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Site Name (Subject):	TREND LINE FURNITURE CORP.
Site ID (Document ID):	NCD081332991
Document Name (DocType):	Contractor Report (CONTR)
Report Segment:	
Description:	FIT Screening Site Inspection, Phase I
Date of Document:	1/8/1990
Date Received:	
Box: *Enter SF and # with no spaces*	SF10,633
Access Level:	PUBLIC
Division:	WASTE MANAGEMENT
Section:	SUPERFUND
Program (Document Group):	SERB (SERB)
Document Category:	FACILITY

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

SISB/SAS RECEIVED JAN 09 1990 EPA - REGION IV ATLANTA, GA.

RECEIVED JAN 22 1990 SUPERFUND SECTION

C-586-1-0-23

January 8, 1990

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

Date: 1/18/90
Site Disposition: NFRAP
EPA Project Manager: K. Cain

Subject: Screening Site Inspection, Phase I FIT
Trend Line Furniture Corporation
Conover, Catawba County, North Carolina
EPA ID No. NCD081332991
TDD No. F4-8909-54

CERCLA

Dear Mr. Hanke:

FIT 4 conducted a Phase I Screening Site Inspection at Trend Line Furniture Corporation in Conover, Catawba County, North Carolina. This assessment included a review of EPA and state file material, completion of a target survey and an offsite reconnaissance of the facility and surrounding area.

Trend Line Furniture was originally constructed in 1956 with additions built in 1963 and 1978. The facility was operated by Wilford Sigmond Company until 1967 and then was sold to the Stanley Division of Mead Corporation. Stanley Division operated the facility under the name of Trend Line Furniture Corporation until 1972 or 1973. Mohasca Corporation purchased the facility in 1972 or 1973 and is presently continuing the operation under the name Trend Line Furniture Corporation (Ref. 1).

Trend Line Furniture Corporation in Conover manufactures chairs, love seats, and sofas. The waste generated at this facility included cotton, felt, foam rubber, paper and solid sludge. A liquid sludge or non-flammable solid was generated from lacquer and stain-spray booths, and the sludge was dewatered by heating until it was solid. This solid sludge was then transported and disposed of at the Catawba County Landfill. In 1977 or 1978, Trend Line Furniture Corporation began to use a different stain and lacquer that could not be dewatered into solid form. Instead, it could only be dewatered to a heavy syrup consistency, which the Catawba County Landfill would not accept. So, at that time, Trend Line Furniture Corporation began to send the liquid sludge to Caldwell Chemical System in Lenoir, North Carolina. The facility generates about 7 to 8 barrels of the sludge waste (or 385 to 440 gallons) per year (Ref. 1).

Trend Line Furniture Corporation had two underground fuel oil storage tanks, with storage capacities of 5,000 gallons and 10,000 gallons, respectively. In 1985, the 10,000-gallon storage tank was found to be leaking at a rate of 0.2 gal/hour and Trend Line Furniture Corporation planned to refiberglass the tank (Ref. 1, 2). Trend Line Furniture Corporation is a conditionally exempt small quantity generator (Ref. 3). The facility did not file as a RCRA Part A application (Ref. 4).

The Trendline Furniture facility is located in the Piedmont Physiographic Province in the western-central portion of North Carolina (Ref. 5, p. 19). The topography is characterized as gently rolling hills, with elevations within a 4-mile radius of the facility ranging from 850 to 1150 feet above sea level (Ref. 6). Net annual precipitation is approximately 9 inches. The 1-year, 24-hour rainfall is approximately 3 inches (Ref. 7).

The facility is situated in the Inner Piedmont Belt. The dominant rock types in the area of the facility are biotite gneiss, hornblende gneiss, and schist (Refs. 8, p. 29; 9). These fractured, crystalline rocks are overlain by a layer of residual soil and saprolite called regolith. The thickness of the regolith ranges from as much as 150 feet in draws and valleys to several feet or less on hilltops (Ref. 10, p. 8). The saturated portion of the regolith and the fractures in the crystalline rocks are hydraulically connected and together comprise the crystalline rock aquifer. It is an unconfined aquifer; however, confined conditions may occur in the deeper fractures (Ref. 11, pp. 30-32). Recharge to the crystalline rock aquifer results from the infiltration of rainfall into the regolith and fractures (Ref. 11, p. 30).

The depth to the water table on slopes and flats in the Piedmont Physiographic Province of North Carolina is approximately 29 feet below land surface (bls) (Ref. 5, p. 30). Water in the deep fractures rarely exceeds a depth of 300-400 feet (bls). The average depth of drilled wells in the gneissic rocks in the Conover area is approximately 205 feet bls while the average yield may range from 23 to 29 gallons per minute (Ref. 7, p. 18). Hydraulic conductivity values in the crystalline rock aquifer generally range from 1×10^{-11} to 1×10^{-7} cm/sec (Ref. 12, p. 29).

The water systems that provide potable water to most of the 4-mile radius are the cities of Hickory, Newton and Conover (Refs. 6, 13). The Hickory water system's source is the Catawba River, and its intake would not be affected by runoff from the facility. The Conover water system purchases its water from the Hickory water system. The Newton water system has intakes on Jacob's Fork and would not be affected by runoff from the facility (Ref. 14). Areas not served by these water systems are assumed to use private wells for water supply. Based on a topographic house count and a drive-by house-to-house survey, there are 150 homes using well water within the 3-mile radius and 500 homes using well water within the 4-mile radius. The nearest home using well water was located 6,500 feet due south of the facility (Ref. 13).

Surface water runoff from the facility flows southwest overland for 300 feet into an intermittent branch before flowing 2,000 feet south into Cline Creek. Cline Creek flows 13,000 feet south into Clark Creek, which flows south for 15 miles; this creek is not used for fishing or swimming over its 15-mile migration route (Refs. 6, 13). There are apparently no critical habitats or sensitive environments within 15 stream miles of the site or its 4-mile radius, but the dwarf-flowered heartleaf is found in Catawba County and is an endangered plant in North Carolina (Refs. 15, 16).

A site reconnaissance was conducted on October 16, 1989. The facility is located in a slightly industrial and residential area. The entire production area of the site was fenced. The nearest residence is approximately 500 feet southeast of the facility (Ref. 6).

Based on the results of this evaluation and the attached reference material, FIT 4 recommends that no further remedial action be planned for Trend Line Furniture Corporation. Please contact me at NUS Corporation if you have any questions about this site.

Very truly yours,

Prince L. Goins

Prince L. Goins
Project Manager

Approved:

Greg Schank

PLG/kw

Enclosures

cc: Kelly Cain

REFERENCES

1. Jack Butler, Engineer, Solid Hazardous Waste Management Branch, telephone conversation with Clyde Beal, Trend Line Furniture Corporation, Conover Plant, December 5, 1985. Subject: Trendline Furniture plant in Conover.

2. Jack Butler, Engineer, Solid Hazardous Waste Management Branch, Raleigh, North Carolina, letter to Lee Layman, Head, Division of Environmental Management, December 5, 1985. Subject: Leaking underground storage tank at Trend Line Furniture Corporation; Conover, North Carolina.

3. North Carolina Department of Human Resources, Solid and Hazardous Waste Management, Alphabetic List of Hazardous Waste Facilities; printout dated August 10, 1989, p. 229.

4. Jim Edwards, Compliance Officer, NCDHR. Hazardous Waste Programs, telephone conversation with Prince L. Goins, NUS Corporation, December 28, 1989. Subject: Part A application for RCRA.

5. 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, U.S. Geological Survey Water Resources Investigation Report 86-4132, pp. 19, 30.

6. U.S. Geological Survey, 7.5 minute series Topographic Maps of North Carolina: Granite Falls (1970), Bethlehem (1970), Longview (1970), Hickory (1970), Millersville (1970), and Newton (1970). Scale 1:24,000.

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

8. Harry E. LeGrand, Geology and Groundwater in the Statesville Area, Bulletin No. 68, U.S. Geological Survey (Washington, D.C.: GPO, 1954), pp. 18, 29, Figures 11, 12.

9. Philip M. Brown and John M. Parker III, compilers, Geologic Map of North Carolina, North Carolina Department of Natural Resources and Community Development (1985), scale 1:500,000.

10. Harry E. LeGrand, Groundwater of the Piedmont and Blue Ridge Provinces in the Southeastern States, Circular 538, (Washington, D.C.: GPO, U.S. Geological Survey, 1967), pp. 1-11.

11. Henry Trapp, Jr., Geology and Groundwater of the Asheville Area, North Carolina Groundwater Bulletin No. 16, (Raleigh, North Carolina, 1970), pp. 30-32.

12. R. A. Freeze and J. A. Cherry, Groundwater, (Engelwood Cliffs, New Jersey: Prentice-Hall, Inc., 1979), p. 29.

13. NUS Corporation Field Logbook No. F4-1741 for Trend Line Furniture Corporation, TDD No. F4-8909-54. Documentation of offsite facility reconnaissance, October 16, 1989.

14. Gene Haynes, Public Utilities Superintendent, city of Hickory, North Carolina, telephone conversation with Stephen Modica, NUS Corporation, March 1, 1989. Subject: Water distribution in Hickory area.

15. James Borawa, North Carolina Fisheries Department, Asheville, North Carolina, telephone conversation with Clifford Leonard, NUS Corporation, October 20, 1989. Subject: South River and Clarks Creek water use.

16. North Carolina Natural Heritage Program Element List, Catawba County, printout date June 21, 1989, p. 1.

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	D081332991

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common or descriptive name of site)	Trend Line Furniture Corporation
02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER	4th Street Place S.W.
03 CITY	Conover
04 STATE	NC
05 ZIP CODE	28613
06 COUNTY	Catawba
07 COUNTY CODE	35
08 CONG DIST	10
09 COORDINATES LATITUDE	35 42 40.0
LONGITUDE	081 13 40.0
10 TYPE OF OWNERSHIP (Check one)	☐ A. PRIVATE ☐ B. FEDERAL ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL ☐ F. OTHER ☐ G. UNKNOWN

III. INSPECTION INFORMATION

01 DATE OF INSPECTION (MONTH DAY YEAR)	10 16 89
02 SITE STATUS	☒ ACTIVE ☐ INACTIVE
03 YEARS OF OPERATION	1956 (BEGINNING YEAR) / (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
Prince L. Goins	Chemist	NUS Corporation	(404) 938-7710

09 OTHER INSPECTORS	10 TITLE	11 ORGANIZATION	12 TELEPHONE NO.
Eric Corbin	Environmental Scientist	NUS Corporation	(404) 938-7710
Clifford Leonard Jr.	Geologist	NUS Corporation	(404) 938-7710
			( )
Off-Site Reconnaissance			( )
			( )

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	18:00	75° and no rain

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO.
Kelly Cain	E.P.A.	(404) 347-5065

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE (MONTH DAY YEAR)
Prince L. Goins	EPA	NUS Corporation	(404) 938-7710	10-16-89

EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	D088332991

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 ______
- NO. OF DRUMS 7 or 8 drums/yr.

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	440	gallons	the sludge was was calc. (55×8)
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
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) N/A

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) N/A

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)

File material

EPA

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

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NC	D081332991

II. HAZARDOUS CONDITIONS AND INCIDENTS ~~N/A~~

01 ✓ A. GROUNDWATER CONTAMINATION — 02 ☐ OBSERVED (DATE: ______) ☒ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

Ground Water leaking underground tank (Fuel oil)

01 ☒ B. SURFACE WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: ______) ☒ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

soil contamination, leaking underground tank (Fuel oil.).

01 ☐ C. CONTAMINATION OF AIR — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

N/A

01 ☐ D. FIRE EXPLOSIVE CONDITIONS — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

N/A

01 ☐ E. DIRECT CONTACT — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

N/A

01 ☐ F. CONTAMINATION OF SOIL — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: ______ (Acres) 04 NARRATIVE DESCRIPTION

N/A

01 ☐ G. DRINKING WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

N/A

01 ☐ H. WORKER EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

N/A

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

N/A

EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	D081332991

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued) N/A

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include name(s) of species)

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES (Spills, Runoff, Standing liquids, Leaking drums) — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

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)

EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	D081332991

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				
☐ C. AIR				
☐ D. RCRA				
☐ E. RCRA INTERIM STATUS				
☐ F. SPCC PLAN				
☐ G. STATE (Specify)				
☐ H. LOCAL (Specify)				
☑ I. OTHER (Specify)	~~unknown~~			~~conditionally exempt generator~~
☐ 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	5,000 and 10,000	gallons
☐ 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

________ 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.

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE: ☐ YES ☒ NO

02 COMMENTS

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

File material state + EPA

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: NC
02 SITE NUMBER: D081332991

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as applicable)

	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 N/A
A. ______ (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 ______

03 DISTANCE TO NEAREST DRINKING WATER WELL ______ (mi)

04 DEPTH TO GROUNDWATER 29 (ft)

05 DIRECTION OF GROUNDWATER FLOW ______

06 DEPTH TO AQUIFER OF CONCERN 29 (ft)

07 POTENTIAL YIELD OF AQUIFER ______ (gpd)

08 SOLE SOURCE AQUIFER ☐ YES ☒ NO

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

10 RECHARGE AREA
☐ YES
☒ NO
COMMENTS

11 DISCHARGE AREA
☐ YES
☒ NO
COMMENTS

IV. SURFACE WATER

01 SURFACE WATER USE (Check one)
☐ A. RESERVOIR, RECREATION DRINKING WATER SOURCE
☐ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES
☐ C. COMMERCIAL, INDUSTRIAL
☒ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

NAME:	AFFECTED	DISTANCE TO SITE
Cline Creek	☐	2.5 (mi)
	☐	(mi)
	☐	(mi)

V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN
ONE (1) MILE OF SITE: A. Est. 750 NO. OF PERSONS
TWO (2) MILES OF SITE: B. Est. 7100 NO. OF PERSONS
THREE (3) MILES OF SITE: Est. C. >150 NO. OF PERSONS

02 DISTANCE TO NEAREST POPULATION 6,500 feet ~~(mi)~~

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE Est. 75

04 DISTANCE TO NEAREST OFF-SITE BUILDING ______ (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)

In the site vicinity their a slight industrial and residential area.

EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	D081332991

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 ________ (ft)

04 DEPTH OF CONTAMINATED SOIL ZONE ________ (ft)

05 SOIL pH ________

06 NET PRECIPITATION 9.0 (in)

07 ONE YEAR 24 HOUR RAINFALL 9.0 (in)

08 SLOPE
SITE SLOPE 4.0 %
DIRECTION OF SITE SLOPE
TERRAIN AVERAGE SLOPE 2.0 %

09 FLOOD POTENTIAL
SITE IS IN ________ YEAR FLOODPLAIN

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

11 DISTANCE TO WETLANDS (5 acre minimum)
ESTUARINE A. ________ (mi)
OTHER B. ________ (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species) ________ (mi)
ENDANGERED SPECIES: None for the area

13 LAND USE IN VICINITY

DISTANCE TO:

~~COMMERCIAL~~/INDUSTRIAL/ and Residential A. 0.8 (mi)

RESIDENTIAL AREAS; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES B. ________ (mi)

AGRICULTURAL LANDS
PRIME AG LAND C. ________ (mi)
AG LAND D. ________ (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

The land in the area of the facility is slightly flat.

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

- File Material and Letter Report
- Field Logbook (NUS Corp.).

EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	008I332991

II. SAMPLES TAKEN N/A

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER			
SURFACE WATER			
WASTE			
AIR			
RUNOFF			
SPILL			
SOIL			
VEGETATION			
OTHER			

III. FIELD MEASUREMENTS TAKEN N/A

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
(Bethlehem, Hickory, Newton, Millersville) North Carolina

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

N/A

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

– Topographical Map and File material

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	0081332991

II. CURRENT OWNER(S) / PARENT COMPANY (if applicable)

01 NAME	02 D+B NUMBER	08 NAME	09 D+B NUMBER
Mahasco Corporation			
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	**04 SIC CODE**	**10 STREET ADDRESS (P.O. Box, RFD #, etc.)**	**11 SIC CODE**
57 Lyon Street			
05 CITY / 06 STATE / 07 ZIP CODE		**12 CITY / 13 STATE / 14 ZIP CODE**	
Amsterdam, N.Y. 12010			
01 NAME	**02 D+B NUMBER**	**08 NAME**	**09 D+B NUMBER**
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	**04 SIC CODE**	**10 STREET ADDRESS (P.O. Box, RFD #, etc.)**	**11 SIC CODE**
05 CITY / 06 STATE / 07 ZIP CODE		**12 CITY / 13 STATE / 14 ZIP CODE**	
01 NAME	**02 D+B NUMBER**	**08 NAME**	**09 D+B NUMBER**
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	**04 SIC CODE**	**10 STREET ADDRESS (P.O. Box, RFD #, etc.)**	**11 SIC CODE**
05 CITY / 06 STATE / 07 ZIP CODE		**12 CITY / 13 STATE / 14 ZIP CODE**	
01 NAME	**02 D+B NUMBER**	**08 NAME**	**09 D+B NUMBER**
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	**04 SIC CODE**	**10 STREET ADDRESS (P.O. Box, RFD #, etc.)**	**11 SIC CODE**
05 CITY / 06 STATE / 07 ZIP CODE		**12 CITY / 13 STATE / 14 ZIP CODE**	

III. PREVIOUS OWNER(S) (List most recent first) / IV. REALTY OWNER(S) (If applicable, list most recent first)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
Stanley Division of Mead Corp			
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**
Wilford Segmand Company			
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)

– File material for State

EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	D081332991

II. CURRENT OPERATOR *(Provide if different from owner)*

01 NAME	Mahasco Corporation
02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	
04 SIC CODE	
05 CITY	
06 STATE	
07 ZIP CODE	
08 YEARS OF OPERATION	
09 NAME OF OWNER	

OPERATOR'S PARENT COMPANY *(If applicable)*

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	Trend Line Furniture Corp.
02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	
04 SIC CODE	
05 CITY	Conover
06 STATE	N.C.
07 ZIP CODE	
08 YEARS OF OPERATION	
09 NAME OF OWNER DURING THIS PERIOD	
01 NAME	
02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	
04 SIC CODE	
05 CITY	
06 STATE	
07 ZIP CODE	
08 YEARS OF OPERATION	
09 NAME OF OWNER DURING THIS PERIOD	
01 NAME	
02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	
04 SIC CODE	
05 CITY	
06 STATE	
07 ZIP CODE	
08 YEARS OF OPERATION	
09 NAME OF OWNER DURING THIS PERIOD	

PREVIOUS OPERATORS' PARENT COMPANIES *(If applicable)*

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

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

– State and U.S. EPA file material

EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	D081332991

II. ON-SITE GENERATOR N/A

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

III. OFF-SITE GENERATOR(S) N/A

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: Caldwell Chemical System | 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: Lenoir, | 06 STATE: N.C. | 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)

- File Material State and EPA

EPA

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

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NC	D081332991

II. PAST RESPONSE ACTIVITIES N/A

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	D081332991

II PAST RESPONSE ACTIVITIES *(Continued)* N/A

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

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

EPA

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

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NC	D081332991

II. ENFORCEMENT INFORMATION

01 PAST REGULATORY ENFORCEMENT ACTION YES X NO

02 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY ENFORCEMENT ACTION

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

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-	
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. [illegible]0-41-7	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
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

II. HAZARDOUS SUBSTANCES

CAS Number	Chemical Name
137. 7783-50-8	Ferric Fluoride
138. 10421-48-4	Ferric Nitrate
139. 10028-22-5	Ferric Sulfate
140. 10045-89-3	Ferrous Ammonium Sulfate
141. 7758-94-3	Ferrous Chloride
142. 7720-78-7	Ferrous Sulfate
143. 206-44-0	Fluoranthene
144. 50-00-0	Formaldehyde
145. 64-18-6	Formic Acid
146. 110-17-8	Fumaric Acid
147. 98-01-1	Furfural
148. 86-50-0	Guthion
149. 76-44-8	Heptachlor
150. 118-74-1	Hexachlorobenzene
151. 87-68-3	Hexachlorobutadiene
152. 67-72-1	Hexachloroethane
153. 70-30-4	Hexachlorophene
154. 77-47-4	Hexachlorocyclopentadiene
155. 7647-01-0	Hydrochloric Acid (Hydrogen Chloride)
156. 7664-39-3	Hydrofluoric Acid (Hydrogen Fluoride)
157. 74-90-8	Hydrogen Cyanide
158. 7783-06-4	Hydrogen Sulfide
159. 78-79-5	Isoprene
160. 42504-46-1	Isopropanolamine Dodecylbenzenesulfonate
161. 115-32-2	Kelthane
162. 143-50-0	Kepone
163. 301-04-2	Lead Acetate
164. 3687-31-8	Lead Arsenate
165. 7758-95-4	Lead Chloride
166. 13814-96-5	Lead Fluoborate
167. 7783-46-2	Lead Fluoride
168. 10101-63-0	Lead Iodide
169. 18256-98-9	Lead Nitrate
170. 7428-48-0	Lead Stearate
171. 15739-80-7	Lead Sulfate
172. 1314-87-0	Lead Sulfide
173. 592-87-0	Lead Thiocyanate
174. 58-89-9	Lindane
175. 14307-35-8	Lithium Chromate
176. 121-75-5	Malthion
177. 110-16-7	Maleic Acid
178. 108-31-6	Maleic Anhydride
179. 2032-65-7	Mercaptodimethur
180. 592-04-1	Mercuric Cyanide
181. 10045-94-0	Mercuric Nitrate
182. 7783-35-9	Mercuric Sulfate
183. 592-85-8	Mercuric Thiocyanate
184. 10415-75-5	Mercurous Nitrate
185. 72-43-5	Methoxychlor
186. 74-93-1	Methyl Mercaptan
187. 80-62-6	Methyl Methacrylate
188. 298-00-0	Methyl Parathion
189. 7786-34-7	Mevinphos
190. 315-18-4	Mexacarbate
191. 75-04-7	Monoethylamine
192. 74-89-5	Monomethylamine
193. 300-76-5	Naled
194. 91-20-3	Naphthalene
195. 1338-24-5	Naphthenic Acid
196. 7440-02-0	Nickel
197. 15699-18-0	Nickel Ammonium Sulfate
198. 37211-05-5	Nickel Chloride
199. 12054-48-7	Nickel Hydroxide
200. 14216-75-2	Nickel Nitrate
201. 7786-81-4	Nickel Sulfate
202. 7697-37-2	Nitric Acid
203. 98-95-3	Nitrobenzene
204. 10102-44-0	Nitrogen Dioxide
205. 25154-55-6	Nitrophenol (all isomers)
206. 1321-12-6	Nitrotoluene
207. 30525-89-4	Paraformaldehyde
208. 56-38-2	Parathion
209. 608-93-5	Pentachlorobenzene
210. 87-86-5	Pentachlorophenol
211. 85-01-8	Phenanthrene
212. 108-95-2	Phenol
213. 75-44-5	Phosgene
214. 7664-38-2	Phosphoric Acid
215. 7723-14-0	Phosphorus
216. 10025-87-3	Phosphorus Oxychloride
217. 1314-80-3	Phosphorus Pentasulfide
218. 7719-12-2	Phosphorus Trichloride
219. 7784-41-0	Potassium Arsenate
220. 10124-50-2	Potassium Arsenite
221. 7778-50-9	Potassium Bichromate
222. 7789-00-6	Potassium Chromate
223. 7722-64-7	Potassium Permanganate
224. 2312-35-8	Propargite
225. 79-09-4	Propionic Acid
226. 123-62-6	Propionic Anhydride
227. 1336-36-3	Polychlorinated Biphenyls
228. 151-50-8	Potassium Cyanide
229. 1310-58-3	Potassium Hydroxide
230. 75-56-9	Propylene Oxide
231. 121-29-9	Pyrethrins
232. 91-22-5	Quinoline
233. 108-46-3	Resorcinol
234. 7446-08-4	Selenium Oxide
235. 7761-88-8	Silver Nitrate
236. 7631-89-2	Sodium Arsenate
237. 7784-46-5	Sodium Arsenite
238. 10588-01-9	Sodium Bichromate
239. 1333-83-1	Sodium Bifluoride
240. 7631-90-5	Sodium Bisulfite
241. 7775-11-3	Sodium Chromate
242. 143-33-9	Sodium Cyanide
243. 25155-30-0	Sodium Dodecylbenzene Sulfonate
244. 7681-49-4	Sodium Fluoride
245. 16721-80-5	Sodium Hydrosulfide
246. 1310-73-2	Sodium Hydroxide
247. 7681-52-9	Sodium Hypochlorite
248. 124-41-4	Sodium Methylate
249. 7632-00-0	Sodium Nitrate
250. 7558-79-4	Sodium Phosphate, Dibasic
251. 7601-54-9	Sodium Phosphate, Tribasic
252. 10102-18-8	Sodium Selenite
253. 7789-06-2	Strontium Chromate
254. 57-24-9	Strychnine and Salts
255. 100-42-5	Styrene
256. 12771-08-3	Sulfur Monochloride
257. 7664-93-9	Sulfuric Acid
258. 93-76-5	2,4,5-T Acid
259. 2008-46-0	2,4,5-T Amines
260. 93-79-8	2,4,5-T Esters
261. 13560-99-1	2,4,5-T Salts
262. 93-72-1	2,4,5-TP Acid
263. 32534-95-5	2,4,5-TP Acid Esters
264. 72-54-8	TDE
265. 95-94-3	Tetrachlorobenzene
266. 127-18-4	Tetrachloroethane
267. 78-00-2	Tetraethyl Lead
268. 107-49-3	Tetraethyl Pyrophosphate
269. 7446-18-6	Thallium (I) Sulfate
270. 108-88-3	Toluene
271. 8001-35-2	Toxaphene
272. 12002-48-1	Trichlorobenzene (all isomers)
273. 52-68-6	Trichlorfon
274. 25323-89-1	Trichloroethane (all isomers)
275. 79-01-6	Trichloroethylene
276. 25167-82-2	Trichlorophenol (all isomers)
277. 27323-41-7	Triethanolamine Dodecylbenzenesulfonate
278. 121-44-8	Triethylamine
279. 75-50-3	Trimethylamine
280. 541-09-3	Uranyl Acetate
281. 10102-06-4	Uranyl Nitrate
282. 1314-62-1	Vanadium Pentoxide
283. 27774-13-6	Vanadyl Sulfate
284. 108-05-4	Vinyl Acetate
285. 75-35-4	Vinylidene Chloride
286. 1300-71-6	Xylenol
287. 557-34-6	Zinc Acetate
288. 52628-25-8	Zinc Ammonium Chloride
289. 1332-07-6	Zinc Borate
290. 7699-45-8	Zinc Bromide
291. 3486-35-9	Zinc Carbonate
292. 7646-85-7	Zinc Chloride
293. 557-21-1	Zinc Cyanide
294. 7783-49-3	Zinc Fluoride
295. 557-41-5	Zinc Formate
296. 7779-86-4	Zinc Hydrosulfite
297. 7779-88-6	Zinc Nitrate
298. 127-82-2	Zinc Phenolsulfonate
299. 1314-84-7	Zinc Phosphide
300. 16871-71-9	Zinc Silicofluoride
301. 7733-02-0	Zinc Sulfate
302. 13746-89-9	Zirconium Nitrate
303. 16923-95-8	Zirconium Potassium Fluoride
304. 14644-61-2	Zirconium Sulfate
305. 10026-11-6	Zirconium Tetrachloride

Reference No. 1

DATE: December 2, 1985

TO: File

FROM: Jack Butler

SUBJECT: Telephone conversation with Clyde Beal [(704) 464-5700] about the Trend Line Furniture plant in Conover NC D081332991.

Mr. Beal reported that the Trend Line plant in Conover was originally built in 1956 with additions in 1963 and 1978. Wilford Sigmond Co. operated the plant until about 1967 when it was bought by the Stanley Division of Mead Corp. Stanley operated the plant under the name of Trend Line until about 1972 or 1973 when Mohasco Corp. bought the plant. Mohasco has continued to operate the plant under the name of Trend Line until the present.

Trend Line produces conventional sofas, chairs, and love seats at the Conover plant. Waste cotton, paper, felt, foam rubber, and other solid wastes are disposed of in the Catawba County landfill. A non-flammable solid or liquid sludge is generated from the lacquer and stain spraybooths. Up until about 1977 or 1978 this sludge could be dewatered by heating until it was a solid and could be landfilled. In about 1977 or 1978 a change in the stain and lacquer being used prevented dewatering beyond a molasses-type syrup. The landfill considered this a liquid waste and therefore would no longer accept it. At that time Trend Line began sending this sludge to Caldwell Chemical Systems in Lenoir. Trend Line generates about 7 to 8 barrels of this sludge each year. This sludge is not considered by Trend Line to be hazardous and is stored in 55 gallon drums on an outside, undiked, asphalt pad.

Trend Line has no wells on this site and is served by city water and sewer. They have no sewer pretreatment.

There are two underground fuel oil storage tanks on this site; one 5,000 gallon, and one 10,000 gallon. These tanks were recently pressure tested and the 10,000 gallon tank was found to lose 0.2 gal/hr. Trend Line intends to have this tank refiberglassed in the near future.

Mr. Beal reported that he knew of no other spills or disposal of wastes on their site.

JB/tb/0210b

Reference No. 2

North Carolina Department of Human Resources
Division of Health Services
P.O. Box 2091 • Raleigh, North Carolina 27602-2091

James G. Martin, Governor
Phillip J. Kirk, Jr., Secretary

Ronald H. Levine, M.D., M.P.H.
State Health Director

DATE: December 5, 1985

TO: Lee Layman, Head
Groundwater Operations Branch
Division of Environmental Management

FROM: Jack Butler, Engineer
Solid and Hazardous Waste Management Branch

SUBJECT: Leaking underground storage tank at Trend Line Furniture Corp., 641 4th Street Place SW, Conover, NC 28613 (NC D081332991)

In the course of performing a preliminary assessment for potential hazardous waste sites a leaking underground fuel storage tank was reported. Mr. Clyde Beal of the Trend Line plant in Conover reported that their 10,000 gallon fuel oil tank was recently tested under pressure for twenty 15 minute intervals and found to be losing 0.2 gal/hr. Mr. Beal stated that Trend Line intended to use the oil out of this tank and have it refiberglassed in the near future. Mr. Beal can be contacted at (704) 464-5700.

If you need any additional information please contact me at 733-2178.

JB/tb/0210b

Reference No. 3

ALPHABETIC LIST OF HAZARDOUS WASTE FACILITIES

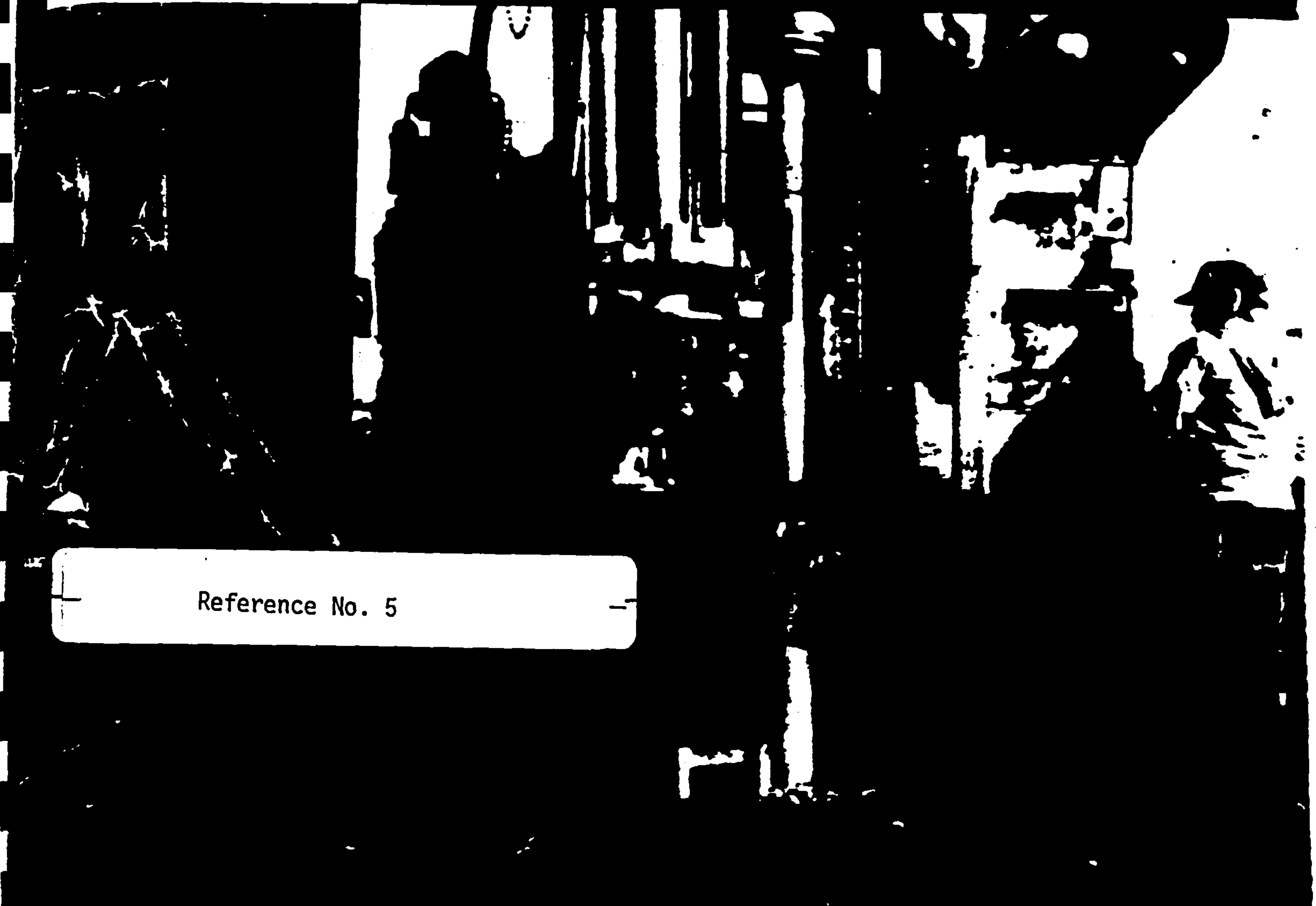
FACILITY ID	FACILITY NAME / CONTACT	FACILITY ADDRESS		MAILING ADDRESS			SG	G	TRN	TR	ST	DS	TELEPHONE AREA	NUMBER
NCD981866973	TRANSPOWER INC. JOHN, BRITT	2031 MIDDLE ROAD FAYETTEVILLE	28302	PO BOX 264 FAYETTEVILLE	NC	28303	X						919	483-5562
NCD074499344	TRANSWORLD X-RAY CORPORATION GORST CHARLES	10210 PINEVILLE ROAD PINEVILLE	28224	PO BOX 240766 CHARLOTTE	NC	28224		X					704	554-8390
NCD982124232	TRANSYLVANIA COMMUNITY HOSPITA MEORY, MARK	HOSPITAL DRIVE BREVARD	28712	PO BOX 1116 BREVARD	NC	28712	X						704	884-9111
NCD065298879	TRASH REMOVAL SERVICE INC MCKEITHAN CHRIS MANAGER	3920 RIVER ROAD WILMINGTON	28403	PO BOX 4730 WILMINGTON	NC	28406	X		X				919	799-5256
NCD981756885	TREDEGAR INDUSTRIES MOORE, WALT	STANLEY BLVD NEW BERN	28560	PO BOX 5209 NEW BERN	NC	28561	X						919	633-5165
NCD982147597	TREE DIMENSIONS MFG. CORP. SUMRELL, DREW	GEORGE WILSON RD. BOONE	28607	P.O. BOX 609 BOONE	NC	28607	X						704	262-0220
NCD074503368	TREND LINE CORPORATION DAVIS CARL	INDUSTRIAL PKWY HWY 321 LINCOLNTON	28092	PO BOX 188 HICKORY	NC	28601	E						704	328-2521
NCD000648436	TREND LINE FURNITURE CORP. DAVIS, CARL	WEST HOLLY ST. MAIDEN	28650	P O BOX 188 HICKORY	NC	28601	E							-
NCD081332991	TREND LINE FURNITURE CORP. DAVIS, CARL	4TH ST. PLACE SW CONOVER	28613	P.O. BOX 188 HICKORY	NC	28601	E							-
NCD981756943	TRENT OLDS CADILLAC BUICK, INC MEWSON, PAUL	HIGHWAY 70 EAST NEW BERN	28560	PO BOX 1310 NEW BERN	NC	28560	X						919	633-2213
NCD981862345	TRI-AD PICKUP & DELIVERY, INC. SMITH HARRY	7609 BOEING DRIVE GREENBORO	27409	7609 BOEING DRIVE GREENSBORO	NC	27409	E						919	668-0039
NCD982123010	TRI-AD PRESS LABUDA, RICK	827 E. SPRAGUE ST. WINSTON-SALEM	27107	827 E. SPRAGUE ST. WINSTON-SALEM	NC	27107	X						919	785-0003
NCD982091035	TRI-CITY TRANSMISSIONS COOK, BILL	3836 HIGH POINT ROAD GREENSBORO	27407	3836 HIGH POINT ROA GREENSBORO	NC	27407	X						919	855-1927
NCD981921208	TRI-STATE CUSTOM FIBERGLASS, I MAY, KENNETH	STATE ROAD 1961 BAILEY	27807	PO BOX 369 BAILEY	NC	27807	X						919	235-2461
NCD982116964	TRI-STATE METALLURGICAL, INC. DEAMER, GEORGE	212 BULB AVENUE GASTONIA	28054	212 BULB AVENUE GASTONIA	NC	28054	X						704	861-8348
NCD981862543	TRIAD FREIGHTLINER OF GREENSBO COWAN, CHARLES	6420 BURNT POPLAR ROAD GREENSBORO	27419	PO BOX 8949 GREENSBORO	NC	27419	X						919	272-1153
NCD042322792	TRIAD MACK SALES & SERVICE INC WHITFIELD, JOHN	1386 SOUTH PARK DRIVE KERNERSVILLE	27284	1386 SOUTH PARK DRI KERNERSVILLE	NC	27284	X						919	996-6060

NUS CORPORATION AND SUBSIDIARIES		*TELECON NOTE*
	Reference No. 4	
CONTROL NO. F4-8909-54	**DATE:** 12-28-89	**TIME:** 0900
DISTRIBUTION:		
BETWEEN: Jim Edwards (Compliance Officer)	**OF:** Hazardous Waste Compliance Program	**PHONE:** (919) 733-2178
AND: Prince L. Goins, NUS Corporation PLG		

DISCUSSION:

I spoke with Mr. Edwards and he indicated that they did not have a Part A application for RCRA.

STATISTICAL ANALYSIS RELATING WELL Y
TO CONSTRUCTION PRACTICES AND SIT
OF WELLS IN THE PIEDMONT AND BLUE R
PROVINCES OF NORTH CAROLINA



Reference No. 5

U.S. GEOLOGICAL SURVEY

WATER RESOURCES INVESTIGATIONS REPORT 86-4132

Prepared in cooperation with the

North Carolina Department of Natural Resources

and Community Development

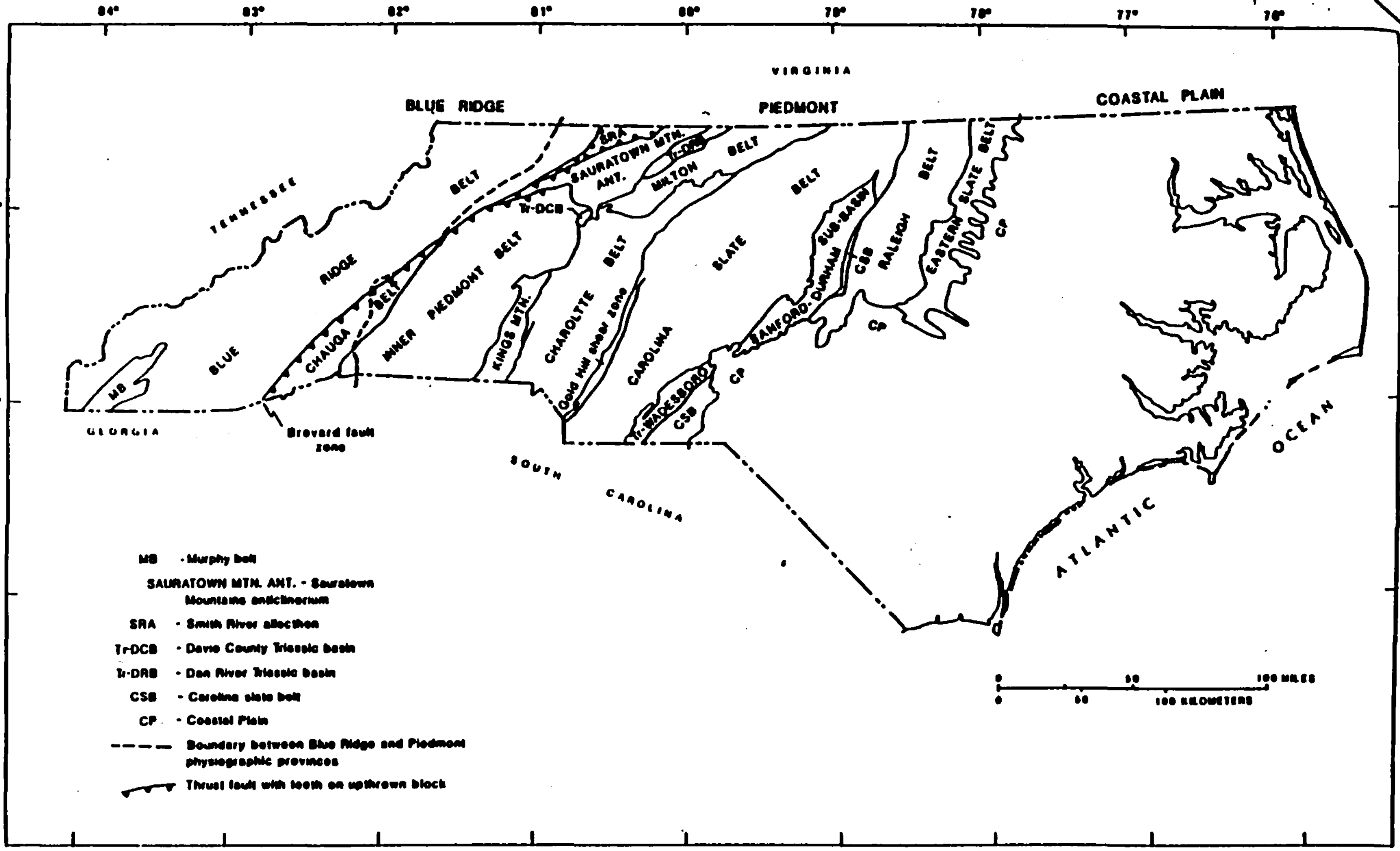
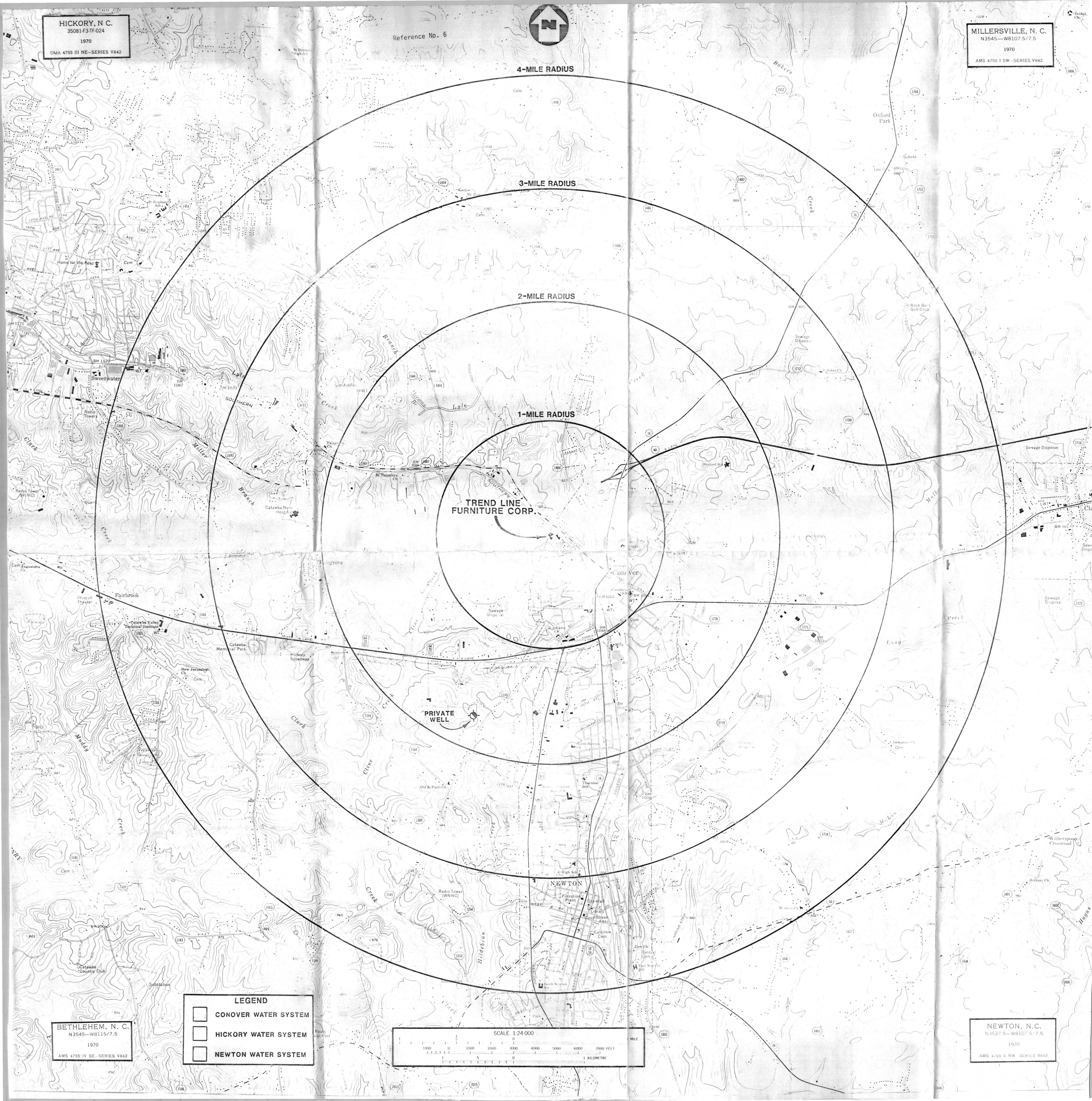


Figure 6.--Geologic belts, terranes, and some major structural features within the Piedmont and Blue Ridge provinces of North Carolina.

Table 5.--Summary statistics defining depth to water, casing depth, and saturated thickness of regolith according to topographic group in the Blue Ridge and Piedmont physiographic provinces
[Statistics for wells penetrating bedrock beneath the western edge of the Coastal Plain sediments are given for comparison.]

Well characteristic	Blue Ridge					Piedmont					Coastal Plain [1/]	
	Draws and valleys	Slopes and flats	Hills and ridges	All wells	Number of wells	Draws and valleys	Slopes and flats	Hills and ridges	All wells	Number of wells	All wells	Number of wells
Average water level (feet below land surface)	23.4	37.5	62.9	37.1	507	22.1	29.3	36.8	31.3	2,326	18.8	145
Median water level (feet below land surface)	18	35	50	30	507	20	25	32	27	2,326	15	145
Average casing (feet)	50.1	57.7	66.6	56.8	698	52.7	53.2	50.0	52.0	2,685	71.7	293
Median casing (feet)	43	55	60	53.5	698	45	46	41	44	2,685	63	293
Average saturated thickness of regolith (feet)	32.2	27.6	20.8	28.0	422	33.6	24.6	20.4	24.0	1,749	47.7	112
Median saturated thickness of regolith (feet)	28	20	10	20	422	28	15	9	13	1,749	44.5	112

[1/] Topography of bedrock surface cannot be determined. Influence of topography on well yield in Coastal Plain is unknown.



HICKORY, N.C.
35081-F3-TF-024
1970
DMA 4755 III NE—SERIES V842
Reference No. 6
MILLERSVILLE, N. C.
N3545—W8107.5/7.5
1970
AMS 4755 I SW—SERIES V842
4-MILE RADIUS
3-MILE RADIUS
2-MILE RADIUS
1-MILE RADIUS
TREND LINE
FURNITURE CORP.
PRIVATE
WELL
Sweetwater
Fairbrook
Conover
NEWTON
LEGEND
CONOVER WATER SYSTEM
HICKORY WATER SYSTEM
NEWTON WATER SYSTEM
SCALE 1:24 000
BETHLEHEM, N. C.
N3545—W8115/7.5
1970
AMS 4755 IV SE—SERIES V842
NEWTON, N.C.
N3537.5—W8107.5/7.5
1970
AMS 4755 II NW—SERIES V842

Reference No. 7

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

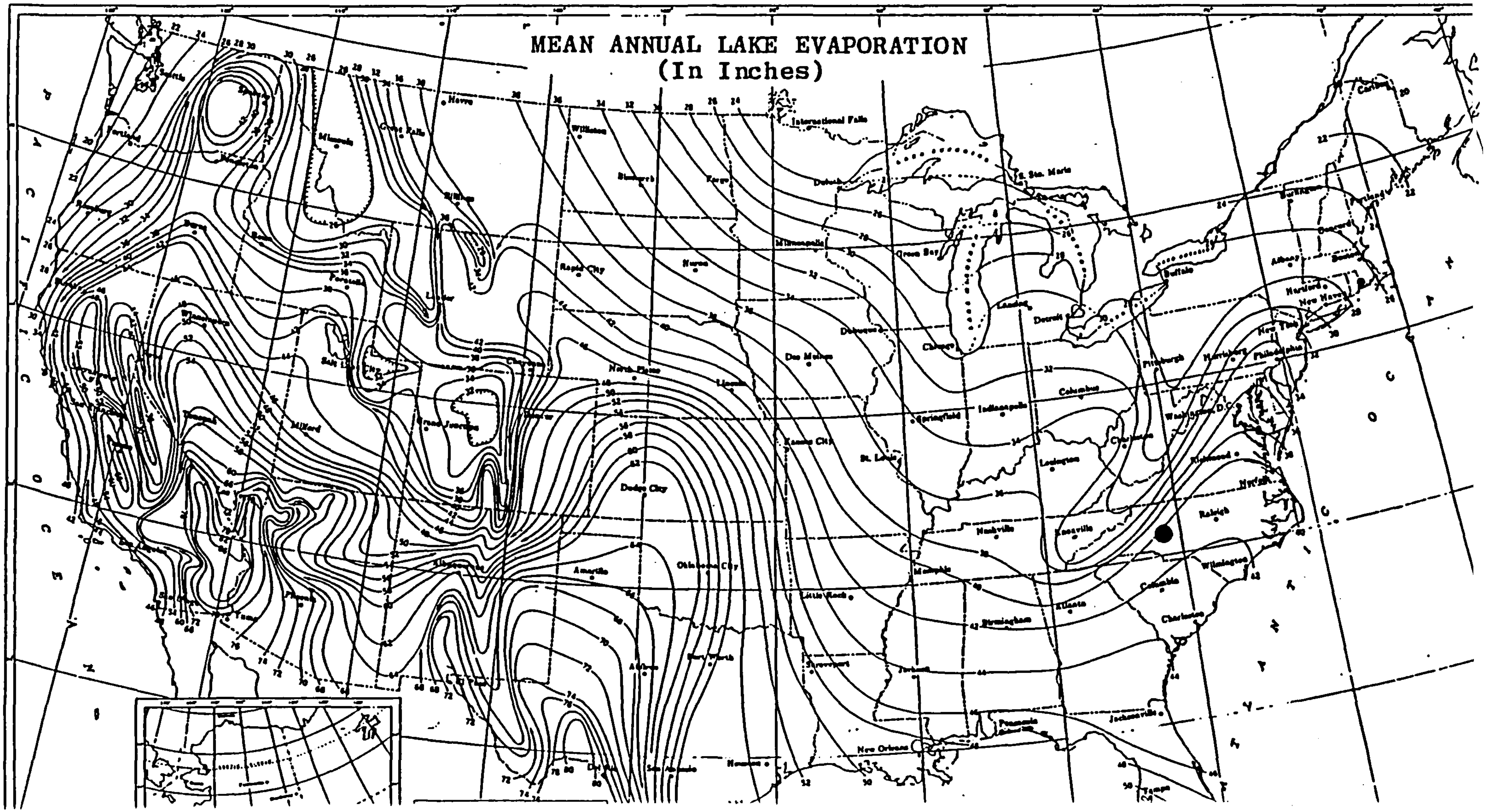
PRECIPITATION (Inches)

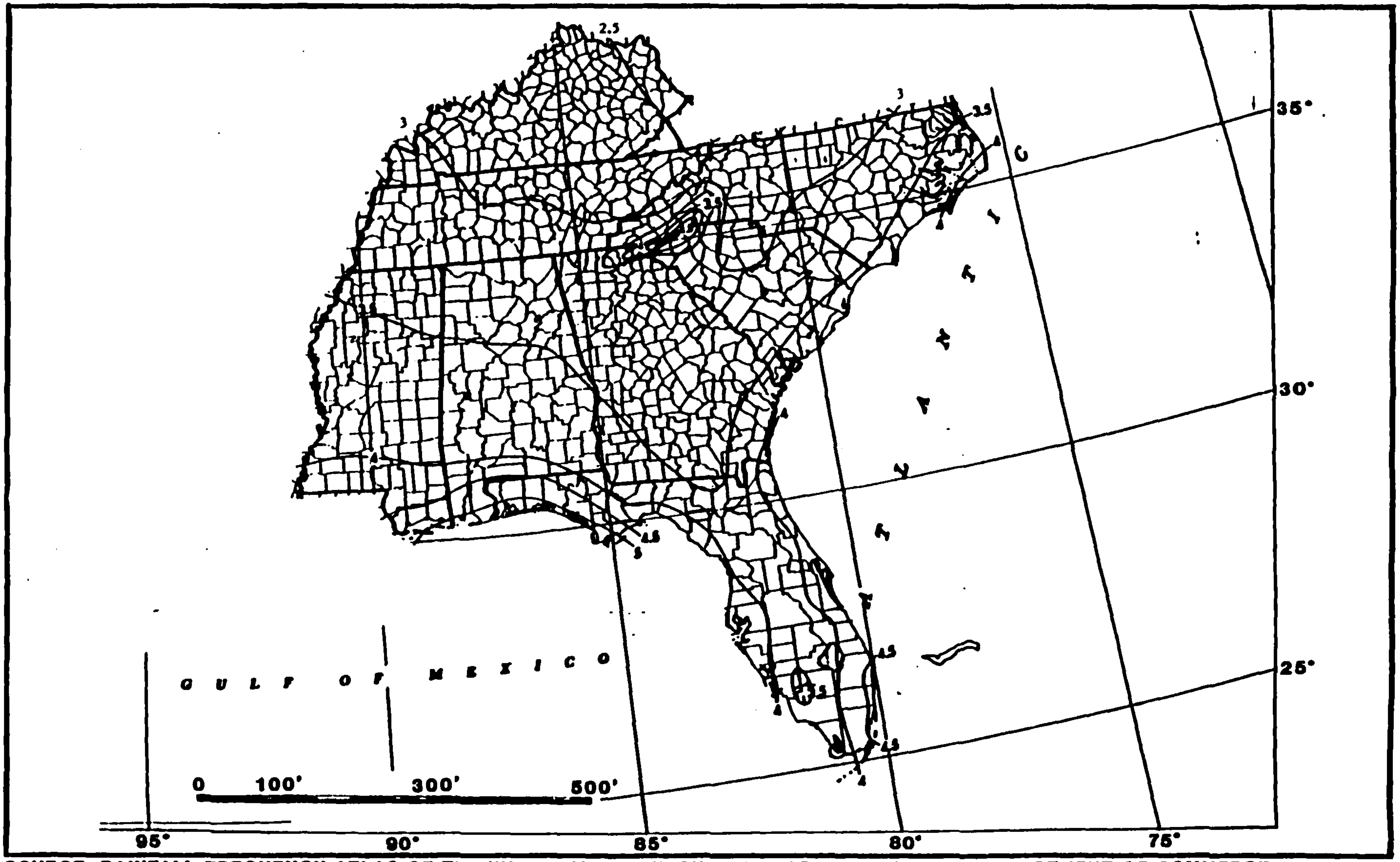
Caution should be used in interpolating on these generalized maps, particularly in mountainous areas.

ALBERS EQUAL AREA PROJECTION — STANDARD PARALLELS 29½ AND 45½

BASED ON PERIOD 1931-60

LAKE EVAPORATION





SOURCE: RAINFALL FREQUENCY ATLAS OF THE UNITED STATES, TECHNICAL PAPER NO. 40, U. S. DEPARTMENT OF COMMERCE, U. S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C., 1963.

FIGURE 8

1-YEAR 24-HOUR RAINFALL (INCHES)

Reference No. 8

NORTH CAROLINA
DEPARTMENT OF CONSERVATION AND DEVELOPMENT
BEN E. DOUGLAS, *Director*

DIVISION OF MINERAL RESOURCES
JASPER L. STUCKEY, *State Geologist*

BULLETIN NUMBER 68

GEOLOGY AND GROUND WATER
IN THE
Statesville Area, North Carolina

By

HARRY E. LEGRAND
Geologist, U. S. Geological Survey

PREPARED COOPERATIVELY BY THE GEOLOGICAL SURVEY
UNITED STATES DEPARTMENT OF THE INTERIOR

1954

The areas in which the different rock units occur are shown on individual county maps in the text. reconnaissance nature of the mapping and the common variation of rock types within distances of ten feet or even fractions of a foot make the geologic maps less accurate than desired. The type of rock p trated or thought to have been penetrated by a well is given with other data in the well tables. The on 821 wells are tabulated and given with the county descriptions in this report. In order to compare water-yielding properties of wells in the different rock units, tables were prepared showing the average de average yield, and other important data for all drilled wells 3 inches or more in diameter in each rock u

Table 3 shows the relative yields of wells in the principal crystalline rock units in the area. The wells have an average depth of 225 feet and an average yield of 24 gallons a minute. The lowest yield zero and the highest yield was about 500 gallons a minute. Fifty percent of all wells yield at least 15 lons a minute.

TABLE 3.—AVERAGE YIELD OF DRILLED WELLS ACCORDING TO ROCK TYPE

Rock type	Number of wells	Average depth (feet)	Yield (gallons a minute) Average	Per foot of well	Per foot of well below water table[1]
Granite	75	254	17	0.07	0.08
Granite gneiss and schist-granite complex	175	205	23	.11	.14
Granite-diorite complex	21	258	35	.14	.16
Gabbro-diorite	54	302	30	.10	.11
Hornblende gneiss and schist	104	214	29	.13	.16
Mica schist	58	232	22	.10	.11
Slate and volcanics	33	133	15	.11	.15
All wells	520	225	24	.11	.13

[1] Assuming the water table to be an average of 35 feet below the surface.

TABLE 4.—AVERAGE YIELD OF MUNICIPAL AND INDUSTRIAL WELLS ACCORDING TO ROCK TYPE

Rock type	Number of wells	Average depth (feet)	Yield (gallons a minute) Average	Per foot of well	Per foot of well below wate table[1]
Granite	14	506	27	0.05	0.06
Granite gneiss and mica schist-granite complex	37	320	32	.10	.11
Granite-diorite complex	10	328	52	.16	.18
Gabbro-diorite	29	413	38	.09	.10
Hornblende gneiss and schist	30	373	60	.16	.18
Mica schist	19	395	38	.10	.11
Slate and volcanics	4	260	31	.12	.14
All wells	143	377	41	.11	.12

[1] Assuming the water table to be an average of 35 feet below the surface.

The table shows that wells penetrating intermediate or basic rocks such as diorite, gabbro, and blende gneiss yield more than wells penetrating acid rocks such as granite, granite gneiss, mica schist the slates and related acid volcanic rocks. This difference is probably due to the greater solubility (basic rocks and consequently to the ability of circulating water to enlarge by solution the fractures i basic rocks. Owing to the scarcity of wells in the Triassic sedimentary rocks, the average expected yi wells penetrating these deposits is not known. Mundorff (1948, p. 29) shows that the average yield of in similar rocks of Triassic age is 17 gallons a minute.

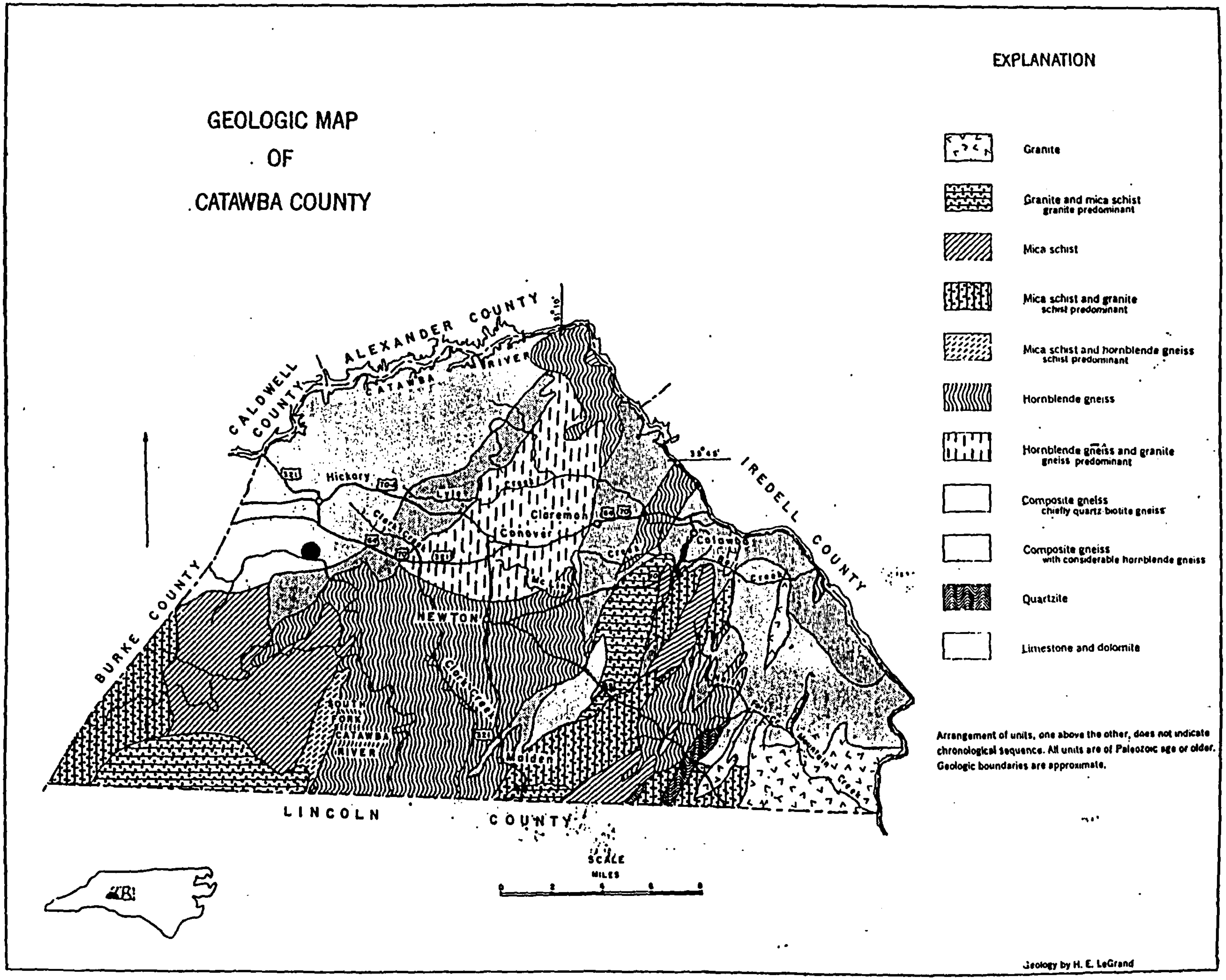


FIGURE 11.—*Geologic map of Catawba County.*

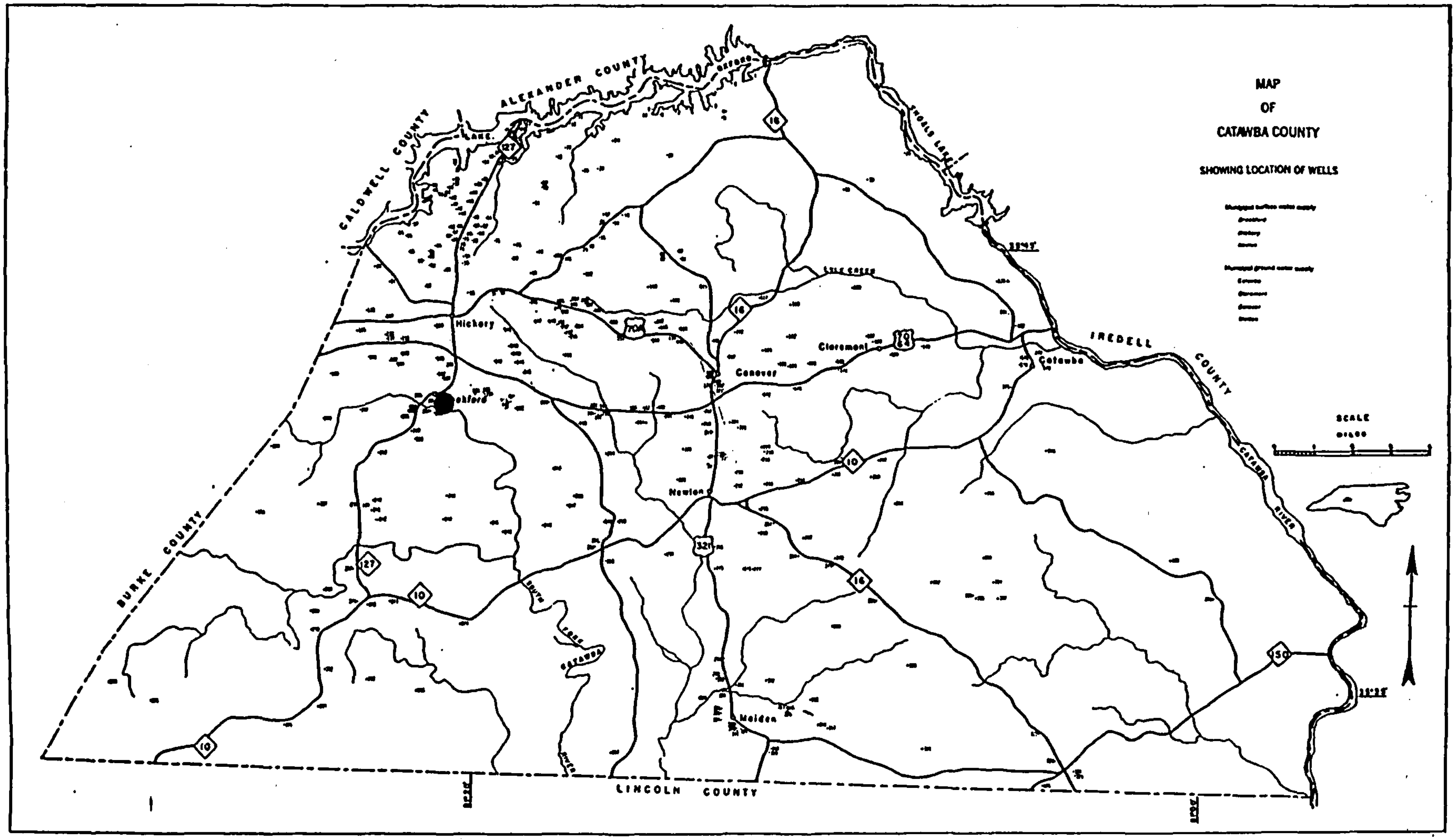


FIGURE 12.—*Map of Catawba County showing location of wells.*

Reference No. 9

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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P. Albert Carpenter, III
Rebecca M. Enos
Billie J. Flynt, Jr.
Patricia E. Gallagher
Charles W. Hoffman
Carl E. Merschat
William F. Wilson

and

John M. Parker, III
State Geologic Map Coordinator
in association with
The State Geologic Map Advisory Committee

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J. Robert Butler
Paul D. Fullagar
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Daniel A. Textoris
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H. D. Wagener
Lauck W. Ward
Walter H. Wheeler
Steven P. Yurkovich
Victor A. Zullo

INNER PIEDMONT, CHAUGA BELT, SMITH RIVER ALLOCHTHON, AND SAURATOWN MOUNTAINS ANTICLINORIUM

METAMORPHIC ROCKS

ROCKS OF BREVARD FAULT ZONE — "Fish scale" schist and phyllonite, graphitic; interlayered with feldspathic metasandstone, marble lenses

BIOTITE GNEISS AND SCHIST — Inequigranular, locally 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

ꞒZbl — FINE-GRAINED BIOTITE GNEISS — Strongly foliated; minor layers of amphibolite and muscovite schist

ꞒZms — MICA SCHIST — Garnet, staurolite, kyanite, or sillimanite occur locally; lenses and layers of quartz schist, micaceous quartzite, calc-silicate rock, biotite gneiss, amphibolite, and phyllite

AMPHIBOLITE AND BIOTITE GNEISS — Interlayered; minor layers and lenses of hornblende gneiss, metagabbro, mica schist, and granitic rock

AMPHIBOLITE — Metamorphosed mafic extrusive and intrusive rock; includes hornblende gneiss, thin layers of mica schist, calc-silicate rock, and, rarely, marble. Also includes small masses of metadiorite and metagabbro

ꞒZba — MEGACRYSTIC BIOTITE GNEISS — Poorly layered to massive; megacrysts of microcline and quartz; local mica schist, amphibolite, and biotite gneiss

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

ꞒZmg — METAGRAYWACKE AND MUSCOVITE-BIOTITE SCHIST — Metagraywacke (biotite gneiss) interlayered and gradational with muscovite-biotite schist; minor marble and granitic rock

$ꞒZma_1$ — METAGRAYWACKE, AMPHIBOLITE, AND KYANITE SCHIST — Metagraywacke (biotite gneiss) interlayered and gradational with amphibolite and kyanite schist; minor ultramafic and granitic rock

$ꞒZma_2$ — METAGRAYWACKE — Contains quartz and microcline porphyroblasts

ꞒZbb — BANDED GNEISS — Interlayered with calc-silicate rock, metaconglomerate, amphibolite, sillimanite-mica schist, and granitic rock

ꞒZph — PHYLLITE AND SCHIST — Includes phyllonite and interlayered biotite gneiss

ꞒZbg — INEQUIGRANULAR BIOTITE GNEISS — Weakly foliated to massive, contains plagioclase megacrysts and, rarely, larger megacrysts of quartz and feldspar

PORPHYROBLASTIC GNEISS — Massive to foliated, granodioritic, migmatitic

GARNET-MICA SCHIST — Interlayered with amphibolite

Yg — GRANITIC GNEISS (Middle Proterozoic, 1192 my; 27) — Megacrystic, in places contains amphibolite

INTRUSIVE ROCKS

Jd — DIABASE — Dikes, gray to black

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

DSc — CAESARS HEAD GRANITE GNEISS (Devonian to Silurian, 409 my: 13) — Equigranular to porphyritic, massive to well foliated; contains biotite and muscovite

SOgg — GRANITE GNEISS (Ordovician to Silurian, 438 my; 17) — Poorly foliated; interlayered with biotite augen gneiss

OꞒgm — MIGMATITIC GRANITIC GNEISS — Foliated to massive, granitic to quartz dioritic; biotite gneiss and amphibolite common

METAMORPHOSED GRANITIC ROCK (Cambrian to Ordovician, ...

CHARLO

M

ꞒZbl — FINE-GRAINED BIOT layers of amphibo

ꞒZfg — FELSIC MICA GNEIS and schist

ꞒZbg — BIOTITE GNEISS AN dant potassic feld calc-silicate rock, s Contains small ma

ꞒZv — METAVOLCANIC RO

ꞒZmv — MAFIC METAVOLCA tuffs and flows, g intrusives and mir

ꞒZfv — FELSIC METAVOLC flows and tuffs, lig ate metavolcanic r

ꞒZq — QUARTZITE — Mass sillimanite, chlorite

ꞒZph — PHYLLITE AND SCHI minor quartzite

Jd — DIABASE — Dikes, g

PPg — GRANITIC ROCK (P Megacrystic to e group) - Churchlar

DSg — GRANITE OF SALISE 415 my; 5) — Pink Salisbury, Southm

DSs — SYENITE OF CONCC cludes the Concor

DOgb — GABBRO OF CONCO 479 my; 24) — Bar dington intrusives

DOg — GRANITIC ROCK — contains hornblenc

SHELTON GRANITE lineated granitic to

PzZg — METAMORPHOSED

PzZg — METAMORPHOSED

PzZm — METAMORPHOSED mafic plutonic-volc

META-ULTRAMAFIC serpentinite, soaps bodies shown

ꞒZg — METAMORPHOSED locally contains hor

Morganton
Valdese
Rutherford College
Connelly Sprs
Hildebran
Granite Falls
Oak Hill
Draco
Whitnel
Gamewell
Saw Mills
Barrett Mtn
Henry River
Baker Mtn
Corinth
Plateau
Maiden
Vale
Lincolnton
Boger City
Iron Station
Mariposa
Alexis
Triangle
Denver
Sherrills Ford
Terrell
Mooresville
Davidson
Cornelius
Huntersville
Mountain Island
High Shoals
Cherryville
Stanley
Dallas
Stubbs
Kings Mountain
Bessemer City
Mtn View
Gastonia
Cramerton
Belmont
Bogertown
Crowders
Patterson Springs
Earl
Grover
Shelby
Boiling Springs
Lawndale
Metcalf
Washburn
CZms
CZbg
OCg
PPmg
Zbt
Jd
Mc
DOg
PzZg
CZg

Ground Water of the Piedmont and Blue Ridge Provinces in the Southeastern States

By H. E. LeGrand

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Ground Water of the Piedmont and Blue Ridge Provinces in the Southeastern States

By H. E. LeGrand

INTRODUCTION

This circular summarizes the underground water conditions in the Piedmont and Blue Ridge provinces of the Southeastern States—the region shown on the geologic map (fig. 1).

There are several ways of developing water from the ground in this region. In earlier days springs were used because they are common in coves or on lowland slopes. Almost all springs in the region yield between ½ to 3 gallons per minute and rarely show a significant decline in yield during dry weather. Dug wells were common in the past, but they are being replaced by bored and drilled wells. Bored wells, like dug wells, are as much as 2 feet in diameter and are commonly lined with concrete or terra cotta pipe; these wells do not extend into hard rock and go dry if the water table falls below the bottom of the well. Drilled wells, which are now the most common source of ground-water supply and which are the chief concern of this report, are cased to the hard rock and extend as open holes into the rock. Although some drilled wells are as small as 2 inches in diameter and others are as large as 10 inches, the most common size is about 5 or 6 inches. Almost every well in recent years has been properly constructed to prevent water on the ground from running down the outside of the casing into the well.

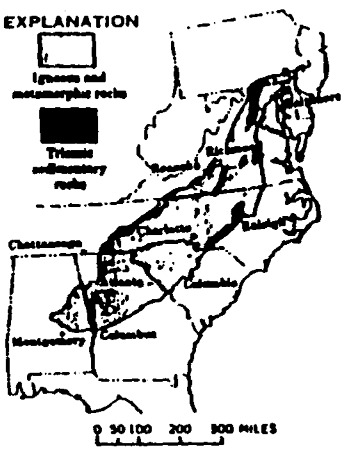


Figure 1.—Generalized geologic map. Areas underlain by igneous and metamorphic rocks are better suited to numerical rating of well sites than areas underlain by Triassic sedimentary rocks.

EVALUATING SITES

A special attempt is made to help those who are interested in the yields of wells. Because yields of individual wells in the region vary greatly within distances as short as 100 feet, estimates of potential yields of prospective wells are difficult to make. This fact has led frequently to water shortages, excessive costs, inconveniences, or undue anxiety in many cases. As the yield of a well is unpredictable, the next best approach is to attempt to show, on a percentage basis, the chance for a certain yield from a well for different conditions.

Although many factors determine the yield of a well, two ground conditions, when used together, serve as a good index for rating a well site. These conditions are topography and soil thickness. The ratings are based on the following statement: High-yielding wells are common where thick residual soils and relatively low topographic areas are combined, and low-yielding wells are common where thin soils and hilltops are combined. By comparing conditions of a site according to the topographic and soil conditions one gets a relative

rating value. For example, the following topographic conditions are assigned point values:

Points	*Topography*
0	Steep ridge top
2	Upland steep slope
4	Pronounced rounded upland
5	Midpoint ridge slope
7	Gentle upland slope
8	Broad flat upland
9	Lower part of upland slope
12	Valley bottom or flood plain
15	Draw in narrow catchment area
18	Draw in large catchment area

Figure 2 shows values for certain topographic conditions. Figure 3 shows rating values for soil thickness. The soil zone in this report includes the normal soils and also the relatively soft or weathered rock. The topographic conditions and soil conditions are separately rated, and the points for each are added to get the total points which may be used in table 1 to rate a site.

Using two well sites, A and B, as examples, we can evaluate each as to the potential yield of a well. Site A, a pronounced rounded upland (4-point rating for topography in fig. 2) having a relatively thin soil (6-point rating for soil characteristic in fig. 3), has a total of 10 points. In table 1 the average yield for site A is 6 gpm (gallons per minute). This site has a 65-percent chance of yielding 3 gpm and a 40-percent chance of yielding 10 gpm. Site B, a

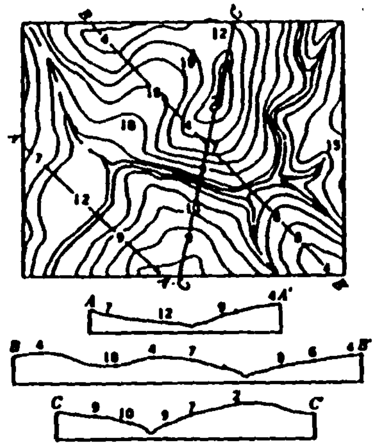
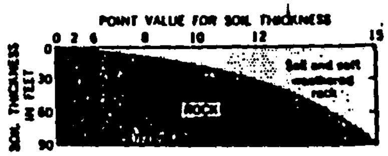


Figure 2.—Topographic map and profiles of ground surface showing rating in points for various topographic positions.



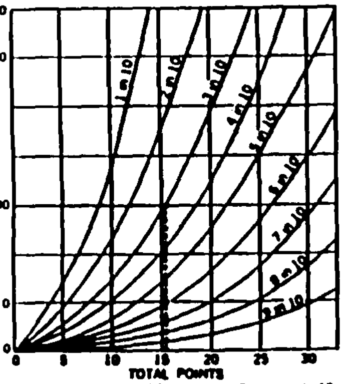
POINT VALUE	CHARACTER OF SOIL AND ROCK
0-2	Bare rock—almost no soil
2-6	Very thin soil—some rock outcrops
6-9	Soil thin—a few rock outcrops
9-12	Moderately thick soil—no fresh outcrops
12-15	Thick soil—no rock outcrops

Figure 3.—Rating in points for various conditions of soil thickness.

Table 1.—*Use of numerical rating of well site to estimate the percent chance of success of a well*

[Data are based on maximum depth of 300 feet or maximum drawdown of water level of about 200 feet. No interference from pumping is assumed. Numerical rating is obtained by adding rating in points for topography and soil thickness]

Total points of a site	Average yield (gpm)	Chance of success, in percent, for a well to yield at least—				
		3 gpm	10 gpm	25 gpm	50 gpm	75 gpm
5	2	48	18	6	2	------
6	3	50	20	7	3	------
7	3	55	25	8	3	------
8	4	55	30	11	3	------
9	5	60	35	12	4	------
10	6	65	40	15	5	------
11	7	70	43	19	7	------
12	9	73	46	22	10	------
13	11	77	50	26	12	------
14	12	80	52	30	14	------
15	14	83	54	33	16	------
16	16	85	57	36	18	------
17	17	86	60	40	20	12
18	20	87	63	45	24	15
19	23	88	66	50	25	18
20	26	89	70	52	27	20
21	28	90	72	54	30	22
22	31	91	74	56	35	24
23	34	92	76	58	38	26
24	37	92	78	60	40	29
25	39	93	80	62	43	32
26	41	93	81	64	46	36
27	43	94	82	66	48	40
28	45	95	83	68	50	42
29	48	95	84	71	53	44
30	50	96	87	73	56	47
30+	50	97	91	75	60	50



4.—Probability of getting a certain yield from a well at different sites having various total-point ratings.

draw or slight sag in topography (18-point rating) having a moderately thick soil (12-point rating), has a total of 30 points, an average yield of 50 gpm, and a 73-percent chance of yielding 25 gpm. Referring to figure 4, we see that the 10-point site has less than 1 chance in 10 of yielding 40 gpm whereas the 30-point site has better than an even chance of yielding 40 gpm.

Some topographic conditions of the region and a few topographic ratings are shown in figure 5. Wells located on concave slopes are commonly more productive than wells on convex slopes or straight slopes. Broad but slight concave slopes near saddles in gently rolling upland areas are especially good sites for potentially high-yielding wells. On the other hand, steep V-shaped valleys of the gully type may not be especially good sites, and they should be avoided if surface drainage near the well is so poor that contamination is possible.

More difficulty is likely to occur in rating character of soil and rock than in rating

Figure 5.—Countryside in the Blue Ridge province showing approximate ratings for topography.

Figure 6.—The soil zone is likely very thin near these rock outcrops (soil-thickness rating 0 to 4 points).

topography. Everyone should be able to determine by observation if the soil is thin (less than 7 soil and rock points as shown in figure 6) and if the soil is fairly thick (more than 10 soil and rock points), but the intermediate ratings are difficult to make. If the observer is unsure of the soil and rock rating above the 6-point (thin soil) value he may choose a 10-point value for the site with assurance that he is fairly correct. White quartz of flint, which occurs as veins and as rock fragments on the ground, is not considered a true rock in this report because it persists in the soil zone; a quartz vein in many cases is considered to be a slightly favorable indication of a good well site.

The numerical rating system is not intended to be precise. One person may rate a particular site at 15 points, whereas another person may rate it at 17 points; such a small difference in rating would not be misleading. Almost everyone's rating will be within 5 points of an average rating for a site.

YIELD

The term "yield" is not definite but is the reported capacity of a well to produce water, generally during a short pumping test. The water level in a well will stabilize if a certain limited yield or withdrawal of water is maintained; however, a greater withdrawal or yield will cause the water level to fall. In many cases the water level continues to fall until the pumping stops so that continuous pumping would result in a smaller yield than that estimated earlier. The percentage of relative yield is not directly proportionate to the percentage of drawdown of the water level, but the greater percentage of yield is reached before the greater percentage of drawdown. Figure 7 shows an approximate relation of drawdown to yield for an average well in the region. Note that the yield-drawdown relationships of all wells lie within the shaded zone and that average conditions occur on or near the heavy line. As an example of the relation between yield and drawdown, we may consider a well 230 feet deep having a static water level of 20 feet below land surface. (See fig. 8.) This well yields 40 gpm with a pumping level at a depth of nearly 220 feet; the pump might better be set at 120 feet (50 percent of drawdown or half the thickness of the water) where about 36 gpm or 90 percent of the relative yield could be realized. It is unnecessary and uneconomical to lower the water level of a well to a position near the bottom unless the yield is so poor that the water stored in the well is needed.

There is no simple definition of the yield of a well—especially in the Blue Ridge and Piedmont provinces. Yields for various levels of the water in the pumped well are rarely known. The yields in this report are considered to be standard for wells about 300 feet deep which are pumped about 12 hours each day and in which drawdown of the water level is about 200 feet; it is assumed that there is no interference by pumping from other wells, which would increase drawdown.

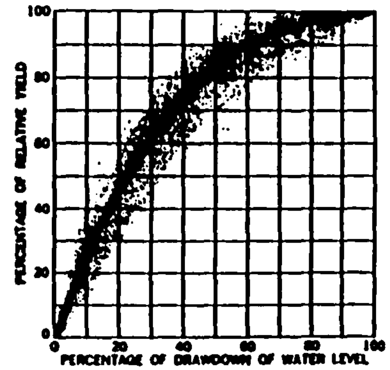


Figure 7.—The curve shows that an increase in yield of a well is not directly proportionate to an increase in drawdown of the water level. A yield of nearly 90 percent of the total capacity of a well results from lowering the water level only 50 percent of the available drawdown.

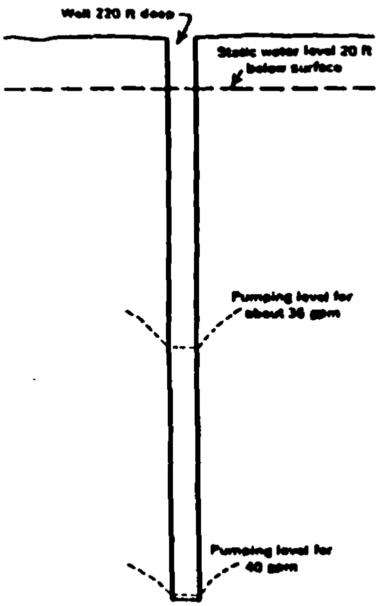


Figure 8.—Yield of a well at two different pumping rates.

DEPTH OF WELLS

How deep should a well be drilled? This question is not easy to answer for an individual well. In most places fractures in the rock get smaller and fewer with depth and deep drilling may not be economical. Figure 9 shows the percentage of total yield for certain depths in an average well.

The following table shows the percentage of wells that reach their maximum yields at certain depths below which drilling is useless. As

Depth (feet)	Percentage of wells
75	20
100	30
150	50
200	70
300	85
400	95

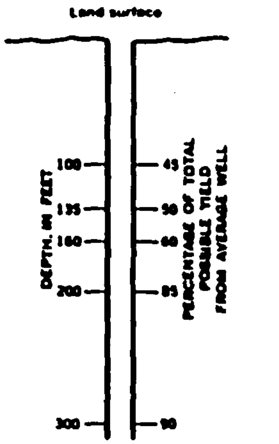


Figure 9.—Extent to which deepening of average well increases the yield.

most of the interconnecting fractures occur in a zone no deeper than 150 feet below the land surface, it may be wise to drill no deeper than 150 feet if the yield is very poor, or no deeper than 300 feet in almost all cases.

FRACTURES IN THE ROCK

Figure 10 illustrates six different fracture patterns in rocks penetrated by wells. To simplify the illustrations the water table and soil thickness are considered uniform, and each well, cased to 50 feet, is 250 feet deep. The approximate number of times each general pattern of fractures occurs in 100 wells is shown in percentage beneath each type. Well *A* penetrates no fractures below the casing; therefore, the well yields no water. Well *B* penetrates a fracture zone in which two or more fractures occur a few feet below the casing. This type of well is common. It may yield as much as 10 to 20 gpm for a period of several minutes until the fractures are drained. Then its yield will likely decline suddenly, and the amount of decline will depend upon the amount of water transmitted to the well by the soil and the underlying thin zone of fractured rock. That part of the well below the fracture zone contributes no water and acts only as a storage reservoir into which water drains. The yield of this well does not increase with increased drawdown. Well *C* penetrates only one fracture, a large one near the

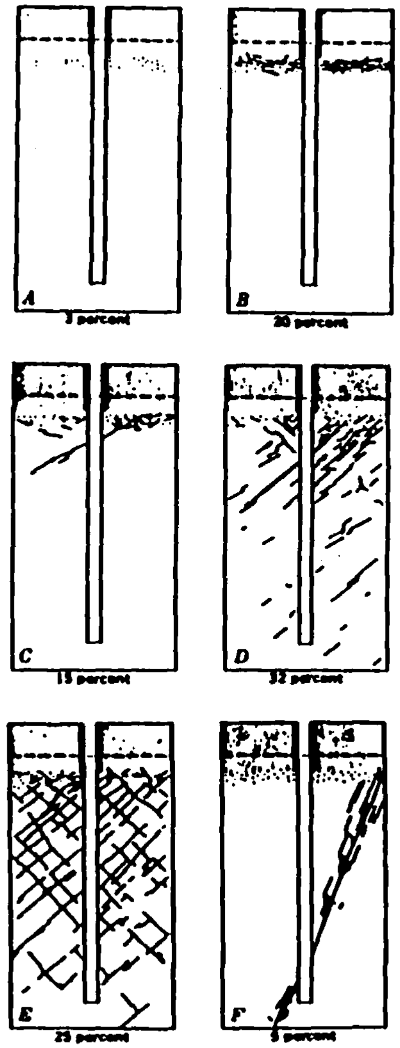


Figure 10.—Six types of ground conditions showing distribution of fractures that influence the yields of wells. The stippled pattern represents soil and soft rock; the dashed line is the water table. The degree of frequency of the different types is shown in percentage.

top of the fresh rock. This well is similar to well *B*. It may yield considerable water for a few minutes until the stored water in the fracture is drained. The perennial yield, under continuous pumping, will depend on the permeability of the soil and weathered rock and on the amount of water that is released to the fracture. Well *D* penetrates several fractures, which contribute small amounts of water, and a large fracture at a depth of about 90 feet. Well *E* penetrates several small- to medium-sized fractures. These fractures are larger and more closely spaced in the upper part of the bedrock. Well *F* penetrates only one fracture—a large one below a depth of 200 feet.

WATER TABLE

The water table, or upper surface of the underground reservoir, continuously fluctuates and reflects changes in underground storage. During droughts we see evidence of a falling water table when many shallow wells go dry. We also can detect a lowering of the water table locally around wells from which water is pumped. There is a continual discharge of ground water by seepage into streams, by evaporation, and by transpiration through vegetation. The discharge causes a gradual lowering of the water table except for periods during and immediately after significant precipitation when recharge to the underground reservoir exceeds the discharge from it and the water table rises. Figure 11 shows the trends of water-level fluctuation in a well at *Chapel Hill, N. C.* The water level in this well is controlled entirely by natural conditions, and its fluctuation is typical of that in the region. There is a characteristic seasonal change in the water table, which begins to decline in April or May owing to the increasing amount of evaporation and transpiration of plants. In November or December, when much of the vegetation has become dormant, the precipitation first makes up the summertime soil-moisture deficiency and then again becomes effective in producing recharge, and the water table begins to rise. In a year of normal rainfall the recharge to the underground reservoir is approximately equal to the discharge from it, so that the water table

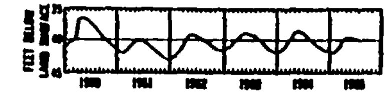


Figure 11.—The water table generally declines in summer and fall but rises to a high level in early spring, as shown by the record of this well in Chapel Hill, N. C.

Table 2.—Concentrations of chemical constituents and their characteristic effects on water use in the region

[Concentration in parts per million except as indicated. Occurrence, where noted, is given in parenthesis after concentrations]

Constituents	Concentration	Characteristic effects on water use
Silica (SiO_2)	Rarely less than 15 or more than 45, commonly 20 to 35.	Forms hard scale in pipes and boilers but not normally a serious problem in the region.
Iron (Fe)	Commonly less than 0.3 in natural water, but corrosion of iron pipes from water with pH less than 6.8 causes a fairly common iron problem.	More than 0.3 ppm stains laundry, utensils, and fixtures reddish brown.
Calcium (Ca) and magnesium (Mg)	Rarely less than 5 or more than 60 (commonly 5 to 20 in water beneath light-colored soils and 15 to 50 in water beneath dark-colored soils).	Cause most of the hardness and scale-forming properties of water. (See hardness below.)
Bicarbonate (HCO_3)	Rarely less than 15 or more than 150, commonly 30 to 100.	Concentrations in region are not generally high enough to cause trouble.
Sulfate (SO_4)	Rarely less than 1 or more than 100, commonly 1 to 40.	Concentrations in region are not generally high enough to cause trouble.
Chloride (Cl)	Rarely less than 1 or more than 40, commonly 1 to 20.	Salty taste to water having more than a few hundred parts per million.
Fluoride (F)	Rarely more than 1, commonly 0.0 to 0.6.	Concentration between 0.6 and 1.7 ppm in water retards decay of teeth, but amounts in excess of 1.5 ppm may cause mottled enamel of teeth.
Nitrate (NO_3)	Rarely more than 20, commonly less than 10.	Where concentration is greater than 20 ppm, contamination from sewage may be suspected. Water of concentrations greater than 45 ppm may be harmful to babies.
Dissolved solids	Total of all mineral matter rarely exceeds 250, commonly 70 to 150.	Water containing more than 1,000 ppm of dissolved solids is unsuitable for most purposes.
Hardness as equivalent $CaCO_3$	Rarely less than 10 or more than 150 (commonly 10 to 50 in water beneath light-colored soils and 40 to 200 in water beneath dark-colored soils).	Causes consumption of soap before lather will form. Hard water forms scale in boilers and hot water heaters. Water whose hardness is less than 60 ppm is considered soft; 61 to 120 ppm, moderately hard; 121 to 180 ppm, hard; more than 180 ppm, very hard.
pH	Rarely less than pH of 5.5 or more than 7.5 (commonly 5.5 to 6.8 in water beneath light-colored soils and 6.8 to 7.5 in water beneath dark-colored soils).	Values less than 7.0 indicate acidity, and corrosiveness of water generally increases with decreasing pH.

at the end of the year is at about the same level as at the beginning of the year. Wells drilled into rock may, when pumped at full capacity, yield slightly less during the driest part of the year when the water table is low. Yet there appears to be no evidence to support the general belief that the water table has been declining during recent years.

CHEMICAL QUALITY OF THE WATER

In comparison with ground water in widely scattered regions of the world, the water in the Piedmont and Blue Ridge provinces ranks among the best in chemical quality. (See table 2.) Most of the water is low in total dissolved solids and is generally soft, but some is moderately hard.

Iron in water is the most common complaint. As little as 0.4 ppm (parts per million) will cause a red stain on plumbing fixtures. About 5 of every 10 wells yield water with less than 0.3 ppm of iron. About 4 of 10 wells yield water with just enough iron to cause a slight stain, and about 1 of 10 wells yields water that has considerable iron. Some iron problems result when iron is dissolved from rocks, and other problems result when water, moving through iron pipes, consequently picks up a brown iron stain by corrosion. It is important to determine the source of the iron, whether dissolved from the rocks or from the pipes, before methods for its removal are employed. Most of the water is satisfactory for use without any type of treatment (table 2). Yet an analysis of the water should be made as soon as a well is drilled to determine if treatment is necessary. It is not possible to determine the quality of water before a well is drilled.

CONTAMINATION OF GROUND WATER

In view of the many hundreds of thousands of wells that are interspersed with about an equal number of septic tanks and other waste sites, it is proper to give serious attention to the possibility of contaminating an individual water supply. The tendency for ground water—and contaminants that might be in it—to move naturally from upland areas toward stream valleys offers help in planning wells and waste sites to avoid contamination. A well that is pumped may modify the natural movement of water and draw contaminated water toward it; this condition is more likely where the soil is thin or absent than where it is thick. Care should be taken to see that no water from the land surface can seep easily into the well around the casing. Not only is the well site important but so is the waste site. In most cases the chances of contaminated water from a waste site moving into a well are not easy to predict, but a few general statements can be made. For example, at a waste site (1) a deep water table is safer than a shallow water table, (2) thick soil is safer than thin soil or rock outcrops, (3) sandy soil with some clay may be better than a clean sandy soil or a sticky clay soil, and (4) a slope of both the land surface and the water table away from a well is better than one toward it.

The soil and weathered rock are generally effective in preventing waste materials from passing through to underlying rock fractures, but the combination of (1) certain types of wastes, (2) excessive quantities of disposed wastes, and (3) thin soils may result in contaminated water reaching bedrock fractures. Once in the bedrock fractures the contaminated water may move easily to water supplies. Only a small percentage of wells have been contaminated, but proper care in locating and constructing wells and waste sites must be taken to minimize the risk of contamination. Minimum standards specified by health officials, such as those relating to permeability of the soil, distance between a well and a waste site, and depth of the water table, must be followed.

GENERAL STATEMENTS ABOUT GROUND WATER IN THE REGION

1. Ground water may be considered as occurring in an underground reservoir, the water being held in the open spaces of the rock materials. The water table, representing the top of the reservoir, generally lies in the clay, or disintegrated rock materials. In the lower part of the reservoir, water occurs in interconnecting fractures in bedrock; the fractures diminish in number and size with increasing depth. Water enters the fractures by seeping through the overlying clay, and drilled wells draw water from these fractures. The source of this water is precipitation in the general area of a well and not in some remote place.

2. A layer of residual soil and weathered rock lies on the fresh rock in most places; the thickness of the soil and weathered rock ranges from zero to slightly more than 150 feet.

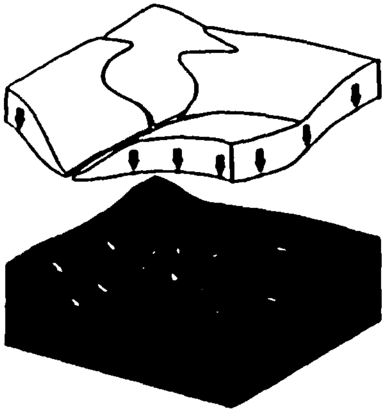


Figure 12.—Dry zone (above water table) lifted up to show water table or surface of saturated zone. Movement of water (arrows) tends to be downward in the dry zone and lateral toward streams in the saturated zone.

3. The water table has a hill and valley relation that approximately conforms with surface topography, although the water table is somewhat flatter. (See fig. 12.) For example, a creek or river is the surface expression of the water table in a valley, but beneath a hill the water table may be 30 to 70 feet below the ground surface. Ground water, like surface water, has the tendency to drain away from the hills to the valleys. This tendency helps in planning the location of wells in relation to other wells and to sources of possible contamination.

4. A close network of streams prevails, and in most places on an upland area a perennial stream is less than 1 mile away.

5. Toward the streams is a continuous flow of ground water. Some of the outflowing ground water is used up by evaporation and by transpiration of plants in the valley areas; the remainder of the water discharges as small springs and as bank and channel seepage into the streams.

6. The natural movement of ground water is relatively short and is almost everywhere restricted to the zone underlying the gross topographic slope extending from a particular land-surface divide to the adjacent streams.

7. In ideal cases the pumping of a well causes the water table to be depressed smoothly in the shape of an inverted cone, the apex of the cone being in the well; however, the erratic distribution of rock fractures and the contrasting nature of permeability between rock fractures and overlying soils cause the depressed part of the water table to extend unevenly around a well. Where two heavily pumped wells are within a few hundred feet of each other, there is a strong likelihood of some *interference of pumping* level between the two, but in most cases there is not any appreciable interference between low-yielding wells a few hundred feet apart. From a pumped well the depressed part of the water table rarely extends beneath a perennial stream or beneath a hilltop to a slope on the opposite side. Well interference is local, and there is no regional lowering of the water table because of pumping.

8. The relation of the depth of a well to yield of the aquifer is not simple. In spite of some beliefs, water already available to a well is rarely lost by drilling deeper; therefore, there is always a chance of getting a larger supply by increasing the depth of the well. Yet this chance becomes poorer as the well deepens because the interconnecting fractures and the ability of the rocks to store and transmit water decrease significantly with depth. More than 90 percent of all ground water occurs in the first 100 feet below the water table. Generally two wells 200 feet deep each will yield more water than one well 400 feet deep.

9. The relationship of topography to yield is emphasized. The great majority of wells are located on hills or smooth upland slopes because of convenience and because these locations appear safe from sources of contamination. Yet the percentage of low-yielding wells is much greater on hills and upland convex slopes than in lowlands or draws (concave slopes that lead upward from a valley to a saddle or sway-backed position in a ridge). Steep-sided depressions, such as gullies and ravines, should not be considered acceptable sites for wells.

10. In general, wells are more productive and tend to have a more stable year-round yield where there is a thick mantle of soil than where bare rock crops out. The presence of a soil cover and the absence of rock outcrop

suggest that water moves downward into the rock and is not readily shunted toward the adjacent valley; in fact, the soil cover suggests that interconnecting rock fractures are available to store water and to transmit it to wells. Where there is a good soil cover, the water table generally *lies in it*; *therefore*, the storage capacity in the vicinity is much greater than where bare rock is exposed and where the only water in storage is in the rock fractures that might be quickly drained.

11. Simple clear-cut statements about the water-yielding properties of the various types of rocks are not easy to make. There are many varieties of igneous and metamorphic rocks, but for a discussion of their ground-water properties they may be grouped as follows: (1) Somewhat massive igneous rocks, such as granite, and (2) metamorphic rocks, such as schists, gneisses, and slates, which may show an alinement of minerals or an alinement of cleavage planes or openings along which water may move. In some places a type of rock may have distinctive water-bearing characteristics, but, if so, it is also likely to show distinctive topographic and soil-mantle features. Topography and soil-mantle features are readily observed and may be used as criteria for predicting the water-yielding potential of a well site, whereas the water-bearing characteristics of a type of rock by itself may be obscure. At any rate, there are too many complex factors involved to justify generalizations about the yield of wells in individual types of rock.

12. Whenever water is pumped from a well, the water level is lowered in and around the well. The drawdown increases with an increase in the rate of pumping, although this relation is not simple. For example, a well yielding 20 gpm with a drawdown of 50 feet will not double its yield by increasing the drawdown to 100 feet. Instead, it will yield less than 40 gpm and perhaps no more than 25 to 30 gpm with a drawdown of 100 feet.

13. Some wells that are pumped heavily tend to decline gradually in yield. This fact may be due to the following circumstances. The size and setting of a pump are determined from a short bailer or pumping test when the well is completed. Such a short test may not indicate the long-term yield of the well because the first water is withdrawn form storage in the rock materials, and many hours, days, or even months may pass before there is a stable adjustment between the amount of water that the fractures can feed into the well and the amount of water available to drain through the overlying clay into the fractures feeding the well. Failure to have knowledge of water-level fluctuations as a result of pumping is the cause of many well problems and of the erroneous conclusion that well supplies are not dependable. If a well tends to have an unstable yield, it is probably overpumped. A reduction in the rate of pumping and consequently a raising of the water level will result in a perennially safe yield. *Constant pumping* at a moderate rate does not damage a well.

14. There is a tendency for rocks underlying a light-colored soil to yield water that is low in dissolved mineral matter and is soft. On the other hand, rocks underlying darker soils (dark red, brown, and yellow) tend to yield water that is slightly hard, or hard, and that may contain objectionable amounts of iron.

15. Many people think that a shallow depth to the water table is an indication of a good yield of a potential well, but this is not a rule to follow. In fact, where the water table is only a few feet beneath the land surface on an upland area, the rock fractures may be so scarce that water may not be able to move downward in the rock; it is held near the ground surface and perhaps is shunted out to the land surface as a wet seepage spot on a *steep slope*.

16. There are many mistaken notions about the availability of ground water in the region. These notions arise from lack of knowledge of the occurrence and movement of ground water and of the behavior of wells. The common erroneous statement that a certain town in the region could not depend on well water stems from the existence of a limited number of wells; never has the underground reservoir beneath any town or city in the region been completely depleted of its water. There has been a tendency for towns of about 3,000 people to convert from well supplies to a treated surface-water supply; such conversion commonly occurs when the town requires more than 300,000 gallons of water per day, an amount which only a few wells in aggregate may not produce. Few towns have the experienced persons with diversified knowledge of wells and ground-water conditions to provide the good management comparable to that of municipal surface-water supplies.

SOURCES OF INFORMATION

There are many sources of information about ground-water conditions in specific parts of the region. At least one agency in each State has cooperated financially with the U.S. Geological Survey, and these agencies have contributed in some way to the results of this report. Further information about reports published or work in progress may be obtained from the district offices of the Geological Survey in each State or from the respective State cooperating agencies.

GEOLOGY AND GROUND-WATER RESOURCES OF THE ASHEVILLE AREA NORTH CAROLINA

By

HENRY TRAPP, JR.
GEOLOGIST, U. S. GEOLOGICAL SURVEY

GROUND WATER BULLETIN NUMBER 16

NORTH CAROLINA
DEPARTMENT OF WATER AND AIR RESOURCES
George E. Pickett, *Director*

Division of Ground Water
Harry M. Peek, *Chief*

PREPARED COOPERATIVELY BY THE GEOLOGICAL SURVEY
UNITED STATES DEPARTMENT OF THE INTERIOR
AND THE NORTH CAROLINA
DEPARTMENT OF WATER AND AIR RESOURCES

APRIL 1970

Hydrologic Cycle

The natural and continuous circulation of water between the atmosphere and the earth is called the hydrologic cycle. Water in the form of rain or snow (precipitation) falls upon the surface of the earth. Par drains off directly into streams and eventually to the ocean (runoff). Part of the water is evaporated or transpired by plants (evapotranspiration). A significant part of the precipitation infiltrates the soil cover into underlying rock and reaches the zone of saturation. The water in the zone of saturation is called ground water. After it reaches the zone of saturation, it flows toward places where it discharges into streams or lakes or directly into the ocean, or where it comes near enough to the surface to be lost by evaporation. The cycle is completed by the return of water to the atmosphere in the form of vapor (fig. 6).

Occurrence of Ground Water

Ground water occurs in rock openings that may be either primary or secondary. Primary openings are formed at the same time the rock was formed, such as the spaces between pebbles in a gravel bed. Secondary openings are those formed after the rock was formed, such as fracture and solution openings. Crystalline rocks, including granite, gneiss, and schist, have little pore space between the component grains. The opening which yield water in these rocks are secondary, and include joints, fractures, cleavage planes, planes of schistosity, bedding planes, and solution channels. These are not uniformly distributed through the rock. Most of the ground water in the Asheville area occurs in secondary openings. Some exceptions are water in local sand and gravel deposits.

An underground zone or layer which is a source of water is called an aquifer. Where the water is not confined beneath an impermeable layer of rock, the upper surface of the zone of saturation (called the water table) is free to rise and fall with changes in atmospheric pressure and precipitation. It is not a flat surface but generally reflects, in a subdued way, the irregularities of topography. The water table intersects ground level at springs, streams, lakes, and ponds. Where ground water occurs only in irregularly distributed fractures and other secondary openings, the water table can be very irregular or discontinuous.

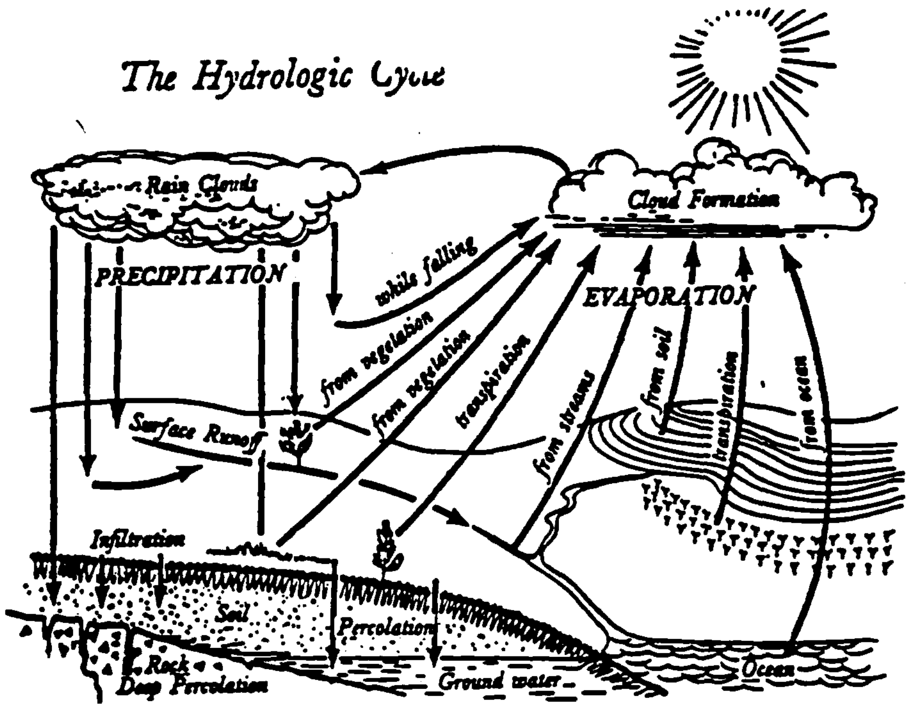


FIGURE 6.- DIAGRAM OF THE HYDROLOGIC CYCLE.

Under artesian conditions, water is confined under sufficient pressure to cause it to rise above the level at which the aquifer is penetrated in a well. An artesian well is not necessarily a flowing well. The imaginary surface that coincides with the static level of the water in the artesian aquifer is called the piezometric surface.

Almost all hand-dug wells are water-table wells. It is possible that a few of the deeper ones in this area, which were blasted into solid rock at the bottom, may be artesian. Some of the drilled wells are known to be artesian. These include several flowing wells and others where the static water level differs substantially from the water level of a nearby dug well or body of surface water. In most of the drilled wells inventoried in the course of this study, it was not possible to determine whether water-table or artesian conditions prevail, because the depth at which water was reached is not known.

Springs are usually located at the head of a draw or the foot of a bluff. Springs may occur where the water table intersects the ground surface, as at changes in slope.

Because of soil cover or sealed enclosures, it is usually difficult to ascertain the nature of the origin of springs. In a few larger springs, the water can be seen issuing from fractures in the rocks. Most smaller springs appear to issue from the contact of soil or saprolite and unweathered rock. In this type of spring, water seeps into the soil on a hill and forms a thin zone of saturation just above impermeable bedrock. Where bedrock crops out, the overlying zone of saturation intersects the ground surface, forming a spring.

Current Use of Ground Water

Springs

Springs are common throughout the Asheville area, particularly in the hills. Most of the springs are small, with yields of about 1 gpm (gallon per minute) or less.

The largest spring known in the area is Bubbling Spring, in the flood plain on the southwest side of the French Broad River, 1 mile northwest of Hot Springs (Madison County). It has a reported yield of about 250 gpm when pumped. The water is probably rising from the Rome Formation through a thin cover of alluvium. The Rome Formation has many minor crenulations and dips nearly vertically in exposures in the

Reference No. 12

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Table 2.2 Range of Values of Hydraulic Conductivity and Permeability

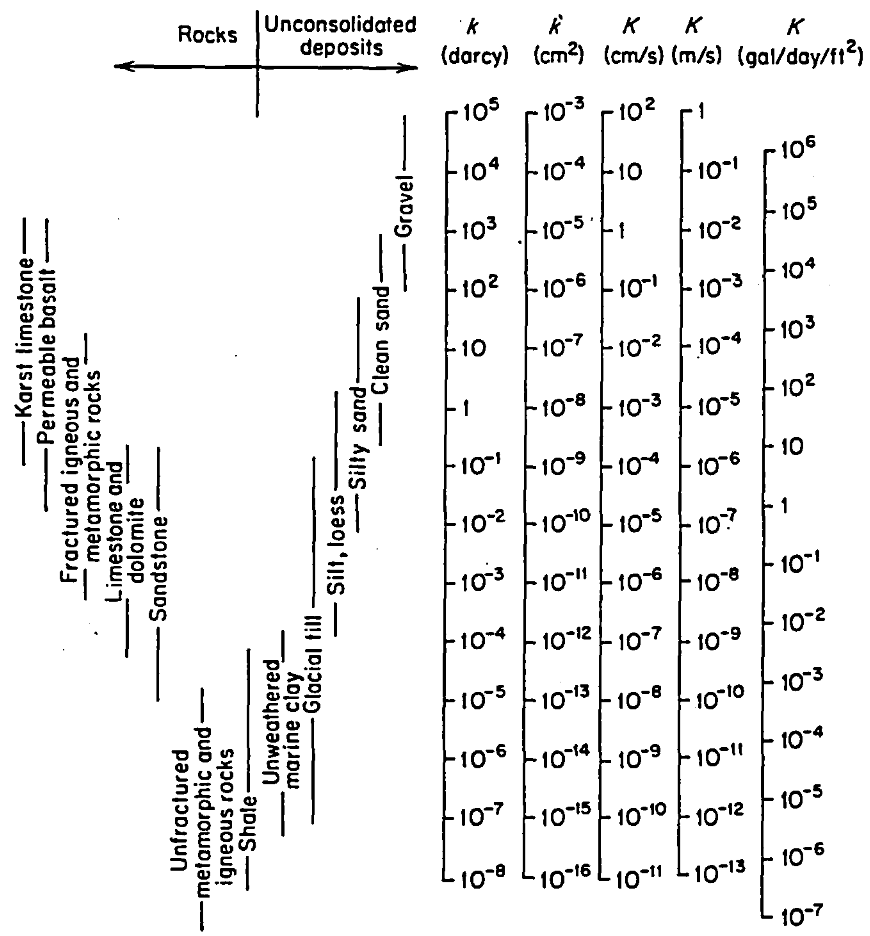

Table 2.3 Conversion Factors for Permeability and Hydraulic Conductivity Units

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

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

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53

Reference No. 13

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ALL-WEATHER
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Notebook No. 311

F4-1741

Site name Trend Line Furniture Corporation (Conover)
Brcs # NCD~~915~~
TDD No. F4-8909-54
Project Mgr. Prince L. Goins

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.

10-16-89 18:00

The undersigned have read the work plan for this phase of the site assessment. No study plan or safety plan are generated for off-site recons.

x Prince L. Goins
PRINCE L. Goins

x Clifford Leonard Jr.
Clifford Leonard Jr.

x Eric Corbin
Eric Corbin

All entries will be made by Prince L. Goins with initials being (P.L.G.).

10-16-89 18:00 P.S.G.

The temperature was 75° and no rain in the forecast.

The site was located directly off 4th Street Pl. S.W.

The surrounding of the facility was completely fenced and patrolled.

No stress vegetation and the nearest residence was 50 feet.

No leaks were noted on site from outside view. The area Looks to be completely asphalt.

There was worker noted on site about 200-300 not approximate.

P.S.G.

10-16-89 18:00 [illegible]

Their was a nearby subdivision in the rear and seem to be vacate field and road.

The land look to be flat and has several or more building on-site.

I interviewed with the county water department and they said that they purchase there water from Hickory water department.

There is a occupied building slightly to the northeast.

Reference #14

NUS CORPORATION AND SUBSIDIARIES

CONTROL NO. F4-8901-01	DATE: March 1, 1989	TIME: 1040
DISTRIBUTION: Weber USA, Inc. (formerly Carter-Weber, Inc.)		
BETWEEN: Gene Haynes, Public Utilities Superintendent	OF: The city of Hickory	PHONE: (704) 322-1910
AND: Stephen F. Modica, NUS Corporation		

DISCUSSION:

Subject: City Water Distribution

Mr. Haynes and I discussed the extent of water distribution in the ~~city of~~ Hickory area. Mr. Haynes indicated that the city of Hickory water lines extend from Lake Hickory South along H.W. 127 to Cloniger Mill Road; from that point it water lines proceed ~~proceeds~~ southeast along Cloniger/Kool Park Road until they ~~it~~ intersect Springs Road. Distribution partitions both north and south. The north extent continues along Springs Road/Sulphur Springs Road to Wandering Lane. The southern extent continues due south (as the bird flies) until it intersects with Tate Blvd. Eastern distribution extent follows Tate Blvd. until it intersects Fargrove Road which turns due south to intersect H.W. 64/70. The water lines follow H.W. 64/70 until it intersects H.W. 321. Water lines then proceed north back to Lake Hickory where the intake station is located.

The city of Hickory has approximately 12,000 connections. As far as the surrounding municipalities are concerned they acquire their water from:

1. St. Stephens - own system
2. Conover - served by city of Hickory
3. Brookford - own system
4. Longview - own system
5. Rhodhiss - own system
6. Claremont - served by Conover
7. Oxford - unknown where they acquire their H_2O
8. Fairbrook - H_2O acquired from Hickory and Newton
9. Newton - acquires their own water

* Hickory acquires their water from Lake Hickory which in turn acquires its water from Lake James.

NUS CORPORATION AND SUBSIDIARIES	Reference No. 15	*TELECON NOTE*
CONTROL NO.	DATE: October 20, 1989	TIME: 2:00pm
DISTRIBUTION:		
BETWEEN: James Borawa	OF: North Carolina Fisheries Department	PHONE: (704) 299-7023
AND: Clifford Leonard, NUS Corporation Clifford Leonard, Jr.		

DISCUSSION:

Lots of sedimentation in South River and probably Clarks Creek. The area has little to no fishing or bathing.

ACTION ITEMS:

NUS 067 REVISED 0685

CATAWBA Reference No. 16

06/21/89

NORTH CAROLINA NATURAL HERITAGE PROGRAM ELEMENT LIST

scientific and common name	state stat	fed stat	state rank	glob rank
HYBOPSIS ZANEMA SANTEE CHUB	SC		S3	G3?
DRY-MESIC OAK--HICKORY FOREST			S5	G5
AMORPHA SCHWERINII SCHWERIN'S AMORPHA	PP		S2	G2G3
HEXASTYLIS NANIFLORA DWARF-FLOWERED HEARTLEAF	E	LT	S2	G2G3
MONOTROPSIS ODORATA SWEET PINESAP	SR		S2	G3
STELLARIA COREI CORE'S STARWORT	SR		S3	G3

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
G=geologic feature
I=invertebrate animal
N=nonvascular plant
P=vascular plant
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 o_ t e atura 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 an Conservation Act, 1979); the other two categories indicate rarity and the need for population monitoring, as determined by the Plant Conserv tion and Natural Heritage Programs.

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

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

GRANK: Nature Conservancy "global rank."

- 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 vulnerabl 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 i 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 questionabl taxonomic status.
- T_ = an additional status for the subspecies or variety; the G r 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.