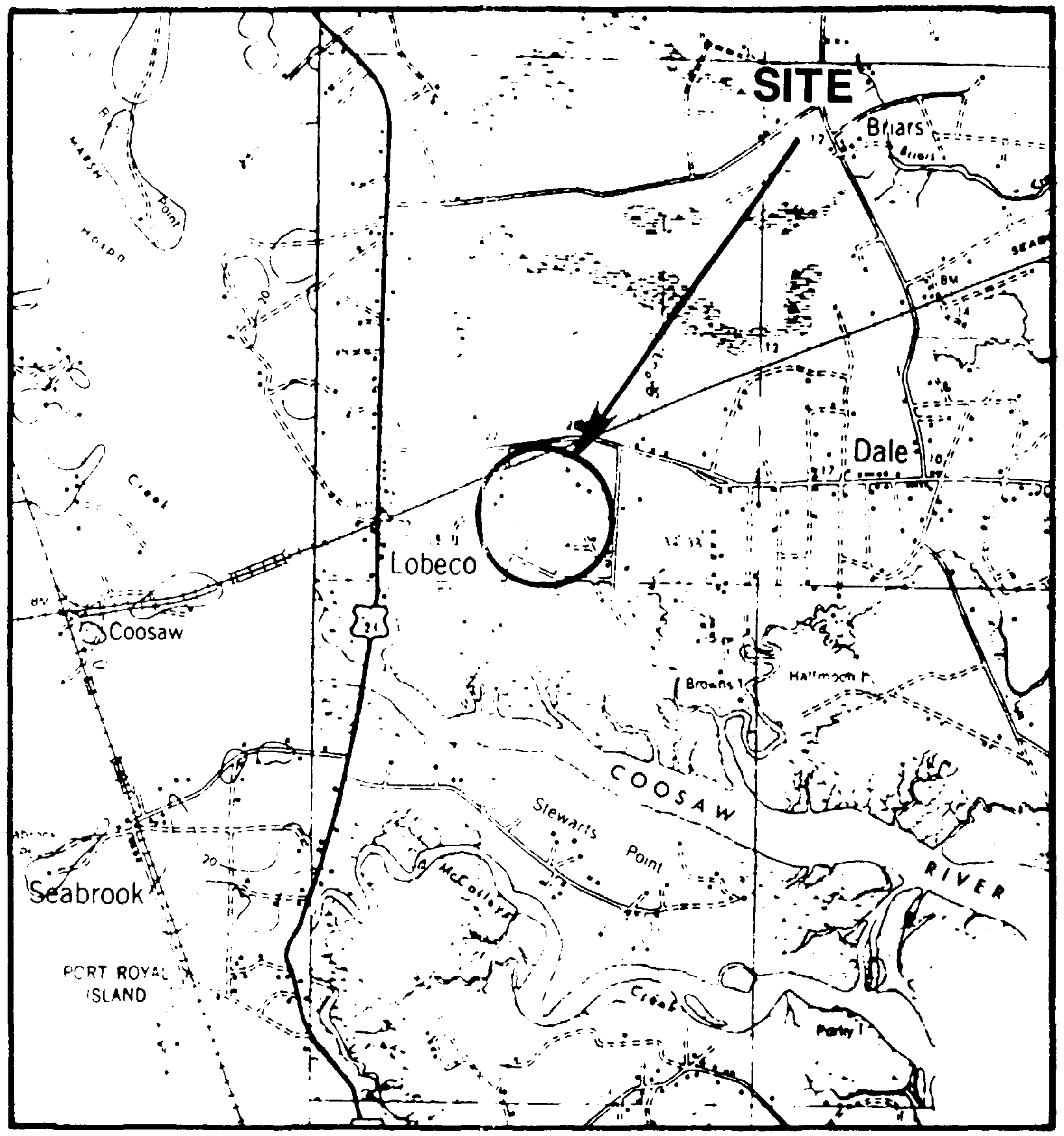


RE: Rand McNally Road Atlas-1986

AREA MAP

0 miles 25
SCALE
(approximate)

-N-



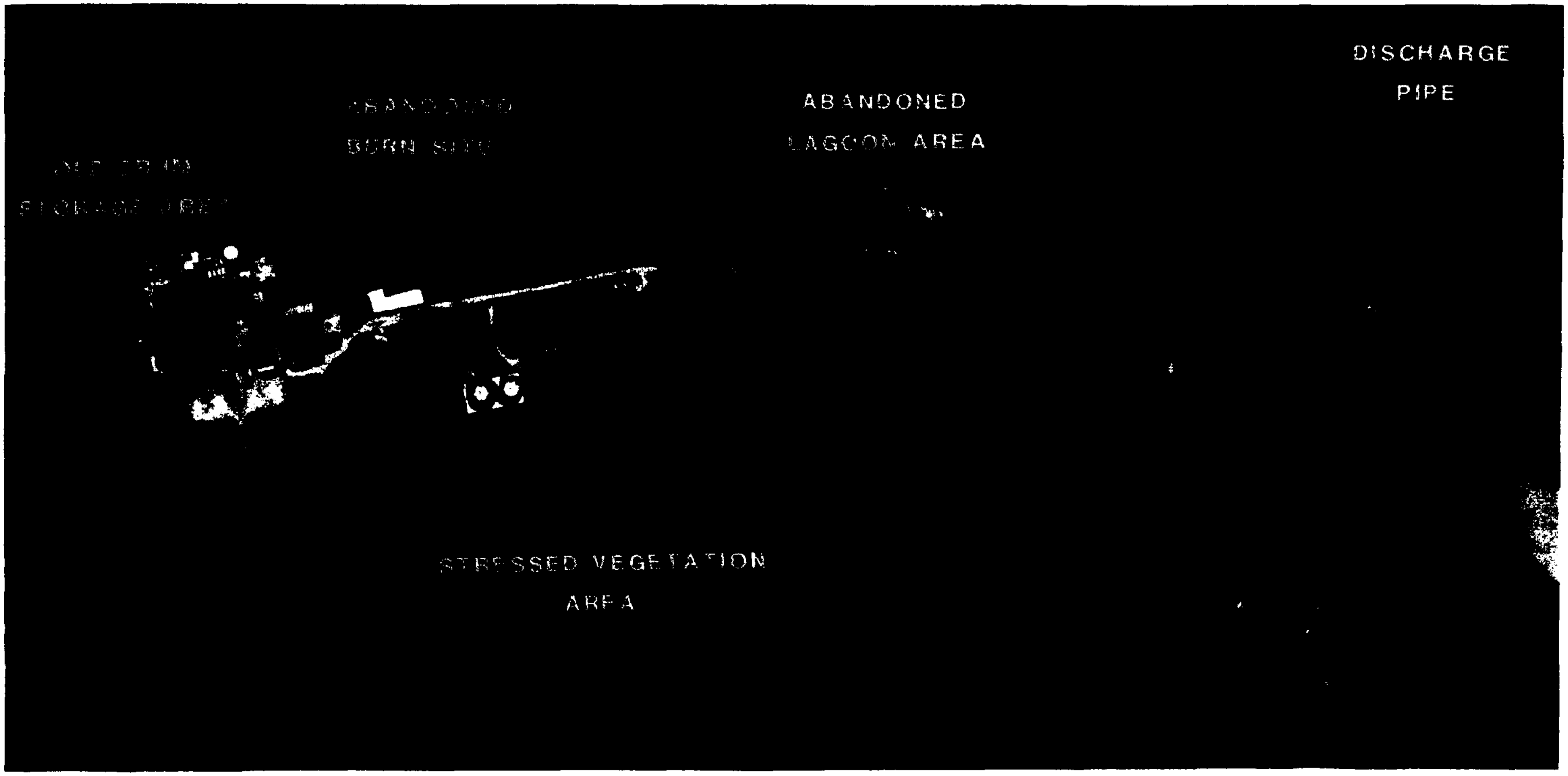
RE: USGS Quadrangle Map "Green Pond, S.C."-1943

VICINITY MAP

0 feet 2000
SCALE

G&E ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

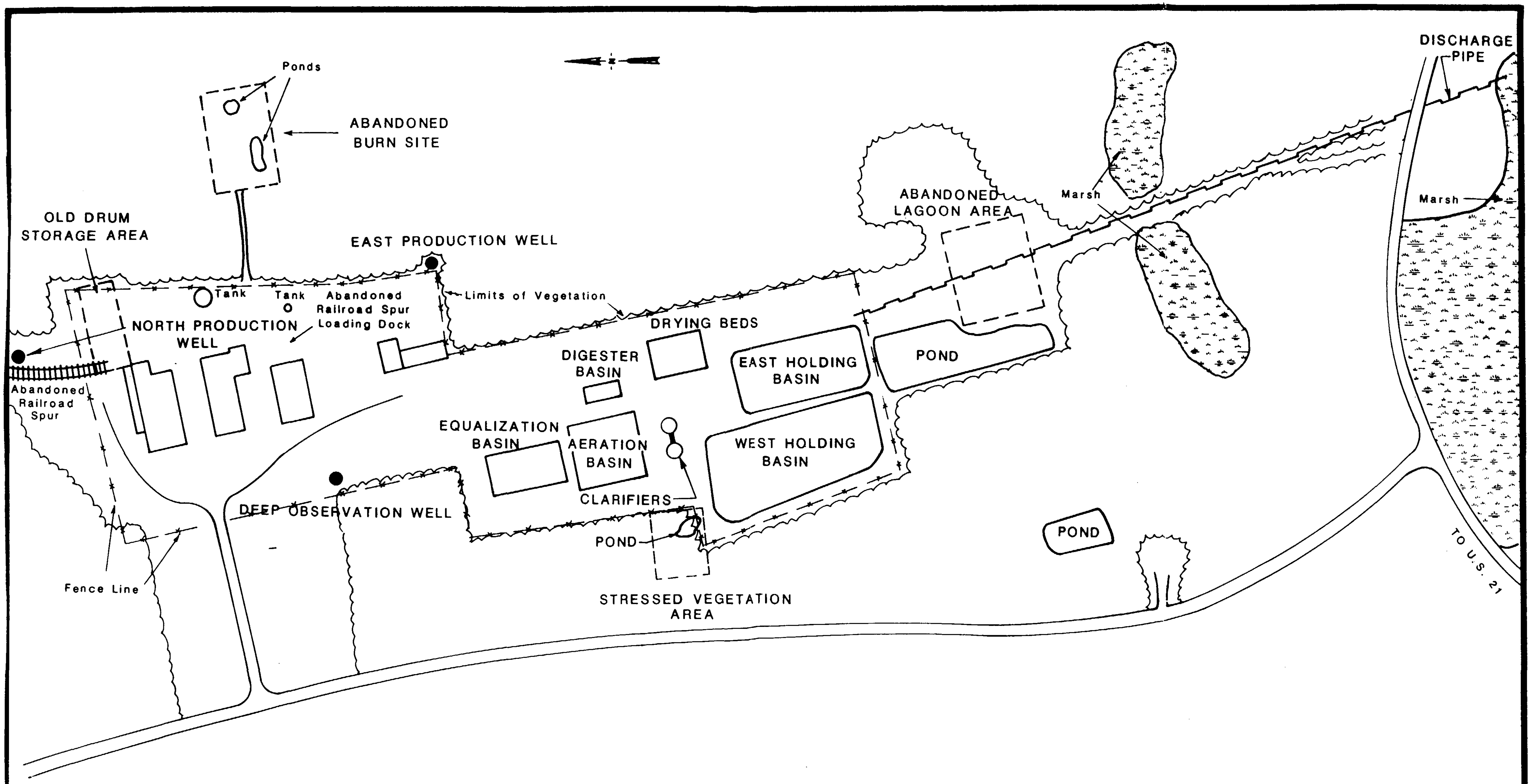
4-14-86 Date	86-1008 File No.		VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	**PREMANUFACTURING NOTICE** VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	**AREA AND VICINITY MAP**	1 Fig. No.
CAB Drawn by	MBW Ckd. by					



RE: AERIAL PHOTOGRAPH TAKEN ON MARCH 4, 1988.

G&E
ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

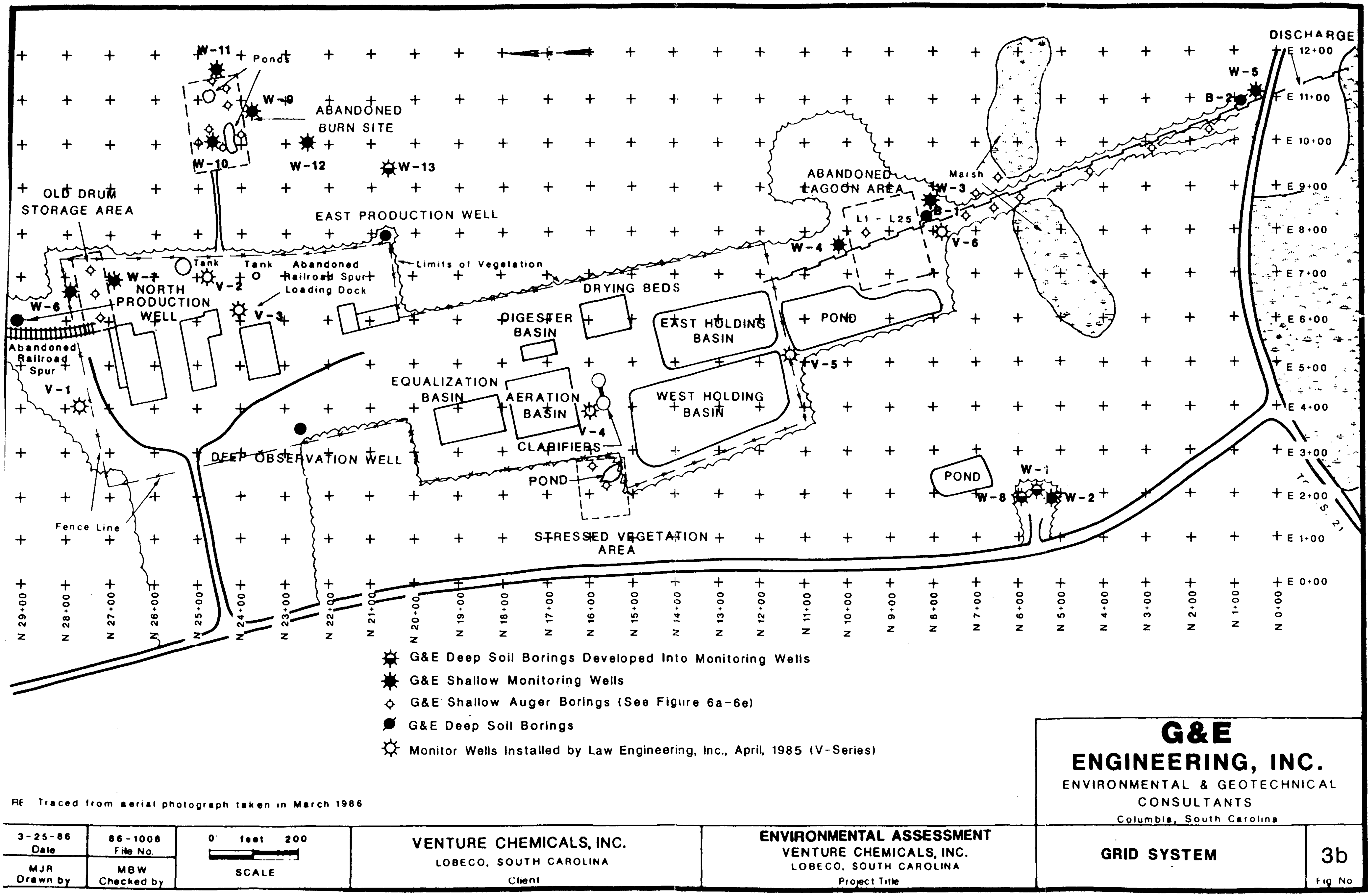
Date	88-1008 File No.	0 feet 400 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	AERIAL PHOTOGRAPH	2 Fig. No.
ABL Drawn by	MJR Ckd by					

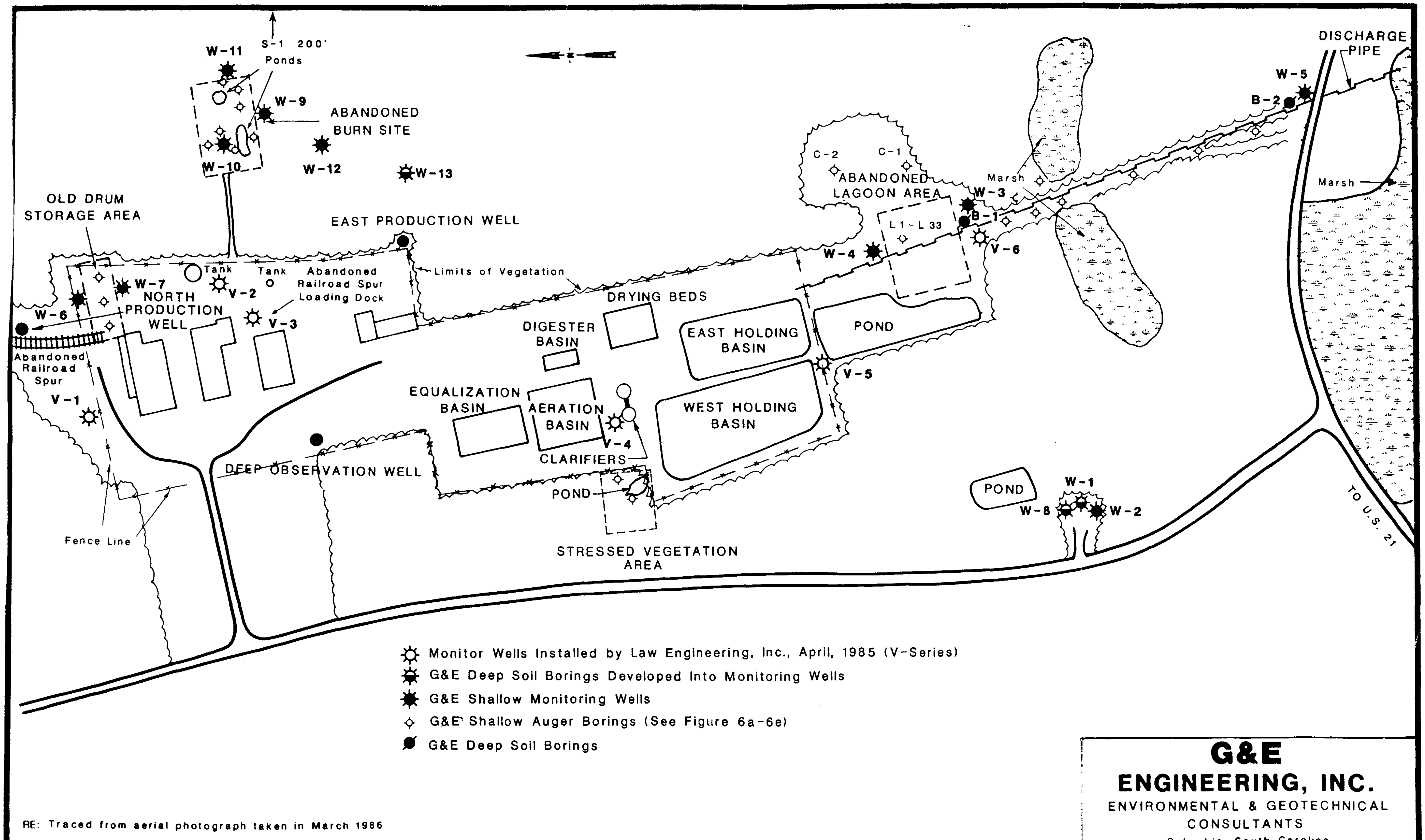


RE: Traced from aerial photograph taken in March 1986

G&E ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

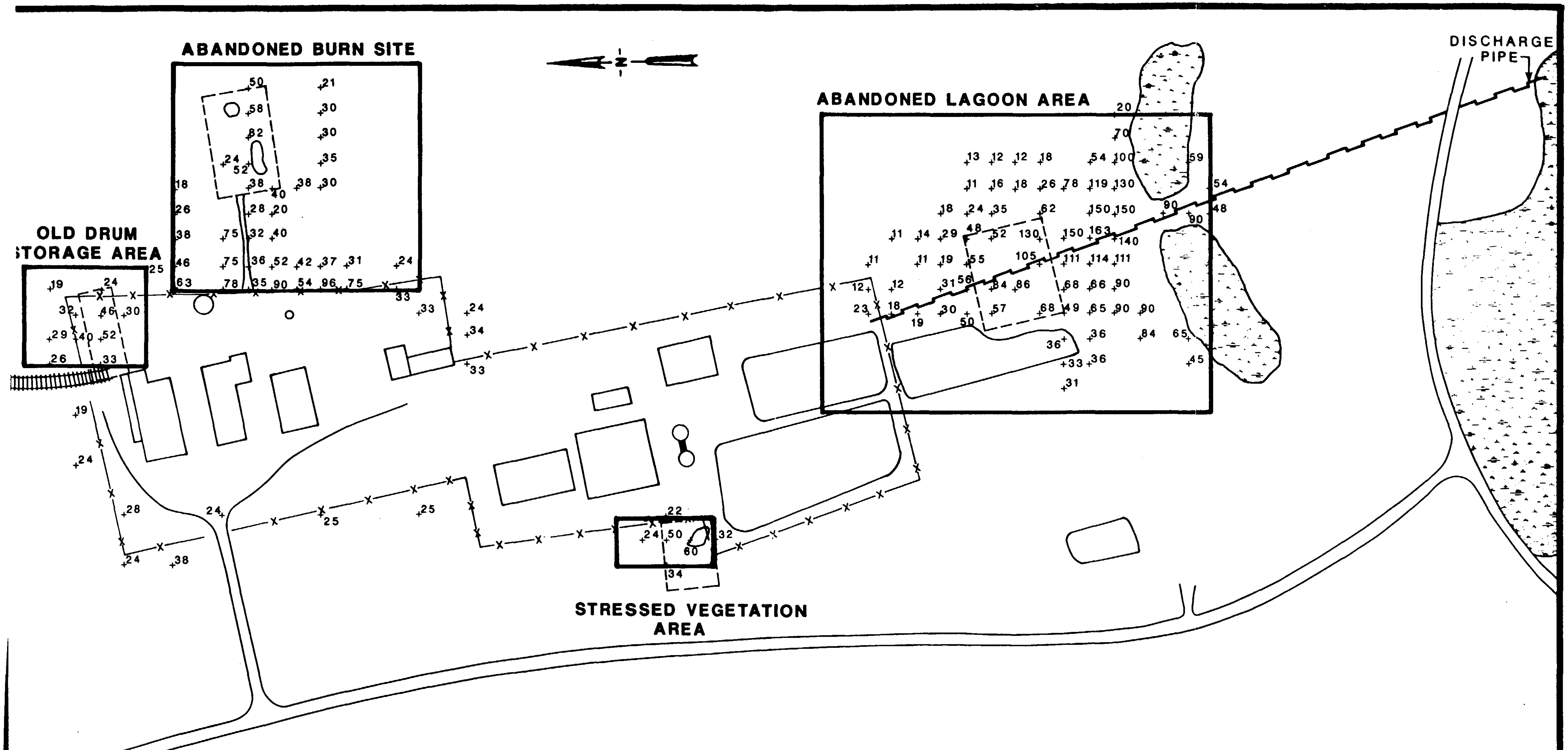
3-25-86 Date	86-1008 File No.	0 feet 200 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	**ENVIRONMENTAL ASSESSMENT** VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	**SITE PLAN**	3a Fig. No.
MJR Drawn by	MBW Checked by					


DISCHARGE
W-11
Ponds
W-9
ABANDONED
BURN SITE
W-10
W-12
W-13
OLD DRUM
STORAGE AREA
EAST PRODUCTION WELL
ABANDONED
LAGOON AREA
Marsh
W-3
B-1
L1 - L25
W-4
V-6
W-5
B-2
Tank
Tank
Abandoned
Railroad Spur
Loading Dock
Limits of Vegetation
W-7
NORTH
PRODUCTION
WELL
V-2
V-3
W-6
Abandoned
Railroad
Spur
V-1
DRYING BEDS
DIGESTER
BASIN
EAST HOLDING
BASIN
POND
V-5
EQUALIZATION
BASIN
AERATION
BASIN
V-4
CLARIFIERS
WEST HOLDING
BASIN
DEEP OBSERVATION WELL
POND
POND
W-1
W-8
W-2
Fence Line
STRESSED VEGETATION
AREA
E 12+00
E 11+00
E 10+00
E 9+00
E 8+00
E 7+00
E 6+00
E 5+00
E 4+00
E 3+00
E 2+00
E 1+00
E 0+00
N 29+00
N 28+00
N 27+00
N 26+00
N 25+00
N 24+00
N 23+00
N 22+00
N 21+00
N 20+00
N 19+00
N 18+00
N 17+00
N 16+00
N 15+00
N 14+00
N 13+00
N 12+00
N 11+00
N 10+00
N 9+00
N 8+00
N 7+00
N 6+00
N 5+00
N 4+00
N 3+00
N 2+00
N 1+00
N 0+00
G&E Deep Soil Borings Developed Into Monitoring Wells
G&E Shallow Monitoring Wells
G&E Shallow Auger Borings (See Figure 6a-6e)
G&E Deep Soil Borings
Monitor Wells Installed by Law Engineering, Inc., April, 1985 (V-Series)
RE Traced from aerial photograph taken in March 1986
G&E
ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL
CONSULTANTS
Columbia, South Carolina
3-25-86
Date
86-1008
File No.
MJR
Drawn by
MBW
Checked by
0 feet 200
SCALE
VENTURE CHEMICALS, INC.
LOBECO, SOUTH CAROLINA
Client
ENVIRONMENTAL ASSESSMENT
VENTURE CHEMICALS, INC.
LOBECO, SOUTH CAROLINA
Project Title
GRID SYSTEM
3b
Fig. No



G&E ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

3-25-86 Date	86-1008 File No.	0 feet 200 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	BORING/MONITOR WELL PLAN	4 Fig. No.
MJR Drawn by	MBW Checked by					



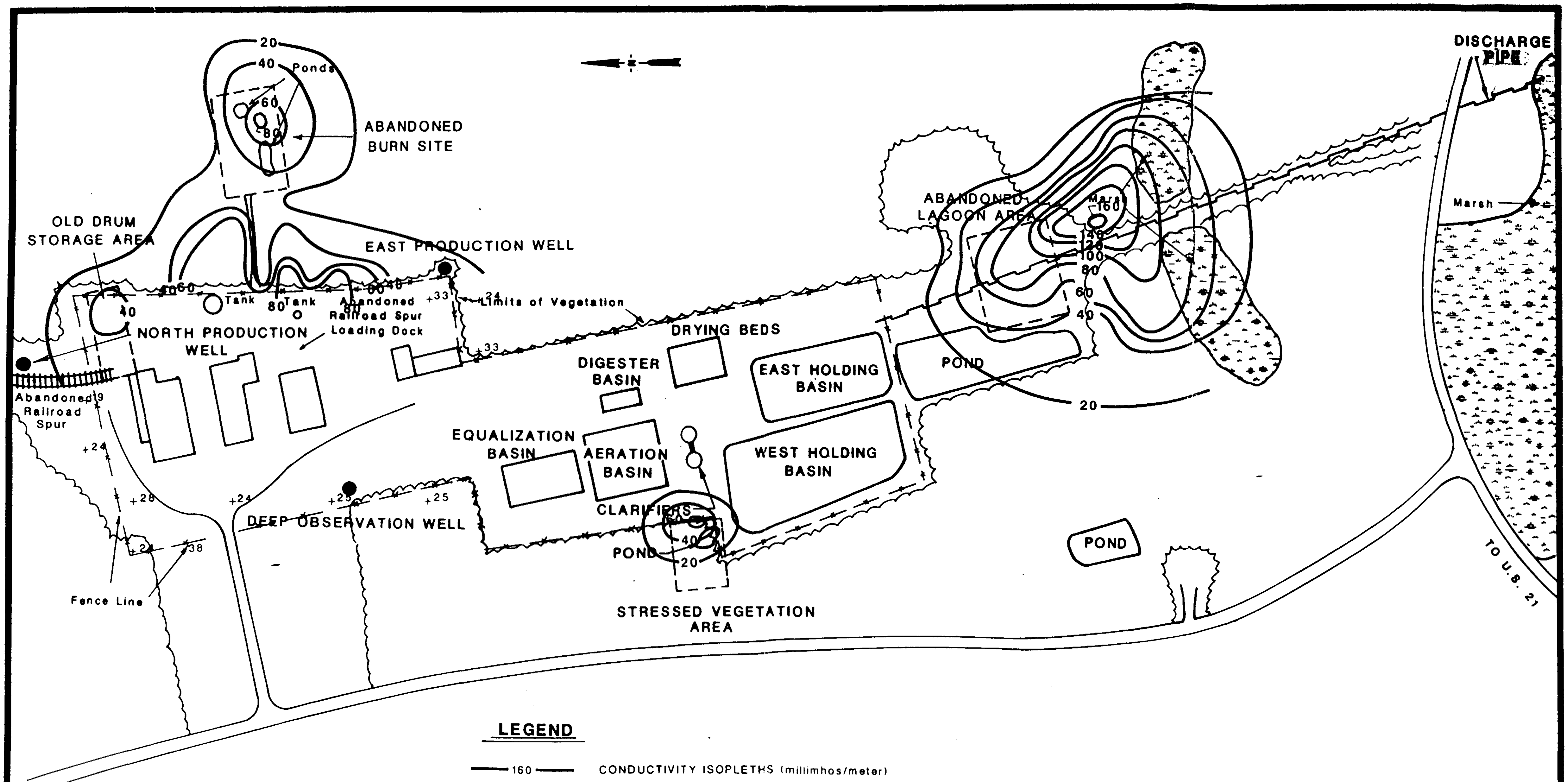
LEGEND

+24 CONDUCTIVITY MEASUREMENT POINT

RE: TRACED FROM AERIAL PHOTOGRAPH TAKEN IN MARCH 1986.

G&E ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

4-22-86 Date	86-1008 File No.	0 feet 200 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA	GEOPHYSICAL (CONDUCTIVITY) SURVEY	5a Fig. No.



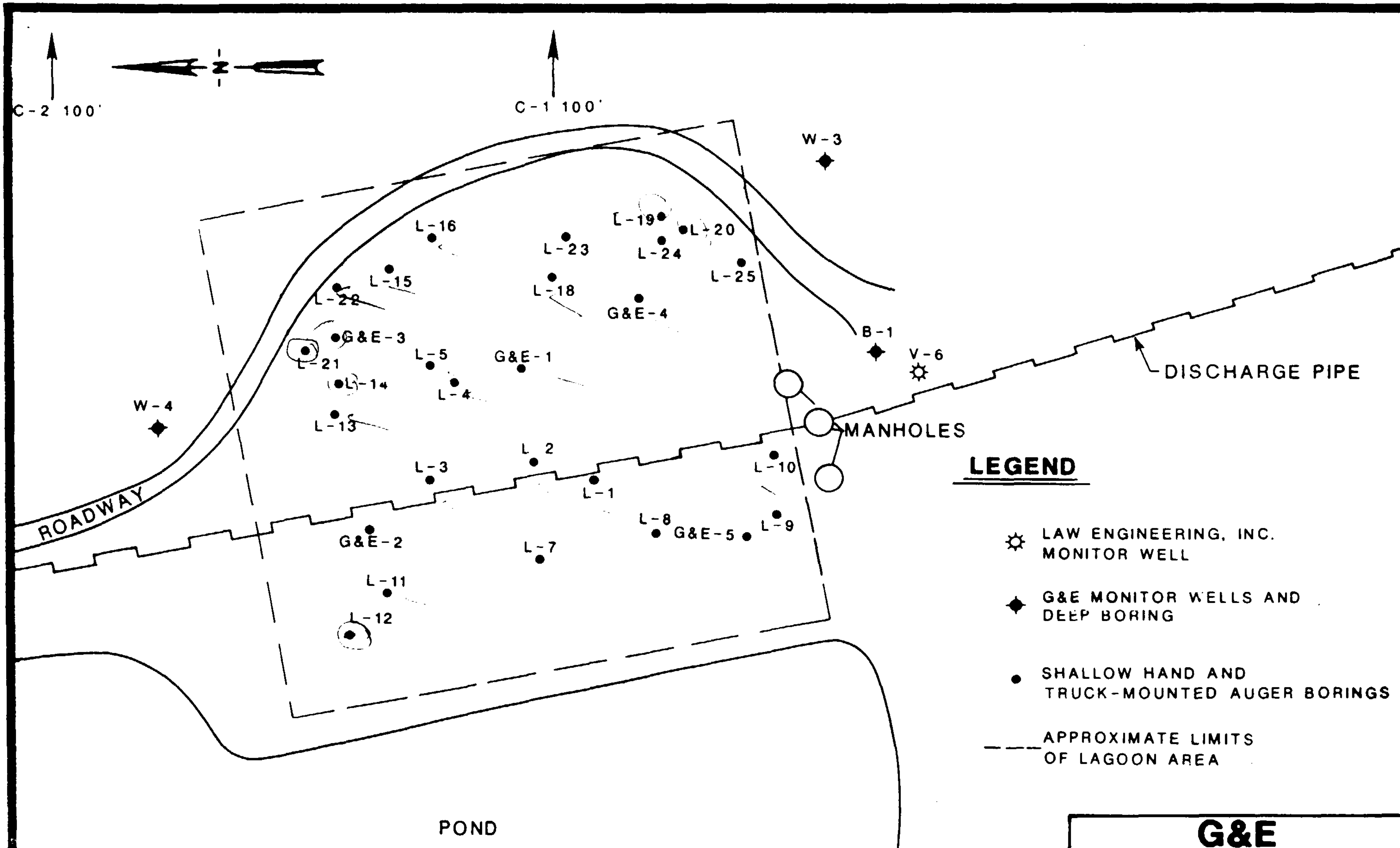
NOTE: CONDUCTIVITY SURVEY TAKEN MARCH, APRIL 1986.
BACKGROUND CONDUCTIVITY APPROXIMATELY 20 TO 25 mmhos/m.

RE: Traced from aerial photograph taken in March 1986

G&E ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

3-25-86 Date	86-1008 File No.	0 feet 200 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	GEOPHYSICAL (CONDUCTIVITY) SURVEY	5b Fig. No.
MJR Drawn by	MBW Checked by					

BRUNING 44-152 0/050

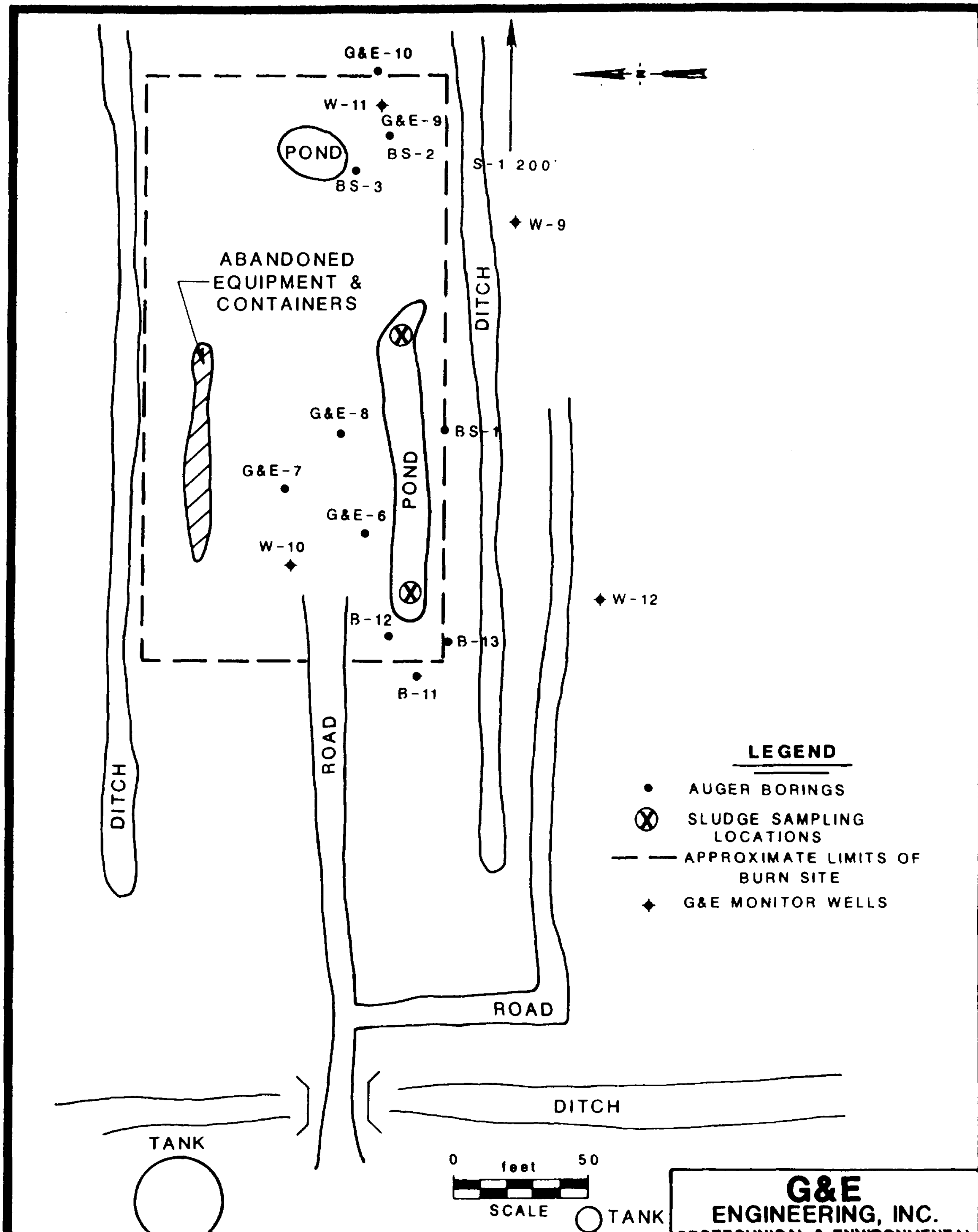


NOTE: G&E Borings drilled in January 1986
L-series Borings drilled in March and April 1986
L-6 and L-17 were not sampled and are not shown

G&E
ENGINEERING, INC.
GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
Columbia, South Carolina

3/31/86 Date	86-1008 File No.	0 feet 50 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT LOBECO, SOUTH CAROLINA Project Title	**ABANDONED LAGOON AREA**	6a Fig. No.
ABL Drawn by	MJR Ckd. by					

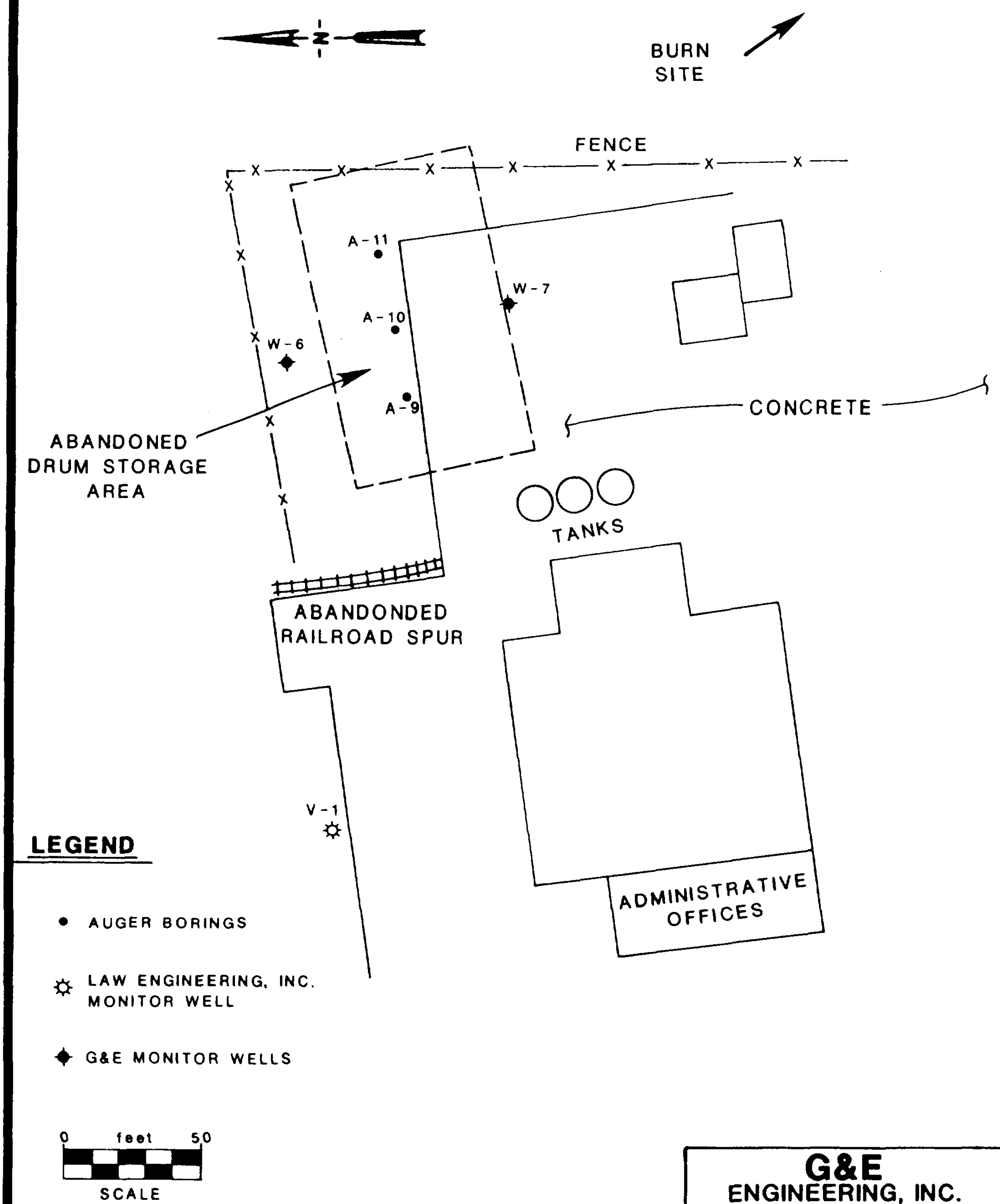
BRUNING 44-132 67880



CAB	MJR	4-14-86	86-1008	G&E ENGINEERING, INC. GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS Columbia, South Carolina
Drawn by	Ckd. by	Date	File No.	

VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICAL INC. LOBECO, SOUTH CAROLINA Project Title	BURN SITE	6b Fig. No.

BRUNING 44-132 64819



ABL	MJR	4/1/86	86-1008
Drawn by	Ckd. by	Date	File No.

G&E ENGINEERING, INC.
GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
Columbia, South Carolina

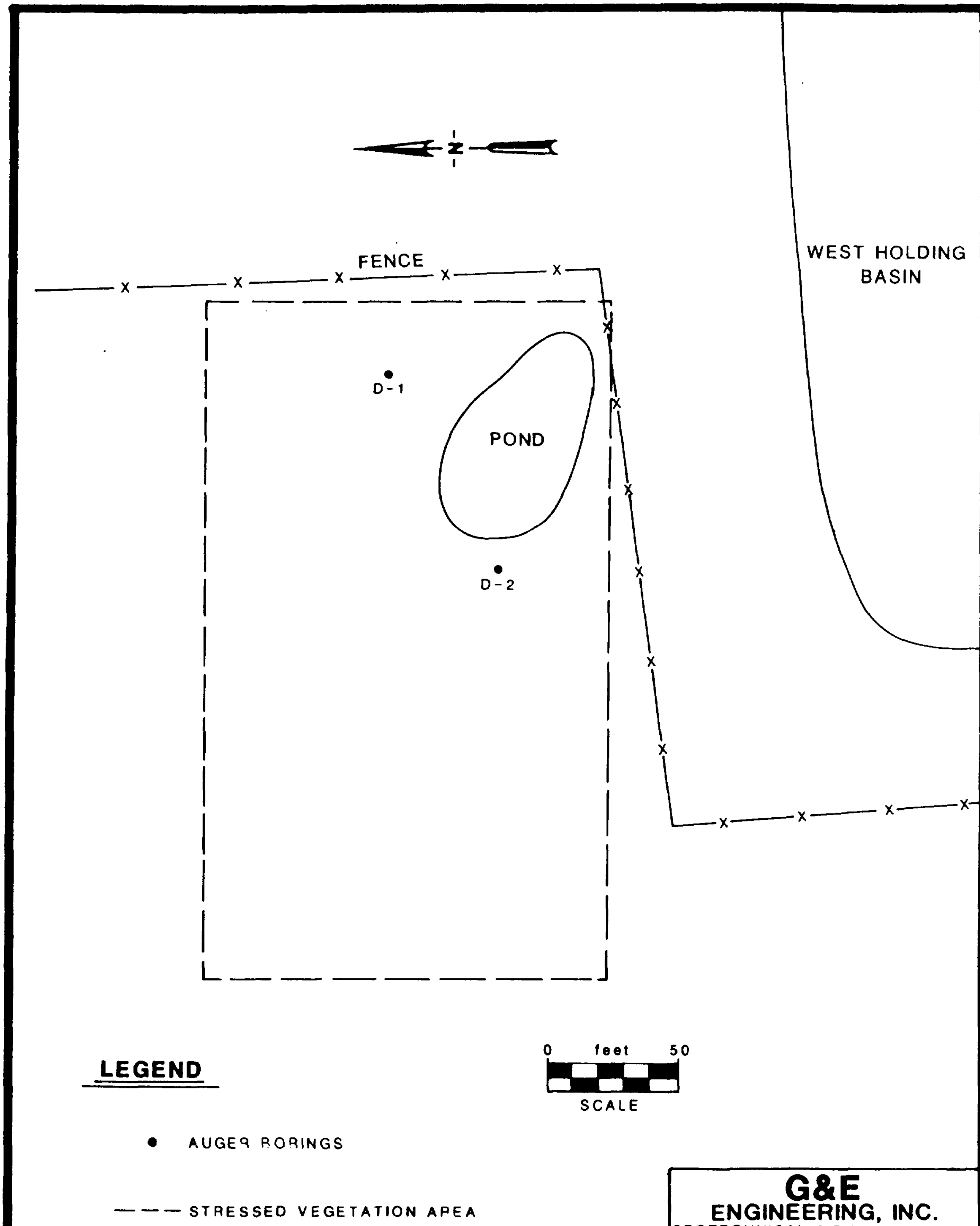
VENTURE CHEMICALS, INC.
LOBECO, SOUTH CAROLINA
Client

ENVIRONMENTAL ASSESSMENT
LOBECO, SOUTH CAROLINA
Project Title

OLD DRUM STORAGE AREA

6c
Fig. No.

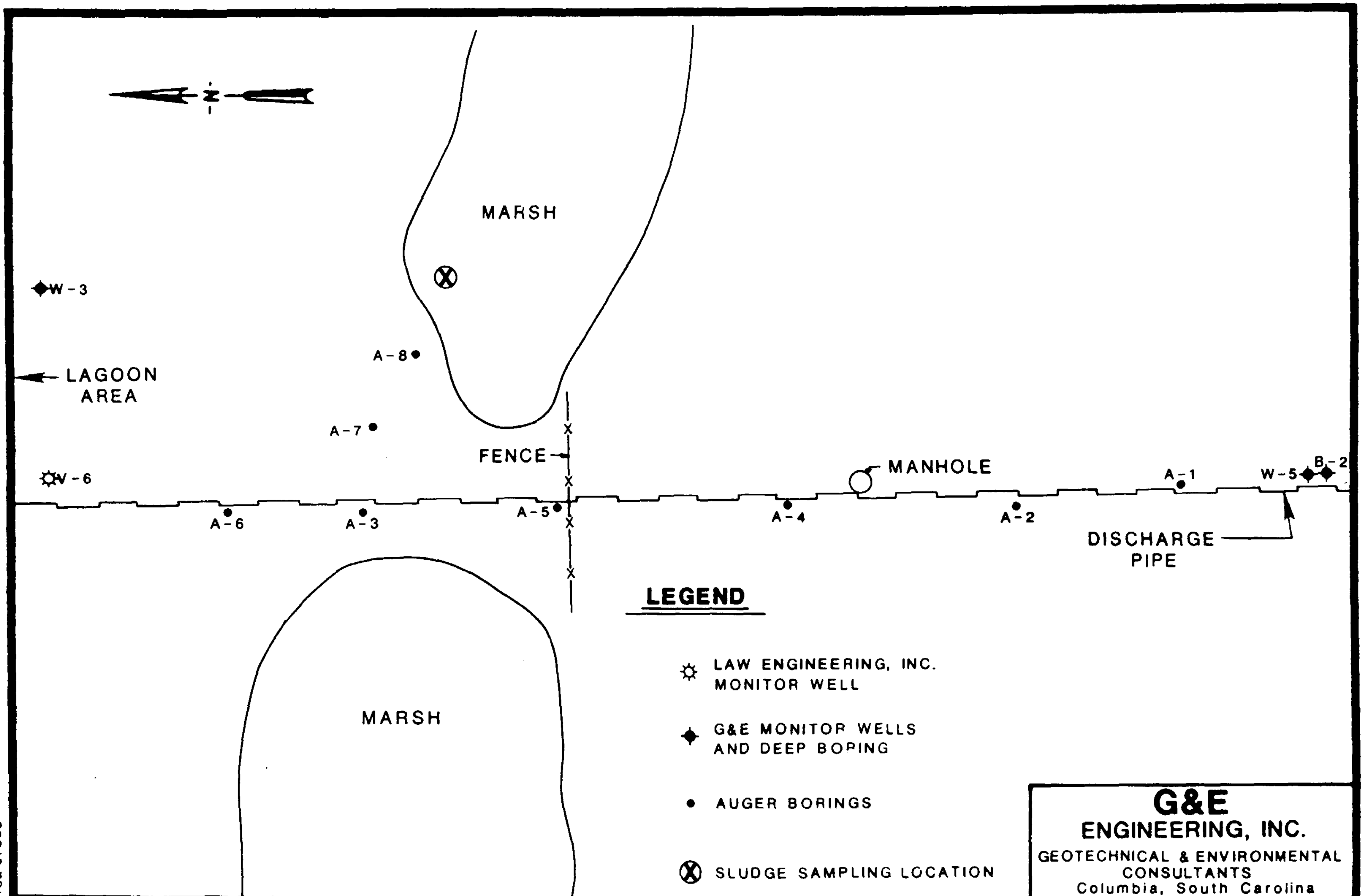
BRUNING 44-132 64819



ARL Drawn by	MJR Ckd. by	4/2/86 Date	86-1008 File No.	**G&E ENGINEERING, INC.** GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS Columbia, South Carolina

VENTURE CHEMICALS, INC. LORECO, SOUTH CAROLINA Client	**ENVIRONMENTAL ASSESSMENT** LORECO, SOUTH CAROLINA Project Title	**STRESSED VEGETATION AREA**	6d Fig. No.

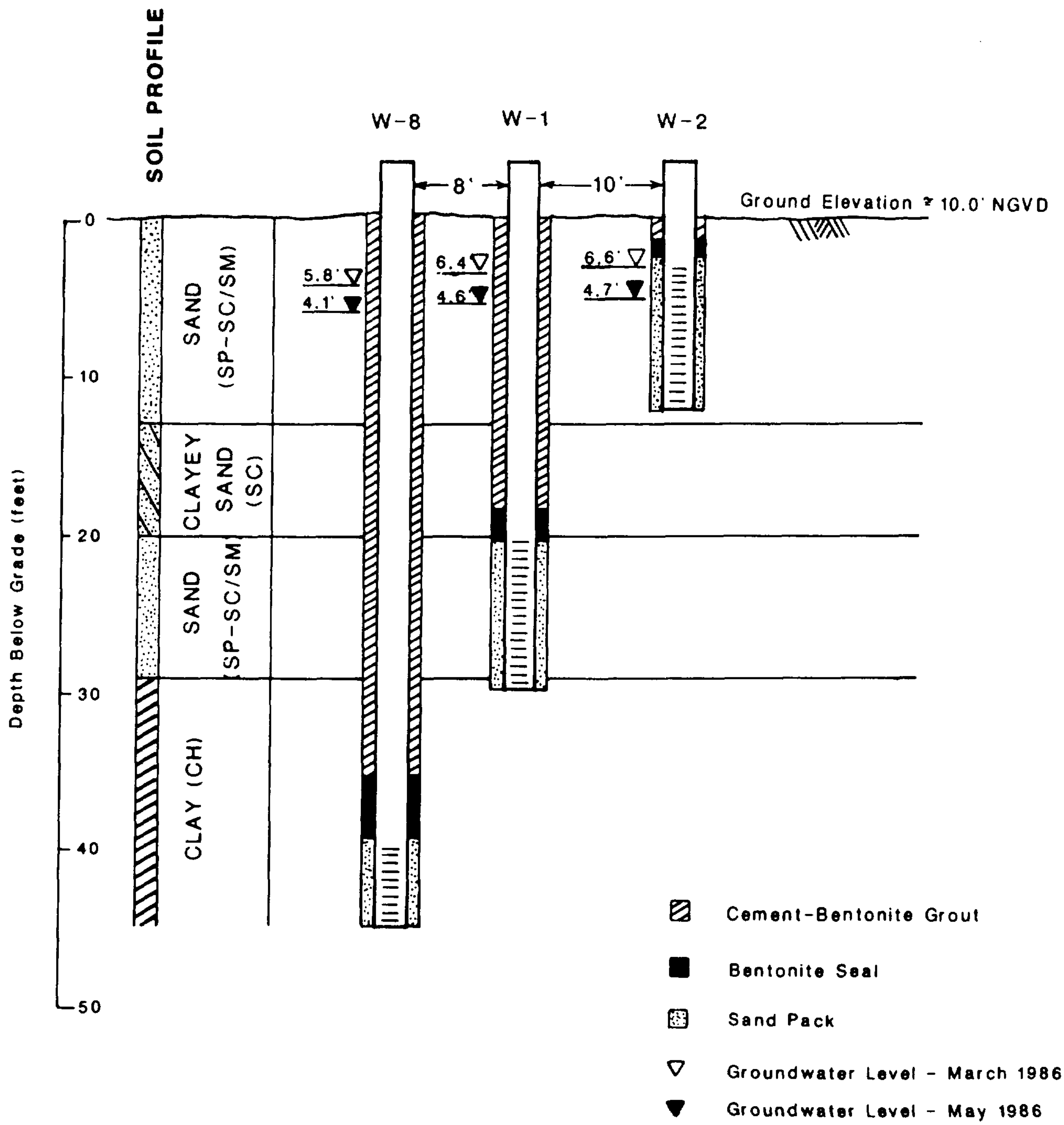
BRUNING 44-132 64819



G&E
ENGINEERING, INC.
GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
Columbia, South Carolina

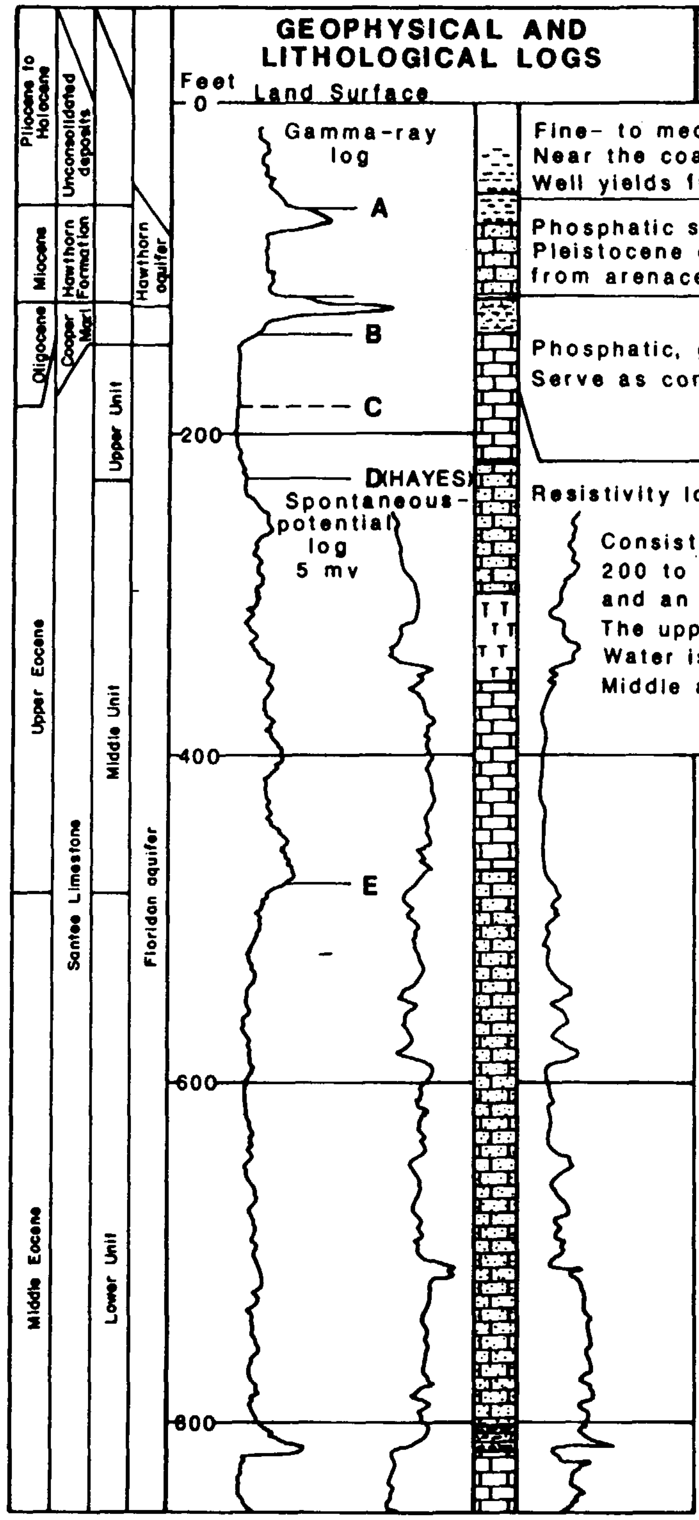
4/1/86 Date	86-1008 File No.	0 feet 50 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT LOBECO, SOUTH CAROLINA Project Title	DISCHARGE PIPE	6e Fig. No.
ABL Drawn by	MJR Ckd. by					

BRUNING 44-132 67880



THREE-WELL MONITORING CLUSTER

	MJR Drawn by	MBW Ckd. by	5-9-86 Date	86-1008 File No.	**G&E** ENGINEERING, INC. ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS Columbia, South Carolina
VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	**ENVIRONMENTAL ASSESSMENT** VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title				**WELL CLUSTER DETAILS** 7 Fig. No.



LITHOLOGY AND WATERBEARING CHARACTER

Fine- to medium-grained, white and dark brown angular quartz sand and clayey sand with interbedded gray and green clay. Near the coast, shell beds exist mixed with sand and clay. Thickness of these deposits is 25 to 100 feet. Well yields from the shallow deposits may range from 2 to 10 gpm of fairly good water.

Phosphatic sand and clay ; arenaceous dolomitic limestone to phosphatic marl. Serves as confining unit to overlying Pliocene and Pleistocene deposits, as well as underlying Floridan aquifer. Moderate quantities of fairly good water are available from arenaceous limestone section if present. Thickness ranges 2 to 40 feet through study area.

Phosphatic, greenish-gray clay and fine-grained sand with moderate to abundant amounts of shells. Serve as confining unit to Floridan aquifer. In the study area it ranges in thickness from zero to 15 feet.

Resistivity log 20 ohms

Consists of a lower unit of moderately indurated, siliceous, glauconitic limestone, light gray to creamy yellow in color, 200 to 400 feet in thickness; a middle unit of soft, calcareous sand and argillaceous limestone, 200 to 400 feet in thickness; and an upper unit of white to light-gray, calcitized, abundantly fossiliferous, moderately indurated limestone, 25 to 100 feet thick in study area. The upper unit is the principal aquifer. Well yields of 200 to 2,000 gpm are possible from wells penetrating the entire thickness of Santee limestone. Water is of good quality in the upper unit, moderately hard and high in minerals, including chloride, in some areas. It is suitable for most areas. Middle and lower units are generally high in chloride throughout most of study area.

EXPLANATION

Sand		A	Miocene-Pliocene contact
Limestone		B	Oligocene-Miocene contact
Clay		C	Eocene-Oligocene contact and Top of Santee Limestone (Upper unit)
Sandy limestone		D	Top of Santee Limestone (Middle unit)
Calcareous sand		E	Top of Santee Limestone (Lower unit)
Sandy clay			
Clayey sand			

RE: From Water Resources Commission, Report No. 147, "Ground-Water Conditions in the Ladies and St. Helena Islands Area South Carolina"-1985

G&E ENGINEERING, INC.
GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
Columbia, South Carolina

4-15-86 Date	86-1008 File No.		VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	REGIONAL HYDROGEOLOGICAL CONDITIONS	8 Fig. No.
CAB Drawn by	MJR Checked by					

WATER WELL TABLE

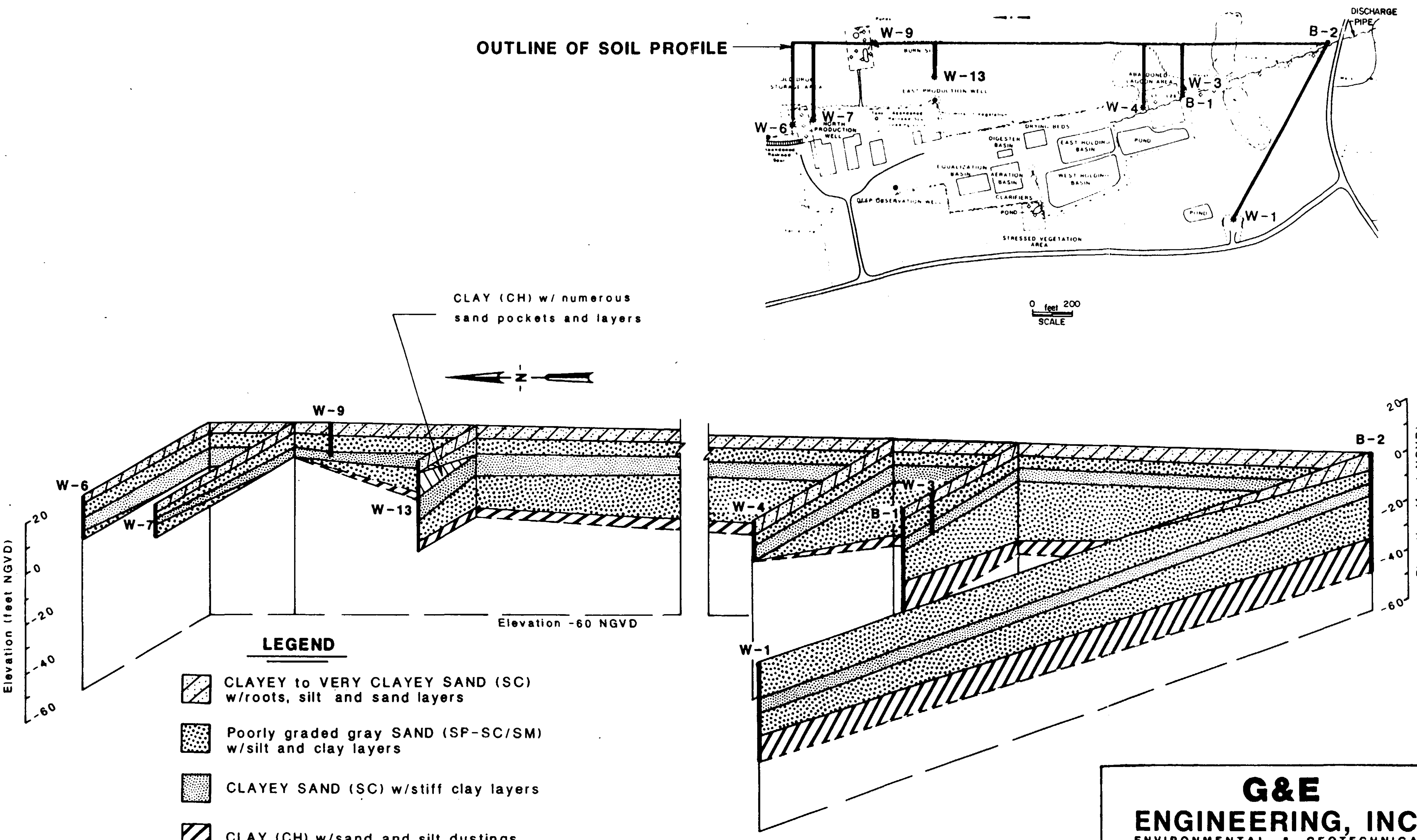
Well No.	Purpose of Well
27GG-f1	Industrial
27GG-f2	Industrial
27GG-f3	Industrial
27GG-f4	Industrial
27GG-f5	Industrial
27GG-f6	Industrial
27GG-f7	Industrial
27GG-g1	Observation
27GG-g2	Industrial
27GG-g3	Industrial
27GG-g4	Industrial
27GG-g5	Observation
27GG-o2	Industrial
27GG-o3	Industrial
27GG-o4	Industrial
27GG-o5	Industrial
27GG-o6	Industrial
27GG-o7	Industrial

NOTE: Water wells are screened in the Floridian Aquifer

RE: Water Resources Commission, Department of Geology and Hydrology, Water Well Reports

G&E ENGINEERING, INC.
GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
Columbia, South Carolina

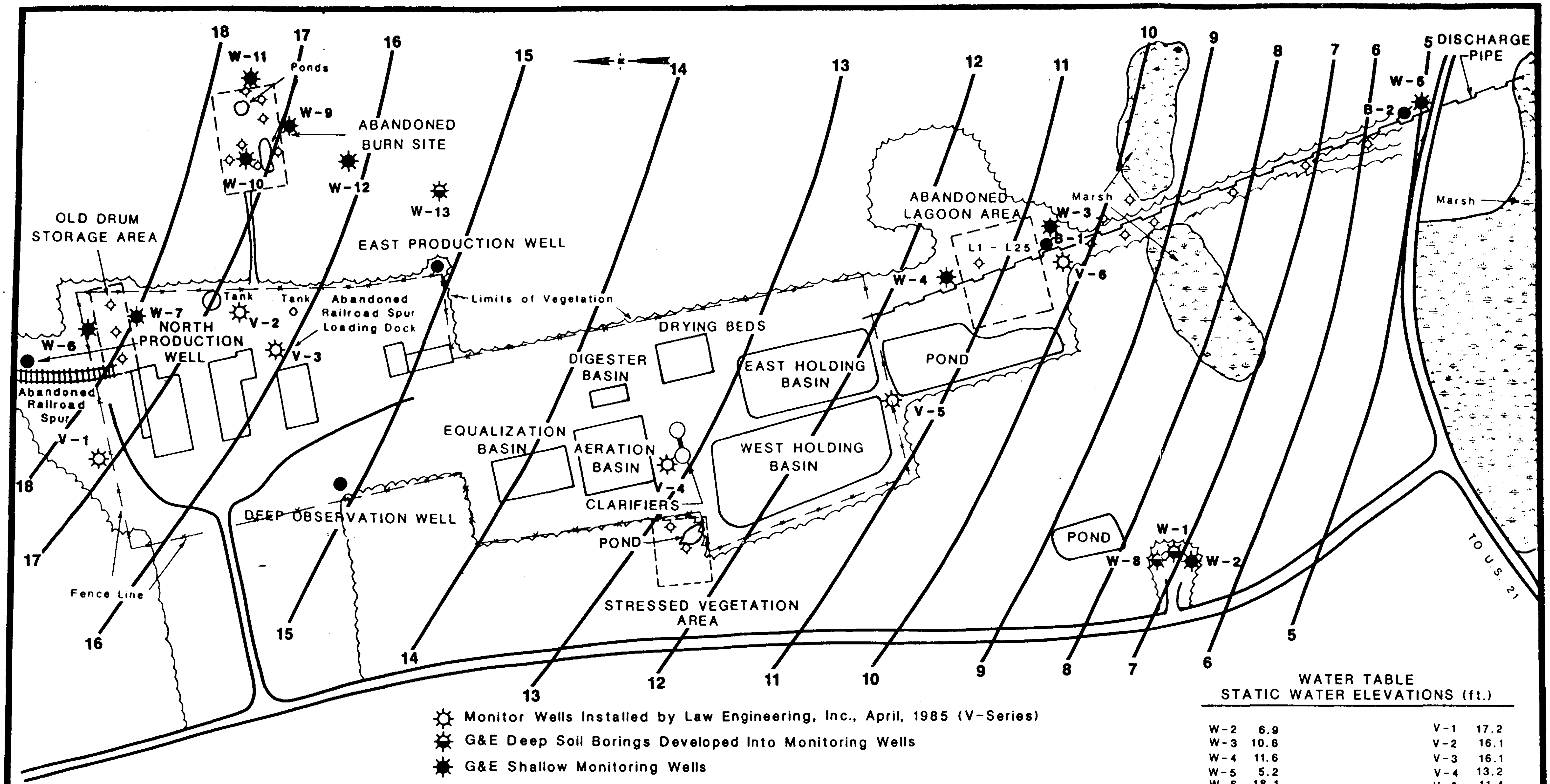
4-16-86 Date	86-1008 File No.	0 miles 1 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	GROUNDWATER WELL LOCATIONS	9 Fig. No.
CAB Drawn by	MJR Checked by					



RE: Soil boring logs located in Appendix B.

G&E ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

4-9-86	86-1008	0 feet 200 HORIZ. SCALE	VENTURE CHEMICALS, INC.	ENVIRONMENTAL ASSESSMENT	ISOMETRIC SOIL PROFILE	10
Date	File No.		LOBECO, SOUTH CAROLINA	VENTURE CHEMICALS, INC.		Fig. No.
CAB	MJR			LOBECO, SOUTH CAROLINA Project Title		



- Monitor Wells Installed by Law Engineering, Inc., April, 1985 (V-Series)
- G&E Deep Soil Borings Developed Into Monitoring Wells
- G&E Shallow Monitoring Wells
- G&E Shallow Auger Borings (See Figure 6a-6e)
- G&E Deep Soil Borings
- 5 Elevation in feet above National Geodetic Vertical Datum (NGVD)
- Groundwater Contour Intervals

WATER LEVEL MEASUREMENTS NOT AVAILABLE FOR W-9 THROUGH W-12.

NOTE: V-SERIES WELLS ARE SCREENED AT GREATER DEPTHS THAN WELLS W-2 THROUGH W-7 AND THIS MAY ACCOUNT FOR ANOMALOUS WATER LEVEL MEASUREMENTS IN THE CASE OF V-2 AND V-6. THE IMPOUNDED WATERS ON THE SITE WOULD BE EXPECTED TO CAUSE LOCAL VARIATIONS IN THE POTENTIOMETRIC CONDITIONS SHOWN.

RE: Traced from aerial photograph taken in March 1986. Water level readings taken on March 19, 1986 from G&E monitor wells.

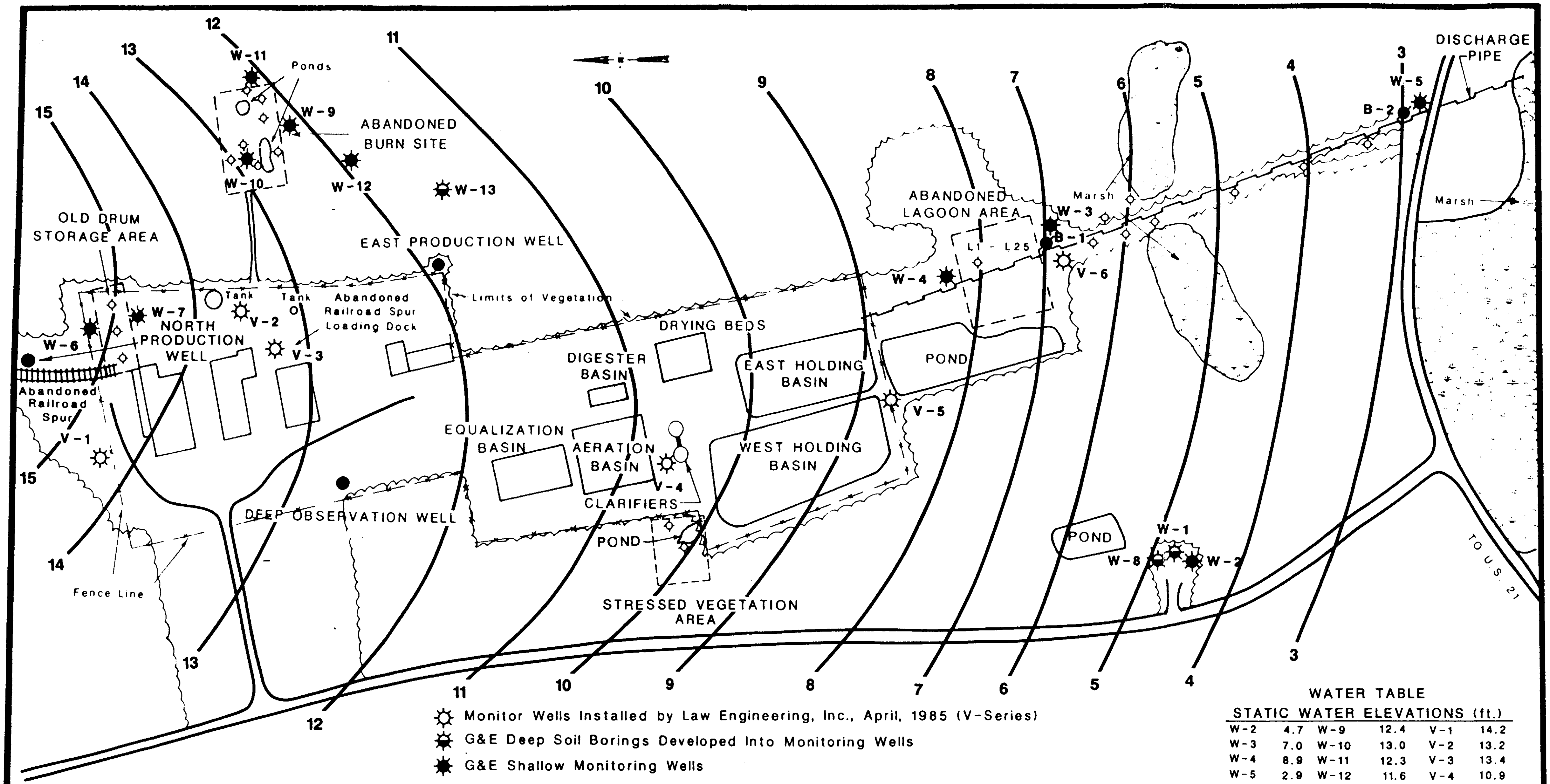
WATER TABLE STATIC WATER ELEVATIONS (ft.)

Well	Elev.	Well	Elev.
W-2	6.9	V-1	17.2
W-3	10.6	V-2	16.1
W-4	11.6	V-3	16.1
W-5	5.2	V-4	13.2
W-6	18.1	V-5	11.4
W-7	18.0	V-6	8.3

G&E ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

3-25-86 Date	86-1008 File No.	0 feet 200 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	GROUNDWATER CONTOURS MARCH 1986	11a Fig No
MJR Drawn by	MBW Checked by					

BRUNING 44-132 67880



☼ Monitor Wells Installed by Law Engineering, Inc., April, 1985 (V-Series)

✹ G&E Deep Soil Borings Developed Into Monitoring Wells

✸ G&E Shallow Monitoring Wells

◇ G&E Shallow Auger Borings (See Figure 6a-6e)

● G&E Deep Soil Borings

5 Elevation in feet above National Geodetic Vertical Datum (NGVD)

— Groundwater Contour Interval

NOTE: V-SERIES WELLS ARE SCREENED AT GREATER DEPTHS THAN WELLS W-2 THROUGH W-7 AND THIS MAY ACCOUNT FOR ANOMALOUS WATER LEVEL MEASUREMENTS IN THE CASE OF V-2 AND V-6. THE IMPOUNDED WATERS ON THE SITE WOULD BE EXPECTED TO CAUSE LOCAL VARIATIONS IN THE POTENTIOMETRIC CONDITIONS SHOWN.

RE: Traced from aerial photograph taken in March 1986. Water level readings taken on May 1,2, 1986 from G&E monitor wells.

WATER TABLE

STATIC WATER ELEVATIONS (ft.)

W-2	4.7	W-9	12.4	V-1	14.2
W-3	7.0	W-10	13.0	V-2	13.2
W-4	8.9	W-11	12.3	V-3	13.4
W-5	2.9	W-12	11.6	V-4	10.9
W-6	14.6			V-5	8.6
W-7	15.1			V-6	5.9

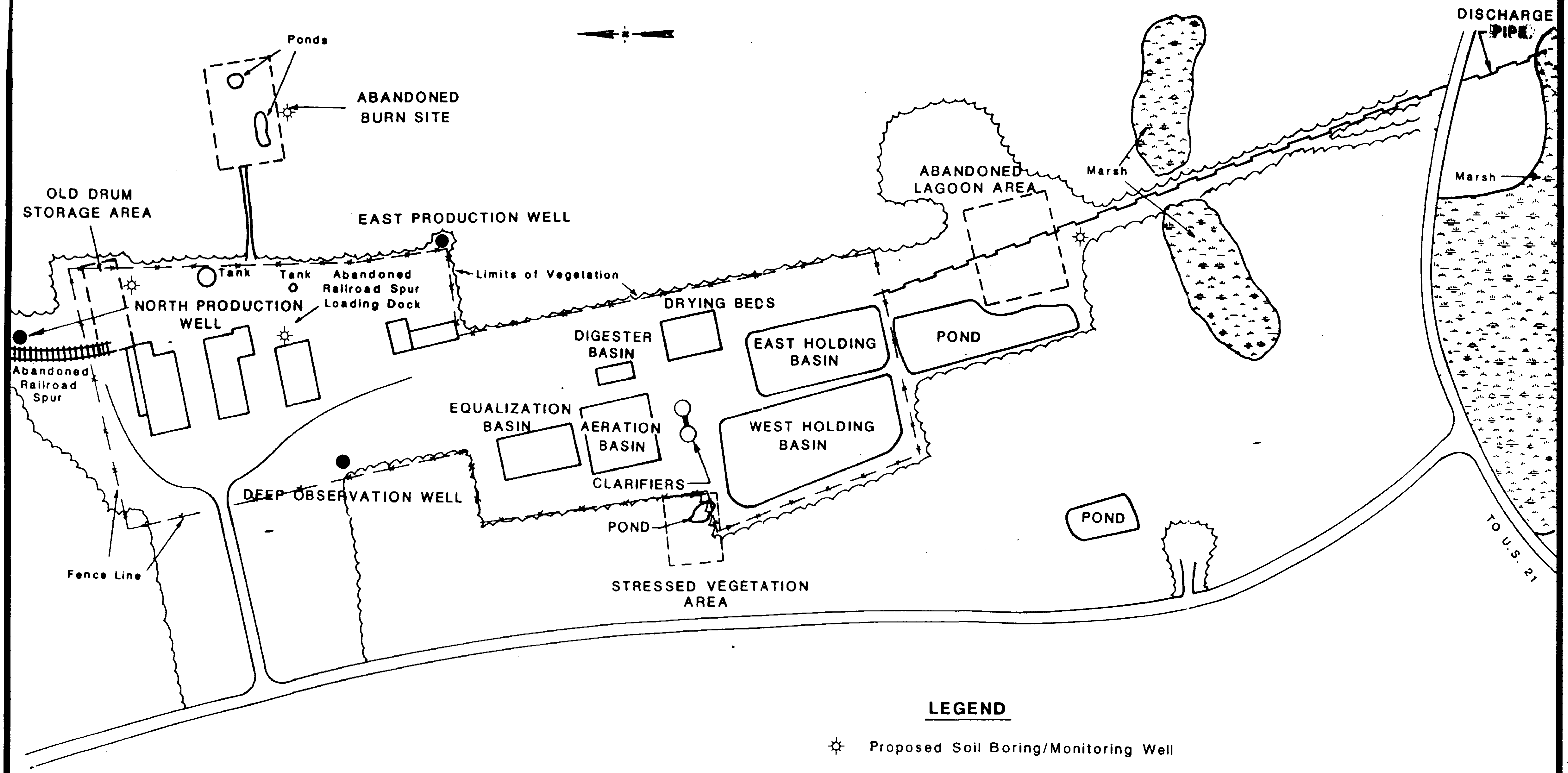
G&E ENGINEERING, INC.

ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS

Columbia, South Carolina

3-25-86 Date	86-1008 File No.	0 feet 200 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	GROUNDWATER CONTOURS MAY 1986	11b Fig No
MJR Drawn by	MBW Checked by					

BRUNING 44-132 67880



LEGEND

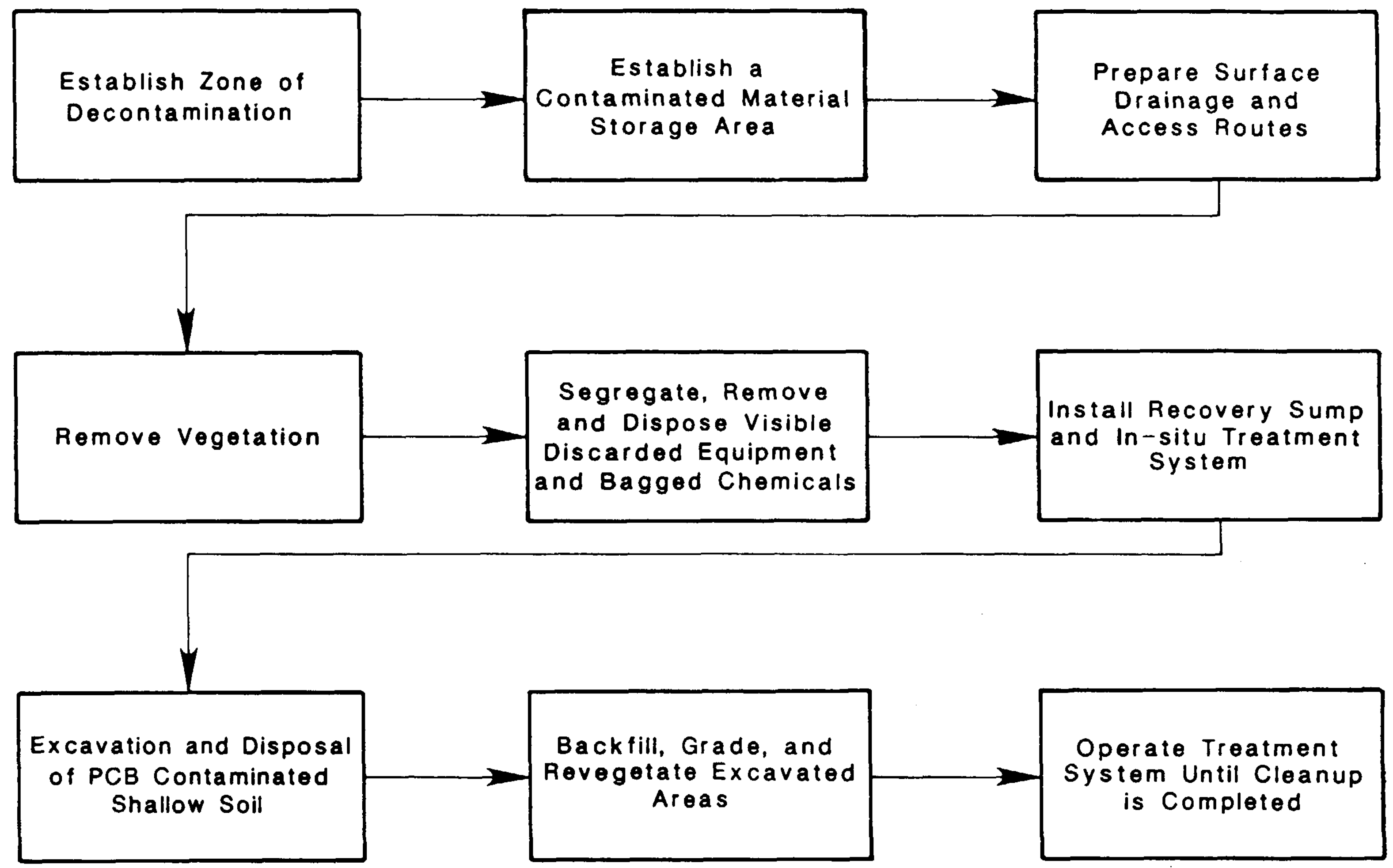
☼ Proposed Soil Boring/Monitoring Well

RE: Traced from aerial photograph taken in March 1986

G&E
ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

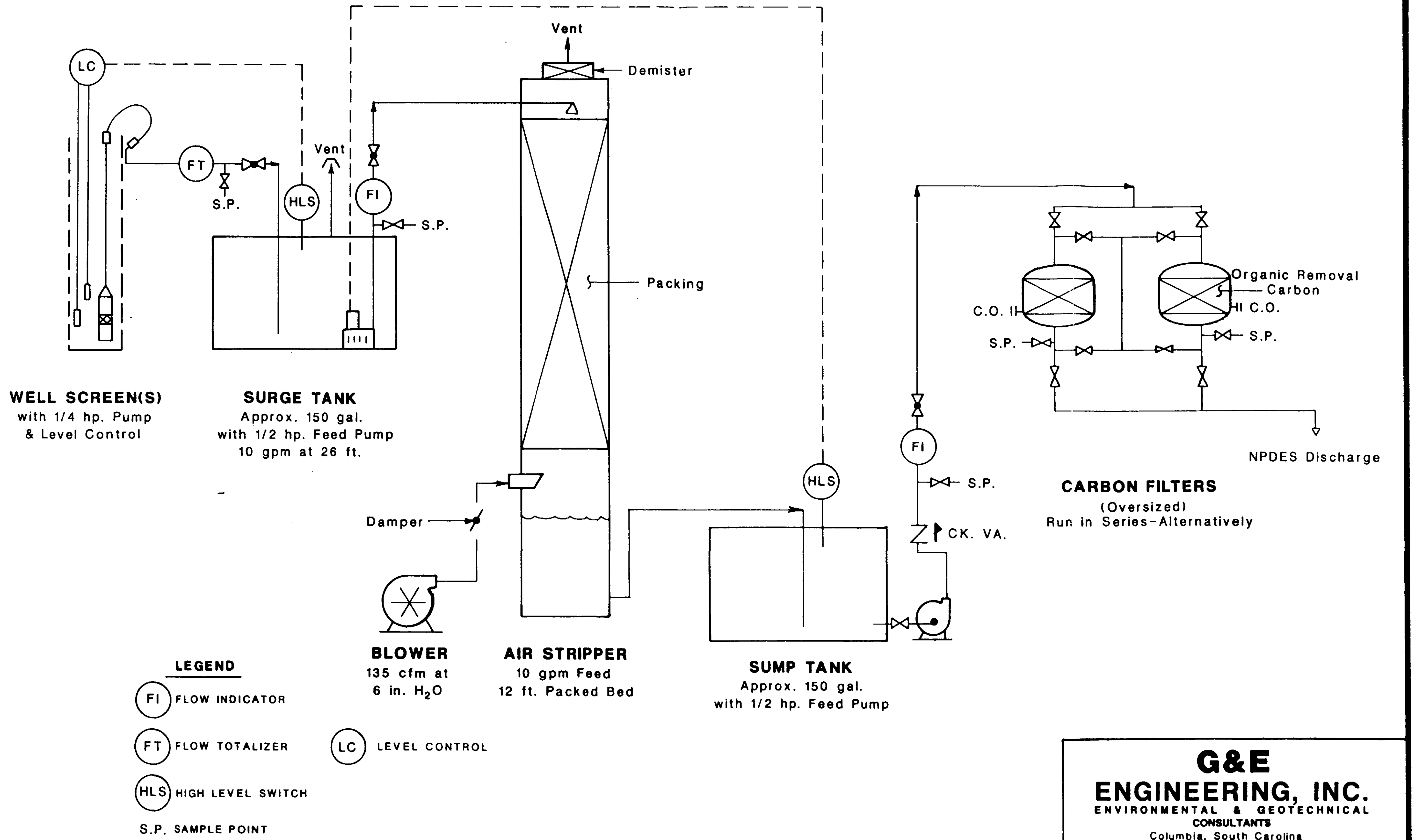
3-25-86 Date	86-1008 File No.	0 feet 200 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	**ENVIRONMENTAL ASSESSMENT** VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	**PROPOSED WELL LOCATIONS**	12 Fig. No.
MJR	RBA					

JNING 44-132 67880



G&E
ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

Date	File No.	Client	Project Title		Fig. No.
4-16-86	86-1008	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA	**ENVIRONMENTAL ASSESSMENT** VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA	**BURN SITE SEQUENCE OF TASKS**	13
Drawn by: CAB	Ckd. by: MJR				



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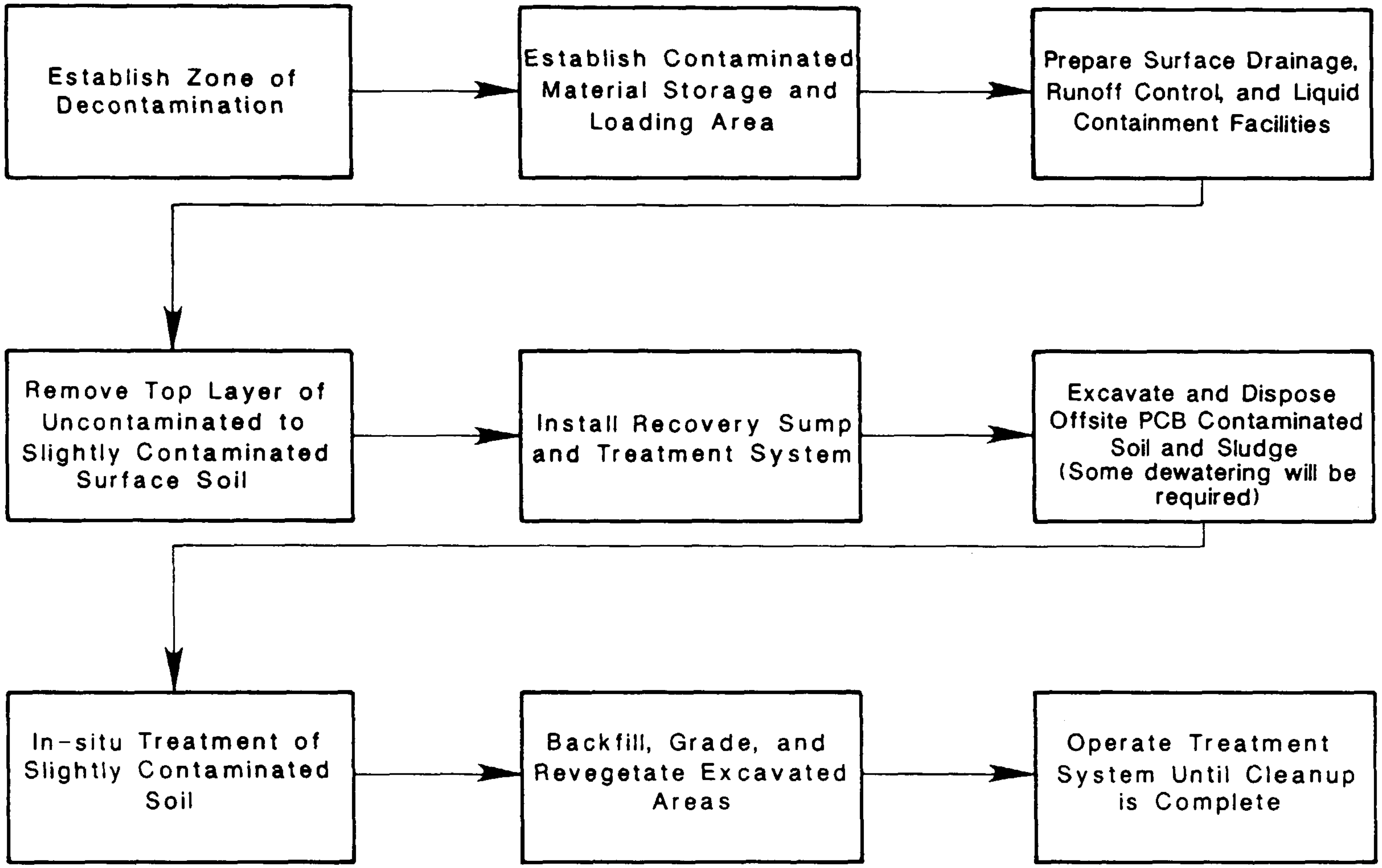
Columbia, South Carolina

Date	File No.	Client	Project Title		Fig. No.
4-11-86	86-1008	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA	PROCESS FLOW DIAGRAM TREATMENT PLANT FOR BURN SITE	14
Drawn by: CAB	Ckd. by: JLD				



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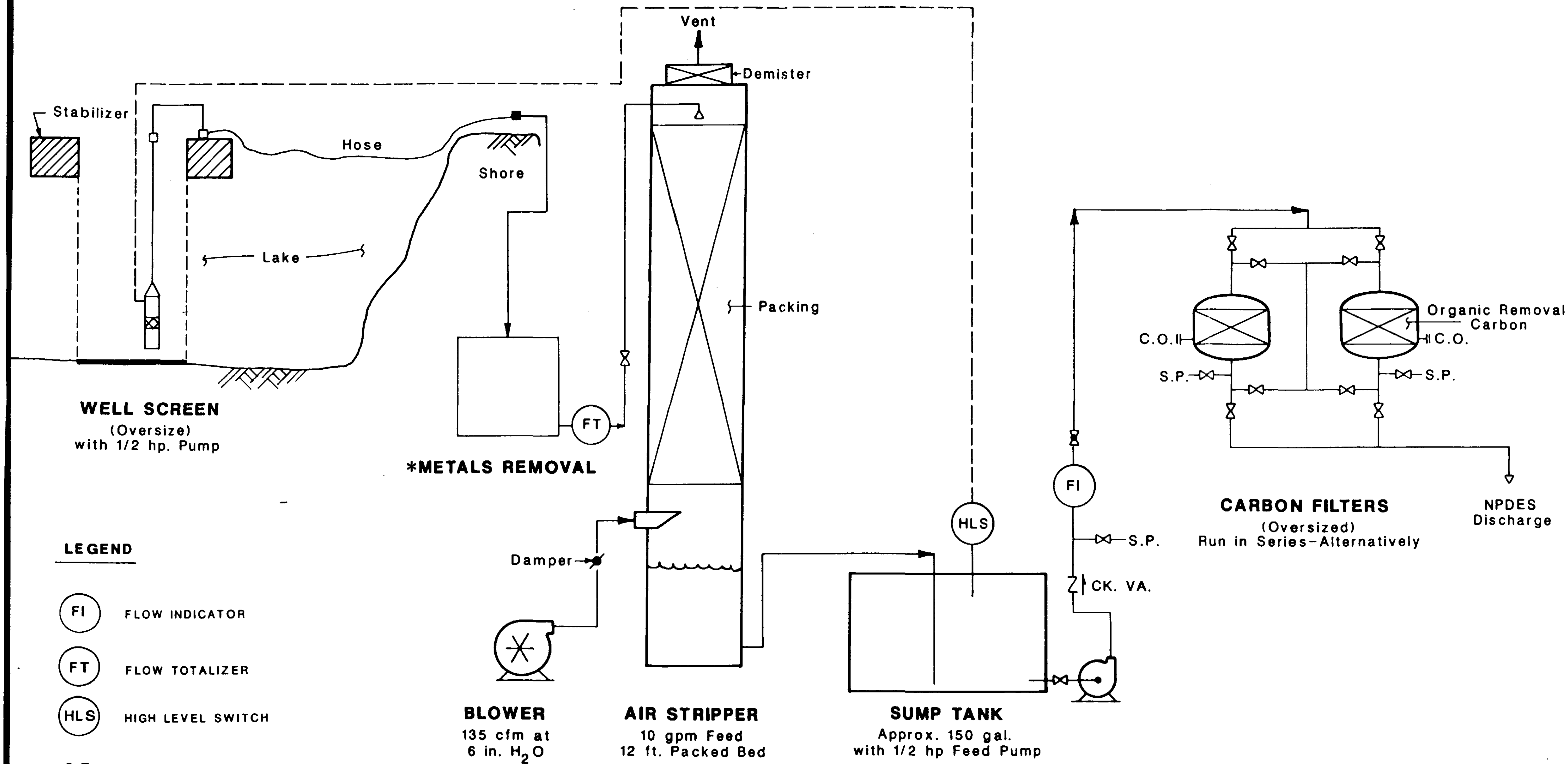
4-16-86 Date	86-1008 File No.		VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	ABANDONED LAGOON SEQUENCE OF TASKS	15 Fig. No.
CAB Drawn by	MJR Ckd. by					



LEGEND

- FI — FLOW INDICATOR
- FT — FLOW TOTALIZER
- HLS — HIGH LEVEL SWITCH
- S.P. — SAMPLE POINT
- * — BASED ON WASTE CHARACTERIZATIONS SOME TYPE OF PHYSICAL/CHEMICAL TREATMENT PRIOR TO AIR STRIPPER MAY BE REQUIRED.

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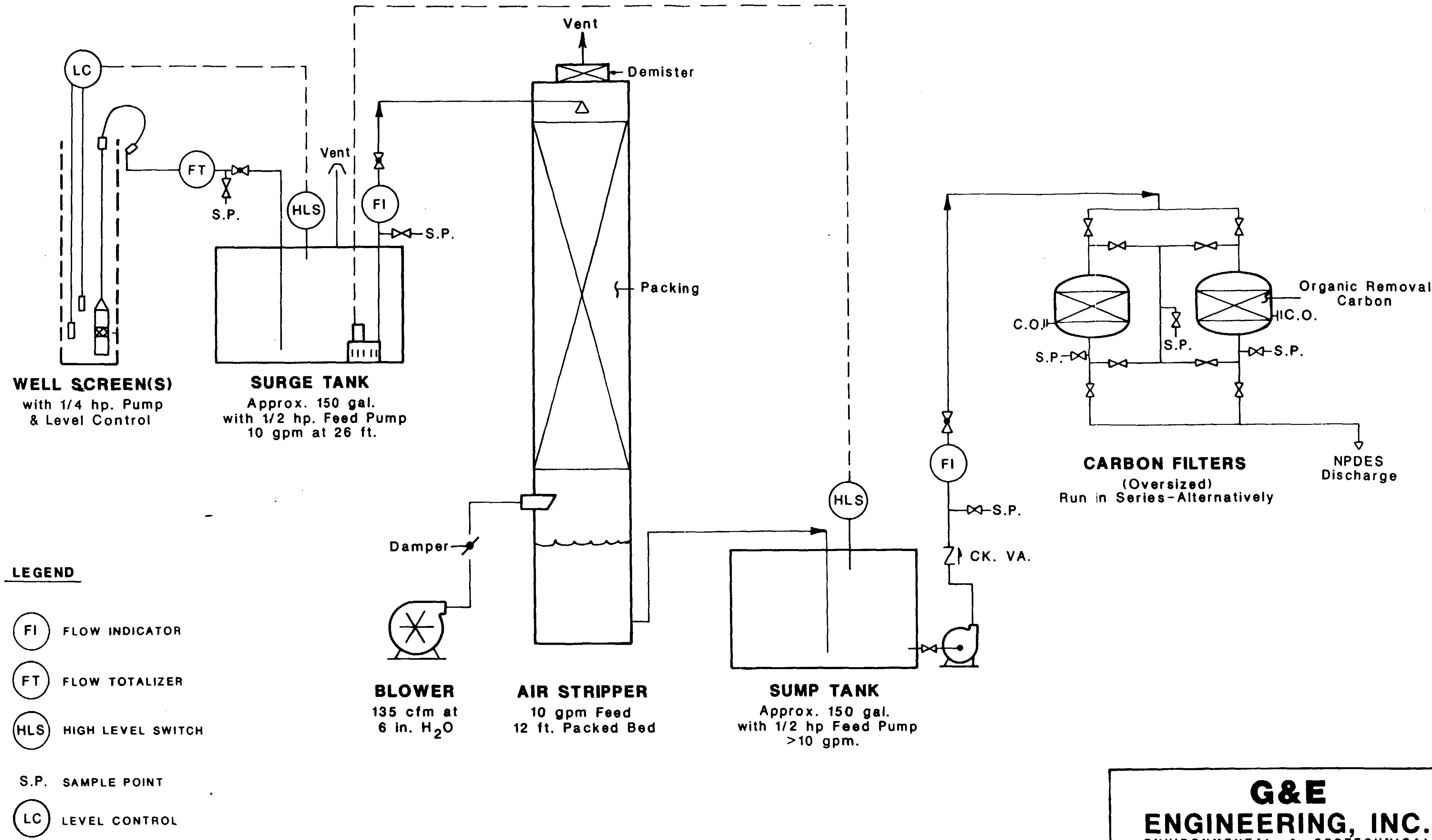
Columbia, South Carolina

4-14-86 Date	86-1008 File No.	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	PROCESS FLOW DIAGRAM TREATMENT PLANT FOR ABANDONED LAGOON	16 Fig. No.
ABL Drawn by	JLD Ckd. by				



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CONSULTANTS
Columbia, South Carolina

4-14-86 Date	86-1008 File No.	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	**ENVIRONMENTAL ASSESSMENT** VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	**PROCESS FLOW DIAGRAM TREATMENT PLANT FOR DRUM STORAGE AREA**	17 Fig. No.
CAB Drawn by	JLD Ckd. by				

EXHIBITS

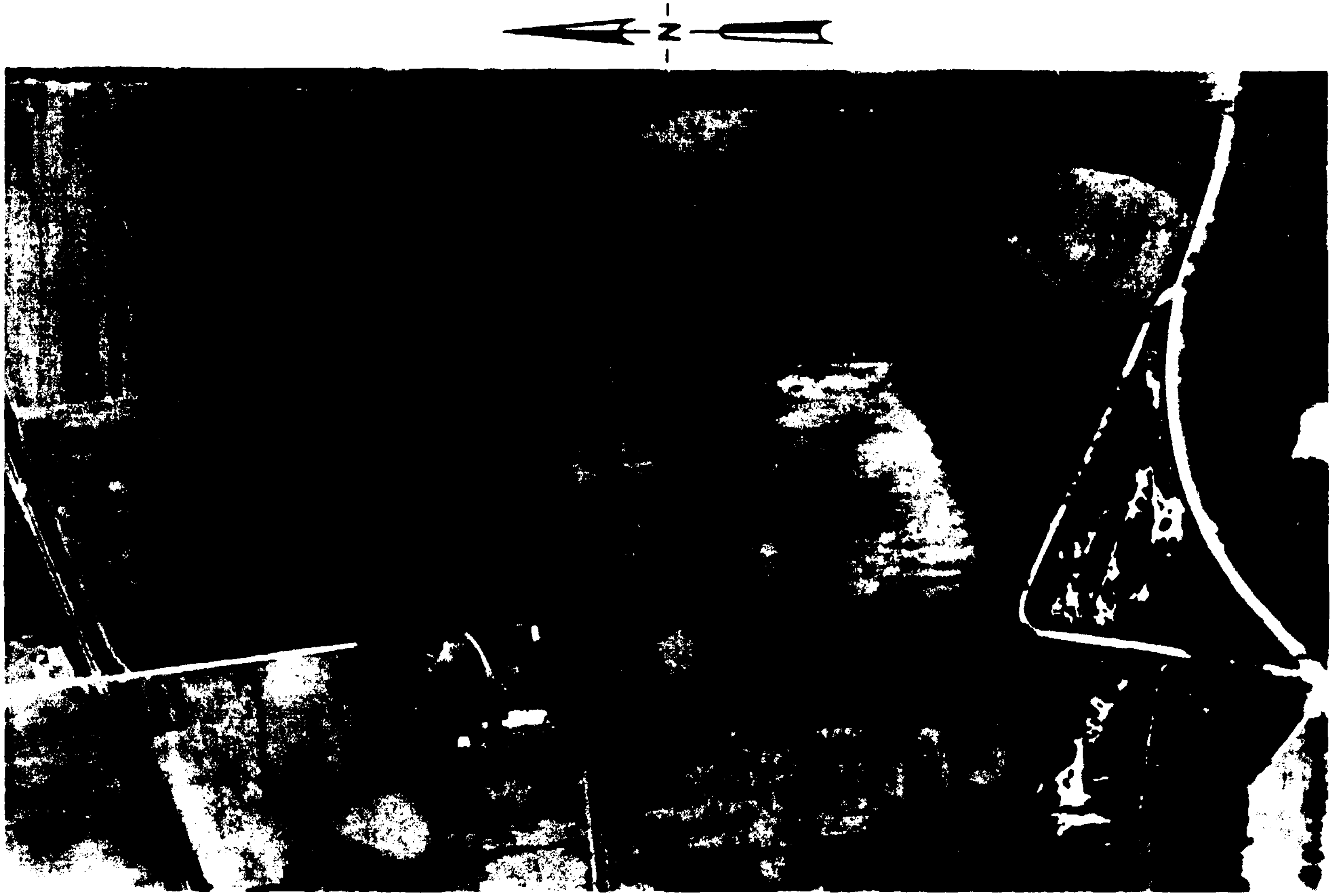
EXHIBIT	DATE	SOURCE	FILM TYPE	SCALE
1	11/01/65	U.S.D.A.-A.S.C.S.	B&W	1:20,000
2	5/01/68	EROS Data Center	B&W	1:40,000
3	4/12/72	Aerial Surveys	Color	Oblique
4	5/04/72	U.S.D.A.-A.S.C.S.	B&W	1:40,000
5	9/22/72	EROS Data Center	CIR	1:131,000
6	5/13/74	EROS Data Center	IR B&W	1:76,000
7	9/27/75	U.S.D.A.-A.S.C.S.	B&W	1:48,000
8	2/08/77	S.C.C.C.	CIR	1:20,000
9	3/18/78	B.C.T.A.	B&W	1:80,000
10	10/27/79	U.S.D.A.-A.S.C.S.	B&W	1:40,000
11	5/11/82	S.C.F.C.	CIR	1:24,000
12	1/18/83	EROS Data Center	CIR	1:60,000

SOURCES:

U.S.D.A.-A.S.C.S.	United States Department Of Agriculture Agriculture Stabilization Conservation Service Salt Lake City, Utah
EROS Data Center	United States Geological Survey EROS Data Center Sioux Falls, South Dakota
Aerial Surveys	Aerial Surveys Rochester, New York
S.C.C.C.	South Carolina Coastal Council Charleston, South Carolina
S.C.F.C.	South Carolina Forestry Commision Columbia, South Carolina
B.C.T.A.	Beaufort County Tax Assessor Beaufort, South Carolina

FILM TYPE:

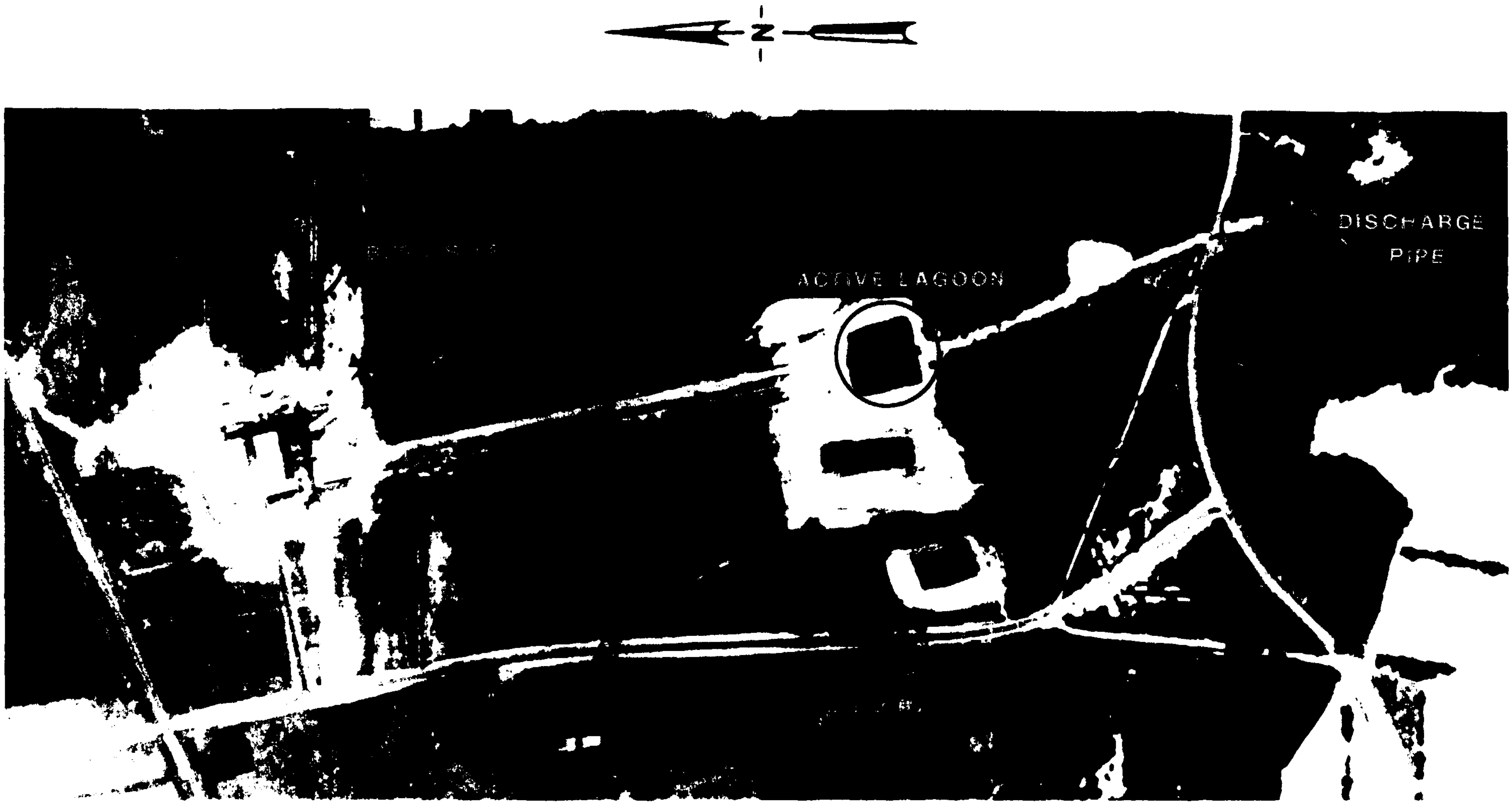
B&W	Black & White
IR B&W	Infrared Black & White
CIR	Color Infrared
Color	Color



RE AERIAL PHOTOGRAPH TAKEN ON NOVEMBER 1, 1965.

G&E
ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

Date	86-1008 File No.	0 feet 400 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	**ENVIRONMENTAL ASSESSMENT** VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	**AERIAL PHOTOGRAPH**	1 EXHIBIT
ABL Drawn by	MJR Ckd by					



RE: AERIAL PHOTOGRAPH TAKEN ON MAY 1, 1988.

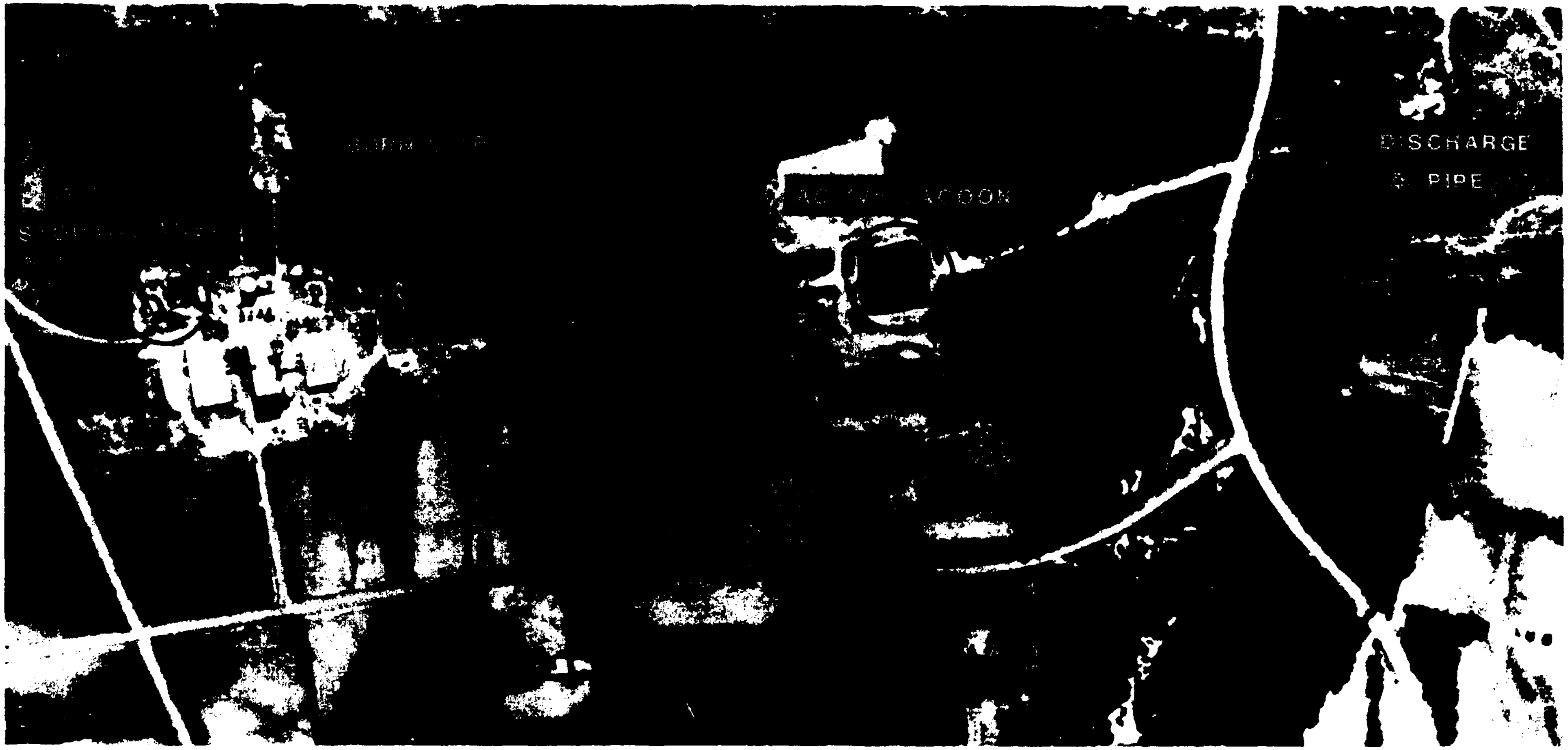
G&E
ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

Date	86-1008 File No.	0 feet 400 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	AERIAL PHOTOGRAPH	2 EXHIBIT
ABL Drawn by	MJR Ckd. by					

RE AERIAL PHOTOGRAPH TAKEN ON APRIL 12, 1972.

G&E
ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

Date	86-1008 File No.	0 feet 400 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	AERIAL PHOTOGRAPH	3 EXHIBIT
ABL Drawn by	MJR Ckd. by					

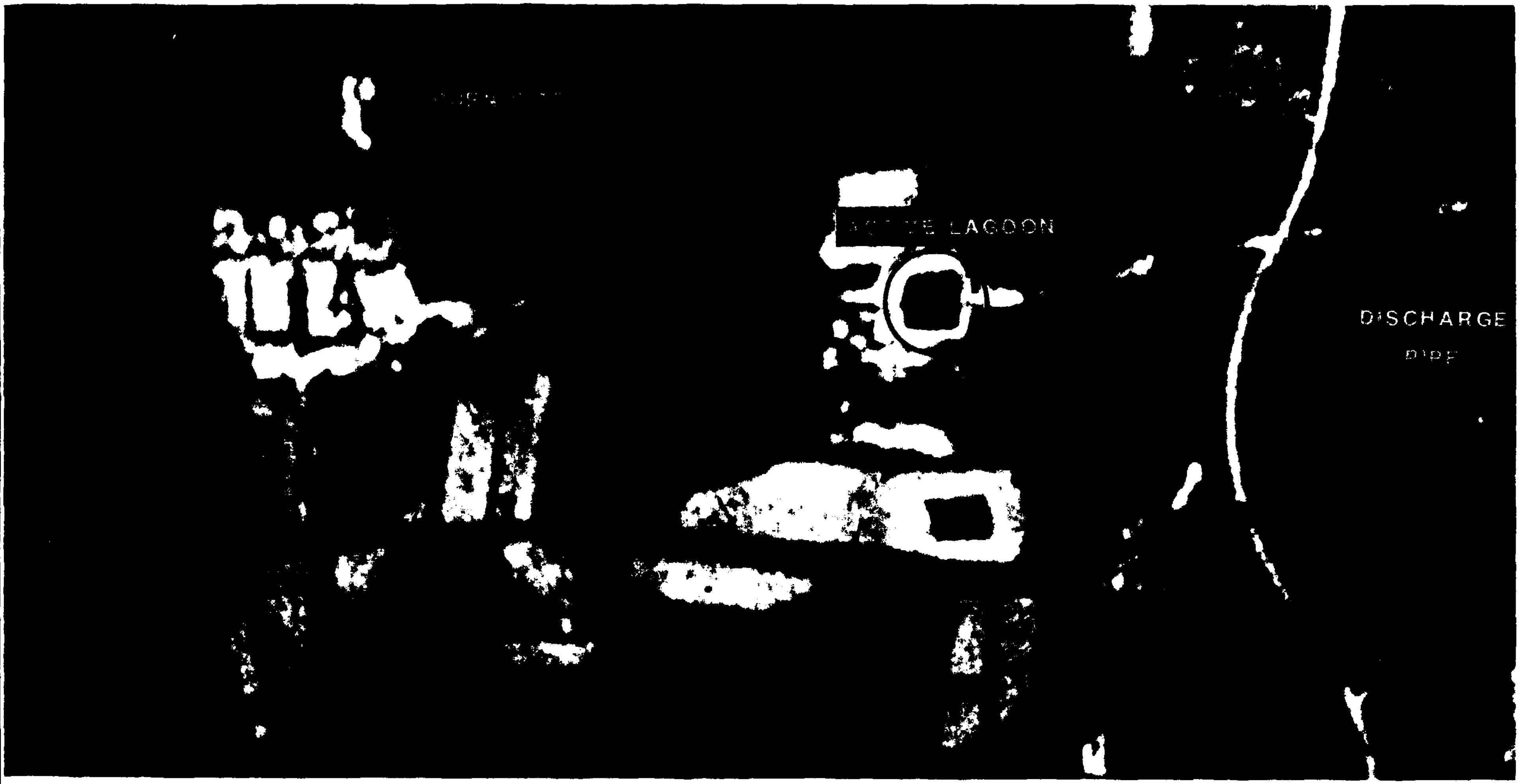


RE: AERIAL PHOTOGRAPH TAKEN ON MAY 4, 1972.

G&E
ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

Date	86-1008 File No.	0 feet 400 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	AERIAL PHOTOGRAPH	4 EXHIBIT
ABL Drawn by	MJR Ckd. by					

N



RE: AERIAL PHOTOGRAPH TAKEN ON SEPTEMBER 22, 1972.

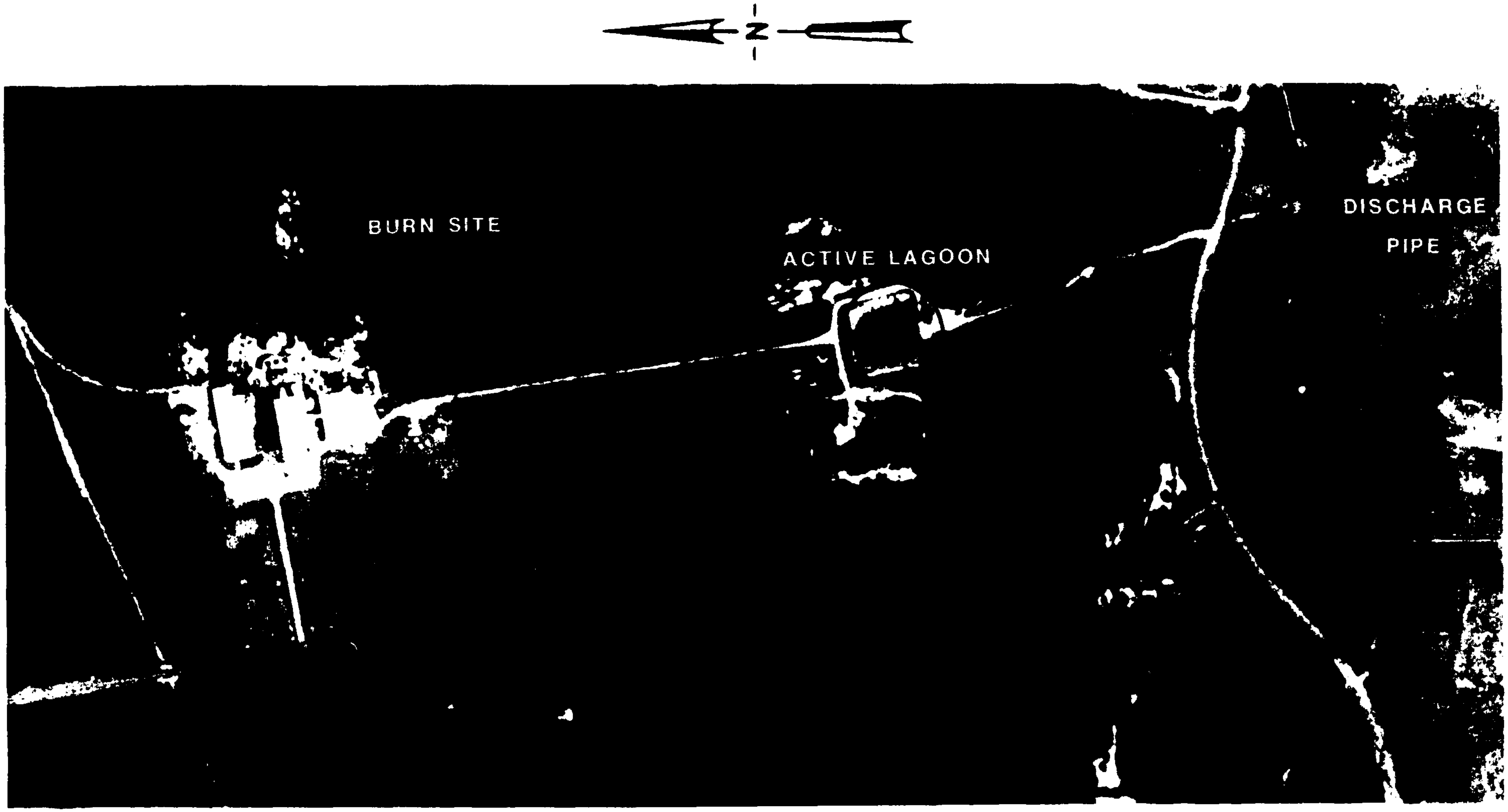
G&E
ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

Date	86-1008 File No.	0 feet 400 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	AERIAL PHOTOGRAPH	5 EXHIBIT
ABL Drawn by	MJR Ckd. by					

RE: AERIAL PHOTOGRAPH TAKEN ON MAY 13, 1974.

G&E
ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

Date	86-1008 File No.	0 feet 400 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	AERIAL PHOTOGRAPH	6 EXHIBIT
ABL Drawn by	MJR Ckd. by					

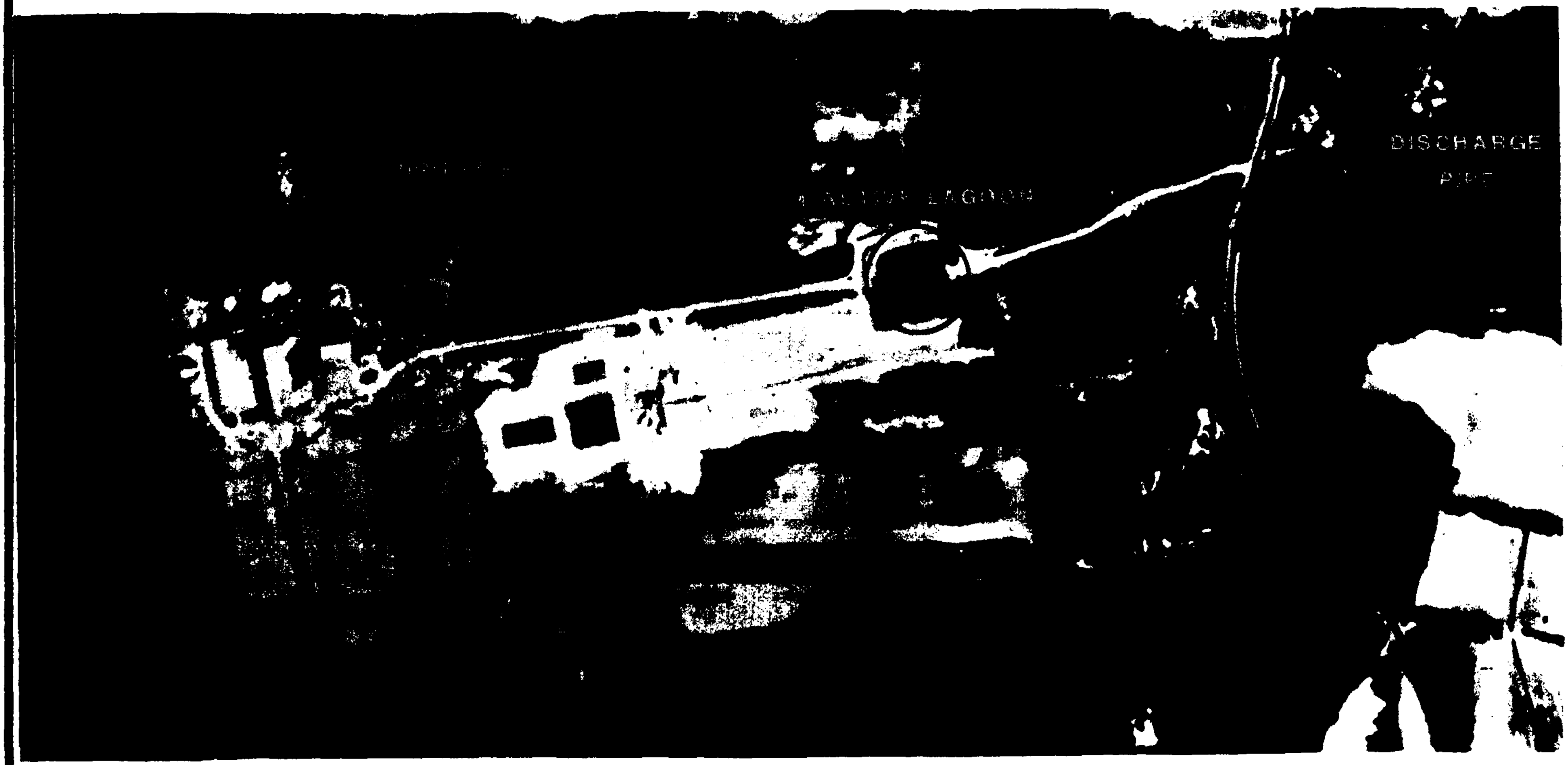


RE: AERIAL PHOTOGRAPH TAKEN ON SEPTEMBER 27, 1975.

G&E
ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

Date	86-1008 File No.	0 feet 400 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	AERIAL PHOTOGRAPH	7 EXHIBIT
ABL Drawn by	MJR Ckd by					

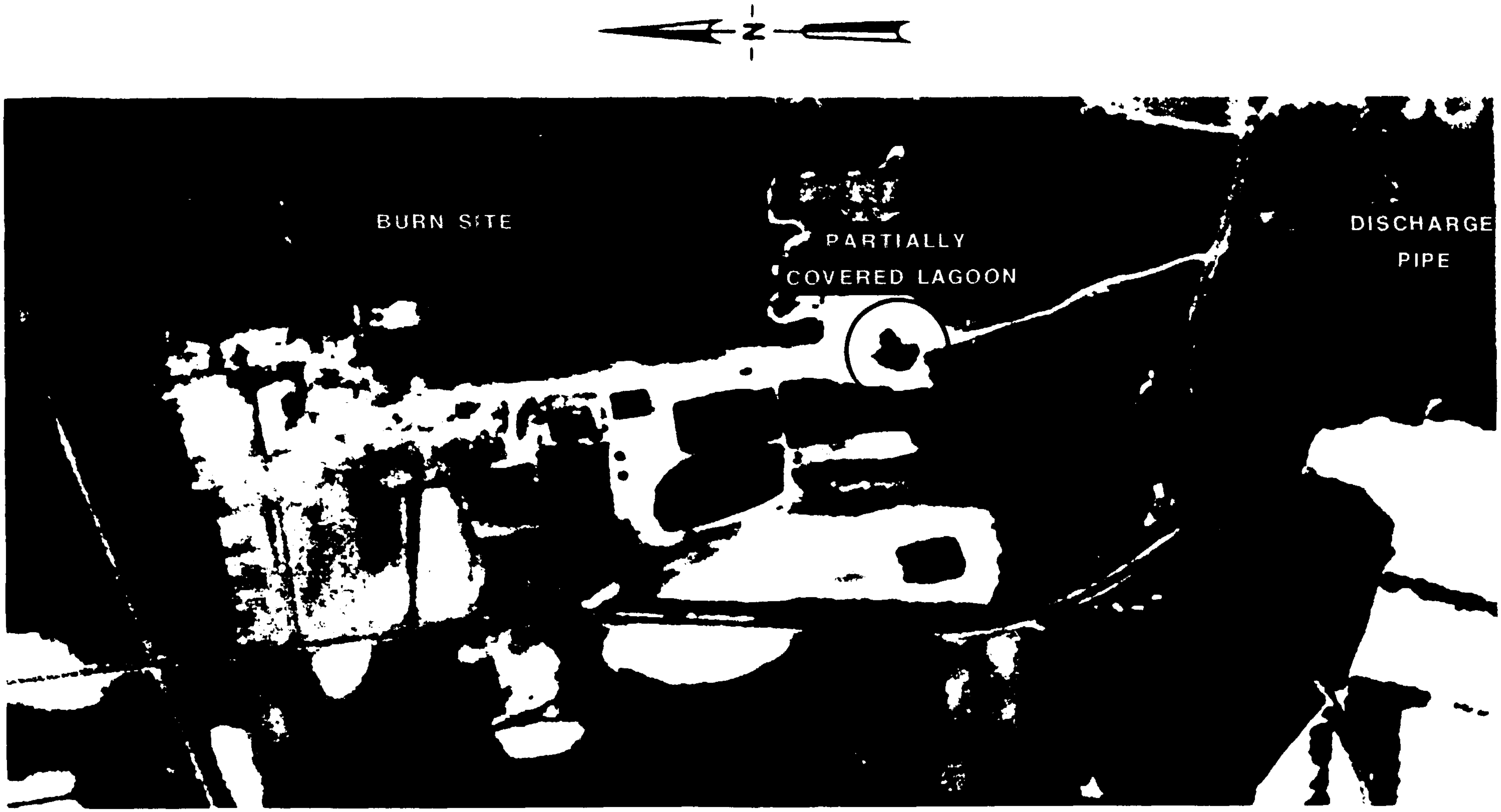
N



RE: AERIAL PHOTOGRAPH TAKEN ON FEBRUARY 8, 1977.

G&E
ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

Date	86-1008 File No.	0 feet 400 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	AERIAL PHOTOGRAPH	8 EXHIBIT
ABL Drawn by	MJR Ckd. by					



RE AERIAL PHOTOGRAPH TAKEN ON MARCH 18, 1978.

G&E
ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

Date	86-1008 File No.	0 feet 400 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	AERIAL PHOTOGRAPH	9 EXHIBIT
ABL Drawn by	MJR Ckd by					

N

RE: AERIAL PHOTOGRAPH TAKEN ON OCTOBER 27, 1979.

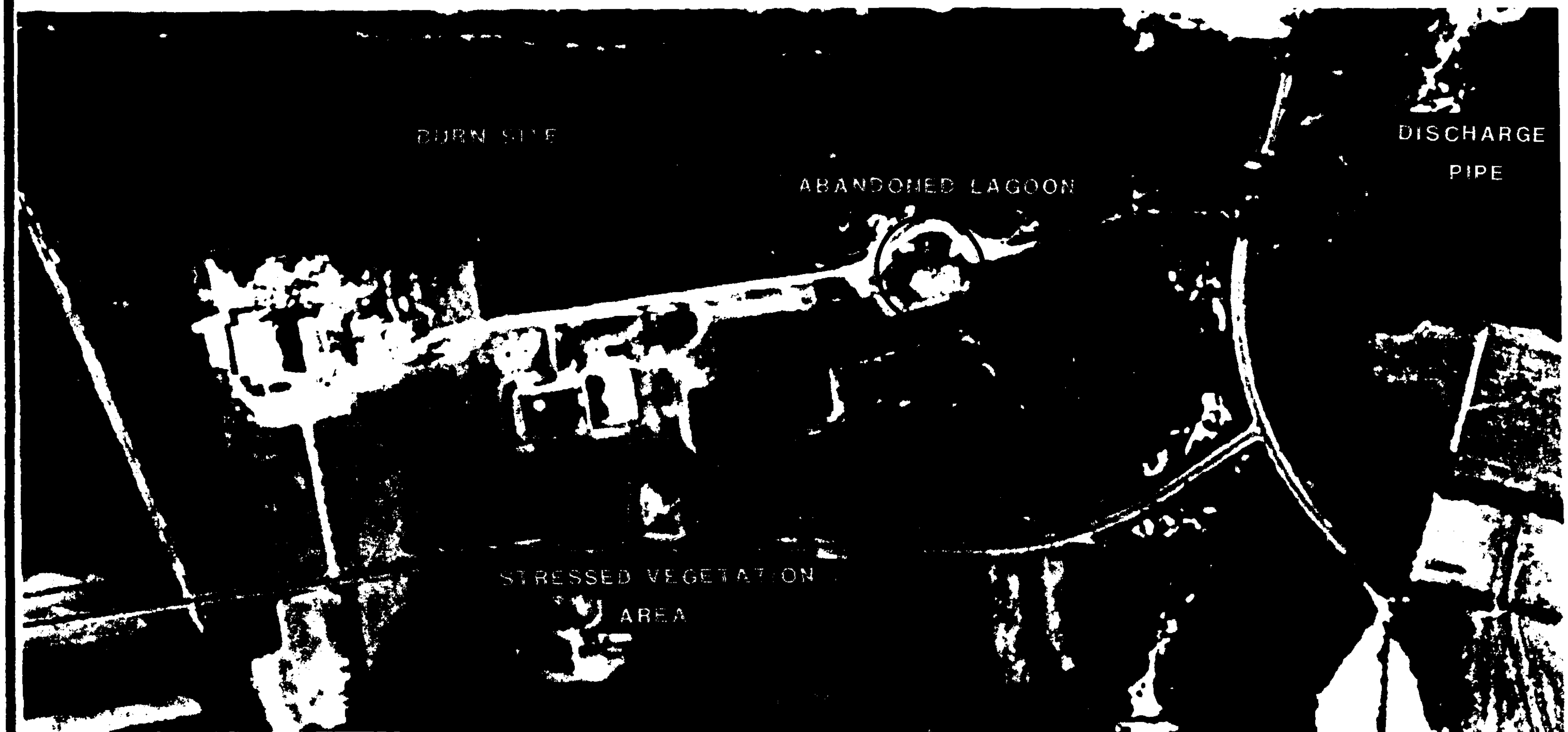
G&E
ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

Date	86-1008 File No.	0 feet 400 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	AERIAL PHOTOGRAPH	10 EXHIBIT
ABL Drawn by	MJR Ckd. by					

RE AERIAL PHOTOGRAPH TAKEN ON MAY 11, 1982.

G&E
ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

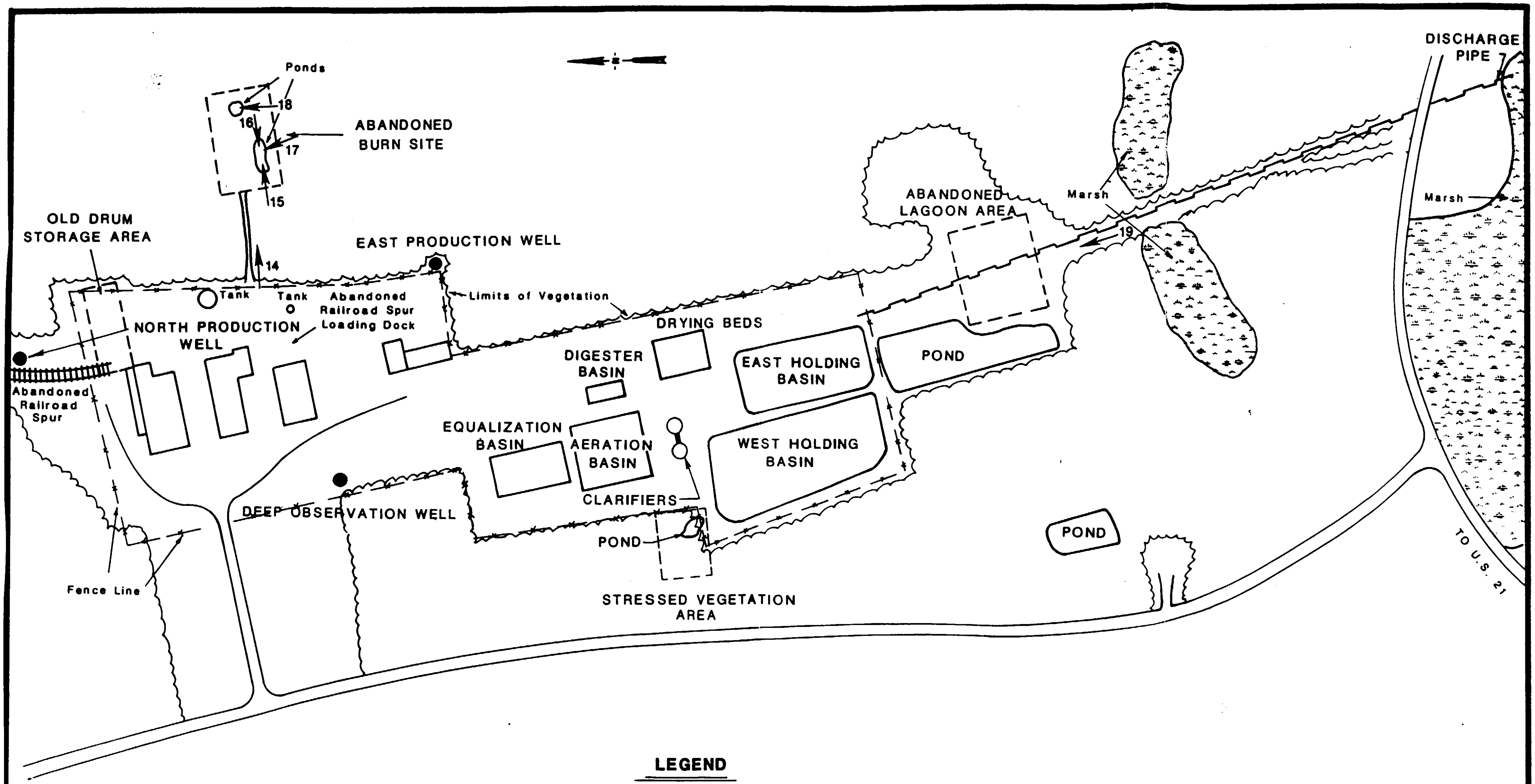
Date	86-1008 File No	0 feet 400 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	AERIAL PHOTOGRAPH	11 EXHIBIT
ABL Drawn by	MJR Ckd. by					



RE: AERIAL PHOTOGRAPH TAKEN ON JANUARY 18, 1983.

G&E
ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

Date	86-1008 File No.	0 feet 400 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	**ENVIRONMENTAL ASSESSMENT** VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	**AERIAL PHOTOGRAPH**	12 EXHIBIT
ABL Drawn by	MJR Ckd by					



LEGEND

→ DIRECTIONS LAND BASE PHOTOGRAPHS WERE TAKEN IN.

RE: Traced from aerial photograph taken in March 1986

G&E
ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

3-25-86 Date	86-1008 File No.	0 feet 200 SCALE	VENTURE CHEMICALS INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS INC. LOBECO, SOUTH CAROLINA Project Title	LAND BASED PHOTOGRAPHY LOCATION MAP	13 EXHIBIT
MJR Drawn by	MBW Checked by					

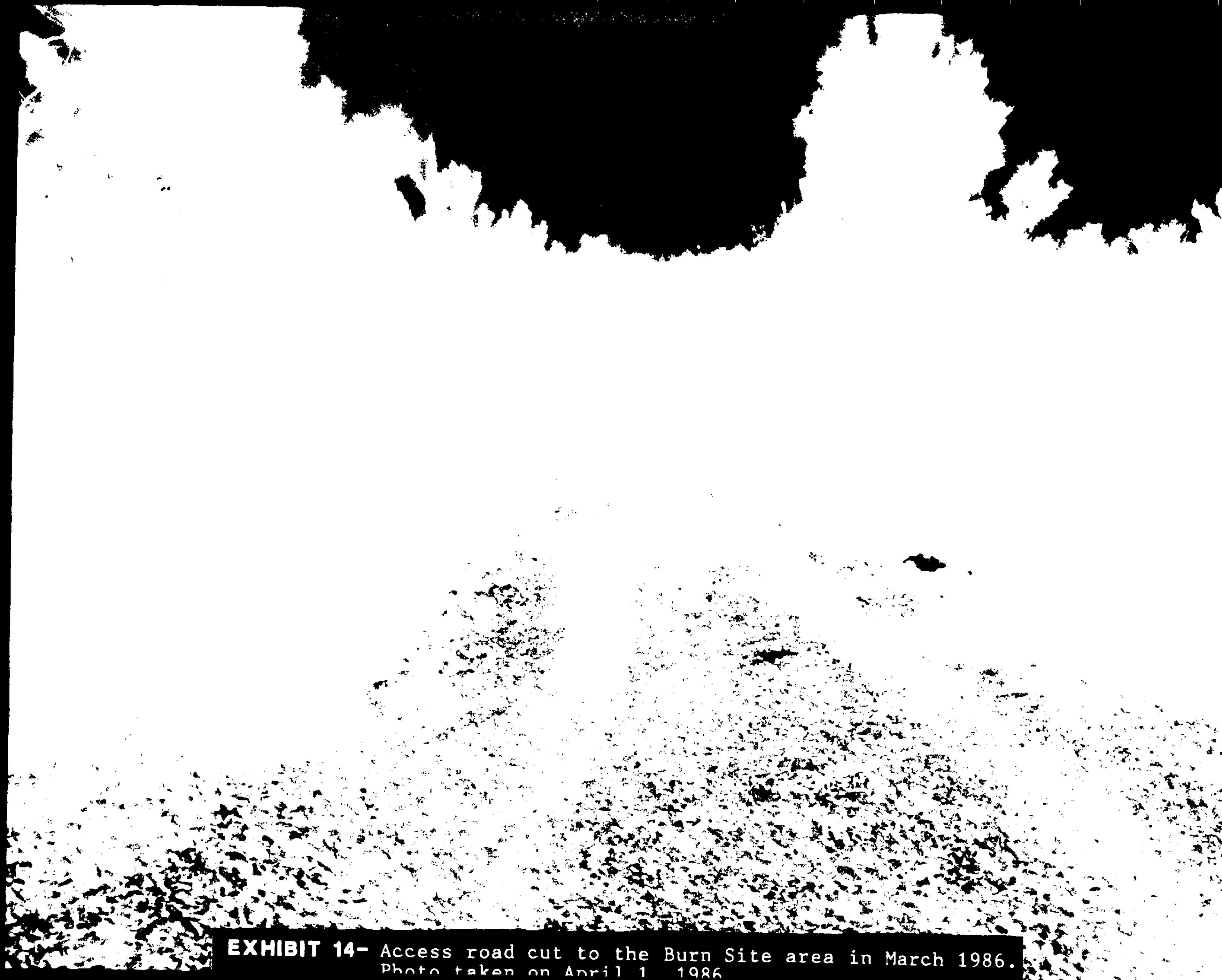


EXHIBIT 14- Access road cut to the Burn Site area in March 1986.
Photo taken on April 1, 1986.

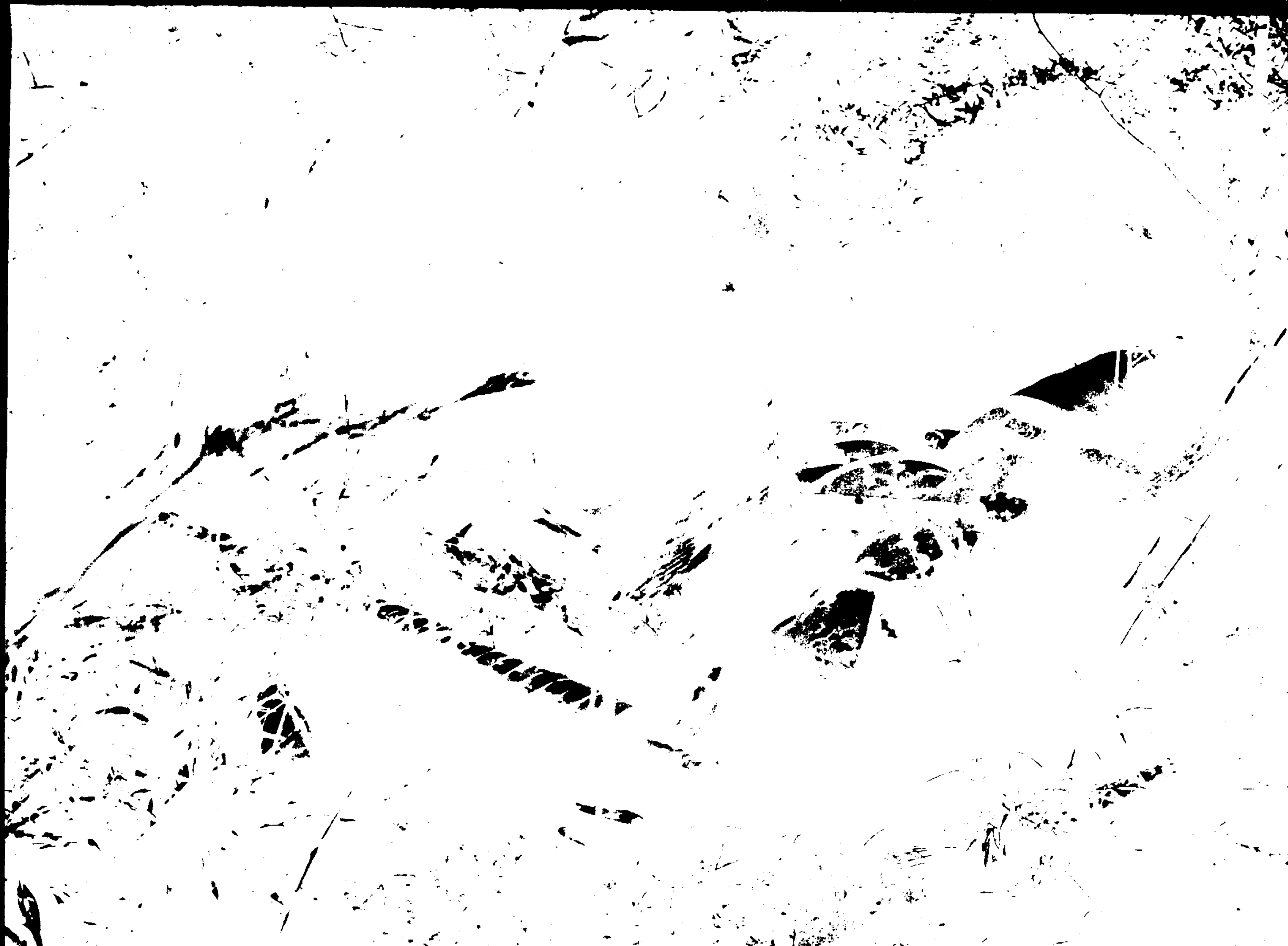


EXHIBIT 15- Debris and abandoned containers in western end of the larger pond in the Burn Site area. Photo taken on April 1, 1986

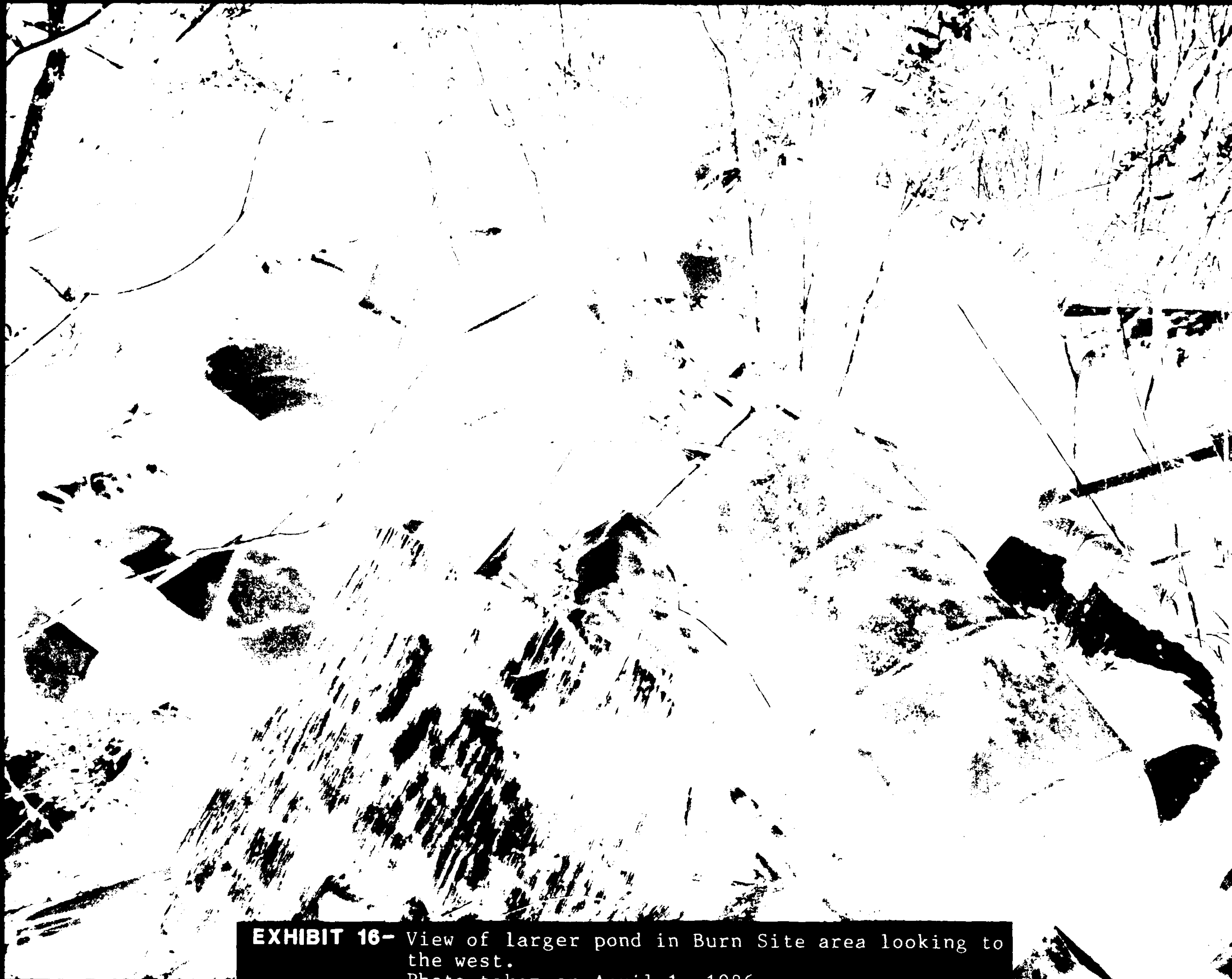


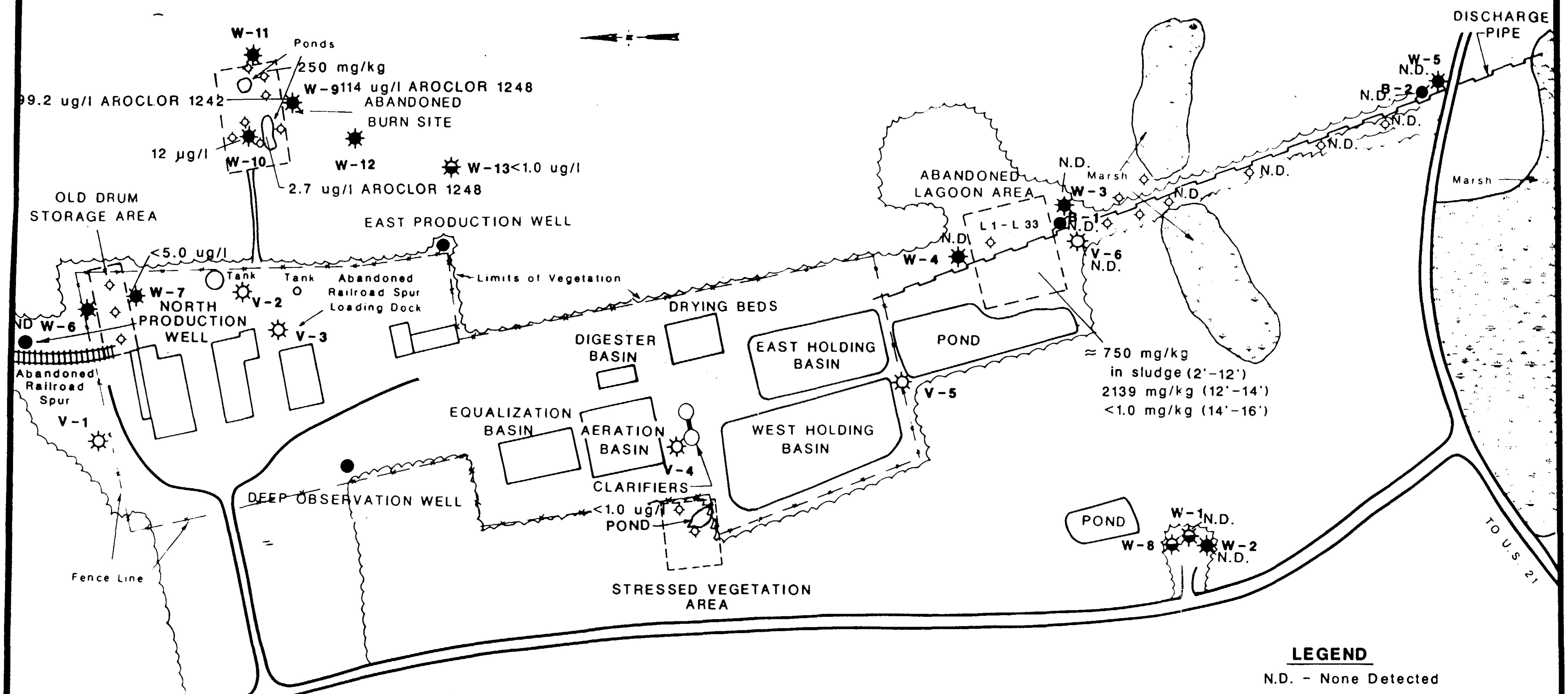
EXHIBIT 16– View of larger pond in Burn Site area looking to the west.
Photo taken on April 1, 1986

EXHIBIT 17- Bagged material in the larger pond in Burn Site area. Photo taken on April 1, 1986.

EXHIBIT 18- Bagged materials in the smaller pond in eastern portion of the Burn Site area.
Photo taken on April 1, 1986.

EXHIBIT 19- View of the southern edge of the old lagoon area looking to the north. Monitoring well V-6 is visible to the right of the black drum.
Photo taken on april 1, 1986.

DATA SUMMARY



LEGEND

N.D. - None Detected

- Monitor Wells Installed by Law Engineering, Inc., April, 1985 (V-Series)
- G&E Deep Soil Borings Developed Into Monitoring Wells
- G&E Shallow Monitoring Wells
- G&E Shallow Auger Borings (See Figure 6a-6e)
- G&E Deep Soil Borings

Rf Traced from aerial photograph taken in March 1986

G&E ENGINEERING, INC.
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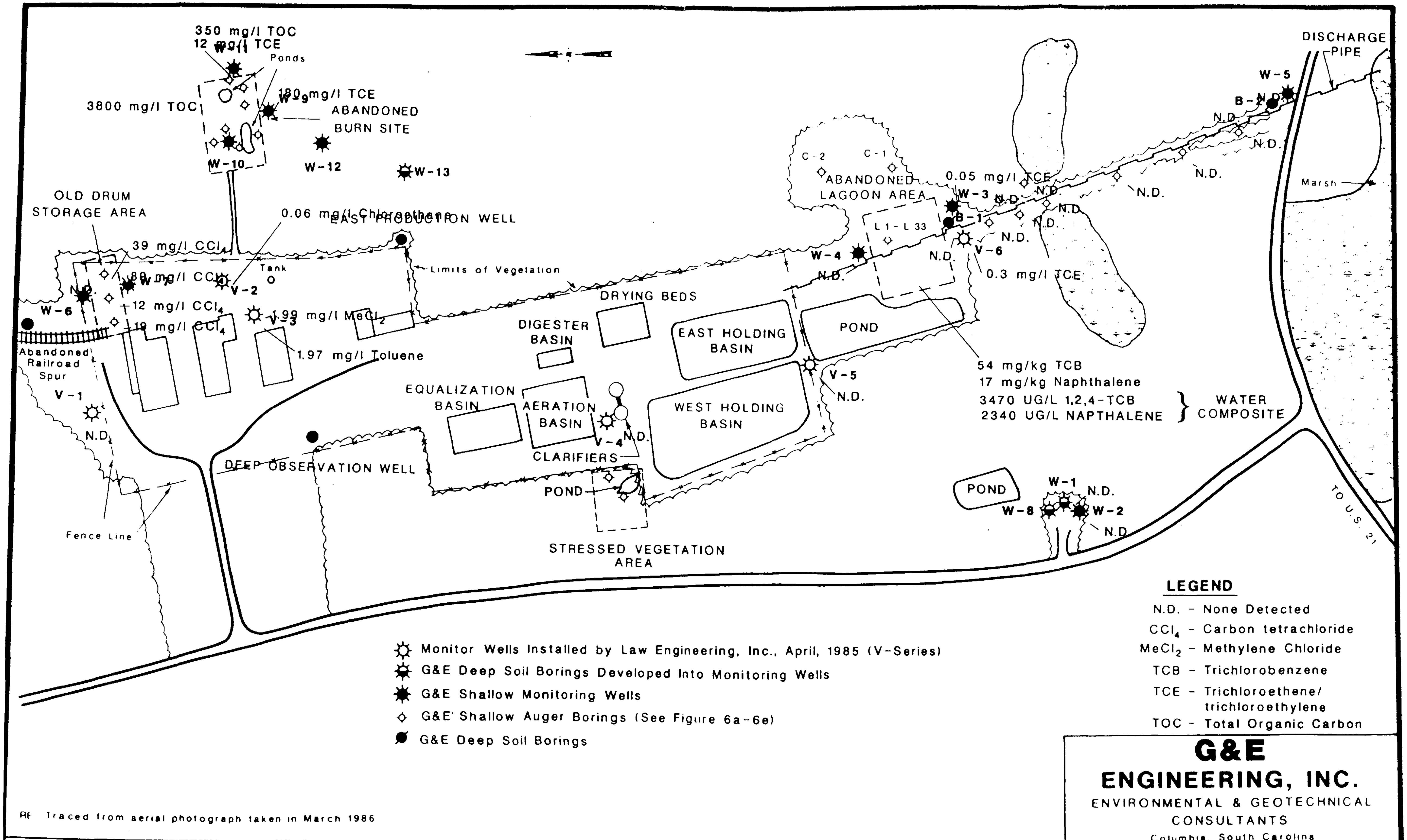
Columbia, South Carolina

3-25-86 Date	86-1008 File No.	0 feet 200 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	AREAS OF PCB CONTAMINATION	Fig No
MJR Drawn by	MBW Checked by					



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ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

3-25-86 Date	86-1008 File No.	SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	AREAS OF ORGANIC VALUES
MJR Drawn by	MBW Checked by				Fig No

ANALYTICAL SUMMARY
ABANDONED LAGOON

ABANDONED LAGOON
TABLE 1
METALS, PCB & TOC ANALYSES

SAMPLE ID	TYPE OF SAMPLE	DEPTH (FT)	DATE SAMPLED	Cd (ppm)	Cr (ppm)	Pb (ppm)	Hg (ppm)	PCB[2]	TOC (ppm)
L-1	Soil	1	3/18/86	-	-	698	19	112	-
	Soil	2.5	3/18/86	-	-	500	4.3	108	-
	Soil	6.5	3/18/86	-	-	283	1.6	676	-
	GW		3/18/86	-	-	11	0.23	-	-
L-2	Soil	4.5	3/18/86	-	-	528	3.8	497	-
	Soil	6.5	3/18/86	-	-	109	0.82	196	-
	Soil	6.5-7	3/18/86	-	-	76	0.88	582	-
	GW		3/18/86	-	-	0.19	<0.002	-	-
L-3	Soil	2.5	3/18/86	-	-	42	0.63	39	-
	Soil	4	3/18/86	-	-	90	1.9	122	-
	Soil	6	3/18/86	-	-	55	0.09	2460	-
	GW		3/18/86	-	-	0.14	<0.002	-	-
L-7	Soil	8	3/21/86	-	-	-	-	369	-
	GW			0.02	0.65	1.5	0.05	-	40
L-9	Soil	2-3	3/21/86	-	-	-	-	140	-
L-10	Soil	3.5-4	3/21/86	-	-	-	-	17	-
L-13	Soil	4-6.5	3/21/86	-	-	-	-	<2.0	-
L-18	GW		3/21/86	0.03	1.9	7.0	0.12	-	45
L-19	Soil	0-3	3/21/86	-	-	-	-	4.0	-
L-20	Soil	0-4	3/21/86	<0.1	3.2	12	0.05	16	-
L-22	Soil	1.5-3	3/21/86	-	-	-	-	249	-
L-24	Soil	6-6.5	3/21/86	-	-	-	-	369	-
L-33	Soil	10-12	4/13/86	-	-	-	-	70	-
	Soil	12-14	4/13/86	-	-	-	-	2139	-
	Soil	14-16	4/13/86	-	-	-	-	<1.0	-
L 1,2,3	GWCOMP.		3/21/86	-	-	-	-	6020	150

Note:

1. "-" sample not analyzed for that parameter.
2. PCB results for groundwater (GW) reported in ppb, for soil in ppm.

ABANDONED LAGOON
Table 2
METALS, PCB, PESTICIDES, PHENOLICS, & TOC ANALYSIS

PARAMETERS	BORING & SAMPLE IDENTIFIERS G&E-1 5-6' (soil) 37183	G&E-3 4-5' (soil) 37184	G&E-4 4-5' (soil) 37186	G&E-4 6-7' (soil) 37187	G&E-5 4-5' (soil) 37185	G&E-5 GW 37192	G&E 1-5 GW COMPOSITE 37190
DATE SAMPLED (1986)	1/13	1/13	1/13	1/13	1/13	1/14	1/14
Antimony(ppm)	<2.5	<4.8	<2.9	<3.6	<3.3	<0.20	<0.20
Arsenic(ppm)	1.7	2.9	1.7	1.6	1.3	0.314	0.555
Beryllium(ppm)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.010	0.13
Cadmium(ppm)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.010	<0.010
Chromium(ppm)	13	46	16	11	4.9	1.2	5.4
Copper(ppm)	16	129	6.3	10	<0.7	0.15	3.6
Lead(ppm)	942	2286	46	144	<3.3	0.60	34
Mercury(ppm)	1.1	13	0.11	3.2	<0.05	0.012	0.614
Nickel(ppm)	4.7	20	8.3	5.4	2.6	0.16	2.1
Selenium(ppm)	<0.5	<0.5	<0.5	<0.5	<0.5	0.026	0.03
Silver(ppm)	<0.5	<0.5	0.6	<0.5	<0.5	0.02	0.05
Zinc(ppm)	2.5	22	7.8	3.6	0.7	0.41	2.9
PCB(ppm)	217	438	5.1	52	<1.0	-	-
PCB*(ppm)	680	6750	-	-	-	-	-
Pesticides(ppm)	<0.1	<0.1	<0.1	<0.1	<0.1	-	-
Phenolics(ppm)	-	-	-	-	-	11	77
TOC(ppm)	-	-	-	-	-	17	25

Note:

1. Analysis by J.L. Rogers & Callcott Engineers, Inc. (2/25/86). 37183-37192 are their sample IDs.
2. PCB* = West Paine Laboratories test results. Split sample analyzed for PCBs.
3. " - " not analyzed for that parameter.

ABANDONED LAGOON
TABLE 3.a
VOLATILE ORGANICS

PARAMETERS	L-7 8' (soil)	L-7 GW	L-9 2-3' (soil)	L-10 3.5-4' (soil)	L-13 4-6.5' (soil)	L-18 GW	L-20 0-4' (soil)	L-22 1.5-3' (soil)
	BORING & SAMPLE IDENTIFIERS							
DATE SAMPLED(1986)	3/21	3/21	3/21	3/21	3/21	3/21	3/21	3/21
Toluene(ppm)	<0.10	<0.01	<0.10	<0.10	<0.10	<0.01	<0.1	<0.10
Trichloroethene(ppm)	<0.10	0.04	<0.10	<0.10	<0.10	0.05	<0.1	<0.10
Total Xylene(ppm)	<0.10	<0.01	<0.10	<0.10	<0.10	<0.01	<0.1	<0.10
Chlorotoluene(ppm)	6.0	1.20	<0.10	<0.10	<0.10	1.70	<0.1	<0.10
*Other Parameters(ppm)	<0.10	<0.01	<0.10	<0.10	<0.10	<0.01	<0.1	<0.10

Note: 1. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).

ABANDONED LAGOON
TABLE 3.b
VOLATILE ORGANICS

PARAMETERS	L-24 6-6.5 (soil)	L1,2,3 GWCOMP	L-1 1' (soil)	L-1 2.5' (soil)	L-1 6.5' (soil)
	BORING & SAMPLE IDENTIFIERS				
DATE SAMPLED(1986)	3/21	3/18	3/18	3/18	3/18
Toluene(ppm)	<0.10	<0.05	<0.10	<0.10	<0.10
Trichloroethene(ppm)	<0.10	0.150	<0.10	<0.10	<0.10
Total Xylene(ppm)	<0.10	<0.05	<0.10	<0.10	<0.10
Chlorotoluene(ppm)	<0.10	<0.05	<0.10	<0.10	<0.10
*Other Parameters(ppm)	<0.10	<0.05	<0.10	<0.10	<0.10

Note: 1. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).

ABANDONED LAGOON
Table 4
VOLATILE ORGANICS

PARAMETERS	G&E-5 GW 37192	G&E 1-5 GW COMP. 37190
	BORINGS & SAMPLE IDENTIFIERS	
DATE SAMPLED(1986)	1/14	1/14
All parameters*(ppb)	<10	<10

Note:

1. Samples analyzed by J.L. Rogers & Callcott Engineers, Inc. (2/25/86). 37190 & 37192 are their sample IDs.
2. *See the list of parameters listed in the J. L. Rogers & Callcott report (2/25/86).

ABANDONED LAGOON
Table 5
ACID AND BASE NEUTRAL EXTRACTABLE ANALYSIS

	BORING & SAMPLE IDENTIFIERS						
PARAMETERS	G&E-1 5-6' (soil) 37183 (ppb)	G&E-3 4-5' (soil) 37184 (ppb)	G&E-4 4-5' (soil) 37186 (ppb)	G&E-4 6-7' (soil) 37187 (ppb)	G&E-5 4-5' (soil) 37185 (ppb)	G&E-5 GW 37192 (ppb)	G&E 1-5 GWCOMP. 37190 (ppb)
DATE SAMPLED (1986)	1/13	1/13	1/13	1/13	1/13	1/14	1/14
1,2,4-TCB(ppm)	54	24	BDL	74	BDL	0.070	0.460
Napthalene(ppm)	54	12	BDL	11	BDL	0.074	0.380
*Other Parameters	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Note:

1. Samples analyzed by J.L. Rogers & Callcott Engineers, Inc. (2/25/86). 37183-37192 are their sample IDs.
2. *See the other parameters listed in the J. L. Rogers & Calcott report (2/25/86).
3. TCB = Trichlorobenzene
4. BDL = Below detection limit.

ABANDONED LAGOON
Table 6
ACID AND BASE NEUTRAL EXTRACTABLE ANALYSIS

	BORING & SAMPLE IDENTIFIERS	
PARAMETERS	L-33 10-12'	L-33 12-14'
DATE SAMPLED(1986)	4/13	4/13
1,2,4-TCB(ppm)	<10	103
Napthalene(ppm)	<10	122
*Other Parameters	BDL	BDL

Note:
1. TCB = Trichlorobenzene
2. BDL = Below detection limit.
3. *See the other parameters listed in the West-Paine report (Appendix E).

ABANDONED LAGOON
Table 7
ACID AND BASE NEUTRAL EXTRACTABLE ANALYSIS

	BORING & SAMPLE IDENTIFIERS
PARAMETERS	L1, L2, L3 GW COMP
DATE SAMPLED(1986)	3/18
*All Parameters(ppb)	<150

Note: 1. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).

ANALYTICAL SUMMARY
BURN SITE

BURN SITE
TABLE 1
METALS, PCB, TOC & PHENOLICS ANALYSES

BORING & SAMPLE IDENTIFIERS

PARAMETERS	BS-LAGOON SW	BS-1 GW	BS-3 (L-28) 3-4' (soil)	PROD. BAG IN LAGOON (solid)	B-11 0.5' (soil)	BURN LAGOON AREA SW
DATE SAMPLED(1986)	3/22	3/21	4/09	3/22	3/26	5/1
Arsenic(ppm)	-	-	0.19	-	0.1	^
Cadmium(ppm)	<0.005	<0.005	0.03	-	<0.2	^
Chromium(ppm)	<0.01	0.10	7.30	-	2.7	^
Lead(ppm)	1.5	0.23	3.80	-	5.8	^
Mercury(ppm)	0.24	0.005	0.015	19	0.21	^
PCB(ppb)	^	^	250(ppm)	-	-	2.7
TOC(ppm)	40	32	3800	-	-	^
Phenol(ppm)	61	0.005	-	-	-	^

Note:
1. SW = surface water.
2. "^" = quantity of sample not sufficient for analysis.
3. "-" = sample not analyzed for that parameter.

BURN SITE
TABLE 2
METALS, PCB, PESTICIDES, PHENOLICS, & TOC ANALYSES

	BORING & SAMPLE IDENTIFIERS			
PARAMETER	G&E-6 3-4' (soil) 37188	G&E-9 1' (soil) 37189	G&E-10 GW 37193	G&E 6-10 GW COMP. 37191
DATE SAMPLED(1986)	1/14	1/14	1/14	1/14
Antimony(ppm)	<2.4	<3.1	<0.2	<0.2
Arsenic(ppm)	2.0	3.7	0.18	0.44
Beryllium(ppm)	<0.5	<0.5	0.17	0.10
Cadmium(ppm)	<0.5	<0.5	<0.10	<0.10
Chromium(ppm)	5.4	565	1.70	5.0
Copper(ppm)	1.4	282	0.20	2.1
Cyanide(ppm)	-	-	<0.02	<0.02
Lead(ppm)	4.7	53	0.4	1.10
Mercury(ppm)	<0.05	0.18	0.0017	0.024
Nickel(ppm)	4.9	129	0.20	0.790
Selenium(ppm)	<0.5	<0.5	0.033	0.030
Silver(ppm)	<0.5	1.3	0.20	0.030
Zinc(ppm)	0.94	44	0.58	1.10
PCB(ppm)	<1.0	169	-	-
PCB*(ppm)	-	155	-	-
TOC(ppm)	-	-	59	254
Phenolics	-	-	<5.0	13

Note:
1. Results by J.L. Rogers & Callcott Engineers, Inc. (2/25/86). 37188 - 37193 are their sample IDs.
2. PCB* = West Paine Laboratories test results. Analysis of split samples for PCBs.
3. "-" sample was not analyzed for that parameter.

BURN SITE
Table 3
VOLATILE ORGANICS ANALYSES

PARAMETER	BS-LAGOON GW	BS-1 GW	BS-3 (L-28) 3-4' (soil)	PROD. BAG IN LAGOON (solid)	B-11 0.5' (soil)
	BORING & SAMPLE IDENTIFIERS				
DATE SAMPLED(1986)	3/22	3/21	4/09	3/22	3/26
Chloroform(ppm)	<0.01	0.140	<0.01	-	<0.1
Trichloroethene(ppm)	0.55	0.270	<0.01	-	<0.1
Trans-1,2-TCE(ppm)	<0.01	0.039	<0.01	-	<0.1
Methylene Chloride(ppm)	<0.01	0.05	<0.01	-	<0.1
*Other parameters(ppm)	<0.01	<0.012	<0.01	-	<0.1

Note: 1. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).

2. "-" sample was not analyzed for that parameter.

BURN SITE
Table 4
VOLATILE ORGANICS ANALYSES

	BORING & SAMPLE IDENTIFIERS	
PARAMETERS	G&E-10 GW 37193	G&E 6-10 GW COMP 37191
DATE SAMPLED(1986)	1/14	1/14
Methylene Chloride(ppb)	6400	<10
1,1,2-Trichloroethane(ppb)	1513	65
*Other Parameters(ppb)	<10	<10

Note:

1. Results by J.L. Rogers & Callcott Engineers, Inc. (2/25/86). 37191 & 37193 are their sample IDs.
2. *See the other parameters listed in the J. L. Rodgers & Callcott report (2/25/86).

BURN SITE
Table 5
ACID AND BASE NEUTRAL EXTRACTABLE ANALYSES

PARAMETER	BORING & SAMPLE IDENTIFIERS G&E-6 3-4' (Soil) 37188	G&E-9 1' (Soil) 37189	G&E-10 GW 37193	G&E-10 GW COMP 37191
DATE SAMPLED(1986)	1/14	1/14	1/14	1/14
1,2,4-TCB(ppb)	BDL	610	BDL	BDL
Napthalene(ppb)	BDL	750	BDL	BDL
Diphenylamine(ppb)	BDL	660	BDL	BDL
*Other Parameters(ppb)	BDL	BDL	BDL	BDL

Note:
1. Results analyzed by J.L. Rogers & Callcott Engineers, Inc. (2/25/86). 37188-37193 are their sample IDs.
2. TCB = Trichlorobenzene
3. BDL = Below Detection Limits
4. *See the other parameters listed in the J. L. Rodgers & Callcott Report (2/25/86).

BURN SITE
Table 6
ACID AND BASE NEUTRAL EXTRACTABLE ANALYSES

	BORING & SAMPLE IDENTIFIERS		
PARAMETER	BS-3 (L-28) GW	BS-1 GW	BS-2 GW
DATE SAMPLED(1986)	4/09	3/21	3/22
*All Parameters	<500	<10	<10

NOTE: 1. All sample results are reported in ppb.

2. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).

ANALYTICAL SUMMARY
OLD DRUM STORAGE AREA

OLD DRUM STORAGE AREA
TABLE 1
Cl & TOC ANALYSES

SAMPLE ID	TYPE OF SAMPLE	DATE SAMPLED	TOC (ppm)	Cl (ppm)
		BORING & SAMPLE IDENTIFIERS		
A-9	GW	3/13/86	30	595
A-10	GW	3/13/86	20	165
A-11	GW	3/13/86	30	115

OLD DRUM STORAGE AREA
TABLE 2
VOLATILE ORGANICS ANALYSES

PARAMETER	BORING & SAMPLE IDENTIFIERS A-9 GW 3/13/86	A-10 GW 3/13/86	A-11 GW 3/13/86
Carbon Tetrachloride(ppm)	19	12	39
Toluene(ppm)	0.26	0.04	5.70
1,1,1 - Trichloroethane(ppm)	<0.01	<0.01	0.04
*Other Parameters(ppm)	<0.01	<0.01	<0.01

Note: 1. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).

ANALYTICAL SUMMARY
DISCHARGE PIPE

DISCHARGE PIPE
TABLE 1
PCB, TOC, CHLORIDES, PHENOLICS & METALS ANALYSES

BORING & SAMPLE IDENTIFIERS

SAMPLE ID	TYPE OF SAMPLE	DATE SAMPLED	DEPTH (FT)	PCB (ppm/soil)	TOC (ppm)	Cl (ppm)	PHENOL (ppm)	Pb (ppm)	Hg (ppm)	Cd (ppm)	Cr (ppm)
A-3	Soil	3-13-86	3	<1.0	-	-	-	-	-	-	-
	Soil	3-13-86	6.5-7	<1.0	-	-	-	-	-	-	-
	GW	3-13-86		-	100	735	0.007	-	-	-	-
A-5	GW	3-13-86		-	60	390	-	-	-	-	-
A-6	Soil	3-13-86	3	<1.0	-	-	-	-	-	-	-
	GW	3-13-86		-	50	560	0.008	-	-	-	-
A-7	Soil COMP.	3-12-86	3+4.5	<1.0	-	-	-	-	-	-	-
A-8	Soil	3-12-86	2	<1.0	-	-	-	-	-	-	-
Dead Pond Marsh	Sludge	3-12-86		<1.0	-	-	-	6.5	<0.02	<0.1	1.1
A-6	Soil on Pipe Fitting	3-13-86	3	-	-	-	1.3	2.4	<0.02	<0.1	2.7

Note: 1. COMP. = Composite

DISCHARGE PIPE
TABLE 2.a
VOLATILE ORGANICS ANALYSES

PARAMETERS	BORING & SAMPLE IDENTIFIERS A-3 3' (SOIL)	A-3 6.5-7' (SOIL)	A-3 GW	A-5 GW	A-6 GW
DATE SAMPLED(1986)	3/13	3/13	3/13	3/13	3/13
Benzene(ppm)	<0.1	<0.1	<0.01	<0.01	0.010
Trichloroethene(ppm)	<0.1	<0.1	<0.01	<0.01	0.056
*OTHER PARAMETERS(ppm)	<0.1	<0.1	<0.01	<0.01	<0.01

Note: 1. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).

DISCHARGE PIPE
TABLE 2.b
VOLATILE ORGANICS ANALYSES

	BORING & SAMPLE IDENTIFIERS				
PARAMETERS	A-6 3' (SOIL)	A-6 6' (SOIL)	A-7 3+4.5' COMP. (SOIL)	A-8 2' (SOIL)	DEAD POND MARSH (SLUDGE)
DATE SAMPLED(1986)	3/13	3/13	3/13	3/13	3/12
*ALL PARAMETERS(ppm)	<0.1	<0.1	<0.1	<0.1	<0.1

Note: 1. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).

2. COMP. = Composite.

ANALYTICAL SUMMARY
STRESSED VEGETATION

STRESSED VEGETATION AREA
TABLE 1
METALS, PCB, TOC & CHLORIDES ANALYSES

BORING & SAMPLE IDENTIFIERS

SAMPLE ID	TYPE OR SAMPLE	DEPTH (FT)	DATE SAMPLED	Cd (ppm)	Cr (ppm)	Pb (ppm)	As (ppm)	Hg (ppm)	PCB	TOC (ppm)	Cl (ppm)
D-1	Soil	1-2	3/27/86	<0.2	3.3	3.8	0.2	<0.02	-	-	-
	GW		3/27/86	<0.005	<0.01	<0.04	<0.01	<0.0002	<1.0	14	28
D-2	GW		3/27/86	<0.005	<0.01	<0.04	<0.01	<0.0002	-	19	35

Note: 1. PCB results for soils and solids are reported in ppm, PCBs in GW reported in ppb.

2. "-" = sample was not analyzed for that parameter.

STRESSED VEGETATION AREA
TABLE 2
VOLATILE ORGANICS ANALYSES

	BORING & SAMPLE IDENTIFIERS		
PARAMETERS	D-1 1-2' SOIL	D-1 GW 3/27/86	D-2 GW 3/27/86
Ethyl Benzene (ppm)	<0.1	<0.01	0.013
*OTHER PARAMETERS (ppm)	<0.1	<0.01	<0.01

Note: 1. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).

ANALYTICAL SUMMARY
MONITORING WELLS

MONITORING WELLS & DEEP BORINGS
TABLE 1.a
CHLORIDE, METALS, PCBS, TOC & PHENOLICS ANALYSES

BORING & SAMPLE IDENTIFIERS

SAMPLE ID	TYPE OF SAMPLE	DEPTH (FT)	DATE SAMPLED	PCB[3]	TOC (ppm)	Cl (ppm)	Pb (ppm)	Hg (ppm)	As (ppm)	Cd (ppm)	Cr (ppm)	Pheno (ppm
W-1	GW		3/11/86	-	21	79	-	-	-	-	-	-
	GW		3/22/86	<1.0	5	15	<0.04	<0.0002	<0.01	<0.005	<0.01	-
W-2	GW		3/22/86	<1.0	9	13.4	<0.04	<0.0002	<0.01	<0.005	<0.01	-
W-3	Soil	15-17	3/12/86	<1.0	-	-	-	-	-	-	-	-
	GW		3/12/86	<1.0	60	-	-	-	-	-	-	-
	GW		3/26/86	<5.0+	170	1650	0.13	<0.002	0.12	0.02	0.13	0.35
W-4	Soil	15-17	3/12/86	<1.0	-	-	-	-	-	-	-	-
	GW		3/12/86	-	11	-	-	-	-	-	-	-
	GW		3/25/86	<1.0	6	34	<0.04	<0.0002	<0.01	<0.005	<0.01	0.11
W-5	GW		4/04/86	<1.0	-	-	-	-	-	-	-	-
	GW		5/01/86	<1.0	-	93	0.04	-	<0.01	<0.005	0.04	<0.00
W-6	GW		3/17/86	<1.0	14	-	0.21	-	<0.1	0.01	0.51	0.00
W-7	GW		3/17/86	-	150	-	1.50	-	<0.1	0.11	2.20	-
	GW		3/22/86	<5.0	120	195	-	-	-	-	-	0.03
W-9	GW		3/21/86	114	70	-	-	-	-	-	-	-
	GW		5/01/86	99.2++	-	310	-	-	-	-	-	<0.01
W-10	GW		4/04/86	12++	38	345	0.05	-	0.01	0.02	0.13	-
W-11	GW		4/04/86	<1.0	350	1100	<0.04	<0.002	<0.1	<0.005	-	0.06
	GW		5/01/86	-	-	1000	0.1	-	<0.01	0.02	0.18	-
W-12	GW		4/04/86	<1.0	9	57.9	<0.04	<0.002	<0.01	<0.005	-	0.02
W-13	GW		4/13/86	<1.0	9	40	0.6	<0.002	0.03	0.02	0.75	-
V-6	GW		3/13/86	<2.0	460	2900	0.32	-	-	-	-	-

Note:
1. + = Sediment phase was analyzed due to insufficient quantity of sample.
2. ++ = The specie is Aroclor 1242, all other species of PCB are Aroclor 1248.
3. PCBs in GW reported in ppb, PCBs for soils and solids are reported in ppm.
4. "*" = being analyzed for that parameter.
5. "-" = sample was not analyzed for that parameter.

MONITORING WELLS & DEEP BORINGS
TABLE 1.b
CHLORIDE, LEADS, PCB & TOC ANALYSES

BORING & SAMPLE IDENTIFIERS

SAMPLE ID	TYPE OF SAMPLE	DEPTH (FT)	DATE SAMPLED	Pb (ppm)	PCB (ppm/soil) (ppm/GW)	TOC (ppm)	Cl (ppm)
B-1	Soil	6-8	3/13/86	1.8	<1.0	-	-
	Soil	10-12	3/13/86	<0.8	<1.0	-	-
	Soil	14-16	3/13/86	0.9	<1.0	-	-
	Soil	43-45	3/13/86	4.6	<1.0	-	-
B-2	Soil	6-8	3/13/86	4.6	<1.0	-	-
	Soil	18-20	3/13/86	0.9	<1.0	-	-
	Soil	40-42	3/13/86	-	<1.0	-	-
	GW		3/13/86	-	*<1.0	10	105

Note: 1. "*" = results are reported in mg/Kg because sediment in the water sample was analyzed due to insufficient quantity of water.

2. "-" = sample was not analyzed for that parameter.

MONITOR WELLS & DEEP BORINGS
TABLE 2.a
VOLATILE ORGANICS ANALYSES

PARAMETERS	BORING & SAMPLE IDENTIFIERS										
	W-1 GW (ppm)	W-1 GW (ppm)	W-2 GW (ppm)	W-3 15-17' (SOIL) (ppm)	W-3 GW (ppm)	W-3 GW (ppm)	W-4 15-17' (SOIL) (ppm)	W-4 GW (ppm)	W-5 GW (ppm)	W-6 GW (ppm)	W-7 GW (ppm)
DATE SAMPLED(1986)	3/12	3/22	3/22	3/12	3/12	3/26	3/12	3/25	4/4	3/17	3/17
Benzene	<0.01	<0.01	<0.01	<0.1	0.01	0.017	<0.10	<0.01	<0.01	<0.01	0.017
Carbon Tetrachloride	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	89
Chlorobenzene	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	0.190
Chloroform	<0.01	<0.01	<0.01	<0.1	<0.01	0.020	<0.10	<0.01	<0.01	<0.01	0.025
Dichlorobenzene	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	+0.160
1,1-Dichloroethane	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	0.030
Methylene Chloride	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.10	<0.01	0.08	<0.01	<0.01
Trichloroethene	<0.01	<0.01	<0.01	<0.1	0.047	0.355	<0.10	<0.01	<0.01	<0.01	<0.110
Total Xylene	<0.01	<0.01	<0.01	<0.1	0.10	<0.01	<0.10	<0.01	<0.01	<0.01	<0.01
Chlorotoluene	<0.01	<0.01	<0.01	<0.1	<0.01	0.20	<0.10	<0.01	<0.01	<0.01	<0.01
*Other Parameters	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	<0.01

Note: 1. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).

2. +Includes 1,2; 1,3; & 1,4 dichlorobenzene

MONITOR WELLS & DEEP BORINGS
TABLE 2.b
VOLATILE ORGANICS ANALYSES

PARAMETERS	W-9 GW (ppm)	W-10 GW (ppm)	W-11 GW (ppm)	W-12 GW (ppm)	B-1 6-8' (SOIL) (ppm)	B-1 10-12' (SOIL) (ppm)	B-1 14-16' (SOIL) (ppm)	B-1 43-45' (SOIL) (ppm)	B-2 6-8' (SOIL) (ppm)	B-2 18-20' (SOIL) (ppm)	B-2 40-42' (SOIL) (ppm)
	BORING & SAMPLE IDENTIFIERS										
DATE SAMPLED(1986)	3/21	4/04	4/04	4/04	3/13	3/13	3/13	3/13	3/13	3/13	3/13
Chloroform	<0.01	<0.01	0.015	<0.01	<0.1	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1
Trans-1,2-Dichloroethene	0.60	<0.01	0.048	<0.01	<0.1	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1
Methylene Chloride	<0.01	<0.01	<0.01	<0.01	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	0.01	<0.01	<0.01	<0.01	<0.1	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1
Trichloroethene	180	0.025	12.0	0.073	<0.1	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylene	<0.01	<0.01	0.012	<0.01	<0.1	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorotoluene	<0.01	<0.01	0.010	<0.01	<0.1	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1
*Other Parameters	<0.01	<0.01	<0.01	<0.01	<0.1	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1

Note: 1. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).

MONITOR WELLS & DEEP BORINGS
TABLE 2.c
VOLATILE ORGANICS ANALYSES

PARAMETERS	BORING & SAMPLE IDENTIFIERS				
	B-2 GW (ppm)	V-6 GW (ppm)	W-5 GW (ppm)	W-7 GW (ppm)	W-13 GW (ppm)
DATE SAMPLED(1986)	3/13	3/13	5/01	3/22	4/13
Benzene	<0.01	0.014	<0.01	0.010	<0.01
Carbon Tetrachloride	<0.01	<0.01	<0.01	52	<0.01
Chlorobenzene	<0.01	<0.01	<0.01	0.260	<0.01
Chloroform	<0.01	0.037	<0.01	<0.01	<0.01
1,2-Dichlorobenzene	<0.01	<0.01	<0.01	0.128**	<0.01
1,3-Dichlorobenzene	<0.01	<0.01	<0.01	0.013	<0.01
1,4-Dichlorobenzene	<0.01	<0.01	<0.01	**	<0.01
1,2-Dichloroethane	<0.01	0.017	<0.01	<0.01	<0.01
Trans-1,2-Dichloroethene	<0.01	<0.01	<0.01	<0.01	<0.01
Methyl Chloride	<0.01	<0.01	<0.01	<0.01	<0.01
Toluene	<0.01	<0.01	<0.01	36	<0.01
Trichloroethene	<0.01	0.235	<0.01	0.260	<0.01
Total Xylene	<0.01	0.068	<0.01	0.010	<0.01
Chlorotoluene	<0.01	<0.01	<0.01	<0.010	<0.01
1,1-Dichloroethane	<0.01	<0.01	<0.01	0.039	<0.01
1,1-Dichloroethene	<0.01	<0.01	<0.01	0.010	<0.01
Methylene Chloride	<0.01	<0.01	<0.01	0.063	<0.01
*Other Parameters	<0.01	<0.01	<0.01	<0.01	<0.01

Note:
1. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).
2. The symbol "**" indicates that the value 0.128 is a combination of 1,2 & 1,4 - Dichlorobenzene.

MONITORING WELLS & DEEP BORINGS
Table 3
ACID & BASE NEUTRAL EXTRACTABLES ANALYSES

BORING & SAMPLE IDENTIFIERS

PARAMETERS	W-9 GW	W-10 GW
DATE SAMPLED(1986)	3/21	4/04
*All Parameters	<10	<10

Note:
1. All GW results are reported in ppm.
2. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).

OVERSIZED

DOCUMENT

REPORT OF

ONGOING SOIL AND GROUNDWATER STUDY
AND CONCEPTUALIZED CLEANUP PLAN
VENTURE CHEMICALS, INC.
LOBECO, SOUTH CAROLINA

VOLUME II (APPENDICES)

PREPARED FOR

VENTURE CHEMICALS, INC.

LOBECO, SOUTH CAROLINA

NOVEMBER 1986

PREPARED BY
G & E
ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL
CONSULTANTS
COLUMBIA, SOUTH CAROLINA

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Davis & Floyd, Inc.
CONSULTING ENGINEERS
POST OFFICE DRAWER 428
GREENWOOD, SOUTH CAROLINA 29648
803-229-5211

LABORATORY ANALYSIS REPORT

FOR: VENTURE CHEMICALS INC.
LOCATION: LOBECO SC
JOB NUMBER: 3915

SAMPLE DATE: 09-18-85
DATE RECEIVED: 09-20-85
REPORT DATE: 11-15-85

PARAMETER	V-1 852279	V-2 852280	V-3 852281
GROUNDWATER ELEVATION	9.43	7.74	8.02
TEMPERATURE	21	20	24
pH	4.3	4.2	4.0
SPECIFIC CONDUCTANCE	391	600	17200 *
CARBON-TOTAL ORGANIC	6.5	7.4	664 *
CHLORIDE	21.6	31.0	3149 *
ARSENIC	<0.002	<0.002	0.064
BARIUM	0.28	<0.10	0.22
CADMIUM	<0.005	<0.005	<0.005
CHROMIUM (TOTAL)	<0.02	<0.02	0.14

SAMPLE 852279 IS V-1
SAMPLE 852280 IS V-2
SAMPLE 852281 IS V-3

NOTES
1. ALL ANALYSES ARE IN MG/L UNLESS OTHERWISE NOTED.
2. GROUNDWATER ELEVATIONS ARE IN FEET FROM TOP OF PIPE TO WATER.
3. TEMPERATURE IS IN DEGREES C.
4. pH IS IN pH UNITS.
5. CONDUCTIVITY RESULTS ARE IN MICROMHOS/CENTIMETER.
6. FOR ANALYSES HAVING THE LESS THAN (<) NOTATION THE VALUE PRESENTED IS THE LOWER LIMIT OF DETECTION FOR THE METHOD AND/OR INSTRUMENT.

SAMPLED BY DAVID TUCK

ANALYSIS BY DT,JM,DD,MM,GS,JH,MC

CHECKED BY [signature] JOHN H. McCORD,JR.

APPROVED BY [signature] E. CARL BURRELL,JR.

Davis & Floyd, Inc.

CONSULTING ENGINEERS
POST OFFICE DRAWER 428
GREENWOOD, SOUTH CAROLINA 29648
803-229-5211

LABORATORY ANALYSIS REPORT

FOR: VENTURE CHEMICALS INC.
LOCATION: LOBECO SC
JOB NUMBER: 3915

SAMPLE DATE: 09-18-85
DATE RECEIVED: 09-20-85
REPORT DATE: 11-15-85

PARAMETER	V-1 852279	V-2 852280	V-3 852281
LEAD	<0.05	<0.05	<0.05
MERCURY	<0.0002	<0.0002	0.0015 *
SELENIUM	<0.005	<0.005	<0.005
SILVER	<0.02	<0.02	<0.02
1-AMINOANTHRAQUIONE	<0.010	<0.010	0.011 *
ANILINE	<0.010	<0.010	<0.010
DIMETHYL AMINE	<0.010	<0.010	<0.010
P-CHLOROPHENOL	<0.010	<0.010	<0.010
CEET	<0.010	<0.010	0.042 *

SAMPLE 852279 IS V-1
SAMPLE 852280 IS V-2
SAMPLE 852281 IS V-3

NOTES
1. ALL ANALYSES ARE IN MG/L UNLESS OTHERWISE NOTED.
2. FOR ANALYSES HAVING THE LESS THAN (<) NOTATION THE VALUE PRESENTED IS THE LOWER LIMIT OF DETECTION FOR THE METHOD AND/OR INSTRUMENT.
3. CEET IS N-CYANOETHYL-N-ETHYL-M-TOLUIDENE.
4. UNABLE TO ANALYZE CHLOROSULFONIC ACID IN TRACE QUANTITIES.
5. UNABLE TO ANALYZE PARALDEHYDE AND DIETHYLENE GLYCOL IN TRACE QUANTITIES.

SAMPLED BY__DAVID TUCK__________

ANALYSIS BY__DT,JM,DD,MM,GS,JH,MC

CHECKED BY [signature]
JOHN H. McCORD, JR.

APPROVED BY [signature]
E. CARL BURRELL, JR.

Davis & Floyd, Inc.

CONSULTING ENGINEERS

POST OFFICE DRAWER 428

GREENWOOD, SOUTH CAROLINA 29648

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LABORATORY ANALYSIS REPORT

FOR: VENTURE CHEMICALS INC.
LOCATION: LOBECO SC
JOB NUMBER: 3915

SAMPLE DATE: 09-18-85
DATE RECEIVED: 09-20-85
REPORT DATE: 11-15-85

PARAMETER	V-4 852282	V-5 852283	V-6 852284
GROUNDWATER ELEVATION	10.54	6.22	5.85
TEMPERATURE	20	20	20
pH	4.6	4.4	4.1
SPECIFIC CONDUCTANCE	1190	10800	21200
CARBON-TOTAL ORGANIC	14.7	90.0	467
CHLORIDE	132	1619	2649
ARSENIC	0.005	<0.002	0.005
BARIUM	<0.10	<0.10	<0.10
CADMIUM	<0.005	<0.005	0.052
CHROMIUM (TOTAL)	<0.02	<0.02	0.12

SAMPLE 852282 IS V-4
SAMPLE 852283 IS V-5
SAMPLE 852284 IS V-6

NOTES
1. ALL ANALYSES ARE IN MG/L UNLESS OTHERWISE NOTED.
2. GROUNDWATER ELEVATIONS ARE IN FEET FROM TOP OF PIPE TO WATER.
3. TEMPERATURE IS IN DEGREES C.
4. pH IS IN pH UNITS.
5. CONDUCTIVITY RESULTS ARE IN MICROMHOS/CENTIMETER.
6. FOR ANALYSES HAVING THE LESS THAN (<) NOTATION THE VALUE PRESENTED IS THE LOWER LIMIT OF DETECTION FOR THE METHOD AND/OR INSTRUMENT.

SAMPLED BY DAVID TUCK

ANALYSIS BY DT,JM,DD,MM,GS,JH,MC

CHECKED BY John H. McCord, Jr.
JOHN H. McCORD, JR.

APPROVED BY E. Carl Burrell, Jr.
E. CARL BURRELL, JR.

Davis & Floyd, Inc.

CONSULTING ENGINEERS
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803-229-5211

LABORATORY ANALYSIS REPORT

FOR: VENTURE CHEMICALS INC.
LOCATION: LOBECO SC
JOB NUMBER: 3915

SAMPLE DATE: 09-18-85
DATE RECEIVED: 09-20-85
REPORT DATE: 11-15-85

PARAMETER	V-4 852282	V-5 852283	V-6 852284
LEAD	<0.05	<0.05	<0.05
MERCURY	<0.0002	<0.0002	0.0061 *
SELENIUM	<0.005	<0.005	<0.005
SILVER	<0.02	<0.02	<0.02
1-AMINOANTHRAQUIONE	<0.010	<0.010	<0.010
ANILINE	<0.010	<0.010	<0.010
DIMETHYL AMINE	<0.010	<0.010	<0.010
P-CHLOROPHENOL	<0.010	<0.010	<0.010
CEET	<0.010	<0.010	<0.010

SAMPLE 852282 IS V-4
SAMPLE 852283 IS V-5
SAMPLE 852284 IS V-6

NOTES
1. ALL ANALYSES ARE IN MG/L UNLESS OTHERWISE NOTED.
2. FOR ANALYSES HAVING THE LESS THAN (<) NOTATION THE VALUE PRESENTED IS THE LOWER LIMIT OF DETECTION FOR THE METHOD AND/OR INSTRUMENT.
3. CEET IS N-CYANOETHYL-N-ETHYL-M-TOLUIDENE.
4. UNABLE TO ANALYZE CHLOROSULFONIC ACID IN TRACE QUANTITIES.
5. UNABLE TO ANALYZE PARALDEHYDE AND DIETHYLENE GLYCOL IN TRACE QUANTITIES.

SAMPLED BY DAVID TUCK

ANALYSIS BY DT,JM,DD,MM,GS,JH,MC

CHECKED BY [signature]
JOHN H. McCORD, JR.

APPROVED BY [signature]
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Davis & Floyd, Inc.

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803-229-5211

LABORATORY ANALYSIS REPORT

FOR: VENTURE CHEMICALS INC.
LOCATION: LOBECO SC
JOB NUMBER: 3915

SAMPLE DATE: 09-18-85
DATE RECEIVED: 09-20-85
REPORT DATE: 11-15-85

PARAMETER	DW-1 852285	DW-2 852286	DW-3 852287
GROUNDWATER ELEVATION	-	-	-
TEMPERATURE	18	17	18
pH	7.7	7.2	7.4
SPECIFIC CONDUCTANCE	391	380	340
CARBON-TOTAL ORGANIC	2.0	2.0	7.6
CHLORIDE	16.7	15.0	6.5
ARSENIC	<0.002	<0.002	<0.002
BARIUM	<0.1	<0.1	<0.1
CADMIUM	<0.005	<0.005	<0.005
CHROMIUM (TOTAL)	<0.02	<0.02	<0.02

SAMPLE 852285 IS DW-1
SAMPLE 852286 IS DW-2
SAMPLE 852287 IS DW-3

NOTES
1. ALL ANALYSES ARE IN MG/L UNLESS OTHERWISE NOTED.
2. GROUNDWATER ELEVATIONS ARE IN FEET FROM TOP OF PIPE TO WATER.
3. TEMPERATURE IS IN DEGREES C.
4. pH IS IN pH UNITS.
5. CONDUCTIVITY RESULTS ARE IN MICROMHOS/CENTIMETER.
6. FOR ANALYSES HAVING THE LESS THAN (<) NOTATION THE VALUE PRESENTED IS THE LOWER LIMIT OF DETECTION FOR THE METHOD AND/OR INSTRUMENT.

SAMPLED BY DAVID TUCK

ANALYSIS BY DT,JM,DD,MM,GS,JH,MC

CHECKED BY [signature]
JOHN H. McCORD,JR.

APPROVED BY [signature]
E. CARL BURRELL,JR.

Davis & Floyd, Inc.
CONSULTING ENGINEERS
POST OFFICE DRAWER 428
GREENWOOD, SOUTH CAROLINA 29648
803-229-5211

LABORATORY ANALYSIS REPORT

FOR: VENTURE CHEMICALS INC.
LOCATION: LOBECO SC
JOB NUMBER: 3915

SAMPLE DATE: 09-18-85
DATE RECEIVED: 09-20-85
REPORT DATE: 11-15-85

PARAMETER	DW-1 852285	DW-2 852286	DW-3 852287
LEAD	<0.05	<0.05	<0.05
MERCURY	<0.0002	<0.0002	<0.0002
SELENIUM	<0.005	<0.005	<0.005
SILVER	<0.02	<0.02	<0.02
1-AMINOANTHRAQUIONE	<0.010	<0.010	<0.010
ANILINE	<0.010	<0.010	<0.010
DIMETHYL AMINE	<0.010	<0.010	<0.010
P-CHLOROPHENOL	<0.010	<0.010	<0.010
CEET	<0.010	<0.010	<0.010

SAMPLE 852285 IS DW-1
SAMPLE 852286 IS DW-2
SAMPLE 852287 IS DW-3

NOTES
1. ALL ANALYSES ARE IN MG/L UNLESS OTHERWISE NOTED.
2. FOR ANALYSES HAVING THE LESS THAN (<) NOTATION THE VALUE PRESENTED IS THE LOWER LIMIT OF DETECTION FOR THE METHOD AND/OR INSTRUMENT.
3. CEET IS N-CYANOETHYL-N-ETHYL-M-TOLUIDENE.
4. UNABLE TO ANALYZE CHLOROSULFONIC ACID IN TRACE QUANTITIES.
5. UNABLE TO ANALYZE PARALDEHYDE AND DIETHYLENE GLYCOL IN TRACE QUANTITIES.

SAMPLED BY DAVID TUCK

ANALYSIS BY DT,JM,DD,MM,GS,JH,MC

CHECKED BY [signature]
JOHN H. McCORD, JR.

APPROVED BY [signature]
E. CARL BURRELL, JR.

REPORT OF DATA
PRIORITY POLLUTANT ANALYSIS

Sample Identification:
B52279 WELL V-1
Davis & Floyd, Inc. Job No.3915

Submitted to:
VENTURE CHEMICALS INC.
LOBECO SC

Checked By:

John H. McCord, Jr.

Approved By:

E. Carl Burrell, Jr.

Sample Identification: 852279 WELL V-1
Davis & Floyd, Inc. Job No. 3715

1. ANALYTICAL METHODOLOGY

The samples were prepared and analyzed according to two (2) general procedures: (1) 'Sampling and Analysis Procedures for Screening of Industrial Effluents for Priority Pollutants,' revised April, 1977 US-EPA AND (2) 'Base/Neutrals, Acids, and Pesticides,' US-EPA, revise December 3, 1979, Federal Register (Guidelines Establishing Test Procedures for the Analysis of Pollutants). The laboratory procedures used follow those in Methods 608, 624, or 625. Quality assurance, sample custody, and document control procedures were followed which meet or exceed EPA requirements.

2. SAMPLE RECORD	DATE
A. RECEIVED/REFRIGERATED	09-20-85

Sample Identification: 852279 WELL V-1
Davis & Floyd, Inc. Job No. 3915

COMPOUNDS	CONCENTRATION (UG/L)	DETECTION LIMIT (UG/L)
VOLATILES		
ACROLEIN	BDL	10
ACRYLONITRILE	BDL	10
BENZENE	BDL	5
CARBON TETRACHLORIDE	BDL	5
CHLOROBENZENE	BDL	5
1,2-DICHLOROETHANE	BDL	5
1,1-DICHLOROETHANE	BDL	5
1,1,2-TRICHLOROETHANE	BDL	5
1,1,2,2,-TETRACHLOROETHANE	BDL	5
CHLOROETHANE	BDL	5
BIS(CHLOROMETHYL)ETHER*	BDL	5
2-CHLOROETHYLVINYL ETHER	BDL	5
CHLOROFORM	BDL	5
1,1-DICHLOROETHYLENE	BDL	5
TRANS-1,2-DICHLOROETHYLENE	BDL	5
TRANS-1,3-DICHLOROPROPENE	BDL	5
CIS-1,3-DICHLOROPROPENE	BDL	5
1,2-DICHLOROPROPANE	BDL	5
ETHYLBENZENE	BDL	5
METHYLENE CHLORIDE	BDL	5
METHYL CHLORIDE	BDL	5
METHYL BROMIDE	BDL	5
BROMOFORM	BDL	5
DICHLOROBROMOMETHANE	BDL	5
1,1,1-TRICHLOROETHANE	BDL	5
DICHLORODIFLUOROMETHANE	BDL	5
TRICHLOROFLUOROMETHANE	BDL	5
CHLORODIBROMOMETHANE	BDL	5
TETRACHLOROETHYLENE	BDL	5
TOLUENE	BDL	5
TRICHLOROETHYLENE	BDL	5
VINYL CHLORIDE	BDL	5

BDL SIGNIFIES BELOW DETECTION LIMIT
NA DENOTES NOT ANALYZED.
* BIS(CHLOROMETHYL) ETHER HAS A VERY SHORT HALF-LIFE IN WATER AND IS NOT LIKELY TO BE DETECTED IN WATER.

Sample Identification: 852280 WELL V-2
Davis & Floyd, Inc. Job No. 3915

COMPOUNDS	CONCENTRATION (UG/L)	DETECTION LIMIT (UG/L)
VOLATILES		
ACROLEIN	BDL	10
ACRYLONITRILE	BDL	10
BENZENE	BDL	5
CARBON TETRACHLORIDE	BDL	5
CHLOROBENZENE	BDL	5
1,2-DICHLOROETHANE	BDL	5
1,1-DICHLOROETHANE	BDL	5
1,1,2-TRICHLOROETHANE	BDL	5
1,1,2,2,-TETRACHLOROETHANE	BDL	5
CHLOROETHANE	56	5
BIS(CHLOROMETHYL)ETHER*	BDL	5
2-CHLOROETHYLVINYL ETHER	BDL	5
CHLOROFORM	BDL	5
1,1-DICHLOROETHYLENE	BDL	5
TRANS-1,2-DICHLOROETHYLENE	BDL	5
TRANS-1,3-DICHLOROPROPENE	BDL	5
CIS-1,3-DICHLOROPROPENE	BDL	5
1,2-DICHLOROPROPANE	BDL	5
ETHYLBENZENE	BDL	5
METHYLENE CHLORIDE	BDL	5
METHYL CHLORIDE	BDL	5
METHYL BROMIDE	BDL	5
BROMOFORM	BDL	5
DICHLOROBROMOMETHANE	BDL	5
1,1,1-TRICHLOROETHANE	BDL	5
DICHLORODIFLUOROMETHANE	BDL	5
TRICHLOROFLUOROMETHANE	BDL	5
CHLORODIBROMOMETHANE	BDL	5
TETRACHLOROETHYLENE	BDL	5
TOLUENE	BDL	5
TRICHLOROETHYLENE	BDL	5
VINYL CHLORIDE	BDL	5

BDL SIGNIFIES BELOW DETECTION LIMIT
NA DENOTES NOT ANALYZED.
* BIS(CHLOROMETHYL) ETHER HAS A VERY SHORT HALF-LIFE IN WATER AND IS NOT LIKELY TO BE DETECTED IN WATER.

Sample Identification: 852281 WELL V-3
Davis & Floyd, Inc. Job No. 3915

COMPOUNDS	CONCENTRATION (UG/L)		DETECTION LIMIT (UG/L)
VOLATILES			
ACROLEIN		BDL	10
ACRYLONITRILE	255		10
BENZENE	25		5
CARBON TETRACHLORIDE		BDL	5
CHLOROBENZENE	898		5
1,2-DICHLOROETHANE		BDL	5
1,1-DICHLOROETHANE		BDL	5
1,1,2-TRICHLOROETHANE		BDL	5
1,1,2,2,-TETRACHLOROETHANE		BDL	5
CHLOROETHANE	782		5
BIS(CHLOROMETHYL)ETHER*		BDL	5
2-CHLOROETHYLVINYL ETHER		BDL	5
CHLOROFORM	98		5
1,1-DICHLOROETHYLENE		BDL	5
TRANS-1,2-DICHLOROETHYLENE	11		5
TRANS-1,3-DICHLOROPROPENE		BDL	5
CIS-1,3-DICHLOROPROPENE		BDL	5
1,2-DICHLOROPROPANE		BDL	5
ETHYLBENZENE	50		5
METHYLENE CHLORIDE	1994		5
METHYL CHLORIDE		BDL	5
METHYL BROMIDE		BDL	5
BROMOFORM	36		5
DICHLOROBROMOMETHANE		BDL	5
1,1,1-TRICHLOROETHANE		BDL	5
DICHLORODIFLUOROMETHANE		BDL	5
TRICHLOROFLUOROMETHANE		BDL	5
CHLORODIBROMOMETHANE		BDL	5
TETRACHLOROETHYLENE		BDL	5
TOLUENE	1968		5
TRICHLOROETHYLENE	73		5
VINYL CHLORIDE		BDL	5

BDL SIGNIFIES BELOW DETECTION LIMIT
NA DENOTES NOT ANALYZED.
* BIS(CHLOROMETHYL) ETHER HAS A VERY SHORT HALF-LIFE IN WATER AND IS NOT LIKELY TO BE DETECTED IN WATER.

Sample Identification: 852282 WELL V-4
Davis & Floyd, Inc. Job No. 3915

COMPOUNDS	CONCENTRATION (UG/L)	DETECTION LIMIT (UG/L)
VOLATILES		
ACROLEIN	BDL	10
ACRYLONITRILE	BDL	10
BENZENE	BDL	5
CARBON TETRACHLORIDE	BDL	5
CHLOROBENZENE	BDL	5
1,2-DICHLOROETHANE	BDL	5
1,1-DICHLOROETHANE	BDL	5
1,1,2-TRICHLOROETHANE	BDL	5
1,1,2,2,-TETRACHLOROETHANE	BDL	5
CHLOROETHANE	BDL	5
BIS(CHLOROMETHYL)ETHER*	BDL	5
2-CHLOROETHYLVINYL ETHER	BDL	5
CHLOROFORM	BDL	5
1,1-DICHLOROETHYLENE	BDL	5
TRANS-1,2-DICHLOROETHYLENE	BDL	5
TRANS-1,3-DICHLOROPROPENE	BDL	5
CIS-1,3-DICHLOROPROPENE	BDL	5
1,2-DICHLOROPROPANE	BDL	5
ETHYLBENZENE	BDL	5
METHYLENE CHLORIDE	8	5
METHYL CHLORIDE	BDL	5
METHYL BROMIDE	BDL	5
BROMOFORM	BDL	5
DICHLOROBROMOMETHANE	BDL	5
1,1,1-TRICHLOROETHANE	BDL	5
DICHLORODIFLUOROMETHANE	BDL	5
TRICHLOROFLUOROMETHANE	BDL	5
CHLORODIBROMOMETHANE	BDL	5
TETRACHLOROETHYLENE	BDL	5
TOLUENE	BDL	5
TRICHLOROETHYLENE	BDL	5
VINYL CHLORIDE	BDL	5

BDL SIGNIFIES BELOW DETECTION LIMIT
NA DENOTES NOT ANALYZED.
* BIS(CHLOROMETHYL) ETHER HAS A VERY SHORT HALF-LIFE IN WATER AND IS NOT LIKELY TO BE DETECTED IN WATER.

Sample Identification: 852283 WELL V-5
Davis & Floyd, Inc. Job No. 3915

COMPOUNDS	CONCENTRATION (UG/L)	DETECTION LIMIT (UG/L)
VOLATILES		
ACROLEIN	BDL	10
ACRYLONITRILE	BDL	10
BENZENE	BDL	5
CARBON TETRACHLORIDE	BDL	5
CHLOROBENZENE	BDL	5
1,2-DICHLOROETHANE	BDL	5
1,1-DICHLOROETHANE	BDL	5
1,1,2-TRICHLOROETHANE	BDL	5
1,1,2,2,-TETRACHLOROETHANE	BDL	5
CHLOROETHANE	BDL	5
BIS(CHLOROMETHYL)ETHER*	BDL	5
2-CHLOROETHYLVINYL ETHER	BDL	5
CHLOROFORM	BDL	5
1,1-DICHLOROETHYLENE	BDL	5
TRANS-1,2-DICHLOROETHYLENE	BDL	5
TRANS-1,3-DICHLOROPROPENE	BDL	5
CIS-1,3-DICHLOROPROPENE	BDL	5
1,2-DICHLOROPROPANE	BDL	5
ETHYLBENZENE	BDL	5
METHYLENE CHLORIDE	BDL	5
METHYL CHLORIDE	BDL	5
METHYL BROMIDE	BDL	5
BROMOFORM	BDL	5
DICHLOROBROMOMETHANE	BDL	5
1,1,1-TRICHLOROETHANE	BDL	5
DICHLORODIFLUOROMETHANE	BDL	5
TRICHLOROFLUOROMETHANE	BDL	5
CHLORODIBROMOMETHANE	BDL	5
TETRACHLOROETHYLENE	BDL	5
TOLUENE	BDL	5
TRICHLOROETHYLENE	BDL	5
VINYL CHLORIDE	BDL	5

BDL SIGNIFIES BELOW DETECTION LIMIT
NA DENOTES NOT ANALYZED.
* BIS(CHLOROMETHYL) ETHER HAS A VERY SHORT HALF-LIFE IN WATER AND IS NOT LIKELY TO BE DETECTED IN WATER.

Sample Identification: 852284 WELL V-6
Davis & Floyd, Inc. Job No. 3915

COMPOUNDS	CONCENTRATION (UG/L)		DETECTION LIMIT (UG/L)
VOLATILES			
ACROLEIN		BDL	10
ACRYLONITRILE		BDL	10
BENZENE	27		5
CARBON TETRACHLORIDE		BDL	5
CHLOROBENZENE		BDL	5
1,2-DICHLOROETHANE		BDL	5
1,1-DICHLOROETHANE		BDL	5
1,1,2-TRICHLOROETHANE		BDL	5
1,1,2,2,-TETRACHLOROETHANE		BDL	5
CHLOROETHANE		BDL	5
BIS(CHLOROMETHYL)ETHER*		BDL	5
2-CHLOROETHYLVINYL ETHER		BDL	5
CHLOROFORM	41		5
1,1-DICHLOROETHYLENE		BDL	5
TRANS-1,2-DICHLOROETHYLENE		BDL	5
TRANS-1,3-DICHLOROPROPENE		BDL	5
CIS-1,3-DICHLOROPROPENE		BDL	5
1,2-DICHLOROPROPANE		BDL	5
ETHYLBENZENE		BDL	5
METHYLENE CHLORIDE	9		5
METHYL CHLORIDE		BDL	5
METHYL BROMIDE		BDL	5
BROMOFORM	6		5
DICHLOROBROMOMETHANE		BDL	5
1,1,1-TRICHLOROETHANE		BDL	5
DICHLORODIFLUOROMETHANE		BDL	5
TRICHLOROFLUOROMETHANE		BDL	5
CHLORODIBROMOMETHANE		BDL	5
TETRACHLOROETHYLENE		BDL	5
TOLUENE	9		5
TRICHLOROETHYLENE	304		5
VINYL CHLORIDE		BDL	5

BDL SIGNIFIES BELOW DETECTION LIMIT
NA DENOTES NOT ANALYZED.
* BIS(CHLOROMETHYL) ETHER HAS A VERY SHORT HALF-LIFE IN WATER AND IS NOT LIKELY TO BE DETECTED IN WATER.

Sample Identification: 852285 WELL DW-1
Davis & Floyd, Inc. Job No. 3915

COMPOUNDS	CONCENTRATION (UG/L)	DETECTION LIMIT (UG/L)
VOLATILES		
ACROLEIN	BDL	10
ACRYLONITRILE	BDL	10
BENZENE	BDL	5
CARBON TETRACHLORIDE	BDL	5
CHLOROBENZENE	BDL	5
1,2-DICHLOROETHANE	BDL	5
1,1-DICHLOROETHANE	BDL	5
1,1,2-TRICHLOROETHANE	BDL	5
1,1,2,2,-TETRACHLOROETHANE	BDL	5
CHLOROETHANE	BDL	5
BIS(CHLOROMETHYL)ETHER*	BDL	5
2-CHLOROETHYLVINYL ETHER	BDL	5
CHLOROFORM	BDL	5
1,1-DICHLOROETHYLENE	BDL	5
TRANS-1,2-DICHLOROETHYLENE	BDL	5
TRANS-1,3-DICHLOROPROPENE	BDL	5
CIS-1,3-DICHLOROPROPENE	BDL	5
1,2-DICHLOROPROPANE	BDL	5
ETHYLBENZENE	BDL	5
METHYLENE CHLORIDE	BDL	5
METHYL CHLORIDE	BDL	5
METHYL BROMIDE	BDL	5
BROMOFORM	BDL	5
DICHLOROBROMOMETHANE	BDL	5
1,1,1-TRICHLOROETHANE	BDL	5
DICHLORODIFLUOROMETHANE	BDL	5
TRICHLOROFLUOROMETHANE	BDL	5
CHLORODIBROMOMETHANE	BDL	5
TETRACHLOROETHYLENE	BDL	5
TOLUENE	BDL	5
TRICHLOROETHYLENE	BDL	5
VINYL CHLORIDE	BDL	5

BDL SIGNIFIES BELOW DETECTION LIMIT
NA DENOTES NOT ANALYZED.
* BIS(CHLOROMETHYL) ETHER HAS A VERY SHORT HALF-LIFE IN WATER AND IS NOT LIKELY TO BE DETECTED IN WATER.

Sample Identification: 852286 WELL DW-2
Davis & Floyd, Inc. Job No. 3915

COMPOUNDS	CONCENTRATION (UG/L)	DETECTION LIMIT (UG/L)
VOLATILES		
ACROLEIN	BDL	10
ACRYLONITRILE	BDL	10
BENZENE	BDL	5
CARBON TETRACHLORIDE	BDL	5
CHLOROBENZENE	BDL	5
1,2-DICHLOROETHANE	BDL	5
1,1-DICHLOROETHANE	BDL	5
1,1,2-TRICHLOROETHANE	BDL	5
1,1,2,2,-TETRACHLOROETHANE	BDL	5
CHLOROETHANE	BDL	5
BIS(CHLOROMETHYL)ETHER*	BDL	5
2-CHLOROETHYLVINYL ETHER	BDL	5
CHLOROFORM	BDL	5
1,1-DICHLOROETHYLENE	BDL	5
TRANS-1,2-DICHLOROETHYLENE	BDL	5
TRANS-1,3-DICHLOROPROPENE	BDL	5
CIS-1,3-DICHLOROPROPENE	BDL	5
1,2-DICHLOROPROPANE	BDL	5
ETHYLBENZENE	BDL	5
METHYLENE CHLORIDE	BDL	5
METHYL CHLORIDE	BDL	5
METHYL BROMIDE	BDL	5
BROMOFORM	BDL	5
DICHLOROBROMOMETHANE	BDL	5
1,1,1-TRICHLOROETHANE	BDL	5
DICHLORODIFLUOROMETHANE	BDL	5
TRICHLOROFLUOROMETHANE	BDL	5
CHLORODIBROMOMETHANE	BDL	5
TETRACHLOROETHYLENE	BDL	5
TOLUENE	BDL	5
TRICHLOROETHYLENE	BDL	5
VINYL CHLORIDE	BDL	5

BDL SIGNIFIES BELOW DETECTION LIMIT
NA DENOTES NOT ANALYZED.
* BIS(CHLOROMETHYL) ETHER HAS A VERY SHORT HALF-LIFE IN WATER AND IS NOT LIKELY TO BE DETECTED IN WATER.

Sample Identification: 852287 WELL DW-3
Davis & Floyd, Inc. Job No. 3915

COMPOUNDS	CONCENTRATION (UG/L)	DETECTION LIMIT (UG/L)
VOLATILES		
ACROLEIN	BDL	10
ACRYLONITRILE	BDL	10
BENZENE	BDL	5
CARBON TETRACHLORIDE	BDL	5
CHLOROBENZENE	BDL	5
1,2-DICHLOROETHANE	BDL	5
1,1-DICHLOROETHANE	BDL	5
1,1,2-TRICHLOROETHANE	BDL	5
1,1,2,2,-TETRACHLOROETHANE	BDL	5
CHLOROETHANE	BDL	5
BIS(CHLOROMETHYL)ETHER*	BDL	5
2-CHLOROETHYLVINYL ETHER	BDL	5
CHLOROFORM	BDL	5
1,1-DICHLOROETHYLENE	BDL	5
TRANS-1,2-DICHLOROETHYLENE	BDL	5
TRANS-1,3-DICHLOROPROPENE	BDL	5
CIS-1,3-DICHLOROPROPENE	BDL	5
1,2-DICHLOROPROPANE	BDL	5
ETHYLBENZENE	BDL	5
METHYLENE CHLORIDE	BDL	5
METHYL CHLORIDE	BDL	5
METHYL BROMIDE	BDL	5
BROMOFORM	BDL	5
DICHLOROBROMOMETHANE	BDL	5
1,1,1-TRICHLOROETHANE	BDL	5
DICHLORODIFLUOROMETHANE	BDL	5
TRICHLOROFLUOROMETHANE	BDL	5
CHLORODIBROMOMETHANE	BDL	5
TETRACHLOROETHYLENE	BDL	5
TOLUENE	BDL	5
TRICHLOROETHYLENE	BDL	5
VINYL CHLORIDE	BDL	5

BDL SIGNIFIES BELOW DETECTION LIMIT
NA DENOTES NOT ANALYZED.
* BIS(CHLOROMETHYL) ETHER HAS A VERY SHORT HALF-LIFE IN WATER AND IS NOT LIKELY TO BE DETECTED IN WATER.

APPENDIX B

APPENDIX B
FIELD INVESTIGATION SPECIFICATIONS, SOIL BORING LOGS & GEOTECHNICAL TESTING, AND MONITOR WELL INSTALLATION DETAILS AND CROSS SECTIONS

B.1 Introduction. This appendix includes the specifications for the field investigation and geotechnical laboratory testing which were performed. Also included herein are the soil boring logs, the results of the geotechnical laboratory testing, and the monitor well construction details and cross sections.

B.2 Field Investigation Specifications.

B.2.1 Auger Borings (Truck-mounted and Hand). A number of auger borings were placed at the abandoned lagoon area, the burn site, the abandoned drum storage area, the stressed vegetation area, and along the discharge pipe. The boring locations were located on-site by G&E's field engineer. Augering was performed in accordance with ASTM Standard Practice D420-69.

The augering personnel utilized all standard safety equipment including hard hats, protective eyewear, steel-toed boots, gloves, face shields, splash aprons, protective suits with hoods, respirator, and rubber chemical inner gloves to preclude direct contact with wastes of potentially contaminated soil or groundwater.

The task included:

a) Fifty-one (51) exploration boreholes five to eight feet deep;

b) Examination of all auger cuttings to determine classification, presence of contamination, and need to sample for analysis; and

c) Sampling of initial groundwater in order to perform analytical testing.

d) Upon auger boring completion, the open hole was carefully backfilled with auger cuttings.

e) After augering the borehole, the auger bit and shaft were cleaned with a cleansing agent and deionized water, scraped with a brush, and dried before augering in another location. These procedures were considered necessary to prevent possible cross-contamination of boreholes.

<u>B.2.2 Deep Exploration Borings</u>. Eight (8) deeper exploration borings were drilled. Seven were placed using a truck-mounted B40H drill rig with continuous-flight, hollow stem augers. One of the borings was installed using hand-augering equipment. All drilling was performed in accordance with ASTM Standard Practice D420-69.

The task included:

a) Three boreholes to depths of 40 to 49 feet and five boreholes 13 to 18 feet in depth;

b) Continuous sampling of the deeper boreholes to 20 feet and on five-foot centers thereafter. The shallower borings were continous sampled to the termination of the boring. All samples were obtained in accordance with ASTM Standard Practice D1586-84 (Penetration Test and Split-Barrel Sampling of Soils). The soil samples were removed from the split-spoons in the field and were properly sealed to avoid moisture loss and sample disturbance. The soil samples were then transported to the geotechnical laboratory for testing;

c) Borings were advanced using a hollow stem, continuous-flight auger procedure until ground water was encountered. With the use of a continous-flight hollow stem auger, casing is not needed to prevent cross-strata contamination as the auger itself accomplishes the purpose of casing. Initial fluid level measurements were then obtained. A series of fluid level measurements were made on regular intervals to determine the rate of rise until the fluid level stabilized; and

d) Upon completion of the boreholes the open holes were grouted using a thick bentonite-cement in water mixture or developed into a groundwater monitoring well. The grout mixture consisted of a bentonite slurry with cement added to impart strength. The boreholes were grouted using the tremie method from the bottom of the borehole to the ground surface.

e) After each hole was advanced by the truck-mounted rig, the augers were cleaned using ALKANOX, and then rinsed with a high-pressure water stream. The sampling spoons were cleaned with ALKANOX and deionized water prior to each sample being taken.

B.2.3 Geotechnical Laboratory Testing. Soil samples obtained from the exploratory borings were subjected to geotechnical laboratory testing to determine classification and hydraulic conductivities. A battery of five geotechnical tests were performed on selected samples. These geotechnical tests included:

a) Natural water content (ASTM Standard Practice D2216-80);

b) Dry density (ASTM Standard Practice D698-78);

c) Particle size analysis (ASTM Standard Practice D422-63);

d) Atterberg limits (ASTM Standard Practice D4318); and

e) Hydraulic conductivity (ASTM Manual STP 746 "Permeability and Groundwater Contaminant Transport").

Results of all geotechnical laboratory tests are included in the following boring logs.

BORING LOG

No. B-1

Project: Environmental Assessment, Venture Chemicals, Inc., Lobeco, South Carolina

Client: Venture Chemicals, Inc., Lobeco, South Carolina

File No. 86-1008
Date Drilled 3/13/86
Drilling Co. A-C Borings, Inc.
Type Rig B40H
Logged By JJF

BORING DATA
Auger Boring: 0' to 49'

Surface Elev. 9.4'

Other Tests	Moisture Content (%)	Dry Density (lbs/cu.ft)	Liquid Limit (%)	Plasticity Index (%)	% Finer Than #200 Sieve	Penetrometer (Tons/sq.ft.) or Std. Pen. Test (blows/foot)	Depth (feet)	Description
	20	108	33	13		6 bpf 11 bpf *	0–5	Loose tan and gray CLAYEY SAND (SC) w/ roots and silt layers ---w/sand at 4'
1	21	92			11	0.0 (p) 0.0 (p) 0.0 (p)	5–12	Very loose gray poorly-graded SAND (SP-SC/SM) w/silt and clay layers
2	33	85	NP	NP	22	0.25 (p) 0.0 (p) 0.0 (p)	12–18	Loose gray CLAYEY SAND (SC) w/clay and silt layers ---w/clay layer at 15'
						0.0 (p) 0.0 (p) 0.0 (p) 0.0 (p) 0.0 (p)	18–40	Loose gray poorly-graded SAND (SP-SC/SM) w/silt and clay layers

Stratification is inferred and may not be exact

1- Particle Size Analysis (89% sand, 11% silt and clay)

2- Particle Size Analysis (78% sand, 22% silt and clay)

Shelby Tube
Std. Penetration Test
Auger Cuttings
No Recovery

▽ Water First Noted
▼ Level After 12 minutes
NP - Non-Plastic
* - No penetrometer value

—G & E Engineering, Inc.—

Project Environmental Assessment
Venture Chemicals, Inc.
Lobeco, South Carolina

Client Venture Chemicals, Inc.
Lobeco, South Carolina

BORING LOG

No. B-1
(cont.)

File No. 86-1008
Date Drilled 3/13/86
Drilling Co. A-C Borings, Inc.
Type Rig B40H
Logged By JJF

LABORATORY TEST DATA						FIELD DATA				BORING DATA
Other Tests	Moisture Content (%)	Dry Density (lbs/cu.ft)	Liquid Limit (%)	Plasticity Index (%)	% Finer Than #200 Sieve	Penetrometer (Tons/sq.ft.) or Std. Pen. Test (blows/foot)	Sampling	Depth (feet)	Water Level	
										Loose gray poorly-graded SAND (SP-SC/SM) w/silt and clay layers
3	70	58	109	77		4.25 (p) 4.25 (p) *		45		Stiff to very stiff green and gray CLAY (CH) w/sand and silt dustings
								50		Boring terminated at 49' and grouted upon completion NOTE: Organic odor noted above the 20 foot depth

3- Permeability test
(k = 2.7 x 10 $^{-8}$ cm/sec)

Stratification is inferred and may not be exact

Shelby Tube
Std. Penetration Test
Auger Cuttings
No Recovery

— G & E Engineering, Inc. —

Project	Environmental Assessment Venture Chemicals, Inc. Lobeco, South Carolina
Client	Venture Chemicals, Inc. Lobeco, South Carolina

BORING LOG

No. B-2

File No. 86-1008
Date Drilled 3/13/86
Drilling Co. A-C Borings, Inc.
Type Rig B40H
Logged By JJF

BORING DATA

Auger Boring: 0' to 43'

Surface Elev. 6.3'

LABORATORY TEST DATA						FIELD DATA				BORING DATA
Other Tests	Moisture Content (%)	Dry Density (lbs/cu.ft)	Liquid Limit (%)	Plasticity Index (%)	% Finer Than #200 Sieve	Penetrometer (Tons/sq.ft.) or Std. Pen. Test (blows/foot)	Sampling	Depth (feet)	Water Level	
						0.0 (p) 1.25 (p)				Loose tan and gray CLAYEY SAND (SC) w/silt and sand layers ---w/roots 1' to 2'
	19	103	23	6		*		5	▼	---w/sand pockets at 5' ---w/silt traces at 6'
						*				---w/sand layer at 7'
						0.75 (p)			▽	Loose to firm gray poorly-graded SAND (SP-SC/SM) w/clay and silt layers
	31	75	17	NP		14 bpf		10		---w/clay layer at 10' ---w/silty layer at 11'
	31				33	0.0 (p)				Very loose gray CLAYEY SAND (SC) w/clay layers
						0.0 (p) 0.25 (p)		15		---w/sand layer at 15' ---w/clay pocket at 16.5'
1	16				1	10 bpf				Firm gray SAND (SP-SC/SM) w/clay traces
								20		---becoming very loose below 21'
2	26	90				0.0 (p)		25		
						0.0 (p)		30		
										---w/alternating stiff clay and loose sand layers
						*		35		
						4.5 (p)				Very stiff green and gray CLAY (CH) w/sand and silt dustings
						4.5 (p)		40		

Stratification is inferred and may not be exact

1- Particle Size Analysis
(99% sand, 1% silt and clay)
2- Permeability Test
($k = 1.8 \times 10^{-5}$ cm/sec)

Shelby Tube
Std. Penetration Test
Auger Cuttings
No Recovery

▽ Water First Noted
▼ Level After 8 minutes
NP - Non-Plastic
* - No penetrometer value

—G & E Engineering, Inc.—

Project	Environmental Assessment Venture Chemicals, Inc. Lobeco, South Carolina	BORING LOG No. B-2 (cont.)	File No. 86-1008
			Date Drilled 3/13/86
Client	Venture Chemicals, Inc. Lobeco, South Carolina		Drilling Co. A-C Borings, Inc.
			Type Rig B40H
			Logged By JJF

LABORATORY TEST DATA						FIELD DATA				BORING DATA
Other Tests	Moisture Content (%)	Dry Density (lbs/cu.ft)	Liquid Limit (%)	Plasticity Index (%)	% Finer Than #200 Sieve	Penetrometer (Tons/sq.ft.) or Std. Pen. Test (blows/foot)	Sampling	Depth (feet)	Water Level	
	53		78	41		4.5 (p)	☒			Very stiff green and gray CLAY (CH)
								45		Boring terminated at 43' and grouted upon completion Note: Groundwater monitoring well W-5 was installed adjacent to Boring B-2.

Stratification is inferred and may not be exact

Shelby Tube

Std. Penetration Test

Auger Cuttings

No Recovery

— G & E Engineering, Inc. —

BORING LOG

No. W-1

Project: Environmental Assessment, Venture Chemicals, Inc., Lobeco, South Carolina

Client: Venture Chemicals, Inc., Lobeco, South Carolina

File No. 86-1008
Date Drilled 3/11/86
Drilling Co. A-C Borings, Inc.
Type Rig B40H
Logged By JJF and MJR

Other Tests	Moisture Content (%)	Dry Density (lbs/cu.ft)	Liquid Limit (%)	Plasticity Index (%)	% Finer Than #200 Sieve	Penetrometer (Tons/sq.ft.) or Std. Pen. Test (blows/foot)	Depth (feet)	BORING DATA
								Auger Boring: 0' to 40'
								Surface Elev. 9.7'
						7 bpf		Loose to firm tan and brown SAND (SP-SC/SM) w/clay and silt layers
						10 bpf		
	15	103	18	NP		17 bpf	5	---w/clay pockets at 5'
1	31				23	17 bpf		
						7 bpf		
							10	---looser below 10'
						3 bpf		
2	38				11	5 bpf		Loose gray CLAYEY SAND (SC) w/stiff dark clay (CH) layers
						2 bpf	15	---clay w/silt and sand at 16'
	46	63	26	NP		12 bpf		
3	72	51	119	84				---w/alternating clay and sand layers from 18' to 20'
						2 bpf		
							20	Loose to firm gray SAND (SP-SC/SM) w/clay and silt layers
4	19				9	20 bpf		
							25	---w/clay pockets at 25'
	17	107	NP	NP		14 bpf		---w/shell at 28'
							30	Stiff green CLAY (CH) w/sand and silt dustings
						8 bpf		---w/sand and shell layer at 34'
							35	---w/sand lenses at 36'
								---w/very little silt and sand at 37'
	59		55	25			40	

Stratification is inferred and may not be exact

1- Particle Size Analysis (77% sand, 23% silt and clay)
2- Particle Size Analysis (89% sand, 11% silt and clay)
3- Permeability Test ($k = 3.2 \times 10^{-8}$ cm/sec)
4- Particle Size Analysis (91% sand, 9% silt and clay)

Shelby Tube
Std. Penetration Test
Auger Cuttings
No Recovery

Water First Noted
Level After 6 minutes
NP - Non-Plastic
* - No penetrometer value

— G & E Engineering, Inc. —

Project	Environmental Assessment Venture Chemicals, Inc. Lobeco, South Carolina	
Client	Venture Chemicals, Inc. Lobeco, South Carolina	

BORING LOG

No. W-1
(cont.)

File No. 86-1008
Date Drilled 3/11/86
Drilling Co. A-C Borings, Inc.
Type Rig B40H
Logged By JJF and MJR

LABORATORY TEST DATA						FIELD DATA				BORING DATA
Other Tests	Moisture Content (%)	Dry Density (lbs/cu.ft)	Liquid Limit (%)	Plasticity Index (%)	% Finer Than #200 Sieve	Penetrometer (Tons/sq.ft.) or Std. Pen. Test (blows/foot)	Sampling	Depth (feet)	Water Level	
										Boring terminated at 40' and developed into a monitor well upon completion
								45		Note: W-8 installed adjacent to W-1. W-8 was 45 feet deep and encountered stiff to very stiff green CLAY (CH) from 40 to 45 feet.

Stratification is inferred and may not be exact

Shelby Tube

Std. Penetration Test

Auger Cuttings

No Recovery

— G & E Engineering, Inc. —

BORING LOG

No. W-3

Project Environmental Assessment
Venture Chemicals, Inc.
Lobeco, South Carolina

Client Venture Chemicals, Inc.
Lobeco, South Carolina

File No. 86-1008
Date Drilled 3/12/86
Drilling Co. A-C Borings, Inc.
Type Rig B40H
Logged By JJF

BORING DATA
Auger Boring: 0' to 17'
Surface Elev. 12.7'

LABORATORY TEST DATA						FIELD DATA				BORING DATA
Other Tests	Moisture Content (%)	Dry Density (lbs/cu.ft)	Liquid Limit (%)	Plasticity Index (%)	% Finer Than #200 Sieve	Penetrometer (Tons/sq.ft.) or Std. Pen. Test (blows/foot)	Sampling	Depth (feet)	Water Level	
	13		19	NP		7 bpf				Loose tan and gray CLAYEY SAND (SC) w/silt and sand layers
1	12				36	10 bpf		5		---more sand at 4'
						18 bpf				Firm gray poorly-graded SAND (SP-SC/SM) w/clay and silt lenses ---becoming looser below 8'
						0.0 (p)		10		Very loose gray CLAYEY SAND (SC) w/clay layers
						0.0 (p)		15		Loose gray SAND (SP-SC/SM) w/clay traces
								20		Boring terminated at 17' and developed into a monitor well upon completion NOTE: Organic odor throughout boring

1- Particle Size Analysis
(64% sand, 36% silt and clay)

Stratification is inferred and may not be exact

- Shelby Tube
- Std. Penetration Test
- Auger Cuttings
- No Recovery
- ▽ Water First Noted
- ▼ Level After 10 minutes
- NP - Non-Plastic
- * - No penetrometer value

BORING LOG

No. W-4

Project: Environmental Assessment
Venture Chemicals, Inc.
Lobeco, South Carolina

Client: Venture Chemicals, Inc.
Lobeco, South Carolina

File No. 86-1008
Date Drilled 3/12/86
Drilling Co. A-C Borings, Inc.
Type Rig B40H
Logged By JJF

BORING DATA
Auger Boring: 0' to 17'
Surface Elev. 12.4'

Other Tests	Moisture Content (%)	Dry Density (lbs/cu.ft)	Liquid Limit (%)	Plasticity Index (%)	% Finer Than #200 Sieve	Penetrometer (Tons/sq.ft.) or Std. Pen. Test (blows/foot)	Depth (feet)	Description
						*	0–6	Loose tan and gray CLAYEY SAND (SC) w/silt and sand layers ---w/sand layers at 5'
	17	110	NP	NP		0.0 (p)	6–10	Very loose tan and gray poorly-graded SAND (SP-SC/SM) w/clay and silt
						0.0 (p)	10–17	Very loose gray CLAYEY SAND (SC) w/clay layers ---w/clay layer at 13'
1	11		22	NP	20	0.0 (p)		---w/less clay below 16'
							17	Boring terminated at 17' and developed into a monitor well upon completion

1- Particle Size Analysis (80% sand, 20% silt and clay)

Stratification is inferred and may not be exact

- Shelby Tube
- Std. Penetration Test
- Auger Cuttings
- No Recovery
- ▽ Water First Noted
- ▼ Level After 12 minutes
- NP - Non-Plastic
- * - No penetrometer value

BORING LOG

No. W-6

Project: Environmental Assessment, Venture Chemicals, Inc., Lobeco, South Carolina

Client: Venture Chemicals, Inc., Lobeco, South Carolina

File No. 86-1008
Date Drilled 3/17/86
Drilling Co. A-C Borings, Inc.
Type Rig B40H
Logged By MJR

BORING DATA
Auger Boring: 0' to 18'
Surface Elev. 19.4'

Other Tests	Moisture Content (%)	Dry Density (lbs/cu.ft)	Liquid Limit (%)	Plasticity Index (%)	% Finer Than #200 Sieve	Penetrometer (Tons/sq.ft.) or Std. Pen. Test (blows/foot)	Depth (feet)	Description
						9 bpf		Loose tan and gray CLAYEY SAND (SC) w/silty clay lenses and silty sand lenses
	20		NP	NP		9 bpf	5	
						11 bpf		Firm gray SAND (SP-SC/SM) w/clay and silt layers
1	33				38	14 bpf		---w/clay layer at 7' to 8' ---w/clay pockets from 8' to 9'
						0.25 (p)	10	Loose white and gray CLAYEY SAND (SC) w/clay layers
						0.0 (p)		---w/clay layer at 12'
						0.0 (p)		
						0.0 (p)		---w/clay layer at 14'
						0.75 (p)	15	Loose gray SAND (SP) w/silt and clay traces
2	32				9	0.75 (p)		
							20	Boring terminated at 18' and developed into a monitor well upon completion

1- Particle Size Analysis (62% sand, 38% silt and clay)
2- Particle Size Analysis (91% sand, 9% silt and clay)

Stratification is inferred and may not be exact

Shelby Tube
Std. Penetration Test
Auger Cuttings
No Recovery

▽ Water First Noted
▼ Level After 4 minutes
NP - Non-Plastic
* - No penetrometer value

—G & E Engineering, Inc.—

BORING LOG

No. W-7

Project: Environmental Assessment
Venture Chemicals, Inc.
Lobeco, South Carolina

Client: Venture Chemicals, Inc.
Lobeco, South Carolina

File No. 86-1008
Date Drilled 3/17/86
Drilling Co. A-C Borings, Inc.
Type Rig B40H
Logged By MJR

LABORATORY TEST DATA						FIELD DATA				BORING DATA
Other Tests	Moisture Content (%)	Dry Density (lbs/cu.ft)	Liquid Limit (%)	Plasticity Index (%)	% Finer Than #200 Sieve	Penetrometer (Tons/sq.ft.) or Std. Pen. Test (blows/foot)	Sampling	Depth (feet)	Water Level	Auger Boring: 0' to 15' Surface Elev. 19.2'
										Concrete Slab
						30 bpf 20 bpf			▼	Loose tan and gray CLAYEY SAND (SC) and SAND (SP) w/clay and sludge
								5	▽	Firm gray and tan SAND (SP-SC/SM) w/clay pockets
	33		33	12		8 bpf 1.00 (p) 1.00 (p)				Loose to firm white and orange CLAYEY SAND (SC) w/clay layers ---becoming coarser at 9'
1	40				38	0.50 (p) 0.0 (p)		10		Loose gray SAND (SP-SC/SM) w/ clay traces ---w/clay layers from 13' to 15'
								15		Boring terminated at 15' and developed into a monitor well upon completion NOTE: Organic odor noted from 1' to 5'

1- Particle Size Analysis
(62% sand, 38% silt and clay)

Stratification is inferred and may not be exact

- Shelby Tube
- Std. Penetration Test
- Auger Cuttings
- No Recovery
- ▽ Water First Noted
- ▼ Level After 5 minutes
- NP - Non-Plastic
- * - No penetrometer value

BORING LOG

No. W-10

Project: Environmental Assessment
Venture Chemicals, Inc.
Lobeco, South Carolina

Client: Venture Chemicals, Inc.
Lobeco, South Carolina

File No. 86-1008
Date Drilled 4/3/86
Drilling Co. A.C.Borings,Inc.
Type Rig B40H
Logged By JFP

LABORATORY TEST DATA							FIELD DATA				BORING DATA
Other Tests	Moisture Content (%)	Dry Density (lbs/cu.ft)	Liquid Limit (%)	Plasticity Index (%)	% Finer Than #200 Sieve		Penetrometer (Tons/sq.ft.) or Std. Pen. Test (blows/foot)	Sampling	Depth (feet)	Water Level	Auger Boring: 0' to 13' Surface Elevation. 18.6'
								Std. Penetration Test (0'–9')	0–9 (5)	▽ (below 5')	Loose to firm tan and brown CLAYEY SAND (SC) w/silt and sand layers. ---w/red & orange streaks below 4' ---w/clay layer at 5' to 6' ---w/clay layer at 8' to 9'
								Std. Penetration Test (9'–14')	9–14 (10)		Loose to firm gray SAND (SP-SC/SM) with clay layers
									15		Boring terminated at 14' and developed into a monitor well upon completion

Stratification is inferred and may not be exact

Shelby Tube
Std. Penetration Test
Auger Cuttings
No Recovery

▽ Water First Noted

NP - Non-Plastic
* - No penetrometer value

BORING LOG

No. W-11

Project Environmental Assessment
Venture Chemicals, Inc.
Lobeco, South Carolina

Client Venture Chemicals, Inc.
Lobeco, South Carolina

File No. 86-1008
Date Drilled 4/3/86
Drilling Co. A.C.Borings, Inc.
Type Rig B40H
Logged By JFP

LABORATORY TEST DATA							FIELD DATA				BORING DATA
Other Tests	Moisture Content (%)	Dry Density (lbs/cu.ft)	Liquid Limit (%)	Plasticity Index (%)	% Finer Than #200 Sieve		Penetrometer (Tons/sq.ft.) or Std. Pen. Test (blows/foot)	Sampling	Depth (feet)	Water Level	Auger Boring: 0' to 14' Surface Elevation. 16.3'
											Loose to firm tan CLAYEY SAND (SC) with clay layers --- w/reddish clay at 4' --- w/reddish clay layer 6' to 8'
									5	▽	
									10		Loose gray SAND (SP-SC/SM) with clay traces
									15		Boring terminated at 14' and developed into a monitor well upon completion NOTE: Organic odor noted from 9' to 14'

Stratification is inferred and may not be exact

Shelby Tube

Std. Penetration Test

Auger Cuttings

No Recovery

▽ Water First Noted

NP - Non-Plastic

* - No penetrometer value

— G & E Engineering, Inc. —

BORING LOG

No. W-12

Project: Environmental Assessment, Venture Chemicals, Inc., Lobeco, South Carolina

Client: Venture Chemical, Inc., Lobeco, South Caroline

File No. 86-1008
Date Drilled 4/3/86
Drilling Co. A.C.Boring,Inc.
Type Rig B40H
Logged By JFP

LABORATORY TEST DATA							FIELD DATA				BORING DATA
Other Tests	Moisture Content (%)	Dry Density (lbs/cu.ft)	Liquid Limit (%)	Plasticity Index (%)	% Finer Than #200 Sieve		Penetrometer (Tons/sq.ft.) or Std. Pen. Test (blows/foot)	Sampling	Depth (feet)	Water Level	Auger Boring: 0' to 14' Surface Elevation. 15.6'
								☒	0–7	▽ (~7')	Loose tan and red CLAYEY SAND (SC) with clay layers --- w/clay pockets at 5' to 7'
								☒	7–14		Loose gray SAND (SP-SC/SM) w/clay traces
									14+		Boring terminated at 14' and developed into a monitor well upon completion

Stratification is inferred and may not be exact

Legend:
- Shelby Tube
- Std. Penetration Test
- Auger Cuttings
- No Recovery
- ▽ Water First Noted
- NP - Non-Plastic
- * - No penetrometer value

— G & E Engineering, Inc. —

Project Environmental Assessment
Venture Chemicals, Inc.
Lobeco, South Carolina

Client Venture Chemicals, Inc.
Lobeco, South Carolina

BORING LOG
No. W-13

File No. 86-1008
Date Drilled 4/3/86
Drilling Co. A.C.Borings,Inc
Type Rig B40H
Logged By JFP

Other Tests	Moisture Content (%)	Dry Density (lbs/cu.ft)	Liquid Limit (%)	Plasticity Index (%)	% Finer Than #200 Sieve	Penetrometer (Tons/sq.ft.) or Std. Pen. Test (blows/foot)	Sampling	Depth (feet)	Water Level	BORING DATA: Auger Boring: 0' to 37'. Surface Elevation. 15.5'
										Firm tan and brown CLAYEY SAND (SC) with roots and grass.
1	34		55	39	65	1.5(p)		5	▼ ▽	Medium tan & brown CLAY (CH) with sand layers and silt pockets. --- with sand layer at 8' to 9'
	29		56	37		1.0(p)		10		--- becoming sandier below 10'
2	33				26	0.0(p)		15		Loose gray CLAYEY SAND (SC) with clay layers --- with clay pocket at 16'
	35					0.0(p)		20		--- with clay pocket at 20'
3	28				16	0.0(p)		25		Loose gray poorly-graded SAND (SP-SC/SM) w/silt & clay traces --- with silt trace at 27' --- with clay trace at 30'
	23					0.0(p)		30		
	59		80	53		4.0(p)		35		Very stiff gray and green CLAY (CH) with silt and sand dustings
								40		Boring terminated at 37' and developed into a monitor well upon completion.

1 - Particle Size Analysis (35% sand, 65% silt and clay)
2 - Particle Size Analysis (74% sand, 26% silt and clay)
3 - Particle Size Analysis (84% sand, 16% silt and clay)

Stratification is inferred and may not be exact

Shelby Tube
Std. Penetration Test
Auger Cuttings
No Recovery

▽ Water First Noted
▼ Level After 6 minutes
NP - Non-Plastic
* - No penetrometer value

— G & E Engineering, Inc. —

SOIL DATA SUMMARY

S&ME JOB NO. 1233-86-053

BORING NUMBER	SAMPLE DEPTH	CLASSIFICATION	STANDARD PENETRATION RESISTANCE	NATURAL MOISTURE (%)	% FINER # 200	UNIT WEIGHT P.C.F.		PROCTOR DATA		SPECIFIC GRAVITY	VOID RATIO E_o	UNCOFINED COMP. MAX.	ATTER-BERG LIMIT		TRIAXIAL SHEAR		CONSOLIDATION C_C	OTHER
						W	D	MAX	OMC				LL	PI	C	φ		
B-1	2-4			20.4		130.7	108.5						33.4	13.3				
B-1	8-10			21.3	10.5	111.5	91.9											
B-1	14-16			32.8		112.7	84.9						NP					
B-1	16-18				22.4													
B-2	4-6			19.0		123.2	103.5						22.9	6.4				
B-2	10-12			31.3		97.8	74.5						17.8	NP				
B-2	12-14			31.0	32.9													
B-2	18-20			15.7	1.2													
B-2	23-25			47.0														
W-1	4-6			15.0		118.5	103.0						18.3	NP				
W-1	6-8			30.9	23.1													
W-1	12-14			38.0	11.3	NA	NA											
W-1	16-18			46.2		92.1	63.0						26.0	NP				
W-1	23-25			18.9	8.8													
W-1	28-30			17.4		125.5	106.9						NP					
W-1	38-40			58.7		NA	NA						55.3	24.9				

NP-Non Plastic
NA-Unit Weights Could Not Be Determined Due To Split Spoon Sample Disturbance

SME 13

SOIL & MATERIAL ENGINEERS, INC.

SOIL DATA SUMMARY

S&ME JOB NO. 1233-86-053

BORING NUMBER	SAMPLE DEPTH	CLASSIFICATION	STANDARD PENETRATION RESISTANCE	NATURAL MOISTURE (%)	% FINER # 200	UNIT WEIGHT P.C.F.		PROCTOR DATA		SPECIFIC GRAVITY	VOID RATIO E.	UNCOFINED COMP. MAX.	ATTER-BERG LIMIT		TRIAXIAL SHEAR		CONSOLIDATION C_C	OTHER
						W	D	MAX	OMC				LL	PI	C	ϕ		
W-3	0-2			13.0		NA							19.3	NP				
W-3	4-6			12.2	36.1													
W-4	5-7			16.9		116.9	110.0						NP					
W-4	15-17			11.0	19.9								22.2					

SME 13

NP-Non Plastic
NA-Unit Weights Could Not Be Determined Due To Split Spoon Sample Disturbance

SOIL & MATERIAL ENGINEERS, INC.

SOIL DATA SUMMARY

S&ME JOB NO. 1233-86-05

BORING NUMBER	SAMPLE DEPTH	CLASSIFICATION	STANDARD PENETRATION RESISTANCE	NATURAL MOISTURE (%)	% FINER # 200	UNIT WEIGHT P.C.F.		PROCTOR DATA		SPECIFIC GRAVITY	VOID RATIO E.	UNCOFINED COMP. MAX.	ATTER-BERG LIMIT		TRIAXIAL SHEAR		CONSOLIDATION C_C	COEFFICIENT OF PERMEABILITY, K (CM/S)
						W	D	MAX	OMC				LL	PI	C	φ		
B-1	45'-47'	CLAY with Sand (CH)		70.5		99.6	58.4			2.67	2.0		109	77				2.7×10^{-8}
B-2	23'-25'			25.9		113.7	90.3			2.69	0.9							1.8×10^{-5}
W1	16'-18'	CLAY with Sand (CH)		72.2		87.5	50.8			2.70	2.3		119	84				3.2×10^{-8}
W6	2'-4'	Silty Fine SAND (SM)		20.3									NP					
W6	6'-8'	Silty Clayey Fine SAND (SM-SC)		32.7	38.1													
W6	16'-18'	Poorly Graded Fine SAND with Sand & Clay Veins (SP-SM/CL)		31.7	8.7													
W7	7'-9'	Very Clayey Silty Fine SAND (SC-SM)		33.0									32.5	11.8				
W7	9'-11'	Very Clayey Fine SAND (SC)		40.1	37.5													

S&ME 13

NP = Non Plastic

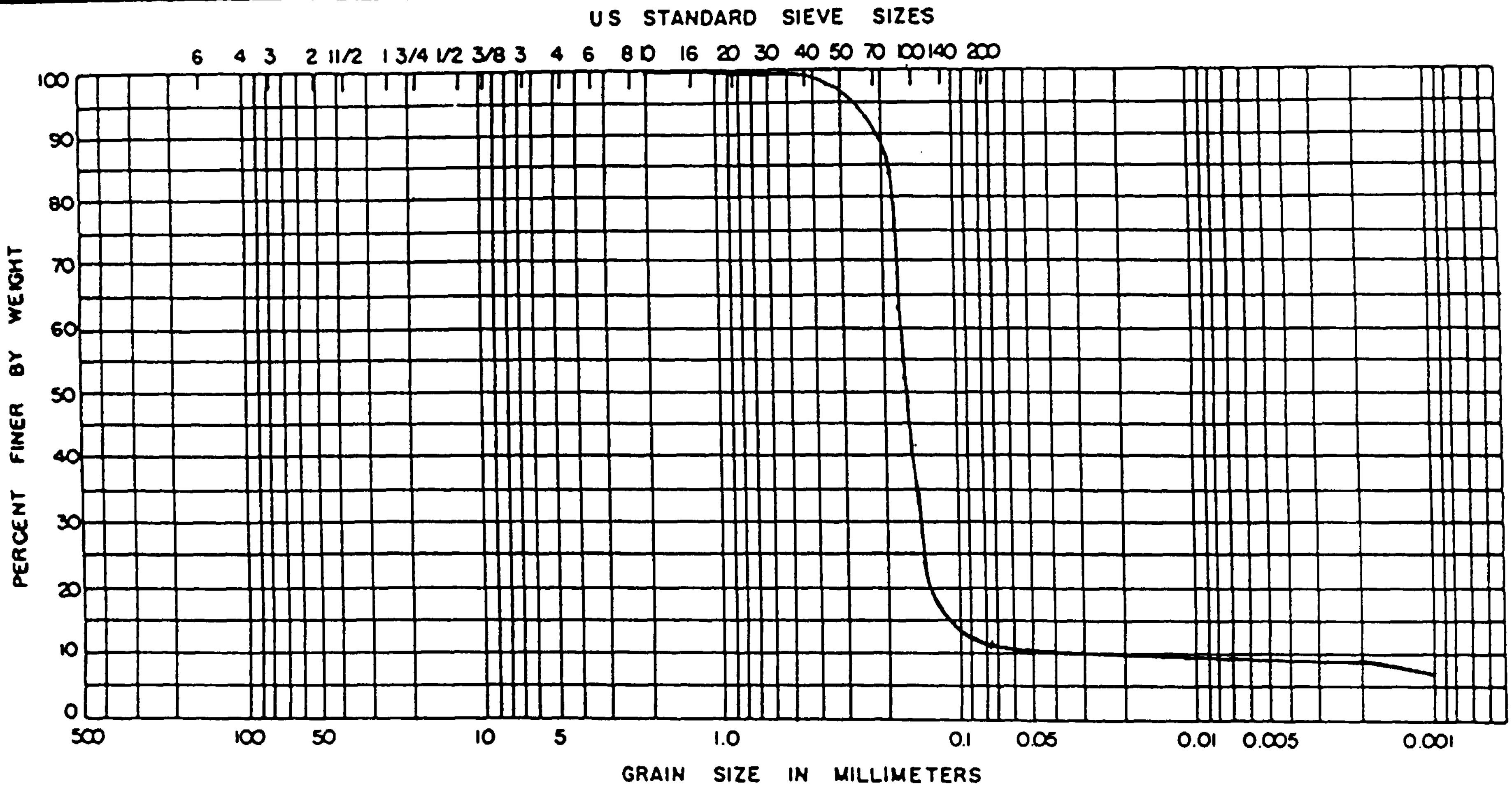
SOIL & MATERIAL ENGINEERS, INC.

TABLE 1

Laboratory Data Summary

Boring No.	Depth (feet)	Visual Description	Moisture Content(%)	Atterberg Limits (LL/PI)
W-13	5 - 7	tan & red clay w/sand pockets & silt laminations	34	55/39*
W-13	10 - 12	brown clay w/sand pockets	29	56/37
W-13	15 - 17	gray & dark gray clayey sand	33	*
W-13	20 - 22	gray & dark gray clayey sand	35	-
W-13	25 - 27	gray & dark gray silty, slightly clayey sand	28	*
W-13	30 - 32	gray & dark gray silty, clayey sand	23	-
W-13	35 - 37	gray & dark gray clay w/silt & sand traces	59	80/53

*Grain size analysis performed (see Plate 1)



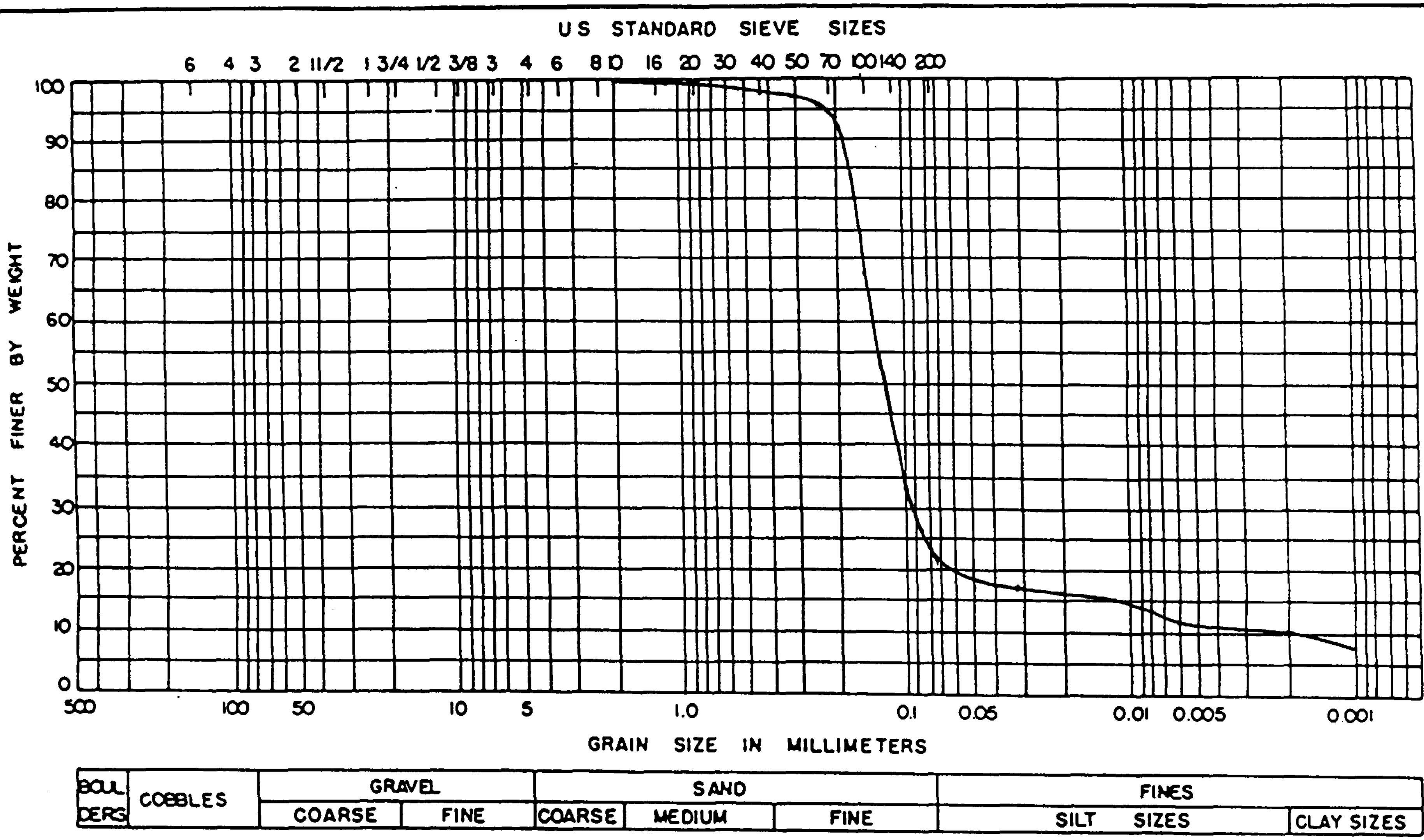
BOULDERS	COBBLES	GRAVEL		SAND			FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

BORING NO.	ELEV. OR DEPTH	NAT WC	LL	PL	PI	CLASSIFICATION
B-1	8-10	21.3				Poorly Graded Fine SAND w/ Silt & Clay (SP-SM/SC)

GRAIN SIZE DISTRIBUTION

JOB NO. 1233-86-053

SOIL & MATERIAL ENGINEERS, INC.

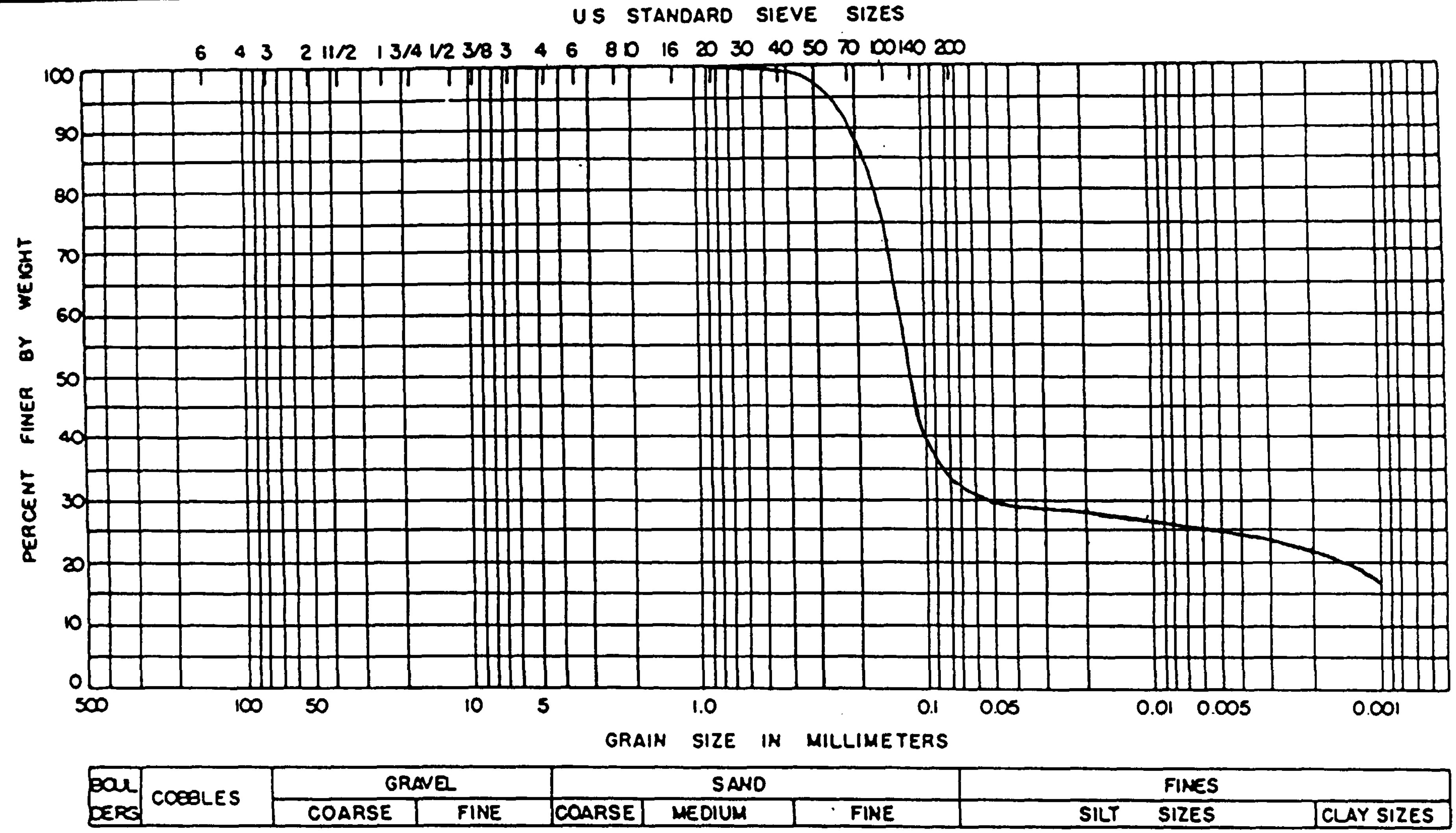


BORING NO.	ELEV. OR DEPTH	NAT WC	LL	PL	PI	CLASSIFICATION
B-1	16-18					Silty Clayey Fine SAND (SM/SC)

GRAIN SIZE DISTRIBUTION

JOB NO. 1233-86-053

SOIL & MATERIAL ENGINEERS, INC.

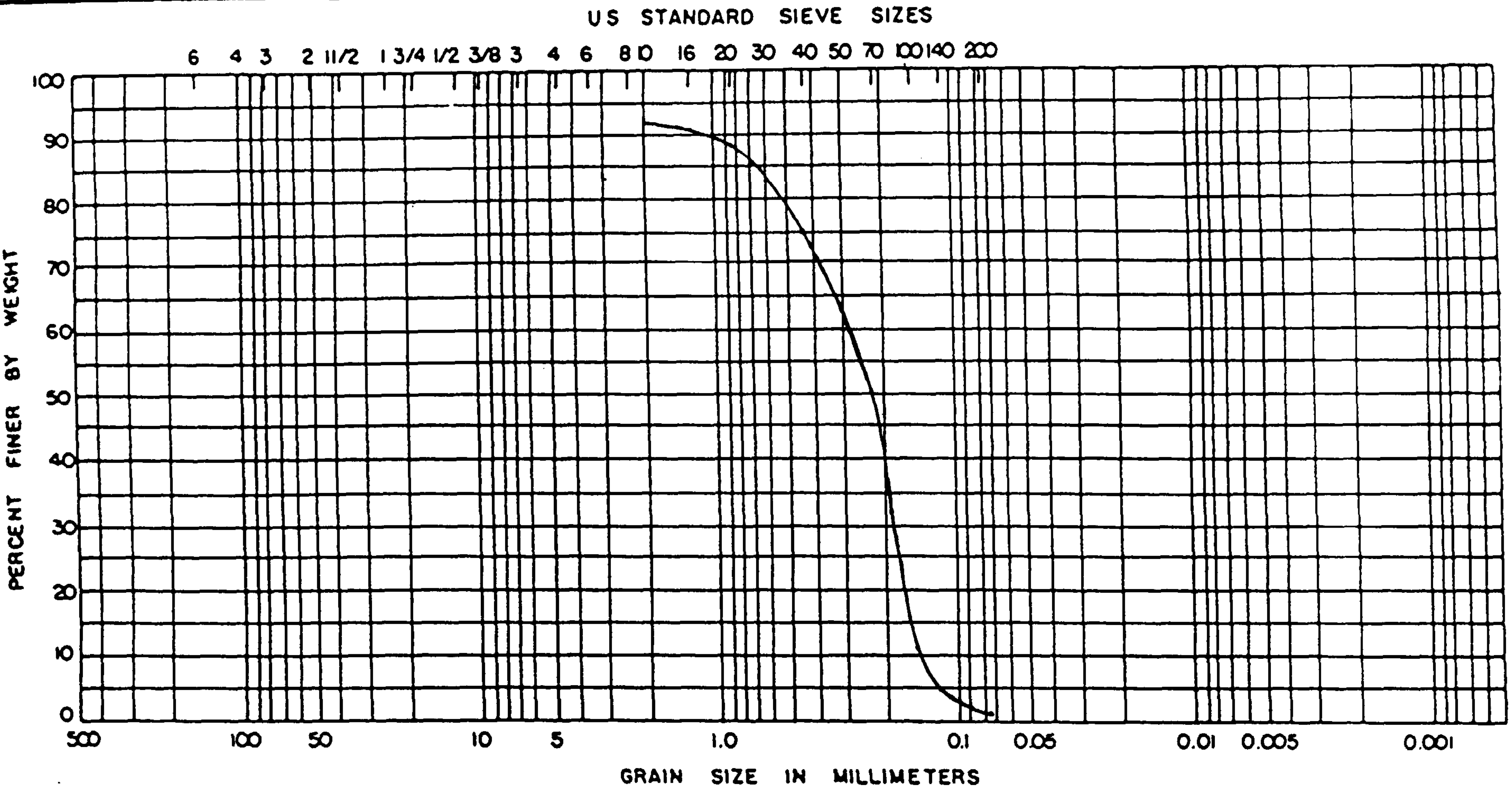


BORING NO.	ELEV. OR DEPTH	NAT WC	LL	PL	PI	CLASSIFICATION
B-2	12-14	32.4				Silty Clayey Fine SAND (SM/SC)

GRAIN SIZE DISTRIBUTION

JOB NO. 1233-86-053

SOIL & MATERIAL ENGINEERS, INC.



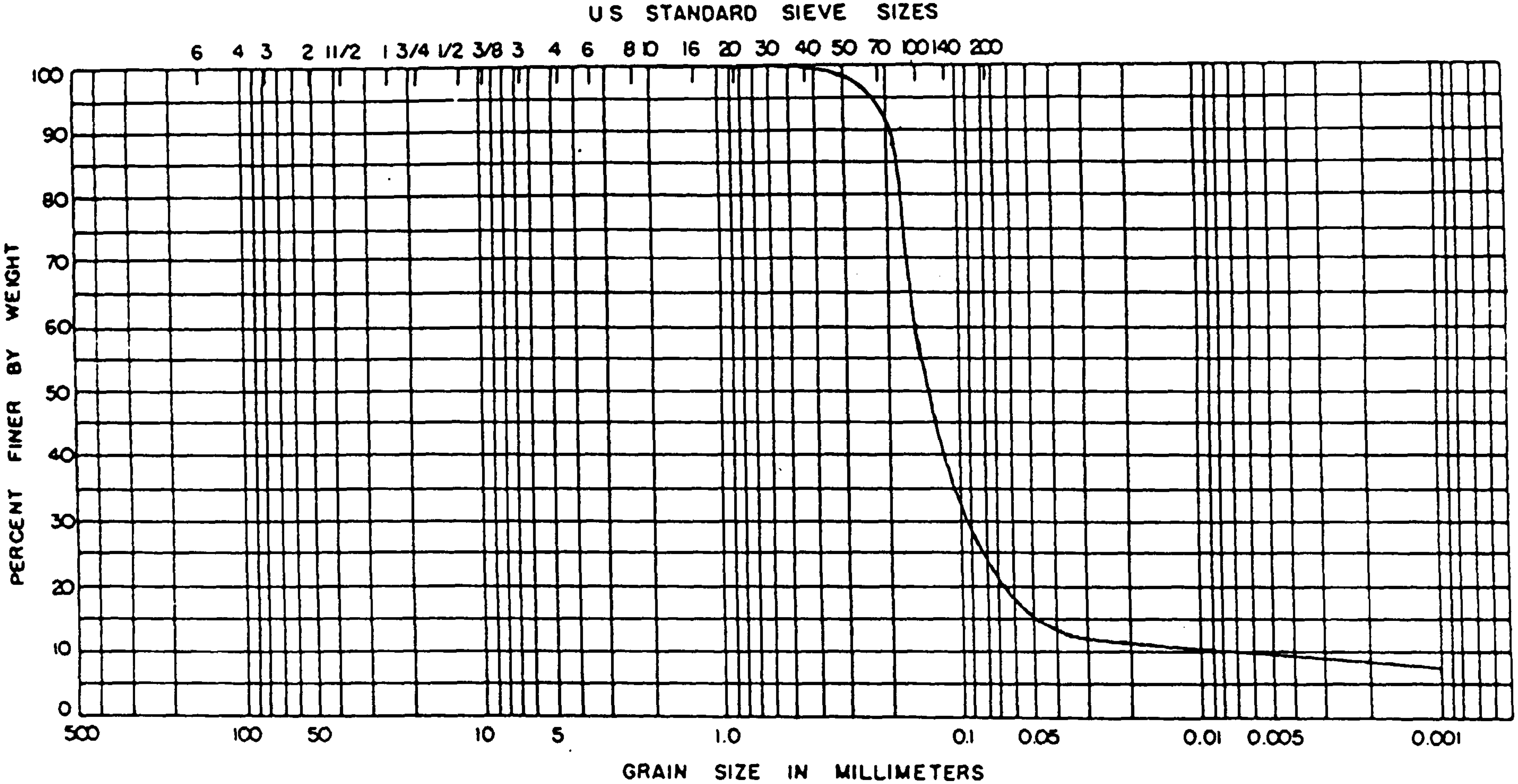
BOULDERS	COBBLES	GRAVEL		SAND			FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

BORING NO.	ELEV. OR DEPTH	NAT WC	LL	PL	PI	CLASSIFICATION
B-2	18-20	15.7				Poorly Graded Fine To Medium SAND (SP)

GRAIN SIZE DISTRIBUTION

JOB NO. 1233-86-053

SOIL & MATERIAL ENGINEERS, INC.



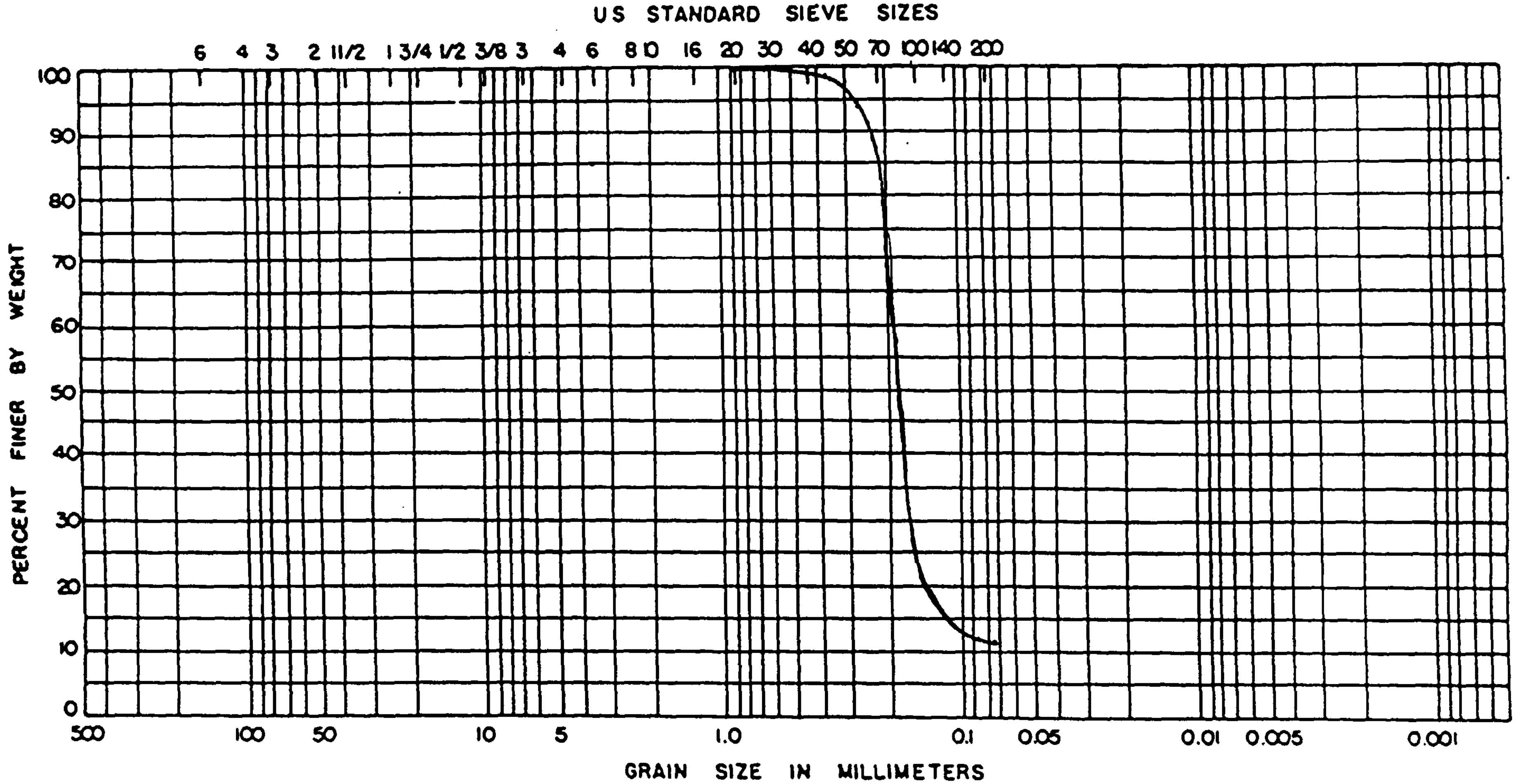
BOUL DERS	COBBLES	GRAVEL		SAND			FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

BORING NO.	ELEV. OR DEPTH	NAT WC	LL	PL	PI	CLASSIFICATION
W-1	6-8	30.9				Silty Clayey Fine SAND (SM/SC)

GRAIN SIZE DISTRIBUTION

JOB NO 1233-86-053

SOIL & MATERIAL ENGINEERS, INC.



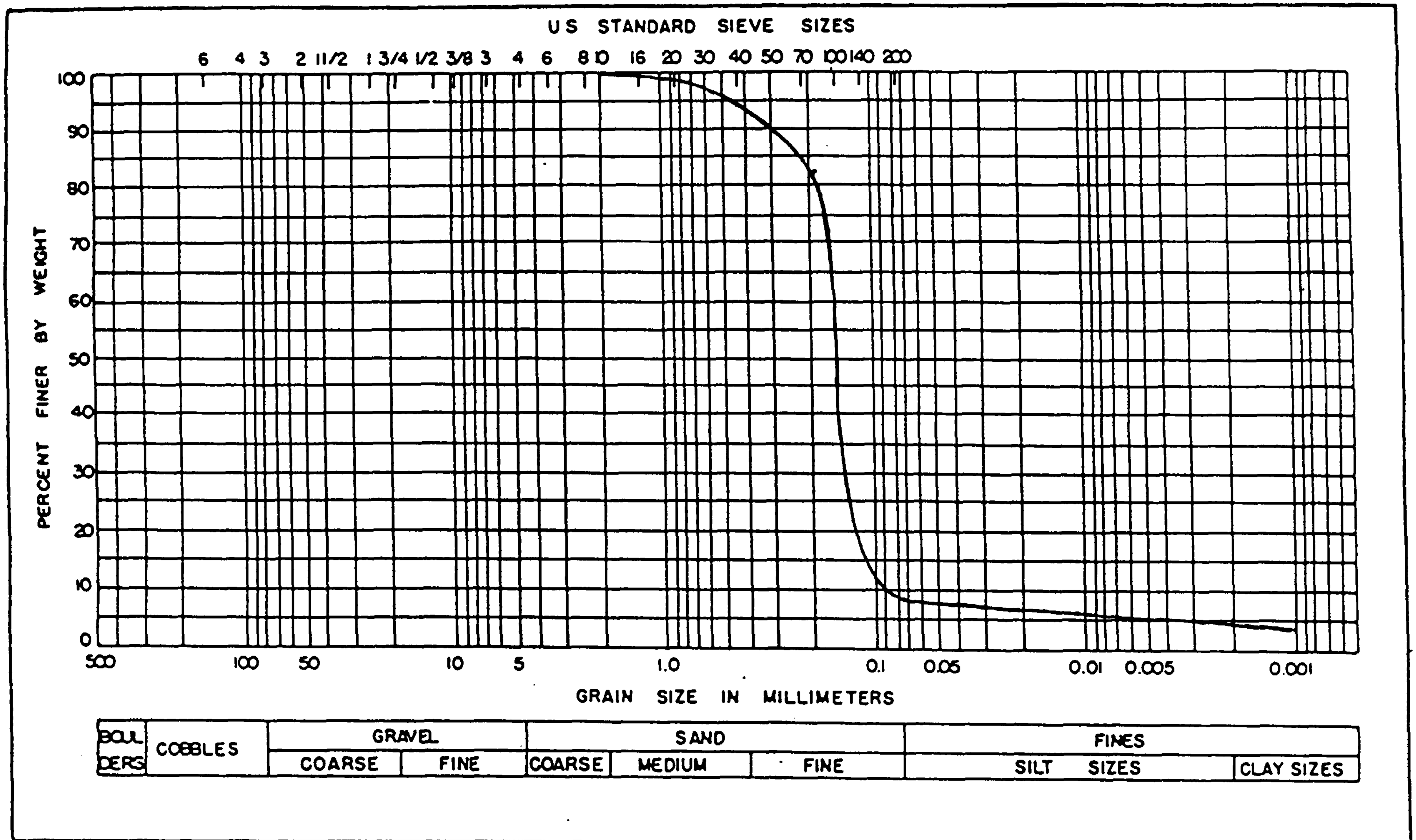
BOULDERS	COBBLES	GRAVEL		SAND			FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

BORING NO.	ELEV. OR DEPTH	NAT WC	LL	PL	PI	CLASSIFICATION
W-1	12-14	38.0				

GRAIN SIZE DISTRIBUTION

JOB NO. 1233-86-053

SOIL & MATERIAL ENGINEERS, INC.

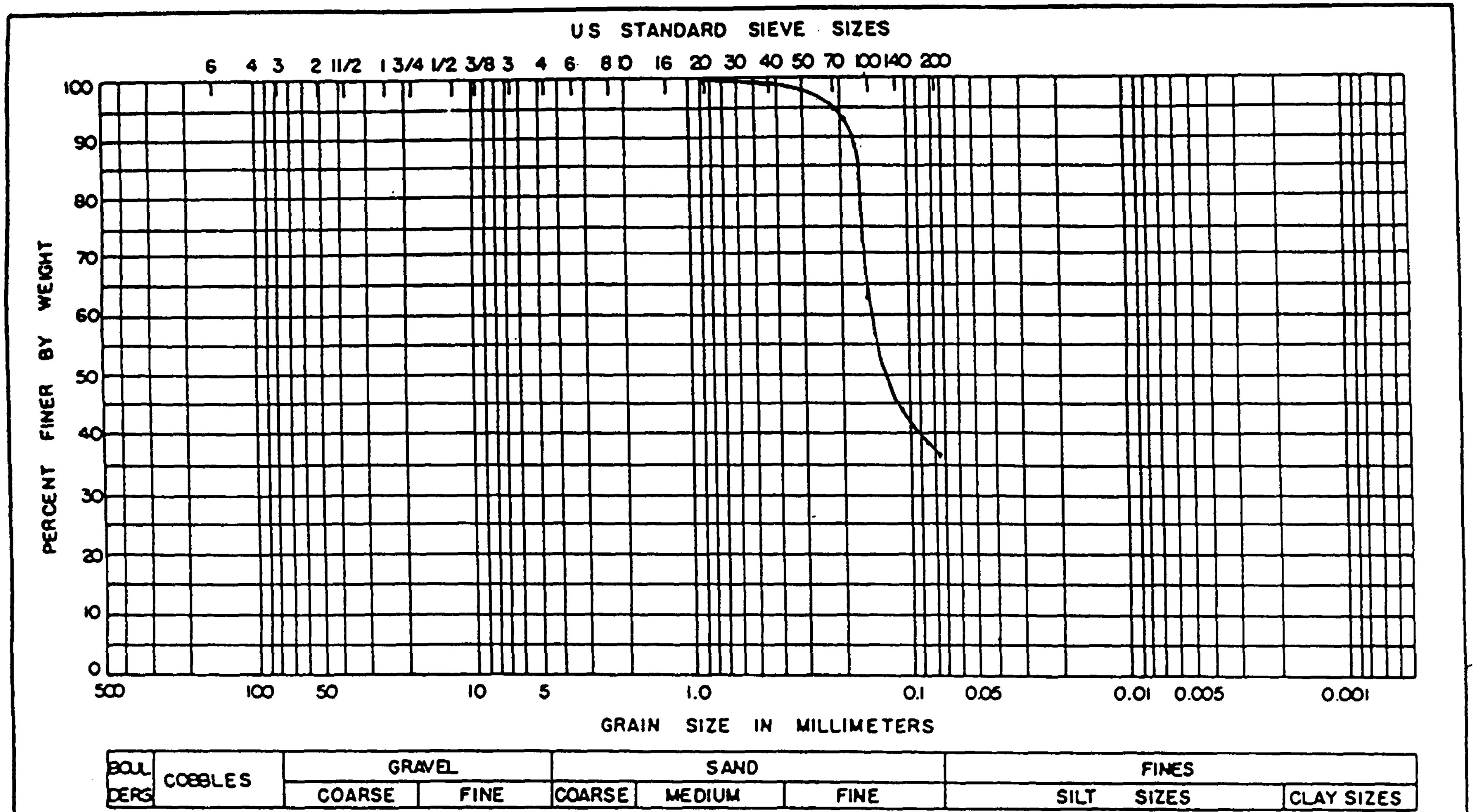


BORING NO.	ELEV. OR DEPTH	NAT WC	LL	PL	PI	CLASSIFICATION
W-1	23-25	18.9				Poorly Graded Fine SAND w/ Silt & Clay (SP-SM/SC)

GRAIN SIZE DISTRIBUTION

JOB NO. 1233-86-053

SOIL & MATERIAL ENGINEERS, INC.

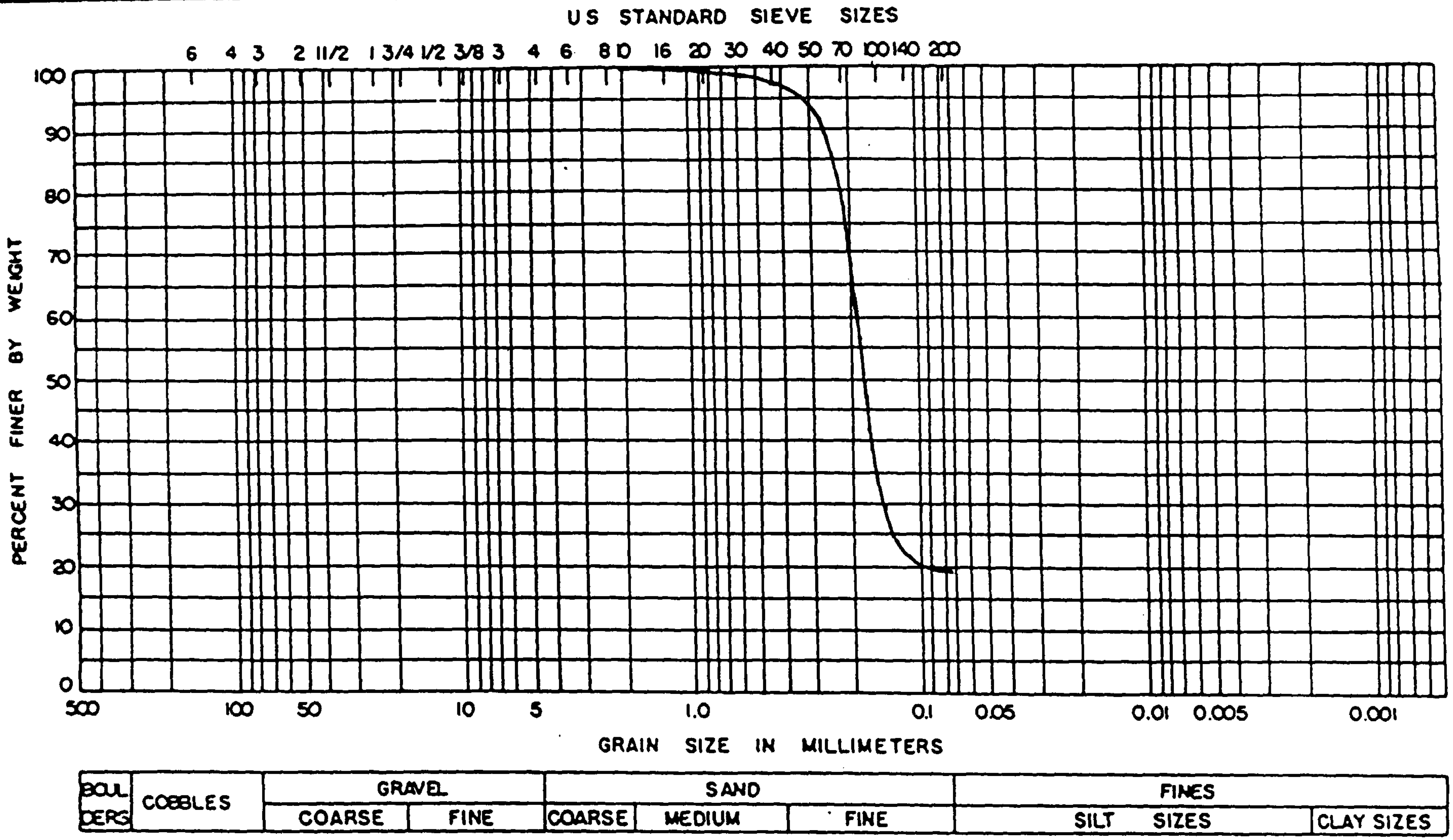


BORING NO.	ELEV. OR DEPTH	NAT WC	LL	PL	PI	CLASSIFICATION
W-3	4-6	12.2				

GRAIN SIZE DISTRIBUTION

JOB NO 1233-86-053

SOIL & MATERIAL ENGINEERS, INC.

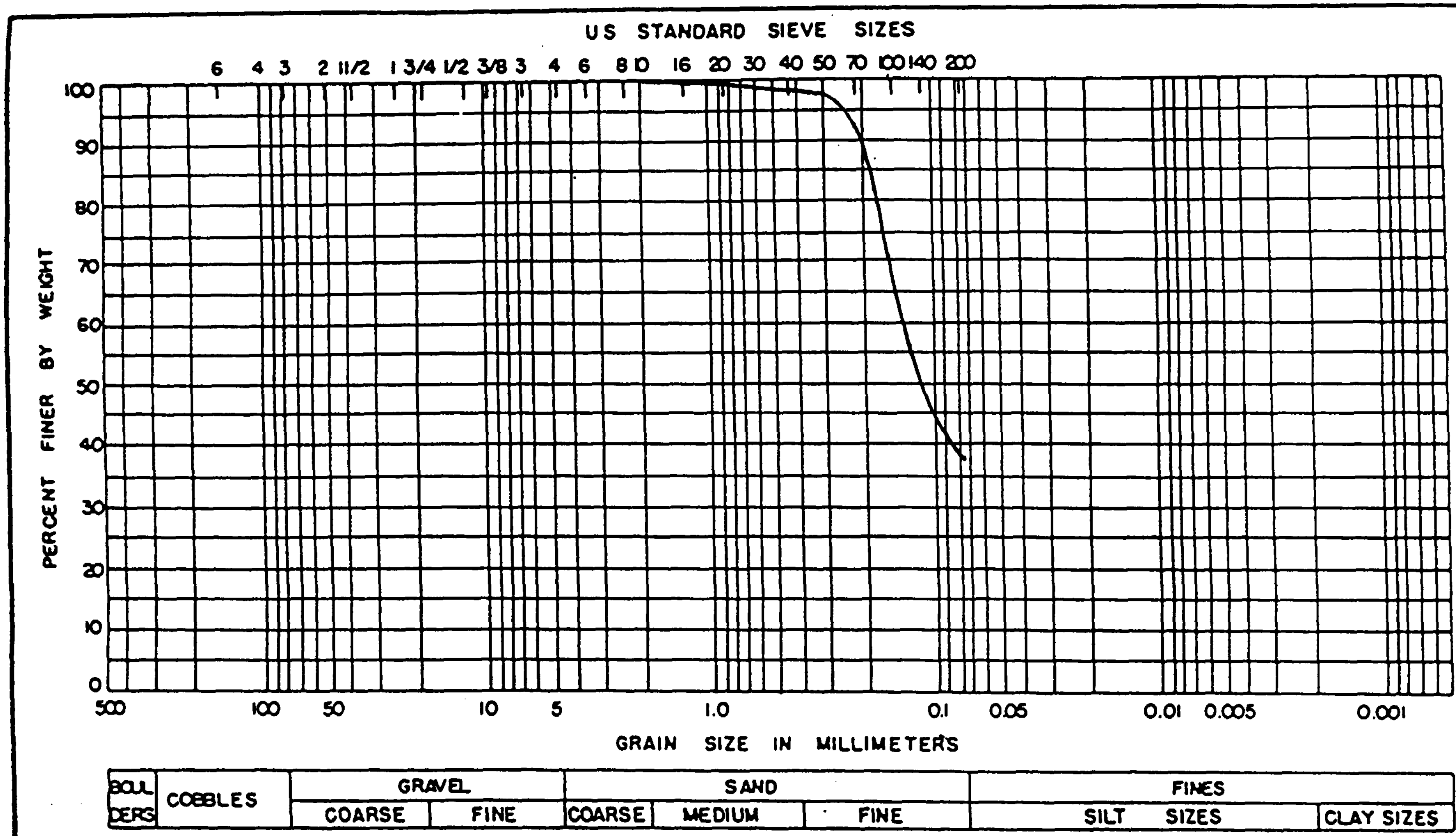


BORING NO.	ELEV. OR DEPTH	NAT WC	LL	PL	PI	CLASSIFICATION
W-4	15-17	11.0				

GRAIN SIZE DISTRIBUTION

JOB NO. 1233-86-053

SOIL & MATERIAL ENGINEERS, INC.

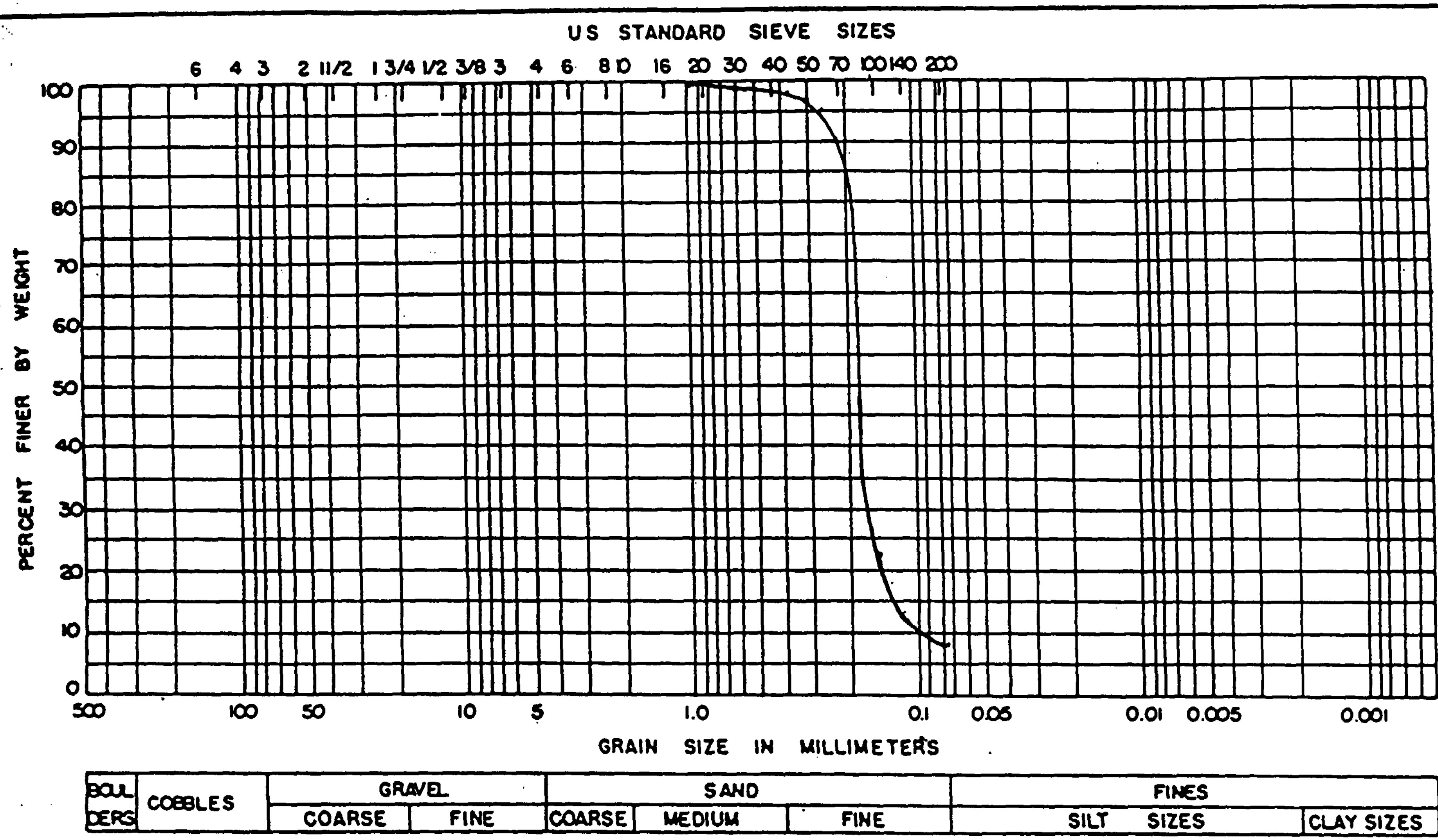


BORING NO.	ELEV. OR DEPTH	NAT WC	LL	PL	PI	CLASSIFICATION
W6	6 - 8	32.7				Silty Clayey Fine SAND (SM-SC)

GRAIN SIZE DISTRIBUTION

JOB NO. 1233-86-053

SOIL & MATERIAL ENGINEERS, INC.

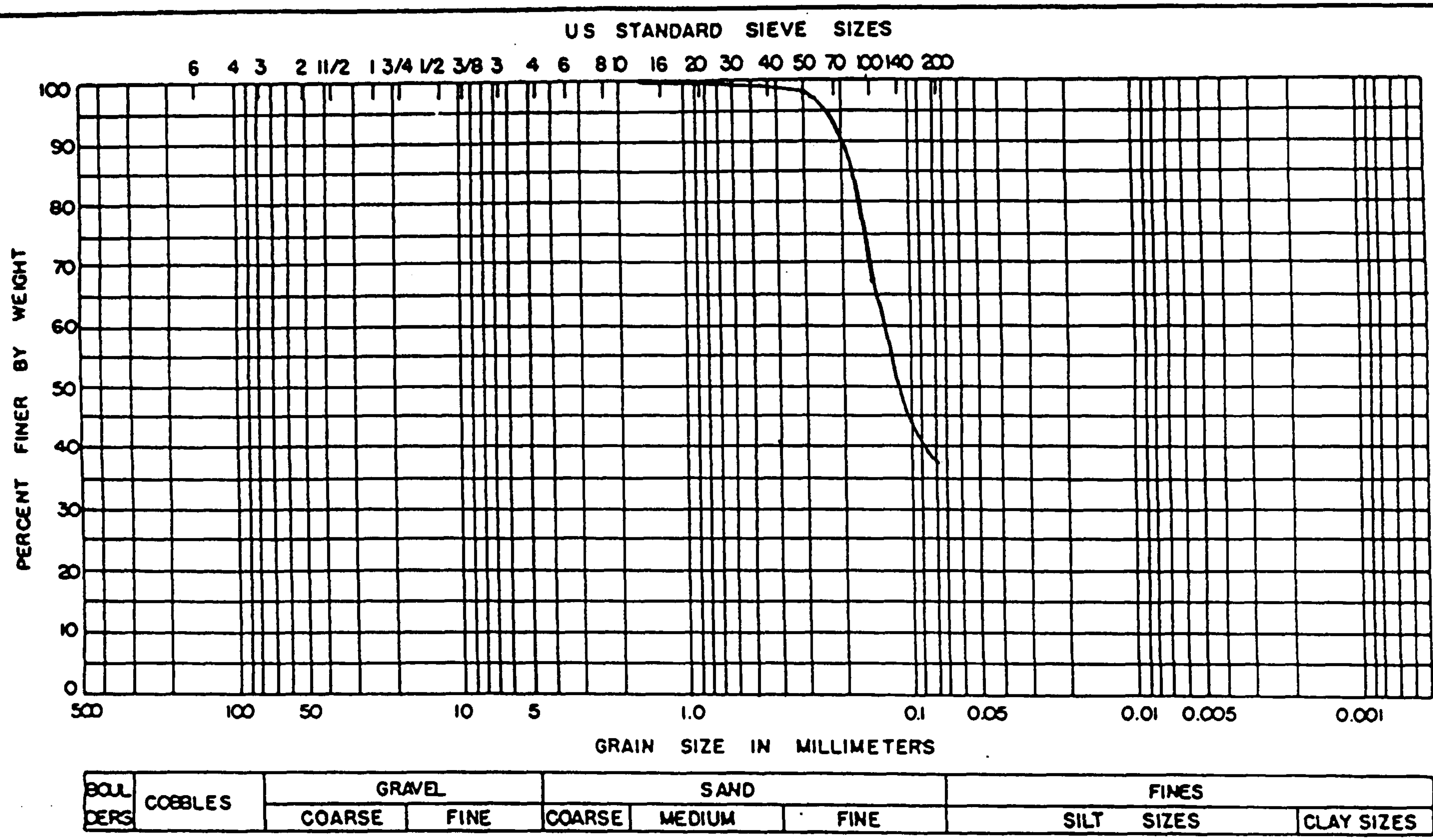


BORING NO.	ELEV. OR DEPTH	NAT WC	LL	PL	PI	CLASSIFICATION
W6	16 - 18	31.7				Poorly Graded Fine SAND with Silt & Clay Veins (SP-SM/CL)

GRAIN SIZE DISTRIBUTION

JOB NO. 1233-86-053

SOIL & MATERIAL ENGINEERS, INC.



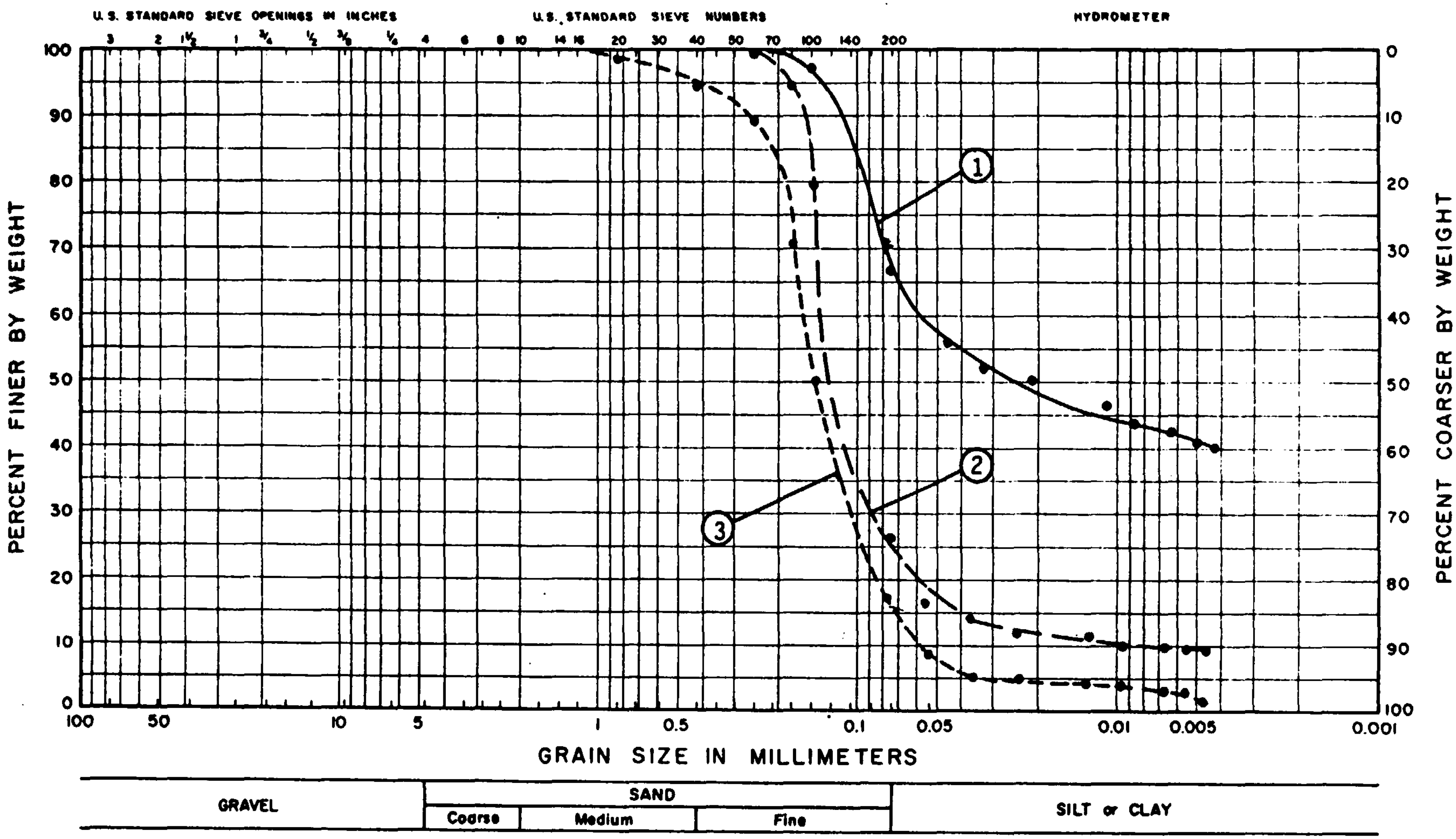
BORING NO.	ELEV. OR DEPTH	NAT WC	LL	PL	PI	CLASSIFICATION
W7	9 - 11	40.1				Very Clayey Fine SAND (SC)

GRAIN SIZE DISTRIBUTION

JOB NO. 1233-86-053

SOIL & MATERIAL ENGINEERS, INC.

GRAIN SIZE CURVES



Curve No.	Boring No.	Depth (feet)	Description
1	W-13	5 - 7	Tan & red clay (CH) w/sand pockets & silt laminations
2	W-13	15 - 17	Gray & dark gray clayey sand (SC) (fine)
3	W-13	25 - 27	Gray & dark gray silty, slightly clayey sand (SM-SC)

CONSTANT HEAD PERMEABILITY TEST REPORT

JOB NO. 4186-158	JOB NAME G&E Engineering	BORING/PIT NO. B-1
REVIEWED	LOCATION	SAMPLE IDENT.
DATE 4/3/86	TEST PROCD. EM 1110-2-1906 App. VII	DEPTH/ELEV. 45-47'
SPECIMEN DESCRIPTION: Dark Gray Clay With Sand		SPECIMEN DIAMETER, in. 1.416
		SPECIMEN HEIGHT, in. 1.288

INDEX PROPERTIES	LL: 109	PI: 77	Gs: 267	%Fines: 86.57

Hydraulic Conductivity, K x 10⁻ cm/s

Flow in Pore Volumes, Qp, %

			SPECIMEN NO.	1	2	3
INITIAL	WATER CONTENT, %	Wo		70.51		
	DRY DENSITY, PCF	Ydo		58.4		
	SATURATION, %	So		92.07		
	VOID RATIO	eo		20446		
AFTER CONSOLIDATION	WATER CONTENT, %	Wc		68.99		
	DRY DENSITY, PCF	Ydc		59.2		
	SATURATION, %	Sc		101.71		
	VOID RATIO	ec		1.8110		
	FINAL BACK PRESSURE, PSI	Uo		20.0		
	EFFECTIVE CONSOLIDATION PRESSURE, PSI	$\bar{\sigma}_3$		12.6		
PERMEATION	PORE PRESSURE DIFFERENCE, PSI	ΔUo		30.2		
	HYDRAULIC GRADIENT	i		650		
	AVG. TEMP. PERMEANT, oC	T		20.7		
	TOTAL FLOW, CC	Qc		23.2		
	TOTAL FLOW PORE VOLUMES, %	Qp		117.3		

	SPECIMEN NUMBER 1	2	3
HYDRAULIC CONDUCTIVITY, K x 10⁻ cm/s	2.7×10^{-8}		

PERMEANT PROPERTIES

PERMEANT DESCRIPTION:

Tap Water

SPECIFIC Wt., DYNES	VISCOSITY, POISE

REMOLDED SOIL PROPERTIES

TEST PROCEDURE:

MAXIMUM DRY DENSITY, PCF	OPTIMUM MOISTURE CONTENT, %

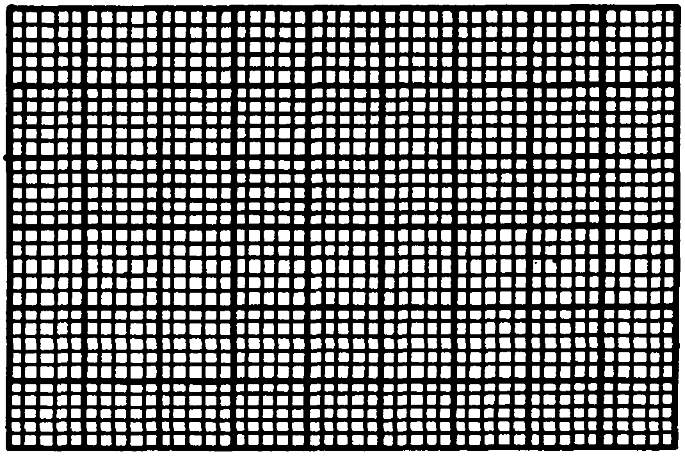
SOIL & MATERIAL ENGINEERS, INC.

77115

CONSTANT HEAD PERMEABILITY TEST REPORT

JOB NO. 4186-158	JOB NAME G&E Engineering	BORING/PIT NO. B-2
REVIEWED	LOCATION	SAMPLE IDENT.
DATE 4/3/86	TEST PROCD. EM 1110-2-1906 App. VII	DEPTH/ELEV. 23-25'
SPECIMEN DESCRIPTION		SPECIMEN DIAMETER, in. 1.381
		SPECIMEN HEIGHT, in. 1.288

INDEX PROPERTIES	LL: --	PI: --	Gs: 2.69	%Fines: --



	SPECIMEN NUMBER 1	2	3
HYDRAULIC CONDUCTIVITY, K x 10⁻ cm/s	1.8 x 10-5		

	SPECIMEN NO.		1	2	3
INITIAL	WATER CONTENT, %	Wo	25.91		
	DRY DENSITY, PCF	Ydo	90.3		
	SATURATION, %	So	78.73		
	VOID RATIO	eo	.8852		
AFTER CONSOLIDATION	WATER CONTENT, %	Wc	39.51		
	DRY DENSITY, PCF	Ydc	92.1		
	SATURATION, %	Sc	129.21		
	VOID RATIO	ec	.8226		
	FINAL BACK PRESSURE, PSI	Uo	20.0		
	EFFECTIVE CONSOLIDATION PRESSURE, PSI	$\bar{\sigma}_3$	10.1		
PERMEATION	PORE PRESSURE DIFFERENCE, PSI	ΔUo	9.3		
	HYDRAULIC GRADIENT	i	200		
	AVG. TEMP. PERMEANT, oC	T	23.6		
	TOTAL FLOW, CC	Qc	240		
	TOTAL FLOW PORE VOLUMES, %	Qp	1739.76		

PERMEANT PROPERTIES	
PERMEANT DESCRIPTION:	
SPECIFIC Wt., DYNES	VISCOSITY, POISE

REMOLDED SOIL PROPERTIES	
TEST PROCEDURE:	
MAXIMUM DRY DENSITY, PCF	OPTIMUM MOISTURE CONTENT, %

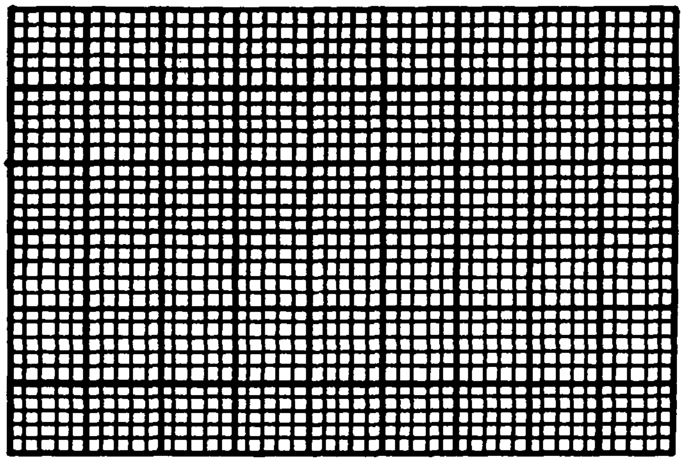
72115

SOIL & MATERIAL ENGINEERS, INC.

CONSTANT HEAD PERMEABILITY TEST REPORT

JOB NO. 4186-158	JOB NAME G&E Engineering	BORING/PIT NO. W-1
REVIEWED	LOCATION	SAMPLE IDENT.
DATE 4/3/86	TEST PROCD. EM 1110-2-1906 App VII	DEPTH/ELEV. 16-18'
SPECIMEN DESCRIPTION: Dark Gray Clay With Sand		SPECIMEN DIAMETER, in. 1.392
		SPECIMEN HEIGHT, in. .851

INDEX PROPERTIES	LL: 119	PI: 84	Gs: 2.70	%Fines: --



SPECIMEN NO.			1	2	3
INITIAL	WATER CONTENT, %	Wo	72.24		
	DRY DENSITY, PCF	Ydo	50.8		
	SATURATION, %	So	84.24		
	VOID RATIO	eo	2.3156		
AFTER CONSOLIDATION	WATER CONTENT, %	Wc	95.82		
	DRY DENSITY, PCF	Ydc	51.8		
	SATURATION, %	Sc	114.84		
	VOID RATIO	ec	2.2531		
	FINAL BACK PRESSURE, PSI	Uo	38.0		
	EFFECTIVE CONSOLIDATION PRESSURE, PSI	$\bar{\sigma}_3$	5.1		
PERMEATION	PORE PRESSURE DIFFERENCE, PSI	ΔUo	15.4		
	HYDRAULIC GRADIENT	I	500		
	AVG. TEMP. PERMEANT, oC	T	23.0		
	TOTAL FLOW, CC	Qc	40.3		
	TOTAL FLOW PORE VOLUMES, %	Qp	279.4		

	SPECIMEN NUMBER 1	2	3
HYDRAULIC CONDUCTIVITY, K x 10⁻ cm/s	3.2x 10-8		

PERMEANT PROPERTIES	
PERMEANT DESCRIPTION: Tap Water	
SPECIFIC Wt., DYNES	VISCOSITY, POISE

REMOLDED SOIL PROPERTIES	
TEST PROCEDURE:	
MAXIMUM DRY DENSITY, PCF	OPTIMUM MOISTURE CONTENT, %

7218

SOIL & MATERIAL ENGINEERS, INC.

B.4 MONITOR WELL INSTALLATION.

B.3.1 Twelve (12) truck-mounted augered monitor wells were installed to various depths. One (1) monitor well was installed using a hand auger. Refer to Section 4.5 of this report for specific depths of installation. Ten foot well screens were used for all wells with the exception of W-8, in which a five foot screen was placed. The general details for construction of the truck-mounted augered monitor wells are shown as follows:

a) The monitoring wells were installed in 6 inch diameter borings;

b) The well casings used were 2 inch ID, Schedule 40, PVC;

c) All joint connections were threaded (no glues were used);

d) The well screen was of commercial quality (0.010 inch slots), Schedule 40, PVC, with a bottom plug;

e) The sand pack was graded to minimize siltation of the well screen;

f) A 12 to 24 inch layer of bentonite pellets was placed above the well screen;

g) Grout was placed above the bentonite pellets which consisted of a thick bentonite-cement mix (As described in Section A.2) and was carefully placed to as to completely fill the annulus and not disturb the bentonite seal;

h) The tops of the well casings are approximately three (3) feet above the ground surface (See monitor well cross section details later in this section for specifics), capped, and vented; and

i) A commercial quality steel shroud and a concrete pad were installed at each monitor well location to protect against damage due to site activities.

The general construction details for the hand augered monitor well was the same as those augered by a truck rig with the following exceptions:

a) The monitor well was installed in a 4-inch diameter boring;

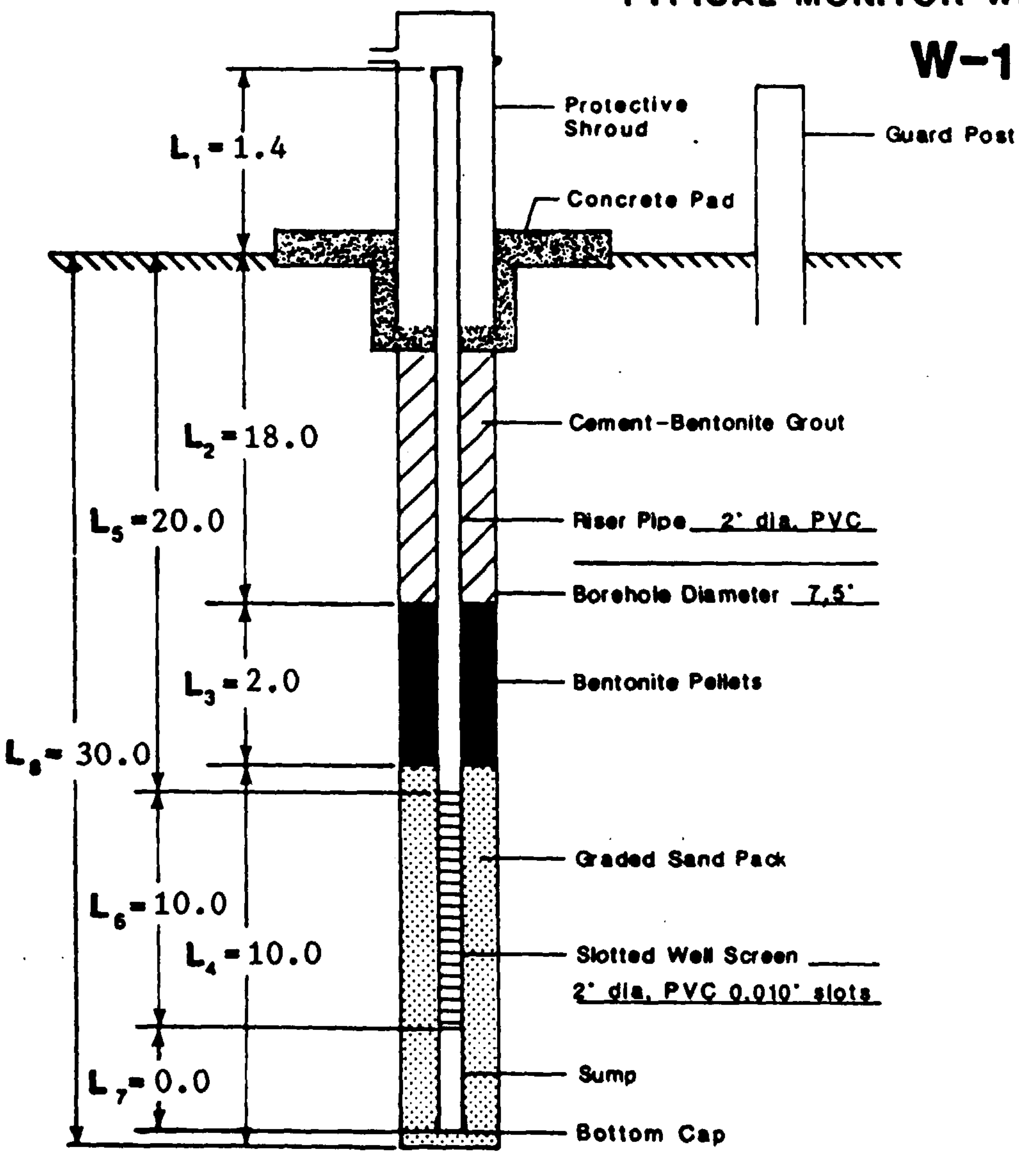
b) A new auger bit was used and none of the shaft pieces used in the drilling of the borehole had been previously used at the site; and

c) Care was taken in inspection of cuttings for signs of contamination, however, no visual evidence of contamination was found in the cuttings.

Construction details of the monitor wells are graphically shown on the following well cross sections.

TYPICAL MONITOR WELL SECTION

W-1



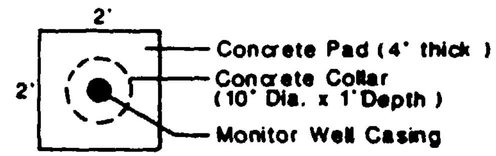
SECTION VIEW

NOTE: All dimensions are in feet.

Elev. Top of Riser 11.06
Elev. Ground Surface 9.8
Screened Interval -10.2 to -20.2

Construction Notes:
Annulus grouted using thick bentonite-cement mix.

Remarks Elevations referenced to feet NGVD.
Well dimensions are in feet.



PLAN VIEW

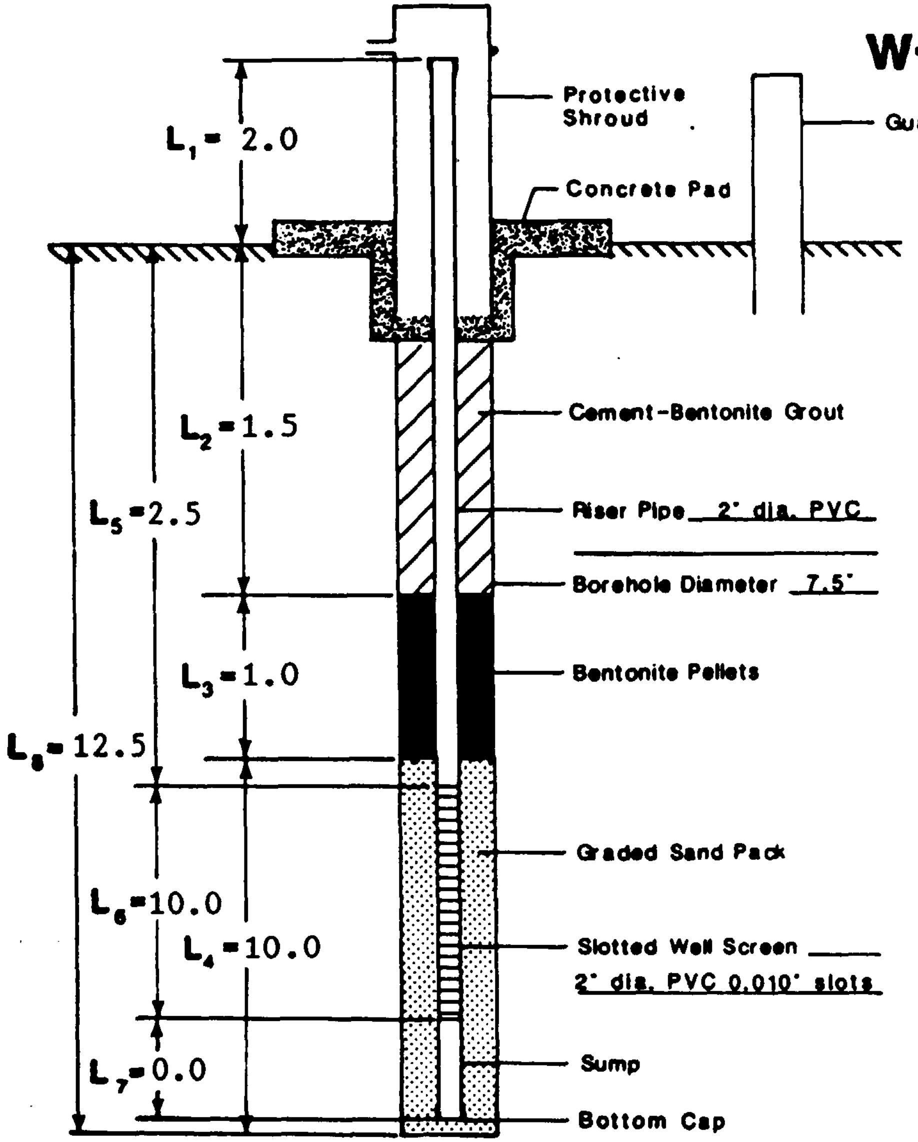
G&E ENGINEERING, INC.
GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
Columbia, South Carolina

3-7-86 Date	86-1008 File No.	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS INC. LOBECO, SOUTH CAROLINA Project Title	TYPICAL MONITOR WELL SECTION	Fig. No.
ABL Drawn by	MJR Ckd. by				

BRUNING 44-132 64819

TYPICAL MONITOR WELL SECTION

W-2



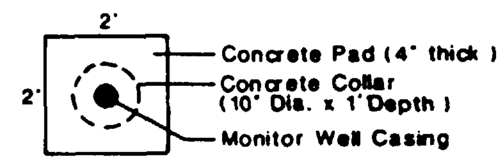
SECTION VIEW

NOTE: All dimensions are in feet.

Elev. Top of Riser	12.1
Elev. Ground Surface	10.1
Screened Interval	7.6 to -2.4

Construction Notes: Annulus grouted using thick bentonite-cement mix.

Remarks: Elevations referenced to feet NGVD. Well dimensions are in feet.



PLAN VIEW

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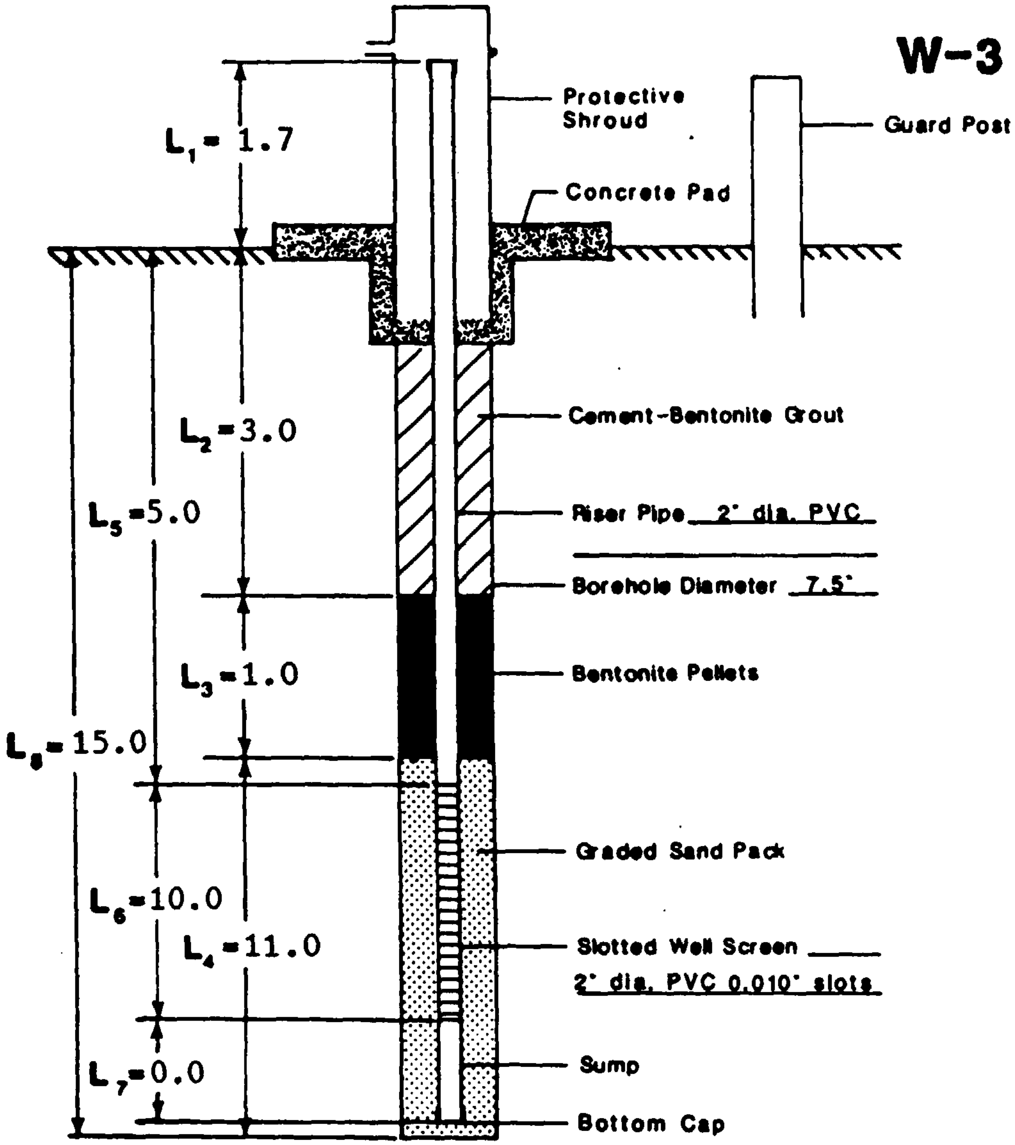
Columbia, South Carolina

3-7-86 Date	86-1008 File No.	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS INC. LOBECO, SOUTH CAROLINA Project Title	TYPICAL MONITOR WELL SECTION	Fig. No.
ABL Drawn by	MJR Ckd. by				

BRUNING 44-132 64819

TYPICAL MONITOR WELL SECTION

W-3



SECTION VIEW

NOTE: All dimensions are in feet.

Elev. Top of Riser 14.4

Elev. Ground Surface 12.7

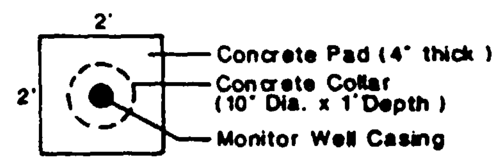
Screened Interval 7.7 to -2.3

Construction Notes:

Annulus grouted using thick bentonite-cement mix.

Remarks: Elevations referenced to feet NGVD.

Well dimensions are in feet.



PLAN VIEW

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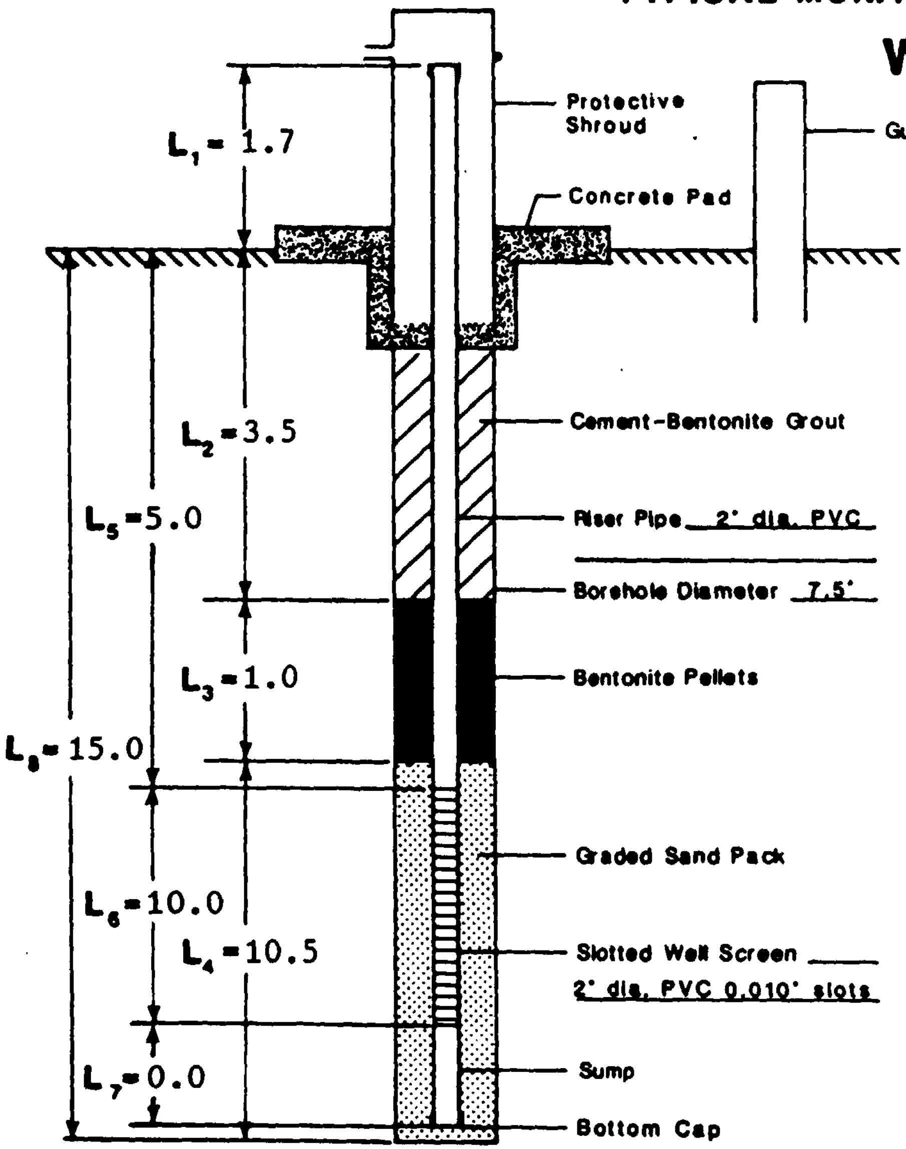
Columbia, South Carolina

3-7-86 Date	86-1008 File No.	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS INC. LOBECO, SOUTH CAROLINA Project Title	TYPICAL MONITOR WELL SECTION
ABL Drawn by	MJR Ckd. by			Fig. No.

BRUNING 44-132 64819

TYPICAL MONITOR WELL SECTION

W-4



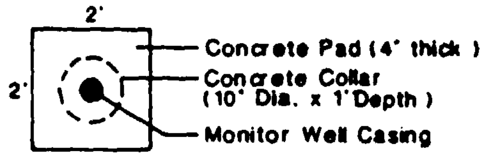
SECTION VIEW

Elev. Top of Riser	14.2
Elev. Ground Surface	12.5
Screened Interval	7.5 to -2.5

Construction Notes:

Annulus grouted using thick bentonite-cement mix.

Remarks: Elevations referenced to feet NGVD.
Well dimensions are in feet.



PLAN VIEW

NOTE: All dimensions are in feet.

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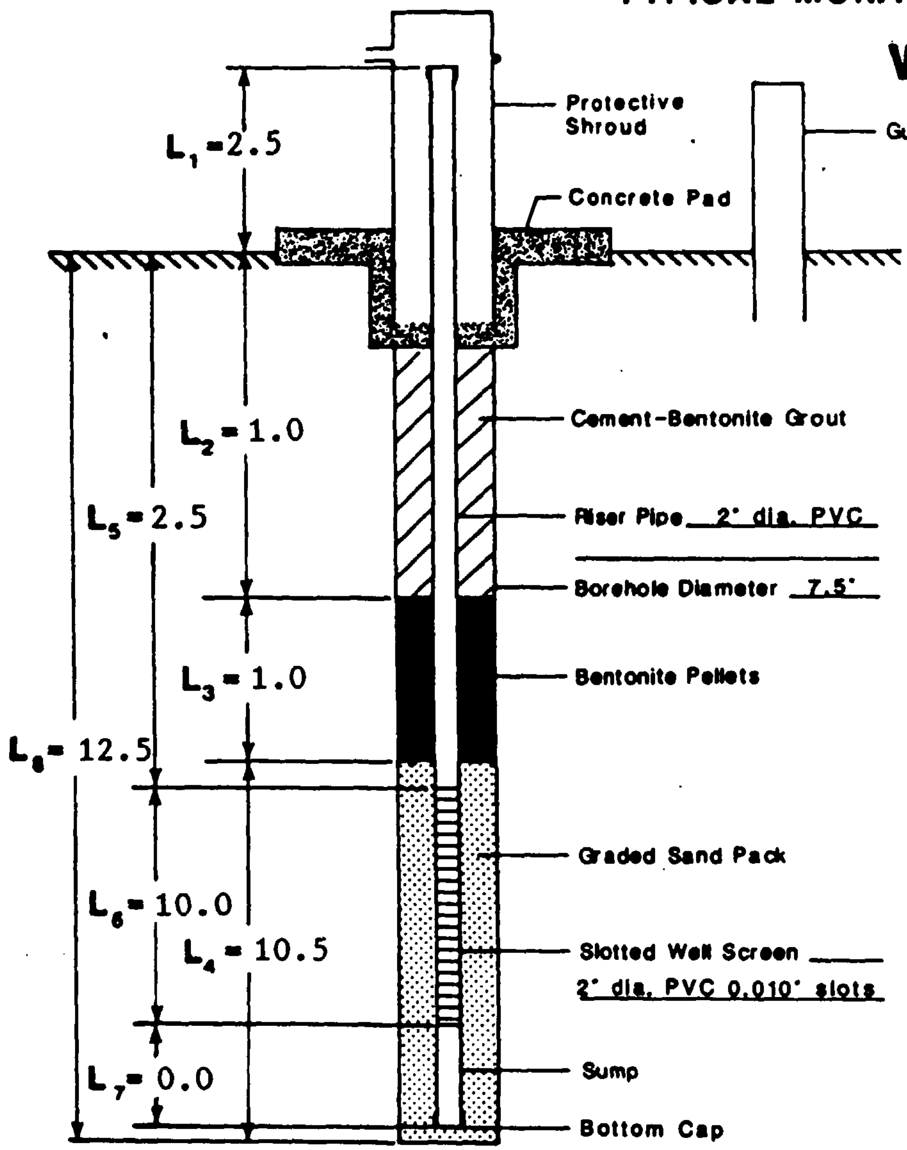
3-7-86 Date	86-1008 File No.	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS INC. LOBECO, SOUTH CAROLINA Project Title	TYPICAL MONITOR WELL SECTION	Fig. No.
ABL Drawn by	MJR Ckd. by				

BRUNING 44-132 64819

TYPICAL MONITOR WELL SECTION

W-5



SECTION VIEW

NOTE: All dimensions are in feet.

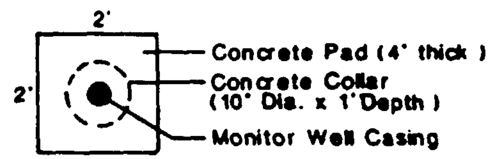
Elev. Top of Riser	8.8
Elev. Ground Surface	6.3
Screened Interval	3.8 to -6.2

Construction Notes:

Annulus grouted using thick bentonite-cement mix.

Remarks: Elevations referenced to feet NGVD.

Well dimensions are in feet.



PLAN VIEW

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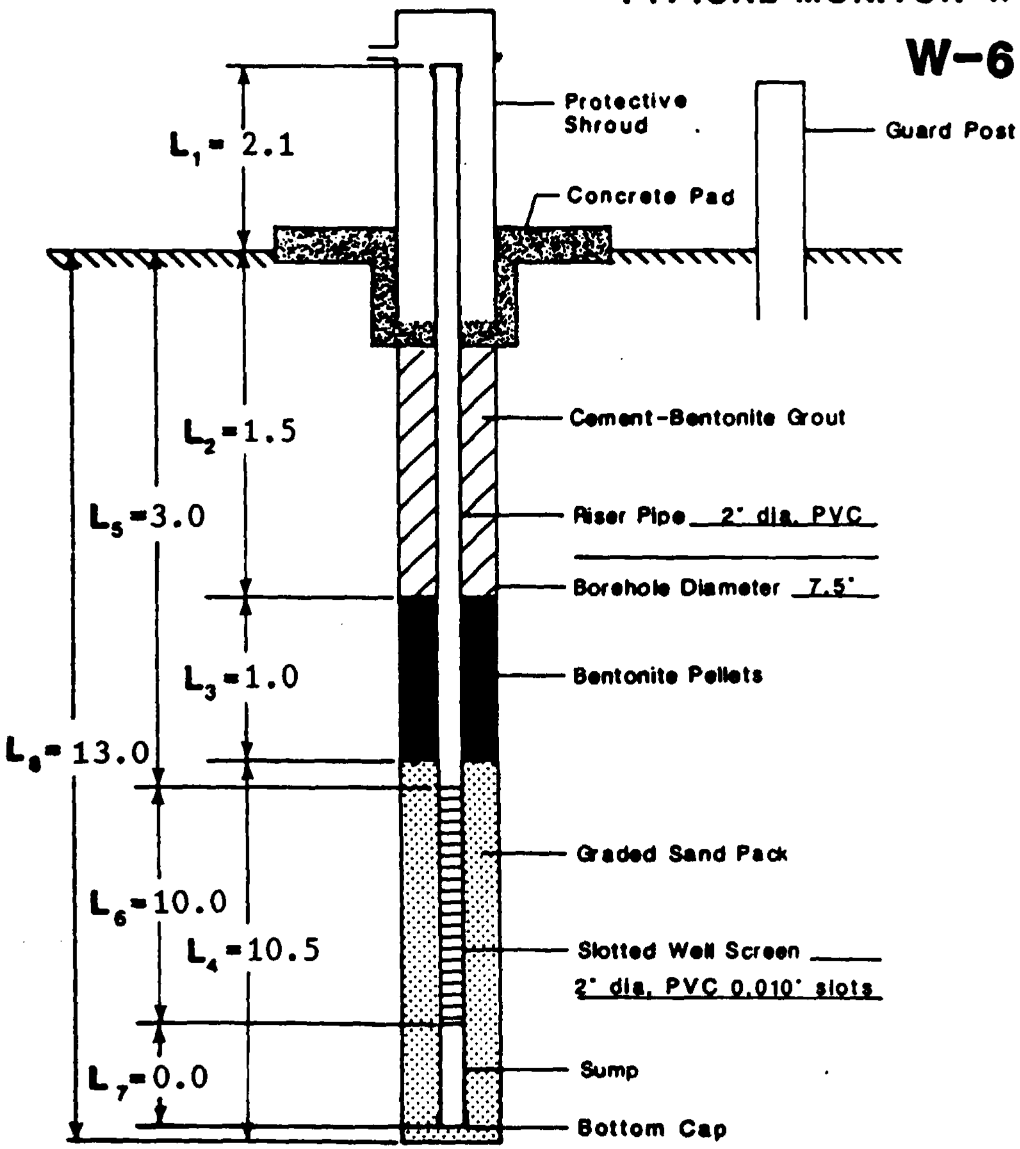
GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
Columbia, South Carolina

3-7-86 Date	86-1008 File No.	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS INC. LOBECO, SOUTH CAROLINA Project Title	TYPICAL MONITOR WELL SECTION
ABL Drawn by	MJR Ckd. by			Fig. No.

BRUNING 44-132 64819

TYPICAL MONITOR WELL SECTION

W-6



SECTION VIEW

NOTE: All dimensions are in feet.

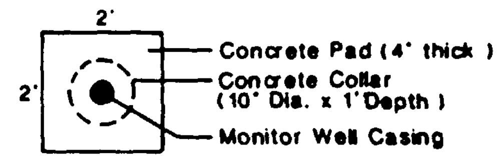
Elev. Top of Riser	21.5
Elev. Ground Surface	19.4
Screened Interval	16.4 to 6.4

Construction Notes:

Annulus grouted using thick bentonite-cement mix.

Remarks: Elevations referenced to feet NGVD.

Well dimensions are in feet.



PLAN VIEW

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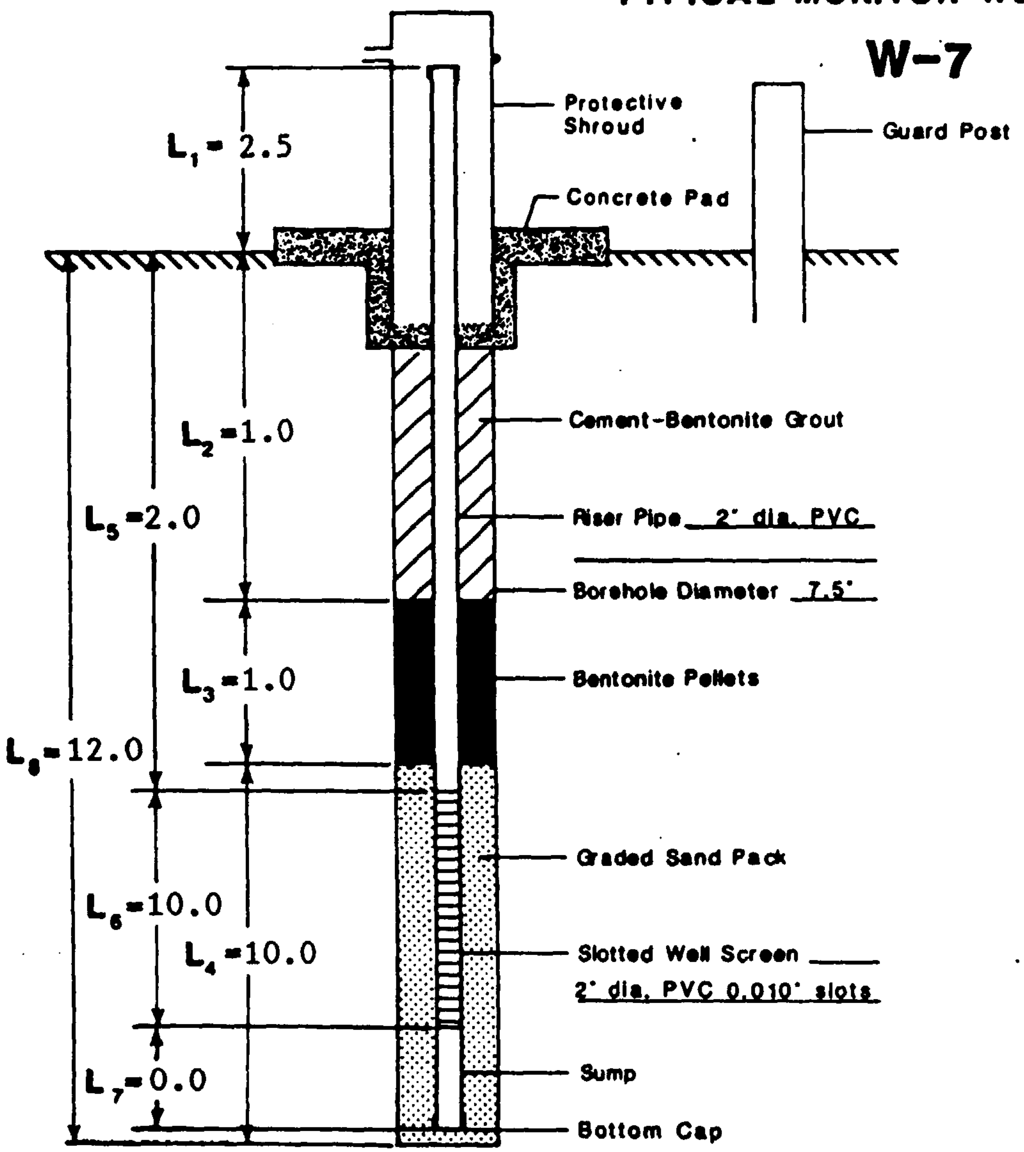
GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
Columbia, South Carolina

3-7-86 Date	86-1008 File No.	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS INC. LOBECO, SOUTH CAROLINA Project Title	TYPICAL MONITOR WELL SECTION	Fig. No.
ABL Drawn by	MJR Ckd. by				

BRUNING 44-132 64819

TYPICAL MONITOR WELL SECTION

W-7



SECTION VIEW

NOTE: All dimensions are in feet.

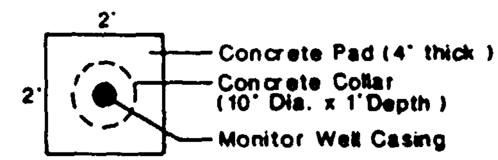
Elev. Top of Riser	21.8
Elev. Ground Surface	19.3
Screened Interval	17.3 to 7.3

Construction Notes:

Annulus grouted using thick bentonite-cement mix.

Remarks: Elevations referenced to feet NGVD.

Well dimensions are in feet.



PLAN VIEW

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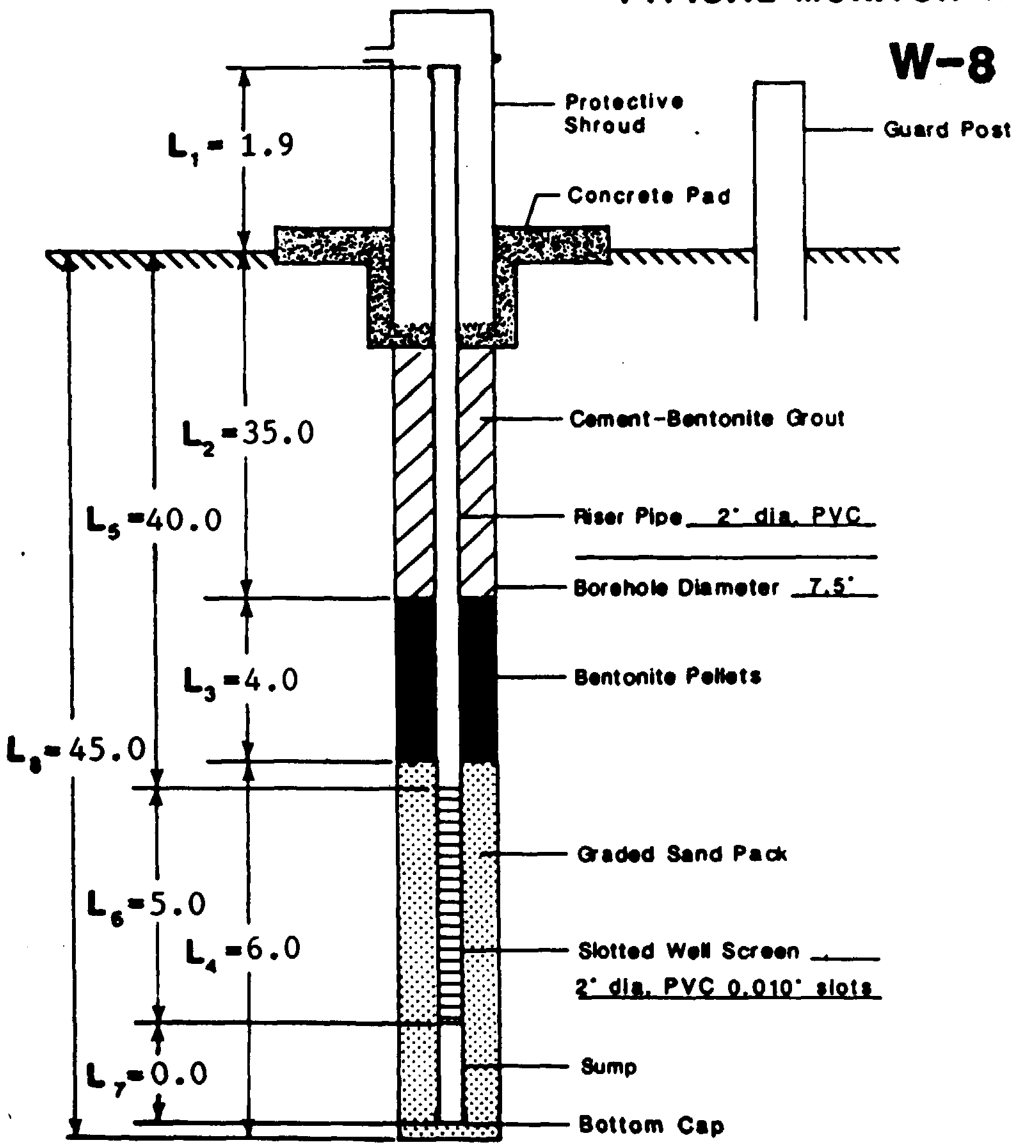
GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
Columbia, South Carolina

3-7-86 Date	86-1008 File No.	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS INC. LOBECO, SOUTH CAROLINA Project Title	TYPICAL MONITOR WELL SECTION	Fig. No.
ABL Drawn by	MJR Ckd. by				

BRUNING 44-132 54619

TYPICAL MONITOR WELL SECTION

W-8



SECTION VIEW

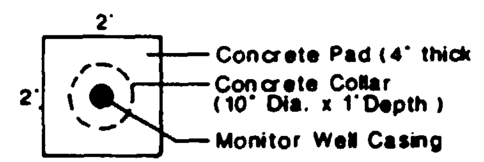
Elev. Top of Riser 11.1

Elev. Ground Surface 9.2

Screened Interval -30.8 to -35.8

Construction Notes: Annulus grouted using thick bentonite-cement mix.

Remarks: Elevations referenced to feet NGVD. Well dimensions are in feet.



PLAN VIEW

NOTE: All dimensions are in feet.

G&E ENGINEERING, INC.
GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
Columbia, South Carolina

3-7-88 Date	88-1008 File No.	
ABL Drawn by	MJR Ckd. by	

VENTURE CHEMICALS, INC.
LOBECO, SOUTH CAROLINA
Client

ENVIRONMENTAL ASSESSMENT
VENTURE CHEMICALS INC.
LOBECO, SOUTH CAROLINA
Project Title

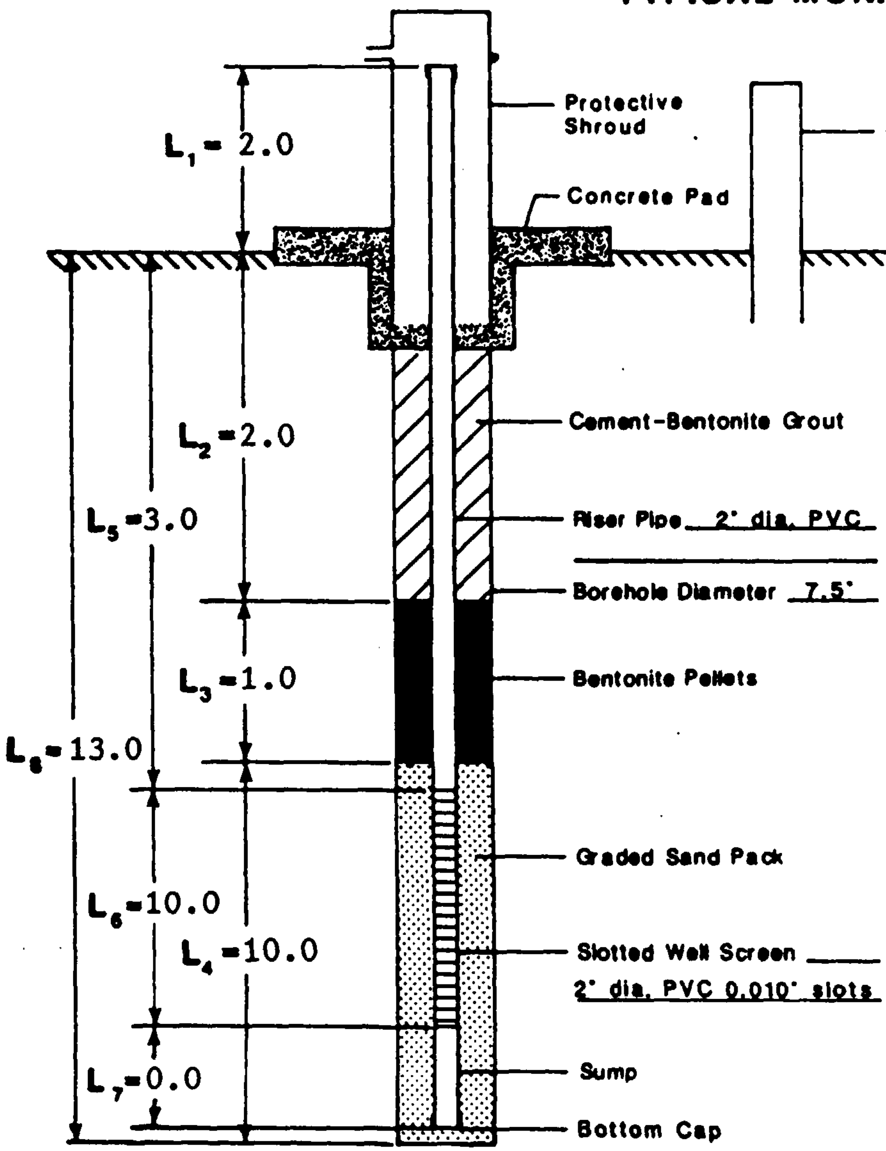
TYPICAL MONITOR WELL SECTION

Fig. No.

BRUNING 44-132 64819

TYPICAL MONITOR WELL SECTION

W-9

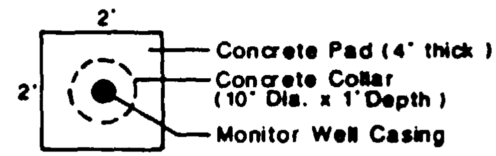


SECTION VIEW

Elev. Top of Riser	19.1'
Elev. Ground Surface	15.8'
Screened Interval	2.8-12.8'

Construction Notes: Annulus grouted using thick bentonite-cement mix.

Remarks: Elevations referenced to feet NGVD. Well dimensions are in feet.



PLAN VIEW

NOTE: All dimensions are in feet.

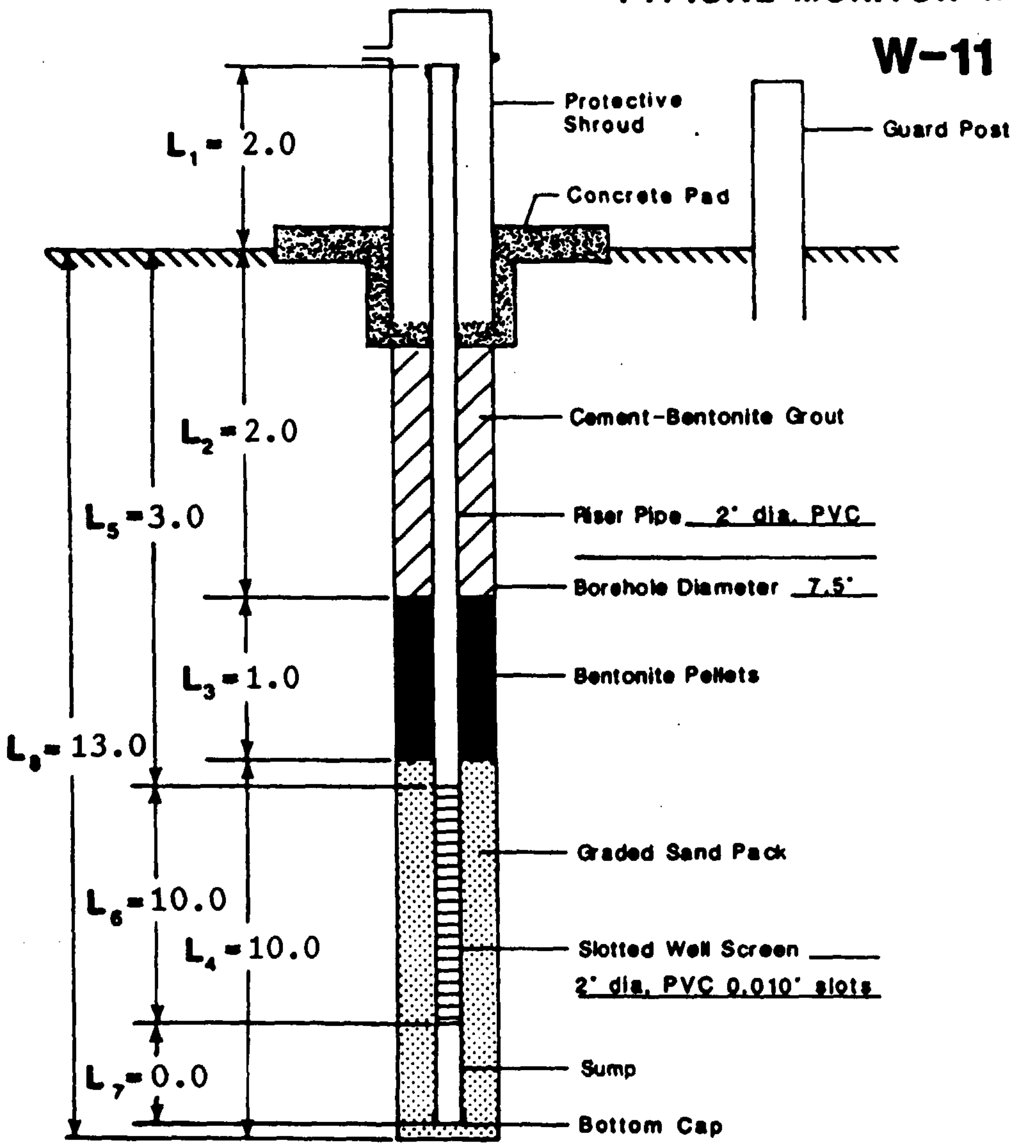
G&E ENGINEERING, INC.
GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
Columbia, South Carolina

Date	File No.	Client	Project Title		Fig. No.
3-7-86	86-1008	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS INC. LOBECO, SOUTH CAROLINA	TYPICAL MONITOR WELL SECTION	
Drawn by: ABL	Ckd. by: MJR				

BRUNING 44-132 64819

TYPICAL MONITOR WELL SECTION

W-11



SECTION VIEW

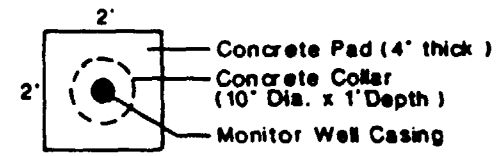
NOTE: All dimensions are in feet.

Elev. Top of Riser	18.2'
Elev. Ground Surface	16.3'
Screened Interval	3.3-13.3'

Construction Notes:

Annulus grouted using thick bentonite-cement mix.

Remarks: Elevations referenced to feet NGVD.
Well dimensions are in feet.



PLAN VIEW

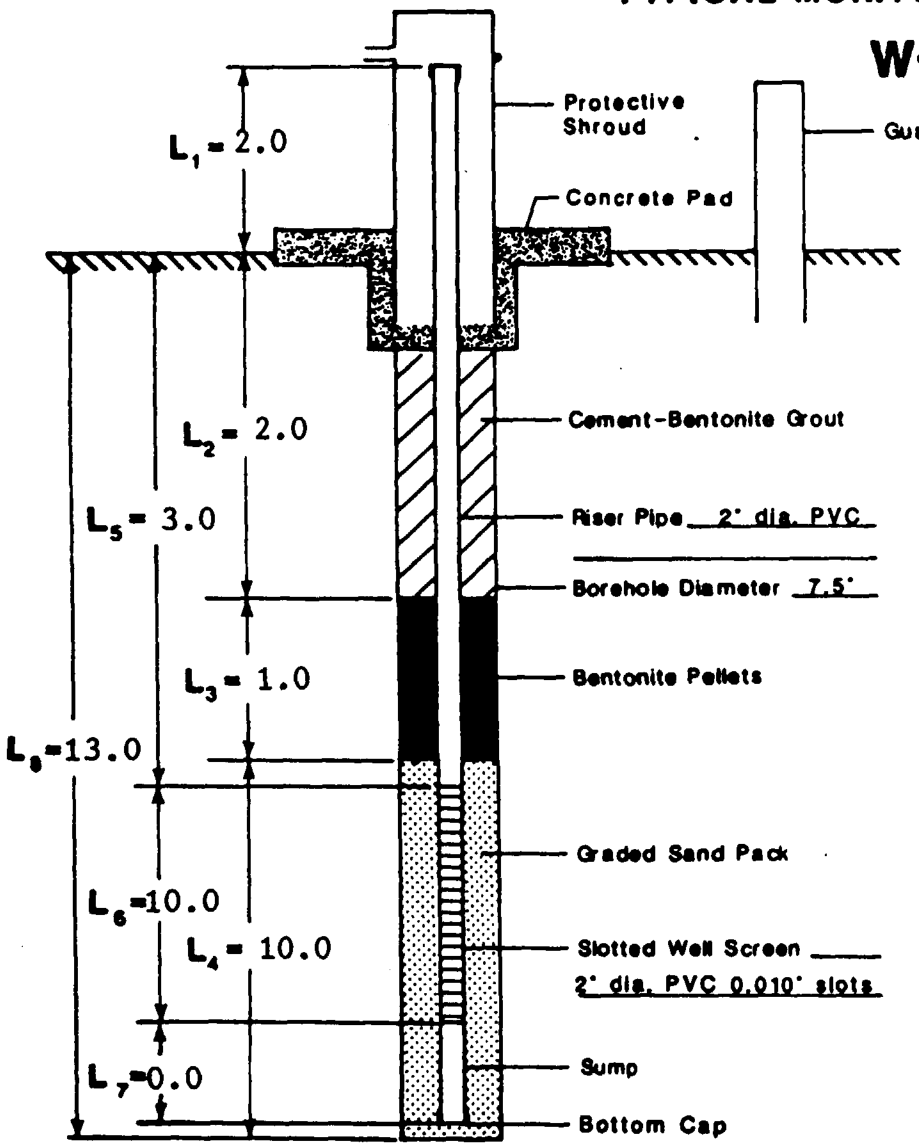
G&E ENGINEERING, INC.
GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
Columbia, South Carolina

3-7-86 Date	86-1008 File No.		VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS INC. LOBECO, SOUTH CAROLINA Project Title	TYPICAL MONITOR WELL SECTION
ABL Drawn by	MJR Ckd. by				Fig. No.

BRUNING 44-132 64819

TYPICAL MONITOR WELL SECTION

W-10



SECTION VIEW

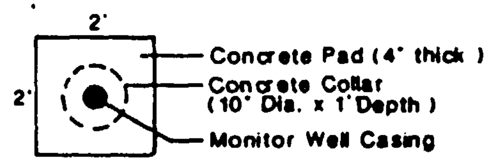
Elev. Top of Riser	20.9'
Elev. Ground Surface	18.6'
Screened Interval	5.6-15.6'

Construction Notes:

Annulus grouted using thick bentonite-cement mix.

Remarks: Elevations referenced to feet NGVD.

Well dimensions are in feet.



PLAN VIEW

NOTE: All dimensions are in feet.

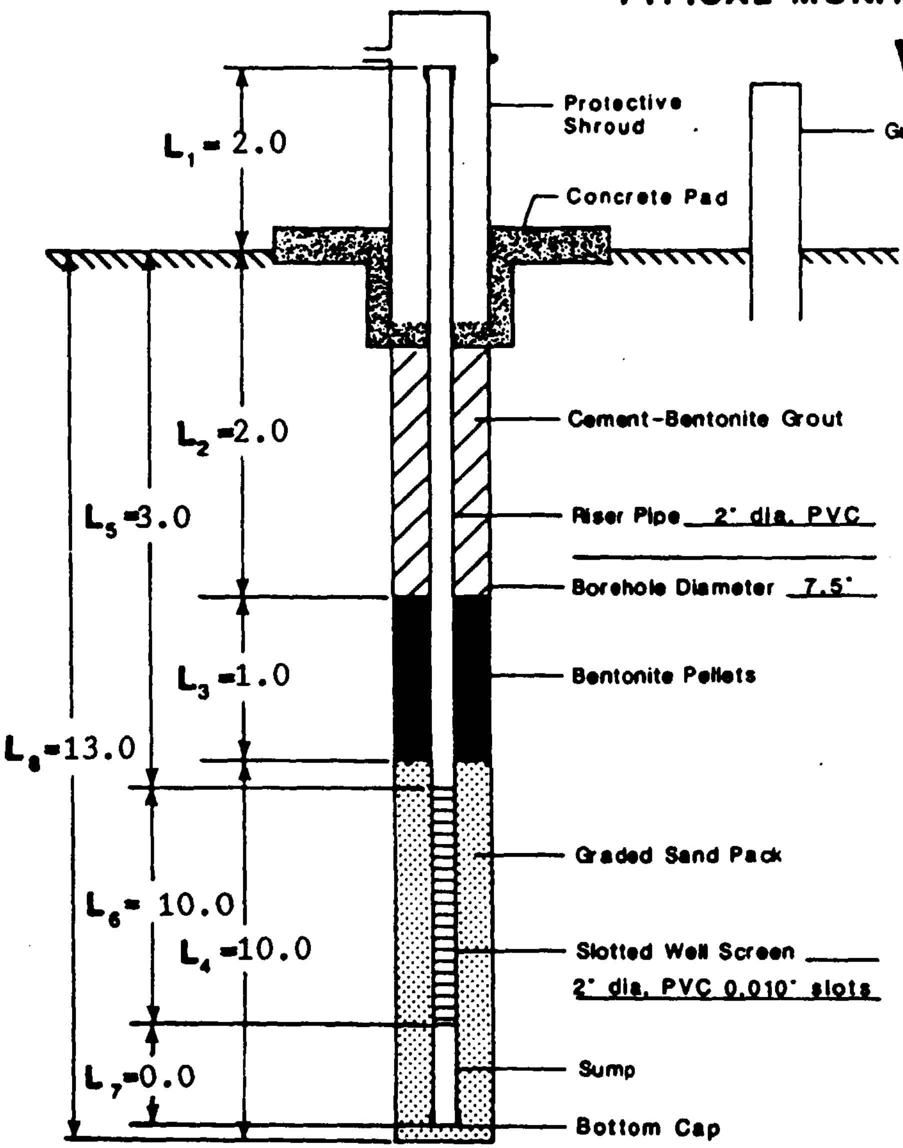
G&E ENGINEERING, INC.
GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
Columbia, South Carolina

3-7-86 Date	86-1008 File No.	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS INC. LOBECO, SOUTH CAROLINA Project Title	TYPICAL MONITOR WELL SECTION
ABL Drawn by	MJR Ckd. by			Fig. No.

BRUNING 44-132 64819

TYPICAL MONITOR WELL SECTION

W-12



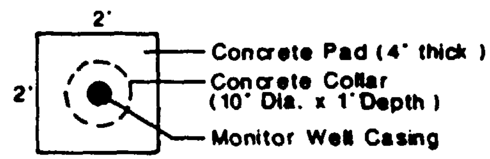
SECTION VIEW

Elev. Top of Riser	17.7'
Elev. Ground Surface	15.6'
Screened Interval	2.6-12.6'

Construction Notes:

Annulus grouted using thick bentonite-cement mix.

Remarks: Elevations referenced to feet NGVD.
Well dimensions are in feet.



PLAN VIEW

NOTE: All dimensions are in feet.

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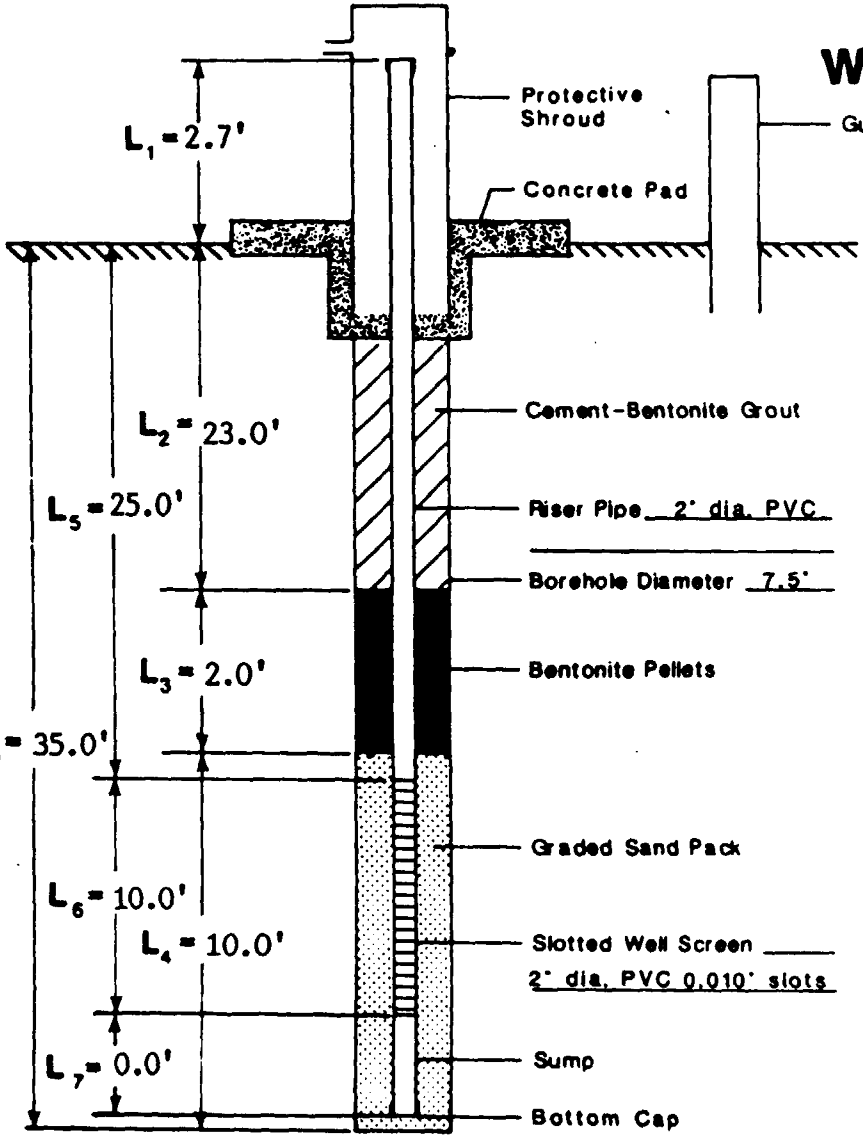
Columbia, South Carolina

3-7-86 Date	86-1008 File No.	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS INC. LOBECO, SOUTH CAROLINA Project Title	TYPICAL MONITOR WELL SECTION	Fig. No.
ABL Drawn by	MJR Ckd. by				

BRUNING 44-132 64819

TYPICAL MONITOR WELL SECTION

W-13



SECTION VIEW

NOTE: All dimensions are in feet.

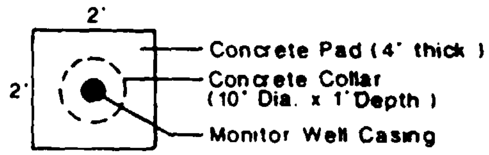
Elev. Top of Riser	18.2'
Elev. Ground Surface	15.5'
Screened Interval	-10.5 to -20.5

Construction Notes:

Annulus grouted using thick bentonite-cement mix.

Remarks: Elevations referenced to feet NGVD.

Well dimensions are in feet.



PLAN VIEW

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Columbia, South Carolina

3-7-86	86-1008		VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS INC. LOBECO, SOUTH CAROLINA	TYPICAL MONITOR WELL SECTION	
Date	File No.		Client	Project Title		Fig. No.
ABL	MJR					
Drawn by	Ckd. by					

BRUNING 44-132 64819

September 24, 1966

WELL #1

Berkshire-Color & Chemical
Beaufort, South Carolina

Daniel Construction Company - Contractor

D. M. Martin - Driller

Finished Depth	-	307'
Static Head	-	12'
Pumping Head	-	107'
Capacity	-	535 GPM

Returned July 1973 To treat well w/ WelHark - Found well filled to depth of 188' in 8" casing & screen. Could not be bailed out. Extensive effort removed only 5' of the filling, which was tightly packed sand, mud & gravel. Depth left was 193'. Pumping head [illegible] Capacity 400 GPM. New bowl shaft & bearings installed to depth of 140' July 14, 1973

L O G

0'	2'	Top Soil
2'	12'	Hard Pan
12'	33'	Sand
33'	38'	Blue Clay with Shall
38'	66'	Brown sticky marle
66'	90'	Blue [illegible]
90'	102'	Hard limestone
102'	260'	Coquina Lime stone
260'	307'	Cooper Marle

PIPE & SCREEN TALLY

22' 2"	Pipe
22' 3"	"
23'11"	"
22' 9"	"
19' 2"	Slotted 1/8"
18' 6"	Slotted 1/8"
23' 7"	Pipe
20' 0"	Slotted 3/16"
18' 6"	Slotted 3/16"
19' 4"	Slotted 3/16"
23' 7"	Pipe
22'10"	Slotted 1/8"
22' 9"	Pipe
21'11"	Pipe
6' 0"	Tail Pipe
307'3"	Total

SCREEN SETTINGS

90' 10" - 128' 6" (37' 8" of 1/8" Slot)

152' 1" - 209'11" (57'10" of 3/16" ")

233' 6" - 256' 4" (22'10" of 1/8" ")

Total ----------- 118' 4" of Slotted Pipe

Total ------------ 188'11" of Solid Pipe

41' of 24" Casing cemented in 30" Hole

24" Hole drilled to 307' - 8" Pipe with 8" mill slotted pipe staggered in line as shown by above tally centered in 24" hole and annular space filled with gravel.

Submitted by: VIRGINIA SUPPLY & WELL COMPANY
1739 Cheshire Bridge Rd., N.E.
Atlanta, Georgia 30324

October 13, 1966

WELL #2

Berkshire-Color & Chemical
Beaufort, South Carolina

Daniel Construction Company - Contractor

D. M. Martin - Driller

Finished Depth	-	263'
Static Head	-	14'
Pumping Head	-	105'
Capacity	-	465 G.P.M.

LOG

0'	- 2'	Top Soil
2'	- 8'	Hard Pan
8'	- 32'	Sand
32'	- 39'	Blue Clay w/shell
39'	- 71'	Firm blue clay
71'	- 79'	Hard lime stone
79'	- 150'	Soft porous lime stone
150'	- 191'	Hard lime stone
191'	- 260'	Soft lime stone
260'	- 263'	Marle

SCREEN SETTINGS

77'7" - 158'3" - 80'8" of 1/8" Slot

204'9" - 255'9" - 51'0" of .050 Slot

Total Slotted 131'8"

Total Solid 131'1"

TOTAL 262'9"

PIPE AND SCREEN TALLY

8' 0"	Pipe
24' 2"	"
23' 2"	"
22' 3"	"
19' 9"	Slotted 1/8"
20' 3"	Slotted 1/8"
20' 4"	Slotted 1/8"
20' 4"	Slotted 1/8"
23' 2"	Pipe
23' 4"	Pipe
10' 2"	Slotted .050 Size
10' 2"	" .050 Size
10' 3"	" .050 Size
10' 2"	" .050 Size
10' 3"	" .050 Size
7' 0"	Tail Pipe

Total 262' 9"

41' of 24" Casing cemented in 30" Hole.

24" Hole drilled to 263' - 8" Pipe with 8" mill slotted pipe

staggered in line as shown by above tally centered in 24" hole and annular space filled with gravel.

Submitted by: VIRGINIA SUPPLY & WELL CO.
1739 Cheshire Bridge Rd., N. E.
Atlanta, Georgia 30324

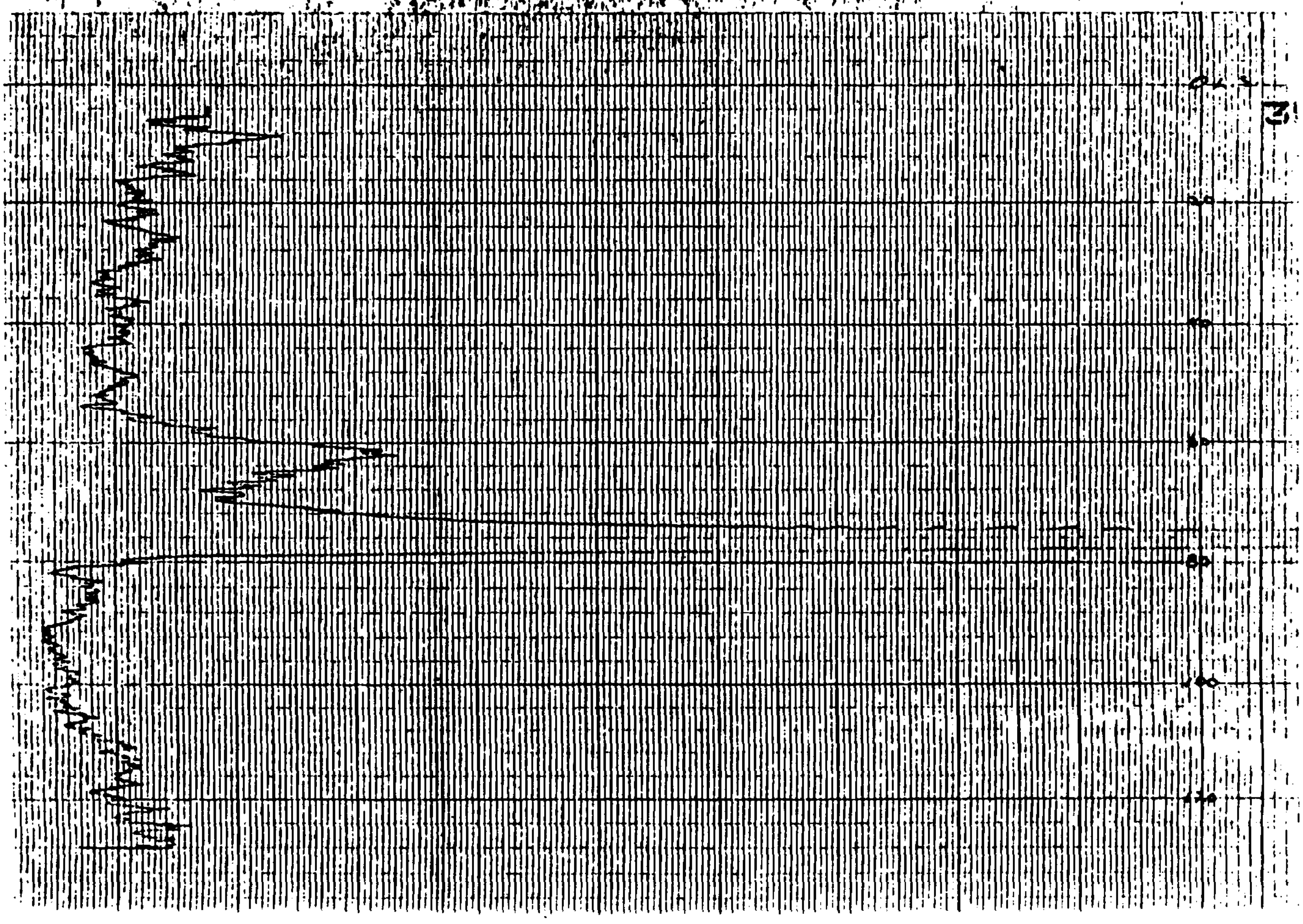
27GG-f6
323301
804418
BFT 1207

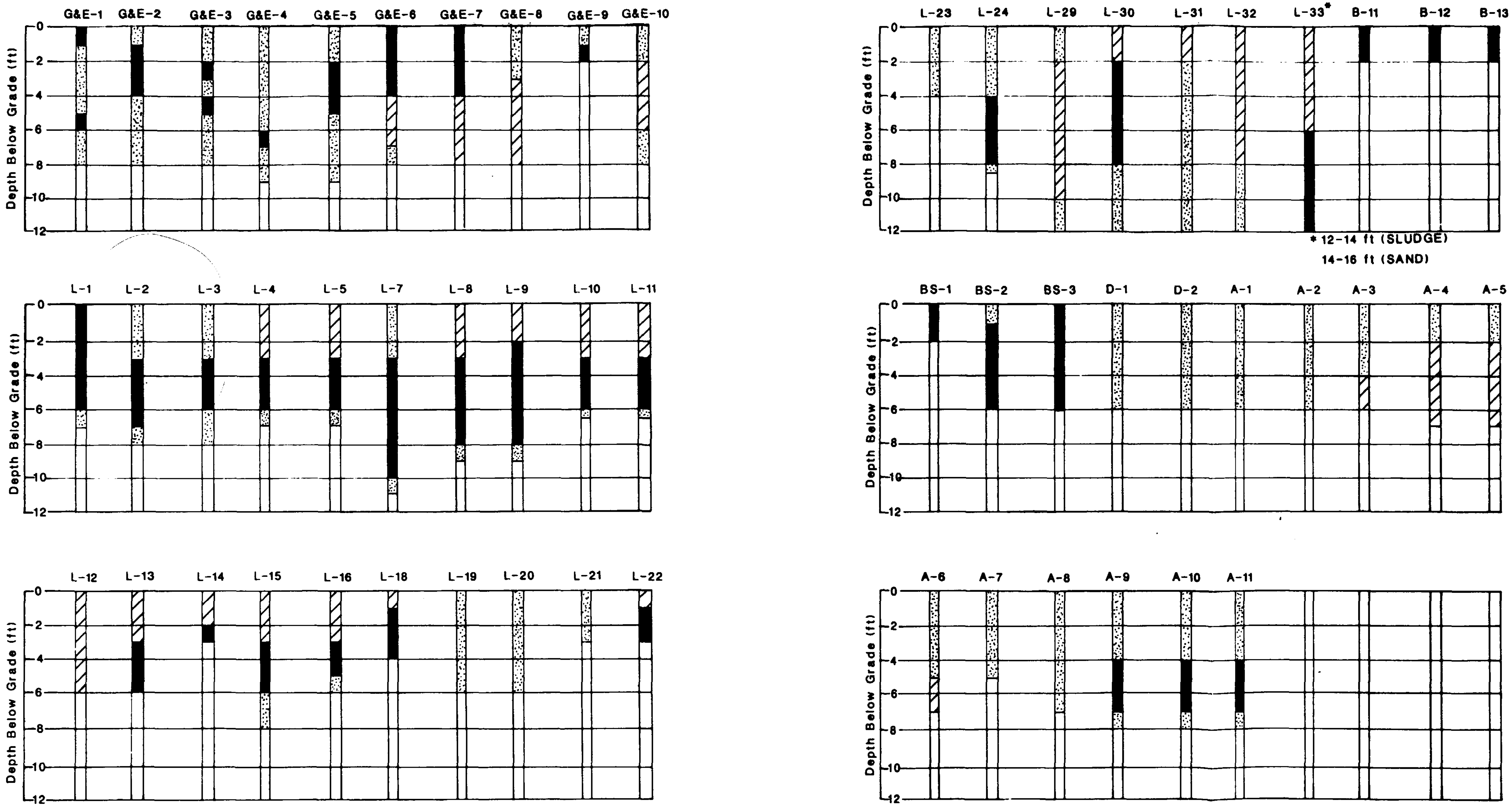
GAMMA LOG

U. S. Geological Survey
Water Resources Division

Hole no. BFT 1207 Date 3-26-80 By CR & JL
Location [illegible] S. C.
Elevation [illegible] 21.73 Log M. P. 2.5 Log T. D. 130 D.W.
Casing I. D. 8" From 90 To 76 Dia. From To
Hole Dia. From To Dia. From To
Fluid type [illegible] Temp. Res.
Logger no. Tool type
Log speed 25 ft/min up dn Vert. scale ft/in
Run no. of Tape no. Begin End
Calibrated-units/in. Standardized
Sens. setting Zero Pos. T. C. 2 CR 50
Detector Energy Disc.
Remarks: [illegible]

THIS LOG IS NOT TO BE USED TO FULFILL PRIVATE CONTRACTUAL OBLIGATIONS





LEGEND

(stippled)	Silty sand, Clayey sand, or Sand
(hatched)	Silt, Clay, or Sandy clay
(solid)	Sludge or contaminated soil (odor, discoloration)

G&E
ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

RE:

4-27-86 Date	86-1008 File No.	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	**ENVIRONMENTAL ASSESSMENT** VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	**AUGER BORING SUMMARY**
MJR Drawn by	JAS Ckd. by			B-1 Fig. No.

APPENDIX C

APPENDIX C

CONDUCTIVITY (ELECTROMAGNETICS)

INTRODUCTION

Conductivity (electromagnetics) is an extremely effective geophysical technique for many applications. The EM-31 Conductivity Meter, one of several conductivity meters, is a very useful and cost-effective conductivity instrument. It requires no contact with the ground and can cover a large land area in a short period of time. As with all geophysical techniques, the findings from a conductivity survey must be calibrated using "hard" data obtained from direct measurement techniques, e.g. sampled and tested soil/rock borings and groundwater monitoring wells. An excellent reference on the principles and use of conductivity (electromagnetics) as well as other geophysical techniques is the USEPA publication "Geophysical Techniques for Sensing Buried Wastes and Waste Migration", by Benson et al, 1983. Excerpts from Chapter V, "Electromagnetics" are included herein and indicated by indentation and single spacing.

ELECTROMAGNETICS

The use of conductivity meters is well established as a technique for scanning the subsurface for anomalous conditions. The usefulness of electromagnetic methods is described below:

> "The electromagnetic (EM) method provides a means of measuring the electrical conductivity of subsurface soil, rock and ground water. Electrical conductivity is a function of the type of soil and rock, its porosity, its permeability and the fluids which fill the pore space. In most cases the conductivity (specific conductance) of the pore fluids will dominate the measurement. Accordingly, the EM method is applicable both to assessment of natural geohydrologic conditions and to mapping of many types of contaminant plumes. Additionally, trench boundaries, buried wastes and drums, as well as metallic utility lines can be located with EM

techniques.

Natural variations in subsurface conductivity may be caused by changes in soil moisture content, ground water specific conductance, depth of soil cover over rock, and thickness of soil and rock layers. Changes in basic soil or rock types, and structural features such as fractures or voids may also produce changes in conductivity. Localized deposits of natural organics, clay, sand, gravel, or salt rich zones will also affect subsurface conductivity.

Many contaminants will produce an increase in free ion concentration when introduced into the soil or ground water systems. This increase over background conductivity enables detection and mapping of contaminated soil and ground water at hazardous waste sites, landfills and impoundments. Large amounts of organic fluids such as diesel fuel can displace the normal soil moisture, causing a decrease in conductivity which may also be mapped, although this is not commonly done. The mapping of a plume will usually define the local flow direction of contaminants. Contaminant migration rates can be established by comparing measurements taken at different times.

The absolute values of conductivity for geologic materials (and contaminants) are not necessarily diagnostic in themselves, but the variations in conductivity, laterally and with depth, are significant. It is these variations which enable the investigator to rapidly find anomalous conditions."

PROFILING

The EM-31 meter is most effectively used in a profiling mode. Profiling is a method of measuring lateral variations in conductivity for a given depth range. With the EM-31, profiling measurements are made to a depth of 6 meters (about 20 feet). Excellent lateral resolution can be achieved from profiling data, and is very effective in delineating migration plumes, and buried features exhibiting conductivity characteristics differing from natural background.

PRINCIPLES

"The basic principle of operation of the electromagnetic method is shown in Figure 1. The transmitter coil radiates an electromagnetic field which induces eddy currents in the earth below the instrument. Each of these eddy current loops, in turn, generates a secondary electromagnetic field which is proportional to the magnitude of the current flowing within the loop. A part of the secondary magnetic field from each loop is intercepted by the receiver coil and produces an output voltage which (within limits) is linearly related to subsurface conductivity. This reading is a bulk measurement of conductivity; the cumulative response to subsurface conditions ranging all the way from the surface to the effective depth of the instrument.

The sampling depth of EM equipment is related to the instrument's coil spacing. Instruments with coil spacings of 1, 4, 10, 20 and 40 meters are commercially available. The nominal sampling depth of an EM system is taken to be approximately 1.5 times the coil spacing. Accordingly, the nominal depth of response for the coil spacings given above is 1.5, 6, 15, 30 and 60 meters.

The conductivity value resulting from an EM instrument is a composite, and represents the combined effects of the thickness of soil or rock layers, their depths, and the specific conductivities of the materials. The instrument reading represents the combination of these effects, extending from the surface to the arbitrary depth range of the instrument. The resulting values are influenced more strongly by shallow materials than by deeper layers, and this must be taken into consideration when interpreting the data. Conductivity conditions from the surface to the instrument's nominal depth range contribute about 75% of the instrument's response. However, contributions from highly conductive materials lying at greater depths may have a significant effect on the reading.

EM instruments are calibrated to read subsurface conductivity in millimhos per meter (mm/m). These units are related to resistivity units in the following manner:

1000/(millimhos/meter) = 1 ohm-meter
1000/(millimhos/meter) = 3.28 ohm-feet
1 millimho/meter = 1 siemen

The advantage of using millimhos/meter is that the common range of resistivities from 1 to 1000 ohm-meters is covered by the range of conductivities from 1000 to 1 millimhos/meter. This makes conversion of units relatively easy.

Most soil and rock minerals, when dry, have very low conductivities (Figure 2). On rare occasions, conductive minerals like magnetite, graphite and pyrite occur in sufficient concentrations to greatly increase natural subsurface conductivity. Most often, conductivity is overwhelmingly influenced by water content and the following soil/rock parameters:

- o The porosity and permeability of the material;
- o The extent to which the pore space is saturated;
- o The concentration of dissolved electrolytes and colloids in the pore fluids;
- o The temperature and phase state (i.e., liquid or ice) of the pore water.

A unique conductivity value cannot be assigned to a particular material, because the interrelationships of soil composition, structure and pore fluids are highly variable in nature.

In areas surrounding hazardous waste sites, contaminants may escape into the soil and the ground water system. In many cases, these fluids contribute large amounts of electrolytes and colloids to both the unsaturated and saturated zones. In either case, the ground conductivity may be greatly affected, sometimes increasing by one to three orders of magnitude above background values. However, if the natural variations in subsurface conductivity are very low, contaminant plumes of only 10 to 20 percent above background may be mapped.

In the case of spills involving heavy non-polar, organic fluids such as diesel oil, the normal soil moisture may be displaced, or a sizeable pool of oil may develop at the water table. In these cases, subsurface conductivities may decrease causing a negative EM anomaly. (A negative anomaly will occur only if substantial quantities of non-conductive contaminants are present)"

INTERFERENCE

"EM systems are susceptible to signal interference from a variety of sources, originating both above the ground and below. Electromagnetic noise may be caused by nearby power lines, powerful radio transmitters, and atmospheric conditions. At some sites shallow EM surveys can be carried out in the immediate vicinity of power lines; at others, conditions may be so bad that measurements are impossible. Generally, deeper measurements using large coil spacings will be more susceptible to noise than shallower measurements. In addition to other forms of electromagnetic noise, instrument responses from subsurface or surface metal may make it difficult to obtain an valid measurement. For instance, piles of drums, nearby vehicles, fences or railroad tracks can act as targets and produce an unwanted response. Within a range of 1.5 to 2 times the coil spacing, these large items may influence the data. Small items of metallic trash usually create no problem. Buried pipes and cables will cause very large EM anomalies. However, because of their characteristic response, they can be recognized, and then either ignored or filtered out of the data. Unfortunately, near such buried objects, important information of lesser magnitude is often lost."

SUMMARY

"Although the EM technique can be used for profiling or sounding, profiling is the most effective use of the EM method. Profiling makes possible the rapid mapping of subsurface conductivity changes, and the location, delineation and assessment of spatial variables resulting from changes in the natural setting or from many contaminants.

EM is a very effective reconnaissance tool. The use of qualitative non-recorded data can provide initial interpretation in the field. If site conditions are complex, the use of a high-density survey grid, continuously-recording instruments, and computer processing may be necessary, in order to properly evaluate subsurface conditions. When continuously-recording instruments are used, total site coverage is feasible. More quantitative information can be obtained by using conductivity data from different depth ranges. At present, three different systems must be used to acquire data from 0.75 meters to 60 meters. Very often, however, data from two standard depths, e.g. 6 and

15 meters, is adequate to furnish depth information.

Capabilities

- The EM profile method permits rapid data acquisition, resulting in high-density and high-resolution surveys.
- Profiling data may be acquired from various discrete depths, ranging from 0.75 meters to 60 meters.
- Continuously-recording instruments (to 15 meter depth) can increase survey speed, density and resolution permitting total site coverage, if required.
- EM reads directly in conductivity units (mm/m) permitting use of raw data in the field, and correlation to specific conductance of ground water samples.
- EM can map local and general changes in the natural geohydrologic setting.
- EM can detect and measure the boundaries of a conductivity plume.
- Direction of plume flow can be determined by an EM conductivity map.
- EM measurements taken at different times can provide the means to compute movement rates of contaminants.
- EM can detect and map burial pits and trenches of both bulk and drummed wastes.
- EM can detect and map the location of buried metallic utility lines.

Limitations

- Em has less sounding (vertical) resolution than the resistivity method, due to its limited number of depth intervals.
- The acquisition of data from depth of 0.75 to 60 meters requires the use of three different EM systems.
- Continuous data can be obtained only to depths up to approximately 15 meters.
- An EM measurement is influenced by the shallower materials more than the deeper ones; this must be considered when evaluating the data.
- EM measurements become non-linear in zones of very high conductivity.

- The EM method is susceptible to noise from a number of sources, including natural atmospheric noise, powerlines, radio transmitters, buried metallic trash, pipes, cables, nearby fences, vehicles and buildings."

CONDUCTIVITY DATA SHEET

PROJECT Groundwater Assessment JOB NO. 86-1008 DATE March,1986

LOCATION Venture Chemicals, Inc. - Lobeco, SC

ENGINEER(S) M. Richardson / J. Pittman SHEET 1 OF 8

STATION	APPARENT CONDUCTIVITY		SENSITIVITY		CALCULATED CONDUCTIVITY		REMARKS
	0	90	0	90	0	90	
N5+00 E9+00	0.48	0.48	100	100	48	48	Lagoon
N5+00 E9+50	0.54	0.55	100	100	54	55	Lagoon
N5+50 E6+00	0.45	0.45	100	100	45	45	Lagoon
N5+50 E6+50	0.63	0.67	100	100	63	67	Lagoon
N5+50 E9+00	0.30	0.30	300	300	90	90	Lagoon
N5+50 E10+00	0.20	0.19	300	300	60	57	Lagoon
N6+00 E9+00	0.29	0.31	300	300	87	93	Lagoon
N6+50 E6+50	0.84	0.84	100	100	84	84	Lagoon
N6+50 E7+00	0.30	0.30	300	300	90	90	Lagoon
N7+00 E7+00	0.31	0.29	300	300	93	87	Lagoon
N7+00 E7+50	0.30	0.30	300	300	90	90	Lagoon
N7+00 E8+00	0.37	0.37	300	300	111	111	Lagoon
N7+00 E8+50	0.47	0.46	300	300	141	138	Lagoon
N7+00 E9+00	0.50	0.50	300	300	150	150	Lagoon
N7+00 E9+50	0.43	0.44	300	300	129	132	Lagoon
N7+00 E10+00	0.33	0.34	300	300	99	102	Lagoon
N7+00 E10+50	0.70	0.70	100	100	70	70	Lagoon
N7+00 E11+00	0.67	0.66	30	30	20	20	Lagoon

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CONDUCTIVITY DATA SHEET

PROJECT Groundwater Assessment JOB NO. 86-1008 DATE Mar.1986

LOCATION Venture Chemicals, Inc. - Lobeco, SC

ENGINEER(S) M. Richardson / J. Pittman SHEET 2 OF 8

STATION	APPARENT CONDUCTIVITY		SENSITIVITY		CALCULATED CONDUCTIVITY		REMARKS
	0	90	0	90	0	90	
N7+50 E6+00	0.36	0.35	100	100	36	35	Lagoon
N7+50 E6+50	0.36	0.36	100	100	36	36	Lagoon
N7+50 E7+00	0.66	0.63	100	100	66	63	Lagoon
N7+50 E7+50	0.66	0.67	100	100	66	67	Lagoon
N7+50 E8+00	0.38	0.38	300	300	114	114	Lagoon
N7+50 E8+50	0.54	0.55	300	300	162	165	Lagoon
N7+50 E9+00	0.50	0.50	300	300	150	150	Lagoon
N7+50 E9+50	0.39	0.40	300	300	117	120	Lagoon
N7+50 E10+00	0.53	0.55	100	100	53	55	Lagoon
N8+00 E5+50	0.31	0.31	100	100	31	31	Lagoon
N8+00 E6+00	0.33	0.34	100	100	33	34	Lagoon
N8+00 E6+50	0.36	0.36	100	100	36	36	Lagoon
N8+00 E7+00	0.49	0.48	100	100	49	48	Lagoon
N8+00 E7+50	0.69	0.67	100	100	69	67	Lagoon
N8+00 E8+00	0.37	0.37	300	300	111	111	Lagoon
N8+00 E8+50	0.50	0.50	300	300	150	150	Lagoon
N8+00 E9+50	0.26	0.26	300	300	78	78	Lagoon
N8+50 E7+00	0.70	0.66	100	100	70	66	Lagoon

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CONDUCTIVITY DATA SHEET

PROJECT Groundwater Assessment JOB NO. 86-1008 DATE Mar.1986

LOCATION Venture Chemicals, Inc. - Lobeco, SC

ENGINEER(S) M. Richardson / J. Pittman SHEET 3 OF 8

STATION	APPARENT CONDUCTIVITY		SENSITIVITY		CALCULATED CONDUCTIVITY		REMARKS
	0	90	0	90	0	90	
N8+50 E8+00	0.35	0.35	300	300	105	105	Lagoon
N8+50 E8+50	0.43	0.44	300	300	129	131	Lagoon
N8+50 E9+00	0.62	0.62	100	100	62	62	Lagoon
N8+50 E9+50	0.86	0.87	30	30	26	26	Lagoon
N8+50 E10+00	0.60	0.61	30	30	18	18	Lagoon
N9+00 E7+50	0.86	0.86	100	100	86	86	Lagoon
N9+00 E9+50	0.61	0.59	30	30	18	18	Lagoon
N9+00 E10+00	0.40	0.39	30	30	12	12	Lagoon
N9+50 E7+00	0.57	0.57	100	100	57	57	Lagoon
N9+50 E7+50	0.84	0.85	100	100	84	85	Lagoon
N9+50 E8+50	0.52	0.53	100	100	52	53	Lagoon
N9+50 E9+00	0.35	0.35	100	100	35	35	Lagoon
N9+50 E9+50	0.53	0.54	30	30	16	16	Lagoon
N9+50 E10+00	0.37	0.43	30	30	11	13	Lagoon
N10+00 E7+00	0.50	0.51	100	100	50	51	Lagoon
N10+00 E7+50	0.56	0.56	100	100	56	56	Lagoon
N10+00 E8+00	0.55	0.55	100	100	55	55	Lagoon
N10+00 E8+50	0.48	0.47	100	100	48	47	Lagoon

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CONDUCTIVITY DATA SHEET

PROJECT Groundwater Assessment JOB NO. 86-1008 DATE Mar. 1986

LOCATION Venture Chemicals, Inc. - Lobeco, SC

ENGINEER(S) M. Richardson / J. Pittman SHEET 4 OF 8

STATION	APPARENT CONDUCTIVITY		SENSITIVITY		CALCULATED CONDUCTIVITY		REMARKS
	0	90	0	90	0	90	
N10+00 E9+00	0.80	0.81	30	30	24	24	Lagoon
N10+00 E9+50	0.36	0.37	30	30	11	11	Lagoon
N10+00 E10+00	0.43	0.40	30	30	13	12	Lagoon
N10+50 E7+00	0.30	0.31	100	100	30	31	Lagoon
N10+50 E7+50	0.31	0.31	100	100	31	31	Lagoon
N10+50 E8+00	0.63	0.64	30	30	19	19	Lagoon
N10+50 E8+50	0.30	0.29	100	100	30	29	Lagoon
N10+50 E9+00	0.60	0.60	30	30	18	18	Lagoon
N11+00 E7+00	0.60	0.64	30	30	19	19	Lagoon
N11+00 E8+00	0.37	0.36	30	30	11	11	Lagoon
N11+00 E8+50	0.46	0.46	30	30	14	14	Lagoon
N11+50 E7+00	0.60	0.60	30	30	18	18	Lagoon
N11+50 E7+50	0.40	0.40	30	30	12	12	Lagoon
N11+50 E8+50	0.38	0.35	30	30	11	11	Lagoon
N12+00 E7+00	0.76	0.80	30	30	23	24	Lagoon
N12+00 E7+50	0.40	0.40	30	30	12	12	Lagoon
N12+00 E8+00	0.37	0.37	30	30	11	11	Lagoon
N15+00 E2+50	0.32	0.32	100	100	32	32	Stressed Vegetation Area

G & E ENGINEERING, INC.

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CONDUCTIVITY DATA SHEET

PROJECT Groundwater Assessment JOB NO. 86-1008 DATE Mar.1986

LOCATION Venture Chemicals, Inc. - Lobeco, SC

ENGINEER(S) M. Richardson / J. Pittman SHEET 5 OF 8

STATION	APPARENT CONDUCTIVITY		SENSITIVITY		CALCULATED CONDUCTIVITY		REMARKS
	0	90	0	90	0	90	
N15+50 E2+50	0.60	0.61	100	100	60	61	Stressed Vegetation Area
N16+00 E2+00	0.34	0.34	100	100	34	34	Stressed Vegetation Area
N16+00 E2+50	0.50	0.50	100	100	50	50	Stressed Vegetation Area
N16+00 E3+00	0.23	0.21	100	100	23	21	Stressed Vegetation Area
N16+50 E2+50	0.80	0.80	30	30	24	24	Stressed Vegetation Area
N20+00 E6+00	0.33	0.33	100	100	33	33	East Fenceline
N20+00 E6+50	0.33	0.35	100	100	35	35	East Fenceline
N20+00 E7+00	0.24	0.80	100	30	24	24	East Fenceline
N21+00 E3+00	0.83	0.83	30	30	25	25	West Fenceline
N21+00 E7+00	0.33	0.34	100	100	33	34	Burn Site Vicinity
N21+50 E7+50	0.33	0.33	100	100	33	33	
N21+50 E8+00	0.24	0.24	100	100	24	24	
N22+50 E7+50	0.75	0.76	100	100	75	75	
N22+50 E8+00	0.31	0.32	100	100	31	32	
N23+00 E3+00	0.83	0.84	30	30	25	25	West Fenceline
N23+00 E7+50	0.96	0.97	100	100	96	97	
N23+00 E8+00	0.37	0.38	100	100	37	38	
N23+00 E9+50	0.30	0.30	100	100	30	30	

G & E ENGINEERING, INC.
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CONDUCTIVITY DATA SHEET

PROJECT Groundwater Assessment JOB NO. 86-1008 DATE Mar.1986

LOCATION Venture Chemicals, Inc. - Lobeco, SC

ENGINEER(S) M. Richardson / J. Pittman SHEET 6 OF 8

STATION	APPARENT CONDUCTIVITY		SENSITIVITY		CALCULATED CONDUCTIVITY		REMARKS
	0	90	0	90	0	90	
N23+00 E10+00	0.35	0.35	100	100	35	35	Burn Site Vicinity
N23+00 E10+50	0.30	0.31	100	100	30	31	Burn Site Vicinity
N23+00 E11+00	0.30	0.30	100	100	30	30	Burn Site Vicinity
N23+00 E11+50	0.70	0.69	30	30	21	21	Burn Site Vicinity
N23+50 E7+50	0.54	0.54	100	100	54	55	Burn Site Vicinity
N23+50 E8+00	0.42	0.41	100	100	42	41	Burn Site Vicinity
N23+50 E9+50	0.38	0.38	100	100	38	38	Burn Site Vicinity
N24+00 E7+50	0.30	0.30	300	300	90	90	Burn Site Vicinity
N24+00 E8+00	0.52	0.52	100	100	52	52	Burn Site Vicinity
N24+00 E8+50	0.40	0.40	100	100	40	40	Burn Site Vicinity
N24+00 E9+00	0.66	0.67	30	30	20	20	Burn Site Vicinity
N24+00 E9+50	0.40	0.41	100	100	40	41	Burn Site Vicinity
N24+50 E7+50	0.35	0.35	100	100	35	35	Burn Site Vicinity
N24+50 E8+00	0.36	0.35	100	100	36	35	Burn Site Vicinity
N24+50 E8+50	0.32	0.33	100	100	32	33	Burn Site Vicinity
N24+50 E9+00	0.28	0.28	100	100	28	28	Burn Site Vicinity
N24+50 E9+50	0.38	0.38	100	100	38	38	Burn Site Vicinity
N24+50 E10+00	0.52	0.52	100	100	52	52	Burn Site Vicinity

G & E ENGINEERING, INC.
CONSULTING GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

CONDUCTIVITY DATA SHEET

PROJECT Groundwater Assessment JOB NO. 86-1008 DATE Mar.1986

LOCATION Venture Chemicals, Inc. - Lobeco, SC

ENGINEER(S) M. Richardson / J. Pittman SHEET 7 OF 8

STATION	APPARENT CONDUCTIVITY		SENSITIVITY		CALCULATED CONDUCTIVITY		REMARKS
	0	90	0	90	0	90	
N24+50 E10+50	0.82	0.82	100	100	82	82	Burn Site Vicinity
N24+50 E11+00	0.59	0.59	100	100	58	59	Burn Site Vicinity
N24+50 E11+50	0.50	0.50	100	100	50	50	Burn Site Vicinity
N25+00 E3+00	0.80	0.81	30	30	24	24	West Fenceline
N25+00 E7+50	0.78	0.78	100	100	78	78	Burn Site Vicinity
N25+00 E8+00	0.75	0.74	100	100	75	74	Burn Site Vicinity
N25+00 E8+50	0.74	0.74	100	100	75	74	Burn Site Vicinity
N25+00 E10+00	0.81	0.80	30	30	24	24	Burn Site Vicinity
N26+00 E7+50	0.63	0.64	100	100	63	64	Burn Site Vicinity
N26+00 E8+00	0.46	0.46	100	100	46	46	Burn Site Vicinity
N26+00 E8+50	0.38	0.38	100	100	38	38	Burn Site Vicinity
N26+00 E9+00	0.26	0.26	100	100	26	26	Burn Site Vicinity
N26+00 E9+50	0.60	0.60	30	30	18	18	Burn Site Vicinity
N26+00 E2+00	0.38	0.38	100	100	38	38	West Fenceline
N26+50 E8+00	0.25	0.25	100	100	25	25	Burn Site Vicinity
N27+00 E2+00	0.80	0.79	30	30	24	24	West Fenceline
N27+00 E3+00	0.28	0.29	100	100	28	29	West Fenceline
N27+00 E7+00	0.30	0.30	100	100	30	30	Old Drum Storage Area

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CONDUCTIVITY DATA SHEET

PROJECT Groundwater Assessment JOB NO. 86-1008 DATE Mar.1986

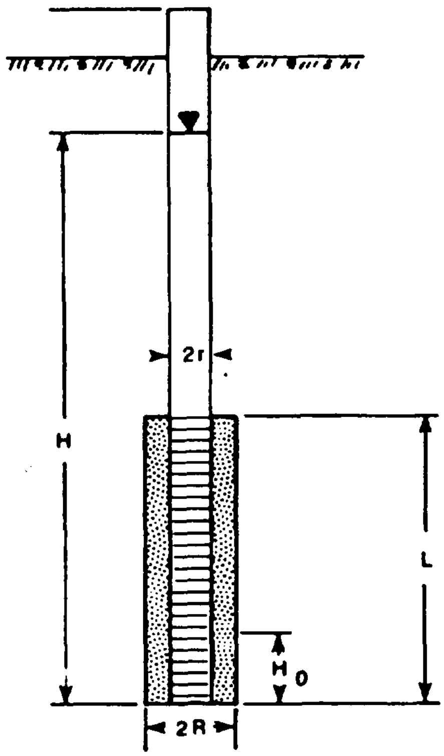
LOCATION Venture Chemicals, Inc.- Lobeco, SC

ENGINEER(S) M. Richardson / J. Pittman SHEET 8 OF 8

STATION	APPARENT CONDUCTIVITY		SENSITIVITY		CALCULATED CONDUCTIVITY		REMARKS
	0	90	0	90	0	90	
N27+50 E6+00	0.33	0.33	100	100	33	33	Old Drum Storage Area
N27+50 E6+50	0.52	0.52	100	100	52	52	Old Drum Storage Area
N27+50 E7+00	0.46	0.45	100	100	46	45	Old Drum Storage Area
N27+50 E7+50	0.24	0.24	100	100	24	24	Old Drum Storage Area
N28+00 E4+00	0.24	0.24	100	100	24	24	North Fenceline
N28+00 E5+00	0.63	0.66	30	30	19	20	North Fenceline
N28+00 E6+50	0.40	0.40	100	100	40	40	Old Drum Storage Area
N28+00 E7+00	0.32	0.33	100	100	32	33	Old Drum Storage Area
N28+50 E6+00	0.26	0.26	100	100	26	26	Old Drum Storage Area
N28+50 E6+50	0.29	0.29	100	100	29	29	Old Drum Storage Area
N28+50 E7+50	0.62	0.64	30	30	19	19	Old Drum Storage Area

APPENDIX D

MONITOR WELL No. W-1



$H = 27.72$

$H_0 = 31.34$

$L = 10$

$H - H_0 = 3.62$

$r = 0.083$

$R = 0.31$

FIELD DATA

t (sec)	h (ft)	H - h (ft)	$\frac{H-h}{H-H_0}$
0	31.34	3.62	1.00
1	30.83	3.11	0.86
2	30.32	2.60	0.72
3	29.80	2.08	0.57
4	29.43	1.71	0.47
9	28.59	0.87	0.24
19	28.13	0.41	0.11

See graph for plot of field data

CALCULATION OF HYDRAULIC CONDUCTIVITY (K)

$$K = \frac{r^2 \ln(L/R)}{2LT_0}$$

for variables given above and

T_0(basic time lag) = 348 sec (see graph)

$$K = \frac{(0.083)^2 \text{ Ln } (10.0/0.31)}{2(10.0)(348)}$$

$= 3.44 \times 10^{-6}$ ft/sec

$= 1.05 \times 10^{-4}$ cm/sec

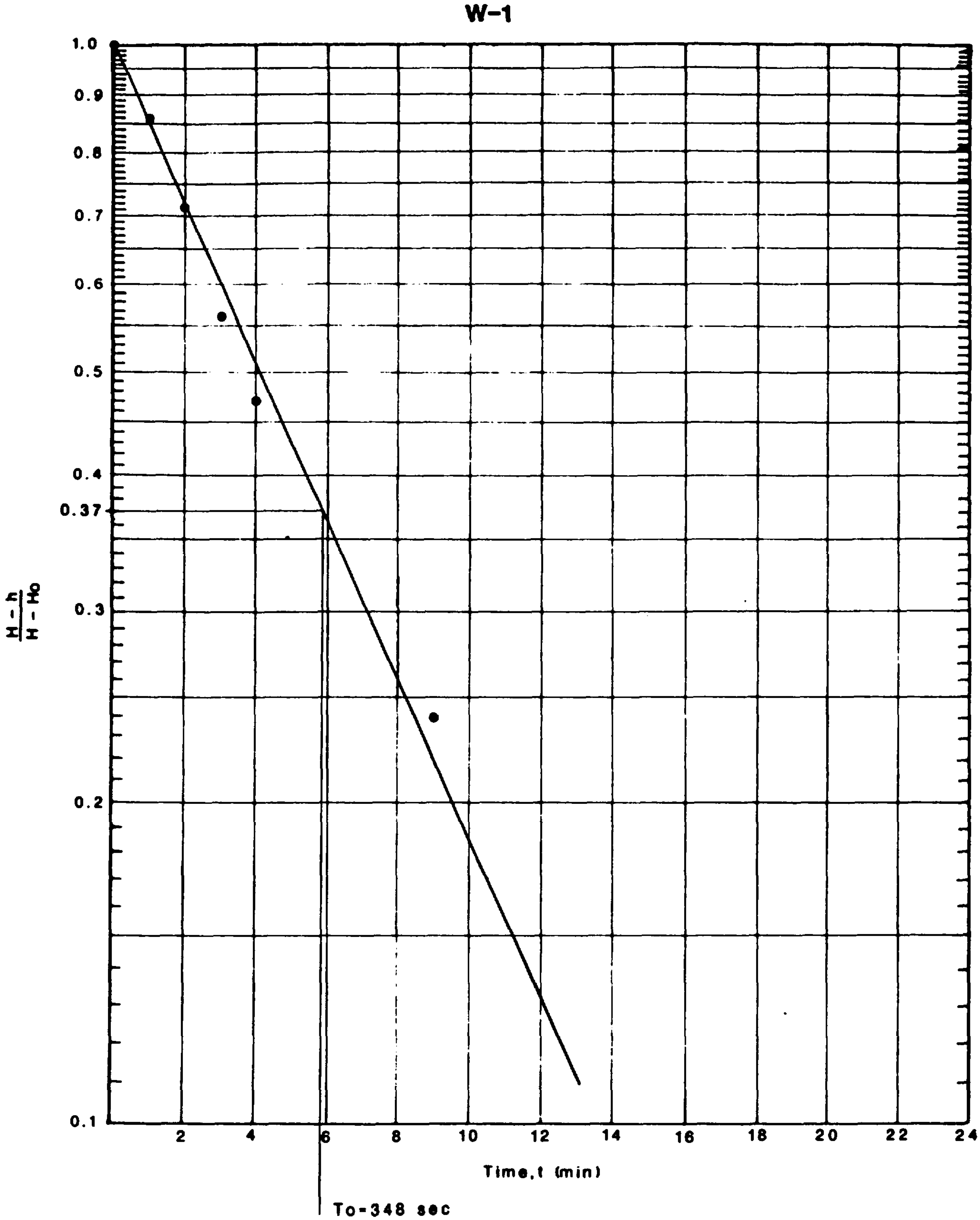
REFERENCE:

HVORSLEV, M.J. 1951. Time lag and soil permeability in groundwater observations. U.S. Army Corps Engrs. Waterways Exp. Sta. Bull. 36, Vicksberg, Miss.

JJF Drawn by	MJR Ckd. by	4-15-86 Date	86-1006 File No.	G&E ENGINEERING, INC. GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS Columbia, South Carolina

VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	Field Permeability Test W-1	D APPEN.

BRUNING 44-132 64819



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Columbia, South Carolina

JJF	MJR	4-15-86	86-1008
Drawn by	Ckd. by	Date	File No.

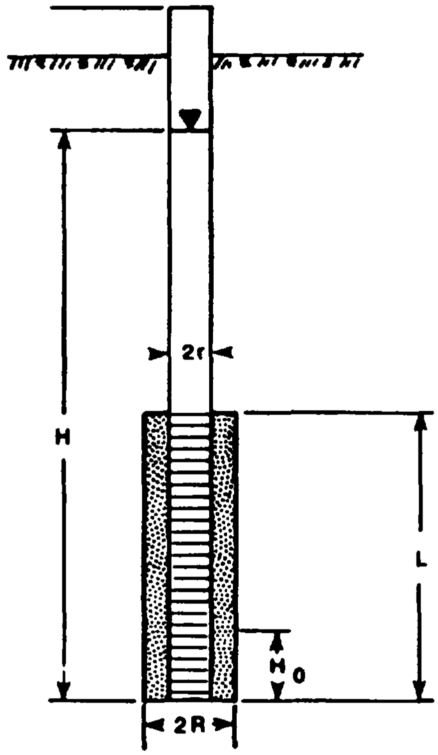
VENTURE CHEMICALS, INC.
LOBECO, SOUTH CAROLINA
Client

ENVIRONMENTAL ASSESSMENT
VENTURE CHEMICALS, INC.
LOBECO, SOUTH CAROLINA
Project Title

D
APPEN.

BRUNING 44-132 64819

MONITOR WELL No. W-2



H=7.43

H_0=6.15

L=10

$H - H_0$=1.28

r=0.083

R=0.27

FIELD DATA

t (sec)	h (ft)	H - h (ft)	$\frac{H-h}{H-H_0}$
0	6.15	1.28	1.00
30	6.52	0.91	0.71
60	6.81	0.62	0.48
120	7.07	0.36	0.28
180	7.22	0.21	0.16
240	7.28	0.15	0.12

See graph for plot of field data

CALCULATION OF HYDRAULIC CONDUCTIVITY (K)

$$K = \frac{r^2 \ln(L/R)}{2LT_0}$$

for variables given above and

T_0(basic time lag) = 90 sec (see graph)

$$K = \frac{(0.083)^2 \, Ln(10.0/0.27)}{2(10.0)(90)}$$

$$= 1.40 \times 10^{-5} \text{ ft/sec}$$

$$= 4.20 \times 10^{-4} \text{ cm/sec}$$

REFERENCE:

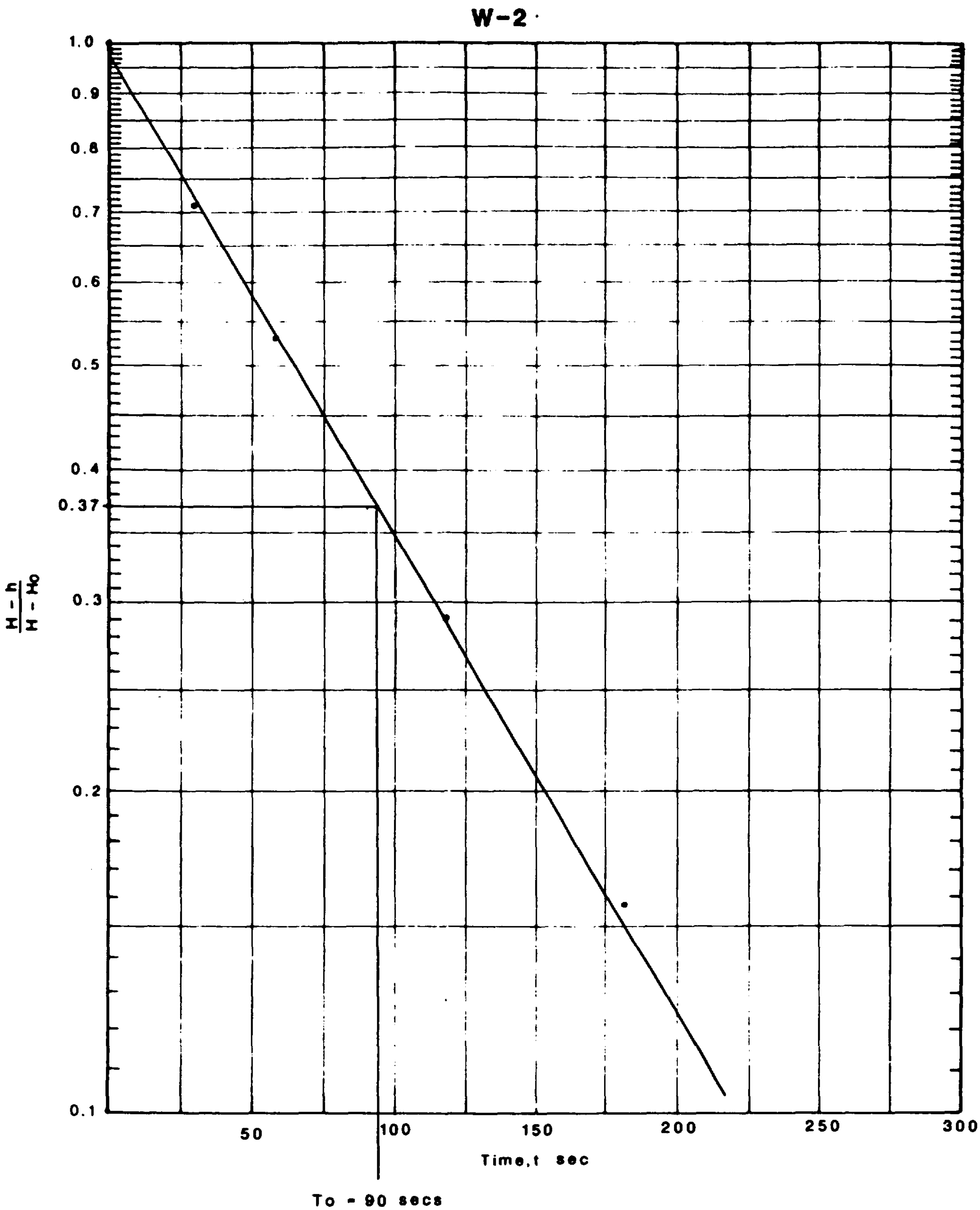
HVORSLEV, M.J. 1951. Time lag and soil permeability in groundwater observations. U.S. Army Corps Engrs. Waterways Exp. Sta. Bull. 36, Vicksberg, Miss.

JJF Drawn by	MJR Ckd. by	4-15-86 Date	86-1008 File No.

G&E ENGINEERING, INC.
GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
Baton Rouge, Louisiana

VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	Field Permeability Test W-2	D Fig. No.

BRUNING 44-132 64819



	JJF Drawn by	MJR Ckd. by	4-15-86 Date	86-1008 File No.

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ENGINEERING, INC.
GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
Baton Rouge, Louisiana

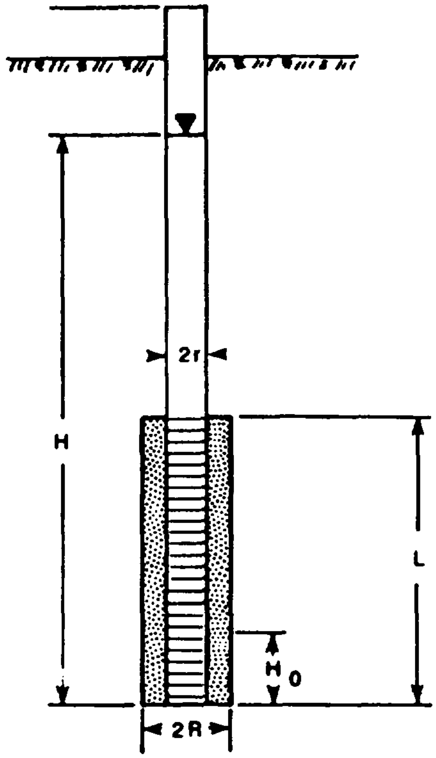
VENTURE CHEMICALS, INC.
LOBECO, SOUTH CAROLINA
Client

ENVIRONMENTAL ASSESSMENT
VENTURE CHEMICALS, INC.
LOBECO, SOUTH CAROLINA
Project Title

D
Fig. No.

BRUNING 44-132 64819

MONITOR WELL No. W-4



H = 13.38

H_0 = 14.78

L = 10.0

$H - H_0$ = 1.4

r = 0.083

R = 0.31

FIELD DATA

t (sec)	h (ft)	H - h (ft)	$\frac{H-h}{H-H_0}$
0	14.78	1.40	1.00
0.5	14.49	1.11	0.79
1	14.14	0.76	0.54
2	13.78	0.40	0.29
3	13.61	0.23	0.16
4	13.54	0.16	0.11

See graph for plot of field data

CALCULATION OF HYDRAULIC CONDUCTIVITY (K)

$$K = \frac{r^2 \ln(L/R)}{2LT_0}$$

for variables given above and

T_0 (basic time lag) = 105 (see graph)

$$K = \frac{(0.083)^2 \ln (10.0/0.31)}{2\ (10.0)\ (105)}$$

$= 1.14 \times 10^{-05}$ ft/sec

$= 3.50 \times 10^{-04}$ cm/sec

REFERENCE:

HVORSLEV, M.J. 1951. Time lag and soil permeability in groundwater observations. U.S. Army Corps Engrs. Waterways Exp. Sta. Bull. 36, Vicksberg, Miss.

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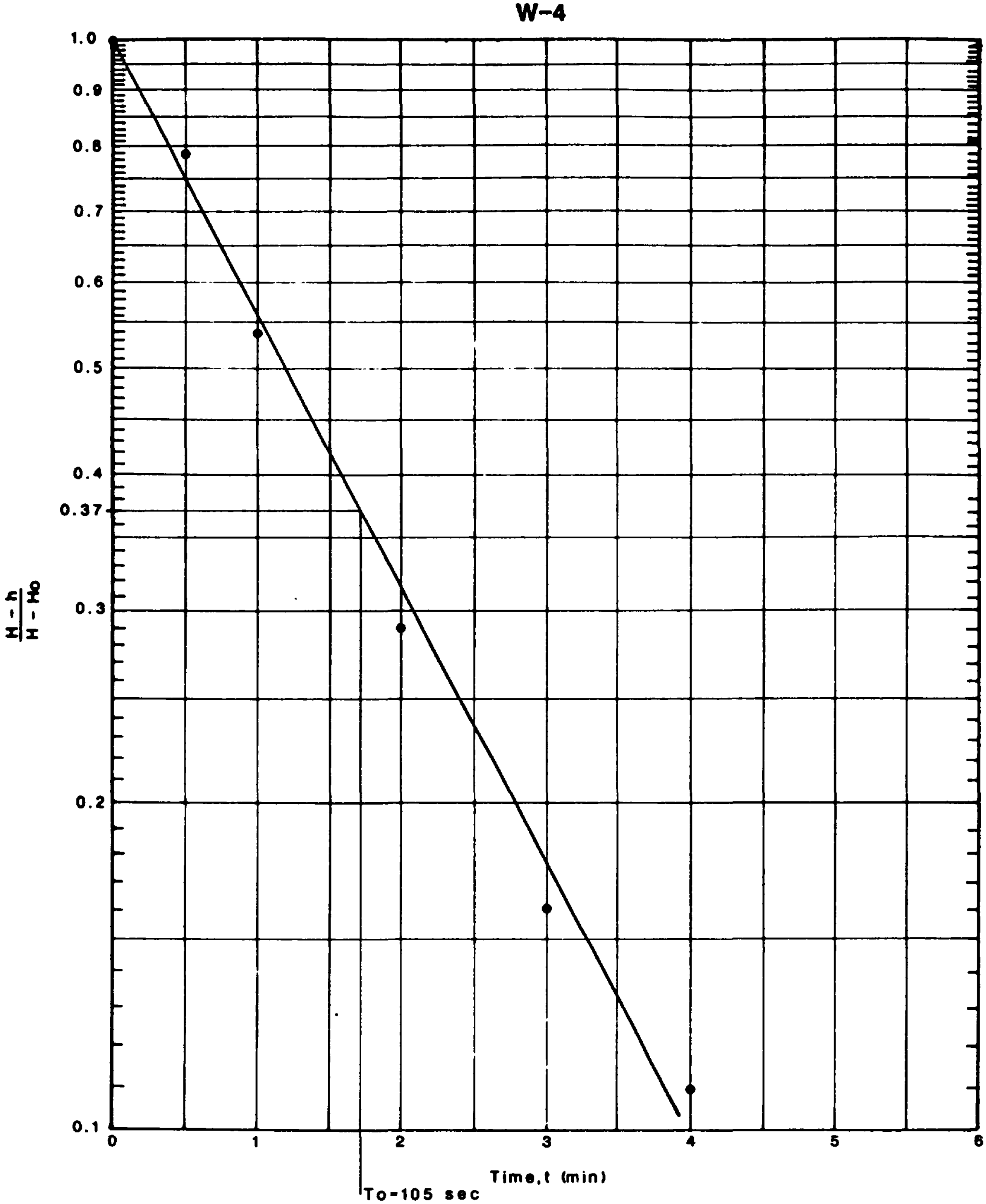
Columbia, South Carolina

JJF	MJR	4-15-86	86-1008
Drawn by	Ckd. by	Date	File No.

VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	Field Permeability Test W-4	D APPEN.

BRUNING 44-132 64819



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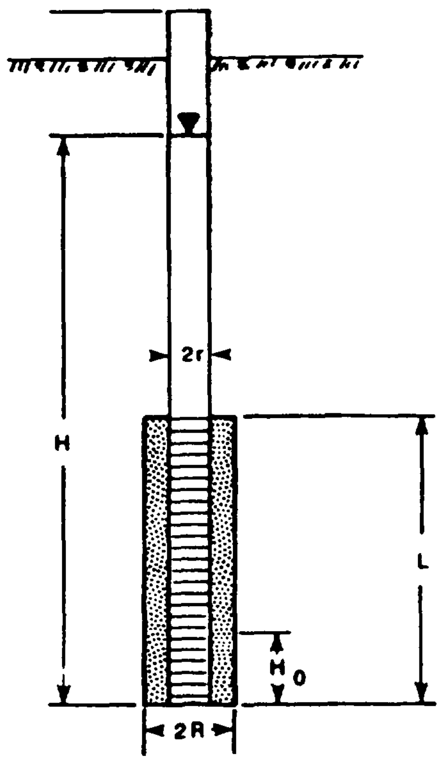
JJF	MJR	4-15-86	86-1008
Drawn by	Ckd. by	Date	File No.

Client	Project Title		
VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA		D APPEN.

BRUNING 44-132 64819

MONITOR WELL No. W-5



$H = 10.18$

$H_0 = 11.58$

$L = 10'$

$H - H_0 = 1.40$

$r = 0.083$

$R = 0.31$

FIELD DATA

t (sec)	h (ft)	H - h (ft)	$\frac{H-h}{H-H_0}$
0	8.88	1.42	1.00
1	9.72	0.58	0.41
2	10.08	0.22	0.15
3	10.20	0.10	0.07

See graph for plot of field data

CALCULATION OF HYDRAULIC CONDUCTIVITY (K)

$$K = \frac{r^2 \ln(L/R)}{2LT_0}$$

for variables given above and

T_0(basic time lag) - 66 sec(see graph)

$$K = \frac{(0.083)^2 \ln(10/0.31)}{2\ (10)\ (66)}$$

$= 1.80 \times 10^{-5}$ ft/sec

$= 5.50 \times 10^{-4}$ cm/sec

REFERENCE:

HVORSLEV, M.J. 1951. Time lag and soil permeability in groundwater observations. U.S. Army Corps Engrs. Waterways Exp. Sta. Bull. 36, Vicksberg, Miss.

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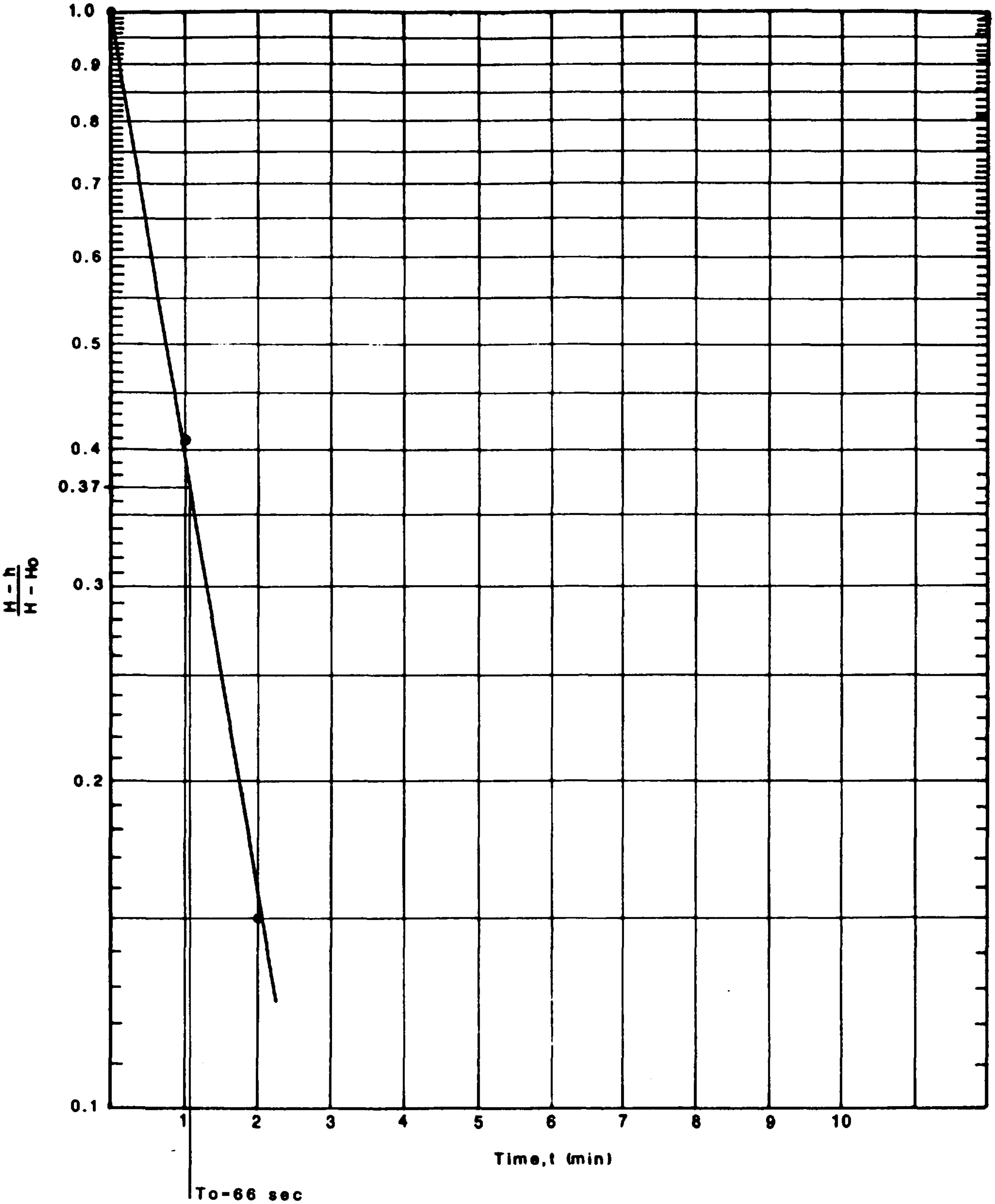
Columbia, South Carolina

JJF	MJR	4-15-86	86-1008
Drawn by	Ckd. by	Date	File No.

VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	Field Permeability Test W-5	D APPEN.

BRUNING 44-132 64819

W-5



JJF	MJR	4-15-86	86-1008
Drawn by	Ckd. by	Date	File No.

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Columbia, South Carolina

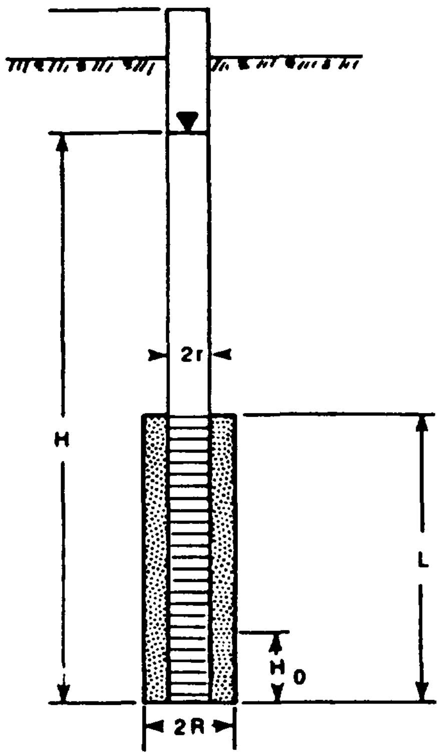
VENTURE CHEMICALS, INC.
LOBECO, SOUTH CAROLINA
Client

ENVIRONMENTAL ASSESSMENT
VENTURE CHEMICALS, INC.
LOBECO, SOUTH CAROLINA
Project Title

D
APPEN.

BRUNING 44-132 64819

MONITOR WELL No. W-6



$H = 10.18$

$H_0 = 11.58$

$L = 10$

$H - H_0 = 1.40$

$r = 0.083$

$R \quad 0.31$

FIELD DATA

t (sec)	h (ft)	H - h (ft)	$\frac{H-h}{H-H_0}$
0	11.58	1.40	1.00
0.5	11.17	0.99	0.71
1	10.86	0.68	0.49
2	10.52	0.34	0.24
4	10.32	0.14	0.10
5	10.26	0.08	0.06

See graph for plot of field data

CALCULATION OF HYDRAULIC CONDUCTIVITY (K)

$$K = \frac{r^2 \ln(L/R)}{2LT_0}$$

for variables given above and

T_0(basic time lag) = (see graph)

$$K = \frac{(0.083)^2 \ln (10.0/0.31)}{2\ (10.0)\ (84)}$$

$$= 1.40 \times 10^{-5} \text{ FT/sec}$$

$$= 4.30 \times 10^{-4} \text{ cm/sec}$$

REFERENCE:

HVORSLEV, M.J. 1951. Time lag and soil permeability in groundwater observations. U.S. Army Corps Engrs. Waterways Exp. Sta. Bull. 36, Vicksberg, Miss.

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JJF	MJR	4-15-86	86-1008
Drawn by	Ckd. by	Date	File No.

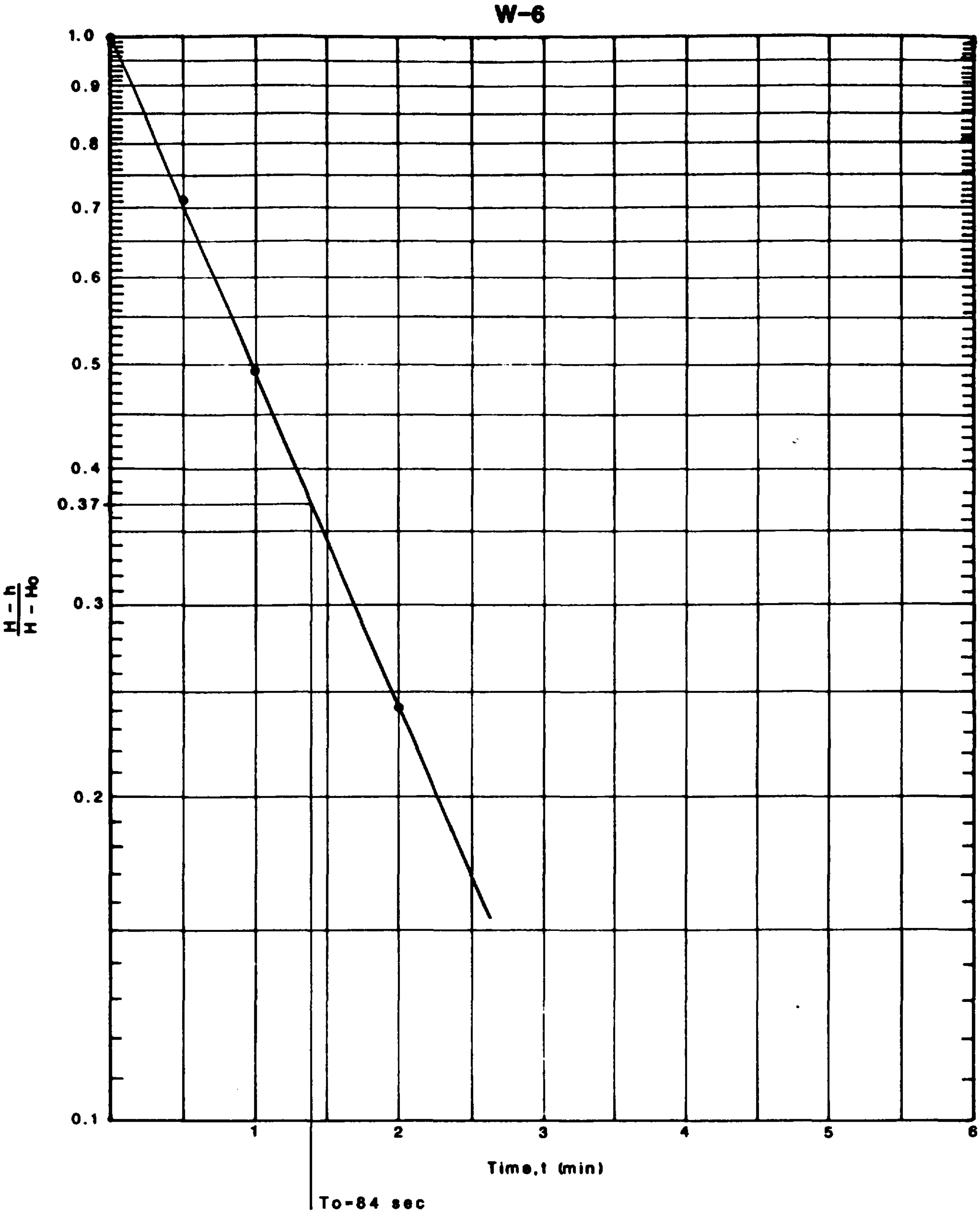
VENTURE CHEMICALS, INC.
LOBECO, SOUTH CAROLINA
Client

ENVIRONMENTAL ASSESSMENT
VENTURE CHEMICALS, INC.
LOBECO, SOUTH CAROLINA
Project Title

Field Permeability Test W-6

D
APPEN.

BRUNING 44-132 64819



JJF	MJR	4-15-86	86-1008
Drawn by	Ckd. by	Date	File No.

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Columbia, South Carolina

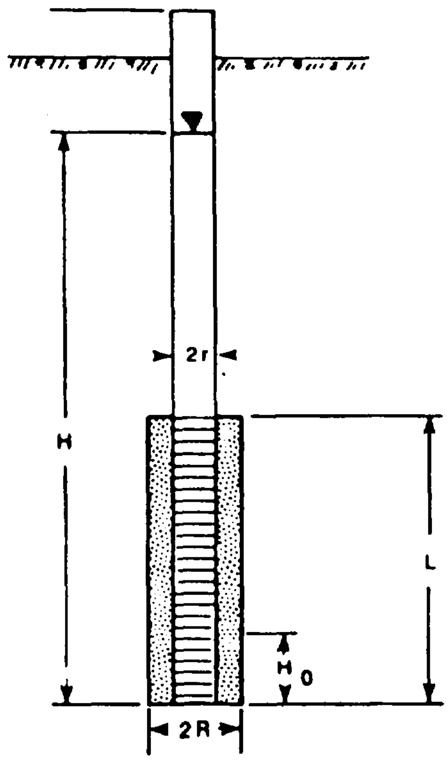
VENTURE CHEMICALS, INC.
LOBECO, SOUTH CAROLINA
Client

ENVIRONMENTAL ASSESSMENT
VENTURE CHEMICALS, INC.
LOBECO, SOUTH CAROLINA
Project Title

D
APPEN.

BRUNING 44-132 64819

MONITOR WELL No. W-8



$H = 42.18$

$H_0 = 46.49$

$L = 5.0'$

$H - H_0 = 4.31$

$r = 0.083$

$R = 0.25$

FIELD DATA

t (sec)	h (ft)	H - h (ft)	$\frac{H-h}{H-H_0}$
0	46.49	4.31	1.00
0.5	46.32	4.14	0.96
1	46.15	3.97	0.92
2	45.97	3.79	0.88
3	45.91	3.73	0.87
6	45.87	3.69	0.86
11	45.82	3.64	0.84
26	45.62	3.44	0.80
41	45.46	3.28	0.76
71	45.17	2.99	0.69

See graph for plot of field data

CALCULATION OF HYDRAULIC CONDUCTIVITY (K)

$$K = \frac{r^2 \ln(L/R)}{2LT_0}$$

for variables given above and

T_0(basic time lag) = 15,300 (see graph)

$$K \quad \frac{(0.083)^2 \ln(5/0.25)}{2(5.0)(15,300)}$$

$= 1.35 \times 10^{-7}$ FT/sec

$= 4.10 \times 10^{-6}$ cm/sec

REFERENCE:

HVORSLEV, M.J. 1951. Time lag and soil permeability in groundwater observations. U.S. Army Corps Engrs. Waterways Exp. Sta. Bull. 36, Vicksberg, Miss.

JJF	MJR	4-15-86	86-1008
Drawn by	Ckd. by	Date	File No.

G&E ENGINEERING, INC.
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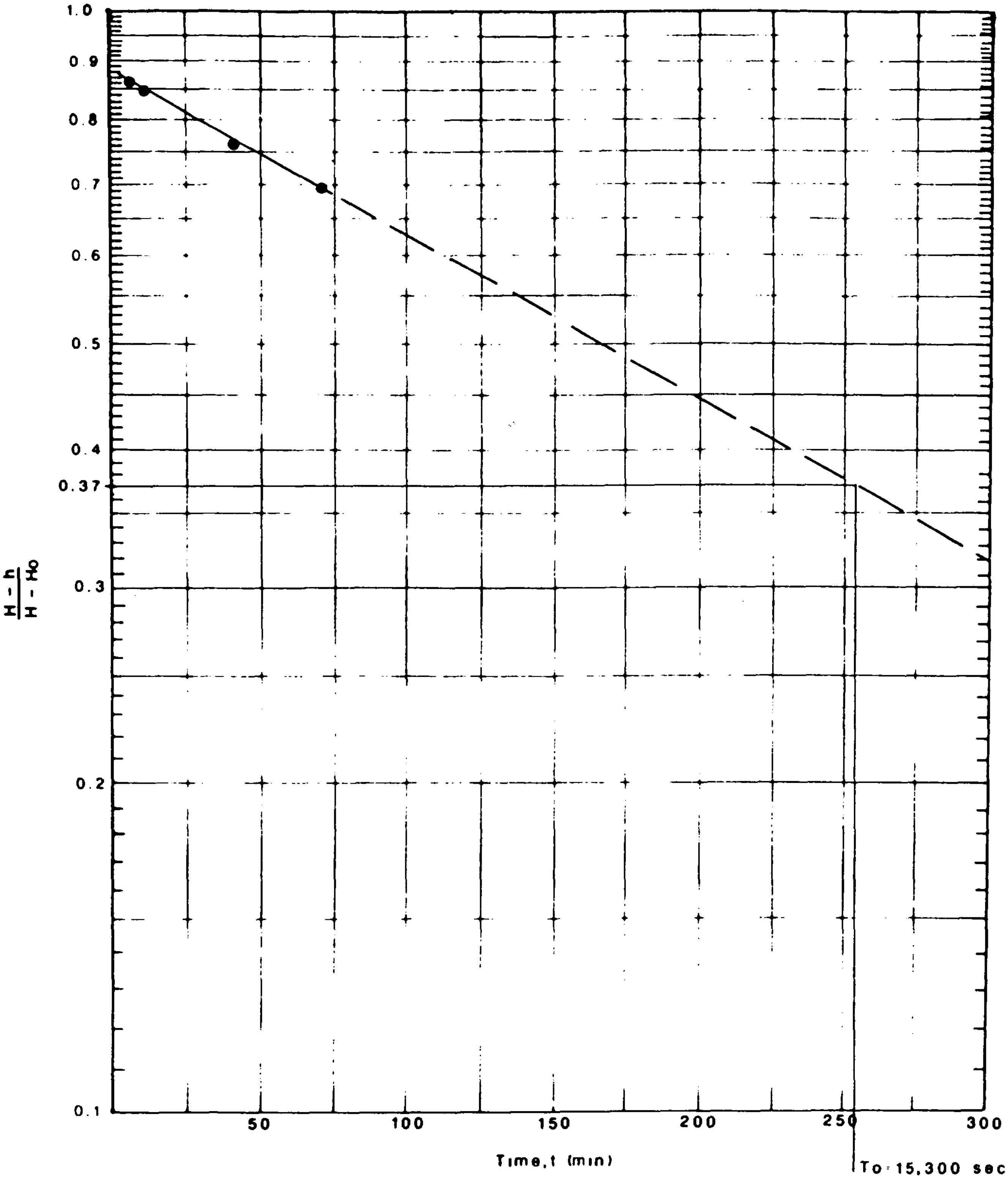
Columbia, South Carolina

VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	Field Permeability Test W-8	D APPEN.

BRUNING 44-132 64819

W-8



G&E ENGINEERING, INC.
GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
Columbia, South Carolina

JJF	MJR	4-15-86	86-1008
Drawn by	Ckd. by	Date	File No.

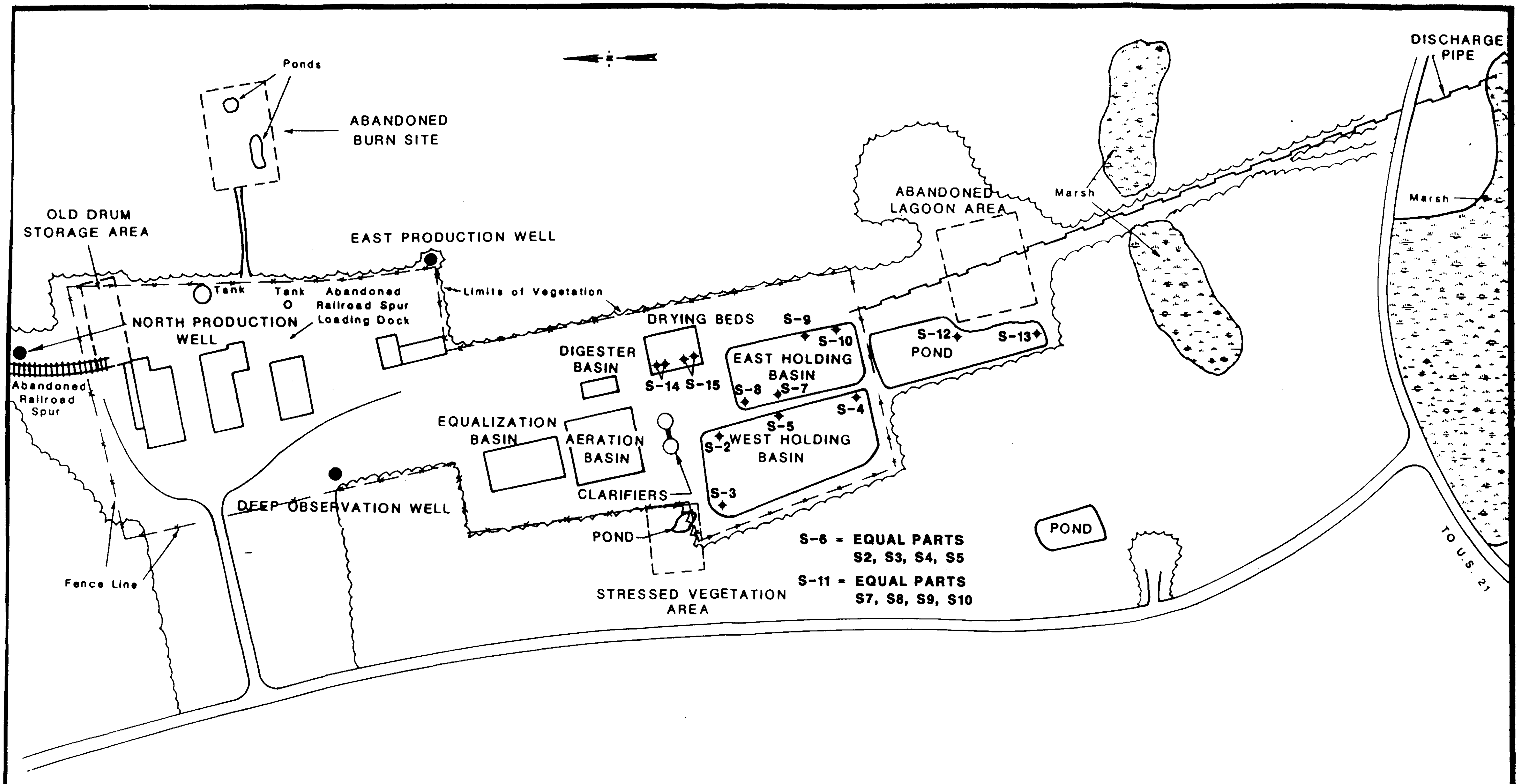
VENTURE CHEMICALS, INC.
LOBECO, SOUTH CAROLINA
Client

ENVIRONMENTAL ASSESSMENT
VENTURE CHEMICALS, INC.
LOBECO, SOUTH CAROLINA
Project Title

D
APPEN.

BRUNING 44-132 64819

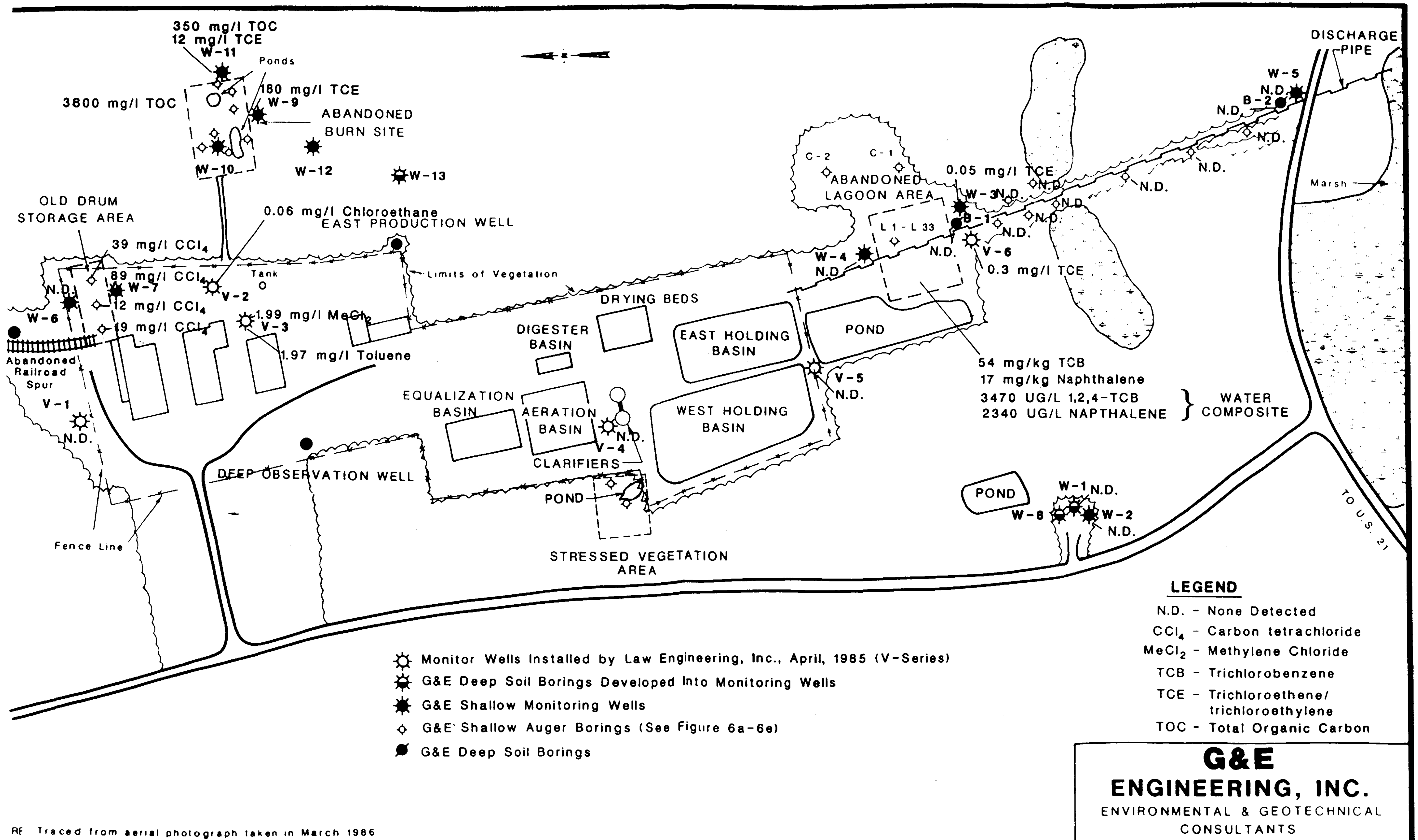
APPENDIX E



RE Traced from aerial photograph taken in March 1986

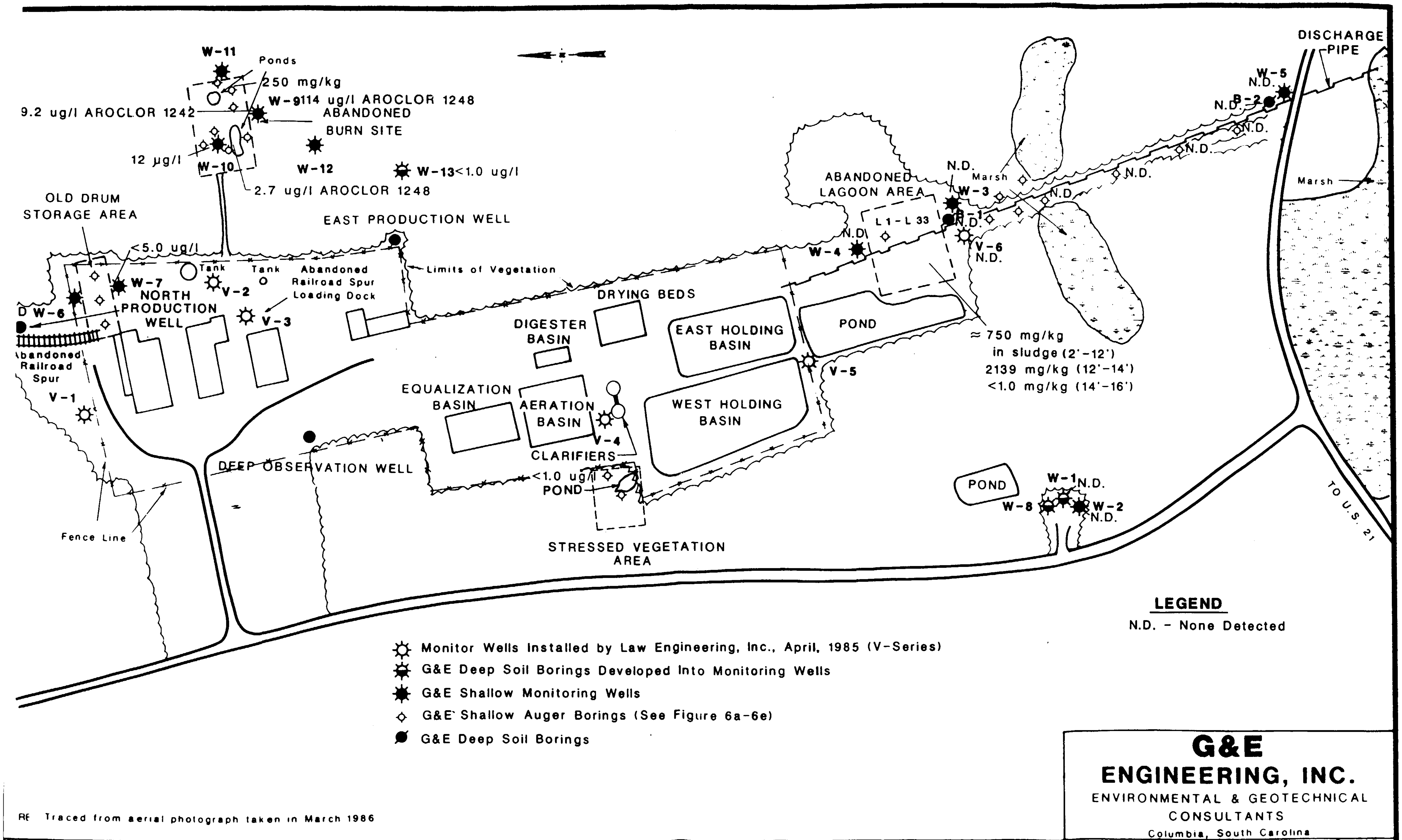
G&E ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

3-25-86 Date	86-1008 File No.	0 feet 200 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	PCB SAMPLING REFERENCE MAP	E-3 Fig No.
MJR Drawn by	MBW Checked by					



G&E ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

3-25-86 Date	86-1008 File No.	0 feet 200 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	AREAS OF ORGANIC VALUES	E-2 Fig No
MJR Drawn by	MBW Checked by					



G&E ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS
Columbia, South Carolina

3-25-86 Date	86-1008 File No.	0 feet 200 SCALE	VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Client	ENVIRONMENTAL ASSESSMENT VENTURE CHEMICALS, INC. LOBECO, SOUTH CAROLINA Project Title	AREAS OF PCB CONTAMINATION	E-1 Fig No
MJR Drawn by	MBW Checked by					

ANALYTICAL SUMMARY
ABANDONED LAGOON

ABANDONED LAGOON
TABLE 1
METALS, PCB & TOC ANALYSES

SAMPLE ID	TYPE OF SAMPLE	DEPTH (FT)	DATE SAMPLED	Cd (ppm)	Cr (ppm)	Pb (ppm)	Hg (ppm)	PCB[2]	TOC (ppm)
L-1	Soil	1	3/18/86	-	-	698	19	112	-
	Soil	2.5	3/18/86	-	-	500	4.3	108	-
	Soil	6.5	3/18/86	-	-	283	1.6	676	-
	GW		3/18/86	-	-	11	0.23	-	-
L-2	Soil	4.5	3/18/86	-	-	528	3.8	497	-
	Soil	6.5	3/18/86	-	-	109	0.82	196	-
	Soil	6.5-7	3/18/86	-	-	76	0.88	582	-
	GW		3/18/86	-	-	0.19	<0.002	-	-
L-3	Soil	2.5	3/18/86	-	-	42	0.63	39	-
	Soil	4	3/18/86	-	-	90	1.9	122	-
	Soil	6	3/18/86	-	-	55	0.09	2460	-
	GW		3/18/86	-	-	0.14	<0.002	-	-
L-7	Soil	8	3/21/86	-	-	-	-	369	-
	GW			0.02	0.65	1.5	0.05	-	40
L-9	Soil	2-3	3/21/86	-	-	-	-	140	-
L-10	Soil	3.5-4	3/21/86	-	-	-	-	17	-
L-13	Soil	4-6.5	3/21/86	-	-	-	-	<2.0	-
L-18	GW		3/21/86	0.03	1.9	7.0	0.12	-	45
L-19	Soil	0-3	3/21/86	-	-	-	-	4.0	-
L-20	Soil	0-4	3/21/86	<0.1	3.2	12	0.05	16	-
L-22	Soil	1.5-3	3/21/86	-	-	-	-	249	-
L-24	Soil	6-6.5	3/21/86	-	-	-	-	369	-
L-33	Soil	10-12	4/13/86	-	-	-	-	70	-
	Soil	12-14	4/13/86	-	-	-	-	2139	-
	Soil	14-16	4/13/86	-	-	-	-	<1.0	-
L 1,2,3	GWCOMP.		3/21/86	-	-	-	-	6020	150

Note:

1. "-" sample not analyzed for that parameter.
2. PCB results for groundwater (GW) reported in ppb, for soil in ppm.

ABANDONED LAGOON
Table 2
METALS, PCB, PESTICIDES, PHENOLICS, & TOC ANALYSIS

	BORING & SAMPLE IDENTIFIERS						
PARAMETERS	G&E-1 5-6' (soil) 37183	G&E-3 4-5' (soil) 37184	G&E-4 4-5' (soil) 37186	G&E-4 6-7' (soil) 37187	G&E-5 4-5' (soil) 37185	G&E-5 GW 37192	G&E 1-5 GW COMPOSITE 37190
DATE SAMPLED (1986)	1/13	1/13	1/13	1/13	1/13	1/14	1/14
Antimony(ppm)	<2.5	<4.8	<2.9	<3.6	<3.3	<0.20	<0.20
Arsenic(ppm)	1.7	2.9	1.7	1.6	1.3	0.314	0.555
Beryllium(ppm)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.010	0.13
Cadmium(ppm)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.010	<0.010
Chromium(ppm)	13	46	16	11	4.9	1.2	5.4
Copper(ppm)	16	129	6.3	10	<0.7	0.15	3.6
Lead(ppm)	942	2286	46	144	<3.3	0.60	34
Mercury(ppm)	1.1	13	0.11	3.2	<0.05	0.012	0.614
Nickel(ppm)	4.7	20	8.3	5.4	2.6	0.16	2.1
Selenium(ppm)	<0.5	<0.5	<0.5	<0.5	<0.5	0.026	0.03
Silver(ppm)	<0.5	<0.5	0.6	<0.5	<0.5	0.02	0.05
Zinc(ppm)	2.5	22	7.8	3.6	0.7	0.41	2.9
PCB(ppm)	217	438	5.1	52	<1.0	-	-
PCB*(ppm)	680	6750	-	-	-	-	-
Pesticides(ppm)	<0.1	<0.1	<0.1	<0.1	<0.1	-	-
Phenolics(ppm)	-	-	-	-	-	11	77
TOC(ppm)	-	-	-	-	-	17	25

Note:
1. Analysis by J.L. Rogers & Callcott Engineers, Inc. (2/25/86). 37183-37192 are their sample IDs.
2. PCB* = West Paine Laboratories test results. Split sample analyzed for PCBs.
3. " - " not analyzed for that parameter.

ABANDONED LAGOON
TABLE 3.a
VOLATILE ORGANICS

PARAMETERS	L-7 8' (soil)	L-7 GW	L-9 2-3' (soil)	L-10 3.5-4' (soil)	L-13 4-6.5' (soil)	L-18 GW	L-20 0-4' (soil)	L-22 1.5-3' (soil)
	BORING & SAMPLE IDENTIFIERS							
DATE SAMPLED(1986)	3/21	3/21	3/21	3/21	3/21	3/21	3/21	3/21
Toluene(ppm)	<0.10	<0.01	<0.10	<0.10	<0.10	<0.01	<0.1	<0.10
Trichloroethene(ppm)	<0.10	0.04	<0.10	<0.10	<0.10	0.05	<0.1	<0.10
Total Xylene(ppm)	<0.10	<0.01	<0.10	<0.10	<0.10	<0.01	<0.1	<0.10
Chlorotoluene(ppm)	6.0	1.20	<0.10	<0.10	<0.10	1.70	<0.1	<0.10
*Other Parameters(ppm)	<0.10	<0.01	<0.10	<0.10	<0.10	<0.01	<0.1	<0.10

Note: 1. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).

ABANDONED LAGOON
TABLE 3.b
VOLATILE ORGANICS

PARAMETERS	BORING & SAMPLE IDENTIFIERS L-24 6-6.5 (soil)	L1,2,3 GWCOMP	L-1 1' (soil)	L-1 2.5' (soil)	L-1 6.5' (soil)
DATE SAMPLED(1986)	3/21	3/18	3/18	3/18	3/18
Toluene(ppm)	<0.10	<0.05	<0.10	<0.10	<0.10
Trichloroethene(ppm)	<0.10	0.150	<0.10	<0.10	<0.10
Total Xylene(ppm)	<0.10	<0.05	<0.10	<0.10	<0.10
Chlorotoluene(ppm)	<0.10	<0.05	<0.10	<0.10	<0.10
*Other Parameters(ppm)	<0.10	<0.05	<0.10	<0.10	<0.10

Note: 1. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).

ABANDONED LAGOON
Table 4
VOLATILE ORGANICS

PARAMETERS	BORINGS & SAMPLE IDENTIFIERS G&E-5 GW 37192	G&E 1-5 GW COMP. 37190
DATE SAMPLED(1986)	1/14	1/14
All parameters*(ppb)	<10	<10

Note:

1. Samples analyzed by J.L. Rogers & Callcott Engineers, Inc. (2/25/86). 37190 & 37192 are their sample IDs.
2. *See the list of parameters listed in the J. L. Rogers & Callcott report (2/25/86).

ABANDONED LAGOON
Table 5
ACID AND BASE NEUTRAL EXTRACTABLE ANALYSIS

PARAMETERS	BORING & SAMPLE IDENTIFIERS						
	G&E-1 5-6' (soil) 37183 (ppb)	G&E-3 4-5' (soil) 37184 (ppb)	G&E-4 4-5' (soil) 37186 (ppb)	G&E-4 6-7' (soil) 37187 (ppb)	G&E-5 4-5' (soil) 37185 (ppb)	G&E-5 GW 37192 (ppb)	G&E 1-5 GWCOMP. 37190 (ppb)
DATE SAMPLED (1986)	1/13	1/13	1/13	1/13	1/13	1/14	1/14
1,2,4-TCB(ppm)	54	24	BDL	74	BDL	0.070	0.460
Napthalene(ppm)	54	12	BDL	11	BDL	0.074	0.380
*Other Parameters	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Note:
1. Samples analyzed by J.L. Rogers & Callcott Engineers, Inc. (2/25/86). 37183-37192 are their sample IDs.
2. *See the other parameters listed in the J. L. Rogers & Calcott report (2/25/86).
3. TCB = Trichlorobenzene
4. BDL = Below detection limit.

ABANDONED LAGOON
Table 6
ACID AND BASE NEUTRAL EXTRACTABLE ANALYSIS

	BORING & SAMPLE IDENTIFIERS	
PARAMETERS	L-33 10-12'	L-33 12-14'
DATE SAMPLED(1986)	4/13	4/13
1,2,4-TCB(ppm)	<10	103
Napthalene(ppm)	<10	122
*Other Parameters	BDL	BDL

Note:
1. TCB = Trichlorobenzene
2. BDL = Below detection limit.
3. *See the other parameters listed in the West-Paine report (Appendix E).

ABANDONED LAGOON
Table 7
ACID AND BASE NEUTRAL EXTRACTABLE ANALYSIS

	BORING & SAMPLE IDENTIFIERS
PARAMETERS	**L1, L2, L3 GW COMP**
DATE SAMPLED(1986)	3/18
*All Parameters(ppb)	<150

Note: 1. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).

ANALYTICAL SUMMARY
BURN SITE

BURN SITE
TABLE 1
METALS, PCB, TOC & PHENOLICS ANALYSES

BORING & SAMPLE IDENTIFIERS

PARAMETERS	BS-LAGOON SW	BS-1 GW	BS-3 (L-28) 3-4' (soil)	PROD. BAG IN LAGOON (solid)	B-11 0.5' (soil)	BURN LAGOON AREA SW
DATE SAMPLED(1986)	3/22	3/21	4/09	3/22	3/26	5/1
Arsenic(ppm)	-	-	0.19	-	0.1	^
Cadmium(ppm)	<0.005	<0.005	0.03	-	<0.2	^
Chromium(ppm)	<0.01	0.10	7.30	-	2.7	^
Lead(ppm)	1.5	0.23	3.80	-	5.8	^
Mercury(ppm)	0.24	0.005	0.015	19	0.21	^
PCB(ppb)	^	^	250(ppm)	-	-	2.7
TOC(ppm)	40	32	3800	-	-	^
Phenol(ppm)	61	0.005	-	-	-	^

Note:
1. SW = surface water.
2. "^" = quantity of sample not sufficient for analysis.
3. "-" = sample not analyzed for that parameter.

BURN SITE
TABLE 2
METALS, PCB, PESTICIDES, PHENOLICS, & TOC ANALYSES

	BORING & SAMPLE IDENTIFIERS			
PARAMETER	G&E-6 3-4' (soil) 37188	G&E-9 1' (soil) 37189	G&E-10 GW 37193	G&E 6-10 GW COMP. 37191
DATE SAMPLED(1986)	1/14	1/14	1/14	1/14
Antimony(ppm)	<2.4	<3.1	<0.2	<0.2
Arsenic(ppm)	2.0	3.7	0.18	0.44
Beryllium(ppm)	<0.5	<0.5	0.17	0.10
Cadmium(ppm)	<0.5	<0.5	<0.10	<0.10
Chromium(ppm)	5.4	565	1.70	5.0
Copper(ppm)	1.4	282	0.20	2.1
Cyanide(ppm)	-	-	<0.02	<0.02
Lead(ppm)	4.7	53	0.4	1.10
Mercury(ppm)	<0.05	0.18	0.0017	0.024
Nickel(ppm)	4.9	129	0.20	0.790
Selenium(ppm)	<0.5	<0.5	0.033	0.030
Silver(ppm)	<0.5	1.3	0.20	0.030
Zinc(ppm)	0.94	44	0.58	1.10
PCB(ppm)	<1.0	169	-	-
PCB*(ppm)	-	155	-	-
TOC(ppm)	-	-	59	254
Phenolics	-	-	<5.0	13

Note:
1. Results by J.L. Rogers & Callcott Engineers, Inc. (2/25/86). 37188 - 37193 are their sample IDs.
2. PCB* = West Paine Laboratories test results. Analysis of split samples for PCBs.
3. "-" sample was not analyzed for that parameter.

BURN SITE
Table 3
VOLATILE ORGANICS ANALYSES

PARAMETER	BS-LAGOON GW	BS-1 GW	BS-3 (L-28) 3-4' (soil)	PROD. BAG IN LAGOON (solid)	B-11 0.5' (soil)
	BORING & SAMPLE IDENTIFIERS				
DATE SAMPLED(1986)	3/22	3/21	4/09	3/22	3/26
Chloroform(ppm)	<0.01	0.140	<0.01	-	<0.1
Trichloroethene(ppm)	0.55	0.270	<0.01	-	<0.1
Trans-1,2-TCE(ppm)	<0.01	0.039	<0.01	-	<0.1
Methylene Chloride(ppm)	<0.01	0.05	<0.01	-	<0.1
*Other parameters(ppm)	<0.01	<0.012	<0.01	-	<0.1

Note:
1. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).
2. "-" sample was not analyzed for that parameter.

BURN SITE
Table 4
VOLATILE ORGANICS ANALYSES

PARAMETERS	BORING & SAMPLE IDENTIFIERS G&E-10 GW 37193	 G&E 6-10 GW COMP 37191
DATE SAMPLED(1986)	1/14	1/14
Methylene Chloride(ppb)	6400	<10
1,1,2-Trichloroethane(ppb)	1513	65
*Other Parameters(ppb)	<10	<10

Note:

1. Results by J.L. Rogers & Callcott Engineers, Inc. (2/25/86). 37191 & 37193 are their sample IDs.
2. *See the other parameters listed in the J. L. Rodgers & Callcott report (2/25/86).

BURN SITE
Table 5
ACID AND BASE NEUTRAL EXTRACTABLE ANALYSES

	BORING & SAMPLE IDENTIFIERS			
PARAMETER	G&E-6 3-4' (Soil) 37188	G&E-9 1' (Soil) 37189	G&E-10 GW 37193	G&E-10 GW COMP 37191
DATE SAMPLED(1986)	1/14	1/14	1/14	1/14
1,2,4-TCB(ppb)	BDL	610	BDL	BDL
Napthalene(ppb)	BDL	750	BDL	BDL
Diphenylamine(ppb)	BDL	660	BDL	BDL
*Other Parameters(ppb)	BDL	BDL	BDL	BDL

Note:

1. Results analyzed by J.L. Rogers & Callcott Engineers, Inc. (2/25/86). 37188-37193 are their sample IDs.
2. TCB = Trichlorobenzene
3. BDL = Below Detection Limits
4. *See the other parameters listed in the J. L. Rodgers & Callcott Report (2/25/86).

BURN SITE
Table 6
ACID AND BASE NEUTRAL EXTRACTABLE ANALYSES

PARAMETER	BORING & SAMPLE IDENTIFIERS BS-3 (L-28) GW	BS-1 GW	BS-2 GW
DATE SAMPLED(1986)	4/09	3/21	3/22
*All Parameters	<500	<10	<10

NOTE: 1. All sample results are reported in ppb.

2. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).

ANALYTICAL SUMMARY
OLD DRUM STORAGE AREA

OLD DRUM STORAGE AREA
TABLE 1
Cl & TOC ANALYSES

		BORING & SAMPLE IDENTIFIERS		
SAMPLE ID	TYPE OF SAMPLE	DATE SAMPLED	TOC (ppm)	Cl (ppm)
A-9	GW	3/13/86	30	595
A-10	GW	3/13/86	20	165
A-11	GW	3/13/86	30	115

OLD DRUM STORAGE AREA
TABLE 2
VOLATILE ORGANICS ANALYSES

	BORING & SAMPLE IDENTIFIERS		
PARAMETER	A-9 GW 3/13/86	A-10 GW 3/13/86	A-11 GW 3/13/86
Carbon Tetrachloride(ppm)	19	12	39
Toluene(ppm)	0.26	0.04	5.70
1,1,1 - Trichloroethane(ppm)	<0.01	<0.01	0.04
*Other Parameters(ppm)	<0.01	<0.01	<0.01

Note: 1. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).

ANALYTICAL SUMMARY
DISCHARGE PIPE

DISCHARGE PIPE
TABLE 1
PCB, TOC, CHLORIDES, PHENOLICS & METALS ANALYSES

BORING & SAMPLE IDENTIFIERS

SAMPLE ID	TYPE OF SAMPLE	DATE SAMPLED	DEPTH (FT)	PCB (ppm/soil)	TOC (ppm)	Cl (ppm)	PHENOL (ppm)	Pb (ppm)	Hg (ppm)	Cd (ppm)	Cr (ppm)
A-3	Soil	3-13-86	3	<1.0	-	-	-	-	-	-	-
	Soil	3-13-86	6.5-7	<1.0	-	-	-	-	-	-	-
	GW	3-13-86		-	100	735	0.007	-	-	-	-
A-5	GW	3-13-86		-	60	390	-	-	-	-	-
A-6	Soil	3-13-86	3	<1.0	-	-	-	-	-	-	-
	GW	3-13-86		-	50	560	0.008	-	-	-	-
A-7	Soil COMP.	3-12-86	3+4.5	<1.0	-	-	-	-	-	-	-
A-8	Soil	3-12-86	2	<1.0	-	-	-	-	-	-	-
Dead Pond Marsh	Sludge	3-12-86		<1.0	-	-	-	6.5	<0.02	<0.1	1.1
A-6	Soil on Pipe Fitting	3-13-86	3	-	-	-	1.3	2.4	<0.02	<0.1	2.7

Note: 1. COMP. = Composite

DISCHARGE PIPE
TABLE 2.a
VOLATILE ORGANICS ANALYSES

PARAMETERS	A-3 3' (SOIL)	A-3 6.5-7' (SOIL)	A-3 GW	A-5 GW	A-6 GW
	BORING & SAMPLE IDENTIFIERS				
DATE SAMPLED(1986)	3/13	3/13	3/13	3/13	3/13
Benzene(ppm)	<0.1	<0.1	<0.01	<0.01	0.010
Trichloroethene(ppm)	<0.1	<0.1	<0.01	<0.01	0.056
*OTHER PARAMETERS(ppm)	<0.1	<0.1	<0.01	<0.01	<0.01

Note: 1. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).

ANALYTICAL SUMMARY
STRESSED VEGETATION

STRESSED VEGETATION AREA
TABLE 1
METALS, PCB, TOC & CHLORIDES ANALYSES

BORING & SAMPLE IDENTIFIERS

SAMPLE ID	TYPE OR SAMPLE	DEPTH (FT)	DATE SAMPLED	Cd (ppm)	Cr (ppm)	Pb (ppm)	As (ppm)	Hg (ppm)	PCB	TOC (ppm)	Cl (ppm)
D-1	Soil	1-2	3/27/86	<0.2	3.3	3.8	0.2	<0.02	-	-	-
	GW		3/27/86	<0.005	<0.01	<0.04	<0.01	<0.0002	<1.0	14	28
D-2	GW		3/27/86	<0.005	<0.01	<0.04	<0.01	<0.0002	-	19	35

Note: 1. PCB results for soils and solids are reported in ppm, PCBs in GW reported in ppb.

2. "-" = sample was not analyzed for that parameter.

STRESSED VEGETATION AREA
TABLE 2
VOLATILE ORGANICS ANALYSES

BORING & SAMPLE IDENTIFIERS

PARAMETERS	D-1 1-2' SOIL	D-1 GW 3/27/86	D-2 GW 3/27/86
Ethyl Benzene(ppm)	<0.1	<0.01	0.013
*OTHER PARAMETERS(ppm)	<0.1	<0.01	<0.01

Note: 1. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).

ANALYTICAL SUMMARY
MONITORING WELLS

MONITORING WELLS & DEEP BORINGS
TABLE 1.a
CHLORIDE, METALS, PCBS, TOC & PHENOLICS ANALYSES

BORING & SAMPLE IDENTIFIERS

SAMPLE ID	TYPE OF SAMPLE	DEPTH (FT)	DATE SAMPLED	PCB[3]	TOC (ppm)	Cl (ppm)	Pb (ppm)	Hg (ppm)	As (ppm)	Cd (ppm)	Cr (ppm)	Phenol (ppm)
W-1	GW		3/11/86	-	21	79	-	-	-	-	-	-
	GW		3/22/86	<1.0	5	15	<0.04	<0.0002	<0.01	<0.005	<0.01	-
W-2	GW		3/22/86	<1.0	9	13.4	<0.04	<0.0002	<0.01	<0.005	<0.01	-
W-3	Soil	15-17	3/12/86	<1.0	-	-	-	-	-	-	-	-
	GW		3/12/86	<1.0	60	-	-	-	-	-	-	-
	GW		3/26/86	<5.0+	170	1650	0.13	<0.002	0.12	0.02	0.13	0.35
W-4	Soil	15-17	3/12/86	<1.0	-	-	-	-	-	-	-	-
	GW		3/12/86	-	11	-	-	-	-	-	-	-
	GW		3/25/86	<1.0	6	34	<0.04	<0.0002	<0.01	<0.005	<0.01	0.11
W-5	GW		4/04/86	<1.0	-	-	-	-	-	-	-	-
	GW		5/01/86	<1.0	-	93	0.04	-	<0.01	<0.005	0.04	<0.001
W-6	GW		3/17/86	<1.0	14	-	0.21	-	<0.1	0.01	0.51	0.005
W-7	GW		3/17/86	-	150	-	1.50	-	<0.1	0.11	2.20	-
	GW		3/22/86	<5.0	120	195	-	-	-	-	-	0.032
W-9	GW		3/21/86	114	70	-	-	-	-	-	-	-
	GW		5/01/86	99.2++	-	310	-	-	-	-	-	<0.01
W-10	GW		4/04/86	12++	38	345	0.05	-	0.01	0.02	0.13	-
W-11	GW		4/04/86	<1.0	350	1100	<0.04	<0.002	<0.1	<0.005	-	0.060
	GW		5/01/86	-	-	1000	0.1	-	<0.01	0.02	0.18	-
W-12	GW		4/04/86	<1.0	9	57.9	<0.04	<0.002	<0.01	<0.005	-	0.020
W-13	GW		4/13/86	<1.0	9	40	0.6	<0.002	0.03	0.02	0.75	-
V-6	GW		3/13/86	<2.0	460	2900	0.32	-	-	-	-	-

Note: 1. + = Sediment phase was analyzed due to insufficient quantity of sample.

2. ++ = The specie is Aroclor 1242, all other species of PCB are Aroclor 1248.

3. PCBs in GW reported in ppb, PCBs for soils and solids are reported in ppm.

4. "*" = being analyzed for that parameter.

5. "-" = sample was not analyzed for that parameter.

MONITORING WELLS & DEEP BORINGS
TABLE 1.b
CHLORIDE, LEADS, PCB & TOC ANALYSES

BORING & SAMPLE IDENTIFIERS

SAMPLE ID	TYPE OF SAMPLE	DEPTH (FT)	DATE SAMPLED	Pb (ppm)	PCB (ppm/soil) (ppm/GW)	TOC (ppm)	Cl (ppm)
B-1	Soil	6-8	3/13/86	1.8	<1.0	-	-
	Soil	10-12	3/13/86	<0.8	<1.0	-	-
	Soil	14-16	3/13/86	0.9	<1.0	-	-
	Soil	43-45	3/13/86	4.6	<1.0	-	-
B-2	Soil	6-8	3/13/86	4.6	<1.0	-	-
	Soil	18-20	3/13/86	0.9	<1.0	-	-
	Soil	40-42	3/13/86	-	<1.0	-	-
	GW		3/13/86	-	*<1.0	10	105

Note:

1. "*" = results are reported in mg/Kg because sediment in the water sample was analyzed due to insufficient quantity of water.
2. "-" = sample was not analyzed for that parameter.

MONITOR WELLS & DEEP BORINGS
TABLE 2.a
VOLATILE ORGANICS ANALYSES

PARAMETERS	BORING & SAMPLE IDENTIFIERS										
	W-1 GW (ppm)	W-1 GW (ppm)	W-2 GW (ppm)	W-3 15-17' (SOIL) (ppm)	W-3 GW (ppm)	W-3 GW (ppm)	W-4 15-17' (SOIL) (ppm)	W-4 GW (ppm)	W-5 GW (ppm)	W-6 GW (ppm)	W-7 GW (ppm)
DATE SAMPLED(1986)	3/12	3/22	3/22	3/12	3/12	3/26	3/12	3/25	4/4	3/17	3/17
Benzene	<0.01	<0.01	<0.01	<0.1	0.01	0.017	<0.10	<0.01	<0.01	<0.01	0.017
Carbon Tetrachloride	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	89
Chlorobenzene	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	0.190
Chloroform	<0.01	<0.01	<0.01	<0.1	<0.01	0.020	<0.10	<0.01	<0.01	<0.01	0.025
Dichlorobenzene	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	+0.160
1,1-Dichloroethane	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	0.030
Methylene Chloride	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.10	<0.01	0.08	<0.01	<0.01
Trichloroethene	<0.01	<0.01	<0.01	<0.1	0.047	0.355	<0.10	<0.01	<0.01	<0.01	<0.110
Total Xylene	<0.01	<0.01	<0.01	<0.1	0.10	<0.01	<0.10	<0.01	<0.01	<0.01	<0.01
Chlorotoluene	<0.01	<0.01	<0.01	<0.1	<0.01	0.20	<0.10	<0.01	<0.01	<0.01	<0.01
*Other Parameters	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	<0.01

Note: 1. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).

2. +Includes 1,2; 1,3; & 1,4 dichlorobenzene

MONITOR WELLS & DEEP BORINGS
TABLE 2.b
VOLATILE ORGANICS ANALYSES

PARAMETERS	W-9 GW (ppm)	W-10 GW (ppm)	W-11 GW (ppm)	W-12 GW (ppm)	B-1 6-8' (SOIL) (ppm)	B-1 10-12' (SOIL) (ppm)	B-1 14-16' (SOIL) (ppm)	B-1 43-45' (SOIL) (ppm)	B-2 6-8' (SOIL) (ppm)	B-2 18-20' (SOIL) (ppm)	B-2 40-42' (SOIL) (ppm)
	BORING & SAMPLE IDENTIFIERS										
DATE SAMPLED(1986)	3/21	4/04	4/04	4/04	3/13	3/13	3/13	3/13	3/13	3/13	3/13
Chloroform	<0.01	<0.01	0.015	<0.01	<0.1	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1
Trans-1,2-Dichloroethene	0.60	<0.01	0.048	<0.01	<0.1	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1
Methylene Chloride	<0.01	<0.01	<0.01	<0.01	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	0.01	<0.01	<0.01	<0.01	<0.1	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1
Trichloroethene	180	0.025	12.0	0.073	<0.1	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylene	<0.01	<0.01	0.012	<0.01	<0.1	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorotoluene	<0.01	<0.01	0.010	<0.01	<0.1	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1
*Other Parameters	<0.01	<0.01	<0.01	<0.01	<0.1	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1

Note: 1. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).

MONITOR WELLS & DEEP BORINGS
TABLE 2.c
VOLATILE ORGANICS ANALYSES

	BORING & SAMPLE IDENTIFIERS				
PARAMETERS	B-2 GW (ppm)	V-6 GW (ppm)	W-5 GW (ppm)	W-7 GW (ppm)	W-13 GW (ppm)
DATE SAMPLED(1986)	3/13	3/13	5/01	3/22	4/13
Benzene	<0.01	0.014	<0.01	0.010	<0.01
Carbon Tetrachloride	<0.01	<0.01	<0.01	52	<0.01
Chlorobenzene	<0.01	<0.01	<0.01	0.260	<0.01
Chloroform	<0.01	0.037	<0.01	<0.01	<0.01
1,2-Dichlorobenzene	<0.01	<0.01	<0.01	0.128**	<0.01
1,3-Dichlorobenzene	<0.01	<0.01	<0.01	0.013	<0.01
1,4-Dichlorobenzene	<0.01	<0.01	<0.01	**	<0.01
1,2-Dichloroethane	<0.01	0.017	<0.01	<0.01	<0.01
Trans-1,2-Dichloroethene	<0.01	<0.01	<0.01	<0.01	<0.01
Methyl Chloride	<0.01	<0.01	<0.01	<0.01	<0.01
Toluene	<0.01	<0.01	<0.01	36	<0.01
Trichloroethene	<0.01	0.235	<0.01	0.260	<0.01
Total Xylene	<0.01	0.068	<0.01	0.010	<0.01
Chlorotoluene	<0.01	<0.01	<0.01	<0.010	<0.01
1,1-Dichloroethane	<0.01	<0.01	<0.01	0.039	<0.01
1,1-Dichloroethene	<0.01	<0.01	<0.01	0.010	<0.01
Methylene Chloride	<0.01	<0.01	<0.01	0.063	<0.01
*Other Parameters	<0.01	<0.01	<0.01	<0.01	<0.01

Note:

1. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).
2. The symbol "**" indicates that the value 0.128 is a combination of 1,2 & 1,4 - Dichlorobenzene.

MONITORING WELLS & DEEP BORINGS
Table 3
ACID & BASE NEUTRAL EXTRACTABLES ANALYSES

BORING & SAMPLE IDENTIFIERS

PARAMETERS	W-9 GW	W-10 GW
DATE SAMPLED(1986)	3/21	4/04
*All Parameters	<10	<10

Note: 1. All GW results are reported in ppm.

2. * = see the complete list of parameters analyzed in the West-Paine report (Appendix E).

WEST·PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

ANALYSIS OF SOIL
AND WATER SAMPLES

for

G & E ENGINEERING, INCORPORATED
Post Office Box 45212
Department 186
Baton Rouge, Louisiana 70895

Attention: Ms. Marie Walsh

March 18, 1986

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

March 18, 1986

Samples collected by G & E Engineering, Incorporated, as documented on the enclosed chain-of-custody forms, were analyzed in accordance with the following EPA approved methods.

A. Test Methods for Evaluating Solid Waste, SW-846, July 1982:

Parameter	Method
PCB - Soil	3550, 8080
PCB - Water	8080

Documented results are reported on the following pages.

Daniel T. Strecker
Operations Supervisor

nal

86-1251

WEST-PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

March 18, 1986

Sample Identification	Depth	Total Polychlorinated Biphenyls (mg/kg)
A-3	3'	<1.0
A-3	6.5' - 7'	<1.0
A-6	3'	<1.0
A-6	6'	<1.0
A-7 Composite	3' + 4.5'	<1.0
A-8	2'	<1.0
W-3	15' - 17'	<1.0
Date/Analyst		03-17/CAL

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

March 18, 1986

Sample Identification	Total Polychlorinated Biphenyls (ug/L)
V-6	<2.0
W-3	<1.0
Date/Analyst	03-17/CAL

nal

86-1251

G & E ENGINEERING, INC.
CONSULTING GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

P O BOX 45212
DEPT 186
BATON ROUGE LOUISIANA 70895

4915 SOUTH SHERWOOD FOREST BOULEVARD
BATON ROUGE, LOUISIANA 70816

(504) 292-9007

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time /Date	Type of Sample
AW-3	4:00pm 3/12/86	Groundwater
W-1	10:30am/3-11-86	Groundwater
A-2	1:05pm/3-12-86	Groundwater
A-8 (2')	12:30pm/3-12-86	Groundwater
W-4	1730/3-12-86	Groundwater
Dead Pond/marsh	12:45pm/3-12-86	Sludge

SAMPLE COLLECTION:

Location of Sampling: Venture Chemicals Co., Lobeco, SC.

Facility Type: ___ Producer ___ Hauler ___ Disposal Site X Other Chemical Plant

Collectors Name: [illegible] Telephone: (504) 292-9007

Company Name: G & E ENGINEERING, INC.

Address: 4915 South Sherwood Forest Blvd.

Date Sampled: 3/11/86 & 3/12/86 Time:

Type of Process or Facility Sampled: Chemical Plant Facility

Field Information: All Samples iced in the field.

[signature] 3/13/86

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: Greyhound Bus Date: 3/13/86 Time: [illegible]

Company Name: Greyhound

Address: [illegible], South Carolina

SAMPLE RECEIVING:

Person accepting sample: [signature] Date: 031486

Time: 1600 Company: WEST-PAINE

Address: 7979 GSRI BR LA 70820

Sample Disposition ___ Storage ___ Further Transportaion ___

___ Other LABORATORY

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

G & E ENGINEERING, INC.

CONSULTING GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

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ON ROUGE LOUISIANA 70895

4915 SOUTH SHERWOOD FOREST BOULEVARD
BATON ROUGE, LOUISIANA 70816

(504) 292-9007

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time	Type of Sample
A-3 (9')	12:55pm	soil
A-5 (2.6-3')	12:20pm	soil
A-4 (6.5')	12:35pm	soil
A-3 (6.5-70')	1:05pm	soil
A-5 (7')	12:10pm	soil
A-6 (6')	12:15pm	soil
A-6 (3')	11:55pm	soil

SAMPLE COLLECTION:

Location of Sampling: Venture Chemicals Co., Lobeco, SC.

Facility Type: ___ Producer ___ Hauler ___ Disposal Site X Other Chemical Plant

Collectors Name: MBW, JF, MJR, CAB Telephone: (504) 292-9007

Company Name: G & E ENGINEERING, INC.

Address: 4915 South Sherwood Forest Blvd.

Date Sampled: 3/13/86 Time: ____

Type of Process or Facility Sampled: Chemical Plant Site

Field Information: All Samples iced in the field.

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: Greyhound Bus Date: 3/14/86 Time: ____

Company Name: Greyhound Bus

Address: Beaufort, South Carolina

SAMPLE RECEIVING:

Person accepting sample: [signature] Date: 031786

Time: 0700 Company: WEST-PAINE

Address: 7979 GSRI BR LA 70820

Sample Disposition ___ Storage ___ Further Transportaion ___

___ Other LAB

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

[illegible] LOUISIANA 70895

G & E ENGINEERING, INC.
CONSULTING GEOTECHNICAL & ENVIRONMENTAL ENGINEERS
4915 SOUTH SHERWOOD FOREST BOULEVARD
BATON ROUGE, LOUISIANA 70816
(504) 292-9007

#3

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time	Type of Sample
A-9	5:00 pm	groundwater
V-6	5:35 pm	groundwater
A-10	6:10 pm	groundwater

SAMPLE COLLECTION:

Location of Sampling: Venture Chemicals Co., Lobeco, SC.
Facility Type: ___ Producer ___ Hauler ___ Disposal Site X Other Chemical Plant
Collectors Name: James J. Franklin Telephone: (504) 292-9007
Company Name: G & E ENGINEERING, INC.
Address: 4915 South Sherwood Forest Blvd.

Date Sampled: 3/13/86 Time: ______
Type of Process or Facility Sampled: Chemical plant site
Field Information: All Samples iced in the field.

SAMPLE SHIPPING (other than transportation by collector)
Transporters Name: Greyhound Bus Date: 3/14/86 Time: ______
Company Name: Greyhound Bus
Address: Beaufort, South Carolina

SAMPLE RECEIVING:
Person accepting sample: [signature]
Time: 0700 Company: WEST-PAINE Date: 031786
Address: 7979 GSRI BR LA 70820
Sample Disposition ___ Storage ___ Further Transportaion ___
___ Other ______

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

MEMBER AMERICAN CONSULTING ENGINEERS COUNCIL

G & E ENGINEERING, INC.
CONSULTING GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

JX 45212
186
.N ROUGE LOUISIANA 70895

4915 SOUTH SHERWOOD FOREST BOULEVARD
BATON ROUGE, LOUISIANA 70816

(504) 292-9007

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time	Type of Sample
✓A-1 (6')	10:15/3-12-86	soil
✓A-1 (1')	10:00am/3/12/86	soil
✓A-2 (3')	10:30am/3/12/86	soil
✓A-2 (1.5')	10:45am/3/12/86	soil
✓A-2 (5')	11:am/3-12-86	soil
✓A-8 (2')	12:20pm/3-12-86	soil
✓A-1 (3')	10:05 3/12/86	soil
✓A-7 (3')	10:00 3/12/86	soil

SAMPLE COLLECTION:

Location of Sampling: Venture Chemicals Co., Lobeco, SC.

Facility Type: ___Producer ___Hauler ___Disposal Site X Other Chemical Plant

Collectors Name: [illegible] Telephone: (504) 292-9007

Company Name: G & E ENGINEERING, INC.

Address: 4915 South Sherwood Forest Blvd.

Date Sampled: 3/11/86 & 3/12/86 Time: ______

Type of Process or Facility Sampled: Chemical Plant Site

Field Information: All Samples iced in the field.

[signature] 3/13/86

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: Greyhound Bus Date: 3/13/86 Time: 11:00

Company Name: Greyhound

Address: Beaufort, ~~[illegible]~~ South Carolina

SAMPLE RECEIVING:

Person accepting sample: [signature] Date: 031486

Time: 1600 Company: WEST-PAINE

Address: 7979 GSRI BR LA 70820

Sample Disposition___ Storage___ Further Transportaion___

___Other LAB

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

WEST-PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

ANALYSES OF SOIL AND WATER SAMPLES

for

G & E ENGINEERING, INCORPORATED
4915 South Sherwood Forest
Baton Rouge, Louisiana 70818

Attention: Ms. Marie Walsh

March 24, 1986

WEST·PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

March 24, 1986

Samples collected by G & E Engineering, Incorporated, as documented on the enclosed chain-of-custody forms, were analyzed in accordance with the following EPA approved methods.

A. Standard Methods for the Examination of Water and Wastewater, 15th Edition, 1980:

Parameter	Method
Lead	316A
Total Organic Carbon	505

B. Test Methods for Evaluating Hazardous Waste, SW-846

Parameter	Method
Volatile Organic Fraction	624 (FID)

The documented results are listed on the following pages.

Daniel T. Strecker
Operations Supervisor

dsl

WEST·PAINE Laboratories INC.
7979 GSRI AVE • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

March 24, 1986

Date Recieved: 03-14-86 and 03-17-86

Sample Identification	Total Organic Carbon (mg/L C)	Lead (mg/L Pb)
V-6, 03-13-86	460	0.32
W-3, 03-12-86	60	----
Quality Assurance Actual/Found	25/24	2.50/2.50
Date/Time Analyst	03-17/1300/RC	03-17/FD

dsl

86-1324

WEST-PAINE Laboratories INC.
7979 GSRI AVE • BATON ROUGE, LA 70820

G & E Engineering, Inc.
4915 S. Sherwood Forest
Baton Rouge, LA 70818

PRIORITY POLLUTANTS
VOLATILES FRACTIONS

All results in milligrams per liter.

	03-12-86 W-3	03-13-86 V-6
Benzene	0.010	0.014
Bromoform	<0.010	<0.010
Carbon tetrachloride	<0.010	<0.010
Chlorobenzene	<0.010	<0.010
Chlorodibromomethane	<0.010	<0.010
Chloroethane	<0.010	<0.010
2-Chloroethylvinyl ether	<0.010	<0.010
Chloroform	<0.010	0.037
1,2-Dichlorobenzene	<0.010	<0.010
1,4-Dichlorobenzene	<0.010	<0.010
1,3-Dichlorobenzene	<0.010	<0.010
Dichlorobromomethane	<0.010	<0.010
1,1-Dichloroethane	<0.010	<0.010
1,2-Dichloroethane	<0.010	0.017
1,1-Dichloroethene	<0.010	<0.010
trans-1,2-Dichloroethene	<0.010	<0.010
1,2-Dichloropropane	<0.010	<0.010
cis-1,3-Dichloropropene	<0.010	<0.010
trans-1,3-Dichloropropene	<0.010	<0.010
Ethylbenzene	<0.010	<0.010
Methylbromide	<0.010	<0.010
Methylchloride	<0.010	<0.010
Methylene chloride	<0.010	<0.010
1,1,2,2-Tetrachloroethane	<0.010	<0.010
Tetrachloroethene	<0.010	<0.010
Toluene	<0.010	<0.010
1,1,1-Trichloroethane	<0.010	<0.010
1,1,2-Trichloroethane	<0.010	<0.010
Trichloroethene	0.047	0.235
Trichlorofluormethane	<0.010	<0.010
Vinyl chloride	<0.010	<0.010
Total Xylene (semiquantitative)	0.100	0.068
Date of Analyses	03-17-86	03-17-86

dsl

86-1324

WEST-PAINE Laboratories INC.

7979 GSRI AVE • BATON ROUGE, LA 70820

G & E Engineering, Inc.

4915 S. Sherwood Forest

Baton Rouge, LA 70818

PRIORITY POLLUTANTS
VOLATILES FRACTIONS

All results in milligrams per kilogram

	A-3 (3')	A-3 (6.5 - 7')	A-6 (6')	A-6 (3')
Benzene	<0.10	<0.10	<0.10	<0.10
Bromoform	<0.10	<0.10	<0.10	<0.10
Carbon tetrachloride	<0.10	<0.10	<0.10	<0.10
Chlorobenzene	<0.10	<0.10	<0.10	<0.10
Chlorodibromomethane	<0.10	<0.10	<0.10	<0.10
Chloroethane	<0.10	<0.10	<0.10	<0.10
2-Chloroethylvinyl ether	<0.10	<0.10	<0.10	<0.10
Chloroform	<0.10	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	<0.10	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	<0.10	<0.10	<0.10	<0.10
Dichlorobromomethane	<0.10	<0.10	<0.10	<0.10
1,1-Dichloroethane	<0.10	<0.10	<0.10	<0.10
1,2-Dichloroethane	<0.10	<0.10	<0.10	<0.10
1,1-Dichloroethene	<0.10	<0.10	<0.10	<0.10
trans-1,2-Dichloroethene	<0.10	<0.10	<0.10	<0.10
1,2-Dichloropropane	<0.10	<0.10	<0.10	<0.10
cis-1,3-Dichloropropene	<0.10	<0.10	<0.10	<0.10
trans-1,3-Dichloropropene	<0.10	<0.10	<0.10	<0.10
Ethylbenzene	<0.10	<0.10	<0.10	<0.10
Methylbromide	<0.10	<0.10	<0.10	<0.10
Methylchloride	<0.10	<0.10	<0.10	<0.10
Methylene chloride	<0.10	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	<0.10	<0.10	<0.10	<0.10
Tetrachloroethene	<0.10	<0.10	<0.10	<0.10
Toluene	<0.10	<0.10	<0.10	<0.10
1,1,1-Trichloroethane	<0.10	<0.10	<0.10	<0.10
1,1,2-Trichloroethane	<0.10	<0.10	<0.10	<0.10
Trichloroethene	<0.10	<0.10	<0.10	<0.10
Trichlorofluormethane	<0.10	<0.10	<0.10	<0.10
Vinyl chloride	<0.10	<0.10	<0.10	<0.10
Total Xylene (semiquantitative)	<0.10	<0.10	<0.10	<0.10
Date of Analyses	03-17-86	03-17-86	03-17-86	03-17-86

dsl

86-1324

WEST-PAINE laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E Engineering, Inc.
4915 S. Sherwood Forest
Baton Rouge, LA 70818

PRIORITY POLLUTANTS
VOLATILES FRACTIONS

All results in milligrams per kilogram.

	A-7 Composite (3' + 4.5')	A-8 (2')	W-3 (15' - 17')
Benzene	<0.10	<0.10	<0.10
Bromoform	<0.10	<0.10	<0.10
Carbon tetrachloride	<0.10	<0.10	<0.10
Chlorobenzene	<0.10	<0.10	<0.10
Chlorodibromomethane	<0.10	<0.10	<0.10
Chloroethane	<0.10	<0.10	<0.10
2-Chloroethylvinyl ether	<0.10	<0.10	<0.10
Chloroform	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	<0.10	<0.10	<0.10
Dichlorobromomethane	<0.10	<0.10	<0.10
1,1-Dichloroethane	<0.10	<0.10	<0.10
1,2-Dichloroethane	<0.10	<0.10	<0.10
1,1-Dichloroethene	<0.10	<0.10	<0.10
trans-1,2-Dichloroethene	<0.10	<0.10	<0.10
1,2-Dichloropropane	<0.10	<0.10	<0.10
cis-1,3-Dichloropropene	<0.10	<0.10	<0.10
trans-1,3-Dichloropropene	<0.10	<0.10	<0.10
Ethylbenzene	<0.10	<0.10	<0.10
Methylbromide	<0.10	<0.10	<0.10
Methylchloride	<0.10	<0.10	<0.10
Methylene chloride	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	<0.10	<0.10	<0.10
Tetrachloroethene	<0.10	<0.10	<0.10
Toluene	<0.10	<0.10	<0.10
1,1,1-Trichloroethane	<0.10	<0.10	<0.10
1,1,2-Trichloroethane	<0.10	<0.10	<0.10
Trichloroethene	<0.10	<0.10	<0.10
Trichlorofluormethane	<0.10	<0.10	<0.10
Vinyl chloride	<0.10	<0.10	<0.10
Total Xylene (semiquantitative)	<0.10	<0.10	<0.10
Date of Analyses	03-17-86	03-17-86	03-17-86

dsl

86-1324

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

ANALYSIS OF SOIL SAMPLES

for

G & E ENGINEERING, INCORPORATED
Post Office Box 45212
Department 186
Baton Rouge, Louisiana 70895

Attention: Ms. Marie Walsh

March 26, 1986

ds1

86-1362

WEST·PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

March 26, 1986

Samples collected by G & E Engineering, Incorporated, as documented on the enclosed chain-of-custody forms, were analyzed in accordance with the following EPA approved methods.

A. Test Methods for Evaluating Solid Waste, SW-846, July 1982:

Parameter	Method
PCB - Soil	3550, 8080

The documented results are reported on the following page.

Victor J. Blanchard, III
Manager

dsl

86-1362

WEST·PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

March 26, 1986

Date Received: 03-18-86

Sample Identification	Polychlorinated Biphenyls (mg/kg)
Boring #1, Sample #37183, 01-13-86 @ 1440hrs.	680
Boring #3, Sample #37184, 01-13-86 @ 1645hrs.	6,750
Boring #9, Sample #37189, 01-14-86 @ 1400hrs.	155
Date/Time/Analyst	03-18/CL

dsl

86-1362

WEST·PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

ANALYSES OF SOIL AND WATER SAMPLES

for

G & E ENGINEERING, INCORPORATED
Post Office Box 45212
Department 186
Baton Rouge, Louisiana 70895

Attention: Ms. Marie Walsh

April 3, 1986

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 3, 1986

Ten (10) samples were received from G & E Engineering on March 24, 1986, as documented by the enclosed chain-of-custody forms. These samples were analyzed according to the following EPA approved methods.

A. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA-600/4-82-057:

Parameter	Method
Volatile Organic Fraction	624 (GC/FID)

B. Test Method for Evaluating Solid Waste, SW-846, July, 1982:

Parameter	Method
Volatile Organic Fraction	8240
PCB - Soil	3550, 8080
PCB - Water	8080

C. Standard Methods for the Examination of Water and Wastewater, 15th Edition, 1980:

Parameter	Method
Total Organic Carbon	505
Specific Conductance	205
pH	423
Chloride	407

D. Standard Methods for the Examination Water and Wastewater, 14th Edition, 1979:

Parameter	Method
Phenol	510A, 510B

WEST-PAINE Laboratories INC.
979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 3, 1986

E. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, March, 1979:

Parameter	Method
Lead	239.1
Mercury	245.1
Chromium	218.1
Cadmium	213.1

The results are reported on the following pages.

Victor J. Blanchard, III
Manager

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 3, 1986

Sample Identification: Water Sample, W-9, 03-22-86

Date Received: 03-24-86

Parameter	Result	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/L Pb)	0.94	2.50/2.50	03-27/FD
Mercury (mg/L Hg)	0.004	0.0100/0.0103	03-31/FD
Chromium (mg/L Cr)	0.67	0.50/0.50	03-26/FD
Cadmium (mg/L Cd)	0.03	0.250/0.250	03-31/FD
Total Organic Carbon (mg/L C)	70	25/22	03-24/0900/RC
Phenol (mg/L Phenol)	0.02	0.020/0.019	03-26/0400/RH
pH (Units)	3.8	7.0/7.0	03-24/0400/RH
Specific Conductance (umhos/cm)	2,100	1,400/1,400	03-24/0400/RH

WEST·PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 3, 1986

Sample Identification: Water Sample, L-7, 03-21-86

Date Received: 03-24-86

Parameter	Result	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/L Pb)	1.5	2.50/2.50	03-27/FD
Mercury (mg/L Hg)	0.05	0.0100/0.0103	03-31/FD
Chromium (mg/L Cr)	0.65	0.50/0.50	03-26/FD
Cadmium (mg/L Cd)	0.02	0.250/0.250	03-31/FD
Total Organic Carbon (mg/L C)	40	25/22	03-24/0900/RC

dsl

86-1498

WEST·PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 3, 1986

Sample Identification: Water Sample, L-18, 03-21-86

Date Received: 03-24-86

Parameter	Result	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/L Pb)	7.0	2.50/2.50	03-27/FD
Mercury (mg/L Hg)	0.12	0.0100/0.0103	03-31/FD
Chromium (mg/L Cr)	1.9	0.50/0.50	03-26/FD
Cadmium (mg/L Cd)	0.03	0.250/0.250	03-31/FD
Total Organic Carbon (mg/L C)	45	25/22	03-24/0900/RC

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 15, 1986

Date Received: 03-24-86

Sample Identification	Polychlorinated Biphenyls (ug/L)
W-9, 03-22-86	114.0

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 3, 1986

Date Received: 03-24-86

Sample Identification	Polychlorinated Biphenyls (mg/kg)
L-7, 8'	369
L-9, 2 - 3'	140
L-10, 3 1/2 - 4'	17
L-13, 4 - 6 1/2'	<2.0
L-22, 18" - 3'	249
L-24, 6 - 6 1/2'	369

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E Engineering, Inc.
P.O. Box 45212, Dept. 186
Baton Rouge, LA 70895

All results in milligrams per liter.

PRIORITY POLLUTANTS
VOLATILES FRACTIONS

	Lagoon Burn Site 03-22-86	W-9 03-22-86	L-7 03-21-86	L-18 03-21-86
Benzene	<0.01	<0.01	<0.01	<0.01
Bromoform	<0.01	<0.01	<0.01	<0.01
Carbon tetrachloride	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.01	<0.01	<0.01	<0.01
Chlorodibromomethane	<0.01	<0.01	<0.01	<0.01
Chloroethane	<0.01	<0.01	<0.01	<0.01
2-Chloroethylvinyl ether	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01
1,2-Dichlorobenzene	<0.01	<0.01	<0.01	<0.01
1,4-Dichlorobenzene	<0.01	<0.01	<0.01	<0.01
1,3-Dichlorobenzene	<0.01	<0.01	<0.01	<0.01
Dichlorobromomethane	<0.01	<0.01	<0.01	<0.01
1,1-Dichloroethane	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.01	<0.01	<0.01	<0.01
1,1-Dichloroethene	<0.01	<0.01	<0.01	<0.01
trans-1,2-Dichloroethene	<0.01	0.60	<0.01	<0.01
1,2-Dichloropropane	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropene	<0.01	<0.01	<0.01	<0.01
trans-1,3-Dichloropropene	<0.01	<0.01	<0.01	<0.01
Ethylbenzene	<0.01	<0.01	<0.01	<0.01
Methylbromide	<0.01	<0.01	<0.01	<0.01
Methylchloride	<0.01	<0.01	<0.01	<0.01
Methylene chloride	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01
Tetrachloroethene	<0.01	<0.01	<0.01	<0.01
Toluene	<0.01	<0.01	<0.01	<0.01
1,1,1-Trichloroethane	<0.01	<0.01	<0.01	<0.01
1,1,2-Trichloroethane	<0.01	<0.01	<0.01	<0.01
Trichloroethene	0.55	180	0.04	0.05
Trichlorofluormethane	<0.01	<0.01	<0.01	<0.01
Vinyl chloride	<0.01	<0.01	<0.01	<0.01
Total Xylene (semiquantitative)	<0.01	<0.01	<0.01	<0.01
Date of Analyses	03-27-86	03-27-86	03-27-86	03-27-86
Chlorotoluene (semiquantitative)	<C.01	<0.01	1.20	1.70

CORRECTED REPORT 86-1498

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E Engineering, Inc.
Post Office Box 45212
Baton Rouge, LA 70895

PRIORITY POLLUTANTS
VOLATILES FRACTIONS

All results in milligrams per kilogr.

	L-7 8'	L-9 2 - 3'	L-10 3 1/2' - 4'
Benzene	<0.10	<0.10	<0.10
Bromoform	<0.10	<0.10	<0.10
Carbon tetrachloride	<0.10	<0.10	<0.10
Chlorobenzene	<0.10	<0.10	<0.10
Chlorodibromomethane	<0.10	<0.10	<0.10
Chloroethane	<0.10	<0.10	<0.10
2-Chloroethylvinyl ether	<0.10	<0.10	<0.10
Chloroform	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	<0.10	<0.10	<0.10
Dichlorobromomethane	<0.10	<0.10	<0.10
1,1-Dichloroethane	<0.10	<0.10	<0.10
1,2-Dichloroethane	<0.10	<0.10	<0.10
1,1-Dichloroethene	<0.10	<0.10	<0.10
trans-1,2-Dichloroethene	<0.10	<0.10	<0.10
1,2-Dichloropropane	<0.10	<0.10	<0.10
cis-1,3-Dichloropropene	<0.10	<0.10	<0.10
trans-1,3-Dichloropropene	<0.10	<0.10	<0.10
Ethylbenzene	<0.10	<0.10	<0.10
Methylbromide	<0.10	<0.10	<0.10
Methylchloride	<0.10	<0.10	<0.10
Methylene chloride	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	<0.10	<0.10	<0.10
Tetrachloroethene	<0.10	<0.10	<0.10
Toluene	<0.10	<0.10	<0.10
1,1,1-Trichloroethane	<0.10	<0.10	<0.10
1,1,2-Trichloroethane	<0.10	<0.10	<0.10
Trichloroethene	<0.10	<0.10	<0.10
Trichlorofluormethane	<0.10	<0.10	<0.10
Vinyl chloride	<0.10	<0.10	<0.10
Total Xylene (semiquantitative)	<0.10	<0.10	<0.10
Date of Analyses	03-31-86	03-31-86	03-31-86
Chlorotoluene (semiquantitative)	6.0	<0.1	<0.1

86-1498

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E Engineering, Inc.
Post OFfice Box 45212
Baton Rouge, LA 70895

PRIORITY POLLUTANTS
VOLATILES FRACTIONS

All results in milligrams per kilogram

	L-13 4 - 6 1/2'	L-22 18" - 3'	L-24 6 - 6 1/2'
Benzene	<0.10	<0.10	<0.10
Bromoform	<0.10	<0.10	<0.10
Carbon tetrachloride	<0.10	<0.10	<0.10
Chlorobenzene	<0.10	<0.10	<0.10
Chlorodibromomethane	<0.10	<0.10	<0.10
Chloroethane	<0.10	<0.10	<0.10
2-Chloroethylvinyl ether	<0.10	<0.10	<0.10
Chloroform	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	<0.10	<0.10	<0.10
Dichlorobromomethane	<0.10	<0.10	<0.10
1,1-Dichloroethane	<0.10	<0.10	<0.10
1,2-Dichloroethane	<0.10	<0.10	<0.10
1,1-Dichloroethene	<0.10	<0.10	<0.10
trans-1,2-Dichloroethene	<0.10	<0.10	<0.10
1,2-Dichloropropane	<0.10	<0.10	<0.10
cis-1,3-Dichloropropene	<0.10	<0.10	<0.10
trans-1,3-Dichloropropene	<0.10	<0.10	<0.10
Ethylbenzene	<0.10	<0.10	<0.10
Methylbromide	<0.10	<0.10	<0.10
Methylchloride	<0.10	<0.10	<0.10
Methylene chloride	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	<0.10	<0.10	<0.10
Tetrachloroethene	<0.10	<0.10	<0.10
Toluene	<0.10	<0.10	<0.10
1,1,1-Trichloroethane	<0.10	<0.10	<0.10
1,1,2-Trichloroethane	<0.10	<0.10	<0.10
Trichloroethene	<0.10	<0.10	<0.10
Trichlorofluormethane	<0.10	<0.10	<0.10
Vinyl chloride	<0.10	<0.10	<0.10
Total Xylene (semiquantitative)	<0.10	<0.10	<0.10
Date of Analyses	03-31-86	03-31-86	03-31-86
Chlorotoluene (semiquantitative)	<0.1	<0.1	<0.1

dsl

86-1498

WEST·PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

ANALYSES OF SOIL SAMPLES

for

G & E ENGINEERING, INCORPORATED
Post Office Box 45212
Department 186
Baton Rouge, Louisiana 70895

Attention: Ms. Marie Walsh

April 7, 1986

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 7, 1986

Two (2) samples were received from G & E Engineering on March 31, 1986, as documented by the enclosed chain-of-custody forms. These samples were analyzed according to the following EPA approved methods.

A. Test Method for Evaluating Solid Waste, SW-846, July, 1982:

Parameter	Method
Volatile Organic Fraction	8240

B. Test Methods for Evaluating Solid Waste, SW-846, July 1982:

Parameter	Method
Arsenic	7060
Cadmium	7130
Chromium	7190
Lead	7420
Mercury	7470

The results are reported on the following pages.

Victor J. Blanchard, III
Manager

nal

86-1545

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 3, 1986

Sample ID: West Tip Burn Lagoon, B-11, 6", 03-26-86 @ 0300hrs.

Date Received: March 31, 1986

Parameter	Result	Quality Assurance Actual/Found	Date/Time Analyst
Chromium (mg/kg Cr)	2.7	0.50/0.49	04-03/VM
Lead (mg/kg Pb)	5.8	2.50/2.40	04-02/VM
Mercury (mg/kg Hg)	0.21	0.0100/0.0103	03-04/VM
Cadmium (mg/kg Cd)	<0.2	0.250/0.246	04-02/VM
Arsenic (mg/kg As)	0.1	0.025/0.025	04-03/VM

nal

86-1545

WEST·PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 3, 1986

Sample ID: 200' West of Clarifier, D-1, 03-26-86 @ No Time

Date Received: March 31, 1986

Parameter	Result	Quality Assurance Actual/Found	Date/Time Analyst
Chromium (mg/kg Cr)	3.3	0.50/0.49	04-03/VM
Lead (mg/kg Pb)	3.8	2.50/2.40	04-02/VM
Mercury (mg/kg Hg)	<0.02	0.0100/0.0103	03-04/VM
Cadmium (mg/kg Cd)	<0.2	0.250/0.246	04-02/VM
Arsenic (mg/kg As)	0.2	0.025/0.025	04-03/VM

nal

WEST-PAINE Laboratories INC.
7976 GSRI AVE • BATON ROUGE LA 70820

G & E Engineering, Inc.

P.O. Box 45212, Dept 186

Baton Rouge, Louisiana 70895

PRIORITY POLLUTANTS
VOLATILES FRACTIONS

All results in milligrams of contaminant per kilogram of soil.

	03-11-86/0300, B-11, 6" West Tip Burn Lagoon	03-26-86/No Time, D-1, 1'-2' 200' West of Clarifier
Benzene	<0.10	<0.10
Bromoform	<0.10	<0.10
Carbon tetrachloride	<0.10	<0.10
Chlorobenzene	<0.10	<0.10
Chlorodibromomethane	<0.10	<0.10
Chloroethane	<0.10	<0.10
2-Chloroethylvinyl ether	<0.10	<0.10
Chloroform	<0.10	<0.10
1,2-Dichlorobenzene	<0.10	<0.10
1,4-Dichlorobenzene	<0.10	<0.10
1,3-Dichlorobenzene	<0.10	<0.10
Dichlorobromomethane	<0.10	<0.10
1,1-Dichloroethane	<0.10	<0.10
1,2-Dichloroethane	<0.10	<0.10
1,1-Dichloroethene	<0.10	<0.10
trans-1,2-Dichloroethene	<0.10	<0.10
1,2-Dichloropropane	<0.10	<0.10
cis-1,3-Dichloropropene	<0.10	<0.10
trans-1,3-Dichloropropene	<0.10	<0.10
Ethylbenzene	<0.10	<0.10
Methylbromide	<0.10	<0.10
Methylchloride	<0.10	<0.10
Methylene chloride	<0.10	<0.10
1,1,2,2-Tetrachloroethane	<0.10	<0.10
Tetrachloroethene	<0.10	<0.10
Toluene	<0.10	<0.10
1,1,1-Trichloroethane	<0.10	<0.10
1,1,2-Trichloroethane	<0.10	<0.10
Trichloroethene	<0.10	<0.10
Trichlorofluormethane	<0.10	<0.10
Vinyl chloride	<0.10	<0.10
Total Xylene (semiquantitative)	<0.10	<0.10
Date of Analyses	04-03-86	04-03-86
Chlorotoluene	<0.10	<0.10

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

ANALYSES OF SOIL AND WATER SAMPLES

for

G & E ENGINEERING, INCORPORATED
Post Office Box 45212
Department 186
Baton Rouge, Louisiana 70895

ATTENTION: Ms. Marie Walsh

April 10, 1986

WEST·PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 10, 1986

Samples were received from G & E Engineering, Incorporated on April 7, 1986, as documented by the enclosed chain-of-custody forms. These samples were analyzed according to the following EPA approved methods.

A. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA-600/4-82-057:

Parameter	Method
Volatile Organic Fraction	624 (GC/FID)

B. Test Methods for Evaluating Solid Waste, SW-846, July 1982:

Parameter	Method
Volatile Organic Fraction	8240 (GC/FID)
PCB - Soil	3550, 8080
PCB - Water	8080

The results are reported on the following pages.

Victor J. Blanchard, III
Manager

nal

86-1609

WEST·PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 10, 1986

All results in milligrams per liter.

Sample Identification	Polychlorinated Biphenyls (ug/L)
Groundwater:	
W-11, 04-04-86 @ 1245hrs.	<1.0
W-12, 04-04-86 @ 1630hrs.	<1.0
W-10, 04-04-86 @ 0445hrs.	12.0 of Aroclor 1242
W-5, 04-04-86 @ 0845hrs.	<1.0
Date of Analyses	04-07-86

nal

86-1609

WEST-PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 10, 1986

All results in milligrams per kilogram.

Sample Identification	Polychlorinated Biphenyls (mg/kg)
Soil:	
3'-4' L-28, 04-04-86 @ No Time	250 of Aroclor 1248
Date of Analyses	04-07-86

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WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E Engineering, Inc.
P.O. Box 45212, Dept 186
Baton Rouge, LA 70895

All results in milligrams per liter.

PRIORITY POLLUTANTS
VOLATILES FRACTIONS

	04-04/1245 W-11	04-04/1630 W-12	04-04/0445 W-10	04-04/0845 W-5
Benzene	<0.010	<0.010	<0.010	<0.010
Bromoform	<0.010	<0.010	<0.010	<0.010
Carbon tetrachloride	<0.010	<0.010	<0.010	<0.010
Chlorobenzene	<0.010	<0.010	<0.010	<0.010
Chlorodibromomethane	<0.010	<0.010	<0.010	<0.010
Chloroethane	<0.010	<0.010	<0.010	<0.010
2-Chloroethylvinyl ether	<0.010	<0.010	<0.010	<0.010
Chloroform	0.015	<0.010	<0.010	<0.010
1,2-Dichlorobenzene	<0.010	<0.010	<0.010	<0.010
1,4-Dichlorobenzene	<0.010	<0.010	<0.010	<0.010
1,3-Dichlorobenzene	<0.010	<0.010	<0.010	<0.010
Dichlorobromomethane	<0.010	<0.010	<0.010	<0.010
1,1-Dichloroethane	<0.010	<0.010	<0.010	<0.010
1,2-Dichloroethane	<0.010	<0.010	<0.010	<0.010
1,1-Dichloroethene	<0.010	<0.010	<0.010	<0.010
trans-1,2-Dichloroethene	0.048	<0.010	<0.010	<0.010
1,2-Dichloropropane	<0.010	<0.010	<0.010	<0.010
cis-1,3-Dichloropropene	<0.010	<0.010	<0.010	<0.010
trans-1,3-Dichloropropene	<0.010	<0.010	<0.010	<0.010
Ethylbenzene	<0.010	<0.010	<0.010	<0.010
Methylbromide	<0.010	<0.010	<0.010	<0.010
Methylchloride	<0.010	<0.010	<0.010	<0.010
Methylene chloride	<0.010	<0.010	<0.010	0.080
1,1,2,2-Tetrachloroethane	<0.010	<0.010	<0.010	<0.010
Tetrachloroethene	<0.010	<0.010	<0.010	<0.010
Toluene	0.010	<0.010	<0.010	<0.010
1,1,1-Trichloroethane	<0.010	<0.010	<0.010	<0.010
1,1,2-Trichloroethane	<0.010	<0.010	<0.010	<0.010
Trichloroethene	12	0.073	0.025	<0.010
Trichlorofluormethane	<0.010	<0.010	<0.010	<0.010
Vinyl chloride	<0.010	<0.010	<0.010	<0.010
Total Xylene (semiquantitative)	0.012	<0.010	<0.010	<0.010
Date of Analyses	04-07-86	04-08-86	04-07-86	04-07-86
Chlorotoluene	0.010	<0.010	<0.010	<0.010

dsl

86-1609

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E Engineering, Inc.
P.O. Box 45212, Dept. 186
Baton Rouge, LA 70895

PRIORITY POLLUTANTS
VOLATILES FRACTIONS

All results in milligrams per kilogram

	3' - 4' L-28, 04-04-86
Benzene	<0.010
Bromoform	<0.010
Carbon tetrachloride	<0.010
Chlorobenzene	<0.010
Chlorodibromomethane	<0.010
Chloroethane	<0.010
2-Chloroethylvinyl ether	<0.010
Chloroform	<0.010
1,2-Dichlorobenzene	<0.010
1,4-Dichlorobenzene	<0.010
1,3-Dichlorobenzene	<0.010
Dichlorobromomethane	<0.010
1,1-Dichloroethane	<0.010
1,2-Dichloroethane	<0.010
1,1-Dichloroethene	<0.010
trans-1,2-Dichloroethene	<0.010
1,2-Dichloropropane	<0.010
cis-1,3-Dichloropropene	<0.010
trans-1,3-Dichloropropene	<0.010
Ethylbenzene	<0.010
Methylbromide	<0.010
Methylchloride	<0.010
Methylene chloride	<0.010
1,1,2,2-Tetrachloroethane	<0.010
Tetrachloroethene	<0.010
Toluene	<0.010
1,1,1-Trichloroethane	<0.010
1,1,2-Trichloroethane	<0.010
Trichloroethene	<0.010
Trichlorofluormethane	<0.010
Vinyl chloride	<0.010
Total Xylene (semiquantitative)	<0.010
Date of Analyses	04-08-86
Chlorotoluene	<0.010

dsl

86-1609

WEST·PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

ANALYSIS OF SOIL
AND WATER SAMPLES

for

G & E ENGINEERING, INCORPORATED
Post Office Box 45212
Department 186
Baton Rouge, Louisiana 70895

ATTENTION: Ms. Marie Walsh

April 11, 1986

WEST·PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 11, 1986

Samples collected by G & E Engineering, Incorporated, as documented on the enclosed chain-of-custody forms, were analyzed in accordance with the following EPA approved methods.

A. Test Methods for Evaluating Solid Waste, SW-846, July 1982:

Parameter	Method
PCB - Soil	3550, 8080
PCB - Water	8080

Documented results are reported on the following pages. The dates indicated are the date of receipt.

Daniel T. Strecker
Operations Supervisor

nal

86-1626

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 11, 1986

Sample Identification	Total Polychlorinated Biphenyls
Soil, L-20 (0-4'), 03-24-86	16.0 mg/kg of Aroclor 1248
Soil, L-19 (0-3'), 03-21-86	4.0 mg/kg of Aroclor 1248
Soil, Dead Pond Marsh, Sludge, 03-14-86	<1.0 mg/kg
Date of Analyses	04-09-86 - 04-10-86

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WEST·PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 11, 1986

Sample Identification	Total Polychlorinated Biphenyls
Groundwater, C-1, 03-31-86	<1.0 ug/L
Groundwater, W-3, 03-31-86	<5.0 ug/L*
Groundwater, B-2, 03-17-86	<1.0 mg/kg*
Groundwater, W-4, 03-31-86	<1.0 ug/L
Date of Analyses	04-09-86

*Analyzed sediment phase due to insufficient quantity of sample.

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WEST-PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

ANALYSIS OF SOIL

AND WATER SAMPLES

for

G & E ENGINEERING, INCORPORATED
Post Office Box 45212
Department 186
Baton Rouge, Louisiana 70895

ATTENTION: Ms. Marie Walsh

April 11, 1986

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 11, 1986

Samples collected by G & E Engineering, Incorporated, as documented on the enclosed chain-of-custody forms, were analyzed in accordance with the following EPA approved methods.

A. Test Methods for Evaluating Solid Waste, SW-846, July 1982:

Parameter	Method
PCB - Soil	3550, 8080
PCB - Water	8080

Documented results are reported on the following pages.

The dates indicated are the date of receipt.

Daniel T. Strecker
Operations Supervisor

nal

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 11, 1986

Sample Identification	Total Polychlorinated Biphenyls (mg/kg)
Soil, B-1 (6-8'), 03-14-86	<1.0
Soil, W-4 (15-17'), 03-14-86	<1.0
Soil, B-1 (14-16'), 03-17-86	<1.0
Soil, B-2 (6-8'), 03-17-86	<1.0
Soil, B-2 (18-20'), 03-17-86	<1.0
Soil, B-2 (40-42'), 03-17-86	<1.0
Soil, L-2 (4.5'), 03-20-86	497.0
Soil, L-2 (6.5'), 03-20-86	196.0
Soil, L-2 (6.5-7.0'), 03-20-86	582.0
Soil, B-1 (10-12'), 03-14-86	<1.0*
Soil, B-1 (43-45'), 03-17-86	<1.0*
Soil, L-1 (1'), 03-20-86	112.0
Soil, L-1 (2.5'), 03-20-86	108.0
Soil, L-1 (6.5'), 03-20-86	676.0
Soil, L-3 (2-5'), 03-20-86	39.0
Soil, L-3 (4'), 03-20-86	122.0
Soil, L-3 (6'), 03-20-86	2,460
Date of Analyses	03-24-86
*Date of Analyses	04-02-86

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86-1635

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 14, 1986

Sample Identification	Total Polychlorinated Biphenyls (ug/L)
Groundwater, Composite, L-1, L-2 and L-3 03-20-86	6,020 ug/L of Aroclor 1248
Date of Analyses	03-24-86

WEST·PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

ANALYSES OF SOIL AND WATER SAMPLES

for

G & E ENGINEERING, INCORPORATED
Post Office Box 45212
Department 186
Baton Rouge, Louisiana 70895

ATTENTION: Ms. Marie Walsh

April 14, 1986

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 14, 1986

Samples collected by G & E Engineering, Incorporated were received at West-Paine Laboratories, Incorporated on the dates as indicated in the report. These samples were analyzed according to the following EPA approved methods.

A. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA-600/4-82-057:

Parameter	Method
Volatile Organic Fraction	624 (GC/FID)

B. Test Methods for Evaluating Solid Waste, SW-846, July 1982:

Parameter	Method
Volatile Organic Fraction	8240 (GC/FID)

C. Standard Methods for the Examination of Water and Wastewater, 15th Edition, 1980:

Parameter	Method
Total Organic Carbon	505
Chloride	407

D. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, March, 1979:

Parameter	Method
Lead	239.1
Mercury	245.1

The results are reported on the following pages.

Victor J. Blanchard, III
Manager

dsl 86-1627

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 14, 1986

Sample Identification	Total Organic Carbon (mg/L C)
Groundwater Composite, L-1, L-2 and L-3	150
Quality Assurance Actual/Found	25/22
Date/Analyst	03-24/0900/RC

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WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 14, 1986

Sample Identification	Mercury (mg/kg Hg)	Lead (mg/kg Pb)
03-18-86 @ No Time, L-1 (1')	19	698
03-18-86 @ No Time, L-1 (2.5')	4.3	500
03-18-86 @ No Time, L-1 (6.5')	1.6	283
03-18-86 @ No Time, L-3 (2-5')	0.63	42
03-18-86 @ No Time, L-3 (4')	1.9	90
03-18-86 @ No Time, L-3 (6')	0.09	55
03-18-86 @ No Time, L-2 (4.5')	3.8	528
03-18-86 @ No Time, L-2 (6.5')	0.82	109
03-18-86 @ No Time, L-2 (6.5-7.0')	0.88	76
Quality Assurance Actual/Found	0.0100/0.104	2.50/2.52
Date/Analyst	03-24/FD	03-24/FD

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WEST-PAINE Laboratories INC.
7979 GSRI AVE • BATON ROUGE LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 14, 1986

Sample Identification	Total Organic Carbon (mg/L C)
Groundwater Composite, L-1, L-2 and L-3, 03-18-86	150
Quality Assurance Actual/Found	25/22
Date/Analyst	03-24/0900/RC

dsl

86-1627

WEST·PAINE Laboratories INC.
7979 GSRI AVE • BATON ROUGE LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 14, 1986

Sample Identification	Mercury (mg/L Hg)	Lead (mg/L Pb)
L-1, Groundwater, 03-18-86	0.23	11
L-2, Groundwater, 03-18-86	<0.002	0.19
L-3, Groundwater, 03-18-86	<0.002	0.14
Quality Assurance Actual/Found	0.0100/0.104	2.50/2.52
Date/Analyst	03-24/FD	03-24/FD

WEST·PAINE
Laboratories INC.
7979 GSRI AVE • BATON ROUGE LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 14, 1986

Sample Identification	Mercury (mg/kg Hg)	Lead (mg/kg Pb)	Chromium (mg/kg Cr)
B-1, (10-12'), 03-13-86	Cancel	<0.80	Cancel
B-1, (6-8'), 03-13-86	Cancel	1.8	Cancel
B-1, (14-16'), 03-13-86	Cancel	0.90	Cancel
B-1, (43-45'), 03-13-86	------	4.6	------
B-2, (6-8'), 03-13-86	Cancel	4.6	Cancel
B-2, (18-20'), 03-13-86	Cancel	0.90	Cancel
Quality Assurance Actual/Found	------	2.50/2.50	------
Date/Analyst	------	03-17/FD	------
Lagoon Solids, Burn Site, 03-22-86	19		
Quality Assurance Actual/Found	0.0100/0.0103		
Date/Analyst	03-31/FD		

WEST-PAINE Laboratories INC.
7979 GSRI AVE • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 14, 1986

Sample Identification	Date Received	Total Organic Carbon (mg/L C)	Chloride (mg/L Cl)
W-1, 03-22-86	03-24-86	5	----
W-2, 03-22-86	03-24-86	9	----
W-3, 03-26-86	03-31-86	170	1,650
W-4, 03-12-86	03-14-86	11	----
W-4, 03-25-86	03-31-86	6	34
W-6, 03-17-86	03-20-86	14	----
W-7, 03-17-86	03-20-86	150	----
W-7, 03-22-86	03-24-86	120	----
W-10, 04-04-86	04-07-86	38	----
A-3, 03-13-86	03-17-86	100	----
A-5, 03-13-86	03-17-86	60	----
A-6, 03-13-86	03-17-86	50	----
BS-1, 03-13-86	03-24-86	32	----
C-1, 03-25-86	03-31-86	9	2.5
C-2, 03-27-86	03-31-86	9	6.0
D-1, 03-27-86	03-31-86	14	28
D-2, 03-27-86	03-31-86	19	35
Quality Assurance Actual/Found		25/22	50.0/52.5
Date/Time Analyst		04-09/2230/RC	04-02/0830/KT

dsl

86-1627

WEST·PAINE
Laboratories INC.
7979 GSRI AVE • BATON ROUGE LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 14, 1986

Sample Identification	Date Received	Total Organic Carbon (mg/L C)	Chloride (mg/L Cl)
W-1, 03-11-86	03-14-86	21	79
A-9, 03-13-86	03-17-86	30	595
A-10, 03-13-86	03-17-86	20	165
A-11, 03-13-86	03-17-86	30	115
B-2, 03-13-86	03-17-86	10	105
Quality Assurance Actual/Found		25/23	50.0/50.0
Date/Time Analyst		03-19/1300/RH	03-18/1500/MS

ds1

86-1627

WEST-PAINE Laboratories INC.
7979 GSRI AVE • BATON ROUGE, LA 70820

G & E Engineering, Inc.
Post Office Box 45212, Dept 186
Baton Rouge, LA 70895

PRIORITY POLLUTANTS
VOLATILES FRACTIONS

All results in milligrams per liter.

	03-12-86 Groundwater W-1
Benzene	<0.01
Bromoform	<0.01
Carbon tetrachloride	<0.01
Chlorobenzene	<0.01
Chlorodibromomethane	<0.01
Chloroethane	<0.01
2-Chloroethylvinyl ether	<0.01
Chloroform	<0.01
1,2-Dichlorobenzene	<0.01
1,4-Dichlorobenzene	<0.01
1,3-Dichlorobenzene	<0.01
Dichlorobromomethane	<0.01
1,1-Dichloroethane	<0.01
1,2-Dichloroethane	<0.01
1,1-Dichloroethene	<0.01
trans-1,2-Dichloroethene	<0.01
1,2-Dichloropropane	<0.01
cis-1,3-Dichloropropene	<0.01
trans-1,3-Dichloropropene	<0.01
Ethylbenzene	<0.01
Methylbromide	<0.01
Methylchloride	<0.01
Methylene chloride	<0.01
1,1,2,2-Tetrachloroethane	<0.01
Tetrachloroethene	<0.01
Toluene	<0.01
1,1,1-Trichloroethane	<0.01
1,1,2-Trichloroethane	<0.01
Trichloroethene	<0.01
Trichlorofluormethane	<0.01
Vinyl chloride	<0.01
Total Xylene (semiquantitative)	<0.01
Date of Analyses	03-31-86
Chlorotoluene	<0.01

86-1627

West-Paine Laboratories Inc.
7979 GSRI AVE • BATON ROUGE, LA 70820

G & E Engineering, Inc.
Post Office Box 45212, Dept. 186
Baton Rouge, LA 70895

PRIORITY POLLUTANTS
VOLATILES FRACTIONS

All results in milligrams per kilogra
Samples collected 03-13-86

	Soil, B-1 (10 - 12')	Soil, B-1 (6 - 8')
Benzene	<0.10	<0.10
Bromoform	<0.10	<0.10
Carbon tetrachloride	<0.10	<0.10
Chlorobenzene	<0.10	<0.10
Chlorodibromomethane	<0.10	<0.10
Chloroethane	<0.10	<0.10
2-Chloroethylvinyl ether	<0.10	<0.10
Chloroform	<0.10	<0.10
1,2-Dichlorobenzene	<0.10	<0.10
1,4-Dichlorobenzene	<0.10	<0.10
1,3-Dichlorobenzene	<0.10	<0.10
Dichlorobromomethane	<0.10	<0.10
1,1-Dichloroethane	<0.10	<0.10
1,2-Dichloroethane	<0.10	<0.10
1,1-Dichloroethene	<0.10	<0.10
trans-1,2-Dichloroethene	<0.10	<0.10
1,2-Dichloropropane	<0.10	<0.10
cis-1,3-Dichloropropene	<0.10	<0.10
trans-1,3-Dichloropropene	<0.10	<0.10
Ethylbenzene	<0.10	<0.10
Methylbromide	<0.10	<0.10
Methylchloride	<0.10	<0.10
Methylene chloride	<0.10	<0.10
1,1,2,2-Tetrachloroethane	<0.10	<0.10
Tetrachloroethene	<0.10	<0.10
Toluene	<0.10	<0.10
1,1,1-Trichloroethane	<0.10	<0.10
1,1,2-Trichloroethane	<0.10	<0.10
Trichloroethene	<0.10	<0.10
Trichlorofluormethane	<0.10	<0.10
Vinyl chloride	<0.10	<0.10
Total Xylene (semiquantitative)	<0.10	<0.10
Date of Analyses	03-31-86	03-31-86
Chlorotoluene	<0.10	<0.10

WEST-PAINE Laboratories INC.
7979 GSRI AVE • BATON ROUGE, LA 70820

G & E Engineering, Inc.
Post Office Box 45212, Dept. 186
Baton Rouge, LA 70895

PRIORITY POLLUTANTS
VOLATILES FRACTIONS

All results in milligrams per kilogra
Samples collected 03-13-86

	W-4 (15 - 17)	B-1 (14 - 16')	B-1 (43 - 45')
Benzene	<0.10	<0.10	<0.10
Bromoform	<0.10	<0.10	<0.10
Carbon tetrachloride	<0.10	<0.10	<0.10
Chlorobenzene	<0.10	<0.10	<0.10
Chlorodibromomethane	<0.10	<0.10	<0.10
Chloroethane	<0.10	<0.10	<0.10
2-Chloroethylvinyl ether	<0.10	<0.10	<0.10
Chloroform	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	<0.10	<0.10	<0.10
Dichlorobromomethane	<0.10	<0.10	<0.10
1,1-Dichloroethane	<0.10	<0.10	<0.10
1,2-Dichloroethane	<0.10	<0.10	<0.10
1,1-Dichloroethene	<0.10	<0.10	<0.10
trans-1,2-Dichloroethene	<0.10	<0.10	<0.10
1,2-Dichloropropane	<0.10	<0.10	<0.10
cis-1,3-Dichloropropene	<0.10	<0.10	<0.10
trans-1,3-Dichloropropene	<0.10	<0.10	<0.10
Ethylbenzene	<0.10	<0.10	<0.10
Methylbromide	<0.10	<0.10	<0.10
Methylchloride	<0.10	<0.10	<0.10
Methylene chloride	<0.10	<0.10	<0.10
.,1,2,2-Tetrachloroethane	<0.10	<0.10	<0.10
Tetrachloroethene	<0.10	<0.10	<0.10
oluene	<0.10	<0.10	<0.10
1,1,1-Trichloroethane	<0.10	<0.10	<0.10
,1,2-Trichloroethane	<0.10	<0.10	<0.10
Trichloroethene	<0.10	<0.10	<0.10
richlorofluormethane	<0.10	<0.10	<0.10
vinyl chloride	<0.10	<0.10	<0.10
otal Xylene (semiquantitative)	<0.10	<0.10	<0.10
ate of Analyses	03-31-86	03-31-86	03-31-86
Chlorotoluene	<0.10	<0.10	<0.10

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86-1627

West-Paine Laboratories Inc.
7979 GSRI AVE • BATON ROUGE, LA 70820

G & E Engineering, Inc.
Post Office Box 45212, Dept. 186
Baton Rouge, LA 70895

PRIORITY POLLUTANTS
VOLATILES FRACTIONS

All results in milligrams per liter.
Samples collected 03-13-86

	Groundwater A-9	Groundwater A-11	Groundwater A-10	Groundwater B-2
Benzene	<0.01	<0.01	<0.01	<0.010
Bromoform	<0.01	<0.01	<0.01	<0.010
Carbon tetrachloride	19	39	12	<0.010
Chlorobenzene	<0.01	<0.01	<0.01	<0.010
Chlorodibromomethane	<0.01	<0.01	<0.01	<0.010
Chloroethane	<0.01	<0.01	<0.01	<0.010
2-Chloroethylvinyl ether	<0.01	<0.01	<0.01	<0.010
Chloroform	<0.01	<0.01	<0.01	<0.010
1,2-Dichlorobenzene	<0.01	<0.01	<0.01	<0.010
1,4-Dichlorobenzene	<0.01	<0.01	<0.01	<0.010
1,3-Dichlorobenzene	<0.01	<0.01	<0.01	<0.010
Dichlorobromomethane	<0.01	<0.01	<0.01	<0.010
1,1-Dichloroethane	<0.01	<0.01	<0.01	<0.010
1,2-Dichloroethane	<0.01	<0.01	<0.01	<0.010
1,1-Dichloroethene	<0.01	<0.01	<0.01	<0.010
trans-1,2-Dichloroethene	<0.01	<0.01	<0.01	<0.010
1,2-Dichloropropane	<0.01	<0.01	<0.01	<0.010
cis-1,3-Dichloropropene	<0.01	<0.01	<0.01	<0.010
trans-1,3-Dichloropropene	<0.01	<0.01	<0.01	<0.010
Ethylbenzene	<0.01	<0.01	<0.01	<0.010
Methylbromide	<0.01	<0.01	<0.01	<0.010
Methylchloride	<0.01	<0.01	<0.01	<0.010
Methylene chloride	<0.01	<0.01	<0.01	<0.010
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.010
Tetrachloroethene	<0.01	<0.01	<0.01	<0.010
Toluene	0.26	5.70	0.04	<0.010
1,1,1-Trichloroethane	<0.01	0.04	<0.01	<0.010
1,1,2-Trichloroethane	<0.01	<0.01	<0.01	<0.010
Trichloroethene	<0.01	<0.01	<0.01	<0.010
Trichlorofluormethane	<0.01	<0.01	<0.01	<0.010
Vinyl chloride	<0.01	<0.01	<0.01	<0.010
Total Xylene (semiquantitative)	<0.01	<0.01	<0.01	<0.010
Date of Analyses	03-31-86	03-31-86	03-31-86	03-31-86
Chlorotoluene	<0.01	<0.01	<0.01	<0.01

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PRIORITY POLLUTANTS
VOLATILES FRACTIONS

All results in milligrams per kilogra
Samples collected 03-13-86

	Soil B-2 (6 - 8')	Soil B-2 (18 - 20')	Soil B-2 (40 - 42')
Benzene	<0.10	<0.10	<0.10
Bromoform	<0.10	<0.10	<0.10
Carbon tetrachloride	<0.10	<0.10	<0.10
Chlorobenzene	<0.10	<0.10	<0.10
Chlorodibromomethane	<0.10	<0.10	<0.10
Chloroethane	<0.10	<0.10	<0.10
2-Chloroethylvinyl ether	<0.10	<0.10	<0.10
Chloroform	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	<0.10	<0.10	<0.10
Dichlorobromomethane	<0.10	<0.10	<0.10
1,1-Dichloroethane	<0.10	<0.10	<0.10
1,2-Dichloroethane	<0.10	<0.10	<0.10
1,1-Dichloroethene	<0.10	<0.10	<0.10
trans-1,2-Dichloroethene	<0.10	<0.10	<0.10
1,2-Dichloropropane	<0.10	<0.10	<0.10
cis-1,3-Dichloropropene	<0.10	<0.10	<0.10
trans-1,3-Dichloropropene	<0.10	<0.10	<0.10
Ethylbenzene	<0.10	<0.10	<0.10
Methylbromide	<0.10	<0.10	<0.10
Methylchloride	<0.10	<0.10	<0.10
Methylene chloride	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	<0.10	<0.10	<0.10
Tetrachloroethene	<0.10	<0.10	<0.10
Toluene	<0.10	<0.10	<0.10
1,1,1-Trichloroethane	<0.10	<0.10	<0.10
1,1,2-Trichloroethane	<0.10	<0.10	<0.10
Trichloroethene	<0.10	<0.10	<0.10
Trichlorofluormethane	<0.10	<0.10	<0.10
Vinyl chloride	<0.10	<0.10	<0.10
Total Xylene (semiquantitative)	<0.10	<0.10	<0.10
Date of Analyses	04-05-86	04-05-86	04-05-86
Chlorotoluene	<0.10	<0.10	<0.10

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All results in milligrams per liter.

PRIORITY POLLUTANTS
VOLATILES FRACTIONS

	03-17-86 Water W-7	03-17-86 Water W-6	03-22-86 Water W-1	03-22-86 Water W-2
Benzene	0.017	<0.010	<0.010	<0.010
Bromoform	<0.010	<0.010	<0.010	<0.010
Carbon tetrachloride	89	<0.010	<0.010	<0.010
Chlorobenzene	0.190	<0.010	<0.010	<0.010
Chlorodibromomethane	<0.010	<0.010	<0.010	<0.010
Chloroethane	<0.010	<0.010	<0.010	<0.010
2-Chloroethylvinyl ether	<0.010	<0.010	<0.010	<0.010
Chloroform	0.025	<0.010	<0.010	<0.010
1,2-Dichlorobenzene		<0.010	<0.010	<0.010
1,4-Dichlorobenzene	0.160	<0 010	<0.010	<0.010
1,3-Dichlorobenzene		<0.010	<0.010	<0.010
Dichlorobromomethane	<0.010	<0.010	<0.010	<0.010
1,1-Dichloroethane	0.030	<0.010	<0.010	<0.010
1,2-Dichloroethane	<0.010	<0.010	<0.010	<0.010
1,1-Dichloroethene	<0.010	<0.010	<0.010	<0.010
trans-1,2-Dichloroethene	<0.010	<0.010	<0.010	<0.010
1,2-Dichloropropane	<0.010	<0.010	<0.010	<0.010
cis-1,3-Dichloropropene	<0.010	<0.010	<0.010	<0.010
trans-1,3-Dichloropropene	<0.010	<0.010	<0.010	<0.010
Ethylbenzene	<0.010	<0.010	<0.010	<0.010
Methylbromide	<0.010	<0.010	<0.010	<0.010
Methylchloride	<0.010	<0.010	<0.010	<0.010
Methylene chloride	<0.010	<0.010	<0.010	<0.010
1,1,2,2-Tetrachloroethane	<0.010	<0.010	<0.010	<0.010
Tetrachloroethene	<0.010	<0.010	<0.010	<0.010
oluene	<0.010	<0.010	<0.010	<0.010
1,1,1-Trichloroethane	<0.010	<0.010	<0.010	<0.010
,1,2-Trichloroethane	<0.010	<0.010	<0.010	<0.010
Trichloroethene	0.110	<0.010	<0.010	<0.010
richlorofluormethane	<0.010	<0.010	<0.010	<0.010
vinyl chloride	<0.010	<0.010	<0.010	<0.010
otal Xylene (semiquantitative)	<0.010	<0.010	<0.010	<0.010
ate of Analyses	04-05-86	04-05-86	04-05-86	04-05-86
Chlorotoluene	<0.010	<0.010	<0.010	<0.010

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PRIORITY POLLUTANTS
VOLATILES FRACTIONS

All results in milligrams per liter.

	03-18-86 Groundwater Composite L-1, L-2, L-3
Benzene	<0.050
Bromoform	<0.050
Carbon tetrachloride	<0.050
Chlorobenzene	<0.050
Chlorodibromomethane	<0.050
Chloroethane	<0.050
2-Chloroethylvinyl ether	<0.050
Chloroform	<0.050
1,2-Dichlorobenzene	<0.050
1,4-Dichlorobenzene	<0.050
1,3-Dichlorobenzene	<0.050
Dichlorobromomethane	<0.050
1,1-Dichloroethane	<0.050
1,2-Dichloroethane	<0.050
1,1-Dichloroethene	<0.050
trans-1,2-Dichloroethene	<0.050
1,2-Dichloropropane	<0.050
cis-1,3-Dichloropropene	<0.050
trans-1,3-Dichloropropene	<0.050
Ethylbenzene	<0.050
Methylbromide	<0.050
Methylchloride	<0.050
Methylene chloride	<0.050
,1,2,2-Tetrachloroethane	<0.050
Tetrachloroethene	<0.050
oluene	<0.050
1,1,1-Trichloroethane	<0.050
,1,2-Trichloroethane	<0.050
Trichloroethene	0.150
richlorofluormethane	<0.050
inyl chloride	<0.050
otal Xylene (semiquantitative)	<0.050
ate of Analyses	03-24-86

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PRIORITY POLLUTANTS
VOLATILES FRACTIONS

All results in milligrams per kilogram

	L-1 (1')	L-1 (2.5')	L-1 (6.5')
Benzene	<0.10	<0.10	<0.10
Bromoform	<0.10	<0.10	<0.10
Carbon tetrachloride	<0.10	<0.10	<0.10
Chlorobenzene	<0.10	<0.10	<0.10
Chlorodibromomethane	<0.10	<0.10	<0.10
Chloroethane	<0.10	<0.10	<0.10
2-Chloroethylvinyl ether	<0.10	<0.10	<0.10
Chloroform	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	<0.10	<0.10	<0.10
Dichlorobromomethane	<0.10	<0.10	<0.10
1,1-Dichloroethane	<0.10	<0.10	<0.10
1,2-Dichloroethane	<0.10	<0.10	<0.10
1,1-Dichloroethene	<0.10	<0.10	<0.10
trans-1,2-Dichloroethene	<0.10	<0.10	<0.10
,2-Dichloropropane	<0.10	<0.10	<0.10
is-1,3-Dichloropropene	<0.10	<0.10	<0.10
rans-1,3-Dichloropropene	<0.10	<0.10	<0.10
Ethylbenzene	<0.10	<0.10	<0.10
ethylbromide	<0.10	<0.10	<0.10
Methylchloride	<0.10	<0.10	<0.10
ethylene chloride	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	<0.10	<0.10	<0.10
etrachloroethene	<0.10	<0.10	<0.10
oluene	<0.10	<0.10	<0.10
,1,1-Trichloroethane	<0.10	<0.10	<0.10
,1,2-Trichloroethane	<0.10	<0.10	<0.10
Trichloroethene	<0.10	<0.10	<0.10
richlorofluormethane	<0.10	<0.10	<0.10
Vinyl chloride	<0.10	<0.10	<0.10
otal Xylene (semiquantitative)	<0.10	<0.10	<0.10
Date of Analyses	03-24-86	03-24-86	03-24-86

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PRIORITY POLLUTANTS
VOLATILES FRACTIONS

All results in milligrams per liter.

	03-25-86 W-4	03-26-86 W-3	03-25-86 C-1	03-27-86 C-2	03-27-86 D-1	03-28-86 D-2
Benzene	<0.010	0.017	<0.010	<0.010	<0.010	<0.010
Bromoform	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Carbon tetrachloride	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Chlorobenzene	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Chlorodibromomethane	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Chloroethane	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
2-Chloroethylvinyl ether	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Chloroform	<0.010	0.020	<0.010	<0.010	<0.010	<0.010
1,2-Dichlorobenzene	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
1,4-Dichlorobenzene	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
1,3-Dichlorobenzene	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Dichlorobromomethane	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
1,1-Dichloroethane	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
1,2-Dichloroethane	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
1,1-Dichloroethene	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
trans-1,2-Dichloroethene	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
1,2-Dichloropropane	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
cis-1,3-Dichloropropene	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
trans-1,3-Dichloropropene	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Ethylbenzene	<0.010	<0.010	<0.010	<0.010	<0.010	0.013
Methylbromide	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Methylchloride	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Methylene chloride	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
1,1,2,2-Tetrachloroethane	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Tetrachloroethene	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Toluene	<0.010	0.010	<0.010	<0.010	<0.010	<0.010
1,1,1-Trichloroethane	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
1,1,2-Trichloroethane	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Trichloroethene	<0.010	0.355	<0.010	<0.010	<0.010	<0.010
Trichlorofluormethane	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Vinyl chloride	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Total Xylene (semiquantitative)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Date of Analyses	04-07-86	04-07-86	04-07-86	04-07-86	04-07-86	04-07-86
Chlorotoluene	<0.010	0.200	<0.010	<0.010	<0.010	

WEST-PAINE
Laboratories INC.
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ANALYSIS OF WATER SAMPLES

for

G & E ENGINEERING, INCORPORATED
Post Office Box 45212
Department 186
Baton Rouge, Louisiana 70895

Attention: Ms. Marie Walsh

April 16, 1986

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

SAMPLE ANALYSES

for

G & E ENGINEERING, INCORPORATED
Post Office Box 45212
Department 186
Baton Rouge, Louisiana 70895

Attention: Ms. Marie Walsh

April 29, 1986

dsl

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G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

April 29, 1986

Soil and water samples collected by G & E Engineering were received at West-Paine Laboratories, Incorporated on March 3 March 14, March 17, and March 24, 1986. The samples were analyzed according to EPA Protocol.

A. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA-600/4-82-057, July, 1982:

Parameter	Method
Volatile Organic Fraction	624 with GC/FID Detection

B. Test Methods for Evaluating Solid Waste, SW-846, July, 1982:

Parameter	Method
Volatile Organic Fraction	8240

The results are reported on the following pages.

Burton A. Boeneke

Burton A. Boeneke
Environmental Coordinator

dsl

86-1941

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All results in milligrams per liter.

PRIORITY POLLUTANTS
VOLATILES FRACTIONS

	Groundwater BS-1 03-21-86	Groundwater W-7 03-22-86
Benzene	<0.010	0.010
Bromoform	<0.010	<0.010
Carbon tetrachloride	<0.010	52
Chlorobenzene	<0.010	0.260
Chlorodibromomethane	<0.010	<0.010
Chloroethane	<0.010	<0.010
2-Chloroethylvinyl ether	<0.010	<0.010
Chloroform	0.140	<0.010
1,2-Dichlorobenzene	<0.010	
1,4-Dichlorobenzene	<0.010	TOTAL 0.128
1,3-Dichlorobenzene	<0.010	0.013
Dichlorobromomethane	<0.010	<0.010
1,1-Dichloroethane	<0.010	0.039
1,2-Dichloroethane	<0.010	<0.010
1,1-Dichloroethene	<0.010	0.010
trans-1,2-Dichloroethene	0.039	<0.010
1,2-Dichloropropane	<0.010	<0.010
cis-1,3-Dichloropropene	<0.010	<0.010
trans-1,3-Dichloropropene	<0.010	<0.010
Ethylbenzene	<0.010	<0.010
Methylbromide	<0.010	<0.010
Methylchloride	<0.010	<0.010
Methylene chloride	0.050	0.063
1,1,2,2-Tetrachloroethane	<0.010	<0.010
Tetrachloroethene	<0.010	<0.010
Toluene	<0.010	36
1,1,1-Trichloroethane	<0.010	<0.010
1,1,2-Trichloroethane	<0.010	<0.010
Trichloroethene	0.270	0.260
Trichlorofluormethane	<0.010	<0.010
Vinyl chloride	<0.010	<0.010
Total Xylene (semiquantitative)	<0.010	0.010
Date of Analyses	04-21-86	04-16-86
Chlorotoluene	<0.010	<0.010

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PRIORITY POLLUTANTS
VOLATILES FRACTIONS

All results in milligrams per kilogram

	Dead Pond Marsh Sludge, 03-12-86
Benzene	<0.10
Bromoform	<0.10
Carbon tetrachloride	<0.10
Chlorobenzene	<0.10
Chlorodibromomethane	<0.10
Chloroethane	<0.10
2-Chloroethylvinyl ether	<0.10
Chloroform	<0.10
1,2-Dichlorobenzene	<0.10
1,4-Dichlorobenzene	<0.10
1,3-Dichlorobenzene	<0.10
Dichlorobromomethane	<0.10
1,1-Dichloroethane	<0.10
1,2-Dichloroethane	<0.10
1,1-Dichloroethene	<0.10
trans-1,2-Dichloroethene	<0.10
1,2-Dichloropropane	<0.10
cis-1,3-Dichloropropene	<0.10
trans-1,3-Dichloropropene	<0.10
Ethylbenzene	<0.10
Methylbromide	<0.10
Methylchloride	<0.10
Methylene chloride	<0.10
1,1,2,2-Tetrachloroethane	<0.10
Tetrachloroethene	<0.10
Toluene	<0.10
1,1,1-Trichloroethane	<0.10
1,1,2-Trichloroethane	<0.10
Trichloroethene	<0.10
Trichlorofluormethane	<0.10
Vinyl chloride	<0.10
Total Xylene (semiquantitative)	<0.10
Date of Analyses	04-21-86

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PRIORITY POLLUTANTS
VOLATILES FRACTIONS

All results in milligrams per liter.

	Groundwater A-3 03-13-86	Groundwater A-5 03-13-86	Groundwater A-6 03-13-86
Benzene	<0.010	<0.010	0.010
Bromoform	<0.010	<0.010	<0.010
Carbon tetrachloride	<0.010	<0.010	<0.010
Chlorobenzene	<0.010	<0.010	<0.010
Chlorodibromomethane	<0.010	<0.010	<0.010
Chloroethane	<0.010	<0.010	<0.010
2-Chloroethylvinyl ether	<0.010	<0.010	<0.010
Chloroform	<0.010	<0.010	<0.010
1,2-Dichlorobenzene	<0.010	<0.010	<0.010
1,4-Dichlorobenzene	<0.010	<0.010	<0.010
1,3-Dichlorobenzene	<0.010	<0.010	<0.010
Dichlorobromomethane	<0.010	<0.010	<0.010
1,1-Dichloroethane	<0.010	<0.010	<0.010
1,2-Dichloroethane	<0.010	<0.010	<0.010
1,1-Dichloroethene	<0.010	<0.010	<0.010
trans-1,2-Dichloroethene	<0.010	<0.010	<0.010
1,2-Dichloropropane	<0.010	<0.010	<0.010
cis-1,3-Dichloropropene	<0.010	<0.010	<0.010
trans-1,3-Dichloropropene	<0.010	<0.010	<0.010
Ethylbenzene	<0.010	<0.010	<0.010
Methylbromide	<0.010	<0.010	<0.010
Methylchloride	<0.010	<0.010	<0.010
Methylene chloride	<0.010	<0.010	<0.010
1,1,2,2-Tetrachloroethane	<0.010	<0.010	<0.010
Tetrachloroethene	<0.010	<0.010	<0.010
Toluene	<0.010	<0.010	<0.010
1,1,1-Trichloroethane	<0.010	<0.010	<0.010
1,1,2-Trichloroethane	<0.010	<0.010	<0.010
Trichloroethene	<0.010	<0.010	0.056
Trichlorofluormethane	<0.010	<0.010	<0.010
Vinyl chloride	<0.010	<0.010	<0.010
Total Xylene (semiquantitative)	<0.010	<0.010	<0.010
Date of Analyses	04-16-86	04-16-86	04-16-86
Chlorotoluene	<0.010	<0.010	<0.010

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PRIORITY POLLUTANTS
VOLATILES FRACTIONS

All results in milligrams per kilogram

	Soil L-20, 0 - 4', 03-21-86
Benzene	<0.10
Bromoform	<0.10
Carbon tetrachloride	<0.10
Chlorobenzene	<0.10
Chlorodibromomethane	<0.10
Chloroethane	<0.10
2-Chloroethylvinyl ether	<0.10
Chloroform	<0.10
1,2-Dichlorobenzene	<0.10
1,4-Dichlorobenzene	<0.10
1,3-Dichlorobenzene	<0.10
Dichlorobromomethane	<0.10
1,1-Dichloroethane	<0.10
1,2-Dichloroethane	<0.10
1,1-Dichloroethene	<0.10
trans-1,2-Dichloroethene	<0.10
1,2-Dichloropropane	<0.10
cis-1,3-Dichloropropene	<0.10
trans-1,3-Dichloropropene	<0.10
Ethylbenzene	<0.10
Methylbromide	<0.10
Methylchloride	<0.10
Methylene chloride	<0.10
1,1,2,2-Tetrachloroethane	<0.10
Tetrachloroethene	<0.10
Toluene	<0.10
1,1,1-Trichloroethane	<0.10
1,1,2-Trichloroethane	<0.10
Trichloroethene	<0.10
Trichlorofluormethane	<0.10
Vinyl chloride	<0.10
Total Xylene (semiquantitative)	<0.10
Date of Analyses	04-21-86
Chlorotoluene	<0.10

86-1941

WEST·PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

ANALYSIS OF SAMPLES

for

G & E ENGINEERING, INCORPORATED
Post Office Box 45212
Department 186
Baton Rouge, Louisiana 70895

ATTENTION: Ms. Marie Walsh

May 2, 1986

WEST·PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

May 2, 1986

Samples collected by G & E Engineering, Incorporated, as documented on the enclosed chain-of-custody forms, were analyzed in accordance with the following Environmental Protection Agency approved methods.

A. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA-600/4-82-057:

Parameter	Method
Volatile Organic Fraction	624
Semivolatile Organic Fraction	625

B. Test Methods for Evaluating Solid Waste, SW-846, July 1982:

Parameter	Method
Semivolatile Organics	8270
Sonication Extraction	3550

The results are reported on the following pages.

Burton A. Boeneke

Burton A. Boeneke
Environmental Coordinator

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E Engineering, Incorporated
P.O Box 45212, Dept 186
Baton Rouge, LA 70895

All results in micrograms per liter.

PRIORITY POLLUTANTS
BASE-NEUTRAL FRACTION

	L-28, Water, 04-09-86 @ 1300hrs.
Acenaphthene	<500
Acenaphthylene	<500
Anthracene	<500
Benzidine	<500
Benzo(a)Anthracene	<500
Benzo(a)Pyrene	<500
3-4 Benzo Fluoranthene	<500
Benzo(ghi)Perylene	<500
Benzo(k)Fluoranthene	<500
Bis(2-Chloroethoxy)Methane	<500
Bis(2-Chloroethyl)Ether	<500
Bis(2-Chloroisopropyl)Ether	<500
Bis-(2-Ethylhexyl)Phthalate	<500
4 Bromophenyl Phenyl Ether	<500
Butyl Benzyl Phthalate	<500
2-Chloronaphthalene	<500
4-Chlorophenyl Phenyl Ether	<500
Chrysene	<500
Dibenzo(a,h)Anthracene	<500
1,2-Dichlorobenzene	<500
1,3-Dichlorobenzene	<500
1,4-Dichlorobenzene	<500
3,3'-Dichlorobenzidine	<500
Diethyl Phthalate	<500
Dimethyl Phthalate	<500
Di-n-Butyl Phthalate	<500
2,4-Dinitrotoluene	<500
2,6-Dintrotoluene	<500
Di-n-Octyl Phthalate	<500
1,2-Diphenylhydrazine	<500
Hexachlorobutadiene	<500

WEST-PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & F Engineering, Incorporated
P.O. Box 45212, Dept. 186
Baton Rouge, LA 70895

All results in micrograms per liter.

PRIORITY POLLUTANTS
BASE-NEUTRAL FRACTION (Continued)

	L-28, Water, 04-09-86 @ 1300hrs.
Fluoranthene	<500
Fluorene	<500
Hexachlorobenzene	<500
Hexachlorocyclopentadiene	<500
Hexachloroethane	<500
Indeno (1,2,3-cd) Pyrene	<500
Isophorone	<500
Napthalene	<500
Nitrobenzene	<500
N-Nitrosodimethylamine	<500
N-Nitrosodi-N-Propylamine	<500
N-Nitrosodiphenylamine	<500
Phenanthrene	<500
Pyrene	<500
1,2,4-Trichlorobenzene	<500
Date of Analyses	04-15-86

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E Engineering, Incorporated
P.O. Box 45212, Dept. 186
Baton Rouge, LA 70895

?RIORITY POLLUTANTS
3ASE-NEUTRAL FRACTION

All results in milligrams per kilogram.

	S-1, Sludge, 04-09-86 @ 1635hrs.	
Acenaphthene	<10	
\cenaphthylene	<10	
Anthracene	<10	
?enzidine	<10	
Benzo(a)Anthracene	<10	
Benzo(a)Pyrene	<10	
3-4 Benzo Fluoranthene	<10	
Benzo(ghi)Perylene	<10	
Benzo(k)Fluoranthene	<10	
Bis(2-Chloroethoxy)Methane	<10	
Bis(2-Chloroethyl)Ether	<10	
Bis(2-Chloroisopropyl)Ether	<10	
Bis-(2-Ethylhexyl)Phthalate	<10	
, Bromophenyl Phenyl Ether	<10	
Butyl Benzyl Phthalate	<10	
'-Chloronaphthalene	<10	
4-Chlorophenyl Phenyl Ether	<10	
:hrysene	<10	
Dibenzo(a,h)Anthracene	<10	
,2-Dichlorobenzene	<10	
1,3-Dichlorobenzene	<10	
',4-Dichlorobenzene	<10	
,3'-Dichlorobenzidine	<10	
Diethyl Phthalate	<10	
imethyl Phthalate	<10	
Di-n-Butyl Phthalate	<10	(N Butyl Phthalate)
,4-Dinitrotoluene	<10	
2,6-Dintrotoluene	<10	
i-n-Octyl Phthalate	<10	
1,2-Diphenylhydrazine	<10	
'exachlorobutadiene	<10	

WEST-PAINE Laboratories INC.
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G & E ENGINEERING, INCORPORATED

Sample ID: A-6, 3' Pipefitting Soil

Sample Type: Soil

Date Collected: March 13, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/kg Pb)	2.4	2.50/2.50	04-22/FD
Mercury (mg/kg Hg)	<0.02	0.0100/0.0103	04-22/VM
Cadmium (mg/kg Cd)	<0.1	0.250/0.245	04-22/FD
Chromium (mg/kg Cr)	2.7	0.50/0.52	04-21/VM
Phenol (mg/kg Phenol)	1.3	0.020/0.018	04-29/0900/RH

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86-2085

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E Engineering, Incorporated
P.O. Box 45212, Dept. 186
Baton Rouge, LA 70895

All results in milligrams per kilogram.

PRIORITY POLLUTANTS
BASE-NEUTRAL FRACTION (Continued)

	S-1, Sludge, 04-09-86 @ 1635hrs.
Fluoranthene	<10
Fluorene	<10
Hexachlorobenzene	<10
Hexachlorocyclopentadiene	<10
Hexachloroethane	<10
Indeno (1,2,3-cd) Pyrene	<10
Isophorone	<10
Napthalene	<10
Nitrobenzene	<10
N-Nitrosodimethylamine	<10
N-Nitrosodi-N-Propylamine	<10
N-Nitrosodiphenylamine	<10
Phenanthrene	<10
Pyrene	<10
1,2,4-Trichlorobenzene	<10
Date of Analyses	04-15-86

----------% Recovery---------

Decafluorobiphenyl	91
Fluorene-D10	103

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PRIORITY POLLUTANTS
BASE-NEUTRAL FRACTION

All results in micrograms per liter.

	L-1, L-2, L-3 Composite, Water, 03-18-86 @ No Time
Acenaphthene	<150
Acenaphthylene	<150
Anthracene	<150
Benzidine	<150
Benzo(a)Anthracene	<150
Benzo(a)Pyrene	<150
3-4 Benzo Fluoranthene	<150
Benzo(ghi)Perylene	<150
Benzo(k)Fluoranthene	<150
Bis(2-Chloroethoxy)Methane	<150
Bis(2-Chloroethyl)Ether	<150
Bis(2-Chloroisopropyl)Ether	<150
Bis-(2-Ethylhexyl)Phthalate	<150
Bromophenyl Phenyl Ether	<150
Butyl Benzyl Phthalate	<150
-Chloronaphthalene	<150
4-Chlorophenyl Phenyl Ether	<150
Chrysene	<150
Dibenzo(a,h)Anthracene	<150
1,2-Dichlorobenzene	<150
,3-Dichlorobenzene	<150
1,4-Dichlorobenzene	<150
,3'-Dichlorobenzidine	<150
Diethyl Phthalate	<150
imethyl Phthalate	<150
Di-n-Butyl Phthalate	<150
,4-Dinitrotoluene	<150
2,6-Dintrotoluene	<150
i-n-Octyl Phthalate	<150
,2-Diphenylhydrazine	<150
Hexachlorobutadiene	<150

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All results in micrograms per liter.

PRIORITY POLLUTANTS
BASE-NEUTRAL FRACTION (Continued)

	L-1, L-2, L-3 Composite, Water, 03-18-86 @ No Time
Fluoranthene	<150
Fluorene	<150
Hexachlorobenzene	<150
Hexachlorocyclopentadiene	<150
Hexachloroethane	<150
Indeno (1,2,3-cd) Pyrene	<150
Isophorone	<150
Napthalene	2,340
Nitrobenzene	<150
N-Nitrosodimethylamine	<150
N-Nitrosodi-N-Propylamine	<150
N-Nitrosodiphenylamine	160
Phenanthrene	<150
Pyrene	<150
1,2,4-Trichlorobenzene	3,470
Date of Analyses	04-15-86

--------% Recovery-------

Decafluorobiphenyl	116
Fluorene-D10	97

1,2,4 TCB
Napthalene

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Baton Rouge, LA 70895

All results in micrograms per liter.

RIORITY POLLUTANTS
ASE-NEUTRAL FRACTION

	W-9, Water, 03-22-86
Acenaphthene	<10
cenaphthylene	<10
nthracene	<10
enzidine	<10
enzo(a)Anthracene	<10
Benzo(a)Pyrene	<10
-4 Benzo Fluoranthene	<10
Benzo(ghi)Perylene	<10
enzo(k)Fluoranthene	<10
Bis(2-Chloroethoxy)Methane	<10
is(2-Chloroethyl)Ether	<10
is(2-Chloroisopropyl)Ether	<10
is-(2-Ethylhexyl)Phthalate	<10
Bromophenyl Phenyl Ether	<10
utyl Benzyl Phthalate	<10
-Chloronaphthalene	<10
4-Chlorophenyl Phenyl Ether	<10
rysene	<10
ibenzo(a,h)Anthracene	<10
2-Dichlorobenzene	<10
1,3-Dichlorobenzene	<10
4-Dichlorobenzene	<10
3'-Dichlorobenzidine	<10
iethyl Phthalate	<10
methyl Phthalate	<10
i-n-Butyl Phthalate	<10
4-Dinitrotoluene	<10
2,6-Dintrotoluene	<10
-n-Octyl Phthalate	<10
1,2-Diphenylhydrazine	<10
xachlorobutadiene	<10

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PRIORITY POLLUTANTS
ASE-NEUTRAL FRACTION (Continued)

All results in micrograms per liter.

	W-9, Water, 03-22-86
Fluoranthene	<10
luorene	<10
нexachlorobenzene	<10
"exachlorocyclopentadiene	<10
..exachloroethane	<10
Indeno (1,2,3-cd) Pyrene	<10
sophorone	<10
Napthalene	<10
itrobenzene	<10
N-Nitrosodimethylamine	<10
-Nitrosodi-N-Propylamine	<10
N-Nitrosodiphenylamine	<10
^henanthrene	<10
yrene	<10
1,2,4-Trichlorobenzene	<10
ate of Analyses	04-15-86

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G & E Engineering, Incorporated

P.O. Box 45212, Dept. 186

Baton Rouge, LA 70895

All results in micrograms per liter.

PRIORITY POLLUTANTS
BASE-NEUTRAL FRACTION

	BS-1, Water, Received 03-24-86
Acenaphthene	<10
Acenaphthylene	<10
Anthracene	<10
Benzidine	<10
Benzo(a)Anthracene	<10
Benzo(a)Pyrene	<10
3-4 Benzo Fluoranthene	<10
Benzo(ghi)Perylene	<10
Benzo(k)Fluoranthene	<10
Bis(2-Chloroethoxy)Methane	<10
Bis(2-Chloroethyl)Ether	<10
Bis(2-Chloroisopropyl)Ether	<10
Bis-(2-Ethylhexyl)Phthalate	<10
4 Bromophenyl Phenyl Ether	<10
Butyl Benzyl Phthalate	<10
2-Chloronaphthalene	<10
4-Chlorophenyl Phenyl Ether	<10
Chrysene	<10
Dibenzo(a,h)Anthracene	<10
1,2-Dichlorobenzene	<10
1,3-Dichlorobenzene	<10
1,4-Dichlorobenzene	<10
3,3'-Dichlorobenzidine	<10
Diethyl Phthalate	<10
Dimethyl Phthalate	<10
Di-n-Butyl Phthalate	<10
2,4-Dinitrotoluene	<10
2,6-Dintrotoluene	<10
Di-n-Octyl Phthalate	<10
1,2-Diphenylhydrazine	<10
Hexachlorobutadiene	<10

WEST-PAINE Laboratories INC.
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G & E Engineering, Incorporated
P.O. Box 45212, Dept. 186
Baton Rouge, LA 70895

PRIORITY POLLUTANTS
BASE-NEUTRAL FRACTION (Continued)

All results in micrograms per liter.

	BS-1, Water, Received 03-24-86
Fluoranthene	<10
Fluorene	<10
Hexachlorobenzene	<10
Hexachlorocyclopentadiene	<10
Hexachloroethane	<10
Indeno (1,2,3-cd) Pyrene	<10
Isophorone	<10
Napthalene	<10
Nitrobenzene	<10
N-Nitrosodimethylamine	<10
N-Nitrosodi-N-Propylamine	<10
N-Nitrosodiphenylamine	<10
Phenanthrene	<10
Pyrene	<10
1,2,4-Trichlorobenzene	<10
Date of Analyses	04-16-86

WEST·PAINE Laboratories INC.
7979 GSRI AVE • BATON ROUGE, LA 70820

G & E Engineering, Incorporated
P.O. Box 45212, Dept. 186
Baton Rouge, LA 70895

All results in micrograms per liter.

PRIORITY POLLUTANTS
BASE-NEUTRAL FRACTION

	BS-2, Water, Received 03-24-86
Acenaphthene	<10
Acenaphthylene	<10
Anthracene	<10
Benzidine	<10
Benzo(a)Anthracene	<10
Benzo(a)Pyrene	<10
3-4 Benzo Fluoranthene	<10
Benzo(ghi)Perylene	<10
Benzo(k)Fluoranthene	<10
Bis(2-Chloroethoxy)Methane	<10
Bis(2-Chloroethyl)Ether	<10
Bis(2-Chloroisopropyl)Ether	<10
Bis-(2-Ethylhexyl)Phthalate	<10
4 Bromophenyl Phenyl Ether	<10
Butyl Benzyl Phthalate	<10
2-Chloronaphthalene	<10
4-Chlorophenyl Phenyl Ether	<10
Chrysene	<10
Dibenzo(a,h)Anthracene	<10
1,2-Dichlorobenzene	<10
1,3-Dichlorobenzene	<10
1,4-Dichlorobenzene	<10
3,3'-Dichlorobenzidine	<10
Diethyl Phthalate	<10
Dimethyl Phthalate	<10
Di-n-Butyl Phthalate	<10
2,4-Dinitrotoluene	<10
2,6-Dintrotoluene	<10
Di-n-Octyl Phthalate	<10
1,2-Diphenylhydrazine	<10
Hexachlorobutadiene	<10

WEST·PAINE
Laboratories INC.
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G & E Engineering, Incorporated
P.O. Box 45212, Dept. 186
Baton Rouge, LA 70895

PRIORITY POLLUTANTS
BASE-NEUTRAL FRACTION (Continued)

All results in micrograms per liter.

	BS-2, Water, Received 03-24-86
Fluoranthene	<10
Fluorene	<10
Hexachlorobenzene	<10
Hexachlorocyclopentadiene	<10
Hexachloroethane	<10
Indeno (1,2,3-cd) Pyrene	<10
Isophorone	<10
Napthalene	<10
Nitrobenzene	<10
N-Nitrosodimethylamine	<10
N-Nitrosodi-N-Propylamine	<10
N-Nitrosodiphenylamine	<10
Phenanthrene	<10
Pyrene	<10
1,2,4-Trichlorobenzene	<10
Date of Analyses	04-16-86

WEST·PAINE
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G & E Engineering, Incorporated
P.O. Box 45212, Dept. 186
Baton Rouge, LA 70895

PRIORITY POLLUTANTS
BASE-NEUTRAL FRACTION

All results in micrograms per liter.

	W-10, Water, 04-04-86 @ 0445hrs.
Acenaphthene	<10
Acenaphthylene	<10
Anthracene	<10
Benzidine	<10
Benzo(a)Anthracene	<10
Benzo(a)Pyrene	<10
3-4 Benzo Fluoranthene	<10
Benzo(ghi)Perylene	<10
Benzo(k)Fluoranthene	<10
Bis(2-Chloroethoxy)Methane	<10
Bis(2-Chloroethyl)Ether	<10
Bis(2-Chloroisopropyl)Ether	<10
Bis-(2-Ethylhexyl)Phthalate	<10
4 Bromophenyl Phenyl Ether	<10
Butyl Benzyl Phthalate	<10
2-Chloronaphthalene	<10
4-Chlorophenyl Phenyl Ether	<10
Chrysene	<10
Dibenzo(a,h)Anthracene	<10
1,2-Dichlorobenzene	<10
1,3-Dichlorobenzene	<10
1,4-Dichlorobenzene	<10
3,3'-Dichlorobenzidine	<10
Diethyl Phthalate	<10
Dimethyl Phthalate	<10
Di-n-Butyl Phthalate	<10
2,4-Dinitrotoluene	<10
2,6-Dintrotoluene	<10
Di-n-Octyl Phthalate	<10
1,2-Diphenylhydrazine	<10
Hexachlorobutadiene	<10

WEST·PAINE
Laboratories INC.
7979 GSRI AVE • BATON ROUGE, LA 70820

G & E Engineering, Incorporated
P.O. Box 45212, Dept. 186
Baton Rouge, LA 70895

All results in micrograms per liter.

PRIORITY POLLUTANTS
BASE-NEUTRAL FRACTION (Continued)

	W-10, Water, 04-04-86 @ 0445hrs.
Fluoranthene	<10
Fluorene	<10
Hexachlorobenzene	<10
Hexachlorocyclopentadiene	<10
Hexachloroethane	<10
Indeno (1,2,3-cd) Pyrene	<10
Isophorone	<10
Napthalene	<10
Nitrobenzene	<10
N-Nitrosodimethylamine	<10
N-Nitrosodi-N-Propylamine	<10
N-Nitrosodiphenylamine	<10
Phenanthrene	<10
Pyrene	<10
1,2,4-Trichlorobenzene	<10
Date of Analyses	04-15-86

WEST·PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

SAMPLE ANALYSES

for

G & E ENGINEERING, INCORPORATED
Post Office Box 45212
Department 186
Baton Rouge, Louisiana 70895

ATTENTION: Ms. Marie Walsh

May 7, 1986

WEST·PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

May 7, 1986

Samples collected by G & E Engineering, Incorporated as documented by the enclosed chain-of-custody form, were analyzed in accordance with the following EPA approved methods.

A. Test Methods for Evaluating Solid Waste, SW-846, July 1982:

Parameter	Method
PCB - Soil (GC/ECD)	8080
Semivolatile Organics (GC/FID)	8270
Sonication Extraction	3550

The results are reported on the following pages.

Burton A. Boeneke
Burton A. Boeneke
Environmental Coordinator

WEST·PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

May 9, 1986

Date Received: May 5, 1986

Sample Identification	Polychlorinated Biphenyls (ug/L)
W-5, Collected: 05-01-86/14:30 (GW)	<1.0
W-9 (A), Collected: 05-02-86/12:30 (GW)	99.2 of Aroclor 1242
Burn Area Lagoon (A), Collected: 05-01-86/17:45	2.7 of Aroclor 1248

WEST-PAINE
Laboratories INC.
7979 GSRI AVE • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

May 7, 1986

Date Received: April 16, 1986

Parameter	L-33, 10-12', 04-13-86 @ No Time
Naphthalene	<10 mg/kg
1,2,4-Trichlorobenzene	<10 mg/kg
Date of Analyses	04-18-86

WEST-PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

May 7, 1986

Date Received: April 16, 1986

Sample Identification	Polychlorinated Biphenyls (mg/kg)
L-33, 10-12', 04-13-86 @ No Time	70 of Aroclor 1248
L-33, 12-14', 04-13-86 @ No Time	2,139 of Aroclor 1248
Date of Analyses	04-19-86

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WEST-PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

ANALYSIS OF SOIL AND WATER SAMPLES

for

G & E ENGINEERING, INCORPORATED
Post Office Box 45212
Department 186
Baton Rouge, Louisiana 70895

ATTENTION: Ms. Marie Walsh

May 8, 1986

WEST·PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED

D. Standard Methods for the Examination of Water and Wastewater, 14th Edition, 1979:

Parameter	Phenol
Phenol	510A, 510B

E. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, March 1979:

Parameter	Method
Lead	239.1
Mercury	245.1
Arsenic	206.2
Chromium	218.1
Cadmium	213.1

The results are reported on the following pages.

Daniel T. Strecker
Operations Supervisor

WEST·PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED

Samples collected by G & E Engineering, Incorporated were received at West-Paine Laboratories, Incorporated on the dates as indicated below. These samples were analyzed according to the Environmental Protection Agency approved methods.

A. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA-600/4-82-057:

Parameter	Method
Volatile Organic Fraction	624 (GC/FID)

B. Test Methods for Evaluating Solid Waste, SW-846, July 1982:

Parameter	Method
Volatile Organic Fraction	8240
PCB - Soil	3550, 8080
PCB - Water	8080
Lead	7420
Mercury	7470
Arsenic	7060
Cadmium	7130
Chromium	7190

C. Standard Methods for the Examination of Water and Wastewater, 15th Edition, 1980:

Parameter	Method
Total Organic Carbon	505
Specific Conductance	205
pH	423
Chloride	407

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED

Sample ID: C-1, Due East Lagoon

Sample Type: Groundwater

Date Collected: March 25, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/L Pb)	<0.04	2.50/2.50	04-07/FD
Mercury (mg/L Hg)	<0.0002	0.0100/0.0104	04-22/FD
Arsenic (mg/L As)	<0.01	0.025/0.026	05-06/FD
Cadmium (mg/L Cd)	<0.005	0.250/0.250	04-17/FD
Chromium (mg/L Cr)	<0.01	0.50/0.50	04-07/FD
Phenol (mg/L Phenol)	0.06	0.020/0.021	04-28/0900/RH

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WEST·PAINE Laboratories INC.
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G & E ENGINEERING, INCORPORATED

Sample ID: C-2, Due East Lagoon

Sample Type: Groundwater

Date Collected: March 27, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/L Pb)	<0.04	2.50/2.50	04-07/FD
Mercury (mg/L Hg)	<0.0002	0.0100/0.0104	04-22/FD
Arsenic (mg/L As)	<0.01	0.025/0.026	05-06/FD
Cadmium (mg/L Cd)	<0.005	0.250/0.250	04-17/FD
Chromium (mg/L Cr)	<0.01	0.50/0.50	04-07/FD
Phenol (mg/L Phenol)	<0.001	0.020/0.018	04-20/1000/JS

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G & E ENGINEERING, INCORPORATED

Sample ID: S-1, End of Ditch

Sample Type: Soil

Date Collected: April 9, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/kg Pb)	6.9	2.50/2.50	05-06/VM
Mercury (mg/kg Hg)	0.04	0.0100/0.0113	05-06/VM
Arsenic (mg/kg As)	0.32	0.025/0.026	05-06/VM
Cadmium (mg/kg Cd)	0.1	0.250/0.250	05-06/VM
Chromium (mg/kg Cr)	2.0	0.50/0.51	05-06/VM

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G & E ENGINEERING, INCORPORATED

Sample ID: V-6

Sample Type: Groundwater

Date Collected: March 13, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Chloride (mg/L Cl)	2,900	50.0/52.5	04-24/1100/ML

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G & E ENGINEERING, INCORPORATED

Sample ID: D-1, 200' West of Clarifer

Sample Type: Groundwater

Date Collected: March 27, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/L Pb)	<0.04	2.50/2.50	04-07/FD
Mercury (mg/L Hg)	<0.0002	0.0100/0.0104	04-22/FD
Arsenic (mg/L As)	<0.01	0.025/0.026	05-06/FD
Cadmium (mg/L Cd)	<0.005	0.250/0.250	04-17/FD
Chromium (mg/L Cr)	<0.01	0.50/0.50	04-07/FD
Phenol (mg/L Phenol)	0.004	0.020/0.018	04-20/1000/JS

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G & E ENGINEERING, INCORPORATED

Sample ID: D-2, 275' West of Clarifer

Sample Type: Groundwater

Date Collected: March 27, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/L Pb)	<0.04	2.50/2.50	04-07/FD
Mercury (mg/L Hg)	<0.0002	0.0100/0.0104	04-22/FD
Arsenic (mg/L As)	<0.01	0.025/0.026	05-06/FD
Cadmium (mg/L Cd)	<0.005	0.250/0.250	04-17/FD
Chromium (mg/L Cr)	<0.01	0.50/0.50	04-07/FD
Phenol (mg/L Phenol)	0.010	0.020/0.018	04-20/1000/JS

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G & E ENGINEERING, INCORPORATED

Sample ID: Dead Pond Marsh Sludge

Sample Type: Soil

Date Collected: March 12, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/kg Pb)	6.5	2.50/2.50	04-22/FD
Mercury (mg/kg Hg)	<0.02	0.0100/0.0107	05-06/VM
Cadmium (mg/kg Cd)	<0.1	0.250/0.245	04-22/FD
Chromium (mg/kg Cr)	1.1	0.50/0.52	04-21/VM

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WEST·PAINE Laboratories INC.
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G & E ENGINEERING, INCORPORATED

Sample ID: A-3

Sample Type: Groundwater

Date Collected: March 13, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Chloride (mg/L Cl)	735	50.0/52.5	04-24/1100/ML
Phenol (mg/L Phenol)	0.007	0.020/0.021	04-22/0900/RH

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G & E ENGINEERING, INCORPORATED

Sample ID: A-5

Sample Type: Groundwater

Date Collected: March 13, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Chloride (mg/L Cl)	390	50.0/52.5	04-24/1100/ML

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Sample ID: A-6

Sample Type: Groundwater

Date Collected: March 13, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Chloride (mg/L Cl)	560	50.0/52.5	04-24/1100/ML
Phenol (mg/L Phenol)	0.008	0.020/0.021	04-28/0900/RH

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WEST·PAINE Laboratories INC.
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G & E ENGINEERING, INCORPORATED

Sample ID: W-1

Sample Type: Groundwater

Date Collected: March 22, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/L Pb)	<0.04	2.50/2.50	04-07/FD
Mercury (mg/L Hg)	<0.0002	0.0100/0.0104	04-22/VM
Arsenic (mg/L As)	<0.01	0.025/0.026	04-23/FD
Cadmium (mg/L Cd)	<0.005	0.250/0.250	04-09/FD
Chromium (mg/L Cr)	<0.01	0.50/0.50	04-07/FD
Chloride (mg/L Cl)	15.0	50.0/52.0	04-24/1100/ML

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G & E ENGINEERING, INCORPORATED

Sample ID: W-2

Sample Type: Groundwater

Date Collected: March 22, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/L Pb)	<0.04	2.50/2.50	04-07/FD
Mercury (mg/L Hg)	<0.0002	0.0100/0.0104	04-22/VM
Arsenic (mg/L As)	<0.01	0.025/0.026	04-23/FD
Cadmium (mg/L Cd)	<0.005	0.250/0.250	04-09/FD
Chromium (mg/L Cr)	<0.01	0.50/0.50	04-07/FD
Chloride (mg/L Cl)	13.4	50.0/52.0	04-24/1100/ML

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WEST·PAINE Laboratories INC.
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G & E ENGINEERING, INCORPORATED

Sample ID: W-3

Sample Type: Groundwater

Date Collected: March 25, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/L Pb)	0.13	2.50/2.50	04-07/FD
Mercury (mg/L Hg)	<0.002	0.0100/0.0104	04-22/FD
Arsenic (mg/L As)	0.12	0.025/0.026	05-06/FD
Cadmium (mg/L Cd)	0.02	0.250/0.250	04-17/FD
Chromium (mg/L Cr)	0.13	0.50/0.50	04-07/FD
Phenol (mg/L Phenol)	0.35	0.020/0.021	04-28/0900/RH

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G & E ENGINEERING, INCORPORATED

Sample ID: W-4

Sample Type: Groundwater

Date Collected: March 25, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/L Pb)	<0.04	2.50/2.50	04-07/FD
Mercury (mg/L Hg)	<0.0002	0.0100/0.0104	04-22/FD
Arsenic (mg/L As)	<0.01	0.025/0.023	05-01/FD
Cadmium (mg/L Cd)	<0.005	0.250/0.250	04-17/FD
Chromium (mg/L Cr)	<0.01	0.50/0.50	04-07/FD
Phenol (mg/L Phenol)	0.11	0.020/0.021	04-28/0900/RH

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G & E ENGINEERING, INCORPORATED

Sample ID: W-6

Sample Type: Groundwater

Date Collected: March 17, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/L Pb)	0.21	2.50/2.52	04-13/FD
Arsenic (mg/L As)	<0.1	0.025/0.026	04-23/FD
Cadmium (mg/L Cd)	0.01	0.250/0.250	04-17/FD
Chromium (mg/L Cr)	0.51	0.50/0.49	04-15/FD
Chloride (mg/L Cl)	Insufficient Sample		
Phenol (mg/L Phenol)	0.005	0.020/0.021	04-28/0900/RH

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G & E ENGINEERING, INCORPORATED

Sample ID: W-7

Sample Type: Groundwater

Date Collected: March 17, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/L Pb)	1.5	2.50/2.52	04-13/FD
Arsenic (mg/L As)	<0.1	0.025/0.026	04-23/FD
Cadmium (mg/L Cd)	0.11	0.250/0.250	04-17/FD
Chromium (mg/L Cr)	2.2	0.50/0.49	04-15/FD

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Sample ID: W-7

Sample Type: Groundwater

Date Collected: March 22, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Chloride (mg/L Cl)	195	50.0/52.0	04-24/1100/ML
Phenol (mg/L Phenol)	0.032	0.020/0.021	04-28/0900/RH

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G & E ENGINEERING, INCORPORATED

Sample ID: W-11

Sample Type: Groundwater

Date Collected: April 4, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/L Pb)	<0.04	2.50/2.48	04-23/VM
Mercury (mg/L Hg)	<0.002	0.0100/0.0093	04-23/VM
Arsenic (mg/L As)	<0.1	0.025/0.023	05-01/FD
Cadmium (mg/L Cd)	<0.005	0.250/0.250	04-30/VM
Chloride (mg/L Cl)	1,100	50.0/52.0	04-24/1100/ML
Total Organic Carbon (mg/L C)	350	25/23	04-23/1000/RC
Phenol (mg/L Phenol)	0.060	0.020/0.018	04-20/1000/MS

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G & E ENGINEERING, INCORPORATED

Sample ID: W-12

Sample Type: Groundwater

Date Collected: April 4, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/L Pb)	<0.04	2.50/2.48	04-23/VM
Mercury (mg/L Hg)	<0.0002	0.0100/0.0093	04-23/VM
Arsenic (mg/L As)	<0.01	0.025/0.023	05-01/FD
Cadmium (mg/L Cd)	<0.005	0.250/0.250	04-30/VM
Chloride (mg/L Cl)	57.9	50.0/52.0	04-24/1100/ML
Total Organic Carbon (mg/L C)	9	25/23	04-23/1000/RC
Phenol (mg/L Phenol)	0.023	0.020/0.018	04-20/1000/MS

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G & E ENGINEERING, INCORPORATED

Sample ID: W-13

Sample Type: Groundwater

Date Collected: April 13, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/L Pb)	0.6	2.50/2.50	04-22/FD
Mercury (mg/L Hg)	<0.002	0.0100/0.0093	04-23/VM
Arsenic (mg/L As)	0.03	0.025/0.026	04-23/FD
Cadmium (mg/L Cd)	0.02	0.250/0.245	04-22/FD
Chromium (mg/L Cr)	0.75	0.50/0.52	04-21/VM
Chloride (mg/L Cl)	40.0	50.0/52.0	04-24/1100/ML
Total Organic Carbon (mg/L C)	9	25/21	04-17/1200/RC

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7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED

Sample Identification	Polychlorinated Biphenyls
W-6, 03-17-86	<1.0 ug/L
W-7, 03-22-86	<5.0 ug/L
D-1, 03-27-86	<1.0 ug/L
W-13, 04-13-86	<1.0 ug/L
L-33, 14-16', 04-16-86	<1.0 mg/kg

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G & E ENGINEERING, INCORPORATED

Sample ID: L-20, 0-4'

Sample Type: Soil

Date Collected: March 21, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/kg Pb)	12	2.50/2.50	04-22/FD
Mercury (mg/kg Hg)	0.05	0.0100/0.0103	04-22/VM
Cadmium (mg/kg Cd)	<0.1	0.250/0.245	04-22/FD
Chromium (mg/kg Cr)	3.2	0.50/0.52	04-21/VM

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G & E ENGINEERING, INCORPORATED

Sample ID: Burnsite Lagoon Sample

Sample Type: Soil

Date Collected: March 22, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Phenol (mg/kg Phenol)	61.0	0.020/0.018	04-16/0900/RH

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G & E ENGINEERING, INCORPORATED

Sample ID: BS-1

Sample Type: Groundwater

Date Collected: March 21, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/L Pb)	0.23	2.50/2.43	04-30/VM
Mercury (mg/L Hg)	0.005	0.0100/0.0103	04-22/VM
Cadmium (mg/L Cd)	<0.005	0.250/0.245	04-22/FD
Chromium (mg/L Cr)	0.10	0.50/0.52	04-21/VM
Chloride (mg/L Cl)	Insufficient Sample		
Phenol (mg/L Phenol)	0.005	0.020/0.021	04-28/0900/RH

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G & E ENGINEERING, INCORPORATED

Sample ID: L-28, 1st Groundwater

Sample Type: Groundwater

Date Collected: April 9, 1986

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/L Pb)	3.8	2.50/2.52	04-13/FD
Mercury (mg/L Hg)	0.015	0.0100/0.0106	04-30/VM
Arsenic (mg/L As)	0.19	0.025/0.026	04-23/FD
Cadmium (mg/L Cd)	0.03	0.250/0.250	04-17/FD
Chromium (mg/L Cr)	7.3	0.50/0.51	04-17/FD
Total Organic Carbon (mg/L C)	3,800	25/21	04-21/1700/TS
pH (Units)	9.8	7.0/7.0	04-11/1300/BT

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Sample Identification	Polychlorinated Biphenyls
S-7, Influent EHP, 04-17-86	<1.0 mg/kg
S-8, NW Corner, 04-17-86	<1.0 mg/kg
S-9, Discharge Point EHP, 04-17-86	<1.0 mg/kg
S-10, SE Corner EHP, 04-17-86	<1.0 mg/kg
S-11, Composite EHP, 04-17-86	<1.0 mg/kg
S-2, Influent WHP, 04-17-86	<10.0 mg/kg
S-3, NW Corner WHP, 04-17-86	<1.0 mg/kg
S-4, SE Corner WHP, 04-17-86	<1.0 mg/kg
S-5, Exit Point WHP, 04-17-86	<2.0 mg/kg
S-6, Composite WHP, 04-17-86	<10.0 mg/kg
S-12, Arch NE Lagoon, 04-17-86	<1.0 mg/kg
S-13, Base of Dam, 04-17-86	<1.0 mg/kg
S-14, Composite Dry Bed N, 04-17-86	<10.0 mg/kg
S-15, Composite Dry Bed S, 04-17-86	<10.0 mg/kg

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WEST-PAINE Laboratories INC.
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G & E Engineering, Inc.
P.O. Box 45212, Dept. 186
Baton Rouge, LA 70895

PRIORITY POLLUTANTS
VOLATILES FRACTIONS

All results in milligrams per liter.

	W-13, 04-13-86 @ 1530hrs.
Benzene	<0.010
Bromoform	<0.010
Carbon tetrachloride	<0.010
Chlorobenzene	<0.010
Chlorodibromomethane	<0.010
Chloroethane	<0.010
2-Chloroethylvinyl ether	<0.010
Chloroform	<0.010
1,2-Dichlorobenzene	<0.010
1,4-Dichlorobenzene	<0.010
1,3-Dichlorobenzene	<0.010
Dichlorobromomethane	<0.010
1,1-Dichloroethane	<0.010
1,2-Dichloroethane	<0.010
1,1-Dichloroethene	<0.010
trans-1,2-Dichloroethene	<0.010
1,2-Dichloropropane	<0.010
cis-1,3-Dichloropropene	<0.010
trans-1,3-Dichloropropene	<0.010
Ethylbenzene	<0.010
Methylbromide	<0.010
Methylchloride	<0.010
Methylene chloride	<0.010
1,1,2,2-Tetrachloroethane	<0.010
Tetrachloroethene	<0.010
Toluene	<0.010
1,1,1-Trichloroethane	<0.010
1,1,2-Trichloroethane	<0.010
Trichloroethene	<0.010
Trichlorofluormethane	<0.010
Vinyl chloride	<0.010
Total Xylene (semiquantitative)	<0.010
Date of Analyses	04-17-86
Chlorotoluene	<0.010

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G & E Engineering, Inc.
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Baton Rouge, LA 70895

PRIORITY POLLUTANTS
VOLATILES FRACTIONS

All results in milligrams per liter.

	L-28, 04-09-86	Quality Assurance Actual/Found
Benzene	<0.010	0.020/0.020
Bromoform	<0.010	
Carbon tetrachloride	<0.010	0.033/0.035
Chlorobenzene	<0.010	
Chlorodibromomethane	<0.010	
Chloroethane	<0.010	
2-Chloroethylvinyl ether	<0.010	
Chloroform	<0.010	0.033/0.031
1,2-Dichlorobenzene	<0.010	
1,4-Dichlorobenzene	<0.010	
1,3-Dichlorobenzene	<0.010	
Dichlorobromomethane	<0.010	
1,1-Dichloroethane	<0.010	
1,2-Dichloroethane	<0.010	0.033/0.027
1,1-Dichloroethene	<0.010	
trans-1,2-Dichloroethene	<0.010	
1,2-Dichloropropane	<0.010	
cis-1,3-Dichloropropene	<0.010	
trans-1,3-Dichloropropene	<0.010	
Ethylbenzene	<0.010	0.020/0.019
Methylbromide	<0.010	
Methylchloride	<0.010	
Methylene chloride	<0.010	
1,1,2,2-Tetrachloroethane	<0.010	
Tetrachloroethene	<0.010	
Toluene	<0.010	0.020/0.018
1,1,1-Trichloroethane	<0.010	
1,1,2-Trichloroethane	<0.010	
Trichloroethene	<0.010	
Trichlorofluormethane	<0.010	
Vinyl chloride	<0.010	
Total Xylene (semiquantitative)	<0.010	
Date of Analyses	04-11-86	
Chlorotoluene	<0.010	

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

SAMPLE ANALYSES

for

G & E ENGINEERING, INCORPORATED
Post Office Box 45212
Department 186
Baton Rouge, Louisiana 70895

ATTENTION: Ms. Marie Walsh

May 9, 1986

WEST-PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

May 9, 1986

Samples collected by G & E Engineering, Incorporated were received at West-Paine Laboratories, Incorporated on May 5, 1986. The samples were analyzed according to the Environmental Protection Agency protocol:

A. Test Methods for Evaluating Solid Waste, SW-846, July 1982:

Parameter	Method
Volatile Organic Fraction	8240 (GC/FID)
Polychlorinated Biphenyls	8080

The results are reported on the following pages.

Daniel T. Strecker
Operations Supervisor

WEST·PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

May 7, 1986

Date Received: April 16, 1986

Parameter	L-33, 12-14', 04-13-86 @ No Time
Naphthalene	103 mg/kg
1,2,4-Trichlorobenzene	122 mg/kg
Date of Analyses	04-18-86

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E Engineering, Inc.
P.O. Box 45212, Dept. 186
Baton Rouge, LA 70895

All results in milligrams per liter.

PRIORITY POLLUTANTS
VOLATILES FRACTIONS

	W-5, 05-01-86/1430hrs., GW	Quality Assurance Actual/Found
Benzene	<0.010	0.020/0.019
Bromoform	<0.010	0.100/0.086
Carbon tetrachloride	<0.010	
Chlorobenzene	<0.010	
Chlorodibromomethane	<0.010	0.100/0.102
Chloroethane	<0.010	
2-Chloroethylvinyl ether	<0.010	
Chloroform	<0.010	0.100/0.107
1,2-Dichlorobenzene	<0.010	
1,4-Dichlorobenzene	<0.010	
1,3-Dichlorobenzene	<0.010	
Dichlorobromomethane	<0.010	0.100/0.121
1,1-Dichloroethane	<0.010	
1,2-Dichloroethane	<0.010	
1,1-Dichloroethene	<0.010	
trans-1,2-Dichloroethene	<0.010	
1,2-Dichloropropane	<0.010	
cis-1,3-Dichloropropene	<0.010	
trans-1,3-Dichloropropene	<0.010	
Ethylbenzene	<0.010	0.020/0.016
Methylbromide	<0.010	
Methylchloride	<0.010	
Methylene chloride	<0.010	
1,1,2,2-Tetrachloroethane	<0.010	
Tetrachloroethene	<0.010	
Toluene	<0.010	0.020/0.017
1,1,1-Trichloroethane	<0.010	
1,1,2-Trichloroethane	<0.010	
Trichloroethene	<0.010	
Trichlorofluormethane	<0.010	
Vinyl chloride	<0.010	
Total Xylene (semiquantitative)	<0.010	
Date of Analyses	05-07-86	

WEST·PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

ANALYSIS OF WATER SAMPLES

for

G & E ENGINEERING, INCORPORATED
Post Office Box 45212
Department 186
Baton Rouge, Louisiana 70895

ATTENTION: Ms. Marie Walsh

May 22, 1986

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

Samples collected by G & E Engineering, Incorporated were received at West-Paine Laboratories, Incorporated on the dates as indicated below. These samples were analyzed according to the following Environmental Protection Agency approved methods.

A. Standard Methods for the Examination of Water and Wastewater, 15th Edition, 1980:

Parameter	Method
Chloride	407

B. Standard Methods for the Examination of Water and Wastewater, 14th Edition, 1979:

Parameter	Method
Phenol	510A, 510B

C. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, March 1979:

Parameter	Method
Lead	239.1
Arsenic	206.2
Chromium	218.1
Cadmium	213.1

The results are reported on the following pages.

Daniel T. Strecker
Operations Supervisor

nal

86-2304

WEST·PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

Sample ID: W-5

Sample Type: Groundwater

Date Collected: May 1, 1986 @ 1430hrs.

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/L Pb)	<0.04	2.50/2.47	05-14/FD
Arsenic (mg/L As)	<0.01	0.025/0.028	05-21/VM
Cadmium (mg/L Cd)	<0.005	0.250/0.250	05-14/FD
Chromium (mg/L Cr)	0.04	0.50/0.50	05-14/FD
Chloride (mg/L Cl)	93.0	50.0/51.5	05-07/0900/ML
Phenol (mg/L Phenol)	<0.001	0.020/0.018	05-11/1030/KT

nal

86-2304

WEST·PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

Sample ID: W-9

Sample Type: Groundwater

Date Collected: May 1, 1986 @ 1630hrs.

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Chloride (mg/L Cl)	310	50.0/51.5	05-07/0900/ML
Phenol (mg/L Phenol)	<0.010	0.020/0.019	05-15/0800/KT

nal

86-2304

WEST-PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

Sample ID: W-10

Sample Type: Groundwater

Date Collected: May 1, 1986 @ 1700hrs.

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/L Pb)	0.05	2.50/2.47	05-14/FD
Arsenic (mg/L As)	0.01	0.025/0.028	05-21/VM
Cadmium (mg/L Cd)	0.02	0.250/0.250	05-14/FD
Chromium (mg/L Cr)	0.13	0.50/0.50	05-14/FD
Chloride (mg/L Cl)	345	50.0/51.5	05-07/0900/ML

WEST·PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

G & E ENGINEERING, INCORPORATED
Baton Rouge, Louisiana

Sample ID: W-11

Sample Type: Groundwater

Date Collected: May 1, 1986 @ 1730hrs.

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Lead (mg/L Pb)	0.10	2.50/2.47	05-14/FD
Arsenic (mg/L As)	<0.01	0.025/0.028	05-21/VM
Cadmium (mg/L Cd)	0.02	0.250/0.250	05-14/FD
Chromium (mg/L Cr)	0.18	0.50/0.50	05-14/FD
Chloride (mg/L Cl)	1,000	50.0/51.5	05-07/0900/ML

G & E ENGINEERING, INC.
CONSULTING GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

4 45212
86
4 ROUGE LOUISIANA 70895

4915 SOUTH SHERWOOD FOREST BOULEVARD
BATON ROUGE, LOUISIANA 70816

(504) 292-9007

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time	Type of Sample
W-1 (14'-16')	10:50/3-11-86	Soil
W-1 (38'-40')	11:45am 3/12/86	Soil
A-7 (4.5')	12:10pm 3/12/86	Soil
~~W-4~~		~~Soil~~ MBW
W-1 (4'-6')	10am/3-11-86	Soil
W-3 (15'-17')	4:10pm/3-12-86	Soil
W-4 (15-17')	5:21pm/3-12-86	Soil
W-2 (10'-12')	3:45pm/3/12/86	Soil

SAMPLE COLLECTION:

Location of Sampling: Venture Chemicals Co., Lobeco, SC.

Facility Type: ___ Producer ___ Hauler ___ Disposal Site X Other Chemical Plant

Collectors Name: M.Richardson, JJFranklin Telephone: (504) 292-9007

Company Name: G & E ENGINEERING, INC.

Address: 4915 South Sherwood Forest Blvd.

Date Sampled: 3/11/86 + 3/12/86 Time: ______

Type of Process or Facility Sampled: Chemical Plant Facility

Field Information: All Samples iced in the field.

[signature] 3/13/86

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: Greyhound Bus Date: 3/13/86 Time: 11:00

Company Name: Greyhound

Address: Beaufort, South Carolina

SAMPLE RECEIVING:

Person accepting sample: [signature] Date: 031486

Time: 1600 Company: WEST-PAINE LABS

Address: 7979 GSRI BR LA 70820

Sample Disposition ___ Storage ___ Further Transportaion ___

___ Other LAB

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

G & E ENGINEERING, INC.

CONSULTING GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

P O BOX 45212
DEPT 186
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4915 SOUTH SHERWOOD FOREST BOULEVARD
BATON ROUGE, LOUISIANA 70816

(504) 292-9007

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time / Date	Type of Sample
W-3	4:20pm 3/6/86	Groundwater
W-1	12:50pm / 3-6-86	Groundwater
A-2	1:05pm / 3-6-86	Groundwater
A-8 (2')	12:50pm / 3-6-86	Groundwater
W-4	1730 / 3-6-86	Groundwater
Dead Pond/marsh	12:45pm / 3-6-86	Sludge

SAMPLE COLLECTION:

Location of Sampling: Venture Chemicals Co., Lobeco, SC.

Facility Type: ___ Producer ___ Hauler ___ Disposal Site X Other Chemical Plant

Collectors Name: [illegible] Telephone: (504) 292-9007

Company Name: G & E ENGINEERING, INC.

Address: 4915 South Sherwood Forest Blvd.

Date Sampled: [illegible] Time: ______

Type of Process or Facility Sampled: [illegible]

Field Information: All Samples iced in the field.

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: [illegible] Date: [illegible] Time: [illegible]

Company Name: [illegible]

Address: [illegible]

SAMPLE RECEIVING:

Person accepting sample: [signature] Date: [illegible]

Time: 1600 Company: WEST-PAINE

Address: 7979 GSRI BR LA 70820

Sample Disposition ___ Storage ___ Further Transportaion ___

___ Other LABORATORY

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

G & E ENGINEERING, INC.
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4915 SOUTH SHERWOOD FOREST BOULEVARD
BATON ROUGE, LOUISIANA 70816

(504) 292-9007

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time	Type of Sample
W-5		groundwater (G & J)* 3/22/86
W-6		groundwater (N & M)** 3/22/86
W-7		groundwater (N & M) 3/22/86
W-1		groundwater (G & T) 3/22/86
W-2		groundwater (G & T) 3/22/86
L-9 (2'-3')		soil (G & N)*** 3/21/86
L-10 (2½'-3')		soil (G & N)*** 3/21/86

SAMPLE COLLECTION: *(G & T) JUDY SCHWIETERS & JOHN PITTMAN ***(G & N) JUDY SCHWIETERS & NORM PARKER
** (N & M) NORM PARKER & MIKE RICHARDSON

Location of Sampling: Venture Chemicals Co., Lobeco, SC.

Facility Type: ___ Producer ___ Hauler ___ Disposal Site X Other Chemical Plant

Collectors Name: NOTED ABOVE Telephone: (504) 292-9007

Company Name: G & E ENGINEERING, INC.

Address: 4915 South Sherwood Forest Blvd.

Date Sampled: _____ Time: _____

Type of Process or Facility Sampled: _____

Field Information: All Samples iced in the field.

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: Greyhound Bus Date: ____ Time: ____

Company Name: Greyhound Bus

Address: Beaufort, South Carolina

SAMPLE RECEIVING:

Person accepting sample: [signature] Date: 032486

Time: 1610 Company: W-P

Address: _____

Sample Disposition ____ Storage ____ Further Transportaion ____

____ Other _____

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

G & E ENGINEERING, INC.

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P. O. BOX 45212
DEPT 186
BATON ROUGE, LOUISIANA 70895

4915 SOUTH SHERWOOD FOREST BOULEVARD
BATON ROUGE, LOUISIANA 70816

(504) 292-9007

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time	Type of Sample
W-5	1430	GW (PCB)
W-5	1430	GW (METALS)
W-5	1430	GW (Calorides)
W-5	1430	GW (Phenol)
W-5	1430	GW (TOC)
W-5	1430	GW (VOA)
W-5	1430	GW (EXTRA)

SAMPLE COLLECTION:

Location of Sampling: Venture Chemicals Co., Lobeco, SC.

Facility Type: ___ Producer ___ Hauler ___ Disposal Site X Other Chemical Plant

Collectors Name: ~~[illegible]~~ MIKE RICHARDSON Telephone: (504) 292-9007

Company Name: G & E ENGINEERING, INC.

Address: 4915 South Sherwood Forest Blvd.

Date Sampled: 1 May 86 Time: Varies

Type of Process or Facility Sampled: Chemical

Field Information: All Samples iced in the field.

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: Greyhound Bus Date: ______ Time: 1:00 pm

Company Name: [signature]

Address: [signature]

SAMPLE RECEIVING:

Person accepting sample: [signature] Date: 050586

Time: 1400 Company: WEST-PAINT

Address: 7979 GSRI

Sample Disposition ___ Storage ___ Further Transportaion ___

___ Other ______

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

G & E ENGINEERING, INC.

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DEPT 186
BATON ROUGE LOUISIANA 70895

4915 SOUTH SHERWOOD FOREST BOULEVARD
BATON ROUGE LOUISIANA 70816

(504) 292 9007

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time	Type of Sample	
W-6 (0-2')	8:45 am	soil &	3/17/86
W-6 (8-10')	10 am	soil	3/17/86
W-6 (16-18')	10:60 am	soil	3/17/84
W-6	9:30 am	groundwater	3/17/86

SAMPLE COLLECTION:

Location of Sampling: Venture Chemicals Co., Lobeco, SC.

Facility Type: ___ Producer ___ Hauler ___ Disposal Site X Other Chemical Plant

Collectors Name: Walsh, Richardson, Pittman Telephone: (504) 292-9007

Company Name: G & E ENGINEERING, INC.

Address: 4915 South Sherwood Forest Blvd.

Date Sampled: 3-17-86 Time:

Type of Process or Facility Sampled: Chemical Plant Lagoon

Field Information: All Samples iced in the field.

MBWalsh 3/19/86

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: Greyhound Bus Date: 3/19/86 Time: 3:50 pm

Company Name: Greyhound Bus

Address: Beaufort, South Carolina

SAMPLE RECEIVING:

Person accepting sample: [signature] Date: 032086

Time: 1375 Company: West Paine Laboratories

Address: 7979 GSRI Ave BR LA 70820

Sample Disposition ___ Storage ___ Further Transportaion ___

___ Other

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

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4915 SOUTH SHERWOOD FOREST BOULEVARD
BATON ROUGE, LOUISIANA 70816

(504) 292-9007

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time	Type of Sample	
W-9		soil	3/21/86 (M&R)*
BS-1		groundwater	3/21/86 (M&R)
W-9 (1st water)		groundwater	3/21/86 (M&R)
W-9 (3')		soil	3/21/86 (M&R)
W-9		groundwater	3/21/86 (M&R)
L-13 (3'-4')		soil	3/21/86 (J&N)**
L-21 (1'-2½')		soil	3/21/86 (J&N)

* M&R MIKE & RUSSELL
** J&N JUDY & NORM

SAMPLE COLLECTION:

Location of Sampling: Venture Chemicals Co., Lobeco, SC.

Facility Type: ___ Producer ___ Hauler ___ Disposal Site X Other Chemical Plant

Collectors Name: NOTED ABOVE ___ Telephone: (504) 292-9007

Company Name: G & E ENGINEERING, INC.

Address: 4915 South Sherwood Forest Blvd.

Date Sampled: 3/21/86 Time: ______

Type of Process or Facility Sampled: ______

Field Information: All Samples iced in the field.

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: ______ Date: ______ Time: ______

Company Name: ______

Address: ______

SAMPLE RECEIVING:

Person accepting sample: [signature] Date: ~~1410~~ 032486

Time: 1410 Company: WP

Address: ______

Sample Disposition ___ Storage ___ Further Transportaion ___

___ Other ______

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

MEMBER AMERICAN CONSULTING ENGINEERS COUNCIL

G & E ENGINEERING, INC.
CONSULTING GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

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BATON ROUGE, LOUISIANA 70816

(504) 292-9007

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time	Type of Sample
W-9	1630	GW (Chlorides)
W-10	1700	GW (METALS)
W-10	1700	GW (Chlorides)
W-11	1730	GW (METALS)
W-11	1730	GW (Chlorides)
W-11	1730	GW (TOC)
(B)-W-12	1615	GW (Chlorides)} did not received

SAMPLE COLLECTION:

Location of Sampling: Venture Chemicals Co., Lobeco, SC.

Facility Type: ___ Producer ___ Hauler ___ Disposal Site X Other Chemical Plant

Collectors Name: MIKE RICHARDSON Telephone: (504) 292-9007

Company Name: G & E ENGINEERING, INC.

Address: 4915 South Sherwood Forest Blvd.

Date Sampled: 1 May 86 Time: VARIES

Type of Process or Facility Sampled: CHEMICAL

Field Information: All Samples iced in the field.

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: Greyhound Bus Date: 2 May 86 Time: 1:00 P

Company Name: Greyhound

Address: [signature]

SAMPLE RECEIVING:

Person accepting sample: [signature] Date: 050586

Time: 1400 Company: WEST-PAINT

Address: 7979 GSRI

Sample Disposition ___ Storage ___ Further Transportaion ___

___ Other ___

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

G & E ENGINEERING, INC.
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DEPT 186
BATON ROUGE, LOUISIANA 70895

4915 SOUTH SHERWOOD FOREST BOULEVARD
BATON ROUGE, LOUISIANA 70816

(504) 292-9007

#3

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time	Type of Sample
A-9	5:00 pm	Groundwater
V-10	5:35 pm	Groundwater
A-10	6:10 pm	Groundwater

SAMPLE COLLECTION:

Location of Sampling: Venture Chemicals Co., Lobeco, SC.

Facility Type: ___ Producer ___ Hauler ___ Disposal Site X Other Chemical Plant

Collectors Name: James J. Franklin Telephone: (504) 292-9007

Company Name: G & E ENGINEERING, INC.

Address: 4915 South Sherwood Forest Blvd.

Date Sampled: 3/13/86 Time: ____

Type of Process or Facility Sampled: Chemical plant site

Field Information: All Samples iced in the field.

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: Greyhound Bus Date: 3/14/86 Time: ____

Company Name: Greyhound Bus

Address: Beaufort, South Carolina

SAMPLE RECEIVING:

Person accepting sample: [signature] Date: 031786

Time: 0700 Company: WEST-PAINE

Address: 7979 GSRI BR LA 70820

Sample Disposition ____ Storage ____ Further Transportaion ____

____ Other ____

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

G & E ENGINEERING, INC.
CONSULTING GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

P O BOX 45212
DEPT 186
BATON ROUGE LOUISIANA 70895

4915 SOUTH SHERWOOD FOREST BOULEVARD
BATON ROUGE, LOUISIANA 70816

(504) 292-9007

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time	Type of Sample
B-1 (4-6')	9:30 am	soil
B-1 (12-14')	10:05 am	soil
B-1 (10-12')	9:55 am	soil
B-1 (8-10')	9:50 am	soil
B-1 (~~50+~~ 2-4') mbw	—	soil
B-1 (6-8')	9:35 am	soil
B-1 (0-2')	9:05 am	soil

SAMPLE COLLECTION:

Location of Sampling: Venture Chemicals Co., Lobeco, SC.

Facility Type: ___ Producer ___ Hauler ___ Disposal Site X Other Chemical Plant

Collectors Name: J.J. Franklin C.A. Burt Telephone: (504) 292-9007

Company Name: G & E ENGINEERING, INC.

Address: 4915 South Sherwood Forest Blvd.

Date Sampled: 3/13/86 Time: ______

Type of Process or Facility Sampled: ______

Field Information: All Samples iced in the field.

Marie B. Walsh
3/13/86

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: Greyhound Bus Date: 3/13/86 Time: 11:00 am

Company Name: Greyhound Bus

Address: Beaufort, South Carolina

SAMPLE RECEIVING:

Person accepting sample: [signature] Date: 031486

Time: 1600 Company: WEST-PAINE

Address: 7979 GSRI BR LA 70820

Sample Disposition ___ Storage ___ Further Transportaion ___

___ Other LAB

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

±(1)

G & E ENGINEERING, INC.

CONSULTING GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

P O BOX 45212
DEPT 186
BATON ROUGE LOUISIANA 70895

4915 SOUTH SHERWOOD FOREST BOULEVARD
BATON ROUGE, LOUISIANA 70816

(504) 292-9007

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time	Type of Sample
B-1 (38-40')	10:50am	Soil
B-1 (28-30')	10:40am	Soil
B-1 (10-18')	10:15am	Soil
B-1 (23-25')	10:30am	Soil
B-1 (18-20')	10:15am	Soil
B-1 (14-15')	10:00am	Soil
A-4 (3')	12:35am	Soil

SAMPLE COLLECTION:

Location of Sampling: Venture Chemicals Co., Lobeco, SC.

Facility Type: ___Producer ___Hauler ___Disposal Site X Other Chemical Plant

Collectors Name: [illegible] Telephone: (504) 292-9007

Company Name: G & E ENGINEERING, INC.

Address: 4915 South Sherwood Forest Blvd.

Date Sampled: 3/13/86 Time: ______

Type of Process or Facility Sampled: Chemical Plant Site

Field Information: All Samples iced in the field.

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: Greyhound Bus Date: 3/14/86 Time: ______

Company Name: Greyhound Bus

Address: Beaufort, South Carolina

SAMPLE RECEIVING:

Person accepting sample: [signature] Date: 031786

Time: 0700 Company: WEST-PAINE

Address: 7979 GSRI BR LA 70820

Sample Disposition____ Storage____ Further Transportaion____

____Other LAB

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

G & E ENGINEERING, INC.
CONSULTING GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

#3

P O BOX 45212
DEPT 186
BATON ROUGE, LOUISIANA 70895

4915 SOUTH SHERWOOD FOREST BOULEVARD
BATON ROUGE, LOUISIANA 70816

(504) 292-9007

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time	Type of Sample
B-1 (43'-45')	11:30am	soil
B-1 (33-40')	11:00am	soil
B-1 (45'-47')	11:35am	soil
A-6 (3') pipebedding	—	soil
A-6	3:45pm	~~soil~~ groundwater (MW)
A-3	4:20pm	groundwater
A-5	5:00pm	groundwater

SAMPLE COLLECTION:

Location of Sampling: Venture Chemicals Co., Lobeco, SC.

Facility Type: ___ Producer ___ Hauler ___ Disposal Site X Other Chemical Plant

Collectors Name: James J. Franklin Telephone: (504) 292-9007

Company Name: G & E ENGINEERING, INC.

Address: 4915 South Sherwood Forest Blvd.

Date Sampled: 3/13/86 Time: ___

Type of Process or Facility Sampled: Chemical Plant Site

Field Information: All Samples iced in the field.

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: Greyhound Bus Date: 3/14/86 Time: ___

Company Name: Greyhound Bus

Address: Beaufort, South Carolina

SAMPLE RECEIVING:

Person accepting sample: [signature] Date: 031786

Time: 0700 Company: WEST-PAINE

Address: 7979 GSRI BR LA 70820

Sample Disposition ___ Storage ___ Further Transportaion ___

___ Other ___

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

G & E ENGINEERING, INC.
CONSULTING GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

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BATON ROUGE, LOUISIANA 70895

4915 SOUTH SHERWOOD FOREST BOULEVARD
BATON ROUGE, LOUISIANA 70816

(504) 292-9007

#1

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time	Type of Sample
B-1 (47'49')	11:40	Soil

SAMPLE COLLECTION:

Location of Sampling: Venture Chemicals Co., Lobeco, SC.

Facility Type: ___Producer ___Hauler ___Disposal Site X Other Chemical Plant

Collectors Name: James J. Franklin Telephone: (504) 292-9007

Company Name: G & E ENGINEERING, INC.

Address: 4915 South Sherwood Forest Blvd.

Date Sampled: 3/13/86 Time: ________

Type of Process or Facility Sampled: Chemical Plant Site

Field Information: All Samples iced in the field.

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: Greyhound Bus Date: 3/14/86 Time: ____

Company Name: Greyhound Bus

Address: Beaufort, South Carolina

SAMPLE RECEIVING:

Person accepting sample: [signature] Date: 031786

Time: 0700 Company: WEST-PAINE

Address: 7979 GSRI BR LA 70820

Sample Disposition ____ Storage ____ Further Transportaion ____

____ Other LAB

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

G & E ENGINEERING, INC.
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DEPT 186
BATON ROUGE, LOUISIANA 70895

4915 SOUTH SHERWOOD FOREST BOULEVARD
BATON ROUGE, LOUISIANA 70816

(504) 292-9007

#2

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time	Type of Sample
B-2 (40-42')	4:05 pm	Soil
B-2 (18-12')	3:15 pm	Soil
B-2 (28-30')	3:30 pm	Soil
B-2 (6-8')	2:00 pm	Soil
A-10 (3-4')	15:16	Soil
A-9 (3-4')	16:00	Soil
A-10 (1-2')	15:10	Soil
A-10 (6-7')	15:18	Soil
A-11 E	6:20	groundwater

SAMPLE COLLECTION:

Location of Sampling: Venture Chemicals Co., Lobeco, SC.

Facility Type: ___ Producer ___ Hauler ___ Disposal Site X Other Chemical Plant

Collectors Name: James J. Franklin Telephone: (504) 292-9007

Company Name: G & E ENGINEERING, INC.

Address: 4915 South Sherwood Forest Blvd.

Date Sampled: 3/13/86 Time: ___

Type of Process or Facility Sampled: Chemical Plant Site

Field Information: All Samples iced in the field.

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: Greyhound Date: 3/14/86 Time: ___

Company Name: Greyhound

Address: Beaufort, South Carolina

SAMPLE RECEIVING:

Person accepting sample: [signature] Date: 031786

Time: 0700 Company: WEST-PAINE

Address: 7979 GSRI BR LA 70820

Sample Disposition ___ Storage ___ Further Transportaion ___

___ Other ___

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

G & E ENGINEERING, INC.
CONSULTING GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

P O BOX 45212
DEPT 186
BATON ROUGE LOUISIANA 70895

4915 SOUTH SHERWOOD FOREST BOULEVARD
BATON ROUGE, LOUISIANA 70816

(504) 292-9007

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time	Type of Sample	
L-1 (1')	4:00pm	soil	3/18/84
L-1 (2.5')	4:30pm	soil	3/18/84
L-1 (6.5')	4:45pm	soil	3/18/84
L-1	5:00pm	groundwater	3/18/84
W-7 (0-2')	11:30a.m.	soil	3/17/84
W-7 (7-9')	12:29pm	soil	3/17/84
W-7	12:15pm	first water	

SAMPLE COLLECTION:

Location of Sampling: Venture Chemicals Co., Lobeco, SC.

Facility Type: ___ Producer ___ Hauler ___ Disposal Site X Other Chemical Plant

Collectors Name: Walsh, Richardson, Lisson Telephone: (504) 292-9007

Company Name: G & E ENGINEERING, INC.

Address: 4915 South Sherwood Forest Blvd.

Date Sampled: 3-17 & 3-18-86 Time: ___

Type of Process or Facility Sampled: Chemical Plant Lagoon

Field Information: All Samples iced in the field.

MBWalsh 3/19/86

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: Greyhound Bus Date: 3/19/86 Time: 3:50pm

Company Name: Greyhound Bus

Address: Beaufort, South Carolina

SAMPLE RECEIVING:

Person accepting sample: [illegible signature] Date: [illegible]

Time: 1325 Company: West Paine Laboratories

Address: 7979 GSRI Ave BR LA 70820

Sample Disposition ___ Storage ___ Further Transportaion ___

___ Other ___

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

86-1008

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4915 SOUTH SHERWOOD FOREST BOULEVARD
BATON ROUGE, LOUISIANA 70816

(504) 292-9007

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time	Type of Sample
L-3 (2.5')	6:00pm	soil
L-3 (4')	6:00pm	soil
L-3 (6')	6:00pm	soil
L-3	6:20pm	groundwater
L-2 (4.5')	5:30pm	soil
L-2 (6.5')	5:40pm	soil
L-2 (6.5-7.0)	5:45pm	soil
L-2	5:45pm	groundwater

SAMPLE COLLECTION:

Location of Sampling: Venture Chemicals Co., Lobeco, SC.

Facility Type: ___ Producer ___ Hauler ___ Disposal Site X Other Chemical Plant

Collectors Name: Walsh, Richardson, Pittman Telephone: (504) 292-9007

Company Name: G & E ENGINEERING, INC.

Address: 4915 South Sherwood Forest Blvd.

Date Sampled: 3/18/86 Time: ______

Type of Process or Facility Sampled: Chemical Plant Lagoon

Field Information: All Samples iced in the field.

M S Walsh 3/19/86

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: Greyhound bus Date: 3/19/86 Time: 5:50pm

Company Name: Greyhound Bus

Address: Beaufort, South Carolina

SAMPLE RECEIVING:

Person accepting sample: [signature] Date: 032086

Time: 1325 Company: West Paine Laboratories

Address: 7979 GSRI BR LA 70820

Sample Disposition ___ Storage ___ Further Transportaion ___

___ Other ______

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

86 - 1008

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BATON ROUGE, LOUISIANA 70816

(504) 292-9007

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time	Type of Sample	
L-4 (4'-5')		soil (G&N)*	3/20/86
L-5 (5'-6')		soil (G&N)	3/20/86
L-4 (3'-4')		soil (G&N)	3/20/86
L-7 (8')		soil (G&N)	3/21/86
L-6 (4'-5½')		soil (G&N)	3/21/86
L-8 (4½-6')		soil (G&N)	3/21/86
L-7 (5'-6')		soil (G&N)	3/21/86

*(G&N) Judy & Norm Parker Schwieters

SAMPLE COLLECTION:

Location of Sampling: Venture Chemicals Co., Lobeco, SC.

Facility Type: ___ Producer ___ Hauler ___ Disposal Site X Other Chemical Plant

Collectors Name: NOTED ABOVE Telephone: (504) 292-9007

Company Name: G & E ENGINEERING, INC.

Address: 4915 South Sherwood Forest Blvd.

Date Sampled: ~~3/22~~ NEW Time: ______

Type of Process or Facility Sampled: ______

Field Information: All Samples iced in the field.

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: Greyhound Bus Date: 3/22/86 Time: ______

Company Name: Greyhound Bus

Address: Beaufort, South Carolina

SAMPLE RECEIVING:

Person accepting sample: [signature] Date: 032486

Time: 1410 Company: W-P

Address: ______

Sample Disposition ___ Storage ___ Further Transportaion ___

___ Other ______

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

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(504) 292-9007

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time	Type of Sample
L-7(3'-5')		soil (G&N)* 3/21/86
L-7(1st water)		groundwater (H_2O)(G&N) 3/21/86
L-15(3')		soil (G&N) 3/21/86
L-14(3½-3')		soil (G&N) 3/21/86
L-15(3'-6')		soil (G&N) 3/21/86
L-24(3-4')		soil (J&N)** 3/21/86

*(G&N) Guy Schwieters & Norm Parker

SAMPLE COLLECTION: *(J&N) John Pittman & Norm Parker

Location of Sampling: Venture Chemicals Co., Lobeco, SC.

Facility Type: ___ Producer ___ Hauler ___ Disposal Site X Other Chemical Plant

Collectors Name: ______ Telephone: (504) 292-9007

Company Name: G & E ENGINEERING, INC.

Address: 4915 South Sherwood Forest Blvd.

Date Sampled: ______ Time: ______

Type of Process or Facility Sampled: ______

Field Information: All Samples iced in the field.

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: Greyhound Bus Date: 3/22/86 Time: ______

Company Name: Greyhound Bus

Address: Beaufort, South Carolina

SAMPLE RECEIVING:

Person accepting sample: [signature] Date: 032486

Time: 1410 Company: [illegible]

Address: ______

Sample Disposition ___ Storage ___ Further Transportaion ___

___ Other ______

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

G & E ENGINEERING, INC.
CONSULTING GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

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BATON ROUGE, LOUISIANA 70816

(504) 292-9007

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time	Type of Sample	
L-10(3½'-4')		soil	3/21/86
L-9(2'-3')		soil	3/21/86
L-16(2½'-3')		soil	3/21/86
L-13(4'-6½')		soil	3/21/86
L-11 (3½'-5½')		soil	3/21/86
L-10 (4-4½')		soil	3/21/86
L-18 4'-3')		soil	3/21/86

SAMPLE COLLECTION:

Location of Sampling: Venture Chemicals Co., Lobeco, SC.

Facility Type: ___ Producer ___ Hauler ___ Disposal Site X Other Chemical Plant

Collectors Name: Judy Schwieters & Norm Parker Telephone: (504) 292-9007

Company Name: G & E ENGINEERING, INC.

Address: 4915 South Sherwood Forest Blvd.

Date Sampled: ________ Time: ________

Type of Process or Facility Sampled: ________

Field Information: All Samples iced in the field.

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: Greyhound Bus Date: 3/22/86 Time: ____

Company Name: Greyhound Bus

Address: Beaufort, South Carolina

SAMPLE RECEIVING:

Person accepting sample: [signature] Date: 032486

Time: 1010 Company: W-P

Address: ________

Sample Disposition ___ Storage ___ Further Transportaion ___

___ Other ________

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

MEMBER AMERICAN CONSULTING ENGINEERS COUNCIL

G & E ENGINEERING, INC.
CONSULTING GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

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DEPT 186
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BATON ROUGE LOUISIANA 70816

(504) 292-9007

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time	Type of Sample
L-18		groundwater 3/21/86 (J&N)
L-19 (0'-3')		4s. SOIL ~~groundwater~~ 3/21/86 (J&N)
** (N&M) BS2 near A-9 1st water		groundwater yellow water 3/2
(N&M) BS Lagoon water		groundwater yellow water 3/22
(N&M) Lagoon sample from product bag		solid } 3/22/86
W-6		groundwater (J&J) *** 3/22/86

SAMPLE COLLECTION: * (J&N) JUDY SCHWIETERS & NORM PARKER *** (J&J) Judy Schwieters & JOHN PITMAN
** (N&M) NORM PARKER & MIKE RICHARDSON

Location of Sampling: Venture Chemicals Co., Lobeco, SC.

Facility Type: ___Producer ___Hauler ___Disposal Site X Other Chemical Plant

Collectors Name: NOTED ABOVE ___ Telephone: (504) 292-9007

Company Name: G & E ENGINEERING, INC.

Address: 4915 South Sherwood Forest Blvd.

Date Sampled: ____________ Time: ____________

Type of Process or Facility Sampled: ____________

Field Information: All Samples iced in the field.

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: Greyhound Bus Date: 3/22/86 Time: ____

Company Name: Greyhound Bus

Address: Beaufort, South Carolina

SAMPLE RECEIVING:

Person accepting sample: [signature] Date: 032486

Time: 1410 Company: W-P

Address: ____________

Sample Disposition ____ Storage ____ Further Transportaion ____

____Other ____________

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

G & E ENGINEERING, INC.
CONSULTING GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

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BATON ROUGE, LOUISIANA 70816

(504) 292-9007

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time	Type of Sample
4-24 (6'-6½')		Soil (J&N)* 3/21/86
4-20 (0'-4')		Soil (Q&N)** 3/21/86
4-22 (1½-3')		Soil (Q&N) 3/21/86
4-24 (7 GW**)		~~So~~ Groundwater (J&N) 3/21/86
4-5 (6'-7')		Soil (Q&N) 3/20/86
4-4 (5'-6')		Soil (Q&N) 3/20/86
4-5 (5'-6')		Soil (Q&N) 3/20/86

*(J&N) JOHN PITTMAN & NORM PARKER

SAMPLE COLLECTION: ** (Q&N) JUDY SCHWIETERS & NORM PARKER

Location of Sampling: Venture Chemicals Co., Lobeco, SC.

Facility Type: ___Producer ___Hauler ___Disposal Site X Other Chemical Plant

Collectors Name: ________ Telephone: (504) 292-9007

Company Name: G & E ENGINEERING, INC.

Address: 4915 South Sherwood Forest Blvd.

Date Sampled: ________ Time: ________

Type of Process or Facility Sampled: ________

Field Information: All Samples iced in the field.

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: Greyhound Bus Date: 3/22/86 Time: ____

Company Name: Greyhound Bus Station

Address: Beaufort, South Carolina

SAMPLE RECEIVING:

Person accepting sample: [signature] Date: 032486

Time: 1410 Company: W-P

Address: ________

Sample Disposition ____ Storage ____ Further Transportaion ____

____Other ________

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

G & E ENGINEERING, INC.
CONSULTING GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

P. O. BOX 45212
DEPT. 186
BATON ROUGE, LOUISIANA 70895

4915 SOUTH SHERWOOD FOREST BOULEVARD
BATON ROUGE, LOUISIANA 70816

(504) 292-9007

CHAIN-OF-CUSTODY RECORD

Collector's Sample No's	Time	Type of Sample	
L-33 (0-2')		SOIL	4/13/86
(2-4')			
(4-6')			
(6-8')			
(8-10')			
(10-12')			
(12-14')			
L-33 (14-16')		SOIL	4/13/86

SAMPLE COLLECTION:

Location of Sampling: Venture Chemical Comp, Lobeco, S.C.

Facility Type: ___ Producer ___ Hauler ___ Disposal Site X Other Chemical

Collectors Name: ____________ Telephone: ( ) ____________

Company Name: G & E Engineering Inc

Address: 4915 So. Sherwoodforest Blvd, Baton Rouge La. 70816

Date Sampled: 4/13/86 Time: ____________

Type of Process or Facility Sampled: Chemical

Field Information: All samples iced in field

SAMPLE SHIPPING (other than transportation by collector)

Transporters Name: Mike Richardson Date: ________ Time: _____

Company Name: G & E

Address: 4915 So. Sherwoodforest Blvd Baton Rouge La. 70816

SAMPLE RECEIVING:

Person accepting sample: [signature] Date: ~~04/8/86~~ 041686 DTS

Time: 1257 Company: [signature]

Address: 7979 GSRI Baton Rouge La 70820

Sample Disposition ___ Storage ___ Further Transportaion ______

___ Other ____________

CHAIN-OF-POSSESSION: (Attach additional sheets as needed to show continuity)

J. L. ROGERS & CALLCOTT ENGINEERS, INC.
718 Lowndes Hill Road – Greenville, South Carolina 29607 – (803) 232-1556

J.L. Rogers, P.E.
F.D. Callcott, P.E.

Diplomate, American Academy of Environmental Engineers

CHAIN-OF-CUSTODY

Client: G&E ENGINEERING INC
BATON ROUGE, LOUISIANA

Job No.: 86-~~[illegible]~~ 1002
Per RLS

Samplers: (Signature) G&E ENG. INC.					Remarks: SAMPLES RETURNED TO G&E FROM ROGERS & CALLCOTT	
Sample #	Date	Time	Comp.	Grab	Location	Preservation
37183	1/13	2:40		*	BORING #1	
37184	1/13	4:45		*	BORING #3	
37189	1/14	2:00		*	BORING #9	
Req'd	PCB	analysis			— Rush!!	

Relinquished by: (Signature)	Date/Time	Received By: (Signature)	Date/Time
		[signature]	3/18/86 0900

Relinquished by: (Signature)	Date/Time	Received for Lab by: (Signature)	Date/Time
[signature]	3/17/86 4:00 PM	[signature]	031886 / 1100

Remarks:

Samples returned to G&E at request of Norm Parker.

PLEASE SIGN AND RETURN PINK COPY

F: A-2 Chain-of-Custody Record

S. ey: iced in field

Samplers: Signature John F. Pittman

Station Number	Station Location	Date	Time	Sample Type: ~~Water~~ Comp. ~~Grab~~			Seq. No.	No. of Containers	Analysis Required
C-1	Due East Lagoon	3.25	4:00	Soil			0-2'	1	To be Spec
C-1	" " "	3.25	4:10	Soil			3-4'	1	To be Spec
C-1	" " "	3.25	4:25	Soil			5-6'	1	To be Spec
C-2	" , "	3.26	11:00	Soil			1'	1	To be Spec
C-2	" " "	3.26	11:10	Soil			3'	1	To be Spec
C-2	" " "	3.26	11:20	Soil			5'	1	To be Spec
B-11	West tip Burn Lagoon	3.26	3:20	Soil			6"	1	To be Spec
B-12	" " " "	3.26	3:30	Soil			0-1'	1	to be Spec.
B-13	" " " "	3.26	3:30	Soil			1'	1	To be Spec.
D-1	200' West of Clarifier	3.26	—	Soil			1-2'	1	to be Spec
D-1	" " "	3.26	—	Soil			2-3'	1	to be Spec.
D-1	" " "	3.27	9:45	Soil			4-5'	1	to be Spec

Relinquished by: Signature	Received by: Signature	Date/Time
John F. Pittman		3.27.400
Relinquished by: Signature	Received by: Signature	Date/Time
Relinquished by: Signature	Received by: Signature	Date/Time
Relinquished by: Signature	Received by Mobile Laboratory for Field analysis: Signature	Date/Time

Dispatched by: Signature	Date/Time	Received for Laboratory by:	Date/Time
		Diane LeBlanc	3/31, 1242

Method of Shipment: Greyhound

Distribution: Orig.—Accompany Shipment
1 Copy—Survey Coordinator Field Files

Figure A-2 Chain-of-Custody Record

Survey	Samplers: Signature
iced in field	John T Pittman

Station Number	Station Location	Date	Time	Sample Type: Water (Comp. / Grab) / Air	Seq. No.	No. of Containers	Analysis Required
D-2	275' West of Clarifier	3·26	—	Soil	1-2'	1	To be Spec
D-2	" " "	3·26	—	Soil	2-3'	1	To be Spec
D-2	" " "	3·27	10:45	Soil	4-5'	1	To be Spec
W-4	—	3·25	12:45	Groundwater	—	5	Phenols, Metals, Cl, TOC, VOA
W-3	— 3/26/86	~~9:00~~	9:00	Groundwater	—	7	Phenols, PCB, Metals, Cl, TOC, VOA
C-1	Due East Lagoon	3·25	4:25	Groundwater	—	6	phenols, Metals, Cl, TOC, VOA
C-2	Due East Lagoon	3·27	—	Groundwater	—	6	Phenols, Metals, Cl, TOC, VOA
D-1	200' West of Clarifier	3·27	—	Groundwater	—	6	Phenols, Metals, Cl, TOC, VOA
D-2	275' West of Clarifier	3·27	—	Groundwater	—	8	Phenols, Metals, Cl, TOC, VOA

Relinquished by: Signature	Received by: Signature	Date/Time
John T Pittman		3:27 4:00
Relinquished by: Signature	Received by: Signature	Date/Time
Relinquished by: Signature	Received by: Signature	Date/Time
Relinquished by: Signature	Received by Mobile Laboratory for Field analysis: Signature	Date/Time

Dispatched by: Signature	Date/Time	Received for Laboratory by:	Date/Time
		Diane LeBlanc	3/31, 1242

Method of Shipment: Greyhound

Distribution: Orig.—Accompany Shipment
1 Copy—Survey Coordinator Field Files

Figure A-2 Chain-of-Custody Record

Survey: Ventron Chemical

Samplers: Signature: [signature]

Station Number	Station Location	Date	Time	Sample Type: Water — ~~Comp.~~	Sample Type: Water — Grab	~~Air~~ Soil	Seq. No.	No. of Containers	Analysis Required
W-5	South of Plant	4-1	3:50	well				1	PCB
W-5	South of Plant	4-4	8:45	well				1	PCB
W-10	Burn Pitt	4-4	11:45	well				7 Phenols, PCB	Metals, TOC, [illegible]
W-11	Burn Pitt	4-4	12:45	well				7 Phenols, PCB	Metals, TOC, [illegible]
W-12	Due South Burn Pitt	4-4	4:30	well				7 Phenols, PCB	Metals, TOC, [illegible]
W-12	Due South Burn Pitt	4-3	3:00	1st well	groundwater digging			7 Phenols, PCB	TOC, metals [illegible]
W-16	Burn Pitt	4-3	—			Soil	4-6'	To be specified	
W-11	Burn Pitt	4-3	—			Soil	2-4'	to be specified	
W-11	Burn Pitt	4-3	—			Soil	8-11'	To be specified	
L-28	Small Lagoon Burn Pitt	4-3	—			Soil	3-4'	To be specified	

Relinquished by: Signature	Received by: Signature	Date/Time
[signature]		
Relinquished by: Signature	Received by: Signature	Date/Time
Relinquished by: Signature	Received by: Signature	Date/Time
Relinquished by: Signature	Received by Mobile Laboratory for Field analysis: Signature	Date/Time

Dispatched by: Signature	Date/Time	Received for Laboratory by:	Date/Time
[signature]	5:30 4-4-86	[signature]	040786 0700

Method of Shipment: Greyhound

Distribution: Orig.—Accompany Shipment
1 Copy—Survey Coordinator Field Files

Venture Ground Water

Chain of Custody for Samples

Sample ~~Well~~ Number JP	L-28		S-1				
Sampling Date	4-9-86		4-9-86				
Sampling Time							
Person Sampling	John Pittman		John Pittman				
Person Transporting Sample	Greyhound		Greyhound				
Lab Number	West Payne		West Payne				
Time Delivered to Lab							
Person Receiving Sample							
Analysis	PCB, TOC Phenols, VOA(2) pH, Cl, Metals		To be Specified				
Date and Time							
Lab Personnel							

Samples Iced in field; 8 bottles total

John J Pittman / 4-9-86 / 10:00 PM

Signature / Date / Time

Contact G&E (504)-292-9007

S-1 add PCB per DS

L-28 pH - ~~pH~~ Pb ~~Hg~~ ~~Cd~~ Hg, Cd ~~Cr~~ Cr, As per DS

APPENDIX F

APPENDIX F

SITE SAFETY BRIEFING

The area you are about to enter has been found to contain soil contaminated with Polychlorinated Biphenyls (PCB's) at relatively low levels. There may be other contaminants of a less hazardous nature but the full extent and nature of these contaminants has not been determined.

Although there is not an immediate danger to life and health (IDLF) the following precautions will be observed.

No person(s) or vehicle(s) shall enter the contaminated site without permission of the site safety inspector or G&E Engineerings site manager.

All outerwear shall be the disposable type and remain on site by placing in the marked drums as one departs the area.

Do not handle soil or liquids on site without protective (disposable) gloves.

Personnel Protection

All personnel entering the contaminated area marked with signs and flagging tape shall wear:

a) Hard hat;

b) Eye protection - safety glasses or monogoggles;

c) Coveralls - Tyvek, disposable type with hood and boots;

d) Rubber boots (optional) - it is mandatory that contaminated soil not be tracked outside marked area. Therefore, boots must be cleaned on site OR Tyvek coveralls worn outside of shoes and disposed of on site;

e) Dust mask - (optional) depending upon site conditions. Site can dry out and wind borne dust will require respiratory protection;

f) Gloves - disposable - are required before handling all contaminated soils or liquids. DO NOT handle soils or liquids in bare hands.

Construction Equipment and Vehicles

Every precaution will be used to prevent tracking soils or liquids off site.

The site safety inspector or G&E's site manager must inspect and approve/disapprove all vehicles entering and leaving the contaminated area.

Decontamination to prevent movement off site is required.

APPENDIX G

APPENDIX G
GROUNDWATER SAMPLING PROTOCOL

The groundwater monitoring wells will be sampled following the guidelines established in the EPA document "Manual of Ground-Water Quality Sampling Procedures" EPA-600/2-81-160. All purging and sampling of the monitor wells will be conducted using a well dedicated bailer system.

1) <u>Monitor Well Presampling and Purging Procedures</u>:

a) Examine well and well casing. Record any apparent problems such as corrosion, etc.

b) Measure the water level in the well from the top rim using an electronic measuring device or chemically clean weighted tape. Carefully lower the measuring device to avoid excessive immersion into the water. Record.

c) Dry the well condensate from the measuring device when retrieving by pulling through a clean paper towel.

d) Bail the fluid from the well using a bailer that is chemically clean. Attach a new nylon line and take precautions that the line is not contaminated by contact with the ground or other contaminated surface. Use a polyethylene sheet or bag to protect the retrieved line from contamination.

e) Bail the well until at least four well volumes have been removed.

f) Discard the retrieved fluid by pouring out of the bailer onto the ground surface away from the well.

g) When well bailing is complete, remove the bailer line and discard into a plastic bag for later disposal.

h) Empty the excess water from inside of the bailer and dry off the outside with a clean paper towel.

i) Return bailer to a dedicated storage sleeve container.

2) <u>Monitor Well Sampling and Field Analyses</u>:

a) Use a chemically clean bailer to obtain groundwater samples from each well. Use the same precautions to prevent bailer and bailer line contamination as in step 1)d) of the presampling and purging procedures.

b) After the well drawndown of the purging acitivity has been stabilized, sampling can begin. A representative sample of water intake to the well is best obtained by sampling at the top of the screened interval in the well due to the density of the hydrocarbon. Lower the bailer so that the top of the well screen is even with the top of the bailer and pull up the sample from there.

c) Pour the first "bailer-full" removed into a clean dry sample jar and take a temperature reading in ^{o}F. Record. Leave the thermometer immersed in the sample.

d) Insert a conductivity probe into the sample and read the specific conductance as per instrument operating instructions. Again read the temperature and record.

e) Remove the conductivity probe and insert the pH probe into the sample. Check the temperature and adjust the temperature dial on the pH meter. Remove the thermometer. Read and record the pH.

f) Rinse off all equipment that has contacted the fluid sample with deionized water and dry with a clean facial tissue.

g) Bail additional fluid samples from the same location in the well and fill the labled bottles and jars provided by an analytical laboratory.

h) Immediately place the sample containers in styrofoam chests and ice.

i) Remove the bailer line and discard into a plastic bag for later disposal.

j) Empty out excess fluid from inside of the bailer and dry off the outside with a clean paper towel.

k) Return bailer to a dedicated storage sleeve container.

3) **Sampling Equipment Cleanup:** After all sampling is complete the following procedure is required for cleaning bailers and bailers storage sleeve containers.

a) Hose off bailers and containers inside and out with tap water.

b) Using a wash bottle wash bailers and containers inside and out with dilute hydrochloric acid solution. (1 part acid to 5 parts water)

c) Using tap water, thoroughly rinse off all surfaces.

d) Sling off all excess water possible and then thoroughly rinse with deionized or distilled water.

e) Dry as much as possible with clean paper towels and store in the cleaned bailer storage sleeve containers.

4. **Chain-of-Custody**: Each sample container will be individually identified as to sample number, date and time taken, and source of sample. A chain-of-custody record will be maintained for all samples and will include:

a) The name of the person collecting the sample(s);
b) The identity of each sample collected;
c) The source of each sample;
d) Preservation requirements for each sample;
e) Analytical requirements;
f) Name of person accepting sample; and
g) The name of a witness.

Upon each transfer of a sample until its termination including final delivery to the analytical laboratory the transferee will sign and record the date and time on the chain-of-custody record and maintain a copy for his files.

8) <u>Sampling Records</u>: Purging and sampling activities will be recorded in a permanent field log book with individual records of each sampling event. The log book record will include the following:

1. **Monitor Well Sampling:**

   a) General Well Data

      1) Sample Number
      2) Well Number
      3) Well Depth (ft.)
      4) Screened Interval (ft.)
      5) Casing Height Above Grade (ft.)
      6) Elevation Top of Casing (MSL)
      7) Well Construction
      8) Well Accessibility

   b) Well Purging Data

      1) Purging Date
      2) Time of Day
      3) Static Water Level In Well (MSL)
      4) Purging Technique
      5) Number of Gallons Purged
      6) Remarks (e.g. well damage)

   c) Well Sampling Data

      1) Sampling Date
      2) Time of Day
      3) Static Water Level (MSL)
      4) Sampling Technique
      5) Water Temperature (^{O}F)
      6) Water pH
      7) Specific Conductance
      8) Remarks

APPENDIX C

This is available upon request.

LOBECO SITE ENVIRONMENTAL ASSESSMENT
RESULTS AND PROPOSED REMEDIAL ACTION PLANS
FOR
AMERICAN COLOR AND CHEMICAL CORPORATION
AND
TENNECO RESINS, INC.

September, 1988

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1. INTRODUCTION

Lobeco Products, Inc. is located in Beaufort County, South Carolina, approximately twelve miles northwest of the town of Beaufort, near Whale Branch of the Coosaw River (Figure 1.1.1).

The facility was built in 1966-67 by the Berkshire Color and Chemical Company, a division of Tenneco Chemical Company (later Tenneco Resins) and has been in operation as a chemical manufacturing plant since that time. American Color and Chemical Company purchased the facility in January, 1974. American Color operated the plant until October, 1982 when the facility was sold to Venture Chemical Company (now Lobeco Products, Inc.). Lobeco Products has owned and operated the facility since October, 1982.

On November 14 and 15, 1983, the South Carolina Department of Health and Environmental Control, (SC DHEC) initiated an investigation of the water quality of Campbell Creek near the Lobeco outfall. The water was analyzed for dissolved oxygen, pH, temperature, salinity and specific conductance. According to the SC DHEC Technical Report dated November, 1984, these data indicated satisfactory water quality. The investigation did, however, detect sixty-six (66) organic chemical compounds in oyster tissue, sediment samples and the Lobeco plant effluent. The investigation concluded that relative to the control station, significantly fewer oysters were observed, and that the fauna in Campbell Creek has been moderately to severely impacted.

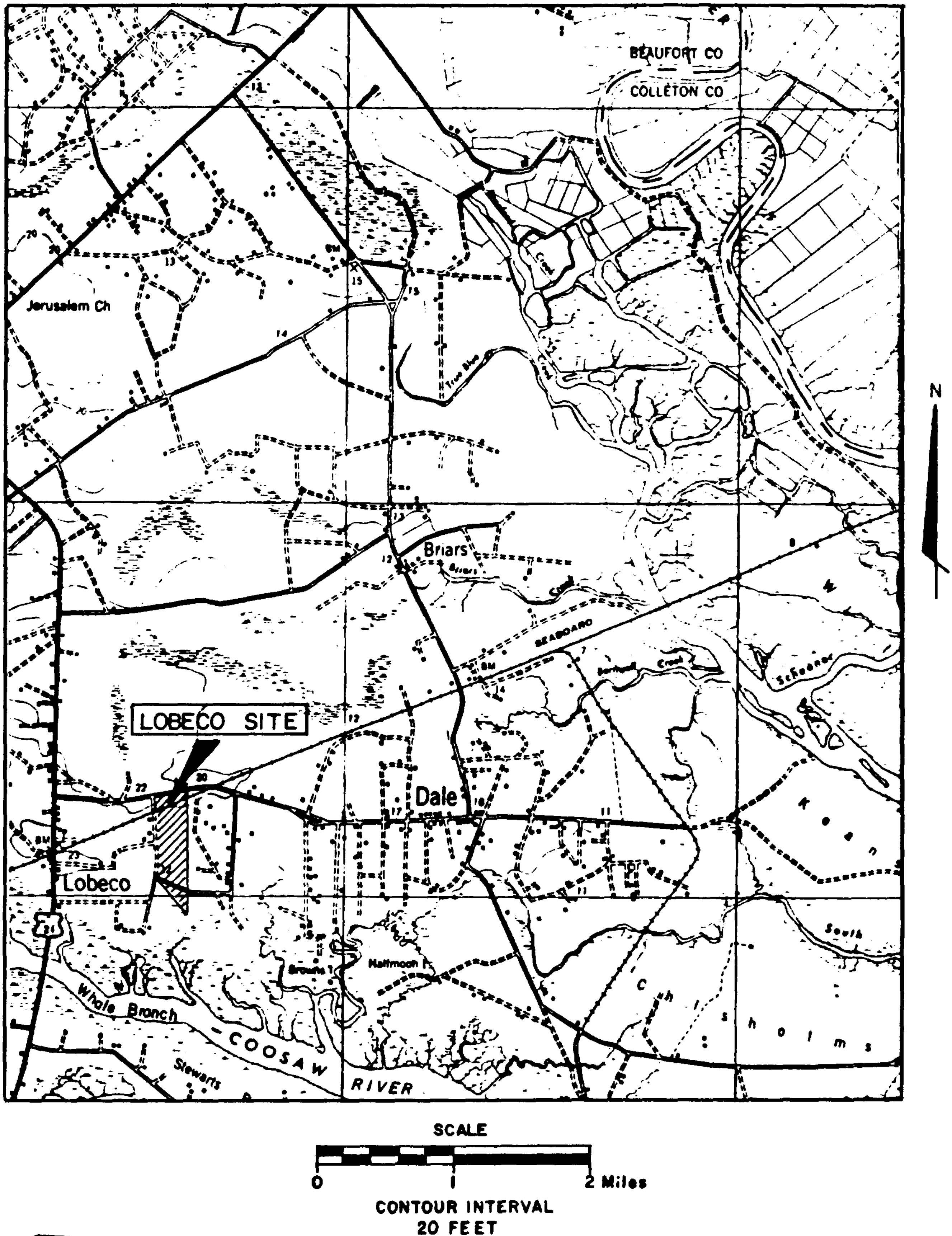

FIGURE 1.1.1
SITE LOCATION MAP

RMT INC.

Subsequent to the SC DHEC findings, Venture Chemical Company (Lobeco) commissioned a study to identify the chemical constituents present in the oyster tissue. The study was conducted in July, 1984. SC DHEC conducted additional sampling on August 9, 1984, and December 5, 1984. The results of these studies indicated improvement in the water quality and biota of Campbell Creek. However, polychlorinated biphenyls (PCBs) were detected in the sediment, at and south of the Lobeco outfall. Previous sampling had not included PCBs on the parameter list.

Following the results of the SC DHEC August and December, 1984 sampling, Venture Chemicals agreed to initiate a ground water monitoring program at the Lobeco site. Law Environmental Services was retained to do the initial site assessment. The investigation consisted of the installation of six monitoring wells (V-1 through V-6). The monitoring wells were sampled and analyzed for 32 priority pollutant volatile organic compounds, total organic carbon (TOC), chlorides, metals, 1-aminoanthraquinone, aniline, dimethyl amine, p-chlorophenol, and cyanoethyl-n-ethyl-m-toluidine. In addition, temperature, pH, and specific conductance were measured in the field. The analytical results indicated that three of the wells (V-3, V-5 and V-6) had elevated chloride and TOC concentrations, and two of the three (V-3 and V-6) contained detectable levels of several volatile organic chemicals.

During September and October, 1985, SC DHEC collected crab samples from Campbell Creek, Whale Branch, Huspah Creek, and the Coosaw River. Tissue samples from all locations showed detectable levels of PCBs. The highest concentration of PCBs were found in samples collected from the vicinity of the plant outfall. However, none of the concentrations detected exceeded the tolerance level recommended by the FDA.

Based on the SCDHEC findings, Venture Chemicals retained G & E Engineering, Inc. to conduct a preliminary environmental assessment of the Lobeco site. Results from this investigation identified three areas which served as potential sources of waste material to affect soil and ground water quality at the site. Two of the areas, the Old Burn Site and the Abandoned Lagoon, showed elevated levels of PCBs in either the soil or the ground water. In addition, elevated concentrations of chlorinated organic constituents were detected near the Old Drum Storage Area. The results of the investigation were reported to SC DHEC in Volumes I and II of G & E's report entitled, "Ongoing Soil and Groundwater Study and Conceptualized Cleanup Plan - Venture Chemicals, Inc., Lobeco, S.C." dated November, 1986.

On June 25, 1987, representatives of the current and prior owners of the Lobeco site entered into a Consent Agreement with the SC DHEC, Bureau of Water Pollution Control. The Consent Agreement required a plan of study to be submitted to the Department which addressed the action(s) to be taken to determine the extent and degree of PCBs at the site.

Lane Environmental Services Corporation was retained to prepare the plan of study which was submitted to the SC DHEC in September, 1987. The plan was approved by the SC DHEC in November, 1987 and initiated by RMT, Inc., in March, 1988. The scope of work for the investigation was based on the ground water quality and flow conditions determined in previous investigations, SCDHEC Consent Order No. 87-65-W dated June 25, 1987 and the Plan of Study as prepared by Lane Environmental Services Corporation dated September, 1987. Field activities were conducted between March 14 and April 18, 1988.

This report presents the results of the "Lobeco Site Environmental Assessment" as defined by the Plan of Study and related documents, and suggests remedial action plans for the study areas.

2. SUMMARY OF FINDINGS AND CONCLUSIONS

2.1 Site Overview

- Two (2) geologic formations were encountered during drilling operations. The Pamlico Formation represents the majority of the surface geology at the site. The formation is typically described as an unconsolidated, tan and grey, fine sand containing varying amounts of silt and clay. Green-grey medium sand with broken shells are also noted below 22 feet in boring RB-3 and 26 feet in borings RB-2 and L-1.

  The Hawthorn Formation represents the lower confining layer for the unconfined aquifer and serves as an aquitard for the potable Floridian Aquifer beneath it. The Hawthorn is typically described as a green clay with trace amounts of silt and broken shells.

- Ground water occurs within the Pamlico Formation under unconfined to semi-confined conditions. Ground water flow is generally to the south with discharge occurring to the marsh bordering Campbell Creek. The average water table gradient is 0.003 feet per foot.

- No known public or private water wells exist in the unconfined aquifer downgradient of the site. Therefore, there is little potential for impact to domestic water supplies.

2.2 Abandoned Lagoon Area

- The soils are generally described as tan and grey, silty sands with varying amounts of clay. These soils typically grade laterally and vertically into slightly sandy silts with variable clay content. Dark grey, silty clay was also noted in several borings below 16.0 feet. Sludge, when encountered, was generally found between 2 and 8 feet below ground surface.

- The data suggests that the PCBs are present and are generally contained in a sludge layer which was formed during the time the lagoon was in active operation as a settling basin. PCBs were not detected outside the boundaries of the former settling basin indicating that the PCBs are bound in the soil matrix and are not migrating.

- Ground water flow is generally to the southeast toward monitoring well L-5 and to the southwest toward monitoring well L-6. Water level data indicate an area of mounding in the north-central portion of the grid extending to the north toward monitoring well W-4. The water table gradient averages 0.009 feet/foot to the southeast and 0.011 feet/foot to the southwest. South of the former lagoon the water table intersects surface water ponded in the marshy areas on either side of the access road.

- Arsenic, benzene, cadmium, and trichloroethylene were identified in the downgradient ground water at concentrations above the EPA maximum contaminant level (MCL). The analytical results indicate that the former settling basin is the source of these compounds. Calculations based on ground water flow rates and constituent concentrations (See Appendix E) suggest that the mass flow rate for each of these constituents is less than one pound per year. In view of these calculations and since no known public or private water supplies are extracted from the unconfined aquifer downgradient of the abandoned lagoon, these constituents do not represent a significant threat to human health or the environment.

- Of the base neutral compounds analyzed, only naphthalene and 1,2,4-trichlorobenzene were identified downgradient.

- PCB concentrations in vegetation samples range from not detected to 1.0 ppm near temporary well ATW-4.

2.3 Old Burn Site

- Soils are generally described as tan to black, fine to silty sands. Between two (2) and four (4) feet, these sediments grade into a silty clay layer. The clay appears to grade laterally and downward into a light grey to white silty sand with variable clay content.

- Ground water flow is generally to the southeast toward monitoring well L-3. The water level data indicate that the water table slopes to the southeast at 0.003 feet/foot increasing to 0.007 feet/foot further downgradient.

- Analytical results indicate a limited and random distribution of PCBs across the study area and with depth. As with the abandoned lagoon area, PCBs were not detected in any downgradient wells.

- Detectable levels of several "drinking water" metals are reported from wells monitoring the Old Burn Site. However, none of the reported concentrations are in excess of either the MCL or the EPA proposed maximum contaminant level goal (MCLG).

- Detectable levels of methylene chloride were reported from wells L-4, W-12 and W-13 while 1,2-trans-dichloroethylene and trichloroethylene were reported from well L-3. Of the organic compounds identified, only trichloroethylene in well L-3 was found above the MCL. The data suggest separate source areas for the organic compounds identified in well L-3 and those identified in wells W-12, W-13, L-7 and L-4.

- Of the base neutral compounds analyzed, only 1,2-dichlorobenzene and 1,2,4-trichlorobenzene are reported from well L-7. The data suggest that these compounds originated from areas other than the Old Burn Site.

2.4 Old Drum Storage Area

- Soils within the Old Drum Storage Area are typically tan to white, fine to silty sands, with variable clay content.

- Detectable levels of PCBs are reported from borings DB-2, DB-3, DB-4, DB-6, DB-7, DB-8, DB-9 and DB-10. The concentrations detected are relatively small (21.4 ppm maximum) and do not appear to significantly impact the environment.

- Elevated TOC concentrations are restricted from the surface to a depth of 2.0 feet suggesting that the elevated readings may be the result of increased biological activity at the surface.

- Ground water flow appears to be to the north toward monitoring well W-6. The water level data indicate a localized area of mounding around well W-7.

- Detectable levels of arsenic, nickel, chlorobenzene, chloroform, methylene chloride, and toluene were identified in well W-7 while background concentrations of zinc were identified in wells W-6 and W-7. Chloroform was the only organic compound identified in well W-6. None of the observed concentrations was in excess of either the MCL or the MCLG.

- Of the base neutral compounds analyzed, only 1,4-dichlorobenzene and 1,2,4-trichlorobenzene were identified and only in well W-7.

- PCBs were not detected in either monitoring well.

2.5 Campbell Creek/Marsh Area

- Detectable levels of PCBs are reported from samples C-1, C-2 and C-4. Previous investigations by SCDHEC in 1984 indicated the presence of PCBs at the outfall at that time. However, differences in the sampling procedures and also in the sample locations makes direct comparisons between SCDHEC analytical results and results presented in Section 6.1.4 of this report inappropriate.

2.6 Site Specific Chemicals

- Two chemicals related to materials produced at the Lobeco plant have been identified as potential carcinogens. These are: 1-amino, 2-methylanthraquinone and 2-aminoanthraquinone. Campbell Creek and tidal marsh sediment samples, and ground water samples from permanent wells W-4, W-5, W-6, W-7, W-12 and W-13 and L-1 through L-7, were analyzed for these two compounds. Neither were detected in any of the samples analyzed.

3. SUMMARY OF RECOMMENDATIONS

The following is a summary of the Recommended Remedial Action Plans for the four areas of the Lobeco property specified in SCDHEC Consent Order No. 87-65-W and in the Plan of Study (the Abandoned Lagoon, the Old Burn Site, the Old Drum Storage Area, and the Campbell Creek/Marsh Area), and the ground water at the site. Details of the proposed RAP are contained in Section 9.

3.1 Abandoned Lagoon Area

The recommended remedial action plan for the Abandoned Lagoon is to excavate the soil and sludge by layers, and segregate the excavated material into nominally contaminated and uncontaminated piles. The contaminated portion, specifically classified as having a PCB concentration greater than 50 ppm, will be dewatered by the addition of kiln dust, if necessary, and transported for disposal at an approved off-site landfill.

After post-excavation sampling to be certain that soil containing PCBs above 50 ppm has been removed, the empty, excavated area will be backfilled using the segregated uncontaminated soil previously excavated and additional clean fill dirt as needed.

Excavation of the soil and sludge will require management of the ground water at the lagoon area prior to and during excavation. Prior to excavation, ground water levels within the lagoon area will be lowered to below the planned excavation depth. The intended method of ground water management is installation of a slurry wall around the lagoon area extending downward into the Hawthorn formation, followed by pumping of the ground water inside the contained area, provided local conditions and/or technological problems do not preclude this approach. Ground water collected from this operation will be discharged to the Campbell Creek/Marsh area with a level of treatment dictated by the concentrations and quantities of chemical constituents contained therein.

3.2 Old Burn Site

The recommended remedial action plan for the Old Burn Site is also to excavate the soil and residual materials, segregate the excavated material into nominally contaminated and uncontaminated piles, dewater by the addition of kiln dust, if necessary, and transport for disposal at an approved off-site landfill.

As with the lagoon area, post-excavation sampling will be used to be certain that contaminated soil and residual materials have been removed. The empty, excavated burn site area will be backfilled using the segregated uncontaminated soil previously excavated and additional clean fill dirt as needed.

Management of the ground water at the burn site will also be required prior to and during excavation. The preferred method is the same as that proposed for the lagoon area utilizing slurry walls, pumping/withdrawal, treatment and discharge of ground water.

3.3 Old Drum Storage Area

Because the analytical data indicate that the soils in the Old Drum Storage Area have not been significantly impacted, no remedial action plan is proposed.

3.4 Campbell Creek/Marsh Area

As discussed in Section 9.5, the data does not indicate that environmental damage will result from the presence of PCBs in this area. Therefore, no remedial action plan is proposed for the Campbell Creek/Marsh Area.

3.5 Ground Water

The recommended remedial action plan for ground water at the Lobeco site is pumping, treatment and discharge of the ground water extracted from contained areas at the Abandoned Lagoon and Old Burn Site Areas during soil remediation. The treatment methods will be selected based on discharge limits imposed by SCDHEC for discharge to Campbell Creek.

In addition, it is recommended that ground water levels across the site be measured quarterly, and samples from wells W-5, W-12 and L-3 be analyzed annually for specific parameters of concern, until all parties agree that such monitoring is no longer necessary.

4. ENVIRONMENTAL SETTING

4.1 Regional Setting

The Lobeco site is located in Sheldon Township, Beaufort County, South Carolina, approximately one (1) mile north of the Whale Branch of the Coosaw River. The Lobeco site is situated in the lower coastal plain physiographic province which is characterized by low relief, lagoons, tidal swamps and salt marshes.

The Beaufort, South Carolina area is underlain by limestone and unconsolidated sands and clay. The rocks and soils beneath the site range in age from late Cretaceous to recent. The primary aquifer in the region is the Floridan, which is composed of the Santee Limestone and the basal portion of the Cooper Marl. The Santee Limestone is primarily a bioclastic limestone. In the Beaufort area the Floridan is several hundred feet thick and is overlain by the Hawthorn Formation. The Hawthorn is characterized by sand, silt and clay with phosphatic pebbles. In the Beaufort area the Hawthorn is found at depths ranging from approximately 50 feet below ground surface to nearly 80 feet. In the Beaufort area the Hawthorn is typically a low permeability clay which serves as the lower confining layer for the Pamlico Formation. The Pamlico Formation is exposed at the surface throughout most of the region. The Pamlico consists of quartz sand and clay, with some glauconite, broken shells and heavy minerals. In the vicinity of the Lobeco Facility, the Pamlico Formation is approximately thirty (30) to forty (40) feet thick.

4.2 Site Geology

Clastic sediments of the Pamlico and Hawthorn formations were sampled during drilling operations at the Lobeco site. The data point location map is included as Plate 1. A cross-section illustrating site geology is presented as Plate 2.

The Hawthorn Formation was encountered in all three reference borings at depths ranging from 26.0 feet in RB-3 to 38.0 feet in RB-2. Only the upper two (2) to three (3) feet of the Hawthorn beneath the Lobeco site was penetrated by any of these borings. However, based on the boring logs for the two production wells on site the Hawthorn formation is approximately forty (40) to fifty (50) feet thick. Split spoon and Shelby tube samples of the Hawthorn Formation were described as green clay with trace amounts of silt and broken shells.

Overlying the Hawthorn is the Pamlico Formation. The Pamlico ranges in thickness from 26.0 feet in RB-3 to 38.0 feet in RB-2. The formation is generally composed of tan and grey silty, fine sand containing varying amounts of clay, alternating with layers of sandy silts with varying amounts of clay. Grey-green medium sand with broken shells were observed between 22.0 feet in RB-3 and 26.0 feet in RB-2 and L-1.

4.2.1 Abandoned Lagoon

Unconsolidated deposits of the Pamlico Formation were encountered during drilling activities in the Abandoned Lagoon Area. Boring and temporary well locations are shown on Plate 3. The soils are generally described as tan and grey silty sands with varying amounts of clay. These soils typically grade laterally and vertically into slightly sandy silts with variable clay content. In several borings, a dark grey, silty clay was observed below 16.0 feet. In addition to the soil types described above, sludge was also identified. Sludge, when encountered, was generally found between 2.0 and 8.0 feet. In boring AB-9, sludge was also reported from 10-12 feet. The distribution of the sludge layer is shown on Figure 4.2.1. In addition, cross sections illustrating the geology across the study area are included as Plate 4.

4.2.2 Old Burn Site

As with the Abandoned Lagoon, clastic sediments of the Pamlico Formation were encountered in all of the borings in the Old Burn Site. Boring and monitoring well locations are shown on Plate 5. The geology surrounding the Old Burn Site is shown on Plate 6. The soils are generally described as tan to black, silty fine sands. Between two (2) and four (4) feet, these sediments grade into a silty clay layer. The clay layer appears to grade laterally and downward into a light grey to white silty sand with variable clay content. Some evidence of burning activities were recognized from the samples.

4.2.3 Old Drum Storage Area

Clastic sediments of the Pamlico Formation were encountered in the Old Drum Storage Area. Boring and monitoring well locations are shown on Plate 7. The deposits are generally described as tan to white fine to silty sands, with variable clay content.

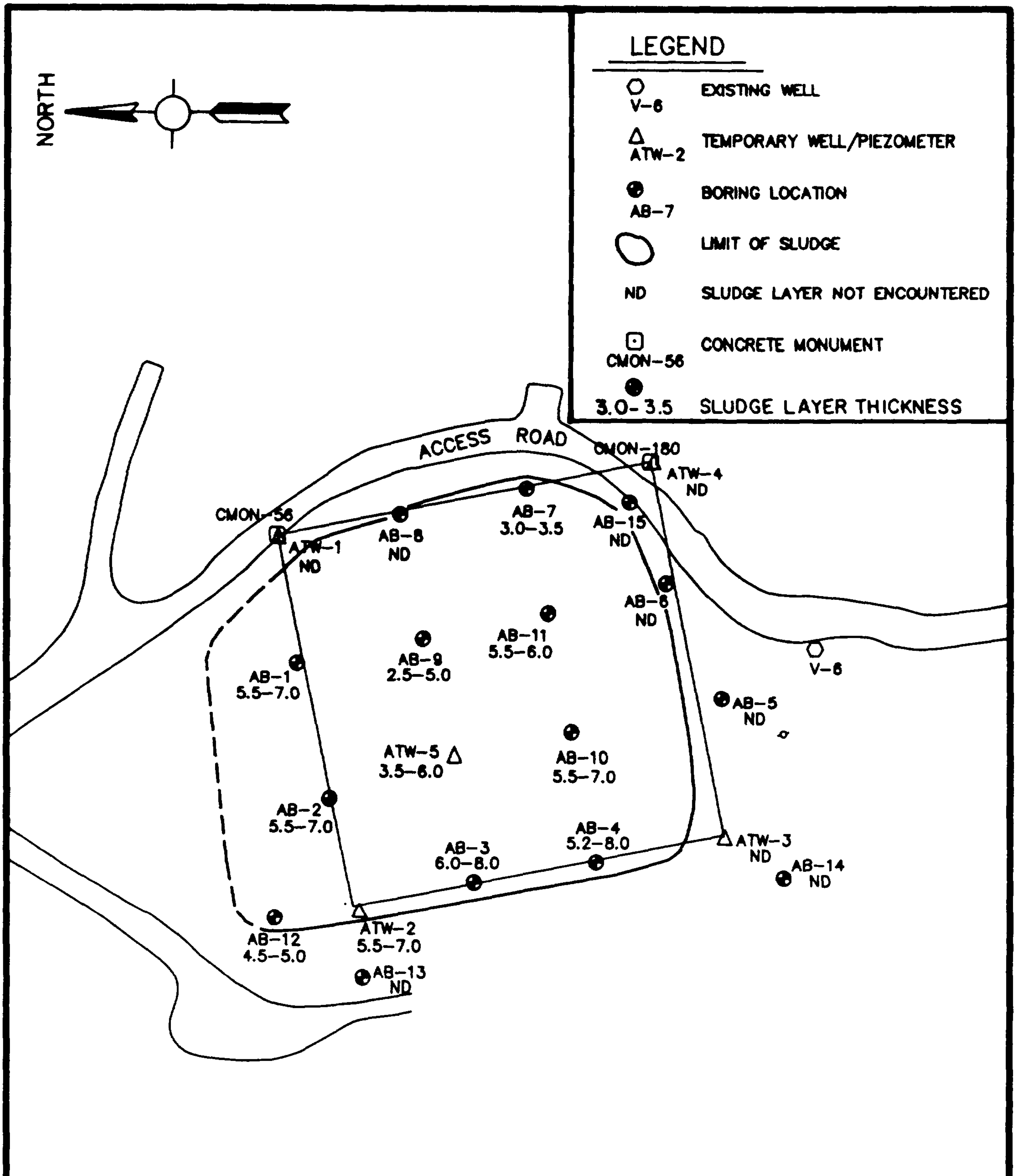

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FIGURE 4.2.1

LOBECO SITE ENVIRONMENTAL ASSESSMENT

LOCATION OF SLUDGE LAYER
ABANDONED LAGOON (AREA A)

Boring logs for drilling activities conducted during the Lobeco Site Environmental Assessment are included in Appendix A.

4.3 Site Hydrogeology

Topographic relief at the Lobeco facility is 20 feet. Ground surface generally slopes to the south at a rate of 0.005 feet per foot. Local variations in response to cultural features are common.

Ground water at the Lobeco site generally occurs under unconfined conditions. However, the soil types identified during drilling activities in the vicinity of the Old Burn Site suggest the potential for localized confined or semi-confined conditions. In addition, perched ground water was noted in the vicinity of the Old Burn Site. The unconfined aquifer is recharged from precipitation on the site.

Surface water, except in curbed containment areas, enters into a ditch drainage system, which appears to be related to pre-plant agricultural activities. These drainage channels eventually drain into the marshy area near Campbell Creek or pool in shallow depressions at the site before entering into the ground water system or evaporating.

There are no known public or private water wells downgradient of the Lobeco site.

5. DATA COLLECTION ACTIVITIES

5.1 Soil Sampling Methods

Continuous split spoon samples were collected from all of the borings drilled in the Abandoned Lagoon, Old Burn Site, Old Drum Storage Area and also from the reference borings, RB-1, RB-2 and RB-3. With the exception of the reference borings, samples were collected for subsequent laboratory analysis. Split spoon samples were collected from the permanent monitoring wells, L-2 through L-7, at five (5) foot intervals for lithologic description. No samples were collected from either of the piezometers, PZ-1 and PZ-2.

Except for the reference borings, all borings were drilled with hollow stem augers. The soil samples were obtained by driving a two (2) foot split spoon beyond the bottom of the augers in accordance with ASTM D 1586. To minimize the risk of cross contamination [of samples and/or borings], all equipment coming in contact with the samples was decontaminated before and after each use.

Before drilling each boring, all tools were decontaminated according to the following procedure. First, all tools were thoroughly cleaned by steam cleaning and brushing when necessary. After steam cleaning, all tools that could come into contact with the sample were rinsed with hexane, then rinsed with acetone, allowed to air dry, and, finally, rinsed with deionized water. The tools were allowed to air dry and wrapped in polyethylene for transportation to the drilling locations.

After each split spoon sampler was removed from the borehole, the driller's geologist opened the sampler and placed the soil sample on a previously unused sheet of plastic. In order to minimize the possible downward transport of overlying materials, the outer portion of each sample was trimmed with a stainless steel spatula or knife to remove smeared sediments. The samples were divided in half, lengthwise, from the bottom of the sample to the top. Each half was placed in a separate appropriately labeled 500 ml amber glass container. Samples to fourteen feet from the Abandoned Lagoon and to eight feet from the Old Burn Site and Old Drum Storage Area were forwarded to the analytical laboratory with the chain-of-custody forms, while the remainder were retained for later use, if necessary. Soil samples collected for lithologic description and/or physical characterization were placed in 8 oz. moisture-tight clean glass jars and retained. In addition to the sample collection described above, one undisturbed soil sample (3 inch x 24 inch Shelby tube) was taken from the Hawthorn Formation in each of the reference borings. A visual description of the sample was recorded and the tube was sealed.

The drilling contractor's geologist prepared a driller's log that included a visual description of the soil sampled, blow counts, depth at which sludge was first encountered (if any), depth at which water was first encountered, HNu response (if any), project name, boring/well number, personnel, drilling method, borehole diameter, and date. The soils were generally described in accordance with the Unified Soils Classification System by an RMT geologist and from these data boring logs were prepared.

5.2 Sediment Sampling Methods

Five (5) sediment cores C-1 through C-5 and duplicates were collected from the marsh area in the vicinity of Campbell Creek. Two (2) of the cores (C-1 and C-2) were collected at the Lobeco outfall using the sediment sampling device shown in Figure 5.2.1. One (1) core (C-1) was taken immediately upstream (assuming an ebb tide) from the Lobeco outfall and one (1) core (C-2) was taken immediately downstream (Plate 1). The three (3) remaining cores (C-3, C-4 and C-5) were obtained from an area in and around the point where a break in the line carrying plant effluent occurred in the early 1970s. The location of these sampling points were determined by inspecting surface characteristics, e.g., impacted vegetation, broken terracotta pipe and also from discussions with Lobeco Products personnel.

Once the sample point had been determined, the device was pushed continuously down until refusal. Smeared sediment on the outside of the PVC sampling tubes was cleaned off with marsh water. The bottom of the tube was sealed with para-film and a PVC cap. The sampling tube was disconnected from the coupling and the top of the sediment inside the tube was located. The empty portion of the tube was removed with a hacksaw. The top of the filled portion of the tube was capped with para-film and a PVC cap. Sealed sample segments were placed on ice and transported to the analytical laboratory. At the laboratory, the sample tubes were cut into sections for analysis. Individual portions of each sample tube were analyzed for PCBs, 1-amino-2-methylanthraquinone and 2-aminoanthraquinone.

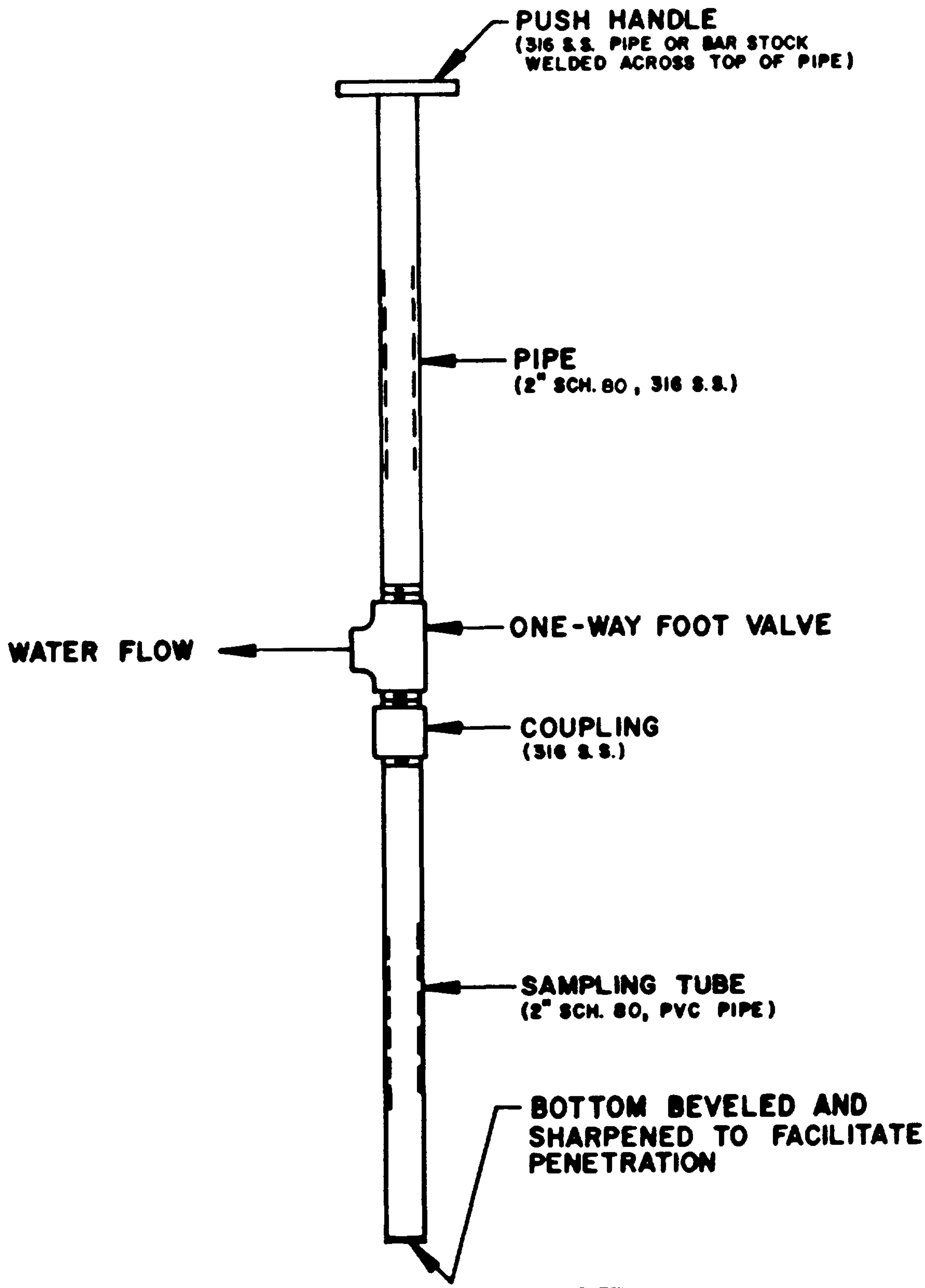

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FIGURE 5.2.1
LOBECO SITE ENVIRONMENTAL ASSESSMENT
MARSH SEDIMENT SAMPLING DEVICE

Because of insufficient sample recovery in samples C-3, C-4 and C-5, split spoon samplers, two (2) feet in length, with sand catchers were used to collect the sediment cores from these locations. The samplers were driven two feet into the sediment with a hammer. As with the soil samples, all tools were decontaminated before and after each use. After the sampler was removed from the marsh, the sampler was opened by an RMT geologist and the sample was placed on a clean sheet of plastic. In order to minimize the possible downward transport of overlying materials, the outer portion of each sample segment was trimmed to remove smeared sediment. The sample was divided in half before being placed in separate, appropriately labeled 500 ml amber glass containers. Duplicate samples were obtained from each sampling point. One set of samples was forwarded to the analytical laboratory while the other set was retained for later use, if necessary.

5.3 Monitoring Well System

Between August and December of 1984, Law Environmental Services installed and sampled six monitoring wells at the site. Monitoring well V-1 was installed as the upgradient well while monitoring wells V-2 through V-6 were located to evaluate water quality conditions near the plant operations areas, the aeration basin, the holding basins and the abandoned lagoon. In addition, as the result of an investigation conducted by SC DHEC during September and October 1985, G & E Engineering, Inc., was retained to conduct a preliminary environmental assessment which included among other things, the installation of thirteen monitoring wells. Monitoring wells W-6 and W-7 were installed to evaluate the Old Drum Storage Area. Monitoring wells W-9, W-10, W-11, W-12, and W-13 were installed to evaluate the Old Burn site and the area downgradient of the Old Burn Site. Also, monitoring wells W-3, W-4 and W-5 were located to investigate water quality immediately around the Abandoned Lagoon Area. Monitoring wells, W-1, W-2, and W-8 were located to investigate the water quality conditions near the borrow area.

In addition to the monitoring wells described above, seven monitoring wells, ten (10) temporary monitoring wells/piezometers and three reference borings were installed between March 14 and April 3, 1988, as part of this investigation. All of the wells were installed according to the "Plan of Study" approved by SC DHEC. Monitoring wells were installed in each of the reference borings; two of these borings, RB-2 and RB-3, were abandoned after one sampling round in accordance with the "Plan of Study". The remaining reference boring, RB-1, was converted to a permanent upgradient monitoring well, L-1. The ten (10) temporary monitoring wells (ATW-1 through ATW-5 and BTW-1 through BTW-5) were converted to piezometers after the first round of sampling. The remaining six wells, L-2 through L-7, were installed as permanent monitoring wells located to evaluate water quality conditions around these study areas.

Except for the reference borings; RB-1 (L-1), RB-2 and RB-3; all of the monitoring wells were constructed inside 6.25-inch ID hollow stem augers. The boreholes for the reference borings were drilled using mud rotary drilling techniques and the monitoring wells were installed in open boreholes.

The monitoring wells and piezometers were constructed using 2-inch schedule 40 flush joint PVC with 0.010 inch machine slotted screen at the bottom. "O"-rings were placed at each connection above the sand pack. Monitoring wells ATW-1 through ATW-5, L-2, L-3, L-5, L-6 and L-7 were installed with fifteen foot long screens. Monitoring wells BTW-1 through BTW-5 were installed with five (5) foot screens and the reference borings; RB-1 (L-1), RB-2 and RB-3 were installed with ten (10) foot lengths of screen. Because of local geologic conditions, a 4.5 foot length of screen was installed in monitoring well L-4. In addition, 2.5 foot sumps were placed below the screens in all of the permanent monitoring wells.

After the screens were set at the desired depth, the annular space around the screens was packed with sand. The sand was placed by using a tremie pipe in the annular space between the inside of the hollow stem auger and the outside of the well casing. The upper surface of the sand pack was sealed with a minimum of one foot of bentonite pellets. If the bentonite seal was placed above the water table, five (5) gallons of potable water was added to facilitate hydration of the pellets. The bentonite seal was allowed to hydrate for at least thirty minutes before introducing grout into the borehole. The remaining annular space was filled with a cement bentonite grout slurry. A steel protective outer casing with locking cap was installed over each permanent monitoring well. In addition, 2' x 2' x 6" concrete pads were framed and poured around the base of each permanent monitoring well and each temporary monitoring well/piezometer. To secure the temporary monitoring wells/piezometers, a hole was drilled through the PVC caps and casing and fitted with a lock. Also three steel posts, four inches in diameter and five feet long were painted high-visibility orange and cemented around wells ATW-1 and ATW-4 to protect them from traffic.

Monitoring well construction data are summarized in Table 5.3.1 and well construction diagrams are included in Appendix B. All cuttings and/or drilling fluid were contained in drums at the drilling locations before being transported to the staging area east of the Abandoned Lagoon Area.

All drilling equipment and well materials were decontaminated and wrapped in plastic prior to drilling and installation. Following installation, the wells were developed with either a 2-inch positive displacement PVC hand pump or a 2-inch gasoline powered centrifugal pump. All downhole equipment was decontaminated before and after each use. All well development fluid was contained in drums and transported to the Lobeco Products wastewater treatment facility for disposal.

The location and elevation of each monitoring well was determined by a registered South Carolina surveyor.

TABLE 5.3.1
SUMMARY OF WELL CONSTRUCTION DATA
LOBECO SITE ENVIRONMENTAL ASSESSMENT

WELL #	L-1	L-2	L-3	L-4	L-5	L-6	L-7	ATW-1	ATW-2	ATW-3	ATW-4
DATE STARTED	3-14-88	3-26-88	3-27-88	3-28-88	3-24-88	3-29-88	3-28-88	3-18-88	3-18-88	3-19-88	3-19-88
DATE COMPLETED	3-15-88	3-26-88	3-27-88	3-28-88	3-24-88	3-29-88	3-28-88	3-18-88	3-18-88	3-19-88	3-19-88
CASING DIAMETER I.D. (inches)	2	2	2	2	2	2	2	2	2	2	2
SCREEN SLOT SIZE (inches)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
GROUND SURFACE ELEVATION (ft above mean sea level)	19.4	20.4	16.0	16.4	7.7	8.6	16.5	12.9	13.2	12.6	11.5
TOP OF CASING ELEVATION (ft above mean sea level)	21.26	23.25	18.81	18.95	10.25	10.97	18.12	15.15	15.25	15.42	13.28
TOP OF BENTONITE SEAL (ft below ground surface)	13.5	1.5	0.8	0.5	3.0	3.5	4.5	1.5	1.7	2.5	0.7
SAND PACK INTERVAL (ft below ground surface)	16.5-28.0	2.5-20.5	1.9-20.5	1.5-7.0	5.5-20.0	5.5-20.0	5.5-20.0	3.0-20.0	3.0-20.0	3.5-20.0	3.0-22.0
SCREENED INTERVAL (ft below ground surface)	18.0-28.0	3.5-18.5	2.9-17.9	2.5-7.0	7.5-17.5	7.5-17.5	7.5-17.5	4.5-19.5	4.5-19.5	5.0-20.0	5.7-20.7
TOTAL DEPTH (ft below ground surface)	35.0	20.5	20.5	8.0	20.0	20.0	20.0	20.0	20.0	20.0	22.0

TABLE 5.3.1 (cont'd)
SUMMARY OF WELL CONSTRUCTION DATA
LOBECO SITE ENVIRONMENTAL ASSESSMENT

WELL #	ATW-5	BTW-1	BTW-2	BTW-3	BTW-4	BTW-5	RB-2	RB-3	PZ-1	PZ-2
DATE STARTED	3-21-88	3-24-88	3-24-88	3-23-88	3-23-88	3-22-88	3-16-88	3-21-88	3-22-88	3-22-88
DATE COMPLETED	3-21-88	3-24-88	3-24-88	3-23-88	3-23-88	3-22-88	3-17-88	3-21-88	3-22-88	3-22-88
CASING DIAMETER I.D. (inches)	2	2	2	2	2	2	2	2	2	2
SCREEN SLOT SIZE (inches)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
GROUND SURFACE ELEVATION (ft above mean sea level)	12.3	17.8	16.7	16.8	17.0	18.0	14.7	7.4	10.5	13.1
TOP OF CASING ELEVATION (ft above mean sea level)	15.00	20.11	19.29	19.36	19.25	20.39	16.52	10.40	13.31	16.08
TOP OF BENTONITE SEAL (ft below ground surface)	1.5	2.0	2.0	2.0	2.0	2.6	24.5	10.0	4.0	4.5
SAND PACK INTERVAL (ft below ground surface)	2.5-20.0	3.0-10.0	3.0-10.0	3.0-10.0	3.0-10.0	3.6-10.0	26.0-37.3	12.0-25.0	5.0-12.0	5.0-12.0
SCREENED INTERVAL (ft below ground surface)	5.0-20.0	5.0-10.0	5.0-10.0	5.0-10.0	5.0-10.0	5.0-10.0	27.3-37.3	15.0-25.0	7.0-12.0	7.0-12.0
TOTAL DEPTH (ft below ground surface)	20.0	10.0	10.0	10.0	10.0	10.0	42.0	30.0	15.0	15.0

5.4 Piezometer Installation and Water Level Measurement

5.4.1 Piezometer Installation

In addition to the monitoring wells described in Section 5.3 of this report, two piezometers PZ-1 and PZ-2 were installed west of the Abandoned Lagoon Area. The piezometers were installed to better define ground water flow conditions in the vicinity of the Abandoned Lagoon. The piezometer locations are shown on Plate 1.

The boreholes for both piezometers were drilled with 2.25-inch ID hollow stem augers. No split spoon samples were obtained from either boring. Both borings were advanced to fifteen feet and the augers were removed from the hole prior to installing the piezometers. The piezometers were constructed of 2-inch ID schedule 40 flush joint PVC with 0.010" machine slotted screen at the bottom. Both piezometers were constructed with five (5) foot lengths of screen. After the screens had been placed at the desired depth, the annular space opposite the screens was filled with sand. The sand pack extended a minimum of one foot above the top of the screens. The top of the sand packs were sealed with a minimum of one foot of bentonite pellets. The bentonite seals were hydrated with five (5) gallons of potable water and allowed to hydrate for thirty minutes before introducing grout into the hole. The remaining annular space was filled with a cement bentonite grout slurry. The piezometers were constructed without protective covers or concrete pads.

Piezometer construction data is summarized in Table 5.3.1 and construction diagrams are included in Appendix B.

5.4.2 Water Level Measurement

Water level data were obtained from wells V-1 through V-6, W-1, W-3 through W-7 and W-10 through W-13 on February 22, 1988, before initiating drilling activities. These data were collected to allow for a preliminary interpretation of the water table configuration prior to initiating field work. In addition, on March 24, 1988, following installation of the temporary monitoring wells/piezometers in the Abandoned Lagoon Area and the Old Burn Site, water levels were measured in all of the new and existing wells. These data were collected to further define ground water flow conditions across these study areas and facilitate the placement of the permanent monitoring wells downgradient of the two study areas. In addition, between April 11, and April 18, 1988, as part of the ground water sampling procedure, water level measurements were taken from all of the new wells and also from wells (W-3, W-4, W-5, W-6, W-7, W-12 and W-13). Finally, water level data from all of the wells sampled and the piezometers were collected on May 25, 1988. These data were used to prepare the water table map included as Plates 8, 9, 10 and 11.

5.5 Monitoring Well Sampling Methods

All monitoring wells were sampled with dedicated, bottom-loading teflon bailers. Clean disposable nylon cord was used to lower the bailer to the bottom of the well during sampling.

The dedicated bailers were used to purge and sample each monitoring well. Water purged from each well was collected in five gallon plastic buckets and transported to the Lobeco wastewater treatment plant for disposal. After calculating the volume of water contained in the well, four well volumes of water were removed. Before the wells were purged, clean, new plastic drop cloths were spread around the wells to prevent the bailers and ropes from coming in contact with the ground surface.

Ground water samples were collected as soon as the well had recovered sufficiently to fill the required sample bottles. Two sets of ground water samples were collected from each well. Appropriate sample containers supplied by the Greenville RMT laboratory were used. One sample was forwarded to the analytical laboratory for analysis and one sample was retained for later use, if required. Field and trip blanks accompanied each shipment.

All sample containers were sealed and labeled on-site. Chain-of-custody documentation was completed on-site and accompanied the samples to the laboratory.

Field filtration and preservation was done on samples collected for metals analyses. All other filtration was performed in the laboratory.

5.6 Vegetation Sampling Methods

Five vegetation samples were collected from the Abandoned Lagoon and Old Burn Site for PCB analysis. Only above ground portions (stem and leaves) were collected. Samples were numbered to correspond with the well number around which the vegetation sample was collected.

All samples were placed in decontaminated containers for shipment to the RMT laboratory. Representative samples of the vegetation in each area was identified. Percentages of the types of herbaceous vegetation were visually assessed and representative portions of each of the major varieties of vegetation were collected.

Duplicate, 30 gram samples were collected at each site. One sample was forwarded to the laboratory with the chain-of-custody forms and one sample was retained for later use, if necessary.

6. RESULTS OF INVESTIGATION

6.1 Soils and Sediment Analytical Results

6.1.1 Abandoned Lagoon (Area A)

One hundred forty (140) soil samples were collected and forwarded to the RMT Laboratory for PCB analysis. In addition, fourteen samples were sent to a separate laboratory (CompuChem) for quality control. Analytical results are included in Appendix C and summarized in Table 6.1.1. PCB-1248 was the only Aroclor identified by the RMT Laboratory. However, three other Aroclors (1242, 1254 and 1260) were identified by CompuChem from the QC samples. Although different Aroclors were identified, the QC analysis verifies the PCB concentrations found.

PCB concentrations range from not detected to 10,500 ppm in boring AB-2. The data indicates that PCB concentrations of concern are principally confined to the interval between four and six feet. In addition there is a positive correlation between elevated PCB concentrations and the presence of a sludge layer which was formed when the lagoon was used as an active settling basin. The distribution and thickness of the sludge layer is shown on Figure 4.2.1.

TABLE 6.1.1
SUMMARY OF PCB ANALYSES ON SOIL SAMPLES
FROM THE ABANDONED LAGOON (AREA A). [1]
LOBECO SITE ENVIRONMENTAL ASSESSMENT

BORING #	ATW-1	ATW-2	ATW-3	ATW-4	ATW-5	AB-1	AB-2	AB-3	AB-4	AB-5
SAMPLE INTERVAL (ft) BELOW GROUND SURFACE										
0.0-2.0	23.1	3.6	ND	ND	2.2	0.12	9.29	ND	ND	1.5
2.0-4.0	27.0	1.6	ND	ND	187	0.78	63.50	0.26	ND	0.23
4.0-6.0	22.1	5.4	ND	ND	1,030	1,300	10,500	0.63	420	0.44
6.0-8.0	ND	1.5	ND	ND	22.9	2.06	67.50	355	120	0.1
8.0-10.0	0.21	0.6	ND	0.8	532	2.01	9.30	5.8	85.0	0.47
10.0-12.0	0.1	0.9	ND	ND	38.5	1.87	2.72	317	5.3	2.1
12.0-14.0	0.1	1.1	ND	ND	18.3	0.68	1.06	3.0	87.0	0.11

BORING #	AB-6	AB-7	AB-8	AB-9	AB-10	AB-11	AB-12	AB-13	AB-14	AB-15
SAMPLE INTERVAL (ft) BELOW GROUND SURFACE										
0.0-2.0	10.4	9.7	6.1	470	1.4	2.2	1.3	ND	ND	375
2.0-4.0	37.4	13.1	22.8	713	2.0	6.0	1.8	ND	ND	2.7
4.0-6.0	9.8	ND	1.1	445	69.5	959	162	ND	ND	4.2
6.0-8.0	0.8	0.2	1.2	19.9	92.1	57.5	ND	ND	ND	1.1
8.0-10.0	ND	ND	0.2	47.9	385	7.0	0.6	ND	ND	1.0
10.0-12.0	1.2	ND	ND	1,313	49.0	2.0	139	ND	ND	5.1
12.0-14.0	1.3	ND	0.1	2.4	9.3	0.4	2.2	ND	ND	0.6

[1]- Analytical Results are Reported in mg/kg dry weight.
ND- Constituent not found above the Detection Limit.

6.1.2 Old Burn Site (Area B)

Sixty-two (62) soil samples were collected and forwarded to the RMT Laboratory for PCB and TOC analyses. In addition, six samples were sent to CompuChem for quality control. Analytical results are included in Appendix C and are summarized in Table 6.1.2. PCB-1248 was the only Aroclor identified by either laboratory. Analytical results from CompuChem confirm the reported RMT results. RMT laboratory analysis for TOC were reported in Mg/kg dry weight whereas CompuChem results were reported in Mg/kg wet weight. Therefore, direct comparison of the analytical results is inappropriate.

PCB concentrations range from not detected to 3,916 ppm. Analytical results indicate a random distribution of PCB across the study area. For example, elevated PCB concentrations are reported in borings BB-2, BB-3, BB-6 and temporary well BTW-5 from 0.0 to 4.0 feet below ground surface. In boring BB-5, elevated PCB concentrations were observed from 2.0 to 6.0 feet and in boring BB-7, from 6.0-10.0 feet.

In addition to the PCB analyses discussed above, soil samples from the Old Burn Site were analyzed for TOC. TOC levels range from 940 ppm dry weight in temporary well BTW-2 to 35,000 ppm dry weight in boring BB-5. The analytical results indicate that the amount of total organic carbon decreases with depth from an average of 10,550 ppm in the 0.0-2.0 interval to 1,775 ppm in the 6.0-8.0 interval. There is not a correlation between elevated PCB concentrations and elevated TOC levels.

Table 6.1.2
Summary of PCB and TOC Analyses on Soil Samples
from the Old Burn Site (Area B). [1]
Lobeco Site Environmental Assessment

PCB Results

BORING # / SAMPLE INTERVAL (ft) BELOW GROUND SURFACE	BTW-1	BTW-2	BTW-3	BTW-4	BTW-5	BB-1	BB-2	BB-3	BB-4	BB-5	BB-6	BB-7	BB-8	BB-9	BB-10
0.0-2.0	ND	ND	4.6	ND	69.4	0.6	60.4	105	1.5	1.0	279	18.2	7.5	0.4	3.9
2.0-4.0	ND	ND	0.1	ND	0.3	0.1	0.9	445	ND	210	0.2	2.4	ND	0.1	0.5
4.0-6.0	0.2	0.5	ND	0.8	5.1	0.4	1.1	11.3	ND	1,718	9.6	1.0	ND		ND
6.0-8.0	0.9	ND	0.9	7.5	1.4	0.2	2.2	0.7	ND	42.5	1.9	3,916	ND	ND	ND
8.0-10.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7.0	N/A	269	N/A	N/A	N/A

TOC Results

BORING # / SAMPLE INTERVAL (ft) BELOW GROUND SURFACE	BTW-1	BTW-2	BTW-3	BTW-4	BTW-5	BB-1	BB-2	BB-3	BB-4	BB-5	BB-6	BB-7	BB-8	BB-9	BB-10
0.0-2.0	8,700	11,000	12,000	6,100	12,000	14,000	9,800	7,600	9,400	14,000	4,800	7,500	15,000	12,000	14,000
2.0-4.0	1,100	4,000	2,900	1,500	6,500	4,200	6,400	11,000	3,000	35,000	3,200	3,000	6,800	12,000	2,200
4.0-6.0	1,500	1,000	2,000	1,400	1,900	1,500	1,900	11,000	1,800	15,000	3,700	2,000	2,300		2,200
6.0-8.0	1,500	940	2,100	980	1,900	1,300	1,700	1,900	2,200	2,600	2,200	3,900	1,100	1,200	1,100
8.0-10.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1,300	N/A	5,200	N/A	N/A	N/A

[1]- Analytical Results are Reported in mg/kg dry weight.
ND- Constituent not found above The Detection Limit.
N/A- Constituent not analyzed.

6.1.3 Old Drum Storage (Area D)

Forty (40) soil samples were collected and forwarded to the RMT Laboratory for PCB and TOC analyses. In addition, four samples were sent to CompuChem for Quality Control. Analytical results are included in Appendix C and are summarized in Table 6.1.3. PCB-1248 was the only Aroclor identified by either laboratory. Analytical results from CompuChem verify the reported RMT results. RMT Laboratory analysis for TOC were reported in mg/kg dry weight whereas CompuChem results were reported in mg/kg wet weight. Therefore, direct comparison of the analytical results is inappropriate.

PCB concentrations range from not detected to 21.4 ppm dry weight in boring DB-8. Detectable levels of PCB are found from ground surface to 8.0 feet. The analytical results show that PCBs are randomly distributed across the study area.

In addition to the analyses discussed above, soil samples from the Old Drum Storage area were also analyzed for TOC. The TOC values ranged from 390 ppm in boring DB-5 to 7,900 ppm in boring DB-4. A graph of average TOC concentrations vs depth, included as Figure 6.1.3, shows that total organic carbon levels decrease significantly from the 0.0-2.0 interval to the 2.0-4.0 interval. From 2.0 to 8.0 feet, TOC levels remain nearly constant. These data suggests that the elevated TOC concentrations at the surface may have resulted from increased biological activity at the ground surface. The TOC levels detected below 2.0 feet may represent background concentrations for the Old Drum Storage area.

Table 6.1.3
Summary of PCB and TOC Analyses on Soil Samples
from the Old Drum Storage (Area D). [1]
Lobeco Site Environmental Assessment

PCB Results

BORING #	DB-1	DB-2	DB-3	DB-4	DB-5	DB-6	DB-7	DB-8	DB-9	DB-10
SAMPLE INTERVAL (ft) BELOW GROUND SURFACE										
0.0-2.0	ND	11.0	0.2	ND	ND	ND	1.0	21.4	0.8	5.5
2.0-4.0	ND	ND	ND	ND	ND	ND	0.4	5.1	ND	ND
4.0-6.0	ND	0.2	ND	0.1	ND	ND	ND	0.5	ND	0.2
6.0-8.0	ND	ND	ND	ND	ND	0.1	ND	ND	ND	2.3

TOC Results

BORING #	DB-1	DB-2	DB-3	DB-4	DB-5	DB-6	DB-7	DB-8	DB-9	DB-10
SAMPLE INTERVAL (ft) BELOW GROUND SURFACE										
0.0-2.0	3,200	3,300	6,300	7,900	2,500	1,300	6,400	3,900	2,600	4,400
2.0-4.0	580	810	790	720	550	1,300	820	780	680	700
4.0-6.0	650	1,000	730	700	390	750	660	520	630	930
6.0-8.0	540	920	740	700	880	680	440	540	700	900

[1]- Analytical Results are Reported in mg/kg dry weight.
ND- Constituent not found above The Detection Limit.

6.1.4 Campbell Creek/Marsh (Area C)

Five sediment cores were collected from Area C. Two sample locations, C-1 and C-2 were chosen near the Lobeco outfall and the remaining three were chosen to evaluate the impact of a break in the discharge pipe carrying plant effluent to the outfall. Sample locations are shown on Plate 1. Samples collected were analyzed for PCB and two site specific chemicals.

Analytical results are included in Appendix C and are summarized in Table 6.1.4. Detectable levels of PCBs are reported from samples C-1, C-2 and C-4.

Previous investigations by SCDHEC in 1984 indicated the presence of PCB at the outfall at a concentration of 23.9 ppm. However, differences in the sampling procedures and also the sample locations makes direct comparisons between SCDHEC results and results presented herein inconclusive.

In addition to the PCBs analyses discussed above, the sediment samples were analyzed for two (2) site specific chemicals (1-amino-2-methylanthraquinone and 2-aminoanthraquinone). These constituents were not found above the detection limit in any of the samples analyzed.

TABLE 6.1.4
SUMMARY OF ANALYTICAL RESULTS ON SOIL/SEDIMENT SAMPLES FROM THE
CAMPBELL CREEK/MARSH (AREA C) [1]
LOBECO SITE ENVIRONMENTAL ASSESSMENT

BORING #	C-1 (0-0.5)	C-1 (0.5-1.0)	C-2 (0.0-0.75)	C-2 (0.75-1.50)	C-3 (0.0-1.0)	C-3 (1.0-2.0)
PARAMETER						
PCB-1248	6.2	30.4	106	7.3	ND	ND
SITE SPECIFIC CHEMICALS						
1-Amino-2-Methylanthraquinone	ND	ND	ND	ND	ND	ND
2-Aminoanthraquinone	ND	ND	ND	ND	ND	ND

BORING #	C-4 (0.0-1.0)	C-4 (1.0-2.0)	C-5 (0.0-1.0)	C-5 (1.0-2.0)
PARAMETER				
PCB-1248	1.5	ND	ND	ND
SITE SPECIFIC CHEMICALS				
1-Amino-2-Methylanthraquinone	ND	ND	ND	ND
2-Aminoanthraquinone	ND	ND	ND	ND

[1]- analytical results are reported in parts per million (PPM).
ND- constituent not found above the Detection Limit.

6.2 Ground Water Flow Gradients

6.2.1 Site Overview

Ground water flow across the Lobeco Products' facility is generally to the south, toward Campbell Creek as shown on Plate 8. Local deviations in response to cultural features on the plant property are likely. The horizontal gradient calculation as well as the map of the water table configuration are based on water level data obtained on May 25, 1988. These data as well as previously obtained water level data are summarized in Table 6.2.1.

As discussed in Section 5.4 of this report, water level data was collected from twenty-six (26) monitoring wells and piezometers across the site. However, data obtained from monitoring well W-13 is anomalously low and may represent local confining conditions. Monitoring well L-4 was intentionally screened opposite a perched water table near W-13 and, therefore does not represent the overall site water table elevation.

The horizontal gradient was calculated using water level data from monitoring wells L-1 located at the north end of the site and W-5 located at the south end. These calculations indicate that the water table slopes to the south at an average of 0.003 ft/ft. Water table elevations range from 16.12 feet above mean sea level in monitoring well W-7 to 4.22 feet above mean sea level in monitoring well W-5.

Table 6.2.1
Summary of Water Table Elevations
Lobeco Site Environmental Assessment

WELL #	FEB 22, 1988	MARCH 24, 1988	APRIL 11-18, 1988	MAY 25, 1988
V-1	16.83	16.48	NR	NR
V-2	15.76	15.40	NR	NR
V-3	15.52	15.29	NR	NR
V-4	12.66	12.20	NR	NR
V-5	10.30	8.54	NR	NR
V-6	8.62	8.00	NR	NR
W-1	6.81	6.54	NR	NR
W-3	10.27	8.99	7.20	6.54
W-4	10.32	9.32	8.02	7.86
W-5	6.47	5.34	4.47	4.22
W-6	16.24	17.40	15.85	15.42
W-7	18.69	18.18	16.36	16.12
W-10	15.95	15.31	NR	NR
W-11	15.43	14.66	NR	NR
W-12	15.47	14.62	13.41	12.31
W-13	12.75	12.43	9.67	9.05
L-1	NA	16.52	15.50	15.04
L-2	NA	NA	14.48	13.55
L-3	NA	NA	12.90	11.68
L-4	NA	NA	14.16	12.75
L-5	NA	NA	6.26	6.06
L-6	NA	NA	6.51	6.27
L-7	NA	NA	12.29	11.51
PZ-1	NA	7.51	NR	6.17
PZ-2	NA	8.19	NR	6.89
RB-2	NA	10.07	10.45	NA
RB-3	NA	5.16	2.83	NA
ATW-1	NA	9.32	7.79	7.52
ATW-2	NA	8.92	7.70	7.62
ATW-3	NA	8.48	6.99	6.61
ATW-4	NA	8.91	7.06	6.56
ATW-5	NA	9.76	8.11	7.85
BTW-1	NA	15.46	14.72	13.58
BTW-2	NA	15.17	14.40	13.12
BTW-3	NA	14.67	13.91	12.84
BTW-4	NA	15.03	14.25	13.16
BTW-5	NA	15.16	14.33	13.16

NA- water level data not available; data collected prior to installation of the monitoring well or after well was abandoned.

NR- no water level measurement taken.

6.2.2 Abandoned Lagoon (Area A)

Ground water flow across the Abandoned Lagoon area is generally to the southeast toward monitoring well L-5 and to the southwest toward monitoring well L-6 as shown on Plate 9. The horizontal gradient calculations as well as the water table configuration is based on water level data collected on May 25, 1988. These data as well as previously collected water level data are summarized on Table 6.2.1.

Water table elevations range from 7.86 feet above mean sea level in monitoring well W-4 to 6.06 feet above mean sea level in monitoring well L-5. The water level data indicate an area of mounded ground water in the north-central portion of the grid area extending to the north outside of the surveyed grid. South of the mounded ground water, within the grid area, the water table slopes to the southeast at an average of 0.009 ft/ft and also to the southwest at an average of 0.011 ft/ft. South of the former lagoon, the water table intersects surface water ponded in the marshy areas on either side of the access road.

6.2.3 Old Burn Site (Area B)

Ground water flow across the Old Burn Site is generally to the southeast toward monitoring well L-3 as shown on Plate 10. Local deviations related to the east-west trending irrigation ditches are possible. The horizontal gradient calculations as well as the map of the water table configuration are based on water level data collected on May 25, 1988. These data as well as previously collected water level data are summarized on Table 6.2.1.

Water table elevations range from 13.58 feet above mean sea level in temporary monitoring well/piezometer BTW-1 to 11.68 feet above mean sea level in monitoring well L-3. The water level data indicate that from northwest to southeast, across the Old Burn Site, the water table slopes to the southeast at 0.003 ft/ft. Further to the south, outside of the surveyed grid area, the water table slopes more steeply to the south-southeast at 0.007 ft/ft.

As previously stated in section 6.2.1 of this report, water level measurements from monitoring wells W-13 and L-4 were not used to prepare Plate 10. The water level measured in well W-13 is anomalously low and may indicate local confined conditions whereas well L-4 was screened opposite perched water and therefore does not represent the water table elevation.

6.2.4 Old Drum Storage (Area D)

Ground water flow across the Old Drum Storage Area appears to be to the north toward monitoring well W-6 as shown on Plate 11. The horizontal gradient calculations as well as the map of the water table configuration are based on water level data collected on May 25, 1988. These data as well as previously collected water level data are summarized on Table 6.2.1.

Water table elevations range from 16.12 feet above mean sea level in well W-7 to 15.04 feet above mean sea level in well L-1. The water level data indicate a localized area of mounding around well W-7. The limited water level data in the vicinity of the Drum Storage Area indicate that water table slopes from south to north at an average of 0.003 ft/ft which is probably a result of the localized mounding. Although the water level data indicates that well L-1 is hydraulically downgradient, the analytical results suggest that well L-1 is representative of background water quality.

6.3 GROUND WATER ANALYTICAL RESULTS

6.3.1 Site Overview

As part of the Lobeco Site Environmental Assessment, ground water samples were obtained from twenty-six monitoring wells. Samples from twelve wells (ATW-1 through ATW-5, BTW-1 through BTW-5 and RB-2 and 3) were analyzed for PCBs and TOC. Samples from the remaining wells were analyzed for the parameters listed in Table 6.3.1 and the analytical results of concentrations above detection limits are summarized in Table 6.3.2.

Four of the wells, L-1, RB-2, RB-3 and W-5, are located away or upgradient from the three primary study areas. Monitoring well L-1 was installed to provide background water quality for the site. Even though the water level data in the immediate vicinity of the Old Drum Storage Area suggest that well L-1 is downgradient of the Old Drum Storage Area, none of the compounds analyzed for were found above the detection limit.

Reference borings RB-2 and RB-3 were screened on top of the Hawthorn Formation to evaluate water quality conditions in the lower part of the unconfined aquifer. These wells were analyzed for the indicator parameters, TOC and PCB. As with well L-1, these analyses indicate background water quality at these locations.

Table 6.3.1

Listing of Analytical Parameters
Lobeco Site Environmental Assessment

Ground water samples were collected from fourteen (14) permanent monitoring wells, ten (10) temporary monitoring wells/piezometers and two (2) reference borings. A summary of the analytical parameters is as follows:

Indicators
- Specific conductance
- pH
- Temperature
- Total Organic Carbon [1]

Inorganics [2]
- Antimony
- Arsenic
- Beryllium
- Cadmium
- Chromium
- Copper
- Cyanide
- Lead
- Mercury
- Nickel
- Phenols
- Selenium
- Silver
- Thallium
- Zinc

Organics [2]
Volatiles
- Acrolein
- Acrylonitrile
- Benzene
- Bis(chloromethyl)Ether
- Bromoform
- Carbon Tetrachloride
- Chlorobenzene
- Chlorodibromomethane
- Chloroethane
- 2-chloro-ethylvinyl ether
- Chloroform
- Dichlorobromomethane
- Dichlorodifluoromethane
- 1,1-Dichloroethane
- 1,2-Dichloroethane
- 1,1-Dichloroethylene
- 1,2-Dichloropropylene
- Ethylbenzene

Table 6.3.1, cont.

Methyl Bromide
Methyl Chloride
Methylene Chloride
1,1,2,2-Tetrachloroethane
Tetrachloroethylene
Toluene
1,2-Trans-Dichloroethylene
1,1,1-Trichlorethane
1,1,2-Trichloroethane
Trichloroethylene
Trichlorofluormethane
Vinyl Chloride

Acid Extractables [2]

2-chlorophenol
2,4-Dichlorophenol
2,4-Dimethylphenol
4,6-Dinitro-O-cresol
2,4-Dimethylphenol
2-Nitrophenol
4-Nitrophenol
P-chloro-M-cresol
Pentachlorophenol
Phenol
2,4.6-Trichlorophenol

Base Neutrals [2]

Acenaphthene
Acenaphthylene
Anthracene
Benzidine
Benzo(a)Anthracene
Benzo(a)pyrene
3,4-Benzofluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Bis(2-chloroethyoxy) methane
Bis(2-chloroethyl) Ether
Bis(2-chloroisopropyl) Ether
Bis(2-ethylhexyl) Phthalate
4-Bromophenyl Phenyl Ether
Butyl Benzyl Phthalate
2-chloronapthalene
4-chlorophenyl phenyl ether
Chrysene
Dibenzo(a,h) Anthracene
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene

Table 6-3-1, contd.

3,3-Dichlorobenzidine
Diethyl Phthalate
Dimethyl Phthalate
Di-N-Butyl Phthalate
2,4-Dinitrotoluene
2,6-Dinitrotoluene
Di-N-Ocytl Phthalate
1,2-Diphenylhydrazine
Fluoranthene
Fluorene
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene
Hexachloroethane
Indeno(1,2,3,cd) Pyrene
Isophorone
Napthalene
Nitrobenzene
N-Nitrosodimethylamine
N-Nitrosodi-N-Prophylamine
N-Nitrosodiphenylamine
Phenanthrene
Pyrene
1,2,4-Trichlorobenzene

Pesticides/PCBs[2]
Alpha-BHC
Beta-BHC
Delta-BHC
Gamma-BHC (Lindane)
Heptachlor
Aldrin
Heptachlor Epoxide
Endosulfan I
Dieldrin
4,4'-DDE
Endrin
Endosulfan II
4,4'-DDD
Endosulfan Sulfate
4,4'-DDT
Methyoxychlor
Endrin Ketone
Toxaphene
PCB-1016
PCB-1221
PCB-1232
PCB-1242
PCB-1248

Table 6.3.1, contd.

PCB-1254
PCB-1260
Endrin Aldehyde
Technical Chlordane

Site Specific Chemicals [2]
1-Amino-2-methylanthraquinone
2-Aminoanthraquinone

[1] Per the Plan of Study, monitoring wells W-3, W-4, W-5, W-6, W-7, W-12, W-13 and L-1 through L-7 were not tested for total organic carbon but were tested for priority pollutant and other organic parameters.

[2] These are priority pollutant parameters with the exception of the site specific chemicals. Per the Plan of Study, temporary monitoring wells were not tested for inorganics, volatile organics, acid extractables, base neutrals, pesticides, or site specific chemicals but were tested for total organic carbon and PCBs.

In addition, soil samples taken from the Abandoned Lagoon (Area A) were analyzed for PCBs. Soil samples taken from the Old Burn Site (Area B) and the Old Drum Storage Area (Area D) were analyzed for PCBs and TOC. Also, soil samples obtained from the Marsh (Area C) were analyzed for PCBs and site specific chemicals.

Table 6.3.2
Summary of Analytical Results from Ground Water Sampling
Lobeco Site Environmental Assessment

WELL #	W-3	W-4	W-5	W-6	W-7	W-12	W-13	L-1	L-2	L-3	L-4	L-5	L-6	L-7
PARAMETERS [2]														
INDICATORS														
Specific Conductance (umhos/cm)	5,570	320	480	130	910	1120	295	170	175	375	245	11,000	7,700	325
pH (standard units)	4.20	4.70	4.80	4.75	5.00	4.50	6.80	6.20	4.80	5.30	5.40	4.15	3.90	4.50
Temperature (C)	17.0	20.0	19.0	16.0	18.0	19.0	24.0	18.0	17.0	20.0	19.0	20.0	20.0	17.0
TOC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PCB														
PCB-1248	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
INORGANICS														
Arsenic	0.055	ND	ND	ND	0.005	0.007	ND	ND	ND	ND	ND	0.33	0.22	ND
Beryllium	0.024	ND	ND	ND	ND	0.018	ND	ND	ND	ND	ND	0.37	0.18	ND
Cadmium	0.032	ND	ND	ND	ND	ND	ND	ND	0.0008	0.0008	ND	0.11	0.064	ND
Chromium	0.010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	ND	ND
Cyanide	0.032	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mercury	0.0006	ND	ND	ND	ND	ND	0.002	ND	ND	ND	ND	0.0002	0.0003	ND
Nickel	0.10	ND	ND	ND	0.028	0.03	ND	ND	ND	ND	ND	0.22	0.22	0.02
Phenols	0.25	ND	ND	ND	ND	ND	ND	ND	ND	0.008	ND	0.25	0.64	ND
Silver	0.0012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0026	0.0021	ND
Zinc	0.47	0.016	0.060	0.170	0.071	0.055	ND	ND	0.008	0.029	ND	1.60	1.40	0.014
ORGANICS														
Volatiles														
Benzene	0.018	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	0.017	ND
Bromoform	0.009	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	0.380	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	0.014	ND	ND	0.046	1.100	ND	ND	ND	ND	ND	ND	0.011	0.013	ND
Methyl Chloride	ND	ND	0.009	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	ND	ND	0.061	0.008	0.081	ND	ND	ND	0.008	0.007	0.009	ND
Toluene	ND	ND	ND	ND	0.080	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Trans-Dichloroethylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.006	ND	ND	ND	ND
Trichloroethylene	0.390	ND	ND	ND	ND	ND	ND	ND	ND	0.210	ND	0.020	0.024	ND
Base Neutrals														
1,4-Dichlorobenzene	ND	ND	ND	ND	0.280	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	2.100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.003	0.610	ND
1,2,4-Trichlorobenzene	2.100	0.039	ND	ND	1.100	ND	ND	ND	ND	ND	ND	ND	0.120	ND
SITE SPECIFIC CHEMICALS														
1-Amino-2-Methylanthraquin	N/A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Aminoanthraquinone	N/A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

[1]- unless otherwise stated analytical results are reported in parts per million (PPM).
[2]- only those parameters found above the detection limit in at least one sample are shown.

ND- constituent not found above the Detection Limit.
N/A- parameter not analyzed.

Table 6.3.2 (cont'd)
Summary of Analytical Results from Ground Water Sampling
Lobeco Site Environmental Assessment

WELL #	ATW-1	ATW-2	ATW-3	ATW-4	ATW-5	BTW-1	BTW-2	BTW-3	BTW-4	BTW-5	RB-2	RB-3
PARAMETERS												
INDICATORS												
Specific Conductance (umhos/cm)	1740	5,600	2,965	8,120	1,405	395	2,810	4,640	800	6,960	510	380
pH (standard units)	5.95	4.40	4.25	4.95	6.65	4.40	3.70	3.90	4.55	4.00	7.30	6.75
Temperature (C)	17.0	19.0	18.0	17.0	21.0	17.0	16.5	17.0	18.0	17.0	20.0	19.0
TOC	34	140	72	260	42	24	43	270	57	400	4.8	5.3
PCB												
PCB-1248	ND	0.0624	0.0023	0.0009	0.258	0.0002	0.0003	0.0009	0.0012	0.0123	ND	ND

[1]- unless otherwise stated analytical results are reported in parts per million (PPM).
ND- constituent not found above the Detection Limit.

Monitoring well W-5 is located at the south end of the facility, downgradient of the Abandoned Lagoon Area. This well is screened in the upper portion of the unconfined aquifer. The analytical results from well W-5 show detectable levels of zinc and methyl chloride. However, neither of these concentrations is in excess of the primary or secondary drinking water standard.

6.3.2 Abandoned Lagoon (Area A)

To evaluate water quality conditions around the abandoned lagoon, ground water samples were collected from nine (9) monitoring wells. Temporary monitoring wells ATW-1 through ATW-5 and permanent monitoring wells L-5, L-6 and W-3 were located to investigate water quality within and downgradient of the former lagoon while permanent monitoring well W-4 is installed upgradient to provide background water quality for the study area.

Indicators

Assuming that well W-4 represents background water quality for the abandoned lagoon area, an area of affected ground water is indicated by elevated specific conductance. Specific conductance values within and downgradient of the former lagoon range from 1405 umhos/cm in well ATW-5 to 11,000 umhos/cm in well L-5 and average 5512 umhos/cm. Upgradient in well W-4, specific conductance was measured at 320 umhos/cm. Within and downgradient of the abandoned lagoon, pH ranges from 3.70 in well L-6 to 6.65 in well ATW-5 and averages 4.80. TOC was measured in temporary wells ATW-1 through ATW-5. TOC concentrations range from 34 ppm in ATW-1 to 260 ppm in

ATW-4. These data suggests that there is some variability in the amount and distribution of organic compounds across the former settling lagoon.

Inorganics

Monitoring wells L-5, L-6, W-3 and W-4 were analyzed for priority pollutant metals. Upgradient of the former lagoon in monitoring well W-4 background concentrations of zinc were identified. Downgradient of the lagoon, detectable levels of arsenic, beryllium, cadmium, chromium, cyanide, mercury, nickel, silver and zinc are reported. However, only arsenic and cadmium were found above the MCLG of 0.05 and 0.005 ppm, respectively.

Arsenic concentrations range from 0.055 ppm in well W-3 to 0.33 ppm in well L-5. Arsenic was not detected in the upgradient well. These data indicate a source of arsenic within the abandoned lagoon.

Cadmium concentrations range from 0.032 ppm in well W-3 to 0.11 ppm in well L-5. As with arsenic, cadmium was not detected in the upgradient well. The analytical results for cadmium, like those for arsenic, also indicate a source of cadmium within the abandoned lagoon.

Organics

In addition to the metals analyses discussed above, monitoring wells L-5, L-6, W-3 and W-4 were analyzed for priority pollutant volatile organic compounds. Analytical results are summarized on Table 6.3.2. Detectable levels of benzene, bromoform, chloroform, methylene chloride, and trichloroethylene were identified downgradient of the former lagoon, but none of these constituents were detected upgradient of the lagoon. This indicates a source of these constituents within the lagoon area. Only benzene and trichloroethylene were found in excess of the MCL.

Benzene concentrations range from 0.010 ppm in well L-5 to 0.018 ppm in well W-3.

Trichloroethylene concentrations range from 0.020 ppm in well L-5 to 0.390 ppm in well W-3.

Base Neutrals

Napthalene and 1,2,4-trichlorobenzene were identified downgradient of the abandoned lagoon. Detectable levels of 1,2,4-trichlorobenzene were found in the upgradient well.

Polychlorinated Biphenyls

PCB analyses were performed on ground water samples from temporary wells ATW-1 through ATW-5, L-5, L-6, W-3 and W-4. Except for temporary wells ATW-3 and ATW-4 located at the southwest and southeast corners respectively, the analytical results indicate that PCBs in the ground water are confined to the former lagoon.

In addition to the analyses discussed above, ground water samples from L-5, L-6, W-3 and W-4 were analyzed for 1-amino-2-methylanthraquinone and 2-aminoanthraquinone. Neither of these compounds were identified above the detection limit.

6.3.3 Old Burn Site (Area B)

To further define water quality conditions around the Old Burn Site, ground water samples were collected from eleven (11) wells. Temporary wells BTW-1 through BTW-5 and permanent wells L-3, L-4, L-7, W-12 and W-13 are located within and downgradient of Area B, while monitoring well L-2 is located upgradient.

Indicators

For the purpose of this discussion, analytical results for well L-2 will be used as background concentrations for study Area B. Elevated specific conductance is reported from wells BTW-2 through BTW-4, and W-12. These elevated readings may be the result of waste salts disposed at the Old Burn Site. Compared with monitoring well L-2, pH measurements at the Old Burn Site indicate that the ground water has been impacted. However, further downgradient pH values appear to represent background conditions. TOC analyses were also performed on ground water samples from BTW-1 through BTW-5. TOC concentrations range from 24 ppm in well BTW-1 to 400 ppm in well BTW-5. The range in concentrations detected suggest that there may be some variability in the amount and distribution of organic compounds at the Old Burn Site.

Inorganics

Monitoring wells L-2, L-3, L-4, L-7, W-12 and W-13 were analyzed for priority pollutant metals. Detectable levels of arsenic, beryllium cyanide, cadmium, mercury, nickel and zinc are reported from the Old Burn Site. However, none of the reported concentrations are in excess of the MCLGs. Detectable levels of cadmium and zinc were observed upgradient in well L-2.

Organics

Monitoring wells L-2, L-3, L-4, L-7, W-12 and W-13 were analyzed for priority pollutant volatile organic compounds. Detectable levels of chloroform and methylene chloride are reported from wells L-7, W-12 and W-13, while 1,2-trans-dichloroethylene and trichloroethylene are reported from well L-3. Volatile organic compounds were not detected in well L-2. Of the organic compounds identified, only trichloroethylene in well L-3 was in excess of the MCL of 0.005 ppm. Based on the ground water flow directions as interpreted from the May 25, 1988 water level data and the analytical results from the wells downgradient of Area B, it appears that there are separate source areas for the organic compounds identified in well L-3 and those identified in wells W-12, W-13, L-7 and L-4.

Polychlorinated Biphenyls

Ground water samples from temporary monitoring wells BTW-1 through BTW-5 and permanent monitoring wells L-2, L-3, L-4, L-7, W-12 and W-13 were analyzed for PCBs. PCBs were identified in wells BTW-1 through BTW-5 at concentrations ranging from 0.0002 ppm in well BTW-1 to 0.0123 ppm in well

BTW-5. As with the abandoned lagoon area, PCBs appear to be confined to the immediate site area. PCBs were not identified in any of the downgradient wells.

Site Specific Chemicals

Monitoring wells L-2, L-3, L-4, L-7, W-12 and W-13 were analyzed for 1-amino-2-methylanthraquinone and 2-aminoanthraquinone. These constituents were not identified in any of the samples analyzed.

6.3.4 Old Drum Storage (Area D)

To evaluate the water quality conditions of the Old Drum Storage Area, ground water samples were obtained from monitoring wells W-6 and W-7. Although well W-7 is hydraulically upgradient from the Old Drum Storage Area, the analytical results do not indicate background water quality.

Indicators

Indicator parameters were measured in wells W-6 and W-7. Specific conductance ranged from 130 umhos/cm in well W-6 to 910 umhos/cm in well W-7. pH varied from 4.75 in well W-6 to 5.00 in well W-7. TOC was not measured in either well.

Inorganics

Priority pollutant metals analyses were performed on wells W-6 and W-7. Detectable levels of arsenic and nickel were identified in well W-7 while background zinc was found in wells W-6 and W-7. However, none of the concentrations observed is in excess of the MCLGs.

Organics

Detectable concentrations of chlorobenzene, chloroform, methylene chloride and toluene are reported from well W-7. Chloroform is the only organic compound identified in well W-6.

Base Neutrals

1,4-dichlorobenzene and 1,2,4-trichlorobenzene were identified in well W-7 above the detection limit.

Polychlorinated Biphenyls

PCBs were not identified in either of the wells sampled.

Site Specific Chemicals

Samples collected from wells W-6 and W-7 were analyzed for 1-amino-2-methylanthraquinone and 1-aminoanthraquinone. These compounds were not identified in the samples from the Old Drum Storage Area.

6.4 Vegetation Analytical Results

6.4.1 Abandoned Lagoon (Area A)

Samples of herbaceous vegetation were collected in the vicinity of each temporary monitoring well/piezometer. The samples were labeled with the prefix "AV" followed by a number which corresponds to the nearest temporary well. The analytical results are summarized in Table 6.4.1, and included in Appendix C.

PCB concentrations range from not detected in samples AV-1, AV-2, and AV-3 to 1.0 ppm in sample AV-4. The analytical results indicate that although PCBs are present, they do not represent a significant environmental impact. Cross contamination from PCBs contained in soils splashed by rain drops or carried on dust particles is possible.

6.4.2 Old Burn Site (Area B)

Samples of herbaceous vegetation were collected near each temporary monitoring well/piezometer. Each sample was labeled with the prefix "BV" followed by the number of the nearest temporary well. The analytical results are summarized in Table 6.4.1 and are included in Appendix C.

PCB concentrations ranged from not detected in samples BV-1 through BV-4 to 2.9 ppm in sample BV-5. The analytical results indicate that although PCBs are present, they do not represent a significant environmental impact. As with the lagoon area, cross contamination from soils splashed by rain drops or carried on dust particles is possible.

TABLE 6.4.1
SUMMARY OF PCB ANALYSES ON VEGETATION SAMPLES [1]
LOBECO SITE ENVIRONMENTAL ASSESSMENT

ABANDONED LAGOON (AREA A)

SAMPLE ID NUMBER	CONCENTRATION (PPM)
AV-1	ND
AV-2	ND
AV-3	ND
AV-4	1.0
AV-5	0.7

OLD BURN SITE (AREA B)

SAMPLE ID NUMBER	CONCENTRATION (PPM)
BV-1	ND
BV-2	ND
BV-3	ND
BV-4	ND
BV-5	2.9

[1]- analytical results are reported in parts per million (PPM).
ND- constituent not detected.

6.5 Geophysical Testing

6.5.1 EM-31 Survey

The Old Burn Site is defined as a small tract of land approximately 225 feet by 125 feet in size. The area is located a few hundred feet east of the plant operations area and has been used as a disposal area for various kinds of waste metal including but not limited to drums. The survey was conducted to identify areas suspected of containing buried material and to facilitate the placement of borings across the study area. Field measurements were obtained from 438 stations, and from these data a contour map of near surface magnetic variability was prepared. Station locations and contours of field values are illustrated in Plate 12. Surface cultural features significant to the study are shown in Plate 13.

The measuring device was a geonics EM-31 conductivity meter, used in the magnetometer mode. Field measurements were corrected for diurnal variation. Two types of magnetic signatures were observed; induced and permanent magnetizations. Metals exhibiting predominantly induced magnetizations include non-annealed, non-precipitation hardened irons and steels, which includes metal drums. Permanent magnetizations are generally produced by high grade steel as well as many types of pipe-rebar-fencing metal. The magnetic survey indicates the existence of buried metal at several locations.

The Old Burn Site contains a total of six positive (A-F) and fourteen negative (I-XIV) magnetic anomalies as shown on Plate 12. Several of the negatives do not lie immediately north of positive features and are not, therefore, the result of induced moments. Readings in areas VI and X, for example, were sharply negative off scale, but the isolated nature of these anomalies suggests that they are due to negatively directed permanent magnetizations in refuse metal immediately below the surface. The same is probably true of the 8 foot diameter negative centered on Plate 12 grid coordinates E58,N112. Sharply negative values in the northeastern corner of area I, all of area II, the eastern lobe of area IV and the north-central portion of area IX are obviously associated with refuse iron at the surface (Plate 13). Very small positive anomalies at E175,N56 and E138,N133 also seem to be the result of surface iron. Readings in areas III, V, XII, XIII, XIV, most of area I and the western lobe of area IV are likely the result of local variations in the magnetic character of underlying soils and rocks.

Five of the six major positive anomalies lie just south of well-defined minima, implying significant induced magnetizations. Each of the coupled features is strongly indicative of the low grade iron and steel typically found in drums. The most probable locations of the objects in question are delineated in Plate 14. The most likely depths to metal fall in the 3-8 foot range. Since the EM31 only provides qualitative indication of changes in magnetism, precise modeling of subsurface features is not possible. Still, the shaded areas of Plate 14 almost certainly overlie significant quantities of metal. This is particularly true for the area near maximum D.

Maximum F, it should be noted, is roughly the same size and intensity as maximum C. In the case of F, however, there is no associated magnetic low. The high may be due to assorted permanently magnetized objects, or it may in fact represent an induced magnetic maximum. The absence of a well-defined minimum could be the result of measurement difficulties encountered 5-15 feet north of the maximum where a steep topographic grade caused readings to be somewhat unstable. Maximum F is probably real and likely overlies some sort of metal. Areal extent and depth of the buried objects, however, are less certain than in the cases of maxima A-E and no location rectangle is indicated in Plate 14.

6.5.2 Physical Soils Testing

In addition to the chemical analyses previously described, one undisturbed sample from the top of the Hawthorn Formation and three (3) split-spoon samples from the overlying soils were collected from each of the reference borings. The undisturbed samples were collected to determine the vertical permeability of the lower confining layer and the split-spoon samples were collected for physical characterization.

The vertical permeability test results as well as the physical soils characterization data are included as Appendix D.

The undisturbed samples were collected in accordance with ASTM-D1587. Permeabilities were determined using the procedures outlined in the U.S. Army Corps of Engineers Manual EM 1110-2-1906, Appendix VII, Permeability Tests. Test results indicate vertical permeability ranges from 1.67×10^{-7} cm/sec in boring L-1 to 5.14×10^{-7} in boring RB-2.

Split spoon samples were tested for Atterberg Limits, moisture content, dry density, and grain size distribution. From these analyses, each sample was classified in accordance with the "Unified Soils Classification". These tests indicate that the soils are typically silty sands that contain varying amounts of clay and clay seams and are generally classified as either sands (SM) or clayey sands (SC). Samples visually classified in the field are consistent with these results.

7. CONCLUSIONS

7.1 Site Overview

As previously noted (Chapter 2), two (2) geologic formations were encountered during drilling operations at the Lobeco site; the Pamlico Formation and the Hawthorn Formation.

The Pamlico represents the dominant surface geology at the site, and is typically described as an unconsolidated, tan and gray, find sand containing varying amounts of silt and clay. Ground water occurs within the Pamlico Formation under confined to semi-confined conditions. Ground water flow is generally to the south with discharge occurring to the marsh bordering Campbell Creek. The average water table gradient across the site from North to South is 0.003 feet per foot.

The ground water flow rates calculated from prior Law Engineering and G&E soil conductivity measurements are 5.0 - 7.5 and 4.0 - 6.0 feet per year respectively. (See Appendix E.)

Available data from indicator parameter analyses (specific conductance, pH, TOC) from shallow wells (10 - 20 feet) and deeper wells (L-1, RBTW-2, W-12 and RBTW-3) do not indicate any mixing between the upper and lower levels of the unconfined aquifer.

The Hawthorn Formation represents the lower confining layer for the unconfined aquifer and serves as a substantial aquitard for the potable Floridan aquifer beneath it. The Hawthorn is typically described as a green clay with trace amounts of silt and broken shells. Geophysical testing of samples of the Hawthorne Formation collected from reference borings RB-1, RB-2, and RB-3 indicate a vertical permeability range of 1.7 to 5.1 x 10-7 cm/sec. Since the Hawthorne is 40 - 50 feet thick at the Lobeco Plant site (Chapter 4), near-future interchange between the surficial aquifer and the Floridan is highly unlikely as long as the Hawthorne is not breached.

No known public or private water supplies are extracted from the unconfined aquifer downgradient of the site. Therefore, there is little potential for impact to domestic water supplies.

7.2 Abandoned Lagoon (Area A)

The soils in Area A are generally described as tan and gray silty sands with varying amounts of clay. These soils typically grade laterally and vertically into slightly sandy silts with variable clay content. Dark gray silty clay was also noted in several borings below 16.0 feet. Sludge, when encountered, was generally found between 2 and 8 feet below ground surface.

PCBs were identified in all of the borings located inside the boundaries of the former lagoon. The PCBs are primarily associated with a "sludge" layer generated during prior usage of the lagoon as a settling basin for process effluent. Significant concentrations of PCB occur in the north-center portion of the former lagoon, spreading toward the south from the original effluent inlet pipe. The highest concentrations of PCB are primarily located between 4 and 6 feet below ground surface; however, PCBs were detected at a few locations to 14 feet. Because the surveyed grid was misplaced slightly to the south, the exact northern boundary of the former lagoon has not yet been defined.

Ground water flow from the lagoon area is toward the southeast toward monitoring well L-5 and southwest toward monitoring well L-6. Water level data indicate an area of mounding in the north-central portion of Area A extending to the north toward monitoring well W-4. The water table gradient averages 0.009 feet/foot to the southeast and 0.011 feet/foot to the southwest. South of the former lagoon the water table intersects surface water ponded in the marshy areas on either side of the access road.

PCBs were not detected outside of the boundaries of the former lagoon, indicating that the PCB within the confines of the lagoon are bound in the soil matrix and are not migrating.

Downgradient of the abandoned lagoon, detectable levels of arsenic, beryllium, cadmium, chromium, cyanide, mercury, nickel, silver and zinc are reported in the ground water. However, only arsenic and cadmium were found above the EPA maximum contaminant level (MCL). The data suggests that the source of contamination was the plant effluent discharged into the lagoon before it was abandoned.

Monitoring wells L-5, L-6, W-3, and W-4 were analyzed for priority pollutant volatile organic compounds. Detectable levels of benzene, bromoform, chloroform, methylene chloride, toluene and trichloroethylene were identified. However, only benzene and trichlorethylene were found in excess of the MCL. As with the metals, the data suggests that the lagoon is the source of the organics.

Calculations based on ground water flow rate and constituent concentrations (See Appendix E) indicate that the mass flow of each of the four components which exceed the MCL is less than one pound per year. In view of these calculations and since no known public or private water supplies are extracted from the unconfined aquifer downgradient of the lagoon area, these constituents do not represent a significant threat to human health or the environment.

Of the base neutral compounds analyzed, only naphthalene and 1,2,4-trichlorobenzene were identified downgradient. No MCLs exist for either of these compounds.

Based on the foregoing, remediation of the soil and sludge in the Abandoned Lagoon is recommended as needed, but remediation of ground water beyond source removal is deemed unnecessary.

7.3 Old Burn Site (Area B)

Soils are generally described as tan to black, silty fine sands. Between two (2) and four (4) feet, these sediments grade into a silty clay layer. The clay layer appears to grade laterally and downward into a light gray to white silty sand with variable clay content.

Ground water flow is generally to the southeast toward monitoring well L-3. The water level data indicate that the water table slopes to the southeast at 0.003 feet/foot increasing to 0.007 feet/foot further downgradient.

Soil analytical results for PCBs indicate a limited and random distribution across the Old Burn Site. The extent of PCB impacted soil has not been fully defined with soil borings. However, as with the abandoned lagoon, the PCBs appear to be confined to the Burn Site. PCBs were not detected in any of the downgradient wells.

An electromagnetic survey (EM-31) of the Burn Site detected 6 positive magnetic anomalies, only 5 of which indicated significant subsurface metal-containing areas. The electromagnetic survey also suggests the potential for buried material outside of the surveyed grid. These areas are currently not defined.

Ground water flow across the Old Burn Site is toward the southeast. Several drinking water metals have been identified downgradient of Area B. However, none of the concentrations observed were in excess of the respective drinking water standard; therefore, the analytical results do not indicate that the downgradient ground water has been significantly impacted by these constituents.

Detectable levels of chloroform, methylene chloride and toluene are reported from wells L-4, L-7, W-12 and W-13, whereas 1,2-trans-dichloroethylene and trichloroethylene were detected in well L-3. The differences in the ground water components detected in L-3 and wells L-4, L-7, W-12 and W-13 indicate that they originated from different sources. Only trichloroethylene was identified above the MCL for drinking water (0.005 ppm).

As with the ground water from the Abandoned Lagoon, the annual mass flow of trichloroethylene from the Burn Site calculates to be less than 1 lb (See Appendix E). In view of these calculations and since no known public or private water supplies are extracted from the unconfined aquifer downgradient of the Old Burn Site, these constituents do not represent a significant threat to human health or the environment.

Based on the foregoing, remediation of the soil in the Burn Site and any buried chemicals is recommended as needed, but remediation of ground water beyond source removal is deemed unnecessary.

7.4 Old Drum Storage (Area D)

Analyses of soil samples from Area D show low concentrations of PCB at a few locations and elevated TOC values only in the upper two feet of the soil. These data indicate that soils in the Old Drum Storage Area have not been significantly impacted.

Ground water elevations in the Old Drum Storage Area indicate "mounding" at and around W-7. Movement of ground water away from this mounded area is probably in all directions, but ultimately is toward the south.

PCB analysis of ground water samples indicates that although PCBs are present at some locations in the soil, they were not found in the ground water system.

Detectable levels of chlorobenzene, chloroform, methylene chloride and toluene have been identified in well W-7. However, none of these constituents was found in excess of the MCLGs.

In addition to the volatile organics, two base neutral compounds were identified in well W-7; 1,4-dichlorobenzene and 1,2,4-trichlorobenzene.

Although W-6 contains a low level of chloroform, it is well below the concentration in W-7. Overall, analytical results indicate a limited area of affected ground water located around well W-7.

Although the cause of the localized ground water "mound" around W-7 should be determined, there is no evidence to indicate that the Old Drum Storage Area, per se, represents a significant threat to human health or environment. No remediation is recommended.

7.5 Campbell Creek/Marsh (Area C)

Analytical results from samples taken near the outfall show the presence of PCB. The concentrations appear to increase with depth to approximately 0.75 feet[1], and are higher downstream than upstream. Below 0.75 feet, PCB concentrations drop to less than 10 ppm. As there is no continuing discharge of PCBs, the concentrations detected in the immediate vicinity of the effluent discharge pipe do not suggest any ongoing concern. PCBs were detected in sample C-4 near the repaired break in the line carrying plant effluent to Campbell Creek. However, PCBs do not appear to significantly impact the marsh in this area.

No remediation is deemed necessary.

1 Represents sample depth after compression, and indicates deposition substantially prior to the sampling date.

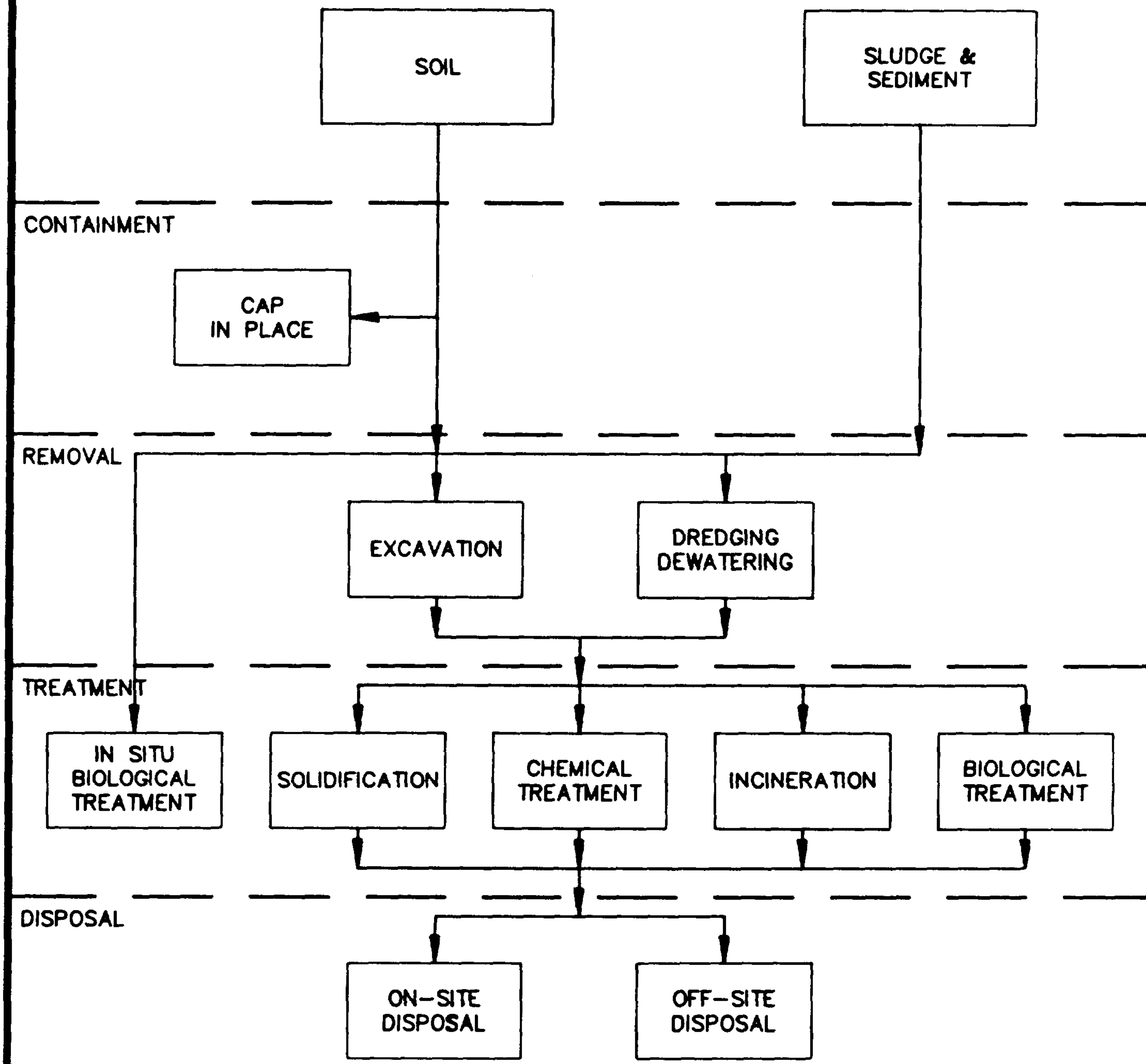
8. REMEDIAL ALTERNATIVES

8.1 Remediation of PCBs

There are several available technologies for remediating PCB containing soil, sludge, and ground water; however, all are not suitable for implementation at every site. The first step in selecting an appropriate remedial process is the identification of appropriate technologies. For the two Lobeco sites identified for remedial action, five broad response actions have been identified.

- No action.
- Containment of wastes and affected media.
- Removal of wastes and affected media.
- Treatment of wastes and affected media.
- Disposal of waste, residual from treatment processes and/or treated ground water.

Figures 8.1.1 and 8.1.2 illustrate a variety of alternative remedial technologies available for the containment, collection, treatment, and disposal of materials containing PCBs. These flowcharts also point out the interdependence and sequential nature of applying remedial technologies to site.



RMT Inc.
11 Regency Hills Drive
PO Box 16778
Greenville, SC 29606
(803)292-1921

FIGURE 8.1.1
LOBECO SITE ENVIRONMENTAL ASSESSMENT
FLOWCHART FOR POTENTIAL REMEDIAL TECHNOLOGIES FOR SOIL, SLUDGE, AND SEDIMENT CONTAINING PCBs

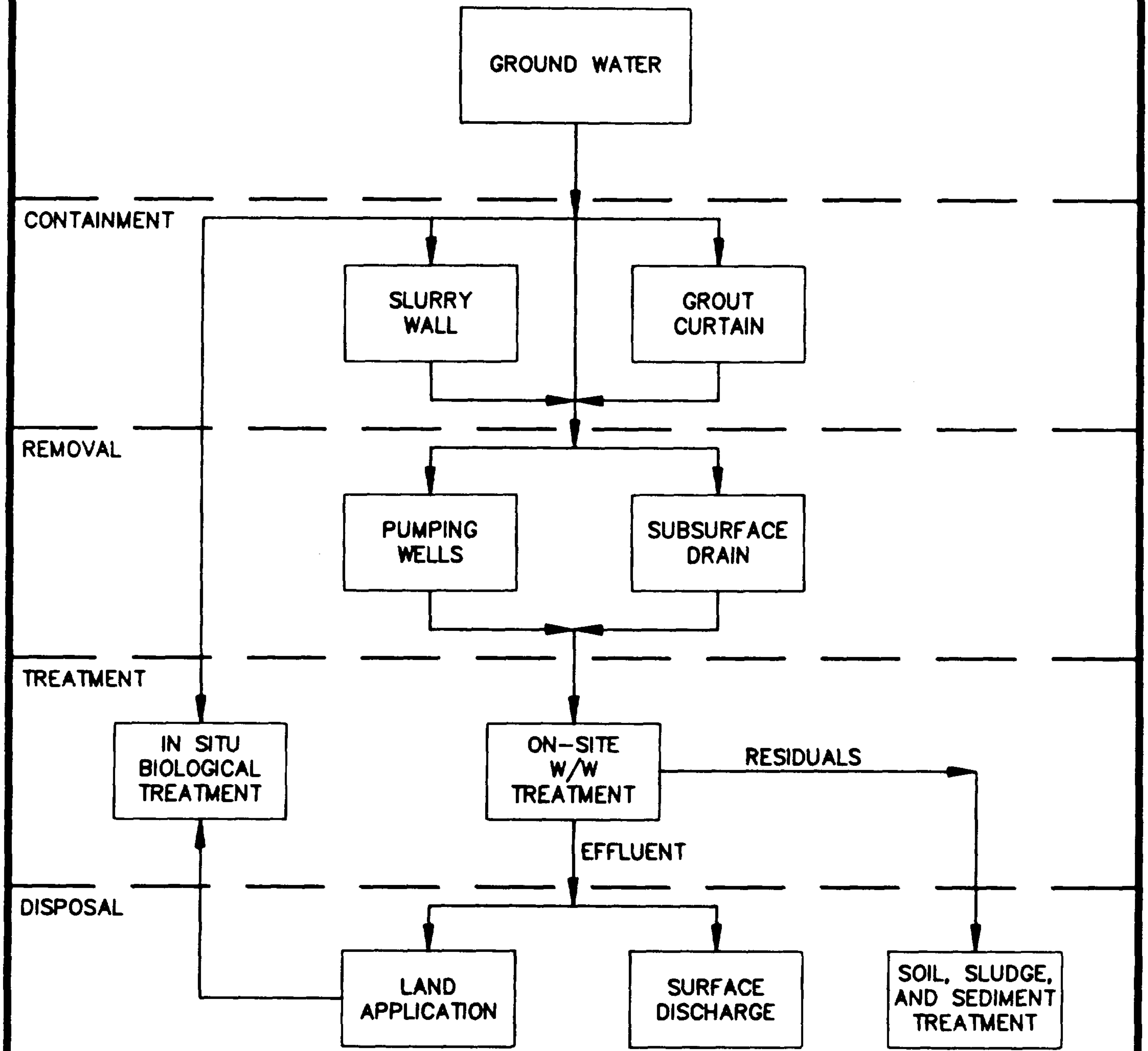


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FIGURE 8.1.2
LOBECO SITE ENVIRONMENTAL ASSESSMENT
FLOWCHART OF POTENTIAL REMEDIAL TECHNOLOGIES FOR GROUND WATER CONTAINING PCBs

8.1.1 Preliminary Identification of Remedial Technologies

The following alternative remedial technologies are potentially applicable.

- Treatment of wastes, sediments or ground water, in place
  - in situ bioremediation
- Removal of wastes, sediments or ground water
  - excavation
  - pumping wells
- Containment of wastes and/or ground water
  - site capping
  - regrading
  - slurry wall
- Treatment of wastes or ground water
  - biological degradation
  - incineration
  - solidification/fixation
  - flocculation/sedimentation (if necessary)
  - carbon adsorption
- Disposal of wastes
  - on-site landfill
  - off-site landfill

These potentially-applicable remedial technologies have been combined to form a preliminary list of remedial alternatives as follows:

- No physical action except for long term monitoring;
- Limited physical action (e.g., grade and cap);
- Limited physical action plus ground water/surface water protection and controls (e.g., slurry walls, drains, pumping);
- Excavate and dispose of waste at commercial PCB landfill for materials with PCB concentrations greater than 50 ppm;
- Excavate and chemically, biologically, or thermally destroy PCBs. Dispose of residuals in solid waste landfill;

- Limited physical action plus ground water/surface water protection and controls (e.g., slurry walls, drains, pumping) plus fixation of the PCB in place;

- Limited physical action plus ground water/surface water protection and controls (e.g., slurry walls, drains, pumping) plus biological treatment of the PCBs <u>in situ</u>.

8.1.2 Remediation Standards for PCBs

<u>Federal Standards</u>

- The Toxic Substance Control Act (TSCA), codified as 15 U.S.C. { 2601 <u>et seq.</u> regulates the manufacturing, processing, distribution, use and disposal of Polychlorinated Biphenyls (PCBs) in { 6(e) (15 U.S.C. { 2605(e)). Comprehensive EPA regulations controlling PCBs are found in 40 C.F.R. Part 761. The Chemical-Specific regulatory level for PCBs is specified in 40 C.F.R. { 761.1 as 50 parts per million (ppm) and above. The provisions of 40 C.F.R. Part 761 are applicable to the disposal and storage of PCBs in concentrations of 50 parts per million and above.

- 40 C.F.R. {761.65(b) (v) provides that any facility used for the storage of PCBs and PCB items must not be located at a site that is below the 100-year flood water elevation.

- 40 C.F.R. { 761.75(b) provides that chemical waste landfills used for the disposal of PCBs and PCB items meet specified requirements for soil, hydrologic conditions, flood protection and topography.

- The disposal of PCBs is not specifically regulated by the Resource Conservation and Recovery Act (RCRA), codified at 42 U.S.C. { 6901 <u>et seq.</u> RCRA, however, does contain location standards for hazardous waste treatment, storage, and disposal facilities. Those standards are generally found at 40 C.F.R. { 265.18 and { 264.18.

<u>South Carolina Standards</u>

- No requirements more stringent than the federal requirements have been identified.

8.2 Remediation of Compounds Other Than PCBs in Soil and Sediment

PCBs are the only components of concern directly identified in the soil and sediment by this study, but the data suggests that there are other chemical compounds in the soil and/or sludge at the abandoned lagoon and the old burn site. There may also be some chemicals in drums buried at the old burn site.

For these materials, five broad response actions have been identified.

- No action;
- Containment of materials and affected media;
- Removal of materials and affected media;
- Treatment of materials and affected media;
- Disposal of materials, treatment residuals, and/or treated ground water;

8.2.1 Volatile Organic Compounds

The following alternative remedial technologies are potentially applicable.

- Treatment in place
    - in situ bioremediation
- Removal
    - excavation
    - vacuum extraction
    - soil flushing
- Containment
    - site capping
    - regrading
    - slurry wall

- Treatment
  - biological degradation
  - incineration
  - solidification/fixation
- Disposal
  - on-site landfill
  - off-site landfill

8.2.2 Other Organic Compounds

The following alternative remedial technologies are potentially applicable.

- Treatment in place
  - <u>in situ</u> bioremediation
- Removal
  - soil flushing
- Containment
  - site capping
  - regrading
  - slurry walls
- Treatment
  - biological degradation
  - incineration
  - solidification/fixation
- Disposal of wastes
  - on-site landfill
  - off-site landfill

8.3 Ground Water Remediation

Analyses of samples from monitoring wells near two of the Lobeco sites (the abandoned lagoon and the old burn area) showed evidence of impacted ground water. The possible remedial alternatives for the ground water on the two sites can be generalized as follows.

- No action
- Hydrodynamic control with treatment, and discharge to a body of surface water
- Hydrodynamic control, treatment, and discharge to the Lobeco wastewater treatment plant
- Hydrodynamic control, treatment, and aquifer recharge
- *In situ* bioremediation

8.3.1 No Action

Continue to monitor the ground water, but take no remedial action. Source removal as discussed in Sections 8.1 and 8.2 would minimize further impact to the ground water.

8.3.2 Hydrodynamic Control and Treatment of the Impacted Ground Water

Hydrodynamic control of the affected ground water to prevent its off-site migration is achieved by installing recovery wells and pumping ground water from the impacted aquifer. Before the contaminated ground water can be properly disposed of, it must be treated to remove the constituents of concern. Treatment alternatives for the Lobeco site may be grouped into the following categories.

- Volatile organic compounds may be treated by air stripping, carbon adsorption, or biological degradation.
- Inorganic compounds may be treated by ion exchange or co-precipitation.
- Nonvolatile organics may be treated by carbon adsorption or biological degradation.

Ground water collection wells in addition to the hydrodynamic control wells can be positioned within the aquifer areas containing high levels of organics to expedite soil and ground water remediation. Minimizing the number and optimizing the location of collection wells can be accomplished by modelling the aquifer and calibrating the model using aquifer characteristics obtained from pumping tests on a recovery test well.

8.3.3 Discharge vs. Recharge of Treated Ground Water

Alternatives for the treated ground water are discharge to the surface water south of the plant site, recharge to the aquifer through an infiltration gallery, and discharge to Lobeco's wastewater treatment plant. In order to discharge to the surface water, an NPDES permit would be required, and SC DHEC would probably limit discharges to periods of outgoing tide.

If the treated water is discharged to surface water, hydrodynamic control will be achieved by the degree to which the withdrawal system draws down the aquifer in the affected area. The draw down develops a negative gradient that conveys ground water into the withdrawal system from outside the affected zone. Therefore, unaffected ground water is continually being exposed to constituents within the affected zone. The water drawn into the affected zone may have a high enough salt content to impact some remediation processes.

Hydrodynamic control of an aquifer can be also be achieved by recharge through infiltration trenches located upgradient of an affected area. Recharge develops a mound (positive gradient) of water around the infiltration trench which promotes an increased flow of water through the aquifer to expedite the remediation effort.

Recharge increases the rate at which an aquifer is flushed. Estimates indicate a 1.5-fold increase in the number of soil pore volumes extracted and treated when recharge is implemented. As a result, this approach would also be more effective in reducing the time required for complete remediation of the site. A withdrawal-recharge system constantly recirculates treated ground water creating a discrete zone of treatment. Filtration may be required to prevent clogging of the recharge system from suspended particulate matter developed in the treatment processes or suspended particulate matter from biological growth.

A withdrawal/recharge system is essential for in situ biological treatment, and it helps to remediate unsaturated soils by flushing.

8.3.4 *In Situ* Biological Remediation

In situ biological remediation can be accomplished by the addition of appropriate nutrients to the recharge water to enhance the biodegradation by naturally-occurring microorganisms found in the soil. *In situ* biological remediation has been used successfully on many organic compounds.

Optimum nutrient requirements, primarily oxygen, nitrogen, phosphorous, and trace compounds, are determined by laboratory evaluations in which a soil inoculum is treated at a number of nutrient concentrations. The purpose of these studies is to determine the viability and metabolic diversity of the soil bacterial population. Laboratory determinations are then used to scale up processes for field evaluation.

The feasibility of bioremediation at the Lobeco sites may be affected by several ground water parameters. The pH of the ground water is typically 5 to 6 and the growth of many microorganisms is retarded by pH that low. High salt content, which is implied by the high conductivity, may also negatively impact bioremediation. The inorganic constituents, which are suspected in the abandoned lagoon, may also be toxic to a microbial population. These parameters must be evaluated on a bench or pilot scale bioreactor before full-scale remediation can be implemented.

8.4 Excavation of Buried Material

Excavation would be carried out with equipment such as dozers, front-end loaders, and back hoes. The covering soil would be carefully removed and stored on site to be used as backfill following removal of the metallic debris. Excavation would be limited to amounts necessary to allow machine operation and sidewall stability.

Excavated soil and waste materials would be stored separately, and the waste would be analyzed in order to determine an appropriate disposal method. If containers were encountered, a determination would be made to carry out the following plan.

- If the condition of the container allows, it would be placed intact in an overpack drum.
- If the condition of the container does not allow it to be lifted into an overpack drum, and if it is possible to safely remove the contents, the contents of the drum would be transferred to a drum that is in good condition.
- If it is not possible to safely remove the contents of the drum or if a drum is inadvertently ruptured during excavation, the drum would be crushed and the contents solidified.

Earthen materials to be removed from off-site or other on-site locations not involved in previous waste disposal activities would be used to backfill the pits to original elevation and grade. During excavation and until backfill is completed, excessive rainwater run-on to the pits would be prevented by means of berms and/or ditches. Precautions to prevent excessive erosion and runoff resulting from removal activities would be used.

Excavated soil would be limited to quantities necessary for removal of previously disposed waste. At completion of waste removal, the bottom elevation of the excavated pit would be measured. The areal extent of the pit would be located by survey. The pit would be backfilled first with excavated sidewall soils and then with the original cover soils. Other earthen materials would be used to complete backfill to the original elevation and grade, and the backfill would be compacted. Following remediation of the remainder of the soil in the old burn area, a final layer of 2 to 4 inches of topsoil would be applied to the excavated surface, graded, and seeded.

8.5 Encapsulation of Waste Deposits

Subsurface barriers may be used to isolate and contain waste deposits, redirect ground water flow around "impacted" areas, and contain plumes of impacted ground water. The barriers may be constructed on either the upgradient or downgradient side or around the entire perimeter of the waste as necessary to contain the waste.

To control the ground water head within or upgradient of such a barrier, pumping wells or subsurface drains are frequently used. In order to effectively control contaminant migration within the ground water regime, a subsurface barrier must be designed so that it contacts a confining layer of low permeability at its base, extends upward to an elevation above the ground water level, and completely encompasses the contaminated area. Hydraulic containment does not address the actual removal of constituents.

A slurry wall is an example of an encapsulation method and is usually the primary means of containment. A slurry wall is constructed by excavating a trench to the depth of the confining base layer while adding a slurry into the excavation. The slurry generally consists of a bentonite/water mixture, which holds the excavation open while creating a low permeability filter cake on the sidewalls of the trench. The wall is usually completed by backfilling with a soil/bentonite mixture. The effectiveness of slurry walls depends on the control of proper excavation procedures and proper proportioning and placement of the select backfill material. In addition to soil and bentonite mixtures, cement/bentonite and synthetic membranes may be used.

Following installation of the slurry wall, the waste deposit is capped. The cap is constructed of compacted clay with a hydraulic conductivity of less than 1×10^{-7} cm/sec and is about two feet thick. A sand blanket is then placed on top of the compacted clay, followed by a layer of fill material, which is then covered by topsoil for revegetation. The clay layer provides a low permeability barrier which minimizes infiltration of surface water. The sand blanket provides a drainage layer above the clay to intercept and drain the infiltrated surface water. The layer of fill materials serves to protect the clay layer from frost penetration and surface erosion. Revegetation helps to reduce surface erosion.

9. PROPOSED REMEDIAL ACTION PLAN

9.1 Site Overview

The Proposed Remedial Action Plan addresses the four areas of the Lobeco property specified in SCDHEC Consent Order No. 87-65-W and in the Plan of Study; the Abandoned Lagoon, the Old Burn Site, the Old Drum Storage Area and the Campbell Creek/Marsh Area. In addition, ground water at the Lobeco Site is also examined.

These individual areas are addressed separately in sections 9.2 through 9.6 and remedial actions are proposed as warranted by the results of the March-April, 1988 site investigation. Based on these results, the soil, sediment, and ground water at the Lobeco site do not represent a significant threat to human health or the environment for the following reasons.

- The Abandoned Lagoon, the Old Burn Site, and the Old Drum Storage Area are inactive; therefore, no constituents of concern are being added to these areas.

- PCBs are no longer used at the site.

- PCBs are not migrating from the Abandoned Lagoon or Old Burn Site.

- Access to the Lagoon and Burn areas is restricted and personnel traffic is limited.

- The ground water in the unconfined aquifer throughout the area is exposed to surface contamination through rainwater infiltration; therefore, it is very unlikely that drinking water would be taken from it.

- The concentrations and quantities of constituents in the unconfined ground water are low, and movement of ground water and constituents is only a few feet per year.

- Natural degradation has and will continue to mitigate the already low concentrations of constituents in the ground water.

- Data from shallow wells (10-20 feet) and deeper wells (L-1, RBTW-2, and RBTW-3) indicate that there is little, if any, mixing between the upper and lower levels of the unconfined aquifer. Although some constituents are found in the shallow ground water which are not due to natural occurrence, none are found in the ground water near the Hawthorn aquitard.

- The Hawthorn aquitard, with a vertical permeability of 10^{-6} to 10^{-7} centimeters per second, effectively protects the Floridan aquifer from potential infiltration from the unconfined aquifer.

9.2 Abandoned Lagoon Area

Although the soils and ground water in the Abandoned Lagoon Area do not represent a significant threat to human health or the environment, source remediation is proposed.

Three remediation options have been selected (from the alternatives and technologies presented in Chapter 8) as being most suitable for the soil and sludge in the Abandoned Lagoon. These include off-site disposal, on-site bioremediation, and on-site encapsulation and storage in an above ground, RCRA-type vault.

All three options involve excavation, which will require management of the ground water at the site prior to and during excavation. In each case, prior to excavation, ground water levels within the lagoon area will be lowered to below the planned excavation depth. The intended method is installation of a slurry wall around the lagoon area extending downward into the Hawthorn formation, followed by pumping of the ground water inside the contained area, provided local conditions and/or technological problems do not preclude this approach. Ground water collected from this operation will be discharged to the Campbell Creek/Marsh area with a level of treatment dictated by the concentrations and quantities of chemical constituents contained therein.

The preferred remediation approach for the Abandoned Lagoon is to excavate the soil and sludge by layers, and segregate the excavated material into nominally contaminated and uncontaminated piles. The contaminated portion, specifically classified as having a PCB concentration greater than 50 ppm, will be dewatered by the addition of kiln dust, if necessary, and transported for disposal at an approved off-site landfill.

After post-excavation sampling to be certain that soil containing PCBs above 50 ppm has been removed, the empty, excavated area will be backfilled using the segregated uncontaminated soil previously excavated and with additional clean fill dirt as needed.

If, for any reason, difficulty is encountered in implementing off-site disposal of contaminated soil and sludge from the Abandoned Lagoon area, two alternate approaches will be considered as discussed below.

9.2.1 On-Site Bioremediation

In this approach, the contaminated excavated soil and sludge would be spread out over previously prepared "land farm" areas to a depth of approximately one foot. Bacteria and nutrients would be tilled into the soil, and the mass would be kept moist using sprinklers as necessary. Leachate run-off would be collected and added back to the soil mass for make-up moisture.

PCB and total organic carbon contents would be monitored by periodic sampling, and the soil mass would be re-tilled periodically as needed to maintain optimum aeration and bioactivity.

The uncontaminated soil would be returned to the excavation, and would be supplemented by the remediated soil when the decontamination limits are achieved. The lagoon area would finally be capped off with clean fill dirt.

9.2.2 On-Site RCRA-Type Vault

In this approach, a RCRA-type vault would be constructed on the Lobeco property in an area that is above the 100-year flood plain, probably between the plant north fence line and the abandoned railroad track. The contaminated soil and sludge from the abandoned lagoon excavation would be placed in the vault. The vault would be closed after all of the contaminated soils, sludge, and residual materials (if any) from the lagoon and burn site had been added.

The lagoon excavation would be backfilled with the non-contaminated soil and with clean soil, as needed.

9.3 Old Burn Site

As at the Abandoned Lagoon Area,the soils and ground water at the Old Burn Site do not represent a significant threat to human health or the environment if left undisturbed. However, to reduce the possibility of future environmental stress from this source, remediation of the contaminated soil from the Burn Site is proposed.

The three remediation options discussed in Section 9.2 were also selected as being the most suitable for the Old Burn Site. As at the Lagoon area, excavation is involved in all three options and ground water management prior to and during excavation will be accomplished as described in Section 9.2.

The preferred remediation option for the Burn Site is also off-site disposal. After removal of ground water from within the Burn Site area, contaminated soils and any residual materials present will be excavated, segregated, treated as necessary prior to transport, and disposed of at an approved off-site landfill.

After post-excavation sampling to be certain that contaminated soil and residual materials have been removed, the empty excavation will be back-filled with the segregated, uncontaminated soil plus additional clean fill dirt as needed.

If, for any reason, off-site disposal cannot be implemented, two alternate approaches will be considered as discussed below.

9.3.1 On-Site Bioremediation

In this approach, contaminated soil from the Burn Site (having greater than 50 ppm PCB) would be spread out over previously prepared "land-farm" areas to a depth of approximately one foot. Bacteria and nutrients would be tilled into the soil, and the land farm area would be managed as discussed in Section 9.2.1.

Any residual materials present in substantial quantities would be transported to an approved off-site landfill for disposal.

As at the Abandoned Lagoon, the uncontaminated soil would be returned to the Burn Site excavation, and would be supplemented by the remediated soil when the decontamination limits have been met. The area would be capped off with clean soil.

9.3.2 On-Site RCRA-Type Vault

In this approach, contaminated soil from the Burn Site, and any residual materials present, would be placed in the RCRA-type vault constructed for the lagoon sludge and soils.

The vault would then be closed according to approved DHEC/EPA practice, and the excavation would be back-filled with the uncontaminated soil and clean fill dirt as needed.

9.4 Old Drum Storage Area

As noted in Chapter 7, the analytical data indicate that the soils in the Old Drum Storage Area have not been significantly impacted.

Although some chemical constituents were identified in the ground water beneath the former drum storage area, the highest concentrations observed were below the EPA Maximum Contaminant Levels (MCLs) for drinking water.

In view of the above, no remediation of the Old Drum Storage Area is proposed.

9.5 Campbell Creek/Marsh Area

PCBs were found in the mud of Campbell Creek in the vicinity of the effluent outfall and at one location near the old effluent line break in the marsh. The concentration of the PCBs determined at these locations were sufficiently low that there is no indication that environmental damage will result from the presence of these materials. Natural biodegradation will further reduce the PCB levels, as there is no ongoing discharge of PCBs to the creek or marsh. Thus, there is no reason for a remediation program to be instituted in this area. Support for this position is provided in the following discussion of past EPA Records of Decision.

EPA records of Decision for PCB-Containing Sediments.

EPA has issued several Superfund Records of Decision (ROD) for sites with PCB-containing sediments. Two sites - the Upper Hudson River Site in New York and the Outboard Marine Corporation Site in Waukegan, Illinois - address PCBs as the only contaminant in the sediments of large surface water bodies. These sites and the remedial actions for the sites found by EPA to be protective of human health and the environment are discussed in this section.

The Hudson River case involves the Superfund cleanup of PCBs discharged over a 30-year period from two General Electric Plants on the

Hudson River. The Remedial Investigation/ Feasibility Study (RI/FS) estimates that one million pounds of PCBs had been discharged into the Hudson River. Much of this has either been washed out to sea or dredged out of the river to keep the navigable channel open; 498,000 to 656,000 pounds are estimated to remain in the river.

The ROD was issued on September 25, 1984, by Lee M. Thomas, then Assistant Administrator of Solid Waste and Emergency Response for EPA. It was supported in an attached letter by William D. Ruckelshaus, then Administrator of the EPA. In the ROD, Mr. Thomas stated, "I have determined that a technologically feasible, cost-effective remedial response to PCB contamination in the river bed that would be reliable and would effectively mitigate and minimize damage to public health, welfare and the environment is not presently available." Mr. Ruckelshaus cited the RI/FS in supporting the decision not to dredge the river bed in areas where the concentration exceeds 50 ppm because of "(1) the lack of a defined threat to public health; and (2) the difficulty in showing that significant environmental and public health benefits would result."

According to EPA Region II, the ROD for the Hudson River PCB site is unchanged as of October 8, 1987, and there has been no change of opinion by the EPA.

The RI/FS concluded the following on consideration of the feasibility of removing river bed sediments in excess of 50 ppm PCBs:

- "...it is not clear that elimination of 28-46% of the PCBs in the river system would result in an equivalent decrease in the total amount of PCBs released from river sediments into the water column."

- "One model produced an estimate that (with the)...hot spot dredging alternative it would take approximately 46 years for the PCBs in the Upper Hudson River to be depleted. Under the no action option ..., this model indicates that the PCBs in the upper river would be fully depleted in approximately 64 years ... . Furthermore, ... it is likely that some level short of total depletion can be considered to provide adequate protection of the public health and the environment."

- "Dredging activities by their nature tend to result in some degree of disturbance of the highly contaminated sediments, and thus result in some short-term problems in the form of elevated PCB concentrations in the water and air, as well as increased fish contamination."

- "Because the technology for reducing the disturbance of the sediment or controlling the spreading of the suspended materials is unproven in this type of situation, it is difficult to estimate reliably the amount of the contamination which will be recovered or ... the level of short-term damage which may result ... ."

- "Therefore, it is difficult to conclude at this time that the technology (of dredging sediments) can be considered feasible or reliable."

- "...even if hot-spot dredging technologies were more reliable, the estimated high cost of dredging and disposal might rule these out ..., especially given the moderate degree of risk reduction which may be achievable."

If the selected "hot spots" were dredged, it is estimated that losses of PCB-contaminated sediment during hydraulic dredging will be 2% of the sediment dredged. It is further assumed that 20% of the PCB losses will remain in the water column.

The New York State Department of Environmental Control, which filed suit to gain the funds from EPA to carry out a dredging operation, has been very selective about the areas where PCBs are to be removed. Regardless of the concentration, they are not contemplating the removal of PCBs from areas that they do not consider erodible.

The Outboard Marine Corporation (OMC) case involves the Superfund clean-up of PCBs discharged over a 20-year period into Lake Michigan. Between 1950 and 1971, OMC purchased about 9 million pounds of PCBs which were used in hydraulic fluids for die casting machines and related equipment. EPA estimates that 1.8 million pounds of PCBs were released with the facility's wastewater.

The OMC facility's wastewater was discharged through one outfall into a 600-foot long ditch to a lagoon and then flowed 2000 feet through a ditch north of OMC (North Ditch) into Lake Michigan. A second OMC outfall discharged wastewater containing PCBs into Slip #3 in Waukegan Harbor southeast of the plant. The Harbor and the North Ditch are estimated by EPA to be releasing 30-42 pounds of PCBs per year into Lake Michigan.

EPA rejected the "no action" alternative and decided to remove sediments with concentrations of 50 ppm or greater from the Harbor for the following reasons:

- Waukegan Harbor is commercially important; therefore, a navigation channel must be kept open. Dredging this channel disturbs the PCB-containing sediments in the Harbor.
- The PCB concentration in the water column of the Harbor and in the air is deemed by the EPA to be a threat to public health and a negative impact on the environment of Waukegan Harbor and the near shore of Lake Michigan.

- Large, concentrated amounts of PCBs are estimated to be present (1,077,000 pounds in 221,600 cubic yards of soil and sediment).
- PCBs are being transported into Lake Michigan.

According to the results of EPA models, if sediments containing 100 ppm or more were removed from the Harbor, the flux of PCB into Lake Michigan would approach zero. To account for turbulence such as heavy storms and boat traffic and to introduce a safety factor, 50 ppm was chosen as the clean-up level for the harbor. Since no other modeling data was available, that level was applied to the entire site.

The Record of Decision (ROD) issued for the OMC site selects several alternatives based on the concentration of PCBs. The "highly contaminated material" (concentrations greater than 10,000 ppm) are to be excavated, dewatered, fixed, and sent to an off-site landfill. "Moderately contaminated material" (500-10,000 ppm) is to be dewatered, fixed and contained on site. The "less contaminated material" (50-500 ppm) is to be excavated, dewatered in the lagoon and contained on site.

Several aspects of the Lobeco site can be directly compared to the Hudson River site. Such a comparison leads to a similar conclusion about the appropriate remedial action for the site. The arguments supporting the "no action" decision at the Hudson River site support the same decision more strongly for the Lobeco site.

- The PCB concentrations in the sediments at the Lobeco site are lower than those in the Hudson River. In the sections of the Hudson River chosen for remediation, the PCB concentrations in the sediments were generally well in excess of 100 ppm. In the Lobeco study area, only one sediment sample was slightly above 100 ppm of total PCBs. These low concentrations would support a decision not to dredge for the same reasons cited in the Hudson River ROD: lack of a defined threat to public health and difficulty in showing significant environmental and public health benefits from any remedial action.

- A remediation project could potentially increase the risk to the environment. Under the best of conditions, removal of PCB-containing sediments from a site by dredging is known to increase the amount of sediment in the water column for 1000 to 1500 feet. Once removed, the sediments would have to be moved to a disposal site and disposed in an approved manner.

9.6 Ground Water

As discussed in Chapter 7, Sections 7.1 through 7.4, the concentrations and mass flow rates of constituents of concern in the unconfined aquifer are sufficiently low that, when considered in conjunction with their very low exposure potential, there is no significant threat to human health or the environment. The rationale for this conclusion is presented in the following paragraphs.

- Of all of the chemical constituents found in the ground water analyses, only four were above the EPA Maximum Contaminant Levels for drinking water. These chemicals, arsenic, cadmium, benzene and trichloroethylene, have been calculated to have mass flows substantially less than one pound per year (See Appendix E). The practical impact of these calculations is that less than 1/4 gram of these constituents will reach the tidal marsh each day,and will not be detectable outside the mixing zone.

- Natural degradation will continue to mitigate the situation to an even lower impact than that predicted by the aforementioned calculations.[1]

- No known public or private water supplies are extracted from the unconfined aquifer downgradient of the Lobeco property.

- There is minimal mixing between the upper, impacted portion of the unconfined aquifer and the lower, uncontaminated portion near the Hawthorn aquitard.

- The Hawthorn aquitard effectively protects the Floridan aquifer from the unconfined aquifer.

- When the principal sources of the chemical constituents in the ground water are removed (i.e., when the abandoned lagoon and burn site are remediated), there will be no further input of chemicals from these areas.

Based on the foregoing, direct remediation of the ground water at the Lobeco site will consist of pumping, treatment and discharge of the ground water extracted from contained areas at the Abandoned Lagoon and Old Burn Site Areas during soil remediation. The treatment methods will be selected based on discharge limits imposed by SCDHEC for discharge to Campbell Creek.

In addition, it is proposed that ground water levels across the site be measured quarterly, and that samples from wells W-5, W-12 and L-3 be analyzed annually for the specific parameters of concern, until all parties agree that such monitoring is no longer necessary.

[1]Studies by Environmental Science and Engineering, Inc. (ESE) on the fate of benzene in Florida ground water, and of several organic constituents in the soil and ground water at a privately held site elsewhere, indicate substantial natural remediation. The principal processes through which this occurs are vaporization and biodegradation. In the Florida benzene study, results indicate almost 90% disappearance of benzene in 5 years and 98% in 10 years. With the low rate of ground water movement at the Lobeco site, it is possible that the organic components will never reach the marsh.

10. REMEDIATION SCHEDULE

In compliance with the provisions of the consent order, an estimated schedule for remediation of the Lobeco Site is presented in Table 10.1. The schedule is based on the recommended remedial alternative presented in Sections 3 and 9 of this report. The schedule consists of two segments, the first beginning with SCDHEC approval of this report (including the recommended remedial alternative) and the second beginning with SCDHEC and EPA approval of the Final Remediation Design. Time is presented as weeks from regulatory approval.

In this schedule, assumptions have been made with respect to the time necessary for negotiations with contractors, disposal site approvals, and construction periods. Many factors can influence these items such as availability of contractors, laboratory analysis turnaround times, and inclement weather. Therefore, the proposed schedule is an estimate of the approximate time required to complete the listed tasks and may need to be adjusted as conditions warrant.

Table 10.1

Estimated Schedule for Remediation
Lobeco Site Environmental Assessment

Task Description	Weeks from Regulatory Approval	
Obtain SCDHEC Approval of Report.	0	
Prepare Final Remediation Design and Submit to SCDHEC and EPA for Review.	12	
Obtain SCDHEC and EPA Approval of Remediation Design.	--	0
Select Consultant and Negotiate Consultant Contract		8
Negotiate Agreements with Disposal Sites.		12
Prepare Contract Documents, Solicit Bids, and Award Contract for Site Cleanup.		16
Mobilize, construct access roads and staging areas, and install slurry walls.		22
Pump and treat ground water from both areas and stabilize waste soils for excavation.		30
Excavate, segregate, and dewater waste soils; haul and dispose at selected facility.		38
Analyze residual soils for waste constituent levels and backfill both sites		40
Prepare Completion Report of remediation activities and submit to SCDHEC and EPA		44
Obtain SCDHEC and EPA Approval of Completion Report		--

OVERSIZED

DOCUMENT

RMT INC.

100 Verdae Boulevard
P. O. Box 16778
Greenville, SC 29606
Phone: 803-281-0030
FAX: 803-281-0288

APPENDICES
FOR
LOBECO SITE ENVIRONMENTAL ASSESSMENT RESULTS AND PROPOSED REMEDIAL ACTION PLANS
FOR
AMERICAN COLOR AND CHEMICAL CORPORATION
AND
TENNECO RESINS, INC.

September, 1988

C. T. Sherron
Project Manager

Mark A. Miesfeldt
Project Hydrogeologist

Mark A. Petermann, P.G.
Hydrogeologist

James E. Clemmer, Ph.D., P.E.
Project Engineer

APPENDIX A

APPENDIX A

BORING LOGS

LOG OF TEST BORING

F-203 (R 01-87)

RMT

PROJECT NAME LOBECO ENVIRO. ASSESS.	BORING NO. L-1
	SHEET NO. 1 OF 1
	PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.	INSTALLATION
CONTRACTOR ATEC	SURFACE ELEV. 19.4
DRILLING METHOD MUD ROTARY	BOREHOLE DIA. 8 IN.

SAMPLING NOTES: INTERVAL NO.	TYPE	RECOVERY N	MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	9-9 7-6		▽ (2.0)	SAND (SM)-fine, slightly silty, slightly clayey, trace mica, tan to light grey.
2	SS	5-7 10-13			
3	SS	1-1 2-10		5	SAND (SC)-fine to coarse, mostly fine, clayey, tan to light grey, with some orange staining, graded.
4	SS	5-6 7-6			SAND (SM)-fine, silty, white and tan, trace mica, poorly graded, slightly clayey.
5	SS	3-3 4-5		10	
6	SS	3-3 4-5			SILT (ML)-clayey with thin clay layers <1.5 in. thick, tan and orange mottled, trace fine sand, increasingly sandy with depth.
7	SS	1-1 3-4			
8	SS	1-1 2-1		15	
9	SS	1-1 5-8			SAND (SM)-fine, silty, white to light grey, poorly graded.
10	SS	1-1 3-3		20	
11	SS	2-1 2-3			
12	SS	1-1 1-2			SAND (SC)-fine, silty, clayey, dark grey, loose.
13	SS	1-2 1-7		25	
14	SS	5-12 20-20			SAND (SM)-fine to medium, mostly fine, some broken shells, green-grey, becoming coarser textured between 30.0-32.0 feet
15	SS	2-2 10-10		30	
16	SS	4-5 3-3			
17	SS	2-2 3-4			Top of Hawthorn-Cooper Formation CLAY (CL)-trace silty, trace shell fragments, green-grey.
18	ST			35	
					BORING TERMINATED A 36.0 FEET

GENERAL NOTES	WATER LEVEL OBSERVATIONS
DATE STARTED 15 MAR 88	WHILE DRILLING ▽ 2.0
DATE COMPLETED 15 MAR 88	AT COMPLETION ▼
RIG MOBILE B-53	AFTER DRILLING
CREW CHIEF BO PRICE	CAVE-IN: DATE/TIME ____ DEPTH ____
LOGGED MAM CHECKED	WATER: DATE/TIME ____ DEPTH ____

RMT LOG OF TEST BORING

F-203 (R 01-87)

PROJECT NAME LOBECO ENVIRO. ASSESS.	BORING NO. L-2
LOCATION BEAUFORT, S.C.	SHEET NO. 1 OF 1
CONTRACTOR ATEC	PROJECT NO. 643.03
DRILLING METHOD H-S AUGER	INSTALLATION
	SURFACE ELEV. 20.4
	BOREHOLE DIA. 10 IN.

SAMPLING NOTES						VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
INTERVAL		RECOVERY		MOISTURE		
NO.	TYPE	N			DEPTH	
1	SS	3-4-5				SAND (SM)-fine, silty, roots, wood, brown to black.
2	SS	4-4-3			▽ (3.5)	SAND (SC)-fine, slightly silty, clayey, tan with orange mottling, some thin clay lenses <1.0 inch thick.
3	SS	3-4-5			10	
4	SS	3-5-2			15	SAND (SM)-fine, slightly silty, trace clay, trace mica, tan with some orange staining.
5	SS	WOH/18"			20	SAND (SM)-fine, slightly silty, slightly clayey, trace mica, medium grey, poorly graded.
						BORING TERMINATED AT 20.0 FEET

GENERAL NOTES	WATER LEVEL OBSERVATIONS
DATE STARTED 26 MAR 88	WHILE DRILLING ▽ 3.5
DATE COMPLETED 26 MAR 88	AT COMPLETION ▼
RIG MOBILE B-53 ATV	AFTER DRILLING
CREW CHIEF TIM QUEEN	CAVE-IN: DATE/TIME ____ DEPTH ____
LOGGED MAM CHECKED	WATER: DATE/TIME ____ DEPTH ____

LOG OF TEST BORING

F-203 (R 01-87)

RMT

PROJECT NAME LOBECO ENVIRO. ASSESS.
LOCATION BEAUFORT, S.C.
CONTRACTOR ATEC
DRILLING METHOD H-S AUGER

BORING NO. L-3
SHEET NO. 1 OF 1
PROJECT NO. 643.03
INSTALLATION
SURFACE ELEV. 16.0
BOREHOLE DIA. 10 IN.

SAMPLING NOTES						VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
INTERVAL		RECOVERY		MOISTURE		
NO.	TYPE	N			DEPTH	
1	SS	2-3-4			▽ (2.0)	SAND (SM)-fine, silty, trace mica, brown, becoming tan with orange staining at 0.5 feet, poorly graded, loose.
						SAND (SM)-fine, slightly silty, slightly clayey with thin clay layers <0.5 thick, trace mica, tan.
2	SS	3-5-4			5	
3	SS	3-1/12"			10	
4	SS	WOH/18"			15	
						CLAY (CL)-slightly silty, dark grey, interbedded with SAND (SM)-slightly clayey, dark grey, individual layers not more than 3.0 inches thick.
5	SS	WOH/18"				
					20	BORING TERMINATED AT 20.0 FEET
					25	
					30	
					35	

GENERAL NOTES

DATE STARTED 27 MAR 88
DATE COMPLETED 27 MAR 88
RIG MOBILE B-53 ATV
CREW CHIEF TIM QUEEN
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 2.0
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

LOG OF TEST BORING

F-203 (R 01-87)

RMT

BORING NO. L-4
SHEET NO. 1 OF 1
PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV. 16.4
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 10 IN.

SAMPLING NOTES						VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
INTERVAL		RECOVERY		MOISTURE		
NO.	TYPE	N			DEPTH	
1	SS	1-1-1			▽	SAND (SM)-fine, slightly silty, black and orange-brown, poorly graded, loose.
2	SS	3-4-5			5	CLAY (CL)-silty, some fine sand layers <1.0 inch thick, green grey, soft.
3	SS	3-5-5				CLAY (CL)-trace fine sand, trace silt, grey-green, soft.
					10	BORING TERMINATED AT 8.0 FEET
					15	
					20	
					25	
					30	
					35	

GENERAL NOTES

DATE STARTED 28 MAR 88
DATE COMPLETED 28 MAR 88
RIG MOBILE B-53 ATV
CREW CHIEF TIM QUEEN
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 0.5
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

LOG OF TEST BORING

F-203 (R 01-87)

RMT

PROJECT NAME: LOBECO ENVIRO. ASSESS.	BORING NO.: L-5
LOCATION: BEAUFORT, S.C.	SHEET NO. 1 OF 1
CONTRACTOR: ATEC	PROJECT NO.: 643.03
DRILLING METHOD: H-S AUGER	INSTALLATION:
	SURFACE ELEV.: 7.7
	BOREHOLE DIA.: 10 IN.

SAMPLING NOTES: INTERVAL NO.	TYPE	RECOVERY N	MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	2-3-7		▽	SAND (SM)-fine, tan and brown, roots, slightly clayey.
2	SS	4-3-3		5	SAND (SM)-fine, slightly silty, trace mica, tan and cream colored with some orange staining, poorly graded.
3	SS	1-1-1		10	
4	SS	1/18"		15	SAND (SM)-fine, clayey, slightly silty, dark grey, loose.
5	SS	3-2-3			SAND (SM)-fine to medium, mostly fine, grey- green, some broken shells, loose.
				20	BORING TERMINATED AT 20.0 FEET
				25	
				30	
				35	

GENERAL NOTES		WATER LEVEL OBSERVATIONS	
DATE STARTED	29 MAR 88	WHILE DRILLING ▽	0.5
DATE COMPLETED	29 MAR 88	AT COMPLETION ▼	
RIG	MOBILE B-53 ATV	AFTER DRILLING	
CREW CHIEF	TIM QUEEN	CAVE-IN: DATE/TIME	DEPTH
LOGGED MAM	CHECKED	WATER: DATE/TIME	DEPTH

RMT LOG OF TEST BORING

F-203 (R 01-87)

BORING NO. L-6
SHEET NO. 1 OF 1
PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV. 8.6
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 10 IN.

SAMPLING NOTES: INTERVAL NO.	TYPE	RECOVERY N		MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	1-2-2			▽	SAND (SM)-silty, clayey, brown to black, roots, wood, trace mica, Topsoil.
						SAND (SM)-fine, slightly silty, trace clay, trace mica, tan with orange staining, poorly graded, loose.
2	SS	2-3-3			5	
3	SS	2-1-1			10	
						SAND (SM)-fine, clayey, slightly silty, decreasing silt and clay downward, dark grey, loose.
4	SS	1/18"			15	
5	SS	1-1-2				
					20	BORING TERMINATED AT 20.0 FEET
					25	
					30	
					35	

GENERAL NOTES

DATE STARTED 29 MAR 88
DATE COMPLETED 29 MAR 88
RIG MOBILE B-53 ATV
CREW CHIEF TIM QUEEN
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 1.0
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

LOG OF TEST BORING

F-203 (R 01-87)

RMT

PROJECT NAME LOBECO ENVIRO. ASSESS.
LOCATION BEAUFORT, S.C.
CONTRACTOR ATEC
DRILLING METHOD H-S AUGER

BORING NO. L-7
SHEET NO. 1 OF 1
PROJECT NO. 643.03
INSTALLATION
SURFACE ELEV. 16.5
BOREHOLE DIA. 10 IN.

SAMPLING NOTES						
INTERVAL		RECOVERY	MOISTURE			VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
NO.	TYPE	N		DEPTH		
1	SS	1-2-1		▽		SAND (SM)-fine, silty, trace clay, brown to black, roots, wood.
						SILT (ML)-slightly sandy, clayey with clay layers up to 1.0 inch thick, tan and grey.
2	SS	3-5-7		5		
						SAND (SM)-fine, slightly silty, tan and grey, poorly graded, loose.
3	SS	1-1-1		10		
						SILT (ML-SC)-clayey, some fine sand, dark grey, soft.
4	SS	0-1-1		15		
5	SS	2/18"				
				20		BORING TERMINATED AT 20.0 FEET
				25		
				30		
				35		

GENERAL NOTES

DATE STARTED 28 MAR 88
DATE COMPLETED 28 MAR 88
RIG MOBILE B-53 ATV
CREW CHIEF TIM QUEEN
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 1.0
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

LOG OF TEST BORING

F-203 (R 01-87)

RMT

BORING NO. RB-2
SHEET NO. 1 OF 2
PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV. 14.7
DRILLING METHOD MUD ROTARY
BOREHOLE DIA. 8 IN.

SAMPLING NOTES					VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
INTERVAL		RECOVERY	MOISTURE		
NO.	TYPE	N		DEPTH	
1	SS	3-9 8-8			SAND (SM)-fine, silty, trace mica, brown to black, poorly graded.
2	SS	2-3 4-5			CLAY (CL)-slightly silty, tan and orange mottled, firm, some fine sand between 4.0 and 6.0 feet (SC).
3	SS	3-4 9-9		5 ▽	
4	SS	2-5 5-5			SAND (SC)-clayey, fine, slightly silty, light grey to tan, some fine sand layers <1.0 inch interbedded throughout.
5	SS	2-2 2-2		10	
6	SS	1-1 1-1			
7	SS	1-1 1-1			
8	SS	2-2 1-2		15	
9	SS	1-1/12" 1			
10	SS	2-2 1-1		20	
11	SS	1-1 1-1			CLAY (CL)-thin <0.2 inch fine sand lenses, dark grey-green, soft.
12	SS	1-1 1-1			SAND (SM)-grey, fine to coarse, mostly fine, trace silt, trace mica, medium grey.
13	SS	2-2 2-3		25	
14	SS	3-3 3-4			SAND (SM)-medium to coarse, mostly coarse, small quartz pebbles, broken shell fragments, green-grey, graded, round.
15	SS	2-3 2-4		30	SAND (SM)-fine, silty, some shell fragments, green-grey, poorly graded, slightly clayey.
16	SS	1-2 1-1			See description from 26-29 feet.
17	SS	2-1 3-1			SAND (SC)-fine, slightly silty, clayey, some shell fragments, green grey, poorly graded.
18	SS	2-1 2-1		35	
19	SS	4-2 3-2			
20	SS	2-3 3-5			Top of Hawthorn-Cooper Formation.

GENERAL NOTES

DATE STARTED 16 MAR 88
DATE COMPLETED 16 MAR 88
RIG MOBILE B-53
CREW CHIEF BO PRICE
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 6.0
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

LOG OF TEST BORING

F-203 (R 01-87)

PROJECT NAME: LOBECO ENVIRO. ASSESS.	BORING NO.: RB-2
LOCATION: BEAUFORT, S.C.	SHEET NO.: 2 OF 2
CONTRACTOR: ATEC	PROJECT NO.: 643.03
DRILLING METHOD: MUD ROTARY	INSTALLATION:
	SURFACE ELEV.: 14.7
	BOREHOLE DIA.: 8 IN.

SAMPLING NOTES						VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
INTERVAL		RECOVERY		MOISTURE		
NO.	TYPE	N			DEPTH	
21	ST					CLAY (CL)-grey-green, trace silt, trace shell fragments.
						BORING TERMINATED AT 42.0 FEET
					45	
					50	
					55	
					60	
					65	
					70	
					75	
					80	
					85	

LOG OF TEST BORING

F-203 (R 01-87)

RMT

PROJECT NAME: LOBECO ENVIRO. ASSESS.	BORING NO. RB-3
	SHEET NO. 1 OF 1
	PROJECT NO. 643.03
LOCATION: BEAUFORT, S.C.	INSTALLATION
CONTRACTOR: ATEC	SURFACE ELEV. 7.4
DRILLING METHOD: MUD ROTARY	BOREHOLE DIA. 8 IN.

SAMPLING NOTES: INTERVAL NO.	TYPE	RECOVERY N	MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	2-3, 4-2			SAND (SM)-fine, slightly silty, trace mica, orange-brown, roots, poorly graded.
2	SS	1-1, 2-4			CLAY (CL)-slightly silty, grey and red mottling, soft, increasingly silty downward.
3	SS	4-3, 4-10		5 ▽	
4	SS	2-6, 10-12			SAND (SM)-fine, white, poorly graded, loose, becoming slightly more silty and clayey with depth.
5	SS	7-12, 12-12		10	
6	SS	10-10, 9-9			
7	SS	8-7, 6-6			
8	SS	2-3, 4-6		15	
9	SS	3-6, 10-14			
10	SS	2-1, 1-1		20	SAND (SC)-fine, silty, clayey with small clay layers dark grey, soft, increasingly sandy downward.
11	SS	3-4, 5-10			
12	SS	2-4, 4-4			SAND (SC)-fine to medium, mostly medium grey-green, graded, clayey with thin clay layers, from 24.0-26.0 feet.
13	SS	1-2, 3-3		25	
14	SS	3-4, 5-7			Top of Hawthorn-Cooper Formation CLAY (CL)-trace silt, medium grey-green.
15	ST				
				30	BORING TERMINATED AT 30.0 FEET
				35	

GENERAL NOTES	WATER LEVEL OBSERVATIONS
DATE STARTED 21 MAR 88	WHILE DRILLING ▽ 6.0
DATE COMPLETED 21 MAR 88	AT COMPLETION ▼
RIG MOBILE B-53	AFTER DRILLING
CREW CHIEF BO PRICE	CAVE-IN: DATE/TIME ____ DEPTH ____
LOGGED MAM CHECKED ____	WATER: DATE/TIME ____ DEPTH ____

RMT

LOG OF TEST BORING

F-203 (R 01-87)

BORING NO. ATW-1
SHEET NO. 1 OF 1

PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV. 12.9
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 10 IN.

SAMPLING NOTES						VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
INTERVAL		RECOVERY		MOISTURE		
NO.	TYPE	N			DEPTH	
1	SS	12-8				SAND (SM)-fine, slightly silty, trace mica, some quartz pebbles, honey brown, road fill.
		5-7			▽	
2	SS	5-5				
		5-5				
3	SS	5-3			5	SAND (SM)-fine, trace mica, trace clay, grey, poorly graded, loose, becoming increasingly silty with depth. NOTE- NO SLUDGE OBSERVED
		12-15				
4	SS	11-15				
		20-28				
5	SS	3-3				SILT (ML)-sandy, slightly clayey, grey.
		4-8			10	
6	SS	1-2				
		2-3				
7	SS	2-1				SAND (SM)-fine, silty, slightly clayey in part, light grey to cream colored, poorly graded, loose, trace mica.
		1-1				
8	SS	2-2			15	
		2-2				
9	SS	3-2				
		1-1				
10	SS	1-1				SILT (ML)-clayey with some fine sand layers, dark grey, soft.
		1-1			20	BORING TERMINATED AT 20.0 FEET
					25	
					30	
					35	

GENERAL NOTES

DATE STARTED 17 MAR 88
DATE COMPLETED 17 MAR 88
RIG MOBILE B-53
CREW CHIEF BO PRICE
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 1.5
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

RMT

LOG OF TEST BORING

F-203 (R 01-87)

BORING NO. ATW-2
SHEET NO. 1 OF 1
PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV. 13.2
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 10 IN.

SAMPLING NOTES: INTERVAL NO.	TYPE	RECOVERY N	MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	2-2 2-3		▽	SAND (SM)-fine, slightly silty, clayey in part, trace mica, tan and orange brown.
2	SS	2-3 4-4			
3	SS	2-3 4-4		5	SAND (SM)-fine slightly silty, purple stain becoming black. NOTE- SLUDGE FROM 5.5-7.0 FEET
4	SS	3-7 8-10			
5	SS	2-3 3-3			SILT (ML)-clayey, light grey and tan, soft.
6	SS	2-3 7-6		10	SAND (SM)-slightly silty, trace mica, light grey to white, poorly graded, slightly clayey in part.
7	SS	3-3 9-3			
8	SS	2-5 1-1		15	
9	SS	1-1 1-1			CLAY (CL)-silty, trace fine sand, grey, very soft.
10	SS	1/12" 1-1			
				20	BORING TERMINATED AT 20.0 FEET
				25	
				30	
				35	

GENERAL NOTES

DATE STARTED 18 MAR 88
DATE COMPLETED 18 MAR 88
RIG MOBILE B-53 ATV
CREW CHIEF TIM QUEEN
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 2.0
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

LOG OF TEST BORING

RMT

F-203 (R 01-87)

BORING NO. ATW-3
SHEET NO. 1 OF 1
PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV. 12.6
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 10 IN.

SAMPLING NOTES					VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
INTERVAL		RECOVERY	MOISTURE		
NO.	TYPE	N		DEPTH	
1	SS	2-3 4-8			SAND (SM)-fine, slightly silty, trace mica, poorly graded, honey brown; becoming more silty with depth.
2	SS	5-10 11-11			
3	SS	4-6 7-8		5	NOTE- NO SLUDGE OBSERVED
4	SS	4-4 6-8			SILT (ML)-slightly clayey, trace mica, grey.
5	SS	6-5 5-3			
6	SS	4-5 5-5		10	
7	SS	2-1 1-1			SAND (SM)-slightly silty, slightly clayey, light grey to cream colored, poorly graded, loose; increasingly clayey downward.
8	SS	1-1 1-2		15	
9	SS	1/18"-1			SAND (SM)-fine, slightly clayey, light grey to cream colored, poorly graded, loose; increasingly clayey downward.
10	SS	1/24"			
				20	BORING TERMINATED AT 20.0 FEET
				25	
				30	
				35	

GENERAL NOTES

DATE STARTED 19 MAR 88
DATE COMPLETED 19 MAR 88
RIG MOBILE B-53 ATV
CREW CHIEF TIM QUEEN
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ∇ 4.0
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

LOG OF TEST BORING

F-203 (R 01-87)

PROJECT NAME LOBECO ENVIRO. ASSESS.	BORING NO. ATW-4
LOCATION BEAUFORT, S.C.	SHEET NO. 1 OF 1
CONTRACTOR ATEC	PROJECT NO. 643.03
DRILLING METHOD H-S AUGER	INSTALLATION
	SURFACE ELEV. 11.5
	BOREHOLE DIA. 8 IN.

SAMPLING NOTES INTERVAL NO.	TYPE	RECOVERY N	MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	3-4 3-4			SAND (SM)-fine, silty, trace mica, tan and brown, poorly graded, roots, wood. Becoming increasingly clayey with depth.
2	SS	3-5 5-5		∇ (2.5)	
3	SS	2-5 7-10		5	SILT (ML)-clayey, trace mica, light grey and orange mottling, stiff.
4	SS	3-3 3-3			NOTE - NO SLUDGE
5	SS	2-4 5-7			SILT (ML)-clayey, dark grey, soft, some fine sand.
6	SS	2-2 2-2		10	
7	SS	1/12"-1-1			SAND (SM)-fine, silty, slighty clayey, trace mica, grey.
8	SS	1/12"-1-1		15	CLAY (CL)-silty, dark grey, very soft, some thin fine sand layers <1.0 inch thick.
9	SS	WOH/12" 1/12"			
10	SS	WOH/24"			
				20	BORING TERMINATED AT 20.0 FEET
				25	
				30	
				35	

GENERAL NOTES	WATER LEVEL OBSERVATIONS
DATE STARTED 19 MAR 88	WHILE DRILLING ∇ 2.5
DATE COMPLETED 19 MAR 88	AT COMPLETION ▼
RIG MOBILE B-53	AFTER DRILLING
CREW CHIEF BO PRICE	CAVE-IN: DATE/TIME DEPTH
LOGGED MAM CHECKED	WATER: DATE/TIME DEPTH

LOG OF TEST BORING

F-203 (R 01-87)

RMT

BORING NO. ATW-5
SHEET NO. 1 OF 1
PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV. 12.3
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 10 IN.

SAMPLING NOTES: INTERVAL NO.	TYPE	RECOVERY N	MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	WOH/12" 2-1			SAND (SM)-fine, slightly silty, slightly clayey, trace mica, light grey, with some orange staining, poorly graded.
2	SS	2-1 2-1			
3	SS	1-2 4-4		5	SAND (SM)-fine, slightly silty, purple stain becoming black. NOTE- SLUDGE FROM 3.5-6.0 FEET
4	SS	4-4 5-5			
5	SS	2-2 2-2			SILT (ML)-clayey, some fine sand, trace mica, light grey to grey, poorly graded.
6	SS	2-2 4-5		10	SAND (SM)-slightly silty to silty, clayey in part, trace mica, light grey to cream colored, poorly graded.
7	SS	3-2 1-5			
8	SS	2-1 1-1		15	
9	SS	3-1 1-1			
10	SS	1-1 1-1			SAND (SM)-fine, slightly silty, clayey, dark grey.
				20	BORING TERMINATED AT 20.0 FEET
				25	
				30	
				35	

GENERAL NOTES

DATE STARTED 21 MAR 88
DATE COMPLETED 21 MAR 88
RIG MOBILE B-53 ATV
CREW CHIEF TIM QUEEN
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ∇
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

LOG OF TEST BORING

F-203 (R 01-87)

RMT

PROJECT NAME LOBECO ENVIRO. ASSESS.
LOCATION BEAUFORT, S.C.
CONTRACTOR ATEC
DRILLING METHOD H-S AUGER

BORING NO. AB-1
SHEET NO. 1 OF 1
PROJECT NO. 643.03
INSTALLATION
SURFACE ELEV.
BOREHOLE DIA. 8 IN.

SAMPLING NOTES					
INTERVAL NO.	INTERVAL TYPE	RECOVERY N	MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	2-2 3-4			SAND (SM)-fine, slightly silty, trace clay, tan with some orange staining, poorly graded, loose, becoming dark grey with depth.
2	SS	1-4 4-4			
3	SS	2-2 2-1		▽ 5	NOTE- SLUDGE FROM 5.5-7.0 FEET
4	SS	3-3 6-5			SILT (ML)-clayey, trace mica, light grey and cream colored.
5	SS	2-2 2-2			SAND (SM)-fine, slightly silty, trace clay, trace mica, light grey and tan, poorly graded.
6	SS	WOH/24"		10	SILT (ML)-slightly clayey, some fine sand trace mica, cream colored, loose, becoming increasingly sandy with depth.
7	SS	2-3 3-5			
8	SS	2-4 4-2		15	
9	SS	3/24"			
10	SS	3/24"			SAND (SM)-fine, silty, slighty clayey, medium grey, loose, some clay layers.
				20	BORING TERMINATED AT 20.0 FEET
				25	
				30	
				35	

GENERAL NOTES

DATE STARTED 16 MAR 88
DATE COMPLETED 16 MAR 88
RIG MOBILE B-53 ATV
CREW CHIEF TIM QUEEN
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 4.5
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

LOG OF TEST BORING

F-203 (R 01-87)

RMT

PROJECT NAME LOBECO ENVIRO. ASSESS.	BORING NO. AB-2
LOCATION BEAUFORT, S.C.	SHEET NO. 1 OF 1
CONTRACTOR ATEC	PROJECT NO. 643.03
DRILLING METHOD H-S AUGER	INSTALLATION
	SURFACE ELEV.
	BOREHOLE DIA. 8 IN.

SAMPLING NOTES					VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
INTERVAL		RECOVERY	MOISTURE		
NO.	TYPE	N		DEPTH	
1	SS	1-4 6-6			SAND (SM)-fine, slightly silty, trace clay, tan and grey with some orange staining, roots, wood, trace mica, becoming purple to black between 5.5-7.0 feet.
2	SS	5-6 5-6			
3	SS	3-3 3-6		▽ 5	NOTE- SLUDGE FROM 5.5-7.0 FEET
4	SS	7-4 3-3			
5	SS	2-2 1-3			SILT (ML)-clayey, slightly sandy with thin sand layers <0.5 inch thick, green-grey, trace mica.
6	SS	3-4 1-3		10	
7	SS	3-3 3-4			SAND (SM)-fine, slightly silty, slightly clayey, light grey to white, poorly graded, loose.
8	SS	5-2 2-1		15	
9	SS	3/24"			
10	SS	3/12"			
				20	BORING TERMINATED AT 20.0 FEET
				25	
				30	
				35	

GENERAL NOTES	WATER LEVEL OBSERVATIONS
DATE STARTED 15 MAR 88	WHILE DRILLING ▽ 4.5
DATE COMPLETED 15 MAR 88	AT COMPLETION ▼
RIG MOBILE B-53 ATV	AFTER DRILLING
CREW CHIEF TIM QUEEN	CAVE-IN: DATE/TIME ____ DEPTH ____
LOGGED MAM CHECKED	WATER: DATE/TIME ____ DEPTH ____

RMT

LOG OF TEST BORING

F-203 (R 01-87)

PROJECT NAME LOBECO ENVIRO. ASSESS.
LOCATION BEAUFORT, S.C.
CONTRACTOR ATEC
DRILLING METHOD H-S AUGER

BORING NO. AB-3
SHEET NO. 1 OF 1
PROJECT NO. 643.03
INSTALLATION
SURFACE ELEV.
BOREHOLE DIA. 8 IN.

SAMPLING NOTES: INTERVAL NO.	TYPE	RECOVERY N	MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	2-3			SAND (SM)-fine, slightly silty, slightly clayey, tan, with some orange staining, increasingly clayey downward.
		4-5			
2	SS	4-3			
		4-4			
3	SS	3-4		5	
		4-4		▽	
4	SS	1-5			SILT (ML)-slightly clayey, slightly sandy, trace mica, purple-grey from 6.0-8.0 feet, light grey below 8.0 feet.
		7-7			
5	SS	3-3			
		5-5		10	NOTE- SLUDGE FROM 6.0-8.0 FEET
6	SS	4-3			SAND (SM)-fine,silty, trace clay, cream colored, moderately graded.
		4-5			
7	SS	5-7			
		3-3			
8	SS	4-2		15	SILT (ML)-clay, slightly sandy, light grey to cream colored, loose.
		1-1			
9	SS	1-1			CLAY (CL)-silty, slightly sandy, dark grey, soft.
		1-1			
10	SS	1-1			
		1-1		20	BORING TERMINATED AT 20.0 FEET
				25	
				30	
				35	

GENERAL NOTES

DATE STARTED 15 MAR 88
DATE COMPLETED 15 MAR 88
RIG MOBILE B-53 ATV
CREW CHIEF TIM QUEEN
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 6.0
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

RMT

LOG OF TEST BORING

F-203 (R 01-87)

BORING NO. AB-4
SHEET NO. 1 OF 1

PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV.
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 8 IN.

SAMPLING NOTES: INTERVAL NO.	TYPE	RECOVERY N	MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	2-1 3-3			SAND (SM)-fine, slightly silty, slightly clayey, trace mica, tan, grey and orange, poorly graded, roots.
2	SS	2-3 3-4			
3	SS	2-1 3-3		5	SAND (SM)-fine, silty, slightly clayey, trace mica, tan becoming purple brown from 5.0-8.0 feet, poorly graded. NOTE-SLUDGE FROM 5.2-8.0 FEET
4	SS	4-6 8-9	▽		
5	SS	3-4 6-6		10	
6	SS	4-3 4-6			color grading to white at 12.0 feet
7	SS	3-4 2-2			
8	SS	WOH/12" 1-1		15	
9	SS	2-1 2-2			CLAY (CL)-silty, slightly sandy, dark grey, trace mica, soft, increasing silty downward.
10	SS	1-1 1-1		20	BORING TERMINATED AT 20.0 FEET
				25	
				30	
				35	

GENERAL NOTES

DATE STARTED 14 MAR 88
DATE COMPLETED 14 MAR 88
RIG MOBILE B-53 ATV
CREW CHIEF TIM QUEEN
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 7.5
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

LOG OF TEST BORING

F-203 (R 01-87)

BORING NO. AB-5
SHEET NO. 1 OF 1
PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV.
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 8 IN.

SAMPLING NOTES: INTERVAL NO.	TYPE	RECOVERY N	MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	2-5 6-6			SAND (SM)-fine, trace clay, trace mica, brown with some orange staining, roots, increasing clay and silt downward. NOTE- NO SLUDGE OBSERVED
2	SS	2-2 3-2			
3	SS	2-1 2-1		▽ 4.5; 5	
4	SS	1-4 4-4			SILT (ML)-clayey, trace mica, cream colored, poorly graded.
5	SS	3-5 5-6		10	SAND (SM)-fine, slightly silty, medium grey and tan, poorly graded, loose.
6	SS	3-7 5-7			
7	SS	5-5 6-2			
8	SS	2-2 1-1		15	SILT (ML-SC)-clayey, some fine sand, tan and medium grey, soft.
9	SS	1-1 2-2			SAND (SM)-fine, slightly silty, slightly clayey, trace mica, tan and grey, poorly graded, loose.
10	SS	1-1 1-1			CLAY (CL)-silty, slightly sandy, dark grey, soft.
				20	BORING TERMINATED AT 20.0 FEET
				25	
				30	
				35	

GENERAL NOTES

DATE STARTED 18 MAR 88
DATE COMPLETED 18 MAR 88
RIG MOBILE B-53 ATV
CREW CHIEF TIM QUEEN
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 4.5
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

RMT

LOG OF TEST BORING

F-203 (R 01-87)

BORING NO. AB-6
SHEET NO. 1 OF 1
PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV.
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 6 IN.

SAMPLING NOTES					VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
INTERVAL NO.	INTERVAL TYPE	RECOVERY N	MOISTURE	DEPTH	
1	SS	3-3 4-6			SAND (SM)-fine, slightly silty, trace mica, tan and light grey with some orange staining, poorly graded, root, wood increasingly clayey downward. NOTE- NO SLUDGE OBSERVED.
2	SS	3-4 4-6		▽ (4.0)	
3	SS	3-4 4-4		5	
4	SS	4-5 7-10			SILT (ML)-slightly clayey, slightly sandy, trace mica, dark grey.
5	SS	2-3 4-6			SAND (SM)-silty, slightly clayey, grey and cream colored, loose, clay layers <0.5 inch thick beginning at 14.0 feet
6	SS	3-1 1-1		10	
7	SS	1-1 1-1			
8	SS	2-1 1-1		15	
9	SS	1/12" 1/12"			SILT (ML)-very clayey, trace fine sand, dark grey, soft, some fine sand layers.
10	SS	1/12" 1/12"			
				20	BORING TERMINATED AT 20.0 FEET
				25	
				30	
				35	

GENERAL NOTES

DATE STARTED 20 MAR 88
DATE COMPLETED 20 MAR 88
RIG MOBILE B-53 ATV
CREW CHIEF TIM QUEEN
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 4.0
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

LOG OF TEST BORING

F-203 (R 01-87)

RMT

PROJECT NAME LOBECO ENVIRO. ASSESS.
LOCATION BEAUFORT, S.C.
CONTRACTOR ATEC
DRILLING METHOD H-S AUGER

BORING NO. AB-7
SHEET NO. 1 OF 1
PROJECT NO. 643.03
INSTALLATION
SURFACE ELEV.
BOREHOLE DIA. 6 IN.

SAMPLING NOTES: INTERVAL NO.	TYPE	RECOVERY N		MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	2-2 3-6				SAND (SM)-fine, slightly silty, slightly clayey, trace mica, light grey and tan with some orange staining, poorly graded, roots. purple staining at 3.0 feet NOTE- SLUDGE FROM 3.0-3.5 FEET
2	SS	5-5 5-5				
3	SS	5-4 6-8			5	
4	SS	5-7 8-6				SILT(ML)-clayey, trace fine sand, trace mica, medium grey.
5	SS	4-5 7-8			10	
6	SS	4-5 7-2				SAND (SM)-fine, slightly silty, light grey, poorly graded, loose, trace mica, some orange staining.
7	SS	2-2 3-1				
8	SS	3/24"			15	
9	SS	1-2 1-3				SILT (ML)-very clayey, trace fine sand, dark grey, soft, interbedded with fine sand layers.
10	SS				20	BORING TERMINATED AT 20.0 FEET
					25	
					30	
					35	

GENERAL NOTES

DATE STARTED 20 MAR 88
DATE COMPLETED 20 MAR 88
RIG MOBILE B-53
CREW CHIEF BO PRICE
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ∇
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

LOG OF TEST BORING

F-203 (R 01-87)

RMT

PROJECT NAME LOBECO ENVIRO. ASSESS.	BORING NO. AB-8
LOCATION BEAUFORT, S.C.	SHEET NO. 1 OF 1
CONTRACTOR ATEC	PROJECT NO. 643.03
DRILLING METHOD H-S AUGER	INSTALLATION
	SURFACE ELEV.
	BOREHOLE DIA. 6 IN.

SAMPLING NOTES					VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
INTERVAL NO.	TYPE	RECOVERY N	MOISTURE	DEPTH	
1	SS	4-7, 6-8			SAND (SM)-fine, slightly silty, trace clay, trace mica, tan and light grey, poorly graded, roots, pink staining between 3.0-3.5 feet. NOTE- NO SLUDGE OBSERVED
2	SS	4-5, 6-11		∇	
3	SS	14-15, 15-14		5	
4	SS	5-6, 3-3			SILT (ML)-slightly clayey, some fine sand, medium grey to dark grey, becoming increasingly clayey downward.
5	SS	2-1, 2/12"		10	
6	SS	2-1, 2-3			SAND (SM)-fine, silty, clayey in part, light grey to cream colored, loose.
7	SS	5-5, 4-2			
8	SS	5-2, 1-1		15	
9	SS	1/12", 1/12"			SILT (ML)-very clayey, slightly sandy with fine sand interbeds, dark grey green, increasingly sandy downward.
10	SS	3/24"		20	BORING TERMINATED AT 20.0 FEET.
				25	
				30	
				35	

GENERAL NOTES	WATER LEVEL OBSERVATIONS
DATE STARTED 20 MAR 88	WHILE DRILLING ∇ 3.0
DATE COMPLETED 20 MAR 88	AT COMPLETION ▼
RIG MOBILE B-53	AFTER DRILLING
CREW CHIEF BO PRICE	CAVE-IN: DATE/TIME DEPTH
LOGGED MAM CHECKED	WATER: DATE/TIME DEPTH

RMT

LOG OF TEST BORING

F-203 (R 01-87)

BORING NO. AB-9
SHEET NO. 1 OF 1
PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV.
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 8 IN.

SAMPLING NOTES						
INTERVAL		RECOVERY	MOISTURE			VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
NO.	TYPE	N		DEPTH		
1	SS	2-4				SAND (SM)-fine to medium, mostly fine, some clay, trace mica, tan with some purple and red staining, graded, fill, roots.
		1-1		▽		
2	SS	3/24"				
3	SS	WOH/6"			5	SAND (SM)-fine, slightly silty, slightly clayey, purple and red staining, trace mica, poorly graded, wood. NOTE- SLUDGE FROM 2.5-5.0 FEET
		2-3-3				
4	SS	4-3				
		3-3				
5	SS	2-3				SAND (SM)-fine, slightly silty, tan and light grey, poorly graded, becoming increasingly silty with depth.
		3-3			10	
6	SS	3-4				CLAY (CL)-silty, dark purple to black, soft, sludge.
		5-6				
7	SS	3-3				SAND (SM)-fine, trace silt, trace mica, light grey to white, poorly graded, increasingly clayey downward.
		1-1				
8	SS	2-2/18"			15	
9	SS	1-1				SILT (ML)-clayey, some fine sand and grey green clay interbeds.
		1-1				
10	SS	3/24"				
					20	BORING TERMINATED AT 20.0 FEET
					25	
					30	
					35	

GENERAL NOTES	WATER LEVEL OBSERVATIONS
DATE STARTED 16 MAR 88	WHILE DRILLING ▽ 1.5
DATE COMPLETED 16 MAR 88	AT COMPLETION ▼
RIG MOBILE B-53 ATV	AFTER DRILLING
CREW CHIEF TIM QUEEN	CAVE-IN: DATE/TIME ____ DEPTH ____
LOGGED MAM CHECKED ____	WATER: DATE/TIME ____ DEPTH ____

RMT

LOG OF TEST BORING

F-203 (R 01-87)

BORING NO. AB-10
SHEET NO. 1 OF 1
PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV.
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 8 IN.

SAMPLING NOTES: INTERVAL NO.	TYPE	RECOVERY N	MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	1-2 2-2			SAND (SM)-fine, slightly silty, trace clay, trace mica, tan and light grey with some orange staining, poorly graded.
2	SS	1-1 2-2			
3	SS	1-1 2-1		∇ 5	NOTE- NO SLUDGE FROM 5.5-7.0 FEET
4	SS	6-11 16-12			SAND (SM)-silty, slightly clayey, trace mica, medium to dark grey, some tan sand lenses between 10.1 and 12.0 feet.
5	SS	5-7 9-11		10	
6	SS	5-7 5-7			
7	SS	3-4 3-3			SAND (SM)-fine, slightly silty, trace mica, trace clay, cream colored, poorly graded, becoming increasingly clayey downward.
8	SS	WOH/24"		15	
9	SS	WOH/18" 1			CLAY (CL)-silty, slightly sandy, dark grey, becoming increasingly clayey downward.
10	SS	WOH/18" 2		20	BORING TERMINATED AT 20.0 FEET
				25	
				30	
				35	

GENERAL NOTES

DATE STARTED 17 MAR 88
DATE COMPLETED 17 MAR 88
RIG MOBILE B-53 ATV
CREW CHIEF TIM QUEEN
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ∇ 4.5
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

RMT

LOG OF TEST BORING

F-203 (R 01-87)

PROJECT NAME: LOBECO ENVIRO. ASSESS.	BORING NO.: AB-11
LOCATION: BEAUFORT, S.C.	SHEET NO. 1 OF 1
CONTRACTOR: ATEC	PROJECT NO.: 643.03
DRILLING METHOD: H-S AUGER	INSTALLATION:
	SURFACE ELEV.:
	BOREHOLE DIA.: 8 IN.

SAMPLING NOTES					
INTERVAL NO.	TYPE	RECOVERY N	MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	1-1 2-1		▽ (2.0)	SAND (SM)-fine, slightly silty, light grey and brown, trace mica, roots, poorly graded, becoming purple to black between 5.5 and 6.0 feet.
2	SS	1-2 2-2			
3	SS	2-2 1-2		5	NOTE- SLUDGE FROM 5.5-6.0 FEET
4	SS	12-14 15-16			SILT (ML)-clayey, some fine sand layers, light grey with faint purple stain in sandy layers, trace mica.
5	SS	4-4 5-5			
6	SS	3-4 5-6		10	
7	SS	5-4 5-4			SAND (SM)-fine, slightly clayey, light grey, white and orange, poorly graded, loose, increasingly clayey downward.
8	SS	3-1 1-1		15	
9	SS	1-1 1-1			
10	SS	3/24"			CLAY (CL)-slightly silty, trace fine sand, dark grey, soft.
				20	BORING TERMINATED AT 20.0 FEET
				25	
				30	
				35	

GENERAL NOTES	WATER LEVEL OBSERVATIONS
DATE STARTED: 17 MAR 88	WHILE DRILLING ▽: 2.0
DATE COMPLETED: 17 MAR 88	AT COMPLETION ▼:
RIG: MOBILE B-53 ATV	AFTER DRILLING
CREW CHIEF: TIM QUEEN	CAVE-IN: DATE/TIME ___ DEPTH ___
LOGGED: MAM CHECKED:	WATER: DATE/TIME ___ DEPTH ___

RMT

LOG OF TEST BORING

F-203 (R 01-87)

BORING NO. AB-12
SHEET NO. 1 OF 1
PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV.
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 8 IN.

SAMPLING NOTES						VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
INTERVAL		RECOVERY		MOISTURE		
NO.	TYPE	N			DEPTH	
1	SS	2-2 3-2				SAND (SM)-fine, slightly silty, trace clay, tan and light grey with some orange staining, poorly graded. NOTE-SLUDGE FROM 4.5-5.0 FEET
2	SS	2-3 3-2				
3	SS	3-6 7-6			▽ 5	SAND (SM)-fine, slightly silty, trace mica, light grey purple, poorly graded.
4	SS	6-10 12-17				
5	SS	3-2 2-2			10	SAND (SM-SC)-fine, silty, clayey, light grey to cream colored, loose, increasingly sandy downward.
6	SS	1-1 1-2				
7	SS	3-3 3-4				
8	SS	4-3 4-5			15	SAND (SM)-fine, slightly silty, trace clay, light grey to white, poorly graded, increasingly clayey downward.
9	SS	1-2 2-2				
10	SS	1-2 1-2				CLAY (CL)-silty, some fine sand, dark grey, soft.
					20	BORING TERMINATED AT 20.0 FEET
					25	
					30	
					35	

GENERAL NOTES	WATER LEVEL OBSERVATIONS
DATE STARTED 17 MAR 88	WHILE DRILLING ▽ 5.0
DATE COMPLETED 17 MAR 88	AT COMPLETION ▼
RIG MOBILE B-53 ATV	AFTER DRILLING
CREW CHIEF TIM QUEEN	CAVE-IN: DATE/TIME ______ DEPTH ______
LOGGED MAM CHECKED	WATER: DATE/TIME ______ DEPTH ______

RMT

LOG OF TEST BORING

F-203 (R 01-87)

PROJECT NAME: LOBECO ENVIRO. ASSESS.	BORING NO. AB-13
LOCATION: BEAUFORT, S.C.	SHEET NO. 1 OF 1
CONTRACTOR: ATEC	PROJECT NO. 643.03
DRILLING METHOD: H-S AUGER	INSTALLATION:
	SURFACE ELEV.:
	BOREHOLE DIA. 6 IN.

SAMPLING NOTES

INTERVAL NO.	INTERVAL TYPE	RECOVERY N		MOISTURE	
1	SS	2-3, 4-5			
2	SS	3-6, 7-9			
3	SS	8-5, 7-8			
4	SS	3-4, 5-6			
5	SS	2-1, 2-3			
6	SS	2-2, 2-4			
7	SS	4-4, 4-5			
8	SS	1/12", 1/12"			
9	SS	2-1, 2-1			
10	SS				

VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS

DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
0	SAND (SM)-fine, slightly silty, trace mica, tan and brown, poorly graded.
	SAND (SM)-fine, trace clay, light grey to cream colored, poorly graded, some orange staining, increasingly silty downward. NOTE- NO SLUDGE OBSERVED
5 (water level ▽)	
10	SILT (ML-SC)-clayey, slightly sandy, light grey to cream colored.
	SAND (SM)-slightly silty, trace clay, white and light grey, poorly graded, loose, trace mica.
15	CLAY (CL)-silty, slightly sandy, dark grey.
20	BORING TERMINATED AT 20.0 FEET
25	
30	
35	

GENERAL NOTES

DATE STARTED: 20 MAR 88
DATE COMPLETED: 20 MAR 88
RIG: MOBILE B-53
CREW CHIEF: BO PRICE
LOGGED: MAM CHECKED:

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽: 5.5
AT COMPLETION ▼:
AFTER DRILLING
CAVE-IN: DATE/TIME ______ DEPTH ______
WATER: DATE/TIME ______ DEPTH ______

RMT

LOG OF TEST BORING

F-203 (R 01-87)

BORING NO. AB-14
SHEET NO. 1 OF 1
PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV.
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 6 IN.

SAMPLING NOTES					VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
INTERVAL		RECOVERY	MOISTURE		
NO.	TYPE	N		DEPTH	
1	SS	3-6 5-3			SAND (SM)-fine, slightly silty, trace mica, tan and light grey, some orange staining, poorly graded, roots, becoming increasingly clayey downward.
2	SS	4-6 9-10			
3	SS	4-5 6-7		▽ 5	
4	SS	5-6 5-5			SILT (ML)-clayey, trace mica, tan and cream colored, loose.
5	SS	4-4 4-4			SAND (SM)-fine, slightly silty, trace clay, tan and cream colored, poorly graded, trace mica.
6	SS	1-3 2-1		10	
7	SS	1-1/12" 1			
8	SS	1-2 1-1		15	
9	SS	3/24"			CLAY (CL)-silty, some fine sand layers, grey green, soft becoming increasingly silty with depth.
10	SS	2/24"			
				20	BORING TERMINATED AT 20.0 FEET
				25	
				30	
				35	

GENERAL NOTES

DATE STARTED 18 MAR 88
DATE COMPLETED 18 MAR 88
RIG MOBILE B-53 ATV
CREW CHIEF TIM QUEEN
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 5.0
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

RMT LOG OF TEST BORING

F-203 (R 01-87)

PROJECT NAME: LOBECO ENVIRO. ASSESS.	BORING NO. AB-15
LOCATION: BEAUFORT, S.C.	SHEET NO. 1 OF 1
CONTRACTOR: ATEC	PROJECT NO. 643.03
DRILLING METHOD: H-S AUGER	INSTALLATION
	SURFACE ELEV.
	BOREHOLE DIA. 6 IN.

SAMPLING NOTES						
INTERVAL NO.	TYPE	RECOVERY N	MOISTURE	DEPTH		VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	2-3 4-7				SAND (SM)-fine, slightly silty, trace clay, trace mica, tan, and grey with some orange and pink staining, roots, wood, increasing clay downward.
2	SS	5-10 7-15				
3	SS	8-15 11-14		▽ 5		SILT (ML-SC)-clayey, slightly sandy, medium grey.
4	SS	4-6 6-9				NOTE- NO SLUDGE DETECTED.
5	SS	2-4 6-7				
6	SS	6-5 5-3		10		
7	SS	1-2 1-2				SAND (SM)-fine, trace clay, slightly silty, tan to cream colored poorly graded.
8	SS	3/24"		15		SILT (ML-SC)-clayey, trace mica, dark grey, soft, increasingly sandy downward.
9	SS	WOH/18" 1				
10	SS	1-1 1-1				
				20		BORING TERMINATED AT 20.0 FEET
				25		
				30		
				35		

GENERAL NOTES	WATER LEVEL OBSERVATIONS
DATE STARTED 20 MAR 88	WHILE DRILLING ▽ 5.0
DATE COMPLETED 20 MAR 88	AT COMPLETION ▼
RIG MOBILE B-53	AFTER DRILLING
CREW CHIEF BO PRICE	CAVE-IN: DATE/TIME ___ DEPTH ___
LOGGED MAM CHECKED ___	WATER: DATE/TIME ___ DEPTH ___

RMT

LOG OF TEST BORING

F-203 (R 01-87)

BORING NO. BTW-1
SHEET NO. 1 OF 1
PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV. 17.8
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 10 IN.

SAMPLING NOTES: INTERVAL NO.	TYPE	RECOVERY N	MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	1-1 2-5		▽	SAND (SM)-fine, slightly silty, slightly clayey, black, trace mica, roots.
2	SS	5-6 4-5			CLAY (CL)-silty, some fine sand layers, tan, black and orange mottling, stiff, increasing sand downward.
3	SS	3-3 6-7		5	
4	SS	5-6 8-8			
5	SS	3-2 2-2			SAND (SM)-fine, slightly silty, clayey in part, light grey to be white, poorly graded, loose.
				10	BORING TERMINATED AT 10.0 FEET
				15	
				20	
				25	
				30	
				35	

GENERAL NOTES

DATE STARTED 24 MAR 88
DATE COMPLETED 24 MAR 88
RIG MOBILE B-53 ATV
CREW CHIEF TIM QUEEN
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 1.5
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

LOG OF TEST BORING

RMT

F-203 (R 01-87)

BORING NO. BTW-2
SHEET NO. 1 OF 1

PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV. 16.7
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 10 IN.

SAMPLING NOTES – INTERVAL NO.	TYPE	RECOVERY N	MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	1-2 2-4		▽	SAND (SM)-fine, slightly silty, trace clay, trace mica, black, poorly graded, roots.
2	SS	2-1 3-4			CLAY (CL)-silty, some fine sand layers, grey, tan and orange mottling.
3	SS	3-5 7-9		5	
4	SS	7-6 7-6			SAND (SM)-fine, slightly silty, trace mica, honey brown, becoming light grey to white with depth.
5	SS	1-1 2-3			
				10	BORING TERMINATED AT 10.0 FEET
				15	
				20	
				25	
				30	
				35	

GENERAL NOTES

DATE STARTED 24 MAR 88
DATE COMPLETED 24 MAR 88
RIG MOBILE B-53 ATV
CREW CHIEF TIM QUEEN
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 2.0
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

RMT

LOG OF TEST BORING

F-203 (R 01-87)

BORING NO. BTW-3
SHEET NO. 1 OF 1

PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV. 16.8
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 10 IN.

SAMPLING NOTES						
INTERVAL NO.	INTERVAL TYPE	RECOVERY N	MOISTURE	DEPTH		VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	1-1 2-4		▽ (1.5)		SAND (SM)-fine, slightly silty, slightly clayey, black and tan perched water.
2	SS	4-3 4-5				CLAY (CL)-silty, trace fine sand, light grey and black.
3	SS	2-3 5-7		5		
4	SS	2-3 5-6				
5	SS	2-4 5-3				SAND (SM)-fine, slightly silty, slightly clayey, light grey to white, poorly graded.
				10		BORING TERMINATED AT 10.0 FEET
				15		
				20		
				25		
				30		
				35		

GENERAL NOTES

DATE STARTED 23 MAR 88
DATE COMPLETED 23 MAR 88
RIG MOBILE B-53 ATV
CREW CHIEF TIM QUEEN
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 1.5
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

LOG OF TEST BORING

F-203 (R 01-87)

RMT

PROJECT NAME: LOBECO ENVIRO. ASSESS.
LOCATION: BEAUFORT, S.C.
CONTRACTOR: ATEC
DRILLING METHOD: H-S AUGER

BORING NO.: BTW-4
SHEET NO. 1 OF 1
PROJECT NO.: 643.03
INSTALLATION:
SURFACE ELEV.: 17.0
BOREHOLE DIA.: 10 IN.

SAMPLING NOTES: INTERVAL NO.	TYPE	RECOVERY N	MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	1-1 1-1		0–2 (water level ∇ 2.0)	SAND (SM)-fine, slightly silty, slightly clayey, black and tan, wood, roots.
2	SS	2-4 5-8		2–8	CLAY (CL)-silty, some fine sand layers, light grey, tan and orange mottling, stiff, increasingly sandy with depth.
3	SS	3-6 7-10			
4	SS	4-5 6-5			
5	SS	4-5 5-6		8–10	SAND (SM)-fine, silty, trace clay, light grey to white, poorly graded, loose.
				10	BORING TERMINATED AT 10.0 FEET

GENERAL NOTES

DATE STARTED: 23 MAR 88
DATE COMPLETED: 23 MAR 88
RIG: MOBILE B-53 ATV
CREW CHIEF: TIM QUEEN
LOGGED: MAM CHECKED:

WATER LEVEL OBSERVATIONS

WHILE DRILLING ∇: 2.0
AT COMPLETION ▼:
AFTER DRILLING
CAVE-IN: DATE/TIME ______ DEPTH ______
WATER: DATE/TIME ______ DEPTH ______

RMT

LOG OF TEST BORING

F-203 (R 01-87)

BORING NO. BTW-5
SHEET NO. 1 OF 1

PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV. 18.0
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 10 IN.

SAMPLING NOTES: INTERVAL NO.	TYPE	RECOVERY N	MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	5-14 7-10			SAND (SM)-fine, with some welded grains, slightly silty, trace clay, black and brown.
2	SS	7-6 5-6		∇	CLAY (CL)-silty, trace fine sand, grey, tan and orange mottling, trace mica.
3	SS	2-5 7-12		5	
4	SS	4-5 6-7			
5	SS	3-3 4-4			SAND (SM)-fine, slightly silty, slightly clayey, decreasing silt and clay with depth, light grey to white, poorly graded.
				10	BORING TERMINATED AT 10.0 FEET
				15	
				20	
				25	
				30	
				35	

GENERAL NOTES

DATE STARTED 22 MAR 88
DATE COMPLETED 22 MAR 88
RIG MOBILE B-53 ATV
CREW CHIEF TIM QUEEN
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ∇ 3.0
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

LOG OF TEST BORING

F-203 (R 01-87)

RMT

PROJECT NAME: LOBECO ENVIRO. ASSESS.
LOCATION: BEAUFORT, S.C.
CONTRACTOR: ATEC
DRILLING METHOD: H-S AUGER

BORING NO.: BB-1
SHEET NO.: 1 OF 1
PROJECT NO.: 643.03
INSTALLATION:
SURFACE ELEV.:
BOREHOLE DIA.: 6 IN.

SAMPLING NOTES					VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
INTERVAL		RECOVERY	MOISTURE		
NO.	TYPE	N		DEPTH	
1	SS	1-4 6-7		▽ (2.0)	SAND (SM)-fine, slightly clayey, brown to black, poorly graded, roots.
2	SS	3-3 3-5			CLAY (CL)-some fine sand and silt, grey and orange mottling, trace wood.
3	SS	3-5 6-9		5	
4	SS	4-6 6-7			
5	SS	3-4 5-6		10	SAND (SM)-fine, clayey, with clay laminae <0.2 inches thick, slightly silty, light grey and tan, poorly graded.
					BORING TERMINATED AT 10.0 FEET
				15	
				20	
				25	
				30	
				35	

GENERAL NOTES

DATE STARTED: 26 MAR 88
DATE COMPLETED: 26 MAR 88
RIG: MOBILE B-53 ATV
CREW CHIEF: TIM J. QUEEN
LOGGED: MAM CHECKED:

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽: 2.0
AT COMPLETION ▼:
AFTER DRILLING
CAVE-IN: DATE/TIME ______ DEPTH ______
WATER: DATE/TIME ______ DEPTH ______

RMT

LOG OF TEST BORING

F-203 (R 01-87)

BORING NO. BB-2
SHEET NO. 1 OF 1

PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV.
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 6 IN.

SAMPLING NOTES					VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
INTERVAL		RECOVERY	MOISTURE		
NO.	TYPE	N		DEPTH	
1	SS	2-1			SAND (SM)-fine, slightly silty, black and tan, trace mica, poorly graded.
		2-5		▽	
2	SS	6-7			CLAY (CL)-silty, trace fine sand, light grey, tan and orange mottling, stiff.
		3-4			
3	SS	5-6		5	
		9-11			
4	SS	7-6			
		10-10			
5	SS	3-3			SAND (SM)-silty in part, clay in part, light grey to white, loose.
		3-4		10	BORING TERMINATED AT 10.0 FEET
				15	
				20	
				25	
				30	
				35	

GENERAL NOTES	WATER LEVEL OBSERVATIONS
DATE STARTED 26 MAR 88	WHILE DRILLING ▽ 2.0
DATE COMPLETED 26 MAR 88	AT COMPLETION ▼
RIG MOBILE B-53 ATV	AFTER DRILLING
CREW CHIEF TIM QUEEN	CAVE-IN: DATE/TIME ____ DEPTH ____
LOGGED MAM CHECKED ____	WATER: DATE/TIME ____ DEPTH ____

RMT

LOG OF TEST BORING

F-203 (R 01-87)

BORING NO. BB-3
SHEET NO. 1 OF 1
PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV.
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 6 IN.

SAMPLING NOTES						
INTERVAL		RECOVERY	MOISTURE			VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
NO.	TYPE	N			DEPTH	
1	SS	1-1 2-1				SAND (SM)-fine, slightly silty, trace clay, black and tan, roots from 0.0-0.5 feet.
2	SS	2-3 2-2				
3	SS	3-3 5-3			5	CLAY (CL)-some silty layers, trace fine sand, light grey and tan, stiff, increasing sand downward.
4	SS	3-4 5-8				
5	SS	3-5 6-8				
					10	BORING TERMINATED AT 10.0 FEET
					15	
					20	
					25	
					30	
					35	

GENERAL NOTES

DATE STARTED 26 MAR 88
DATE COMPLETED 26 MAR 88
RIG MOBILE B-53 ATV
CREW CHIEF TIM QUEEN
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ∇
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

LOG OF TEST BORING

F-203 (R 01-87)

RMT

PROJECT NAME: LOBECO ENVIRO. ASSESS.	BORING NO. BB-4
LOCATION: BEAUFORT, S.C.	SHEET NO. 1 OF 1
CONTRACTOR: ATEC	PROJECT NO. 643.03
DRILLING METHOD: H-S AUGER	INSTALLATION
	SURFACE ELEV.
	BOREHOLE DIA. 6 IN.

SAMPLING NOTES: INTERVAL NO.	TYPE	RECOVERY N	MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	1-3 4-5			SAND (SM)-fine, with hard welded layers <0.2 inches thick, slightly clayey, slightly silty, black.
2	SS	4-2 3-3		▽	CLAY (CL)-slightly sandy with fine sand layers up to 1.0 inch thick, light grey to grey.
3	SS	4-8 6-12		5	
4	SS	4-4 7-8			
5	SS	3-3 5-7			SAND (SM)-fine, clayey, silty, light grey.
				10	BORING TERMINATED AT 10.0 FEET
				15	
				20	
				25	
				30	
				35	

GENERAL NOTES	WATER LEVEL OBSERVATIONS
DATE STARTED: 25 MAR 88	WHILE DRILLING ▽ 2.5
DATE COMPLETED: 25 MAR 88	AT COMPLETION ▼
RIG: MOBILE B-53 ATV	AFTER DRILLING
CREW CHIEF: TIM J. QUEEN	CAVE-IN: DATE/TIME ____ DEPTH ____
LOGGED: MAM CHECKED:	WATER: DATE/TIME ____ DEPTH ____

RMT LOG OF TEST BORING

F-203 (R 01-87)

BORING NO. BB-5
SHEET NO. 1 OF 1
PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV.
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 10 IN.

SAMPLING NOTES					
INTERVAL NO.	INTERVAL TYPE	RECOVERY N	MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	1-2 2-10		▽ (2.0)	SAND (SM)-fine, slightly silty, some welded layers, black, roots, wood, several pebbles, fill.
2	SS	16-28 8-4			CLAY (CL)-silty, trace fine sand, grey, tan and orange mottling, increasing sand downward.
3	SS	1-4 6-3		5	
4	SS	3-4 5-7			
5	SS	3-5 5-6			SAND (SM)-fine, slightly silty, slightly clayey, white, poorly graded.
				10	BORING TERMINATED AT 10.0 FEET
				15	
				20	
				25	
				30	
				35	

GENERAL NOTES

DATE STARTED 25 MAR 88
DATE COMPLETED 25 MAR 88
RIG MOBILE B-53 ATV
CREW CHIEF TIM QUEEN
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 2.0
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

RMT

LOG OF TEST BORING

F-203 (R 01-87)

BORING NO. BB-6
SHEET NO. 1 OF 1

PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV.
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 6 IN.

SAMPLING NOTES						VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
INTERVAL		RECOVERY		MOISTURE		
NO.	TYPE	N			DEPTH	
1	SS	2-4 6-7				SAND (SM)-fine, with hard welded hayers approximately 0.1 inch thick, slightly clayey, slightly silty, black.
2	SS	5-7 7-6			∇	SAND (SM) and CLAY (CL)-alternating layers of silty sand, light grey and clay, grey and orange mottling.
3	SS	3-5 7-8			5	
4	SS	4-6 7-9				CLAY (CL)-slightly sandy, silty, light to medium grey.
5	SS	4-4 5-6			10	SAND (SM)-fine, silty; clayey, light grey, poorly graded.
					15	BORING TERMINATED AT 10.0 FEET
					20	
					25	
					30	
					35	

GENERAL NOTES

DATE STARTED 25 MAR 88
DATE COMPLETED 25 MAR 88
RIG MOBILE B-53 ATV
CREW CHIEF TIM J. QUEEN
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ∇ 2.5
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

LOG OF TEST BORING

F:203 (R 01-87)

RMT

BORING NO. BB-7
SHEET NO. 1 OF 1
PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV.
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 6 IN.

SAMPLING NOTES						
INTERVAL NO.	TYPE	RECOVERY N	MOISTURE	DEPTH		VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	1-1, 1-2				SAND (SM)-fine, slightly clayey, slightly silty, black and brown, poorly graded.
2	SS	2-4, 4-7		▽		CLAY (CL)-slightly silty, trace fine sand, grey and tan.
3	SS	5-7, 10-13		5		
4	SS	4-5, 6-6				
5	SS	3-5, 6-3				SAND (SM)-fine, clayey, slightly silty, light grey and black mottling, poorly graded.
				10		BORING TERMINATED AT 10.0 FEET
				15		
				20		
				25		
				30		
				35		

GENERAL NOTES

DATE STARTED 25 MAR 88
DATE COMPLETED 25 MAR 88
RIG MOBILE B-53 ATV
CREW CHIEF TIM J. QUEEN
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 2.5
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

LOG OF TEST BORING

F-203 (R 01-87)

RMT

PROJECT NAME: LOBECO ENVIRO. ASSESS.	BORING NO. BB-8
LOCATION: BEAUFORT, S.C.	SHEET NO. 1 OF 1
CONTRACTOR: ATEC	PROJECT NO. 643.03
DRILLING METHOD: H-S AUGER	INSTALLATION
	SURFACE ELEV.
	BOREHOLE DIA. 6 IN.

SAMPLING NOTES						
INTERVAL NO.	TYPE	RECOVERY N		MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	2-2 4-2			▽ (2.0)	SAND (SM)-fine, slightly silty, trace clay, black, trace mica, roots.
2	SS	3-3 2-2				CLAY (CL)-silty, trace fine sand, light grey, tan and orange mottling, stiff, increasing sand downward.
3	SS	2-2 4-5			5	
4	SS	2-4 6-9				
5	SS	3-3 5-5			10	SAND (SM)-fine, slightly silty, slightly clayey, light grey to white poorly graded.
						BORING TERMINATED AT 10.0 FEET

Depth scale: 5, 10, 15, 20, 25, 30, 35

GENERAL NOTES		WATER LEVEL OBSERVATIONS	
DATE STARTED	24 MAR 88	WHILE DRILLING ▽	2.0
DATE COMPLETED	24 MAR 88	AT COMPLETION ▼	
RIG	MOBILE B-53	AFTER DRILLING	
CREW CHIEF	BO PRICE	CAVE-IN: DATE/TIME	DEPTH
LOGGED MAM	CHECKED	WATER: DATE/TIME	DEPTH

RMT

LOG OF TEST BORING

F-203 (R 01-87)

BORING NO. BB-9

SHEET NO. 1 OF 1

PROJECT NAME LOBECO ENVIRO. ASSESS.

PROJECT NO. 643.03

LOCATION BEAUFORT, S.C.

INSTALLATION

CONTRACTOR ATEC

SURFACE ELEV.

DRILLING METHOD H-S AUGER

BOREHOLE DIA. 6 IN.

SAMPLING NOTES					VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
INTERVAL NO.	TYPE	RECOVERY N	MOISTURE	DEPTH	
1	SS	2-4 3-2			SAND (SM)-fine, slightly silty, trace clay, black, some roots.
2	SS	2-2 3-2		▽	CLAY (CL)-some silty layers, trace mica, trace sand, light grey and tan, stiff. Increasing sand downward.
3	SS	2-3 5-6		5	
4	SS	2-3 4-5			
5	SS	3-3 4-3		10	SAND (SM)-fine, silty, slightly clayey, interbedded with clay layers <0.5 inches thick, light grey to white.
					BORING TERMINATED AT 10.0 FEET
				15	
				20	
				25	
				30	
				35	

GENERAL NOTES

DATE STARTED 24 MAR 88

DATE COMPLETED 24 MAR 88

RIG MOBILE B-53

CREW CHIEF BO PRICE

LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 3.0

AT COMPLETION ▼

AFTER DRILLING

CAVE-IN: DATE/TIME ______ DEPTH ______

WATER: DATE/TIME ______ DEPTH ______

LOG OF TEST BORING

F-203 (R 01-87)

RMT

PROJECT NAME LOBECO ENVIRO. ASSESS.
LOCATION BEAUFORT, S.C.
CONTRACTOR ATEC
DRILLING METHOD H-S AUGER

BORING NO. BB-10
SHEET NO. 1 OF 1
PROJECT NO. 643.03
INSTALLATION
SURFACE ELEV.
BOREHOLE DIA. 6 IN.

SAMPLING NOTES: INTERVAL NO.	TYPE	RECOVERY N		MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	2-2 3-2			▽ (2.0)	SAND (SM)-fine, slighly silty, brown and black, poorly graded, roots.
2	SS	1-1 1-2				CLAY (CL)-some fine sand and silt, tan and orange mottling.
3	SS	2-4 6-8			5	
4	SS	2-2 4-6				
5	SS					SAND (SM)-fine, slightly clayey, slightly silty, light grey and white, poorly graded.
					10	BORING TERMINATED AT 10.0 FEET
					15	
					20	
					25	
					30	
					35	

GENERAL NOTES

DATE STARTED 24 MAR 88
DATE COMPLETED 24 MAR 88
RIG MOBILE B-53
CREW CHIEF BO PRICE
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 2.0
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

RMT

LOG OF TEST BORING

F-203 (R 01-87)

BORING NO. DB-1

SHEET NO. 1 OF 1

PROJECT NAME LOBECO ENVIRO. ASSESS.

PROJECT NO. 643.03

LOCATION BEAUFORT, S.C.

INSTALLATION

CONTRACTOR ATEC

SURFACE ELEV.

DRILLING METHOD H-S AUGER

BOREHOLE DIA. 5 IN.

SAMPLING NOTES						VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
INTERVAL NO.	TYPE	RECOVERY N		MOISTURE	DEPTH	
1	SS	2-6 7-8			▽ (2.0)	SAND (SM)-fine, slightly clayey, trace mica tan and brown with some orange staining, roots.
2	SS	2-6 7-8				SAND (SM)-fine, slightly clayey, slightly silty, trace mica, poorly graded, loose, tan, grey and orange mottling.
3	SS	5-5 4-5			5	
4	SS	3-5 7-6				SAND (SM)-fine, trace mica, light grey to white, poorly graded, loose, clay laminae <0.1 inch thick between 8.0-10.0 feet.
5	SS	3-5 3-8				
					10	BORING TERMINATED AT 10.0 FEET
					15	
					20	
					25	
					30	
					35	

GENERAL NOTES

DATE STARTED 23 MAR 88

DATE COMPLETED 23 MAR 88

RIG MOBILE B-53

CREW CHIEF BO PRICE

LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 2.0

AT COMPLETION ▼

AFTER DRILLING

CAVE-IN: DATE/TIME DEPTH

WATER: DATE/TIME DEPTH

LOG OF TEST BORING

F-203 (R 01-87)

PROJECT NAME LOBECO ENVIRO. ASSESS.	BORING NO. DB-2
LOCATION BEAUFORT, S.C.	SHEET NO. 1 OF 1
CONTRACTOR ATEC	PROJECT NO. 643.03
DRILLING METHOD H-S AUGER	INSTALLATION
	SURFACE ELEV.
	BOREHOLE DIA. 6 IN.

SAMPLING NOTES: INTERVAL NO.	TYPE	RECOVERY N	MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	2-10 12-14		▽ (2.0)	SAND (SM)-fine, slightly clayey, tan and brown with some orange staining, poorly graded, roots.
2	SS	4-4 5-5			SAND (SM)-fine, slightly clayey, slightly silty, tan grey and orange mottling, poorly graded, loose.
3	SS	1-2 5-5		5	
4	SS	4-5 8-10			
5	SS	3-6 9-13			SAND (SM)-fine, light grey and orange stained, poorly graded, loose.
				10	BORING TERMINATED AT 10.0 FEET
				15	
				20	
				25	
				30	
				35	

GENERAL NOTES

DATE STARTED 24 MAR 88

DATE COMPLETED 24 MAR 88

RIG MOBILE B-53

CREW CHIEF BO PRICE

LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 2.0

AT COMPLETION ▼

AFTER DRILLING

CAVE-IN: DATE/TIME DEPTH

WATER: DATE/TIME DEPTH

RMT

LOG OF TEST BORING

F-203 (R 01-87)

PROJECT NAME LOBECO ENVIRO. ASSESS.	BORING NO. DB-3
LOCATION BEAUFORT, S.C.	SHEET NO. 1 OF 1
CONTRACTOR ATEC	PROJECT NO. 643.03
DRILLING METHOD H-S AUGER	INSTALLATION
	SURFACE ELEV.
	BOREHOLE DIA. 6 IN.

SAMPLING NOTES						
INTERVAL		RECOVERY		MOISTURE		VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
NO.	TYPE	N			DEPTH	
1	SS	4-8 5-4			0–2 (water level ▽ at 2.0)	SAND (SM)-fine, trace clay, trace mica, several quartz pebbles, roots, light grey and tan, fill.
2	SS	3-4 8-10			2–8	SAND (SM)-fine, slightly clayey with some clay laminae <0.1 inch thick, slightly silty, grey and orange mottling, poorly graded.
3	SS	4-5 5-8			5	
4	SS	3-4 5-7				
5	SS	2-3 5-7			8–10	SAND (SM)-fine, slightly silty, trace mica, light grey to white, poorly graded.
					10	BORING TERMINATED AT 10.0 FEET
					15	
					20	
					25	
					30	
					35	

GENERAL NOTES	WATER LEVEL OBSERVATIONS
DATE STARTED 23 MAR 88	WHILE DRILLING ▽ 2.0
DATE COMPLETED 23 MAR 88	AT COMPLETION ▼
RIG MOBILE B-53	AFTER DRILLING
CREW CHIEF BO PRICE	CAVE-IN: DATE/TIME ____ DEPTH ____
LOGGED MAM CHECKED ____	WATER: DATE/TIME ____ DEPTH ____

LOG OF TEST BORING

F-203 (R 01-87)

PROJECT NAME: LOBECO ENVIRO. ASSESS.
LOCATION: BEAUFORT, S.C.
CONTRACTOR: ATEC
DRILLING METHOD: H-S AUGER

BORING NO.: DB-4
SHEET NO.: 1 OF 1
PROJECT NO.: 643.03
INSTALLATION:
SURFACE ELEV.:
BOREHOLE DIA.: 6 IN.

SAMPLING NOTES						
INTERVAL NO.	INTERVAL TYPE	RECOVERY N	MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	4-6 4-7			SAND (SM)-fine, slightly clayey, tan with some orange staining, poorly graded, roots, topsoil to 0.5 feet.
2	SS	6-8 10-12		▽	SAND (SM)-fine, slightly clayey, tan, grey and orange mottling, poorly graded, loose
3	SS	4-4 6-6		5	
4	SS	3-3 5-7			SAND (SM)-fine, slightly clayey with clay laminae <0.2 inches thick, light grey with some orange staining, poorly graded, loose.
5	SS	3-5 8-12			
				10	BORING TERMINATED AT 10.0 FEET
				15	
				20	
				25	
				30	
				35	

GENERAL NOTES

DATE STARTED: 23 MAR 88
DATE COMPLETED: 23 MAR 88
RIG: MOBILE B-53
CREW CHIEF: BO PRICE
LOGGED: MAM CHECKED:

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽: 3.0
AT COMPLETION ▼:
AFTER DRILLING
CAVE-IN: DATE/TIME ______ DEPTH ______
WATER: DATE/TIME ______ DEPTH ______

RMT

LOG OF TEST BORING

F-203 (R 01-87)

BORING NO. DB-5

SHEET NO. 1 OF 1

PROJECT NAME LOBECO ENVIRO. ASSESS.

PROJECT NO. 643.03

LOCATION BEAUFORT, S.C.

INSTALLATION

CONTRACTOR ATEC

SURFACE ELEV.

DRILLING METHOD H-S AUGER

BOREHOLE DIA. 6 IN.

SAMPLING NOTES						VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
INTERVAL		RECOVERY		MOISTURE		
NO.	TYPE	N			DEPTH	
1	SS	4-5 6-4				SAND (SM)-fine, trace clay, tan with some orange staining, poorly graded, loose, roots to 0.5 feet.
2	SS	4-5 6-7				SAND (SM)-fine, slightly clayey, trace mica, tan, grey and orange mottling, poorly graded, loose.
3	SS	2-3 5-8			5	
4	SS	3-4 7-8				
5	SS	8-8 8-9				SAND (SM)-fine, light grey to white, poorly graded, loose.
					10	BORING TERMINATED AT 10.0 FEET
					15	
					20	
					25	
					30	
					35	

GENERAL NOTES

DATE STARTED 22 MAR 88

DATE COMPLETED 22 MAR 88

RIG MOBILE B-53

CREW CHIEF BO PRICE

LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ∇

AT COMPLETION ▼

AFTER DRILLING

CAVE-IN: DATE/TIME DEPTH

WATER: DATE/TIME DEPTH

LOG OF TEST BORING

RMT — F-203 (R 01-87)

BORING NO. DB-6
SHEET NO. 1 OF 1
PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV.
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 6 IN.

SAMPLING NOTES						VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
INTERVAL		RECOVERY		MOISTURE		
NO.	TYPE	N			DEPTH	
1	SS	4-6 8-5				SAND (SM)-fine, slightly clayey, trace mica, tan and brown with some orange staining, poorly graded, roots.
2	SS	2-2 3-5		▽		SAND (SM)-fine, some clay, slightly silty, tan, grey and orange mottling, poorly graded, loose.
3	SS	4-4 6-8			5	
4	SS	3-5 5-10				SAND (SM)-fine, slightly clayey-decreasing with depth, light grey becoming white with depth, poorly graded, loose.
5	SS	8-8 10-8				
					10	BORING TERMINATED AT 10.0 FEET
					15	
					20	
					25	
					30	
					35	

GENERAL NOTES

DATE STARTED 22 MAR 88
DATE COMPLETED 22 MAR 88
RIG MOBILE B-53
CREW CHIEF BO PRICE
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 3.0
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

RMT

LOG OF TEST BORING

F-203 (R 01-87)

BORING NO. DB-7
SHEET NO. 1 OF 1

PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV.
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 6 IN.

SAMPLING NOTES					
INTERVAL NO.	INTERVAL TYPE	RECOVERY N	MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	2-5 7-7			SAND (SM)-fine, trace clay, trace mica, roots, tan with some orange staining, topsoil.
2	SS	2-5 4-6		∇ (4.0)	SAND (SM)-fine, trace clay, tan, grey and orange mottling, poorly graded, loose.
3	SS	4-4 5-5		5	
4	SS	2-2 6-12			SAND (SM)-fine, light grey, poorly graded, loose.
5	SS	2-3 7-9			
				10	BORING TERMINATED AT 10.0 FEET
				15	
				20	
				25	
				30	
				35	

GENERAL NOTES

DATE STARTED 22 MAR 88
DATE COMPLETED 22 MAR 88
RIG MOBILE B-53
CREW CHIEF BO PRICE
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ∇ 4.0
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

RMT

LOG OF TEST BORING

F-203 (R 01-87)

BORING NO. DB-8
SHEET NO. 1 OF 1

PROJECT NAME LOBECO ENVIRO. ASSESS.
PROJECT NO. 643.03
LOCATION BEAUFORT, S.C.
INSTALLATION
CONTRACTOR ATEC
SURFACE ELEV.
DRILLING METHOD H-S AUGER
BOREHOLE DIA. 6 IN.

SAMPLING NOTES: INTERVAL NO.	TYPE	RECOVERY N		MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	2-4 10-10			0–2.5	SAND (SM)-fine, slightly clayey, tan and brown with some orange staining, poorly graded, loose, roots to 0.75 feet.
2	SS	2-4 6-8				
3	SS	6-5 7-8			4–6	SAND (SM)-fine, slightly clayey, tan, grey and orange mottling, poorly graded, loose.
4	SS	4-5 6-5			6–10	SAND (SM)-fine, trace clay, tan and light grey, poorly graded, loose.
5	SS	2-2 3-6				
					10	BORING TERMINATED AT 10.0 FEET

Depth scale: 5, 10, 15, 20, 25, 30, 35

GENERAL NOTES

DATE STARTED 23 MAR 88
DATE COMPLETED 23 MAR 88
RIG MOBILE B-53
CREW CHIEF BO PRICE
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

LOG OF TEST BORING

F-203 (R 01-87)

RMT

PROJECT NAME: LOBECO ENVIRO. ASSESS.	BORING NO.: DB-9
LOCATION: BEAUFORT, S.C.	SHEET NO. 1 OF 1
CONTRACTOR: ATEC	PROJECT NO.: 643.03
DRILLING METHOD: H-S AUGER	INSTALLATION:
	SURFACE ELEV.:
	BOREHOLE DIA.: 6 IN.

SAMPLING NOTES						
INTERVAL		RECOVERY	MOISTURE			VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
NO.	TYPE	N			DEPTH	
1	SS	2-4 6-6				SAND (SM)-fine, trace clay, trace mica, tan with some orange staining, poorly graded, loose, roots to 0.5 feet.
2	SS	4-5 6-7			∇	
3	SS	2-3 4-5			5	SAND (SM)-fine, slightly clayey, tan, grey and orange mottling, poorly graded, loose.
4	SS	4-4 4-7				SAND (SM)-fine, slightly clayey with clay laminae <0.2 inches thick, light grey, poorly graded, loose.
5	SS	6-7 5-10				
					10	BORING TERMINATED AT 10.0 FEET
					15	
					20	
					25	
					30	
					35	

GENERAL NOTES	WATER LEVEL OBSERVATIONS
DATE STARTED: 23 MAR 88	WHILE DRILLING ∇: 3.0
DATE COMPLETED: 23 MAR 88	AT COMPLETION ▼:
RIG: MOBILE B-53	AFTER DRILLING
CREW CHIEF: BO PRICE	CAVE-IN: DATE/TIME ____ DEPTH ____
LOGGED: MAM CHECKED:	WATER: DATE/TIME ____ DEPTH ____

RMT

LOG OF TEST BORING

F-203 (R 01-87)

PROJECT NAME LOBECO ENVIRO. ASSESS.
LOCATION BEAUFORT, S.C.
CONTRACTOR ATEC
DRILLING METHOD H-S AUGER

BORING NO. DB-10
SHEET NO. 1 OF 1
PROJECT NO. 643.03
INSTALLATION
SURFACE ELEV.
BOREHOLE DIA. 6 IN.

SAMPLING NOTES						
INTERVAL NO.	INTERVAL TYPE	RECOVERY N	MOISTURE	DEPTH	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	SS	4-5 8-7			SAND (SM)-fine, slightly clayey, tan and brown with some orange staining, poorly graded, loose, roots.
2	SS	4-6 8-10		▽ (3.0)	SAND (SM)-fine, slightly clayey, tan, grey and orange mottling, poorly graded, loose.
3	SS	3-3 5-6		5	
4	SS	3-6 8-10			SAND (SM)-fine, light grey to white, poorly graded, loose.
5	SS	10-10 12-14			
				10	BORING TERMINATED AT 10.0 FEET
				15	
				20	
				25	
				30	
				35	

GENERAL NOTES

DATE STARTED 23 MAR 88
DATE COMPLETED 23 MAR 88
RIG MOBILE B-53
CREW CHIEF BO PRICE
LOGGED MAM CHECKED

WATER LEVEL OBSERVATIONS

WHILE DRILLING ▽ 3.0
AT COMPLETION ▼
AFTER DRILLING
CAVE-IN: DATE/TIME DEPTH
WATER: DATE/TIME DEPTH

APPENDIX B

APPENDIX B

WELL CONSTRUCTION DIAGRAMS

RMT

MONITORING WELL CONSTRUCTION

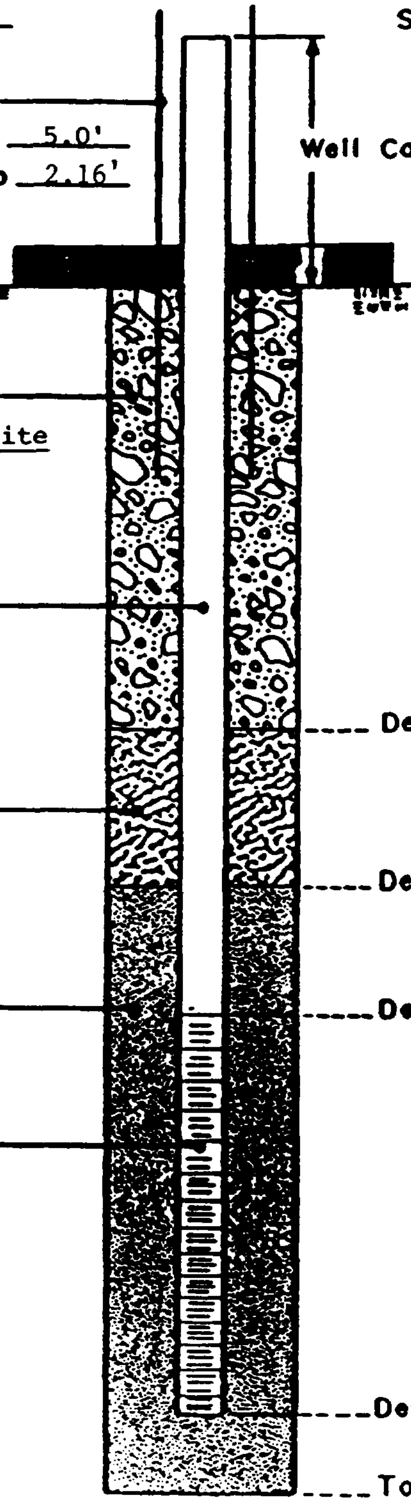
WELL No. L-1
Date Completed 3-15-88
Project No. 643.05

O.D. OF CASING 2" Ø
LENGTH OF SCREEN 10.0'
SCREEN OPENING SIZE 0.010"

Protective Casing
Protective Casing Length 5.0'
Protective Casing Stickup 2.16'

Well Casing Stickup 1.86'

Ground Surface Elev. 19.4'



0.0'

Grout
Cement-Bentonite
(Type)

Casing
2"Ø Schedule 40 PVC
(Size & Type)

Depth to Top of Bentonite 13.5'

Bentonite
Pellets
(Type)

Depth to Top of Gravel/Sand 16.5'

Gravel/Sand

Depth to Top of Screen 18.0'

Screen

Depth to Bottom of Screen 28.0'

Total Depth 35.0'

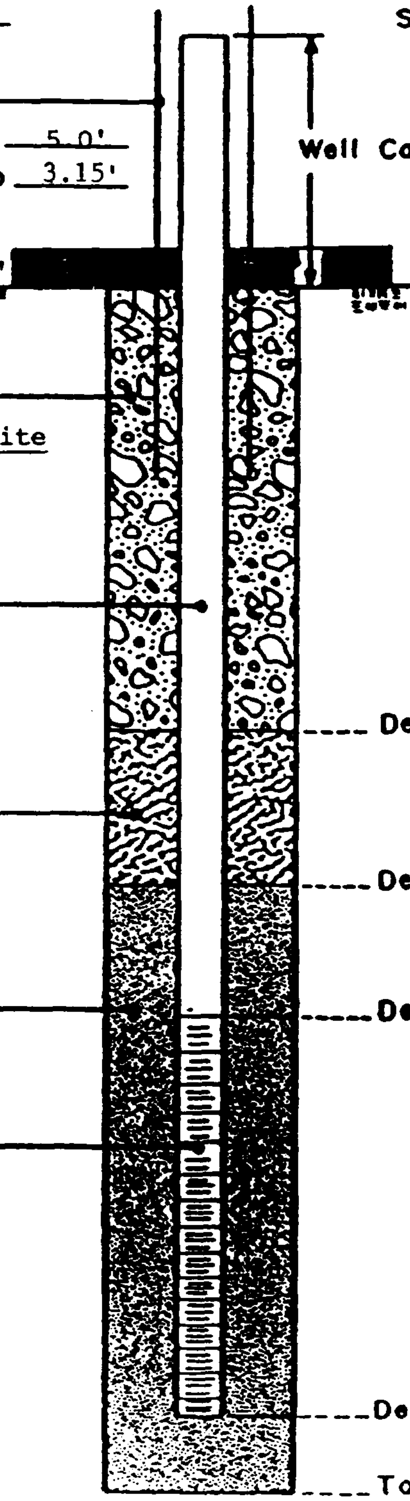
Note: All Depths Referenced From Ground Surface.

RMT

MONITORING WELL CONSTRUCTION

WELL No. L-2
Date Completed 3-26-88
Project No. 643.05

O.D. OF CASING 2" Ø
LENGTH OF SCREEN 15.0'
SCREEN OPENING SIZE 0.010"



Protective Casing
Protective Casing Length 5.0'
Protective Casing Stickup 3.15'

Well Casing Stickup 2.85'

Ground Surface Elev. 20.4'

0.0'

Grout
Cement-Bentonite
(Type)

Casing
2"Ø Schedule 40 PVC
(Size & Type)

Depth to Top of Bentonite 1.5'

Bentonite
Pellets
(Type)

Depth to Top of Gravel/Sand 2.5'

Gravel/Sand

Depth to Top of Screen 3.5'

Screen

Depth to Bottom of Screen 18.5

Total Depth 20.5'

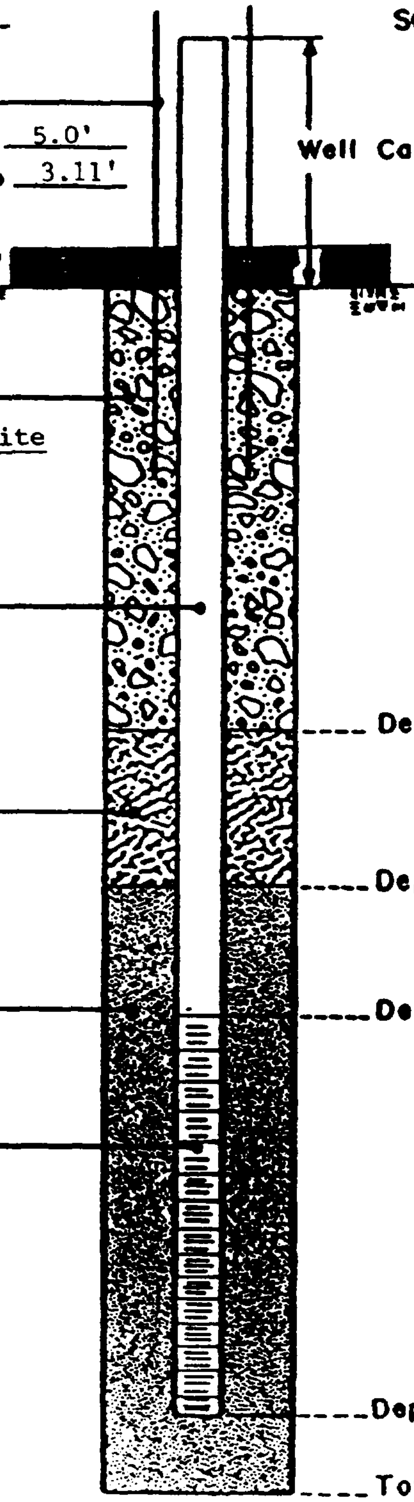
Note: All Depths Referenced From Ground Surface.

RMT

MONITORING WELL CONSTRUCTION

WELL No. L-3
Date Completed 3-27-88
Project No. 643.05

O.D. OF CASING 2" Ø
LENGTH OF SCREEN 15.0'
SCREEN OPENING SIZE 0.010"



Protective Casing
Protective Casing Length 5.0'
Protective Casing Stickup 3.11'

Well Casing Stickup 2.81'

Ground Surface Elev. 16.0'

0.0'

Grout
Cement-Bentonite
(Type)

Casing
2"Ø Schedule 40 PVC
(Size & Type)

Depth to Top of Bentonite 0.8'

Bentonite
Pellets
(Type)

Depth to Top of Gravel/Sand 1.9'

Gravel/Sand

Depth to Top of Screen 2.9'

Screen

Depth to Bottom of Screen 17.9'

Total Depth 20.5'

Note: All Depths Referenced From Ground Surface.

RMT

MONITORING WELL CONSTRUCTION

WELL No. L-4
Date Completed 3-28-88
Project No. 643.05

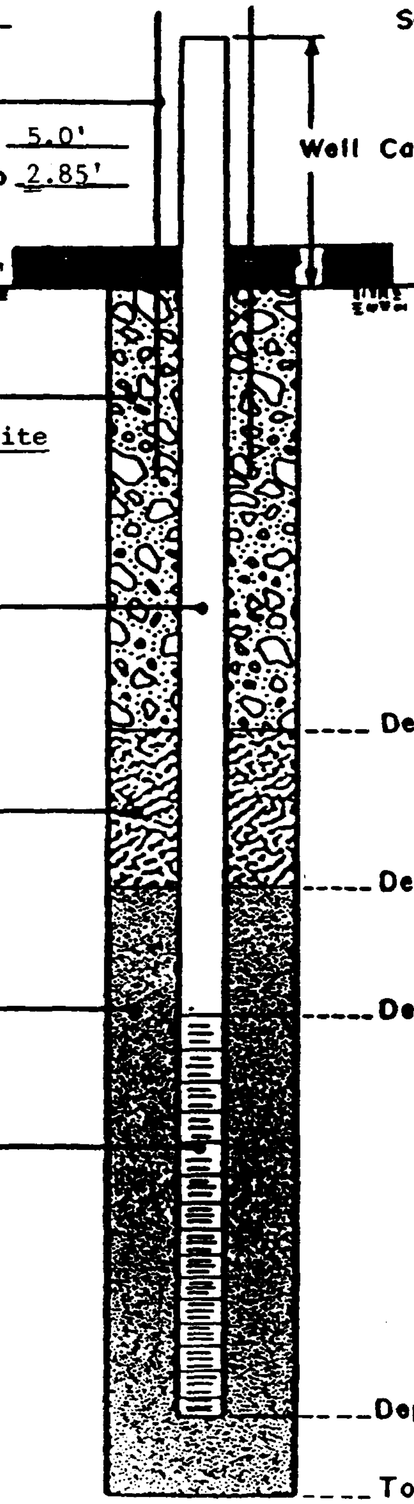
O.D. OF CASING 2" Ø
LENGTH OF SCREEN 4.5'
SCREEN OPENING SIZE 0.010"

Protective Casing
Protective Casing Length 5.0'
Protective Casing Stickup 2.85'

Well Casing Stickup 2.55'

Ground Surface Elev. 16.4'

0.0'



Grout
Cement-Bentonite
(Type)

Casing
2"Ø Schedule 40 PVC
(Size & Type)

Depth to Top of Bentonite 0.5'

Bentonite
Pellets
(Type)

Depth to Top of Gravel/Sand 1.5'

Gravel/Sand

Depth to Top of Screen 2.5'

Screen

Depth to Bottom of Screen 7.0'

Total Depth 8.0'

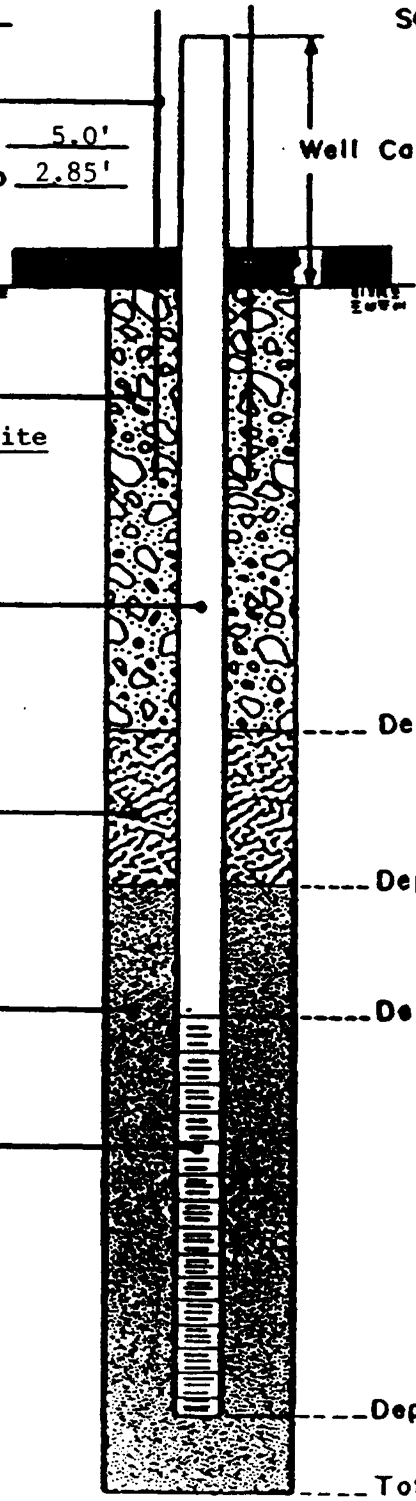
Note: All Depths Referenced From Ground Surface.

RMT

MONITORING WELL CONSTRUCTION

WELL No. L-5
Date Completed 3-24-88
Project No. 643.05

O.D. OF CASING 2" Ø
LENGTH OF SCREEN 10.0
SCREEN OPENING SIZE 0.010"



Protective Casing
Protective Casing Length 5.0'
Protective Casing Stickup 2.85'

Well Casing Stickup 2.55'

Ground Surface Elev. 7.7'

0.0'

Grout
Cement-Bentonite
(Type)

Casing
2"Ø Schedule 40 PVC
(Size & Type)

Depth to Top of Bentonite 3.0'

Bentonite
Pellets
(Type)

Depth to Top of Gravel/Sand 5.5'

Gravel/Sand

Depth to Top of Screen 7.5'

Screen

Depth to Bottom of Screen 17.5'

Total Depth 20.0'

Note: All Depths Referenced From Ground Surface.

RMT

MONITORING WELL CONSTRUCTION

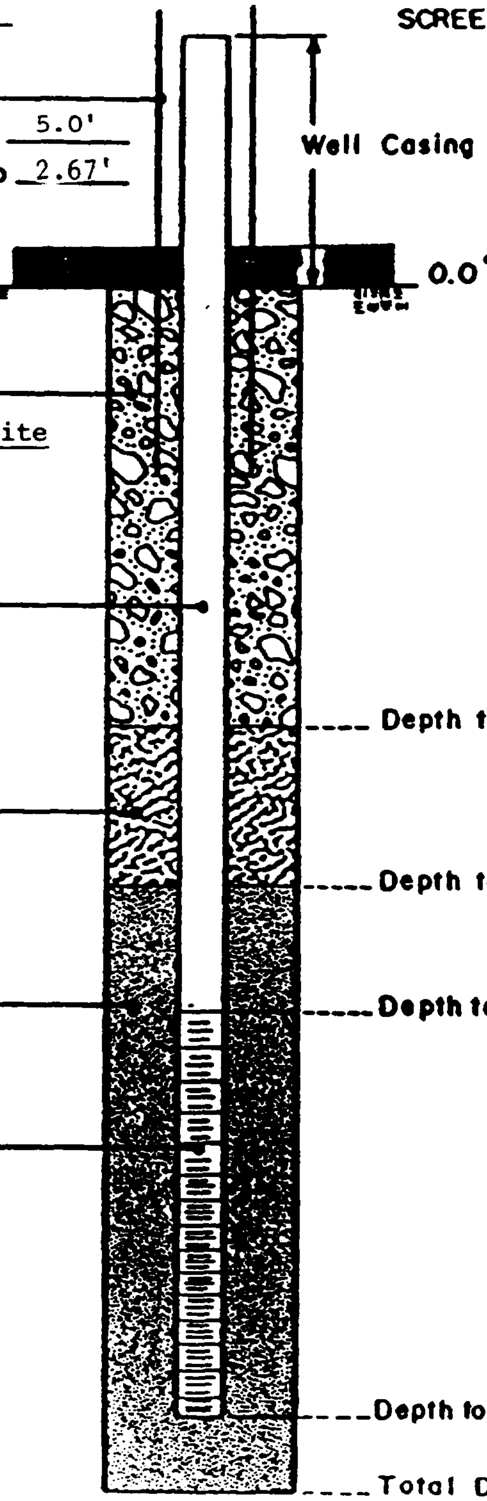
WELL No. L-6
Date Completed 3-29-88
Project No. 643.05

O.D. OF CASING 2" Ø
LENGTH OF SCREEN 10.0'
SCREEN OPENING SIZE 0.010"

Protective Casing
Protective Casing Length 5.0'
Protective Casing Stickup 2.67'

Well Casing Stickup 2.37'

Ground Surface Elev. 8.6'



Grout
Cement-Bentonite
(Type)

Casing
2"Ø Schedule 40 PVC
(Size & Type)

Depth to Top of Bentonite 3.5'

Bentonite
Pellets
(Type)

Depth to Top of Gravel/Sand 5.5'

Gravel/Sand

Depth to Top of Screen 7.5'

Screen

Depth to Bottom of Screen 17.5'

Total Depth 20.0'

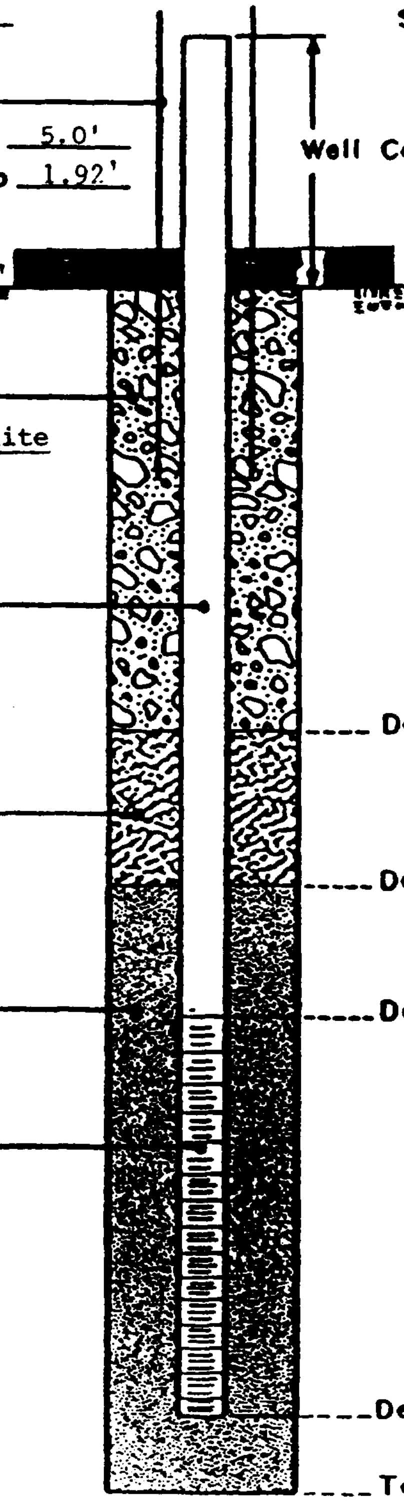
Note: All Depths Referenced From Ground Surface.

RMT

MONITORING WELL CONSTRUCTION

WELL No. L-7
Date Completed 3-28-88
Project No. 643.05

O.D. OF CASING 2" Ø
LENGTH OF SCREEN 10.0'
SCREEN OPENING SIZE 0.010"



Protective Casing
Protective Casing Length 5.0'
Protective Casing Stickup 1.92'

Well Casing Stickup 1.62'

Ground Surface Elev. 16.5'

0.0'

Grout
Cement-Bentonite
(Type)

Casing
2"Ø Schedule 40 PVC
(Size & Type)

Depth to Top of Bentonite 4.5'

Bentonite
Pellets
(Type)

Depth to Top of Gravel/Sand 5.5'

Gravel/Sand

Depth to Top of Screen 7.5'

Screen

Depth to Bottom of Screen 17.5'

Total Depth 20.0'

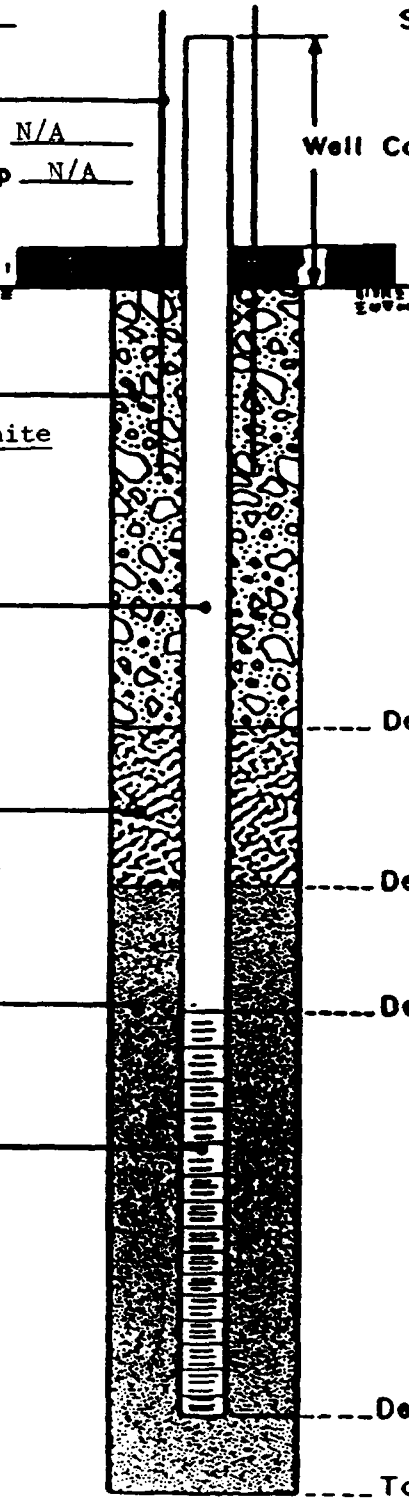
Note: All Depths Referenced From Ground Surface.

RMT

MONITORING WELL CONSTRUCTION

WELL No. BTW-1
Date Completed 3-24-88
Project No. 643.05

O.D. OF CASING 2" Ø
LENGTH OF SCREEN 5.0'
SCREEN OPENING SIZE 0.010"



Protective Casing
Protective Casing Length N/A
Protective Casing Stickup N/A

Well Casing Stickup 2.31'

Ground Surface Elev. 17.8'

0.0'

Grout
Cement-Bentonite
(Type)

Casing
2"Ø Schedule 40 PVC
(Size & Type)

Depth to Top of Bentonite 2.0'

Bentonite
Pellets
(Type)

Depth to Top of Gravel/Sand 3.0'

Gravel/Sand

Depth to Top of Screen 5.0'

Screen

Depth to Bottom of Screen 10.0'

Total Depth 10.0'

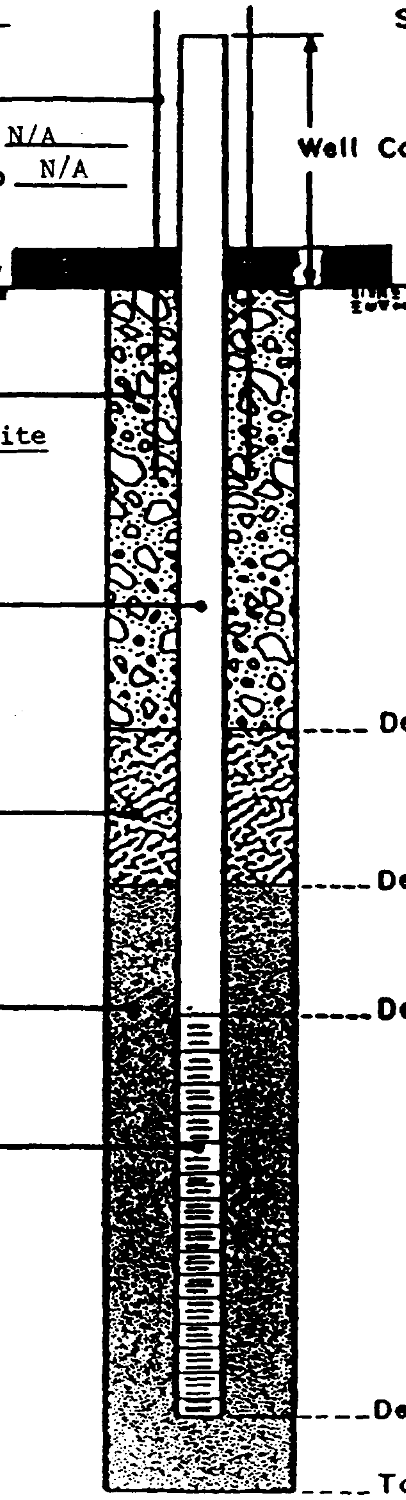
Note: All Depths Referenced From Ground Surface.

RMT

MONITORING WELL CONSTRUCTION

WELL No. BTW-2
Date Completed 3-24-88
Project No. 643.05

O.D. OF CASING 2" Ø
LENGTH OF SCREEN 5.0'
SCREEN OPENING SIZE 0.010"



Protective Casing
Protective Casing Length N/A
Protective Casing Stickup N/A

Well Casing Stickup 2.59'

Ground Surface Elev. 16.7' — 0.0'

Grout
Cement-Bentonite
(Type)

Casing
2"Ø Schedule 40 PVC
(Size & Type)

Depth to Top of Bentonite 2.0'

Bentonite
Pellets
(Type)

Depth to Top of Gravel/Sand 3.0'

Gravel/Sand

Depth to Top of Screen 5.0'

Screen

Depth to Bottom of Screen 10.0'

Total Depth 10.0'

Note: All Depths Referenced From Ground Surface.

RMT

MONITORING WELL CONSTRUCTION

WELL No. BTW-3
Date Completed 3-23-88
Project No. 643.05

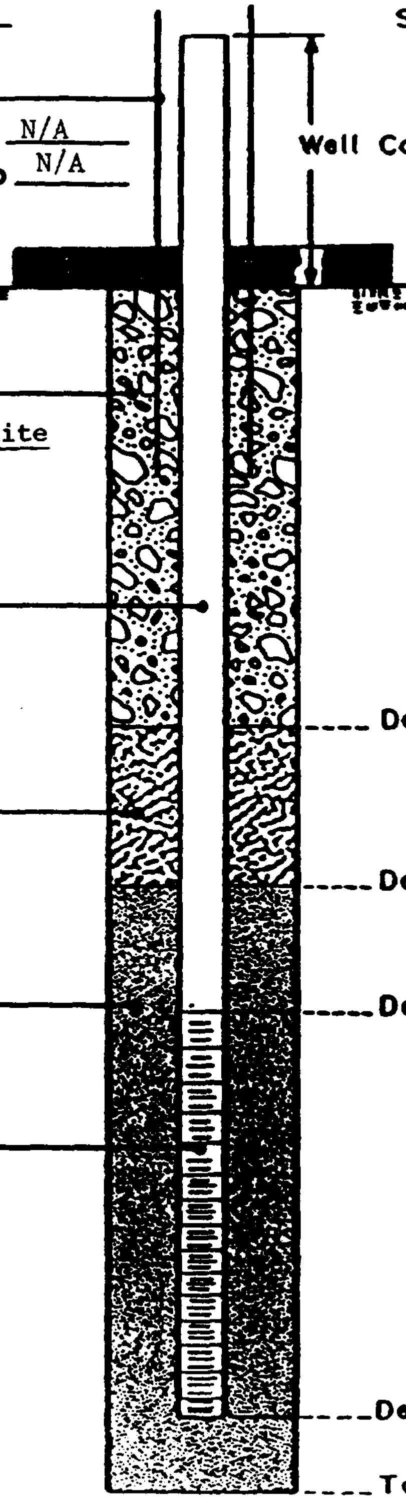
O.D. OF CASING 2" Ø
LENGTH OF SCREEN 5.0'
SCREEN OPENING SIZE 0.010"

Protective Casing
Protective Casing Length N/A
Protective Casing Stickup N/A

Well Casing Stickup 2.56'

Ground Surface Elev. 16.8'

0.0'



Grout
Cement-Bentonite
(Type)

Casing
2"Ø Schedule 40 PVC
(Size & Type)

Depth to Top of Bentonite 2.0'

Bentonite
Pellets
(Type)

Depth to Top of Gravel/Sand 3.0'

Gravel/Sand

Depth to Top of Screen 5.0'

Screen

Depth to Bottom of Screen 10.0'

Total Depth 10.0'

Note: All Depths Referenced From Ground Surface.

RMT

MONITORING WELL CONSTRUCTION

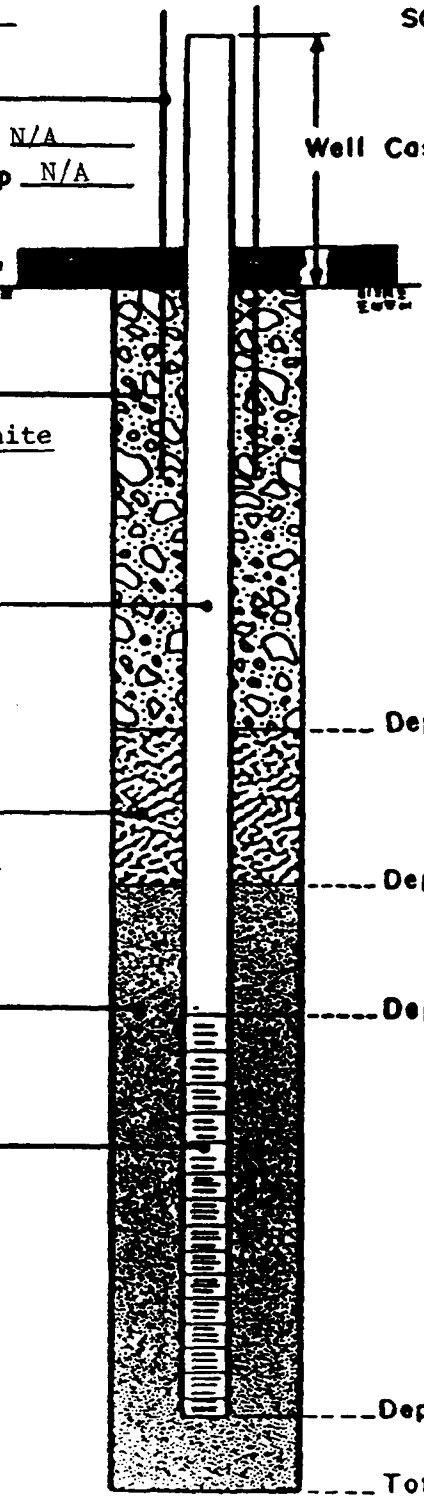
WELL No. BTW-4
Date Completed 3-23-88
Project No. 643.05

O.D. OF CASING 2" Ø
LENGTH OF SCREEN 5.0'
SCREEN OPENING SIZE 0.010"

Protective Casing
Protective Casing Length N/A
Protective Casing Stickup N/A

Well Casing Stickup 2.25'

Ground Surface Elev. 17.0'



0.0'

Grout
Cement-Bentonite
(Type)

Casing
2"Ø Schedule 40 PVC
(Size & Type)

Depth to Top of Bentonite 2.0'

Bentonite
Pellets
(Type)

Depth to Top of Gravel/Sand 3.0'

Gravel/Sand

Depth to Top of Screen 5.0'

Screen

Depth to Bottom of Screen 10.0'

Total Depth 10.0'

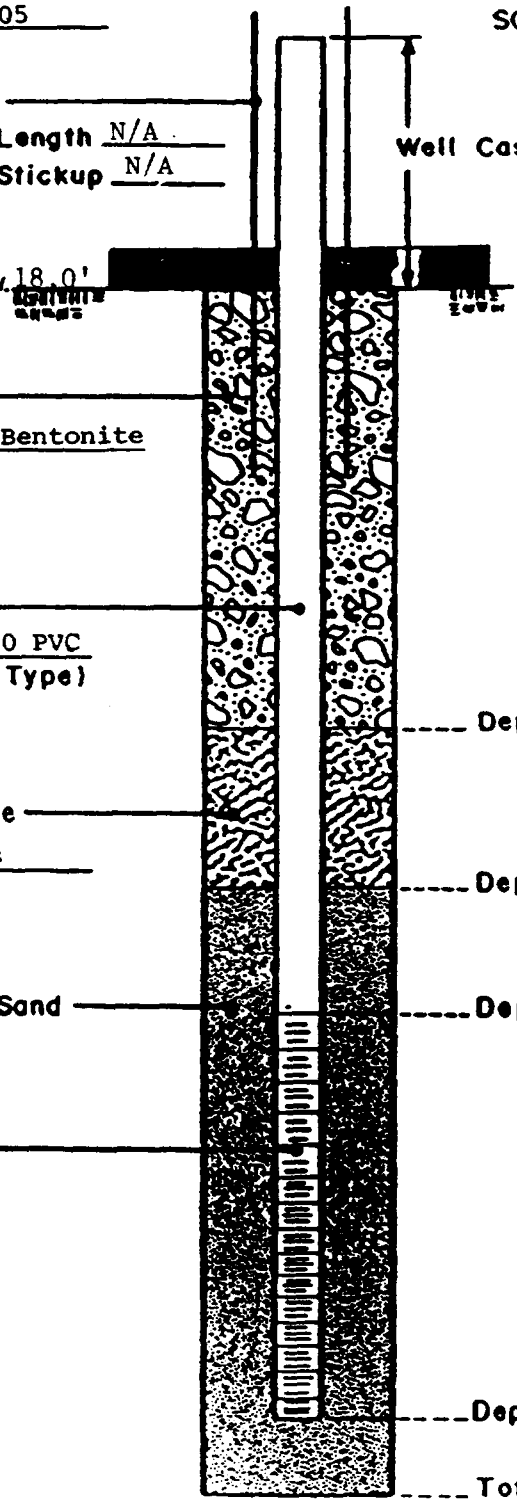
Note: All Depths Referenced From Ground Surface.

RMT

MONITORING WELL CONSTRUCTION

WELL No. BTW-5
Date Completed 3-22-88
Project No. 643.05

O.D. OF CASING 2" Ø
LENGTH OF SCREEN 5.0'
SCREEN OPENING SIZE 0.010"



Protective Casing
Protective Casing Length N/A
Protective Casing Stickup N/A

Well Casing Stickup 2.39'

Ground Surface Elev. 18.0'

0.0'

Grout
Cement-Bentonite
(Type)

Casing
2"Ø Schedule 40 PVC
(Size & Type)

Depth to Top of Bentonite 2.6'

Bentonite
Pellets
(Type)

Depth to Top of Gravel/Sand 3.6'

Gravel/Sand

Depth to Top of Screen 5.0'

Screen

Depth to Bottom of Screen 10.0'

Total Depth 10.0'

Note: All Depths Referenced From Ground Surface.

RMT

MONITORING WELL CONSTRUCTION

WELL No. ATW-1
Date Completed 3-18-88
Project No. 643.05

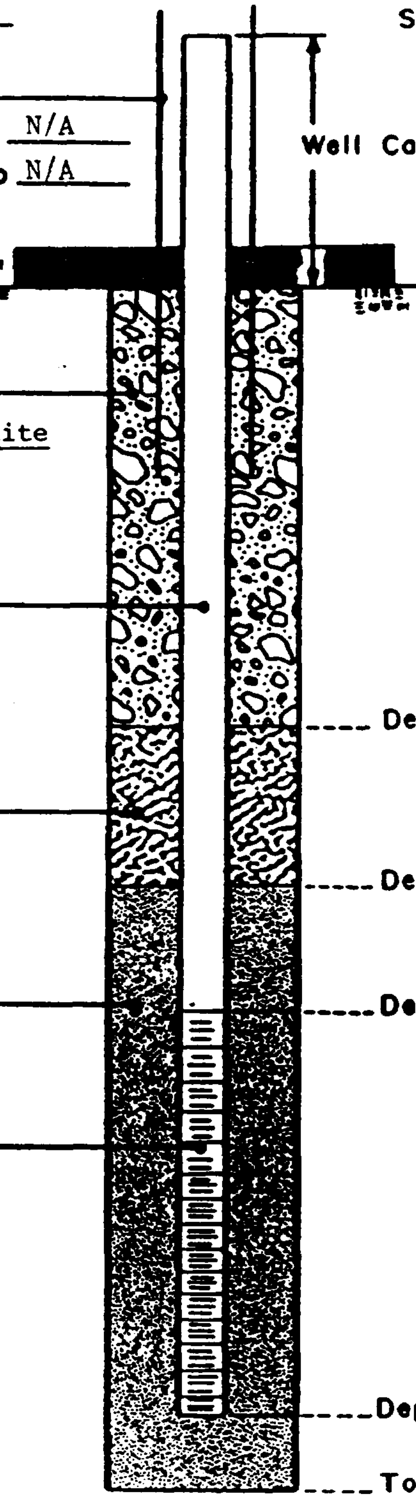
O.D. OF CASING 2" Ø
LENGTH OF SCREEN 15.0'
SCREEN OPENING SIZE 0.010"

Protective Casing
Protective Casing Length N/A
Protective Casing Stickup N/A

Well Casing Stickup 2.25'

Ground Surface Elev. 12.9'

0.0'



Grout
Cement-Bentonite
(Type)

Casing
2"Ø Schedule 40 PVC
(Size & Type)

Depth to Top of Bentonite 1.5'

Bentonite
Pellets
(Type)

Depth to Top of Gravel/Sand 3.0'

Gravel/Sand

Depth to Top of Screen 4.5'

Screen

Depth to Bottom of Screen 19.5'

Total Depth 20.0'

Note: All Depths Referenced From Ground Surface.

RMT

MONITORING WELL CONSTRUCTION

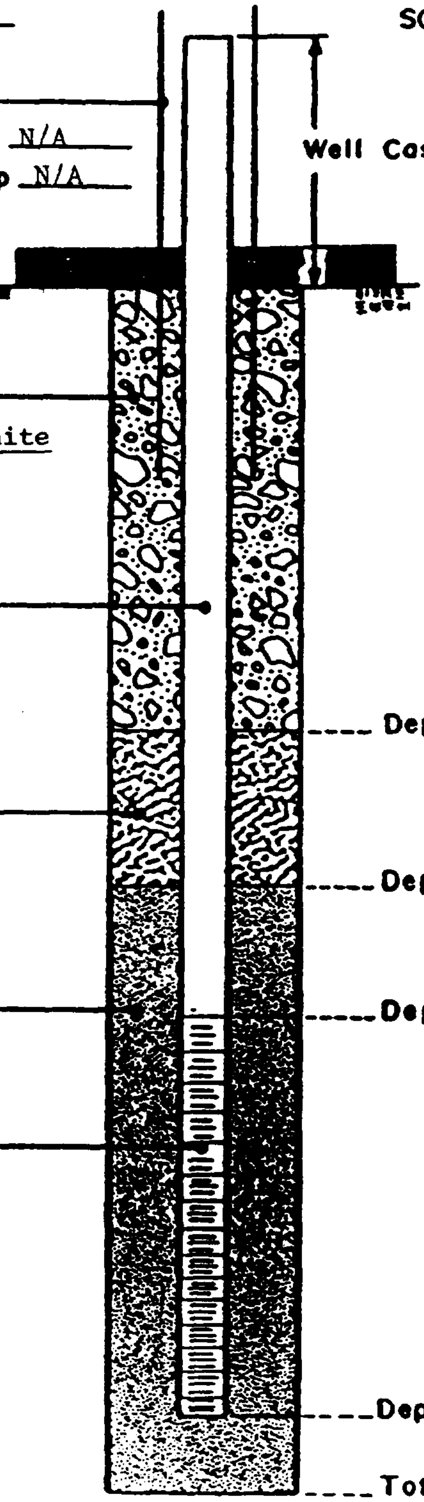
WELL No. ATW-2
Date Completed 3-18-88
Project No. 643.05

O.D. OF CASING 2" Ø
LENGTH OF SCREEN 15.0'
SCREEN OPENING SIZE 0.010"

Protective Casing
Protective Casing Length N/A
Protective Casing Stickup N/A

Well Casing Stickup 2.05'

Ground Surface Elev. 13.2'



Grout
Cement-Bentonite
(Type)

Casing
2"Ø Schedule 40 PVC
(Size & Type)

Depth to Top of Bentonite 1.7'

Bentonite
Pellets
(Type)

Depth to Top of Gravel/Sand 3.0'

Gravel/Sand

Depth to Top of Screen 4.5'

Screen

Depth to Bottom of Screen 19.5'

Total Depth 20.0'

Note: All Depths Referenced From Ground Surface.

RMT

MONITORING WELL CONSTRUCTION

WELL No. ATW-3

Date Completed 3-19-88

Project No. 643.05

O.D. OF CASING 2" Ø

LENGTH OF SCREEN 15.0'

SCREEN OPENING SIZE 0.010"

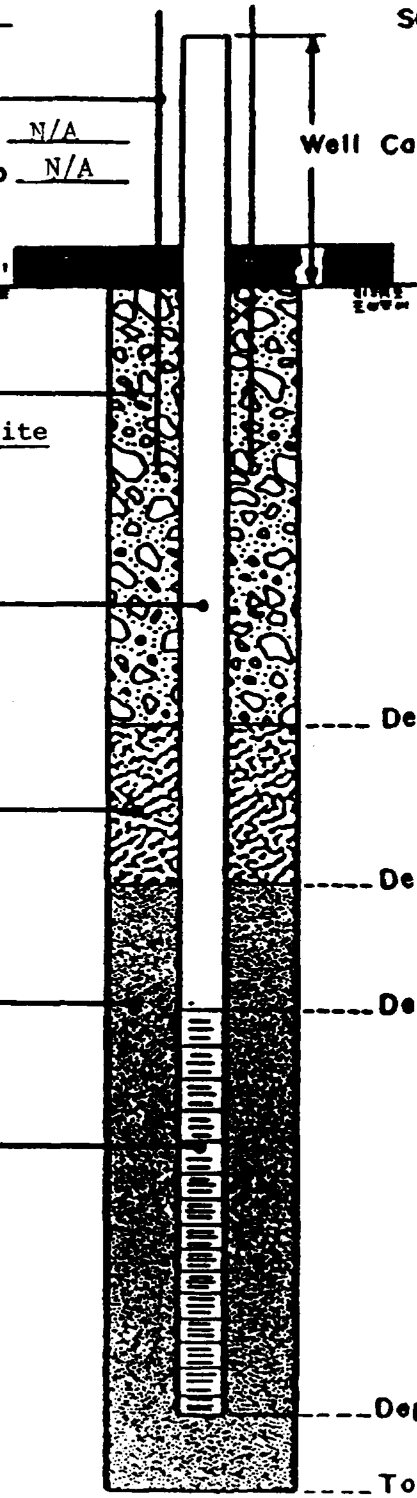
Protective Casing

Protective Casing Length N/A

Protective Casing Stickup N/A

Well Casing Stickup 2.82'

Ground Surface Elev. 12.6'



Grout
Cement-Bentonite
(Type)

Casing
2"Ø Schedule 40 PVC
(Size & Type)

Bentonite
Pellets
(Type)

Gravel/Sand

Screen

Depth to Top of Bentonite 2.5'

Depth to Top of Gravel/Sand 3.5'

Depth to Top of Screen 5.0'

Depth to Bottom of Screen 20.0

Total Depth 20.0

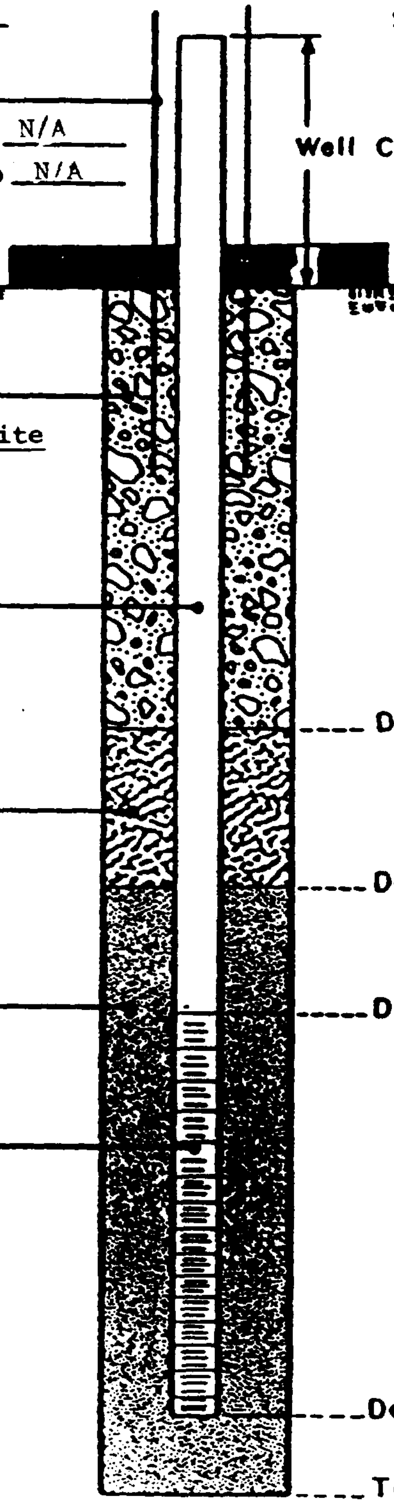
Note: All Depths Referenced From Ground Surface.

RMT

MONITORING WELL CONSTRUCTION

WELL No. ATW-4
Date Completed 3-19-88
Project No. 643.05

O.D. OF CASING 2" Ø
LENGTH OF SCREEN 15.0'
SCREEN OPENING SIZE 0.010"



Protective Casing
Protective Casing Length N/A
Protective Casing Stickup N/A

Well Casing Stickup 1.78'

Ground Surface Elev. 11.5'
0.0'

Grout
Cement-Bentonite
(Type)

Casing
2"Ø Schedule 40 PVC
(Size & Type)

Depth to Top of Bentonite 0.7'

Bentonite
Pellets
(Type)

Depth to Top of Gravel/Sand 3.0'

Gravel/Sand

Depth to Top of Screen 5.7'

Screen

Depth to Bottom of Screen 20.7'

Total Depth 22.0'

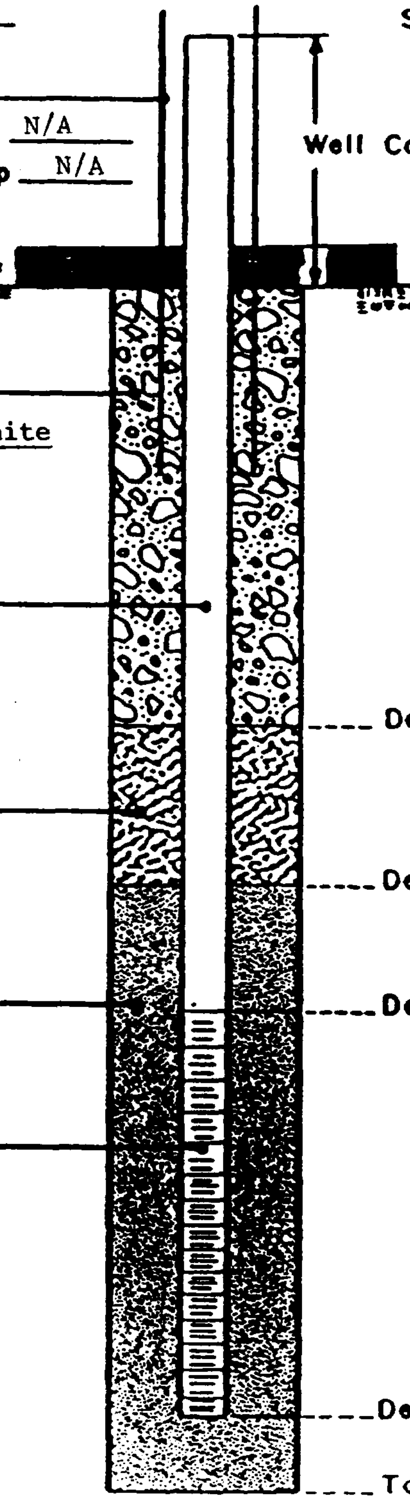
Note: All Depths Referenced From Ground Surface.

RMT

MONITORING WELL CONSTRUCTION

WELL No. ATW-5
Date Completed 3-21-88
Project No. 643.05

O.D. OF CASING 2" Ø
LENGTH OF SCREEN 15.0'
SCREEN OPENING SIZE 0.010"



Protective Casing
Protective Casing Length N/A
Protective Casing Stickup N/A

Well Casing Stickup 2.70'

Ground Surface Elev. 12.3'

0.0'

Grout
Cement-Bentonite
(Type)

Casing
2"Ø Schedule 40 PVC
(Size & Type)

Depth to Top of Bentonite 1.5'

Bentonite
Pellets
(Type)

Depth to Top of Gravel/Sand 2.5'

Gravel/Sand

Depth to Top of Screen 5.0'

Screen

Depth to Bottom of Screen 20.0'

Total Depth 20.0'

Note: All Depths Referenced From Ground Surface.

RMT

MONITORING WELL CONSTRUCTION

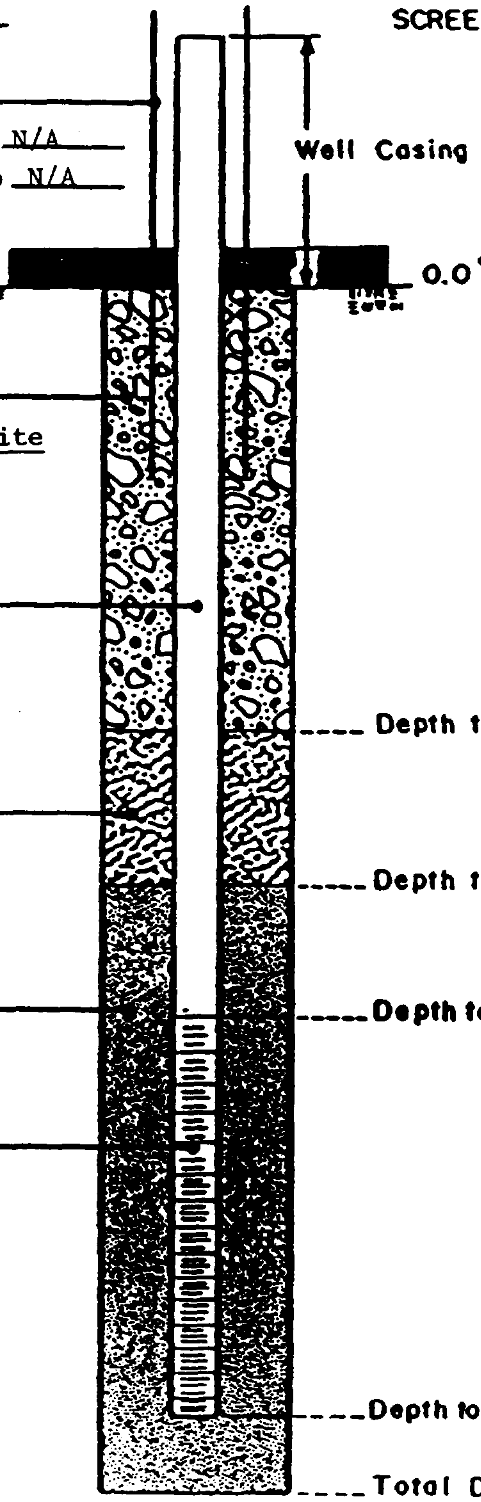
WELL No. PZ-1
Date Completed 3-22-88
Project No. 643.05

O.D. OF CASING 2" Ø
LENGTH OF SCREEN 5.0'
SCREEN OPENING SIZE 0.010"

Protective Casing
Protective Casing Length N/A
Protective Casing Stickup N/A

Well Casing Stickup 2.81'

Ground Surface Elev. 10.5'



Grout
Cement-Bentonite
(Type)

Casing
2"Ø Schedule 40 PVC
(Size & Type)

Depth to Top of Bentonite 4.0'

Bentonite
Pellets
(Type)

Depth to Top of Gravel/Sand 5.0'

Gravel/Sand

Depth to Top of Screen 7.0'

Screen

Depth to Bottom of Screen 12.0'

Total Depth 15.0'

Note: All Depths Referenced From Ground Surface.

RMT

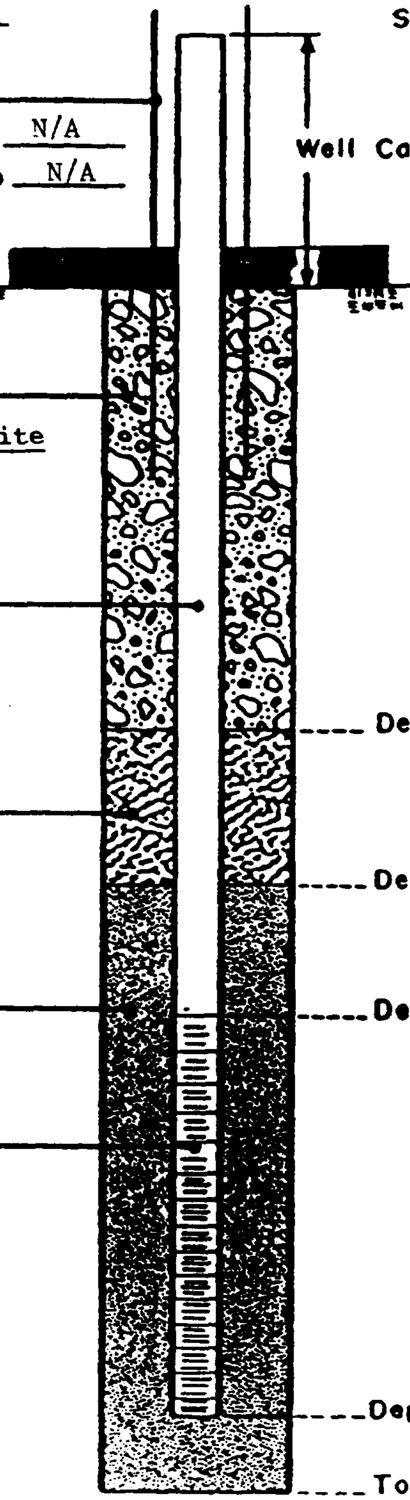
MONITORING WELL CONSTRUCTION

WELL No. PZ-2
Date Completed 3-22-88
Project No. 643.05

O.D. OF CASING 2" Ø
LENGTH OF SCREEN 5.0'
SCREEN OPENING SIZE 0.010"

Protective Casing
Protective Casing Length N/A
Protective Casing Stickup N/A

Well Casing Stickup 2.98'



Ground Surface Elev. 13.1' 0.0'

Grout
Cement-Bentonite
(Type)

Casing
2"Ø Schedule 40 PVC
(Size & Type)

Depth to Top of Bentonite 4.5'

Bentonite
Pellets
(Type)

Depth to Top of Gravel/Sand 6.0'

Gravel/Sand

Depth to Top of Screen 7.0'

Screen

Depth to Bottom of Screen 12.0'

Total Depth 15.0'

Note: All Depths Referenced From Ground Surface.

RMT

MONITORING WELL CONSTRUCTION

WELL No. RB-2
Date Completed 3-17-88
Project No. 643.05

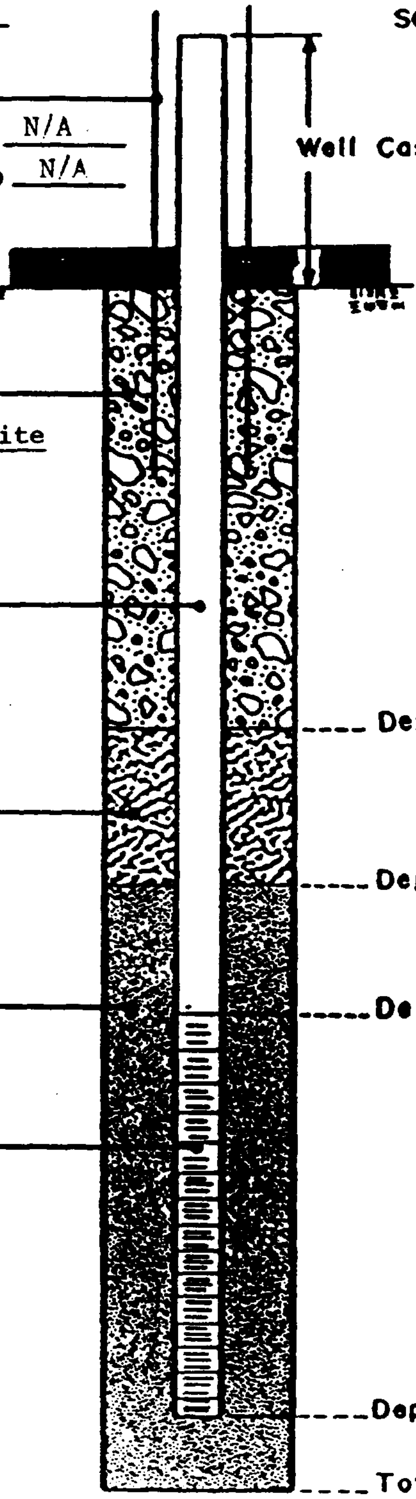
O.D. OF CASING 2" Ø
LENGTH OF SCREEN 10.0'
SCREEN OPENING SIZE 0.010"

Protective Casing
Protective Casing Length N/A
Protective Casing Stickup N/A

Well Casing Stickup 1.82'

Ground Surface Elev. 14.7'

0.0'



Grout
Cement-Bentonite
(Type)

Casing
2"Ø Schedule 40 PVC
(Size & Type)

Depth to Top of Bentonite 24.5'

Bentonite
Pellets
(Type)

Depth to Top of Gravel/Sand 26.0'

Gravel/Sand

Depth to Top of Screen 27.3'

Screen

Depth to Bottom of Screen 37.3'

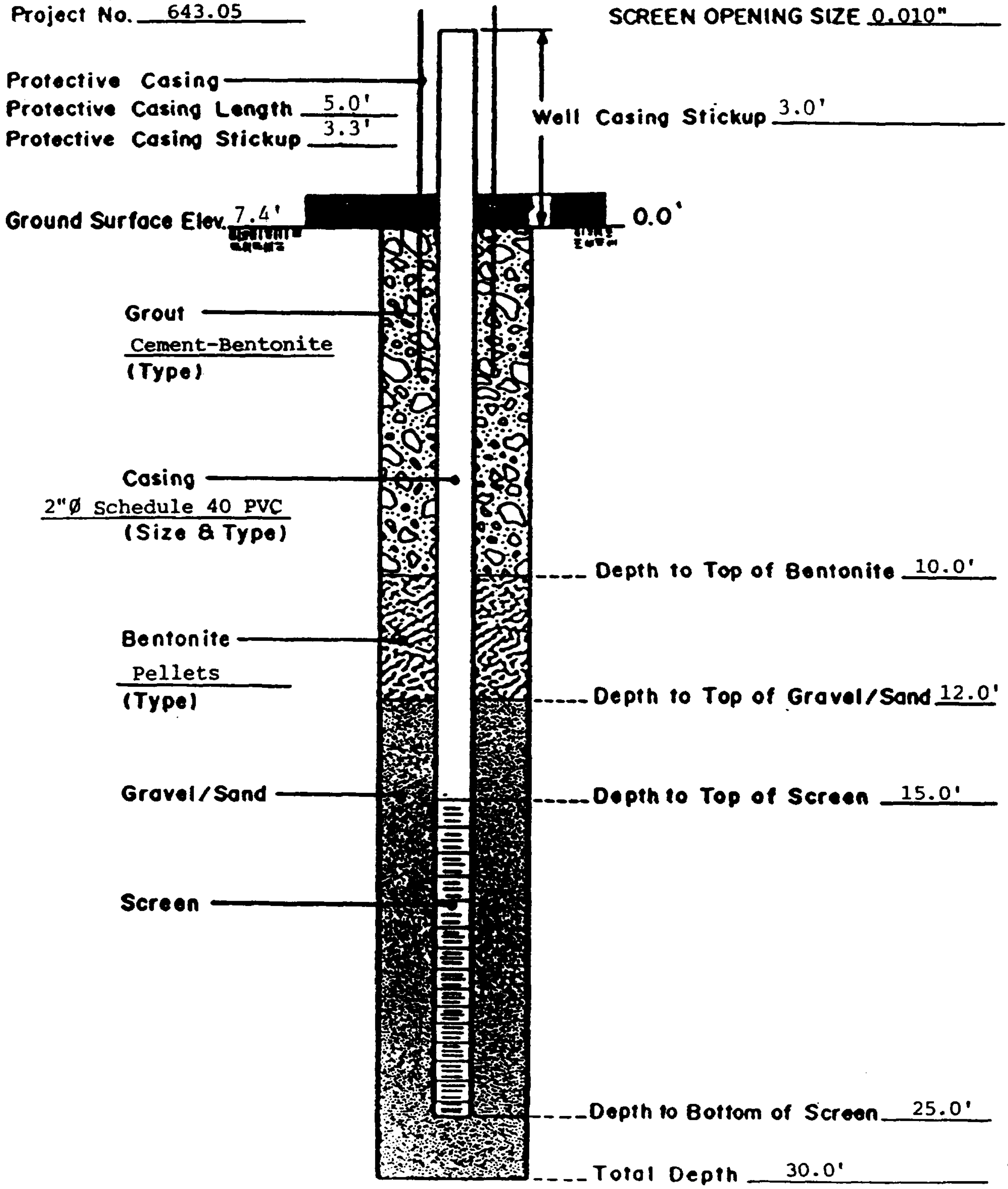
Total Depth 42.0'

Note: All Depths Referenced From Ground Surface.

MONITORING WELL CONSTRUCTION

WELL No. RB-3
Date Completed 3-21-88
Project No. 643.05

O.D. OF CASING 2" Ø
LENGTH OF SCREEN 10.0'
SCREEN OPENING SIZE 0.010"



Note: All Depths Referenced From Ground Surface.

APPENDIX C

APPENDIX C

ANALYTICAL RESULTS

RMT, Inc.
Suite 124
1406 East Washington Ave
Madison, WI 53703-3009
Phone: 608-255-2134
FAX: 608-255-0234

June 8, 1988

Mr. Chuck Sherron
RMT, Inc.
11 Regency Hills Drive
Greenville, SC 29607

Dear Chuck:

The project designated as Beaufort L. was investigated for polychlorinated biphenyls (PCBs). After preliminary screening of the samples and comparison to authentic standards, it was determined that the prevalent PCB present was Aroclor 1248. This is consistent with the information revealed and contained in the report from meeting History No. 001, February 5, 1988.

There was no indication that any other PCB was present in the samples submitted to RMT. However, minimum detection limits for other PCBs were not set due to the inherent interference of the congeners from one PCB mixture (e.g., Aroclor 1248) to a second mixture (e.g. Aroclor 1242).

In summary, Aroclor 1248 was determined to be the PCB present in the Beaufort L. samples.

Sincerely,

Mitch Rubenstein, Ph.D.
Organic Supervisor

Alan Doughty, Ph.D.
Lab Director

jez

643.05 101:TME:sherron

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 002

DATE: 05/12/88
W.O. #: 031788-0064305
SAMPLE DATE: 03/16/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29372	AB-1	0.5-2.0'	0.12	mg/kg dry wt.
29373	AB-1	2.0-4.0'	0.78	mg/kg dry wt.
29374	AB-1	4.3-6.0'	1300	mg/kg dry wt.
29375	AB-1	7.0-8.0'	2.06	mg/kg dry wt.
29376	AB-1	8.5-10.0'	2.01	mg/kg dry wt.
29377	AB-1	10.5-12.0'	1.87	mg/kg dry wt.
29378	AB-1	12.5-14.0'	0.68	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Kenneth C Brunner
Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 002

DATE: 05/12/88
W.O. #: 031788-0064305
SAMPLE DATE: 03/15/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29363	AB-2	0.5-2.0	9.29	mg/kg dry wt.
29364	AB-2	2.5-4.0	63.5	mg/kg dry wt.
29365	AB-2	4.5-6.0	10,500	mg/kg dry wt.
29366	AB-2	6.5-8.0	67.5	mg/kg dry wt.
29367	AB-2	8.5-10.0	9.30	mg/kg dry wt.
29368	AB-2	10.0-11.0	2.72	mg/kg dry wt.
29369	AB-2	13.0-14.0	1.06	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Kenneth C Brunner
Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05

DATE: 05/05/88
W.O. #: 031688-0064305
SAMPLE DATE: 03/15/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29334	AB-3	1.0-2.0	0.09*	mg/kg dry wt.
29335	AB-3	3.0-4.0	0.26	mg/kg dry wt.
29336	AB-3	4.8-6.0	0.63	mg/kg dry wt.
29337	AB-3	6.3-8.0	355	mg/kg dry wt.
29338	AB-3	9.0-10.0	5.8	mg/kg dry wt.
29339	AB-3	10.0-12.0	317	mg/kg dry wt.
29340	AB-3	12.5-14.0	3.0	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg
* ESTIMATED

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT L
PROJECT #: 00643.05

DATE: 05/05/88
W.O. #: 031688-0064305
SAMPLE DATE: 03/14/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR 1248	UNITS
29327	AB-4	0.0-2.0	0.03*	mg/kg dry wt.
29328	AB-4	3.0-4.0	0.06*	mg/kg dry wt.
29329	AB-4	4.5-6.0	420	mg/kg dry wt.
29330	AB-4	7.0-8.0	120	mg/kg dry wt.
29331	AB-4	8.5-10.0	85.0	mg/kg dry wt.
29332	AB-4	11.5-12.0	5.3	mg/kg dry wt.
29333	AB-4	13.2-14.0	87.0	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg
* ESTIMATED

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 004

DATE: 05/28/88
W.O. #: 032188-0064305
SAMPLE DATE: 03/18/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29426	AB-5	1-2	1.5	mg/kg dry wt.
29427	AB-5	3-4	0.23	mg/kg dry wt.
29428	AB-5	4.5-6.0	0.44	mg/kg dry wt.
29429	AB-5	6.5-8.0	0.1	mg/kg dry wt.
29430	AB-5	8.8-10.0	0.47	mg/kg dry wt.
29431	AB-5	10.8-12.0	2.1	mg/kg dry wt.
29432	AB-5	13.0-14.0	0.11	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 009

DATE: 05/29/88
W.O. #: 032288-9064305
SAMPLE DATE: 03/20/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29501	AB-6	0-1.5	10.4	mg/kg dry wt.
29502	AB-6	2-3	37.4	mg/kg dry wt.
29503	AB-6	5-6	9.8	mg/kg dry wt.
29504	AB-6	7-8	0.8	mg/kg dry wt.
29505	AB-6	9-10	< 0.5 *	mg/kg dry wt.
29506	AB-6	11-12	1.2	mg/kg dry wt.
29507	AB-6	12-14	1.3	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg except where noted (*) by matrix interference.

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 008

DATE: 05/29/88
W.O. #: 032288-8064305
SAMPLE DATE: 03/20/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29486	AB-7	1-2	9.7	mg/kg dry wt.
29487	AB-7	3-4	13.1	mg/kg dry wt.
29488	AB-7	4.5-6.0	< 0.1	mg/kg dry wt.
29489	AB-7	6.4-8.0	0.2	mg/kg dry wt.
29490	AB-7	8.2-10.0	< 0.1	mg/kg dry wt.
29491	AB-7	10.5-12.0	< 0.1	mg/kg dry wt.
29492	AB-7	12.0-14.0	< 0.1	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 009

DATE: 05/29/88
W.O. #: 032288-9064305
SAMPLE DATE: 03/20/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29508	AB-8	1.0-2.0	6.1	mg/kg dry wt.
29509	AB-8	3.0-4.0	22.8	mg/kg dry wt.
29510	AB-8	4.5-6.0	1.1	mg/kg dry wt.
29511	AB-8	6.0-7.5	1.2	mg/kg dry wt.
29512	AB-8	8.0-9.8	0.2	mg/kg dry wt.
29513	AB-8	10.4-12.0	< 0.1	mg/kg dry wt.
29514	AB-8	12.0-14.0	0.1	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 003

DATE: 05/19/88
W.O. #: 031888-0064305
SAMPLE DATE: 03/16/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29387	AB-9	1-2'	470	mg/kg dry wt.
29388	AB-9	3-4'	713	mg/kg dry wt.
29389	AB-9	4.5-6.0'	445	mg/kg dry wt.
29390	AB-9	6.5-8.0'	19.9	mg/kg dry wt.
29391	AB-9	8.5-10.0'	47.9	mg/kg dry wt.
29392	AB-9	11.5-12.0'	1313	mg/kg dry wt.
29393	AB-9	13-14'	2.4	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 004

DATE: 05/28/88
W.O. #: 032188-0064305
SAMPLE DATE: 03/17/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29410	AB-10	1-2	1.4	mg/kg dry wt.
29411	AB-10	3-4	2.0	mg/kg dry wt.
29412	AB-10	5-6	69.5	mg/kg dry wt.
29413	AB-10	6.5-8	92.1	mg/kg dry wt.
29414	AB-10	8.5-10	385	mg/kg dry wt.
29415	AB-10	11-12	49.0	mg/kg dry wt.
29416	AB-10	13-14	9.3	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 003

DATE: 05/19/88
W.O. #: 031888-0064305
SAMPLE DATE: 03/17/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29396	AB-11	1-2	2.2	mg/kg dry wt.
29397	AB-11	2.5-4	6.0	mg/kg dry wt.
29398	AB-11	4.5-6	959	mg/kg dry wt.
29399	AB-11	6.3-8	57.5	mg/kg dry wt.
29400	AB-11	8.2-10	7.0	mg/kg dry wt.
29401	AB-11	10.5-12	2.0	mg/kg dry wt.
29402	AB-11	13-14	0.4	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 008

DATE: 05/29/88
W.O. #: 032288-8064305
SAMPLE DATE: 03/20/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29493	AB-12	0-1	1.3	mg/kg dry wt.
29494	AB-12	3-4	1.8	mg/kg dry wt.
29495	AB-12	4.5-6.0	162	mg/kg dry wt.
29496	AB-12	6.5-8.0	< 0.1	mg/kg dry wt.
29497	AB-12	8-10	0.6	mg/kg dry wt.
29498	AB-12	12-14	2.2	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 006

DATE: 05/29/88
W.O. #: 032288-6064305
SAMPLE DATE: 03/20/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29462	AB-13	0-1.5	< 0.1	mg/kg dry wt.
29463	AB-13	2.5-4	< 0.1	mg/kg dry wt.
29464	AB-13	4.5-6	< 0.1	mg/kg dry wt.
29465	AB-13	6.5-8	< 0.1	mg/kg dry wt.
29466	AB-13	11-12	< 0.1	mg/kg dry wt.
29467	AB-13	13-14	< 0.1	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 011

DATE: 06/01/88
W.O. #: 032488-9064305
SAMPLE DATE: 03/20&22/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29554	DB-6	0-1	< 0.1 *	mg/kg dry wt.
29555	DB-6	2-3	< 0.1	mg/kg dry wt.
29556	DB-6	5-6	< 0.1	mg/kg dry wt.
29557	DB-6	6.5-8	0.1	mg/kg dry wt.
29558	DB-7	0-1	1.0	mg/kg dry wt.
29559	DB-7	3-4	0.4	mg/kg dry wt.
29560	DB-7	4.5-6	< 0.1	mg/kg dry wt.
29561	DB-7	7-8	< 0.1	mg/kg dry wt.
29562	AB-13	8.5-10	< 0.1	mg/kg dry wt.
29563	AB-12	10-12	139	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg
* Sample gave variable results due to matrix interference.

[signature]
Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 005

DATE: 05/23/88
W.O. #: 032088-0064305
SAMPLE DATE: 03/18/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29440	AB-14	1-2	< 0.1	mg/kg dry wt.
29441	AB-14	3.0-4.0	< 0.1	mg/kg dry wt.
29442	AB-14	4.5-6.0	< 0.1	mg/kg dry wt.
29443	AB-14	6.5-8.0	< 0.1	mg/kg dry wt.
29444	AB-14	9.0-10.0	< 0.1	mg/kg dry wt.
29445	AB-14	10.8-12.0	< 0.1	mg/kg dry wt.
29446	AB-14	12.5-14.0	< 0.1	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 006

DATE: 05/29/88
W.O. #: 032288-6064305
SAMPLE DATE: 03/20/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29455	AB-15	1-2	375	mg/kg dry wt.
29456	AB-15	2.8-4.0	2.7	mg/kg dry wt.
29457	AB-15	4.5-6.0	4.2	mg/kg dry wt.
29458	AB-15	6.5-8.0	1.1	mg/kg dry wt.
29459	AB-15	9.0-10.0	1.0	mg/kg dry wt.
29460	AB-15	10.0-12.0	5.1	mg/kg dry wt.
29461	AB-15	12.4-14.0	0.6	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 004

DATE: 05/28/88
W.O. #: 032188-0064305
SAMPLE DATE: 03/17-18/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29417	ATW-1	1-2	23.1	mg/kg dry wt.
29418	ATW-1	3-4	27.0	mg/kg dry wt.
29419	ATW-1	5-6	22.1	mg/kg dry wt.
29420	ATW-1	7-8	< 0.1	mg/kg dry wt.
29421	ATW-1	9-10	0.21	mg/kg dry wt.
29422	ATW-1	11-12	0.1	mg/kg dry wt.
29423	ATW-1	12.5-14	0.1	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 005

DATE: 05/23/88
W.O. #: 032088-0064305
SAMPLE DATE: 03/18/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29433	ATW-2	1-2	3.6	mg/kg dry wt.
29434	ATW-2	2.5-4.0	1.6	mg/kg dry wt.
29435	ATW-2	5-6	5.4	mg/kg dry wt.
29436	ATW-2	7-8	1.5	mg/kg dry wt.
29437	ATW-2	9-10	0.6	mg/kg dry wt.
29438	ATW-2	11-12	0.9	mg/kg dry wt.
29439	ATW-2	12.5-14	1.1	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 007

DATE: 05/24/88
W.O. #: 032288-0064305
SAMPLE DATE: 03/19/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29470	ATW-3	1-2	< 0.5	mg/kg dry wt.
29471	ATW-3	3.0-4.0	< 0.5	mg/kg dry wt.
29472	ATW-3	4.8-6.0	< 0.5	mg/kg dry wt.
29473	ATW-3	6.5-8.0	< 0.5	mg/kg dry wt.
29474	ATW-3	8.0-9.6	< 0.5	mg/kg dry wt.
29475	ATW-3	11.0-12.0	< 0.5	mg/kg dry wt.
29476	ATW-3	12.5-14.0	< 0.5	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 007

DATE: 05/24/88
W.O. #: 032288-0064305
SAMPLE DATE: 03/19/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29477	ATW-4	0-1	< 0.5	mg/kg dry wt.
29478	ATW-4	2-3	< 0.5	mg/kg dry wt.
29479	ATW-4	4-5.5	< 0.5	mg/kg dry wt.
29480	ATW-4	6-8	< 0.5	mg/kg dry wt.
29481	ATW-4	9-10	0.8	mg/kg dry wt.
29482	ATW-4	10.5-12	< 0.5	mg/kg dry wt.
29483	ATW-4	13-14	< 0.5	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 010

DATE: 05/29/88
W.O. #: 032388-0064305
SAMPLE DATE: 03/21/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29517	ATW-5	1.0-2.0	2.2	mg/kg dry wt.
29518	ATW-5	3.0-4.0	187	mg/kg dry wt.
29519	ATW-5	5.0-6.0	1030	mg/kg dry wt.
29520	ATW-5	6.0-8.0	22.9	mg/kg dry wt.
29521	ATW-5	8.0-10.0	532	mg/kg dry wt.
29522	ATW-5	10.5-12.0	38.5	mg/kg dry wt.
29523	ATW-5	12.5-14	18.3	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 006

DATE: 05/29/88
W.O. #: 032288-6064305
SAMPLE DATE: 03/16&20/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION	AROCLOR - 1248	UNITS
29468 FIELD BLANK	2.3	ug/l
29469 TRIP BLANK	< 0.1	ug/l

MINIMUM DETECTION LIMIT - < 0.1 ug/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 007

DATE: 05/24/88
W.O. #: 032288-0064305
SAMPLE DATE: 03/16&20/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION		AROCLOR - 1248	UNITS
29484	FIELD BLANK	1.8	ug/l
29485	TRIP BLANK	< 0.1	ug/l

MINIMUM DETECTION LIMIT - < 0.1 ug/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 002

DATE: 05/12/88
W.O. #: 031788-0064305
SAMPLE DATE: 03/16/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION		AROCLOR - 1248	UNITS
29370	TRIP BLANK	<1.0	ug/l
29371	FIELD BLANK	1.11	ug/l

MINIMUM DETECTION LIMIT - < 0.1 ug/l

Kenneth O. Rumer
Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 003

DATE: 05/19/88
W.O. #: 031888-0064305
SAMPLE DATE: 03/17/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION	AROCLOR - 1248	UNITS
29394 FIELD BLANK	9.4	ug/l
29395 TRIP BLANK	< 0.1	ug/l

MINIMUM DETECTION LIMIT - < 0.1 ug/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 004

DATE: 05/28/88
W.O. #: 032188-0064305
SAMPLE DATE: 03/18/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION		AROCLOR - 1248	UNITS
29424	FIELD BLANK	0.3	ug/l
29425	TRIP BLANK	< 0.1	ug/l

MINIMUM DETECTION LIMIT - < 0.1 ug/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 005

DATE: 05/23/88
W.O. #: 032088-0064305
SAMPLE DATE: 03/19/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION		AROCLOR - 1248	UNITS
29447	FIELD BLANK	1.1	ug/l
29448	TRIP BLANK	< 0.1	ug/l

MINIMUM DETECTION LIMIT - < 0.1 ug/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 009

DATE: 05/29/88
W.O. #: 032288-9064305
SAMPLE DATE: 03/20&21/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION	AROCLOR - 1248	UNITS
29515 FIELD BLANK	1.6	ug/l
29516 TRIP BLANK	< 0.1	ug/l

MINIMUM DETECTION LIMIT - < 0.1 ug/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 008

DATE: 05/29/88
W.O. #: 032288-8064305
SAMPLE DATE: 03/21/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION		AROCLOR - 1248	UNITS
29499	TRIP BLANK	< 0.1	ug/l
29500	FIELD BLANK	< 0.1	ug/l

MINIMUM DETECTION LIMIT - < 0.1 ug/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 010

DATE: 05/29/88
W.O. #: 032388-0064305
SAMPLE DATE: 03/21&22/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION		AROCLOR - 1248	UNITS
29524	TRIP BLANK	< 0.1	ug/l
29525	FIELD BLANK	0.6	ug/l

MINIMUM DETECTION LIMIT - < 0.1 ug/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 011

DATE: 06/01/88
W.O. #: 032488-0064305
SAMPLE DATE: 03/23/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION		AROCLOR - 1248	UNITS
29572	FIELD BLANK	4.4	ug/l
29573	TRIP BLANK	< 0.1	ug/l

MINIMUM DETECTION LIMIT - < 0.1 ug/l

Laboratory Director

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: AB-1 (2-4)
COMPUCHEM® SAMPLE NUMBER: 185948

		CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
1P.	PCB-1016	BDL	20
2P.	PCB-1221	BDL	20
3P.	PCB-1232	BDL	20
4P.	PCB-1242	BDL	20
5P.	PCB-1248	BDL	20
6P.	PCB-1254	49	20
7P.	PCB-1260	BDL	20

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	23	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).
BDL=BELOW DETECTION LIMIT

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: AB-3 (10-12)
COMPUCHEM® SAMPLE NUMBER: 185538

		CONCENTRATION (ug/kg)	DETECTION† LIMIT (ug/kg)
1P.	PCB-1016	BDL	4000
2P.	PCB-1221	BDL	4000
3P.	PCB-1232	BDL	4000
4P.	PCB-1242	420000	4000
5P.	PCB-1248	BDL	4000
6P.	PCB-1254	BDL	4000
7P.	PCB-1260	41000	4000

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	**	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).

BDL=BELOW DETECTION LIMIT

**No surrogate recovery data available due to a dilution and/or matrix interference.

†Sample analyzed using a dilution to properly evaluate the GC Chromatogram, thus the higher than normal detection limits.

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: AB-4 (4.5-6)
COMPUCHEM® SAMPLE NUMBER: 185539

		CONCENTRATION (ug/kg)	DETECTION† LIMIT (ug/kg)
1P.	PCB-1016	BDL	2000
2P.	PCB-1221	BDL	2000
3P.	PCB-1232	BDL	2000
4P.	PCB-1242	200000	2000
5P.	PCB-1248	BDL	2000
6P.	PCB-1254	BDL	2000
7P.	PCB-1260	23000	2000

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	**	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).

BDL=BELOW DETECTION LIMIT

**No surrogate recovery data available due to a dilution and/or matrix interference.

†Sample analyzed using a dilution to properly evaluate the GC Chromatogram, thus the higher than normal detection limits.

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: AB-5 (4.5-6.0)
COMPUCHEM® SAMPLE NUMBER: 186354

		CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
1P.	PCB-1016	BDL	20
2P.	PCB-1221	BDL	20
3P.	PCB-1232	BDL	20
4P.	PCB-1242	BDL	20
5P.	PCB-1248	85	20
6P.	PCB-1254	BDL	20
7P.	PCB-1260	BDL	20

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	33	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).

BDL=BELOW DETECTION LIMIT

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: AB-7 (12-14)
COMPUCHEM® SAMPLE NUMBER: 186679

		CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
1P.	PCB-1016	BDL	20
2P.	PCB-1221	BDL	20
3P.	PCB-1232	BDL	20
4P.	PCB-1242	BDL	20
5P.	PCB-1248	240	20
6P.	PCB-1254	BDL	20
7P.	PCB-1260	BDL	20

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	36	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).

BDL=BELOW DETECTION LIMIT

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: AB-11 (6.3-8)
COMPUCHEM® SAMPLE NUMBER: 185949

		CONCENTRATION (ug/kg)	DETECTION† LIMIT (ug/kg)
1P.	PCB-1016	BDL	200
2P.	PCB-1221	BDL	200
3P.	PCB-1232	BDL	200
4P.	PCB-1242	BDL	200
5P.	PCB-1248	3500	200
6P.	PCB-1254	BDL	200
7P.	PCB-1260	BDL	200

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	19	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).
BDL=BELOW DETECTION LIMIT
†Sample analyzed using a 10:1 dilution, thus the higher than normal detection limits.

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: AB-12 (8-10)
COMPUCHEM® SAMPLE NUMBER: 186682

		CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
1P.	PCB-1016	BDL	20
2P.	PCB-1221	BDL	20
3P.	PCB-1232	BDL	20
4P.	PCB-1242	BDL	20
5P.	PCB-1248	180	20
6P.	PCB-1254	BDL	20
7P.	PCB-1260	BDL	20

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	25	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).

BDL=BELOW DETECTION LIMIT

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: AB-13 (4.5-6)
COMPUCHEM® SAMPLE NUMBER: 186681

		CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
1P.	PCB-1016	BDL	20
2P.	PCB-1221	BDL	20
3P.	PCB-1232	BDL	20
4P.	PCB-1242	BDL	20
5P.	PCB-1248	BDL	20
6P.	PCB-1254	BDL	20
7P.	PCB-1260	BDL	20

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	34	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).

BDL=BELOW DETECTION LIMIT

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: AB-14 (2.5-14)
COMPUCHEM® SAMPLE NUMBER: 186684

		CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
1P.	PCB-1016	BDL	20
2P.	PCB-1221	BDL	20
3P.	PCB-1232	BDL	20
4P.	PCB-1242	BDL	20
5P.	PCB-1248	BDL	20
6P.	PCB-1254	BDL	20
7P.	PCB-1260	BDL	20

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	37	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).

BDL=BELOW DETECTION LIMIT

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: AB-15 (10-12)
COMPUCHEM® SAMPLE NUMBER: 186680

		CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
1P.	PCB-1016	BDL	20
2P.	PCB-1221	BDL	20
3P.	PCB-1232	BDL	20
4P.	PCB-1242	BDL	20
5P.	PCB-1248	550	20
6P.	PCB-1254	BDL	20
7P.	PCB-1260	BDL	20

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	36	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).

BDL=BELOW DETECTION LIMIT

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: ATW-1 (12.5-14)
COMPUCHEM® SAMPLE NUMBER: 186355

		CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
1P.	PCB-1016	BDL	20
2P.	PCB-1221	BDL	20
3P.	PCB-1232	BDL	20
4P.	PCB-1242	BDL	20
5P.	PCB-1248	BDL	20
6P.	PCB-1254	BDL	20
7P.	PCB-1260	BDL	20

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	45	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).
BDL=BELOW DETECTION LIMIT

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: ATW-3 (0-2)
COMPUCHEM® SAMPLE NUMBER: 186685

		CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
1P.	PCB-1016	BDL	20
2P.	PCB-1221	BDL	20
3P.	PCB-1232	BDL	20
4P.	PCB-1242	BDL	20
5P.	PCB-1248	BDL	20
6P.	PCB-1254	BDL	20
7P.	PCB-1260	BDL	20

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	36	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).

BDL=BELOW DETECTION LIMIT

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: ATW-4 (6-8)
COMPUCHEM® SAMPLE NUMBER: 186683

		CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
1P.	PCB-1016	BDL	20
2P.	PCB-1221	BDL	20
3P.	PCB-1232	BDL	20
4P.	PCB-1242	BDL	20
5P.	PCB-1248	BDL	20
6P.	PCB-1254	BDL	20
7P.	PCB-1260	BDL	20

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	31	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).

BDL=BELOW DETECTION LIMIT

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: ATW-5(3.0-4.0')
COMPUCHEM® SAMPLE NUMBER: 187519

		CONCENTRATION (ug/kg)	DETECTION† LIMIT (ug/kg)
1P.	PCB-1016	BDL	200
2P.	PCB-1221	BDL	200
3P.	PCB-1232	BDL	200
4P.	PCB-1242	BDL	200
5P.	PCB-1248	5100	200
6P.	PCB-1254	BDL	200
7P.	PCB-1260	BDL	200

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	93	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).
BDL=BELOW DETECTION LIMIT

†Sample analyzed using a 10:1 dilution, thus the higher than normal detection limits.

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 016

DATE: 06/06/88
W.O. #: 032988-0064305
SAMPLE DATE: 03/26/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29700	BB-3	0.5-2.0	105	mg/kg dry wt.
29701	BB-3	2.5-4.0	445.4	mg/kg dry wt.
29702	BB-3	4.5-6.0	11.3	mg/kg dry wt.
29703	BB-3	7.0-8.0	0.7	mg/kg dry wt.
29704	BB-1	0.5-2.0	0.6	mg/kg dry wt.
29705	BB-1	2.5-4.0	0.1	mg/kg dry wt.
29706	BB-1	4.5-6.0	0.4	mg/kg dry wt.
29707	BB-1	6.5-8.0	0.2	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 015

DATE: 06/06/88
W.O. #: 032988-2064305
SAMPLE DATE: 03/23,25&26/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29685	BB-4	1.0-2.0	1.5	mg/kg dry wt.
29686	BB-4	2.5-4.0	< 0.1	mg/kg dry wt.
29687	BB-4	4.3-6.0	< 0.1	mg/kg dry wt.
29688	BB-4	6.5-8.0	< 0.1	mg/kg dry wt.
29689	BB-5	1.0-2.0	1.0	mg/kg dry wt.
29690	BB-5	3.0-4.0	210	mg/kg dry wt.
29691	BB-5	5.5-6.0	1718	mg/kg dry wt.
29692	BB-5	6.5-8.0	42.5	mg/kg dry wt.
29693	DB-10	6.5-8	2.3	mg/kg dry wt.
29696	BB-2	0.5-2.0	60.4	mg/kg dry wt.
29697	BB-2	2.5-4.0	0.9	mg/kg dry wt.
29698	BB-2	4.8-6.0	1.1	mg/kg dry wt.
29699	BB-2	6.5-8.0	2.2	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 014

DATE: 06/03/88
W.O. #: 032688-0064305
SAMPLE DATE: 03/25/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29660	BB-6	0-2.0	279	mg/kg dry wt.
29661	BB-6	2.5-4.0	0.2	mg/kg dry wt.
29662	BB-6	4.5-6.0	9.6	mg/kg dry wt.
29663	BB-6	6.5-8.0	1.9	mg/kg dry wt.
29664	BB-7	0.5-2.0	18.2	mg/kg dry wt.
29665	BB-7	2.8-4.0	2.4	mg/kg dry wt.
29666	BB-7	4.5-6.0	1.0	mg/kg dry wt.
29667	BB-7	6.5-8.0	3916	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 013

DATE: 06/06/88
W.O. #: 032588-1364305
SAMPLE DATE: 03/23&24/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29626	BTW-2	0.5-2.0	< 0.1	mg/kg dry wt.
29627	BTW-2	2.5-4.0	< 0.1	mg/kg dry wt.
29628	BTW-2	4.5-6.0	0.5	mg/kg dry wt.
29629	BTW-2	6.5-8.0	< 0.8	mg/kg dry wt.
29632	DB-8	0-1.5	21.4	mg/kg dry wt.
29633	DB-8	2.5-4	5.1	mg/kg dry wt.
29634	DB-8	5-6	0.5	mg/kg dry wt.
29635	DB-8	7-8	< 0.4	mg/kg dry wt.
29636	DS-1		1.3	mg/kg dry wt.
29637	BB-9	0-1.5	0.4	mg/kg dry wt.
29638	BB-9	3-4	0.1	mg/kg dry wt.
29639	BB-9	6.5-8	< 0.1	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg
Because of matrix interferences, Minimum Detection Limit may vary.

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 014

DATE: 06/03/88
W.O. #: 032688-0064305
SAMPLE DATE: 03/24/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29648	BB-8	0-2	7.5	mg/kg dry wt.
29649	BB-8	2-4	< 0.1	mg/kg dry wt.
29650	BB-8	4.5-6	< 0.1	mg/kg dry wt.
29651	BB-8	6.5-8	< 0.1	mg/kg dry wt.
29652	BTW-1	0.8-2.0	< 0.1	mg/kg dry wt.
29653	BTW-1	2.8-4.0	< 0.1	mg/kg dry wt.
29654	BTW-1	5.0-6.0	0.2	mg/kg dry wt.
29655	BTW-1	6.5-8.0	0.9	mg/kg dry wt.
29656	BB-10	0-2	3.9	mg/kg dry wt.
29657	BB-10	3-4	0.5	mg/kg dry wt.
29658	BB-10	5-6	< 0.1	mg/kg dry wt.
29659	BB-10	6.5-8	< 0.1	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 012

DATE: 06/03/88
W.O. #: 032588-0064305
SAMPLE DATE: 03/23/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29579	DB-10	0-1	5.5	mg/kg dry wt.
29580	DB-10	3-4	< 0.1	mg/kg dry wt.
29581	DB-10	5-6	0.2	mg/kg dry wt.
29582	BTW-3	1.0-2.0	4.6	mg/kg dry wt.
29583	BTW-3	2.5-4.0	0.1	mg/kg dry wt.
29584	BTW-3	4.8-6.0	< 0.1	mg/kg dry wt.
29585	BTW-3	6.5-8.0	0.9	mg/kg dry wt.
29586	BTW-4	1.0-2.0	< 0.1	mg/kg dry wt.
29587	BTW-4	2.5-4.0	< 0.1	mg/kg dry wt.
29588	BTW-4	4.5-6	0.8	mg/kg dry wt.
29589	BTW-4	7.0-8.0	7.5	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 011

DATE: 06/01/88
W.O. #: 032488-9064305
SAMPLE DATE: 03/22/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29564	BTW-5	1.0-2.0	69.4 **	mg/kg dry wt.
29565	BTW-5	3.0-4.0	0.3	mg/kg dry wt.
29566	BTW-5	4.5-6.0	5.1	mg/kg dry wt.
29567	BTW-5	6.5-8.0	1.4	mg/kg dry wt.
29568	DB-5	0-1.5	< 0.1	mg/kg dry wt.
29569	DB-5	3-4	< 0.1	mg/kg dry wt.
29570	DB-5	5-6	< 0.1	mg/kg dry wt.
29571	DB-5	6.5-8	< 0.1	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg
** Duplicate gave large variation, but within soil limits.

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 034

DATE: 06/17/88
W.O. #: 061088-0064305
SAMPLE DATE: 03/25/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION	AROCLOR - 1248	UNITS
31130 BB-5 8.5-10	7.0	mg/kg
31131 BB-7 8.5-10	269.3	mg/kg

MINIMUM DETECTION LIMIT 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 014

DATE: 06/03/88
W.O. #: 032688-0064305
SAMPLE DATE: 03/25/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION	AROCLOR - 1248	UNITS
29668 FIELD BLANK	0.4	ug/l
29669 TRIP BLANK	< 0.1	ug/l

MINIMUM DETECTION LIMIT - < 0.1 ug/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 015

DATE: 06/06/88
W.O. #: 032988-2064305
SAMPLE DATE: 03/25/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION		AROCLOR - 1248	UNITS
29694	FIELD BLANK	0.5	ug/l
29695	TRIP BLANK	0.2	ug/l

MINIMUM DETECTION LIMIT - < 0.1 ug/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 016

DATE: 06/06/88
W.O. #: 032988-0064305
SAMPLE DATE: 03/28/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION		AROCLOR - 1248	UNITS
29708	TRIP BLANK	< 0.1	ug/l
29709	FIELD BLANK	< 0.1	ug/l

MINIMUM DETECTION LIMIT - < 0.1 ug/l

Laboratory Director

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: BB-1 (0.5-2)
COMPUCHEM® SAMPLE NUMBER: 188062

		CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
1P.	PCB-1016	BDL	20
2P.	PCB-1221	BDL	20
3P.	PCB-1232	BDL	20
4P.	PCB-1242	BDL	20
5P.	PCB-1248	550	20
6P.	PCB-1254	BDL	20
7P.	PCB-1260	BDL	20

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	93	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).

BDL=BELOW DETECTION LIMIT

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: BB-2 (6.5-8)
COMPUCHEM® SAMPLE NUMBER: 188063

		CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
1P.	PCB-1016	BDL	20
2P.	PCB-1221	BDL	20
3P.	PCB-1232	BDL	20
4P.	PCB-1242	BDL	20
5P.	PCB-1248	290	20
6P.	PCB-1254	BDL	20
7P.	PCB-1260	BDL	20

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	95	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).

BDL=BELOW DETECTION LIMIT

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: BB-7(2.8-4')
COMPUCHEM® SAMPLE NUMBER: 187759

	CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
1P. PCB-1016	BDL	20
2P. PCB-1221	BDL	20
3P. PCB-1232	BDL	20
4P. PCB-1242	BDL	20
5P. PCB-1248	490	20
6P. PCB-1254	BDL	20
7P. PCB-1260	BDL	20

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	77	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).
BDL=BELOW DETECTION LIMIT

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: BB-8(2-4')
COMPUCHEM® SAMPLE NUMBER: 187755

		CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
1P.	PCB-1016	BDL	20
2P.	PCB-1221	BDL	20
3P.	PCB-1232	BDL	20
4P.	PCB-1242	BDL	20
5P.	PCB-1248	57	20
6P.	PCB-1254	BDL	20
7P.	PCB-1260	BDL	20

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	94	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).
BDL=BELOW DETECTION LIMIT

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: BB-10(0-2')
COMPUCHEM® SAMPLE NUMBER: 187758

		CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
1P.	PCB-1016	BDL	20
2P.	PCB-1221	BDL	20
3P.	PCB-1232	BDL	20
4P.	PCB-1242	BDL	20
5P.	PCB-1248	670	20
6P.	PCB-1254	BDL	20
7P.	PCB-1260	BDL	20

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	77	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).
BDL=BELOW DETECTION LIMIT

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: BTW-3
COMPUCHEM® SAMPLE NUMBER: 187525

		CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
1P.	PCB-1016	BDL	20
2P.	PCB-1221	BDL	20
3P.	PCB-1232	BDL	20
4P.	PCB-1242	BDL	20
5P.	PCB-1248	200	20
6P.	PCB-1254	BDL	20
7P.	PCB-1260	BDL	20

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	34	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).
BDL=BELOW DETECTION LIMIT

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
SAMPLE NUMBERS : 29700-29709
LOT ID: 016

DATE: 05/29/88
W.O. #: 0032988-0064305
SAMPLE DATE: 03/26&28/88

SOIL ANALYSIS

SAMPLE NUMBER & DESCRIPTION			TOTAL ORGANIC CARBON	UNITS
29700	BB-3	0.5-2.0	7600	mg/kg dry wt.
29701	BB-3	2.5-4.0	11000	mg/kg dry wt.
29702	BB-3	4.5-6.0	11000	mg/kg dry wt.
29703	BB-3	7.0-8.0	1900	mg/kg dry wt.
29704	BB-1	0.5-2.0	14000	mg/kg dry wt.
29705	BB-1	2.5-4.0	4200	mg/kg dry wt.
29706	BB-1	4.5-6.0	1500	mg/kg dry wt.
29707	BB-1	6.5-8.0	1300	mg/kg dry wt.
29708	TRIP BLANK		2.0	mg/l
29709	FIELD BLANK		1.3	mg/l

INSTRUMENT DETECTION LIMIT - SOILS 100 mg/kg WATER 0.25 mg/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
SAMPLE NUMBERS : 29694-29699
LOT ID: 015

DATE: 05/29/88
W.O. #: 0032988-2064305
SAMPLE DATE: 03/25&26/88

SOIL ANALYSIS

SAMPLE NUMBER & DESCRIPTION		TOTAL ORGANIC CARBON	UNITS
29694	FIELD BLANK	1.2	mg/l
29695	TRIP BLANK	0.9	mg/l
29696	BB-2 0.5-2.0	9800	mg/kg dry wt.
29697	BB-2 2.5-4.0	6400	mg/kg dry wt.
29698	BB-2 4.8-6.0	1900	mg/kg dry wt.
29699	BB-2 6.5-8.0	1700	mg/kg dry wt.

INSTRUMENT DETECTION LIMIT - SOILS 100 mg/kg WATER 0.25 mg/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
SAMPLE NUMBERS : 29685-29693
LOT ID: 015

DATE: 05/29/88
W.O. #: 0032988-2064305
SAMPLE DATE: 03/23&25/88

SOIL ANALYSIS

SAMPLE NUMBER & DESCRIPTION			TOTAL ORGANIC CARBON	UNITS
29685	BB-4	1.0-2.0	9400	mg/kg dry wt.
29686	BB-4	2.5-4.0	3000	mg/kg dry wt.
29687	BB-4	4.3-6.0	1800	mg/kg dry wt.
29688	BB-4	6.5-8.0	2200	mg/kg dry wt.
29689	BB-5	1.0-2.0	14000	mg/kg dry wt.
29690	BB-5	3.0-4.0	35000	mg/kg dry wt.
29691	BB-5	5.5-6.0	15000	mg/kg dry wt.
29692	BB-5	6.5-8.0	2600	mg/kg dry wt.
29693	DB-10	6.5-8	900	mg/kg dry wt.

INSTRUMENT DETECTION LIMIT - SOILS 100 mg/kg WATER 0.25 mg/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
SAMPLE NUMBERS : 29660-29669
LOT ID: 014

DATE: 05/29/88
W.O. #: 0032688-0064305
SAMPLE DATE: 03/25/88

SOIL ANALYSIS

SAMPLE NUMBER & DESCRIPTION			TOTAL ORGANIC CARBON	UNITS
29660	BB-6	0-2.0	4800	mg/kg dry wt.
29661	BB-6	2.5-4.0	3200	mg/kg dry wt.
29662	BB-6	4.5-6.0	3700	mg/kg dry wt.
29663	BB-6	6.5-8.0	2200	mg/kg dry wt.
29664	BB-7	0.5-2.0	7500	mg/kg dry wt.
29665	BB-7	2.8-4.0	3000	mg/kg dry wt.
29666	BB-7	4.5-6.0	2000	mg/kg dry wt.
29667	BB-7	6.5-8.0	3900	mg/kg dry wt.
29668	FIELD BLANK		1.0	mg/l
29669	TRIP BLANK		0.8	mg/l

INSTRUMENT DETECTION LIMIT - SOILS 100 mg/kg WATER 0.25 mg/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
SAMPLE NUMBERS : 29648-29659
LOT ID: 014

DATE: 05/29/88
W.O. #: 0032688-0064305
SAMPLE DATE: 03/24/88

SOIL ANALYSIS

SAMPLE NUMBER & DESCRIPTION			TOTAL ORGANIC CARBON	UNITS
29648	BB-8	0-2	15000	mg/kg dry wt.
29649	BB-8	2-4	6800	mg/kg dry wt.
29650	BB-8	4.5-6	2300	mg/kg dry wt.
29651	BB-8	6.5-8	1100	mg/kg dry wt.
29652	BTW-1	0.8-2.0	8700	mg/kg dry wt.
29653	BTW-1	2.8-4.0	1100	mg/kg dry wt.
29654	BTW-1	5.0-6.0	1500	mg/kg dry wt.
29655	BTW-1	6.5-8.0	1500	mg/kg dry wt.
29656	BB-10	0-2	14000	mg/kg dry wt.
29657	BB-10	3-4	2200	mg/kg dry wt.
29658	BB-10	5-6	2200	mg/kg dry wt.
29659	BB-10	6.5-8	1100	mg/kg dry wt.

INSTRUMENT DETECTION LIMIT - SOILS 100 mg/kg WATER 0.25 mg/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
SAMPLE NUMBERS : 29626-29637
LOT ID: 013

DATE: 05/29/88
W.O. #: 0032588-0064305
SAMPLE DATE: 03/23&24/88

SOIL ANALYSIS

SAMPLE NUMBER & DESCRIPTION			TOTAL ORGANIC CARBON	UNITS
29626	BTW-2	0.5-2.0	11000	mg/kg dry wt.
29627	BWT-2	2.5-4.0	4000	mg/kg dry wt.
29628	BTW-2	4.5-6.0	1000	mg/kg dry wt.
29629	BTW-2	6.5-8.0	940	mg/kg dry wt.
29630	FIELD BLANK		2.5	mg/l
29631	TRIP BLANK		0.6	mg/l
29632	DB-8	0-1.5	3900	mg/kg dry wt.
29633	DB-8	2.5-4	780	mg/kg dry wt.
29634	DB-8	5-6	520	mg/kg dry wt.
29635	DB-8	7-8	540	mg/kg dry wt.
29636	DS-1		4000	mg/kg dry wt.
29637	BB-9	0-1.5	12000	mg/kg dry wt.

INSTRUMENT DETECTION LIMIT - SOILS 100 mg/kg WATER 0.25 mg/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
SAMPLE NUMBERS : 29638-29647
LOT ID: 013

DATE: 05/29/88
W.O. #: 0032588-0064305
SAMPLE DATE: 03/23&24/88

SOIL ANALYSIS

SAMPLE NUMBER & DESCRIPTION			TOTAL ORGANIC CARBON	UNITS
29638	BB-9	3-4	12000	mg/kg dry wt.
29639	BB-9	6.5-8	1200	mg/kg dry wt.
29640	DB-1	0-1	3200	mg/kg dry wt.
29641	DB-1	3-4	580	mg/kg dry wt.
29642	DB-1	5-6	650	mg/kg dry wt.
29643	DB-1	7-8	540	mg/kg dry wt.
29644	DB-2	0-1.5	3300	mg/kg dry wt.
29645	DB-2	3-4	810	mg/kg dry wt.
29646	DB-2	4-5	1000	mg/kg dry wt.
29647	DB-2	6-8	920	mg/kg dry wt.

INSTRUMENT DETECTION LIMIT - SOILS 100 mg/kg WATER 0.25 mg/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
SAMPLE NUMBERS : 29579-29589
LOT ID: 012

DATE: 05/11/88
W.O. #: 0032588-0064305
SAMPLE DATE: 03/23/88

SOIL ANALYSIS

SAMPLE NUMBER	DESCRIPTION	TOTAL ORGANIC CARBON	UNITS
29579	DB-10 0-1	4400	mg/kg dry wt.
29580	DB-10 3-4	700	mg/kg dry wt.
29581	DB-10 5-6	930	mg/kg dry wt.
29582	BTW-3 1.0-2.0	12000	mg/kg dry wt.
29583	BTW-3 2.5-4.0	2900	mg/kg dry wt.
29584	BTW-3 4.8-6.0	2000	mg/kg dry wt.
29585	BTW-3 6.5-8.0	2100	mg/kg dry wt.
29586	BTW-4 1.0-2.0	6100	mg/kg dry wt.
29587	BTW-4 2.5-4.0	1500	mg/kg dry wt.
29588	BTW-4 4.5-6	1400	mg/kg dry wt.
29589	BTW-4 7.0-8.0	980	mg/kg dry wt.

INSTRUMENT DETECTION LIMIT - SOILS 100 mg/kg WATER 0.25 mg/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
SAMPLE NUMBERS : 29554-29567
LOT ID: 011

DATE: 05/10/88
W.O. #: 0032488-0064305
SAMPLE DATE: 03/22/88

SOIL ANALYSIS

SAMPLE NUMBER & DESCRIPTION		TOTAL ORGANIC CARBON	UNITS
29554	DB-6 0-1	1300	mg/kg dry wt.
29555	DB-6 2-3	1300	mg/kg dry wt.
29556	DB-6 5-6	750	mg/kg dry wt.
29557	DB-6 6.5-8	680	mg/kg dry wt.
29558	DB-7 0-1	6400	mg/kg dry wt.
29559	DB-7 3-4	820	mg/kg dry wt.
29560	DB-7 4.5-6	660	mg/kg dry wt.
29561	DB-7 7-8	440	mg/kg dry wt.
29564	BTW-5 1.0-2.0	12000	mg/kg dry wt.
29565	BTW-5 3.0-4.0	6500	mg/kg dry wt.
29566	BTW-5 4.5-6.0	1900	mg/kg dry wt.
29567	BTW-5 6.5-8.0	1900	mg/kg dry wt.

INSTRUMENT DETECTION LIMIT - SOILS 100 mg/kg WATER 0.25 mg/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
SAMPLE NUMBERS : 31130-31131
LOT ID: 034

DATE: 06/17/88
W.O. #: 061088-0064305
SAMPLE DATE: 03/25/88

SOIL ANALYSIS

SAMPLE NUMBER & DESCRIPTION	TOTAL ORGANIC CARBON	UNITS
31130 BB-5 8.5-10	1300	mg/kg dry wt.
31131 BB-7 8.5-10	5200	mg/kg dry wt.

INSTRUMENT DETECTION LIMIT - SOILS 100 mg/kg

Laboratory Director

SAMPLE IDENTIFIER: BB-1 (0.5-2)
COMPUCHEM SAMPLE NUMBER: 188064

	CONCENTRATION (MG/KG)	DETECTION LIMIT (MG/KG)
Total Organic Carbon	12	1.0

SAMPLE IDENTIFIER: BB-2 (6.5-8)
COMPUCHEM SAMPLE NUMBER: 188065

	CONCENTRATION (MG/KG)	DETECTION LIMIT (MG/KG)
Total Organic Carbon	160	1.0

COMPOUND LIST --- TOTAL ORGANIC CARBON

SAMPLE IDENTIFIER	COMPUCHEM® NUMBER	CONCENTRATION (mg/kg)	DETECTION LIMIT (mg/kg)
BB-8(2-4')	187760	87	0.1
BB-10(0-2')	187761	60	0.1
BB-7(2.8-4')	187762	77	0.1

BDL=BELOW DETECTION LIMIT

COMPOUND LIST --- TOTAL ORGANIC CARBON

SAMPLE IDENTIFIER	COMPUCHEM NUMBER	CONCENTRATION (mg/kg)	DETECTION (mg/kg)
DB-6 (5-6')	187538	7.2	0.1
DB-3 (6-8)	187540	12	0.1
BTW-3 (4.8-6.0)	187543	37	0.1
DB-10 (3-4)	187548	23	0.1
DB-1 (5-6)	187549	7.5	0.1

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 013

DATE: 06/06/88
W.O. #: 032588-1364305
SAMPLE DATE: 03/23&24/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29640	DB-1	0-1	< 1.0	mg/kg dry wt.
29641	DB-1	3-4	< 0.4	mg/kg dry wt.
29642	DB-1	5-6	< 0.1	mg/kg dry wt.
29643	DB-1	7-8	< 0.4	mg/kg dry wt.
29644	DB-2	0-1.5	11.0	mg/kg dry wt.
29645	DB-2	3-4	< 0.4	mg/kg dry wt.
29646	DB-2	4-5	0.2	mg/kg dry wt.
29647	DB-2	6-8	< 0.2	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg
29640 - Heavy Matrix Interference. Higher Minimum Detection Limit.
Because of matrix interferences, Minimum Detection Limit may vary.

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 012

DATE: 06/03/88
W.O. #: 032588-0064305
SAMPLE DATE: 03/23/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29590	DB-9	0-1.5	0.8	mg/kg dry wt.
29591	DB-9	2.5-4	< 0.1	mg/kg dry wt.
29592	DB-9	5-6	< 0.1	mg/kg dry wt.
29593	DB-9	7-8	< 0.1	mg/kg dry wt.
29594	DB-4	0-1.5	< 0.1	mg/kg dry wt.
29595	DB-4	2.5-4	< 0.1	mg/kg dry wt.
29596	DB-4	5-6	0.1	mg/kg dry wt.
29597	DB-4	6.5-8	< 0.1	mg/kg dry wt.
29598	DB-3	0-1	0.2	mg/kg dry wt.
29599	DB-3	3-4	< 0.1	mg/kg dry wt.
29600	DB-3	5-6	< 0.1	mg/kg dry wt.
29601	DB-3	6-8	< 0.1	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 011

DATE: 06/01/88
W.O. #: 032488-9064305
SAMPLE DATE: 03/22/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29564	BTW-5	1.0-2.0	69.4 **	mg/kg dry wt.
29565	BTW-5	3.0-4.0	0.3	mg/kg dry wt.
29566	BTW-5	4.5-6.0	5.1	mg/kg dry wt.
29567	BTW-5	6.5-8.0	1.4	mg/kg dry wt.
29568	DB-5	0-1.5	< 0.1	mg/kg dry wt.
29569	DB-5	3-4	< 0.1	mg/kg dry wt.
29570	DB-5	5-6	< 0.1	mg/kg dry wt.
29571	DB-5	6.5-8	< 0.1	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg
** Duplicate gave large variation, but within soil limits.

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 011

DATE: 06/01/88
W.O. #: 032488-9064305
SAMPLE DATE: 03/20&22/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29554	DB-6	0-1	< 0.1 *	mg/kg dry wt.
29555	DB-6	2-3	< 0.1	mg/kg dry wt.
29556	DB-6	5-6	< 0.1	mg/kg dry wt.
29557	DB-6	6.5-8	0.1	mg/kg dry wt.
29558	DB-7	0-1	1.0	mg/kg dry wt.
29559	DB-7	3-4	0.4	mg/kg dry wt.
29560	DB-7	4.5-6	< 0.1	mg/kg dry wt.
29561	DB-7	7-8	< 0.1	mg/kg dry wt.
29562	AB-13	8.5-10	< 0.1	mg/kg dry wt.
29563	AB-12	10-12	139	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg
* Sample gave variable results due to matrix interference.

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 013

DATE: 06/06/88
W.O. #: 032588-1364305
SAMPLE DATE: 03/23&24/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29626	BTW-2	0.5-2.0	< 0.1	mg/kg dry wt.
29627	BTW-2	2.5-4.0	< 0.1	mg/kg dry wt.
29628	BTW-2	4.5-6.0	0.5	mg/kg dry wt.
29629	BTW-2	6.5-8.0	< 0.8	mg/kg dry wt.
29632	DB-8	0-1.5	21.4	mg/kg dry wt.
29633	DB-8	2.5-4	5.1	mg/kg dry wt.
29634	DB-8	5-6	0.5	mg/kg dry wt.
29635	DB-8	7-8	< 0.4	mg/kg dry wt.
29636	DS-1		1.3	mg/kg dry wt.
29637	BB-9	0-1.5	0.4	mg/kg dry wt.
29638	BB-9	3-4	0.1	mg/kg dry wt.
29639	BB-9	6.5-8	< 0.1	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg
Because of matrix interferences, Minimum Detection Limit may vary.

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 012

DATE: 06/03/88
W.O. #: 032588-0064305
SAMPLE DATE: 03/23/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29579	DB-10	0-1	5.5	mg/kg dry wt.
29580	DB-10	3-4	< 0.1	mg/kg dry wt.
29581	DB-10	5-6	0.2	mg/kg dry wt.
29582	BTW-3	1.0-2.0	4.6	mg/kg dry wt.
29583	BTW-3	2.5-4.0	0.1	mg/kg dry wt.
29584	BTW-3	4.8-6.0	< 0.1	mg/kg dry wt.
29585	BTW-3	6.5-8.0	0.9	mg/kg dry wt.
29586	BTW-4	1.0-2.0	< 0.1	mg/kg dry wt.
29587	BTW-4	2.5-4.0	< 0.1	mg/kg dry wt.
29588	BTW-4	4.5-6	0.8	mg/kg dry wt.
29589	BTW-4	7.0-8.0	7.5	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 015

DATE: 06/06/88
W.O. #: 032988-2064305
SAMPLE DATE: 03/23,25&26/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
29685	BB-4	1.0-2.0	1.5	mg/kg dry wt.
29686	BB-4	2.5-4.0	< 0.1	mg/kg dry wt.
29687	BB-4	4.3-6.0	< 0.1	mg/kg dry wt.
29688	BB-4	6.5-8.0	< 0.1	mg/kg dry wt.
29689	BB-5	1.0-2.0	1.0	mg/kg dry wt.
29690	BB-5	3.0-4.0	210	mg/kg dry wt.
29691	BB-5	5.5-6.0	1718	mg/kg dry wt.
29692	BB-5	6.5-8.0	42.5	mg/kg dry wt.
29693	DB-10	6.5-8	2.3	mg/kg dry wt.
29696	BB-2	0.5-2.0	60.4	mg/kg dry wt.
29697	BB-2	2.5-4.0	0.9	mg/kg dry wt.
29698	BB-2	4.8-6.0	1.1	mg/kg dry wt.
29699	BB-2	6.5-8.0	2.2	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 012

DATE: 06/03/88
W.O. #: 032588-0064305
SAMPLE DATE: 03/24/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION		AROCLOR - 1248	UNITS
29602	TRIP BLANK	< 0.1	ug/l
29603	FIELD BLANK	2.7	ug/l

MINIMUM DETECTION LIMIT - < 0.1 ug/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 013

DATE: 06/06/88
W.O. #: 032588-1364305
SAMPLE DATE: 03/24/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION		AROCLOR - 1248	UNITS
29630	FIELD BLANK	2.7	ug/l
29631	TRIP BLANK	< 0.1	ug/l

MINIMUM DETECTION LIMIT - < 0.1 ug/l

Laboratory Director

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: DB-1 (5-6)
COMPUCHEM® SAMPLE NUMBER: 187529

		CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
1P.	PCB-1016	BDL	20
2P.	PCB-1221	BDL	20
3P.	PCB-1232	BDL	20
4P.	PCB-1242	BDL	20
5P.	PCB-1248	BDL	20
6P.	PCB-1254	BDL	20
7P.	PCB-1260	BDL	20

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	87	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).
BDL=BELOW DETECTION LIMIT

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: DB-3 (6-8)
COMPUCHEM® SAMPLE NUMBER: 187523

		CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
1P.	PCB-1016	BDL	20
2P.	PCB-1221	BDL	20
3P.	PCB-1232	BDL	20
4P.	PCB-1242	BDL	20
5P.	PCB-1248	BDL	20
6P.	PCB-1254	BDL	20
7P.	PCB-1260	BDL	20

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	86	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).
BDL=BELOW DETECTION LIMIT

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: DB-6 (5-6')
COMPUCHEM® SAMPLE NUMBER: 187520

		CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
1P.	PCB-1016	BDL	20
2P.	PCB-1221	BDL	20
3P.	PCB-1232	BDL	20
4P.	PCB-1242	BDL	20
5P.	PCB-1248	BDL	20
6P.	PCB-1254	BDL	20
7P.	PCB-1260	BDL	20

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	22	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).
BDL=BELOW DETECTION LIMIT

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: DB-10 (3-4)
COMPUCHEM® SAMPLE NUMBER: 187527

		CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
1P.	PCB-1016	BDL	20
2P.	PCB-1221	BDL	20
3P.	PCB-1232	BDL	20
4P.	PCB-1242	BDL	20
5P.	PCB-1248	BDL	20
6P.	PCB-1254	BDL	20
7P.	PCB-1260	BDL	20

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	93	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).
BDL=BELOW DETECTION LIMIT

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
SAMPLE NUMBERS : 29638-29647
LOT ID: 013

DATE: 05/29/88
W.O. #: 0032588-0064305
SAMPLE DATE: 03/23&24/88

SOIL ANALYSIS

SAMPLE NUMBER & DESCRIPTION			TOTAL ORGANIC CARBON	UNITS
29638	BB-9	3-4	12000	mg/kg dry wt.
29639	BB-9	6.5-8	1200	mg/kg dry wt.
29640	DB-1	0-1	3200	mg/kg dry wt.
29641	DB-1	3-4	580	mg/kg dry wt.
29642	DB-1	5-6	650	mg/kg dry wt.
29643	DB-1	7-8	540	mg/kg dry wt.
29644	DB-2	0-1.5	3300	mg/kg dry wt.
29645	DB-2	3-4	810	mg/kg dry wt.
29646	DB-2	4-5	1000	mg/kg dry wt.
29647	DB-2	6-8	920	mg/kg dry wt.

INSTRUMENT DETECTION LIMIT - SOILS 100 mg/kg WATER 0.25 mg/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
SAMPLE NUMBERS : 29590-29601
LOT ID: 012

DATE: 05/11/88
W.O. #: 0032588-0064305
SAMPLE DATE: 03/23/88

SOIL ANALYSIS

SAMPLE NUMBER & DESCRIPTION			TOTAL ORGANIC CARBON	UNITS
29590	DB-9	0-1.5	2600	mg/kg dry wt.
29591	DB-9	2.5-4	680	mg/kg dry wt.
29592	DB-9	5-6	630	mg/kg dry wt.
29593	DB-9	7-8	700	mg/kg dry wt.
29594	DB-4	0-1.5	7900	mg/kg dry wt.
29595	DB-4	2.5-4	720	mg/kg dry wt.
29596	DB-4	5-6	700	mg/kg dry wt.
29597	DB-4	6.5-8	700	mg/kg dry wt.
29598	DB-3	0-1	6300	mg/kg dry wt.
29599	DB-3	3-4	790	mg/kg dry wt.
29600	DB-3	5-6	730	mg/kg dry wt.
29601	DB-3	6-8	740	mg/kg dry wt.

INSTRUMENT DETECTION LIMIT - SOILS 100 mg/kg WATER 0.25 mg/l

Laboratory Director

RMT INC

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
SAMPLE NUMBERS : 29568-29573
LOT ID: 011

DATE: 05/10/88
W.O. #: 0032488-0064305
SAMPLE DATE: 03/22-23/88

SOIL ANALYSIS

SAMPLE NUMBER & DESCRIPTION		TOTAL ORGANIC CARBON	UNITS
29568	DB-5 0-1.5	2500	mg/kg dry wt.
29569	DB-5 3-5	550	mg/kg dry wt.
29570	DB-5 5-6	390	mg/kg dry wt.
29571	DB-5 6.5-8	880	mg/kg dry wt.
29572	FIELD BLANK	1.2	mg/l
29573	TRIP BLANK	0.7	mg/l

INSTRUMENT DETECTION LIMIT - SOILS 100 mg/kg WATER 0.25 mg/l

[signature]
Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
SAMPLE NUMBERS : 29554-29567
LOT ID: 011

DATE: 05/10/88
W.O. #: 0032488-0064305
SAMPLE DATE: 03/22/88

SOIL ANALYSIS

SAMPLE NUMBER & DESCRIPTION		TOTAL ORGANIC CARBON	UNITS
29554	DB-6 0-1	1300	mg/kg dry wt.
29555	DB-6 2-3	1300	mg/kg dry wt.
29556	DB-6 5-6	750	mg/kg dry wt.
29557	DB-6 6.5-8	680	mg/kg dry wt.
29558	DB-7 0-1	6400	mg/kg dry wt.
29559	DB-7 3-4	820	mg/kg dry wt.
29560	DB-7 4.5-6	660	mg/kg dry wt.
29561	DB-7 7-8	440	mg/kg dry wt.
29564	BTW-5 1.0-2.0	12000	mg/kg dry wt.
29565	BTW-5 3.0-4.0	6500	mg/kg dry wt.
29566	BTW-5 4.5-6.0	1900	mg/kg dry wt.
29567	BTW-5 6.5-8.0	1900	mg/kg dry wt.

INSTRUMENT DETECTION LIMIT - SOILS 100 mg/kg WATER 0.25 mg/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
SAMPLE NUMBERS : 29626-29637
LOT ID: 013

DATE: 05/29/88
W.O. #: 0032588-0064305
SAMPLE DATE: 03/23&24/88

SOIL ANALYSIS

SAMPLE NUMBER & DESCRIPTION			TOTAL ORGANIC CARBON	UNITS
29626	BTW-2	0.5-2.0	11000	mg/kg dry wt.
29627	BWT-2	2.5-4.0	4000	mg/kg dry wt.
29628	BTW-2	4.5-6.0	1000	mg/kg dry wt.
29629	BTW-2	6.5-8.0	940	mg/kg dry wt.
29630	FIELD BLANK		2.5	mg/l
29631	TRIP BLANK		0.6	mg/l
29632	DB-8	0-1.5	3900	mg/kg dry wt.
29633	DB-8	2.5-4	780	mg/kg dry wt.
29634	DB-8	5-6	520	mg/kg dry wt.
29635	DB-8	7-8	540	mg/kg dry wt.
29636	DS-1		4000	mg/kg dry wt.
29637	BB-9	0-1.5	12000	mg/kg dry wt.

INSTRUMENT DETECTION LIMIT - SOILS 100 mg/kg WATER 0.25 mg/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
SAMPLE NUMBERS : 29685-29693
LOT ID: 015

DATE: 05/29/88
W.O. #: 0032988-2064305
SAMPLE DATE: 03/23&25/88

SOIL ANALYSIS

SAMPLE NUMBER & DESCRIPTION			TOTAL ORGANIC CARBON	UNITS
29685	BB-4	1.0-2.0	9400	mg/kg dry wt.
29686	BB-4	2.5-4.0	3000	mg/kg dry wt.
29687	BB-4	4.3-6.0	1800	mg/kg dry wt.
29688	BB-4	6.5-8.0	2200	mg/kg dry wt.
29689	BB-5	1.0-2.0	14000	mg/kg dry wt.
29690	BB-5	3.0-4.0	35000	mg/kg dry wt.
29691	BB-5	5.5-6.0	15000	mg/kg dry wt.
29692	BB-5	6.5-8.0	2600	mg/kg dry wt.
29693	DB-10	6.5-8	900	mg/kg dry wt.

INSTRUMENT DETECTION LIMIT - SOILS 100 mg/kg WATER 0.25 mg/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
SAMPLE NUMBERS : 29579-29589
LOT ID: 012

DATE: 05/11/88
W.O. #: 0032588-0064305
SAMPLE DATE: 03/23/88

SOIL ANALYSIS

SAMPLE NUMBER & DESCRIPTION		TOTAL ORGANIC CARBON	UNITS
29579	DB-10 0-1	4400	mg/kg dry wt.
29580	DB-10 3-4	700	mg/kg dry wt.
29581	DB-10 5-6	930	mg/kg dry wt.
29582	BTW-3 1.0-2.0	12000	mg/kg dry wt.
29583	BTW-3 2.5-4.0	2900	mg/kg dry wt.
29584	BTW-3 4.8-6.0	2000	mg/kg dry wt.
29585	BTW-3 6.5-8.0	2100	mg/kg dry wt.
29586	BTW-4 1.0-2.0	6100	mg/kg dry wt.
29587	BTW-4 2.5-4.0	1500	mg/kg dry wt.
29588	BTW-4 4.5-6	1400	mg/kg dry wt.
29589	BTW-4 7.0-8.0	980	mg/kg dry wt.

INSTRUMENT DETECTION LIMIT - SOILS 100 mg/kg WATER 0.25 mg/l

Laboratory Director

COMPOUND LIST --- TOTAL ORGANIC CARBON

SAMPLE IDENTIFIER	COMPUCHEM NUMBER	CONCENTRATION (mg/kg)	DETECTION (mg/kg)
DB-6 (5-6')	187538	7.2	0.1
DB-3 (6-8)	187540	12	0.1
BTW-3 (4.8-6.0)	187543	37	0.1
DB-10 (3-4)	187548	23	0.1
DB-1 (5-6)	187549	7.5	0.1

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 020

DATE: 05/29/88
W.O. #: 041588-1064305
SAMPLE DATE: 04/11-12/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION			AROCLOR - 1248	UNITS
30210	C-1	0-0.5	6.2	mg/kg dry wt.
30211	C-1	0.5-1.0	30.4	mg/kg dry wt.
30212	C-2	0-0.75	106	mg/kg dry wt.
30213	C-2	0.75-1.5	7.3	mg/kg dry wt.
30214	C-3	0-1	< 0.1	mg/kg dry wt.
30215	C-3	1-2	< 0.1	mg/kg dry wt.
30216	C-4	0-1	1.5	mg/kg dry wt.
30217	C-4	1-2	< 0.1	mg/kg dry wt.
30218	C-5	0-1	< 0.1	mg/kg dry wt.
30219	C-5	1-2	< 0.1	mg/kg dry wt.

MINIMUM DETECTION LIMIT - 0.1 mg/kg

Laboratory Director

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: C-5, 1-2
COMPUCHEM® SAMPLE NUMBER: 190769

		CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
1P.	PCB-1016	BDL	20
2P.	PCB-1221	BDL	20
3P.	PCB-1232	BDL	20
4P.	PCB-1242	BDL	20
5P.	PCB-1248	BDL	20
6P.	PCB-1254	BDL	20
7P.	PCB-1260	BDL	20

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	30	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re analysis).
BDL=BELOW DETECTION LIMIT

Test Description	Units	01 C-1 0-1	02 C-2 0-1.5	03 C-3 0-1	04 C-3 1-2
1-AMINO-2-METHYLANTHRAQUIN	ug/kg	<660	<660	<660	<660
2-AMINOANTHRAQUINONE	ug/kg	<660	<660	<660	<660

Test Description	Units	05 C-4 0-1	06 C-4 1-2	07 C-5 0-1	08 C-5 1-2
1-AMINO-2-METHYLANTHRAQUIN	ug/kg	<660	<660	<660	<660
2-AMINOANTHRAQUINONE	ug/kg	<660	<660	<660	<660

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 028

DATE: 06/01/88
W.O. #: 042288-0064305
SAMPLE DATE: 04/17&18/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION		AROCLOR - 1248	UNITS
30266	ATW-1	< 0.1	ug/l
30267	ATW-2	62.4	ug/l
30268	ATW-3	2.3	ug/l
30269	ATW-4	0.9	ug/l
30270	ATW-5	258	ug/l

MINIMUM DETECTION LIMIT - < 0.1 ug/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 031

DATE: 06/01/88
W.O. #: 042188-0064305
SAMPLE DATE: 04/18/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION	AROCLOR - 1248	UNITS
30301 ATW-4	< 0.1	ug/l

MINIMUM DETECTION LIMIT - < 0.1 ug/l
Refer to Lot 028 for QC.

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
SAMPLE NUMBERS : 30266-30270
LOT ID: 028

DATE: 05/29/88
W.O. #: 0042288-0064305
SAMPLE DATE: 04/17-18/88

WATER ANALYSIS

SAMPLE NUMBER & DESCRIPTION		TOTAL ORGANIC CARBON	UNITS
30266	ATW 1	34	mg/l
30267	ATW 2	140	mg/l
30268	ATW 3	72	mg/l
30269	ATW 4	260	mg/l
30270	ATW 5	42	mg/l

INSTRUMENT DETECTION LIMIT - WATER 0.25 mg/l

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 022

DATE: 06/01/88
W.O. #: 041888-9064305
SAMPLE DATE: 04/13&14/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION		AROCLOR - 1248	UNITS
30222*	BTW-1	0.2	ug/l
30223*	BTW-2	0.3	ug/l
30224-A	BTW-3	0.9 **	ug/l
30224-B	BTW-3	0.9 **	ug/l
30225	BTW-4	1.2	ug/l
30226	BTW-5	12.3	ug/l

MINIMUM DETECTION LIMIT - < 0.1 ug/l
Refer to LOT 028 for QC.
* High interferences - weak PCB pattern and/or poor peak ratios.
** Samples submitted in duplicate for filtered/unfiltered; samples were identical.

Laboratory Director

COMPOUND LIST -- PESTICIDES/PCBs

SAMPLE IDENTIFIER: BTW-3
COMPUCHEM® SAMPLE NUMBER: 190904

		CONCENTRATION (ug/L)	DETECTION LIMIT (ug/L)
1P.	ALDRIN	BDL	0.10
2P.	ALPHA-BHC	BDL	0.10
3P.	BETA-BHC	BDL	0.10
4P.	GAMMA-BHC	BDL	0.10
5P.	DELTA-BHC	BDL	0.10
6P.	CHLORDANE (TECHNICAL)	BDL	0.50
7P.	4,4'-DDT	BDL	0.10
8P.	4,4'-DDE	BDL	0.10
9P.	4,4'-DDD	BDL	0.10
10P.	DIELDRIN	BDL	0.10
11P.	ALPHA-ENDOSULFAN	BDL	0.10
12P.	BETA-ENDOSULFAN	BDL	0.10
13P.	ENDOSULFAN SULFATE	BDL	0.10
14P.	ENDRIN	BDL	0.10
15P.	ENDRIN ALDEHYDE	BDL	0.10
16P.	HEPTACHLOR	BDL	0.10
17P.	HEPTACHLOR EPOXIDE	BDL	0.10
18P.	PCB-1242	BDL	1.0
19P.	PCB-1254	BDL	1.0
20P.	PCB-1221	BDL	1.0
21P.	PCB-1232	BDL	1.0
22P.	PCB-1248	BDL	1.0
23P.	PCB-1260	BDL	1.0
24P.	PCB-1016	BDL	1.0
25P.	TOXAPHENE	BDL	1.0

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	55	(48-136)*

BDL=BELOW DETECTION LIMIT

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
SAMPLE NUMBERS : 30222-30226
LOT ID: 022

DATE: 05/29/88
W.O. #: 0041888-0064305
SAMPLE DATE: 04/13-14/88

WATER ANALYSIS

SAMPLE NUMBER & DESCRIPTION		TOTAL ORGANIC CARBON	UNITS
30222	BTW 1	24	mg/l
30223	BTW 2	43	mg/l
30224	BTW 3	270	mg/l
30225	BTW 4	57	mg/l
30226	BTW 5	400	mg/l

INSTRUMENT DETECTION LIMIT - WATER 0.25 mg/l

Laboratory Director

SAMPLE IDENTIFIER: BTW-3
COMPUCHEM SAMPLE NUMBER: 190905

	CONCENTRATION (mg/L)	DETECTION LIMIT (mg/L)
1. TOTAL ORGANIC CARBON	260	0.50

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 018

DATE: 06/03/88
W.O. #: 041388-0064305
SAMPLE DATE: 04/11/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION		AROCLOR - 1248	UNITS
30149	RBTW 3	< 0.1	ug/l
30150	RBTW 2	< 0.1	ug/l

MINIMUM DETECTION LIMIT - < 0.1 ug/l
* See Lot 022 for QC.

Laboratory Director

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

PROJECT #: 643.05

RMT SAMPLE #: 30150

DESCRIPTION: RBTW2

SAMPLE DATE: 04/11/88

REPORT DATE: 05/13/88

W.O.#: 041388-0064305

GROUND WATER
MONITORING RESULTS

Parameters	Result	Units	Detection limit
Total Organic Carbon	4.8	mg/l	0.25

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

SAMPLE DATE: 04/11/88

PROJECT #: 643.05

REPORT DATE: 05/13/88

RMT SAMPLE #: 30149

W.O.#: 041388-0064305

DESCRIPTION: RBTW3

GROUND WATER
MONITORING RESULTS

Parameters	Result	Units	Detection limit
Total Organic Carbon	5.3	mg/l	0.25

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

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REPORT OF ANALYSIS

SUE WELLS
RMT, INCORPORATED
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

SAMPLE NUMBER: 80403549

DATE ENTERED: 04/18/88

REPORT PRINTED: 05/31/88

GROUND WATER: L-1 4/13/88; 30220
PROJECT NO. 643.05

PURCHASE ORDER NUMBER: 16906

VOLATILE FRACTION

COMPOUND NAME	MCG/L
ACROLEIN	LESS THAN 50
ACRYLONITRILE	LESS THAN 50
BENZENE	LESS THAN 5
BIS (CHLOROMETHYL)ETHER*(1)	N/A
BROMOFORM	LESS THAN 5
CARBON TETRACHLORIDE	LESS THAN 5
CHLOROBENZENE	LESS THAN 5
CHLORODIBROMOMETHANE	LESS THAN 5
CHLOROETHANE	LESS THAN 10
2-CHLORO-ETHYLVINYL ETHER	LESS THAN 10
CHLOROFORM	LESS THAN 5
DICHLOROBROMOMETHANE	LESS THAN 5
DICHLORODIFLUOROMETHANE*(2)	N/A
1,1-DICHLOROETHANE	LESS THAN 5
1,2-DICHLOROETHANE	LESS THAN 5
1,1-DICHLOROETHYLENE	LESS THAN 5
1,2-DICHLOROPROPANE	LESS THAN 5
1,3-DICHLOROPROPYLENE	LESS THAN 5
ETHYLBENZENE	LESS THAN 5
METHYL BROMIDE	LESS THAN 10
METHYL CHLORIDE	LESS THAN 10
METHYLENE CHLORDIE	LESS THAN 5
1,1,2,2-TETRACHLOROETHANE	LESS THAN 5
TETRACHLOROETHYLENE	LESS THAN 5
TOLUENE	0.8 JB (1J)
1,2-TRANS-DICHLOROETHYLENE	LESS THAN 5
1,1,1-TRICHLOROETHANE	LESS THAN 5
1,1,2-TRICHLOROETHANE	LESS THAN 5
TRICHLOROETHYLENE	LESS THAN 5
TRICHLOROFLUOROMETHANE*(2)	N/A
VINYL CHLORIDE	LESS THAN 10

*(1) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 10723, FEB. 4, 1981)
*(2) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 46103, JAN. 8, 1981)

SAMPLE NUMBER: 80403549

GROUND WATER: L-1 4/13/88; 30220
PROJECT NO. 643.05

VOLATILE FRACTION (CONTINUED)

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

'B' INDICATES THE ANALYTE WAS FOUND IN THE BLANK AS WELL AS THE SAMPLE. THE CONCENTRATION SHOWN IN PARENTHESIS WAS DETECTED IN THE METHOD BLANK.

SEMI-VOLATILE FRACTION

ACID FRACTION

COMPOUND NAME	MCG/L
2-CHLOROPHENOL	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
4,6-DINITRO-O-CRESOL	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
4-NITROPHENOL	LESS THAN 10
P-CHLORO-M-CRESOL	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 10
PHENOL	LESS THAN 10
2,4,6-TRICHLOROPHENOL	LESS THAN 10

BASE/NEUTRAL FRACTION

COMPOUND NAME	MCG/L
ACENAPHTHENE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
BENZIDINE	LESS THAN 50
BENZO(a)ANTHRACENE	LESS THAN 10
BENZO(a)PYRENE	LESS THAN 10
3,4-BENZOFLUORANTHENE	LESS THAN 10
BENZO(g,h,i)PERYLENE	LESS THAN 10
BENZO(k)FLUORANTHENE	LESS THAN 10
BIS (2-CHLOROETHOXY)METHANE	LESS THAN 10
BIS (2-CHLOROETHYL)ETHER	LESS THAN 10
BIS (2-CHLOROISOPROPYL)ETHER	LESS THAN 10
BIS (2-ETHYLHEXYL)PHTHALATE	LESS THAN 10
4-BROMOPHENYL PHENYL ETHER	LESS THAN 10
BUTYL BENZYL PHTHALATE	LESS THAN 10
2-CHLORONAPTHALENE	LESS THAN 10
4-CHLOROPHENYL PHENYL ETHER	LESS THAN 10
CHRYSENE	LESS THAN 10
DIBENZO(a,h)ANTHRACENE	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10

SAMPLE NUMBER: 80403549

GROUND WATER: L-1 4/13/88; 30220
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION (CONTINUED)

1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 10
DIETHYL PHTHALATE	LESS THAN 10
DIMETHYL PHTHALATE	LESS THAN 10
DI-N-BUTYL PHTHALATE	LESS THAN 10
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
1,2-DIPHENYLHYDRAZINE*(1)	LESS THAN 10
FLUORANTHENE	LESS THAN 10
FLUORENE	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
INDENO(1,2,3-cd)PYRENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
NITROBENZENE	LESS THAN 10
N-NITROSODIMETHYLAMINE	LESS THAN 10
N-NITROSODI-N-PROPYLAMINE	LESS THAN 10
N-NITROSODIPHENYLAMINE*(2)	LESS THAN 10
PHENANTHRENE	LESS THAN 10
PYRENE	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10

*(1) 1,2-DIPHENYLHYDRAZINE DETECTED AS AZOBENZENE.
*(2) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.052
BETA-BHC	LESS THAN 0.052
DELTA-BHC	LESS THAN 0.052
GAMMA-BHC (LINDANE)	LESS THAN 0.052
HEPTACHLOR	LESS THAN 0.052
ALDRIN	LESS THAN 0.052
HEPTACHLOR EPOXIDE	LESS THAN 0.052
ENDOSULFAN I	LESS THAN 0.052
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10
ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10

SAMPLE NUMBER: 80403549

GROUND WATER: L-1 4/13/88; 30220
PROJECT NO. 643.05

PESTICIDE/PCB FRACTION (CONTINUED)

METHOXYCHLOR	LESS THAN 0.52
ENDRIN KETONE	LESS THAN 0.10
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.52
PCB-1221	LESS THAN 0.52
PCB-1232	LESS THAN 0.52
PCB-1242	LESS THAN 0.52
PCB-1248	LESS THAN 0.52
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0
ENDRIN ALDEHYDE	LESS THAN 0.38
TECHNICAL CHLORDANE	LESS THAN 0.52

METHOD REFERENCES

VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 624, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 624 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43373-43384, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8240, U.S. EPA, WASHINGTON DC (REVISED APRIL 1984)

SEMI-VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

SAMPLE DATE: 04/13/88

PROJECT #: 643.05

REPORT DATE: 05/13/88

RMT SAMPLE #: 30220

W.O.#: 041588-0064305

DESCRIPTION: L-1

GROUND WATER
MONITORING RESULTS

Parameters	Result	Units	Detection limit
Antimony	ND	mg/1	0.06
Arsenic	ND	mg/1	0.004
Beryllium	ND	mg/1	0.002
Cadmium	ND	mg/1	0.0002
Chromium	ND	mg/1	0.01
Copper	ND	mg/1	0.02
Cyanide	ND	mg/1	0.010
Lead	ND	mg/1	0.002
Mercury	ND	mg/1	0.0002
Nickel	ND	mg/1	0.02
Phenols	ND	mg/1	0.008
Selenium	ND	mg/1	0.003
Silver	ND	mg/1	0.0002
Thallium	ND	mg/1	0.10
Zinc	ND	mg/1	0.004

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

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REPORT OF ANALYSIS

SUE WELLS
RMT, INCORPORATED
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

SAMPLE NUMBER: 80403550
DATE ENTERED: 04/18/88
REPORT PRINTED: 05/31/88

GROUND WATER: L-2 4/13/88; 30221
PROJECT NO. 643.05

PURCHASE ORDER NUMBER: 16906

VOLATILE FRACTION

COMPOUND NAME	MCG/L
ACROLEIN	LESS THAN 50
ACRYLONITRILE	LESS THAN 50
BENZENE	LESS THAN 5
BIS (CHLOROMETHYL)ETHER*(1)	N/A
BROMOFORM	LESS THAN 5
CARBON TETRACHLORIDE	LESS THAN 5
CHLOROBENZENE	LESS THAN 5
CHLORODIBROMOMETHANE	LESS THAN 5
CHLOROETHANE	LESS THAN 10
2-CHLORO-ETHYLVINYL ETHER	LESS THAN 10
CHLOROFORM	LESS THAN 5
DICHLOROBROMOMETHANE	LESS THAN 5
DICHLORODIFLUOROMETHANE*(2)	N/A
1,1-DICHLOROETHANE	LESS THAN 5
1,2-DICHLOROETHANE	LESS THAN 5
1,1-DICHLOROETHYLENE	LESS THAN 5
1,2-DICHLOROPROPANE	LESS THAN 5
1,3-DICHLOROPROPYLENE	LESS THAN 5
ETHYLBENZENE	LESS THAN 5
METHYL BROMIDE	LESS THAN 10
METHYL CHLORIDE	LESS THAN 10
METHYLENE CHLORDIE	LESS THAN 5
1,1,2,2-TETRACHLOROETHANE	LESS THAN 5
TETRACHLOROETHYLENE	LESS THAN 5
TOLUENE	0.8 JB (1J)
1,2-TRANS-DICHLOROETHYLENE	LESS THAN 5
1,1,1-TRICHLOROETHANE	LESS THAN 5
1,1,2-TRICHLOROETHANE	LESS THAN 5
TRICHLOROETHYLENE	LESS THAN 5
TRICHLOROFLUOROMETHANE*(2)	N/A
VINYL CHLORIDE	LESS THAN 10

*(1) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 10723, FEB. 4, 1981)
*(2) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 46103, JAN. 8, 1981)

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SAMPLE NUMBER: 80403550

GROUND WATER: L-2 4/13/88; 30221
PROJECT NO. 643.05

VOLATILE FRACTION (CONTINUED)

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

'B' INDICATES THE ANALYTE WAS FOUND IN THE BLANK AS WELL AS THE SAMPLE. THE CONCENTRATION SHOWN IN PARENTHESIS WAS DETECTED IN THE METHOD BLANK.

SEMI-VOLATILE FRACTION

ACID FRACTION

COMPOUND NAME	MCG/L
2-CHLOROPHENOL	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
4,6-DINITRO-O-CRESOL	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
4-NITROPHENOL	LESS THAN 10
P-CHLORO-M-CRESOL	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 10
PHENOL	LESS THAN 10
2,4,6-TRICHLOROPHENOL	LESS THAN 10

BASE/NEUTRAL FRACTION

COMPOUND NAME	MCG/L
ACENAPHTHENE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
BENZIDINE	LESS THAN 50
BENZO(a)ANTHRACENE	LESS THAN 10
BENZO(a)PYRENE	LESS THAN 10
3,4-BENZOFLUORANTHENE	LESS THAN 10
BENZO(g,h,i)PERYLENE	LESS THAN 10
BENZO(k)FLUORANTHENE	LESS THAN 10
BIS (2-CHLOROETHOXY)METHANE	LESS THAN 10
BIS (2-CHLOROETHYL)ETHER	LESS THAN 10
BIS (2-CHLOROISOPROPYL)ETHER	LESS THAN 10
BIS (2-ETHYLHEXYL)PHTHALATE	LESS THAN 10
4-BROMOPHENYL PHENYL ETHER	LESS THAN 10
BUTYL BENZYL PHTHALATE	LESS THAN 10
2-CHLORONAPTHALENE	LESS THAN 10
4-CHLOROPHENYL PHENYL ETHER	LESS THAN 10
CHRYSENE	LESS THAN 10
DIBENZO(a,h)ANTHRACENE	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10

SAMPLE NUMBER: 80403550

GROUND WATER: L-2 4/13/88; 30221
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION (CONTINUED)

1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 10
DIETHYL PHTHALATE	LESS THAN 10
DIMETHYL PHTHALATE	LESS THAN 10
DI-N-BUTYL PHTHALATE	LESS THAN 10
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
1,2-DIPHENYLHYDRAZINE*(1)	LESS THAN 10
FLUORANTHENE	LESS THAN 10
FLUORENE	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
INDENO(1,2,3-cd)PYRENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
NITROBENZENE	LESS THAN 10
N-NITROSODIMETHYLAMINE	LESS THAN 10
N-NITROSODI-N-PROPYLAMINE	LESS THAN 10
N-NITROSODIPHENYLAMINE*(2)	LESS THAN 10
PHENANTHRENE	LESS THAN 10
PYRENE	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10

*(1) 1,2-DIPHENYLHYDRAZINE DETECTED AS AZOBENZENE.
*(2) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.051
BETA-BHC	LESS THAN 0.051
DELTA-BHC	LESS THAN 0.051
GAMMA-BHC (LINDANE)	LESS THAN 0.051
HEPTACHLOR	LESS THAN 0.051
ALDRIN	LESS THAN 0.051
HEPTACHLOR EPOXIDE	LESS THAN 0.051
ENDOSULFAN I	LESS THAN 0.051
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10
ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10

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SAMPLE NUMBER: 80403550

GROUND WATER: L-2 4/13/88; 30221
PROJECT NO. 643.05

PESTICIDE/PCB FRACTION (CONTINUED)

METHOXYCHLOR	LESS THAN 0.51
ENDRIN KETONE	LESS THAN 0.10
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.51
PCB-1221	LESS THAN 0.51
PCB-1232	LESS THAN 0.51
PCB-1242	LESS THAN 0.51
PCB-1248	LESS THAN 0.51
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0
ENDRIN ALDEHYDE	LESS THAN 0.36
TECHNICAL CHLORDANE	LESS THAN 0.51

METHOD REFERENCES

VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 624, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 624 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43373-43384, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8240, U.S. EPA, WASHINGTON DC (REVISED APRIL 1984)

SEMI-VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

SAMPLE DATE: 04/13/88

PROJECT #: 643.05

REPORT DATE: 05/13/88

RMT SAMPLE #: 30221

W.O.#: 041588-0064305

DESCRIPTION: L -2

GROUND WATER
MONITORING RESULTS

Parameters	Result	Units	Detection limit
Antimony	ND	mg/l	0.06
Arsenic	ND	mg/l	0.004
Beryllium	ND	mg/l	0.002
Cadmium	0.0008	mg/l	0.0002
Chromium	ND	mg/l	0.01
Copper	ND	mg/l	0.02
Cyanide	ND	mg/l	0.010
Lead	ND	mg/l	0.002
Mercury	ND	mg/l	0.0002
Nickel	ND	mg/l	0.02
Phenols	ND	mg/l	0.008
Selenium	ND	mg/l	0.003
Silver	ND	mg/l	0.0002
Thallium	ND	mg/l	0.10
Zinc	0.008	mg/l	0.004

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

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REPORT OF ANALYSIS

SUE WELLS
RMT, INCORPORATED
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

SAMPLE NUMBER: 80403551

DATE ENTERED: 04/18/88

REPORT PRINTED: 05/31/88

GROUND WATER: L-3 4/14/88; 30227
PROJECT NO. 643.05

PURCHASE ORDER NUMBER: 16906

VOLATILE FRACTION

COMPOUND NAME	MCG/L
ACROLEIN	LESS THAN 50
ACRYLONITRILE	LESS THAN 50
BENZENE	LESS THAN 5
BIS (CHLOROMETHYL)ETHER*(1)	N/A
BROMOFORM	LESS THAN 5
CARBON TETRACHLORIDE	LESS THAN 5
CHLOROBENZENE	LESS THAN 5
CHLORODIBROMOMETHANE	LESS THAN 5
CHLOROETHANE	LESS THAN 10
2-CHLORO-ETHYLVINYL ETHER	LESS THAN 10
CHLOROFORM	LESS THAN 5
DICHLOROBROMOMETHANE	LESS THAN 5
DICHLORODIFLUOROMETHANE*(2)	N/A
1,1-DICHLOROETHANE	LESS THAN 5
1,2-DICHLOROETHANE	LESS THAN 5
1,1-DICHLOROETHYLENE	LESS THAN 5
1,2-DICHLOROPROPANE	LESS THAN 5
1,3-DICHLOROPROPYLENE	LESS THAN 5
ETHYLBENZENE	LESS THAN 5
METHYL BROMIDE	LESS THAN 10
METHYL CHLORIDE	LESS THAN 10
METHYLENE CHLORDIE	LESS THAN 5
1,1,2,2-TETRACHLOROETHANE	LESS THAN 5
TETRACHLOROETHYLENE	LESS THAN 5
TOLUENE	LESS THAN 5
1,2-TRANS-DICHLOROETHYLENE	6
1,1,1-TRICHLOROETHANE	LESS THAN 5
1,1,2-TRICHLOROETHANE	LESS THAN 5
TRICHLOROETHYLENE	210
TRICHLOROFLUOROMETHANE*(2)	N/A
VINYL CHLORIDE	LESS THAN 10

*(1) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 10723, FEB. 4, 1981)
*(2) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 46103, JAN. 8, 1981)

SAMPLE NUMBER: 80403551

GROUND WATER: L-3 4/14/88; 30227
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION

ACID FRACTION

COMPOUND NAME	MCG/L
2-CHLOROPHENOL	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
4,6-DINITRO-O-CRESOL	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
4-NITROPHENOL	LESS THAN 10
P-CHLORO-M-CRESOL	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 10
PHENOL	LESS THAN 10
2,4,6-TRICHLOROPHENOL	LESS THAN 10

BASE/NEUTRAL FRACTION

COMPOUND NAME	MCG/L
ACENAPHTHENE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
BENZIDINE	LESS THAN 50
BENZO(a)ANTHRACENE	LESS THAN 10
BENZO(a)PYRENE	LESS THAN 10
3,4-BENZOFLUORANTHENE	LESS THAN 10
BENZO(g,h,i)PERYLENE	LESS THAN 10
BENZO(k)FLUORANTHENE	LESS THAN 10
BIS (2-CHLOROETHOXY)METHANE	LESS THAN 10
BIS (2-CHLOROETHYL)ETHER	LESS THAN 10
BIS (2-CHLOROISOPROPYL)ETHER	LESS THAN 10
BIS (2-ETHYLHEXYL)PHTHALATE	LESS THAN 10
4-BROMOPHENYL PHENYL ETHER	LESS THAN 10
BUTYL BENZYL PHTHALATE	LESS THAN 10
2-CHLORONAPTHALENE	LESS THAN 10
4-CHLOROPHENYL PHENYL ETHER	LESS THAN 10
CHRYSENE	LESS THAN 10
DIBENZO(a,h)ANTHRACENE	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10
1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 10
DIETHYL PHTHALATE	LESS THAN 10
DIMETHYL PHTHALATE	LESS THAN 10
DI-N-BUTYL PHTHALATE	LESS THAN 10
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
1,2-DIPHENYLHYDRAZINE*(1)	LESS THAN 10

SAMPLE NUMBER: 80403551

GROUND WATER: L-3 4/14/88; 30227
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION (CONTINUED)

FLUORANTHENE	LESS THAN 10
FLUORENE	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
INDENO(1,2,3-cd)PYRENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
NITROBENZENE	LESS THAN 10
N-NITROSODIMETHYLAMINE	LESS THAN 10
N-NITROSODI-N-PROPYLAMINE	LESS THAN 10
N-NITROSODIPHENYLAMINE*(2)	LESS THAN 10
PHENANTHRENE	LESS THAN 10
PYRENE	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10

*(1) 1,2-DIPHENYLHYDRAZINE DETECTED AS AZOBENZENE.
*(2) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.051
BETA-BHC	LESS THAN 0.051
DELTA-BHC	LESS THAN 0.051
GAMMA-BHC (LINDANE)	LESS THAN 0.051
HEPTACHLOR	LESS THAN 0.051
ALDRIN	LESS THAN 0.051
HEPTACHLOR EPOXIDE	LESS THAN 0.051
ENDOSULFAN I	LESS THAN 0.051
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10
ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10
METHOXYCHLOR	LESS THAN 0.51
ENDRIN KETONE	LESS THAN 0.10
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.51
PCB-1221	LESS THAN 0.51
PCB-1232	LESS THAN 0.51
PCB-1242	LESS THAN 0.51
PCB-1248	LESS THAN 0.51
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0

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SAMPLE NUMBER: 80403551

GROUND WATER: L-3 4/14/88; 30227
PROJECT NO. 643.05

PESTICIDE/PCB FRACTION (CONTINUED)

ENDRIN ALDEHYDE	LESS THAN 0.36
TECHNICAL CHLORDANE	LESS THAN 0.51

METHOD REFERENCES

VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 624, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 624 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43373-43384, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8240, U.S. EPA, WASHINGTON DC (REVISED APRIL 1984)

SEMI-VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

PESTICIDE/PCB FRACTION
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U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

SAMPLE DATE: 04/14/88

PROJECT #: 643.05

REPORT DATE: 05/13/88

RMT SAMPLE #: 30227

W.O.#: 041888-0064305

DESCRIPTION: L-3

GROUND WATER
MONITORING RESULTS

Parameters	Result	Units	Detection limit
Antimony	ND	mg/l	0.06
Arsenic	ND	mg/l	0.004
Beryllium	ND	mg/l	0.002
Cadmium	0.0008	mg/l	0.0002
Chromium	ND	mg/l	0.01
Copper	ND	mg/l	0.02
Cyanide	ND	mg/l	0.010
Lead	ND	mg/l	0.002
Mercury	ND	mg/l	0.0002
Nickel	ND	mg/l	0.02
Phenols	0.008	mg/l	0.005
Selenium	ND	mg/l	0.003
Silver	ND	mg/l	0.0002
Thallium	ND	mg/l	0.10
Zinc	0.029	mg/l	0.004

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

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REPORT OF ANALYSIS

SUE WELLS
RMT, INCORPORATED
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

SAMPLE NUMBER: 80403780

DATE ENTERED: 04/19/88

REPORT PRINTED: 05/31/88

GROUND WATER: L-4, 4/15/88; 30254
PROJECT NO. 643.05

PURCHASE ORDER NUMBER: 16924

VOLATILE FRACTION

COMPOUND NAME	MCG/L
ACROLEIN	LESS THAN 50
ACRYLONITRILE	LESS THAN 50
BENZENE	LESS THAN 5
BIS (CHLOROMETHYL)ETHER*(1)	N/A
BROMOFORM	LESS THAN 5
CARBON TETRACHLORIDE	LESS THAN 5
CHLOROBENZENE	LESS THAN 5
CHLORODIBROMOMETHANE	LESS THAN 5
CHLOROETHANE	LESS THAN 10
2-CHLORO-ETHYLVINYL ETHER	LESS THAN 10
CHLOROFORM	2 JB (4J)
DICHLOROBROMOMETHANE	LESS THAN 5
DICHLORODIFLUOROMETHANE*(2)	N/A
1,1-DICHLOROETHANE	LESS THAN 5
1,2-DICHLOROETHANE	LESS THAN 5
1,1-DICHLOROETHYLENE	LESS THAN 5
1,2-DICHLOROPROPANE	LESS THAN 5
1,3-DICHLOROPROPYLENE	LESS THAN 5
ETHYLBENZENE	LESS THAN 5
METHYL BROMIDE	LESS THAN 10
METHYL CHLORIDE	LESS THAN 10
METHYLENE CHLORIDE	8 B (5)
1,1,2,2-TETRACHLOROETHANE	LESS THAN 5
TETRACHLOROETHYLENE	LESS THAN 5
TOLUENE	1 JB (.8J)
1,2-TRANS-DICHLOROETHYLENE	LESS THAN 5
1,1,1-TRICHLOROETHANE	LESS THAN 5
1,1,2-TRICHLOROETHANE	LESS THAN 5
TRICHLOROETHYLENE	LESS THAN 5
TRICHLOROFLUOROMETHANE*(2)	N/A
VINYL CHLORIDE	LESS THAN 10

*(1) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 10723, FEB. 4, 1981)
*(2) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 46103, JAN. 8, 1981)

HAZLETON LABORATORIES AMERICA, INC.
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GROUND WATER: L-4, 4/15/88; 30254
PROJECT NO. 643.05

VOLATILE FRACTION (CONTINUED)

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

'B' INDICATES THE ANALYTE WAS FOUND IN THE BLANK AS WELL AS THE SAMPLE. THE CONCENTRATION SHOWN IN PARENTHESIS WAS DETECTED IN THE METHOD BLANK.

SEMI-VOLATILE FRACTION

ACID FRACTION

COMPOUND NAME	MCG/L
2-CHLOROPHENOL	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
4,6-DINITRO-O-CRESOL	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
4-NITROPHENOL	LESS THAN 10
P-CHLORO-M-CRESOL	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 10
PHENOL	LESS THAN 10
2,4,6-TRICHLOROPHENOL	LESS THAN 10

BASE/NEUTRAL FRACTION

COMPOUND NAME	MCG/L
ACENAPHTHENE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
BENZIDINE	LESS THAN 51
BENZO(a)ANTHRACENE	LESS THAN 10
BENZO(a)PYRENE	LESS THAN 10
3,4-BENZOFLUORANTHENE	LESS THAN 10
BENZO(g,h,i)PERYLENE	LESS THAN 10
BENZO(k)FLUORANTHENE	LESS THAN 10
BIS (2-CHLOROETHOXY)METHANE	LESS THAN 10
BIS (2-CHLOROETHYL)ETHER	LESS THAN 10
BIS (2-CHLOROISOPROPYL)ETHER	LESS THAN 10
BIS (2-ETHYLHEXYL)PHTHALATE	LESS THAN 10
4-BROMOPHENYL PHENYL ETHER	LESS THAN 10
BUTYL BENZYL PHTHALATE	LESS THAN 10
2-CHLORONAPTHALENE	LESS THAN 10
4-CHLOROPHENYL PHENYL ETHER	LESS THAN 10
CHRYSENE	LESS THAN 10
DIBENZO(a,h)ANTHRACENE	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10

SAMPLE NUMBER: 80403780

GROUND WATER: L-4, 4/15/88; 30254
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION (CONTINUED)

1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 10
DIETHYL PHTHALATE	LESS THAN 10
DIMETHYL PHTHALATE	LESS THAN 10
DI-N-BUTYL PHTHALATE	LESS THAN 10
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
1,2-DIPHENYLHYDRAZINE*(1)	LESS THAN 10
FLUORANTHENE	LESS THAN 10
FLUORENE	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
INDENO(1,2,3-cd)PYRENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
NITROBENZENE	LESS THAN 10
N-NITROSODIMETHYLAMINE	LESS THAN 10
N-NITROSODI-N-PROPYLAMINE	LESS THAN 10
N-NITROSODIPHENYLAMINE*(2)	LESS THAN 10
PHENANTHRENE	LESS THAN 10
PYRENE	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10

*(1) 1,2-DIPHENYLHYDRAZINE DETECTED AS AZOBENZENE.
*(2) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.051
BETA-BHC	LESS THAN 0.051
DELTA-BHC	LESS THAN 0.051
GAMMA-BHC (LINDANE)	LESS THAN 0.051
HEPTACHLOR	LESS THAN 0.051
ALDRIN	LESS THAN 0.051
HEPTACHLOR EPOXIDE	LESS THAN 0.051
ENDOSULFAN I	LESS THAN 0.051
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10
ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10

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SAMPLE NUMBER: 80403780

GROUND WATER: L-4, 4/15/88; 30254
PROJECT NO. 643.05

PESTICIDE/PCB FRACTION (CONTINUED)

METHOXYCHLOR	LESS THAN 0.51
ENDRIN KETONE	LESS THAN 0.10
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.51
PCB-1221	LESS THAN 0.51
PCB-1232	LESS THAN 0.51
PCB-1242	LESS THAN 0.51
PCB-1248	LESS THAN 0.51
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0
ENDRIN ALDEHYDE	LESS THAN 0.10
TECHNICAL CHLORDANE	LESS THAN 0.51

METHOD REFERENCES

VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 624, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 624 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43373-43384, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8240, U.S. EPA, WASHINGTON DC (REVISED APRIL 1984)

SEMI-VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

SAMPLE DATE: 04/15/88

PROJECT #: 643.05

REPORT DATE: 05/13/88

RMT SAMPLE #: 30254

W.O.#: 041988-0064305

DESCRIPTION: L-4

GROUND WATER
MONITORING RESULTS

Parameters	Result	Units	Detection limit
Antimony	ND	mg/l	0.06
Arsenic	ND	mg/l	0.004
Beryllium	ND	mg/l	0.002
Cadmium	ND	mg/l	0.005
Chromium	ND	mg/l	0.01
Copper	ND	mg/l	0.02
Cyanide	ND	mg/l	0.010
Lead	ND	mg/l	0.002
Mercury	ND	mg/l	0.0002
Nickel	ND	mg/l	0.02
Phenols	ND	mg/l	0.005
Selenium	ND	mg/l	0.003
Silver	ND	mg/l	0.0002
Thallium	ND	mg/l	0.10
Zinc	ND	mg/l	0.004

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

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REPORT OF ANALYSIS

SUE WELLS
RMT, INCORPORATED
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

SAMPLE NUMBER: 80404180

DATE ENTERED: 04/20/88

REPORT PRINTED: 05/31/88

GROUND WATER: L-5; 30273
PROJECT NO. 643.05

PURCHASE ORDER NUMBER: 16944

VOLATILE FRACTION

COMPOUND NAME	MCG/L
ACROLEIN	LESS THAN 50
ACRYLONITRILE	LESS THAN 50
BENZENE	10
BIS (CHLOROMETHYL)ETHER*(1)	N/A
BROMOFORM	LESS THAN 5
CARBON TETRACHLORIDE	LESS THAN 5
CHLOROBENZENE	LESS THAN 5
CHLORODIBROMOMETHANE	LESS THAN 5
CHLOROETHANE	LESS THAN 10
2-CHLORO-ETHYLVINYL ETHER	LESS THAN 10
CHLOROFORM	11 B (4J)
DICHLOROBROMOMETHANE	LESS THAN 5
DICHLORODIFLUOROMETHANE*(2)	N/A
1,1-DICHLOROETHANE	LESS THAN 5
1,2-DICHLOROETHANE	LESS THAN 5
1,1-DICHLOROETHYLENE	LESS THAN 5
1,2-DICHLOROPROPANE	LESS THAN 5
1,3-DICHLOROPROPYLENE	LESS THAN 5
ETHYLBENZENE	LESS THAN 5
METHYL BROMIDE	LESS THAN 10
METHYL CHLORIDE	LESS THAN 10
METHYLENE CHLORIDE	7 B (5)
1,1,2,2-TETRACHLOROETHANE	LESS THAN 5
TETRACHLOROETHYLENE	LESS THAN 5
TOLUENE	2 JB (.8J)
1,2-TRANS-DICHLOROETHYLENE	LESS THAN 5
1,1,1-TRICHLOROETHANE	LESS THAN 5
1,1,2-TRICHLOROETHANE	LESS THAN 5
TRICHLOROETHYLENE	20
TRICHLOROFLUOROMETHANE*(2)	N/A
VINYL CHLORIDE	LESS THAN 10

*(1) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 10723, FEB. 4, 1981)
*(2) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 46103, JAN. 8, 1981)

SAMPLE NUMBER: 80404180

GROUND WATER: L-5; 30273
PROJECT NO. 643.05

VOLATILE FRACTION (CONTINUED)

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

'B' INDICATES THE ANALYTE WAS FOUND IN THE BLANK AS WELL AS THE SAMPLE. THE CONCENTRATION SHOWN IN PARENTHESIS WAS DETECTED IN THE METHOD BLANK.

SEMI-VOLATILE FRACTION

ACID FRACTION

COMPOUND NAME	MCG/L
2-CHLOROPHENOL	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
4,6-DINITRO-O-CRESOL	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
4-NITROPHENOL	LESS THAN 10
P-CHLORO-M-CRESOL	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 10
PHENOL	LESS THAN 10
2,4,6-TRICHLOROPHENOL	LESS THAN 10

BASE/NEUTRAL FRACTION

COMPOUND NAME	MCG/L
ACENAPHTHENE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
BENZIDINE	LESS THAN 52
BENZO(a)ANTHRACENE	LESS THAN 10
BENZO(a)PYRENE	LESS THAN 10
3,4-BENZOFLUORANTHENE	LESS THAN 10
BENZO(g,h,i)PERYLENE	LESS THAN 10
BENZO(k)FLUORANTHENE	LESS THAN 10
BIS (2-CHLOROETHOXY)METHANE	LESS THAN 10
BIS (2-CHLOROETHYL)ETHER	LESS THAN 10
BIS (2-CHLOROISOPROPYL)ETHER	LESS THAN 10
BIS (2-ETHYLHEXYL)PHTHALATE	LESS THAN 10
4-BROMOPHENYL PHENYL ETHER	LESS THAN 10
BUTYL BENZYL PHTHALATE	LESS THAN 10
2-CHLORONAPTHALENE	LESS THAN 10
4-CHLOROPHENYL PHENYL ETHER	LESS THAN 10
CHRYSENE	LESS THAN 10
DIBENZO(a,h)ANTHRACENE	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10

SAMPLE NUMBER: 80404180

GROUND WATER: L-5; 30273
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION (CONTINUED)

1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 10
DIETHYL PHTHALATE	LESS THAN 10
DIMETHYL PHTHALATE	LESS THAN 10
DI-N-BUTYL PHTHALATE	LESS THAN 10
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
1,2-DIPHENYLHYDRAZINE*(1)	LESS THAN 10
FLUORANTHENE	LESS THAN 10
FLUORENE	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
INDENO(1,2,3-cd)PYRENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
NAPHTHALENE	3 J
NITROBENZENE	LESS THAN 10
N-NITROSODIMETHYLAMINE	LESS THAN 10
N-NITROSODI-N-PROPYLAMINE	LESS THAN 10
N-NITROSODIPHENYLAMINE*(2)	LESS THAN 10
PHENANTHRENE	1 J
PYRENE	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10

*(1) 1,2-DIPHENYLHYDRAZINE DETECTED AS AZOBENZENE.
*(2) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.051
BETA-BHC	LESS THAN 0.051
DELTA-BHC	LESS THAN 0.051
GAMMA-BHC (LINDANE)	LESS THAN 0.051
HEPTACHLOR	LESS THAN 0.051
ALDRIN	LESS THAN 0.051
HEPTACHLOR EPOXIDE	LESS THAN 0.051
ENDOSULFAN I	LESS THAN 0.051
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10

SAMPLE NUMBER: 80404180

GROUND WATER: L-5; 30273
PROJECT NO. 643.05

PESTICIDE/PCB FRACTION (CONTINUED)

ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10
METHOXYCHLOR	LESS THAN 0.51
ENDRIN KETONE	LESS THAN 0.10
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.51
PCB-1221	LESS THAN 0.51
PCB-1232	LESS THAN 0.51
PCB-1242	LESS THAN 0.51
PCB-1248	LESS THAN 0.51
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0
ENDRIN ALDEHYDE	LESS THAN 0.10
TECHNICAL CHLORDANE	LESS THAN 0.51

METHOD REFERENCES

VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 624, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 624 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43373-43384, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8240, U.S. EPA, WASHINGTON DC (REVISED APRIL 1984)

SEMI-VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

SAMPLE NUMBER: 80404180

GROUND WATER: L-5; 30273
PROJECT NO. 643.05

METHOD REFERENCES (CONTINUED)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

SAMPLE DATE: 04/17/88

PROJECT #: 643.05

REPORT DATE: 05/13/88

RMT SAMPLE #: 30273

W.O.#: 042088-0064305

DESCRIPTION: L-5

GROUND WATER
MONITORING RESULTS

Parameters	Result	Units	Detection limit
Antimony	ND	mg/1	0.06
Arsenic	0.33	mg/1	0.1
Beryllium	0.37	mg/1	0.002
Cadmium	0.11	mg/1	0.005
Chromium	0.01	mg/1	0.01
Copper	ND	mg/1	0.02
Cyanide	ND	mg/1	0.017
Lead	ND	mg/1	0.004
Mercury	0.0002	mg/1	0.0002
Nickel	0.22	mg/1	0.02
Phenols	0.25	mg/1	0.005
Selenium	ND	mg/1	0.3
Silver	0.0026	mg/1	0.0002
Thallium	ND	mg/1	0.10
Zinc	1.6	mg/1	0.004

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

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REPORT OF ANALYSIS

SUE WELLS
RMT, INCORPORATED
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

SAMPLE NUMBER: 80404178

DATE ENTERED: 04/20/88

REPORT PRINTED: 05/31/88

GROUND WATER: L-6; 30271
PROJECT NO. 643.05

PURCHASE ORDER NUMBER: 16944

VOLATILE FRACTION

COMPOUND NAME	MCG/L
ACROLEIN	LESS THAN 50
ACRYLONITRILE	LESS THAN 50
BENZENE	17
BIS (CHLOROMETHYL)ETHER*(1)	N/A
BROMOFORM	LESS THAN 5
CARBON TETRACHLORIDE	LESS THAN 5
CHLOROBENZENE	LESS THAN 5
CHLORODIBROMOMETHANE	LESS THAN 5
CHLOROETHANE	LESS THAN 10
2-CHLORO-ETHYLVINYL ETHER	LESS THAN 10
CHLOROFORM	13 B (4J)
DICHLOROBROMOMETHANE	LESS THAN 5
DICHLORODIFLUOROMETHANE*(2)	N/A
1,1-DICHLOROETHANE	LESS THAN 5
1,2-DICHLOROETHANE	LESS THAN 5
1,1-DICHLOROETHYLENE	LESS THAN 5
1,2-DICHLOROPROPANE	LESS THAN 5
1,3-DICHLOROPROPYLENE	LESS THAN 5
ETHYLBENZENE	LESS THAN 5
METHYL BROMIDE	LESS THAN 10
METHYL CHLORIDE	LESS THAN 10
METHYLENE CHLORIDE	9 B (5)
1,1,2,2-TETRACHLOROETHANE	LESS THAN 5
TETRACHLOROETHYLENE	LESS THAN 5
TOLUENE	3 JB (.8J)
1,2-TRANS-DICHLOROETHYLENE	LESS THAN 5
1,1,1-TRICHLOROETHANE	LESS THAN 5
1,1,2-TRICHLOROETHANE	LESS THAN 5
TRICHLOROETHYLENE	24
TRICHLOROFLUOROMETHANE*(2)	N/A
VINYL CHLORIDE	LESS THAN 10

*(1) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 10723, FEB. 4, 1981)
*(2) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 46103, JAN. 8, 1981)

SAMPLE NUMBER: 80404178

GROUND WATER: L-6; 30271
PROJECT NO. 643.05

VOLATILE FRACTION (CONTINUED)

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

'B' INDICATES THE ANALYTE WAS FOUND IN THE BLANK AS WELL AS THE SAMPLE. THE CONCENTRATION SHOWN IN PARENTHESIS WAS DETECTED IN THE METHOD BLANK.

SEMI-VOLATILE FRACTION

ACID FRACTION

COMPOUND NAME	MCG/L
2-CHLOROPHENOL	LESS THAN 100
2,4-DICHLOROPHENOL	LESS THAN 100
2,4-DIMETHYLPHENOL	LESS THAN 100
4,6-DINITRO-O-CRESOL	LESS THAN 100
2,4-DINITROPHENOL	LESS THAN 100
2-NITROPHENOL	LESS THAN 100
4-NITROPHENOL	LESS THAN 100
P-CHLORO-M-CRESOL	LESS THAN 100
PENTACHLOROPHENOL	LESS THAN 100
PHENOL	LESS THAN 100
2,4,6-TRICHLOROPHENOL	LESS THAN 100

BASE/NEUTRAL FRACTION

COMPOUND NAME	MCG/L
ACENAPHTHENE	LESS THAN 100
ACENAPHTHYLENE	LESS THAN 100
ANTHRACENE	LESS THAN 100
BENZIDINE	LESS THAN 510
BENZO(a)ANTHRACENE	LESS THAN 100
BENZO(a)PYRENE	LESS THAN 100
3,4-BENZOFLUORANTHENE	LESS THAN 100
BENZO(g,h,i)PERYLENE	LESS THAN 100
BENZO(k)FLUORANTHENE	LESS THAN 100
BIS (2-CHLOROETHOXY)METHANE	LESS THAN 100
BIS (2-CHLOROETHYL)ETHER	LESS THAN 100
BIS (2-CHLOROISOPROPYL)ETHER	LESS THAN 100
BIS (2-ETHYLHEXYL)PHTHALATE	LESS THAN 100
4-BROMOPHENYL PHENYL ETHER	LESS THAN 100
BUTYL BENZYL PHTHALATE	LESS THAN 100
2-CHLORONAPTHALENE	LESS THAN 100
4-CHLOROPHENYL PHENYL ETHER	LESS THAN 100
CHRYSENE	LESS THAN 100
DIBENZO(a,h)ANTHRACENE	LESS THAN 100
1,2-DICHLOROBENZENE	LESS THAN 100

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SAMPLE NUMBER: 80404178

GROUND WATER: L-6; 30271
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION (CONTINUED)

1,3-DICHLOROBENZENE	LESS THAN 100
1,4-DICHLOROBENZENE	LESS THAN 100
3,3'-DICHLOROBENZIDINE	LESS THAN 100
DIETHYL PHTHALATE	LESS THAN 100
DIMETHYL PHTHALATE	LESS THAN 100
DI-N-BUTYL PHTHALATE	LESS THAN 100
2,4-DINITROTOLUENE	LESS THAN 100
2,6-DINITROTOLUENE	LESS THAN 100
DI-N-OCTYL PHTHALATE	LESS THAN 100
1,2-DIPHENYLHYDRAZINE*(1)	LESS THAN 100
FLUORANTHENE	LESS THAN 100
FLUORENE	LESS THAN 100
HEXACHLOROBENZENE	LESS THAN 100
HEXACHLOROBUTADIENE	LESS THAN 100
HEXACHLOROCYCLOPENTADIENE	LESS THAN 100
HEXACHLOROETHANE	LESS THAN 100
INDENO(1,2,3-cd)PYRENE	LESS THAN 100
ISOPHORONE	LESS THAN 100
NAPHTHALENE	610
NITROBENZENE	LESS THAN 100
N-NITROSODIMETHYLAMINE	LESS THAN 100
N-NITROSODI-N-PROPYLAMINE	LESS THAN 100
N-NITROSODIPHENYLAMINE*(2)	LESS THAN 100
PHENANTHRENE	LESS THAN 100
PYRENE	LESS THAN 100
1,2,4-TRICHLOROBENZENE	170

*(1) 1,2-DIPHENYLHYDRAZINE DETECTED AS AZOBENZENE.
*(2) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.50
BETA-BHC	LESS THAN 0.50
DELTA-BHC	LESS THAN 0.050
GAMMA-BHC (LINDANE)	LESS THAN 0.50
HEPTACHLOR	LESS THAN 0.050
ALDRIN	LESS THAN 0.050
HEPTACHLOR EPOXIDE	LESS THAN 0.050
ENDOSULFAN I	LESS THAN 0.050
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10
ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10

HAZLETON LABORATORIES AMERICA, INC.
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SAMPLE NUMBER: 80404178

GROUND WATER: L-6; 30271
PROJECT NO. 643.05

PESTICIDE/PCB FRACTION (CONTINUED)

METHOXYCHLOR	LESS THAN 0.50
ENDRIN KETONE	LESS THAN 0.10
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.50
PCB-1221	LESS THAN 5.0
PCB-1232	LESS THAN 0.50
PCB-1242	LESS THAN 0.50
PCB-1248	LESS THAN 0.50
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0
ENDRIN ALDEHYDE	LESS THAN 0.10
TECHNICAL CHLORDANE	LESS THAN 0.50

METHOD REFERENCES

VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 624, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 624 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43373-43384, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8240, U.S. EPA, WASHINGTON DC (REVISED APRIL 1984)

SEMI-VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

PROJECT #: 643.05

RMT SAMPLE #: 30271

DESCRIPTION: L-6

SAMPLE DATE: 04/17/88

REPORT DATE: 05/13/88

W.O.#: 042088-0064305

GROUND WATER
MONITORING RESULTS

Parameters	Result	Units	Detection limit
Antimony	ND	mg/l	0.06
Arsenic	0.22	mg/l	0.02
Beryllium	0.18	mg/l	0.002
Cadmium	0.064	mg/l	0.005
Chromium	ND	mg/l	0.01
Copper	ND	mg/l	0.02
Cyanide	ND	mg/l	0.010
Lead	ND	mg/l	0.004
Mercury	0.0003	mg/l	0.0002
Nickel	0.22	mg/l	0.02
Phenols	0.64	mg/l	0.005
Selenium	ND	mg/l	0.015
Silver	0.0021	mg/l	0.0002
Thallium	ND	mg/l	0.10
Zinc	1.4	mg/l	0.004

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

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REPORT OF ANALYSIS

SUE WELLS
RMT, INCORPORATED
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

SAMPLE NUMBER: 80403777
DATE ENTERED: 04/19/88
REPORT PRINTED: 05/31/88

GROUND WATER: L-7, 4/15/88; 30246
PROJECT NO. 643.05

PURCHASE ORDER NUMBER: 16924

VOLATILE FRACTION

COMPOUND NAME	MCG/L
ACROLEIN	LESS THAN 50
ACRYLONITRILE	LESS THAN 50
BENZENE	LESS THAN 5
BIS (CHLOROMETHYL)ETHER*(1)	N/A
BROMOFORM	LESS THAN 5
CARBON TETRACHLORIDE	LESS THAN 5
CHLOROBENZENE	LESS THAN 5
CHLORODIBROMOMETHANE	LESS THAN 5
CHLOROETHANE	LESS THAN 10
2-CHLORO-ETHYLVINYL ETHER	LESS THAN 10
CHLOROFORM	LESS THAN 5
DICHLOROBROMOMETHANE	LESS THAN 5
DICHLORODIFLUOROMETHANE*(2)	N/A
1,1-DICHLOROETHANE	LESS THAN 5
1,2-DICHLOROETHANE	LESS THAN 5
1,1-DICHLOROETHYLENE	LESS THAN 5
1,2-DICHLOROPROPANE	LESS THAN 5
1,3-DICHLOROPROPYLENE	LESS THAN 5
ETHYLBENZENE	LESS THAN 5
METHYL BROMIDE	LESS THAN 10
METHYL CHLORIDE	LESS THAN 10
METHYLENE CHLORIDE	2 JB (14)
1,1,2,2-TETRACHLOROETHANE	LESS THAN 5
TETRACHLOROETHYLENE	LESS THAN 5
TOLUENE	0.9 JB (.9)
1,2-TRANS-DICHLOROETHYLENE	LESS THAN 5
1,1,1-TRICHLOROETHANE	LESS THAN 5
1,1,2-TRICHLOROETHANE	LESS THAN 5
TRICHLOROETHYLENE	LESS THAN 5
TRICHLOROFLUOROMETHANE*(2)	N/A
VINYL CHLORIDE	LESS THAN 10

*(1) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 10723, FEB. 4, 1981)
*(2) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 46103, JAN. 8, 1981)

HAZLETON LABORATORIES AMERICA, INC.
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SAMPLE NUMBER: 80403777

GROUND WATER: L-7, 4/15/88; 30246
PROJECT NO. 643.05

VOLATILE FRACTION (CONTINUED)

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

'B' INDICATES THE ANALYTE WAS FOUND IN THE BLANK AS WELL AS THE SAMPLE. THE CONCENTRATION SHOWN IN PARENTHESIS WAS DETECTED IN THE METHOD BLANK.

SEMI-VOLATILE FRACTION

ACID FRACTION

COMPOUND NAME	MCG/L
2-CHLOROPHENOL	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
4,6-DINITRO-O-CRESOL	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
4-NITROPHENOL	LESS THAN 10
P-CHLORO-M-CRESOL	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 10
PHENOL	LESS THAN 10
2,4,6-TRICHLOROPHENOL	LESS THAN 10

BASE/NEUTRAL FRACTION

COMPOUND NAME	MCG/L
ACENAPHTHENE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
BENZIDINE	LESS THAN 51
BENZO(a)ANTHRACENE	LESS THAN 10
BENZO(a)PYRENE	LESS THAN 10
3,4-BENZOFLUORANTHENE	LESS THAN 10
BENZO(g,h,i)PERYLENE	LESS THAN 10
BENZO(k)FLUORANTHENE	LESS THAN 10
BIS (2-CHLOROETHOXY)METHANE	LESS THAN 10
BIS (2-CHLOROETHYL)ETHER	LESS THAN 10
BIS (2-CHLOROISOPROPYL)ETHER	LESS THAN 10
BIS (2-ETHYLHEXYL)PHTHALATE	LESS THAN 10
4-BROMOPHENYL PHENYL ETHER	LESS THAN 10
BUTYL BENZYL PHTHALATE	LESS THAN 10
2-CHLORONAPTHALENE	LESS THAN 10
4-CHLOROPHENYL PHENYL ETHER	LESS THAN 10
CHRYSENE	LESS THAN 10
DIBENZO(a,h)ANTHRACENE	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10

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SAMPLE NUMBER: 80403777

GROUND WATER: L-7, 4/15/88; 30246
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION (CONTINUED)

1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 10
DIETHYL PHTHALATE	LESS THAN 10
DIMETHYL PHTHALATE	LESS THAN 10
DI-N-BUTYL PHTHALATE	LESS THAN 10
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
1,2-DIPHENYLHYDRAZINE*(1)	LESS THAN 10
FLUORANTHENE	LESS THAN 10
FLUORENE	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
INDENO(1,2,3-cd)PYRENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
NITROBENZENE	LESS THAN 10
N-NITROSODIMETHYLAMINE	LESS THAN 10
N-NITROSODI-N-PROPYLAMINE	LESS THAN 10
N-NITROSODIPHENYLAMINE*(2)	LESS THAN 10
PHENANTHRENE	LESS THAN 10
PYRENE	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10

*(1) 1,2-DIPHENYLHYDRAZINE DETECTED AS AZOBENZENE.
*(2) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.051
BETA-BHC	LESS THAN 0.051
DELTA-BHC	LESS THAN 0.051
GAMMA-BHC (LINDANE)	LESS THAN 0.051
HEPTACHLOR	LESS THAN 0.051
ALDRIN	LESS THAN 0.051
HEPTACHLOR EPOXIDE	LESS THAN 0.051
ENDOSULFAN I	LESS THAN 0.051
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10
ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10

SAMPLE NUMBER: 80403777

GROUND WATER: L-7, 4/15/88; 30246
PROJECT NO. 643.05

PESTICIDE/PCB FRACTION (CONTINUED)

METHOXYCHLOR	LESS THAN 0.51
ENDRIN KETONE	LESS THAN 0.10
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.51
PCB-1221	LESS THAN 0.51
PCB-1232	LESS THAN 0.51
PCB-1242	LESS THAN 0.51
PCB-1248	LESS THAN 0.51
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0
ENDRIN ALDEHYDE	LESS THAN 0.10
TECHNICAL CHLORDANE	LESS THAN 0.51

METHOD REFERENCES

VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 624, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 624 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43373-43384, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8240, U.S. EPA, WASHINGTON DC (REVISED APRIL 1984)

SEMI-VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

SAMPLE DATE: 04/15/88

PROJECT #: 643.05

REPORT DATE: 05/13/88

RMT SAMPLE #: 30246

W.O.#: 041988-0064305

DESCRIPTION: L-7

GROUND WATER
MONITORING RESULTS

Parameters	Result	Units	Detection limit
Antimony	ND	mg/l	0.06
Arsenic	ND	mg/l	0.004
Beryllium	ND	mg/l	0.002
Cadmium	ND	mg/l	0.005
Chromium	ND	mg/l	0.01
Copper	ND	mg/l	0.02
Cyanide	ND	mg/l	0.010
Lead	ND	mg/l	0.002
Mercury	ND	mg/l	0.0002
Nickel	0.02	mg/l	0.02
Phenols	ND	mg/l	0.005
Selenium	ND	mg/l	0.003
Silver	ND	mg/l	0.0002
Thallium	ND	mg/l	0.10
Zinc	0.014	mg/l	0.004

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

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REPORT OF ANALYSIS

SUE WELLS
RMT, INCORPORATED
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

SAMPLE NUMBER: 80404690

DATE ENTERED: 04/21/88

REPORT PRINTED: 05/31/88

GROUND WATER: W-3; 30300
PROJECT NO. 643.05

PURCHASE ORDER NUMBER: 16954

VOLATILE FRACTION

COMPOUND NAME	MCG/L
ACROLEIN	LESS THAN 1200
ACRYLONITRILE	LESS THAN 1200
BENZENE	18
BIS (CHLOROMETHYL)ETHER*(1)	N/A
BROMOFORM	9
CARBON TETRACHLORIDE	LESS THAN 12
CHLOROBENZENE	LESS THAN 12
CHLORODIBROMOMETHANE	LESS THAN 12
CHLOROETHANE	LESS THAN 25
2-CHLORO-ETHYLVINYL ETHER	LESS THAN 25
CHLOROFORM	14
DICHLOROBROMOMETHANE	LESS THAN 12
DICHLORODIFLUOROMETHANE*(2)	N/A
1,1-DICHLOROETHANE	LESS THAN 12
1,2-DICHLOROETHANE	LESS THAN 12
1,1-DICHLOROETHYLENE	LESS THAN 12
1,2-DICHLOROPROPANE	LESS THAN 12
1,3-DICHLOROPROPYLENE	LESS THAN 12
ETHYLBENZENE	LESS THAN 12
METHYL BROMIDE	LESS THAN 25
METHYL CHLORIDE	LESS THAN 25
METHYLENE CHLORIDE	LESS THAN 12
1,1,2,2-TETRACHLOROETHANE	LESS THAN 12
TETRACHLOROETHYLENE	LESS THAN 12
TOLUENE	7 12 J
1,2-TRANS-DICHLOROETHYLENE	LESS THAN 12
1,1,1-TRICHLOROETHANE	LESS THAN 12
1,1,2-TRICHLOROETHANE	LESS THAN 12
TRICHLOROETHYLENE	390
TRICHLOROFLUOROMETHANE*(2)	N/A
VINYL CHLORIDE	LESS THAN 25

*(1) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 10723, FEB. 4, 1981)
*(2) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 46103, JAN. 8, 1981)

SAMPLE NUMBER: 80404690

GROUND WATER: W-3; 30300
PROJECT NO. 643.05

VOLATILE FRACTION (CONTINUED)

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

'B' INDICATES THE ANALYTE WAS FOUND IN THE BLANK AS WELL AS THE SAMPLE. THE CONCENTRATION SHOWN IN PARENTHESIS WAS DETECTED IN THE METHOD BLANK.

SEMI-VOLATILE FRACTION

ACID FRACTION

COMPOUND NAME	MCG/L
2-CHLOROPHENOL	LESS THAN 250
2,4-DICHLOROPHENOL	LESS THAN 250
2,4-DIMETHYLPHENOL	LESS THAN 250
4,6-DINITRO-O-CRESOL	LESS THAN 250
2,4-DINITROPHENOL	LESS THAN 250
2-NITROPHENOL	LESS THAN 250
4-NITROPHENOL	LESS THAN 250
P-CHLORO-M-CRESOL	LESS THAN 250
PENTACHLOROPHENOL	LESS THAN 250
PHENOL	LESS THAN 250
2,4,6-TRICHLOROPHENOL	LESS THAN 250

BASE/NEUTRAL FRACTION

COMPOUND NAME	MCG/L
ACENAPHTHENE	LESS THAN 250
ACENAPHTHYLENE	LESS THAN 250
ANTHRACENE	LESS THAN 250
BENZIDINE	LESS THAN 1300
BENZO(a)ANTHRACENE	LESS THAN 250
BENZO(a)PYRENE	LESS THAN 250
3,4-BENZOFLUORANTHENE	LESS THAN 250
BENZO(g,h,i)PERYLENE	LESS THAN 250
BENZO(k)FLUORANTHENE	LESS THAN 250
BIS (2-CHLOROETHOXY)METHANE	LESS THAN 250
BIS (2-CHLOROETHYL)ETHER	LESS THAN 250
BIS (2-CHLOROISOPROPYL)ETHER	LESS THAN 250
BIS (2-ETHYLHEXYL)PHTHALATE	LESS THAN 250
4-BROMOPHENYL PHENYL ETHER	LESS THAN 250
BUTYL BENZYL PHTHALATE	LESS THAN 250
2-CHLORONAPTHALENE	LESS THAN 250
4-CHLOROPHENYL PHENYL ETHER	LESS THAN 250
CHRYSENE	LESS THAN 250
DIBENZO(a,h)ANTHRACENE	LESS THAN 250
1,2-DICHLOROBENZENE	LESS THAN 250

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SAMPLE NUMBER: 80404690

GROUND WATER: W-3; 30300
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION (CONTINUED)

1,3-DICHLOROBENZENE	LESS THAN 250
1,4-DICHLOROBENZENE	LESS THAN 250
3,3'-DICHLOROBENZIDINE	LESS THAN 250
DIETHYL PHTHALATE	LESS THAN 250
DIMETHYL PHTHALATE	LESS THAN 10
DI-N-BUTYL PHTHALATE	LESS THAN 10
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
1,2-DIPHENYLHYDRAZINE*(1)	LESS THAN 10
FLUORANTHENE	LESS THAN 10
FLUORENE	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
INDENO(1,2,3-cd)PYRENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
NAPHTHALENE	2100 DL
NITROBENZENE	LESS THAN 10
N-NITROSODIMETHYLAMINE	LESS THAN 10
N-NITROSODI-N-PROPYLAMINE	LESS THAN 10
N-NITROSODIPHENYLAMINE*(2)	LESS THAN 10
PHENANTHRENE	LESS THAN 10
PYRENE	LESS THAN 10
1,2,4-TRICHLOROBENZENE	2100 DL

*(1) 1,2-DIPHENYLHYDRAZINE DETECTED AS AZOBENZENE.
*(2) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

'DL' INDICATES THAT THE LIMIT OF QUANTITATION FOR THIS COMPOUND WAS ELEVATED DUE TO INTERFERENCES PRESENT.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 1.0
BETA-BHC	LESS THAN 1.0
DELTA-BHC	LESS THAN 1.0
GAMMA-BHC (LINDANE)	LESS THAN 1.0
HEPTACHLOR	LESS THAN 1.0
ALDRIN	LESS THAN 1.0
HEPTACHLOR EPOXIDE	LESS THAN 0.050
ENDOSULFAN I	LESS THAN 0.050
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10
ENDOSULFAN II	LESS THAN 0.10

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SAMPLE NUMBER: 80404690

GROUND WATER: W-3; 30300
PROJECT NO. 643.05

PESTICIDE/PCB FRACTION (CONTINUED)

4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10
METHOXYCHLOR	LESS THAN 0.50
ENDRIN KETONE	LESS THAN 0.10
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 10.0
PCB-1221	LESS THAN 10.0
PCB-1232	LESS THAN 10.0
PCB-1242	LESS THAN 10.0
PCB-1248	LESS THAN 0.50
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0
ENDRIN ALDEHYDE	LESS THAN 0.10
TECHNICAL CHLORDANE	LESS THAN 0.50

METHOD REFERENCES

VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 624, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 624 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43373-43384, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8240, U.S. EPA, WASHINGTON DC (REVISED APRIL 1984)

SEMI-VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

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SAMPLE NUMBER: 80404690

GROUND WATER: W-3; 30300
PROJECT NO. 643.05

METHOD REFERENCES (CONTINUED)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

PROJECT #: 643.05

RMT SAMPLE #: 30300

DESCRIPTION: W-3

SAMPLE DATE: 04/18/88

REPORT DATE: 05/13/88

W.O.#: 042188-0064305

GROUND WATER
MONITORING RESULTS

Parameters	Result	Units	Detection limit
Antimony	ND	mg/l	0.06
Arsenic	0.055	mg/l	0.02
Beryllium	0.024	mg/l	0.002
Cadmium	0.032	mg/l	0.005
Chromium	0.01	mg/l	0.01
Copper	ND	mg/l	0.02
Cyanide	0.032	mg/l	0.017
Lead	ND	mg/l	0.004
Mercury	0.0006	mg/l	0.0002
Nickel	0.10	mg/l	0.02
Phenols	0.25	mg/l	0.005
Selenium	ND	mg/l	0.015
Silver	0.0012	mg/l	0.0002
Thallium	ND	mg/l	0.10
Zinc	0.47	mg/l	0.004

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

HAZLETON LABORATORIES AMERICA, INC.
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REPORT OF ANALYSIS

SUE WELLS
RMT, INCORPORATED
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

SAMPLE NUMBER: 80404692

DATE ENTERED: 04/21/88

REPORT PRINTED: 05/31/88

GROUND WATER: W-4; 30304
PROJECT NO. 643.05

PURCHASE ORDER NUMBER: 16954

VOLATILE FRACTION

COMPOUND NAME	MCG/L
ACROLEIN	LESS THAN 50
ACRYLONITRILE	LESS THAN 50
BENZENE	LESS THAN 5
BIS (CHLOROMETHYL)ETHER*(1)	N/A
BROMOFORM	LESS THAN 5
CARBON TETRACHLORIDE	LESS THAN 5
CHLOROBENZENE	LESS THAN 5
CHLORODIBROMOMETHANE	LESS THAN 5
CHLOROETHANE	LESS THAN 10
2-CHLORO-ETHYLVINYL ETHER	LESS THAN 10
CHLOROFORM	LESS THAN 5
DICHLOROBROMOMETHANE	LESS THAN 5
DICHLORODIFLUOROMETHANE*(2)	N/A
1,1-DICHLOROETHANE	LESS THAN 5
1,2-DICHLOROETHANE	LESS THAN 5
1,1-DICHLOROETHYLENE	LESS THAN 5
1,2-DICHLOROPROPANE	LESS THAN 5
1,3-DICHLOROPROPYLENE	LESS THAN 5
ETHYLBENZENE	LESS THAN 5
METHYL BROMIDE	LESS THAN 10
METHYL CHLORIDE	LESS THAN 10
METHYLENE CHLORIDE	LESS THAN 5
1,1,2,2-TETRACHLOROETHANE	LESS THAN 5
TETRACHLOROETHYLENE	LESS THAN 5
TOLUENE	LESS THAN 5
1,2-TRANS-DICHLOROETHYLENE	LESS THAN 5
1,1,1-TRICHLOROETHANE	LESS THAN 5
1,1,2-TRICHLOROETHANE	LESS THAN 5
TRICHLOROETHYLENE	LESS THAN 5
TRICHLOROFLUOROMETHANE*(2)	N/A
VINYL CHLORIDE	LESS THAN 10

*(1) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 10723, FEB. 4, 1981)
*(2) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 46103, JAN. 8, 1981)

HAZLETON LABORATORIES AMERICA, INC.
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SAMPLE NUMBER: 80404692

GROUND WATER: W-4; 30304
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION

ACID FRACTION

COMPOUND NAME	MCG/L
2-CHLOROPHENOL	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
4,6-DINITRO-O-CRESOL	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
4-NITROPHENOL	LESS THAN 10
P-CHLORO-M-CRESOL	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 10
PHENOL	LESS THAN 10
2,4,6-TRICHLOROPHENOL	LESS THAN 10

BASE/NEUTRAL FRACTION

COMPOUND NAME	MCG/L
ACENAPHTHENE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
BENZIDINE	LESS THAN 51
BENZO(a)ANTHRACENE	LESS THAN 10
BENZO(a)PYRENE	LESS THAN 10
3,4-BENZOFLUORANTHENE	LESS THAN 10
BENZO(g,h,i)PERYLENE	LESS THAN 10
BENZO(k)FLUORANTHENE	LESS THAN 10
BIS (2-CHLOROETHOXY)METHANE	LESS THAN 10
BIS (2-CHLOROETHYL)ETHER	LESS THAN 10
BIS (2-CHLOROISOPROPYL)ETHER	LESS THAN 10
BIS (2-ETHYLHEXYL)PHTHALATE	LESS THAN 10
4-BROMOPHENYL PHENYL ETHER	LESS THAN 10
BUTYL BENZYL PHTHALATE	LESS THAN 10
2-CHLORONAPTHALENE	LESS THAN 10
4-CHLOROPHENYL PHENYL ETHER	LESS THAN 10
CHRYSENE	LESS THAN 10
DIBENZO(a,h)ANTHRACENE	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10
1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 10
DIETHYL PHTHALATE	LESS THAN 10
DIMETHYL PHTHALATE	LESS THAN 10
DI-N-BUTYL PHTHALATE	LESS THAN 10
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
1,2-DIPHENYLHYDRAZINE*(1)	LESS THAN 10

SAMPLE NUMBER: 80404692

GROUND WATER: W-4; 30304
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION (CONTINUED)

FLUORANTHENE	LESS THAN 10
FLUORENE	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
INDENO(1,2,3-cd)PYRENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
NITROBENZENE	LESS THAN 10
N-NITROSODIMETHYLAMINE	LESS THAN 10
N-NITROSODI-N-PROPYLAMINE	LESS THAN 10
N-NITROSODIPHENYLAMINE*(2)	LESS THAN 10
PHENANTHRENE	LESS THAN 10
PYRENE	LESS THAN 10
1,2,4-TRICHLOROBENZENE	39

*(1) 1,2-DIPHENYLHYDRAZINE DETECTED AS AZOBENZENE.
*(2) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.051
BETA-BHC	LESS THAN 0.051
DELTA-BHC	LESS THAN 0.051
GAMMA-BHC (LINDANE)	LESS THAN 0.051
HEPTACHLOR	LESS THAN 0.051
ALDRIN	LESS THAN 0.051
HEPTACHLOR EPOXIDE	LESS THAN 0.051
ENDOSULFAN I	LESS THAN 0.051
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10
ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10
METHOXYCHLOR	LESS THAN 0.51
ENDRIN KETONE	LESS THAN 0.10
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.51
PCB-1221	LESS THAN 0.51
PCB-1232	LESS THAN 0.51

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GROUND WATER: W-4; 30304
PROJECT NO. 643.05

PESTICIDE/PCB FRACTION (CONTINUED)

PCB-1242	LESS THAN 0.51
PCB-1248	LESS THAN 0.51
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0
ENDRIN ALDEHYDE	LESS THAN 0.10
TECHNICAL CHLORDANE	LESS THAN 0.51

METHOD REFERENCES

VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 624, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 624 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43373-43384, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8240, U.S. EPA, WASHINGTON DC (REVISED APRIL 1984)

SEMI-VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

SAMPLE DATE: 04/18/88

PROJECT #: 643.05

REPORT DATE: 05/13/88

RMT SAMPLE #: 30304

W.O.#: 042188-0064305

DESCRIPTION: W-4

GROUND WATER
MONITORING RESULTS

Parameters	Result	Units	Detection limit
Antimony	ND	mg/l	0.06
Arsenic	ND	mg/l	0.004
Beryllium	ND	mg/l	0.002
Cadmium	ND	mg/l	0.005
Chromium	ND	mg/l	0.01
Copper	ND	mg/l	0.02
Cyanide	ND	mg/l	0.010
Lead	ND	mg/l	0.004
Mercury	ND	mg/l	0.0002
Nickel	ND	mg/l	0.02
Phenols	ND	mg/l	0.005
Selenium	ND	mg/l	0.003
Silver	ND	mg/l	0.0002
Thallium	ND	mg/l	0.10
Zinc	0.016	mg/l	0.004

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

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REPORT OF ANALYSIS

SUE WELLS
RMT, INCORPORATED
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

SAMPLE NUMBER: 80403775
DATE ENTERED: 04/19/88
REPORT PRINTED: 05/31/88

GROUND WATER: W-5, 4/16/88; 30244
PROJECT NO. 643.05

PURCHASE ORDER NUMBER: 16924

VOLATILE FRACTION

COMPOUND NAME	MCG/L
ACROLEIN	LESS THAN 50
ACRYLONITRILE	LESS THAN 50
BENZENE	LESS THAN 5
BIS (CHLOROMETHYL)ETHER*(1)	N/A
BROMOFORM	LESS THAN 5
CARBON TETRACHLORIDE	LESS THAN 5
CHLOROBENZENE	LESS THAN 5
CHLORODIBROMOMETHANE	LESS THAN 5
CHLOROETHANE	LESS THAN 10
2-CHLORO-ETHYLVINYL ETHER	LESS THAN 10
CHLOROFORM	2 JB (4J)
DICHLOROBROMOMETHANE	LESS THAN 5
DICHLORODIFLUOROMETHANE*(2)	N/A
1,1-DICHLOROETHANE	LESS THAN 5
1,2-DICHLOROETHANE	LESS THAN 5
1,1-DICHLOROETHYLENE	LESS THAN 5
1,2-DICHLOROPROPANE	LESS THAN 5
1,3-DICHLOROPROPYLENE	LESS THAN 5
ETHYLBENZENE	LESS THAN 5
METHYL BROMIDE	LESS THAN 10
METHYL CHLORIDE	LESS THAN 10
METHYLENE CHLORIDE	9 B (5)
1,1,2,2-TETRACHLOROETHANE	LESS THAN 5
TETRACHLOROETHYLENE	LESS THAN 5
TOLUENE	1 JB (.8J)
1,2-TRANS-DICHLOROETHYLENE	LESS THAN 5
1,1,1-TRICHLOROETHANE	LESS THAN 5
1,1,2-TRICHLOROETHANE	LESS THAN 5
TRICHLOROETHYLENE	LESS THAN 5
TRICHLOROFLUOROMETHANE*(2)	N/A
VINYL CHLORIDE	LESS THAN 10

*(1) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 10723, FEB. 4, 1981)
*(2) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 46103, JAN. 8, 1981)

SAMPLE NUMBER: 80403775

GROUND WATER: W-5, 4/16/88; 30244
PROJECT NO. 643.05

VOLATILE FRACTION (CONTINUED)

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

'B' INDICATES THE ANALYTE WAS FOUND IN THE BLANK AS WELL AS THE SAMPLE. THE CONCENTRATION SHOWN IN PARENTHESIS WAS DETECTED IN THE METHOD BLANK.

SEMI-VOLATILE FRACTION

ACID FRACTION

COMPOUND NAME	MCG/L
2-CHLOROPHENOL	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
4,6-DINITRO-O-CRESOL	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
4-NITROPHENOL	LESS THAN 10
P-CHLORO-M-CRESOL	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 10
PHENOL	LESS THAN 10
2,4,6-TRICHLOROPHENOL	LESS THAN 10

BASE/NEUTRAL FRACTION

COMPOUND NAME	MCG/L
ACENAPHTHENE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
BENZIDINE	LESS THAN 51
BENZO(a)ANTHRACENE	LESS THAN 10
BENZO(a)PYRENE	LESS THAN 10
3,4-BENZOFLUORANTHENE	LESS THAN 10
BENZO(g,h,i)PERYLENE	LESS THAN 10
BENZO(k)FLUORANTHENE	LESS THAN 10
BIS (2-CHLOROETHOXY)METHANE	LESS THAN 10
BIS (2-CHLOROETHYL)ETHER	LESS THAN 10
BIS (2-CHLOROISOPROPYL)ETHER	LESS THAN 10
BIS (2-ETHYLHEXYL)PHTHALATE	LESS THAN 10
4-BROMOPHENYL PHENYL ETHER	LESS THAN 10
BUTYL BENZYL PHTHALATE	LESS THAN 10
2-CHLORONAPTHALENE	LESS THAN 10
4-CHLOROPHENYL PHENYL ETHER	LESS THAN 10
CHRYSENE	LESS THAN 10
DIBENZO(a,h)ANTHRACENE	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10

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SAMPLE NUMBER: 80403775

GROUND WATER: W-5, 4/16/88; 30244
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION (CONTINUED)

1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 10
DIETHYL PHTHALATE	LESS THAN 10
DIMETHYL PHTHALATE	LESS THAN 10
DI-N-BUTYL PHTHALATE	LESS THAN 10
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
1,2-DIPHENYLHYDRAZINE*(1)	LESS THAN 10
FLUORANTHENE	LESS THAN 10
FLUORENE	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
INDENO(1,2,3-cd)PYRENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
NITROBENZENE	LESS THAN 10
N-NITROSODIMETHYLAMINE	LESS THAN 10
N-NITROSODI-N-PROPYLAMINE	LESS THAN 10
N-NITROSODIPHENYLAMINE*(2)	LESS THAN 10
PHENANTHRENE	LESS THAN 10
PYRENE	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10

*(1) 1,2-DIPHENYLHYDRAZINE DETECTED AS AZOBENZENE.
*(2) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.051
BETA-BHC	LESS THAN 0.051
DELTA-BHC	LESS THAN 0.051
GAMMA-BHC (LINDANE)	LESS THAN 0.051
HEPTACHLOR	LESS THAN 0.051
ALDRIN	LESS THAN 0.051
HEPTACHLOR EPOXIDE	LESS THAN 0.051
ENDOSULFAN I	LESS THAN 0.051
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10
ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10

SAMPLE NUMBER: 80403775

GROUND WATER: W-5, 4/16/88; 30244
PROJECT NO. 643.05

PESTICIDE/PCB FRACTION (CONTINUED)

METHOXYCHLOR	LESS THAN 0.51
ENDRIN KETONE	LESS THAN 0.10
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.51
PCB-1221	LESS THAN 0.51
PCB-1232	LESS THAN 0.51
PCB-1242	LESS THAN 0.51
PCB-1248	LESS THAN 0.51
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0
ENDRIN ALDEHYDE	LESS THAN 0.10
TECHNICAL CHLORDANE	LESS THAN 0.51

METHOD REFERENCES

VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 624, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 624 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43373-43384, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8240, U.S. EPA, WASHINGTON DC (REVISED APRIL 1984)

SEMI-VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

PROJECT #: 643.05

RMT SAMPLE #: 30244

DESCRIPTION: W-5

SAMPLE DATE: 04/16/88

REPORT DATE: 05/13/88

W.O.#: 041988-0064305

GROUND WATER
MONITORING RESULTS

Parameters	Result	Units	Detection limit
Antimony	ND	mg/l	0.06
Arsenic	ND	mg/l	0.004
Beryllium	ND	mg/l	0.002
Cadmium	ND	mg/l	0.005
Chromium	ND	mg/l	0.01
Copper	ND	mg/l	0.02
Cyanide	ND	mg/l	0.017
Lead	ND	mg/l	0.002
Mercury	ND	mg/l	0.0002
Nickel	ND	mg/l	0.02
Phenols	ND	mg/l	0.005
Selenium	ND	mg/l	0.003
Silver	ND	mg/l	0.0002
Thallium	ND	mg/l	0.10
Zinc	0.060	mg/l	0.004

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

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REPORT OF ANALYSIS

SUE WELLS
RMT, INCORPORATED
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

SAMPLE NUMBER: 80403547
DATE ENTERED: 04/18/88
REPORT PRINTED: 05/31/88

GROUND WATER: W-6 4/12/88; 30153
PROJECT NO. 643.05

PURCHASE ORDER NUMBER: 16906

VOLATILE FRACTION

COMPOUND NAME	MCG/L
ACROLEIN	LESS THAN 50
ACRYLONITRILE	LESS THAN 50
BENZENE	LESS THAN 5
BIS (CHLOROMETHYL)ETHER*(1)	N/A
BROMOFORM	LESS THAN 5
CARBON TETRACHLORIDE	LESS THAN 5
CHLOROBENZENE	LESS THAN 5
CHLORODIBROMOMETHANE	LESS THAN 5
CHLOROETHANE	LESS THAN 10
2-CHLORO-ETHYLVINYL ETHER	LESS THAN 10
CHLOROFORM	46 B (2J)
DICHLOROBROMOMETHANE	LESS THAN 5
DICHLORODIFLUOROMETHANE*(2)	N/A
1,1-DICHLOROETHANE	LESS THAN 5
1,2-DICHLOROETHANE	LESS THAN 5
1,1-DICHLOROETHYLENE	LESS THAN 5
1,2-DICHLOROPROPANE	LESS THAN 5
1,3-DICHLOROPROPYLENE	LESS THAN 5
ETHYLBENZENE	LESS THAN 5
METHYL BROMIDE	LESS THAN 10
METHYL CHLORIDE	LESS THAN 10
METHYLENE CHLORIDE	LESS THAN 5
1,1,2,2-TETRACHLOROETHANE	LESS THAN 5
TETRACHLOROETHYLENE	LESS THAN 5
TOLUENE	0.8 JB (1J)
1,2-TRANS-DICHLOROETHYLENE	LESS THAN 5
1,1,1-TRICHLOROETHANE	LESS THAN 5
1,1,2-TRICHLOROETHANE	LESS THAN 5
TRICHLOROETHYLENE	LESS THAN 5
TRICHLOROFLUOROMETHANE*(2)	N/A
VINYL CHLORIDE	LESS THAN 10

*(1) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 10723, FEB. 4, 1981)
*(2) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 46103, JAN. 8, 1981)

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SAMPLE NUMBER: 80403547

GROUND WATER: W-6 4/12/88; 30153
PROJECT NO. 643.05

VOLATILE FRACTION (CONTINUED)

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

'B' INDICATES THE ANALYTE WAS FOUND IN THE BLANK AS WELL AS THE SAMPLE. THE CONCENTRATION SHOWN IN PARENTHESIS WAS DETECTED IN THE METHOD BLANK.

SEMI-VOLATILE FRACTION

ACID FRACTION

COMPOUND NAME	MCG/L
2-CHLOROPHENOL	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
4,6-DINITRO-O-CRESOL	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
4-NITROPHENOL	LESS THAN 10
P-CHLORO-M-CRESOL	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 10
PHENOL	LESS THAN 10
2,4,6-TRICHLOROPHENOL	LESS THAN 10

BASE/NEUTRAL FRACTION

COMPOUND NAME	MCG/L
ACENAPHTHENE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
BENZIDINE	LESS THAN 50
BENZO(a)ANTHRACENE	LESS THAN 10
BENZO(a)PYRENE	LESS THAN 10
3,4-BENZOFLUORANTHENE	LESS THAN 10
BENZO(g,h,i)PERYLENE	LESS THAN 10
BENZO(k)FLUORANTHENE	LESS THAN 10
BIS (2-CHLOROETHOXY)METHANE	LESS THAN 10
BIS (2-CHLOROETHYL)ETHER	LESS THAN 10
BIS (2-CHLOROISOPROPYL)ETHER	LESS THAN 10
BIS (2-ETHYLHEXYL)PHTHALATE	LESS THAN 10
4-BROMOPHENYL PHENYL ETHER	LESS THAN 10
BUTYL BENZYL PHTHALATE	LESS THAN 10
2-CHLORONAPTHALENE	LESS THAN 10
4-CHLOROPHENYL PHENYL ETHER	LESS THAN 10
CHRYSENE	LESS THAN 10
DIBENZO(a,h)ANTHRACENE	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10

SAMPLE NUMBER: 80403547

GROUND WATER: W-6 4/12/88; 30153
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION (CONTINUED)

1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 10
DIETHYL PHTHALATE	LESS THAN 10
DIMETHYL PHTHALATE	LESS THAN 10
DI-N-BUTYL PHTHALATE	LESS THAN 10
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
1,2-DIPHENYLHYDRAZINE*(1)	LESS THAN 10
FLUORANTHENE	LESS THAN 10
FLUORENE	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
INDENO(1,2,3-cd)PYRENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
NITROBENZENE	LESS THAN 10
N-NITROSODIMETHYLAMINE	LESS THAN 10
N-NITROSODI-N-PROPYLAMINE	LESS THAN 10
N-NITROSODIPHENYLAMINE*(2)	LESS THAN 10
PHENANTHRENE	LESS THAN 10
PYRENE	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10

*(1) 1,2-DIPHENYLHYDRAZINE DETECTED AS AZOBENZENE.
*(2) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.053
BETA-BHC	LESS THAN 1.1
DELTA-BHC	LESS THAN 0.053
GAMMA-BHC (LINDANE)	LESS THAN 1.1
HEPTACHLOR	LESS THAN 0.053
ALDRIN	LESS THAN 1.1
HEPTACHLOR EPOXIDE	LESS THAN 0.053
ENDOSULFAN I	LESS THAN 0.053
DIELDRIN	LESS THAN 0.11
4,4'-DDE	LESS THAN 0.11
ENDRIN	LESS THAN 0.11
ENDOSULFAN II	LESS THAN 0.11
4,4'-DDD	LESS THAN 0.11
ENDOSULFAN SULFATE	LESS THAN 0.11
4,4'-DDT	LESS THAN 0.11

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SAMPLE NUMBER: 80403547

GROUND WATER: W-6 4/12/88; 30153
PROJECT NO. 643.05

PESTICIDE/PCB FRACTION (CONTINUED)

METHOXYCHLOR	LESS THAN 0.53
ENDRIN KETONE	LESS THAN 0.11
TOXAPHENE	LESS THAN 1.1
PCB-1016	LESS THAN 0.53
PCB-1221	LESS THAN 0.53
PCB-1232	LESS THAN 0.53
PCB-1242	LESS THAN 0.53
PCB-1248	LESS THAN 0.53
PCB-1254	LESS THAN 1.1
PCB-1260	LESS THAN 1.1
ENDRIN ALDEHYDE	LESS THAN 0.38
TECHNICAL CHLORDANE	LESS THAN 0.53

METHOD REFERENCES

VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 624, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 624 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43373-43384, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8240, U.S. EPA, WASHINGTON DC (REVISED APRIL 1984)

SEMI-VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

SAMPLE DATE: 04/12/88

PROJECT #: 643.05

REPORT DATE: 05/13/88

RMT SAMPLE #: 30153

W.O.#: 041488-0064305

DESCRIPTION: W-6

GROUND WATER
MONITORING RESULTS

Parameters	Result	Units	Detection limit
Antimony	ND	mg/l	0.06
Arsenic	ND	mg/l	0.004
Beryllium	ND	mg/l	0.002
Cadmium	ND	mg/l	0.005
Chromium	ND	mg/l	0.01
Copper	ND	mg/l	0.02
Cyanide	ND	mg/l	0.017
Lead	ND	mg/l	0.002
Mercury	ND	mg/l	0.0002
Nickel	ND	mg/l	0.02
Phenols	ND	mg/l	0.005
Selenium	ND	mg/l	0.003
Silver	ND	mg/l	0.0002
Thallium	ND	mg/l	0.10
Zinc	0.17	mg/l	0.004

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

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REPORT OF ANALYSIS

SUE WELLS
RMT, INCORPORATED
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

SAMPLE NUMBER: 80403548

DATE ENTERED: 04/18/88

REPORT PRINTED: 05/31/88

GROUND WATER: W-7 4/12/88; 30154
PROJECT NO. 643.05

PURCHASE ORDER NUMBER: 16906

VOLATILE FRACTION

COMPOUND NAME	MCG/L
ACROLEIN	LESS THAN 500
ACRYLONITRILE	LESS THAN 500
BENZENE	19 J
BIS (CHLOROMETHYL)ETHER*(1)	N/A
BROMOFORM	LESS THAN 50
CARBON TETRACHLORIDE	LESS THAN 50
CHLOROBENZENE	380
CHLORODIBROMOMETHANE	LESS THAN 50
CHLOROETHANE	LESS THAN 100
2-CHLORO-ETHYLVINYL ETHER	LESS THAN 100
CHLOROFORM	1100 B (4J)
DICHLOROBROMOMETHANE	LESS THAN 50
DICHLORODIFLUOROMETHANE*(2)	N/A
1,1-DICHLOROETHANE	LESS THAN 50
1,2-DICHLOROETHANE	LESS THAN 50
1,1-DICHLOROETHYLENE	LESS THAN 50
1,2-DICHLOROPROPANE	LESS THAN 50
1,3-DICHLOROPROPYLENE	LESS THAN 50
ETHYLBENZENE	LESS THAN 50
METHYL BROMIDE	LESS THAN 100
METHYL CHLORIDE	LESS THAN 100
METHYLENE CHLORIDE	61 B (5)
1,1,2,2-TETRACHLOROETHANE	LESS THAN 50
TETRACHLOROETHYLENE	LESS THAN 50
TOLUENE	80 B (.8J)
1,2-TRANS-DICHLOROETHYLENE	LESS THAN 50
1,1,1-TRICHLOROETHANE	LESS THAN 50
1,1,2-TRICHLOROETHANE	LESS THAN 50
TRICHLOROETHYLENE	LESS THAN 50
TRICHLOROFLUOROMETHANE*(2)	N/A
VINYL CHLORIDE	LESS THAN 100

*(1) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 10723, FEB. 4, 1981)
*(2) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 46103, JAN. 8, 1981)

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SAMPLE NUMBER: 80403548

GROUND WATER: W-7 4/12/88; 30154
PROJECT NO. 643.05

VOLATILE FRACTION (CONTINUED)

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

'B' INDICATES THE ANALYTE WAS FOUND IN THE BLANK AS WELL AS THE SAMPLE. THE CONCENTRATION SHOWN IN PARENTHESIS WAS DETECTED IN THE METHOD BLANK.

SEMI-VOLATILE FRACTION

ACID FRACTION

COMPOUND NAME	MCG/L
2-CHLOROPHENOL	LESS THAN 100
2,4-DICHLOROPHENOL	LESS THAN 100
2,4-DIMETHYLPHENOL	LESS THAN 100
4,6-DINITRO-O-CRESOL	LESS THAN 100
2,4-DINITROPHENOL	LESS THAN 100
2-NITROPHENOL	LESS THAN 100
4-NITROPHENOL	LESS THAN 100
P-CHLORO-M-CRESOL	LESS THAN 100
PENTACHLOROPHENOL	LESS THAN 100
PHENOL	LESS THAN 100
2,4,6-TRICHLOROPHENOL	LESS THAN 100

BASE/NEUTRAL FRACTION

COMPOUND NAME	MCG/L
ACENAPHTHENE	LESS THAN 100
ACENAPHTHYLENE	LESS THAN 100
ANTHRACENE	LESS THAN 100
BENZIDINE	LESS THAN 500
BENZO(a)ANTHRACENE	LESS THAN 100
BENZO(a)PYRENE	LESS THAN 100
3,4-BENZOFLUORANTHENE	LESS THAN 100
BENZO(g,h,i)PERYLENE	LESS THAN 100
BENZO(k)FLUORANTHENE	LESS THAN 100
BIS (2-CHLOROETHOXY)METHANE	LESS THAN 100
BIS (2-CHLOROETHYL)ETHER	LESS THAN 100
BIS (2-CHLOROISOPROPYL)ETHER	LESS THAN 100
BIS (2-ETHYLHEXYL)PHTHALATE	LESS THAN 100
4-BROMOPHENYL PHENYL ETHER	LESS THAN 100
BUTYL BENZYL PHTHALATE	LESS THAN 100
2-CHLORONAPTHALENE	LESS THAN 100
4-CHLOROPHENYL PHENYL ETHER	LESS THAN 100
CHRYSENE	LESS THAN 100
DIBENZO(a,h)ANTHRACENE	LESS THAN 100
1,2-DICHLOROBENZENE	LESS THAN 100

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SAMPLE NUMBER: 80403548

GROUND WATER: W-7 4/12/88; 30154
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION (CONTINUED)

1,3-DICHLOROBENZENE	LESS THAN 100
1,4-DICHLOROBENZENE	280
3,3'-DICHLOROBENZIDINE	LESS THAN 100
DIETHYL PHTHALATE	LESS THAN 100
DIMETHYL PHTHALATE	LESS THAN 100
DI-N-BUTYL PHTHALATE	LESS THAN 100
2,4-DINITROTOLUENE	LESS THAN 100
2,6-DINITROTOLUENE	LESS THAN 100
DI-N-OCTYL PHTHALATE	LESS THAN 100
1,2-DIPHENYLHYDRAZINE*(1)	LESS THAN 100
FLUORANTHENE	LESS THAN 100
FLUORENE	LESS THAN 100
HEXACHLOROBENZENE	LESS THAN 100
HEXACHLOROBUTADIENE	LESS THAN 100
HEXACHLOROCYCLOPENTADIENE	LESS THAN 100
HEXACHLOROETHANE	LESS THAN 100
INDENO(1,2,3-cd)PYRENE	LESS THAN 100
ISOPHORONE	LESS THAN 100
NAPHTHALENE	LESS THAN 100
NITROBENZENE	LESS THAN 100
N-NITROSODIMETHYLAMINE	LESS THAN 100
N-NITROSODI-N-PROPYLAMINE	LESS THAN 100
N-NITROSODIPHENYLAMINE*(2)	LESS THAN 100
PHENANTHRENE	LESS THAN 100
PYRENE	LESS THAN 100
1,2,4-TRICHLOROBENZENE	1100

*(1) 1,2-DIPHENYLHYDRAZINE DETECTED AS AZOBENZENE.
*(2) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.051
BETA-BHC	LESS THAN 1.0
DELTA-BHC	LESS THAN 0.051
GAMMA-BHC (LINDANE)	LESS THAN 1.0
HEPTACHLOR	LESS THAN 1.0
ALDRIN	LESS THAN 0.051
HEPTACHLOR EPOXIDE	LESS THAN 0.051
ENDOSULFAN I	LESS THAN 0.051
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10
ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10

SAMPLE NUMBER: 80403548

GROUND WATER: W-7 4/12/88; 30154
PROJECT NO. 643.05

PESTICIDE/PCB FRACTION (CONTINUED)

METHOXYCHLOR	LESS THAN 0.51
ENDRIN KETONE	LESS THAN 0.10
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.51
PCB-1221	LESS THAN 0.51
PCB-1232	LESS THAN 0.51
PCB-1242	LESS THAN 0.51
PCB-1248	LESS THAN 0.51
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0
ENDRIN ALDEHYDE	LESS THAN 0.37
TECHNICAL CHLORDANE	LESS THAN 0.51

METHOD REFERENCES

VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 624, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 624 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43373-43384, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8240, U.S. EPA, WASHINGTON DC (REVISED APRIL 1984)

SEMI-VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

SAMPLE DATE: 04/12/88

PROJECT #: 643.05

REPORT DATE: 05/13/88

RMT SAMPLE #: 30154

W.O.#: 041488-0064305

DESCRIPTION: W-7

GROUND WATER
MONITORING RESULTS

Parameters	Result	Units	Detection limit
Antimony	ND	mg/l	0.06
Arsenic	0.005	mg/l	0.004
Beryllium	ND	mg/l	0.002
Cadmium	ND	mg/l	0.005
Chromium	ND	mg/l	0.01
Copper	ND	mg/l	0.02
Cyanide	ND	mg/l	0.017
Lead	ND	mg/l	0.002
Mercury	ND	mg/l	0.0002
Nickel	ND	mg/l	0.02
Phenols	0.028	mg/l	0.005
Selenium	ND	mg/l	0.003
Silver	ND	mg/l	0.0002
Thallium	ND	mg/l	0.10
Zinc	0.071	mg/l	0.004

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

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REPORT OF ANALYSIS

SUE WELLS
RMT, INCORPORATED
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

SAMPLE NUMBER: 80403779

DATE ENTERED: 04/19/88

REPORT PRINTED: 05/31/88

GROUND WATER: W-12, 4/14/88; 30248
PROJECT NO. 643.05

PURCHASE ORDER NUMBER: 16924

VOLATILE FRACTION

COMPOUND NAME	MCG/L
ACROLEIN	LESS THAN 50
ACRYLONITRILE	LESS THAN 50
BENZENE	LESS THAN 5
BIS (CHLOROMETHYL)ETHER*(1)	N/A
BROMOFORM	LESS THAN 5
CARBON TETRACHLORIDE	LESS THAN 5
CHLOROBENZENE	LESS THAN 5
CHLORODIBROMOMETHANE	LESS THAN 5
CHLOROETHANE	LESS THAN 10
2-CHLORO-ETHYLVINYL ETHER	LESS THAN 10
CHLOROFORM	2 JB (4J)
DICHLOROBROMOMETHANE	LESS THAN 5
DICHLORODIFLUOROMETHANE*(2)	N/A
1,1-DICHLOROETHANE	LESS THAN 5
1,2-DICHLOROETHANE	LESS THAN 5
1,1-DICHLOROETHYLENE	LESS THAN 5
1,2-DICHLOROPROPANE	LESS THAN 5
1,3-DICHLOROPROPYLENE	LESS THAN 5
ETHYLBENZENE	LESS THAN 5
METHYL BROMIDE	LESS THAN 10
METHYL CHLORIDE	LESS THAN 10
METHYLENE CHLORIDE	8 B (5)
1,1,2,2-TETRACHLOROETHANE	LESS THAN 5
TETRACHLOROETHYLENE	LESS THAN 5
TOLUENE	2 JB (.8J)
1,2-TRANS DICHLOROETHYLENE	LESS THAN 5
1,1,1-TRICHLOROETHANE	LESS THAN 5
1,1,2-TRICHLOROETHANE	LESS THAN 5
TRICHLOROETHYLENE	LESS THAN 5
TRICHLOROFLUOROMETHANE*(2)	N/A
VINYL CHLORIDE	LESS THAN 10

*(1) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 10723, FEB. 4, 1981)
*(2) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 46103, JAN. 8, 1981)

HAZLETON LABORATORIES AMERICA, INC.
3301 KINSMAN BLVD. • P.O. BOX 7545 • MADISON, WI 53707 • (608) 241-4471 • TLX 703956 HAZRAL MDS UD

SAMPLE NUMBER: 80403779

GROUND WATER: W-12, 4/14/88; 30248
PROJECT NO. 643.05

VOLATILE FRACTION (CONTINUED)

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

'B' INDICATES THE ANALYTE WAS FOUND IN THE BLANK AS WELL AS THE SAMPLE. THE CONCENTRATION SHOWN IN PARENTHESIS WAS DETECTED IN THE METHOD BLANK.

SEMI-VOLATILE FRACTION

ACID FRACTION

COMPOUND NAME	MCG/L
2-CHLOROPHENOL	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
4,6-DINITRO-O-CRESOL	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
4-NITROPHENOL	LESS THAN 10
P-CHLORO-M-CRESOL	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 10
PHENOL	LESS THAN 10
2,4,6-TRICHLOROPHENOL	LESS THAN 10

BASE/NEUTRAL FRACTION

COMPOUND NAME	MCG/L
ACENAPHTHENE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
BENZIDINE	LESS THAN 51
BENZO(a)ANTHRACENE	LESS THAN 10
BENZO(a)PYRENE	LESS THAN 10
3,4-BENZOFLUORANTHENE	LESS THAN 10
BENZO(g,h,i)PERYLENE	LESS THAN 10
BENZO(k)FLUORANTHENE	LESS THAN 10
BIS (2-CHLOROETHOXY)METHANE	LESS THAN 10
BIS (2-CHLOROETHYL)ETHER	LESS THAN 10
BIS (2-CHLOROISOPROPYL)ETHER	LESS THAN 10
BIS (2-ETHYLHEXYL)PHTHALATE	LESS THAN 10
4-BROMOPHENYL PHENYL ETHER	LESS THAN 10
BUTYL BENZYL PHTHALATE	LESS THAN 10
2-CHLORONAPTHALENE	LESS THAN 10
4-CHLOROPHENYL PHENYL ETHER	LESS THAN 10
CHRYSENE	LESS THAN 10
DIBENZO(a,h)ANTHRACENE	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10

HAZLETON LABORATORIES AMERICA, INC.
3301 KINSMAN BLVD. • P.O. BOX 7545 • MADISON, WI 53707 • (608) 241-4471 • TLX 703956 HAZRAL MDS UD

SAMPLE NUMBER: 80403779

GROUND WATER: W-12, 4/14/88; 30248
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION (CONTINUED)

1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 10
DIETHYL PHTHALATE	LESS THAN 10
DIMETHYL PHTHALATE	LESS THAN 10
DI-N-BUTYL PHTHALATE	LESS THAN 10
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
1,2-DIPHENYLHYDRAZINE*(1)	LESS THAN 10
FLUORANTHENE	LESS THAN 10
FLUORENE	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
INDENO(1,2,3-cd)PYRENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
NITROBENZENE	LESS THAN 10
N-NITROSODIMETHYLAMINE	LESS THAN 10
N-NITROSODI-N-PROPYLAMINE	LESS THAN 10
N-NITROSODIPHENYLAMINE*(2)	LESS THAN 10
PHENANTHRENE	LESS THAN 10
PYRENE	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10

*(1) 1,2-DIPHENYLHYDRAZINE DETECTED AS AZOBENZENE.
*(2) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.051
BETA-BHC	LESS THAN 0.051
DELTA-BHC	LESS THAN 0.051
GAMMA-BHC (LINDANE)	LESS THAN 0.051
HEPTACHLOR	LESS THAN 0.051
ALDRIN	LESS THAN 0.051
HEPTACHLOR EPOXIDE	LESS THAN 0.051
ENDOSULFAN I	LESS THAN 0.051
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10
ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10

HAZLETON LABORATORIES AMERICA, INC.
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SAMPLE NUMBER: 80403779

GROUND WATER: W-12, 4/14/88; 30248
PROJECT NO. 643.05

PESTICIDE/PCB FRACTION (CONTINUED)

METHOXYCHLOR	LESS THAN 0.51
ENDRIN KETONE	LESS THAN 0.10
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.51
PCB-1221	LESS THAN 0.51
PCB-1232	LESS THAN 0.51
PCB-1242	LESS THAN 0.51
PCB-1248	LESS THAN 0.51
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0
ENDRIN ALDEHYDE	LESS THAN 0.10
TECHNICAL CHLORDANE	LESS THAN 0.51

METHOD REFERENCES

VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 624, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 624 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43373-43384, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8240, U.S. EPA, WASHINGTON DC (REVISED APRIL 1984)

SEMI-VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

SAMPLE DATE: 04/14/88

PROJECT #: 643.05

REPORT DATE: 05/13/88

RMT SAMPLE #: 30248

W.O.#: 041988-0064305

DESCRIPTION: W-12

GROUND WATER
MONITORING RESULTS

Parameters	Result	Units	Detection limit
Antimony	ND	mg/l	0.06
Arsenic	0.007	mg/l	0.004
Beryllium	0.018	mg/l	0.002
Cadmium	ND	mg/l	0.005
Chromium	ND	mg/l	0.01
Copper	ND	mg/l	0.02
Cyanide	ND	mg/l	0.017
Lead	ND	mg/l	0.002
Mercury	ND	mg/l	0.0002
Nickel	0.03	mg/l	0.02
Phenols	ND	mg/l	0.005
Selenium	ND	mg/l	0.003
Silver	ND	mg/l	0.0002
Thallium	ND	mg/l	0.10
Zinc	0.055	mg/l	0.004

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

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REPORT OF ANALYSIS

SUE WELLS
RMT, INCORPORATED
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

SAMPLE NUMBER: 80403781

DATE ENTERED: 04/19/88

REPORT PRINTED: 05/31/88

GROUND WATER: W-13, 4/15/88; 30255
PROJECT NO. 643.05

PURCHASE ORDER NUMBER: 16924

VOLATILE FRACTION

COMPOUND NAME	MCG/L
ACROLEIN	LESS THAN 50
ACRYLONITRILE	LESS THAN 50
BENZENE	LESS THAN 5
BIS (CHLOROMETHYL)ETHER*(1)	N/A
BROMOFORM	LESS THAN 5
CARBON TETRACHLORIDE	LESS THAN 5
CHLOROBENZENE	LESS THAN 5
CHLORODIBROMOMETHANE	LESS THAN 5
CHLOROETHANE	LESS THAN 10
2-CHLORO-ETHYLVINYL ETHER	LESS THAN 10
CHLOROFORM	2 JB (4J)
DICHLOROBROMOMETHANE	LESS THAN 5
DICHLORODIFLUOROMETHANE*(2)	N/A
1,1-DICHLOROETHANE	LESS THAN 5
1,2-DICHLOROETHANE	LESS THAN 5
1,1-DICHLOROETHYLENE	LESS THAN 5
1,2-DICHLOROPROPANE	LESS THAN 5
1,3-DICHLOROPROPYLENE	LESS THAN 5
ETHYLBENZENE	LESS THAN 5
METHYL BROMIDE	LESS THAN 10
METHYL CHLORIDE	LESS THAN 10
METHYLENE CHLORIDE	81 B (5)
1,1,2,2-TETRACHLOROETHANE	LESS THAN 5
TETRACHLOROETHYLENE	LESS THAN 5
TOLUENE	1 JB (.8J)
1,2-TRANS-DICHLOROETHYLENE	LESS THAN 5
1,1,1-TRICHLOROETHANE	LESS THAN 5
1,1,2-TRICHLOROETHANE	LESS THAN 5
TRICHLOROETHYLENE	LESS THAN 5
TRICHLOROFLUOROMETHANE*(2)	N/A
VINYL CHLORIDE	LESS THAN 10

*(1) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 10723, FEB. 4, 1981)
*(2) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 46103, JAN. 8, 1981)

SAMPLE NUMBER: 80403781

GROUND WATER: W-13, 4/15/88; 30255
PROJECT NO. 643.05

VOLATILE FRACTION (CONTINUED)

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

'B' INDICATES THE ANALYTE WAS FOUND IN THE BLANK AS WELL AS THE SAMPLE. THE CONCENTRATION SHOWN IN PARENTHESIS WAS DETECTED IN THE METHOD BLANK.

SEMI-VOLATILE FRACTION

ACID FRACTION

COMPOUND NAME	MCG/L
2-CHLOROPHENOL	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
4,6-DINITRO-O-CRESOL	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
4-NITROPHENOL	LESS THAN 10
P-CHLORO-M-CRESOL	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 10
PHENOL	LESS THAN 10
2,4,6-TRICHLOROPHENOL	LESS THAN 10

BASE/NEUTRAL FRACTION

COMPOUND NAME	MCG/L
ACENAPHTHENE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
BENZIDINE	LESS THAN 50
BENZO(a)ANTHRACENE	LESS THAN 10
BENZO(a)PYRENE	LESS THAN 10
3,4-BENZOFLUORANTHENE	LESS THAN 10
BENZO(g,h,i)PERYLENE	LESS THAN 10
BENZO(k)FLUORANTHENE	LESS THAN 10
BIS (2-CHLOROETHOXY)METHANE	LESS THAN 10
BIS (2-CHLOROETHYL)ETHER	LESS THAN 10
BIS (2-CHLOROISOPROPYL)ETHER	LESS THAN 10
BIS (2-ETHYLHEXYL)PHTHALATE	LESS THAN 10
4-BROMOPHENYL PHENYL ETHER	LESS THAN 10
BUTYL BENZYL PHTHALATE	LESS THAN 10
2-CHLORONAPTHALENE	LESS THAN 10
4-CHLOROPHENYL PHENYL ETHER	LESS THAN 10
CHRYSENE	LESS THAN 10
DIBENZO(a,h)ANTHRACENE	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10

SAMPLE NUMBER: 80403781

GROUND WATER: W-13, 4/15/88; 30255
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION (CONTINUED)

1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 10
DIETHYL PHTHALATE	LESS THAN 10
DIMETHYL PHTHALATE	LESS THAN 10
DI-N-BUTYL PHTHALATE	LESS THAN 10
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
1,2-DIPHENYLHYDRAZINE*(1)	LESS THAN 10
FLUORANTHENE	LESS THAN 10
FLUORENE	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
INDENO(1,2,3-cd)PYRENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
NITROBENZENE	LESS THAN 10
N-NITROSODIMETHYLAMINE	LESS THAN 10
N-NITROSODI-N-PROPYLAMINE	LESS THAN 10
N-NITROSODIPHENYLAMINE*(2)	LESS THAN 10
PHENANTHRENE	LESS THAN 10
PYRENE	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10

*(1) 1,2-DIPHENYLHYDRAZINE DETECTED AS AZOBENZENE.
*(2) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.051
BETA-BHC	LESS THAN 0.051
DELTA-BHC	LESS THAN 0.051
GAMMA-BHC (LINDANE)	LESS THAN 0.051
HEPTACHLOR	LESS THAN 0.051
ALDRIN	LESS THAN 0.051
HEPTACHLOR EPOXIDE	LESS THAN 0.051
ENDOSULFAN I	LESS THAN 0.051
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10
ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10

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SAMPLE NUMBER: 80403781

GROUND WATER: W-13, 4/15/88; 30255
PROJECT NO. 643.05

PESTICIDE/PCB FRACTION (CONTINUED)

METHOXYCHLOR	LESS THAN 0.51
ENDRIN KETONE	LESS THAN 0.10
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.51
PCB-1221	LESS THAN 0.51
PCB-1232	LESS THAN 0.51
PCB-1242	LESS THAN 0.51
PCB-1248	LESS THAN 0.51
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0
ENDRIN ALDEHYDE	LESS THAN 0.10
TECHNICAL CHLORDANE	LESS THAN 0.51

METHOD REFERENCES

VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 624, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 624 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43373-43384, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8240, U.S. EPA, WASHINGTON DC (REVISED APRIL 1984)

SEMI-VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

PROJECT #: 643.05

RMT SAMPLE #: 30255

DESCRIPTION: W-13

SAMPLE DATE: 04/15/88

REPORT DATE: 05/13/88

W.O.#: 041988-0064305

GROUND WATER
MONITORING RESULTS

Parameters	Result	Units	Detection limit
Antimony	ND	mg/l	0.06
Arsenic	ND	mg/l	0.004
Beryllium	ND	mg/l	0.002
Cadmium	ND	mg/l	0.005
Chromium	ND	mg/l	0.01
Copper	ND	mg/l	0.02
Cyanide	ND	mg/l	0.010
Lead	ND	mg/l	0.002
Mercury	0.002	mg/l	0.0002
Nickel	ND	mg/l	0.02
Phenols	ND	mg/l	0.005
Selenium	ND	mg/l	0.003
Silver	ND	mg/l	0.0002
Thallium	ND	mg/l	0.10
Zinc	ND	mg/l	0.004

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

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REPORT OF ANALYSIS

SUE WELLS
RMT, INCORPORATED
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

SAMPLE NUMBER: 80403545
DATE ENTERED: 04/18/88
REPORT PRINTED: 05/31/88

GROUND WATER: TRIP BLANK 4/8/88; 30151
PROJECT NO. 643.05

PURCHASE ORDER NUMBER: 16906

VOLATILE FRACTION

COMPOUND NAME	MCG/L
ACROLEIN	LESS THAN 50
ACRYLONITRILE	LESS THAN 50
BENZENE	LESS THAN 5
BIS (CHLOROMETHYL)ETHER*(1)	N/A
BROMOFORM	LESS THAN 5
CARBON TETRACHLORIDE	LESS THAN 5
CHLOROBENZENE	LESS THAN 5
CHLORODIBROMOMETHANE	LESS THAN 5
CHLOROETHANE	LESS THAN 10
2-CHLORO-ETHYLVINYL ETHER	LESS THAN 10
CHLOROFORM	LESS THAN 5
DICHLOROBROMOMETHANE	LESS THAN 5
DICHLORODIFLUOROMETHANE*(2)	N/A
1,1-DICHLOROETHANE	LESS THAN 5
1,2-DICHLOROETHANE	LESS THAN 5
1,1-DICHLOROETHYLENE	LESS THAN 5
1,2-DICHLOROPROPANE	LESS THAN 5
1,3-DICHLOROPROPYLENE	LESS THAN 5
ETHYLBENZENE	LESS THAN 5
METHYL BROMIDE	LESS THAN 10
METHYL CHLORIDE	LESS THAN 10
METHYLENE CHLORIDE	10 B (14)
1,1,2,2-TETRACHLOROETHANE	LESS THAN 5
TETRACHLOROETHYLENE	LESS THAN 5
TOLUENE	1 JB (.9J)
1,2-TRANS-DICHLOROETHYLENE	LESS THAN 5
1,1,1-TRICHLOROETHANE	2 JB (2J)
1,1,2-TRICHLOROETHANE	LESS THAN 5
TRICHLOROETHYLENE	LESS THAN 5
TRICHLOROFLUOROMETHANE*(2)	N/A
VINYL CHLORIDE	LESS THAN 10

*(1) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 10723, FEB. 4, 1981)
*(2) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 46103, JAN. 8, 1981)

SAMPLE NUMBER: 80403545

GROUND WATER: TRIP BLANK 4/8/88; 30151
PROJECT NO. 643.05

VOLATILE FRACTION (CONTINUED)

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

'B' INDICATES THE ANALYTE WAS FOUND IN THE BLANK AS WELL AS THE SAMPLE. THE CONCENTRATION SHOWN IN PARENTHESIS WAS DETECTED IN THE METHOD BLANK.

SEMI-VOLATILE FRACTION

ACID FRACTION

COMPOUND NAME	MCG/L
2-CHLOROPHENOL	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
4,6-DINITRO-O-CRESOL	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
4-NITROPHENOL	LESS THAN 10
P-CHLORO-M-CRESOL	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 10
PHENOL	2 J
2,4,6-TRICHLOROPHENOL	LESS THAN 10

BASE/NEUTRAL FRACTION

COMPOUND NAME	MCG/L
ACENAPHTHENE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
BENZIDINE	LESS THAN 50
BENZO(a)ANTHRACENE	LESS THAN 10
BENZO(a)PYRENE	LESS THAN 10
3,4-BENZOFLUORANTHENE	LESS THAN 10
BENZO(g,h,i)PERYLENE	LESS THAN 10
BENZO(k)FLUORANTHENE	LESS THAN 10
BIS (2-CHLOROETHOXY)METHANE	LESS THAN 10
BIS (2-CHLOROETHYL)ETHER	LESS THAN 10
BIS (2-CHLOROISOPROPYL)ETHER	LESS THAN 10
BIS (2-ETHYLHEXYL)PHTHALATE	LESS THAN 10
4-BROMOPHENYL PHENYL ETHER	LESS THAN 10
BUTYL BENZYL PHTHALATE	LESS THAN 10
2-CHLORONAPTHALENE	LESS THAN 10
4-CHLOROPHENYL PHENYL ETHER	LESS THAN 10
CHRYSENE	LESS THAN 10
DIBENZO(a,h)ANTHRACENE	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10

SAMPLE NUMBER: 80403545

GROUND WATER: TRIP BLANK 4/8/88; 30151
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION (CONTINUED)

1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 10
DIETHYL PHTHALATE	LESS THAN 10
DIMETHYL PHTHALATE	LESS THAN 10
DI-N-BUTYL PHTHALATE	2 JB (1 J)
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
1,2-DIPHENYLHYDRAZINE*(1)	LESS THAN 10
FLUORANTHENE	LESS THAN 10
FLUORENE	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
INDENO(1,2,3-cd)PYRENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
NITROBENZENE	LESS THAN 10
N-NITROSODIMETHYLAMINE	LESS THAN 10
N-NITROSODI-N-PROPYLAMINE	LESS THAN 10
N-NITROSODIPHENYLAMINE*(2)	LESS THAN 10
PHENANTHRENE	LESS THAN 10
PYRENE	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10

*(1) 1,2-DIPHENYLHYDRAZINE DETECTED AS AZOBENZENE.
*(2) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

'B' INDICATES THE ANALYTE WAS FOUND IN THE BLANK AS WELL AS THE SAMPLE. THE CONCENTRATION SHOWN IN PARENTHESIS WAS DETECTED IN THE METHOD BLANK.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.052
BETA-BHC	LESS THAN 0.052
DELTA-BHC	LESS THAN 0.052
GAMMA-BHC (LINDANE)	LESS THAN 0.052
HEPTACHLOR	LESS THAN 0.052
ALDRIN	LESS THAN 0.052
HEPTACHLOR EPOXIDE	LESS THAN 0.052
ENDOSULFAN I	LESS THAN 0.052

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SAMPLE NUMBER: 80403545

GROUND WATER: TRIP BLANK 4/8/88; 30151
PROJECT NO. 643.05

PESTICIDE/PCB FRACTION (CONTINUED)

DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10
ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10
METHOXYCHLOR	LESS THAN 0.52
ENDRIN KETONE	LESS THAN 0.10
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.52
PCB-1221	LESS THAN 0.52
PCB-1232	LESS THAN 0.52
PCB-1242	LESS THAN 0.52
PCB-1248	LESS THAN 0.52
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0
ENDRIN ALDEHYDE	LESS THAN 0.38
TECHNICAL CHLORDANE	LESS THAN 0.52

METHOD REFERENCES

VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 624, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 624 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43373-43384, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8240, U.S. EPA, WASHINGTON DC (REVISED APRIL 1984)

SEMI-VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

SAMPLE NUMBER: 80403545

GROUND WATER: TRIP BLANK 4/8/88; 30151
PROJECT NO. 643.05

METHOD REFERENCES (CONTINUED)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

SAMPLE DATE: 04/08/88

PROJECT #: 643.05

REPORT DATE: 05/13/88

RMT SAMPLE #: 30151

W.O.#: 041388-0064305

DESCRIPTION: Trip Blank

GROUND WATER
MONITORING RESULTS

Parameters	Result	Units	Detection limit
Antimony	ND	mg/l	0.06
Arsenic	ND	mg/l	0.004
Beryllium	ND	mg/l	0.002
Cadmium	ND	mg/l	0.005
Chromium	ND	mg/l	0.01
Copper	ND	mg/l	0.02
Cyanide	ND	mg/l	0.010
Lead	ND	mg/l	0.002
Mercury	ND	mg/l	0.0002
Nickel	ND	mg/l	0.02
Phenols	ND	mg/l	0.005
Selenium	ND	mg/l	0.003
Silver	ND	mg/l	0.0002
Thallium	ND	mg/l	0.10
Total Organic Carbon	2.5	mg/l	0.25
Zinc	ND	mg/l	0.004

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

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3301 KINSMAN BLVD. • P.O. BOX 7545 • MADISON, WI 53707 • (608) 241-4471 • TLX 703956 HAZRAL MDS UD

REPORT OF ANALYSIS

SUE WELLS
RMT, INCORPORATED
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

SAMPLE NUMBER: 80403546
DATE ENTERED: 04/18/88
REPORT PRINTED: 05/31/88

GROUND WATER: FIELD BLANK 4/12/88; 30152
PROJECT NO. 643.05

PURCHASE ORDER NUMBER: 16906

VOLATILE FRACTION

COMPOUND NAME	MCG/L
ACROLEIN	LESS THAN 50
ACRYLONITRILE	LESS THAN 50
BENZENE	LESS THAN 5
BIS (CHLOROMETHYL)ETHER*(1)	N/A
BROMOFORM	LESS THAN 5
CARBON TETRACHLORIDE	LESS THAN 5
CHLOROBENZENE	LESS THAN 5
CHLORODIBROMOMETHANE	LESS THAN 5
CHLOROETHANE	LESS THAN 10
2-CHLORO-ETHYLVINYL ETHER	LESS THAN 10
CHLOROFORM	LESS THAN 5
DICHLOROBROMOMETHANE	LESS THAN 5
DICHLORODIFLUOROMETHANE*(2)	N/A
1,1-DICHLOROETHANE	LESS THAN 5
1,2-DICHLOROETHANE	LESS THAN 5
1,1-DICHLOROETHYLENE	LESS THAN 5
1,2-DICHLOROPROPANE	LESS THAN 5
1,3-DICHLOROPROPYLENE	LESS THAN 5
ETHYLBENZENE	LESS THAN 5
METHYL BROMIDE	LESS THAN 10
METHYL CHLORIDE	LESS THAN 10
METHYLENE CHLORIDE	LESS THAN 5
1,1,2,2-TETRACHLOROETHANE	LESS THAN 5
TETRACHLOROETHYLENE	LESS THAN 5
TOLUENE	1 JB (1J)
1,2-TRANS-DICHLOROETHYLENE	LESS THAN 5
1,1,1-TRICHLOROETHANE	LESS THAN 5
1,1,2-TRICHLOROETHANE	LESS THAN 5
TRICHLOROETHYLENE	LESS THAN 5
TRICHLOROFLUOROMETHANE*(2)	N/A
VINYL CHLORIDE	LESS THAN 10

*(1) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 10723, FEB. 4, 1981)
*(2) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 46103, JAN. 8, 1981)

SAMPLE NUMBER: 80403546

GROUND WATER: FIELD BLANK 4/12/88; 30152
PROJECT NO. 643.05

VOLATILE FRACTION (CONTINUED)

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

'B' INDICATES THE ANALYTE WAS FOUND IN THE BLANK AS WELL AS THE SAMPLE. THE CONCENTRATION SHOWN IN PARENTHESIS WAS DETECTED IN THE METHOD BLANK.

SEMI-VOLATILE FRACTION

ACID FRACTION

COMPOUND NAME	MCG/L
2-CHLOROPHENOL	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
4,6-DINITRO-O-CRESOL	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
4-NITROPHENOL	LESS THAN 10
P-CHLORO-M-CRESOL	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 10
PHENOL	LESS THAN 10
2,4,6-TRICHLOROPHENOL	LESS THAN 10

BASE/NEUTRAL FRACTION

COMPOUND NAME	MCG/L
ACENAPHTHENE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
BENZIDINE	LESS THAN 50
BENZO(a)ANTHRACENE	LESS THAN 10
BENZO(a)PYRENE	LESS THAN 10
3,4-BENZOFLUORANTHENE	LESS THAN 10
BENZO(g,h,i)PERYLENE	LESS THAN 10
BENZO(k)FLUORANTHENE	LESS THAN 10
BIS (2-CHLOROETHOXY)METHANE	LESS THAN 10
BIS (2-CHLOROETHYL)ETHER	LESS THAN 10
BIS (2-CHLOROISOPROPYL)ETHER	LESS THAN 10
BIS (2-ETHYLHEXYL)PHTHALATE	LESS THAN 10
4-BROMOPHENYL PHENYL ETHER	LESS THAN 10
BUTYL BENZYL PHTHALATE	LESS THAN 10
2-CHLORONAPTHALENE	LESS THAN 10
4-CHLOROPHENYL PHENYL ETHER	LESS THAN 10
CHRYSENE	LESS THAN 10
DIBENZO(a,h)ANTHRACENE	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10

SAMPLE NUMBER: 80403546

GROUND WATER: FIELD BLANK 4/12/88; 30152
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION (CONTINUED)

1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 10
DIETHYL PHTHALATE	LESS THAN 10
DIMETHYL PHTHALATE	LESS THAN 10
DI-N-BUTYL PHTHALATE	LESS THAN 10
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
1,2-DIPHENYLHYDRAZINE*(1)	LESS THAN 10
FLUORANTHENE	LESS THAN 10
FLUORENE	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
INDENO(1,2,3-cd)PYRENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
NITROBENZENE	LESS THAN 10
N-NITROSODIMETHYLAMINE	LESS THAN 10
N-NITROSODI-N-PROPYLAMINE	LESS THAN 10
N-NITROSODIPHENYLAMINE*(2)	LESS THAN 10
PHENANTHRENE	LESS THAN 10
PYRENE	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10

*(1) 1,2-DIPHENYLHYDRAZINE DETECTED AS AZOBENZENE.
*(2) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.055
BETA-BHC	LESS THAN 0.055
DELTA-BHC	LESS THAN 0.055
GAMMA-BHC (LINDANE)	LESS THAN 0.055
HEPTACHLOR	LESS THAN 0.055
ALDRIN	LESS THAN 0.055
HEPTACHLOR EPOXIDE	LESS THAN 0.055
ENDOSULFAN I	LESS THAN 0.055
DIELDRIN	LESS THAN 0.11
4,4'-DDE	LESS THAN 0.11
ENDRIN	LESS THAN 0.11
ENDOSULFAN II	LESS THAN 0.11
4,4'-DDD	LESS THAN 0.11
ENDOSULFAN SULFATE	LESS THAN 0.11
4,4'-DDT	LESS THAN 0.11

SAMPLE NUMBER: 80403546

GROUND WATER: FIELD BLANK 4/12/88; 30152
PROJECT NO. 643.05

PESTICIDE/PCB FRACTION (CONTINUED)

METHOXYCHLOR	LESS THAN 0.55
ENDRIN KETONE	LESS THAN 0.11
TOXAPHENE	LESS THAN 1.1
PCB-1016	LESS THAN 0.55
PCB-1221	LESS THAN 0.55
PCB-1232	LESS THAN 0.55
PCB-1242	LESS THAN 0.55
PCB-1248	LESS THAN 0.55
PCB-1254	LESS THAN 1.1
PCB-1260	LESS THAN 1.1
ENDRIN ALDEHYDE	LESS THAN 0.39
TECHNICAL CHLORDANE	LESS THAN 0.55

METHOD REFERENCES

VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 624, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 624 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43373-43384, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8240, U.S. EPA, WASHINGTON DC (REVISED APRIL 1984)

SEMI-VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

SAMPLE DATE: 04/12/88

PROJECT #: 643.05

REPORT DATE: 05/13/88

RMT SAMPLE #: 30152

W.O.#: 041388-0064305

DESCRIPTION: Field Blank

GROUND WATER MONITORING RESULTS

Parameters	Result	Units	Detection limit
Antimony	ND	mg/l	0.06
Arsenic	ND	mg/l	0.004
Beryllium	ND	mg/l	0.002
Cadmium	ND	mg/l	0.005
Chromium	ND	mg/l	0.01
Copper	ND	mg/l	0.02
Cyanide	ND	mg/l	0.010
Lead	ND	mg/l	0.002
Mercury	ND	mg/l	0.0002
Nickel	ND	mg/l	0.02
Phenols	ND	mg/l	0.005
Selenium	ND	mg/l	0.003
Silver	ND	mg/l	0.0002
Thallium	ND	mg/l	0.10
Total Organic Carbon	1.6	mg/l	0.25
Zinc	ND	mg/l	0.004

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

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REPORT OF ANALYSIS

SUE WELLS
RMT, INCORPORATED
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

SAMPLE NUMBER: 80403776
DATE ENTERED: 04/19/88
REPORT PRINTED: 05/31/88

GROUND WATER: TRIP BLANK, 4/14/88; 30245
PROJECT NO. 643.05

PURCHASE ORDER NUMBER: 16924

VOLATILE FRACTION

COMPOUND NAME	MCG/L
ACROLEIN	LESS THAN 50
ACRYLONITRILE	LESS THAN 50
BENZENE	LESS THAN 5
BIS (CHLOROMETHYL)ETHER*(1)	N/A
BROMOFORM	LESS THAN 5
CARBON TETRACHLORIDE	LESS THAN 5
CHLOROBENZENE	LESS THAN 5
CHLORODIBROMOMETHANE	LESS THAN 5
CHLOROETHANE	LESS THAN 10
2-CHLORO-ETHYLVINYL ETHER	LESS THAN 10
CHLOROFORM	LESS THAN 5
DICHLOROBROMOMETHANE	LESS THAN 5
DICHLORODIFLUOROMETHANE*(2)	N/A
1,1-DICHLOROETHANE	LESS THAN 5
1,2-DICHLOROETHANE	LESS THAN 5
1,1-DICHLOROETHYLENE	LESS THAN 5
1,2-DICHLOROPROPANE	LESS THAN 5
1,3-DICHLOROPROPYLENE	LESS THAN 5
ETHYLBENZENE	LESS THAN 5
METHYL BROMIDE	LESS THAN 10
METHYL CHLORIDE	LESS THAN 10
METHYLENE CHLORIDE	6 B (14)
1,1,2,2-TETRACHLOROETHANE	LESS THAN 5
TETRACHLOROETHYLENE	LESS THAN 5
TOLUENE	1 JB (.9J)
1,2-TRANS-DICHLOROETHYLENE	LESS THAN 5
1,1,1-TRICHLOROETHANE	LESS THAN 5
1,1,2-TRICHLOROETHANE	LESS THAN 5
TRICHLOROETHYLENE	LESS THAN 5
TRICHLOROFLUOROMETHANE*(2)	N/A
VINYL CHLORIDE	LESS THAN 10

*(1) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 10723, FEB. 4, 1981)
*(2) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 46103, JAN. 8, 1981)

HAZLETON LABORATORIES AMERICA, INC.
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GROUND WATER: TRIP BLANK, 4/14/88; 30245
PROJECT NO. 643.05

VOLATILE FRACTION (CONTINUED)

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

'B' INDICATES THE ANALYTE WAS FOUND IN THE BLANK AS WELL AS THE SAMPLE. THE CONCENTRATION SHOWN IN PARENTHESIS WAS DETECTED IN THE METHOD BLANK.

SEMI-VOLATILE FRACTION

ACID FRACTION

COMPOUND NAME	MCG/L
2-CHLOROPHENOL	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
4,6-DINITRO-O-CRESOL	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
4-NITROPHENOL	LESS THAN 10
P-CHLORO-M-CRESOL	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 10
PHENOL	2 J
2,4,6-TRICHLOROPHENOL	LESS THAN 10

BASE/NEUTRAL FRACTION

COMPOUND NAME	MCG/L
ACENAPHTHENE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
BENZIDINE	LESS THAN 51
BENZO(a)ANTHRACENE	LESS THAN 10
BENZO(a)PYRENE	LESS THAN 10
3,4-BENZOFLUORANTHENE	LESS THAN 10
BENZO(g,h,i)PERYLENE	LESS THAN 10
BENZO(k)FLUORANTHENE	LESS THAN 10
BIS (2-CHLOROETHOXY)METHANE	LESS THAN 10
BIS (2-CHLOROETHYL)ETHER	LESS THAN 10
BIS (2-CHLOROISOPROPYL)ETHER	LESS THAN 10
BIS (2-ETHYLHEXYL)PHTHALATE	2 J
4-BROMOPHENYL PHENYL ETHER	LESS THAN 10
BUTYL BENZYL PHTHALATE	LESS THAN 10
2-CHLORONAPTHALENE	LESS THAN 10
4-CHLOROPHENYL PHENYL ETHER	LESS THAN 10
CHRYSENE	LESS THAN 10
DIBENZO(a,h)ANTHRACENE	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10

HAZLETON LABORATORIES AMERICA, INC.
3301 KINSMAN BLVD. • P.O. BOX 7545 • MADISON, WI 53707 • (608) 241-4471 • TLX 703956 HAZRAL MDS UD

SAMPLE NUMBER: 80403776

GROUND WATER: TRIP BLANK, 4/14/88; 30245
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION (CONTINUED)

1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 10
DIETHYL PHTHALATE	LESS THAN 10
DIMETHYL PHTHALATE	LESS THAN 10
DI-N-BUTYL PHTHALATE	1 J
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
1,2-DIPHENYLHYDRAZINE*(1)	LESS THAN 10
FLUORANTHENE	LESS THAN 10
FLUORENE	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
INDENO(1,2,3-cd)PYRENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
NITROBENZENE	LESS THAN 10
N-NITROSODIMETHYLAMINE	LESS THAN 10
N-NITROSODI-N-PROPYLAMINE	LESS THAN 10
N-NITROSODIPHENYLAMINE*(2)	LESS THAN 10
PHENANTHRENE	LESS THAN 10
PYRENE	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10

*(1) 1,2-DIPHENYLHYDRAZINE DETECTED AS AZOBENZENE.
*(2) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.051
BETA-BHC	LESS THAN 0.051
DELTA-BHC	LESS THAN 0.051
GAMMA-BHC (LINDANE)	LESS THAN 0.051
HEPTACHLOR	LESS THAN 0.051
ALDRIN	LESS THAN 0.051
HEPTACHLOR EPOXIDE	LESS THAN 0.051
ENDOSULFAN I	LESS THAN 0.051
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10

HAZLETON LABORATORIES AMERICA, INC.
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SAMPLE NUMBER: 80403776

GROUND WATER: TRIP BLANK, 4/14/88; 30245
PROJECT NO. 643.05

PESTICIDE/PCB FRACTION (CONTINUED)

ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10
METHOXYCHLOR	LESS THAN 0.51
ENDRIN KETONE	LESS THAN 0.10
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.51
PCB-1221	LESS THAN 0.51
PCB-1232	LESS THAN 0.51
PCB-1242	LESS THAN 0.51
PCB-1248	LESS THAN 0.51
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0
ENDRIN ALDEHYDE	LESS THAN 0.10
TECHNICAL CHLORDANE	LESS THAN 0.51

METHOD REFERENCES

VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 624, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 624 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43373-43384, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8240, U.S. EPA, WASHINGTON DC (REVISED APRIL 1984)

SEMI-VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

SAMPLE NUMBER: 80403776

GROUND WATER: TRIP BLANK, 4/14/88; 30245
PROJECT NO. 643.05

METHOD REFERENCES (CONTINUED)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

SAMPLE DATE: 04/08/88

PROJECT #: 643.05

REPORT DATE: 05/13/88

RMT SAMPLE #: 30245

W.O.#: 041988-0064305

DESCRIPTION: Trip Blank

GROUND WATER
MONITORING RESULTS

Parameters	Result	Units	Detection limit
Antimony	ND	mg/l	0.06
Arsenic	ND	mg/l	0.004
Beryllium	ND	mg/l	0.002
Cadmium	ND	mg/l	0.005
Chromium	ND	mg/l	0.01
Copper	ND	mg/l	0.02
Cyanide	ND	mg/l	0.010
Lead	ND	mg/l	0.002
Mercury	ND	mg/l	0.0002
Nickel	ND	mg/l	0.02
Phenols	ND	mg/l	0.005
Selenium	ND	mg/l	0.003
Silver	ND	mg/l	0.0002
Thallium	ND	mg/l	0.10
Total Organic Carbon	0.9	mg/l	0.25
Zinc	ND	mg/l	0.004

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

HAZLETON LABORATORIES AMERICA, INC.
3301 KINSMAN BLVD. • P.O. BOX 7545 • MADISON, WI 53707 • (608) 241-4471 • TLX 703956 HAZRAL MDS UD

REPORT OF ANALYSIS

SUE WELLS
RMT, INCORPORATED
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

SAMPLE NUMBER: 80403778
DATE ENTERED: 04/19/88
REPORT PRINTED: 05/31/88

GROUND WATER: FIELD BLANK, 4/15/88; 30247
PROJECT NO. 643.05

PURCHASE ORDER NUMBER: 16924

VOLATILE FRACTION

COMPOUND NAME	MCG/L
ACROLEIN	LESS THAN 50
ACRYLONITRILE	LESS THAN 50
BENZENE	LESS THAN 5
BIS (CHLOROMETHYL)ETHER*(1)	N/A
BROMOFORM	LESS THAN 5
CARBON TETRACHLORIDE	LESS THAN 5
CHLOROBENZENE	LESS THAN 5
CHLORODIBROMOMETHANE	LESS THAN 5
CHLOROETHANE	LESS THAN 10
2-CHLORO-ETHYLVINYL ETHER	LESS THAN 10
CHLOROFORM	2 J
DICHLOROBROMOMETHANE	LESS THAN 5
DICHLORODIFLUOROMETHANE*(2)	N/A
1,1-DICHLOROETHANE	LESS THAN 5
1,2-DICHLOROETHANE	LESS THAN 5
1,1-DICHLOROETHYLENE	LESS THAN 5
1,2-DICHLOROPROPANE	LESS THAN 5
1,3-DICHLOROPROPYLENE	LESS THAN 5
ETHYLBENZENE	LESS THAN 5
METHYL BROMIDE	LESS THAN 10
METHYL CHLORIDE	LESS THAN 10
METHYLENE CHLORIDE	6 B (14)
1,1,2,2-TETRACHLOROETHANE	LESS THAN 5
TETRACHLOROETHYLENE	LESS THAN 5
TOLUENE	1 JB (.9)
1,2-TRANS-DICHLOROETHYLENE	LESS THAN 5
1,1,1-TRICHLOROETHANE	LESS THAN 5
1,1,2-TRICHLOROETHANE	LESS THAN 5
TRICHLOROETHYLENE	LESS THAN 5
TRICHLOROFLUOROMETHANE*(2)	N/A
VINYL CHLORIDE	LESS THAN 10

*(1) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 10723, FEB. 4, 1981)
*(2) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 46103, JAN. 8, 1981)

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SAMPLE NUMBER: 80403778

GROUND WATER: FIELD BLANK, 4/15/88; 30247
PROJECT NO. 643.05

VOLATILE FRACTION (CONTINUED)

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

'B' INDICATES THE ANALYTE WAS FOUND IN THE BLANK AS WELL AS THE SAMPLE. THE CONCENTRATION SHOWN IN PARENTHESIS WAS DETECTED IN THE METHOD BLANK.

SEMI-VOLATILE FRACTION

ACID FRACTION

COMPOUND NAME	MCG/L
2-CHLOROPHENOL	LESS THAN 11
2,4-DICHLOROPHENOL	LESS THAN 11
2,4-DIMETHYLPHENOL	LESS THAN 11
4,6-DINITRO-O-CRESOL	LESS THAN 11
2,4-DINITROPHENOL	LESS THAN 11
2-NITROPHENOL	LESS THAN 11
4-NITROPHENOL	LESS THAN 11
P-CHLORO-M-CRESOL	LESS THAN 11
PENTACHLOROPHENOL	LESS THAN 11
PHENOL	LESS THAN 11
2,4,6-TRICHLOROPHENOL	LESS THAN 11

BASE/NEUTRAL FRACTION

COMPOUND NAME	MCG/L
ACENAPHTHENE	LESS THAN 11
ACENAPHTHYLENE	LESS THAN 11
ANTHRACENE	LESS THAN 11
BENZIDINE	LESS THAN 55
BENZO(a)ANTHRACENE	LESS THAN 11
BENZO(a)PYRENE	LESS THAN 11
3,4-BENZOFLUORANTHENE	LESS THAN 11
BENZO(g,h,i)PERYLENE	LESS THAN 11
BENZO(k)FLUORANTHENE	LESS THAN 11
BIS (2-CHLOROETHOXY)METHANE	LESS THAN 11
BIS (2-CHLOROETHYL)ETHER	LESS THAN 11
BIS (2-CHLOROISOPROPYL)ETHER	LESS THAN 11
BIS (2-ETHYLHEXYL)PHTHALATE	3 J
4-BROMOPHENYL PHENYL ETHER	LESS THAN 11
BUTYL BENZYL PHTHALATE	LESS THAN 11
2-CHLORONAPTHALENE	LESS THAN 11
4-CHLOROPHENYL PHENYL ETHER	LESS THAN 11
CHRYSENE	LESS THAN 11
DIBENZO(a,h)ANTHRACENE	LESS THAN 11
1,2-DICHLOROBENZENE	LESS THAN 11

SAMPLE NUMBER: 80403778

GROUND WATER: FIELD BLANK, 4/15/88; 30247
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION (CONTINUED)

1,3-DICHLOROBENZENE	LESS THAN 11
1,4-DICHLOROBENZENE	LESS THAN 11
3,3'-DICHLOROBENZIDINE	LESS THAN 11
DIETHYL PHTHALATE	LESS THAN 11
DIMETHYL PHTHALATE	LESS THAN 11
DI-N-BUTYL PHTHALATE	LESS THAN 11
2,4-DINITROTOLUENE	LESS THAN 11
2,6-DINITROTOLUENE	LESS THAN 11
DI-N-OCTYL PHTHALATE	LESS THAN 11
1,2-DIPHENYLHYDRAZINE*(1)	LESS THAN 11
FLUORANTHENE	LESS THAN 11
FLUORENE	LESS THAN 11
HEXACHLOROBENZENE	LESS THAN 11
HEXACHLOROBUTADIENE	LESS THAN 11
HEXACHLOROCYCLOPENTADIENE	LESS THAN 11
HEXACHLOROETHANE	LESS THAN 11
INDENO(1,2,3-cd)PYRENE	LESS THAN 11
ISOPHORONE	LESS THAN 11
NAPHTHALENE	LESS THAN 11
NITROBENZENE	LESS THAN 11
N-NITROSODIMETHYLAMINE	LESS THAN 11
N-NITROSODI-N-PROPYLAMINE	LESS THAN 11
N-NITROSODIPHENYLAMINE*(2)	LESS THAN 11
PHENANTHRENE	LESS THAN 11
PYRENE	LESS THAN 11
1,2,4-TRICHLOROBENZENE	LESS THAN 11

*(1) 1,2-DIPHENYLHYDRAZINE DETECTED AS AZOBENZENE.
*(2) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.056
BETA-BHC	LESS THAN 0.056
DELTA-BHC	LESS THAN 0.056
GAMMA-BHC (LINDANE)	LESS THAN 0.056
HEPTACHLOR	LESS THAN 0.056
ALDRIN	LESS THAN 0.056
HEPTACHLOR EPOXIDE	LESS THAN 0.056
ENDOSULFAN I	LESS THAN 0.056
DIELDRIN	LESS THAN 0.11
4,4'-DDE	LESS THAN 0.11
ENDRIN	LESS THAN 0.11

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SAMPLE NUMBER: 80403778

GROUND WATER: FIELD BLANK, 4/15/88; 30247
PROJECT NO. 643.05

PESTICIDE/PCB FRACTION (CONTINUED)

ENDOSULFAN II	LESS THAN 0.11
4,4'-DDD	LESS THAN 0.11
ENDOSULFAN SULFATE	LESS THAN 0.11
4,4'-DDT	LESS THAN 0.11
METHOXYCHLOR	LESS THAN 0.56
ENDRIN KETONE	LESS THAN 0.11
TOXAPHENE	LESS THAN 1.1
PCB-1016	LESS THAN 0.56
PCB-1221	LESS THAN 0.56
PCB-1232	LESS THAN 0.56
PCB-1242	LESS THAN 0.56
PCB-1248	LESS THAN 0.56
PCB-1254	LESS THAN 1.1
PCB-1260	LESS THAN 1.1
ENDRIN ALDEHYDE	LESS THAN 0.11
TECHNICAL CHLORDANE	LESS THAN 0.56

METHOD REFERENCES

VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 624, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 624 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43373-43384, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8240, U.S. EPA, WASHINGTON DC (REVISED APRIL 1984)

SEMI-VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

GROUND WATER: FIELD BLANK, 4/15/88; 30247
PROJECT NO. 643.05

METHOD REFERENCES (CONTINUED)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

SAMPLE DATE: 04/15/88

PROJECT #: 643.05

REPORT DATE: 05/13/88

RMT SAMPLE #: 30247

W.O.#: 041988-0064305

DESCRIPTION: Field Blank

GROUND WATER
MONITORING RESULTS

Parameters	Result	Units	Detection limit
Antimony	ND	mg/l	0.06
Arsenic	ND	mg/l	0.004
Beryllium	ND	mg/l	0.002
Cadmium	ND	mg/l	0.005
Chromium	ND	mg/l	0.01
Copper	ND	mg/l	0.02
Cyanide	ND	mg/l	0.010
Lead	ND	mg/l	0.002
Mercury	ND	mg/l	0.0002
Nickel	ND	mg/l	0.02
Phenols	0.008	mg/l	0.005
Selenium	ND	mg/l	0.003
Silver	ND	mg/l	0.0002
Thallium	ND	mg/l	0.10
Total Organic Carbon	0.6	mg/l	0.25
Zinc	0.040	mg/l	0.004

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

SAMPLE NUMBER: 80404179

GROUND WATER: FIELD BLANK; 30272
PROJECT NO. 643.05

VOLATILE FRACTION (CONTINUED)

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

'B' INDICATES THE ANALYTE WAS FOUND IN THE BLANK AS WELL AS THE SAMPLE. THE CONCENTRATION SHOWN IN PARENTHESIS WAS DETECTED IN THE METHOD BLANK.

SEMI-VOLATILE FRACTION

ACID FRACTION

COMPOUND NAME	MCG/L
2-CHLOROPHENOL	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
4,6-DINITRO-O-CRESOL	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
4-NITROPHENOL	LESS THAN 10
P-CHLORO-M-CRESOL	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 10
PHENOL	LESS THAN 10
2,4,6-TRICHLOROPHENOL	LESS THAN 10

BASE/NEUTRAL FRACTION

COMPOUND NAME	MCG/L
ACENAPHTHENE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
BENZIDINE	LESS THAN 52
BENZO(a)ANTHRACENE	LESS THAN 10
BENZO(a)PYRENE	LESS THAN 10
3,4-BENZOFLUORANTHENE	LESS THAN 10
BENZO(g,h,i)PERYLENE	LESS THAN 10
BENZO(k)FLUORANTHENE	LESS THAN 10
BIS (2-CHLOROETHOXY)METHANE	LESS THAN 10
BIS (2-CHLOROETHYL)ETHER	LESS THAN 10
BIS (2-CHLOROISOPROPYL)ETHER	LESS THAN 10
BIS (2-ETHYLHEXYL)PHTHALATE	1 J
4-BROMOPHENYL PHENYL ETHER	LESS THAN 10
BUTYL BENZYL PHTHALATE	LESS THAN 10
2-CHLORONAPTHALENE	LESS THAN 10
4-CHLOROPHENYL PHENYL ETHER	LESS THAN 10
CHRYSENE	LESS THAN 10
DIBENZO(a,h)ANTHRACENE	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10

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REPORT OF ANALYSIS

SUE WELLS
RMT, INCORPORATED
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

SAMPLE NUMBER: 80404179

DATE ENTERED: 04/20/88

REPORT PRINTED: 05/31/88

GROUND WATER: FIELD BLANK; 30272
PROJECT NO. 643.05

PURCHASE ORDER NUMBER: 16944

VOLATILE FRACTION

COMPOUND NAME	MCG/L
ACROLEIN	LESS THAN 50
ACRYLONITRILE	LESS THAN 50
BENZENE	5
BIS (CHLOROMETHYL)ETHER*(1)	N/A
BROMOFORM	LESS THAN 5
CARBON TETRACHLORIDE	LESS THAN 5
CHLOROBENZENE	LESS THAN 5
CHLORODIBROMOMETHANE	LESS THAN 5
CHLOROETHANE	LESS THAN 10
2-CHLORO-ETHYLVINYL ETHER	LESS THAN 10
CHLOROFORM	2 JB (4J)
DICHLOROBROMOMETHANE	LESS THAN 5
DICHLORODIFLUOROMETHANE*(2)	N/A
1,1-DICHLOROETHANE	LESS THAN 5
1,2-DICHLOROETHANE	LESS THAN 5
1,1-DICHLOROETHYLENE	LESS THAN 5
1,2-DICHLOROPROPANE	LESS THAN 5
1,3-DICHLOROPROPYLENE	LESS THAN 5
ETHYLBENZENE	LESS THAN 5
METHYL BROMIDE	LESS THAN 10
METHYL CHLORIDE	LESS THAN 10
METHYLENE CHLORIDE	7 B (5)
1,1,2,2-TETRACHLOROETHANE	LESS THAN 5
TETRACHLOROETHYLENE	LESS THAN 5
TOLUENE	1 JB (.8J)
1,2-TRANS-DICHLOROETHYLENE	LESS THAN 5
1,1,1-TRICHLOROETHANE	LESS THAN 5
1,1,2-TRICHLOROETHANE	LESS THAN 5
TRICHLOROETHYLENE	LESS THAN 5
TRICHLOROFLUOROMETHANE*(2)	N/A
VINYL CHLORIDE	LESS THAN 10

*(1) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 10723, FEB. 4, 1981)
*(2) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 46103, JAN. 8, 1981)

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GROUND WATER: FIELD BLANK; 30272
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION (CONTINUED)

1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 10
DIETHYL PHTHALATE	LESS THAN 10
DIMETHYL PHTHALATE	LESS THAN 10
DI-N-BUTYL PHTHALATE	2 J
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
1,2-DIPHENYLHYDRAZINE*(1)	LESS THAN 10
FLUORANTHENE	LESS THAN 10
FLUORENE	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
INDENO(1,2,3-cd)PYRENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
NITROBENZENE	LESS THAN 10
N-NITROSODIMETHYLAMINE	LESS THAN 10
N-NITROSODI-N-PROPYLAMINE	LESS THAN 10
N-NITROSODIPHENYLAMINE*(2)	LESS THAN 10
PHENANTHRENE	LESS THAN 10
PYRENE	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10

*(1) 1,2-DIPHENYLHYDRAZINE DETECTED AS AZOBENZENE.
*(2) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.052
BETA-BHC	LESS THAN 0.052
DELTA-BHC	LESS THAN 0.052
GAMMA-BHC (LINDANE)	LESS THAN 0.052
HEPTACHLOR	LESS THAN 0.052
ALDRIN	LESS THAN 0.052
HEPTACHLOR EPOXIDE	LESS THAN 0.052
ENDOSULFAN I	LESS THAN 0.052
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10

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SAMPLE NUMBER: 80404179

GROUND WATER: FIELD BLANK; 30272
PROJECT NO. 643.05

PESTICIDE/PCB FRACTION (CONTINUED)

ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10
METHOXYCHLOR	LESS THAN 0.52
ENDRIN KETONE	LESS THAN 0.10
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.52
PCB-1221	LESS THAN 0.52
PCB-1232	LESS THAN 0.52
PCB-1242	LESS THAN 0.52
PCB-1248	LESS THAN 0.52
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0
ENDRIN ALDEHYDE	LESS THAN 0.38
TECHNICAL CHLORDANE	LESS THAN 0.52

METHOD REFERENCES

VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 624, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 624 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43373-43384, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8240, U.S. EPA, WASHINGTON DC (REVISED APRIL 1984)

SEMI-VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

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GROUND WATER: FIELD BLANK; 30272
PROJECT NO. 643.05

METHOD REFERENCES (CONTINUED)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

PROJECT #: 643.05

RMT SAMPLE #: 30272

DESCRIPTION: Field Blank

SAMPLE DATE: 04/17/88

REPORT DATE: 05/13/88

W.O.#: 042088-0064305

GROUND WATER
MONITORING RESULTS

Parameters	Result	Units	Detection limit
Antimony	ND	mg/l	0.06
Arsenic	ND	mg/l	0.004
Beryllium	ND	mg/l	0.002
Cadmium	ND	mg/l	0.005
Chromium	ND	mg/l	0.01
Copper	ND	mg/l	0.02
Cyanide	ND	mg/l	0.010
Lead	ND	mg/l	0.004
Mercury	ND	mg/l	0.0002
Nickel	ND	mg/l	0.02
Phenols	ND	mg/l	0.005
Selenium	ND	mg/l	0.003
Silver	ND	mg/l	0.0002
Thallium	ND	mg/l	0.10
Total Organic Carbon	0.7	mg/l	0.25
Zinc	ND	mg/l	0.004

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

HAZLETON LABORATORIES AMERICA, INC.
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REPORT OF ANALYSIS

SUE WELLS
RMT, INCORPORATED
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

SAMPLE NUMBER: 80404181

DATE ENTERED: 04/20/88

REPORT PRINTED: 05/31/88

GROUND WATER: TRIP BLANK; 30274
PROJECT NO. 643.05

PURCHASE ORDER NUMBER: 16944

VOLATILE FRACTION

COMPOUND NAME	MCG/L
ACROLEIN	LESS THAN 50
ACRYLONITRILE	LESS THAN 50
BENZENE	LESS THAN 5
BIS (CHLOROMETHYL)ETHER*(1)	N/A
BROMOFORM	LESS THAN 5
CARBON TETRACHLORIDE	LESS THAN 5
CHLOROBENZENE	LESS THAN 5
CHLORODIBROMOMETHANE	LESS THAN 5
CHLOROETHANE	LESS THAN 10
2-CHLORO-ETHYLVINYL ETHER	LESS THAN 10
CHLOROFORM	2 JB (4J)
DICHLOROBROMOMETHANE	LESS THAN 5
DICHLORODIFLUOROMETHANE*(2)	N/A
1,1-DICHLOROETHANE	LESS THAN 5
1,2-DICHLOROETHANE	LESS THAN 5
1,1-DICHLOROETHYLENE	LESS THAN 5
1,2-DICHLOROPROPANE	LESS THAN 5
1,3-DICHLOROPROPYLENE	LESS THAN 5
ETHYLBENZENE	LESS THAN 5
METHYL BROMIDE	LESS THAN 10
METHYL CHLORIDE	LESS THAN 10
METHYLENE CHLORIDE	40 B (5)
1,1,2,2-TETRACHLOROETHANE	LESS THAN 5
TETRACHLOROETHYLENE	LESS THAN 5
TOLUENE	1 JB (.8J)
1,2-TRANS-DICHLOROETHYLENE	LESS THAN 5
1,1,1-TRICHLOROETHANE	LESS THAN 5
1,1,2-TRICHLOROETHANE	LESS THAN 5
TRICHLOROETHYLENE	LESS THAN 5
TRICHLOROFLUOROMETHANE*(2)	N/A
VINYL CHLORIDE	LESS THAN 10

*(1) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 10723, FEB. 4, 1981)
*(2) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 46103, JAN. 8, 1981)

SAMPLE NUMBER: 80404181

GROUND WATER: TRIP BLANK; 30274
PROJECT NO. 643.05

VOLATILE FRACTION (CONTINUED)

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

'B' INDICATES THE ANALYTE WAS FOUND IN THE BLANK AS WELL AS THE SAMPLE. THE CONCENTRATION SHOWN IN PARENTHESIS WAS DETECTED IN THE METHOD BLANK.

SEMI-VOLATILE FRACTION

ACID FRACTION

COMPOUND NAME	MCG/L
2-CHLOROPHENOL	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
4,6-DINITRO-O-CRESOL	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
4-NITROPHENOL	LESS THAN 10
P-CHLORO-M-CRESOL	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 10
PHENOL	LESS THAN 10
2,4,6-TRICHLOROPHENOL	LESS THAN 10

BASE/NEUTRAL FRACTION

COMPOUND NAME	MCG/L
ACENAPHTHENE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
BENZIDINE	LESS THAN 52
BENZO(a)ANTHRACENE	LESS THAN 10
BENZO(a)PYRENE	LESS THAN 10
3,4-BENZOFLUORANTHENE	LESS THAN 10
BENZO(g,h,i)PERYLENE	LESS THAN 10
BENZO(k)FLUORANTHENE	LESS THAN 10
BIS (2-CHLOROETHOXY)METHANE	LESS THAN 10
BIS (2-CHLOROETHYL)ETHER	LESS THAN 10
BIS (2-CHLOROISOPROPYL)ETHER	LESS THAN 10
BIS (2-ETHYLHEXYL)PHTHALATE	2 J
4-BROMOPHENYL PHENYL ETHER	LESS THAN 10
BUTYL BENZYL PHTHALATE	LESS THAN 10
2-CHLORONAPTHALENE	LESS THAN 10
4-CHLOROPHENYL PHENYL ETHER	LESS THAN 10
CHRYSENE	LESS THAN 10
DIBENZO(a,h)ANTHRACENE	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10

SAMPLE NUMBER: 80404181

GROUND WATER: TRIP BLANK; 30274
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION (CONTINUED)

1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 10
DIETHYL PHTHALATE	LESS THAN 10
DIMETHYL PHTHALATE	LESS THAN 10
DI-N-BUTYL PHTHALATE	5 J
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
1,2-DIPHENYLHYDRAZINE*(1)	LESS THAN 10
FLUORANTHENE	LESS THAN 10
FLUORENE	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
INDENO(1,2,3-cd)PYRENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
NITROBENZENE	LESS THAN 10
N-NITROSODIMETHYLAMINE	LESS THAN 10
N-NITROSODI-N-PROPYLAMINE	LESS THAN 10
N-NITROSODIPHENYLAMINE*(2)	LESS THAN 10
PHENANTHRENE	LESS THAN 10
PYRENE	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10

*(1) 1,2-DIPHENYLHYDRAZINE DETECTED AS AZOBENZENE.
*(2) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.050
BETA-BHC	LESS THAN 0.050
DELTA-BHC	LESS THAN 0.050
GAMMA-BHC (LINDANE)	LESS THAN 0.050
HEPTACHLOR	LESS THAN 0.050
ALDRIN	LESS THAN 0.050
HEPTACHLOR EPOXIDE	LESS THAN 0.050
ENDOSULFAN I	LESS THAN 0.050
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10

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SAMPLE NUMBER: 80404181

GROUND WATER: TRIP BLANK; 30274
PROJECT NO. 643.05

PESTICIDE/PCB FRACTION (CONTINUED)

ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10
METHOXYCHLOR	LESS THAN 0.50
ENDRIN KETONE	LESS THAN 0.10
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.50
PCB-1221	LESS THAN 0.50
PCB-1232	LESS THAN 0.50
PCB-1242	LESS THAN 0.50
PCB-1248	LESS THAN 0.50
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0
ENDRIN ALDEHYDE	LESS THAN 0.10
TECHNICAL CHLORDANE	LESS THAN 0.50

METHOD REFERENCES

VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 624, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 624 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43373-43384, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8240, U.S. EPA, WASHINGTON DC (REVISED APRIL 1984)

SEMI-VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

SAMPLE NUMBER: 80404181

GROUND WATER: TRIP BLANK; 30274
PROJECT NO. 643.05

METHOD REFERENCES (CONTINUED)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

SAMPLE DATE: 04/08/88

PROJECT #: 643.05

REPORT DATE: 05/13/88

RMT SAMPLE #: 30274

W.O.#: 042088-0064305

DESCRIPTION: Trip Blank

GROUND WATER
MONITORING RESULTS

Parameters	Result	Units	Detection limit
Antimony	ND	mg/l	0.06
Arsenic	ND	mg/l	0.004
Beryllium	ND	mg/l	0.002
Cadmium	ND	mg/l	0.005
Chromium	ND	mg/l	0.01
Copper	ND	mg/l	0.02
Cyanide	ND	mg/l	0.010
Lead	ND	mg/l	0.004
Mercury	ND	mg/l	0.0002
Nickel	ND	mg/l	0.02
Phenols	0.015	mg/l	0.005
Selenium	ND	mg/l	0.003
Silver	ND	mg/l	0.0002
Thallium	ND	mg/l	0.10
Total Organic Carbon	ND	mg/l	0.25
Zinc	0.018	mg/l	0.004

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

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REPORT OF ANALYSIS

SUE WELLS
RMT, INCORPORATED
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

SAMPLE NUMBER: 80404689

DATE ENTERED: 04/21/88

REPORT PRINTED: 05/31/88

GROUND WATER: TRIP BLANK; 30299
PROJECT NO. 643.05

PURCHASE ORDER NUMBER: 16954

VOLATILE FRACTION

COMPOUND NAME	MCG/L
ACROLEIN	LESS THAN 50
ACRYLONITRILE	LESS THAN 50
BENZENE	LESS THAN 5
BIS (CHLOROMETHYL)ETHER*(1)	N/A
BROMOFORM	LESS THAN 5
CARBON TETRACHLORIDE	LESS THAN 5
CHLOROBENZENE	LESS THAN 5
CHLORODIBROMOMETHANE	LESS THAN 5
CHLOROETHANE	LESS THAN 10
2-CHLORO-ETHYLVINYL ETHER	LESS THAN 10
CHLOROFORM	LESS THAN 5
DICHLOROBROMOMETHANE	LESS THAN 5
DICHLORODIFLUOROMETHANE*(2)	N/A
1,1-DICHLOROETHANE	LESS THAN 5
1,2-DICHLOROETHANE	LESS THAN 5
1,1-DICHLOROETHYLENE	LESS THAN 5
1,2-DICHLOROPROPANE	LESS THAN 5
1,3-DICHLOROPROPYLENE	LESS THAN 5
ETHYLBENZENE	LESS THAN 5
METHYL BROMIDE	LESS THAN 10
METHYL CHLORIDE	LESS THAN 10
METHYLENE CHLORIDE	LESS THAN 5
1,1,2,2-TETRACHLOROETHANE	LESS THAN 5
TETRACHLOROETHYLENE	LESS THAN 5
TOLUENE	LESS THAN 5
1,2-TRANS-DICHLOROETHYLENE	LESS THAN 5
1,1,1-TRICHLOROETHANE	LESS THAN 5
1,1,2-TRICHLOROETHANE	LESS THAN 5
TRICHLOROETHYLENE	LESS THAN 5
TRICHLOROFLUOROMETHANE*(2)	N/A
VINYL CHLORIDE	LESS THAN 10

*(1) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 10723, FEB. 4, 1981)
*(2) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 46103, JAN. 8, 1981)

SAMPLE NUMBER: 80404689

GROUND WATER: TRIP BLANK; 30299
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION

ACID FRACTION

COMPOUND NAME	MCG/L
2-CHLOROPHENOL	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
4,6-DINITRO-O-CRESOL	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
4-NITROPHENOL	LESS THAN 10
P-CHLORO-M-CRESOL	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 10
PHENOL	6 J
2,4,6-TRICHLOROPHENOL	LESS THAN 10

BASE/NEUTRAL FRACTION

COMPOUND NAME	MCG/L
ACENAPHTHENE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
BENZIDINE	LESS THAN 50
BENZO(a)ANTHRACENE	LESS THAN 10
BENZO(a)PYRENE	LESS THAN 10
3,4-BENZOFLUORANTHENE	LESS THAN 10
BENZO(g,h,i)PERYLENE	LESS THAN 10
BENZO(k)FLUORANTHENE	LESS THAN 10
BIS (2-CHLOROETHOXY)METHANE	LESS THAN 10
BIS (2-CHLOROETHYL)ETHER	LESS THAN 10
BIS (2-CHLOROISOPROPYL)ETHER	LESS THAN 10
BIS (2-ETHYLHEXYL)PHTHALATE	1 J
4-BROMOPHENYL PHENYL ETHER	LESS THAN 10
BUTYL BENZYL PHTHALATE	LESS THAN 10
2-CHLORONAPTHALENE	LESS THAN 10
4-CHLOROPHENYL PHENYL ETHER	LESS THAN 10
CHRYSENE	LESS THAN 10
DIBENZO(a,h)ANTHRACENE	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10
1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 10
DIETHYL PHTHALATE	LESS THAN 10
DIMETHYL PHTHALATE	LESS THAN 10
DI-N-BUTYL PHTHALATE	2 J
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
1,2-DIPHENYLHYDRAZINE*(1)	LESS THAN 10

SAMPLE NUMBER: 80404689

GROUND WATER: TRIP BLANK; 30299
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION (CONTINUED)

FLUORANTHENE	LESS THAN 10
FLUORENE	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
INDENO(1,2,3-cd)PYRENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
NITROBENZENE	LESS THAN 10
N-NITROSODIMETHYLAMINE	LESS THAN 10
N-NITROSODI-N-PROPYLAMINE	LESS THAN 10
N-NITROSODIPHENYLAMINE*(2)	LESS THAN 10
PHENANTHRENE	LESS THAN 10
PYRENE	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10

*(1) 1,2-DIPHENYLHYDRAZINE DETECTED AS AZOBENZENE.
*(2) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.052
BETA-BHC	LESS THAN 0.052
DELTA-BHC	LESS THAN 0.052
GAMMA-BHC (LINDANE)	LESS THAN 0.052
HEPTACHLOR	LESS THAN 0.052
ALDRIN	LESS THAN 0.052
HEPTACHLOR EPOXIDE	LESS THAN 0.052
ENDOSULFAN I	LESS THAN 0.052
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10
ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10
METHOXYCHLOR	LESS THAN 0.52
ENDRIN KETONE	LESS THAN 0.10
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.52
PCB-1221	LESS THAN 0.52
PCB-1232	LESS THAN 0.52

SAMPLE NUMBER: 80404689

GROUND WATER: TRIP BLANK; 30299
PROJECT NO. 643.05

PESTICIDE/PCB FRACTION (CONTINUED)

PCB-1242	LESS THAN 0.52
PCB-1248	LESS THAN 0.52
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0
ENDRIN ALDEHYDE	LESS THAN 0.10
TECHNICAL CHLORDANE	LESS THAN 0.52

METHOD REFERENCES

VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 624, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 624 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43373-43384, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8240, U.S. EPA, WASHINGTON DC (REVISED APRIL 1984)

SEMI-VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

SAMPLE DATE: 04/08/88

PROJECT #: 643.05

REPORT DATE: 05/13/88

RMT SAMPLE #: 30299

W.O.#: 042188-0064305

DESCRIPTION: Trip Blank

GROUND WATER
MONITORING RESULTS

Parameters	Result	Units	Detection limit
Antimony	ND	mg/l	0.06
Arsenic	ND	mg/l	0.004
Beryllium	ND	mg/l	0.002
Cadmium	ND	mg/l	0.005
Chromium	ND	mg/l	0.01
Copper	ND	mg/l	0.02
Cyanide	ND	mg/l	0.010
Lead	ND	mg/l	0.004
Mercury	ND	mg/l	0.0002
Nickel	ND	mg/l	0.02
Phenols	ND	mg/l	0.005
Selenium	ND	mg/l	0.003
Silver	ND	mg/l	0.0002
Thallium	ND	mg/l	0.10
Total Organic Carbon	0.3	mg/l	0.25
Zinc	0.006	mg/l	0.004

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

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REPORT OF ANALYSIS

SUE WELLS
RMT, INCORPORATED
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

SAMPLE NUMBER: 80404691
DATE ENTERED: 04/21/88
REPORT PRINTED: 05/31/88

GROUND WATER: FIELD BLANK; 30303
PROJECT NO. 643.05

PURCHASE ORDER NUMBER: 16954

VOLATILE FRACTION

COMPOUND NAME	MCG/L
ACROLEIN	LESS THAN 50
ACRYLONITRILE	LESS THAN 50
BENZENE	LESS THAN 5
BIS (CHLOROMETHYL)ETHER*(1)	N/A
BROMOFORM	LESS THAN 5
CARBON TETRACHLORIDE	LESS THAN 5
CHLOROBENZENE	LESS THAN 5
CHLORODIBROMOMETHANE	LESS THAN 5
CHLOROETHANE	LESS THAN 10
2-CHLORO-ETHYLVINYL ETHER	LESS THAN 10
CHLOROFORM	LESS THAN 5
DICHLOROBROMOMETHANE	LESS THAN 5
DICHLORODIFLUOROMETHANE*(2)	N/A
1,1-DICHLOROETHANE	LESS THAN 5
1,2-DICHLOROETHANE	LESS THAN 5
1,1-DICHLOROETHYLENE	LESS THAN 5
1,2-DICHLOROPROPANE	LESS THAN 5
1,3-DICHLOROPROPYLENE	LESS THAN 5
ETHYLBENZENE	LESS THAN 5
METHYL BROMIDE	LESS THAN 10
METHYL CHLORIDE	LESS THAN 10
METHYLENE CHLORIDE	LESS THAN 5
1,1,2,2-TETRACHLOROETHANE	LESS THAN 5
TETRACHLOROETHYLENE	LESS THAN 5
TOLUENE	LESS THAN 5
1,2-TRANS-DICHLOROETHYLENE	LESS THAN 5
1,1,1-TRICHLOROETHANE	LESS THAN 5
1,1,2-TRICHLOROETHANE	LESS THAN 5
TRICHLOROETHYLENE	LESS THAN 5
TRICHLOROFLUOROMETHANE*(2)	N/A
VINYL CHLORIDE	LESS THAN 10

*(1) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 10723, FEB. 4, 1981)
*(2) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 46103, JAN. 8, 1981)

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SAMPLE NUMBER: 80404691

GROUND WATER: FIELD BLANK; 30303
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION

ACID FRACTION

COMPOUND NAME	MCG/L
2-CHLOROPHENOL	LESS THAN 10
2,4-DICHLOROPHENOL	LESS THAN 10
2,4-DIMETHYLPHENOL	LESS THAN 10
4,6-DINITRO-O-CRESOL	LESS THAN 10
2,4-DINITROPHENOL	LESS THAN 10
2-NITROPHENOL	LESS THAN 10
4-NITROPHENOL	LESS THAN 10
P-CHLORO-M-CRESOL	LESS THAN 10
PENTACHLOROPHENOL	LESS THAN 10
PHENOL	LESS THAN 10
2,4,6-TRICHLOROPHENOL	LESS THAN 10

BASE/NEUTRAL FRACTION

COMPOUND NAME	MCG/L
ACENAPHTHENE	LESS THAN 10
ACENAPHTHYLENE	LESS THAN 10
ANTHRACENE	LESS THAN 10
BENZIDINE	LESS THAN 51
BENZO(a)ANTHRACENE	LESS THAN 10
BENZO(a)PYRENE	LESS THAN 10
3,4-BENZOFLUORANTHENE	LESS THAN 10
BENZO(g,h,i)PERYLENE	LESS THAN 10
BENZO(k)FLUORANTHENE	LESS THAN 10
BIS (2-CHLOROETHOXY)METHANE	LESS THAN 10
BIS (2-CHLOROETHYL)ETHER	LESS THAN 10
BIS (2-CHLOROISOPROPYL)ETHER	LESS THAN 10
BIS (2-ETHYLHEXYL)PHTHALATE	3 J
4-BROMOPHENYL PHENYL ETHER	LESS THAN 10
BUTYL BENZYL PHTHALATE	LESS THAN 10
2-CHLORONAPTHALENE	LESS THAN 10
4-CHLOROPHENYL PHENYL ETHER	LESS THAN 10
CHRYSENE	LESS THAN 10
DIBENZO(a,h)ANTHRACENE	LESS THAN 10
1,2-DICHLOROBENZENE	LESS THAN 10
1,3-DICHLOROBENZENE	LESS THAN 10
1,4-DICHLOROBENZENE	LESS THAN 10
3,3'-DICHLOROBENZIDINE	LESS THAN 10
DIETHYL PHTHALATE	LESS THAN 10
DIMETHYL PHTHALATE	LESS THAN 10
DI-N-BUTYL PHTHALATE	LESS THAN 10
2,4-DINITROTOLUENE	LESS THAN 10
2,6-DINITROTOLUENE	LESS THAN 10
DI-N-OCTYL PHTHALATE	LESS THAN 10
1,2-DIPHENYLHYDRAZINE*(1)	LESS THAN 10

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SAMPLE NUMBER: 80404691

GROUND WATER: FIELD BLANK; 30303
PROJECT NO. 643.05

SEMI-VOLATILE FRACTION (CONTINUED)

FLUORANTHENE	LESS THAN 10
FLUORENE	LESS THAN 10
HEXACHLOROBENZENE	LESS THAN 10
HEXACHLOROBUTADIENE	LESS THAN 10
HEXACHLOROCYCLOPENTADIENE	LESS THAN 10
HEXACHLOROETHANE	LESS THAN 10
INDENO(1,2,3-cd)PYRENE	LESS THAN 10
ISOPHORONE	LESS THAN 10
NAPHTHALENE	LESS THAN 10
NITROBENZENE	LESS THAN 10
N-NITROSODIMETHYLAMINE	LESS THAN 10
N-NITROSODI-N-PROPYLAMINE	LESS THAN 10
N-NITROSODIPHENYLAMINE*(2)	LESS THAN 10
PHENANTHRENE	LESS THAN 10
PYRENE	LESS THAN 10
1,2,4-TRICHLOROBENZENE	LESS THAN 10

*(1) 1,2-DIPHENYLHYDRAZINE DETECTED AS AZOBENZENE.
*(2) CANNOT BE SEPARATED FROM DIPHENYLAMINE.

'J' INDICATES AN ESTIMATED VALUE. MASS SPECTRAL DATA INDICATED THE PRESENCE OF A COMPOUND THAT MEETS THE IDENTIFICATION CRITERIA BUT THE RESULT IS LESS THAN THE SPECIFIED DETECTION LIMIT BUT GREATER THAN ZERO.

PESTICIDE/PCB FRACTION

COMPOUND NAME	MCG/L
ALPHA-BHC	LESS THAN 0.051
BETA-BHC	LESS THAN 0.051
DELTA-BHC	LESS THAN 0.051
GAMMA-BHC (LINDANE)	LESS THAN 0.051
HEPTACHLOR	LESS THAN 0.051
ALDRIN	LESS THAN 0.051
HEPTACHLOR EPOXIDE	LESS THAN 0.051
ENDOSULFAN I	LESS THAN 0.051
DIELDRIN	LESS THAN 0.10
4,4'-DDE	LESS THAN 0.10
ENDRIN	LESS THAN 0.10
ENDOSULFAN II	LESS THAN 0.10
4,4'-DDD	LESS THAN 0.10
ENDOSULFAN SULFATE	LESS THAN 0.10
4,4'-DDT	LESS THAN 0.10
METHOXYCHLOR	LESS THAN 0.51
ENDRIN KETONE	LESS THAN 0.10
TOXAPHENE	LESS THAN 1.0
PCB-1016	LESS THAN 0.51
PCB-1221	LESS THAN 0.51
PCB-1232	LESS THAN 0.51

HAZLETON LABORATORIES AMERICA, INC.
3301 KINSMAN BLVD. • P.O. BOX 7545 • MADISON, WI 53707 • (608) 241-4471 • TLX 703956 HAZRAL MDS UD

GROUND WATER: FIELD BLANK; 30303
PROJECT NO. 643.05

PESTICIDE/PCB FRACTION (CONTINUED)

PCB-1242	LESS THAN 0.51
PCB-1248	LESS THAN 0.51
PCB-1254	LESS THAN 1.0
PCB-1260	LESS THAN 1.0
ENDRIN ALDEHYDE	LESS THAN 0.10
TECHNICAL CHLORDANE	LESS THAN 0.51

METHOD REFERENCES

VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 624, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 624 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43373-43384, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8240, U.S. EPA, WASHINGTON DC (REVISED APRIL 1984)

SEMI-VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 625, U.S. EPA, CINCNNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 625 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43385-43406, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8270, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

PESTICIDE/PCB FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 608, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 608 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43321-43336, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8080, U.S. EPA, WASHINGTON, DC (REVISED APRIL 1984)

RMT, INC.

LABORATORY REPORT

CLIENT: Beaufort-L

SAMPLE DATE: 04/18/88

PROJECT #: 643.05

REPORT DATE: 05/13/88

RMT SAMPLE #: 30303

W.O.#: 042188-0064305

DESCRIPTION: Field Blank

GROUND WATER
MONITORING RESULTS

Parameters	Result	Units	Detection limit
Antimony	ND	mg/l	0.06
Arsenic	ND	mg/l	0.004
Beryllium	ND	mg/l	0.002
Cadmium	ND	mg/l	0.005
Chromium	ND	mg/l	0.01
Copper	ND	mg/l	0.02
Cyanide	ND	mg/l	0.010
Lead	ND	mg/l	0.004
Mercury	ND	mg/l	0.0002
Nickel	ND	mg/l	0.02
Phenols	ND	mg/l	0.005
Selenium	ND	mg/l	0.003
Silver	ND	mg/l	0.0002
Thallium	ND	mg/l	0.10
Total Organic Carbon	0.4	mg/l	0.25
Zinc	0.004	mg/l	0.004

ND = Not Detected

Laboratory Director

96.04:LAB:beau0520

COMPOUND LIST - VOLATILE ORGANICS

SAMPLE IDENTIFIER: L-3
COMPUCHEM® SAMPLE NUMBER: 190911

		CONCENTRATION (ug/L)	DETECTION LIMIT (ug/L)
1V.	CHLOROMETHANE	BDL	10
2V.	BROMOMETHANE	BDL	10
3V.	VINYL CHLORIDE	BDL	10
4V.	CHLOROETHANE	BDL	10
5V.	METHYLENE CHLORIDE	BDL	10
6V.	ACROLEIN	BDL	100
7V.	ACRYLONITRILE	BDL	100
8V.	1,1-DICHLOROETHENE	BDL	10
9V.	1,1-DICHLOROETHANE	BDL	10
10V.	1,2-DICHLOROETHENE (TOTAL)	8 J	10
11V.	CHLOROFORM	BDL	10
12V.	1,2-DICHLOROETHANE	BDL	10
13V.	1,1,1-TRICHLOROETHANE	BDL	10
14V.	CARBON TETRACHLORIDE	BDL	10
15V.	BROMODICHLOROMETHANE	BDL	10
16V.	1,2-DICHLOROPROPANE	BDL	10
17V.	TRANS-1,3-DICHLOROPROPENE	BDL	10
18V.	TRICHLOROETHENE	170	10
19V.	DIBROMOCHLOROMETHANE	BDL	10
20V.	1,1,2-TRICHLOROETHANE	BDL	10
21V.	BENZENE	BDL	10
22V.	CIS-1,3-DICHLOROPROPENE	BDL	10
23V.	2-CHLOROETHYL VINYL ETHER	BDL	10
24V.	BROMOFORM	BDL	10
25V.	TETRACHLOROETHENE	BDL	10
26V.	1,1,2,2-TETRACHLOROETHANE	BDL	10
27V.	TOLUENE	BDL	10
28V.	CHLOROBENZENE	BDL	10
29V.	ETHYLBENZENE	BDL	10

Surrogate Recoveries - Introduced at the instrument, volatile surrogate standards are deuterated and/or select compounds that analytically mimic the response of certain analytes. Known concentrations of these surrogates are added to the sample and a percent recovery is calculated. This recovery acts as a barometer of method efficiency for the individual sample.

	% Recovery	Control Range %
D_4-1,2-Dichloroethane	96	(76-114)
4-Bromofluorobenzene	114	(86-115)
D_8-Toluene	104	(88-110)

BDL=BELOW DETECTION LIMIT

J - Estimated concentration of analyte which is present but at a concentration less than the stated detection limit.

COMPOUND LIST -- ACID EXTRACTABLES

SAMPLE IDENTIFIER: L-3
COMPUCHEM® SAMPLE NUMBER: 190907

		CONCENTRATION (ug/L)	DETECTION LIMIT (ug/L)
1A.	PHENOL	BDL	10
2A.	2-CHLOROPHENOL	BDL	10
3A.	2-NITROPHENOL	BDL	10
4A.	2,4-DIMETHYLPHENOL	BDL	10
5A.	2,4-DICHLOROPHENOL	BDL	10
6A.	4-CHLORO-M-METHYLPHENOL	BDL	10
7A.	2,4,6-TRICHLOROPHENOL	BDL	10
8A.	2,4-DINITROPHENOL	BDL	50
9A.	4-NITROPHENOL	BDL	50
10A.	4,6-DINITRO-2-METHYLPHENOL	BDL	50
11A.	PENTACHLOROPHENOL	BDL	50

Surrogate Recoveries - Introduced at the beginning of the extraction, surrogate standards are deuterated and/or select compounds that analytically mimic the response of certain analytes. Known concentrations of these surrogates are added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	%Recovery	Control Range%
2-Fluorophenol	31	(21-100)
D_5-Phenol	24	(10- 94)
2,4,6-Tribromophenol	43	(10-123)

BDL= BELOW DETECTION LIMIT

COMPOUND LIST -- BASE-NEUTRAL EXTRACTABLES

SAMPLE IDENTIFIER: L-3
COMPUCHEM® SAMPLE NUMBER: 190907

		CONCENTRATION (ug/L)	DETECTION LIMIT (ug/L)
1B.	N-NITROSODIMETHYLAMINE	BDL	10
2B.	BIS(2-CHLOROETHYL)ETHER	BDL	10
3B.	1,3-DICHLOROBENZENE	BDL	10
4B.	1,4-DICHLOROBENZENE	BDL	10
5B.	1,2-DICHLOROBENZENE	BDL	10
6B.	BIS(2-CHLOROISOPROPYL)ETHER	BDL	10
7B.	N-NITROSODI-N-PROPYLAMINE	BDL	10
8B.	HEXACHLOROETHANE	BDL	10
9B.	NITROBENZENE	BDL	10
10B.	ISOPHORONE	BDL	10
11B.	BIS(2-CHLOROETHOXY)METHANE	BDL	10
12B.	1,2,4-TRICHLOROBENZENE	BDL	10
13B.	NAPHTHALENE	BDL	10
14B.	HEXACHLOROBUTADIENE	BDL	10
15B.	HEXACHLOROCYCLOPENTADIENE	BDL	10
16B.	2-CHLORONAPHTHALENE	BDL	10
17B.	DIMETHYLPHTHALATE	BDL	10
18B.	ACENAPHTHYLENE	BDL	10
19B.	2,6-DINITROTOLUENE	BDL	10
20B.	ACENAPHTHENE	BDL	10
21B.	2,4-DINITROTOLUENE	BDL	10
22B.	DIETHYLPHTHALATE	BDL	10
23B.	4-CHLOROPHENYL PHENYL ETHER	BDL	10
24B.	FLUORENE	BDL	10
25B.	DIPHENYLAMINE(N-NITROSO)	BDL	10
26B.	1,2-DIPHENYLHYDRAZINE(AZOBENZENE)	BDL	10
27B.	4-BROMOPHENYL PHENYL ETHER	BDL	10
28B.	HEXACHLOROBENZENE	BDL	10

(Continued)

BDL=BELOW DETECTION LIMIT

COMPOUND LIST -- BASE-NEUTRAL EXTRACTABLES (Page Two)

SAMPLE IDENTIFIER: L-3
COMPUCHEM® SAMPLE NUMBER: 190907

		CONCENTRATION (ug/L)	DETECTION LIMIT (ug/L)
29B.	PHENANTHRENE	BDL	10
30B.	ANTHRACENE	BDL	10
31B.	DI-N-BUTYLPHTHALATE	BDL	10
32B.	FLUORANTHENE	BDL	10
33B.	PYRENE	BDL	10
34B.	BENZIDINE	BDL	50
35B.	BUTYLBENZYLPHTHALATE	BDL	10
37B.	3,3'-DICHLOROBENZIDINE	BDL	20
36B.	BENZO(A)ANTHRACENE	BDL	10
39B.	BIS(2-ETHYLHEXYL)PHTHALATE	BDL	10
38B.	CHRYSENE	BDL	10
40B.	DI-N-OCTYLPHTHALATE	BDL	10
41B.	BENZO(B)FLUORANTHENE	BDL	10
42B.	BENZO(K)FLUORANTHENE	BDL	10
43B.	BENZO(A)PYRENE	BDL	10
44B.	INDENO(1,2,3-C,D)PYRENE	BDL	10
45B.	DIBENZO(A,H)ANTHRACENE	BDL	10
46B.	BENZO(G,H,I)PERYLENE	BDL	10

Surrogates Recoveries - Introduced at the beginning of the extraction, surrogate standards are deuterated and/or select compounds that analytically mimic the response of certain analytes. Known concentrations of these surrogates are added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
D_5-Nitrobenzene	97	(35-114)
2-Fluorobiphenyl	94	(43-116)
D_{14}-Terphenyl	126	(33-141)
D_{10}-Pyrene*	129	*

BDL=BELOW DETECTION LIMIT
*Advisory Surrogate; therefore no control range

COMPOUND LIST -- PESTICIDES/PCBs

SAMPLE IDENTIFIER: L-3
COMPUCHEM® SAMPLE NUMBER: 190910

		CONCENTRATION (ug/L)	DETECTION LIMIT (ug/L)
1P.	ALDRIN	BDL	0.10
2P.	ALPHA-BHC	BDL	0.10
3P.	BETA-BHC	BDL	0.10
4P.	GAMMA-BHC	BDL	0.10
5P.	DELTA-BHC	BDL	0.10
6P.	CHLORDANE (TECHNICAL)	BDL	0.50
7P.	4,4'-DDT	BDL	0.10
8P.	4,4'-DDE	BDL	0.10
9P.	4,4'-DDD	BDL	0.10
10P.	DIELDRIN	BDL	0.10
11P.	ALPHA-ENDOSULFAN	BDL	0.10
12P.	BETA-ENDOSULFAN	BDL	0.10
13P.	ENDOSULFAN SULFATE	BDL	0.10
14P.	ENDRIN	BDL	0.10
15P.	ENDRIN ALDEHYDE	BDL	0.10
16P.	HEPTACHLOR	BDL	0.10
17P.	HEPTACHLOR EPOXIDE	BDL	0.10
18P.	PCB-1242	BDL	1.0
19P.	PCB-1254	BDL	1.0
20P.	PCB-1221	BDL	1.0
21P.	PCB-1232	BDL	1.0
22P.	PCB-1248	BDL	1.0
23P.	PCB-1260	BDL	1.0
24P.	PCB-1016	BDL	1.0
25P.	TOXAPHENE	BDL	1.0

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	68	(48-136)*

BDL=BELOW DETECTION LIMIT

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).

FORM I

ıpuChem Laboratories, Inc.
). Box 12652
)8 Chapel Hill/Nelson Highway
search Triangle Park, NC 27709

Client Sample No.
L-3

DATE 5/13/88

INORGANIC ANALYSIS DATA SHEET

NAME: Inorganics Laboratory — CASE NO: COMMERCIAL

NO: 785 — Lab Receipt Date 04/16/88

SAMPLE ID. NO. 190914 — QC REPORT NO COM1A

ELEMENTS IDENTIFIED AND MEASURED

CENTRATION: LOW XXX MEDIUM ____

RIX: WATER XXX SOIL ____ SLUDGE ____ OTHER ____

UNITS: ug/l

	Element	Value	Method		Element	Value	Method
.	Aluminum			13.	Magnesium		
.	Antimony	25U	P	14.	Manganese		
.	Arsenic	1.5U	F	15.	Mercury	.20U	CV
.	Barium			16.	Nickel	[36]	P
.	Beryllium	7.3	P	17.	Potassium		
.	Cadmium	4.1U	P	18.	Selenium	2.2U	F
.	Calcium			19.	Silver	4.4U	P
.	Chromium	5.0U	P	20.	Sodium		
.	Cobalt			21.	Thallium	1.8U	F
.	Copper	16U	P	22.	Vanadium		
.	Iron			23.	Zinc	37	P
.	Lead	2.3U	F				

nide ____ Percent Solids(%) ____

---

lags used: U = Element analyzed for but not detected
Value reported is the instrument detection limit.
[] = Value reported is less than contract-required detection limit
hods used: P = ICP; F = Furnace AA; CV = Cold Vapor

ments: CLEAR, COLORLESS

LAB MANAGER [signature]

COMPOUND LIST - CLASSICAL PARAMETERS

SAMPLE IDENTIFIER: L-3
COMPUCHEM SAMPLE NUMBER: 190913

	CONCENTRATION (ug/L)	DETECTION LIMIT (ug/L)
1. CYANIDE, TOTAL	BDL	10

BDL = BELOW DETECTION LIMITS

COMPOUND LIST - CLASSICAL PARAMETERS

SAMPLE IDENTIFIER: L-3
COMPUCHEM SAMPLE NUMBER: 190912

	CONCENTRATION (ug/L)	DETECTION LIMIT (ug/L)
1. PHENOLS, TOTAL	BDL	10

BDL = BELOW DETECTION LIMITS

COMPOUND LIST - VOLATILE ORGANICS

SAMPLE IDENTIFIER: W-12
COMPUCHEM® SAMPLE NUMBER: 190917

		CONCENTRATION (ug/L)	DETECTION LIMIT (ug/L)
1V.	CHLOROMETHANE	BDL	10
2V.	BROMOMETHANE	BDL	10
3V.	VINYL CHLORIDE	BDL	10
4V.	CHLOROETHANE	BDL	10
5V.	METHYLENE CHLORIDE	BDL	10
6V.	ACROLEIN	BDL	100
7V.	ACRYLONITRILE	BDL	100
8V.	1,1-DICHLOROETHENE	BDL	10
9V.	1,1-DICHLOROETHANE	BDL	10
10V.	1,2-DICHLOROETHENE,(TOTAL)	BDL	10
11V.	CHLOROFORM	BDL	10
12V.	1,2-DICHLOROETHANE	BDL	10
13V.	1,1,1-TRICHLOROETHANE	BDL	10
14V.	CARBON TETRACHLORIDE	BDL	10
15V.	BROMODICHLOROMETHANE	BDL	10
16V.	1,2-DICHLOROPROPANE	BDL	10
17V.	TRANS-1,3-DICHLOROPROPENE	BDL	10
18V.	TRICHLOROETHENE	BDL	10
19V.	DIBROMOCHLOROMETHANE	BDL	10
20V.	1,1,2-TRICHLOROETHANE	BDL	10
21V.	BENZENE	BDL	10
22V.	CIS-1,3-DICHLOROPROPENE	BDL	10
23V.	2-CHLOROETHYL VINYL ETHER	BDL	10
24V.	BROMOFORM	BDL	10
25V.	TETRACHLOROETHENE	BDL	10
26V.	1,1,2,2-TETRACHLOROETHANE	BDL	10
27V.	TOLUENE	BDL	10
28V.	CHLOROBENZENE	BDL	10
29V.	ETHYLBENZENE	BDL	10

Surrogate Recoveries - Introduced at the instrument, volatile surrogate standards are deuterated and/or select compounds that analytically mimic the response of certain analytes. Known concentrations of these surrogates are added to the sample and a percent recovery is calculated. This recovery acts as a barometer of method efficiency for the individual sample.

	% Recovery	Control Range%
D_4-1,2-Dichloroethane	92	(76-114)
4-Bromofluorobenzene	113	(86-115)
D_8-Toluene	107	(88-110)

BDL= BELOW DETECTION LIMIT

COMPOUND LIST -- ACID EXTRACTABLES

SAMPLE IDENTIFIER: W-12
COMPUCHEM® SAMPLE NUMBER: 190915

		CONCENTRATION (ug/L)	DETECTION LIMIT (ug/L)
1A.	PHENOL	BDL	10
2A.	2-CHLOROPHENOL	BDL	10
3A.	2-NITROPHENOL	BDL	10
4A.	2,4-DIMETHYLPHENOL	BDL	10
5A.	2,4-DICHLOROPHENOL	BDL	10
6A.	4-CHLORO-M-METHYLPHENOL	BDL	10
7A.	2,4,6-TRICHLOROPHENOL	BDL	10
8A.	2,4-DINITROPHENOL	BDL	50
9A.	4-NITROPHENOL	BDL	50
10A.	4,6-DINITRO-2-METHYLPHENOL	BDL	50
11A.	PENTACHLOROPHENOL	BDL	50

Surrogate Recoveries - Introduced at the beginning of the extraction, surrogate standards are deuterated and/or select compounds that analytically mimic the response of certain analytes. Known concentrations of these surrogates are added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	%Recovery	Control Range%
2-Fluorophenol	31	(21-100)
D_5-Phenol	25	(10- 94)
2,4,6-Tribromophenol	41	(10-123)

BDL= BELOW DETECTION LIMIT

COMPOUND LIST -- BASE-NEUTRAL EXTRACTABLES

SAMPLE IDENTIFIER: W-12
COMPUCHEM® SAMPLE NUMBER: 190915

		CONCENTRATION (ug/L)	DETECTION LIMIT (ug/L)
1B.	N-NITROSODIMETHYLAMINE	BDL	10
2B.	BIS(2-CHLOROETHYL)ETHER	BDL	10
3B.	1,3-DICHLOROBENZENE	BDL	10
4B.	1,4-DICHLOROBENZENE	BDL	10
5B.	1,2-DICHLOROBENZENE	BDL	10
6B.	BIS(2-CHLOROISOPROPYL)ETHER	BDL	10
7B.	N-NITROSODI-N-PROPYLAMINE	BDL	10
8B.	HEXACHLOROETHANE	BDL	10
9B.	NITROBENZENE	BDL	10
10B.	ISOPHORONE	BDL	10
11B.	BIS(2-CHLOROETHOXY)METHANE	BDL	10
12B.	1,2,4-TRICHLOROBENZENE	BDL	10
13B.	NAPHTHALENE	BDL	10
14B.	HEXACHLOROBUTADIENE	BDL	10
15B.	HEXACHLOROCYCLOPENTADIENE	BDL	10
16B.	2-CHLORONAPHTHALENE	BDL	10
17B.	DIMETHYLPHTHALATE	BDL	10
18B.	ACENAPHTHYLENE	BDL	10
19B.	2,6-DINITROTOLUENE	BDL	10
20B.	ACENAPHTHENE	BDL	10
21B.	2,4-DINITROTOLUENE	BDL	10
22B.	DIETHYLPHTHALATE	BDL	10
23B.	4-CHLOROPHENYL PHENYL ETHER	BDL	10
24B.	FLUORENE	BDL	10
25B.	DIPHENYLAMINE(N-NITROSO)	BDL	10
26B.	1,2-DIPHENYLHYDRAZINE(AZOBENZENE)	BDL	10
27B.	4-BROMOPHENYL PHENYL ETHER	BDL	10
28B.	HEXACHLOROBENZENE	BDL	10

(Continued)

BDL=BELOW DETECTION LIMIT

COMPOUND LIST -- BASE-NEUTRAL EXTRACTABLES (Page Two)

SAMPLE IDENTIFIER: W-12
COMPUCHEM® SAMPLE NUMBER: 190915

		CONCENTRATION (ug/L)	DETECTION LIMIT (ug/L)
29B.	PHENANTHRENE	BDL	10
30B.	ANTHRACENE	BDL	10
31B.	DI-N-BUTYLPHTHALATE	BDL	10
32B.	FLUORANTHENE	BDL	10
33B.	PYRENE	BDL	10
34B.	BENZIDINE	BDL	50
35B.	BUTYLBENZYLPHTHALATE	BDL	10
37B.	3,3'-DICHLOROBENZIDINE	BDL	20
36B.	BENZO(A)ANTHRACENE	BDL	10
39B.	BIS(2 ETHYLHEXYL)PHTHALATE	BDL	10
38B.	CHRYSENE	BDL	10
40B.	DI-N-OCTYLPHTHALATE	BDL	10
41B.	BENZO(B)FLUORANTHENE	BDL	10
42B.	BENZO(K)FLUORANTHENE	BDL	10
43B.	BENZO(A)PYRENE	BDL	10
44B.	INDENO(1,2,3-C,D)PYRENE	BDL	10
45B.	DIBENZO(A,H)ANTHRACENE	BDL	10
46B.	BENZO(G,H,I)PERYLENE	BDL	10

Surrogates Recoveries - Introduced at the beginning of the extraction, surrogate standards are deuterated and/or select compounds that analytically mimic the response of certain analytes. Known concentrations of these surrogates are added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
D_5-Nitrobenzene	99	(35-114)
2 Fluorobiphenyl	92	(43-116)
D_{14}-Terphenyl	118	(33-141)
D_{10}-Pyrene*	124	*

BDL=BELOW DETECTION LIMIT
*Advisory Surrogate; therefore no control range

COMPOUND LIST -- PESTICIDES/PCBs

SAMPLE IDENTIFIER: W-12
COMPUCHEM® SAMPLE NUMBER: 190916

		CONCENTRATION (ug/L)	DETECTION LIMIT (ug/L)
1P.	ALDRIN	BDL	0.10
2P.	ALPHA-BHC	BDL	0.10
3P.	BETA-BHC	BDL	0.10
4P.	GAMMA-BHC	BDL	0.10
5P.	DELTA-BHC	BDL	0.10
6P.	CHLORDANE (TECHNICAL)	BDL	0.50
7P.	4,4'-DDT	BDL	0.10
8P.	4,4'-DDE	BDL	0.10
9P.	4,4'-DDD	BDL	0.10
10P.	DIELDRIN	BDL	0.10
11P.	ALPHA-ENDOSULFAN	BDL	0.10
12P.	BETA-ENDOSULFAN	BDL	0.10
13P.	ENDOSULFAN SULFATE	BDL	0.10
14P.	ENDRIN	BDL	0.10
15P.	ENDRIN ALDEHYDE	BDL	0.10
16P.	HEPTACHLOR	BDL	0.10
17P.	HEPTACHLOR EPOXIDE	BDL	0.10
18P.	PCB-1242	BDL	1.0
19P.	PCB-1254	BDL	1.0
20P.	PCB-1221	BDL	1.0
21P.	PCB-1232	BDL	1.0
22P.	PCB-1248	BDL	1.0
23P.	PCB-1260	BDL	1.0
24P.	PCB-1016	BDL	1.0
25P.	TOXAPHENE	BDL	1.0

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and a percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	66	(48-136)*

BDL=BELOW DETECTION LIMIT

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).

FORM I

npuChem Laboratories, Inc.
O. Box 12652
08 Chapel Hill/Nelson Highway
search Triangle Park, NC 27709

Client Sample No.
W-12

DATE 5/13/88

INORGANIC ANALYSIS DATA SHEET

B NAME: Inorganics Laboratory CASE NO: COMMERCIAL

N NO: 785 Lab Receipt Date 04/16/88

B SAMPLE ID. NO. 190920 QC REPORT NO COM1A

ELEMENTS IDENTIFIED AND MEASURED

NCENTRATION: LOW XXX MEDIUM ______

TRIX: WATER XXX SOIL ______ SLUDGE ______ OTHER ______

UNITS: ug/l

. Aluminum			13. Magnesium		
. Antimony	25U	P	14. Manganese		
. Arsenic	1.5U	F	15. Mercury	.20U	CV
. Barium			16. Nickel	43	P
. Beryllium	24	P	17. Potassium		
. Cadmium	4.1U	P	18. Selenium	2.2U	F
. Calcium			19. Silver	4.4U	P
. Chromium	5.0U	P	20. Sodium		
. Cobalt			21. Thallium	1.8U	F
. Copper	16U	P	22. Vanadium		
. Iron			23. Zinc	53	P
. Lead	2.3U	F			

anide ______ Percent Solids(%) ______

Flags used: U = Element analyzed for but not detected
Value reported is the instrument detection limit.
[ ] = Value reported is less than contract-required detection limit
hods used: P = ICP; F = Furnace AA; CV = Cold Vapor

nments: CLEAR, COLORLESS

LAB MANAGER [signature]

COMPOUND LIST - CLASSICAL PARAMETERS

SAMPLE IDENTIFIER: W-12
COMPUCHEM SAMPLE NUMBER: 190919

	CONCENTRATION (ug/L)	DETECTION LIMIT (ug/L)
1. CYANIDE, TOTAL	BDL	10

BDL = BELOW DETECTION LIMITS

COMPOUND LIST - CLASSICAL PARAMETERS

SAMPLE IDENTIFIER: W-12
COMPUCHEM SAMPLE NUMBER: 190918

	CONCENTRATION (ug/L)	DETECTION LIMIT (ug/L)
1. PHENOLS, TOTAL	BDL	10

BDL = BELOW DETECTION LIMITS

Received: 04/15/88

06/01/88 15:03:29

Test Description	Units	01 W-6	02 W-7	03 L-1	04 L-2
1-AMINO-2-METHYLANTHRAQUIN	ug/l	<20	<20	<20	<20
2-AMINOANTHRAQUINONE	ug/l	<20	<20	<20	<20

Test Description	Units	01 FIELD BLANK	02 L-7	03 L-4	04 W-13
1-AMINO-2-METHYLANTHRAQUIN	ug/l	<20	<20	<20	<20
2-AMINOANTHRAQUINONE	ug/l	<20	<20	<20	<20

Davis & Floyd, Inc.

Laboratory Analysis Report

Received: 04/20/88

06/01/88 15:04:45

Work Order # 88-04-071

Test Description	Units	02 W-4	03 L-5	04 L-6
1-AMINO-2-METHYLANTHRAQUIN	ug/l	<20	<20	<20
2-AMINOANTHRAQUINONE	ug/l	<20	<20	<20

Davis & Floyd, Inc.

Laboratory Analysis Report

Page 2

Work Order # 88-04-066

Received: 04/18/88

05/02/88 [illegible]

Test Description	Units	01 W-5	02 W-1	03 L-3
1-AMINO-2-METHYLANTHRAQUIN	ug/l	<20	<20	<20
2-AMINOANTHRAQUINONE	ug/l	<20	<20	<20

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 032

DATE: 06/01/88
W.O. #: 042188-0064305
SAMPLE DATE: 04/18/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION	AROCLOR - 1248	UNITS
30305 TAP WATER	< 0.1	ug/l

MINIMUM DETECTION LIMIT - < 0.1 ug/l
Refer to Lot 028 for QC.

Laboratory Director

HAZLETON LABORATORIES AMERICA, INC.
3301 KINSMAN BLVD. • P.O. BOX 7545 • MADISON, WI 53707 • (608) 241-4471 • TLX 703956 HAZRAL MDS UD

REPORT OF ANALYSIS

RMT, INCORPORATED
1406 EAST WASHINGTON AVENUE
SUITE 124
MADISON, WI 53703

SAMPLE NUMBER: 80405205
DATE ENTERED: 04/22/88
REPORT PRINTED: 05/12/88

GROUND WATER: TAP WATER, 30305; 4/18/88
PROJECT NO. 643.05

PURCHASE ORDER NUMBER: 16963

VOLATILE FRACTION

COMPOUND NAME	MCG/L
ACROLEIN	LESS THAN 50
ACRYLONITRILE	LESS THAN 50
BENZENE	LESS THAN 5
BIS (CHLOROMETHYL)ETHER*(1)	N/A
BROMOFORM	LESS THAN 5
CARBON TETRACHLORIDE	LESS THAN 5
CHLOROBENZENE	LESS THAN 5
CHLORODIBROMOMETHANE	LESS THAN 5
CHLOROETHANE	LESS THAN 10
2-CHLORO-ETHYLVINYL ETHER	LESS THAN 10
CHLOROFORM	LESS THAN 5
DICHLOROBROMOMETHANE	LESS THAN 5
DICHLORODIFLUOROMETHANE*(2)	N/A
1,1-DICHLOROETHANE	LESS THAN 5
1,2-DICHLOROETHANE	LESS THAN 5
1,1-DICHLOROETHYLENE	LESS THAN 5
1,2-DICHLOROPROPANE	LESS THAN 5
1,3-DICHLOROPROPYLENE	LESS THAN 5
ETHYLBENZENE	LESS THAN 5
METHYL BROMIDE	LESS THAN 10
METHYL CHLORIDE	LESS THAN 10
METHYLENE CHLORIDE	LESS THAN 5
1,1,2,2-TETRACHLOROETHANE	LESS THAN 5
TETRACHLOROETHYLENE	LESS THAN 5
TOLUENE	LESS THAN 5
1,2-TRANS-DICHLOROETHYLENE	LESS THAN 5
1,1,1-TRICHLOROETHANE	LESS THAN 5
1,1,2-TRICHLOROETHANE	LESS THAN 5
TRICHLOROETHYLENE	LESS THAN 5
TRICHLOROFLUOROMETHANE*(2)	N/A
VINYL CHLORIDE	LESS THAN 10

*(1) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 10723, FEB. 4, 1981)
*(2) REMOVED FROM PRIORITY POLLUTANT LIST (46 FR 46103, JAN. 8, 1981)

HAZLETON LABORATORIES AMERICA, INC.
3301 KINSMAN BLVD. • P.O. BOX 7545 • MADISON, WI 53707 • (608) 241-4471 • TLX 703956 HAZRAL MDS UD

SAMPLE NUMBER: 80405205

GROUND WATER: TAP WATER, 30305; 4/18/88
PROJECT NO. 643.05

THIS IS A PARTIAL REPORT.
WHEN ALL ANALYSES ARE COMPLETED, YOU WILL RECEIVE A COMPLETE REPORT.
THE FOLLOWING ANALYSES ARE NOT COMPLETE:

DATA SUMMARY-QC SUMMARY PACKAGES

METHOD REFERENCES

VOLATILE FRACTION
METHODS FOR ORGANIC ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER, EPA PUBLICATION NO. 600/4-82-057, METHOD 624, U.S. EPA, CINCINNATI, OH (REVISED OCTOBER 1984)
U.S. EPA METHOD 624 (FEDERAL REGISTER, VOLUME 49, NO. 209, PG. 43373-43384, OCTOBER 26, 1984)
TEST METHODS FOR EVALUATING SOLID WASTE, EPA PUBLICATION NO. SW-846, SECOND EDITION, METHOD 8240, U.S. EPA, WASHINGTON DC (REVISED APRIL 1984)

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 033

DATE: 06/09/88
W.O. #: 060788-0064305
SAMPLE DATE: 04/16/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION		AROCLOR - 1248	UNITS
31039	AV 1	< 0.5	mg/kg
31040	AV 2	< 0.5	mg/kg
31041	AV 3	< 0.5	mg/kg
31042	AV 4	1.0	mg/kg
31043	AV 5	0.7	mg/kg

MINIMUM DETECTION LIMIT FOR VEGETATION IS < 0.5 mg/kg.
Answers calc. on a wet basis.

Laboratory Director

RMT INC.

LABORATORY REPORT

CLIENT : BEAUFORT-L
PROJECT #: 00643.05
LOT ID: 025

DATE: 05/29/88
W.O. #: 041988-0064305
SAMPLE DATE: 04/15/88

PCB ANALYSIS

SAMPLE NUMBER & DESCRIPTION		AROCLOR - 1248	UNITS
30249	BV 1	< 0.5	mg/kg dry wt.
30250	BV 2	< 0.5	mg/kg dry wt.
30251	BV 3	< 1.0	mg/kg dry wt.
30252	BV 4	< 1.0	mg/kg dry wt.
30253	BV 5	2.9	mg/kg dry wt.

MINIMUM DETECTION LIMIT FOR VEGETATION IS < 0.5 mg/kg or based on calculations from matrix interference.

Laboratory Director

COMPOUND LIST
APPENDIX VIII, IX - PCBs, METHOD 8080

SAMPLE IDENTIFIER: BV-5
COMPUCHEM® SAMPLE NUMBER: 190906

		CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
1P.	PCB-1016	BDL	20
2P.	PCB-1221	BDL	20
3P.	PCB-1232	BDL	20
4P.	PCB-1242	BDL	20
5P.	PCB-1248	950	20
6P.	PCB-1254	220	20
7P.	PCB-1260	BDL	20

Surrogate Recovery - Introduced at the beginning of the extraction, the surrogate standard is a select compound that analytically mimics the response of certain analytes. A known concentration of this surrogate is added to the sample and percent recovery is calculated. This recovery acts as a barometer of extraction efficiency and analytical response for the individual sample.

	% Recovery	Control Range %
Dibutylchlorendate	28	(20-150)*

*Advisory surrogate; with the exception of dilutions recovery below 10% requires action step (re-extraction and re-analysis).
BDL=BELOW DETECTION LIMIT

APPENDIX D

APPENDIX D

PHYSICAL SOILS CHARACTERIZATION DATA

ATEC Associates, Inc.
1300 Williams Drive
Marietta, Georgia 30066
404/427-9456

REPORT OF: PERMEABILITY TESTS

Project: LOBECO PRODUCTS, INC.

Client: Lobeco Products, Inc.

Date: 4/15/88

Job No.: 32-81015

TYPE TEST: Falling head, specimen's back pressure saturated to achieve a saturated condition prior to test. Reference, U.S. Army Corps of Engineers Manual EM 1110-2-1906, Appendix VII, Permeability tests.

BORING NO.	DEPTH FT.	MOISTURE NAT. %	DENSITY DRY, pcf	VOID RATIO	SATURATION INITIAL %	PERMEABILITY CM/SEC
L-1	34-36	80.1	52.5	2.093	99.4	1.67×10^{-7}
RB-2	40-42	54.7	67.4	1.454	99.7	5.14×10^{-7}
RB-3	28-30	85.6	49.7	2.263	98.3	4.29×10^{-7}

L-1 gray soft clay (CH)

RB-2 gray soft clay (CH) with silty fine sand lenses.

RB-3 gray soft clay (CH)

Respectfully Submitted,

ATEC Associates, Inc.

James W. Bellah
Lab Manager

JWB/pw

ATEC Associates, Inc.
1300 Williams Drive
Marietta, Georgia 30066
404/427-9456

REPORT OF: **UNIT WEIGHT TESTS**

Project: **LOBECO PRODUCTS, INC.** Date: 4/15/88

Client: Lobeco Products, Inc. Job No.: 32-81015

NOTE: See "Gradation Curves" for classification results.

BORING NO.	SAMPLE NO.	MOISTURE NAT. %	DENSITY DRY, pcf
L-1	2	19.6	116.1
L-1	12	65.6	72.7
L-1	13	33.3	101.8
RB-2	3	27.4	109.3
RB-2	10	48.5	72.3
RB-2	18	30.4	95.9
RB-3	3	23.8	115.3
RB-3	11	30.6	85.8
RB-3	13	50.3	71.8

Respectfully Submitted,

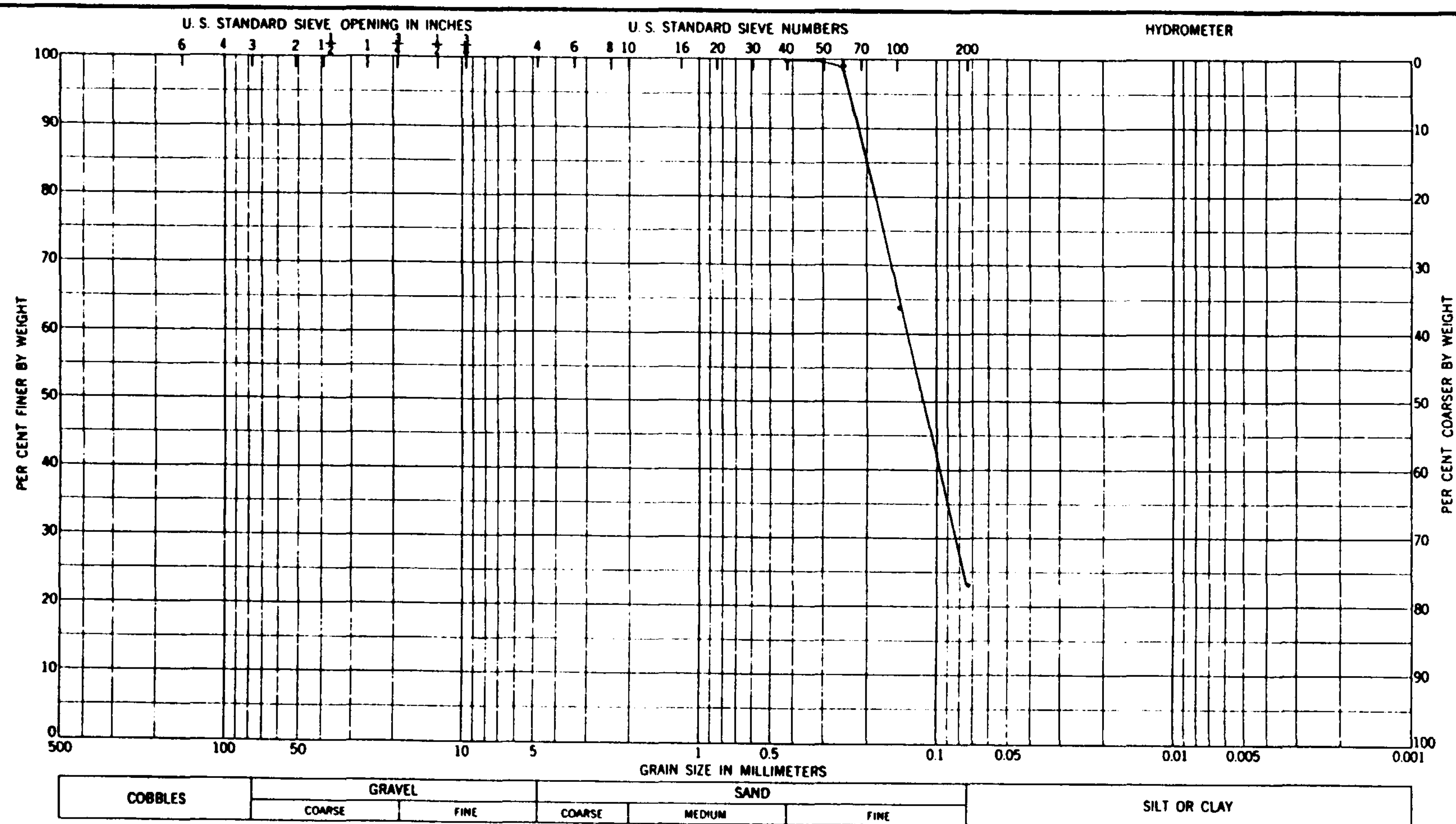
ATEC Associates, Inc.

James W. Bellah, Sr. C.E.T.
Lab Manager

JWB/pw

Project LOBECO PRODUCTS, INC. Job No. 32-81015

Date 4/1/5/88



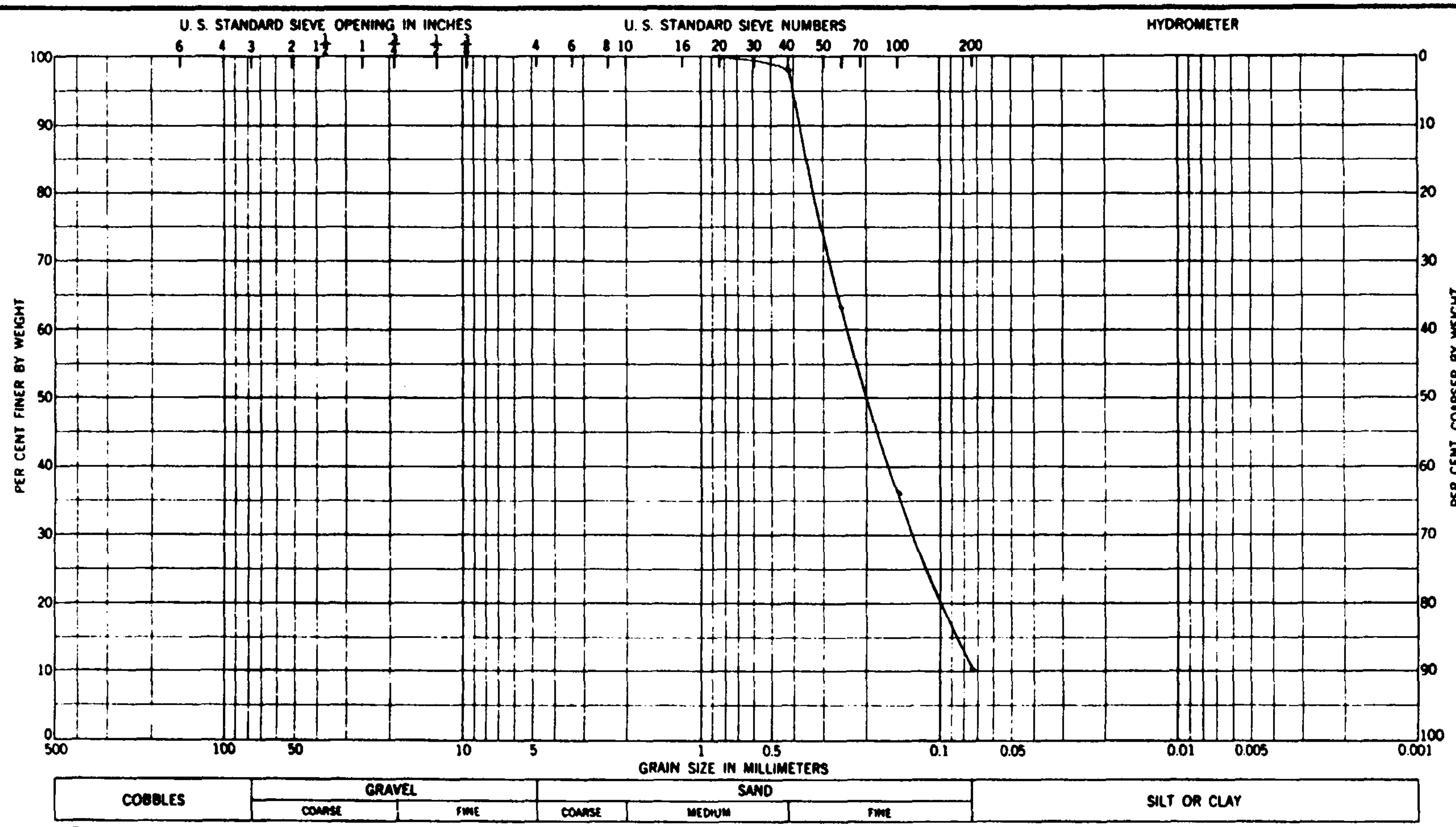
Boring No.	Sample No	Elev or Depth	Classification	Nat w %	LL	PL	PI
L-1	2	2'-4'	Light gray & yellow, tan silty sand (SM)	19.6	23	22	1

GRADATION CURVES

ATEC Associates, Inc.
of Georgia
1300 Williams Drive
Marietta, Georgia 30066
404-427-9456

Project LOBECO PRODUCTS, INC. Job No. 32-81015

Date 4/15/88



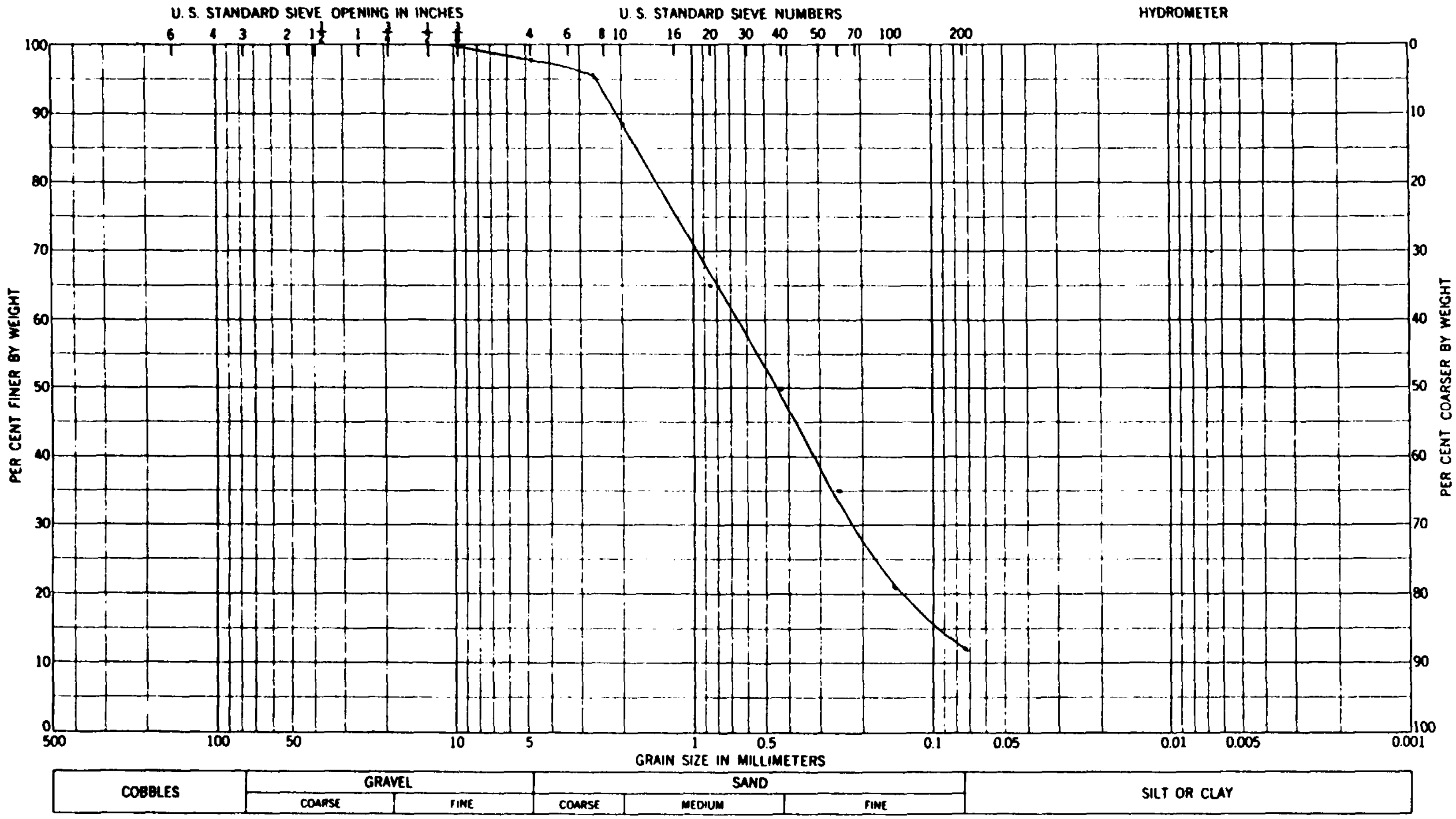
Boring No.	Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
L-1	12	22-24'	Dark gray silty sand (SC) slightly plastic	65.6	21	21	0

GRADATION CURVES

ATEC Associates, Inc.
of Georgia
1300 Williams Drive
Marietta, Georgia 30066
404-427-9456

Project LOBECO PRODUCTS, INC. Job No. 32-81015

Date 4/15/88



Boring No.	Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
L-1	13	24-26'	Medium gray, brown clayey sand & shell fragments (SC)	33.3	47	30	17

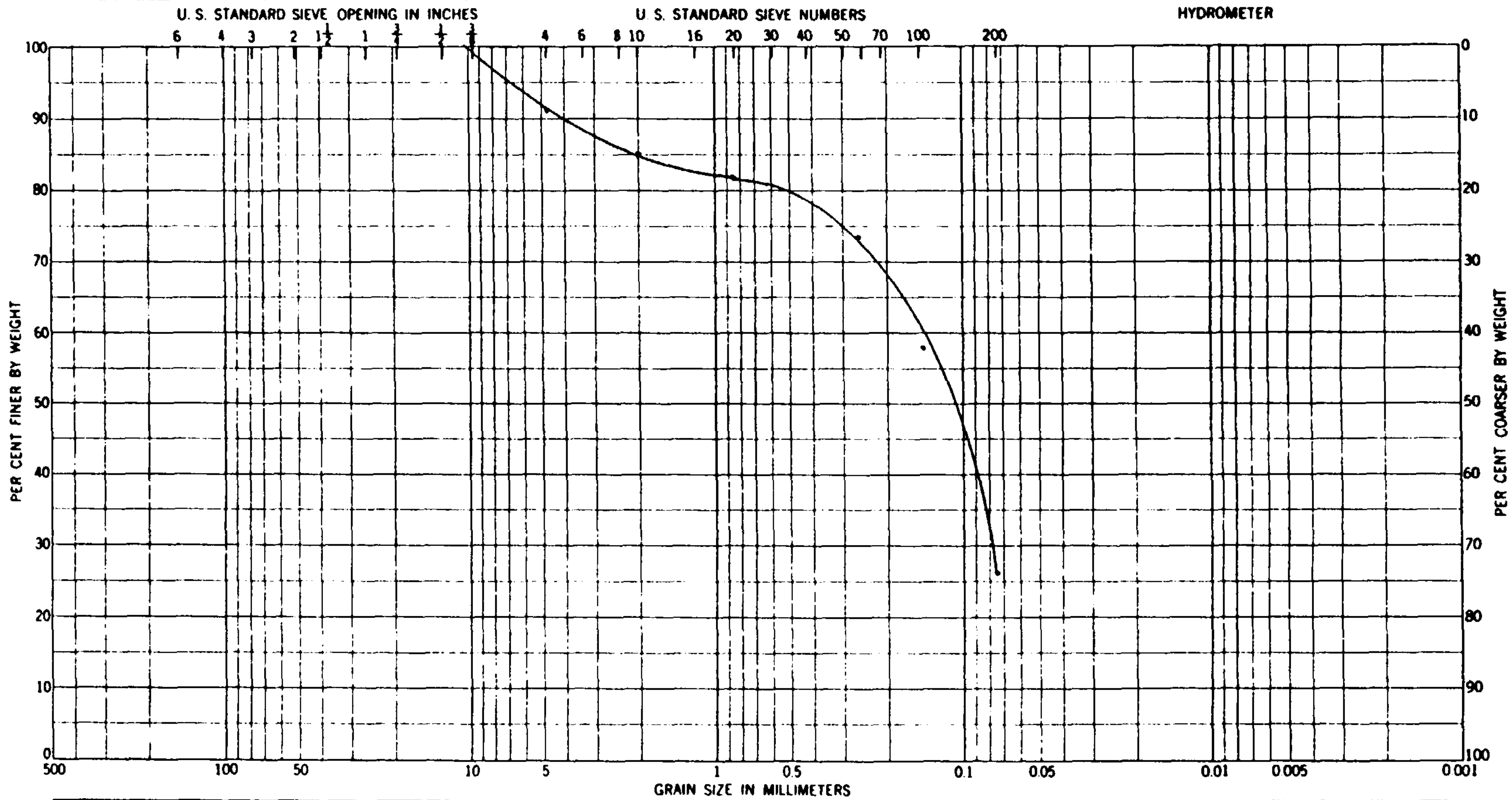
ATEC Associates, Inc.

of Georgia
1300 Williams Drive
Marietta, Georgia 30066
404-427-9456

GRADATION CURVES

Project LOBECO PRODUCTS, INC. Job No. 32-81015

Date 4/15/88



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

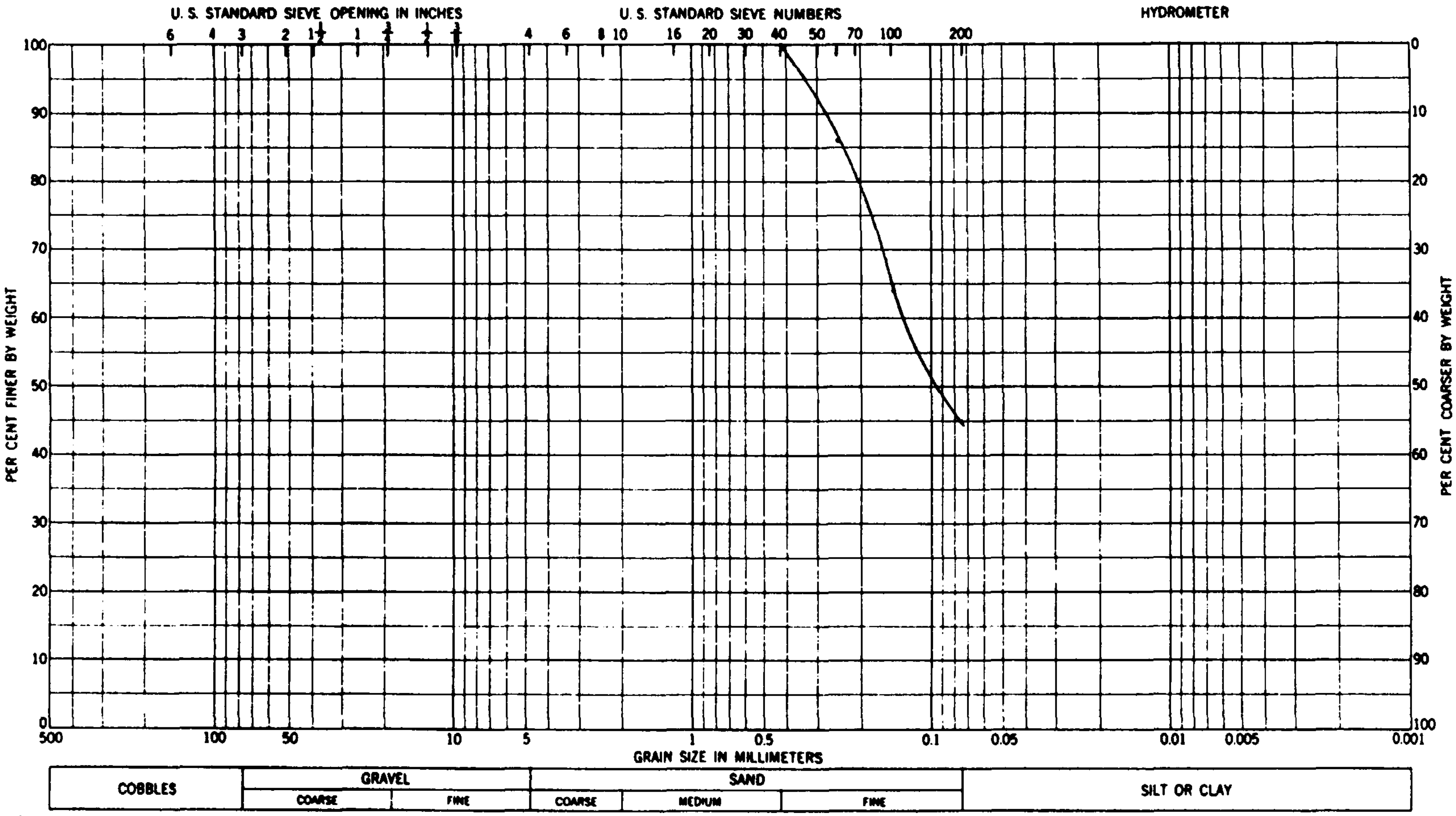
Boring No.	Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
RB-2	3	4-6'	Orange & light gray clayey sand (SC).	27.4	44	21	23

GRADATION CURVES

ATEC Associates, Inc.
of Georgia
1300 Williams Drive
Marietta, Georgia 30066
404-427-9456

Project LOBECO PRODUCTS, INC. Job No. 32-81015

Date 4/15/88



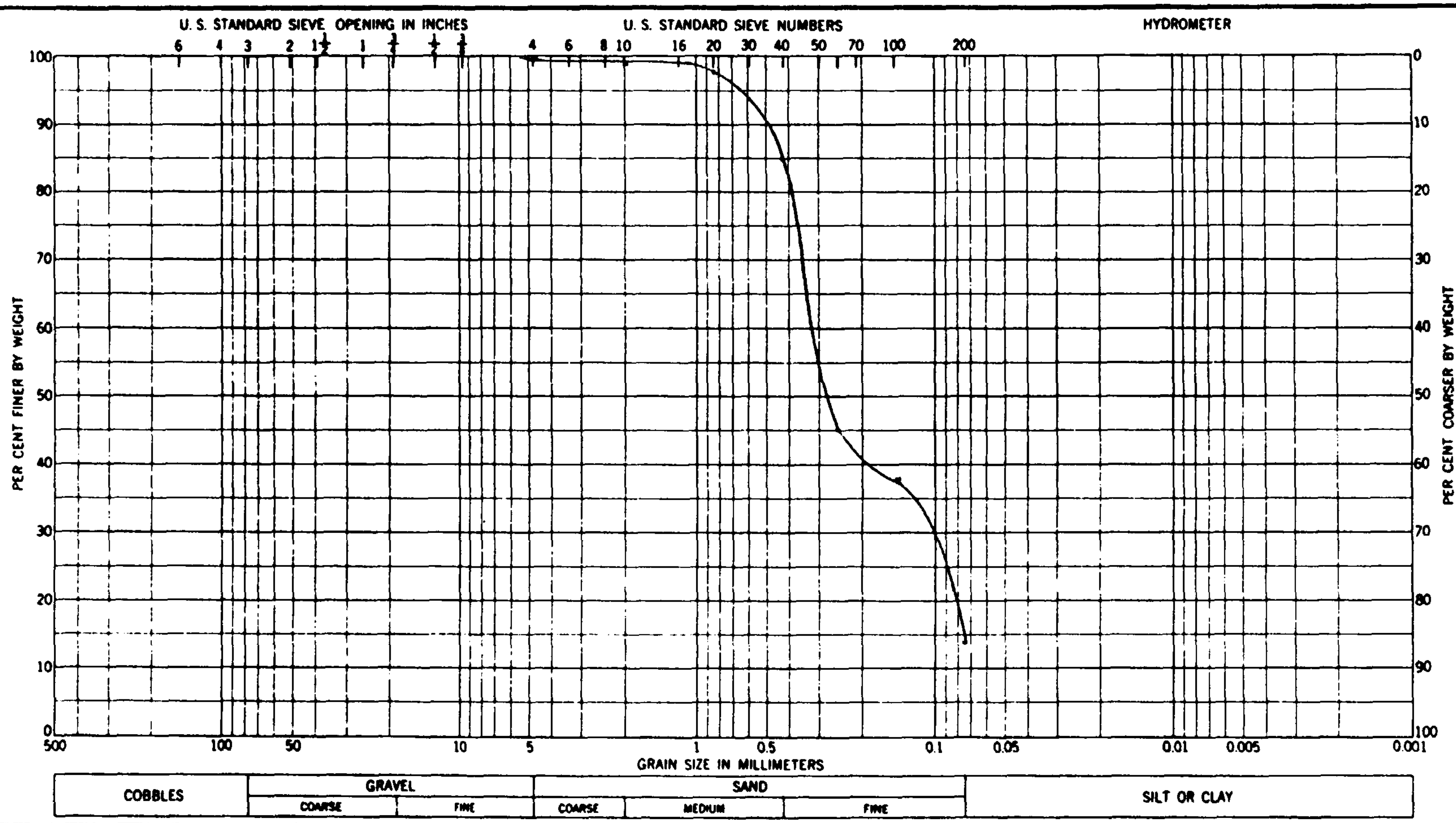
Boring No.	Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
RB-2	10	18-20'	Gray clayey sand (SC) with seams of gray (CH)	48.5	31	22	9

GRADATION CURVES

ATEC Associates, Inc.
of Georgia
1300 Williams Drive
Marietta, Georgia 30066
404-427-9456

Project LOBECO PRODUCTS, INC. Job No. 32-81015

Date 4/15/88



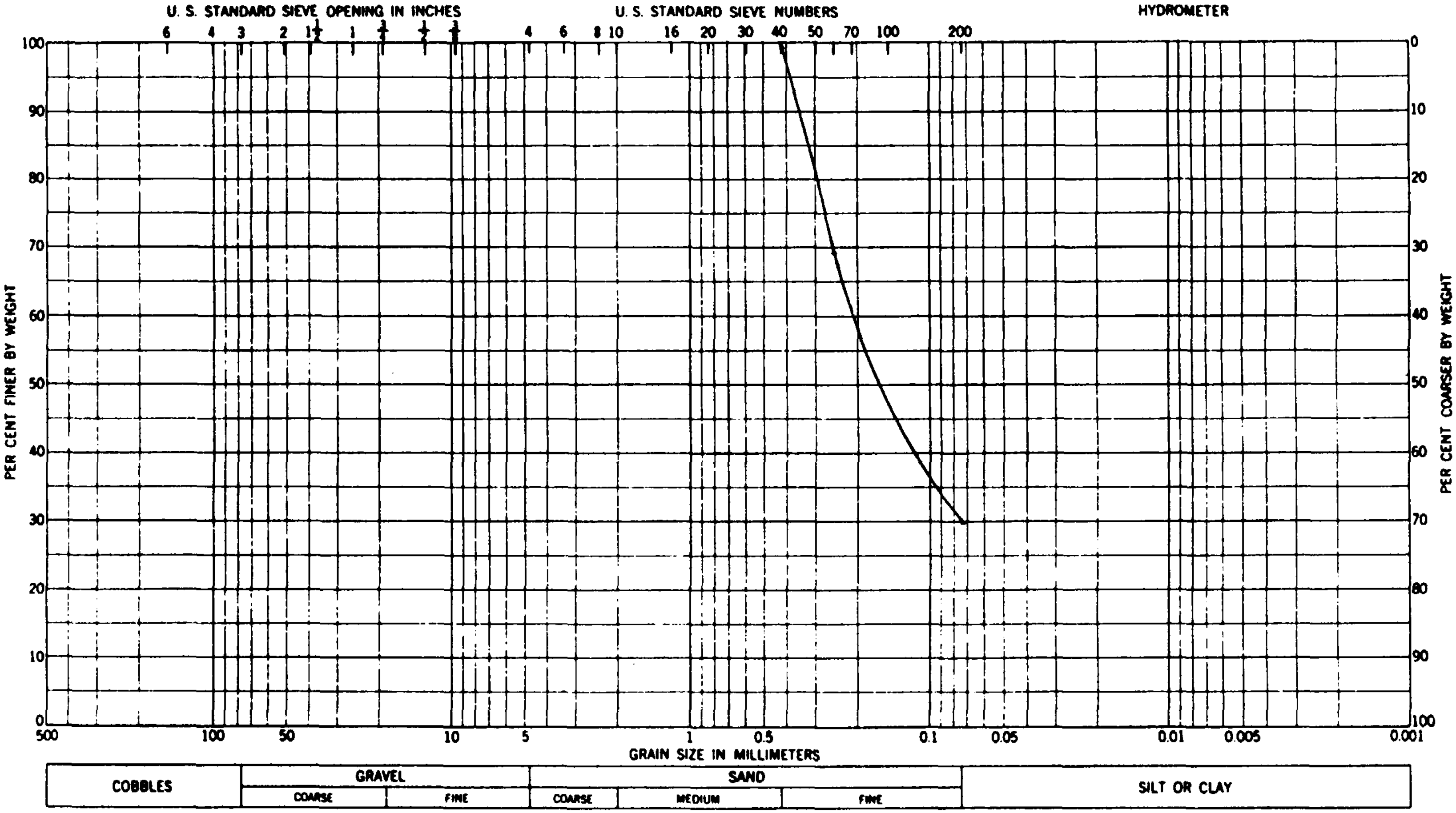
Boring No.	Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
RB-2	18	34-36'	Gray clayey sand (SC)	30.4	21	19	2

GRADATION CURVES

ATEC Associates, Inc.
of Georgia
1300 Williams Drive
Marietta, Georgia 30066
404-427-9456

Project LOBECO PRODUCTS, INC. Job No. 32-81015

Date 4/15/88



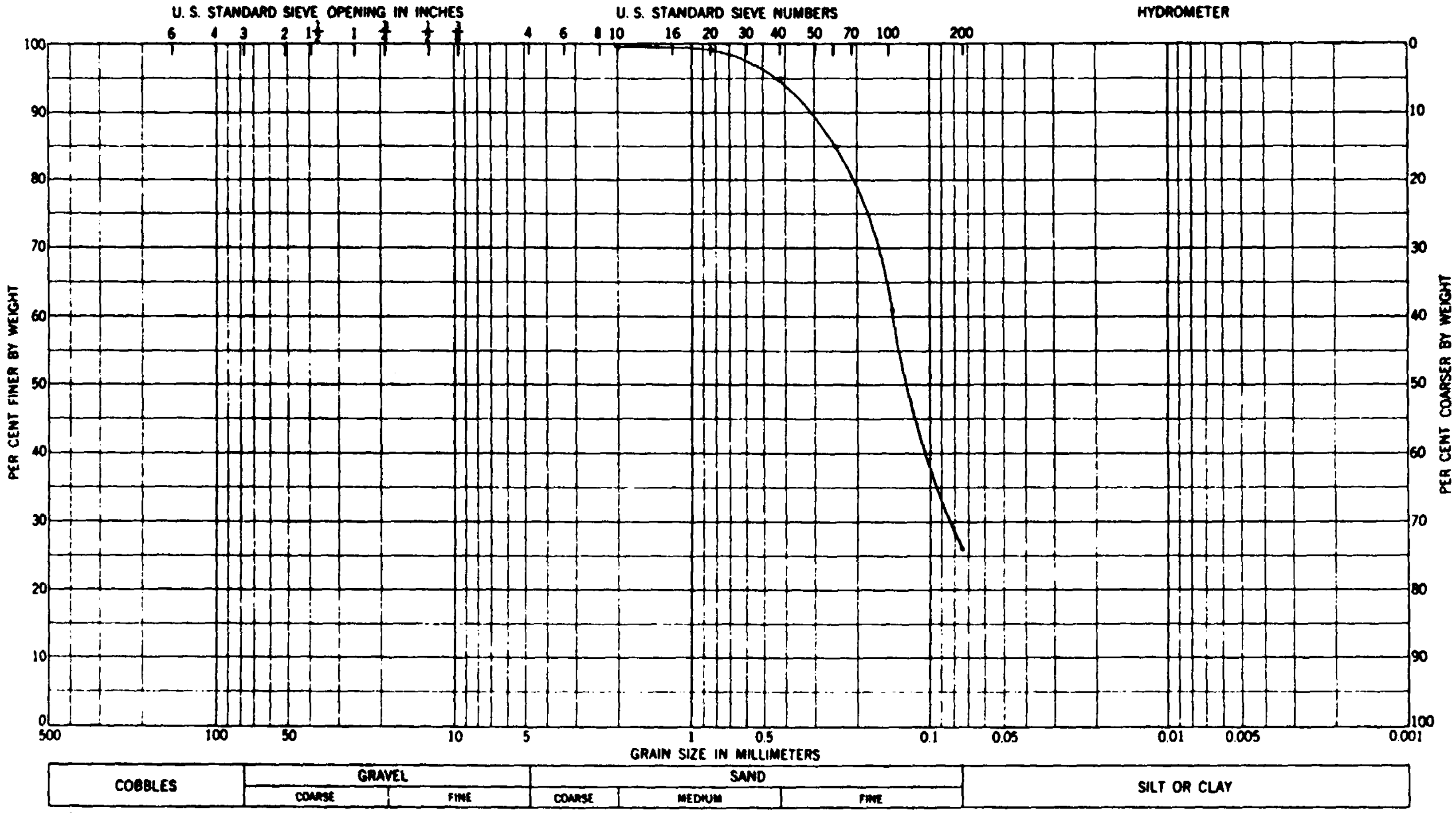
Boring No	Sample No	Elev or Depth	Classification	Nat w %	LL	PL	PI
RB-3	3	4-6'	Light gray, tan & red brown mottled clayey sand (SC)	23.8	32	17	15

GRADATION CURVES

ATEC Associates, Inc.
of Georgia
1300 Williams Drive
Marietta, Georgia 30066
404-427-9456

Project LOBECO PRODUCTS, INC. Job No. 32-81015

Date 4/15/88



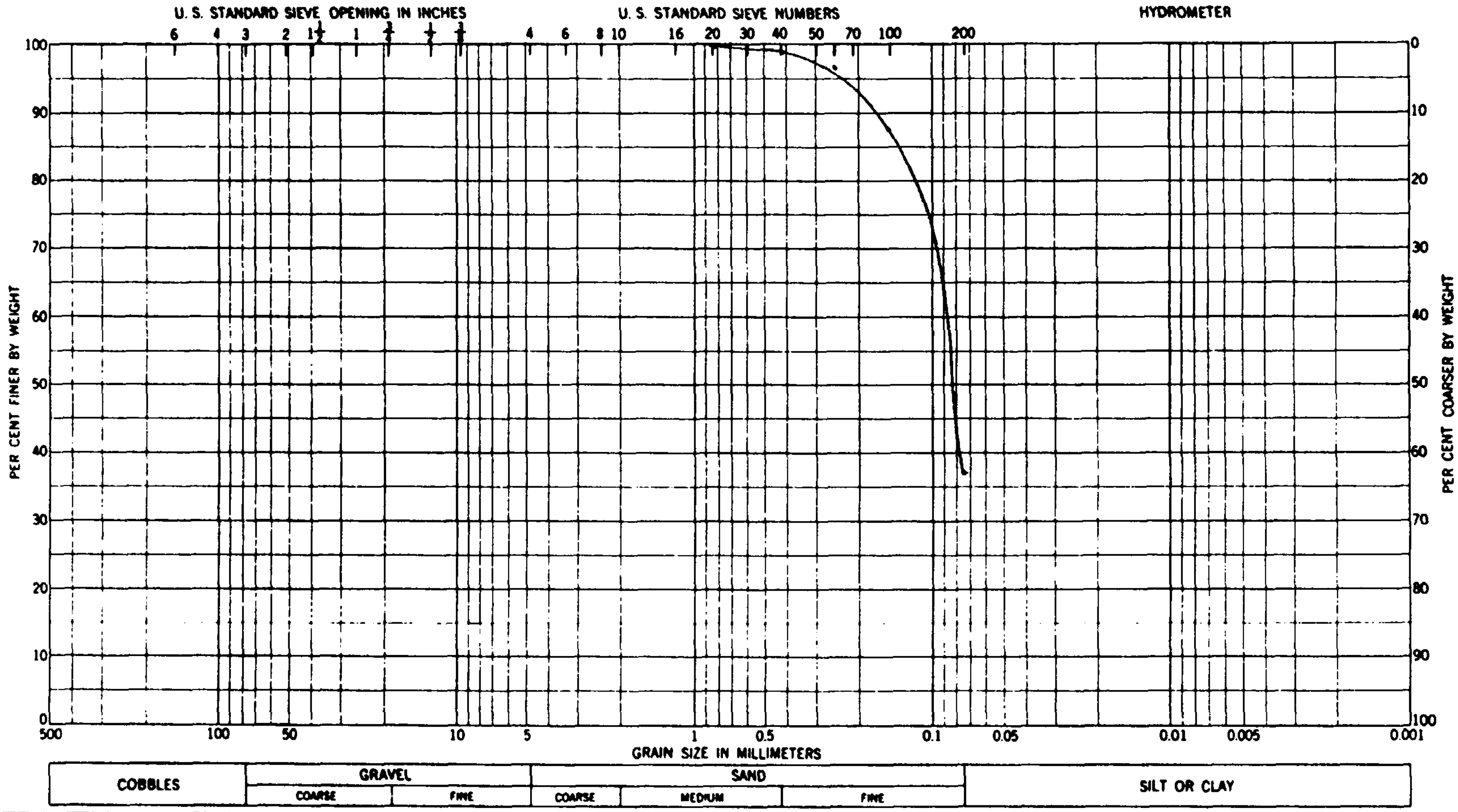
Boring No	Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
RB-3	11	20-22'	Gray silty sand (SC) with seams of gray (CH)	30.6	21	21	0

ATEC Associates, Inc.
of Georgia
1300 Williams Drive
Marietta, Georgia 30066
404-427-9456

GRADATION CURVES

Project LOBECO PRODUCTS, INC. Job No. 32-81015

Date 4/15/88



Boring No	Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
RB-3	13	24-26'	Dark gray clayey sand (SC) with seams of gray (CH)	50.3	44	21	23

GRADATION CURVES

ATEC Associates, Inc.
of Georgia
1300 Williams Drive
Marietta, Georgia 30066
404-427-9456

APPENDIX E

APPENDIX E

GROUND WATER AND MASS FLOW CALCULATIONS

Horizontal Ground Water Flow Rate Calculations

Hydraulic conductivity values were obtained from the G&E Engineering report entitled "Ongoing Soil and Ground Water Study and Conceptualized Cleanup Plan", Venture Chemicals, Inc., dated November, 1986 and also from the Law Engineering report entitled "Preliminary Hydrogeologic Assessment, Venture Chemicals Plant". From the data in these reports, both the Seepage Velocity ($Q = \frac{kiA}{n}$) for horizontal flow rates and the Darcy Flow Velocity ($Q = kiA$) for mass flow rates were calculated.

Site Overview

G&E Engineering data:		
	W-1	1.4×10^{-4} cm/sec
	W-2	4.2×10^{-4} cm/sec
	W-4	3.5×10^{-4} cm/sec
	W-5	5.5×10^{-4} cm/sec
	W-6	4.3×10^{-4} cm/sec

Average Hydraulic Conductivity = 3.8×10^{-4} cm/sec
Horizontal Gradient (site overview) = 0.003 ft/ft.
Effective Porosity = 0.2

Seepage Velocity =

$$\frac{(3.8 \times 10^{-4}\ \text{cm/sec})(1.97)(1440)(365) \times 0.003\ \text{ft/ft}}{0.2} = 5.9\ \text{ft/yr}$$

Darcy Flow Velocity =

$$(3.8 \times 10^{-4}\ \text{cm/sec})(1.97)(1440)(365) \times 0.003\ \text{ft/ft} = 1.18\ \text{ft/yr}$$

Law Engineering data:

Average Hydraulic Conductivity = 4.8×10^{-4} cm/sec
Horizontal Gradient (site overview) = 0.003 ft/ft.
Effective Porosity = 0.2

Seepage Velocity =

$$\frac{(4.8 \times 10^{-4}\ \text{cm/sec})(1.97)(1440)(365) \times 0.003\ \text{ft/ft}}{0.2} = 7.46\ \text{ft/yr.}$$

Darcy Flow Velocity =

$$(4.8 \times 10^{-4}\ \text{cm/sec})(1.97)(1440)(365) \times 0.003\ \text{ft/ft} = 1.49\ \text{ft/yr}$$

Abandoned Lagoon (Area A)

G&E Engineering data:

Average Hydraulic Conductivity = $3.8\text{x}10^{-4}$ cm/sec
Horizontal Gradient (Abandoned Lagoon) = 0.0037 ft/ft
Effective Porosity = 0.2

Seepage Velocity =

$$\frac{(3.8\text{x}10^{-4}\ \text{cm/sec})(1.97)(1440)(365)\ \text{x}\ 0.0037\ \text{ft/ft}}{0.2} = 7.27\ \text{ft/yr}$$

Darcy Flow Velocity =

$$(3.8\text{x}10^{-4}\ \text{cm/sec})(1.97)(1440)(365)\ \text{x}\ 0.0037\ \text{ft/ft} = 1.46\ \text{ft/yr}$$

Law Engineering data:

Average Hydraulic Conductivity = $4.8\text{x}10^{-4}$ cm/sec
Horizontal Gradient (Abandoned Lagoon) = 0.0037 ft/ft
Effective Porosity = 0.2

Seepage Velocity =

$$\frac{(4.8\text{x}10^{-4}\ \text{cm/sec})(1.97)(1440)(365)\ \text{x}\ 0.0037\ \text{ft/ft}}{0.2} = 9.19\ \text{ft/yr}$$

Darcy Flow Velocity =

$$(4.8\text{x}10^{-4}\ \text{cm/sec})(1.97)(1440)(365)\ \text{x}\ 0.0037\ \text{ft/ft} = 1.84\ \text{ft/yr}$$

Old Burn Site (Area B)

G&E Engineering data:

Average Hydraulic Conductivity = $3.8\text{x}10^{-4}$ cm/sec
Horizontal Gradient (Old Burn Site) = 0.0033
Effective Porosity = 0.2

Seepage Velocity =

$$\frac{(3.8\text{x}10^{-4}\ \text{cm/sec})(1.97)(1440)(365)\ \text{x}\ 0.0033\ \text{ft/ft}}{0.2} = 6.49\ \text{ft/yr}$$

Darcy Flow Velocity =

$$(3.8\text{x}10^{-4}\ \text{cm/sec})(1.97)(1440)(365)\ \text{x}\ 0.0033\ \text{ft/ft} = 1.30\ \text{ft/yr}$$

Law Engineering data:

Average Hydraulic Conductivity = 4.8×10^{-4} cm/sec
Horizontal Gradient (Burn Site) = 0.0033 ft/ft
Effective Porosity = 0.2

Seepage Velocity =

$$\frac{(4.8 \times 10^{-4}\ \text{cm/sec})(1.97)(1440)(365) \times 0.0033\ \text{ft/ft}}{0.2} = 8.20\ \text{ft/yr}$$

Darcy Flow Velocity =

$$(4.8 \times 10^{-4}\ \text{cm/sec})(1.97)(1440)(365) \times 0.0033\ \text{ft/ft} = 1.64\ \text{ft/yr}$$

Mass Flow Calculations

Because the ground water mass flow is calculated using the Darcy Flow Velocity ($Q = kiA$) and not the Seepage Velocity ($Q = \frac{kiA}{n}$), the Darcy Flow Velocity will be used in the following calculations.

Abandoned Lagoon (Area A)

To calculate the ground water mass flow rate and the mass flow of arsenic, cadmium, benzene and trichloroethylene, the following assumptions were made:

1. Plume width is 400'
2. Vertical extent of hazardous constituents is 15 feet
3. Darcy Flow Velocity is 1.84 ft/yr (yields greatest mass flow for Abandoned Lagoon calculations)

Ground Water Mass Flow =
$(15')(400')(1.84\ ft/yr)(62.4\ lbs/ft^3) = 688{,}896\ lbs/yr$

Arsenic

Mass Flow rate of arsenic is based on an average of the arsenic concentrations detected in monitoring wells L-5 and L-6.

Average Arsenic Concentration = 0.275 ppm

$$\text{Arsenic Mass Flow} = \frac{(0.275\ ppm)(688{,}896\ lb/yr)}{1 \times 10^6} = 0.19\ lb/yr$$

Cadmium

The mass flow of cadmium is based on an average of the cadmium concentrations detected in monitoring wells L-5 and L-6.

Average Cadmium Concentration = 0.087 ppm

$$\text{Cadmium Mass Flow} = \frac{(0.087\ ppm)(688{,}896\ lb/yr)}{1 \times 10^6} = 0.06\ lb/yr$$

Benzene

The mass flow of benzene is based on an average of the benzene concentrations detected in monitoring wells L-5 and L-6.

Average benzene concentration = 0.0135 ppm

$$\text{Benzene Mass Flow} = \frac{(0.0135\ ppm)(688{,}896\ lb/yr)}{1 \times 10^6} = 0.009\ lb/yr$$

Trichloroethylene

The mass flow of trichloroethylene (TCE) is based on an average of the TCE concentrations detected in monitoring wells L-5 and L-6.

Average TCE concentration = 0.022 ppm

$$\text{TCE Mass Flow} = \frac{(0.022 \text{ ppm})(688,896 \text{ lb/yr})}{1\times10^6} = 0.015 \text{ lb/yr}$$

Old Burn Site

To calculate the ground water mass flow rate and the mass flow of trichloroethylene (TCE) from the Old Burn Site, the following assumptions were made:

1. Plume width is 150' at L-3.
2. Vertical extent of hazardous constituents is 15'
3. Darcy Flow Velocity is 1.64 ft/yr (yields greatest mass flow for Old Burn Site calculations)

Ground Water Mass Flow =

$$(15')(150')(1.64 \text{ ft/yr})(62.4 \text{ lb/ft}^3) = 230,256 \text{ lb/yr}$$

Trichloroethylene

The mass flow of trichloroethylene (TCE) is based on the TCE concentration detected in monitoring well L-3.

TCE concentration (in L-3) = 0.21 ppm

$$\text{TCE Mass Flow} = \frac{(0.21 \text{ ppm})(230,256 \text{ lb/yr})}{1\times10^6} = 0.048 \text{ lb/yr}$$

Both the Abandoned Lagoon and the Old Burn Site

Trichloroethylene

The total mass flow of trichloroethylene for both sites is:

0.015 lb/yr + 0.048 lb/yr = 0.063 lb/yr.

Summary of Mass Flow Calculations

Constituent	lb/yr	lb/day	grams/Tidal Change[1]
Arsenic	0.19	0.0005	0.12
Cadmium	0.06	0.0002	0.04
Benzene	0.009	0.00002	0.006
Trichloroethylene	0.063	0.0002	0.04

[1] Calculated by multiplying lb/day by 453.5924 grams/lb and dividing by 2 tidal changes per day.

APPENDIX D

OVERSIZED

DOCUMENT

G & E Engineering, Inc.
4915 S. Sherwood Forest Blvd.
P.O. Box 45212, Dept.186
Baton Rouge, LA 70895
(504) 292-9007

LETTER OF TRANSMITTAL

DATE	JOB NO.
June 11, 1990	10-1012

ATTENTION: Mr. Jim Miller

RE: Copy of G&E Report

TO: NUS Corporation
1927 Lakeside Parkway
Suite 614
Tucker, GA 30084

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via ______ the following items:

☒ Reports ☐ Prints ☐ Plans ☐ Samples ☐ Specifications

☐ Copy of Letter ☐ Change order ☐ ______

COPIES	DATE	NO.	DESCRIPTION
1	11/86	Vol. I	Ongoing Soil and Groundwater Study and Conceptualized Cleanup Plan; Venture Chemicals, Inc.; Lobeco, South Carolina
1	11/86	Vol. II	Ongoing Soil and Groundwater Study and Conceptualized Cleanup Plan; Venture Chemicals, Inc.; Lobeco, South Carolina

THESE ARE TRANSMITTED as checked below:

☐ **For Approval** ☐ **Approved as submitted** ☐ **Resubmit ______ copies for approval**

☒ **For your use** ☐ **Approved as noted** ☐ **Submit ______ copies for distribution**

☒ **As requested** ☐ **Returned for corrections** ☐ **Return ______ corrected prints**

☐ **For review and comment** ☐ ______

☐ **FOR BIDS DUE ______ 19 ___** ☐ **PRINTS RETURNED AFTER LOAN TO US**

REMARKS

COPY TO ______ SIGNED: Leonard H. Sedlin

If enclosures are not as noted, kindly notify us at once.

RMT INC

P. O. BOX 16778 • GREENVILLE, SOUTH CAROLINA 29606

LETTER OF TRANSMITTAL

TO: NUS Corporation
1927 Lakeside Pkwy, Suite 614
Tucker, GA 30084

JOB NO.: 643.08 DATE: 6-11-90

RE: NUS Corp. P.O.# 44513

Attention:

GENTLEMEN:

WE ARE SENDING YOU (✓) Attached ( ) Under separate cover via

( ) Shop Drawings ( ) Prints ( ) Plans ( ) Samples ( ) Specifications

( ) Copy of letter ( ) Change Order (✓) Report & Appendices

NO.	DRAWING NO.	REV.	DESCRIPTION
1	—	—	Lobeco Site Environmental Assessment "Results and Proposed Remedial Action Plans" September, 1988
1	—	—	Appendices for above report

THESE ARE TRANSMITTED AS CHECKED BELOW:

( ) For approval
( ) For your use
(✓) As requested
( ) For review and comment
( ) Prints returned after loan to us
( ) FOR BIDS DUE ______, 19 __

( ) Approved as submitted
( ) Approved as noted
( ) Returned for corrections

( ) Resubmit ______ copies for Approval
( ) Return ______ corrected prints

REMARKS: Invoice will follow under separate cover

DISTRIBUTION:	T	SEP	FULL		T	SEP	FULL
Mr. Sam Lane	1						
File 643.08(c)	1						

SIGNED: Chuck [signature]

LOBECO PRODUCTS, INC.

P.O. BOX 815
LOBECO, SOUTH CAROLINA 29931

(803) 846-8171

SC HWY. 38
LOBECO, SOUTH CAROLINA 29931

August 14, 1989

Mr. Jim Miller
NUS Corporation
1927 Lakeside Parkway
Suite 614
Tucker, GA 30084

re: Groundwater Assessments; Lobeco Products, Inc., Beaufort County, SC

Dear Jim:

In accordance with my telephone conversation today with Bryan Holloway of EPA, I am forwarding herewith the five original documents of the two (2) groundwater assessments completed for this facility. The initial study was completed by G & E Engineering dated April and November, 1986. The follow-up assessment was conducted by RMT with report dated September, 1988. Individual titles are listed below:

Ongoing Soil and Groundwater Study, G & E Engineering, Inc.
(1) Volume I, dated November, 1986
(2) Volume II, dated April, 1986
(3) Revised Text and Addendum, dated April, 1986

Lobeco Site Environmental Assessment, RMT, Inc.
(4) one volume, dated September, 1988
(5) Appendices, dated September, 1988

Since these are the only copies of these documents, please copy as needed and return these original books to Lobeco Products, Inc. Please acknowledge receipt of referenced documents by signing the letter of receipt and returning in the enclosed addressed envelope.

Please advise if there are questions.

Sincerely,

John Meeks

John M. Meeks
Vice President

JMM:nls

cc: R. S. Andrews, President, Lobeco Products, Inc.
E. L. Barnhart, President, Hydroscience, Inc.
W. B. Harvey, Esquire, Harvey & Battey, P.A.
S. M. Lane, Lane Environmental Services
B. Holloway, EPA Region III

Received 5 documents from LPI.
Jim Miller

NUS CORPORATION

TDD No. F4- 8704-54

Site Name: American Color and Chemical Venture Chemical

Your Name: Jim Miller

File Subsection (check one):

___ Project Plans ___ References

___ Field Data Records

___ Reports ___ Misc.

✓ Correspondence/Proj. Notes

Correspondence/Report No: ___

Description: Mc Jim Miller; 8/4/87; cover letter for groundwater assessments of site

NUS CORPORATION

1927 LAKESIDE PARKWAY
SUITE 614
TUCKER, GEORGIA 30084
404-938-7710

C-586-8-9-102

August 10, 1989

Mr. Robert Lott
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

Subject: Information needed for a Phase II, Screening Site Inspection
Lobeco Products, Inc.
Lobeco, Beaufort County, South Carolina

Dear Mr. Lott:

The NUS Corporation Region 4 Field Investigation Team (FIT) was tasked by the U.S. Environmental Protection Agency (EPA), Waste Management Division to conduct a Phase II Screening Site Inspection (SSI) at the Lobeco Products, Inc. facility in Lobeco, Beaufort County, South Carolina. The site is known in state file material as American Color and Chemical/Venture Chemical. There is presently not enough information in our file to complete an adequate study plan, or a final report, for this investigation. The following information is needed for the NUS study:

1) Historical Operational Survey of the Lobeco Products, Incorporated, Lobeco, South Carolina plant, February 1988 (Reference No. 5 of "Updated Preliminary Assessment Report");

2) Plan of Study, Lobeco Products, Inc. Manufacturing site, January 20, 1987 (Reference No. 6 of "Updated Preliminary Assessment Report");

3) Ongoing Soil and Groundwater Study and Conceptualized Cleanup Plan, Venture Chemicals, Inc., April 1986 (Reference No. 7 of "Updated Preliminary Assessment Report");

4) Geological and hydrogeological information;

5) Site layout map;

6) Monitor well locations;

7) All analytical data from previous samples collected at Lobeco Products, Inc. This includes data from environmental samples (soil and water), biological samples (oyster tissue), and samples of the Lobeco plant effluent; and

8) Sampling location map(s) from any previous investigations.

Mr. Robert Lott
SCDHEC
August 10, 1989 - page two

Please send copies of whatever is available at your earliest convenience. If you have any questions regarding this matter, please contact me at NUS Corporation.

Very truly yours,

James Miller

James Miller
Project Manager

Approved:

Greg Schank

JM/gwn

NUS CORPORATION

TDD No. F4- 8104-54

Site Name: American Color and Chemical Venture Chemical

Your Name: Jim Miller

File Subsection (check one):

___ Project Plans ___ References

___ Field Data Records

___ Reports ___ Misc.

✓ Correspondence/Proj. Notes

Correspondence/Report No: C-586-8-9-102

Description: Mr. Robert Stitt, 8/10/89; request for information concerning Phase II, Screening Site Inspection

South Carolina Department of Health and Environmental Control

2600 Bull Street
Columbia, S.C. 29201

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Michael D. Jarrett

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John Hay Burriss
Euta M. Colvin, M.D.

July 7, 1989

Jim Miller
NUS
1927 Lakeside Parkway
Suite 614
Tucker, GA 30084

RE: American Color/Venture Chemical
SCD 046 507 018

Dear Jim:

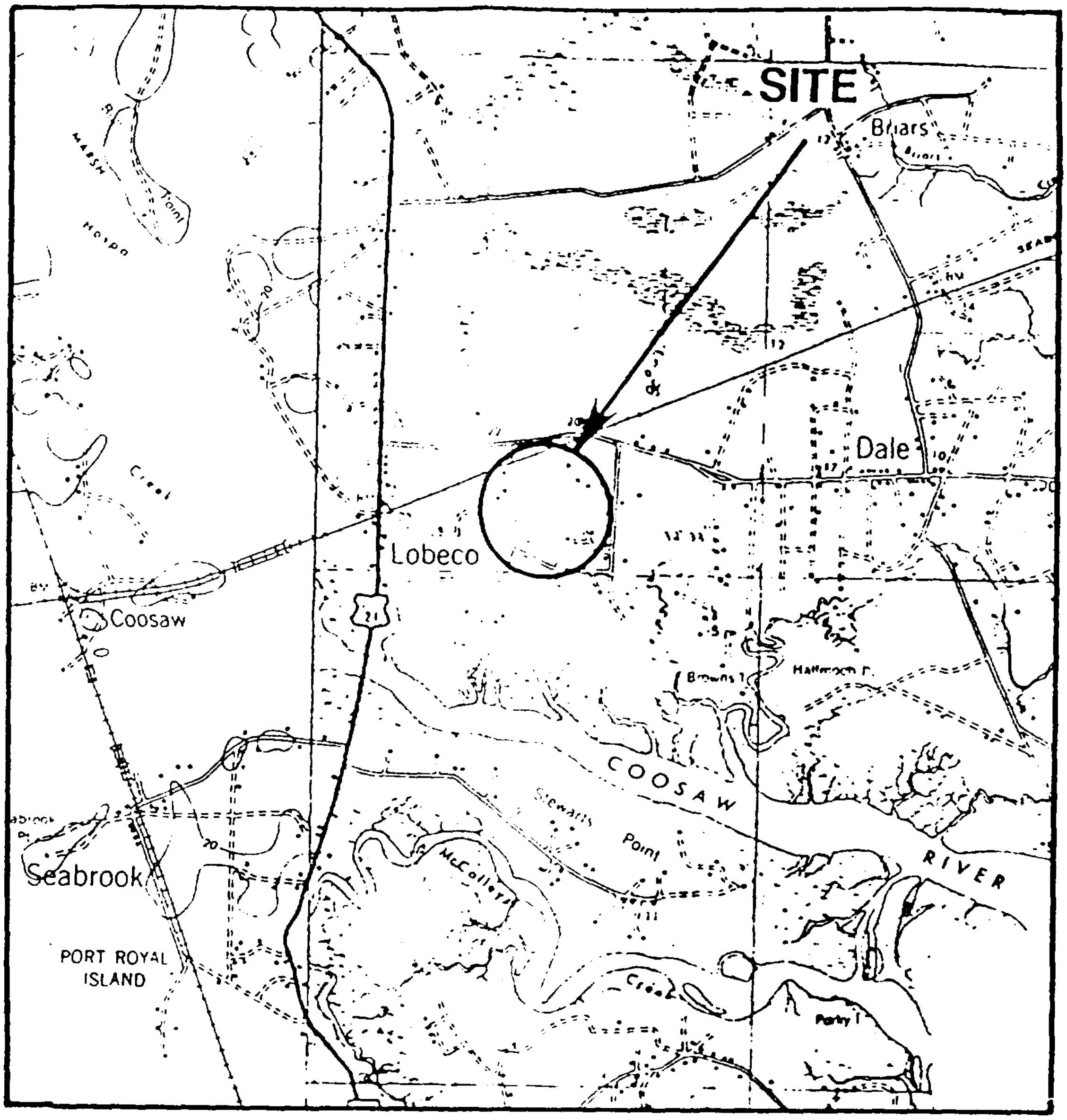
Please find attached a copy of our file on American Color/Venture Chemical. I have included the originals of the site plan with the file materials. Best of Luck!

Cordially,

David W. Nix
Site Screening Section
Bureau of Solid and Hazardous Waste Management

DWN/njw

Attachment



RE: USGS Quadrangle Map 'Green Pond, S.C.'-1943

VICINITY MAP

0 feet 2000
SCALE

G&E
ENGINEERING, INC.
ENVIRONMENTAL & GEOTECHNICAL
CONSULTANTS
Columbia, South Carolina

ENVIRONMENTAL ASSESSMENT OF REACTOR ACCIDENT LOBECO PRODUCTS, INC. Project Title	**AREA AND VICINITY MAP**	**1** Fig. No.

OVERSIZED

DOCUMENT

NUS CORPORATION

TDD No. F4-8704-54

Site Name: American Color and Chemical/Venture Chemical

Your Name: Jim Miller

File Subsection (check one):

___ Project Plans ___ References

___ Field Data Records

___ Reports ___ Misc.

✓ Correspondence/Proj. Notes

Correspondence/Report No: ___________

Description: Jim Miller, 7/7/87, copy of site file

NUS
CORPORATION

1927 LAKESIDE PARKWAY
SUITE 614
TUCKER, GEORGIA 30084
404-938-7710

C-586-6-9-120

June 14, 1989

Mr. Brian Holaway
Site Investigation and Support Branch
Waste Management Division
Environmental Protection Agency
345 Courtland Street, N. E.
Atlanta, Georgia 30365

Subject: Site Access Information
American Color and Chemical/Venture Chemical
Lobeco, Beaufort County, South Carolina
TDD No. F4-8904-54

Dear Mr. Holaway:

The American Color & Chemical/Venture Chemical property is owned by Lobeco Products, Inc., SC Hwy. 83, Lobeco, South Carolina, 29931. The plant manager is Mr. Jim Huckabee. Mr. Huckabee's phone number is (803) 846-8171.

American Color & Chemical/Venture Chemical is now Lobeco Products. The facility is located 12 miles northwest of Beaufort, South Carolina.

FIT has scheduled the SSI for the week of September 4, 1989. Jim Miller is the Project Manager. If you require any more information for site access, please let me know.

Very truly yours,

Carol Northern

Carol D. Northern
South Carolina Section Coordinator

Approved:

Michael Pro...

CDN/kw

NUS CORPORATION

TDD No. F4-8904-54

Site Name: American Color and Chemical Venture Chemical

Your Name: Jim Miller

File Subsection (check one):

___ Project Plans ___ References

___ Field Data Records

___ Reports ___ Misc.

✓ Correspondence/Proj. Notes

Correspondence/Report No: C-586-6-9-120

Description: Mr. Brian Holloway; 1/14/89; site access information

South Carolina Department of Health and Environmental Control

2600 Bull Street
Columbia, S.C. 29201

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John Hay Burriss
Euta M. Colvin, M.D.

MEMORANDUM

TO: File
Lobeco Products, Inc.
Beaufort County

FROM: Sandra L. Hursey, EQM
Enforcement Section

SUBJECT: Meeting
April 13, 1989

DATE: April 17, 1989

On Thursday, April 13, 1989, a meeting was held between the Department and the parties to Consent Order 87-65-W - Tenneco Resins, Inc., American Color and Chemical Corporation and Lobeco Products, Inc. - to discuss issues related to the Remedial Action Plan proposed by the Respondents. The roster of attendees is attached.

The meeting began with one of the consultants stating that they planned remediation of the soil at the abandoned lagoon and old burn area to a level of 25ppm PCB's instead of the 50ppm originally proposed. The consultants believed, from "literature" they had read, that the lower level would be acceptable under EPA's regulations. (A Department representative offered the comment that the 25ppm was applicable to a spill clean up.)

The contaminated soil will be transported to Alabama for disposal in a landfill approved by EPA to accept PCB wastes. After the remediation has been completed, the excavations will be backfilled and covered with low permeability soil for containment purposes. Should the situation in Alabama change so that the landfill will not accept the contaminated soil, the Respondents are considering on-site incineration as another alternative.

The major items of discussion were:

1) <u>Ground-water Remediation at Abandoned Lagoon and Old Burn Site Areas:</u> The ground-water pumped off the sites in preparation for the remediation will contain PCB's as well as organics and heavy metals. The consultants propose treating this water by sending it through two carbon columns and discharging it to the plant's wastewater treatment system. The Department thought a modification to the NPDES Permit would be necessary for this waste substream. Requirements for testing the effluent for PCB's and possible other parameters would have to be added to the permit. This process would, by law, include a public notice period.

The Respondents objected to this suggestion for several reasons:

a) The length of time involved in the modification process. It would unnecessarily delay the project.

b) They didn't consider this as a major change in the treatment process. They were not requesting a change in effluent limits and the 40 to 50 gal/min discharge would only last for two or three months.

c) The Consent Order had already addressed the process and stated that "upon approval of the remediation plan and schedule, the schedule will become an enforceable part of the Order."

One of the Respondent's attorneys suggested that any additional effluent requirements be placed in an order. The order could contain a provision that if PCB's are detected in the effluent, the discharge cease. The Department agreed to look into the feasibility of proceeding in this manner. If a change in the permit is required, the permit can be re-issued rather than merely modified.

2) <u>Landfill Permit:</u> A landfill permit might be required to backfill the excavated area because the soil will still contain some PCB's. The Respondents objected to this also. One of the consultants said that precedents had been set in that other cleanups he had worked on had not required a landfill permit if the soil had been "cleaned" to an acceptable level. Department personnel stated that if the soil were "clean" it wouldn't matter. However, once the soil is "disturbed," the need for a permit will have to be decided by the Permitting Section of the Bureau of Solid and Hazardous Waste. The Department agreed to look into this issue.

3) <u>Ground-Water Contamination:</u> The ground-water at the old burn site and abandoned lagoon areas is contaminated, although not to a significant degree. The attached monitoring results are from five wells at each of those locations. The monitoring wells were existing ones and the consultant pointed out that some of the older ones were not installed in accordance with current Department regulations. The purpose of the samples was to aid in the design of the carbon columns and treatment system for use in the dewatering process at the sites. The results were presented at the meeting as an <u>indication</u> of the degree of ground-water contamination in the areas in question.

Ground-water monitoring will be required after site remediation. Initially it can be included in the construction permit. If low frequency monitoring will be required when the project is "completed," the monitoring requirements can be included in the NPDES Permit when it is reissued.

4) <u>Risk Assessment:</u> The critical factor in determining the need for a risk assessment will be required is whether Respondents can provide the Department with information on whether 25ppm PCB's is a "safe" level. The Department's position was, if the information provided by the consultants is inconclusive, a risk assessment may be required. One of the consultants said a risk assessment had not been included in the proposed plan was because of the information available and because the PCB's left at the site would be encapsulated. He also stated that of the three elements in risk assessment - source, pathway and receptacle - he felt two them, source and pathway, had been removed by the proposed plan.

A Department representative pointed out that the Respondents should make sure they have fully defined the area of contamination. Slurry walls will have to be constructed outside any area of known contamination. Test results indicate the highest level of contamination in the area to be at the southern end of the burn site. He suggested the Respondents hand-auger borings to the south of the burn site until an area uncontaminated with PCB's is found. As for any areas contaminated by an explosion which had occurred at the site several years ago (December 1987, part of the burn site), one of the consultants stated that the proposal had taken care of areas negotiated via the order ,i.e., the Respondents had reached an agreement on <u>shared</u> interests. They would not agree on anything beyond that scope.

During the course of the meeting the Respondents were made aware that the following Department permits will be required during the course of the project:

a) A construction permit from the Bureau of Water Pollution Control for the installation of the ground-water monitoring wells;
b) A construction permit from the Bureau of Water Pollution Control for the carbon columns (The PER and application can be submitted before the final design is completed);
c) A permit from the Bureau of Air Quality Control may be required if on-site incineration is utilized;
d) A NPDES Permit modification or reissuance (may be handled in an order) by the Bureau of Water Pollution Control; and,
e) A land-fill permit from the Bureau of Solid and Hazardous Waste if determined to be required.

The Department also suggested that the Respondents get in touch with TOSCA at EPA. It may or may not be interested in the project. The Respondents stated that they had established such contact.

Before the meeting closed, it was agreed that in about a week (no later than Monday, April 24, 1989) the consultants would provide the Department with information concerning the safety level of PCB's and additional engineering information on the issue of additional borings south of the burn site. After intra-agency discussion, the Department is to decide the issues of amending the order vs. permits.

SLH/sh
cc: George Nelson
Russ Sherer
Andy Yasinsac
Ray Livingston
Tom Wright
Coleman Miles
Steve Thomas

CONFERENCE REGISTER

LOBECO PRODUCTS, et al.

APRIL 13, 1989
(Date)

	Attendants (Please Print)	Affiliation
1.	SAMUEL M LANE	LANE ENVIRONMENTAL SERVICES
2.	ROGER TOWE	TENNECO INC.
3.	RALPH M. MELLOM	OGLETREE LAW FIRM - TENN.
4.	DAVID Nichols	RMT (LANE ENV.)
5.	RAY LIVINGSTON	SCDHEC
6.	TOM Knight	SC DHEC
7.	Colemaw Miles	SC DHEC
8.	Russ Sharer	SCDHEC
9.	Robert GROST	HYDROSCIENCE
10.	W. Brantley Harvey Jr	atty for Lobeco Products
11.	[illegible]	Lobeco Products Co.
12.	PRIMO MARCHESI	American Cane & Chem Corp
13.	Andy Yasinsac	SCDHEC Industrial WW
14.	Sandra Hursey	" WW Enforcement
15.	Jim Fields	McNair Law Firm - American Co
16.		
17.		
18.		
19.		
20.		

Lenny - file

South Carolina Department of Health and Environmental Control

2600 Bull Street
Columbia, S.C. 29201

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Michael D. Jarrett

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Moses H. Clarkson, Jr., Chairman
Oren L. Brady, Jr., Vice-Chairman
Euta M. Colvin, M.D., Secretary
Harry M. Hallman, Jr.
Henry S. Jordan, M.D.
Toney Graham, Jr. M.D.

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

August 16, 1988

Mr. John M. Meeks
Vice President-General Manager
Lobeco Products, Inc.
Post Office Box 815
Lobeco, SC 29931

RE: Consent Order 88-37-W
Lobeco Products, Inc.
Beaufort County

Dear Mr. Meeks:

Enclosed, for your records, is a completely executed copy of Consent Order 88-37-W for the above referenced facility.

This letter will also serve to acknowledge your check in the amount of twenty thousand dollars ($20,000) in satisfaction of requirement #6 of the order.

Sincerely,

Sandra L. Hursey

Sandra L. Hursey
Environmental Quality Manager
Water Quality Assessment
and Enforcement Division

SLH\sh

cc: George Nelson
Andy Yasinsac
Russ Sherer
Steve Thomas
Brantley Harvey, Jr.

RECEIVED
AUG 1 8 '88
RECEIVED

American Color & Chemical Corporation

P.O. Box 88
Mt Vernon Street
Lock Haven, Pa. 17745
Telephone (717) 748-6747

January 28, 1981

Mr. Robert G. Gross, P.E.
Director, Industrial Wastewater Division
Bureau of Wastewater Control
South Carolina Department of Health
and Environmental Control
2600 Bull Street
Columbia, SC 29201

Re: NPDES SC0000914
Lobeco, Beaufort County

Dear Mr. Gross:

I am enclosing for your information and file the analysis on our final effluent for priority pollutants.

For reference, we are also including sample locations, collection field data sheets and analysis on raw water and mixed effluent.

Note that no pesticides have been found. The reports are self-explanatory.

Should you have any questions, please call.

Very truly yours,

J. F. Jacobetz

J. F. Jacobetz, Director
Safety & Environmental Services

JFJ/hew

RECEIVED
FEB 2 1981
...AGRICULTU...
WASTEWATER DIVISION

Wins

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,ame, Baptist
triumph over

Page 1-C

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Page 1-B

haled or swallowed. ... called the gas methyl iso cyanide.

Union Carbide called an immediate halt worldwide to the production and shipment of the poisonous material.

At a news conference in Danbury, another Union Carbide official, Jackson B. Browning, said: "We are doing what we can to bring the existence of this material to a halt through halting production and we are halting distribution, as I indicated, and we are taking this special added precaution of determining if the safety processes and devices are fully operational."

A doctor and four technicians have been sent to India to investigate, Browning said, adding that Union Carbide officials had been unable to contact company managers at the Bhopal plant.

Union Carbide's managing director in India, Y.P. Gokhale, said the gas began leaking when a storage tank valve broke under rising pressure. He said gas escaped for 40 minutes before the leak was stopped and the poisonous gas slowly began dissipating in the air.

By then the cloud of gas had settled over a 25-square-mile area inhabited primarily by poor laborers.

concluding that running ... Massachusetts Democrat "could very well have become a destructive situation than a constructive one."

He said lack of wide support from colleagues and O'Neill's promises that conservatives would be given a much stronger voice in House decisions prompted his decision to drop out.

"When a team is losing, the coach gets the blame," Stenholm, of Texas, told reporters. "(But) it became apparent that we are unable to change the coach. If you can't change the coach, you change the game plan. ... We are going to work within the Democratic Party."

But Stenholm bowed out with a shot at O'Neill, claiming his old-style liberalism was out of touch with the views of most Americans. O'Neill "is perceived as being the cause of our federal deficits. ... The speaker, in the eyes of many, in Texas and in the South, is the problem," Stenholm said.

Democrats kept most of the rest of their lead-

Rep. Thomas P. O'Neill Jr.

... the Democratic vice presidential nominee, could not run for re-election to her House seat.

At a separate caucus, Republicans also stuck by their leaders of the last Congress, re-electing Robert H. Michel of Illinois as minority leader, Trent Lott of Mississippi as minority whip and Jack Kemp of New York, a potential 1988 GOP presidential contender, as chairman of the GOP conference.

Michel, 61, in his acceptance speech, told colleagues that even though Republicans were the minority party in the House, "I believe we are the party that speaks for the majority of the American people."

He said he would try hard to rebuild the coalition of Republicans and conservative Democrats that helped propel President Reagan's tax and budget-cutting bills through the House in 1981 and early 1982.

DHEC Finds Ecological Problems In Creek Near Chemical Company

By KEN BURGER
Post-Courier Reporter

LOBECO — Almost a year after a Beaufort physician asked the state to investigate a chemical company he claimed was discharging toxic waste into Campbell Creek, the Department of Health and Environmental Control has issued a report identifying 66 organic chemicals being dumped by the plant.

The DHEC report states that several of these compounds could deliver toxic or narcotic effects to the aquatic community, and that some are cancer causing.

The general manager of Venture Chemicals Company, the subject of the report, says the DHEC report is distorted. The company is located 10 miles north of Beaufort.

Dr. Read Lewin, the only resident on Campbell Creek which empties into Whale Branch just north of Beaufort, called for the DHEC investigation last December after losing a battle to prevent County Council from approving a $3 million industrial revenue bond for expansion of the controversial plant.

The chemical plant, which has had three owners since it was built in 1966, sits approximately one-half mile from Campbell Creek. A pipe runs to the creek where the effluent is discharged. Venture produces intermediate dye materials which are shipped to other companies around the country to be converted into dyes. The plant also produces specialty organic chemicals.

"They are putting poison in the water," said Lewin, whose home sits a few hundred yards from the plant's discharge point. "I've seen the red-colored dye coming right out of the outflow, and I know it's damaging the creek."

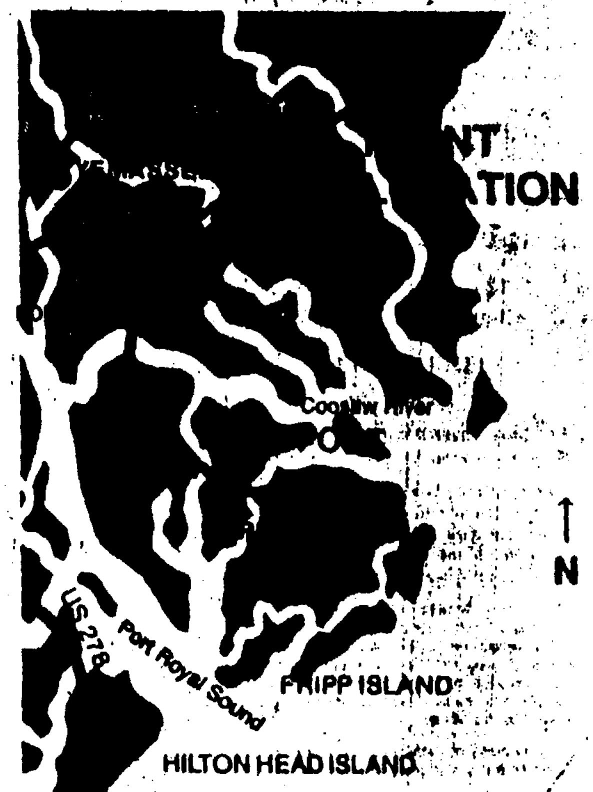
Lewin said he has spent more than $2,600 in legal fees to fight the company, which employs 60 people from the area.

Venture Chemical is owned by Enterra Corporation of Philadelphia which purchased the plant from American Color and Chemical Inc. in 1982. The plant was originally built by Berkshire Color Division of Tenneco Inc.

Specifically, DHEC noted in its report:

- The source of the majority of the 66 chemicals came from Venture Chemicals Company.
- Several of the compounds could cause toxic

See Chemical, Page 8-A



Post-Courier Map by Bill Thompson

...Chemical

Continued From Page 1-A

or narcotic effects on the biological community in Campbell Creek, and are considered definite or likely carcinogens (cancer causers).

- A reduction in the numbers of decapod crustaceans (shrimp, lobsters and crabs) in the area near the discharge.
- Fewer oysters in the creek, and more importantly, significantly fewer juvenile oysters.
- Severe biological degradation and toxic effects to fauna in the creek, but not fully extended into Whale Branch.
- No marked accumulation of selected heavy metals in oyster tissue or sediment.
- It is questionable as to whether Venture Chemical has efficiently and consistently treated the raw waste.
- Disinfecting agents used by Venture, in some cases, actually increase the toxicity of some of the chemicals.
- Perhaps the most significant finding from sediment analyses was the identification of mercury in a detectable amount. The presence of any form of mercury must be considered undesireable and potentially hazardous.

"This company has been using the fact that they employ about 60 poor blacks as a smokescreen to what they are doing to the water," said Lewin. "They are ruining the waters around here, and there is no reason for our waters to be degraded to the point of damaging the shellfish.

"What they need to do is just figure out a way to haul that stuff out of here instead of dumping it in the creek," Lewin said.

John M. Meeks, general manager of the Venture plant who has worked for all three owners over the past 16 years, said his company is "definitely not" polluting the waters in the area.

"I've seen that report, and in my opinion the conclusions are in error," Meeks said. "They are qualitative and not quantitative. The numbers don't support the conclusions."

Meeks said he has been in touch with DHEC officials and expects another report to be done. He also produced an independent oyster study, paid for by Venture and compiled by the Greenwood engineering firm of Davis & Floyd, which claims the presence of such compounds is widespread in the area and not the result of a particular discharge to surface water.

"I am reluctant to give an opinion at this point. All I can say is that I am going through channels to isolate the reasoning and timing behind this report," Meeks said. "But I am satisfied that what we are doing here has no adverse effect on the waters here, and I'd like for the people of Beaufort County to know that.

"We have to live with these people, and I think we will find that hard to do for a while because of this report," Meeks said.

As for Lewin's idea to haul the waste away, Meeks said there are no such alternatives available to him at this time.

"It is not economical to haul off the waste," Meeks said. "The only long range alternative would be to change our product lines so that there would be zero discharge."

Jack C. Wright, DHEC's district director in Beaufort, said "there has been deleterious effects on organisms in Campbell Creek, not only in numbers but in the size of oysters.

"That area has been impacted heavily," Wright said. "We've had problems with plant die-offs two or three times in the past because of Venture."

The area, in fact, was closed for shellfishing eight months ago by DHEC.

Arthur Horne, executive director of the Beaufort County Development Commission and a former chairman of County Council, said Venture Chemicals is a "good corporate citizen" which pays its lowest paid workers more than minimum wage.

"Based on knowing their management and other personnel and my personal observation of the plant, I think they are a good corporate citizen," Horne said. "They have had an above-average impact on the area's economy."

Asked about the pipe which discharges wastewater into Campbell Creek, Horne said that he was not aware of a pipe leading from the plant to the water.

"I'm not aware of a pipe or any discharge that has ever amounted to fouling of waters, surface or subsurface, in or around that operation," Horne said.

Horne spoke in favor of Venture before County Council last year when the company was seeking the $3 million revenue bond. "I have no idea what they make out there," Horne said. "But when I represented them before council for the revenue bonds, I spoke with a lot of people and found no warts."

He admitted, however, that Venture is the only chemical company in Beaufort County, and that if another chemical company would try to locate here, he would not approve of it.

State Sen. James M. Waddell, a Beaufort insurance executive and chairman of the S.C. Coastal Council, said he was not up to date on Venture.

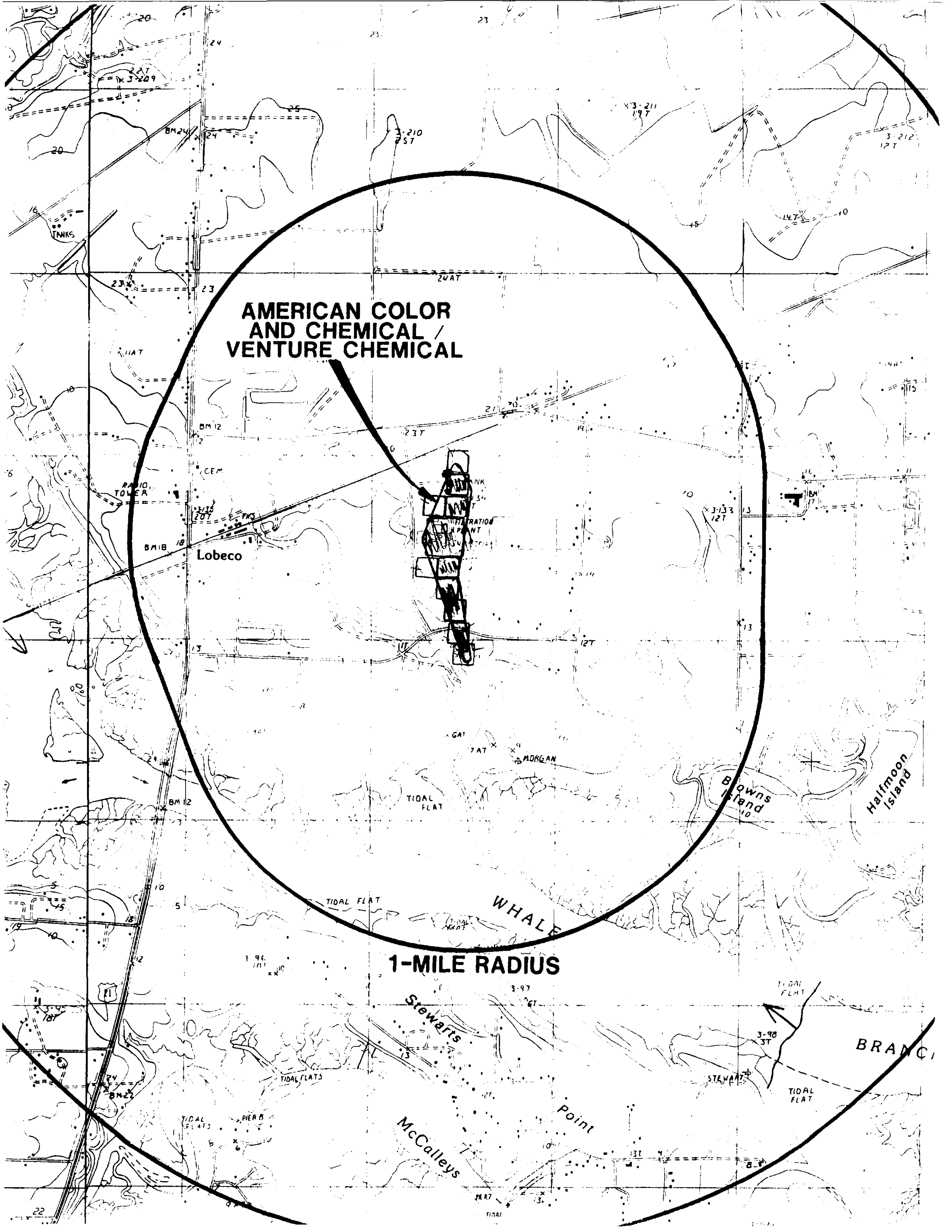
"I haven't heard much about them lately," Waddell said. "I haven't heard of any fish kills in that area, but they have had some discharge problems."

Waddell said anything built prior to the 1977 conception of the Coastal Council was not under the council's jurisdiction.

SOLID BRASS TRAY

Christmas Gifts

NOR
Shop
Phon
Mon


AMERICAN COLOR
AND CHEMICAL /
VENTURE CHEMICAL
1-MILE RADIUS
Lobeco
TIDAL FLAT
Browns Island
Halfmoon Island
WHALE
Stewarts Point
McCalleys
BRANC
MORGAN
TANKS
RADIO TOWER
CEM

NUS CORPORATION

TDD No. F4- 8904-54

Site Name: American Color and Chemical /Venture Chemical

Your Name: Jim Miller

File Subsection (check one):

___ Project Plans ___ References

___ Field Data Records

___ Reports ✓ Misc.

___ Correspondence/Proj. Notes

Correspondence/Report No: ___________

Description: calculation of site acreage

SC	LOBECO		45013	32.5533	80.7450

Press RETURN key to continue ...

CENSUS DATA

AMERICAN COLOR
LATITUDE 32:33:21 LONGITUDE 80:43:43 1980 POPULATION

KM	0.00-.400	.400-.810	.810-1.60	1.60-3.20	3.20-4.80	4.80-6.40	SECTOR TOTALS
S 1	0	0	0	0	0	0	0
S 2	0	0	0	0	0	0	0
S 3	0	0	0	0	0	0	0
S 4	0	0	0	0	0	0	0
S 5	0	0	0	0	0	2865	2865
S 6	0	0	0	0	0	0	0
S 7	0	0	0	0	0	0	0
S 8	0	0	0	0	0	0	0
RING TOTALS	0	0	0	0	0	2865	2865

Press RETURN key to continue ...

STAR STATION

INDEX NUMBER	STATION NAME	LATITUDE DEGREE	LONGITUDE DEGREE	PERIOD OF RECORD	STABILITY CLASSES	DISTANCE (km)
03822	SAVANNAH/TRAVIS GA	32.1333	81.2000			6 64.51
13824	SAVANNAH/HUNTER GA	32.0167	81.1333			5 70.94
13880	CHARLESTON SC	32.9000	80.0333			6 75.40
03820	AUGUSTA/BUSH GA	33.3667	81.9667			6146.40
13883	COLUMBIA/MET SC	33.9500	81.1167			6159.03
93836	BRUNSWICK/GLYNCO GA	31.2500	81.4667			5160.91
13870	ALMA/BACON CO GA	31.5333	82.5167			5203.12

Press RETURN key to continue ...

U.S. SOIL DATA

STATE : SOUTH CAROLINA

LATITUDE : 32:33:21 LONGITUDE : 80:43:43
THE STATION IS INSIDE H.U. 3050208

GROUND WATER ZONE	:	10	
RUNOFF SOIL TYPE	:	1	
EROSION	:	2.6150E-04	CM/MONTH

```
DEPTH TO GROUND WATER BETWEEN   :  0.0000E+00  AND  1.0000E+02
FIELD CAPACITY FOR TOP SOIL     :  6.0000E-02
EFFECTIVE POROSITY BETWEEN      :  2.0000E-02  AND  3.0000E-01
SEEPAGE TO GROUNDWATER BETWEEN  :  4.6330E+03  AND  1.3900E+04  CM/MONTH
DISTANCE TO DRINKING WELL       :  2.5000E+04                   CM

Press RETURN key to continue ...


                              U.S.  CITY
                              ==========

STATE  PLACE NAME            FIPSCODE  LATITUDE  LONGITUDE
-----  --------------------  --------  --------  ---------
  SC   LOBECO                  45013    32.5533    80.7450
  SC   SEABROOK                45013    32.5417    80.7291

Press RETURN key to continue ...
ERROR:          3

MENU: Geodata Handling Data List procedures

1.  Site level retrieval of data                                (SITERET)
2.  Access Census Data                                          (CENSUS)
3.  Determine County Coverage                                   (COVERAGE)
4.  Geographic Data Management                                  (GEODM)
5.  HUCODE/SOIL locator                                         (HUCODE)
6.  Convert to Lat/Long                                         (LATLON)
7.  Lookup/Examine Star Station Data                            (STAR)
8.  Find US cities                                              (USCITY)
9.  Find Soil Survey Status of Counties                         (SSURVEY)

Enter an option number or a procedure name (in parentheses)
or a command: HELP, HELP option, BACK, CLEAR, EXIT, TUTOR
GEMS> EXIT

Type YES to confirm the EXIT command; type NO to restart GEMS
GEMS> YES
$ LOGOUT
        NODE: VAXTM1
ACCT: NTIS                            START TIME:    28-NOV-1989 13:48:51.10
PROJ: NTISNUCN                        FINISH TIME:   28-NOV-1989 13:57:31.77
USER: WRT                             BILLING PERIOD:891101
UIC:  [000750,000112]                 WEEKDAY:       TUESDAY
BAUD:                                 TERMINAL PORT: VTA540

DESCRIPTION OF CHARGE                   QUANTITY                EXPENDITURE
---------------------------------------------------------------------------

  ALL CHARGE LEVELS
    300  baud           (Seconds)          521                       1.3025
    CPU TIME            (Seconds)            7                       0.4628
                                                                -----------
    TOTAL FOR THIS SESSION                                      $    1.7653
NODE 3157  HOST 1038: DROPPED BY HOST
please log in: X

error, type user name:
```

NUS CORPORATION

TDD No. F4-8?04-54

Site Name: American C... and Chemical Venture ...

Your Name: Jim Miller

File Subsection (check one):

___ Project Plans ___ References

___ Field Data Records

___ Reports ✓ Misc.

___ Correspondence/Proj. Notes

Correspondence/Report No: ____________

Description: GEMS data for site

South Carolina Department of Health and Environmental Control

2600 Bull Street
Columbia, S.C. 29201

Commissioner
Michael D. Jarrett

Board
Toney Graham, Jr., M.D., Chairman
Henry S. Jordan, M.D., Vice-Chairman
John B. Pate, M.D., Secretary
William E. Applegate
Oren L. Brady, Jr.
John Hay Burriss
Euta M. Colvin, M.D.

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

June 12, 1989

Mr. R.D. Pruessner
Manager of Environmental Affairs
Tenneco, Inc.
Post Office Box 2511
Houston, Texas 77001

RE: Proposed Amendment to Consent Order 87-65-W
Tenneco Resins, Inc.
American Color and Chemical Corporation
Lobeco Products, Inc.
Beaufort County

Dear Mr. Pruessner:

Enclosed is the proposed Amendment to Consent Order 87-65-W which we discussed at our meeting in April. Read it carefully and, if acceptable, coordinate with the other parties in obtaining the appropriate signatures. When the Amendment has been fully executed, a copy will be returned to you for your records.

If you have any questions concerning the order, please call me at 734-5304. I will be glad to assist you.

Sincerely,

Sandra L. Hursey

Sandra L. Hursey
Environmental Quality Manager
Water Quality Assessment and
Enforcement Division

SLH/sh

cc: George Nelson
Andy Yasinsac
Tom Knight
Miles Coleman
Rick Renfrow
Russ Sherer
Steve Thomas
James P. Fields, Jr.
Primo Marchesi
John Meeks
Brantley Harvey Jr.
Bob Gross
Ann Pizzorusso
Sam Lane
Roger D. Towe
Ralph Mellom
Jack Kelly

STATE OF SOUTH CAROLINA
BEFORE THE DEPARTMENT OF HEALTH & ENVIRONMENTAL CONTROL

IN RE: TENNECO RESINS, INC.
AMERICAN COLOR & CHEMICAL CORPORATION
LOBECO PRODUCTS, INC.
BEAUFORT COUNTY

CONSENT ORDER
87-65-W

WHEREAS, Tenneco Resins, Inc., formerly Tenneco Chemicals, Inc. ("Tenneco"), built a chemical manufacturing plant located in Lobeco, Beaufort County, South Carolina in 1967 and operated it until 1974; and,

WHEREAS, American Color and Chemical Corporation ("American Color") purchased the property in 1974 and operated a chemical manufacturing plant at the site until 1982; and

WHEREAS, Lobeco Products, Inc., formerly Venture Chemical, Inc. ("Lobeco") purchased the property in 1982 and has continued to operate a chemical manufacturing plant at the site; and,

WHEREAS, investigations conducted since December 1984 have found polychlorinated byphenyls ("PCBs") in Campbell Creek; and

WHEREAS, Lobeco and American Color have cooperated in an investigation to further define and locate the presence of PCBs and other potentially hazardous contaminants at the abandoned lagoon and discharge pipe area, the old drum storage area, and the abandoned burn site; and,

WHEREAS, the extent and degree of contamination at the Lobeco site has not been fully determined; and,

WHEREAS, Tenneco, American Color and Lobeco (referred to collectively as "the Respondents") have expressed a willingness to participate in a cooperate effort to more fully investigate and determine the cause, source, nature and extent of the contamination; and,

WHEREAS, the Respondents have expressed a willingness to develop a proposal for review by the Department to implement a remedial action plan based upon the findings of the completed investigation; and,

WHEREAS, it is understood and agreed upon by the Department that the Respondents waive no rights to contest the liability, if any, individually for any violation of state or federal requirements pertaining to the contamination of the site or the clean-up thereof; and,

WHEREAS, the Department, pursuant to the powers and duties as set forth in the South Carolina Pollution Control Act (Sections 48-1-10 to 350, Code of Laws of South Carolina, 1976, as amended), has authority to conduct studies and investigation of pollution; to require the owners and operators of pollution sources to provide such information as it reasonably may require; to regulate the disposal of wastes and the discharge of pollutants into the environment of the State; to abate, control and prevent pollution; and to hold hearings, make determinations, and issue orders.

NOW, THEREFORE, IT IS ORDERED, CONSENTED TO AND AGREED that the Repondents shall:

Within thirty (30) days of the issuance of this Order, Submit to the Department a plan of study, including an implementation schedule, which addresses the action(s) to be taken to determine the full extent and degree of contamination at the Lobeco site, including the abandoned lagoon and discharge pipe area, the old drum storage area, the abandoned burn site, the sediments in the branch of Campbell Creek in the vicinity of the discharge pipe, and a section of the marsh southwest of the intersection of the discharge pipe and County Road 301 where a leak may have previously occurred. Upon Department approval of the plan, including the implementation schedule, it shall become an enforceable part of this Order, and the Respondents shall carry out the approved plan in accordance with the approved schedule. The results of the study shall be submitted to the Department in accordance with the approved schedule and shall include a remedial action plan, as well as a proposed schedule for site remediation.

IT IS FURTHER ORDERED AND AGREED that failure to comply with any provision of this Order shall be grounds for appropriate sanctions and further enforcement action.

THE SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

By: Michael D. Jarrett
Michael D. Jarrett
Commissioner

By: Robert G. Gross
Robert G. Gross, Chief
Bureau of Water Pollution Control

Dated: June 25, 1987

WE CONSENT:

Ralph M Mellon
Tenneco Resins, Inc.
Date: April 13, 1987

American Color and Chemical Corporation
Date: April 28, 1987

Lobeco Products, Inc.
Date: 5/20/87

W. Brantley Harvey Jr.
Walton J. McLeod III
6-22-87

OVERSIZED

DOCUMENT