739SERBSF10,640

739SERBSF10,640

Site Name (Subject):	VALSPAR CORPORATION
Site ID (Document ID):	NCD041415019
Document Name (DocType):	Contractor Report (CONTR)
Report Segment:	
Description:	Screening Site Inspection, Phase I
Date of Document:	7/24/1990
Date Received:	8/1/1990
Box: *Enter SF and # with no spaces*	SF10,640
Access Level:	PUBLIC
Division:	WASTE MANAGEMENT
Section:	SUPERFUND
Program (Document Group):	SERB (SERB)
Document Category:	FACILITY

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

State Copy

NUS CORPORATION
1927 LAKESIDE PARKWAY
SUITE 614
TUCKER, GEORGIA 30084
404-938-7710

RECEIVED
AUG 22 1990
SUPERFUND SECTION

SISB/SAS
RECEIVED
JUL 26 1990
EPA - REGION IV
ATLANTA, GA.

C-586-7-0-61

July 24, 1990

CERCLA

Mr. A.R. Hanke
Waste Programs Branch
Waste Management Division
Environmental Protection Agency
345 Courtland Street, N. E.
Atlanta, Georgia 30365

Date: 8-1-90
Site Disposition: NFRAP
EPA Project Manager: Vaughn-Wright

Subject: Screening Site Inspection, Phase I
Valspar Corporation
High Point, Guilford County, North Carolina
NCD041415019
TDD No. F4-8911-69

Dear Mr. Hanke:

FIT 4 was tasked to conduct a Phase I Screening Site Inspection, at Valspar Corporation in High Point, Guilford County, North Carolina. This assessment included a comprehensive review of EPA and state file material, a drive-by reconnaissance of the facility, and completion of a target survey.

The Valspar Corporation is located in a predominantly commercial/industrial area at 1647 English Road in High Point, Guilford County, North Carolina (Ref. 1). Valspar is an active facility and has been involved in the production of paints, lacquers and coatings since 1962, when the facility was known as the Mobil Chemical Company. In August 1984, the facility changed ownership to Valspar Corporation (Refs. 2, 3). Prior to Mobil's ownership, the facility was occupied by American Marietta as well as a furniture company for an unknown period of time (Ref. 4). The Valspar Corporation is located on approximately 4.3 acres of gently westward-sloping land, and is mostly paved or cemented, with the exception of a small, landscaped area in front of the Valspar offices (Ref. 1).

Hazardous wastes generated at the Valspar facility are solvent-and water-based cleaning wastes, wastewater treatment sludges, air pollution control sludges, ignitable wastes, barium, and other occasional solvents such as ketones, alcohols, and esters (Ref. 4). The preponderance of the facility waste was stored in drums or tanks until shipped offsite for disposal. Disposal practices prior to 1976 are currently unknown (Refs. 3, 4).

The Valspar Company currently has status as a RCRA full-quantity generator (Ref. 5). The facility filed a RCRA Part A application for an existing facility in 1980, requesting interim status as a treater and storer of hazardous waste (Ref. 2). In 1983, Valspar was deleted as a treatment and storage facility. In March 1984, interim status was terminated (Refs. 5, 6).

High Point is located within the Carolina Slate Belt of the Piedmont Physiographic Province (Refs. 7; 8; p. 76). The area is characterized by gently rolling topography with moderately steep slopes along the drainageways (Ref. 9). High Point has a temperate climate (Ref. 10, pp. 7, 11). Total annual precipitation averages about 45 inches with a net annual precipitation of 4 inches (Refs. 11, pp. 3, 17; 12).

The geology of High Point consists of folded and fractured metamorphic bedrock overlain nearly everywhere by residual material termed saprolite (Refs. 8, p. 77, plate 1; 11, p. 2; 13). The saprolite ranges in thickness from a few feet near rock outcrops to more than 100 feet in interstream areas with an average thickness of 30 feet on most hills and ridges (Refs. 10, p. 28; 11, p. 3). Metamorphic rock types in the area include highly altered granite, gabbro, and diorite (Refs. 7; 8, p. 77, plate 1).

The saprolite and bedrock act as a single hydrologic system, as there is no confining layer present between them. In the saprolite, groundwater occurs within intergranular pore spaces (Ref. 11, p. 4). In the bedrock, groundwater occurs primarily within joints, fractures, and other secondary porosity openings (Ref. 8, plate 1). The frequency, size, and interconnection of both joints and fractures diminishes with depth (Ref. 11, p. 4). There are few open fractures at depths greater than 400 feet (Ref. 10, p. 12).

The saprolite has a hydraulic conductivity of less than 10^{-7} cm/sec and acts as a reservoir which slowly feeds water into the underlying bedrock (Refs. 11, pp. 2, 12; 14). It is also the unit from which most domestic water supplies in the region are obtained (Ref. 8, pp. 23, 77-78). The water is supplied to both dug and bored wells that are completed within the saprolite at, and just below, the water table (Ref. 8, pp. 77-78). The depth to the water table in the facility area is about 15 feet below land surface (Ref. 10, pp. 7, 59). Groundwater flow in the Piedmont typically follows surficial features toward topographically low areas; therefore, the most likely direction of groundwater flow at the Valspar Corporation is north-northwest (Ref. 12).

Potable water for the study area is supplied by three municipal systems. The Archdale Water Department, which purchases its water from High Point and Davidson Water, serves 2,700 connections within the city limits and in some areas beyond (Ref. 15). The city of High Point has 27,500 connections that are served by their two surface water intakes, one on High Point Lake at the dam, and the other one Oak Hollow Lake at the Deep River reservoir. Both intakes are located more than 5 miles northeast of the facility and not on the surface water pathway. A small area of private well use exists in the study area, approximately 2 miles south-southeast of Valspar. A topographical house count shows approximately 83 residences relying on groundwater for their potable supplies (Ref. 1). The third water system to serve the study area is the Davidson Water Company, which draws its water from a surface intake on the Yadkin River, more than 20 miles west of High Point. Davidson Water Company draws 7 million gallons of water per day, and serves 30,000 connections (Ref. 16). None of the surface intakes used for potable water in the study area are found along the surface water pathway (Ref. 17).

The surface water pathway for the Valspar Corporation is not readily apparent. The facility is located approximately 0.5 miles south-southeast of Payne Creek, and runoff from the facility which is not caught in the city storm drains could flow in this direction. Payne Creek joins Rich Fork 5.4 miles further downstream, and flows in a southwesterly direction. Neither Payne Creek nor Rich Fork are

used as a source of potable water, although both are large enough to be used for recreational fishing, if not boating (Refs. 1, 17).

The Cape Fear shiner (Notropis mekistocholas) is a federally designated endangered species which is located in Randolph County. The heartleaf plantain (Plantago cordata) is a state-designated endangered species which is located in Davidson County (Refs. 18, 19). Although portions of Randolph and Davidson Counties fall within a 4-mile radius of the Valspar facility, it is not known if these species are located within the radius.

The Valspar Corporation is an active facility. Although employees have easy access, the facility is fenced (Ref. 1). Located 0.5 miles southwest of Valspar Corporation along English Road is Linda's Day Care Center, at 1917 English Road. High Point Jr. High School is located approximately 0.6 miles north of the facility. The nearest residence is located approximately 0.4 mile west-northwest of the facility (Ref. 1). There are approximately 4,711 residents within 1 mile of the Valspar Corporation, and 68,354 people who live within 4 miles of the facility (Ref. 20).

Based on the above referenced factors, and enclosures, it is recommended that no further remedial action be planned for Valspar Corporation. If you have any questions or comments please feel free to call me.

Very truly yours,

Bryan J. Williams
Project Manager

Approved:

BJW/tb

Enclosures

cc: Kelly Cain

References

1. NUS Corporation Field Logbook No. F4-1928 for Valspar Corporation, TDD No. F4-8911-69, January 3, 1990.

2. RCRA Part A Application (EPA Forms 3510-1 and 3510-3) for Mobil Chemical Co., Chemical Coatings Division, High Point, Guilford County, North Carolina. Submitted by P. J. LaMarche, Vice President, Mobil Chemical Company, November 18, 1980.

3. O. W. Strickland, Solid and Hazardous Waste Branch, letter to Mr. Pachasa, Valspar Corporation, August 9, 1984. Subject: Name change of the Mobil Chemical Company.

4. Potential Hazardous Waste Site Preliminary Assessment (EPA Form 2070-12) for Valspar Corporation (NCD041415019). Filed by D. Mark Durway and Lee Crosby, North Carolina Department of Human Resources, February 25, 1985.

5. Jim Edwards, North Carolina Department of Human Resources, telephone conversation with Bryan J. Williams, NUS Corporation, January 10, 1990. Subject: RCRA status of Valspar Corporation.

6. O. W. Strickland, Solid and Hazardous Waste Branch, letter to D. A. Grenci, Mobil Chemical Company, March 13, 1984. Subject: Termination of interim status.

7. North Carolina Geological Survey, Geologic Map of North Carolina (1985).

8. M. J. Mundorff, Geology and Ground water in the Greensboro Area, North Carolina, Bulletin Number 55 (Raleigh, 1948), pp. 23, 76-78, plate 1.

9. U. S. Dept. of Agriculture, Soil Conservation Service, Soil Survey of Guilford County, North Carolina (December, 1977), p. 1.

10. Charles C. Daniel III and N. Bonar Sharpless, Ground-Water Supply Potential and Procedures for Well-Site Selection, Upper Fear River Basin (1983), pp. 7, 11-12, 38, 59.

11. Edwin O. Floyd and Richard R. Peace, An Appraisal of the Groundwater Resources of the Upper Cape Fear River Basin North Carolina, Groundwater Bulletin Number 20 (1974), pp. 3-4, 6, 17.

12. 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.

13. Charles C. Daniel III, Statistical Analysis Relating Well Yield to Construction Practices and Siting of Wells in the Piedmont and Blue Ridge Provinces of North Carolina, Water Resources Investigations Report 86-4132 (Washington, D. C.: GPO, 1987), pp. 9-10.

14. U. S. Environmental Protection Agency, Uncontrolled Hazardous Waste Site Ranking System: A Users Manual (HW-10), originally published in the July 16, 1982, Federal Register (Washington, D.C.: GPO, 1984), p. 15.

15. Angie Nelson, Archdale, North Carolina, telephone conversation with Mike Profit, NUS Corporation, May 3, 1989. Subject: City of Archdale water service.

16. Mary Pangan, Davidson Water Company, telephone conversation with Mike Profit, NUS Corporation, May 3, 1989. Subject: Davidson Water Company service.

17. U. S. Geological Survey, 7.5 minute series Topographic Quadrangle Maps of North Carolina: High Point West 1969 (Photorevised 1987), High Point East 1950 (PR 1982), Kernersville 1969 (PR 1987), Guilford 1951 (PR 1968), scale 1:24,000.

18. North Carolina Natural Heritage Program Element List, June 30, 1989.

19. North Carolina Natural Heritage Program Natural Areas List, July 5, 1989.

20. United States Environmental Protection Agency, Graphical Exposure Modeling System (GEMS) Data Base, compiled from U.S. Bureau of the Census data, (1980).

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
NC	D041415019

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
Valspar Corporation	P.O. Box 2438 (1647 English Road

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
High Point	NC	27261	Guilford	41	06

09 COORDINATES LATITUDE	LONGITUDE	10 TYPE OF OWNERSHIP (Check one)
355645	795843	☒ 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
N/A (MONTH DAY YEAR)	☒ ACTIVE ☐ INACTIVE	1961 (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
Bryan Williams	Biologist	NUS	(404) 938-7710
09 OTHER INSPECTORS	**10 TITLE**	**11 ORGANIZATION**	**12 TELEPHONE NO.**
John McKeown	Chemist	NUS.	(404) 938-7710
			( )
			( )
			( )
			( )

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	15 ADDRESS	16 TELEPHONE NO
			( )
			( )
			( )
			( )
			( )
			( )

17 ACCESS GAINED BY (Check one)	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
☐ PERMISSION ☐ WARRANT		

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO
D. Mark Durway	NCDHR	( )

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE
Bryan J. Williams	NUS	Corporation	(404) 938-7710	04/06/90 (MONTH DAY YEAR)

EPA FORM 2070-13 (7-81)

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	D041415019

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

A SOLID
B POWDER FINES
C SLUDGE
D OTHER _____ (Specify)
E SLURRY
F LIQUID
G GAS

02 WASTE QUANTITY AT SITE
(Measures of waste quantities must be independent)

TONS _____
CUBIC YARDS unknown
NO. OF DRUMS _____

03 WASTE CHARACTERISTICS (Check all that apply)

A TOXIC
B CORROSIVE
C. RADIOACTIVE
D. PERSISTENT
E SOLUBLE
F INFECTIOUS
G FLAMMABLE
H IGNITABLE
I HIGHLY VOLATILE
J EXPLOSIVE
K REACTIVE
L. INCOMPATIBLE
M NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS	possible releases of organics i.e. halogenated		
IOC	INORGANIC CHEMICALS	solvents, Ketones, etc., and Trace		
ACD	ACIDS	amounts of heavy metals		
BAS	BASES			
MES	HEAVY METALS			

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

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Federal, state, and NUS Files

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NC	D041415019

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☐ A. GROUNDWATER CONTAMINATION — 02 ☐ OBSERVED (DATE: _____) — ☒ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION
if spills or releases had occured, they could've possibly reached groundwater

01 ☐ B. SURFACE WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION
The nearest surface water is approx. 0.5 miles from the facility, and anything not caught in City sewers could potentially reach this body.

01 ☐ C. CONTAMINATION OF AIR — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION
There was a solvent smell at the time of the recon, and may have been previously.

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS — 02 ☐ OBSERVED (DATE: _____) — ☒ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION
possibly from current feedstocks, but not from previous, potentially released wastes.

01 ☐ E. DIRECT CONTACT — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION
The possible wastes released (or that had the potential

01 ☐ F. CONTAMINATION OF SOIL — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: _____ (Acres) — 04 NARRATIVE DESCRIPTION
There are some areas of bare ground onsite and adjacent, along the railroad Tracks

01 ☐ G. DRINKING WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION
There are no drinking water wells or intakes in the study area

01 ☐ H. WORKER EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION
not ~~from~~ likely from wastes potentially released previously

01 ☐ I. POPULATION EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION
same as above

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NC	D041415019

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
none observed

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include name(s) of species)
none observed

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
there are no fisheries along the surface water pathway

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES (Spills, Runoff, Standing liquids, Leaking drums) — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION
it is unknown if wastes were poorly contained or not

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
if a release occured, it might possibly have damaged off-site property, but none was observed

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
if a release had occured, it could have

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
This could've possibly occured previously - there is no record of this prior to 1976

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: _____

IV. COMMENTS

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)
Federal, State, and NUS Files

EPA FORM 2070-13 (7-81)

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION
PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	D041415019

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				
☐ B. UIC				The facility is a RCRA monitored Full quantity generator - but not an interim status or permitted facility
☐ 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		
☐ B. PILES		
☐ C. DRUMS, ABOVE GROUND		
☐ 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

approx 3.5 Acres

07 COMMENTS

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.

Diking was visible from the street, but its integrity was not possible to determine

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE. ☐ YES ☒ NO

02 COMMENTS

not to the public

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, records.)

Federal, State, and NUS Files

EPA FORM 2070-13 (7-81)

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	D041415019

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as appropriate)

	SURFACE	WELL
COMMUNITY	A. ☑	B. ☐
NON-COMMUNITY	C. ☐	D. ☐

02 STATUS N/A

ENDANGERED	AFFECTED	MONITORED
A. ☐	B. ☐	C. ☐
D. ☐	E. ☐	F. ☐

03 DISTANCE TO SITE

A. >15 (mi)

B. _____ (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

02 POPULATION SERVED BY GROUND WATER Ø

03 DISTANCE TO NEAREST DRINKING WATER WELL >4 (mi)

04 DEPTH TO GROUNDWATER	05 DIRECTION OF GROUNDWATER FLOW	06 DEPTH TO AQUIFER OF CONCERN	07 POTENTIAL YIELD OF AQUIFER	08 SOLE SOURCE AQUIFER
15 (ft)	unknown	15 (ft)	unknown (gpd)	☐ YES ☑ NO

09 DESCRIPTION OF WELLS (Including useage, depth, and location relative to population and buildings)

10 RECHARGE AREA		11 DISCHARGE AREA	
☐ YES ☐ NO	COMMENTS	☐ 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
Payne Creek	☐	.5 (mi)
Rich Fork	☐	6.1 (mi)
	☐	(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
A. _____ NO. OF PERSONS	B. _____ NO. OF PERSONS	C. _____ NO. OF PERSONS

02 DISTANCE TO NEAREST POPULATION <.1 (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE

the city of High Point

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)

area is predominantly commercial/industrial area

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	D041415019

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	04 DEPTH OF CONTAMINATED SOIL ZONE	05 SOIL pH
unknown (ft)	unknown (ft)	unknown

06 NET PRECIPITATION	07 ONE YEAR 24 HOUR RAINFALL	08 SLOPE: SITE SLOPE	DIRECTION OF SITE SLOPE	TERRAIN AVERAGE SLOPE
4.0 (in)	2.8 (in)	.1 %	west	.5 %

09 FLOOD POTENTIAL

SITE IS IN N/A YEAR FLOODPLAIN

10 N/A ☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS (5 acre minimum)

ESTUARINE	OTHER
A. >15 (mi)	B. >15 (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species)

unknown (mi)

ENDANGERED SPECIES: Cape Fear Shiner

13 LAND USE IN VICINITY

DISTANCE TO:

COMMERCIAL/INDUSTRIAL	RESIDENTIAL AREAS; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES	AGRICULTURAL LANDS: PRIME AG LAND	AGRICULTURAL LANDS: AG LAND
A. <.1 (mi)	B. .2 (mi)	C. unknown (mi)	D. >4.0 (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

The facility is in High Point itself; the gravel slopes to the west, but not greatly.

VII. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

State, Federal, and NUS Files

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 6 - SAMPLE AND FIELD INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	D041415019

II. SAMPLES TAKEN

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER			
SURFACE WATER			
WASTE			
AIR	No Sampling was performed		
RUNOFF			
SPILL			
SOIL			
VEGETATION			
OTHER			

III. FIELD MEASUREMENTS TAKEN

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)

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

Federal, State, and NUS Files

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 7 - OWNER INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	D041415019

II. CURRENT OWNER(S)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
The Valspar Corporation		P.O. Box 625		Raritan	N.J.	08869

PARENT COMPANY (If applicable)

08 NAME	09 D+B NUMBER	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE	12 CITY	13 STATE	14 ZIP CODE

III. PREVIOUS OWNER(S) (List most recent first)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
Mobil Chemical Comp.		P.O. Box 2438		High Point	N.C.	27261
American Marietta						

IV. REALTY OWNER(S) (If applicable; list most recent first)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

State, Federal, and NUS Files

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 8 - OPERATOR INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	D041415019

II. CURRENT OPERATOR (Provide if different from owner)

01 NAME	02 D+B NUMBER
The Valspar Corp.	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
P.O. Box 2438	

05 CITY	06 STATE	07 ZIP CODE
High Point	N.C.	27261

08 YEARS OF OPERATION	09 NAME OF OWNER
6	The Valspar Corp

OPERATOR'S PARENT COMPANY (If applicable)

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)

01 NAME	02 D+B NUMBER
Mobil Chemical Comp	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
P.O. Box 2438	

05 CITY	06 STATE	07 ZIP CODE
High Point	N.C.	27261

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD
1976	Mobil Chemical Corp

PREVIOUS OPERATORS' PARENT COMPANIES (If applicable)

10 NAME	11 D+B NUMBER

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

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

10 NAME	11 D+B NUMBER

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

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

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)

State, Federal, and NUS Files

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	D041415019

II. ON-SITE GENERATOR

01 NAME	02 D+B NUMBER
Valspar Corp.	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
P.O. Box 2438	

05 CITY	06 STATE	07 ZIP CODE
High Point	N.C.	27261

III. OFF-SITE GENERATOR(S)

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)

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, reports)

State Federal, + NUS Files

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NC	D041415019

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 _____ — 03 AGENCY _____
04 DESCRIPTION

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

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NC	D041415019

II PAST RESPONSE ACTIVITIES (Continued)

01 ☐ R. BARRIER WALLS CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ S. CAPPING/COVERING — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

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

None of the above are applicable

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

State, Federal, NUS Files

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 11 - ENFORCEMENT INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NC	D041415019

II. ENFORCEMENT INFORMATION

01 PAST REGULATORY ENFORCEMENT ACTION YES NO unknown

02 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY ENFORCEMENT ACTION

III. SOURCES OF INFORMATION (Cite specific references, e.g., State files, sample analysis, reports)

State, Federal + NUS File material

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. 100-420-5	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

"Rite in the Rain"®

ALL-WEATHER

LEVEL

Notebook No. 311

F4-1926

Union Camp Corp
F4-8911-70
Jamestown, Guilford Co., N.C.
P.M.: Bryan J. Williams
NCP 61E

LOGBOOK REQUIREMENTS
REVISED - NOVEMBER 29, 1988

NOTE: ALL LANGUAGE SHOULD BE FACTUAL AND OBJECTIVE

1. Record on front cover of the Logbook: TDD 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 in detail 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.

All entries in this book will be made by Bryan Williams. Each page used will be initialed by the project manager and dated. All mistakes will be crossed out with one stroke and initialled. All members of the reconnaissance team have read and understand the workplan.

As understanding of the above:

Bryan Williams: Bryan G. Williams
Margaret Graves: Margaret D. Graves
John McKeown: John D. McKeown

2 1/5/90 TSJr

Note: All water information applicable to this site and others studied on this recon will be found in logbook No. F4-1914 for Guardsman Chemicals TDD No. F4-8912-02

1050 Reconned the facility - drove into parking lot and back out. A School is located kitty-corner across the RR. tracks. Site is wooded south to the river, w/ a house between.

All foliage in the area appeared healthy, and there were no

1/5/90 TSJr

noticable odors around the site.

The facility is backed by a Chemical Company and bordered by RR tracks. A water tower is onsite.

facility is not fenced, but not easily accessable.

weather sunny & pleasant, ≅65°F

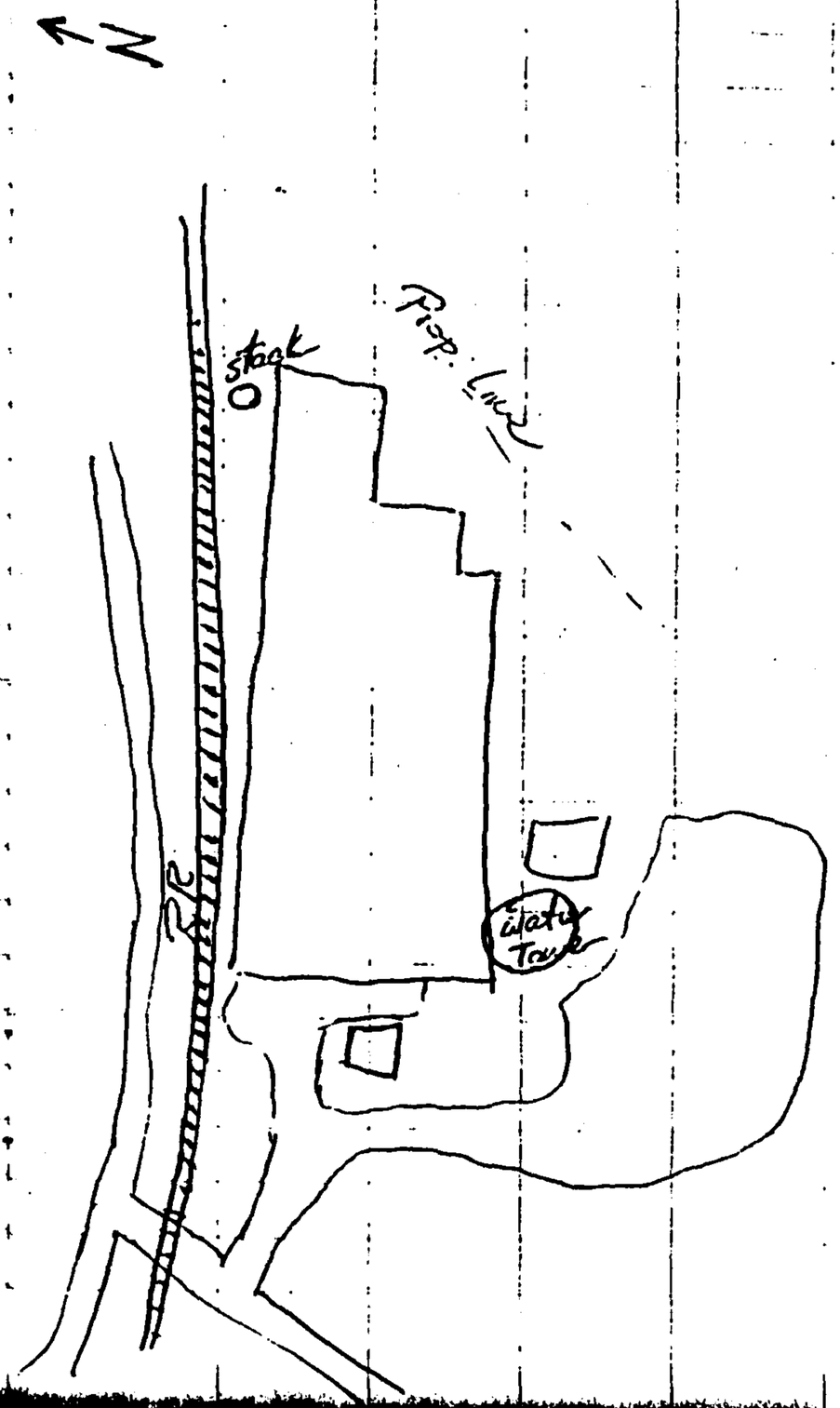
1120 Drove Down Dillon Rd and found houses to be on private wells. Spoke w/ Mr. Jasper Skeen, of

4 1/5/90 BJW

3425 Dillon Rd.
She said they had a shallow 40 ft well until Oct. 88, then redrilled to 140 ft. because of poor yield. She said almost everybody else had redrilled as well.

Bryan J. Wilkin

1/5/90 BJW



5

6 TSW

7/16 Spoke w/ Betty Pruner Today. She said a small area of private wells was located just South of Guilford Co. and showed me on my Topo. Further information on these wells is available from file on Reliance Universal, F4-8912-07.

Bryan J Willis

7

(fill-in areas are spaced for elite type, i.e., 12 characters/inch).

Form Approved OMB No. [illegible]

FORM 1 GENERAL

U.S. ENVIRONMENTAL PROTECTION AGENCY

GENERAL INFORMATION

Consolidated Permits Program

(Read the "General Instructions" before starting.)

EPA I.D. NUMBER: F N C D 0 4 1 4 1 5 0 1 9

LABEL ITEMS

I. EPA I.D. NUMBER: NCD041415019

III. FACILITY NAME: ~~MOBIL OIL CORPORATION~~

V. FACILITY MAILING ADDRESS: PO BOX 2439, HIGH POINT, NC 27260

VI. FACILITY LOCATION: 1647 ENGLISH RD, HIGH POINT, NC . 27260

0 0 2 8 1

RECEIVED EPA/REGION

GENERAL INSTRUCTIONS

If a preprinted label has been provided, affix it in the designated space. Review the information carefully; if any of it is incorrect, cross through it and enter the correct data in the appropriate fill-in area below. Also, if any of the preprinted data is absent *(the area to the left of the label space lists the information that should appear)*, please provide it in the proper fill-in area*(s)* below. If the label is complete and correct, you need not complete Items I, III, V, and VI *(except VI-B which must be completed regardless)*. Complete all Items if no label has been provided. Refer to the instructions for detailed item descriptions and for the legal authorizations under which this data is collected.

II. POLLUTANT CHARACTERISTICS

INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of bold-faced terms.

SPECIFIC QUESTIONS	MARK 'X' YES	NO	FORM ATTACHED
A. Is this facility a publicly owned treatment works which results in a discharge to waters of the U.S.? (FORM 2A)		X	
C. Is this a facility which currently results in discharges to waters of the U.S. other than those described in A or B above? (FORM 2C)	X		
E. Does or will this facility treat, store, or dispose of hazardous wastes? (FORM 3)	X		X
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production, inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons? (FORM 4)		X	
I. Is this facility a proposed stationary source which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	

SPECIFIC QUESTIONS	MARK 'X' YES	NO	FORM ATTACHED
B. Does or will this facility *(either existing or proposed)* include a concentrated animal feeding operation or aquatic animal production facility which results in a discharge to waters of the U.S.? (FORM 2B)		X	1
D. Is this a proposed facility *(other than those described in A or B above)* which will result in a discharge to waters of the U.S.? (FORM 2D)		X	
F. Do you or will you inject at this facility industrial or municipal effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water? (FORM 4)		X	
H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel, or recovery of geothermal energy? (FORM 4)		X	
J. Is this facility a proposed stationary source which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	

III. NAME OF FACILITY

1 SKIP MOBIL CHEMICAL CO CHEMICAL COATINGS DIV

IV. FACILITY CONTACT

A. NAME & TITLE *(last, first, & title)*	B. PHONE *(area code & no.)*
2 PACHASA E S PLANT MANAGER	919 882 6825

V. FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX

3

B. CITY OR TOWN	C. STATE	D. ZIP CODE
4		

VI. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER

5

B. COUNTY NAME

GUILFORD

C. CITY OR TOWN	D. STATE	E. ZIP CODE	F. COUNTY CODE *(if known)*
6			

CONTINUE ON REVERSE

Fill-in areas are spaced for elite type, i.e., 12 characters/inch).

Form Approved OMB No. 158-R0175

FORM 1 GENERAL

EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY

GENERAL INFORMATION

Consolidated Permits Program

(Read the "General Instructions" before starting.)

I. EPA I.D. NUMBER: F N C D 0 4 1 4 1 5 0 1 9

LABEL ITEMS

I. EPA I.D. NUMBER

III. FACILITY NAME

V. FACILITY MAILING ADDRESS

VI. FACILITY LOCATION

NCD041415019

~~MOBIL OIL CORPORATION~~
PO BOX 2438
HIGH POINT, NC 27260

1647 ENGLISH RD
HIGH POINT, NC . 27260

RECEIVED
EPA REGION

GENERAL INSTRUCTIONS

If a preprinted label has been provided, affix it in the designated space. Review the information carefully; if any of it is incorrect, cross through it and enter the correct data in the appropriate fill-in area below. Also, if any of the preprinted data is absent *(the area to the left of the label space lists the information that should appear)*, please provide it in the proper fill-in area(s) below. If the label is complete and correct, you need not complete Items I, III, V, and VI *(except VI-B which must be completed regardless)*. Complete all items if no label has been provided. Refer to the instructions for detailed item descriptions and for the legal authorizations under which this data is collected.

II. POLLUTANT CHARACTERISTICS

INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of bold-faced terms.

SPECIFIC QUESTIONS	MARK 'X' YES	NO	FORM ATTACHED
A. Is this facility a publicly owned treatment works which results in a discharge to waters of the U.S.? (FORM 2A)		X	
B. Does or will this facility *(either existing or proposed)* include a concentrated animal feeding operation or aquatic animal production facility which results in a discharge to waters of the U.S.? (FORM 2B)		X	
C. Is this a facility which currently results in discharges to waters of the U.S. other than those described in A or B above? (FORM 2C)	X		
D. Is this a proposed facility *(other than those described in A or B above)* which will result in a discharge to waters of the U.S.? (FORM 2D)		X	
E. Does or will this facility treat, store, or dispose of hazardous wastes? (FORM 3)	X		X
F. Do you or will you inject at this facility industrial or municipal effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water? (FORM 4)		X	
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production, inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons? (FORM 4)		X	
H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel, or recovery of geothermal energy? (FORM 4)		X	
I. Is this facility a proposed stationary source which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	
J. Is this facility a proposed stationary source which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	

NAME OF FACILITY

SKIP MOBIL CHEMICAL CO CHEMICAL-COATINGS DIV

FACILITY CONTACT

A. NAME & TITLE *(last, first, & title)*: CHASA E S PLANT MANAGER

B. PHONE *(area code & no.)*: 919 882 6825

FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX:

B. CITY OR TOWN:

C. STATE:

D. ZIP CODE:

FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER:

B. COUNTY NAME: ILFORD

C. CITY OR TOWN:

D. STATE:

E. ZIP CODE:

F. COUNTY CODE *(if known)*:

CONTINUED FROM THE FRONT

VII. SIC CODES *(4-digit, in order of priority)*

A. FIRST: 2851 *(specify)* Paints, varnishes, lacquers, enamels and allied products

B. SECOND: *(specify)*

C. THIRD: *(specify)*

D. FOURTH: *(specify)*

VIII. OPERATOR INFORMATION

A. NAME: MOBIL CHEMICAL CO DIV MOBIL OIL CORP

B. Is the name in Item VIII-A the owner? [X] YES [ ] NO

C. STATUS OF OPERATOR *(Enter the appropriate letter into the box)*
F = FEDERAL
S = STATE
P = PRIVATE
M = PUBLIC *(other than federal or state)*
O = OTHER *(specify)*
: F

D. PHONE *(area code & no.)*: A 919 882 6825

E. STREET OR P.O. BOX: PO BOX 2438

F. CITY OR TOWN: HIGH POINT

G. STATE H. ZIP CODE: NC 27260

IX. INDIAN LAND
Is the facility located on Indian lands? [ ] YES [X] NO

X. EXISTING ENVIRONMENTAL PERMITS

A. NPDES *(Discharges to Surface Water)*: N NC0026077

B. UIC *(Underground Injection of Fluids)*: U

C. RCRA *(Hazardous Wastes)*: R

D. PSD *(Air Emissions from Proposed Sources)*: P

E. OTHER *(specify)*: 9 9060 2 *(specify)* NC DEPT. of NATURAL & ECONOMIC RESOURCES

E. OTHER *(specify)*: 9 41400 64 *(specify)* NC DEPT. of NATURAL & ECONOMIC RESOURCES

XI. MAP

Attach to this application a topographic map of the area extending at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in the map area. See instructions for precise requirements.

XII. NATURE OF BUSINESS *(provide a brief description)*

Manufacture of paints, varnishes, lacquers, enamels and allied products.

XIII. CERTIFICATION *(see instructions)*

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME & OFFICIAL TITLE *(type or print)*	B. SIGNATURE	C. DATE SIGNED
. J. LaMarche, V.P. Mobil Chemical Co. Gen. Mgr. Chemical Coatings Division		November 18, 1980

COMMENTS FOR OFFICIAL USE ONLY

...e the unshaded areas only
...aced for elite type, i.e., 12 characters/inch).

Form Approved OMB No. 158-S80004

U.S. ENV...NMENTAL PROTECTION AGENCY

HAZARDO...WASTE PERMIT APPLICATION

Consolidated Permits Program

(This information is required under Section 3005 of RCRA.)

EPA I.D. NUMBER: F N C D 0 4 1 4 1 5 0 1 9

...FFICIAL USE ONLY

...ATION ...ROVED	DATE RECEIVED (yr., mo., & day)	COMMENTS

I. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below *(mark one box only)* to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA I.D. Number, or if this is a revised application, enter your facility's EPA I.D. Number in Item I above.

A. FIRST APPLICATION *(place an "X" below and provide the appropriate date)*

[X] 1. EXISTING FACILITY *(See instructions for definition of "existing" facility. Complete item below.)*

[ ] 2. NEW FACILITY *(Complete item below.)*

FOR EXISTING FACILITIES, PROVIDE THE DATE *(yr., mo., & day)* OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED *(use the boxes to the left)*

C	YR.	MO.	DAY
8	6 2		

FOR NEW FACILITIES PROVIDE THE DATE *(yr., mo., & day)* OPERATION BEGAN OR IS EXPECTED TO BEGIN

YR.	MO.	DAY

B. REVISED APPLICATION *(place an "X" below and complete Item I above)*

[ ] 1. FACILITY HAS INTERIM STATUS

[ ] 2. FACILITY HAS A RCRA PERMIT

III. PROCESSES — CODES AND DESIGN CAPACITIES

A. PROCESS CODE — Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the code(s) in the space provided. If a process will be used that is not included in the list of codes below, then describe the process *(including its design capacity)* in the space provided on the form *(Item III-C)*.

B. PROCESS DESIGN CAPACITY — For each code entered in column A enter the capacity of the process.

1. AMOUNT — Enter the amount.
2. UNIT OF MEASURE — For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER *(barrel, drum, etc.)*	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D79	GALLONS OR LITERS
LANDFILL	D80	ACRE-FEET *(the volume that would cover one acre to a depth of one foot)* OR HECTARE-METER
LAND APPLICATION	D81	ACRES OR HECTARES
OCEAN DISPOSAL	D82	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D83	GALLONS OR LITERS

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER *(Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Item III-C.)*	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE	UNIT OF MEASURE	UNIT OF MEASURE CODE	UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G	LITERS PER DAY	V	ACRE-FEET	A
LITERS	L	TONS PER HOUR	D	HECTARE-METER	F
CUBIC YARDS	Y	METRIC TONS PER HOUR	W	ACRES	B
CUBIC METERS	C	GALLONS PER HOUR	E	HECTARES	Q
GALLONS PER DAY	U	LITERS PER HOUR	H		

EXAMPLE FOR COMPLETING ITEM III *(shown in line numbers X-1 and X-2 below)*: A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

C	DUP		1

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	B. 2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY	LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT	B. 2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY
X-1	S 0 2	600	G		5				
X-2	T 0 3	20	E		6				
1	S 0 1	33,000	G		7				
2	S 0 2	18,000	G		8				
3	T 0 4	600	G		9				
4	T 0 4	15,000	U		10				

CONTINUE ON REVE...

ntinued from the front.

. PROCESSES *(continued)*

C. SPACE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESSES *(code "T04")*. FOR EACH PROCESS ENTERED INCLUDE DESIGN CAPACITY.

T04 - NPDES Separator. Unit has a capacity of 600 gallon containment. This separator part of the SPCC Plan for the plant. Run-off from yard area where there are possibilities of spill occurring, flows through the Separator. Any floatables are skimmed and sludges settled from the effluent. Run-off discharges to surface waters. Plant has NPDES for discharge. Effluent remaining in cell is discharged to City of High Point POTW only after authorization has been given to do so. Floatables and sludges sent off-site for disposal.

T04 - Treatment System consists of neutralization, heavy metal precipitation and sludge removal from the caustic effluent streams from the plant drum cleaning and reconditioning system. Treated effluent monitored and discharged into sanitary sewer system with approval of POTW. Sludge disposed of offsite at a Hazardous Waste Management Facility. Capacity of system is 15,000 gallons per day.

IV. DESCRIPTION OF HAZARDOUS WASTES

A. EPA HAZARDOUS WASTE NUMBER — Enter the four-digit number from 40 CFR, Subpart D for each listed hazardous waste you will handle. If you handle hazardous wastes which are not listed in 40 CFR, Subpart D, enter the four-digit number*(s)* from 40 CFR, Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.

B. ESTIMATED ANNUAL QUANTITY — For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non-listed waste*(s)* that will be handled which possess that characteristic or contaminant.

C. UNIT OF MEASURE — For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:
   For listed hazardous waste: For each listed hazardous waste entered in column A select the code*(s)* from the list of process codes contained in Item III to indicate how the waste will be stored, treated, and/or disposed of at the facility.
   For non-listed hazardous wastes: For each characteristic or toxic contaminant entered in column A, select the code*(s)* from the list of process codes contained in Item III to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed hazardous wastes that possess that characteristic or toxic contaminant.
   Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code*(s)*.
2. PROCESS DESCRIPTION: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER — Hazardous wastes that can be described by ore than one EPA Hazardous Waste Number shall be described on the form as follows:

1. Select one of the EPA Hazardous Waste Numbers and enter it in column A. On the same line complete columns B,C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In column D(2) on that line enter "included with above" and make no other entries on that line.
3. Repeat step 2 for each other EPA Hazardous Waste Number that can be used to describe the hazardous waste.

EXAMPLE FOR COMPLETING ITEM IV *(shown in line numbers X-1, X-2, X-3, and X-4 below)* — A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 0 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
X-1	K 0 5 4	900	P	T 0 3 D 8 0	
-2	D 0 0 2	400	P	T 0 3 D 8 0	
X-3	D 0 0 1	100	P	T 0 3 D 8 0	
-4	D 0 0 2				*included with above*

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ge 2.
y this page before completing if you h more than 26 wastes to list.

Form Approved OMB No. 158-S80004

. NUMBER (enter from page 1)

D 0 4 1 4 1 5 0 1 9 | T/A | C 1

FOR OFFICIAL USE ONLY

S W | DUP | T/A | C 2 | DUP

DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	K078	1,160,000	P	S01 S02	
2	K081	37,000	P	T04 S02 S01	
3	K079				Included in Line 2
4	D001	150,000	P	S01	
5	D005				Included in Line 4
6	K082				Included in Line 4
7					
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EPA Form 3510-3 (6-80)

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ntinued from the front.

V. DESCRIPTION OF HAZARDOUS WASTES *(continued)*

E. USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM ITEM D(1) ON PAGE 3.

EPA I.D. NO. *(enter from page 1)*

F | N C D 0 4 1 4 1 5 0 1 9 | T/A | C 6

. FACILITY DRAWING

All existing facilities must include in the space provided on page 5 a scale drawing of the facility *(see instructions for more detail).*

VI. PHOTOGRAPHS

All existing facilities must include photographs *(aerial or ground—level)* that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas *(see instructions for more detail).*

VII. FACILITY GEOGRAPHIC LOCATION

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*
3 5 / 5 6 / 4 5 N	7 9 / 5 8 / 4 3 W

VIII. FACILITY OWNER

[X] A. If the facility owner is also the facility operator as listed in Section VIII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VIII on Form 1, complete the following items:

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. *(area code & no.)*
E	

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST.	6. ZIP CODE
F	G		

IX. OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED
P. J. LaMarche, V.P. Mobil Chemical Co. Gen.Mgr. Chemical Coatings Division		November 18, 1980

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED

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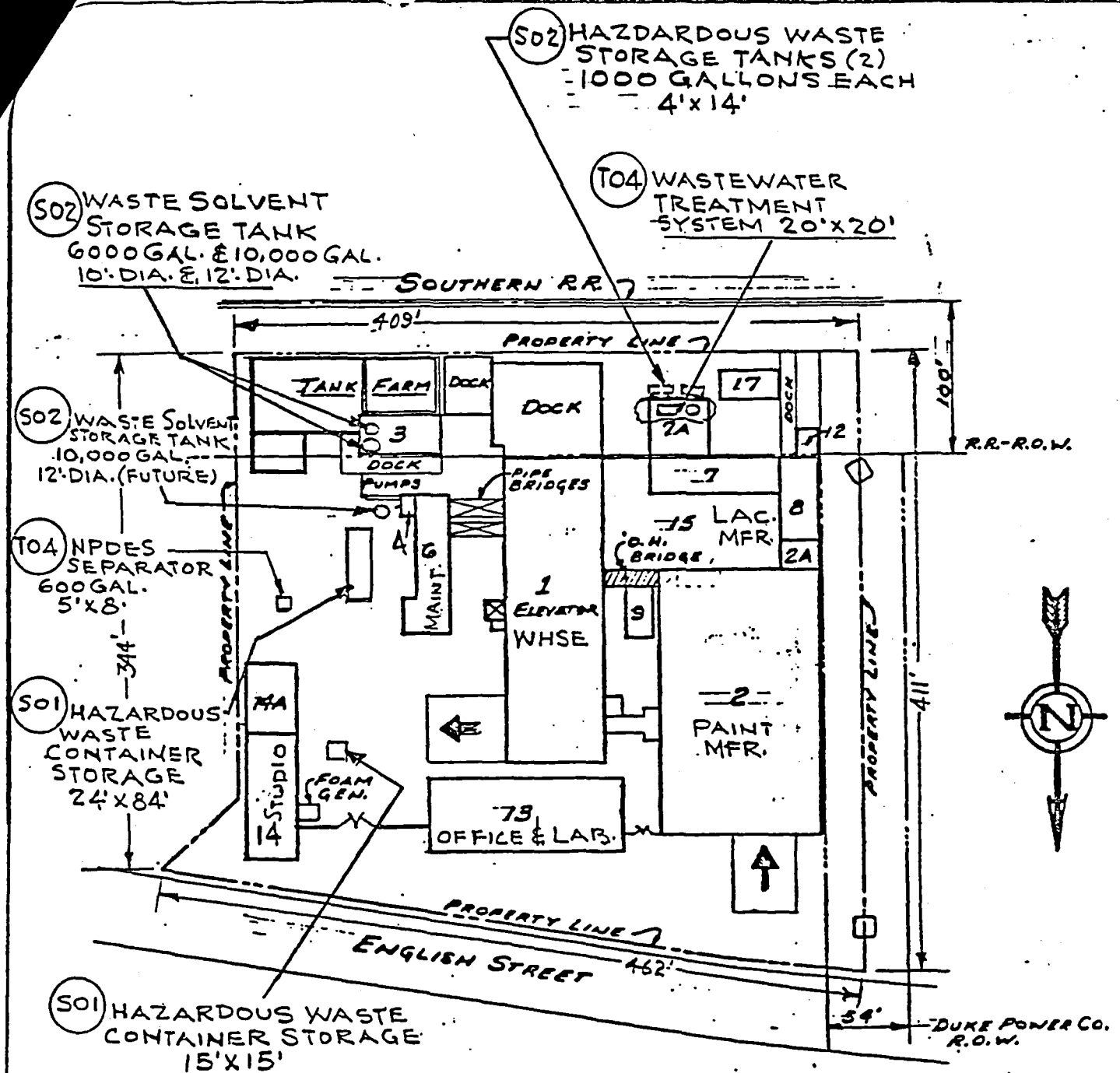
Y DRAWING (see page 4)

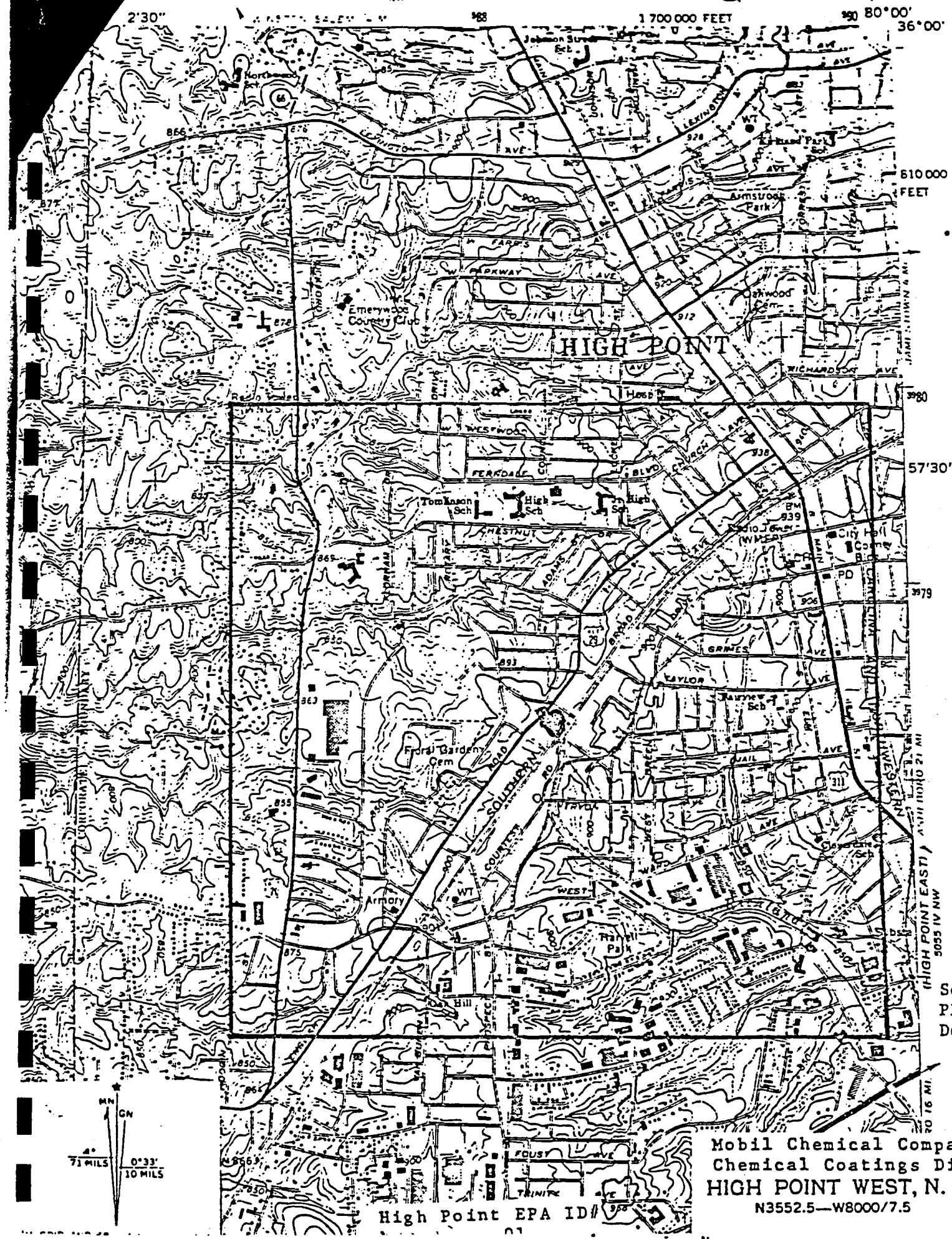


EPA ID # NCD041415019

SCALE 1" = 100'

REVISIONS				MOBIL CHEMICAL COMPANY	PLOT PLAN	
NO	BY	DATE		A DIVISION OF MOBIL OIL CORPORATION	PLANT HIGH POINT N.C.	
1	WJZ WRW	3/31/80	RCRA	CHEMICAL COATINGS DIVISION ENGINEERING DEPARTMENT	BY TLH	JOB
2					DATE 7-10-75	SHEET 3394-M

HIGH POINT WEST QUADRANGLE
NORTH CAROLINA
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mobil Chemical Company
Chemical Coatings Divisi
HIGH POINT WEST, N. C.
N3552.5—W8000/7.5

High Point EPA ID#
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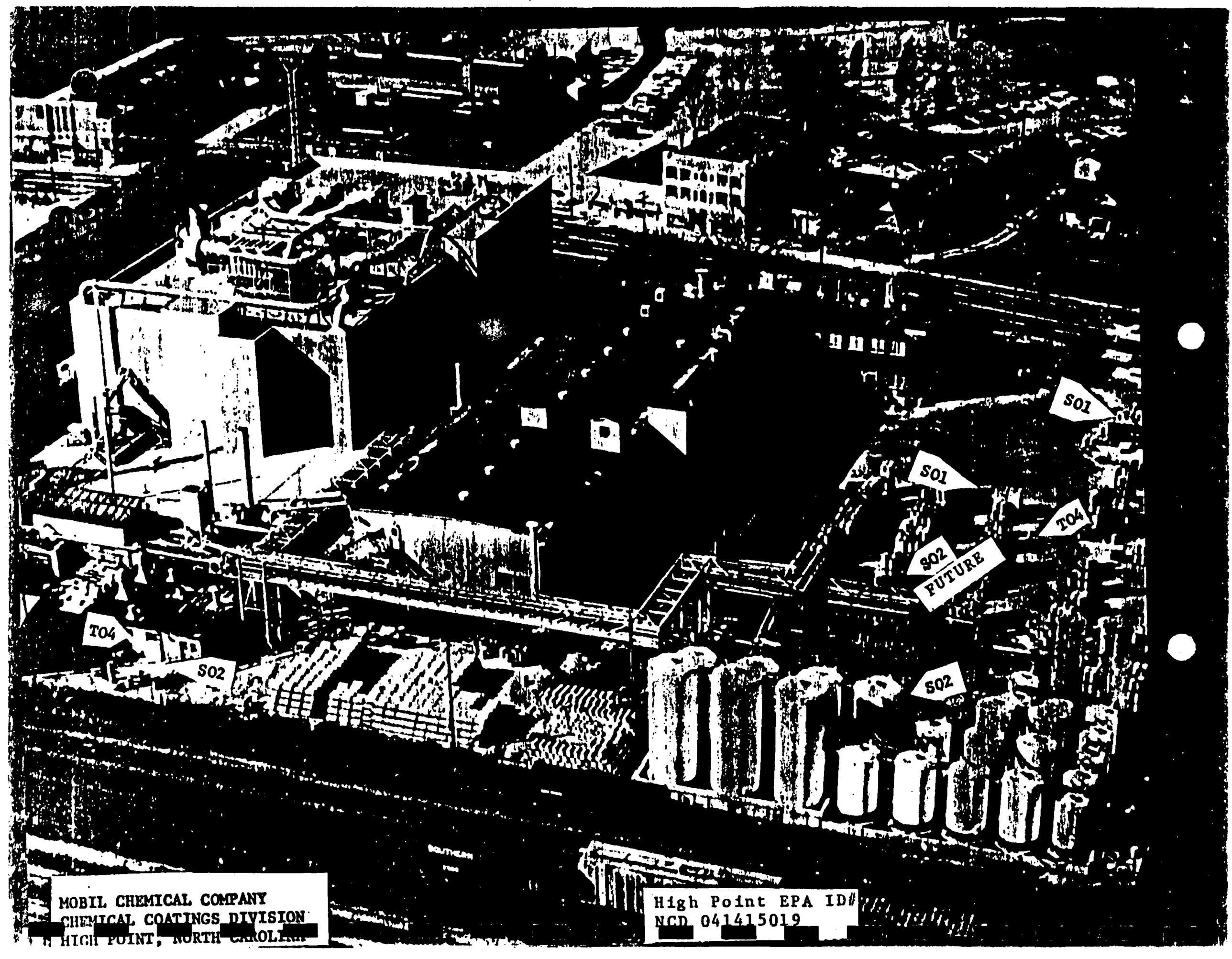

MOBIL CHEMICAL COMPANY
CHEMICAL COATINGS DIVISION
HIGH POINT, NORTH CAROLINA

High Point EPA ID#
NCD 041415019

FILE

Ronald H. Levine, M.D., M.P.H.
STATE HEALTH DIRECTOR

DIVISION OF HEALTH SERVICES
P.O. Box 2091
Raleigh, N.C. 27602-2091

August 9, 1984

Date August 1, 1984
EPA ID Number NCD 041 415 019
Company Name The Valspar Corporation

Dear Mr. Pachasa:

We have processed and accept at the state level your request for RCRA change identified below:

	EXISTING	CHANGE TO
Company Name	Mobil Chemical Company	The Valspar Corporation
Ownership	Mobil Chemical Company	The Valspar Corporation
Facility Contact	E. S. Pachasa	E. S. Pachasa
Facility Phone Number	(919) 882-6825	(919) 882-6825
Facility Mailing Address	P.O. Box 2438 High Point, NC 27261	P.O. Box 2438 High Point, NC 27261

Cordially yours,

O. W. Strickland

O. W. Strickland, Head
Solid and Hazardous Waste Management Br
Environmental Health Section

OWS/EB: tl

Enclosure

cc: Doug McCurry
EPA Region IV

NORTH CAROLINA
DEPARTMENT OF CONSERVATION AND DEVELOPMENT
R. BRUCE ETHERIDGE, DIRECTOR

DIVISION OF MINERAL RESOURCES
JASPER L. STUCKEY, STATE GEOLOGIST

BULLETIN NUMBER 55

Geology and Ground Water IN THE Greensboro Area, North Carolina

BY

M. J. MUNDORFF

PREPARED IN COOPERATION WITH THE GEOLOGICAL SURVEY, UNITED STATES DEPARTMENT OF THE INTERIOR

RALEIGH

1948

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ABSTRACT

The Greensboro area is in the north-central Piedmont of North Carolina and includes Alamance, Caswell, Forsyth, Guilford, Rockingham, and Stokes Counties.

The area includes 2,975 square miles and had a population of 438,404 in 1940.

The area lies entirely within the Piedmont province, which is characterized by flat to rolling upland surfaces, separated by stream valleys, with a few scattered monadnock hills.

Except for a belt of sandstones and shales along Dan River, the area is underlain by igneous and metamorphic rocks, consisting chiefly of gneiss, schist, slate, and granite.

Wells drilled in greenstone schist have a considerably higher average yield than wells in any other rock unit. The average yield of municipal and industrial wells in this rock is 55 gallons a minute. In granite, gneiss, and the Triassic sandstones and shales, the average yield of municipal and industrial wells is 33 to 35 gallons a minute.

Topographic location has an important bearing on the amount of water yielded by wells. The average yield of wells drilled in draws and valleys is more than 3½ times greater than the average yield of wells drilled on hills. It is probable that draws and valleys mark the location of sheared and fractured zones in which the rocks are saturated with water, whereas hills occupy areas of massive, unbroken rock which contain, and will yield, relatively little water.

Wells drilled where the weathered mantle is thick generally yield larger supplies than those drilled where it is thin.

The yield per foot of well generally decreases with depth and beyond 250 feet drops quite sharply, indicating that it is usually not advisable to drill beyond that depth if the well has not obtained water when it reaches that depth.

Included in the report are a number of tables showing the relation of yield to type of rock, to topographic location, and to depth of wells. The report includes a chapter on the ground-water resources of each of the six counties with tables of well data, chemical analyses, and well logs.

GEOLOGY AND GROUND WATER IN THE GREENSBORO AREA, NORTH CAROLINA

INTRODUCTION

LOCATION OF AREA AND SCOPE OF THE INVESTIGATION

This report, the third of a series on the ground-water resources of the State, gives the results of an investigation of the ground-water resources in a part of the north-central Piedmont of North Carolina. The area consists of Alamance, Caswell, Forsyth, Guilford, Rockingham, and Stokes Counties.

The investigations on which the reports are based are being made through a continuing cooperative agreement between the North Carolina Department of Conservation and Development and the Geological Survey, U. S. Department of the Interior. The program is under the direction of Dr. J. L. Stuckey, State Geologist of North Carolina, and Dr. A. N. Sayre, Geologist in charge, Division of Ground Water, U. S. Geological Survey.

The first report, published as Bulletin 47 of the North Carolina Department of Conservation and Development, is a progress report giving general information on ground-water resources of the entire State, with particular emphasis on the Coastal Plain.

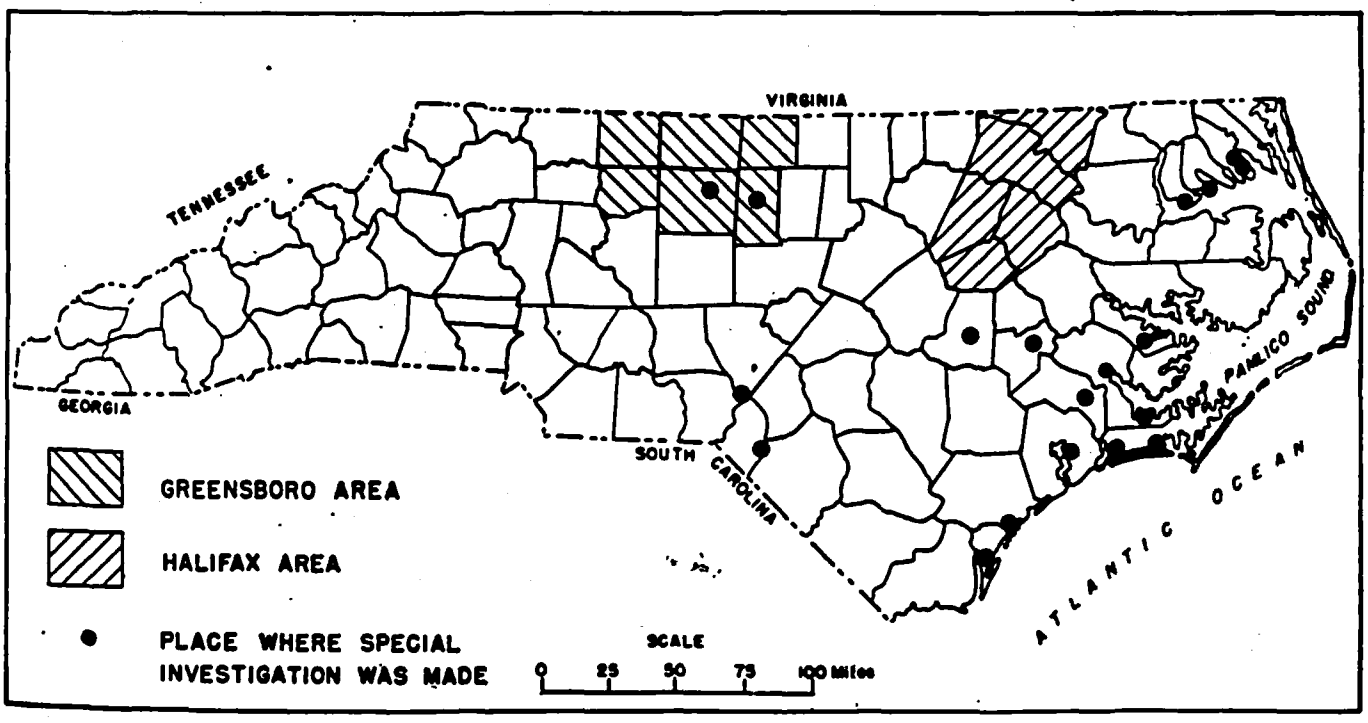


Fig. 1—Index map of North Carolina showing the location of the Greensboro area and other places where ground-water investigations have been made.

The second report, published as Bulletin 51, gives the results of an investigation of the ground-water resources of the Halifax area, including Edgecombe, Halifax, Nash, Northampton, and Wilson Counties.

Because of the many military establishments constructed in North Carolina during the war, most of which utilize ground water, a considerable amount of time has been devoted to special investigations and reports regarding ground-water supplies for military bases, war plants, and contiguous civilian housing areas. The index map (fig. 1) shows the areas in which investigations have been made.

The field work in the Greensboro area was done principally in the summers and autumns of 1942 and 1943 and consisted of obtaining data on about 1,300 wells, a number of springs, and the 23 municipal supplies, collecting samples of water, and noting the geologic and topographic setting of the wells. Information on the wells was obtained by interviewing well owners and operators and well drillers. A great deal of the information was given from memory and some of it, therefore, may be somewhat inaccurate.

During the course of the field work it was found that existing geologic maps were so generalized as to be wholly inadequate for use with the hydrologic data secured. Therefore, an additional 5 weeks were spent in the autumn of 1944 in mapping the geology on a reconnaissance scale. It should be emphasized that the geologic map (pl. 1) is based on these few weeks of field work plus notes made during the collection of hydrologic data in 1942 and 1943; and, in detail, the geology of the area is a great deal more complex than is shown by the map. Rocks of similar geologic and hydrologic characteristics have generally been mapped together. Also, some rocks of different kinds have been mapped together because they occur together in such a way that only mapping on a large scale, requiring a great deal of time, would permit their separation. The belt mapped as gneiss is a good example of this in that several types of gneiss and schist may alternate repeatedly in a short distance.

ACKNOWLEDGMENTS

Nearly all the chemical analyses were made by members of the Quality of Water Division, U. S. Geological Survey. The names of the analysts are given in the tables of analyses.

The writer wishes to acknowledge the courteous and generous assistance of the well owners, well drillers, school superintendents, superintendents of public water supplies, and many others. Without their aid the investigation could not have been successfully completed. Especial acknowledgment is due the well drillers, including the Carolina Drilling and Equipment Co., Danville Well Drilling Co., Heater Well Co., M. A. Holder, John Hopkins, W. B. Mayhew, J. A. Rich, F. L. Smith, J. Stafford, Sydnor Pump and Well Co., Virginia Machinery and Well Co., and Well Drillers Inc., who generously gave their time and effort in furnishing records of wells drilled by them.

GEOGRAPHY

INTRODUCTION

Area and population.—The Greensboro area is in the north-central part of the State, bordering the Virginia State line, and includes Alamance, Caswell, Forsyth, Guilford, Rockingham, and Stokes Counties, with a total area of 2,975 square miles. The location of the Greensboro area is shown in figure 1.

The area had a population of 438,404 in 1940, about 147 to the square mile, according to the U. S. Census Bureau report. There are 18 incorporated cities and towns with an aggregate population of 219,121, which is 50 percent of the total population of the area. Four cities, Burlington, Greensboro, High Point, and Reidsville, have a population of more than 10,000, and nine other cities and towns have a population of more than 1,000.

Agriculture and industry.—More than 79 percent of the area is included in farms, nearly half the total area of the farms, however, being woodland. The total value of the farm products in 1939, according to the 1940 census, was $20,599,677, tobacco accounting for slightly more than half the total. Other important products are livestock, dairy products, poultry and eggs, corn, wheat, hay, potatoes, and vegetables.

Manufacturing is the most important occupation in the area, with 67,607 wage earners being employed in 1939. The 1940 census report lists 526 manufacturing establishments in the Greensboro area. The total value added to that of the raw materials by the operations of these establishments in 1939, exclusive of the establishments in Forsyth and Rockingham Counties which are not reported, is more than $61,000,000. If these two counties were included, the total value added by manufacture probably would be well above $100,000,000. The textile industry, chiefly cotton, is the most important, employing about 65 percent of all factory workers. Tobacco manufacture, principally the manufacture of cigarettes, is next in importance, followed by furniture, food, chemicals, and lumber.

Above-normal rainfall during 1935 and 1936 resulted in high ground-water levels in the spring in 1935, 1936, and 1937. However, the excess of rain did not prevent the water level from declining to near-normal levels in the autumn of each year. Below-normal rainfall in the winter and spring of 1938 prevented the normal winter and spring rise; and although about the normal amount of rain fell during the remainder of the year, the water level in the Lindale well reached record low stages. Because of the above-normal rainfall during the last part of 1938 at Haw River, the Governor Holt well did not decline to record lows. Rainfall and water levels in both wells were not far from normal in 1939 and 1940. Below-normal rainfall in nearly every month of 1941 and in January 1942 resulted in record low levels in both wells during the first part of February 1942. Approximately normal rainfall during February and March did not suffice to raise the water level of either well back to normal, evidently because of a very large deficiency in soil moisture. With approximately normal rainfall during the remainder of the year, both wells were at below-normal levels. However, the water level at the end of the year was not far below normal and evidently the soil-moisture deficiency was not large because the water level made its usual spring recovery in 1943 with normal or below-normal rainfall. Above-normal rainfall in 1944 built up the water table to a very favorable position at the end of 1944, although no record high was reached.

UTILIZATION OF GROUND WATER

Ground water in the Greensboro area is obtained from wells and springs. The different types of wells include dug, bored, and drilled wells.

Dug wells.—More domestic water supplies in the Greensboro area are obtained from dug wells than from any other type. Dug wells in the area range from a few feet to nearly 100 feet in depth. The hole is generally dug between 30 and 60 inches in diameter. When the well is curbed with terra cotta or concrete pipe, the inside diameter usually is 24 to 30 inches. The inside diameter of masonry- or rock-curbed wells and uncurbed wells generally is somewhat greater. Dug wells have certain advantages over other types of wells but also have certain disadvantages. Probably the most important consideration that leads to the choice of a dug well is that of cost. Generally this is the least expensive method of obtaining a water supply, with the possible exception of bored wells. Furthermore, many wells on farms and on the fringes of towns are dug by the owner in his spare time or in slack seasons, so that there is no cash outlay from digging. However, cost is not always in favor of the dug well, particularly where bedrock is encountered before a satisfactory supply is obtained. The cost of dug wells under such conditions has been reported at several places to have exceeded the cost of the average drilled well in the neighborhood. A second advantage of the dug well is the large storage capacity as compared particularly with the small-diameter drilled wells. A well 24 inches in diameter will contain nearly 24 gallons of water per foot of depth, as compared to 1½ gallons and 1/6 gallon per foot of depth for wells 6 inches and 2 inches in diameter, respectively. Thus, even though the yield of a well may be very low, a fairly large quantity of water can be withdrawn in a short time.

Dug wells have two important disadvantages. Usually the depth of water in a dug well is not great, either because of the difficulty involved in digging below the water table or because bedrock is encountered. In periods of drought, therefore, many dug wells go dry. A second disadvantage is that the water in these wells is much more susceptible to pollution or contamination by the entrance of impure surface water. A survey made in Pennsylvania in 1930 and 1931, during which 17,665 water supplies were examined for purity, showed that the supplies from 90 percent of the drilled wells were safe whereas less than 50 percent of the supplies from dug wells were safe[1].

The danger of contamination of dug wells can be decreased by observing certain precautions. All dug wells should be covered tightly to prevent direct entrance of contaminating material, either solid or liquid. The well should be cased or curbed with tile or concrete pipe or similar material and the joints should be cemented to a depth of at least a few feet below the water table, but in any event to a depth of at least 10 feet below the surface. The space between the walls and the curbing should be filled, above the water-bearing bed, with clay. The dug well should be located several hundred feet from any source of contamination and up the ground-water slope from any nearby source of contamination.

[1] Lohman, Stanley W., Ground water in northeastern Pennsylvania; Pennsylvania Topog. and Geol. Survey Bull. W4, p. 40, 1937.

ANALYSES OF GROUND WATER FROM FORSYTH COUNTY, NORTH CAROLINA

(Analysts: E. W. Lohr and M. S. Berry, U. S. Geological Survey. Numbers at heads of columns correspond to numbers in table of well data)

(parts per million)

	2	3	93	124	164
Silicia (SiO_2)	31	28	22	31	29
Iron (Fe)	.02	.02	.03	.03	.03
Calcium (Ca)	5.7	22	64	23	6.7
Magnesium (Mg)	3.1	8.0	24	7.4	3.0
Sodium and Potassium (Na+K)	14	7.2	67	7.0	1.3
Carbonate (CO_3)	0	0	0	0	0
Bicarbonate (HCO_3)	63	112	46	92	30
Sulfate (SO_4)	3.2	9.1	10	17	3.7
Chloride (Cl)	1.2	1.5	225	5	1.2
Fluoride (F)	----------	----------	.0	.5	----------
Nitrate (NO_3)	.0	.0	47	2.0	2.2
Dissolved solids	89	130	603	143	71
Total hardness as $CaCO_3$	27	88	258	88	29
Date of collection	May 21, 1943	May 20, 1943	Oct. 16, 1942	Oct. 13, 1942	May 19, 1943
Depth (feet)	130	350	714	308	110
Chief aquifer	Gneiss	Gneiss	Gneiss	Granite	Granite

GUILFORD COUNTY

(Area, 651 square miles; population, 153,916)

Geography, physiography, and drainage.—Guilford County, in the south-central part of the Greensboro area, is the largest of the six counties and has the largest population. It has four incorporated cities and towns and about 14 unincorporated towns and villages. Greensboro, located in the center of the county, is the largest city and county seat. High Point, the only other city, is in the extreme southwestern corner of the county. Greensboro is an important center of textile manufacturing and High Point also has a number of textile factories, although it is better known as a center of furniture manufacturing. There are a few factories in the smaller towns and villages, but the remainder of the county is dominantly agricultural. Guilford County has a good system of paved roads and railroads, most of which radiate from Greensboro.

Guilford County is in the Piedmont physiographic province. Its surface is formed by the uplifted and partially dissected peneplane of that province. The land surface near the larger streams is gently rolling, with a relief of 100 to 150 feet. The interstream areas are broad and generally quite flat. No large trunk streams flow through or near Guilford County and therefore there are no deep valleys. Because the base-level is higher, dissection has generally been less extensive than in other counties of the Greensboro area. Guilford County is underlain by rocks of several different types. Because some of these differ considerably in resistance to erosion, both the topography and the drainage pattern are greatly influenced by the geology. However, topographic maps have not been made of any part of the county, and the geology is complex and at many places obscure, so that the exact relation of the topography and drainage to the geology cannot always be ascertained. The outstanding feature is the northeastward trend of the ridges and streams. Apparently some of the streams flow along or near the contact between different kinds of rocks, whereas others flow in weaker rocks, the more resistant rocks forming interstream divides. The major exception to the northeastward trend of the streams is Deep River, which flows southeastward chiefly across diorite and granite, which are uniformly resistant.

Practically all of Guilford County is drained by the two main branches of the Cape Fear River system, Haw River and Deep River. About 75 percent of the county is drained by Haw River and its tributaries, the most important of which are Reedy Fork, Buffalo Creek, and Alamance Creek. Practically all of the remaining 25 percent is drained by Deep River, only a few square miles of the southwest corner of the county draining southward into Yadkin River.

Geology.—The geology of Guilford County apparently is more complex than that of any other county of the Greensboro area. Seven of the nine geologic units crop out in Guilford County and the areal distribution of most of them is quite irregular.

The gneiss unit crops out in several irregular belts extending northeastward across the northwestern corner of the county. These belts are separated by areas of porphyritic granite, which was intruded into the gneiss. The principal rocks of the gneiss unit are banded quartz-mica-feldspar gneiss and quartz-mica schist. They are chiefly of sedimentary origin, and although the rocks have been greatly changed by metamorphism at many places the bedding planes can still be distinguished. The granite has intimately intruded the gneiss so that the boundaries between the two units necessarily are greatly generalized.

The greenstone schist crops out in large, irregularly shaped areas in the southeastern two-thirds of the county. These areas are separated by areas of sheared granite. The greenstone schist consists of a green fine- to medium-grained basic schistose rocks, chiefly of volcanic origin. At most places the rock is highly schistose but at a few places it is coarser and fairly massive.

The sericite schist crops out in a belt extending northeastward across the county from a point near Guilford College. It is closely associated with the greenstone schist and may be a metamorphosed tuff or possibly a metamorphosed clay. The rock is greatly weathered, and usually the only recognizable minerals are quartz, sericite and iron oxide, the latter apparently an oxidation product of chlorite and hornblende.

The slate unit is limited to a narrow, highly irregular belt extending across the southeastern corner of the county and to a small patch in the south edge of High Point. The rocks are mostly tuffaceous slates but include some clay slates.

The sheared granite is exposed over about 50 percent of the southeastern half of the county, where it forms a fairly continuous area interrupted by large patches of greenstone and slate. The granite is generally a moderately coarse pink schistose and gneissic rock consisting chiefly of quartz, biotite, and feldspar. The granite has been considerably metamorphosed and intensely sheared. The outstanding feature of the granite is the schistose and slaty dikes, which are green in color and greatly resemble the greenstone schists.

Diorite crops out at a number of places but was mapped separately at only two places. The outcrops otherwise are too small or not well enough exposed to map separately. Places where diorite crops out but is not shown on the map include the vicinity of Sedgefield, Pleasant Garden, along State highway 62 between Climax and High Point, and an area about 6 miles north of High Point. The diorite is a medium- to coarse grained, dark-gray to greenish-gray rock consisting chiefly of plagioclase and hornblende. It generally is massive but at a few places is somewhat schistose.

The porphyritic granite outcrops in irregular, elongated patches across the northwestern corner of the county, where it is closely associated with the gneiss. In places the gneiss has been completely assimilated by the granite but in other places the gneiss has only been impregnated by emenations from the granitic magma. Because the granite has so intimately intruded the gneiss and because every gradation between true granite and true gneiss can be found, the map is necessarily greatly generalized.

The porphyritic granite is generally coarse-grained and medium gray, with large phenocrysts of feldspar. The ground mass consists of quartz, biotite, and feldspar. At most places the granite is entirely massive, but at some places the granite has some of the schistosity of the gneiss.

Ground water.—Nearly all domestic water supplies, many industrial supplies, and one of the three municipal water supplies are obtained from wells.

Dug wells are extensively used for domestic supplies in rural districts. Generally they are from about 15 to 50 feet deep and 2½ to 4 feet in diameter. Wells can generally be dug deep enough in gneiss and schist that they will not go dry even during a drought. However, at some places in granite, diorite, greenstone schist, and slate, the rock is so close to the surface that dug wells frequently go dry.

Bored wells are used considerably in suburban areas and are cheaply and easily constructed. They are bored by power-driven earth augers and cannot go below the completely weathered zone. For this reason, they are not always successful in rocks such as granite and diorite, where the water table at times declines below the weathered zone. Most bored wells are cased, and where they are properly constructed and of sufficient depth that they will not go dry, they are a satisfactory source of supply. Dug and bored wells

obtain their water from the weathered rock material at and just below the water table. For this reason, extra precautions must be observed to prevent contamination.

There are a large number of drilled wells in Guilford County. Records of more than 350 drilled wells are given in the tables of well data. Many of these were core-drilled with chilled shot and are 2 or 3 inches in diameter. There are many other core-drilled wells in Guilford County which do not appear in the table. Core-drilled wells have the advantages of all drilled wells and are cheaper than the larger percussion-drilled wells. However, although they are satisfactory for domestic wells, their small size makes them unsatisfactory for most industrial plants. About 7 or 8 gallons a minute is the maximum rate at which water can be removed from a 2-inch well by a deep-well pump. The average yield of 157 wells 2 inches in diameter in Guilford County is 6 gallons a minute and the average yield of 20 wells 3 inches in diameter is 10½ gallons a minute. These quantities are near the maximum amount that can be pumped from wells of that diameter and suggest that many of the wells would yield more than can be withdrawn from the well.

Most industrial, and public-supply wells are drilled with a percussion drill and are from 4 to 8 inches in diameter. The 6-inch well is by far the commonest. The larger-diameter wells encounter more fractures and cracks than small-diameter wells. Also, because a larger pump can be used, more water can be pumped from a large-diameter well than from a small-diameter well.

Drilled wells, both core-drilled and churn-drilled, have certain advantages over dug or bored wells. Because they are generally tightly cased and the water is obtained from crevices in the rock, they are much less liable to contamination. The depth of water in the well is generally large in comparison with the fluctuation of the water level, so that the yield decreases only slightly during a drought.

A summary of data on drilled wells 3 inches or more in diameter is given below:

TABLE 16—SUMMARY OF DATA ON WELLS IN GUILFORD COUNTY
(Drilled wells 3 inches or more in diameter)

ACCORDING TO ROCK TYPE

Type of Rock	Number of Wells	Average Depth (feet)	Yield (gallons a minute)			Percent of wells yielding less than 1 gallon a minute
			Range	Average	Per foot of Well	
Gneiss	20	123	1—50	15.6	0.126	5.0
Greenstone schist	67	163	1—200	36.5	.223	3.0
Sericite schist	8	116	5—20	11.1	.105	0
Slate	4	273	5—15	10.5	.039	0
Sheared granite	54	175	0—70	14.4	.093	13.0
Porphyritic granite	26	137	½—30	10.9	.079	3.8
All wells	179	158	0—200	22.0	.139	6.1

ACCORDING TO TOPOGRAPHIC LOCATION

Topographic Location	Number of Wells	Average Depth (feet)	Yield (gallons a minute)			Percent of wells yielding less than 1 gallon a minute
			Range	Average	Per foot of Well	
Hill	41	203	0—100	15.5	0.076	24.4
Flat	44	170	0—200	22.2	.131	2.3
Slope	55	130	2—120	21.8	.168	0
Draw	16	125	2½—75	22.8	.182	0
Valley	22	158	10—100	34.4	.218	0

ange name from Mobil Chemical
The Valspar Corp.

EPA

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	D041415019

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER				
The Valspar Corporation	P.O. Box 2438 (1647 English Road)				
03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
High Point	NC	27261	Guilford	41	06

09 COORDINATES LATITUDE 35° 56' 45" LONGITUDE 79° 58' 43"

10 DIRECTIONS TO SITE (Starting from nearest public road) From the train depot in downtown High Point, located at the intersection of N. Main St. and English Road, travel SW on English for appx. 1 mi. The Valspar Corp. is located on the left at the intersection of English Road and ~~West Point Avenue.~~

III. RESPONSIBLE PARTIES

01 OWNER (If known)	02 STREET (Business, mailing, residential)		
The Valspar Corporation	P. O. Box 625		
03 CITY	04 STATE	05 ZIP CODE	06 TELEPHONE NUMBER
Raritan	NJ	08869	(201) 725-8800
07 OPERATOR (If known and different from owner)	08 STREET (Business, mailing, residential)		
The Valspar Corporation	P. O. Box 2438		
09 CITY	10 STATE	11 ZIP CODE	12 TELEPHONE NUMBER
High Point	NC	27261	(919) 882-6825

13 TYPE OF OWNERSHIP (Check one)
☒ A. PRIVATE ☐ B. FEDERAL: _____ (Agency name) ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL
☐ F. OTHER: _____ (Specify) ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)
☒ A. RCRA 3001 DATE RECEIVED: 8 / 18 / 80 (MONTH DAY YEAR) ☐ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: / / (MONTH DAY YEAR) ☐ C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION
☐ YES DATE / / (MONTH DAY YEAR)
☒ NO

BY (Check all that apply)
☐ A. EPA ☐ B. EPA CONTRACTOR ☐ C. STATE ☐ D. OTHER CONTRACTOR
☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: _____ (Specify)
CONTRACTOR NAME(S): _____

02 SITE STATUS (Check one)
☒ A. ACTIVE ☐ B. INACTIVE ☐ C. UNKNOWN

03 YEARS OF OPERATION
1961 (BEGINNING YEAR) | (ENDING YEAR) ☐ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED Mobil Chemical Co. (now Valspar Corp) notified in around 1979, as required for Eckhardt survey. No record of on-site disposal between 1976 and present, though may have occurred prior to this date. Also, may have have occurred under previous ownership (American Marietta and a furniture company)

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION

Wastes which might have been released or disposed of on-site prior to 1976 include organics (halogenated solvents, ketones, etc.) and trace amounts of heavy metals.

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)
☐ A. HIGH (Inspection required promptly) ☐ B. MEDIUM (Inspection required) ☒ C. LOW (Inspect on time available basis) ☐ D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NUMBER
E. S. Pachasa	The Valspar Corporation	(919) 882-6825

04 PERSON RESPONSIBLE FOR ASSESSMENT	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NUMBER	08 DATE
D. Mark Durway/Lee Crosby	NC DHR/DHS	S&HW Mgt. Br.	(919) 733-2178	2 / 25 / 85 (MONTH DAY YEAR)

EPA FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	D041455019

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- ☐ A. SOLID
- ☐ B. POWDER, FINES
- ☐ C. SLUDGE
- ☐ D. OTHER N/A (Specify)
- ☐ E. SLURRY
- ☐ F. LIQUID
- ☐ G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

TONS _____
CUBIC YARDS N/A
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			RCRA Part A, 11-18-80,
OLW	OILY WASTE			estimates annual waste
SOL	SOLVENTS			quantity to be 1,347,000 lbs.
PSD	PESTICIDES			(See Section IV)
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

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
K078	Solvent cleaning wastes-paint mfg.		No waste	N/A	
K079	Water cleaning wastes-paint mfg.		Stored on		
K081	Wastewater treatment sludges "		site for more than		
K082	Air pollution control sludges "		90 days. Possible		
D001	EP Ignitable		releases or on-site		
D005	Barium		disposal occurred		
			prior to 1976.		
OCC	ketones,solvents,alcohols		"		
	esters,etc. N.O.S.				

V. FEEDSTOCKS (See Appendix for CAS Numbers)

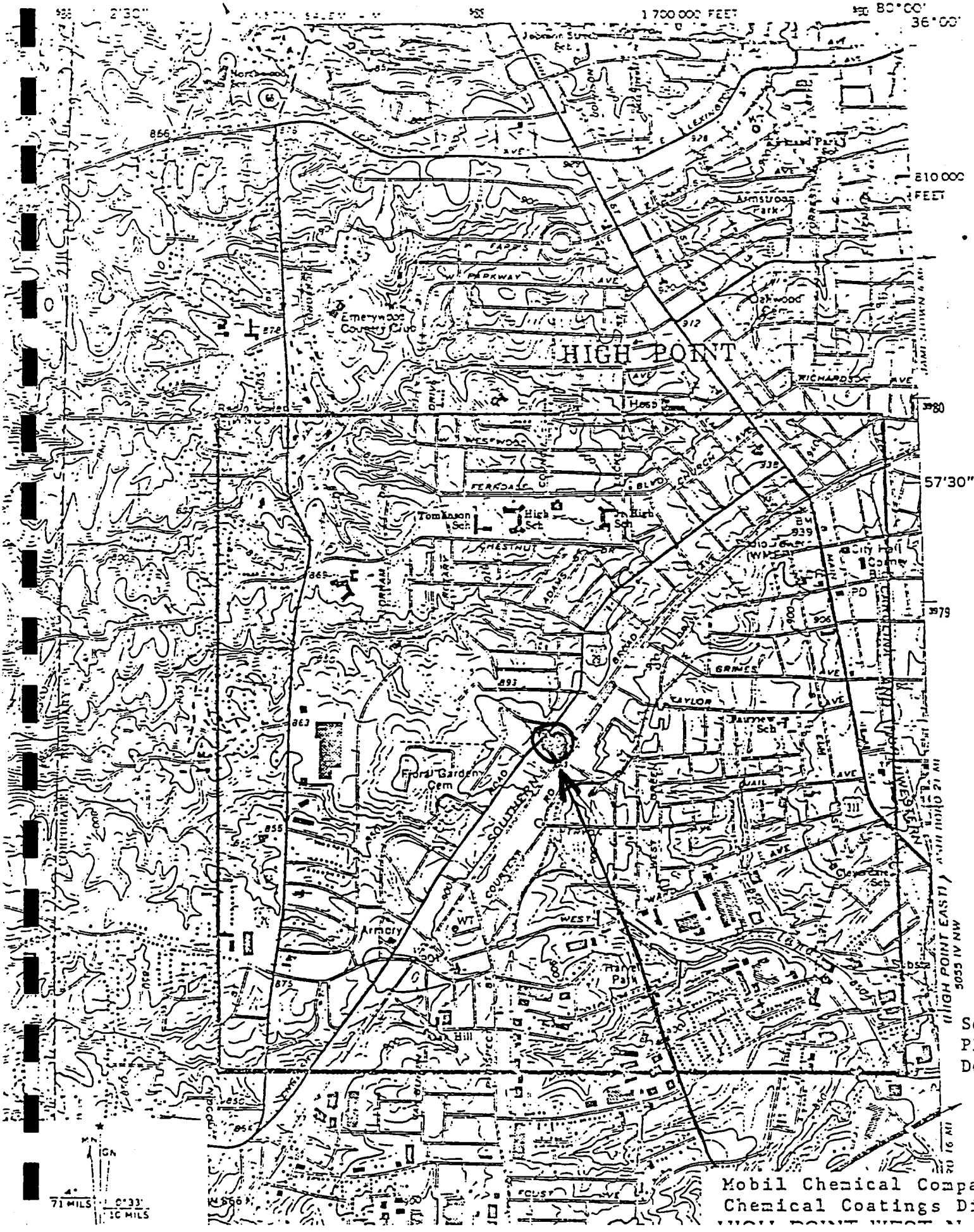
CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS	N/A		FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

1) RCRA Part A, 11-18-80
2) File at NC S&HW Mgmt.
3) Pachasa, E.S., Plant Manager, telephone conversation, 2-25-85
4) Dominic Grenci, environmental coordinator at Valspar, personal communication, 4-15-85
5) ~~Eckhardt Notification (in part 2) from Valspar Corp.~~

EPA FORM 2070-12 (7-81)

HIGH POINT WEST QUADRANGLE
NORTH CAROLINA
7.5 MINUTE SERIES (TOPOGRAPHIC)



NUS CORPORATION AND SUBSIDIARIES **TELECON NOTE**

CONTROL NO.	DATE: 1/9/90	TIME: 1130

DISTRIBUTION:

BETWEEN: Jim Edwards	OF: N.C.D.H.R.	PHONE: (919) 733-2178

AND: Bryan Williams, NUS Corporation

DISCUSSION:

Mr. Edwards confirmed that the Valspar Corporation was indeed a RCRA listed generator that had filed a RCRA Part A application 11/18/80 - however, Valspar withdrew their Part A, closed their storage unit(s) and had their interim status withdrawn.

Ronald H. Levine, M.D., M.P.H.
STATE HEALTH DIRECTOR

DIVISION OF HEALTH SERVICES
P.O. Box 2091
Raleigh, N.C. 27602-2091

(6)

March 13, 1984

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. D. A. Grenci
Mobil chemical Co.
P.O. Box 2438
High Point, N.C. 27260

Re: NCD041415419

Dear Mr. Grenci:

On November 21, 1983, in response to a formal call for part B of a permit application, an officer of your company advised this Branch that a part B application would not be filed. Following this, on January 29, 1984 and February 1, 1984, the Solid and Hazardous Waste Management Waste Management Branch of the Department of Human Resources published a legal notice in the Raleigh papers, announcing its intention to deny a permit and terminate interim status for a number of plants, including yours.

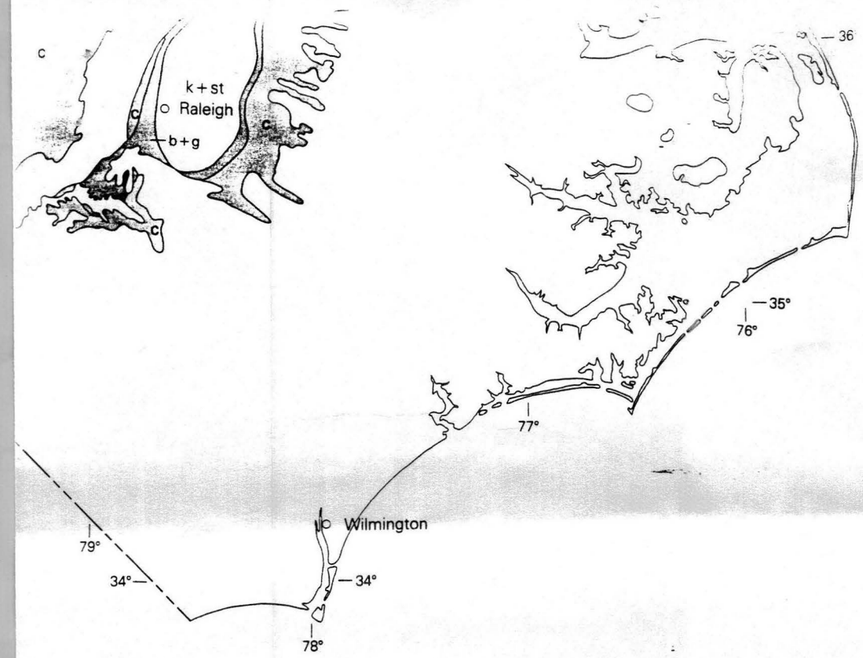
You are now advised that this plant has been denied a permit as a hazardous waste treatment, storage, or disposal facility and its interim status has been formally terminated. As of March 30, 1984, the operators of it may not treat or dispose of hazardous waste, nor store it for more than 90 days from the of accumulation.

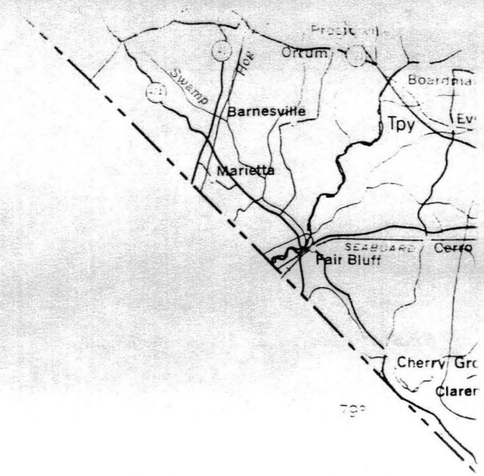
If you have any questions about this matter, please call or write to Mr. Keith Lawson at this office.

Very sincerely,

O. W. Strickland, Head
Solid and Hazardous Waste Management Branch
Environmental Health Section

OWS/KL: tl





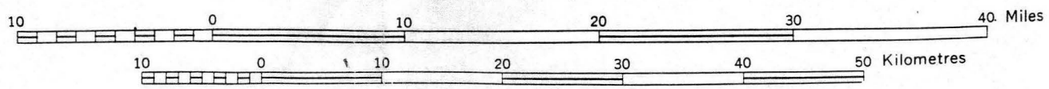
ORPHIC FACIES

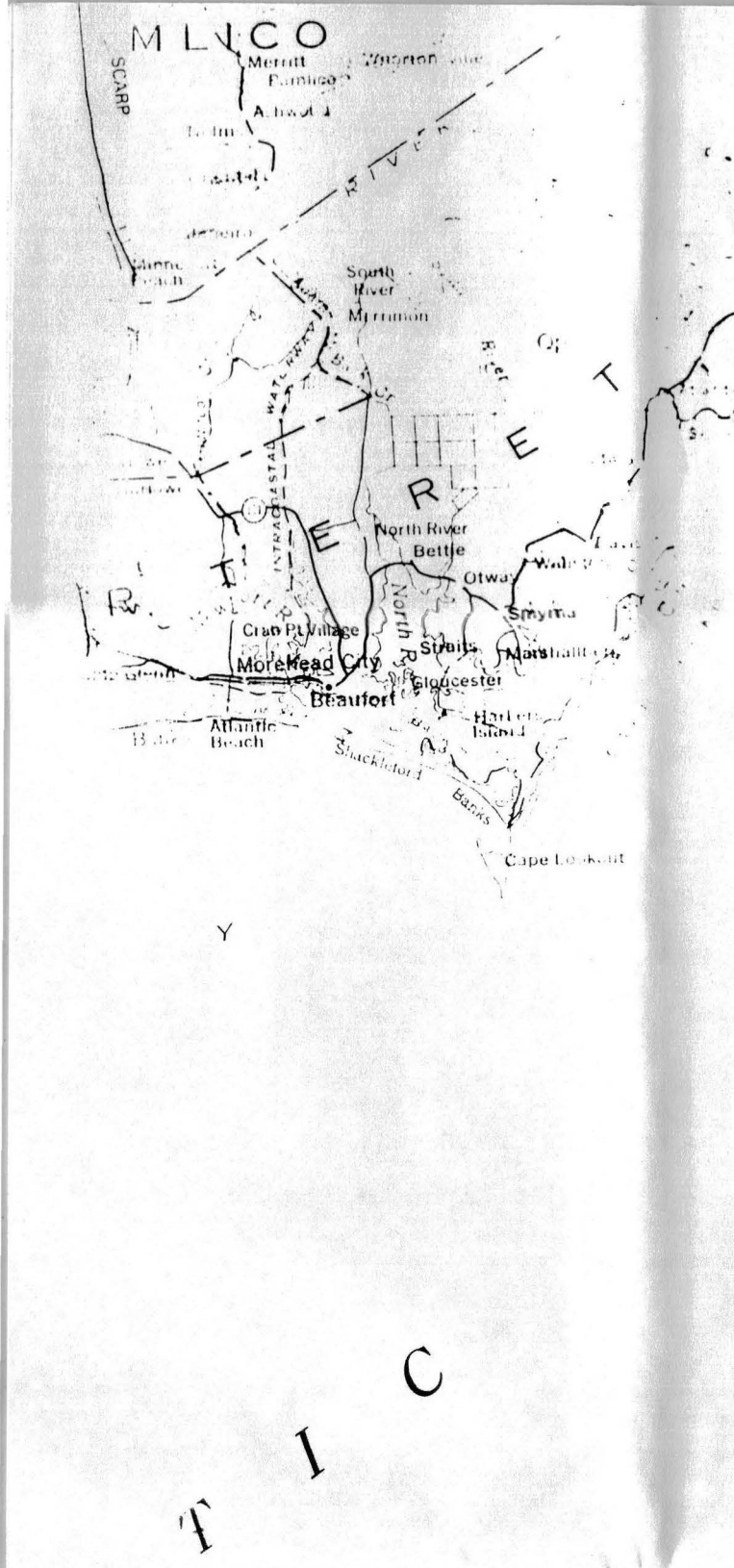
84

GEOLOGIC MAP OF NORTH CAROLINA

1985

Scale 1:500,000
1 inch equals approximately 8 miles





DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT
S. Thomas Rhodes, Secretary

Division of Land Resources
Stephen G. Conrad, Director and State Geologist

Compiled by

The North Carolina Geological Survey
Philip M. Brown, Chief Geologist

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and

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State Geologic Map Coordinator
in association with
The State Geologic Map Advisory Committee

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STATE OF NORTH CAROLINA

JAMES G. MARTIN, GOVERNOR

ER PIEDMONT, CHAUGA BELT, ITH RIVER ALLOCHTHON, AND OWN MOUNTAINS ANTICLINORIUM

METAMORPHIC ROCKS

REVARD FAULT ZONE — "Fish scale" schist and phyllonite, nterlayered with feldspathic metasandstone, marble lenses

SS AND SCHIST — Inequigranular, locally abundant potas- r and garnet; interlayered and gradational with calc-silicate anite-mica schist, mica schist, and amphibolite. Contains es of granitic rock

D BIOTITE GNEISS — Strongly foliated; minor layers of e and muscovite schist

— Garnet, staurolite, kyanite, or sillimanite occur locally; layers of quartz schist, micaceous quartzite, calc-silicate e gneiss, amphibolite, and phyllite

E AND BIOTITE GNEISS — Interlayered; minor layers and ornblende gneiss, metagabbro, mica schist, and granitic

E — Metamorphosed mafic extrusive and intrusive rock; ornblende gneiss, thin layers of mica schist, calc-silicate arely, marble. Also includes small masses of metadiorite abbro

C BIOTITE GNEISS — Poorly layered to massive; mega- icrocline and quartz; local mica schist, amphibolite, and ss

— Interlayered with quartz-muscovite schist, contains andalusite, kyanite, or sillimanite

ACKE AND MUSCOVITE-BIOTITE SCHIST — Meta- biotite gneiss) interlayered and gradational with muscovite- t; minor marble and granitic rock

ACKE, AMPHIBOLITE, AND KYANITE SCHIST — Meta- biotite gneiss) interlayered and gradational with amphibo- ite schist; minor ultramafic and granitic rock

ACKE — Contains quartz and microcline porphyroblasts

SS — Interlayered with calc-silicate rock, metaconglomer- olite, sillimanite-mica schist, and granitic rock

SCHIST — Includes phyllonite and interlayered biotite

LAR BIOTITE GNEISS — Weakly foliated to massive, con- lase megacrysts and, rarely, larger megacrysts of quartz

ASTIC GNEISS — Massive to foliated, granodioritic, mig-

SCHIST — Interlayered with amphibolite

SS (Middle Proterozoic, 1192 my; 27) — Megacrystic, in ns amphibolite

INTRUSIVE ROCKS

es, gray to black

GRANITE (Mississippian, 351 my; 20,21) — Massive to ed; contains pegmatites, lithium-bearing on east side

GRANITE GNEISS (Devonian to Silurian, 409 my;) — o porphyritic, massive to well foliated; contains biotite

CHARLOTTE AND MILTON BELTS

METAMORPHIC ROCKS

€Zbf — FINE-GRAINED BIOTITE GNEISS — Massive to strongly foliated; minor layers of amphibolite and muscovite schist

€Zfg — FELSIC MICA GNEISS — Interlayered with biotite and hornblende gneiss and schist

€Zbg — BIOTITE GNEISS AND SCHIST — Inequigranular and megacrystic; abundant potassic feldspar and garnet; interlayered and gradational with calc-silicate rock, sillimanite-mica schist, mica schist, and amphibolite. Contains small masses of granitic rock

€Zv — METAVOLCANIC ROCK — Interbedded felsic to mafic tuffs and flowrock

€Zmv — MAFIC METAVOLCANIC ROCK — Metamorphosed basaltic to andesitic tuffs and flows, grayish green to black. Locally includes hypabyssal intrusives and minor felsic metavolcanic rock

€Zfv — FELSIC METAVOLCANIC ROCK — Metamorphosed dacitic to rhyolitic flows and tuffs, light gray to greenish gray; minor mafic and intermediate metavolcanic rock

€Zq — QUARTZITE — Massive to well foliated; contains andalusite, kyanite, or sillimanite, chloritoid, and pyrite

€Zph — PHYLLITE AND SCHIST — Minor biotite, pyrite, and sillimanite; includes minor quartzite

INTRUSIVE ROCKS

Jd — DIABASE — Dikes, gray to black

PIPg — GRANITIC ROCK (Pennsylvanian to Permian, 265-325 my; 11,9) — Megacrystic to equigranular. Churchland Plutonic Suite (Western group) - Churchland, Landis, and Mooresville intrusives

DSg — GRANITE OF SALISBURY PLUTONIC SUITE (Devonian to Silurian, 385-415 my; 5) — Pink, massive to weakly foliated. Gold Hill, Kannapolis, Salisbury, Southmont, and Yadkin intrusives

DSs — SYENITE OF CONCORD PLUTONIC SUITE (Silurian, 404 my; 9) — Includes the Concord ring dike

DOgb — GABBRO OF CONCORD PLUTONIC SUITE (Devonian to Ordovician, 399-479 my; 24) — Barber, Concord, Farmington, Mecklenburg, and Weddington intrusives

DOg — GRANITIC ROCK — Locally pinkish gray, massive to weakly foliated; contains hornblende

SHELTON GRANITE GNEISS (Silurian, 429 my; 21) — Poorly foliated, lineated granitic to quartz monzonitic gneiss

PzZq — METAMORPHOSED QUARTZ DIORITE — Foliated to massive

PzZg — METAMORPHOSED GABBRO AND DIORITE — Foliated to massive

PzZm — METAMORPHOSED MAFIC ROCK — Metagabbro, metadiorite, and mafic plutonic-volcanic complexes

META-ULTRAMAFIC ROCK — Metamorphosed dunite and peridotite; serpentinite, soapstone, and other altered ultramafic rock. Only larger bodies shown

€Zg — METAMORPHOSED GRANITIC ROCK — Megacrystic, well foliated; locally contains hornblende

CAROLINA SLATE BELT

METAMORPHIC ROCKS

€Zy — YADKIN FORMATION — Metamorphosed graywacke, volcanic sandstone, and siltstone; interbedded with mafic and intermediate metavolcanic flows and tuffs

€Zmd — METAMUDSTONE AND META-ARGILLITE — Thin to thick bedded; bedding plane and axial-planar cleavage common; interbedded with metasandstone, metaconglomerate, and metavolcanic rock
$CZmd_3$ - Floyd Church Formation
$CZmd_2$ - Cid Formation
$CZmd_1$ - Tillery Formation
} (southwest of Asheboro)

€Zmv — MAFIC METAVOLCANIC ROCK — Metamorphosed basaltic flows and tuffs, dark green to black; interbedded with felsic and intermediate metavolcanic rock and metamudstone
$CZmv_1$ - Cid Formation (southwest of Asheboro)

€Zfv — FELSIC METAVOLCANIC ROCK — Metamorphosed dacitic to rhyolitic flows and tuffs, light gray to greenish gray; interbedded with mafic and intermediate metavolcanic rock, meta-argillite, and metamudstone
$CZfv_2$ - Cid Formation (southwest of Asheboro)
$CZfv_1$ - Uwharrie Formation (at Asheboro and to south)

€Ziv — INTERMEDIATE METAVOLCANIC ROCK — Metamorphosed andesitic tuffs and flows, medium to dark grayish green; minor felsic and mafic metavolcanic rock

€Zv — METAVOLCANIC ROCK — Interbedded felsic to mafic tuffs and flowrock

€Zve — METAVOLCANIC-EPICLASTIC ROCK — Metamorphosed argillite, mudstone, volcanic sandstone, conglomerate, and volcanic rock

€Zc — VOLCANIC METACONGLOMERATE — Includes metagraywacke and metamudstone

€Zph — PHYLLITE AND SCHIST — Locally laminated and pyritic; includes phyllonite, sheared fine-grained metasediment, and metavolcanic rock. In Lilesville granite aureole, includes hornfels ($€Zph_1$), and biotite gneiss and schist (€Zbg)

INTRUSIVE ROCKS

Jd — DIABASE — Dikes, gray to black

PIPg — GRANITIC ROCK (Pennsylvanian to Permian, 265-325 my; 11) — Megacrystic to equigranular. Lilesville granite

IPgb — PEE DEE GABBRO (Pennsylvanian, 314 my; 21) — Dark gray to black, medium to fine grained, massive

PzZq — METAMORPHOSED QUARTZ DIORITE — Foliated to massive

PzZg — METAMORPHOSED GABBRO AND DIORITE — Foliated to massive

PzZm — METAMORPHOSED MAFIC ROCK — Metagabbro, metadiorite, and mafic plutonic-volcanic complexes

META-ULTRAMAFIC ROCK — Metamorphosed dunite and peridotite; serpentinite, soapstone, and other altered ultramafic rock. Only larger bodies shown

€Zg — METAMORPHOSED GRANITIC ROCK (Late Proterozoic to late Cambrian, 520-650 my; [illegible]) — Megacrystic, well foliated; locally contains hornblende. Chapel Hill, Chatham, Farrington, Meadow Flats, Mt. Moriah, Parks Crossroads plutons, and Roxboro and Vance County

AMPHIBOLITE includes ho layered ma

BIOTITE GNE places cont and amphib

€Zms — MICA SCHIST cludes lens gneiss, am

€Zig — INJECTED GN and dikes o

€Zfg — FELSIC MICA mica-garnet

€Zlg — LINEATED FEL muscovite-t tion and lay

€Zph — PHYLLITE AND sheared fin

Jr — RHYOLITE (Ju crysts of sa clay amygd

Jd — DIABASE — D

PIPg — GRANITIC RO crystic to e

PIPmg — FOLIATED TO 270-320 m Wise and L

PzZg — METAMORPH

META-ULTRA serpentinite bodies sho

€Zg — METAMORPH 520-650 m blende; Var

NEWARK SUPERGF

DAN RIVER GRO

Rd — DAN RIVER G sandstone, and mudsto

Rds — STONEVILL stone, le

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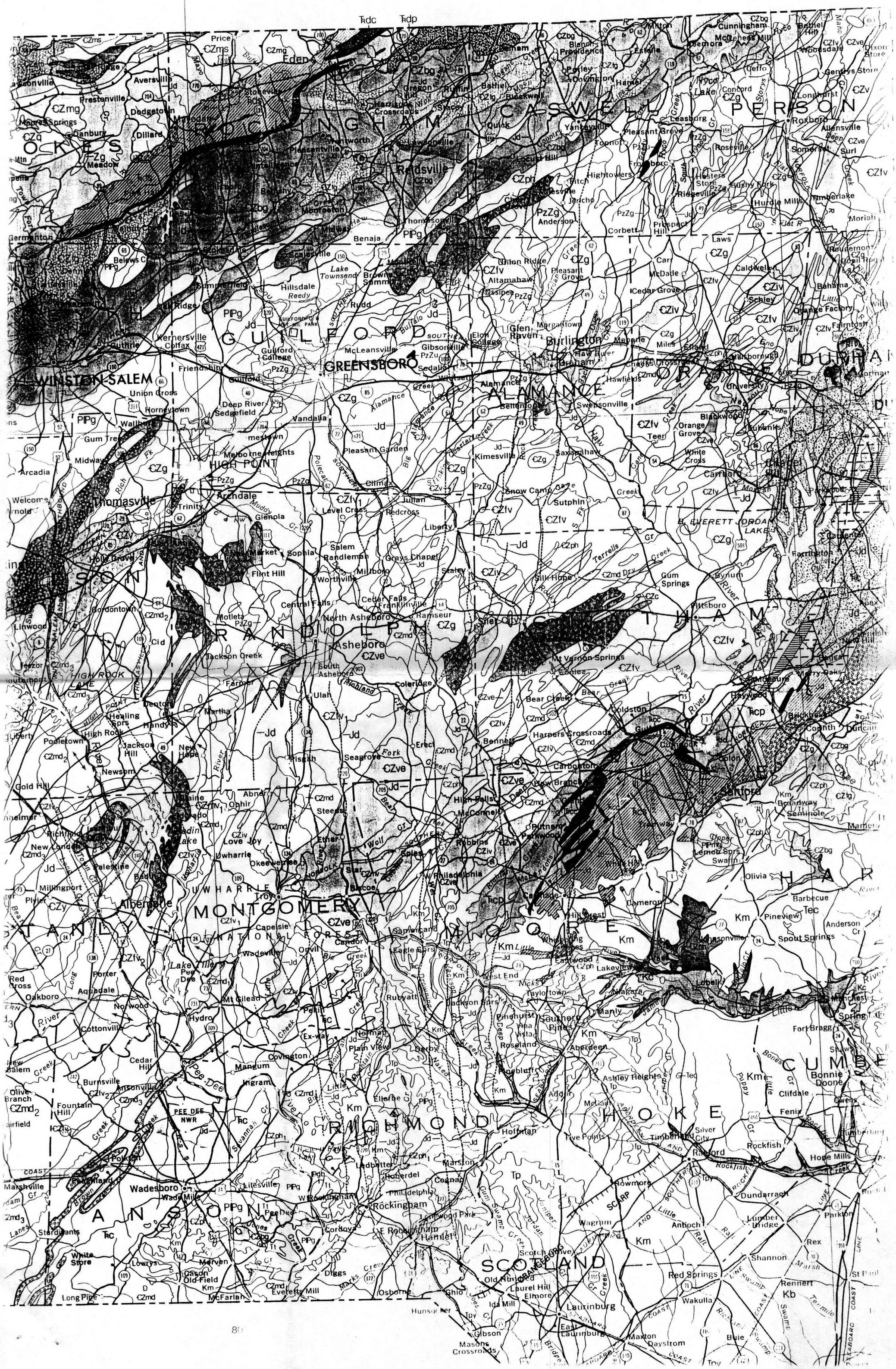
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Burlington
Asheboro
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B. EVERETT JORDAN LAKE
HIGH ROCK LAKE
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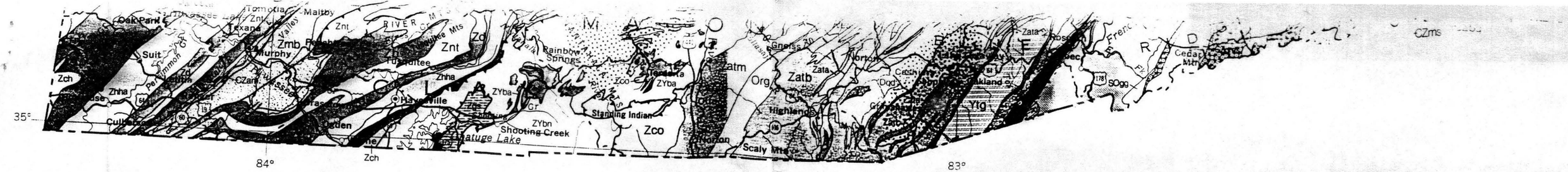
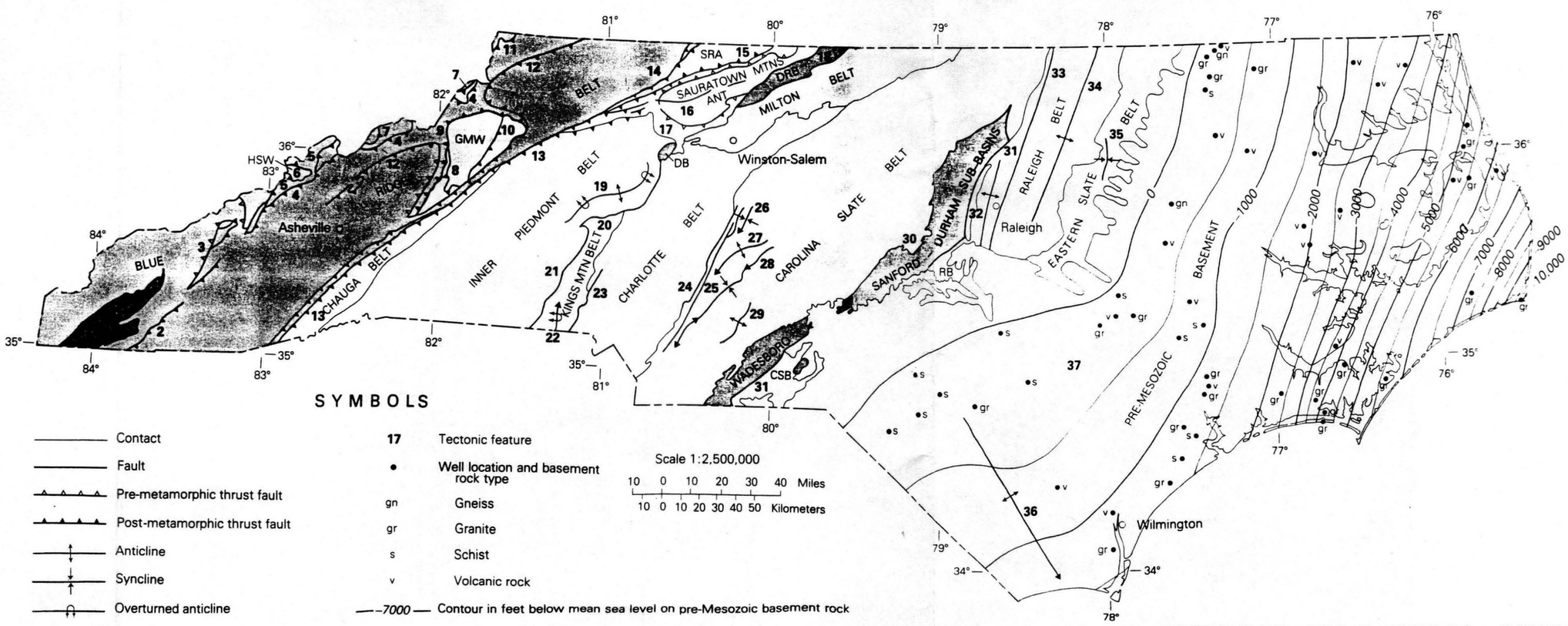


G E O R G I A

EXPLANATION

- MURPHY BELT
- HSW — HOT SPRINGS WINDOW
- GMW — GRANDFATHER MOUNTAIN WINDOW
- SRA — SMITH RIVER ALLOCHTHON
- BLUE RIDGE BELT
- CHAUGA BELT
- INNER PIEDMONT BELT
- KINGS MOUNTAIN BELT
- SAURATOWN MOUNTAINS ANTICLINORIUM
- CHARLOTTE BELT
- MILTON BELT
- CSB — CAROLINA SLATE BELT
- TRIASSIC BASINS
  - DURHAM, SANFORD } SUB-BASINS
  - WADESBORO BASIN
  - DAN RIVER BASIN (DRB)
  - DAVIE BASIN (DB)
- RB — RALEIGH BELT
- EASTERN SLATE BELT



SYMBOLS

- Contact
- Fault
- Pre-metamorphic thrust fault
- Post-metamorphic thrust fault
- Anticline
- Syncline
- Overturned anticline
- 17 — Tectonic feature
- • — Well location and basement rock type
- gn — Gneiss
- gr — Granite
- s — Schist
- v — Volcanic rock
- —7000— Contour in feet below mean sea level on pre-Mesozoic basement rock

Scale 1:2,500,000

10 0 10 20 30 40 Miles

10 0 10 20 30 40 50 Kilometers

SOIL SURVEY OF

Guilford County, North Carolina

United States Department of Agriculture
Soil Conservation Service

In cooperation with
Board of Commissioners, Guilford County, North Carolina, and
North Carolina Agricultural Experiment Station

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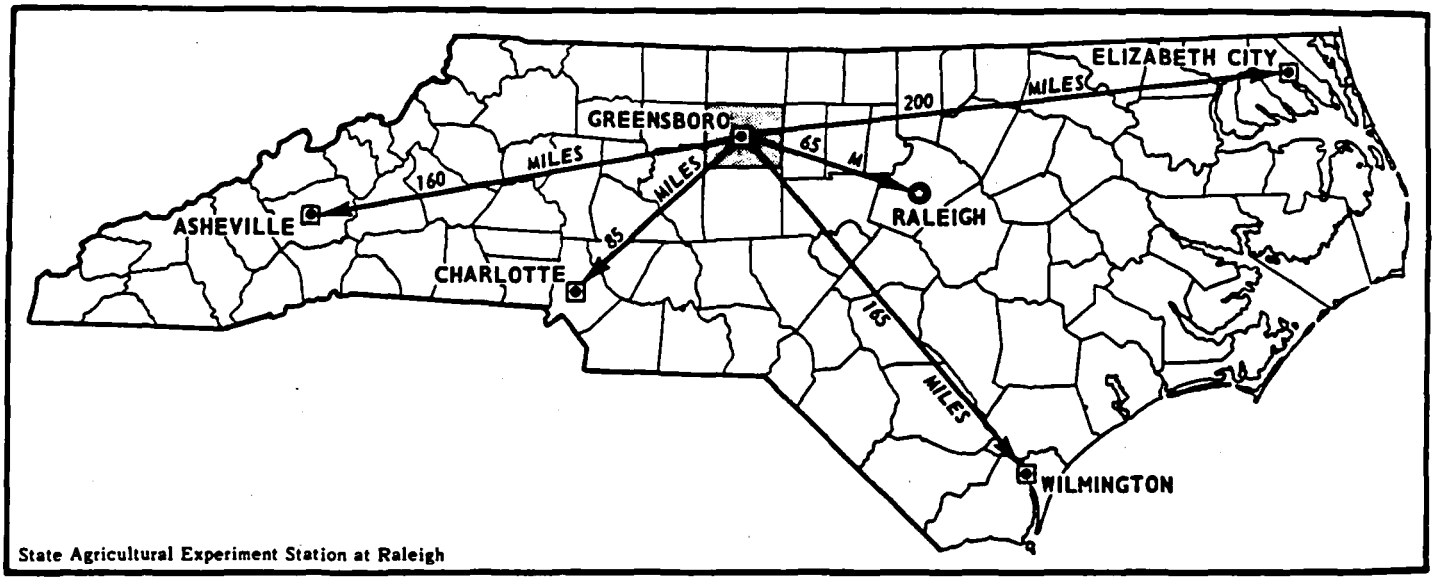
Issued December 1977



Location of Guilford County in North Carolina.

SOIL SURVEY OF GUILFORD COUNTY, NORTH CAROLINA

By Ronald B. Stephens

Soils surveyed by E. H. Karnowski, R. B. Stephens, Marcus R. Bostian, R. L. Howard, Roger J. Leab, and Michael L. Sherrill, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service, in cooperation with Board of Commissioners, Guilford County, North Carolina, and North Carolina Agricultural Experiment Station

Introduction

GUILFORD COUNTY is an agricultural, industrial, and urbanized county in north-central North Carolina (See map on facing page). It is bounded on the east by Alamance County, on the north by Rockingham County, on the west by Forsyth County, and on the south by Randolph County. The area of Guilford County is 415,940 acres. In 1970 the population was 288,590. The City of Greensboro is the county seat and is at the geographic center of the county.

Guilford County is in the Piedmont physiographic province. The county is generally rolling with moderately steep slopes along the drainageways.

Guilford County is rapidly growing into an industrial and urban county. Well diversified industry, government at all levels, educational institutions, wholesale and retail outlets, and transportation all contribute substantially to the economy of the county.

The northern part of the county is still primarily agricultural. Tobacco provides about 80 percent of the gross farm income from the major crops. Corn, hay, wheat, soybeans, oats, sweet potatoes, Irish potatoes, lespedeza seed, and cotton account for most of the remaining farm income. Beef and dairy livestock and poultry are also raised.

General Nature of the County

This section gives general facts about Guilford County. It briefly discusses climate, history, cultural facilities, industry and transportation, water supply, and land use.

Climate

Guilford County is hot and generally humid in summer because of its moist maritime air. Winter is moderately cold but short because the mountains to the west protect the county against many cold waves. Precipitation is quite evenly distributed throughout the year and is adequate for all crops.

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Greensboro for the period 1951 to 1974. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on the length of the growing season.

In winter the average temperature is 40 degrees F, and the average daily low is 29 degrees. The lowest temperature on record, -1 degree, occurred at Greensboro on January 16, 1972. In summer the average temperature is 76 degrees, and the average daily high is 86 degrees. The highest temperature, 102 degrees, was recorded on June 27, 1954.

Growing degree days, shown in table 1, are equivalent to "heat units." Beginning in spring, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

Of the total annual precipitation, 22 inches, or 52 percent, usually fails during the period April through September, which includes the growing season for most crops. Two years in 10, the April-September rainfall is less than 19 inches. The heaviest 1-day rainfall during the period of record was 6.24 inches at Greensboro on October 15, 1954. Thunderstorms number about 47 each year, 29 of which occur in summer.

Average seasonal snowfall is 11 inches. The greatest snow depth at any one time during the period of record was 15 inches. On the average, 4 days have at least 1 inch of snow on the ground, but the number of days varies greatly from year to year.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night in all seasons, and the average at dawn is about 85 percent. The percentage of possible sunshine is 64 percent in summer and 54 percent in winter. Prevailing winds are southwesterly. Average windspeed is highest, 9 miles per hour, in March.

In winter every few years heavy snow covers the ground for a few days to a week. Every few years in late summer or autumn, a tropical storm moving inland from

differences among the soils of Guilford County. Major differences among parent materials, such as differences in texture, can be observed in the field. Less distinct differences, such as differences in mineralogical composition, can be determined only by careful laboratory analysis.

The two broad classes of parent materials in Guilford County are residual materials and alluvium. Residual material is related to the underlying rock, from which it has weathered. Transported materials are related directly to the soils or rocks from which they were removed.

Guilford County is underlain by granite, diorite, slate, schist, and gneiss (*3*). Granite makes up about 48 percent of the underlying rock. Gneiss is found in the northwestern corner of the county and makes up about 15 percent. Schist underlies about 31 percent of the county. Minor amounts of diorite and slate make up the remaining underlying bedrock.

In Guilford County the parent materials of the residual soils derived primarily from acid and basic igneous and metamorphic rocks. The light-colored, acid rocks include granite, gneiss, and schist. Cecil and Appling soils formed in material derived from acid igneous and metamorphic rocks, as reflected in the low pH of these soils. In addition, the characteristics of the parent material have influenced the texture of these soils and of other more friable, coarser textured soils of this group. The dark-colored, basic rocks include diorite and gabbro. These rocks are the parent material of Iredell, Mecklenburg, and other soils of the county that are more plastic and finer in texture. The basic influence of the parent materials is reflected in the reaction of these soils: they are less acid than others in the county. A number of soils of Guilford County formed in mixed acid and basic rocks; for example, Coronaca, Helena, Sedgefield, and Wilkes soils. Greenstone schist makes up a large part of the mixed rocks. At various locations the mixture consists of weathered granitic rocks and dikes of basic, dark-colored rocks that intrude into the granite. These dikes vary considerably in width, and their sudden outcropping results in abrupt changes in kinds of soil. Many of the soils in such areas are mapped in the Helena-Sedgefield complex.

Transported parent materials are primarily alluvium and local alluvium, both of which may be young or old. Young alluvium has been deposited recently and consists of material that has been changed very little by the soil-forming processes. Old alluvium consists of material that has been deposited long enough for the soil-forming processes to change it in varying degrees. Local alluvium consists of soil material that has been transported short distances by water and has been deposited along small drainageways, in depressions, and at the foot of slopes. The principal soils that formed in alluvium along streams on flood plains are in the Congaree, Chewacla, and Wehadkee series.

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Glossary

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim. An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single mapping unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	More than 9

Base saturation. The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to frequent flooding.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the bases of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Complex, soil. A mapping unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

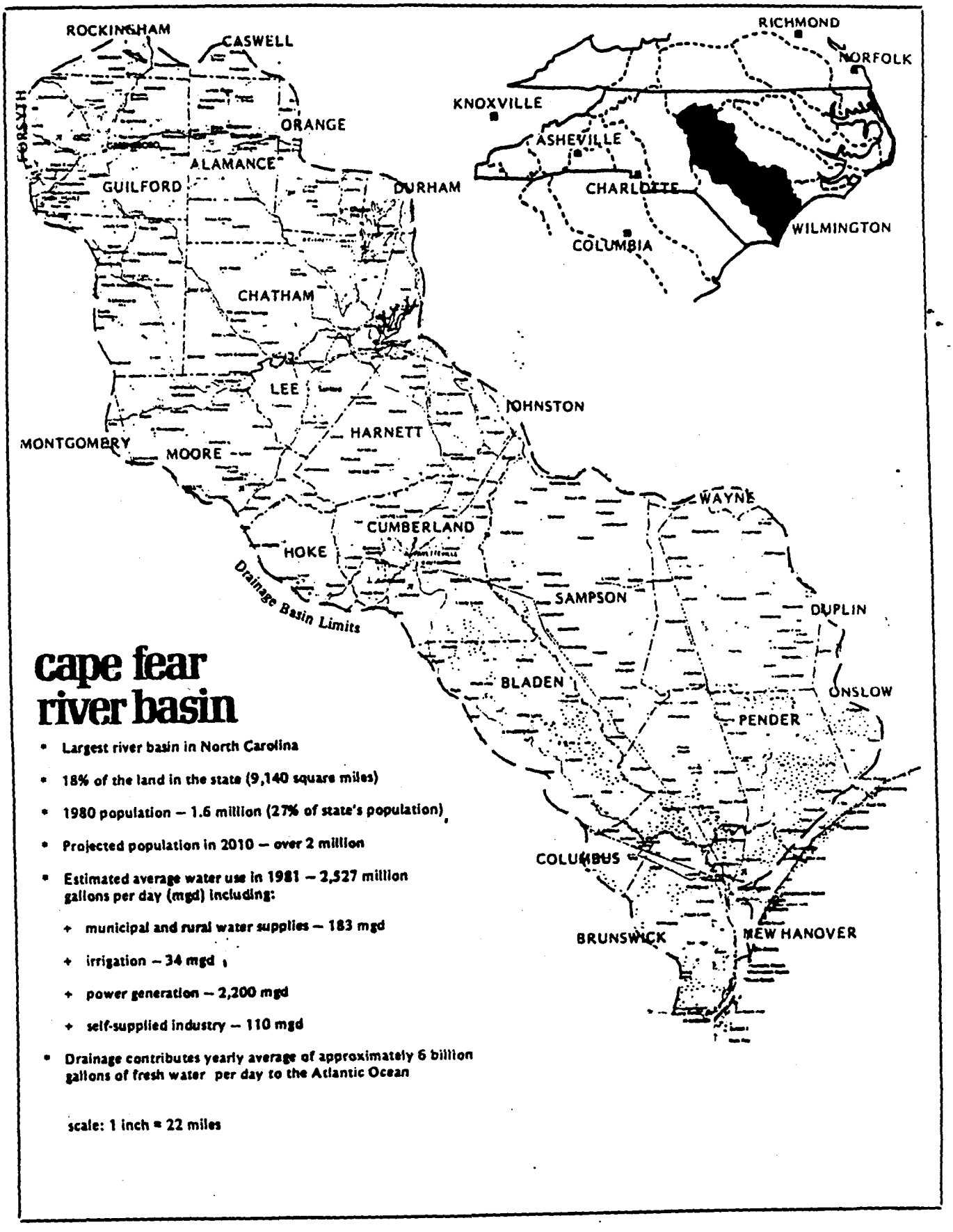
Bob Tooley

GROUND-WATER SUPPLY POTENTIAL AND PROCEDURES FOR WELL-SITE SELECTION

UPPER CAPE FEAR RIVER BASIN

cape fear river basin study

1981-83



cape fear river basin

- Largest river basin in North Carolina
- 18% of the land in the state (9,140 square miles)
- 1980 population – 1.6 million (27% of state's population)
- Projected population in 2010 – over 2 million
- Estimated average water use in 1981 – 2,527 million gallons per day (mgd) including:
  - municipal and rural water supplies – 183 mgd
  - irrigation – 34 mgd
  - power generation – 2,200 mgd
  - self-supplied industry – 110 mgd
- Drainage contributes yearly average of approximately 6 billion gallons of fresh water per day to the Atlantic Ocean

scale: 1 inch = 22 miles

GROUND-WATER SUPPLY POTENTIAL

AND

PROCEDURES FOR WELL-SITE SELECTION

UPPER CAPE FEAR RIVER BASIN

CAPE FEAR RIVER BASIN STUDY

Sponsored by

North Carolina Department of Natural
Resources and Community Development
and
U. S. Water Resources Council

1155 Archdale Building
P. O. Box 27687
Raleigh, NC 27611

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October, 1983

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GROUND-WATER SUPPLY POTENTIAL AND PROCEDURES FOR WELL-SITE SELECTION IN THE UPPER CAPE FEAR RIVER BASIN, NORTH CAROLINA

By

Charles C. Daniel III and N. Bonar Sharpless

ABSTRACT

Population growth and industrial development in the 1,750 square mile upper Cape Fear River basin of the central North Carolina Piedmont has been increasing, and current surface-water supplies are approaching limits of capacity. Thus, other water sources need to be considered as alternatives in planning for future water supplies. Ground water is one alternative source of supply. Ground water supplies nearly half the population in the Piedmont and Blue Ridge areas of North Carolina. Ground water is used at a rate of about 200 million gallons per day, yet it is a vastly underutilized resource and little used for large municipal and industrial sources of water.

This report describes the most favorable areas for high-yield wells (yields equal to or greater than 50 gal/min), estimates the total ground water availability both in storage and from recharge, and describes a site-selection procedure for wells that is based on bedrock lithology, geomorphic analysis to locate fractures, and reconnaissance mapping to locate areas of thick regolith and a high water table.

Ground water is stored in the regolith and in the underlying fractured bedrock. The regolith averages about 50 feet thick and contains approximately 1.5 billion gallons per square mile of potentially available water. Seasonally this value ranges from 1.3 to 1.7 billion gallons per square mile. Storage capacity in the fractured bedrock is low and decreases to nearly zero below a depth of about 400 feet. Precipitation data from National Weather Service stations

at Graham, Greensboro, and High Point averaged 45.9 inches per year for the period 1971 through 1980. About 19 percent of this amount infiltrates to the water table to recharge the ground-water system.

The mafic volcanics unit is the most productive bedrock aquifer, having nearly three times as many high-yield wells as the sheared granite, porphyritic granite, felsic volcanics, mica gneiss, and diorite. High-yield wells are absent in the mica schist and argillite units. The sheared granite, based on outcrop area and well yield, is the second best unit for wells.

High-yield wells are most often found in draws or narrow valleys where the well site is underlain by thick regolith and highly fractured bedrock, and has a high water table. Drainage patterns provide clues to the presence or absence of fractured bedrock.

Drilling of test wells demonstrated the usefulness of the site-selection criteria for locating, in selected geologic units, wells with above average yields that penetrated zones of highly fractured rock at sites with thick regolith and a high water table. A well completed in the sheared granite near Gibsonville yielded 18 gallons per minute, above average for the sheared granite unit. A production well drilled in the mafic volcanics near the Greensboro-High Point Regional Airport yielded 50 gallons per minute, nearly twice the average for the unit. That well was tested by continuous pumping for 62 hours at an average rate of 38.5 gallons per minute. Eighteen additional wells, 4 in bedrock and 14 in the regolith, were monitored during the test. The water table assumed the shape of an elliptical cone with the long axis approximately parallel to the strike of foliation in the bedrock. Nearly all the pumped water was derived from storage in the regolith.

INTRODUCTION

Additional water supplies will be needed in the upper Cape Fear River basin as population and industrial development continue to increase. Development of additional surface-water sources will be confronted by a number of problems, including: (1) reservoirs compete with farming, housing, and industrial development, for available land; (2) many of the best reservoir sites, those in deep, narrow valleys, are in use; (3) less suitable sites having wider, shallower valleys, will require more land area. Shallow reservoirs also tend to have more water-quality problems associated with biologic activity than deeper reservoirs; and, (4) increasing land and construction costs will make new reservoirs very expensive to build. Thus, other water sources need to be considered as alternatives in planning for future water supplies.

Ground water has many attractive features as a source of supply. Ground water in the Piedmont province has a relatively low cost of development (Cederstrom, 1973). Generally, ground water in Piedmont areas, such as the upper Cape Fear River basin, is of good chemical quality and requires little treatment. Because of the large quantity of water in storage, the ground-water system usually can sustain moderate yields during annual drought periods. Use of ground water generally permits other land use activities if they do not impede the infiltration of recharge or diminish water quality.

Ground water is an important but underutilized water-supply source in the Piedmont province and hydrogeologically similar Blue Ridge province of North Carolina. Data from a recent survey (Mann, 1978) show that 13 percent of the 132 public water supplies serving 500 or more customers in the Piedmont rely on ground water. In 1975, out of a total population of 3,950,000 in the Piedmont and Blue Ridge of North Carolina, two million people relied on ground water as a source of supply (Heath, 1978). Ground-water use was approximately 200 million gallons per day.

Results of studies in other areas of the Piedmont similar to the upper Cape Fear River basin suggest that the ground-water system may possibly support large yields. For example, many wells in the Georgia Piedmont produce more than 100 gal/min (gallons per minute) and some yield nearly 500 gal/min (David Swanson, Georgia Geological Survey, written comm., 1979). Similarly, Cederstrom (1972) found that yields of 100 to 300 gal/min are not uncommon for bedrock wells in the Piedmont and Blue Ridge provinces from Maine to Virginia.

Purpose and Scope

The primary purpose of this study was to evaluate ground water as a source of large supplies for the upper Cape Fear River basin. The occurrence and quantities of ground water available, both in storage and from recharge by precipitation, are described in this report along with improved techniques for developing the resource and locating sites to drill wells which will have a good probability of offering high sustained yields. This report discusses findings made from January 1982 to May 1983.

The most favorable conditions for ground-water development were identified in an analysis of existing records of high-yield wells (yields greater than 50 gal/min) and correlations between well yield and rock type, topographic position, distance from streams, and regolith thickness.

Ground-water storage was estimated from water-level records, estimates of regolith thickness, and hydrologic properties of core samples from the north Georgia Piedmont. An estimate of the maximum ground-water availability was determined in water-budget analyses for several streams in the upper Cape Fear River basin using continuous streamflow records and rainfall data collected between 1971 and 1980. Ground-water recharge was estimated by hydrograph separation.

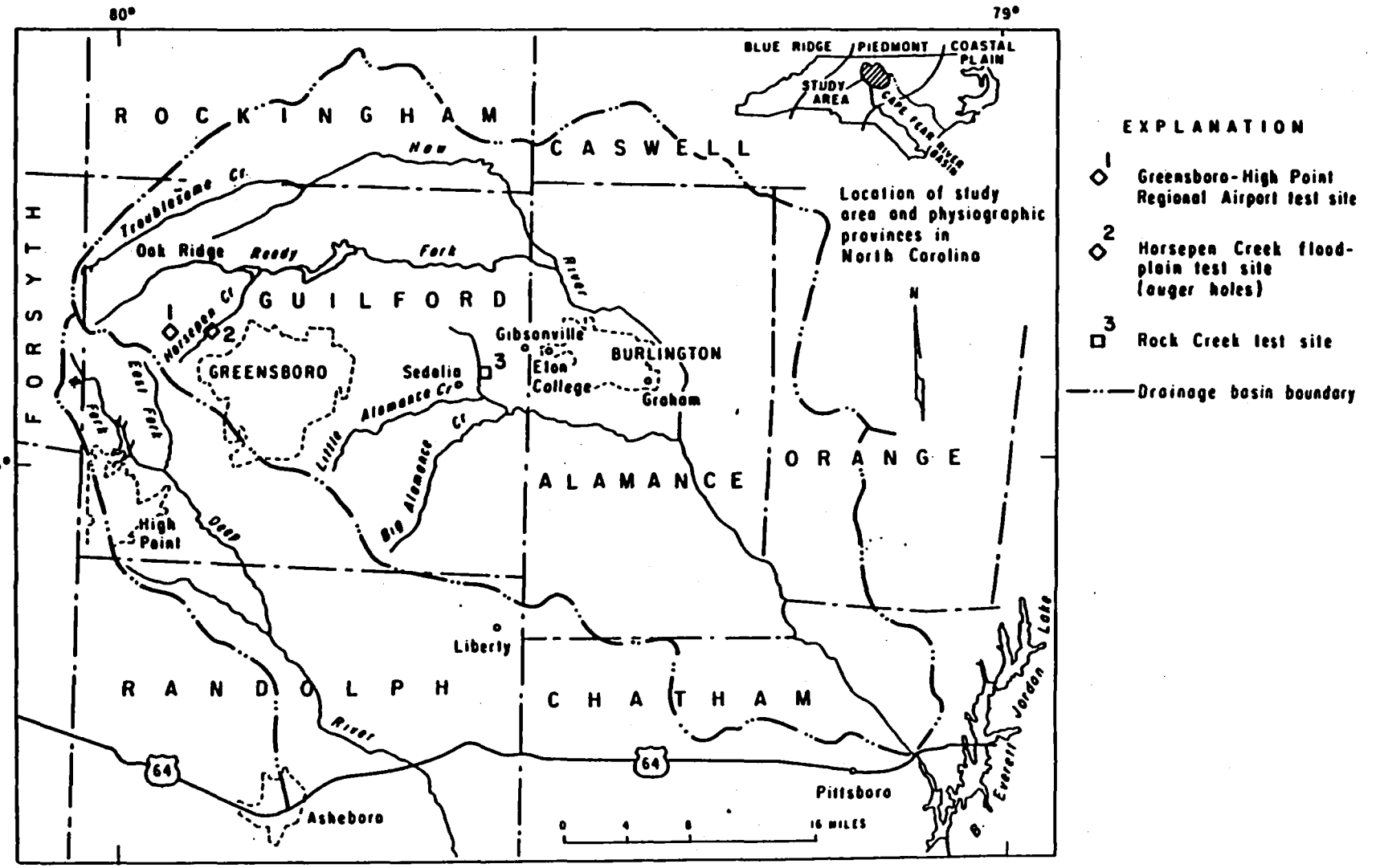

Figure 1.--Regional setting of the upper Cape Fear River basin study area in the Piedmont physiographic province of North Carolina.

Climate

The climate of the study area is temperate with distinct seasonal changes in weather. The coldest month is January with an average temperature of about 41 degrees Fahrenheit and the warmest month is July with an average temperature of about 78 degrees Fahrenheit. The average annual rainfall is approximately 45 inches. The growing season, that period without killing frosts, lasts from mid April to the end of October. The moderate weather and abundant rainfall support the lush growth of natural vegetation and crops of many kinds. Undeveloped areas are often heavily forested with stands of evergreen and deciduous trees. Fields and pastures support crops and grasses much of the year.

GEOHYDROLOGY

The principal components of the ground-water system in the study area are illustrated schematically in figure 3. The regolith consists of an unconsolidated or semiconsolidated mixture of clay and fragmental material ranging in size from silt and sand to boulders. The porosity of the regolith is on the order of 35 to 55 percent near land surface but decreases with depth as the degree of weathering decreases. Because of its high porosity, the regolith acts as a reservoir which slowly feeds water downward into the bedrock. The consolidated bedrock contains very little intergranular pore space. Rather, the water within the bedrock is contained primarily in planar secondary openings developed as a result of fracturing. Secondary porosity ranges from 1 to 10 percent in fractured crystalline rock (Freeze and Cherry, 1979, table 2.4). Porosities of 10 percent are atypical, whereas values of 1 to 3 percent are much more representative of the North Carolina Piedmont.

As a general rule, very few open fractures occur in bedrock of the Piedmont at depths greater than 400 feet (LeGrand, 1967). At greater depths, the pressure of the overlying material, or lithostatic pressure, holds these fractures closed and the porosity can be less than 1 percent. Fractures are most numerous and have the largest openings near the top of the bedrock. These fractures are the openings along which water can move.

The implications for the drilling of wells is obvious. The chances of penetrating open fractures and obtaining water (or additional water) at depths below 400 feet is low. In fact, 85 percent of the total possible yield from the average well is already obtained at a depth of 200 feet; the average yield increases only 5 percent by drilling to 300 feet (LeGrand, 1967). From the standpoint of ground-water production, two 200-foot deep wells are more effective, on

soil and saprolite as a reservoir and the desirability of having as large a reservoir as possible from which to draw water, the smaller drainages underlain by thick regolith seem to be better sites than the larger, broader stream bottoms which may only contain a thin veneer of alluvium on top of bedrock.

Using average casing depth of wells as an indication of regolith thickness (table 1), one might assume that the upland flats have the largest, thickest regolith reservoir and therefore represent the best location for a well site. However, under the influence of gravity ground water flows away from the hilltops and toward lower lying discharge areas along streams and lakes. Consequently wells in the lower part of a drainage area are able to intercept water flowing toward them and, in effect, derive water from a larger area because of the natural gradient toward the well. Wells on hilltops, on the other hand, must induce flow toward the well by pumping.

The Ideal Well Site

An ideal site would be located in the geologic unit having the greatest probability of high yields, have thick regolith, a high water table, be underlain by highly-fractured bedrock, and have a large contributing drainage area. High-yield geologic units of the area are known (fig. 8); regolith thickness can be estimated from existing well data (table 1); and fracture locations can be inferred from types of stream drainage patterns discussed earlier.

Sites having the greatest possible saturated thickness of regolith must also be identified. The porosity and specific yield of the regolith decrease with depth (fig. 5). Consequently, sites with a large saturated thickness of regolith, and a high water table, will have the greater amount of available water in storage. In addition, the higher the water table, the greater the available drawdown to wells (in comparison to a well of similar depth in an area with a low water table). In the upper Cape Fear River basin the regolith is generally thickest in the interstream areas and thinnest in the flood plains of perennial streams. On the other hand, the depth to

SUMMARY

Ground water is used by nearly half the population of the Piedmont and Blue Ridge provinces of North Carolina as their source of water supply, yet it is a vastly underutilized resource and little used for large municipal and industrial sources of water. In a 1978 survey, only 13 percent of the public water supplies serving 500 or more customers in this region were using ground water as a supply source.

In contrast to the small amount of ground water actually used (approximately 200 million gallons per day) the amount of potentially available water stored in the ground is very large. In the Piedmont and Blue Ridge provinces, ground water is stored in the regolith and in the underlying fractured bedrock. Nearly all of the storage capacity is in the regolith. The storage capacity within fractures in the bedrock is low and below a depth of about 400 feet the storage capacity decreases nearly to zero. In the upper Cape Fear River basin, the average thickness of the regolith is about 50 feet and the average depth to the water table 15 feet. Given that the remaining 35 feet is saturated with water and has a 20 percent drainable porosity, each square mile contains an estimated 1.5 billion gallons of water some of which drains to springs, streams, lakes, and wells. Due to seasonal changes in the water table, the amount of water in storage can vary from about 1.3 to 1.7 billion gallons per square mile.

On an annual basis, the change in ground-water storage is usually small and recharge will be about equal to ground-water discharge or base runoff. Within the upper Cape Fear River basin average annual precipitation is 45.9 inches per year or about 1,500 $(gal/min)/mi^2$. Of this amount, about 19 percent infiltrates to the water table and part is available to wells.

The most favorable area for ground-water development within the upper Cape Fear River basin is the area underlain by the mafic volcanics unit. The second best is the area underlain by the sheared granite unit. The likelihood of obtaining a high-yield well is

greatest in these areas. Selection of the best sites within any rock unit is based on considerations of topography and drainage patterns. The best well sites will be in topographically low areas having a high water table and large saturated thickness of regolith, all of which is underlain by highly fractured bedrock. The best sites are within the smaller valleys and draws of fracture-controlled intermittent streams. Drainage patterns provide clues as to the presence of fractured rock; drainage linears that cut across lithologic boundaries are a good indication of fracture control. Reconnaissance geologic mapping is used to confirm interpretations of drainage patterns, help determine the presence and thickness of regolith, and facilitate final site selection.

Two test sites were selected for evaluating the site selection procedure. One site was in the Rock Creek basin southwest of Gibsonville, an area underlain by sheared granite. The other site was in the Horsepen Creek basin, about 1 mile southeast of the Greensboro-High Point Regional Airport. The second site is in an area underlain by the mafic volcanics unit.

Between December 14, 1982 and April 26, 1983, two wells were drilled at the Rock Creek site and 20 wells were drilled at the airport site. Two potential production wells were drilled at each site; however, only one production well was successfully completed at each site. The Rock Creek well yielded about 18 gal/min, above average for the sheared granite. The airport well was pumped at rates as high as 65 gal/min, much more than the average yield of 28 gal/min for the mafic volcanics unit, as reported by Mundorff (1948).

The remaining wells at the airport were used for monitoring water levels during a pumping test of the production well, conducted May 9 to 13, 1983. The average pumping rate for 62 hours of continuous pumping was 38.5 gal/min and a total volume of 143,200 gallons was pumped from the well. Nearly all of this water was derived from storage in the regolith. Water levels in the production well declined to 153.5 feet below the top of the casing by the end of the test.

The final pumping level was 61.5 feet above the pump intake. Water levels in all 18 observation wells declined during the test; declines ranged from less than 1 foot to more than 13 feet. The water table assumed the shape of an elliptical cone by the end of the test. The long axis of the cone was approximately parallel to the strike of foliation in the bedrock, or N. 50° E.

After the pump was turned off the water level recovered to 28.6 feet below the top of the casing at the end of one hour and to 19.7 feet, within 1.9 feet of the starting level, after 14 hours.

The successful completion of wells at test sites chosen using site-selection criteria based on geologic units, fracture identification by geomorphic analysis, and regolith thickness, demonstrated the usefulness of the criteria for identifying well sites.

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AN APPRAISAL OF THE GROUNDWATER RESOURCES OF THE UPPER CAPE FEAR RIVER BASIN NORTH CAROLINA

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GROUNDWATER BULLETIN NUMBER 20
GROUNDWATER DIVISION
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EARLE C. HUBBARD, DIRECTOR

DEPARTMENT OF NATURAL AND ECONOMIC RESOURCES
JAMES E. HARRINGTON, SECRETARY

PREPARED COOPERATIVELY BY
UNITED STATES GEOLOGICAL SURVEY
AND THE
NORTH CAROLINA OFFICE OF WATER AND AIR RESOURCES
MAY 1974

AN APPRAISAL OF THE GROUND-WATER RESOURCES OF THE UPPER CAPE FEAR RIVER BASIN, NORTH CAROLINA

by

Edwin O. Floyd, U.S. Geological Survey

and

Richard Peace, N.C. Department of Natural and Economic Resources

INTRODUCTION

This report has been jointly prepared by the U.S. Geological Survey and the Division of Ground Water of the North Carolina Department of Natural and Economic Resources as a contribution to the interagency study of the water resources of the upper Cape Fear River basin. The report describes the occurrence, availability, chemical quality, and cost of development of the ground-water resources in the basin.

The authors wish to acknowledge the cooperation of Heater Well Company, Inc., McCall Brothers, Inc., and Bainbridge and Dance, Inc., in supplying estimates of well-drilling costs in the basin.

PURPOSE AND SCOPE

An adequate and dependable supply of good-quality water is a prime requisite to economic development of an area. The decision to use ground water or surface water as a source of supply should not be made until both sources are compared in terms of quantity, dependability, quality, and costs.

The purpose of this report is to supply information pertaining to the feasibility of using ground water as a source of supply in the upper Cape Fear River basin. Within the scope of this report, an appraisal of the ground-water resources can be made by discussing, in general terms, the following basic questions:

Table 1.-- Population supplied with water from surface-water and ground-water sources in the counties lying entirely or partly in the upper Cape Fear River basin.

County	Population in 1970	Population served with		Percent using ground water
		Ground water	Surface water	
Alamance	96,362	46,562	49,800	48
Chatham	29,554	21,854	7,700	74
Caswell	19,055	17,555	1,500	92
Durham	132,681	32,681	100,000	25
Guilford	288,590	66,293	222,297	23
Harnett	49,667	34,017	15,650	68
Lee	30,467	17,967	12,500	59
Montgomery	19,267	13,767	5,500	71
Moore	39,048	27,468	11,580	70
Orange	57,707	24,207	33,500	42
Randolph	76,358	53,858	22,500	71
Rockingham	72,402	31,702	40,700	44
Wake	228,453	91,653	136,800	40
Totals	1,139,611	479,584	660,027	42

GROUND-WATER RESOURCES

Occurrence of Ground Water

The source of all water in the upper part of the Cape Fear River basin is precipitation, about 45 inches each year. Most of the precipitation runs overland to streams and is classed as "surface runoff." Another large part is returned to the atmosphere through evaporation and by transpiration of plants. Ten to 15 percent of the total amount percolates to the water table and becomes ground water. Beneath the water table, ground water is stored in and is transmitted through the openings in the rocks to points of discharge, such as wells and streams.

The rocks underlying the basin generally occur in two distinct zones. The uppermost zone is formed by weathering of the underlying bedrock. The residual material formed by weathering is referred to as saprolite. It usually consists of clay with lesser amounts of sand and large rock fragments. The thickness of saprolite in the upper Cape Fear River basin ranges from a few feet or less near rock outcrops to somewhat more than 100 feet. The average thickness on most hills and ridges is 30 feet.

Saprolite that has been eroded from the hills and transported to the stream valleys to form the flood plains is called alluvium, which may range in composition from clay to boulders. Its thickness is generally less than 20 feet.

The saprolite in the basin is underlain by unweathered bedrock. It consists of several different types of rock, most of which have similar hydrologic properties. The different rock types will be discussed in another section of this report.

The saprolite and fractured parts of the bedrock form the ground-water reservoir of the basin. The quantity of water that can be stored or transmitted by the saprolite-bedrock reservoir is dependent on the size, shape, and abundance of their contained openings. In the saprolite, ground water occurs in the pore spaces between particles. In bedrock, water occurs in the sheetlike openings developed along fractures in the rock.

The bedrock has been subjected to great stresses during its long geologic history and comprises a complex reservoir system. The degree of fracturing of the rocks resulting from these stresses varies greatly from place to place, ranging from very small, widely spaced fractures to zones of intensely broken rocks that are tens or hundreds of feet wide. Generally, bedrock fractures are only fractions of an inch in size and spaced a few inches to several feet apart. As a rule, the fractures decrease in number and size with depth. Data show that zones of significant fracturing extend to depths of more than 800 feet. The range of depth and degree of fracturing is not adequately known and considerable exploratory drilling will be necessary to ascertain the structure of the reservoir system.

One of the basic concepts of ground-water hydrology is that aquifers function both as a reservoir to store water and as a pipeline to transmit water. The quantity of water that can be stored depends on the porosity of the aquifer material. The ability to transmit water depends on the permeability and thickness of the aquifer material. The porosity usually is between 20 and 50 percent in saprolite whereas the porosity of bedrock is generally a fraction of 1 percent. The permeability of both materials generally is between 1 and 100 gpd (gallons per day) per square foot. Obviously, the water in storage in a unit volume of saprolite is many times greater than in an equal volume of bedrock. However, the thickness of the water-bearing zone in bedrock is generally several times greater than the thickness of the saturated part of the saprolite. In most cases it is useful to consider that the saprolite functions as the reservoir and that the bedrock functions as the pipeline.

Geologic Units

The occurrence of ground water in the upper Cape Fear River basin is influenced to a large extent by the local geology. The type and structure of the rocks have a strong influence on such factors as topography and the thickness of the saprolite.

LeGrand (1967) has shown that the yield of wells in the Piedmont region, which includes the upper Cape Fear River basin, is related to the topography at the well site and to the thickness of the saprolite. The highest-yielding wells are almost invariably located in topographically low areas, such as draws and stream valleys. The lowest-yielding wells are generally located near the tops of hills and ridges.

The differences in yield in different topographic situations apparently reflect the composite effect of several factors. Chief among these is the number and size of fractures in the bedrock. Valleys are believed to be located where fractures are most abundant, whereas the hills and ridges suggest the presence of relatively massive (unfractured) rock. Another factor is the tendency of the ground water to move toward valleys from the adjoining ridges, so that more water is available to pumping wells in valleys. A third factor, and one of the most important, is the infiltration of water from streams into the fractured rock when ground-water levels are lowered by pumping.

The thickness of saprolite is important because, as noted earlier, the saprolite functions as a reservoir. When fractured-rock wells are pumped, water slowly seeps downward from the saprolite into the fractures in the rock. Thus, the thicker the saprolite the larger the volume of water available for withdrawal. From what was said in the preceding paragraph about stream infiltration in valley areas, it is apparent that the thickness of saprolite is of greatest significance to the yield of wells in upland areas. In uplands underlain by 25 to 50 feet of saprolite, the sustained yield of wells may be double that of wells in uplands underlain by only 5 to 10 feet of saprolite.

Quantity of Available Ground Water

During extended dry periods the flow of streams in the basin is sustained by ground water discharging from the adjacent aquifers. The volume of ground water discharged to streams is an indication of the amount of water available for development from the ground-water reservoir.

Comprehensive quantitative studies of the amount of ground water available for development in the upper part of the Cape Fear River basin have not been made. However, based on studies in similar areas, it is estimated that the streamflow equaled or exceeded 70 percent of the time is a reliable indicator of the amount of ground water available.

Figure 3 shows areas of approximately-equal ground-water discharge, based on the flow of streams equaled or exceeded 70 percent of the time. The area encompassed by each coincides with the areas underlain by the three principal hydrologic units and represents the average rate of ground-water discharge to streams, in millions of gallons per day per square mile of

ground-water development, and after spending thousands of dollars in drilling wells they still do not have an adequate supply of water. However, the ground-water resources of the basin are adequate to meet demands many times larger than those presently being met. To minimize future problems, development of ground-water supplies for industries and municipalities should be carefully designed and managed by qualified professional personnel.

Pollution

Even though ground water is better protected from pollution than surface water, there are many places where pollutants are known to have found their way into the aquifers. With increased development of an area, there comes an increasing potential for pollution of the ground-water resource. Sanitary land fills are becoming more numerous and in each case provide almost direct connection between the refuse and the water table. Sewage, fertilizers, and industrial wastes are common agents of stream pollution, and, if unchecked, they may preclude the development of potentially large ground-water supplies from some of the stream valleys in the basin.

CONCLUSIONS

Large amounts of water are stored in the rocks underlying the upper part of the Cape Fear River basin. Dependable ground-water supplies can be developed from these rocks in all parts of the basin if the hydrologic conditions are properly evaluated and the wells and well fields are designed accordingly.

The chemical quality of the ground water in the basin is generally suitable for most uses. However, excessive concentrations of iron, hardness, and chloride occur in some local areas. Where necessary, the objectionable constituents can be effectively and economically reduced or removed by treatment of the water.

It is not within the scope of this report to provide exact data for development of water supplies at specific sites. However, with the available data, it is possible to predict, within acceptable limits, the general hydrologic conditions over a sizable area. Even in similar geologic and topographic situations, the hydrologic conditions can differ greatly within a short distance. For this reason, it is rarely possible to predict accurately the conditions at a specific site prior to actual on-site testing.

The different geologic, hydrologic, and economic conditions that had to be considered in appraising the ground-water resources of the basin make it necessary that certain generalized assumptions be made in estimating the costs of development. On these assumptions were based the estimated costs of construction and operation of hypothetical wells. These estimates are valid only for a comparison with estimates of costs of developing a supply from surface-water sources or from the different geologic units in the basin. Because of these assumptions, the estimates given are neither appropriate nor intended for use in detailed planning of a specific system. Planning and design of specific systems require geologic and hydrologic data from the actual project site and also the services of consulting ground-water hydrologists and qualified well-drilling contractors.

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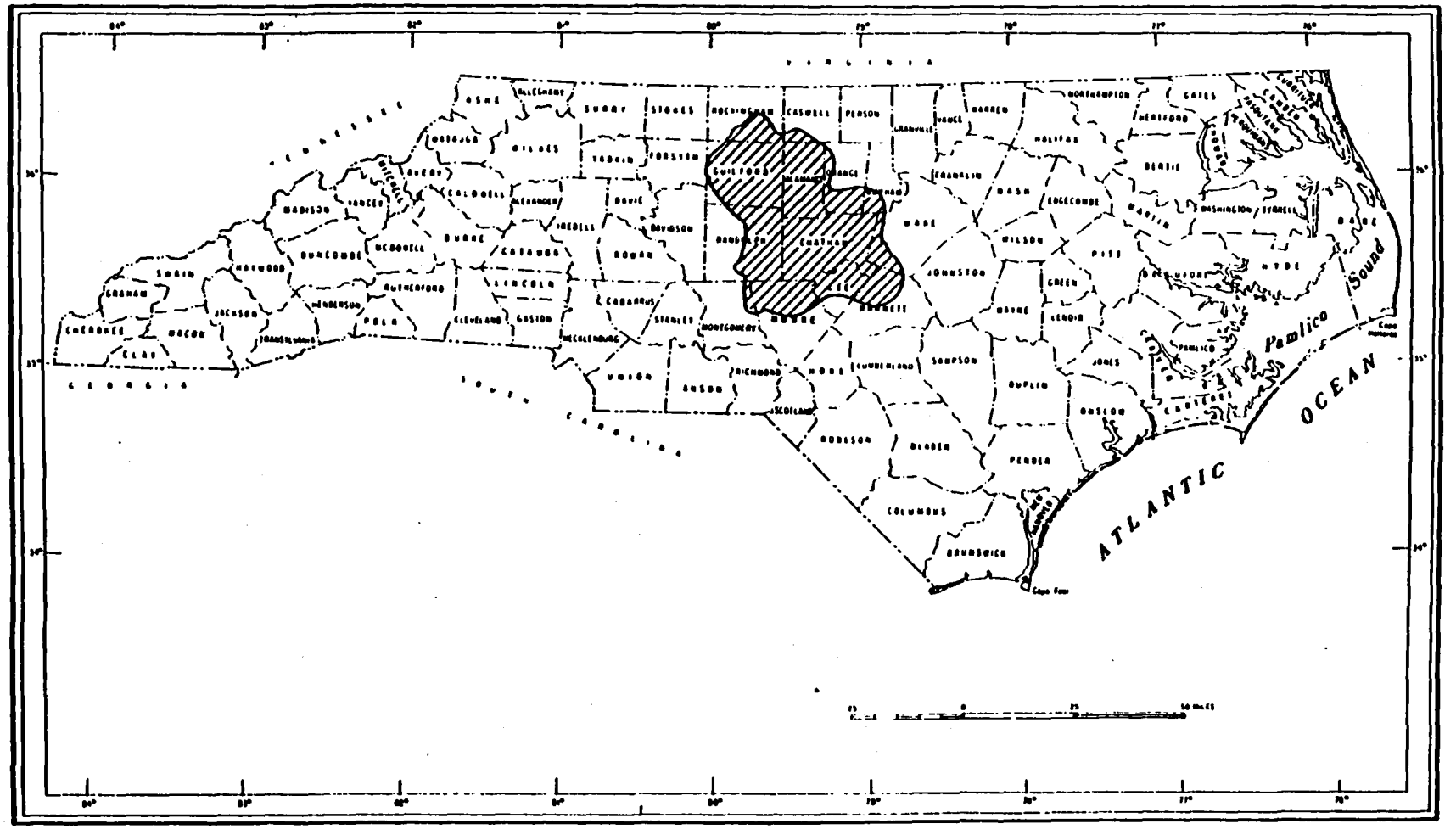
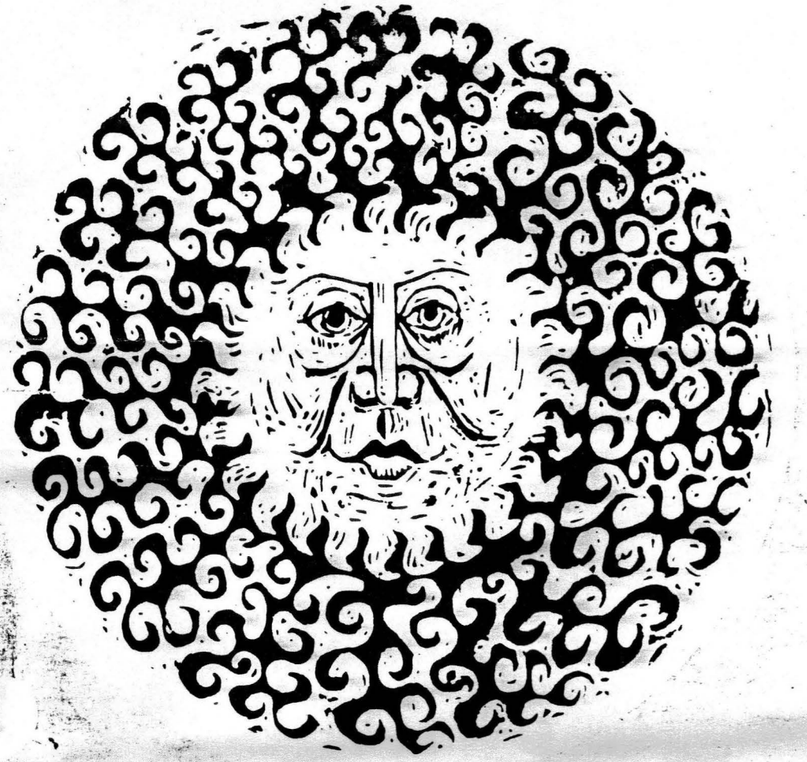


Figure 1. Map of North Carolina showing the location of the upper part of the Cape Fear River basin.



CLIMATIC ATLAS OF THE UNITED STATES

U.S. DEPARTMENT OF COMMERCE . Environmental Science Services Administration . Environmental Data Service

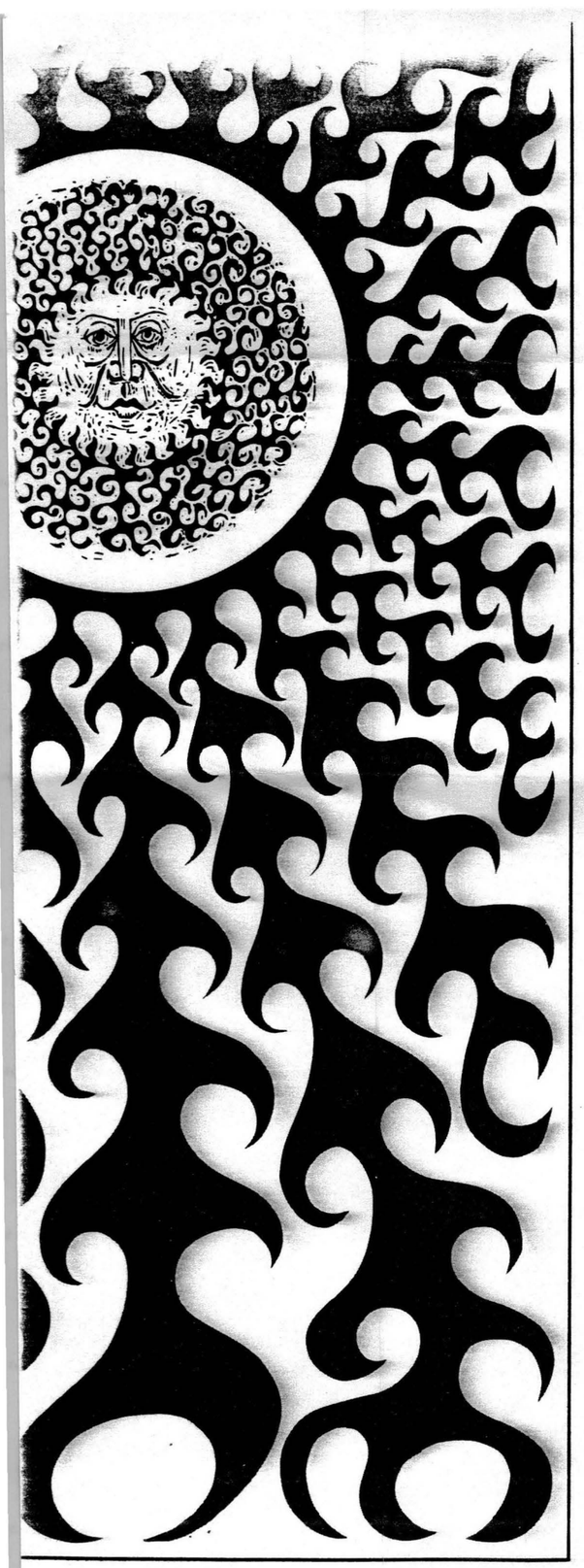
U.S. DEPARTMENT OF COMMERCE
C. R. Smith, Secretary

ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
Robert M. White, Administrator

ENVIRONMENTAL DATA SERVICE
Woodrow C. Jacobs, Director

JUNE 1968

REPRINTED BY THE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
1983



THE UNITED STATES

PREFACE

The purpose of this atlas is to depict the climate of the United States in terms of the distribution and variation of constituent climatic elements. Climate has a profound, often controlling, effect upon the life, mood, health, and activity of all of us.

Climate may be considered the collective state of the earth's atmosphere at a specific place for a long period of time (usually several decades). The short-term variations of the state of the atmosphere are called "weather." Weather is the product of the interaction of numerous natural elements; the long term statistical valuations of these various elements collectively define the climate. For many planning, engineering, and scheduling purposes it is more important to know the climate of a certain city, State, resort area, etc., than to know what the weather happens to be there today.

The Climatic Maps of the United States present in uniform format a series of analyses showing the national distribution of mean, normal, and/or extreme values of temperature, precipitation, wind, barometric pressure, relative humidity, dewpoint, sunshine, sky cover, heating degree days, solar radiation, and evaporation. The map projection has been standardized to allow accurate comparison and correlation of the various climatic elements and their patterns.

The individual analyses were originally prepared to meet the demand for climatic information from commercial, industrial, agricultural, research, and educational institutions, as well as from the general public. Each sheet, or set of sheets, was made available as soon as printed. Now the entire set - a total of 40 large sheets containing 271 climatic maps and 15 tables - has been collected and bound into this comprehensive atlas. (Individual sheets and sets may still be purchased separately).

It should be remembered that these analyses are not forecasts of temperature, precipitation, etc., but rather reflect collective atmospheric conditions that occurred over periods of years; often observed conditions for any given day, week, month - or even year - will differ sharply from those indicated in the analyses.

The climatic maps in this atlas were prepared primarily by John L. Baldwin, Chief of the Domestic Climatology Branch of the Environmental Data Service, ESSA, an agency of the U.S. Department of Commerce, with some map contributions from the Hydrologic Services Division and the former Solar Radiation Section of the Weather Bureau. Appreciation is due Dr. Helmut E. Landsberg, former Director of the Environmental Data Service, and to the National Academy of Science Advisory Committee on Climatology for advice and guidance.

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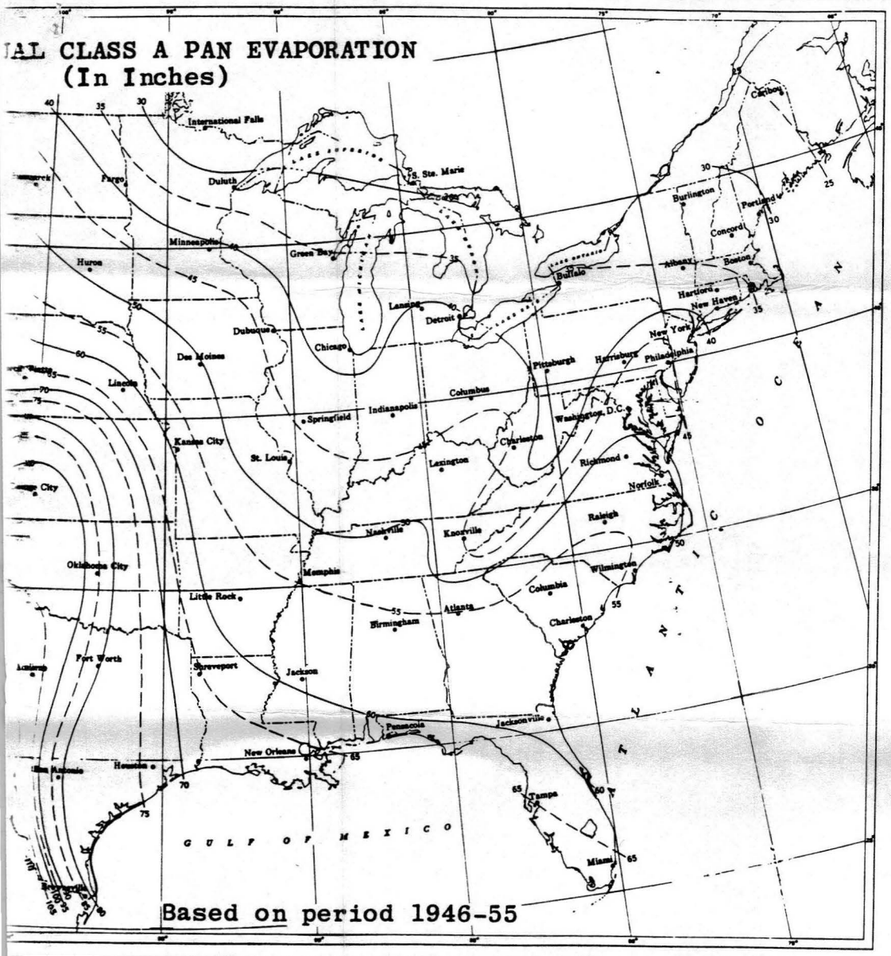


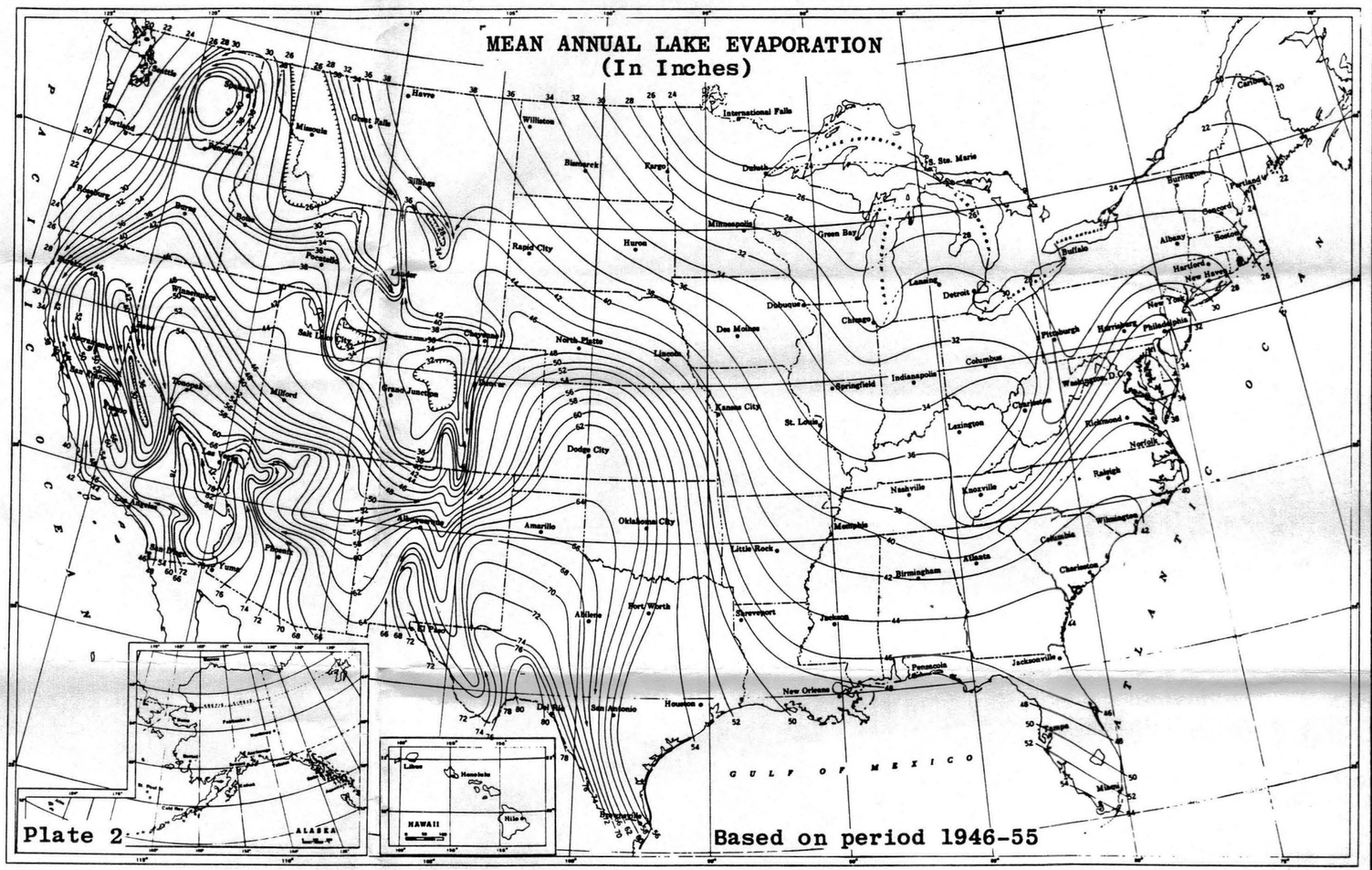
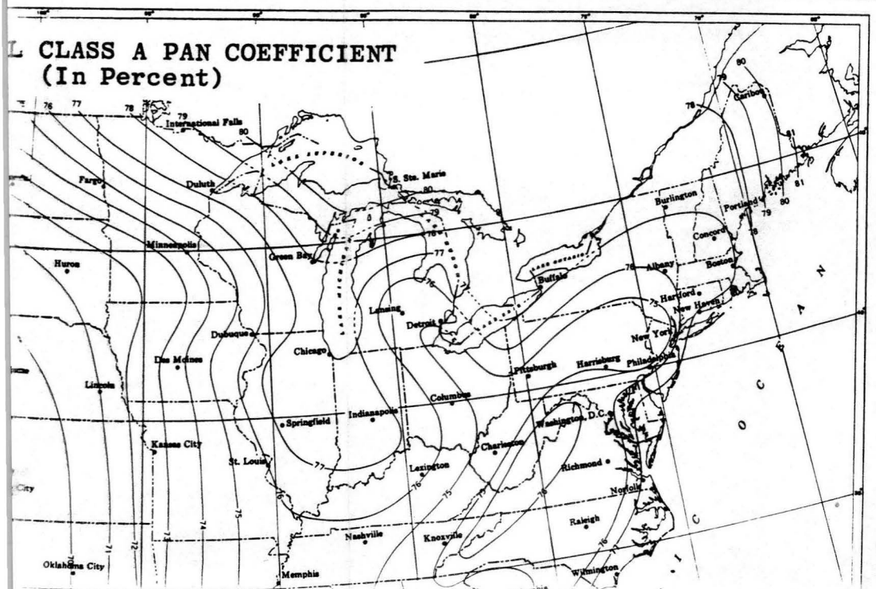
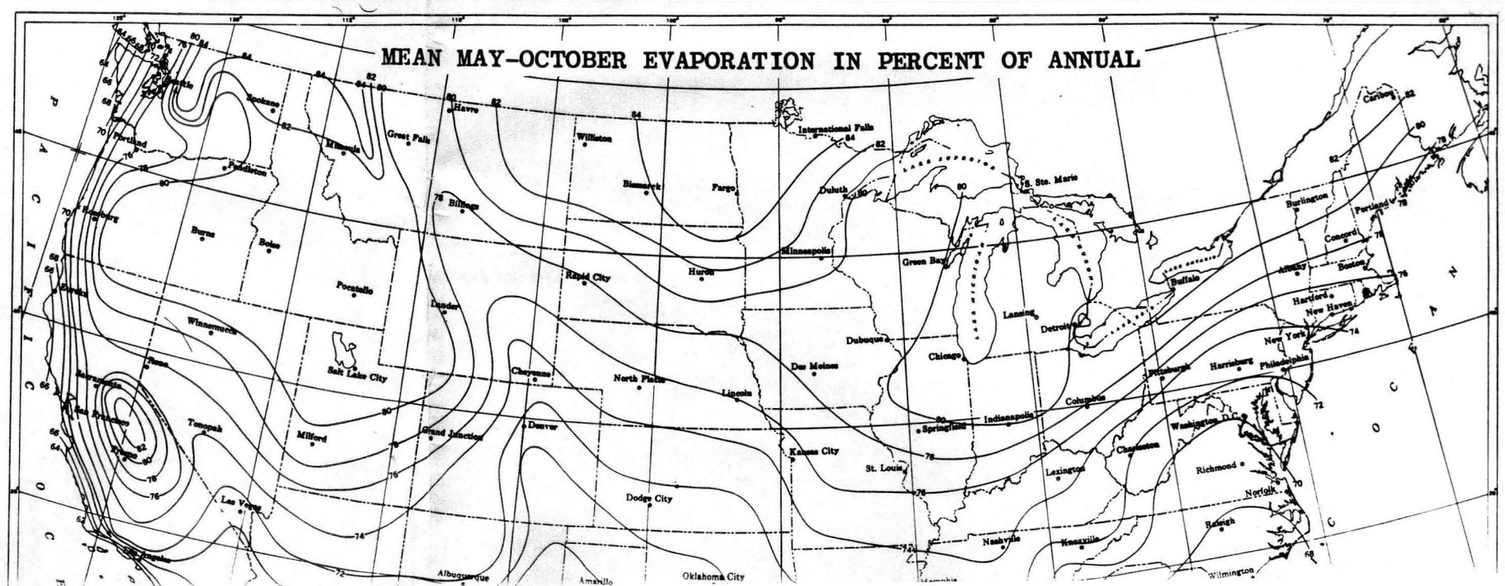


Plate 2





STATISTICAL ANALYSIS RELATING WELL YIEL TO CONSTRUCTION PRACTICES AND SITING OF WELLS IN THE PIEDMONT AND BLUE RIDG PROVINCES OF NORTH CAROLINA

U.S. GEOLOGICAL SURVEY

WATER RESOURCES INVESTIGATIONS REPORT 86-4132

Prepared in cooperation with the

North Carolina Department of Natural Resources

and Community Development

U.S. GEOLOGICAL SURVEY

WATER RESOURCES INVESTIGATIONS REPORT 86-4132

Errata sheet

References were omitted from captions to figures 3 and 6 on pages 7 and 19 respectively. The correct captions are as follows:

Figure 3.--Physical setting of the ground-water system in North Carolina (From Heath, 1980).

Figure 6.--Geologic belts, terranes, and some major structural features within the Piedmont and Blue Ridge provinces of North Carolina (From Brown, P.M., and Parker, J.M., III, 1985).

The equation on page 33 is incorrect as shown. The equation should read:

$$\text{yield} = a - b(\text{depth}) + c(\text{depth} \times \text{diameter}) - d(\text{depth}^2 \times \text{diameter})$$

where a, b, c, and d are regression coefficients.

STATISTICAL ANALYSIS RELATING WELL YIELD TO CONSTRUCTION PRACTICES AND SITING OF WELLS IN THE PIEDMONT AND BLUE RIDGE PROVINCES OF NORTH CAROLINA

By Charles C. Daniel III

U.S. GEOLOGICAL SURVEY

Water Resources Investigations Report 86-4132

Prepared in cooperation with the

NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES
AND COMMUNITY DEVELOPMENT

Raleigh, North Carolina

1987

HANKINSON

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COVER PHOTOGRAPH: Drilling of a test well in Guilford County near the Greensboro-High Point Regional Airport, December 16, 1982. Yield at time of photograph approximately 50 gallons per minute. (Photograph by Charles C. Daniel, U.S. Geological Survey.)

STATISTICAL ANALYSIS RELATING WELL YIELD TO CONSTRUCTION PRACTICES AND SITING OF WELLS IN THE PIEDMONT AND BLUE RIDGE PROVINCES OF NORTH CAROLINA

By Charles C. Daniel III

ABSTRACT

A statistical analysis was made of data from more than 6,200 water wells drilled in the fractured crystalline rocks of the Blue Ridge, Piedmont, and western edge of the Coastal Plain where crystalline rocks underlie sediments at shallow depths. The study area encompassed 65 counties in western North Carolina, an area of 30,544 mi^2, comprising nearly two-thirds of the State. Additional water supplies will be needed in western North Carolina as population and industrial development continue to increase. Ground water is an attractive alternative to surface water sources for moderate to large supplies. The statistical analysis was made to identify the geologic, topographic, and construction factors associated with high-yield wells.

It is generally held that the crystalline rocks of the Blue Ridge and Piedmont provinces yield only small amounts of water to wells, that water is obtained from vertical fractures that pinch out at a depth of about 300 feet because of lithostatic pressure, and that the function of a large diameter well is primarily for storage. These concepts are reasonable when based upon the average well drilled in these rocks: a domestic well, 125 feet deep, 6 inches or less in diameter, and located on a hill or ridge. However, statistical analysis shows that wells in draws or valleys have average yields three times those of wells on hills and ridges. Wells in the most productive hydrogeologic units have average yields twice those of wells in the least productive units. Wells in draws and valleys in the most productive units average five times more yield than wells on hills and ridges in the least productive units.

Well diameter can have a significant influence on yield; for a given depth, yield is directly proportional to well diameter. Maximum well yields are obtained from much greater depths than previously believed. For

example, the average yield of 6-inch diameter wells located in draws and valleys can be expected to reach a maximum of about 45 gallons per minute at depths of 500 to 525 feet; for similarly located 12-inch diameter wells, the average yield can be expected to reach a maximum of about 150 gallons per minute at depths of 700 to 800 feet.

INTRODUCTION

Additional water supplies will be needed in the Piedmont and Blue Ridge provinces of North Carolina (fig. 1) as population and industrial development continue to increase. Municipal and industrial water supplies are derived almost exclusively from surface water sources. However, the potential for further development of surface water is limited, and ground water is an attractive alternative for moderate to large water supplies.

Ground water has many attractive features as a source of supply. Ground water in the crystalline rocks of the Piedmont and Blue Ridge provinces has a relatively low cost of development (Cederstrom, 1972). Generally, ground water in these areas is of good chemical quality and requires little treatment. Because of the large quantity of water in storage, the ground-water system usually can sustain moderate yields during seasonal dry periods. The use of ground water generally permits other land-use activities if they do not impede the infiltration of recharge or diminish water quality.

The crystalline rocks underlying the Blue Ridge and Piedmont have the reputation for furnishing only small quantities of ground water. This impression is the outgrowth of drilling large numbers of domestic wells, which do not represent efforts to obtain quantities of water beyond the minimum requirement of 2 to 10 gal/min. About 70 percent of all wells drilled in the Blue Ridge and Piedmont are for domestic supply and most were located and drilled without regard to geology, topography, and optimal construction. There are, however, a significant number of wells that yield a few tens to a few hundreds of gallons per minute. Additional high-yield wells likely could be developed at carefully selected sites throughout the area.

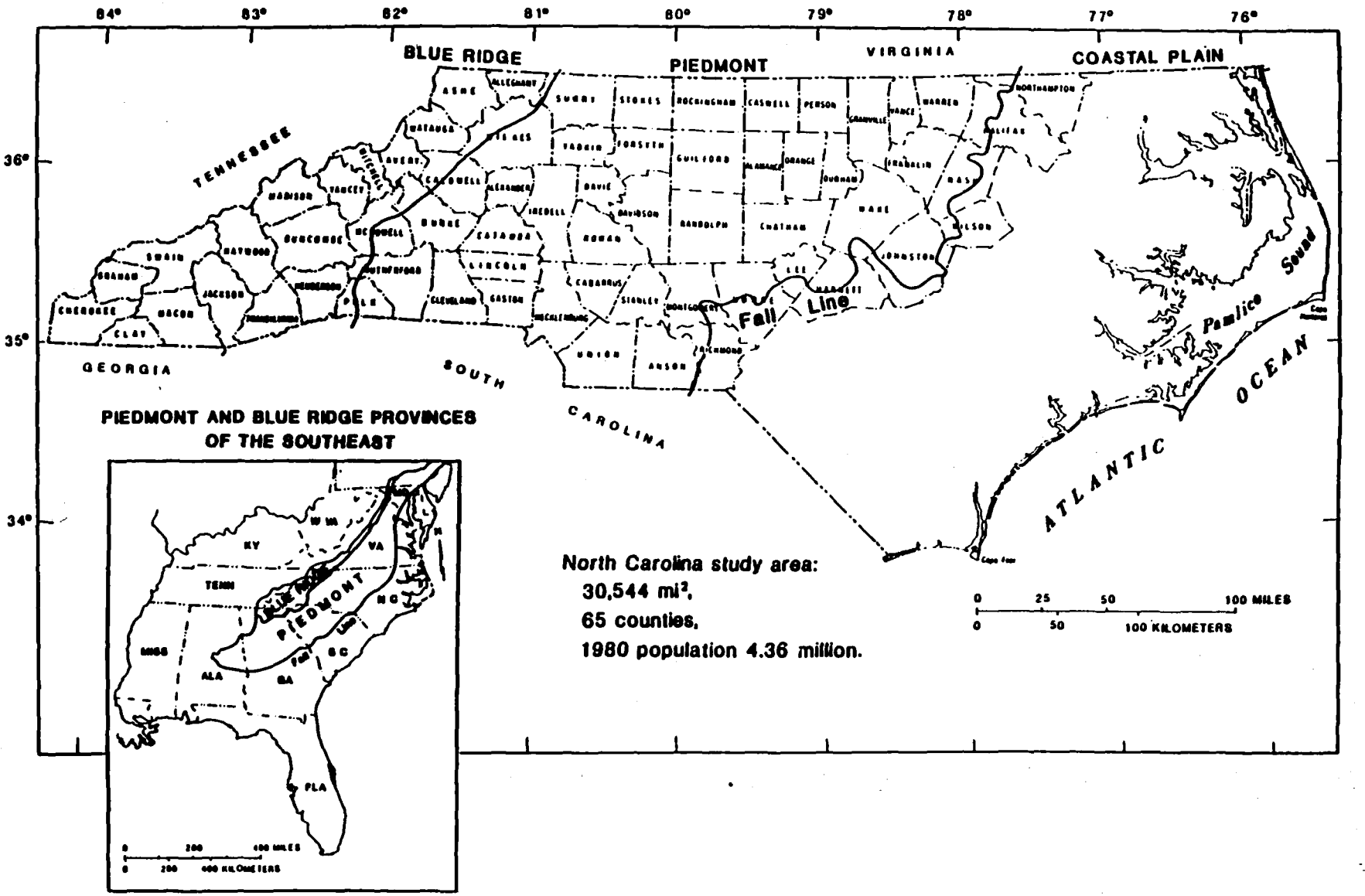

Figure 1.--Area of investigation showing counties and physiographic provinces.

Results of studies in several areas of the Piedmont, both within and outside North Carolina, show that the ground-water system can support large well yields. For example, Daniel and Sharpless (1983) reported finding more than 300 wells in an eight-county area of central North Carolina that produce 50 gal/min or more. Cressler and others (1983) found a substantial number of wells in the Georgia Piedmont that yield more than 100 gal/min and some that yield nearly 500 gal/min. They also found 66 mainly industrial and municipal wells that had been in use for periods of 12 to more than 30 years without experiencing declining yields. Similarly, Cederstrom (1972) found that yields of 100 to 300 gal/min are not uncommon for bedrock wells in the Piedmont and Blue Ridge provinces from Maine to Virginia.

To evaluate the potential for large ground-water supplies in the Piedmont and Blue Ridge provinces of North Carolina, the U.S. Geological Survey, in cooperation with the North Carolina Department of Natural Resources and Community Development, conducted a five-year study of ground-water resources in the region. This report is part of that study.

Purpose and Scope

The purpose of this report is to describe a statistical analysis of data from a large number of water wells in the Piedmont and Blue Ridge provinces of North Carolina that was undertaken to identify factors associated with high-yield wells.

The statistical analysis was made by using hydrologic, geologic, topographic, and well-construction data obtained from records of more than 6,200 water wells. The wells are in an area including all of the Blue Ridge and Piedmont provinces in the State and an adjoining narrow strip at the western edge of the Coastal Plain province where a number of wells draw water from Piedmont crystalline rocks at shallow depth beneath the sedimentary cover. The study area encompassed all of 65 counties in North Carolina, an area of 30,544 mi^2, comprising nearly two-thirds of the State (fig. 1).

The Coastal Plain has little relief in contrast to the adjoining Piedmont. It is marked by sluggish streams flowing in broad valleys cut into predominately sand and clay units that thicken seaward from a feather edge at the Fall Line. Along the western edge of the Coastal Plain, the sediments are underlain at shallow depth by crystalline Piedmont rocks (fig. 3).

Geology

The geology of the Piedmont and Blue Ridge is extremely complex. All major classes of rocks--metamorphic, igneous, and sedimentary--are represented, although metamorphic rocks are the most abundant. The metamorphic and igneous rocks range in composition from felsic to ultramafic and range in age from Precambrian in the Blue Ridge to Triassic and Jurassic in the Piedmont. The metamorphism of the rocks varies in grade from low rank to high rank, that is, varying in degree of recrystallization and destruction of the original texture; many have been folded and refolded during multiple metamorphic and orogenic events. The rocks are broken and displaced by numerous faults and zones of shearing, some of which are many miles in length. Nearly everywhere are rock fractures without displacement called joints. The joints commonly cluster in groups orientated about one or more preferred directions. Within the crystalline rocks of the Piedmont are downfaulted basins (grabens) filled with sedimentary rocks of Triassic age.

There have been three or more periods of igneous intrusion (Fullagar, 1971) with the emplacement of plutonic bodies ranging in size from batholiths down to dikes, sills, and veins. Most instrusions have been metamorphosed, deformed, and fractured, but some are massive and have little or no foliation. All rocks have been subjected to uplift, weathering, and erosion, which resulted in the widening of fractures and the formation of new openings such as stress-relief fractures. These breaks in the otherwise solid rock are the conduits for ground-water flow. All of the events and processes that are part of the geologic history of the area have given the hydrogeologic system properties that control the present-day movement and circulation of ground water.

Bedding and planes of metamorphic foliation generally are folded and tilted and can have almost any attitude and orientation. Fractures, bedding, and foliation create inhomogeneities in the rocks, with the result that permeability is usually greatest parallel to bedding and foliation and zones of fracture concentration, and least at right angles to the plane of these features.

Bedrock may be exposed at land surface on steep slopes, rugged hilltops, or in stream valleys, but nearly everywhere else is overlain by unconsolidated material to depths of more than a hundred feet. Collectively this unconsolidated material, which is composed of saprolite, alluvium, and soil, is referred to as regolith. Saprolite is clay-rich, residual material derived from in-place weathering of the bedrock. When the bedrock weathers to form saprolite, the relict structures generally are retained and the directional properties of permeability are also retained. In many valleys the saprolite has been removed by erosion, and bedrock is exposed or thinly covered by alluvial deposits. Soil is nearly everywhere present as a thin mantle on top of both the saprolite and alluvium. The water-storing and transmitting characteristics of bedrock and regolith and the hydrologic relation between them determines the water-supply potential of the ground-water system in the Piedmont and Blue Ridge provinces.

Hydrogeologic Units

Within the Piedmont and Blue Ridge of North Carolina there are hundreds of rock units which have been defined and named by various conventions more in keeping with classical geologic nomenclature than hydrologic terminology. The geologic nomenclature does little to reflect the water-bearing potential of the different units. To overcome this shortcoming and to reduce the number of rock units to the minimum necessary to reflect the differences in water-bearing potential, a classification scheme based on origin, composition, and texture was devised (table 1). The rationale behind the hydrogeologic units shown in table 1 is the hypothesis that these factors would be linked not only to a rock's primary porosity but also to its susceptibility to the development of secondary porosity in the form of

unit(s). The yield data used for this comparison also were corrected to an average 154-foot depth and 6-inch diameter. A regression analysis of well yields in the various belts is shown in figure 14. The average difference in yield between belts is 0.9 gal/min. Average yield varies from a low of about 11.5 gal/min for the Smith River allocthon (SR) and Triassic basins (TR) to a high of about 23 gal/min for the Blue Ridge belt (BR). Analysis of variance tests found that the average yield of belts at the upper and lower ends of the data are significantly different. The inequalities significant at the 0.95 confidence level are also shown in figure 14.

The belts with the highest yields, the Blue Ridge (BR), Chauga (CA), and Inner Piedmont (IP), are dominated by high rank metasedimentary rocks, mafic gneisses, schists, and quartzites, and include smaller areas of metaigneous rocks, all of which have above average yields. The Charlotte belt (CH), which is characterized by igneous rocks intruded into country rocks of metavolcanic and metaigneous origin (Fullagar, 1971), and the Carolina slate belt (CS), which is dominated by metavolcanic rocks (Butler and Ragland, 1969), both are belts having low average yields.

The areas containing sedimentary rocks, the Triassic basins (TR) and the western edge of the Coastal Plain (CP), are far apart in average yield with the Triassic basins having the next-to-lowest yield and the Coastal Plain the third highest.

SUMMARY AND CONCLUSIONS

A statistical analysis was made of data from more than 6,200 wells drilled in the crystalline rocks of the Blue Ridge, Piedmont, and the western edge of the Coastal Plain where crystalline rocks underlie sediments at shallow depths. This analysis was made to identify factors associated with high-yield wells. The data were classified according to geologic belts, hydrogeologic units composed of similar rock types, topographic setting, total and saturated thickness of regolith, water level, casing depth, yield, total depth, well diameter, and water use.

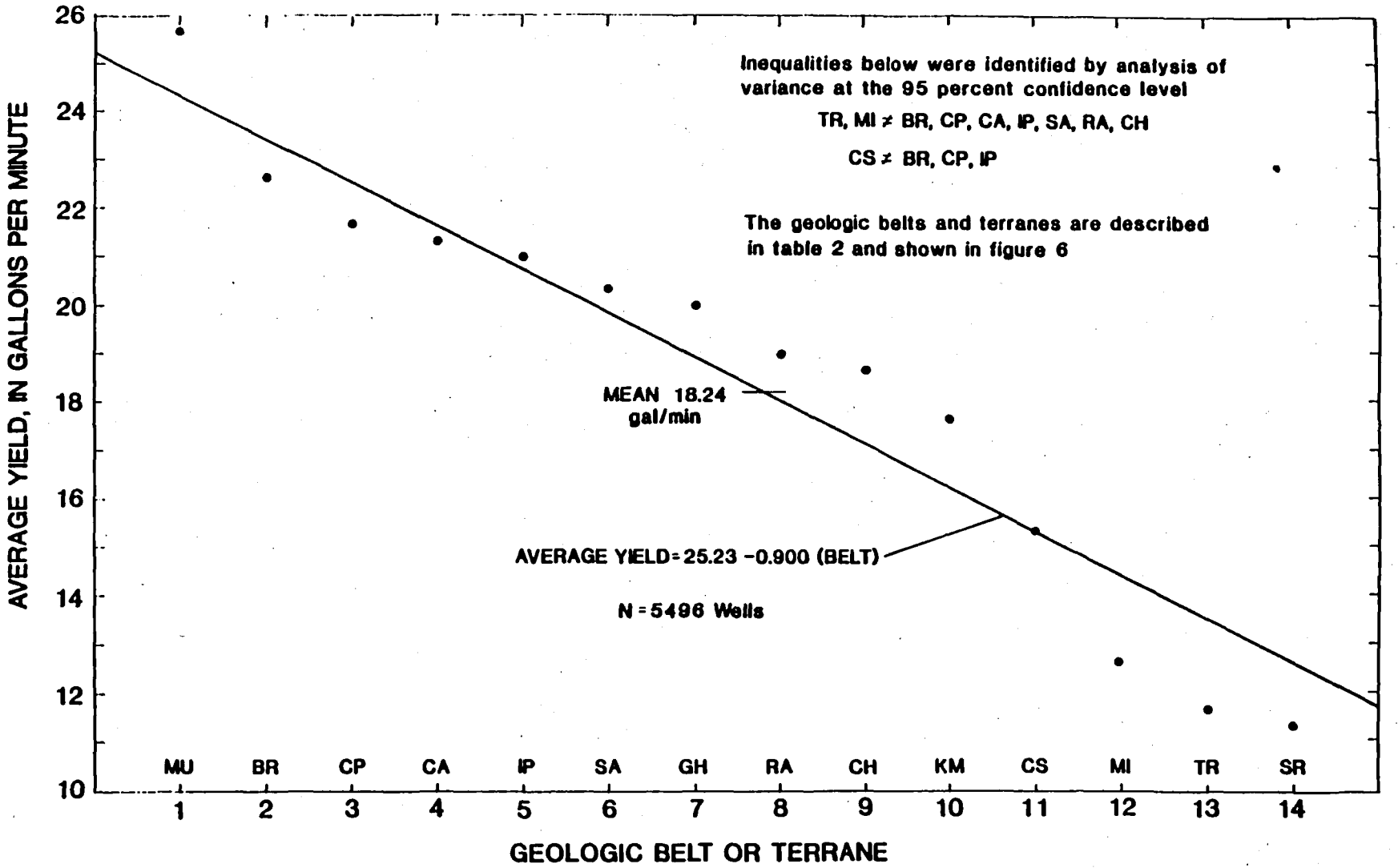

Figure 14.--Average yield of wells of average construction in the geologic belts and terranes of the Piedmont and Blue Ridge provinces of North Carolina.

Six topographic settings were combined into three groups based on well yields: hills and ridges, slopes and flats, and draws and valleys. Wells on hills and ridges had the lowest yields (averaging about 10 gal/min), wells in draws and valleys, the greatest (averaging about 30 gal/min). Regolith thickness was about the same regardless of topographic group, but saturated thickness was least (about 19 feet) under hills and ridges and greatest (about 34 feet) under draws and valleys. Average yields in the geologic belts and hydrogeologic units ranged from about 11 to 25 gal/min. There was considerable scatter in yields in all geologic belts and hydrogeologic units. Of 14 geologic belts, 10 were statistically different on the basis of well yield, as were 9 of 21 hydrogeologic units.

About 70 percent of the wells were drilled for domestic use and, on the average, yielded about 11 gal/min; 80 percent of these wells were located on hills and ridges. The 30 percent of the wells drilled for public supply and commercial-industrial supply yielded about 30 gal/min on the average; about 50 percent of these wells were located in draws and valleys. The domestic wells had an average depth of about 125 feet, the public-supply and commercial-industrial wells about 225 feet. Fewer than 2 percent of the domestic wells were 8 inches in diameter or larger, whereas nearly 25 percent of the public-supply and commercial-industrial wells were 8 inches or larger.

Selecting the most favorable hydrogeologic unit or geologic belt alone can improve the chance of increasing the yield of the average 6-inch diameter, 154-foot deep well from about 11 to 12 gal/min to about 23 to 24 gal/min, about a two-fold increase. Considering topography alone, the average well on hills and ridges can be expected to average less than 12 gal/min, whereas wells in draws and valleys can be expected to average about 29 gal/min, an increase of 2.4 times. When the factors of hydrogeologic unit or geologic belt are considered in combination with topographic setting, the range in yields is even greater. Wells in draws and valleys in the most productive units average five times more yield than wells on hills and ridges in the least productive units.

The statistical analysis supported some concepts and criteria for well-site selection, such as the siting of a well with regard to topography. More importantly, however, the analysis indicates that some previously held concepts may be in error. First and foremost is the generally held concept that the crystalline rocks yield only small amounts of water to wells. The analysis showed that this concept may be due to cultural bias. Most wells drilled in these rocks are small diameter, are located primarily on hills and ridges--the poorest possible sites for wells--and are drilled only to depths where sufficient water for a domestic supply is obtained. In the same theme, well diameter has not been considered to have much effect on yield--a large-diameter well was considered a storage tank. Statistical analysis shows, however, that for a given depth the yield of a well is directly proportional to the well diameter. The larger the diameter the greater the yield.

Well construction in crystalline rocks has long been based on the concept of a well intersecting near vertical open fractures and joints that because of lithostatic pressure, pinch out at depths of about 300 feet. As a result, the drilling of many wells has been arbitrarily stopped when the depth of 300 feet was reached. The average well, whether domestic or commercial-industrial, is not even that deep. The analysis indicates that very few wells have been drilled deep enough to test the full potential of the sites. For example, the average yield of 6-inch diameter wells located in draws or valleys reaches a maximum of about 45 gal/min at depths of 500 to 525 feet; the average yield of 12-inch diameter wells located in draws or valleys reaches a maximum of about 150 gal/min at depths of 700 to 800 feet.

Whatever the hydrogeologic unit or topographic location, the chances of obtaining high yields are enhanced by increasing the depth and diameter of the well to a much greater extent than previously thought.

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☆U.S. GOVERNMENT PRINTING OFFICE 1987—748-188/40040

Uncontrolled Hazardous Waste Site Ranking System

A Users Manual

(HW-10)

Originally Published in
the July 16, 1982, *Federal Register*

United States
Environmental Protection
Agency

1984

FOREWORD

The method for ranking hazardous substance facilities that is described in this document was developed by The MITRE Corporation under contract to the U.S. Environmental Protection Agency. The method has benefited from extensive review and comment by EPA personnel, state officials, and interested parties in the private sector.

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1.0 INTRODUCTION

The Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) (PL 96-510) requires the President to identify the 400 facilities in the nation warranting the highest priority for remedial action. In order to set the priorities, CERCLA requires that criteria be established based on relative risk or danger, taking into account the population at risk; the hazardous potential of the substances at a facility; the potential for contamination of drinking water supplies, for direct human contact, and for destruction of sensitive ecosystems; and other appropriate factors.

This document describes the Hazard Ranking System (HRS) to be used in evaluating the relative potential of uncontrolled hazardous substance facilities to cause human health or safety problems, or ecological or environmental damage. Detailed instructions for using the HRS are given in the following sections. Uniform application of the ranking system in each State will permit EPA to identify those releases of hazardous substances that pose the greatest hazard to humans or the environment. However, the HRS by itself cannot establish priorities for the allocation of funds for remedial action. The HRS is a means for applying uniform technical judgement regarding the potential hazards presented by a facility relative to other facilities. It does not address the feasibility, desirability, or degree of cleanup required. Neither does it deal

TABLE 1

COMPREHENSIVE LIST TO RATING FACTORS

HAZARD MODE	FACTOR CATEGORY	FACTORS		
		GROUND WATER ROUTE	SURFACE WATER ROUTE	AIR ROUTE
Migration	Route Characteristics	• Depth to Aquifer of Concern • Net Precipitation • Permeability of Unsaturated Zone • Physical State	• Facility Slope and Intervening Terrain • One-Year 24-Hour Rainfall • Distance to Nearest Surface Water • Physical State	
	Containment	• Containment	• Containment	
	Waste Characteristics	• Toxicity/Persistence • Hazardous Waste Quantity	• Toxicity/Persistence • Hazardous Waste Quantity	• Reactivity/Incompatibility • Toxicity • Hazardous Waste Quantity
	Targets	• Ground Water Use • Distance to Nearest Well/ Population Served	• Surface Water Use • Distance to Sensitive Environment • Population Served/Distance to Water Intake Downstream	• Land Use • Population Within 4-Mile Radius • Distance to Sensitive Environment
Fire and Explosion	Containment	• Containment		
	Waste Characteristics	• Direct Evidence • Ignitability • Reactivity • Incompatibility • Hazardous Waste Quantity		
	Targets	• Distance to Nearest Population • Distance to Nearest Building • Distance to Nearest Sensitive Environment • Land Use • Population Within 2-Mile Radius • Number of Buildings Within 2-Mile Radius		
Direct Contact	Observed Incident	• Observed Incident		
	Accessibility	• Accessibility of Hazardous Substances		
	Containment	• Containment		
	Toxicity	• Toxicity		
	Targets	• Population Within 1-Mile Radius • Distance to Critical Habitat		

The ranking of facilities nationally for remedial action will be based primarily on S_M. S_{FE} and S_{DC} may be used to identify facilities requiring emergency attention.

TABLE 2

PERMEABILITY OF GEOLOGIC MATERIALS*

Type of Material	Approximate Range of Hydraulic Conductivity	Assigned Value
Clay, compact till, shale; unfractured metamorphic and igneous rocks	$<10^{-7}$ cm/sec	0
Silt, loess, silty clays, silty loams, clay loams; less permeable limestone, dolomites, and sandstone; moderately permeable till	$10^{-5} - 10^{-7}$ cm/sec	1
Fine sand and silty sand; sandy loams; loamy sands; moderately permeable limestone, dolomites, and sandstone (no karst); moderately fractured igneous and metamorphic rocks, some coarse till	$10^{-3} - 10^{-5}$ cm/sec	2
Gravel, sand; highly fractured igneous and metamorphic rocks; permeable basalt and lavas; karst limestone and dolomite	$>10^{-3}$ cm/sec	3

*Derived from:

Davis, S. N., Porosity and Permeability of Natural Materials in Flow-Through Porous Media, R.J.M. DeWest ed., Academic Press, New York, 1969

Freeze, R.A. and J.A. Cherry, Groundwater, Prentice-Hall, Inc., New York, 1979

$1.0 \times 10^{-}$

NUS CORPORATION AND SUBSIDIARIES **TELECON NOTE**

Reference No. 21

CONTROL NO. TDD No. F4-8803-42	**DATE: May 3, 1988**	**TIME: 1100**

DISTRIBUTION: Custom Finishers, Inc., High Point, North Carolina

BETWEEN: Angie Nelson, Water Clerk	**OF: City of Archdale, North Carolina**	**PHONE: (919) 431-9141**

AND: Michael Profit, NUS Corporation

MP 5-3-88

DISCUSSION:

We discussed the source of Archdale's water. Archdale buys water from High Point and Davidson Water. Archdale serves 2700 connections within the city limits and border areas.

NUS CORPORATION AND SUBSIDIARIES **TELECON NOTE**

Reference No. 22

CONTROL NO. TDD No. F4-8803-42	DATE: May 3, 1988	TIME: 1115

DISTRIBUTION: Custom Finishers, Inc., High Point, North Carolina

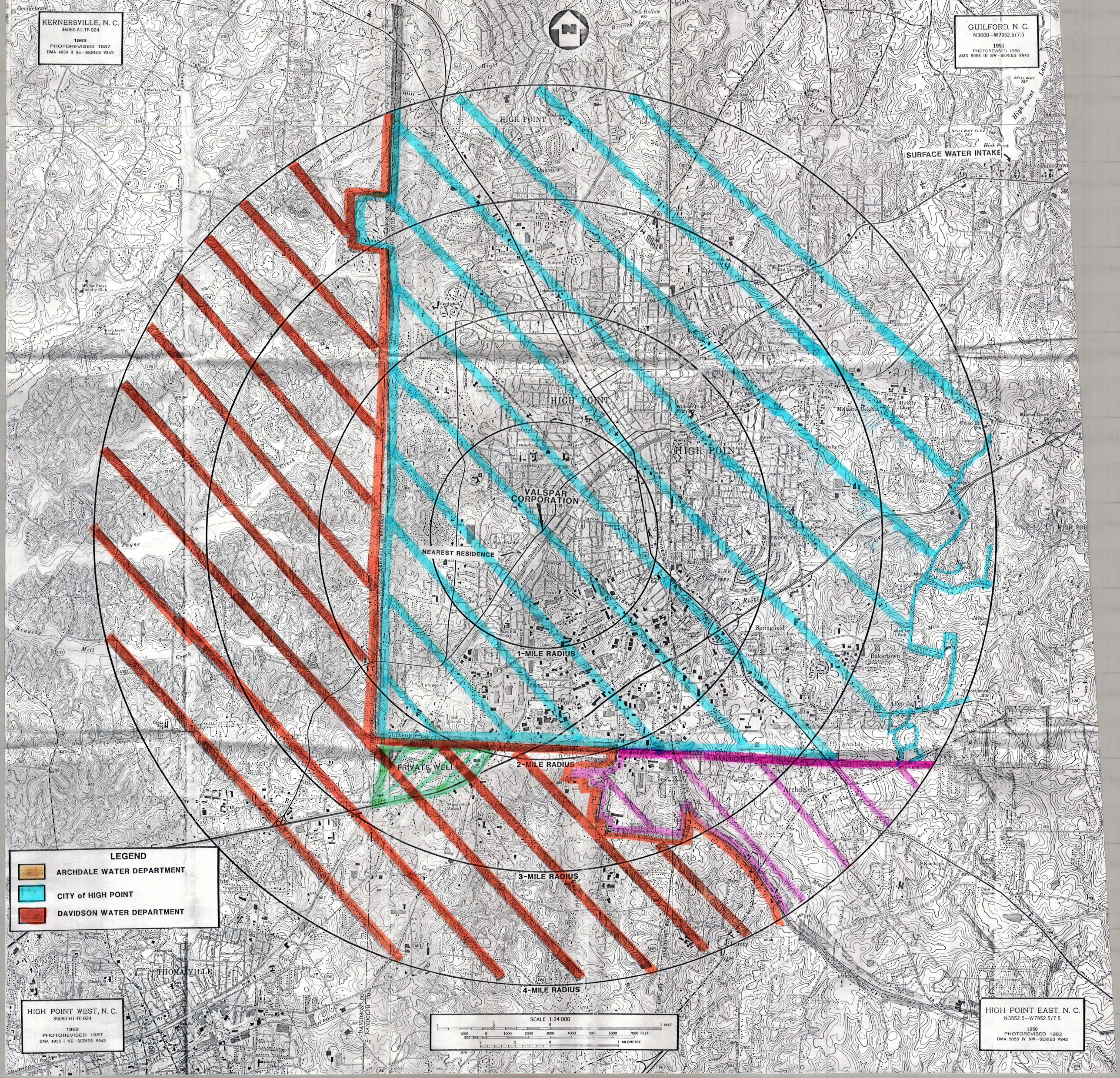
BETWEEN: Mary Pangan, Clerk	OF: Davidson Water Co.	PHONE: (919) 475-8225

AND: Michael Profit, NUS Corporation

MP 5-3-88

DISCUSSION:

We discussed the source of Davidson's water. Davidson Water obtains its water from the Yadkin River. The water plant is located on Koontz Road off of Old 64 West, leading toward Mocksville. Davidson Water serves 30,000 connections, covering all of Davidson County (except Lexington), parts of Forsyth, Guilford and Randolf Counties. System withdraws 7 mill gal/day. The Yadkin River intake is more than 20 miles from High Point.


KERNERSVILLE, N. C.
36080-A1-TF-024
1969
PHOTOREVISED 1987
DMA 4956 II SE-SERIES V842
GUILFORD, N. C.
N3600—W7952.5/7.5
1951
PHOTOREVISED 1968
AMS 5056 III SW-SERIES V842
SURFACE WATER INTAKE
HIGH POINT
VALSPAR CORPORATION
NEAREST RESIDENCE
1-MILE RADIUS
2-MILE RADIUS
3-MILE RADIUS
4-MILE RADIUS
PRIVATE WELL
LEGEND
ARCHDALE WATER DEPARTMENT
CITY of HIGH POINT
DAVIDSON WATER DEPARTMENT
SCALE 1:24 000
1 MILE
7000 FEET
1 KILOMETRE
HIGH POINT WEST, N. C.
35080-H1-TF-024
1969
PHOTOREVISED 1987
DMA 4955 I NE-SERIES V842
HIGH POINT EAST, N. C.
N3552.5—W7952.5/7.5
1950
PHOTOREVISED 1982
DMA 5055 IV NW-SERIES V842

06/30/89 Guilford

NORTH CAROLINA NATURAL HERITAGE PROGRAM ELEMENT LIST

scientific and common name	state stat	fed stat	state rank	glob rank
ETHEOSTOMA COLLIS CAROLINA DARTER	SC		S3	G3
MEANDER SCARS				
CAMBARUS CATAGIUS GREENSBORO BURROWING CRAYFISH	T	C2		G1G3
HESPERIA LEONARDUS LEONARD'S SKIPPER	UNK		S2?	G4
DENTARIA MULTIFIDA DIVIDED TOOTHWORT	SR		S1	G5Q
EPILOBIUM LEPTOPHYLLUM NARROWLEAF WILLOWHERB	PP		S2	G5
NESTRONIA UMBELLULA NESTRONIA	T	C2	S3	G3G4

NORTH CAROLINA NATURAL HERITAGE PROGRAM ELEMENT LIST

scientific and common name	state stat	fed stat	state rank	glob rank
ETHEOSTOMA COLLIS CAROLINA DARTER	SC		S3	G3
MESIC MIXED HARDWOODS FOREST, PIEDMONT SUBTYPE			S4	G??
AMORPHA SCHWERINII SCHWERIN'S AMORPHA	PP		S2	G2G
LOTUS PURSHIANUS VAR HELLERI HELLER'S TREFOIL	SR		S2	G4G
PLANTAGO CORDATA HEART-LEAF PLANTAIN	E	C2	S1	G3
PORTERANTHUS STIPULATUS INDIAN PHYSIC	SR		S2	G5

NORTH CAROLINA NATURAL HERITAGE PROGRAM ELEMENT LIST

scientific and common name	state stat	fed stat	state rank	glob rank
HEMIDACTYLIUM SCUTATUM FOUR-TOED SALAMANDER	SC		S3	G5
NOTROPIS MEKISTOCHOLAS CAPE FEAR SHINER	T	LE	S1	G1
CHESTNUT OAK--SCARLET OAK FOREST			S4	G5
DRY OAK--HICKORY FOREST			S5	G5
DRY-MESIC OAK--HICKORY FOREST			S5	G5
MESIC MIXED HARDWOODS FOREST, PIEDMONT SUBTYPE			S4	G5T
MONADNOCK				
ELLIPTIO LANCEOLATA YELLOW LANCE	SC			G4
VILLOSA CONSTRICTA NOTCHED RAINBOW	SC			G3
AMORPHA SCHWERINII SCHWERIN'S AMORPHA	PP		S2	G2G
DENTARIA MULTIFIDA DIVIDED TOOTHWORT	SR		S1	G5Q

EXPLANATION OF SPECIES STATUS CODES

The attached output from the N.C. Natural Heritage Program database is a listing of the elements (rare species, geologic features, natural communities, special animal habitats) known to occur in your geographic area of interest. Following is an explanation of the four columns of status codes on the righthand side of the printout.

STATE STATUS

Plants:

From Sutter, R.D., L. Mansberg, and J.H. Moore. 1983. Endangered, threatened, and rare plant species of North Carolina: a revised list. ASB Bulletin 30:153-163, and updated lists of the Natural Heritage and Plant Conservation Programs.

E = Endangered
T = Threatened
SC = Special Concern
PP = Primary Proposed
SR = Significantly Rare

E,T,and SC species are protected by state law (the Plant Protection and Conservation Act, 1979); the other two categories indicate rarity and the need for population monitoring, as determined by the Plant Conservation and Natural Heritage Programs.

Animals:

From Cooper, J.E., S.S. Robinson, and J.B. Funderburg (Eds.). 1977. Endangered and Threatened Plants and Animals of North Carolina. N.C. Museum of Natural History, Raleigh, NC. 444 pages + i-xvi, and updated lists of the Natural Heritage Program.

E = Endangered
T = Threatened
SR = Significantly Rare
SC = Special Concern
UNK= Undetermined
EX = Extirpated

FEDERAL STATUS

From Endangered & Threatened Wildlife and Plants, April 10, 1987. 50 CFR 17.11 & 17.12. Department of Interior. Established by the Endangered Species Act of 1973, as amended.

E = Taxa currently listed as Endangered
T = Taxa currently listed as Threatened
PE = Taxa currently proposed for listing as Endangered
PT = Taxa currently proposed for listing as Threatened

Taxa under review for possible listing ("candidate species"):

C1 = Taxa with sufficient information to support listing
C2 = Taxa without sufficient information to support listing

GLOBAL RANK (STATE RANK)

The Nature Conservancy's system of measuring rarity and threat status. "Global" refers to worldwide, "State" to statewide.

G1 = Critically imperiled globally because of extreme rarity or otherwise very vulnerable to exinction throughout its range.

G2 = Imperiled globally because of rarity or otherwise vulnerable to extinction throughout its range.

G3 = Either very rare and local throughout its range, or found locally in a restricted area.

G4 = Apparently secure globally, though it may be quite rare in parts of its range (especially at the periphery).

G5 = Demonstrably secure globally, though it may be quite rare in parts of its range (especially at the periphery).

GU = Possibly in peril but status uncertain; need more information.

GX = Believed to be extinct throughout range.

Q = a suffix attached to the Global Rank indicating questionable taxonomic status.

T_ = an additional status for the subspecies or variety; the G rank then refers only to the species as a whole.

State rank codes follow the same definitions, except substitute the words, "in the state," for "globally" or "throughout its range."

COVERAGE

STATE	COUNTY	STATE NAME	COUNTY NAME
37	57	North Carolina	Davidson Co
37	67	North Carolina	Forsyth Co
37	81	North Carolina	Guilford Co
37	151	North Carolina	Randolph Co

CENTER POINT AT STATE : 37 North Carolina
COUNTY : 81 Guilford Co

Press RETURN key to continue...

REGION OF THE COUNTRY

Zipcode found: 27261 at a distance of 2.5 Km

STATE	CITY NAME	FIPSCODE	LATITUDE	LONGITUDE
NC	HIGH POINT	37081	35.9533	80.0050

Press RETURN key to continue ...

CENSUS DATA

Valspar Corp.
LATITUDE 35:56:45 LONGITUDE 79:58:43 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	1125	4483	4691	5134	15433
S 2	0	0	0	3845	515	0	4360
S 3	0	0	0	2332	0	0	2332
S 4	0	0	0	2213	1664	0	3877
S 5	0	0	0	1464	2570	587	4621
S 6	0	701	0	1208	526	3402	5837
S 7	0	0	775	3147	5381	3517	12820
S 8	0	570	1540	3775	7375	5814	19074
RING TOTALS	0	1271	3440	22467	22722	18454	68354

Press RETURN key to continue ...

STAR STATION

INDEX NUMBER	STATION NAME	LATITUDE DEGREE	LONGITUDE DEGREE	PERIOD OF RECORD	STABILITY CLASSES	DISTANCE (km)
13723	GREENSBORO/GSO-HI NC	36.0833	79.9500			6 15.49
93807	WINSTON SALEM/S REYN	36.1333	80.2333			6 30.74
13728	DANVILLE VA	36.5667	79.3333			6 90.00
13722	RALEIGH/RALEIGH-DURH	35.8667	78.7833			6107.92
13231	CHARLOTTE/DOUGLAS NC	35.2167	80.9333			6118.33
13714	FT BRAGG/POPE/FAYETT	35.1667	79.0167			6123.68
13968	PULASKI/NEW RIVER VA	37.1333	80.6833			6136.1[illegible]

Press RETURN key to continue ...

U.S. SOIL DATA

STATE : NORTH CAROLINA

LATITUDE : 35:56:45 LONGITUDE : 79:58:43
THE STATION IS INSIDE H.U. 3030003

GROUND WATER ZONE	:	8		
RUNOFF SOIL TYPE	:	2		
EROSION	:	1.1950E-03		CM/MONTH
DEPTH TO GROUND WATER BETWEEN	:	3.0000E+02 AND	1.0000E+03	
FIELD CAPACITY FOR TOP SOIL	:	7.2000E-02		
EFFECTIVE POROSITY BETWEEN	:	1.0000E-02 AND	1.0000E-01	
SEEPAGE TO GROUNDWATER BETWEEN	:	4.6330E+02 AND	9.2660E+02	CM/MONTH
DISTANCE TO DRINKING WELL	:	2.0000E+04		CM

Press RETURN key to continue ...

U.S. CITY

STATE	PLACE NAME	FIPSCODE	LATITUDE	LONGITUDE
NC	HIGH POINT	37081	35.9423	80.0030

Press RETURN key to continue ...

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>

Enter an option number or a procedure name (in parentheses)
or a command: HELP, HELP option, BACK, CLEAR, EXIT, TUTOR
GEMS>

```
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
 WRT          logged out at 26-JUN-1990 10:06:22.44
 Itemized resource charges, for this session, follow:

NODE: VAXTM1
ACCT: NTIS                                START TIME:     26-JUN-1990 10:01:31.35
PROJ: NTISNUCN                            FINISH TIME:    26-JUN-1990 10:06:22.44
USER: WRT                                 BILLING PERIOD:900601
UIC:  [000750,000112]                     WEEKDAY:        TUESDAY
BAUD:                                     TERMINAL PORT:  VTA1748

DESCRIPTION OF CHARGE                     QUANTITY                EXPENDITURE
-------------------------------------------------------------------------------

  ALL CHARGE LEVELS
    300  baud            (Seconds)          291                       0.7275
    CPU TIME             (Seconds)            7                       0.4628
                                                                   -----------
    TOTAL FOR THIS SESSION                                    $      1.1903
NODE 3157  HOST 1038: DROPPED BY HOST
please log in: X

password:
```

TAR RIVER (GRANVILLE) AQUATIC HABITAT

COUNTYNAME: NCGRAN
QUADNAME: MORIAH, BEREA, STEM, WILTON
DIRECTIONS: THE ENTIRE STRETCH OF THE TAR RIVER IN GRANVILLE COUNTY

OWNER: NC PUBLIC WATERS
SITEDESC:
ONE OF ONLY TWO KNOWN SITES IN NC FOR THE FEDERALLY ENDANGERED HARPERELLA (PTILIMNIUM NODOSUM) IS LOCATED ALONG THE RIVER IN SHOALS IN THE CENTRAL PART OF THE COUNTY. SEVERAL SITES FOR DWARF WEDGE MUSSEL, A FEDERAL CANDIDATE SPECIES, ARE ALSO PRESENT. OTHER RARE ANIMALS ARE ROANOKE BASS, NEUSE RIVER WATERDOG.
SIZE: 0 PRIORITY: A
RANKCOMM: RARE PLANT SPECIES, RARE ANIMAL SPECIES

PROTSTAT: NO PROTECTION STATUS

UMSTEAD HOSPITAL PINE-OAK FOREST

COUNTYNAME: NCGRAN
QUADNAME: LAKE MICHIE
DIRECTIONS: IN BUTNER MIDWAY BETWEEN UMSTEAD HOSPITAL AND FEDERAL PRISON
0.7 MI. SO. OF JCT. SR 1120 AND SR 1004
OWNER: NC DEPT. AGR.
SITEDESC:
ADJACENT TO COE KNAP OF REEDS DIABASE AREA (TO WEST). NUMEROUS RARE HERBACEOUS PLANT IN FOREST OPENINGS INCL. PRAIRIE DOCK, SMOOTH CONEFLOWER, EARLE'S BLAZING STAR, HOARY PUCCOON, NESTRONIA, AND OTHER UNCOMMON PLANTS. GENERALLY ASSOC. WITH BASIC OR CIRCUMNEUTRAL SOILS. MIDDLE-AGED MONTMORILLONITE PINE-OAK FOREST TYPE
SIZE: 32 PRIORITY: B
RANKCOMM: RARE PLANT SPECIES, NATURAL COMMUNITY

PROTSTAT: NO FORMAL PROTECTION STATUS

JAMESTOWN MEANDER SCARS

COUNTYNAME: NCGUIL
QUADNAME: HIGH POINT EAST
DIRECTIONS: 2 MI SE OF JAMESTOWN, APPROX. 0.5 MI SE OF I-85 WHERE IT CROSSES THE DEEP RIVER; ON E SIDE OF RIVER
OWNER: PRIVATE
SITEDESC:
SMALL STREAM VALLEY CONTAINS EXCEPTIONAL EXAMPLES OF MEANDER SCARS AND FEATURES OF PROCESSES BY WHICH MEANDER PLAINS AND VALLEY WALLS ARE SHAPED. IN 2000 FT STRETCH OF DEEP RIVER FIND SUCH FLUVIAL LANDFORMS AS ARCUATE MEANDER SCARS, AND CUT SLOPES THROUGH DENUDATIONAL PROCESS, INGROWN MEANDERS.
SIZE: 45 PRIORITY: C
RANKCOMM: GEOMORPHIC LANDFORMS

PROTSTAT: NO PROTECTION STATUS

US 264 LOW POCOSIN (FLOATING PEAT BOG)

COUNTYNAME: NCDARE
QUADNAME: ENGELHARD NE & NW, LONG SHOAL
DIRECTIONS: ALONG US 264 FROM STUMPY POINT FIRE TOWER TO DARE/HYDE CO. LINE
OWNER: FIRST COLONY FARMS, INC. AND DEPT. OF DEFENSE-DARE BOMBING R
SITEDESC:
EASTERN SEGMENT OF WIDE BAND OF VARIOUS WETLANDS EXTENDING ACROSS SOUTHERN DARE PENINSULA. EXCEPTIONALLY WET POCOSIN IN PLACES RESEMBLES FRESHWATER MARSH AND UNIQUE IN DEVELOPMENTAL HISTORY. NEVER COVERED BY SWAMP FOREST. LOW SHRUB BOG MAINTAINED ITS VEGETATION TYPE FOR 3000-5000 YEARS. ELEVATION UNDER 5 FT MSL.
SIZE: 21000 PRIORITY: A
RANKCOMM: EXEMPLARY NATURAL COMMUNITY, GEOMORPHIC LANDFORM

PROTSTAT: RHA (PARTIAL). INTERIOR PORTION IN DOD DARE BOMBING RANGE PART OF REGISTERED NATURAL AREA. MAJORITY UNPROTECTED.

BEAVERDAM CREEK/GRASSY FORK HEARTLEAF PLAINTAIN S.

COUNTYNAME: NCDAVD
QUADNAME: DENTON
DIRECTIONS: ALONG BEAVERDAM CREEK ABOVE & BELOW ROAD CROSSING OF NC 49. APPROX. 0.8 MI SW OF JCT OF NC 49 AND NC 109
OWNER: PRIVATE (SOME JACOB'S CREEK STONE CO., INC.)
SITEDESC:
LARGEST KNOWN NC POPULATION OF ENDANGERED PLANT--PLANTAGO CORDATA (HEART-LEAFE PLANTAIN). GROWS PARTIALLY SUBMERGED ON GRAVEL BARS IN SMALL STREAM OF YADKIN RIVER BASIN AND ALSO ON BANKS OF THE SLATE-BOTTOMED STREAM. 1500-2000 PLANTS I CLUMPED POPULATIONS. CANOPY OF MIXED HARDWOODS. SLATE BELT REGION.
SIZE: 175 PRIORITY: B
RANKCOMM: ENDANGERED PLANT SPECIES

PROTSTAT: RHA (PARTIAL). STONE CO. PROPERTY REGISTERED NATURAL AREA. TNC MANAGEMENT AGREEMENT WITH 2 OWNERS. REST UNPROTECTED.

BOONE'S CAVE NATURAL AREA

COUNTYNAME: NCDAVD
QUADNAME: CHURCHLAND
DIRECTIONS: IN BOONE'S CAVE STATE PARK ON THE EASTERN SIDE OF YADKIN RIVER, ENTRANCE FROM SR 1167
OWNER: NCDNRCD-BOONES CAVE SP
SITEDESC:
BOONE'S CAVE IS AN 80-FOOT LONG NATURAL CREVICE AT THE BASE OF A STEEP BLUFF ALONG THE YADKIN RIVER. THE PARK CONTAINS GOOD QUALITY EXAMPLES OF MESIC MIXED HARDWOOD FOREST AND DRY-MEXIC OAK--HICORY FOREST. MANY PLANT SPECIES TYPICAL O THE MOUNTAIN REGION.
SIZE: 42 PRIORITY: C
RANKCOMM: NATURAL COMMUNITIES

PROTSTAT: RHA. REGISTERED NATURAL HERITAGE AREA.

FLAT SWAMP CREEK HEARTLEAF PLANTAIN SITE

COUNTYNAME: NCDAVD
QUADNAME: GRIST MOUNTAIN
DIRECTIONS: A SMALL SLATE-BOTTOMED TRIBUTARY TO FLAT SWAMP CREEK, 2.8 MILES NW OF SNYDER ON NC 47.
OWNER: PRIVATE
SITEDESC:
LARGE POPULATION (1000+ INDIVIDUALS) OF STATE ENDANGERED PLANTAGO CORDATA GROW IN A SMALL SLATE-BOTTOMED TRIBUTARY OF FLAT SWAMP CREEK.

SIZE: 0 PRIORITY: B
RANKCOMM: ENDANGERED PLANT SPECIES

PROTSTAT: UNPROTECTED

COOLEEMEE PLANTATION ORBICULAR DIORITE AREA

COUNTYNAME: NCDAVY
QUADNAME: CHURCHLAND
DIRECTIONS: SOUTH OF US 64, 1.3 MI W OF WESTERN END OF BRIDGE OVER YADKIN RIVER
OWNER: PETER HAIRSTON, III
SITEDESC:
ONLY KNOWN OCCURRENCE IN NORTH AMERICA OF UNUSUAL ROCK TYPE. SPECTACULAR TEXTL AND COLOR IN ROCK. DARK GREEN HORNBLENDE AND PYROXENE FORM SPHEROIDAL MASSES WHICH ELONGATE CRYSTALS RADIATE.

SIZE: 40 PRIORITY: A
RANKCOMM: GEOLOGIC FEATURE

PROTSTAT: RHA. REGISTERED NATURAL AREA

COOLEEMEE PLANTATION-YADKIN RIVER SLOPES

COUNTYNAME: NCDAVY
QUADNAME: CHURCHLAND
DIRECTIONS: 1.4 MI ON US 64 W OF YADKIN RIVER, LEFT ON CR 1812 FOR 0.7MI TO END OF ROAD, THROUGH WOODS, FIELD, RAVINE TO RIDGE
OWNER: PETER HAIRSTON
SITEDESC:
A PROMINENT SE-RUNNING RIDGE WITH STEEP SLOPES; YADKIN RIVER FORMS S BOUNDARY. MATURING TO MATURE UPLAND OAK-HICKORY FORESTS. UNUSUAL RIDGETOP BEECH/WHITE OR RED MAPLE FOREST. MESIC MIXED HARDWOODS, DRY-MESIC OAK-HICKORY, AND PIEDMONT/ MOUNTAIN ALLUVIAL FOREST COMMUNITIES.
SIZE: 120 PRIORITY: C
RANKCOMM: NATURAL COMMUNITIES

PROTSTAT: OWNER DECLINED TO REGISTER

TRYON PEAK NATURAL AREA

COUNTYNAME: NCPOLK
QUADNAME: MILL SPRING
DIRECTIONS: BETWEEN MILLER MOUNTAIN AND WHITE OAK MOUNTAIN

OWNER: ?
SITEDESC:
UNIQUE AREA CONSISTS OF RICH WHITE OAK WOODS WITH SCATTERED CHESTNUT OAKS AND CEDARS ALONG THE EDGE OF ROCK OUTCROPS. BASIC SOILS ON THE PEAK: HENDERSON GNEISS ON THE CLIFF. THREE SPECIAL STATUS PLANTS PRESENT HERE: BILTMORE SEDGE (PP), DIVIDED-LEAF RAGWORT (T), AND ALLEGHANY CLIFF FERN (SR).
SIZE: 100 PRIORITY: B
RANKCOMM: RARE PLANT SPECIES, NATURAL COMMUNITIES

PROTSTAT: NO PROTECTION STATUS

WHITE OAK MOUNTAIN

COUNTYNAME: NCPOLK
QUADNAME: MILL SPRING
DIRECTIONS: N-NW OF COLUMBUS; ACCESS VIA SR 1136

OWNER: PRIVATE
SITEDESC:
MOUNTAIN PEAK & CONNECTING RIDGE. TYPE LOCALITY FOR THE STATE ENDANGERED. POSSIBLY EXTINCT, PLANT BIGLEAF SCURFPEA (PSORALEA MACROPHYLLA), WHICH HAS NOT BEEN SEEN SINCE 1897. OTHER RARE PLANTS INCLUDE REFLEXED BLUE-EYED GRASS (PP). DIVIDED-LEAF RAGWORT (T), AND BROADLEAVED COREOPSIS (T).
SIZE: 0 PRIORITY: B
RANKCOMM: RARE PLANT SPECIES

PROTSTAT: NO PROTECTION STATUS

BIRKHEAD UPLAND FOREST NATURAL AREA

COUNTYNAME: NCRAND
QUADNAME: ELEAZER, FARMER
DIRECTIONS: EAST OF SR 1107

OWNER: USFS-UWHARRIE NF
SITEDESC:
MATURE, OLD GROWTH HARDWOOD FOREST ENCOMPASSING A VARIETY OF CHARACTERISTIC PIEDMONT UPLAND COMMUNITIES GRADING FROM XERIC ROCK CHESTNUT OAK-POST OAK STANI ON RIDGE TOPS TO MESIC-MIXED HARDWOOD STANDS ON SLOPES WITH A MT. LAUREL THICKE UNDERSTORY ALONG SMALL CREEKS.
SIZE: 1300 PRIORITY: B
RANKCOMM: NATURAL COMMUNITIES

PROTSTAT: RHA. REGISTERED NATURAL AREA.
EWA. NAT'L WILDERNESS AREA.

EXPLANATION OF NC NATURAL HERITAGE PROGRAM DATABASE OUTPUT

Probably the most important database kept by the N.C. Natural Heritage Program is the one that tracks occurrences of elements of natural diversity (rare animals, rare plants, geologic features, special animal habitats). The output (printout) you have received is a subset of this very large database. Each record (an occurrence) is printed out in a particular format, the structure of which is explained below.

EOCODE: Internal coding for the element occurrence. The first letter indicates the kind of element:

A=vertebrate animal	N=nonvascular plant
G=geologic feature	P=vascular plant
I=invertebrate animal	S=special animal habitat

For vertebrates, the second letter indicates the order (taxonomic), with A=amphibians, B=birds, F=fish, etc. For vascular plants, the second letter indicates whether the plant is a monocot (M), dicot (D), pteridophyte (P), or gymnosperm (G). For nonvascular plants, the second letter indicates whether the plant is a bryophyte (B) or lichen (L).

The last 3 digits, following the decimal point, are the number of that occurrence of the species in the database. For plants, numbers with an H are occurrences reported from before 1935 which have not been found since. In some cases, H has also been used to indicate very vague records, or populations known to have been extirpated.

NAME: Scientific name of the element.

COMNAME: Common name of the element.

FEDSTAT: Federal status of the species, from Endangered & Threatened Wildlife and Plants, April 10, 1987. 50 CFR 17.11 & 17.12. Department of Interior. Established by the Endangered Species Act of 1973, as amended.

LE = Taxa currently listed as Endangered
LT = Taxa currently listed as Threatened
PE = Taxa currently proposed for listing as Endangered
PT = Taxa currently proposed for listing as Threatened
Taxa under review for possible listing ("candidate species"):
C1 = Taxa with sufficient information to support listing
C2 = Taxa without sufficient information to support listing

STATESTAT: Status of the species in North Carolina. For plants, from Sutter, R.D., L. Mansberg, and J.H. Moore. 1983. Endangered, threatened, and rare plant species of North Carolina: a revised

list. ASB Bulletin 30:153-163, and updated lists of the Natural Heritage and Plant Conservation Programs.

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SR = Significantly Rare

E,T,and SC species are protected by state law (the Plant Protection ar Conservation Act, 1979); the other two categories indicate rarity and the need for population monitoring, as determined by the Plant Conser tion and Natural Heritage Programs.

For animals, from Cooper, J.E., S.S. Robinson, and J.B. Funderbu (Eds.). 1977. Endangered and Threatened Plants and Animals of North Carolina. N.C. Museum of Natural History, Raleigh, NC. 444 pages + i-xvi.

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EX = Extirpated

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G4 = Apparently secure globally, though it may be quite rare in parts of its range (especially at the periphery).
G5 = Demonstrably secure globally, though it may be quite rare parts of its range (especially at the periphery).
GU = Possibly in peril but status uncertain; need more informat
GX = Believed to be extinct throughout range.
Q = a suffix attached to the Global Rank indicating questionab taxonomic status.
T_ = an additional status for the subspecies or variety; the G then refers only to the species as a whole.

SRANK: Nature Conservancy state rank. Coding similar to global ranks.

COUNTYNAME: Acronym for the county. In general, this is the first four letters of the county name.

QUADNAME: USGS quad map name, at 7.5 minute scale when available.

PRECISION: The precision with which the location can be mapped from the available information: S=seconds (hundreds of feet), M=minutes (up to 1.5 mile radius), G=general (to a place name only, or up to 5 mile radius).

LAT, LONG: Latitude and Longitude coordinates for the center of the occurrence.

LASTOBS: Year, month, and day the element was last observed.

DIRECTIONS: How to find the site.

GENDESC: General description. A word picture of the site, describing the habitat.

ELEV, SIZE: Elevation and size of the occurrence.

EODATA: Information on number, size, condition, and other relevant information on the element occurrence.

COMMENTS: Additional information on the occurrence, the site, or sources of information.

SITENAME: Name of the site as standardized by the Natural Heritage Program for internal use. Many sites do not have a name.

OWNER: Name of owner of the site (some abbreviations used).

SPECSTAT: Codes indicating special status of the site.

AEC=Area of Environmental Concern
DED=Dedicated State Nature Preserve
ESN=National Estuarine Sanctuary
EWA=Established Wilderness Area
EAN=Conservation Easement
NNL=National Natural Landmark
NPK=National Park
NPY=National Parkway
NSH=National Seashore
RHA=Registered Natural Heritage Area
RNA=Research Natural Area (USFS)
SPK=State Park (incl. State Natural Areas)
ORW=Outstanding Resource Water
WSR=Wild and Scenic River
...and a few others, infrequently used

OWNERCOM: Comments on ownership.

PROTCOMM: Comments on need for additional protection for the element.

MGMTCOMM: Comments on need for management of the site for the element.

SOURCE: Best source of information on the element occurrence.