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# SDMS

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Site: CRACKER ASPHALT
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# ADEM

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September 15, 1994

REC'D.
SEP 26 1994
WPB-SAS

Mr. Brian Farrier
CERCLA PA/SI Regional Project Officer
USEPA Region IV
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Dear Mr. Farrier:

Enclosed, you will find a Preliminary Assessment report for the following:

**Cracker Asphalt**

Please advise us when this report has been evaluated and a determination has been made concerning its acceptability. Should you have questions or require assistance in evaluating this report, please do not hesitate to contact our staff.

Sincerely,

Jymalyn E. Redmond

Jymalyn E. Redmond, Chief
Site Assessment Unit

JER/tpc

10449697

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SI APPROVED
BJ 10/25/94

**PRELIMINARY ASSESSMENT**
**CRACKER ASPHALT**
**TUSCALOOSA / HALE COUNTY, ALABAMA**
**EPA ID No.: AL0000412112**
**SITE REF. No.: 6243**


***Prepared By***
***Jerremy Stamps***
***Alabama Department of Environmental Management***
***Special Projects***

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# 1. INTRODUCTION

Under authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA) and a cooperative agreement between the U. S. Environmental Protection Agency and the Alabama Department of Environmental Management (ADEM), a Preliminary Assessment (PA) was conducted at the Cracker Asphalt site in Moundville, Tuscaloosa County, Alabama. The purpose of this investigation was to collect information concerning conditions at the site sufficient to assess the threat posed to human health and the environment and to determine the need for additional investigation under CERCLA/SARA or other action. The scopes of the investigation included a review of available file information, a comprehensive target survey, and a site reconnaissance on August 18, 1994.

# 2. SITE DESCRIPTION, SITE HISTORY, AND WASTE CHARACTERISTICS

## 2.1 Location

The Cracker Asphalt Facility (CAF) is located in Tuscaloosa County, Alabama (see Figure 1). The geographic coordinates are 33° 00' 42.86" N latitude and 87° 37' 22.18" W longitude (Reference 1; Reference 2). The town of Moundville is a small incorporated community consisting of approximately 1348 residents (Reference 11). Within one half a mile of the site there are two industries, two service stations, a grocery store, a video store, the Mound State Monument and approximately 3 homes (Attachment 3).

The Moundville area has a moist subtropical climate with precipitation well distributed throughout the year. Tuscaloosa County receives precipitation of 0.10 inch or more approximately 75 days out of each year and has an average yearly precipitation of 49.26 inches. (Reference 3)

The mean annual temperature for Tuscaloosa County is approximately 63.4° F. On a monthly average, January is the coldest and July is the warmest. January has an average daily maximum temperature of 54.9° F and an average daily minimum temperature of 33.5° F. July has an average daily maximum temperature of 91.7° F and an average daily minimum of 70.2° F. (Reference 3)

## 2.2 Site Description

The CAF site is located in the SW 1/4 of the NW 1/4 and the NW 1/4 of the SW 1/4 of Section 31, Township 24 North, Range 5 East in Tuscaloosa County, Alabama (see Figure 1). The CAF site is bound on north by pine forest and swamp land, and then by the Black Warrior River; on the south by rail road tracks, and then by residential property and farm land; on the east by a dirt methane well access road, and then by pine forest and swamp land; on the west by Lauter Chemical Plant, and then by the Mound State Monument (see Plate 1). The nearest residential property is approximately 400 feet to the south of the site. (Attachment 3)

The CAF site is an approximately 25-acre dogleg shaped parcel of land. It is presently improved with 9 buildings, 24 above ground storage tanks and a lagoon that captures most of the surface water runoff from the site. The site is accessible to the general public from all directions. The only part of the site currently being utilized are the buildings on the site (see Figure 2 and photographs in Appendix A).

The CAF site is approximately 100 to 175 feet above mean sea level with a 2 to 6 percent sloping topography. All the Area surrounding the CAF site is at elevations lower than that of the site. Therefore, surface water runoff from the surrounding area would not flow across site under normal conditions. The Black Warrior River runs along the northwest boundary of the CAF site and is the nearest probable point of entry (PPE) into the surface water pathway for runoff exiting from the site (see Plate 1).

## 2.3 Operational History

During a bankruptcy sale that took place in 1968, Conrad Wesselhoeft purchased the CAF site. The CAF site was previously owned by Cracker Asphalt Company, an asphalt refining and storage company. The Cracker Asphalt Company left behind warehouses, shops, various types of petroleum and asphalt processing equipment, a cooling pond, a sediment pond and several large above ground storage tanks. After purchasing the property, Mr. Wesselhoeft's metal fabrication business made use of the office, shops, warehouses and much of the open space on the site. Mr. Wesselhoeft also has occasionally leased one of the tanks (350,000 gallon capacity) on the site to Southern Resins Company (SRC) for storage of by-product petroleum solvents. (Attachment 3)

On April 29, 1986, Fred Mason, with the Alabama Department of Environmental Management (ADEM), observed spillage in the containment area of the CAF tank leased to SRC. Mr. Mason also informed John Elliot, the superintendent for Wesselhoeft, Inc., about the UST Program and that it would be necessary for his employer to have the asphalt lagoon closed or permitted (Attachment 2).

On May 6, 1986, a Notice of Violation (NOV) was issued to Mr. Conrad Wesselhoeft by ADEM. The NOV stated that groundwater was being contaminated by the CAF asphalt lagoon and that it was his responsibility to take actions to correct the problem (Attachment 2).

On June 1, 1986, in response to the NOV issued on May 6, 1986, an engineering report on the investigation of the CAF was received by ADEM Water Division (Attachment 2).

On June 12, 1986, Mr. Charles Horn, Chief of ADEM-Water Division, sent Mr. Wesselhoeft a letter stating that the engineering report his consultant submitted did not address the ground water contamination at the site and that it would be necessary for him to do so before any lagoon closure plan could be approved (Attachment 2).

On September 25, 1986, after no response to a request for a ground water evaluation of the CAF site, Mr. Charles Horn referred the CAF site to the Office of General Counsel for appropriate action (Attachment 2).

On January 12, 1994, Kathleen Keller with ADEM-Water Division reported the CAF site to ADEM-Special Projects. ADEM-Special Projects then sent a site discovery form to the EPA and approval was given to assess the site as a possible EPA Superfund Site (Attachment 1).

On July 27, 1994, Environmental Testing and Engineering sent ADEM a proposed ground water assessment plan for the CAF site. The proposed plan suggests that Mr. Wesselhoeft is willing to investigate and remediate ground water contamination, but can only conduct the investigation and remediation at a pace that he would be able to financially afford.

**2.4 Waste Characteristics**

Waste found at the CAF site is suspected of contributing to ground water and surface water contamination. Petroleum related contaminants have been documented in monitoring wells located along the property boundary between

SRC and CAF. Also at the downgradient SRC facility, Red colored lechate having a petroleum sheen is seeping out of the ground. There is also a possibility that the CAF facility is responsible for surface water contamination via ground water to surface water discharge at the Black Warrior River (Attachment 2).

The possible sources of the documented and suspected contamination coming from the CAF site include a sludge pond, a cooling pond, two asphalt skimmer trenches, a tank that has occasionally been used to store petroleum solvents, and several other tanks that have not been used since the bankruptcy of the Cracker Asphalt Company (Attachment 2).

## 3. GROUND WATER PATHWAY

### 3.1 Hydrogeologic Setting

The CAF site and the surrounding area lie within the Alluvial-Deltic Plain district of the East Gulf Coastal Plain physiographic section. The prominent physiographic feature of this area is the broad, well developed, flat flood plains and terraces that have been formed by the meandering Black Warrior River. (Reference 6; Reference 7)

The geologic units that outcrop in Moundville and the surrounding area are of sedimentary origin and consist of gravel, sand, silt and clay (Reference 9). At the CAF site alluvium and terrace deposits of Quaternary age overlie the Cretaceous age Gordo and Coker formations of the Tuscaloosa Group (Reference 6; Reference 7).

The Quaternary flood plain deposits can be as much as 100 feet thick, and consist mainly of gravel, sand, silt and clay (Reference 7). The Gordo Formation, which lies beneath the flood plain deposits, is as much as 400 feet thick, and consist of sand and gravel overlain by alternating lenticular beds of sand and mottled clay (Reference 7). The Coker Formation, which lies beneath the Gordo Formation, ranges in thickness from less than 100 feet to up to 1,000 feet. The Coker Formation consists of a nonmarine zone of gravel overlain by marine sand and clay. The nonmarine basal zone is generally separated from the marine sand beds by 50 feet or more of clay (Reference 6).

Sand and gravel beds of the Tuscaloosa Group are the major sources of ground water in the study area. Alluvium and terrace deposits may also contain sand and gravel aquifers that are capable of yielding enough water for a private domestic or stock supply (Reference 6).

### 3.2 Ground Water Targets

There are two public water supply wells within the 4-mile ground water target radius (see Plate 1). The water from the two wells is blended together to make up 100 percent of the Moundville Water Works system. The Moundville Water Works has 1,348 connections on its system. The Moundville Water Works also sells 300,000 gallons of water per day to the Hale County Water System. (Reference 5).

The Hale County Water System purchases 40 percent of their systems water from Moundville Water Works and 60 percent from Greensboro Water System. The water that the Hale County Water System buys is blended together before it is used by 2,500 purchasers. (Attachment 5)

### 3.3 Ground Water Conclusions

While there is evidence that the ground water at the CAF site is contaminated, the likelihood of any known municipal wells becoming contaminated is minimal. The nearest public well is greater than a mile to the southwest of the site. The flow direction of ground water in the shallow terrace deposit aquifer beneath the CAF site is thought to be towards the Black Warrior River and not towards the either of the public wells. The public water supply wells located within the 4-mile target radius are screened in the Coker Aquifer. The Coker Aquifer has a flow direction to the southwest but lies deep below the CAF site.

## 4. SURFACE WATER PATHWAY

### 4.1 Hydrologic Setting

The CAF site is outside of the 100-year flood plain (Reference 8) at an elevation of approximately 170 feet above mean sea level (see Figure 1). The northern most part of the site is the lowest portion of the site. The northwest corner of the site has a 60 to 65 foot vertical drop-off to the Black Warrior River that makes it very unlikely that the river will overflow its southern bank in the vicinity of the site.

Overland drainage from the CAF site exits the site via 3 somewhat well defined discharge points as well as many other less defined points (see Figure 2). The most probable point of entry (PPE) for any contaminated overland drainage from the site to enter into the surface water pathway is southwest of the site at a point on Carthage Branch. The previously mentioned PPE is approximately 1/10 a mile upstream of The Black Warrior River. The closest PPE is at the northwest corner

of the site at the point where the CAF site meets with the Black Warrior River. In either case, once the overland drainage enters the Black Warrior River it remains in the river for the remainder of the targeted 15-mile downstream surface water pathway (see plate 1).

The CAF is located within the Black Warrior River Basin (Reference 4). The lowest flow to which the river will decline during 7 consecutive days on an average of once every 2 years of normal flow (7-day Q2) is 935 cubic feet per second (Reference 4).

### 4.2 Surface Water Targets

The 15-mile downstream surface water pathway (SWP) begins and end on the Black Warrior River (Plate 1). There are no known drinking water intakes located along the SWP (Reference 5). Approximately 26 of the 30 miles of river bank land along the SWP is probably considered wetlands. The land along the river banks might also be critical to the support of many threatened and endangered species (see list of species in section 5.2).

### 4.3 Surface Water Conclusion

There is a good likelihood that contaminants from the CAF site have been released into the surface water pathway. Fisheries, wetlands and possibly critical habitats are located along the 15-mile downstream surface water pathway.

## 5. SOIL EXPOSURE AND AIR PATHWAY

### 5.1 Physical Conditions

Except for gates at all road entrances to the site, the CAF site has no manmade barricades to detour or prevent public access. Due to the natural river barrier north of the site and the expansive swamp and forest land to the east and northeast, most access to the site would occur along the south and west borders of the site (see Figure 2).

The USDA Soil Survey, indicates that the site is underlain by Bama Series soils. The soils of this complex are formed from loamy marine sediments of fine sandy loam, loam and sandy clay loam texture. The Bama series consist of deep, well drained, moderately permeable soils that have a moderate available water capacity. Runoff is medium. (Reference 3)

## 5.2 Soil and Air Targets

There are approximately 20 people working on the CAF site, 60 people working at the adjacent Southern Resins Company and approximately 3 people living within 400 feet of the site. The nearest School, Moundville Elementary, is approximately 7/8 of a mile to the southwest of the site (Reference 10). No daycare facilities were seen within 1/2 of a mile of the site during the site reconnaissance. According to the Alabama 1990 census records (Reference 11), the average number of people living in homes located in the counties of Hale and Tuscaloosa is 2.685 residents per household. In the following table, the total population within the target area has been broken down into sub-populations that live within each specified distance radius from the site:

| *DISTANCE FROM SITE* | *POPULATION* |
|---|---|
| 0 TO 1/4 MILE | 3 |
| >1/4 TO 1/2 MILE | 6 |
| >1/2 TO 1 MILE | 453 |
| >1 TO 2 MILES | 821 |
| >2 TO 3 MILES | 629 |
| >3 TO 4 MILES | 558 |
| **TOTAL POPULATION** | 2470 |

None of the CAF site is considered to be a wetland environment. Within the 4-mile target area and the 15-mile surface water pathway are many wetland areas. The nearest wetlands are northwest of the site along the banks of the Black Warrior River. Approximately 35 percent of the total area within one mile of the site may possibly be considered wetlands (see Plate 1).

It is not know if the CAF site itself is a critical habitat for federally designated endangered or threatened species. The table below is a list of the species that may utilize the land and surface waters located within the specified target areas:

| *Common Name* | *Listing* | *Distribution in Alabama* |
|---|---|---|
| Flat Pigtoe Mussel | Endangered | Known in Green County |
| Heavy Pigtoe Mussel | Endangered | Known in Green County |
| Inflated Heelsplitter Mussel | Endangered | Known in Green and Hale counties |
| Orange-Nacre Musket Mussel | Endangered | Known in Green and Tuscaloosa counties |
| Ovate Clubshell Mussel | Endangered | Known in Green and Tuscaloosa counties |
| Southern Clubshell Mussel | Endangered | Known in Green and Tuscaloosa counties |
| Stirrup Shell Mussel | Endangered | Known in Green County |
| Wood Stork | Endangered | Possible occurrence in Green and Hale counties |
| Red-Coakaded Woodpecker | Endangered | Known in Hale and Tuscaloosa counties |
| Indiana Bat | Endangered | Possible occurrence in Tuscaloosa County |
| Dark Pigtoe Mussel | Endangered | Known in Tuscaloosa County |
| Fine-Lined Pocketbook Mussel | Endangered | Known in Tuscaloosa County |
| Flattened Musk Turtle | Endangered | Known in Tuscaloosa County |
| Red Wolf | Endangered | Statewide |
| Backman's Warbler | Endangered | Statewide |
| Eskimo Curlew | Endangered | Statewide |
| American Peregrine Falcon | Endangered | Statewide |
| American Burying Beetle | Endangered | Statewide |

(Reference 12, Reference 13, Reference 14)

### 5.3 Soil Exposure and Air Pathway Conclusion

Due to the Characteristics of the waste present at the CAF site, the soil and air exposure may pose a moderate threat to human health, wildlife and the environment. There are 20 workers employed at the site and the presence of a

Native American burial mound on the north end of the site makes the site likely to be traveled across by trespassers.

## 6. SUMMARY AND CONCLUSIONS

The Cracker Asphalt Company operated an asphalt refining and storage company at the site in the late 1960's. During a bankruptcy sale that took place in 1968, Conrad Wesselhoeft purchased the old CAF site and started a metal fabricating business that produces metal tank heads and large boat anchors. Leakage and spillage from asphalt and diesel fuel storage tanks are believed to be the sources of known ground water and possible surface water contamination. Since all the tanks at the site are currently empty and Mr. Wesselhoeft's metal fabrication business does not use any materials containing the type contaminants found in samples of ground water and lechate from the site, the initial sources of contamination are thought to be no longer be present.

It is recommended that the soil, ground water and possible surface water contamination at the Cracker Asphalt site be further evaluated. Further evaluation would better determine if the conditions that exist at the site actually pose a significant risk to human health or the environment.

## 7. REFERENCES


1. U.S.G.S. 7.5 Minute Series Topographic Quadrangle Maps of Alabama: Englewood 1970 (Photorevised 1983); Foster 1969 (Photorevised 1978); Moundville West 1980; Moundville East 1980 (Photorevised 19843. Scale 1:24,000.

2. U.S. Environmental Protection Agency, Standard Operating Procedure to Determine Site Latitude and Longitude Coordinates, 1991. Calculation worksheet for the Perdido Tire Dump Site.

3. Johnson, Kenneth W., et al., United States Department of Agriculture Soil Conservation Service and Forest Service in cooperation with Alabama Department of Agriculture and Industries and Alabama Agricultural Experiment Station, 1981, Soil Survey of Tuscaloosa County, Alabama.

4. Moore, James D., et al, Geological Survey of Alabama, 1991, Water in Alabama, 1990: Circular 122H.

5. Alabama Department of Environmental Management, Federal Reporting Data System (FRDS-II), Public Water Supply Summary.

6. DeJarnette, Sydney S., and Crownover, Jo E., 1987, Geohydrology and Susceptibility of Major Aquifers to Surface Contamination in Alabama; Area 6: U.S. Geological Survey Water-Resources Investigations Report 87-4113.

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10. State of Alabama-Department of Education, LEA Personnel System (EDLP471), 1992, Total Number of Pupils and Faculty by School and County.

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12. Teem, David H., et al., Alabama Agricultural Experiment Station, 1986, Vertebrate Animals of Alabama in Need of Special Attention.

13. U.S. Fish and Wildlife Services, 1991, Counties in Alabama with Federally Listed Species.

14. Department of Conservation and Natural Resources, 1991 Federally Listed Endangered/Threatened Species.

15. Alabama Department of Environmental Management; Water Division - Water Quality Program, 1993, Water Use Classification for Interstate and Intrastate Waters, Chapter 335-6-11.

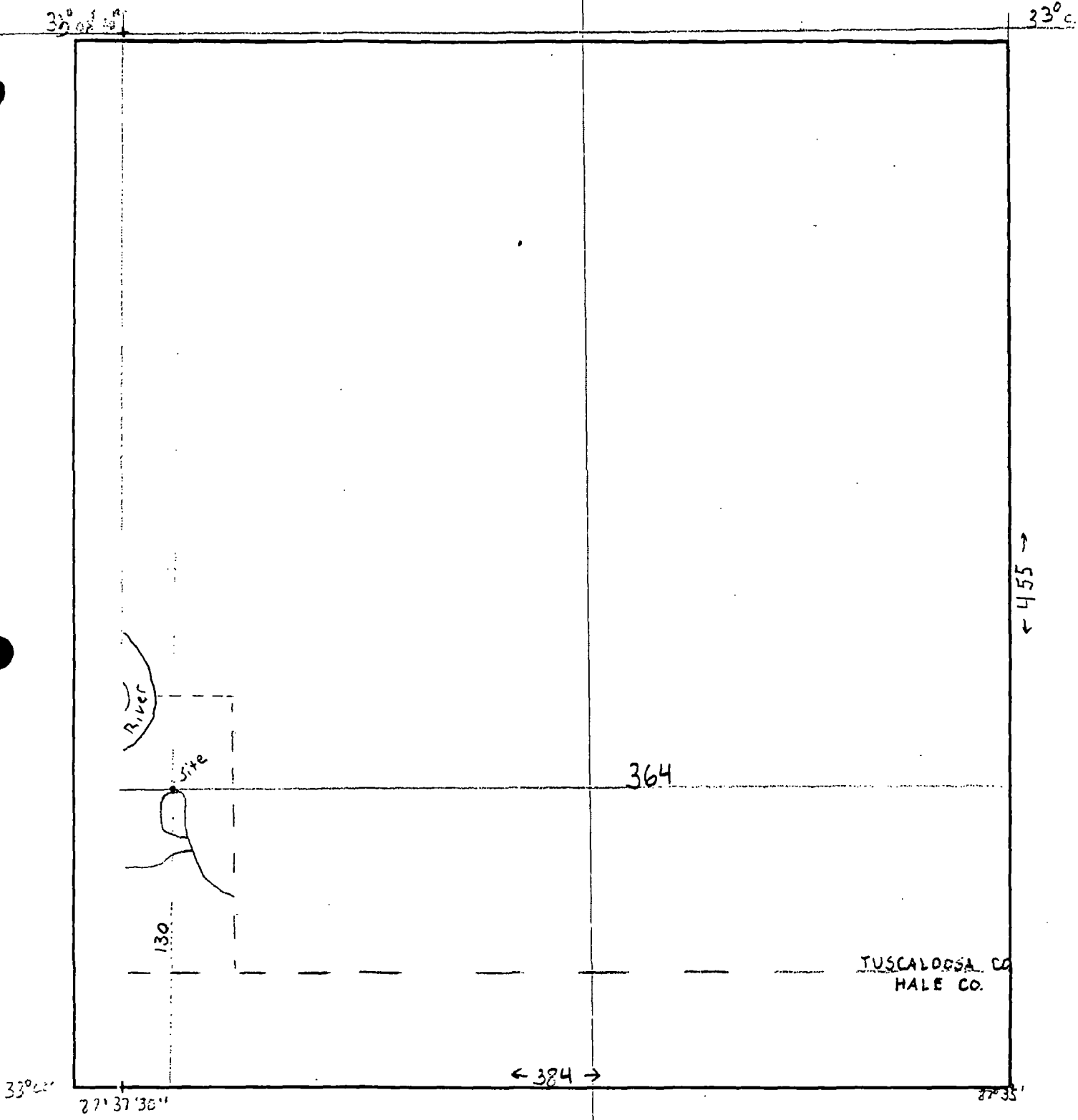
# REFERENCE 1

# REFERENCE 1

(4-mile Radius and 15-mile Downstream Map)

*see Plate 1*

# REFERENCE 2




SITE NAME: Cracker Asphalt NUMBER: Ref # 6243

MAP NAME: Englewood, AL SCALE: 1:24,000 DATUM: 1927

COORDINATES OF LOWER RIGHT HAND CORNER OF 2.5 MINUTE GRID

LATITUDE 33 ° 00 ' 00 " LONGITUDE 87° ° 35 ' 00 "

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

SITE NAME: Cracker Asphalt CERCLIS #: —

AKA: Ref # 6243 SSID: —

ADDRESS: PO Box 3323 ESS Tuscaloosa, AL 35043

CITY: Moundville STATE: AL ZIP CODE: —

SITE REFERENCE POINT: tank

USGS QUAD MAP NAME: Englewood, AL TOWNSHIP: 24 (N)/S RANGE: 5 (E)/W

SCALE: (1:24,000) MAP DATE: 197 SECTION: 31 SW 1/4 of NW 1/4 and NW 1/4 of SW 1/4

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

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

LONGITUDE: 37 ° 30 ' 00 " LATITUDE: 33 ° 00 ' 00 "

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

LONGITUDE: 37 ° 35 ' 00 " LATITUDE: 33 ° 00 ' 00 "

CALCULATIONS: LATITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM LATITUDE GRID LINE TO SITE REF POINT: 130

B) MULTIPLY (A) BY ~~0.3304~~ (150 ÷ 455) = 0.3297 TO CONVERT TO SECONDS:

A x 0.3304 = 42 . 86 "

C) EXPRESS IN MINUTES AND SECONDS (1' = 60"): 0 ' 42 . 86 "

D) ADD TO STARTING LATITUDE: 33 ° 00 ' 00 . 00 " + 0 ' 42 . 86 =

SITE LATITUDE: 33 ° 00 ' 42 . 86 "

CALCULATIONS: LONGITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM RIGHT LONGITUDE LINE TO SITE REF POINT: 384

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS: (150 ÷ 384) = 0.3906

A x 0.3304 = 142 . 18 "

C) EXPRESS IN MINUTES AND SECONDS (1' = 60"): 2 ' 22 . 18 "

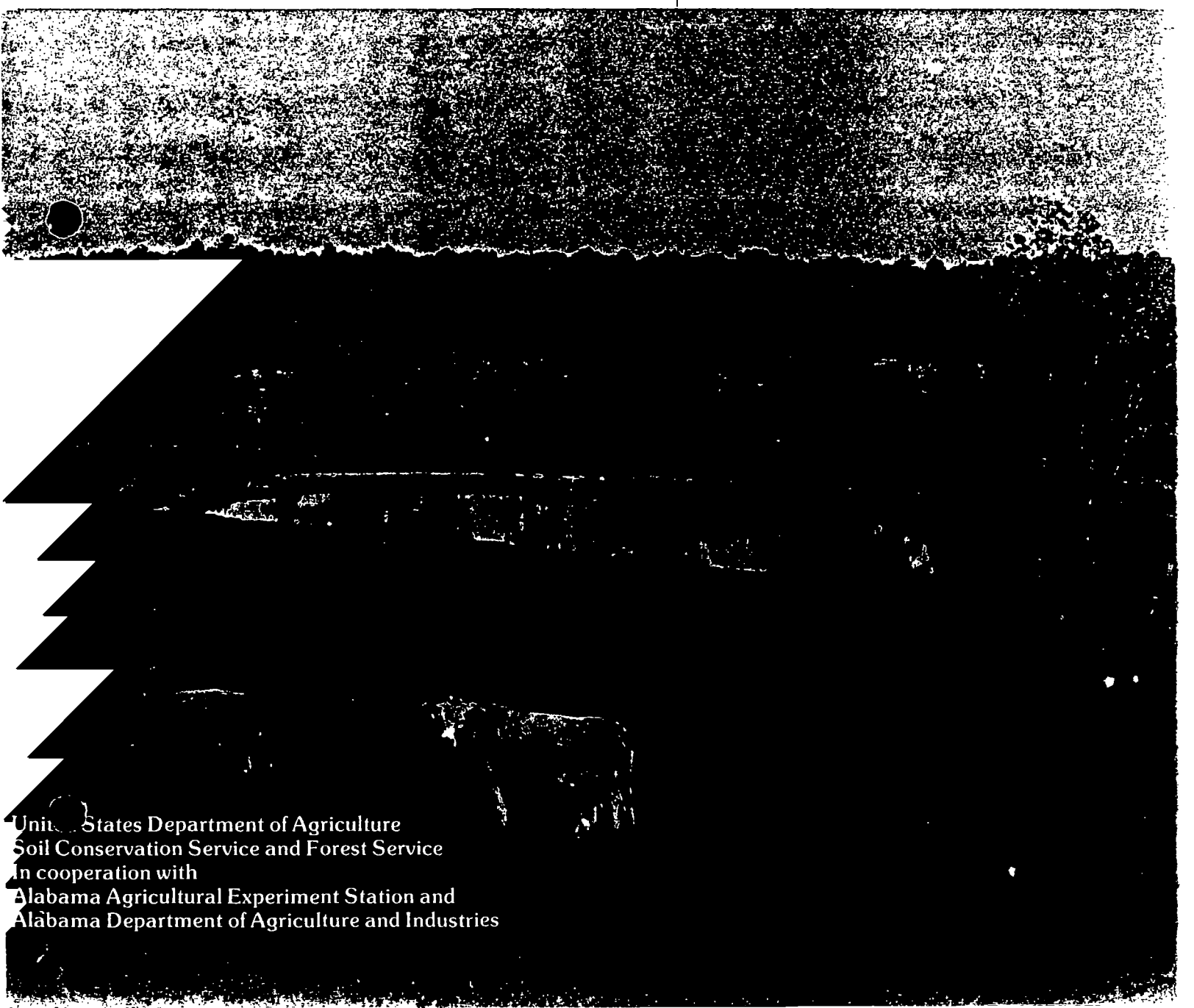
D) ADD TO STARTING LONGITUDE: 87 ° 35 ' 00 . 00 " + 02 ' 22 . 18 =

SITE LONGITUDE: 87 ° 37 ' 22 . 18 "

INVESTIGATOR: [signature] DATE: 8-3-94

# REFERENCE 3

# SOIL SURVEY OF
# Tuscaloosa County, Alabama



United States Department of Agriculture
Soil Conservation Service and Forest Service
In cooperation with
Alabama Agricultural Experiment Station and
Alabama Department of Agriculture and Industries

# soil survey of
# Tuscaloosa County, Alabama

By Kenneth W. Johnson, Soil Conservation Service

Fieldwork by Kenneth W. Johnson, Johnny C. Trayvick, James C. Cotton, and James E. Boman, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service and Forest Service
in cooperation with
Alabama Agricultural Experiment Station and
Alabama Department of Agriculture and Industries

## general nature of the county

Tuscaloosa County is in the west-central part of Alabama. Tuscaloosa, the county seat and major urban area, has a population of about 73,228. The city of Northport is across the Black Warrior River from Tuscaloosa and has a population of approximately 12,000. Just east of the city of Tuscaloosa are two smaller, unincorporated communities: Cottondale and Holt. The county has two other incorporated areas: Brookwood and Vance. In the southern part of the county, the town of Moundville projects into Tuscaloosa County.

Tuscaloosa County is in the second tier of counties from the Alabama-Mississippi state line. It is the second largest county in the state, and has an area of 863,360 acres or 1,349 square miles. Tuscaloosa is bounded on the west by Pickens and Greene Counties; on the north by Fayette and Walker Counties; on the east by Walker, Jefferson, and Bibb Counties; and on the south by Bibb, Hale, and Green Counties.

An earlier survey of Tuscaloosa County was published in 1911 (*9*). The present survey updates this earlier survey and provides additional information and more detailed maps.

## climate

Prepared by the National Climatic Center, Asheville, North Carolina.

Tuscaloosa County has long, hot summers because moist tropical air from the Gulf of Mexico persistently covers the area. Winters are cool and fairly short, with only a rare cold wave that moderates in 1 or 2 days. Precipitation is fairly heavy throughout the year, and prolonged droughts are rare. Summer precipitation, mainly afternoon thunderstorms, is adequate for all crops.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Tuscaloosa, Alabama in the period 1951 to 1973. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 46° F, and the average daily minimum temperature is 35°. The lowest temperature on record, which occurred at Tuscalooosa on January 30, 1966, is 1°. In summer the average temperature is 80°, and the average daily maximum temperature is 91°. The highest recorded temperature, which occurred on July 24, 1952, is 107°.

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

The total annual precipitation is 49 inches. Of this, 23 inches, or 45 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 19 inches. The heaviest 1-day rainfall during the period of record was 5.44 inches at

Tuscaloosa on February 21,1961. Thunderstorms occur on about 60 days each year, and most occur in summer.

Average seasonal snowfall is less than 1 inch. The greatest snow depth at any one time during the period of record was 7 inches. On an average, there is seldom a day with at least 1 inch of snow on the ground. The number of such days varies from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 85 percent. The sun shines 60 percent of the time possible in summer and 45 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 9 miles per hour, in winter.

Severe local storms, including tornadoes, strike occasionally in or near the area. They are short and cause variable and spotty damage. Every few years in summer or autumn, a tropical depression or remnant of a hurricane that has moved inland causes extremely heavy rains for 1 to 3 days.

## history

In 1540 Spanish explorers, led by Hernando De Soto, visited the area. The Spaniards fought a battle with Indians near the Indian capital city of Mauvilla. Thousands of Indians died in that battle, including Chief Tuscaloosa (*16*). The Chief's name is from the Choctaw language and means "Black Warrior." Tuscaloosa and the Black Warrior River were named in his honor.

The first settlers came from the Carolinas in 1816. Tuscaloosa was incorporated in 1819. The State Capitol was moved from Cahaba to Tuscaloosa in 1829, and it remained here until it was moved to Montgomery in 1845 (*4*).

## transportation

The county is served by three railroads, all of which intersect within the city of Tuscaloosa. Major highways that cross the county are: Interstate 59 and Interstate 20; U.S. 11 from northeast to southwest; U.S. 82 from southeast to northwest; and U.S. 43, Alabama 69, and Alabama 171 from north to south. All of these highways intersect within the city of Tuscaloosa.

The only major airport within the Tuscaloosa area is Van De Graaf Field. It has a terminal building and a 6,500-foot lighted jet runway. Several commercial airlines utilize these facilities.

The Black Warrior River is the only navigable river that flows through the county. It is part of one of the longest "channelized" river systems in the world and extends from Birmingham to the Gulf of Mexico at Mobile. Several barge companies serve this area by river, mostly transporting coal and raw materials. Grains and other crops, primarily soybeans, are transported southward from Tuscaloosa from state docks at Northport (*16*).

## geology

Tuscaloosa County is divided into two approximately equal parts by the "Fall Line," which extends roughly from the northwest to the southeast corner. The Fall Line was the coast line of the ocean from a previous epoch. Numerous cities throughout the southwest are located on the Fall Line. This marks the point where smooth waters of the river once encountered rough waters which prohibited navigation.

South of the Fall Line is the Gulf Coastal Plain, which makes up about one-third of the county. The Gulf Coastal Plain is level to gently rolling hills and terraces. Terraces are extensive in the Gulf Coastal Plain part of the county, and several are as high as 300 feet above the river. Other low terraces flank the flood plains.

The Sand Mountain Land Resource Area lies above the Fall Line in the northeastern part of the county and makes up the terminus of the Appalachian Mountains. The plateau is steep, rough terrain. Streams are in steep-sided valleys, which often form gorges. Drainage patterns are dendritic. Streams have cut deeply into the landscape and have narrow valleys within layers of alluvial material. Elevation varies from 150 to 750 feet above sea level.

The eastern to northeastern part of the county is in the Southern Appalachian Ridges and Valleys, which runs northeast to southwest. This area is not extensive in Tuscaloosa County, but the nearby city of Birmingham has been greatly influenced by this geologic structure. Stream patterns are somewhat trellised, and streams tend to be deeply cut and have narrow flood plains. Elevation varies between 100 to 450 feet above sea level.

## natural resources

*Minerals*—Brown iron ore (limonite) and Red iron ore (hematite) are in the northeastern part of the county and have been mined extensively.

The Tuscaloosa area is well supplied with sand and gravel deposits that are now being mined. Dredging the Black Warrior River has yielded large amounts of gravel. Sand and gravel deposits are well distributed throughout the Gulf Coastal Plain part of the county.

Pottery clay is abundant, and several small pottery plants use it. Refractory clays from beneath coal seams are mined and delivered to refractory plants in nearby Birmingham.

Limestone occurs in the eastern part of the county from Vance northeastward, but it has been little utilized so far. Sandstone crops out along the Black Warrior River and its major tributaries in the northeastern part of the county.

ttled clay to a depth of 59 inches. The underlying material is dark yellowish brown sandy loam.

The Augusta soil is low in natural fertility and organic matter content. Reaction ranges from medium acid to very strongly acid. Permeability is moderate, and available water capacity is high. The water table is seasonally high. It is at a depth of 18 inches during winter and early in spring. The root zone is deep, but plant roots are somewhat restricted by the high water table.

About 20 percent of the map unit is Amy soil. Typically, the surface layer is grayish brown silt loam about 5 inches thick. The subsurface layer is light brownish gray silt loam to a depth of 14 inches. The upper part of the subsoil is light gray, mottled silt loam to a depth of 31 inches. The lower part is mottled gray and light brownish gray silty clay loam that extends to a depth of 48 inches. The underlying material is mottled gray, light brownish gray, and pale brown loam.

The Amy soil is low in natural fertility and organic matter content. Reaction is strongly acid or very strongly acid. Permeability is slow, and available water capacity is high. The water table is seasonally high. It is at a depth of 12 inches during winter and early in spring. The root zone is deep, but plant roots are somewhat restricted by the high water table.

Included with these soils in mapping are small areas of ntachie and Shatta soils. Shatta soils are moderately drained, and Mantachie soils are somewhat poorly drained. These included soils make up about 5 percent of the map unit.

Most areas of these soils are used as woodland. Frequent flooding restricts almost any other use.

The Augusta and Amy soils are not suited to cultivated crops and are poorly suited to pasture and hay. Frequent flooding and wetness are limitations for these uses. These limitations are difficult and expensive to overcome.

The soils in this unit are well suited to water oak, green ash, blackgum, and loblolly pine. Wetness is the main limitation for using equipment in managing and harvesting the tree crop. This limitation can be partly overcome by logging during drier seasons. These soils are well suited to use as wetland and woodland wildlife habitat.

Wetness and flooding are severe limitations for urban uses. These limitations can be overcome only by major flood control and drainage measures.

Both soils in this complex are in capability subclass Vw and woodland group 2w.

**5—Bama fine sandy loam, 0 to 2 percent slopes.** This deep, well drained soil is on Coastal Plain uplands. Slopes range from 0 to 2 percent. Individual areas range from 10 to 150 acres.

pically, the surface layer is brown fine sandy loam t 5 inches thick. The subsoil, to a depth of 72 inches or more, is red and yellowish red and ranges from sandy clay loam to loam.

This soil is low in natural fertility and organic matter content. Reaction is strongly acid or very strongly acid throughout, unless the surface layer has been limed. Permeability is moderate, and available water capacity is moderate. Tilth is good, and the soil can be worked throughout a wide range in moisture content. The root zone is deep and easily penetrated by plant roots. Runoff is slow to medium.

Included with this soil in mapping are soils in concave areas that have a yellowish brown subsoil. Other soils on a few knolls and plateaus have a dark red surface layer. Also included are a few areas of Shatta, Luverne, Boswell, and Smithdale soils. These included soils make up 15 to 20 percent of the map unit.

This Bama soil is mainly used for cultivated crops and pasture, although some areas remain in woodland.

Cultivated crops, pasture, and hay are well suited to this soil. Cotton and soybeans are commonly grown. Pasture grasses generally consist of bahiagrass or coastal bermudagrass. Some areas are used for vegetable crops and small gardens.

Loblolly pine and longleaf pine are well suited to this soil. There are no significant limitations for woodland use or management. This soil is well suited to use as woodland wildlife habitat. It is well suited to urban uses and has no significant limitations.

This Bama soil is in capability class I and woodland group 3o.

**6—Bama fine sandy loam, 2 to 6 percent slopes.** This deep, well drained soil is on Coastal Plain uplands. Slopes range from 2 to 6 percent. Individual areas range from 10 to 1,200 acres.

Typically, the surface layer is brown fine sandy loam about 5 inches thick. The subsoil, to a depth of 72 inches or more, is red and yellowish red and ranges from sandy clay loam to loam.

This soil is low in natural fertility and organic matter content. Reaction is strongly acid or very strongly acid throughout, unless the surface layer has been limed. Permeability and available water capacity are moderate. Tilth is good, and the soil can be worked throughout a wide range in moisture content. The root zone is deep and easily penetrated by plant roots. Runoff is medium.

Included with this soil in mapping are soils in concave areas that have a yellowish brown subsoil. Other soils on a few knolls and plateaus have a dark red surface layer. Also included are a few areas of Boswell, Luverne, Ruston, and Smithdale soils. The included soils make up 5 to 20 percent of this map unit.

This Bama soil is mainly used for cultivated crops and pasture, although some small areas are used for woodland. The soil is well suited to cultivated crops, pasture, and hay. The hazard of erosion is moderate if cultivated crops are grown. Terraces, minimum tillage, and cover crops can help slow runoff and control erosion.

Longleaf and loblolly pines are well suited to this soil. There are no significant limitations for woodland use or

management. This soil is well suited to use as woodland wildlife habitat. It is well suited to most urban uses and has no significant limitations.

The Bama soil is in capability subclass IIe and woodland group 3o.

**7—Bama-Urban land complex, 0 to 2 percent slopes.** This map unit consists of Bama soil and Urban land in small areas that are so intermingled that it was not practical to map them separately. This well drained soil is on broad ridgetops and plateaus of the Coastal Plain uplands. Slopes are smooth and convex. They range from 0 to 2 percent. Individual areas range from 40 to 200 acres.

Bama fine sandy loam makes up about 50 percent of each mapped area. Typically, the surface layer is brown fine sandy loam about 5 inches thick. The subsoil, to a depth of 72 inches or more, is red and yellowish red and ranges from sandy clay loam to loam. In many areas the soil has been significantly disturbed or modified by filling, cutting, or grading.

The Bama soil is low in natural fertility and organic matter content. Reaction is strongly acid or very strongly acid throughout, unless the surface layer has been limed. Permeability and available water capacity are moderate. The root zone is deep and easily penetrated by plant roots.

Urban land makes up about 40 percent of each mapped area. It consists of areas that are covered by sidewalks, patios, driveways, parking lots, streets, and buildings, such as schools, churches, homes, offices, and industrial plants.

Included with this complex in mapping are a few small areas of Shatta soils and a few areas that have slopes of more than 2 percent. Included soils make up about 10 percent of this map unit.

The Bama soil is well suited to vegetable gardens and plants normally used in landscaping.

This soil is well suited to most recreation uses. There are no significant limitations for most other uses. This soil is well suited to most engineering uses. The risk of corrosion of uncoated concrete is moderate. The Bama soil is well suited to most urban uses. Low strength is a moderate limitation if the soil is used for local roads and streets. This limitation generally can be overcome by proper engineering design.

This complex is not in a capability subclass or woodland group.

**8—Bama-Urban land complex, 2 to 6 percent slopes.** This map unit consists of Bama soil and Urban land in small areas that are so intermingled that it was not practical to map them separately. This well drained soil is on broad ridgetops and plateaus of the Coastal Plain uplands. Slopes are smooth and convex. They range from 2 to 6 percent. Individual areas range from 30 to 300 acres.

Bama fine sandy loam makes up about 50 percent of each mapped area. Typically, the surface layer is brown fine sandy loam about 5 inches thick. The subsoil, to a depth of 72 inches or more, is yellowish red and red an ranges from sandy clay loam to loam. In many areas th soil has been significantly disturbed or modified by cutting, filling, or grading.

This Bama soil is low in natural fertility and organic matter content. Reaction is strongly acid or very strongl acid throughout, unless the surface layer has been limed. Permeability and available water capacity are moderate. The root zone is deep and easily penetrated by plant roots.

Urban land makes up about 45 percent of each mapped area. It consists of areas that are covered by sidewalks, patios, driveways, parking lots, and streets and buildings, such as schools, churches, offices, homes, and industrial plants.

Included with this complex in mapping are a few small areas of Shatta and Smithdale soils. Included soils make up about 5 percent of this map unit.

The Bama soil is well suited to most recreation uses. Slopes, however, are moderate limitations for playgrounds. There are no significant limitations for most other recreation uses.

This soil is well suited to most engineering uses. The risk of corrosion of uncoated concrete is moderate. The soil is well suited to most urban uses. Slope and low strength are moderate limitations for industrial uses and for local roads and streets. These limitations generally can be overcome by proper engineering design.

This complex is not in a capability subclass or a woodland group.

**9—Bibb soils, frequently flooded.** These deep, poorly drained soils are on flood plains of streams in the Coastal Plain. These soils are frequently flooded and are subject to scouring and uneven deposition of overwash. Slopes range from 0 to 2 percent. Individual areas range from 20 to 80 acres.

Typically, the surface layer is dark brown sandy loam about 10 inches thick. The underlying material is gray, mottled loam, fine sandy loam, and loamy sand.

These soils are low in natural fertility and organic matter content. Reaction is strongly acid or very strongly acid throughout. Permeability is moderate, and available water capacity is high. The root zone is deep, but roots are somewhat restricted by a seasonal high water table late in fall and early in spring. These soils are flooded several times each year.

Included with these soils in mapping are natural levees of stratified sandy deposits and seep areas that have a surface layer that is high in organic matter content. Also included are a few intermingled areas of Iuka and Mantachie soils on the flood plain and the adjacent Smithdale and Luverne soils on toe slopes. Included soils make up 10 to 15 percent of this map unit.

Bibb soils are mostly used as woodland with scattered areas of cropland or pasture. These soils are not suited to cultivated crops but are fairly suited to pasture and

IIC—59 to 72 inches; dark yellowish brown (10YR 4/4) sandy loam; massive; many fine mica flakes; very strongly acid.

Solum thickness ranges from 40 to more than 60 inches. Unless the surface layer has been limed, reaction ranges from medium acid to very strongly acid.

The A horizon has hue of 10YR, value of 4 through 6, and chroma of 2 through 4. Texture is fine sandy loam, loam, or silt loam.

The B21t horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. Mottles are in shades of gray and brown. Texture is loam, clay loam, or sandy clay loam. The B22tg and B3g horizons have hue of 10YR, value of 5 or 6, and chroma of 2 through 6. Mottles are in shades of yellow, brown, and gray. There are a few brown and black stains throughout the B horizon. In the lower part, there are few to many mica flakes.

The IIC horizon has hue of 10YR, value of 3 through 5, and chroma of 3 through 6. Texture ranges from sandy loam to silty clay loam. Mottles are in shades of gray and brown.

## Bama series

The Bama series consists of deep, well drained, moderately permeable soils that formed in thick beds of loamy marine sediments. These soils are on broad ridgetops and plateaus of the Coastal Plain uplands. Slopes range from 0 to 6 percent.

Bama soils are geographically associated with Smithdale, Luverne, Ruston, and Boswell soils. Smithdale soils are on side slopes and narrow ridgetops. Luverne and Boswell soils have a clayey control section and are on steeper slopes. Ruston soils have a bisequal profile.

Typical pedon of Bama fine sandy loam, 2 to 6 percent slopes; in a stand of pine, 20 feet north and 1,837 feet west of the southeast corner of sec. 16, T. 20 S., R. 10 W:

Ap—0 to 5 inches; brown (10YR 4/3) fine sandy loam; weak medium subangular blocky structure parting to weak fine granular; friable; many fine roots; strongly acid; gradual wavy boundary.

B21t—5 to 18 inches; red (2.5YR 4/6) clay loam; weak medium subangular blocky structure; friable; few fine and medium roots; patchy distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.

B22t—18 to 30 inches; yellowish red (5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine and medium roots; patchy faint clay films on faces of peds; very strongly acid; gradual wavy boundary.

B23t—30 to 54 inches; red (2.5YR 4/6) loam; weak medium subangular blocky structure; friable; continuous distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.



B24t—54 to 61 inches; red (2.5YR 4/6) sandy clay lo: weak medium subangular blocky structure; friable patchy distinct clay films on faces of peds; pocke of uncoated yellowish brown (10YR 5/4) sand grains; very strongly acid; gradual wavy boundary.

B25t—61 to 72 inches; red (2.5YR 5/6) sandy clay lo weak medium subangular blocky structure; friable; patchy faint clay films on faces of some peds; pockets of clay loam material; very strongly acid.

Solum thickness is more than 72 inches. Unless the surface has been limed, reaction is strongly acid or ve strongly acid. Gravel content is generally less than 5 percent but ranges to as much as 10 percent in some pedons.

The A horizon has hue of 10YR, value of 3 through and chroma of 2 through 4. Texture is fine sandy loam sandy loam, or loam.

The B1 horizon, if present, has hue of 5YR, value of or 5, and chroma of 4 through 8. Texture is loam or sandy loam. The B2t horizon has hue of 5YR or 2.5YR value of 4 or 5, and chroma of 6 or 8. In some pedons the lower part of the B2t horizon has hue of 10R, value of 3, and chroma of 6. Mottles are in shades of yellow and brown. Texture is loam, sandy clay loam, or clay loam.

## Bibb series

The Bibb series consists of deep, poorly drained, moderately permeable soils that formed in sandy fluvial deposits on stream terraces of the Coastal Plain. These soils are frequently flooded and are subject to scouring and uneven deposition of overwash. Slopes range from 0 to 2 percent.

Bibb soils are geographically associated with Amy, Augusta, Iuka, and Mantachie soils. Amy soils are poorl drained and have a fine-silty control section. Iuka soils are at a slightly higher elevation and are moderately wel drained. Augusta and Mantachie soils have a fine-loamy control section and are somewhat poorly drained.

Typical pedon of Bibb sandy loam in an area of Bibb soils, frequently flooded; in a narrow stream bottom, 585 feet south and 2,000 feet east of the northwest corner c sec. 19, T. 19 S., R. 10 W:

A—0 to 10 inches; dark brown (10YR 4/3) sandy loam; weak fine granular structure; very friable; many fine medium and coarse roots; very strongly acid; clear wavy boundary.

C1g—10 to 23 inches; gray (10YR 6/1) loam; common medium distinct yellowish brown (10YR 5/6) mottles massive; sticky; few medium roots; few brown stains around roots; very strongly acid; gradual wavy boundary.

C2g—23 to 34 inches; mottled gray (10YR 5/1), grayish brown (10YR 5/2), and dark yellowish brown (10YR 4/4) loamy sand; massive; loose; few brown stains

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-73 at Tuscaloosa, Ala.]

| Month | Temperature | | | | | | Precipitation | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average daily maximum | Average daily minimum | Average daily | 2 years in 10 will have-- Maximum temperature higher than-- | 2 years in 10 will have-- Minimum temperature lower than-- | Average number of growing degree days[1] | Average | 2 years in 10 will have-- Less than-- | 2 years in 10 will have-- More than-- | Average number of days with 0.10 inch or more | Average snowfall |
| | °F | °F | °F | °F | °F | Units | In | In | In | | In |
| January---- | 54.9 | 33.5 | 44.2 | 76 | 11 | 43 | 4.96 | 3.05 | 6.67 | 7 | .2 |
| February--- | 59.3 | 36.1 | 47.7 | 79 | 15 | 102 | 4.72 | 2.41 | 6.60 | 7 | .5 |
| March------ | 66.5 | 42.3 | 54.4 | 84 | 23 | 200 | 5.26 | 3.31 | 7.01 | 8 | .0 |
| April------ | 76.7 | 51.6 | 64.2 | 90 | 32 | 426 | 4.94 | 2.92 | 6.74 | 7 | .0 |
| May-------- | 83.8 | 59.1 | 71.5 | 95 | 40 | 667 | 3.53 | 1.62 | 5.08 | 6 | .0 |
| June------- | 90.0 | 67.0 | 78.5 | 102 | 52 | 855 | 3.45 | 1.78 | 4.81 | 5 | .0 |
| July------- | 91.7 | 70.2 | 81.0 | 101 | 59 | 961 | 4.95 | 2.33 | 7.08 | 7 | .0 |
| August----- | 91.7 | 69.4 | 80.6 | 101 | 58 | 949 | 3.30 | 1.43 | 4.82 | 5 | .0 |
| September-- | 87.1 | 63.8 | 75.5 | 98 | 45 | 765 | 2.87 | 1.18 | 4.26 | 5 | .0 |
| October---- | 77.5 | 50.7 | 64.1 | 92 | 29 | 437 | 2.71 | .78 | 4.24 | 4 | .0 |
| November--- | 65.3 | 39.9 | 52.6 | 83 | 20 | 123 | 3.30 | 2.16 | 4.33 | 6 | .0 |
| December--- | 57.5 | 35.6 | 46.6 | 78 | 13 | 91 | 5.27 | 2.80 | 7.28 | 8 | .1 |
| Yearly: | | | | | | | | | | | |
| Average-- | 75.2 | 51.6 | 63.4 | --- | --- | --- | --- | --- | --- | --- | --- |
| Extreme-- | --- | --- | --- | 103 | 9 | --- | --- | --- | --- | --- | --- |
| Total---- | --- | --- | --- | --- | --- | 5,619 | 49.26 | 42.78 | 55.52 | 75 | .8 |

[1]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50° F).

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

| Soil name and map symbol | Ordination symbol | Management concerns: Erosion hazard | Equipment limitation | Seedling mortality | Windthrow hazard | Potential productivity: Common trees | Site index | Trees to plant |
|---|---|---|---|---|---|---|---|---|
| 2 Adaton | 2w | Slight | Severe | Severe | Slight | Water oak | 80 | Shumard oak, loblolly pine, sweetgum. |
| | | | | | | Loblolly pine | 80 | |
| | | | | | | Sweetgum | 80 | |
| 3*: | | | | | | | | |
| Allen | 3o | Slight | Slight | Slight | Slight | Loblolly pine | 80 | Loblolly pine, yellow-poplar. |
| | | | | | | Yellow-poplar | 87 | |
| | | | | | | Shortleaf pine | 72 | |
| Bodine | 3f | Slight | Moderate | Moderate | Slight | Shortleaf pine | 60 | Loblolly pine. |
| | | | | | | Yellow-poplar | 90 | |
| | | | | | | Southern red oak | 70 | |
| | | | | | | Black oak | 70 | |
| 4* Augusta-Amy | 2w | Slight | Moderate | Slight | Slight | Loblolly pine | 90 | Loblolly pine, sweetgum, American sycamore, cherrybark oak, water oak. |
| | | | | | | Sweetgum | 90 | |
| | | | | | | American sycamore | 90 | |
| | | | | | | White oak | 80 | |
| | | | | | | Southern red oak | 80 | |
| | | | | | | Water oak | --- | |
| | | | | | | Shortleaf pine | --- | |
| 5, 6 Bama | 3o | Slight | Slight | Slight | Slight | Loblolly pine | 85 | Loblolly pine. |
| | | | | | | Shortleaf pine | 75 | |
| 9* Bibb | 2w | Slight | Severe | Severe | Moderate | Loblolly pine | 90 | Loblolly pine, sweetgum, water oak. |
| | | | | | | Sweetgum | 90 | |
| | | | | | | Water oak | 90 | |
| 10*: | | | | | | | | |
| Bodine | 3f | Slight | Moderate | Moderate | Slight | Shortleaf pine | 60 | Loblolly pine. |
| | | | | | | Yellow-poplar | 90 | |
| | | | | | | Southern red oak | 70 | |
| | | | | | | Black oak | 70 | |
| Allen | 3r | Moderate | Moderate | Slight | Slight | Loblolly pine | 80 | Loblolly pine. |
| | | | | | | Virginia pine | 73 | |
| | | | | | | Southern red oak | 71 | |
| 11 Boswell | 3c | Slight | Moderate | Moderate | Moderate | Loblolly pine | 80 | Loblolly pine. |
| | | | | | | Shortleaf pine | 70 | |
| 12 Brilliant | 3x | Severe | Severe | Severe | Slight | American sycamore | 80 | American sycamore, loblolly pine, Virginia pine, eastern cottonwood. |
| | | | | | | Loblolly pine | 80 | |
| | | | | | | Virginia pine | 70 | |
| | | | | | | Sweetgum | 80 | |
| | | | | | | Eastern cottonwood | 90 | |
| 13 Cahaba | 2o | Slight | Slight | Slight | Slight | Loblolly pine | 87 | Loblolly pine, yellow-poplar, sweetgum, American sycamore, cherrybark oak. |
| | | | | | | Yellow-poplar | --- | |
| | | | | | | Sweetgum | 90 | |
| | | | | | | Southern red oak | --- | |
| | | | | | | White oak | --- | |
| | | | | | | Cherrybark oak | --- | |
| | | | | | | Longleaf pine | 72 | |
| | | | | | | Blackgum | --- | |

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

| Soil name and map symbol | Limitations for-- Pond reservoir areas | Embankments, dikes, and levees | Features affecting-- Drainage | Irrigation | Terraces and diversions | Grasse waterwa |
|---|---|---|---|---|---|---|
| 2 Adaton | Slight | Severe: wetness. | Percs slowly | Wetness, percs slowly. | Percs slowly, wetness. | Wetness, percs slo |
| 3*: | | | | | | |
| Allen | Moderate: seepage. | Severe: piping. | Deep to water | Slope | Slope | Slope. |
| Bodine | Severe: seepage, slope. | Severe: seepage, large stones. | Deep to water | Large stones, droughty, slope. | Slope, large stones. | Large stone slope, droughty. |
| 4*: | | | | | | |
| Augusta | Moderate: seepage. | Severe: piping, wetness. | Floods | Wetness, floods. | Wetness | Wetness. |
| Amy | Moderate: seepage. | Severe: wetness. | Percs slowly, floods. | Wetness, percs slowly, erodes easily. | Erodes easily, wetness, percs slowly. | Wetness, erodes eas percs slow |
| 5 Bama | Moderate: seepage. | Slight | Deep to water | Favorable | Favorable | Favorable. |
| 6 Bama | Moderate: seepage, slope. | Slight | Deep to water | Slope | Favorable | Favorable. |
| 7*: | | | | | | |
| Bama | Moderate: seepage. | Slight | Deep to water | Favorable | Favorable | Favorable. |
| Urban land. | | | | | | |
| 8*: | | | | | | |
| Bama | Moderate: seepage, slope. | Slight | Deep to water | Slope | Favorable | Favorable. |
| Urban land. | | | | | | |
| 9* Bibb | Moderate: seepage. | Severe: piping, wetness. | Floods | Wetness, floods. | Wetness | Wetness. |
| 10*: | | | | | | |
| Bodine | Severe: seepage, slope. | Severe: seepage, large stones. | Deep to water | Large stones, droughty, slope. | Slope, large stones. | Large stones, slope, droughty. |
| Allen | Severe: slope. | Severe: piping. | Deep to water | Slope | Slope | Slope. |
| 11 Boswell | Slight | Severe: hard to pack. | Deep to water | Percs slowly, slope, erodes easily. | Erodes easily, percs slowly. | Erodes easily percs slowly |
| 12 Brilliant | Severe: seepage, slope. | Severe: seepage. | Deep to water | Droughty, slope. | Slope, large stones. | Large stones, slope, droughty. |
| 13 Cahaba | Severe: seepage. | Moderate: thin layer, piping. | Deep to water | Favorable | Favorable | Favorable. |
| 14 Choccolocco | Moderate: seepage. | Severe: piping. | Deep to water | Favorable | Erodes easily | Erodes easily. |

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments > 3 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | | | | | Pct | |
| 39*: | | | | | | | | | | | |
| Smithdale | 0-5 | Fine sandy loam | SM, SM-SC | A-4, A-2 | 0 | 100 | 85-100 | 60-95 | 28-49 | <20 | NP-5 |
| | 5-42 | Clay loam, sandy clay loam, loam. | SM-SC, SC, CL, CL-ML | A-6, A-4 | 0 | 100 | 85-100 | 80-96 | 45-75 | 23-38 | 7-16 |
| | 42-72 | Loam, sandy loam | SM, ML, CL, SC | A-4 | 0 | 100 | 85-100 | 65-95 | 36-70 | <30 | NP-10 |
| Urban land. | | | | | | | | | | | |
| 39* Smithdale | 0-5 | Fine sandy loam | SM, SM-SC | A-4, A-2 | 0 | 100 | 85-100 | 60-95 | 28-49 | <20 | NP-5 |
| | 5-42 | Clay loam, sandy clay loam, loam. | SM-SC, SC, CL, CL-ML | A-6, A-4 | 0 | 100 | 85-100 | 80-96 | 45-75 | 23-38 | 7-16 |
| | 42-72 | Loam, sandy loam | SM, ML, CL, SC | A-4 | 0 | 100 | 85-100 | 65-95 | 36-70 | <30 | NP-10 |
| 39*: | | | | | | | | | | | |
| Smithdale | 0-5 | Fine sandy loam | SM, SM-SC | A-4, A-2 | 0 | 100 | 85-100 | 60-95 | 28-49 | <20 | NP-5 |
| | 5-42 | Clay loam, sandy clay loam, loam. | SM-SC, SC, CL, CL-ML | A-6, A-4 | 0 | 100 | 85-100 | 80-96 | 45-75 | 23-38 | 7-16 |
| | 42-72 | Loam, sandy loam | SM, ML, CL, SC | A-4 | 0 | 100 | 85-100 | 65-95 | 36-70 | <30 | NP-10 |
| Luverne | 0-4 | Fine sandy loam | ML, SM | A-2, A-4 | 0-5 | 87-100 | 84-100 | 80-100 | 19-75 | <20 | NP |
| | 4-39 | Clay loam, sandy clay, clay. | ML, MH, CH, CL | A-5, A-7 | 0-5 | 95-100 | 90-100 | 85-100 | 50-95 | 38-70 | 8-30 |
| | 39-80 | Stratified loamy sand to clay. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 40*: | | | | | | | | | | | |
| Smithdale | 0-5 | Fine sandy loam | SM, SM-SC | A-4, A-2 | 0 | 100 | 85-100 | 60-95 | 28-49 | <20 | NP-5 |
| | 5-42 | Clay loam, sandy clay loam, loam. | SM-SC, SC, CL, CL-ML | A-6, A-4 | 0 | 100 | 85-100 | 80-96 | 45-75 | 23-38 | 7-16 |
| | 42-72 | Loam, sandy loam | SM, ML, CL, SC | A-4 | 0 | 100 | 85-100 | 65-95 | 36-70 | <30 | NP-10 |
| Pikeville | 0-16 | Fine sandy loam | SM, ML | A-4 | 0 | 90-100 | 90-100 | 50-85 | 36-60 | <30 | NP-4 |
| | 16-25 | Sandy clay loam, loam, gravelly loam. | SC, CL, SM-SC, CL-ML | A-4, A-6 | 0 | 80-100 | 65-100 | 60-90 | 36-60 | 20-40 | 4-17 |
| | 25-31 | Gravelly sandy loam, gravelly loam, gravelly sandy clay loam. | SC, SM, GM | A-1, A-2 A-4, A-6 | 0 | 60-90 | 50-85 | 45-75 | 20-45 | 25-48 | 2-18 |
| | 31-72 | Very gravelly sandy loam, very gravelly loam, very gravelly sandy clay loam. | GW-GM, GM, SW-SM, SM | A-1, A-2 | 0-5 | 35-75 | 20-65 | 15-55 | 9-30 | 20-45 | 2-16 |
| 41* Urban land. | | | | | | | | | | | |

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

| Soil name and map symbol | Depth | Clay <2mm | Permeability | Available water capacity | Soil reaction | Shrink-swell potential | Erosion factors K | Erosion factors T | Organic matter |
|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | In/hr | In/in | pH | | | | Pct |
| 2--- Ada[illegible] | 0-7 | 10-27 | 0.6-2.0 | 0.20-0.22 | 4.5-5.5 | Low | 0.37 | 5 | 1-3 |
| | 7-96 | 20-42 | 0.06-0.2 | 0.18-0.22 | 4.5-5.5 | Moderate | 0.32 | | |
| 3*: | | | | | | | | | |
| Al[illegible] | 0-15 | 6-25 | 0.6-2.0 | 0.14-0.19 | 4.5-5.5 | Low | 0.24 | 5 | .5-3 |
| | 15-46 | 18-35 | 0.6-2.0 | 0.12-0.17 | 4.5-5.5 | Low | 0.20 | | |
| | 46-60 | 20-45 | 0.6-2.0 | 0.10-0.17 | 4.5-5.5 | Low | 0.20 | | |
| Boc[illegible] | 0-5 | 7-27 | 2.0-6.0 | 0.07-0.12 | 3.6-5.5 | Low | 0.28 | 5 | .5-2 |
| | 5-21 | 7-27 | 2.0-6.0 | 0.05-0.10 | 3.6-5.5 | Low | 0.28 | | |
| | 21-62 | 18-35 | 2.0-6.0 | 0.05-0.10 | 3.6-5.5 | Low | 0.28 | | |
| 4*: | | | | | | | | | |
| Aug[illegible] | 0-9 | 10-25 | 0.6-2.0 | 0.15-0.22 | 4.5-6.0 | Low | 0.15 | 4 | .5-2 |
| | 9-59 | 20-45 | 0.6-2.0 | 0.12-0.18 | 4.5-6.0 | Low | 0.24 | | |
| | 59-72 | 3-18 | 2.0-6.0 | 0.06-0.12 | 4.5-6.0 | Low | 0.24 | | |
| Amy- | 0-14 | 15-25 | 0.6-2.0 | 0.13-0.24 | 4.5-5.5 | Low | 0.43 | 5 | .5-2 |
| | 14-48 | 20-32 | 0.06-0.2 | 0.16-0.24 | 4.5-5.5 | Low | 0.43 | | |
| | 48-60 | 11-35 | 0.6-2.0 | 0.11-0.15 | 4.5-5.5 | Low | 0.43 | | |
| 5, 6- Bama | 0-5 | 7-22 | 0.6-6.0 | 0.08-0.15 | 4.5-6.0 | Low | 0.24 | 5 | .5-1 |
| | 5-54 | 18-32 | 0.6-2.0 | 0.12-0.18 | 4.5-5.5 | Low | 0.32 | | |
| | 54-72 | 20-35 | 0.6-2.0 | 0.12-0.18 | 4.5-5.5 | Low | 0.32 | | |
| 7*, 8* Bama- | 0-5 | 7-22 | 0.6-6.0 | 0.08-0.15 | 4.5-6.0 | Low | 0.24 | 5 | .5-1 |
| | 5-54 | 18-32 | 0.6-2.0 | 0.12-0.18 | 4.5-5.5 | Low | 0.32 | | |
| | 54-72 | 20-35 | 0.6-2.0 | 0.12-0.18 | 4.5-5.5 | Low | 0.32 | | |
| Urban [illegible] | | | | | | | | | |
| 9*---- Bibb | 0-10 | 2-18 | 0.6-2.0 | 0.12-0.18 | 4.5-5.5 | Low | 0.20 | 5 | .5-2 |
| | 10-62 | 2-18 | 0.6-2.0 | 0.12-0.20 | 4.5-5.5 | Low | 0.37 | | |
| 10*: | | | | | | | | | |
| Bodine | 0-5 | 7-27 | 2.0-6.0 | 0.07-0.12 | 3.6-5.5 | Low | 0.28 | 5 | .5-2 |
| | 5-21 | 7-27 | 2.0-6.0 | 0.05-0.10 | 3.6-5.5 | Low | 0.28 | | |
| | 21-62 | 18-35 | 2.0-6.0 | 0.05-0.10 | 3.6-5.5 | Low | 0.28 | | |
| Allen | 0-15 | 6-25 | 0.6-2.0 | 0.14-0.19 | 4.5-5.5 | Low | 0.24 | 5 | .5-3 |
| | 15-46 | 18-35 | 0.6-2.0 | 0.12-0.17 | 4.5-5.5 | Low | 0.20 | | |
| | 46-60 | 20-45 | 0.6-2.0 | 0.10-0.17 | 4.5-5.5 | Low | 0.20 | | |
| 11----- Boswell | 0-4 | 7-27 | 0.6-2.0 | 0.15-0.20 | 4.5-5.5 | Low | 0.43 | 5 | .5-2 |
| | 4-75 | 38-80 | <0.06 | 0.14-0.18 | 4.5-5.5 | High | 0.32 | | |
| 12----- Brilliant | 0-70 | 8-25 | 2.0-6.0 | 0.04-0.10 | 5.6-8.4 | Low | 0.24 | 5 | <.5 |
| 13----- Cahaba | 0-4 | 7-17 | 2.0-6.0 | 0.05-0.14 | 4.5-6.0 | Very low | 0.24 | 4 | .5-2 |
| | 4-37 | 18-35 | 0.6-2.0 | 0.12-0.15 | 4.5-6.0 | Low | 0.28 | | |
| | 37-63 | 4-20 | 2.0-20 | 0.05-0.10 | 4.5-6.0 | Very low | 0.24 | | |
| 14----- Choccolocco | 0-6 | 7-25 | 0.6-2.0 | 0.12-0.18 | 4.5-6.0 | Low | 0.32 | 5 | 1-3 |
| | 6-38 | 25-35 | 0.6-2.0 | 0.15-0.20 | 4.5-6.0 | Low | 0.37 | | |
| | 38-72 | 10-30 | 2.0-6.0 | 0.10-0.16 | 4.5-6.0 | Low | 0.32 | | |
| 15----- Decatur | 0-4 | 15-40 | 0.6-2.0 | 0.18-0.20 | 4.5-6.0 | Low | 0.32 | 5 | .5-1 |
| | 4-30 | 35-60 | 0.6-2.0 | 0.14-0.17 | 4.5-5.5 | Moderate | 0.32 | | |
| | 30-72 | 35-60 | 0.6-2.0 | 0.12-0.16 | 4.5-5.5 | Moderate | 0.32 | | |

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES

[See text for definitions of terms such as "rare," "brief," "apparent," and "perched." The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern]

| Soil name and map symbol | Hydrologic group | Flooding | | | High water table | | | Bedrock | | Risk of corrosion | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Frequency | Duration | Months | Depth | Kind | Months | Depth | Hardness | Uncoated steel | Concrete |
| | | | | | Ft | | | In | | | |
| Adaton | D | Rare | --- | --- | 0-0.5 | Apparent | Jan-Apr | >60 | --- | High | High. |
| 3*: | | | | | | | | | | | |
| Allen | B | None | --- | --- | >6.0 | --- | --- | >60 | --- | Low | Moderate. |
| Bodine | B | None | --- | --- | >6.0 | --- | --- | >60 | --- | Low | High. |
| 4*: | | | | | | | | | | | |
| Augusta | C | Frequent | Brief | Jan-May | 1.0-2.0 | Apparent | Jan-May | >60 | --- | High | Moderate. |
| Amy | D | Frequent | Brief to very long. | Dec-May | 0-1.0 | Perched | Dec-Apr | >60 | --- | High | Moderate. |
| 5, 6 Bama | B | None | --- | --- | >6.0 | --- | --- | >60 | --- | Low | Moderate. |
| 7*, 8*: | | | | | | | | | | | |
| Bama | B | None | --- | --- | >6.0 | --- | --- | >60 | --- | Low | Moderate. |
| Urban land. | | | | | | | | | | | |
| 9* Bibb | C | Frequent | Brief | Dec-May | 0.5-1.5 | Apparent | Dec-Apr | >60 | --- | High | Moderate. |
| [illegible]ine | B | None | --- | --- | >6.0 | --- | --- | >60 | --- | Low | High. |
| Allen | B | None | --- | --- | >6.0 | --- | --- | >60 | --- | Low | Moderate. |
| 11 Boswell | D | None | --- | --- | >6.0 | --- | --- | >60 | --- | High | Moderate. |
| 12 Brilliant | B | None | --- | --- | >6.0 | --- | --- | >60 | --- | Low | Low. |
| 13 Cahaba | B | Rare | --- | --- | >6.0 | --- | --- | >60 | --- | Moderate | Moderate. |
| 14 Choccolocco | B | Rare | --- | --- | >6.0 | --- | --- | >60 | --- | Moderate | Moderate. |
| 15 Decatur | B | None | --- | --- | >6.0 | --- | --- | >60 | --- | High | Moderate. |
| 16 Dundee | C | Rare | --- | --- | 1.5-3.5 | Apparent | Jan-Apr | >60 | --- | High | Moderate. |
| 17 Ellisville | B | Frequent | Very brief | Nov-Mar | >6.0 | --- | --- | >60 | --- | Moderate | Moderate. |
| 18 Falkner | C | None | --- | --- | 1.5-2.5 | Perched | Jan-Mar | >60 | --- | High | Moderate. |
| 19*: | | | | | | | | | | | |
| Iuka | C | Frequent | Very brief to brief. | Dec-Apr | 1.0-3.0 | Apparent | Dec-Apr | >60 | --- | Moderate | High. |
| Mantachie | C | Frequent | Brief | Jan-Mar | 1.0-1.5 | Apparent | Dec-Mar | >60 | --- | High | High. |
| 20*: | | | | | | | | | | | |
| Laverne | C | None | --- | --- | >6.0 | --- | --- | >60 | --- | High | High. |
| Smithdale | B | None | --- | --- | >6.0 | --- | --- | >60 | --- | Low | Moderate. |

See footnote at end of table.

TABLE 16.--PHYSICAL ANALYSIS OF SELECTED SOILS

| Soil name and sample number | Depth | Horizon | Particle-size distribution (Percent less than 2.0 mm) | | |
|---|---|---|---|---|---|
| | | | Sand (2.0-0.05 mm) | Silt (0.05-0.002 mm) | Clay (0.002 mm) |
| | In | | | | |
| Adaton: | | | | | |
| S77AL-125-8-1 | 0-2 | Ap | 19.1 | 54.0 | 26.9 |
| S77AL-125-8-2 | 2-7 | A2 | 13.4 | 62.2 | 24.4 |
| S77AL-125-8-3 | 7-20 | B21tg | 17.3 | 59.8 | 22.9 |
| S77AL-125-8-4 | 20-31 | B22tg | 19.9 | 54.6 | 25.5 |
| S77AL-125-8-5 | 31-46 | B23tg | 14.7 | 53.5 | 31.8 |
| S77AL-125-8-6 | 46-58 | B24tg | 9.7 | 60.1 | 30.2 |
| S77AL-125-8-7 | 58-79 | B25tg | 13.7 | 53.2 | 33.1 |
| Amy: | | | | | |
| S77AL-125-10-1 | 0-5 | A1 | 19.9 | 63.1 | 17.0 |
| S77AL-125-10-2 | 5-14 | A2g | 29.6 | 53.5 | 16.9 |
| S77AL-125-10-3 | 14-31 | B21tg | 18.0 | 56.5 | 25.5 |
| S77AL-125-10-4 | 31-48 | B22tg | 17.1 | 54.3 | 28.6 |
| S77AL-125-10-5 | 48-60 | Cg | 46.0 | 42.3 | 11.7 |
| S77AL-125-10-6 | 60-72 | IICg | 70.0 | 19.2 | 10.8 |
| Augusta: | | | | | |
| S77AL-125-9-1 | 0-5 | A1 | 37.0 | 41.5 | 21.5 |
| S77AL-125-9-2 | 5-9 | A2 | 34.8 | 43.9 | 21.3 |
| S77AL-125-9-3 | 9-24 | B21t | 36.3 | 36.3 | 27.4 |
| S77AL-125-9-4 | 24-35 | B22tg | 23.2 | 34.3 | 42.5 |
| S77AL-125-9-5 | 35-59 | B3g | 21.2 | 34.1 | 44.7 |
| S77AL-125-9-6 | 59-72 | IIC | 71.6 | 16.0 | 12.4 |
| Bama: | | | | | |
| S77AL-125-5-1 | 0-5 | Ap | 60.3 | 23.6 | 16.1 |
| S77AL-125-5-2 | 5-18 | B21t | 41.9 | 30.7 | 27.4 |
| S77AL-125-5-3 | 18-30 | B22t | 46.1 | 25.9 | 28.0 |
| S77AL-125-5-4 | 30-54 | B23t | 47.8 | 28.2 | 24.0 |
| S77AL-125-5-5 | 54-61 | B24t | 56.2 | 18.8 | 25.0 |
| Boswell: | | | | | |
| S77AL-125-7-1 | 0-4 | Ap | 34.7 | 43.9 | 21.4 |
| S77AL-125-7-2 | 4-15 | B21t | 5.2 | 39.0 | 55.8 |
| S77AL-125-7-3 | 15-26 | B22t | 2.1 | 38.7 | 59.2 |
| S77AL-125-7-4 | 26-34 | B23t | 1.5 | 31.0 | 67.5 |
| S77AL-125-7-5 | 34-70 | B24t | 2.0 | 20.6 | 77.4 |
| S77AL-125-7-6 | 70-75 | C | 2.9 | 18.7 | 78.4 |
| Dundee*: | | | | | |
| S78AL-125-1-1 | 0-3 | Ap | 13.2 | 73.8 | 13.0 |
| S78AL-125-1-2 | 3-13 | A12 | 17.2 | 69.6 | 13.2 |
| S78AL-125-1-3 | 13-24 | B21t | 12.9 | 61.4 | 25.7 |
| S78AL-125-1-4 | 24-36 | B22t | 14.4 | 64.4 | 21.2 |
| S78AL-125-1-5 | 36-58 | B3g | 13.5 | 57.4 | 29.1 |
| S78AL-125-1-6 | 58-72 | Cg | 7.6 | 63.0 | 29.4 |
| Dundee: | | | | | |
| S79AL-125-1-1 | 0-4 | Ap | 16.9 | 61.8 | 21.3 |
| S79AL-125-1-2 | 4-10 | A2 | 13.7 | 62.6 | 23.7 |
| S79AL-125-1-3 | 10-16 | B21t | 15.9 | 57.1 | 27.0 |
| S79AL-125-1-4 | 16-22 | B22tg | 16.8 | 55.8 | 27.4 |
| S79AL-125-1-5 | 22-41 | B23tg | 14.3 | 51.8 | 34.2 |
| S79AL-125-1-6 | 41-59 | B24tg | 11.4 | 53.5 | 35.1 |
| S79AL-125-1-7 | 59-80 | Cg | 6.3 | 60.7 | 33.0 |
| Falkner: | | | | | |
| S77AL-125-12-2 | 3-12 | A2 | 16.2 | 69.2 | 14.6 |
| S77AL-125-12-3 | 12-18 | B21t | 7.4 | 59.2 | 33.4 |
| S77AL-125-12-4 | 18-39 | B22t | 15.9 | 50.0 | 34.1 |
| S77AL-125-12-5 | 39-63 | B23t | 18.4 | 53.6 | 28.0 |
| S77AL-125-12-6 | 63-86 | C1 | 17.0 | 58.2 | 24.8 |

See footnote at end of table.

TABLE 17.--CHEMICAL ANALYSIS OF SELECTED SOILS

| Soil name and sample number | Depth | Horizon | Extractable bases | | | Extractable acidity | Base saturation | Reaction | Cation exchange capacity |
|---|---|---|---|---|---|---|---|---|---|
| | | | Ca | Mg | K | | | | |
| | | | Meg/100g | | | | Pct | pH | |
| Adaton: | | | | | | | | | |
| S77AL-125-8-1 | 0-2 | Ap | 3.28 | 1.44 | 0.32 | 7.68 | 40 | 4.6 | 12.72 |
| S77AL-125-8-2 | 2-7 | A2 | 2.82 | 0.91 | 0.15 | 6.32 | 38 | 4.9 | 10.21 |
| S77AL-125-8-3 | 7-20 | B21tg | 2.14 | 1.08 | 0.10 | 4.08 | 45 | 5.1 | 7.40 |
| S77AL-125-8-4 | 20-31 | B22tg | 1.60 | 1.77 | 0.15 | 4.16 | 46 | 5.2 | 7.68 |
| S77AL-125-8-5 | 31-46 | B23tg | 0.34 | 2.13 | 0.10 | 7.20 | 26 | 4.8 | 9.77 |
| S77AL-125-8-7 | 58-79 | B25tg | 0.20 | 3.77 | 0.15 | 5.84 | 41 | 4.8 | 9.96 |
| Amy*: | | | | | | | | | |
| S77AL-125-10-1 | 0-5 | A1 | 2.92 | 1.09 | 0.22 | 2.40 | 64 | 4.1 | 6.62 |
| S77AL-125-10-2 | 5-14 | A2g | 1.00 | 0.85 | 0.12 | 5.04 | 28 | 4.2 | 7.01 |
| S77AL-125-10-3 | 14-31 | B21tg | 0.98 | 1.08 | 0.05 | 6.24 | 25 | 4.3 | 8.35 |
| S77AL-125-10-4 | 31-48 | B22tg | 0.88 | 1.04 | 0.05 | 6.96 | 22 | 4.3 | 8.94 |
| S77AL-125-10-5 | 48-60 | Cg | 0.22 | 0.65 | 0.04 | 6.24 | 13 | 4.3 | 7.15 |
| S77AL-125-10-6 | 60-72 | IICg | 0.22 | 0.55 | 0.06 | 5.92 | 12 | 4.4 | 6.75 |
| Augusta*: | | | | | | | | | |
| S77AL-125-9-1 | 0-5 | A1 | 1.04 | 0.98 | 0.21 | 7.36 | 23 | 4.4 | 9.59 |
| S77AL-125-9-2 | 5-9 | A2 | 0.76 | 0.95 | 0.32 | 5.36 | 28 | 4.4 | 7.39 |
| S77AL-125-9-3 | 9-24 | B21t | 1.06 | 1.27 | 0.09 | 6.08 | 29 | 4.6 | 8.51 |
| S77AL-125-9-4 | 24-35 | B22tg | 1.22 | 1.70 | 0.12 | 7.52 | 29 | 4.6 | 10.56 |
| S77AL-125-9-5 | 35-59 | B3g | 0.98 | 1.60 | 0.12 | 9.04 | 23 | 4.5 | 11.74 |
| S77AL-125-9-6 | 59-72 | IIC | 0.60 | 1.27 | 0.08 | 2.48 | 44 | 5.0 | 4.44 |
| Bama: | | | | | | | | | |
| S77AL-125-5-1 | 0-5 | Ap | 1.12 | 0.39 | 0.13 | 2.48 | 40 | 5.0 | 4.12 |
| S77AL-125-5-2 | 5-18 | B21t | 1.52 | 0.68 | 0.10 | 4.64 | 33 | 4.8 | 6.95 |
| S77AL-125-5-3 | 18-30 | B22t | 0.14 | 1.50 | 0.11 | 4.00 | 31 | 4.6 | 5.76 |
| S77AL-125-5-4 | 30-54 | B23t | 0.14 | 0.72 | 0.10 | 3.60 | 21 | 4.8 | 4.56 |
| S77AL-125-5-5 | 54-61 | B24t | 0.12 | 0.55 | 0.07 | 4.64 | 14 | 4.6 | 5.38 |
| Boswell*: | | | | | | | | | |
| S77AL-125-7-1 | 0-4 | Ap | 1.90 | 0.75 | 0.18 | 3.68 | 44 | 4.9 | 6.51 |
| S77AL-125-7-2 | 4-15 | B21t | 1.84 | 0.81 | 0.16 | 5.68 | 33 | 4.3 | 8.50 |
| S77AL-125-7-3 | 15-26 | B22t | 1.26 | 0.68 | 0.16 | 7.44 | 22 | 4.0 | 9.55 |
| S77AL-125-7-4 | 26-34 | B23t | 1.02 | 1.34 | 0.16 | 9.60 | 21 | 3.9 | 12.12 |
| S77AL-125-7-5 | 34-70 | B24t | 1.42 | 2.63 | 0.12 | 4.80 | 47 | 3.9 | 8.98 |
| S77AL-125-7-6 | 70-75 | C | 1.68 | 2.88 | 0.16 | 8.32 | 36 | 3.7 | 13.04 |
| Dundee: | | | | | | | | | |
| S78AL-125-1-1 | 0-3 | Ap | 4.84 | 1.24 | 0.32 | 3.92 | 62 | 5.7 | 10.33 |
| S78AL-125-1-2 | 3-13 | A12 | 4.50 | 0.81 | 0.10 | 4.32 | 56 | 5.4 | 9.74 |
| S78AL-125-1-3 | 13-24 | B21t | 1.18 | 1.31 | 0.06 | 4.72 | 35 | 5.2 | 7.27 |
| S78AL-125-1-4 | 24-36 | B22t | 0.82 | 1.54 | 0.06 | 5.44 | 31 | 5.3 | 7.86 |
| S78AL-125-1-5 | 36-58 | B3g | 0.20 | 1.73 | 0.07 | 6.00 | 25 | 5.2 | 8.00 |
| S78AL-125-1-6 | 58-72 | Cg | 1.06 | 2.70 | 0.28 | 5.20 | 44 | 5.1 | 9.24 |
| Dundee: | | | | | | | | | |
| S79AL-125-1-1 | 0-4 | Ap | 6.82 | 0.98 | 0.17 | 2.32 | 77 | 5.8 | 10.30 |
| S79AL-125-1-2 | 4-10 | A2 | 3.86 | 0.72 | 0.06 | 3.12 | 60 | 5.5 | 7.77 |
| S79AL-125-1-3 | 10-16 | B21t | 0.44 | 0.83 | 0.05 | 6.72 | 16 | 4.8 | 8.04 |
| S79AL-125-1-4 | 16-22 | B22tg | 0.32 | 0.79 | 0.05 | 5.36 | 18 | 4.9 | 6.52 |
| S79AL-125-1-5 | 22-41 | B23tg | 0.22 | 1.42 | 0.05 | 7.44 | 17 | 5.3 | 9.14 |
| S79AL-125-1-6 | 41-59 | B24tg | 0.26 | 1.92 | 0.06 | 6.24 | 27 | 5.4 | 8.49 |
| S79AL-125-1-7 | 59-80 | Cg | 0.88 | 3.05 | 0.07 | 6.00 | 40 | 5.4 | 10.01 |
| Falkner: | | | | | | | | | |
| S77AL-125-12-1 | 0-3 | Ap | 5.66 | 2.22 | 0.54 | 4.32 | 66 | 5.3 | 12.75 |
| S77AL-125-12-2 | 3-12 | A2 | 3.02 | 1.19 | 0.10 | 5.84 | 43 | 5.2 | 10.15 |
| S77AL-125-12-3 | 12-18 | B21t | 1.16 | 1.31 | 0.08 | 7.92 | 24 | 5.0 | 10.47 |
| S77AL-125-12-4 | 18-39 | B22t | 0.34 | 1.31 | 0.08 | 6.24 | 22 | 5.3 | 7.97 |
| S77AL-125-12-5 | 39-63 | B23t | 0.22 | 3.01 | 0.10 | 5.92 | 36 | 5.4 | 9.25 |
| S77AL-125-12-6 | 63-86 | C1 | 0.12 | 3.73 | 0.11 | 5.04 | 44 | 5.4 | 9.01 |

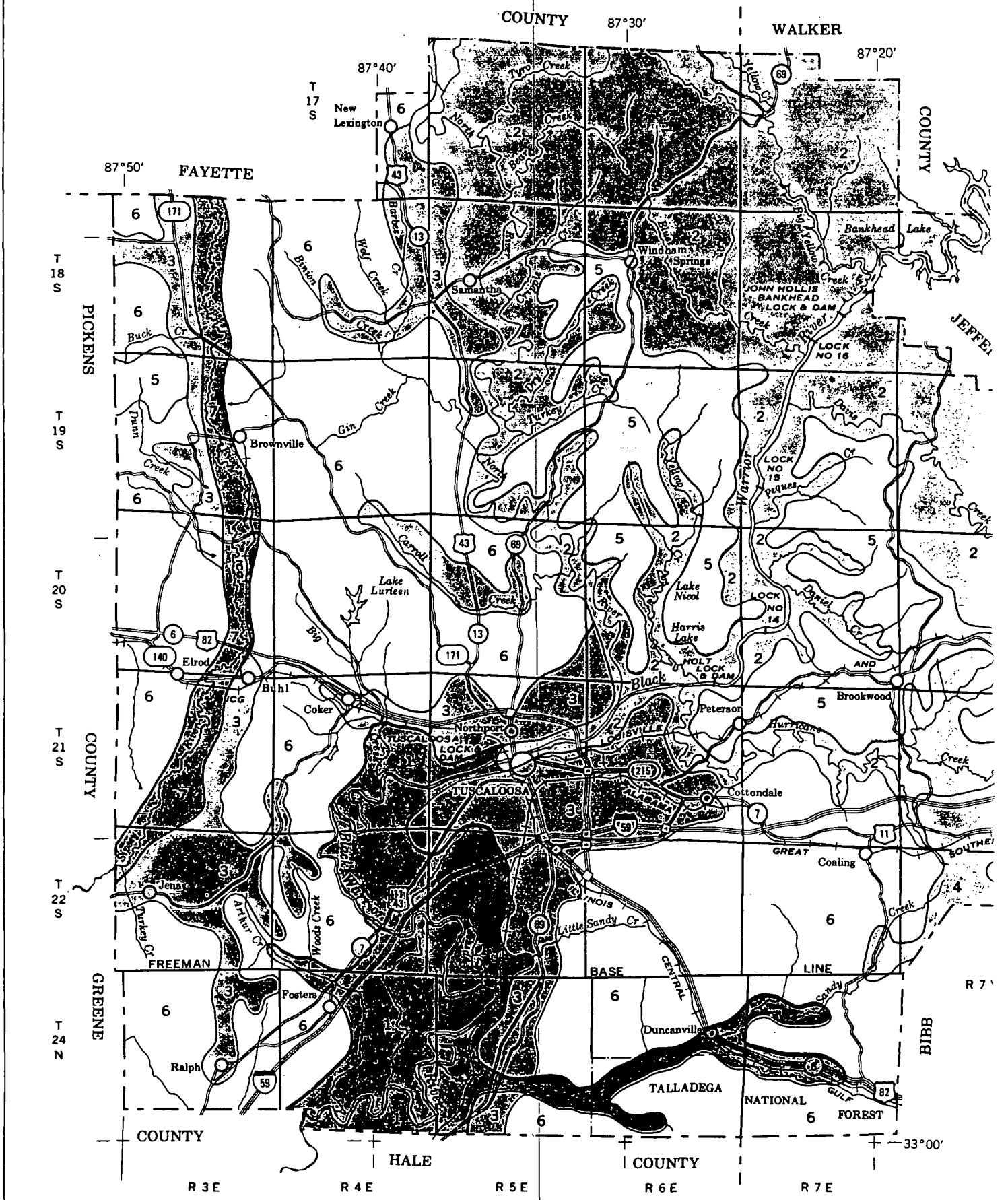
See footnote at end of table.

TABLE 18.--ENGINEERING INDEX TEST DATA

[Dashes indicate data were not available. NP means nonplastic]

| Soil name, report number, horizon, and depth in inches | Classification | | Grain-size distribution | | | | | | | | | | Liquid limit | Plasticity index | Moisture density | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Percentage passing sieve-- | | | | | | | Percentage smaller than-- | | | | | | |
| | AASHTO | Unified | 2 inch | 3/4 inch | 3/8 inch | No. 4 | No. 10 | No. 40 | No. 200 | .02 mm | .005 mm | .002 mm | | | Max. dry density | Optimum moisture |
| | | | | | | | | | | | | | Pct | | Lb/Ft$^3$ | Pct |
| Bama fine sandy loam:[1] (S78AL-125-004) | | | | | | | | | | | | | | | | |
| Ap------- 0 to 5 | A-4 (00) | ML | 100 | 100 | 100 | 99 | 99 | 95 | 51 | -- | -- | -- | -- | NP | 112 | 13 |
| B22t-----18 to 30 | A-6 (03) | CL | 100 | 100 | 100 | 99 | 99 | 95 | 53 | -- | -- | -- | 31 | 11 | 115 | 13 |
| Boswell loam:[2] (S78AL-125-007) | | | | | | | | | | | | | | | | |
| Ap------- 0 to 4 | A-4 (05) | ML | 100 | -- | -- | 99 | 99 | 97 | 84 | -- | -- | -- | 33 | 6 | 99 | 18 |
| B23t-----26 to 34 | A-7-6(39) | CH | 100 | 100 | 100 | 100 | 100 | 100 | 99 | -- | -- | -- | 60 | 33 | 96 | 16 |
| Luverne fine sandy loam:[3] (S78AL-125-002) | | | | | | | | | | | | | | | | |
| Ap------- 0 to 2 | A-2-4(00) | SM | 100 | 100 | 100 | 78 | 68 | 65 | 20 | -- | -- | -- | -- | NP | 99 | 18 |
| B22t-----14 to 24 | A-7-5(13) | MH | 100 | 100 | 100 | 98 | 98 | 96 | 62 | -- | -- | -- | 55 | 22 | 96 | 22 |
| C2-------50 to 80 | A-7-5(10) | ML | 100 | 100 | 100 | 100 | 99 | 98 | 62 | -- | -- | -- | 49 | 18 | 95 | 20 |
| Smithdale fine sandy loam:[4] (S78AL-125-003) | | | | | | | | | | | | | | | | |
| Ap------- 0 to 5 | A-2-4(00) | SM | 100 | 100 | 100 | 99 | 98 | 94 | 29 | -- | -- | -- | -- | NP | 111 | 11 |
| B21t----- 5 to 20 | A-6 (06) | CL | 100 | 100 | 100 | 99 | 98 | 96 | 56 | -- | -- | -- | 38 | 16 | 107 | 16 |
| B24t-----52 to 72 | A-4 (00) | SM-SC | 100 | 100 | 100 | 99 | 98 | 95 | 36 | -- | -- | -- | 22 | 5 | 121 | 11 |

[1]Bama fine sandy loam:
20 feet north and 1,837 feet west of the southeast corner of sec. 16, T. 20 S., R. 10 W.
[2]Boswell loam:
935 feet north and 750 feet east of the southwest corner of sec. 10, T. 22 S., R. 9 W.
[3]Luverne fine sandy loam:
835 feet north and 2,608 feet west of the southeast corner of sec. 11, T. 22 S., R. 9 W.
[4]Smithdale fine sandy loam:
2,000 feet north and 1,840 feet east of the southwest corner of sec. 17, T. 20 S., R. 9 W.



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Brownville
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Buhl
Coker
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TUSCALOOSA
Peterson
Brookwood
Cottondale
Coaling
Jena
Fosters
Ralph
Duncanville
Lake Lurleen
Lake Nicol
Harris Lake
Bankhead Lake
JOHN HOLLIS BANKHEAD LOCK & DAM
LOCK NO 16
LOCK NO 15
LOCK NO 14
HOLT LOCK & DAM
TUSCALOOSA LOCK & DAM
Black Warrior
Warrior River
Tyro Creek
North Creek
Yellow Cr
Barbee Cr
Wolf Creek
Binion Creek
Buck Cr
Dunn Creek
Gin Creek
Carroll Creek
Turkey Cr
Big Creek
Davis Cr
Peques Cr
Daniel Cr
Hurricane Creek
Little Sandy Cr
Sandy Creek
Arthur Cr
Woods Creek
Turkey Cr
FREEMAN BASE LINE
TALLADEGA NATIONAL FOREST
GREAT SOUTHERN
ILLINOIS CENTRAL
GULF

## LEGEND

1 ADATON-ELLISVILLE-DUNDEE: Deep, nearly level, poorly drained, well drained, and somewhat poorly drained soils that have a loamy subsoil; formed in fluvial deposits

2 MONTEVALLO-NAUVOO: Shallow and deep, moderately steep and steep, well drained soils that have a dominantly loamy subsoil; formed from material weathered from siltstone, sandstone, shale, and interbedded sandstone and shale

3 BAMA-SMITHDALE-SHATTA: Deep, nearly level to sloping, well drained and moderately well drained soils that have a loamy subsoil; formed in thick beds of loamy marine sediments

4 ALLEN-BODINE-DECATUR: Deep, gently sloping to steep, well drained and somewhat excessively drained soils that have a loamy or clayey subsoil; formed in loamy residuum of weathered limestone and chert

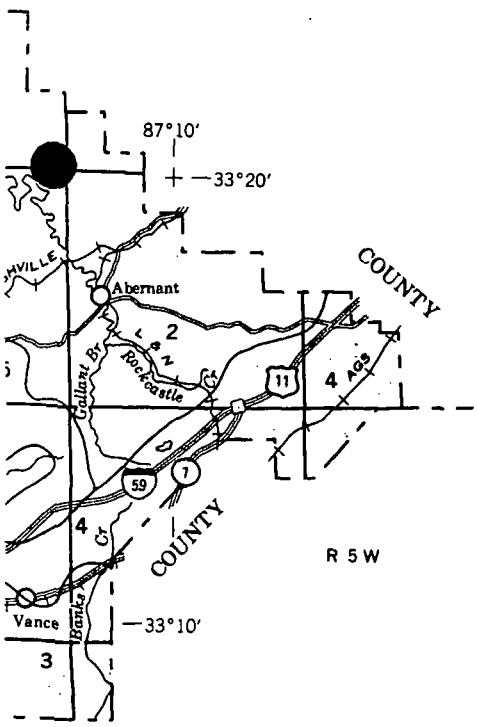
5 SMITHDALE-PALMERDALE-PIKEVILLE: Deep, rolling to steep, well drained and somewhat excessively drained soils that have a loamy subsoil; formed in thick beds of loamy and gravelly marine sediments and mine spoil materials

6 SMITHDALE-LUVERNE: Deep, sloping to steep, well drained soils that have a loamy or clayey subsoil; formed in marine sediments deposited as stratified sands, silts, and clays

7 AUGUSTA-AMY: Deep, nearly level, somewhat poorly drained and poorly drained soils that have a loamy subsoil; formed in fluvial deposits

Compiled 1981

33°30'




U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FOREST SERVICE
ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES
ALABAMA AGRICULTURAL EXPERIMENT STATION

# GENERAL SOIL MAP

## TUSCALOOSA COUNTY, ALABAMA

N

Scale 1:316,800

1 0 1 2 3 4 5 Miles

1 0 5 10 Km

*Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.*

# SOIL LEGEND

| SYMBOL | NAME |
|---|---|
| 2 | Adaton silt loam |
| 3 | Allen-Bodine complex, 8 to 15 percent slopes |
| 4 | Augusta-Amy complex, frequently flooded |
| 5 | Bama fine sandy loam, 0 to 2 percent slopes |
| 6 | Bama fine sandy loam, 2 to 6 percent slopes |
| 7 | Bama-Urban land complex, 0 to 2 percent slopes |
| 8 | Bama-Urban land complex, 2 to 6 percent slopes |
| 9 | Bibb soils, frequently flooded |
| 10 | Bodine-Allen association, hilly |
| 11 | Boswell loam, 4 to 10 percent slopes |
| 12 | Brilliant very shaly loam, 6 to 45 percent slopes |
| 13 | Cahaba sandy loam |
| 14 | Choccolocco silt loam |
| 15 | Decatur loam, 2 to 8 percent slopes |
| 16 | Dundee silt loam |
| 17 | Ellisville silt loam, frequently flooded |
| 18 | Falkner silt loam |
| 19 | Iuka-Mantachie complex, frequently flooded |
| 20 | Luverne-Smithdale complex, 4 to 10 percent slopes |
| 21 | Montevallo-Nauvoo complex, 15 to 45 percent slopes |
| 22 | Montevallo-Nauvoo association, steep |
| 23 | Nauvoo fine sandy loam, 4 to 10 percent slopes |
| 24 | Palmerdale very gravelly loam, 6 to 45 percent slopes |
| 25 | Palmerdale very shaly loam, 6 to 45 percent slopes |
| 26 | Pits |
| 27 | Ruston fine sandy loam, 0 to 2 percent slopes |
| 28 | Ruston fine sandy loam, 2 to 6 percent slopes |
| 29 | Shatta silt loam, 0 to 2 percent slopes |
| 30 | Shatta silt loam, 2 to 6 percent slopes |
| 31 | Shatta-Urban land complex, 0 to 2 percent slopes |
| 32 | Shatta-Urban land complex, 2 to 6 percent slopes |
| 33 | Smithdale fine sandy loam, 6 to 15 percent slopes |
| 34 | Smithdale fine sandy loam, 15 to 35 percent slopes |
| 35 | Smithdale-Flomaton complex, 15 to 35 percent slopes |
| 36 | Smithdale-Luverne complex, 15 to 35 percent slopes |
| 37 | Smithdale-Urban land complex, 6 to 15 percent slopes |
| 38 | Smithdale association, hilly |
| 39 | Smithdale-Luverne association, hilly |
| 40 | Smithdale-Pikeville association, hilly |
| 41 | Urban land |

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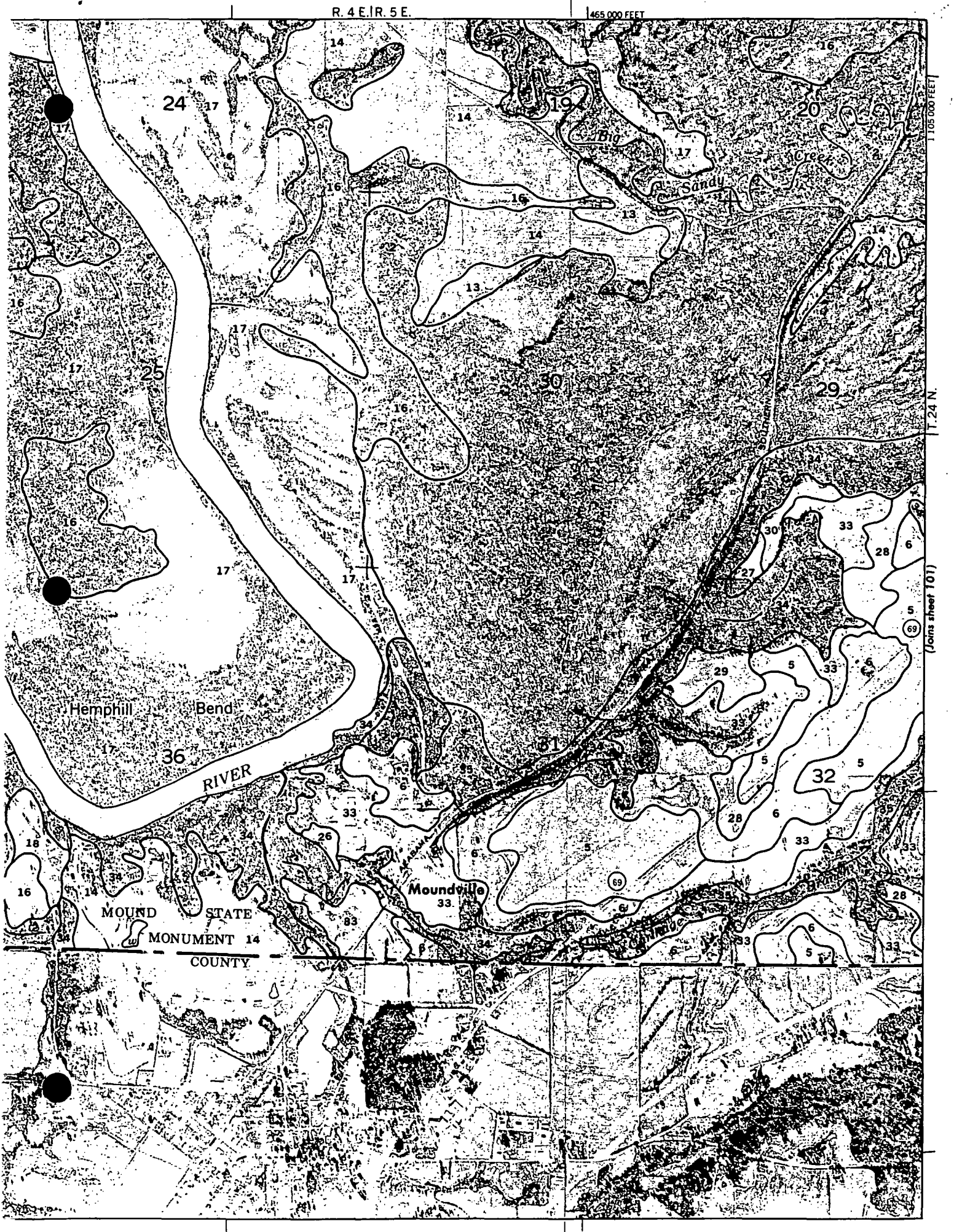
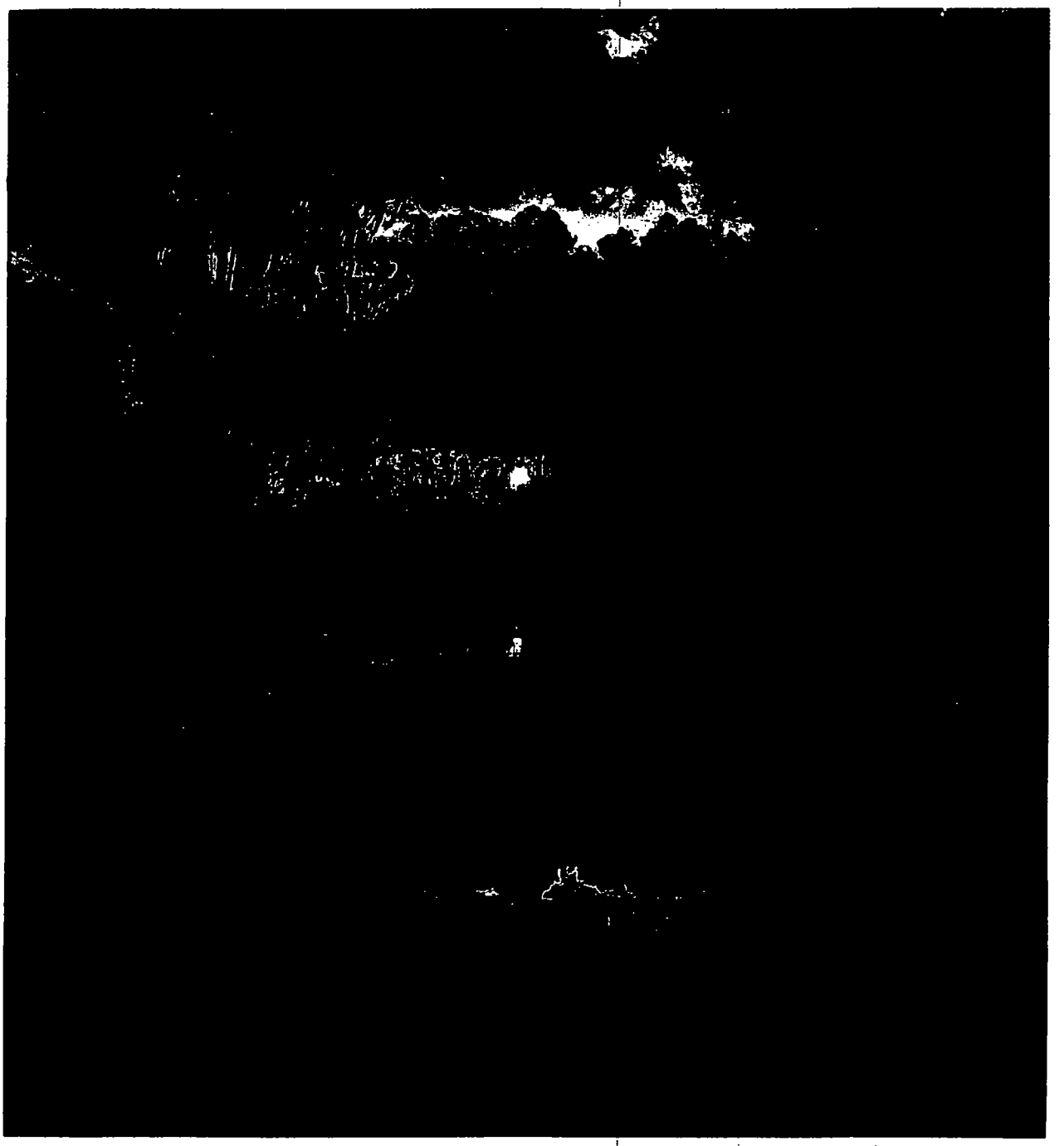



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

# REFERENCE 4

# WATER IN ALABAMA, 1990



*Geological Survey of Alabama*
*Circular 122H*

GEOLOGICAL SURVEY OF ALABAMA

Ernest A. Mancini
State Geologist

WATER RESOURCES DIVISION

# CIRCULAR 122H

# WATER IN ALABAMA, 1990

By

James D. Moore, Robert M. Baker,

Neil E. Moss, and Sydney S. DeJarnette

Tuscaloosa, Alabama
1991

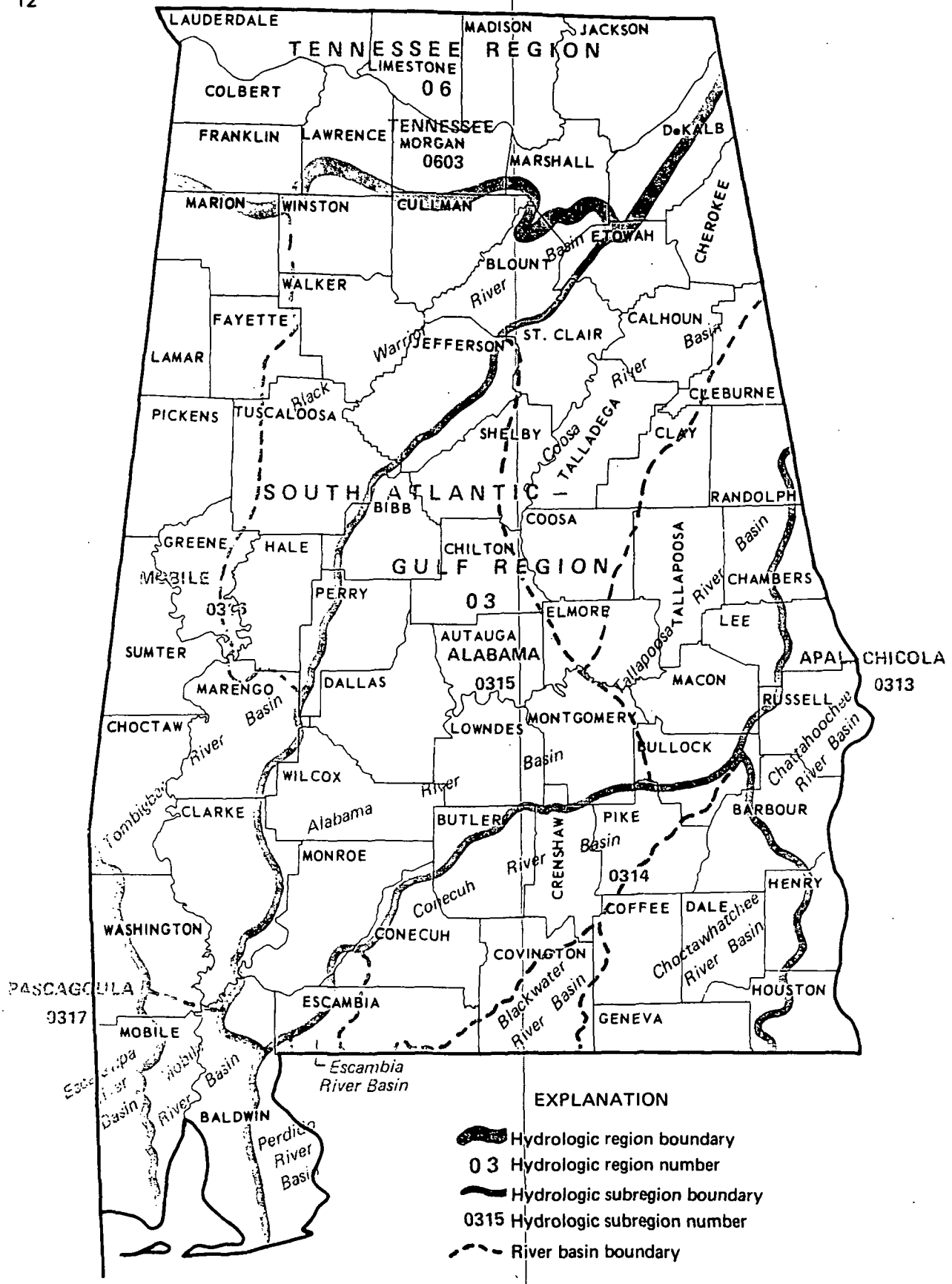



Figure 11.--Hydrologic regions and principal river basins in Alabama.

Table 1.--Low-flow (7-day $Q_2$ and $Q_{10}$) values and average discharge values for selected streams in Alabama

| Station number | Location of station | Discharge | | Low flow | | |
|---|---|---|---|---|---|---|
| | | Years of record[1] | Average discharge for period of record ($ft^3/s$) | Years of record[1] | 7-day $Q_2$ ($ft^3/s$) | 7-day $Q_{10}$ ($ft^3/s$) |
| 02361000 | Choctawhatchee River near Newton | 60 | 958 | 55 | 143 | 81 |
| 02369800 | Blackwater River near Bradley | 23 | 147 | 20 | 33 | 23 |
| 02371500 | Conecuh River at Brantley | 53 | 664 | 50 | 52 | 29 |
| 02411000 | Coosa River at Jordan Dam | 66 | 16,400 | 75 | 2,530 | 1,738 |
| 02413300 | Little Tallapoosa River near Newell | 15 | 587 | 12 | 72 | 45 |
| 02418500 | Tallapoosa River below Tallassee | 62 | 4,797 | 60 | 618 | 141 |
| 02425000 | Cahaba River near Marion Junction | 38 | 2,865 | 48 | 406 | 305 |
| 02428400 | Alabama River at Claiborne Lock and Dam | 15 | 33,770 | 12 | 6,247 | 4,807 |
| 02446500 | Sipsey River near Elrod | 47 | 784 | 58 | 52 | 29 |
| 02447025 | Tombigbee River at Gainesville Lock and Dam | | 11,680 | 8 | 424 | 264 |
| 02448500 | Noxubee River at Geiger | 46 | 1,579 | 47 | 61 | 35 |
| 02450180 | Mulberry Fork near Arkadelphia | 12 | 908 | 9 | 19 | 15 |
| 02450250 | Sipsey Fork near Grayson | 24 | 165 | 21 | 3.4 | 2.0 |
| 02456500 | Locust Fork at Sayre | 52 | 1,457 | 60 | 53 | 30 |
| 02466030 | Black Warrior River at Selden Lock and Dam | 14 | 9,667 | 10 | 935 | 619 |
| 02469761 | Tombigbee River at Coffeeville Lock and Dam | 30 | 230,030 | 27 | 2,275 | 1,503 |
| 03574500 | Paint Rock River near Woodville | 54 | 680 | 51 | 13 | 5.4 |
| 03575500 | Tennessee River at Whitesburg | 66 | 42,940 | 62 | 15,602 | 6,916 |
| 03575830 | Indian Creek near Madison | 22 | 64.1 | 27 | 4.2 | 3.1 |
| 03589500 | Tennessee River at Florence | 96 | 51,680 | 92 | 14,300 | 7,592 |

[1] "Years of record" indicates years for which discharge information was available. It does not necessarily indicate consecutive years of record. Data available through 1990 were used in determining average discharge values. Data available through 1988 were used in determining flow values. Low-flow data are preliminary machine computation estimates, and the user is responsible for assessment and interpretation. Data were provided by the U.S. Geological Survey.

values are the annual 7-day low flows of 2-year and 10-year recurrence intervals, called the 7-day $Q_2$ and 7-day $Q_{10}$, respectively. The 7-day $Q_2$ represents the median low flow, or the lowest flow to which the stream will decline during 7 consecutive days on an average of once every 2 years of normal flow. This value also provides an estimate of the amount of flow generally available without the need for storage. The 7-day $Q_{10}$ is the lowest flow for 7 consecutive days that may be expected to occur once in 10 years. The 7-day $Q_2$ and 7-day $Q_{10}$ values for some of the major streams and rivers in Alabama are provided in table 1, and figure 13 shows the areal variation in median 7-day low flow of minor streams. The reliability of low-flow values is dependent upon the length of the period of record for which discharge records are available. Usually, the longer the period of record, the more reliable the low-flow values. Low-flow values, especially those determined for extensive periods of record, change very little from year to year except when affected by extreme drought or flood conditions.

The U.S. Geological Survey maintains computer files of streamflow data and publishes daily values for gaging stations in its annual Water Data Reports for the state.

## WATER REGULATIONS

### FEDERAL LEGISLATION

Major pieces of legislation passed in recent years include the Comprehensive Environmental Response, Compensation, and Liability Act (known as the Superfund law), the Water Resources Development Act, amendments to the Safe Drinking Water Act, the Clean Water Act, and the Resource Conservation and Recovery Act.

The Comprehensive Environmental Response, Compensation, and Liability Act provides a 5-year reauthorization of a hazardous

Appendix A.--Water levels and spring discharges, Fall 1990—Continued

| County | Well or spring no. | Method of measure-ment | Date | Depth (ft) to water below or above (+) land-surface datum or spring discharge (cfs/gpm) | Change in water levels (ft) or spring discharge (cfs/gpm) since: Spring 1990 | Fall 1989 | Remarks |
|---|---|---|---|---|---|---|---|
| Geneva | B-2 | S | 10-8-90 | 58.68 | -0.87 | -0.18 | -- |
| | C-2 | S | 10-9-90 | 25.79 | -3.55 | -2.79 | -- |
| | E-30 | -- | -- | -- | -- | -- | Discontinued. |
| | H-8 | S | 10-8-90 | 49.52 | -4.47 | -2.26 | |
| | I-7 | S | 10-8-90 | 81.37 | -5.73 | +1.98 | Pump off 11 hrs. |
| | J-1 | C | 10-9-90 | 0.44/197 | -- | -- | Coffee Springs. |
| | J-4 | S | 10-9-90 | 70.74 | -1.96 | -1.78 | -- |
| | L-5 | S | 10-9-90 | 43.00 | -2.30 | -3.16 | Pump off 17 hrs. |
| | L-6 | S | 10-9-90 | 55.62 | -6.73 | -2.47 | Pump off 17 hrs. |
| | L-7 | S | 10-9-90 | 26.61 | -9.89 | -3.78 | -- |
| | N-9 | S | 10-9-90 | 85.52 | -14.94 | -- | -- |
| | Q-9 | S | 10-8-90 | 23.43 | -4.22 | -1.58 | -- |
| | R-10 | S | 10-9-90 | 18.70 | -6.57 | -1.93 | -- |
| | R-11 | -- | 10-9-90 | -- | -- | -- | Not measured. |
| | R-16 | S | 10-9-90 | 92.72 | +8.75 | +5.45 | Pump off 15 hrs. |
| | R-17 | -- | 10-2-90 | -- | -- | -- | Not measured. |
| | S-8 | S | 10-9-90 | 97.32 | -10.10 | -6.49 | Pump off 15 hrs. |
| | T-9 | S | 10-8-90 | 32.56 | -2.56 | -0.47 | -- |
| | X-4 | S | 10-9-90 | 95.74 | -4.01 | -0.18 | -- |
| | AA-2 | S | 10-8-90 | 63.15 | -4.57 | -3.95 | -- |
| Greene | A-1 | S | 10-16-90 | 11.28 | -- | -- | -- |
| | F-1 | S | 10-16-90 | 43.90 | -2.15 | -0.63 | -- |
| | J-4 | S | 10-16-90 | 4.47 | -0.79 | -0.06 | -- |
| | M-14 | S | 10-16-90 | 1.00 | -2.5 | -2.0 | -- |
| | Q-6 | S | 10-16-90 | 32.86 | -1.86 | +1.09 | -- |
| | R-9 | S | 10-16-90 | 9.10 | +0.83 | -- | -- |
| | R-12 | -- | 10-16-90 | -- | -- | -- | Not measured. |
| | V-11 | S | 10-16-90 | 155.60 | -- | -10.41 | -- |
| | DD-9 | S | 10-18-90 | 27.24 | -1.81 | -0.27 | -- |
| | EE-2 | S | 10-16-90 | 35.69 | -1.18 | -1.72 | -- |
| Hale | C-3 | S | 10-9-90 | 11.96 | -2.41 | -2.27 | -- |
| | E-5 | -- | 10-9-90 | -- | -- | -- | No flow. |
| | E-7 | S | 10-9-90 | 13.68 | -6.49 | -7.06 | -- |
| | I-7 | S | 10-9-90 | 56.93 | +1.54 | -3.49 | -- |
| | J-14 | S | 10-9-90 | 12.88 | -6.14 | -1.90 | -- |
| | O-25 | S | 10-9-90 | 62.20 | +5.52 | -1.71 | -- |

Appendix A.--Water levels and spring discharges, Fall 1990—Continued

| County | Well or spring no. | Method of measurement | Date | Depth (ft) to water below or above (+) land-surface datum or spring discharge (cfs/gpm) | Change in water levels (ft) or spring discharge (cfs/gpm) since: Spring 1990 | Fall 1989 | Remarks |
|---|---|---|---|---|---|---|---|
| Hale—Cont'd | R-2 | S | 10-9-90 | 39.70 | -12.05 | -4.98 | -- |
| | R-13 | S | 10-9-90 | 61.85 | -9.48 | -4.60 | -- |
| | S-13 | SI | 10-9-90 | +5.86 | -3.34 | -2.31 | -- |
| Henry | A-3 | S | 10-3-90 | 17.10 | -3.73 | -2.70 | -- |
| | F-4 | -- | 10-3-90 | -- | -- | -- | Not measured. |
| | J-1 | S | 10-3-90 | 136.02 | -1.00 | -0.37 | -- |
| | J-7 | S | 10-3-90 | 222.40 | -25.62 | -14.10 | Pump off 7½ hrs. |
| | K-3 | S | 10-3-90 | 198.48 | -3.35 | -1.38 | -- |
| | K-5 | S | 10-3-90 | 216.49 | -5.97 | -5.19 | Pump off 5 hrs. |
| | N-7 | S | 10-3-90 | 21.65 | -4.05 | +0.10 | -- |
| | N-8 | S | 10-3-90 | 238.75 | -10.60 | -17.04 | -- |
| | P-5 | S | 10-3-90 | 154.55 | -4.52 | -2.10 | -- |
| | V-3 | S | 10-3-90 | 244.15 | -14.18 | -15.70 | -- |
| | X-1 | S | 10-3-90 | 286.05 | -15.65 | -- | -- |
| Houston | A-4 | -- | 10/3/90 | -- | -- | -- | Not measured. |
| | G-02 | S | 10-2-90 | 259.99 | -4.32 | -9.76 | -- |
| | H-4 | S | 10-2-90 | 73.59 | -2.29 | -3.30 | |
| | I-8 | -- | 10-3-90 | -- | -- | -- | Not measured. |
| | I-11 | -- | 10-3-90 | -- | -- | -- | Not measured. |
| | I-18 | -- | 10-3-90 | -- | -- | -- | Not measured. |
| | J-3 | -- | 10-3-90 | -- | -- | -- | Not measured. |
| | J-8 | -- | 10-3-90 | -- | -- | -- | Not measured. |
| | K-12 | -- | 10-3-90 | -- | -- | -- | Not measured. |
| | K-15 | S | 10-3-90 | 104.47 | -6.17 | -2.57 | -- |
| | N-14 | A | 10-3-90 | 126 | -- | +12.6 | Pump off 14 hrs. |
| | O-12 | S | 10-3-90 | 28.01 | -14.42 | -7.45 | -- |
| | Q-4 | -- | -- | -- | -- | -- | Discontinued (destroyed). |
| | Q-6 | S | 10-2-90 | 85.05 | -- | -- | -- |
| | Q-7 | S | 10-2-90 | 73.65 | -2.35 | -0.19 | -- |
| | R-6 | S | 10-2-90 | 21.62 | -2.59 | -0.08 | -- |
| | R-7 | -- | 10-2-90 | -- | -- | -- | Not measured. |
| | S-8 | S | 10-3-90 | 19.86 | -6.09 | -4.81 | -- |
| | T-6 | -- | 10-3-90 | -- | -- | -- | Bazemore Spring. No observable flow. |
| | T-10 | S | 10-3-90 | 36.96 | -15.41 | -12.11 | -- |
| | U-7 | -- | 10-3-90 | -- | -- | -- | Not measured. |
| | U-8 | S | 10-3-90 | 51.50 | -17.18 | -9.58 | -- |
| | X-2 | S | 10-3-90 | 39.52 | -13.70 | -4.83 | -- |
| | AA-1 | S | 10-2-90 | 41.05 | -3.37 | -1.79 | -- |

Appendix A.--Water levels and spring discharges, Fall 1990—Continued

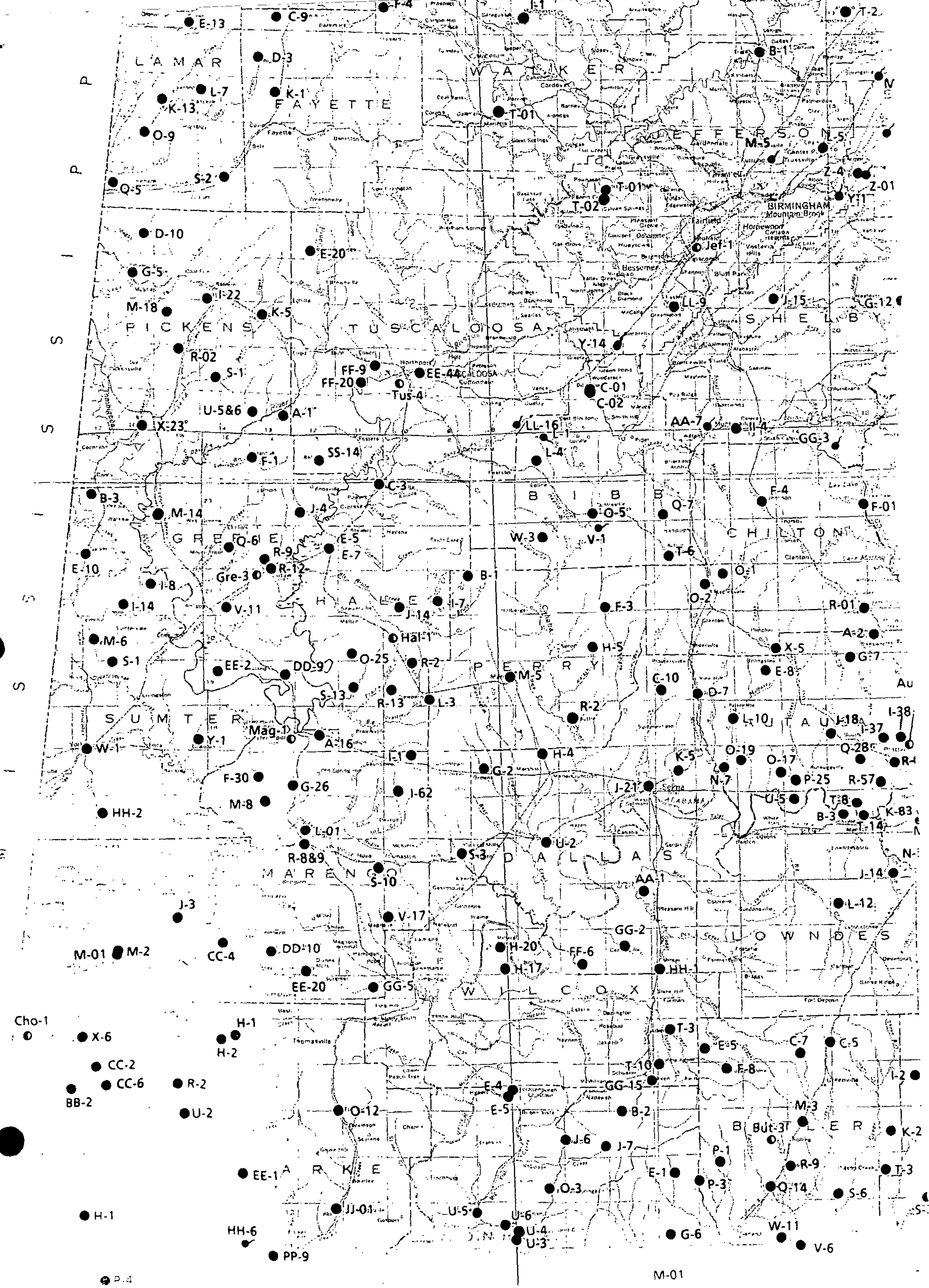
| County | Well or spring no. | Method of measurement | Date | Depth (ft) to water below or above (+) land-surface datum or spring discharge (cfs/gpm) | Change in water levels (ft) or spring discharge (cfs/gpm) since: Spring 1990 | Fall 1989 | Remarks |
|---|---|---|---|---|---|---|---|
| Talladega | F-7 | S | 10-2-90 | 105.05 | -23.28 | -3.22 | -- |
| | G-14 | C | 10-3-90 | 4.58/2,054 | -- | -1.18/529 | Cedar Spring. |
| | N-01 | S | 10-3-90 | 101.17 | -14.19 | -8.37 | Pump off overnight. |
| | R-2 | C | 10-3-90 | 1.62/727 | -- | -0.23/104 | Grogan Spring. |
| | V-14 | C | 10-3-90 | 1.37/614 | -- | -0.41/185 | Tallaseehatchee Spring. |
| | AA-19 (Tal-2) | S | 10-3-90 | 40.59 | 26.11 | 17.72 | -- |
| Tallapoosa | A-01 | S | 10-4-90 | -- | -- | -- | Dry at 26.4 feet. |
| | A-02 | S | 10-4-90 | 25.78 | -9.78 | -0.75 | -- |
| | B-01 | -- | -- | -- | -- | -- | Discontinued (destroyed). |
| | L-01 | S | 10-4-90 | 25.50 | -0.51 | +3.18 | -- |
| | N-01 | S | 10-5-90 | 90.43 | -23.63 | -16.28 | -- |
| Tuscaloosa | EE-44 | S | 10-23-90 | 25.69 | -2.75 | -- | -- |
| | FF-9 | S | 10-23-90 | 23.46 | -3.04 | -0.87 | -- |
| | E-20 | S | 10-23-90 | 31.22 | -1.77 | +1.32 | -- |
| | O-02 | S | 10-23-90 | 16.93 | -- | -- | -- |
| | FF-20 | S | 10-23-90 | 18.73 | -12.61 | -2.1 | -- |
| | SS-14 | SI | 10-23-90 | 5.36 | +0.08 | -0.27 | -- |
| | Y-14 | C | 10-18-90 | 1.54/693 | -- | -0.8/361 | -- |
| | LL-16 | C | 10-18-90 | 17.44/7,828 | -- | -- | -- |
| Walker | D-01 | S | 10-11-90 | 92.99 | +1.84 | +8.91 | -- |
| | T-01 | S | 10-4-90 | 29..23 | -0.82 | +4.76 | -- |
| | I-1 | S | 10-4-90 | 35.53 | -3.16 | -1.58 | -- |
| Washington | H-1 | S | 10-1-90 | 10.75 | -0.32 | +1.34 | -- |
| | P-4 | S | 10-1-90 | 99.05 | -4.22 | -3.29 | -- |
| | EE-1 | -- | 10-1-90 | -- | -- | -- | Not measured. |
| Wilcox | H-17 | S | 10-2-90 | 160.58 | -18.08 | -70.53 | -- |
| | H-20 | S | 10-2-90 | 20.57 | -9.96 | -0.14 | -- |
| | T-3 | S | 10-9-90 | 23.60 | -9.75 | -0.95 | -- |
| | T-10 | -- | -- | -- | -- | -- | Discontinued. |
| Winston | J-01 | S | 10-4-90 | 56.17 | -3.28 | -0.04 | -- |
| | O-01 | E | 10-4-90 | 158.0 | -56.32 | -55.7 | -- |

Appendix E-1.--Ground-water quality sites
(See plate 4 for well and spring locations.)

| Site no. | Well owner or spring name | Use | Identifying number and county | Depth (feet) | Water-bearing unit |
|---|---|---|---|---|---|
| 1 | Citronelle | PWS | D-3, Mobile | 735 | Miocene-Pliocene Series |
| 2 | Atmore | PWS | Z-71, Escambia | 130 | Miocene-Pliocene Series |
| 3 | Theodore | PWS | KK-1, Mobile | 148 | Miocene-Pliocene Series |
| 4 | Dauphin Island | PWS | UU-2 (Well #2), Mobile | 305 | Miocene-Pliocene Series |
| 5 | Orange Beach | PWS | ZZ-8, Baldwin | 120 | Miocene-Pliocene Series |
| 6 | Brewton | PWS | O-95, Escambia | 661 | Lisbon Formation |
| 7 | Fairhope | PWS | NN-04, Baldwin | 230 | Miocene-Pliocene Series |
| 8 | Brewton Airport | PWS | V-37, Escambia | 435 | Ocala Limestone |
| 9 | Evergreen | PWS | S-2, Conecuh | 180 | Tallahatta Formation |
| 10 | Butler | PWS | M-01 (Well #4), Choctaw | 708 | Nanafalia Formation |
| 11 | Andalusia | PWS | M-8, Antioch Road Well, Covington | 1,090 | Nanafalia Formation |
| 12 | Geneva | PWS | R-11 (Well #3), Geneva | 1,040 | Nanafalia Formation |
| 13 | Monroeville | PWS | U-4, Hammond Street Well, Monroe | 1,240 | Nanafalia Formation |
| 14 | Jackson | PWS | HH-6, Clarke | Spring | Crystal River Formation |
| 15 | Elba | PWS | K-4 (Well #2), Coffee | 585 | Clayton Formation |
| 16 | Ozark | PWS | F-16, Dale | 880 | Ripley Formation |
| 17 | Greenville | PWS | H-12, Butler | 577 | Ripley Formation |
| 18 | Troy | PWS | J-8 (Well #2), Pike | 519 | Ripley Formation |
| 19 | Luverne | PWS | L-5 (Well #1), Crenshaw | 567 | Ripley Formation |
| 20 | Camden | PWS | O-38, Wilcox | 441 | Ripley Formation |
| 21 | Clayton | PWS | S-1, Barbour | 195 | Ripley Formation |
| 22 | Dothan | PWS | I-19 (Well #23), Houston | 860 | Ripley Formation |
| 23 | C. A. Boyd | Stock | J-8, Sumter | 940 | Eutaw Formation |
| 24 | Montgomery | PWS | K-95 (Well #40), Montgomery | 275 | Eutaw Formation |
| 25 | Linden | PWS | L-26, Marengo | 1,240 | Eutaw Formation |
| 26 | Eutaw | PWS | R-12, Greene | 429 | Eutaw Formation |
| 27 | Montgomery | PWS | J-31, (Well #13), Montgomery | 631 | Tuscaloosa Group |
| 28 | Vernon | PWS | K-13, Lamar | 335 | Tuscaloosa Group |
| 29 | Hayneville | PWS | L-12, Lowndes | 1,061 | Tuscaloosa Group |
| 30 | Union Springs | PWS | L-3 (Well #2), Bullock | 1,105 | Tuscaloosa Group |
| 31 | Aliceville | PWS | W-30, Pickens | 521 | Tuscaloosa Group |
| 32 | Olympia Spa | Mineral pool | Q-6, Houston | 2,924 | Tuscaloosa Group |
| 33 | Brydie Farms | Stock | AA-33, Greene | 750 | Tuscaloosa Group |
| 34 | Coker | PWS | FF-51, Tuscaloosa | 182 | Tuscaloosa Group |
| 35 | Moundville | PWS | B-20, Hale | 233 | Tuscaloosa Group |
| 36 | Eufaula | PWS | V-1, Barbour | 1,752 | Tuscaloosa Group |
| 37 | State of Alabama (Marion Fish Hatchery) | Fish | I-9, Perry | 773 | Tuscaloosa Group |

## Appendix E-2.--Results of chemical analyses of water samples from selected wells and springs—Continued

| Parameter | Site numbers | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
| Date | 6/11/90 | 6/11/90 | 6/14/90 | 6/18/90 | 6/14/90 | 6/13/90 | 6/18/90 | 6/13/90 | 6/11/90 | 6/18/90 | 6/15/90 | 6/13/90 |
| Time | 1445 | 0821 | 1357 | 1050 | 1215 | 0948 | 0920 | 1521 | 0840 | 0744 | 1157 | 1114 |
| Flow (cfs) | -- | -- | -- | 31 | -- | -- | -- | -- | -- | -- | -- | -- |
| Specific conductance (µmhos/cm) | 2,130 | 858 | 451 | 85 | 281 | 249 | 183 | 7,710 | 7,070 | 180 | 30.5 | 356 |
| Temperature (°C) | 28 | 21 | 21 | 26 | 27 | 26 | 20 | 24 | 24 | 19 | 20 | 30 |
| Turbidity (NTU) | -- | -- | -- | NA | -- | -- | -- | -- | -- | -- | -- | -- |
| Bicarbonate (mg/L) | 710 | 210 | 200 | 40 | 130 | 110 | 98 | 770 | 42 | 61 | 12 | 160 |
| Carbonate (mg/L) | 0 | 0 | 28 | 0 | 4.1 | 6.6 | 0 | 0 | 0 | 0 | 0 | 25 |
| Alkalinity as $CaCO_3$ (mg/L) | 580 | 170 | 210 | 33 | 110 | 99 | 80 | 630 | 35 | 50 | 9.6 | 170 |
| pH | 8.3 | 8.2 | 9.2 | 5.9 | 8.5 | 8.6 | 7.2 | 8.3 | 6.3 | 6.7 | 6.3 | 9.2 |
| Silica (mg/L) | 14 | 12 | 13 | 9.7 | 14 | 14 | 11 | 20 | 12 | 14 | 18 | 18 |
| Calcium (mg/L) | 4.6 | 5.1 | 1.5 | 1.9 | 1.6 | 2.6 | 2.6 | 24 | 150 | 14 | 1.5 | 0.8 |
| Magnesium (mg/L) | 1.0 | 0.9 | 0.1 | 1.4 | 0.1 | 0.1 | 0.6 | 9.5 | 28 | 4.9 | 0.8 | ND |
| Sodium (mg/L) | 550 | 190 | 110 | 2.8 | 66 | 55 | 34 | 2,000 | 1,700 | 3.4 | 1.5 | 87 |
| Potassium (mg/L) | 3.0 | 3.0 | 0.7 | 3.3 | 0.7 | 1.2 | 3.0 | 12 | 14 | 4.3 | 3.0 | 0.6 |
| Sulfate (mg/L) | ND | 0.29 | 12 | 2.3 | 4.9 | 19 | 3.4 | ND | ND | 8.2 | 1.6 | 3.8 |
| Chloride (mg/L) | 400 | 160 | 7.2 | 1.8 | 16 | 5.4 | 2.1 | 2,600 | 2,900 | 2.4 | 2.0 | 7.9 |
| Fluoride (mg/L) | 2.3 | 1.0 | 0.5 | 0.1 | 0.1 | ND | 0.1 | 0.6 | ND | 0.1 | <0.05 | 0.2 |
| Nitrate as N (mg/L) | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Ammonia as N (mg/L) | 1.0 | 0.61 | 0.18 | ND | 0.18 | 0.28 | 0.26 | 0.62 | 3.4 | 0.05 | ND | 0.30 |
| Orthophosphate as P (mg/L) | ND | ND | 0.03 | ND | ND | ND | 0.06 | ND | ND | ND | ND | ND |
| Arsenic (µg/L) | ND | ND | <0.5 | ND | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | ND | ND | <0.5 |
| Barium (µg/L) | 11 | 10 | <5 | 10 | ND | ND | ND | 90 | 1,400 | 200 | 30 | ND |
| Cadmium (µg/L) | ND | <0.5 | <0.5 | ND | 1 | 1 | ND | 1 | <0.5 | 1 | <0.5 | ND |
| Chromium (µg/L) | <0.5 | 1 | 1 | <0.5 | 1 | 1 | ND | 1 | 1 | <0.5 | 1 | 1 |
| Iron (µg/L) | 20 | 80 | 10 | 13,000 | 20 | 20 | 100 | 40 | 2,800 | 10,000 | 10 | <5 |
| Lead (µg/L) | <0.5 | ND | <0.5 | ND | 1 | ND | ND | <0.5 | ND | <0.5 | <0.5 | 1 |
| Manganese (µg/L) | 14 | 16 | ND | 710 | 6 | ND | 16 | 40 | 50 | 380 | 5 | 2 |
| Mercury (µg/L) | ND | ND | ND | ND | ND | ND | ND | ND | 0.1 | 0.1 | ND | ND |
| Selenium (µg/L) | <0.5 | <0.5 | 1 | <0.5 | ND | ND | <0.5 | ND | ND | ND | <0.5 | ND |
| Silver (µg/L) | ND | ND | ND | <0.5 | <0.5 | ND | <0.5 | <0.5 | ND | <0.5 | <0.5 | ND |
| Strontium (µg/L) | 320 | 200 | 40 | 20 | 40 | 60 | 120 | 3,600 | 9,100 | 560 | 30 | 20 |
| Zinc (µg/L) | 10 | 10 | 10 | 40 | 40 | 10 | <5 | 20 | 80 | 10 | 30 | 20 |
| Total dissolved solids (mg/L) | 1,310 | 490 | 296 | 36 | 188 | 172 | 100 | 5,260 | 5,110 | 82 | 28 | 228 |
| Hardness as $CaCO_3$ (mg/L) | 18 | 16 | 4 | 11 | 5 | 7 | 9 | 99 | 490 | 55 | 7 | 2 |



LAMAR
FAYETTE
WALKER
JEFFERSON
BIRMINGHAM
PICKENS
TUSCALOOSA
SHELBY
GREENE
HALE
BIBB
CHILTON
PERRY
SUMTER
AUTAUGA
DALLAS
MARENGO
LOWNDES
WILCOX
BUTLER
CLARKE
MISSISSIPPI
E-13
C-9
F-4
J-1
T-2
B-1
D-3
L-7
K-1
K-13
O-9
T-01
M-5
L-5
Z-4
Z-01
Y-1
S-2
Q-5
T-02
D-10
E-20
Jef-1
G-5
I-22
M-18
K-5
LL-9
J-15
G-12
Y-14
R-02
FF-9
EE-44
S-1
FF-20
Tus-4
C-01
C-02
U-5&6
A-1
X-23
LL-16
L-1
AA-7
J-4
GG-3
F-1
SS-14
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C-3
B-3
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M-14
Q-7
O-5
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W-3
V-1
Q-6
E-5
E-7
R-9
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E-10
R-12
Gre-3
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O-2
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G-7
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DD-9
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L-12
GG-2
M-01
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FF-6
H-17
HH-1
EE-20
GG-5
Cho-1
X-6
H-1
H-2
T-3
E-5
C-7
C-5
CC-2
F-8
T-10
CC-6
R-2
GG-15
I-2
BB-2
E-4
E-5
U-2
O-12
B-2
M-3
But-3
K-2
J-6
J-7
P-1
EE-1
E-1
R-9
T-3
P-3
O-3
Q-14
S-6
JJ-01
U-5
U-6
H-1
U-4
U-3
G-6
W-11
HH-6
V-6
PP-9
M-01

# REFERENCE 5

8/1/94

Hale Co.

Display PWS SUMMARY

PWS ID: AL 0000651 PWS TYPE: C (C,N,P) SAMPLING PLAN: Y (Y,N)
ACTIVITY FLAG: A (A or I) SYSTEM BEGIN-YY: 75 SYSTEM BEGIN-MM: 06
DEACT-YY: 00 DEACT-MM: 00 POPULATION SERVED: 2,916
PCT SURFACE: 000 PCT GROUND: 100 PCT PUR SURFACE: 000 PCT PUR GROUND: 000
SYSTEM NAME: MOUNDVILLE WATER WORKS
RESPONSIBLE PERSON: ATTN: ROBERT LAKE, MAYOR
ADDRESS (ST/BOX): PO BOX 98
CITY: MOUNDVILLE STATE: AL ZIP: 35474
PRIMARY PHONE: 205 371 2641 EMERGENCY PHONE: 205 371 2641
SERVICE CONNECTIONS: 972 OWNER TYPE: 4 AC PIPE:
REGULATING ENTITY: S (F=Federal S=State B=Both N=Neither) CROSS CONNECT: Y
SEASON BEGIN-MM: 00 SEASON BEGIN-DD: 00 SEASON END-MM: 00 SEASON END-DD: 00
REQUIRED COMPLIANCE SAMPLES: 0003 REQUIRED RAW SAMPLES: 0001
LAB ID: 10020 LAB NAME: Birmingham Branch Laboratory
TURBIDITY MONITORING REQUIRED: N (Y OR N) USER: CED DATE: 12/15/93
FLOURIDE MONITORING REQUIRED: N (Y OR N) TIME: 06:21:12.81

[illegible] DATA / ON SITE VISIT [illegible]
[illegible] Permanent E=Emergency S=Seasonal T=Interim O=Other)
[illegible] NAME: [illegible]

12) SOURCE ENTITY I / ENFORCEMENT DAT 16) Return
13) GEOGRAPHIC AREA / PROJECTS
9) Modify 14) SERVICE AREAS / TOTALS

2256MWS

SOURCE ENTITY INFO Choose by cursor position or X's

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Federal Reporting Data System (FRDS-II)

| PWS ID | SE ID | NAME | SE CODE |
|---|---|---|---|
| AL0001509 | 001 | [redacted] | SW |
| AL0001509 | 002 | [redacted] | SW |

Display 10) PWS SUMMARY 15) Output
/ Clear 6) Add 11) TREATMENT DATA / Send
7) Query 12) TOTALS 16) Return
13) SOURCE CHEMICAL MONITORING / Exit Menu
9) Modify

2256MWS

SOURCE ENTITY INFO

USERID: NL DATE: 01/08/93
NAME: HALE COUNTY WATER SYSTEM TIME: 10:37:25.94
AL 0001509 SE ID: 001 PWS TYPE: C ACTIVITY CODE: A
ILITY: P (P=Permanent E=Emergency S=Seasonal I=Interium O=Other)
E: SW [redacted]
JSID: AL 0000645 LATITUDE: 000000 LONGITUDE: 0000000
NAME: CT: 0
ORIGIN: S TOWNSHIP: 000 (N or S) RANGE: 000 (E or W)
CO QTR SECTION: (NW,NE,SW,SE) QTR QTR SECTION: (NW,NE,SW,SE)
REACHNUM: 00000000 ON REACH: (Y or N) REACH MILES: 0.00
TYPE: WELL DEPTH: 0 AQUIFER:
DIAMETER: 0 CASING TYPE: WELL DRAW DOWN: 0
WATER LEVEL: 0 SOURCE AVERAGE PRODUCTION: 0
RATED CAPACITY: 0 RAW STORAGE: 0
PRODUCTION: 0 SOURCE DATE-MM: 00 SOURCE DATE-YY: 00
TREAT PLANT: VULNERABILITY:

10) PWS SUMMARY 15) Output
6) Add 11) TREATMENT DATA / Send
16) Return
Clear 7) Modify

2256MWS

SOURCE ENTITY INFO

USERID: NL DATE: 01/08/93
NAME: HALE COUNTY WATER SYSTEM TIME: 10:37:26.04
SE ID: 002 PWS TYPE: C ACTIVITY CODE: A
P=Permanent E=Emergency S=Seasonal I=Interium O=Other)
[redacted]

ATA ORIGIN: S TOWNSHIP: 000 (N or S) RANGE: 000 (E or W)
ECTION: 00 QTR SECTION: (NW,NE,SW,SE) QTR QTR SECTION: (NW,NE,SW,SE)
IVER REACHNUM: 00000000 ON REACH: (Y or N) REACH MILES: 0.00
ELL TYPE: WELL DEPTH: 0 AQUIFER:
ASING DIAMETER: 0 CASING TYPE: WELL DRAW DOWN: 0
ELL STATIC LEVEL: 0 SOURCE AVERAGE PRODUCTION: 0
UMP RATED CAPACITY: 0 RAW STORAGE: 0
AXIMUM PRODUCTION: 0 SOURCE DATE-MM: 00 SOURCE DATE-YY: 00
ECEIVING PLANT: VULNERABILITY:

10) PWS SUMMARY
11) TREATMENT DATA

6) Add
9) Modify

15) Output / Send
16) Return

) Down
) Prev / First

) 1

2256MWS

8/1/94

Tuscaloosa Co.

No Wells in 4 mile Radius

USERID: JS DATE: 03/29/94
SYSTEM NAME: CITIZEN'S WATER SERVICE TIME: 10:52:57.32
PWS ID: AL 0001292 SE ID: 001 PWS TYPE: C ACTIVITY CODE: A
AVAILABILITY: P (P=Permanent E=Emergency S=Seasonal I=Interim O=Other)
SE CODE: SP SOURCE NAME: WEST BLOCTON
SELLER PWSID: AL 0000097 LATITUDE: 000000 LONGITUDE: 0000000
MERIDIAN NAME: CT: 0
DATA ORIGIN: S TOWNSHIP: 000 (N or S) RANGE: 000 (E or W)
SECTION: 00 STR SECTION: (NW,NE,SW,SE) STR DTR SECTION: (NW,NE,SW,SE)
RIVER REACHNUM: 00000000 UN REACH: (Y or N) REACH MILES: 0.00
WELL TYPE: WELL DEPTH: 0 AQUIFER:
CASING DIAMETER: 0 CASING TYPE: WELL DRAW DOWN: 0
WELL STATIC LEVEL: 0 SOURCE AVERAGE PRODUCTION: 0
PUMP RATED CAPACITY: 0 RAW STORAGE: 0
MAXIMUM PRODUCTION: 0 SOURCE DATE-AM: 00 SOURCE DATE-PM: 0
RECEIVING PLANT: 95: PURCHASE FROM W.SLOC VULNERABILITY:

[illegible] PWS NUMBER: [illegible]
[illegible] TREATMENT DATA [illegible]
[illegible]

[illegible]
[illegible]

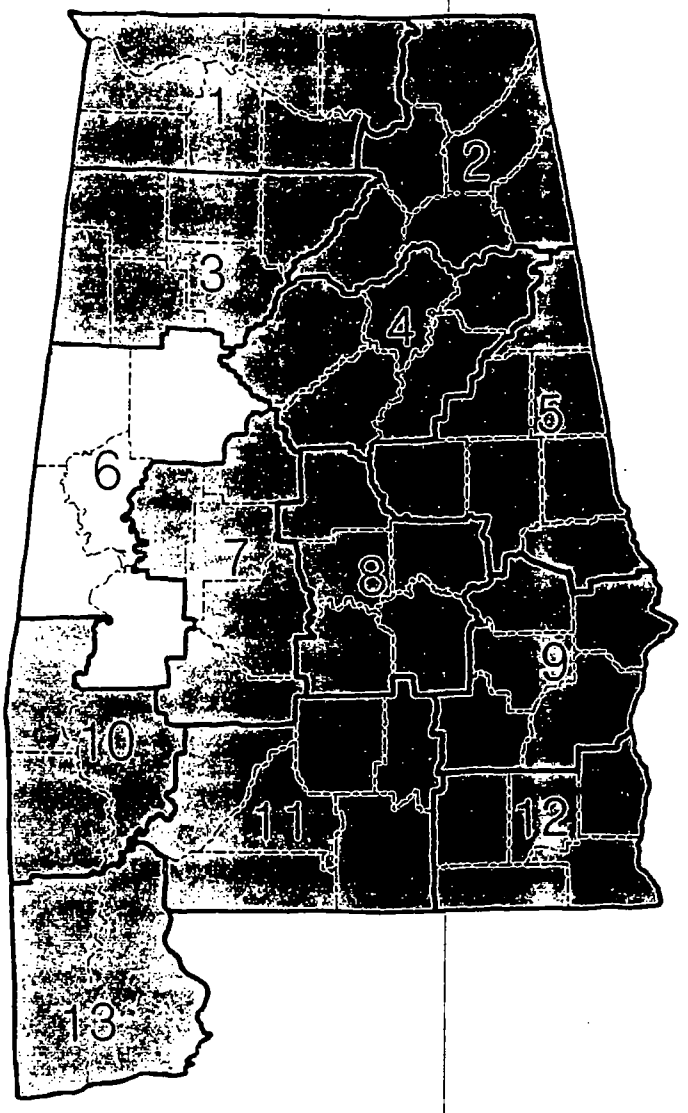
[illegible]

[illegible]

# REFERENCE 6

WATER-RESOURCES INVESTIGATIONS REPORT 87-4113

# GEOHYDROLOGY AND SUSCEPTIBILITY OF MAJOR AQUIFERS TO SURFACE CONTAMINATION IN ALABAMA; AREA 6




Prepared by
U.S. GEOLOGICAL SURVEY
in cooperation with the
ALABAMA DEPARTMENT OF
ENVIRONMENTAL MANAGEMENT

# GEOHYDROLOGY AND SUSCEPTIBILITY OF MAJOR AQUIFERS TO SURFACE CONTAMINATION IN ALABAMA; AREA 6

by Sydney S. DeJarnette and Jo E. Crownover

U.S. GEOLOGICAL SURVEY

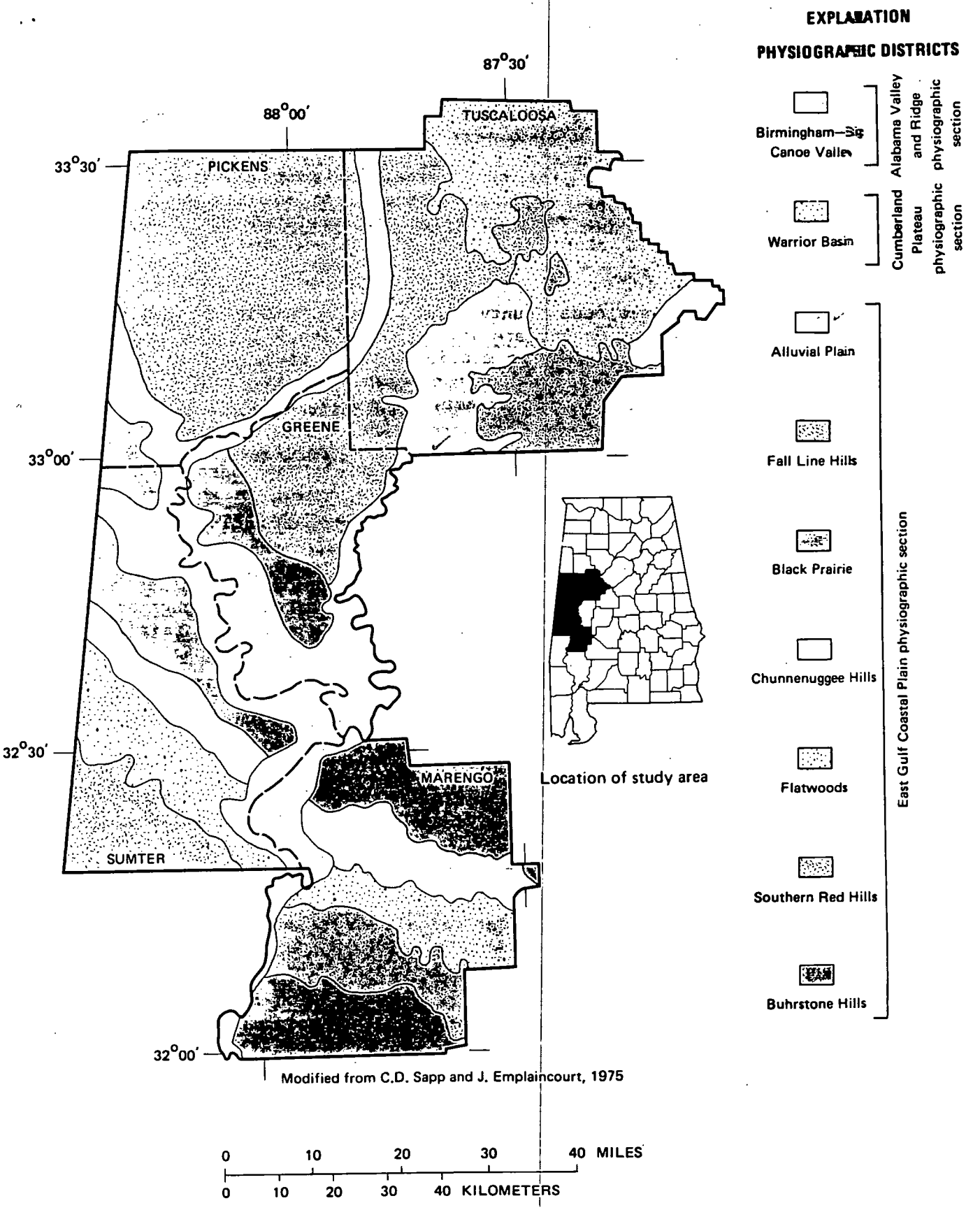
Water-Resources Investigations Report 87-4113

Prepared in cooperation with the

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Tuscaloosa, Alabama

1987




Modified from C.D. Sapp and J. Emplaincourt, 1975

Figure 1.--Physiographic divisions of the study area.

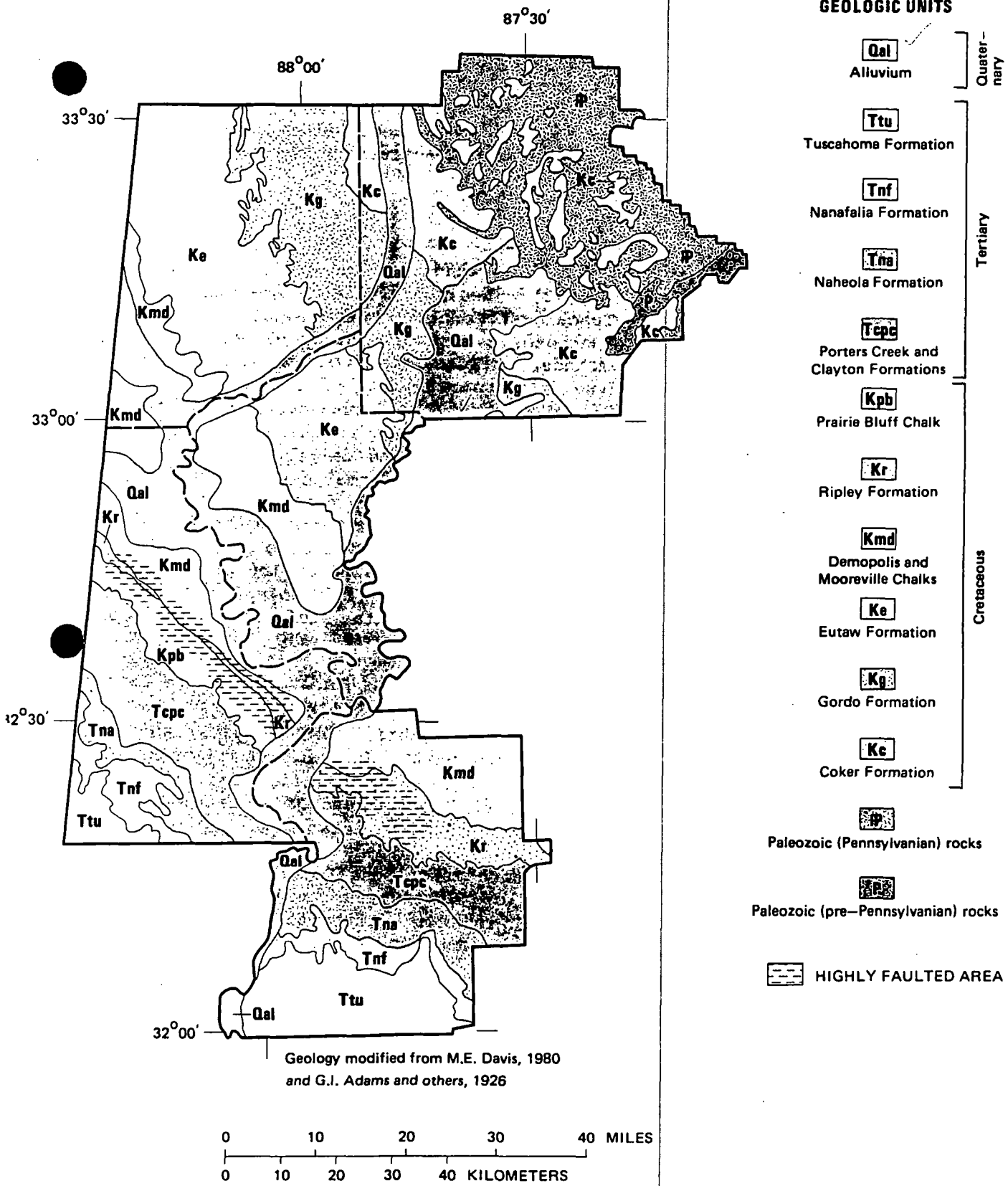



Figure 2.--Generalized geology of the study area.

## Cretaceous Formations

### Coker Formation

The Coker Formation crops out in Tuscaloosa County and in streambeds in eastern Pickens County (see fig. 2). The Coker underlies all of the study area south and southwest of its area of outcrop.

The Coker Formation consists of a basal nonmarine zone of gravel, marine sand and clay. In most parts of the study area, the basal zone is generally separated from the marine sand beds by 50 feet or more of clay. A clay zone is usually present at the top of the Coker. Where this clay exists, it serves as a confining unit between the Coker aquifer and the overlying Gordo aquifer (see figs. 3 and 4). However, over much of the area, the two aquifers are hydraulically connected and are treated as one aquifer referred to as the Tuscaloosa aquifer for purposes of the potentiometric map of this report (fig. 4). The Coker Formation ranges in thickness from less than 100 feet where only the basal beds remain to more than 1,000 feet in southernmost parts of the study area.

The towns of Coker and Gordo, and the Buhl-Elrod-Holman Water System pump from the Coker aquifer. However, the Coker is not used extensively farther downdip where shallower aquifers are available. An electric log of an oil test well in southwestern Pickens County indicates that the Coker contains relatively fresh water to a depth of 1,750 feet in that area (Wahl, 1965).

### Gordo Formation

The Gordo Formation overlies the Coker Formation and crops out in southwestern Tuscaloosa County, northeastern Pickens County and in a small part of northeastern Greene County (see fig. 2). Like the Coker, it dips to the southwest and underlies the formations that crop out south of it. The Gordo consists of a basal zone of gravelly sand overlain by alternating lenticular beds of sand and varicolored mottled clay. It ranges in thickness from less than 100 feet at outcrops to nearly 400 feet in the subsurface in the southern part of the study area. The towns of Aliceville, Reform, Faunsdale, and Union pump from the Gordo aquifer.

### Eutaw Formation

The Eutaw Formation overlies the Gordo Formation and crops out over the central part of Pickens County, northern Greene County, and a small part of southwestern Tuscaloosa County. The Eutaw consists of upper and lower zones of marine sand separated by a zone of clay. It ranges in thickness from less than 200 to 400 feet where the entire formation is present. The lower part of the formation consists of 30 to 50 feet of glauconitic sand interbedded with sandy clay. The middle part consists of 50 to 150 feet of calcareous clay and sandy clay. The upper part, the Tombigbee Sand Member, consists of 25 to 100 feet of massive glauconitic sand interbedded with calcareous sandstone and sandy limestone. In part of the area the McShan Formation underlies the Eutaw

Formation (Conant and Monroe, 1945), but for the purposes of this report it is combined with the Eutaw Formation and forms the Eutaw aquifer (Newton and others, 1961).

The Eutaw is the most extensively used aquifer in the study area; it is pumped in downdip areas where it is overlain by the Mooreville and Demopolis Chalks (discussed below) in addition to its outcrop area. The towns of Eutaw, Boligee, Forkland, Demopolis, Linden, and Thomaston pump from the Eutaw.

### Mooreville Chalk

The Mooreville Chalk overlies the Eutaw Formation, and crops out in southwestern Pickens County, northern Sumter County, and central Greene County (fig. 2). The Mooreville consists of about 400 to 420 feet of chalk, calcareous clay, sandy clay and limestone. The Arcola Limestone Member of the Mooreville, at the top of the unit, consists of two to four thin beds of limestone separated by clay and sandy clay. The Mooreville Chalk is relatively impermeable and is not a source of water in the study area. The chalk is an upper confining layer for the upper Eutaw aquifer. However, the Mooreville and the overlying Demopolis Chalk and Ripley Formation are extensively faulted in parts of Sumter and Marengo Counties (see fig. 2), which may allow water to move through the chalk.

### Demopolis Chalk

The Demopolis Chalk overlies the Mooreville Chalk, and crops out in extreme southwest Pickens County, northern Sumter County, and northern Marengo County (fig. 2). The Demopolis consists of about 400 to 440 feet of chalk, calcareous clay, and sandy clay. It is relatively impermeable and is not an aquifer in the study area.

### Ripley Formation

The Ripley Formation overlies the Demopolis Chalk and crops out in central Marengo and Sumter Counties (fig. 2). The Ripley Formation consists of fine grained fossiliferous calcareous clayey sand. The lower part locally contains thin beds of calcareous sandstone. The formation ranges in thickness from 150 to 220 feet in the study area. The Ripley is a minor aquifer in the study area.

### Prairie Bluff Chalk

The Prairie Bluff Chalk overlies the Ripley and crops out in a narrow belt at the southern margin of the Ripley Formation in Sumter and Marengo Counties. It consists of fossiliferous sandy chalk and clay and generally ranges in thickness from 60 feet in Sumter County to 10 feet in Marengo County. The Prairie Bluff is relatively impermeable, and is not an aquifer in the study area.

and clay. Alluvial deposits along the flood plains of the Black Warrior, Sipsey, and Tombigbee Rivers are shown on the geologic map (fig. 2). Remnants of older alluvial deposits (usually mapped as high terrace deposits) are not shown on the geologic map, but form relatively flat uplands in several parts of the study area. The alluvial deposits generally range in thickness from 30 to 60 feet. They are not a major aquifer in the study area.

## HYDROLOGY OF THE MAJOR AQUIFERS

The major aquifers in the study area are sand and gravel beds in the Coker, Gordo, Eutaw, and Nanafalia Formations. Water in these aquifers occurs under artesian conditions in most parts of the study area. Municipal wells that tap the major aquifers are shown in table 2 and their locations are shown on plate 1.

### Recharge and Movement of Ground Water

Rainfall, which averages about 50 inches per year, is the source of recharge to the major aquifers. A large part of the rainfall runs off during and directly after rainstorms or is returned to the atmosphere by evaporation and transpiration of trees and other plants; a small part infiltrates to the water table to recharge aquifers. The recharge area for the Coker aquifer is mainly in Tuscaloosa County; the Gordo aquifer mainly in Pickens and Tuscaloosa Counties; and the Eutaw aquifer in Pickens and Greene Counties. The recharge area for the Nanafalia aquifer is in Sumter and Marengo Counties (see plate 1). These recharge areas consist largely of rolling sandhills, parts of which are wooded and parts cultivated. In Tuscaloosa and Pickens Counties remnants of high terrace deposits overlie significant parts of the recharge areas. These terrace remnants form relatively flat, permeable landscapes that impede runoff and probably increase recharge to the aquifers. Alluvial deposits overlie the major aquifers along the flood plains in the Black Warrior, Sipsey, and Tombigbee Rivers. These permeable deposits may provide increased recharge to the aquifers. Water moves downdip from areas of recharge to areas of natural discharge or areas of ground-water withdrawals, generally perpendicular to the potentiometric contour lines shown on figures 4, 5, and 6.

### Natural Discharge and Ground-Water Withdrawals

The aquifers discharge through seeps and springs to provide the base (dry weather) flow of streams. Discharge to the rivers also occurs where streams are entrenched into the aquifers. Discharge to streams can occur by upward leakage through the confining unit between aquifers or by passing through fractures in the Mooreville and Demopolis Chalks (Gardner, 1981). Most of the remainder of the discharge is through wells. The largest pumping center in the study area is the city of Demopolis. In 1985, it was estimated to pump 1.3 Mgal/d (million gallons per day). The other pumping centers in the study area pump less than 1 Mgal/d each.

Wells are used for domestic, stock, industrial, and irrigation purposes. The amount of water used for these purposes was estimated to be 7.7 Mgal/d in 1982 (Baker, 1983). A significant amount of water is lost from the aquifers through flowing artesian wells. For example, about 3.2 Mgal/d was discharging through wells that flow in Tuscaloosa County in 1958 (Miller and Causey, 1958); about 2.7 Mgal/d in Greene County in 1965 (Wahl, 1966); about 2 Mgal/d in Pickens County in 1963 (Wahl, 1965); and more than 1 Mgal/d in Marengo County in 1961 (Newton and others, 1961). Many wells which formerly flowed have ceased to flow as a result of lowering of the potentiometric surface of the aquifers.

### Effects of Withdrawals from the Aquifers

Long-term withdrawals of water from the major aquifers have resulted in lowering of the potentiometric surface and formation of depressions on the potentiometric surface of water in the aquifers. Depressions have formed in the Coker and Gordo aquifers (fig. 4) at Demopolis and in the vicinity of the Black Warrior River south of Tuscaloosa. A depression also exists at Demopolis in the Eutaw aquifer (fig. 5). The depressions at Demopolis are partly a result of pumping in both aquifers there. However, these and the depression on the Black Warrior River and the trough-like depression in the Nanafalia aquifer along the Tombigbee River (fig. 6) also reflect natural discharge to the rivers.

## SUSCEPTIBILITY OF THE AQUIFERS TO SURFACE CONTAMINATION

All recharge areas for the major aquifers in the study area are susceptible to surface contamination (plate 1). However, throughout most of the study area the recharge areas are in rural settings that are used for timberlands, farms, or pastures. Usually, the depth of the water-producing zone being tapped and its horizontal distance from the aquifer outcrop provide some buffer from surface contamination (table 2). Shallow wells in outcrop areas are more susceptible, but none are considered highly susceptible. The areas most susceptible to future contamination are the flood plains of the Black Warrior, Sipsey, and Tombigbee Rivers, which are underlain by terrace and alluvial deposits that are in hydraulic connection with the major aquifers.

The recharge areas of the minor aquifers (the Paleozoic rocks, the Ripley, Naheola, and Tuscahoma Formations) are also susceptible to contamination from the surface. However, they are not included in the susceptible area on the map because they do not contain actively pumped public supply wells within the study area. Some of these aquifers, notably the Paleozoic limestone, contain public supply wells outside the area in neighboring counties, and are potential sources of public supply within the study area. For instance, the Paleozoic limestone is recharged in Tuscaloosa County and is the source of public supply for the city of West Blocton in adjacent Bibb County.

The terrace and alluvial deposits overlie and recharge the major aquifers along major streams in the study area. The alluvial sediments permit water to move downward from the land surface to the aquifers, especially areas where the potentiometric surfaces in the aquifers being recharged have been lowered by pumpage. In the study area, the depressions formed by pumpage on the potentiometric surfaces of the major aquifers are not in direct contact with alluvial aquifers. Figures 4 and 5 show depressions in the potentiometric surface of the Tuscaloosa and Eutaw aquifers at Demopolis. Figure 2 shows the alluvium that overlies the Mooreville and Demopolis Chalks near Demopolis. The chalk between the Eutaw aquifer and the alluvial aquifer should retard vertical movement of water or contaminants in this and similar areas. However, it has been determined by Gardner (1981) that water moves up from the Tuscaloosa and Eutaw aquifers through fractures in the chalk. Therefore, if pumping at Demopolis or similar areas lowers the potentiometric surface sufficiently, water and possible contaminants could flow downward from the alluvial aquifer to the Eutaw aquifer below.

## SUMMARY AND CONCLUSIONS

The major aquifers in the study area (defined as those with actively pumped public supply wells) are the Coker, Gordo, Eutaw, and Nanafalia aquifers. The recharge areas for these aquifers are in Tuscaloosa, Pickens, Greene, Sumter, and Marengo Counties. The aquifers underlie most of the study area and consist of sand and gravel beds. Water in the aquifers usually occurs under artesian conditions.

The Coker aquifer is the source of public water supplies for the towns of Coker and Gordo, and for the Buhl-Elrod-Holman Water System in Tuscaloosa County. The Gordo and Eutaw aquifers are sources of public water supplies in Pickens, Greene, and Marengo Counties. The Nanafalia aquifer is the source of public water supplies for the towns of Sweetwater and Myrtlewood in Marengo County.

Depressions in the potentiometric surface have developed around Demopolis in the Coker, Gordo, and Eutaw aquifers, partly as a result of ground-water withdrawals. Other depressions and troughs have formed along the major rivers because of ground-water discharge to the rivers.

All the recharge areas for the major aquifers are susceptible to surface contamination throughout most of the study area; however, the recharge areas are in rural settings that are used for timberlands, farms, and pastures. Usually, the depth to the water-bearing zone tapped by a well and the horizontal distance from the outcrop to the well provide a buffer from surface contamination.

Other potential areas susceptible to surface contamination are the permeable terrace and alluvial deposits if the potentiometric surface in the underlying aquifer has been depressed. The alluvial deposits are usually in areas of discharge, but if pumpage has caused a depression in the potentiometric surface of the underlying aquifer, the alluvial aquifer will become a source of recharge.

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Table 1.—Generalized section of geologic formations in the study area, and their water-bearing properties

| Era-them | System | Series | Group | Geologic unit | Thickness (ft) | Lithology | Water-bearing properties | Quality of water |
|---|---|---|---|---|---|---|---|---|
| Cenozoic | Quaternary | Holocene | | Alluvium | 0-60 | Clay, silt, sand, and gravel | Supplies water to shallow dug wells and driven wells in the flood plains of the major streams and rivers. Adjacent to major streams, where induced recharge is possible, large quantities of water can be withdrawn from these beds. | Water is soft and generally has a chloride content of less than 41 mg/L. Locally contains iron in excess of 0.3 mg/L. |
| | | Pleistocene | | Terrace deposits | 100 | Clay, silt, sand, and gravel | Will yield 10 gal/min or more to individual wells where saturated sands are of sufficient thickness. | |
| | Tertiary | Paleocene | Wilcox Group | Tuscahoma | 275 | Sand, crossbedded; laminated silty clay and sand; fine-grained glauconitic beds of sand; two sandy glauconitic fossiliferous marl zones near the middle of the formation | Upper part of formation is a fair aquifer. Sand beds in lower parts of formation are good aquifers and supply water for domestic and farm use. | Water is soft to hard, generally has a chloride content of less than 250 mg/L, and may locally have an iron content in excess of 0.3 mg/L. |
| | | | | Nanafalia Formation | 150-200 | Interbedded clay, claystone, and glauconitic sandy fossiliferous marl; crossbedded micaceous sand and thin-bedded sandy silt in lower 5 to 50 ft | Very good aquifer; supplies water to many drilled artesian wells south of the area of outcrop of the formation. | Water generally is soft to hard and contains less than 700 mg/L dissolved solids and 100 mg/L chloride. Locally, water contains iron in excess of 0.3 mg/L. |
| | | | Midway Group | Naheola Formation | 120 | Sand and sandy marl; fine- to medium-grained, glauconitic in upper 10-30 ft; fine-grained interlaminated sand and silty clay and beds of fine-grained sand in lower 70 to 90 ft | Upper sand beds yield small supply of water to dug wells and a few drilled wells for domestic and farm use. Lower part of formation is relatively impermeable and is not known to yield water to wells in the area. | Water generally is soft and contains less than 45 mg/L chloride. Locally, water contains iron in excess of 0.3 mg/L. |
| | | | | Porters Creek Formation | 200 | Marl, fossiliferous in upper 25 ft; massive clay, silty sand, sandstone, and massive calcareous clay in lower 175 ft | Relatively impermeable and not an aquifer. A few dug wells in the outcrop area of formation tap water in upper weathered zone. | |
| | | | | Clayton Formation | 70-170 | Limestone, chalky, argillaceous in upper 20 to 40 ft; sandy fossiliferous limestone; medium-grained micaceous sand, and calcareous micaceous sandy silt in lower part | Wells developed in weathered sandy limestone beds in this formation may supply adequate water of moderate hardness for domestic and farm use. | Water is generally soft to moderately hard and low in dissolved solids and chloride contents. |

Table 1.--Generalized section of geologic formations in the study area, and their water-bearing properties (continued)

| Erathem | System | Series | Group | Geologic unit | Thickness (ft) | Lithology | Water-bearing properties | Quality of water |
|---|---|---|---|---|---|---|---|---|
| Mesozoic | Cretaceous | Upper Cretaceous | Selma Group | Prairie Bluff Chalk | 10-60 | Silty and sandy fossiliferous chalk and calcareous clay | Relatively impermeable; not a source of water. | |
| | | | | Ripley Formation | 150-200 | Fine- to coarse-grained glauconitic sand, sandy fossiliferous clay and thin beds of fossiliferous calcareous sandstone and sandy limestone | Because these beds are fine-grained and micaceous, the development of wells is sometimes difficult. | Water generally is soft to moderately hard and contains less than 250 mg/L chloride and 1,000 mg/L dissolved solids. Locally, water contains iron in excess of 0.3 mg/L. |
| | | | | Demopolis Chalk | 0-440 | Fossiliferous chalk; sandy silty fossiliferous chalk, and silty fossiliferous calcareous clay | Relatively impermeable; not a source of water supply. | |
| | | | | Mooreville Chalk | 0-420 | Upper 10 to 20 ft consists of beds of dense limestone about 1 ft thick separated by fossiliferous sandy chalk; lower part consists of fossiliferous silty to fine sandy chalk and calcareous sandy fossiliferous clay | Relatively impermeable; not a source of water supply. | |
| | | | | Eutaw Formation (Includes McShan Formation) | 0-400 | Upper part consists of medium-grained crossbedded glauconitic sand interbedded with silty clay; lower part consists of medium to very coarse grained glauconitic sand interbedded with laminated to thin-bedded micaceous sandy clay | Will yield 2 Mgal/d or more to individual wells. Excellent aquifer. | Soft to hard but generally is soft to moderately hard. Iron in excess of 0.3 mg/L in some locations. Contains less than 250 mg/L of dissolved solids in its northern extent, increasingly higher to the south. Chloride content exceeds 1,000 mg/L in the southern part of the aquifer. |
| | | | Tuscaloosa Group | Gordo Formation | 0-400 | Poorly sorted coarse-grained sand and chert gravel in lower part of formation; upper part consists of laminated to massive clay and lenticular sand beds | Will yield 1 to 2 Mgal/d or more to individual wells. Excellent aquifer. | Soft to moderately hard and contains less than 200 mg/L of dissolved solids. Commonly contains iron in excess of 0.3 mg/L. May be sufficiently mineralized in the southern extent of the aquifer to be objectionable to other uses. |
| | | | | Coker Formation | 0-1,000 | Sand, very fine to coarse grained; basal sand 100 to 200 ft thick and is generally gravelly. Partly carbonaceous sandy clay | Potential source of 1 Mgal/d or more to individual wells. Excellent aquifer. | Soft to hard and contains less than 250 mg/L of dissolved solids in northern part of the aquifer. May be sufficiently mineralized to be objectionable for some uses in the southern extent of the aquifer. Iron levels often exceed 0.3 mg/L. |
| | Pennsylvanian | | | Pottsville Formation | 2,800+ | Sandstone, siltstone, and shale, interbedded with conglomerate, coal, and underclay; orthoquartzite at the base and subgraywacke at the top. Shale, silty; numerous coal beds and underclays | Water occurs in joints, fractures, and bedding planes; yields sufficient for domestic use; no large capacity wells have been drilled in the study area. | Soft to hard. Iron content may exceed 0.3 mg/L. |
| Paleozoic | Mississippian to Cambrian | | | Floyd Shale, Fort Payne Chert, Little Oak Limestone, Newala Limestone, Longview Limestone, Knox Dolomite (part), Bibb Dolomite, Ketona Dolomite, and Brierfield Dolomite | 1,000+ | Dolomite, limestone, chert, and shale | Potential source of large water supplies from limestones and dolomites; no large-capacity wells have been drilled in the study area. | Moderately hard to hard. Dissolved solids generally less than 300 mg/L. Iron content is usually less than 0.3 mg/L. |

Table 2.--Records of public water-supply wells in the study area (continued)

| Well number | Geographic coordinate number | Well owner | Drilled by | Well depth (feet) | Well diam. (inches) | Water bearing unit | Altitude of land surface | Water level above (-) or below Land Surface Datum | Date of measurement | Method of lift | Use of well | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 32 | 331915087535001 | City of Gordo | Layne-Central Co. 05/23/62 | 143 | 16<br>8 | Kc | 239 | - 14.5 | 03/13/63 | T | P | Well 2 casing: 16 in. from surface to 121 ft. 8 in. from 59 to 124 ft. 6 in. screen from 124 to 144 ft. Drawdown 52 ft after pumping 200 gal/min for 24 hrs on 08/06/63. |
| 33 | 331918087540001 | City of Gordo | H.W. Peerson Drilling Co. 07/27/50 | 186 | 8 | Kc | 242 | - 2 | 09/19/51 | T | P | Well 1 casing: 8 in. from surface to 124 ft. 6 in. screen from 124 to 166 ft. |
| 34 | 331848087531401 | City of Gordo | Graves Drilling Co. 1978 | 132 | 12<br>8 | Kc | 277.5 | 21.3 | 10/05/78 | T | P | Well 3 casing: 12 in. from surface to 112 ft. 8 in. inner casing to 112 ft. 6 in. screen from 112 to 132 ft. Drawdown 45 ft after pumping 160 gal/min for 26.5 hrs on 10/06/78. |
| 35 | 330353088150001 | Pickens County Water System, Cochrane | Weldon Drilling Co., Inc. 09/15/83 | 705 | 8<br>4 | Ke | 160 | 94 | 09/15/83 | T | P | Casing: 8 in. from surface to 609 ft. 4 in. screen from 609 ft to 689 ft. Yield: 8 gal/min per ft of drawdown on 09/15/83. |
| 36 | 331337088155501 | Pickens County Water System, Pickensville | Layne-Central Co. 08/04/76 | 480 | 12.75<br>6 | Ke | 230 | 76 | 09/01/76 | T | P | Casing: 12.75 in. from surface to 4 415 ft. 6 in. from 365 to 420 ft. 6 in. screen from 420 to 470 ft. Drawdown 33 ft after pumping 205 gal/min for 4 hrs on 04/19/77. |
| 37 | 332229088005601 | City of Reform | Layne-Central Co. 1956 | 88 | 6 | Kg | 238 | | | T | N | Well 2. |
| 38 | 332237088010801 | City of Reform | Graves Drilling Co. 01/26/83 | 92 | 16 | Kg | 244 | 12.75 | 01/31/83 | T | P | Casing: 16 in. from surface to 59.75 ft. 8 in. screen from 59.75 to 92 ft. Drawdown 3.5 ft after pumping 310 gal/min for 4 hrs on 01/31/83. |
| 39 | 331058087342501 | City of Tuscaloosa | Layne-Central Co. 05/11/62 | 92 | 16 | Kc | 175 | 20 | 05/11/62 | T | N | Drawdown 42 ft after pumping 500 gal/min for 96 hrs. |
| 40 | 331058087342502 | City of Tuscaloosa | Layne-Central Co. 07/03/62 | 70 | 16 | Kc | 175 | 6 | 07/03/62 | T | N | Drawdown 42 ft after pumping 500 gal/min for 120 hrs. |
| 41 | 331058087342503 | City of Tuscaloosa | Layne-Central Co. 08/08/62 | 98 | 16 | Kc | 175 | 29 | 08/08/62 | T | N | Drawdown 52 ft after pumping 350 gal/min for 48 hrs. |

Table 2.--Records of public water-supply wells in the study area (continued)

| Well number | Geographic coordinate number | Well owner | Drilled by | Well depth (feet) | Well diam. (inches) | Water bearing unit | Altitude of land surface | Water level above (-) or below Land Surface Datum | Date of measurement | Method of lift | Use of well | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 42 | 331058087342504 | City of Tuscaloosa | Layne-Central Co. 08/03/62 | 88 | 16 | Kc | 175 | 5 | 08/03/62 | T | N | Drawdown 60 ft after pumping 500 gal/min for 48 hrs. |
| 43 | 330927087361501 | City of Tuscaloosa | Layne-Central Co. 04/71 | 142 | 12 | Kc | 130 | 11 | 04/01/71 | T | N | Screen from 112 to 132 ft. Drawdown 52 ft after pumping 703 gal/min for 8 hrs. |
| 44 | 330927087361601 | City of Tuscaloosa | Layne-Central Co. 01/71 | 162 | 12 | Kc | 130 | 10 | 01/22/71 | T | N | Screen from 132 to 152 ft. |
| 45 | 330906087363901 | City of Tuscaloosa | Layne-Central Co. 02/71 | 149 | 12 | Kc | 130 | 12 | 02/16/71 | T | N | Screen from 119 to 139 ft. Drawdown 38 ft after pumping 536 gal/min for 1 hr. |
| 46 | 331450087412101 | Town of Coker | Graves Drilling Co. 07/21/67 | 182 | 4 | Kc | 180 | 37.36 | 09/21/67 | T | P | Screen from 162 to 182 ft. Drawdown 20 ft after pumping 125 gal/min for 8 hrs 28 min. |
| 47 | 331446087411701 | Town of Coker | Graves Drilling Co. 04/15/74 | 205 | 4 | Kc | 180 | 42.5 | 03/28/74 | T | P | Drawdown 27.5 ft after pumping 169 gal/min for 8 hrs. |
| 48 | 331526087480201 | Buhl-Elrod-Holman Water System | Graves Drilling Co. 04/02/85 | 108 | 4 | Qal | 240 | Ground Level | 03/13/85 | S | P | Well 1. Screen from 67 to 107 ft. Drawdown 55 ft after pumping 100 gal/min for 24 hrs. |
| 49 | 331526087480202 | Buhl-Elrod-Holman Water System | Graves Drilling Co. 04/02/85 | 336 | 4 | Kc | 240 | 49.2 | 03/13/85 | S | P | Well 2. Screen from 284 to 335 ft. Drawdown 80 ft after pumping 140 gal/min for 24 hrs. |

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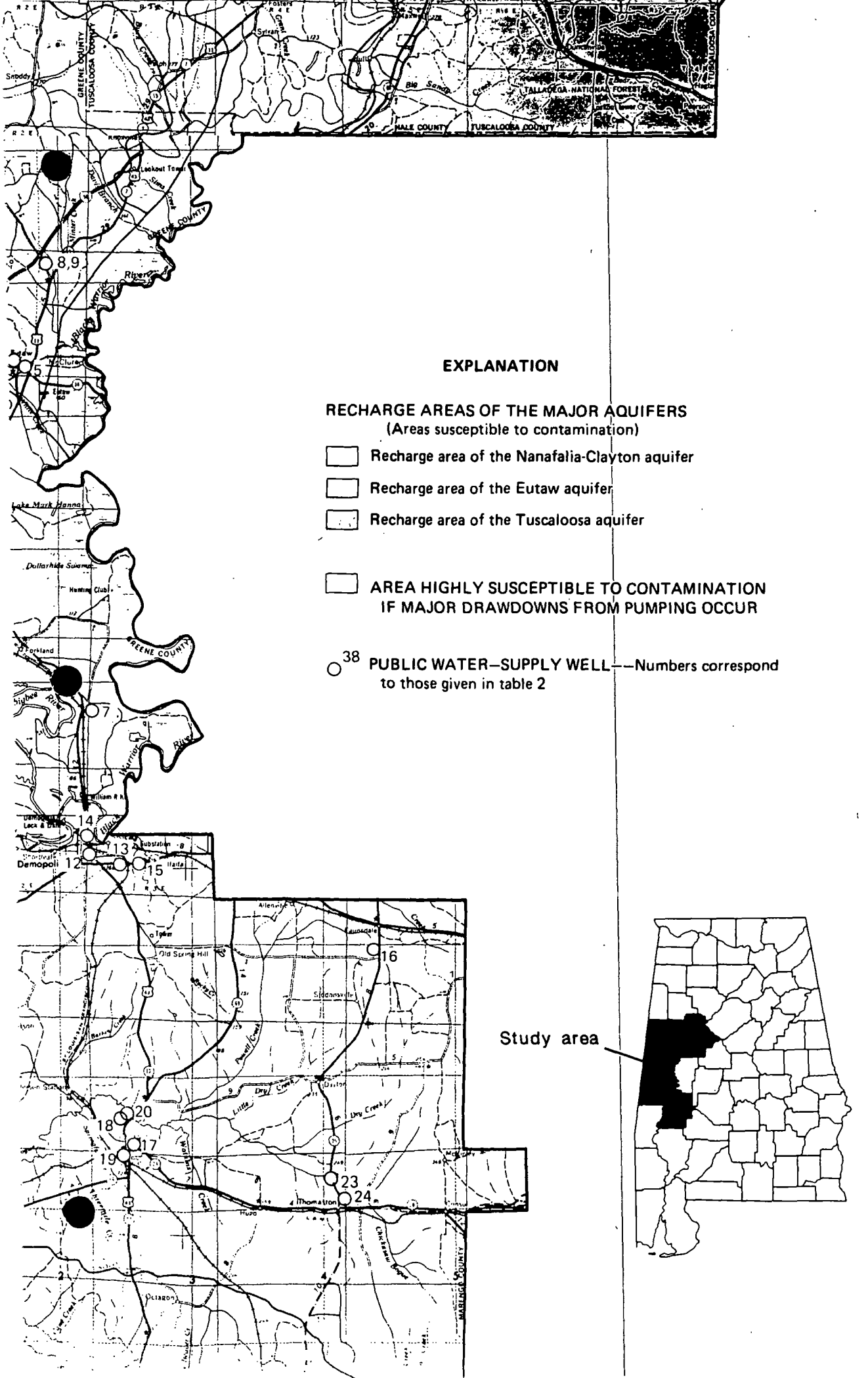
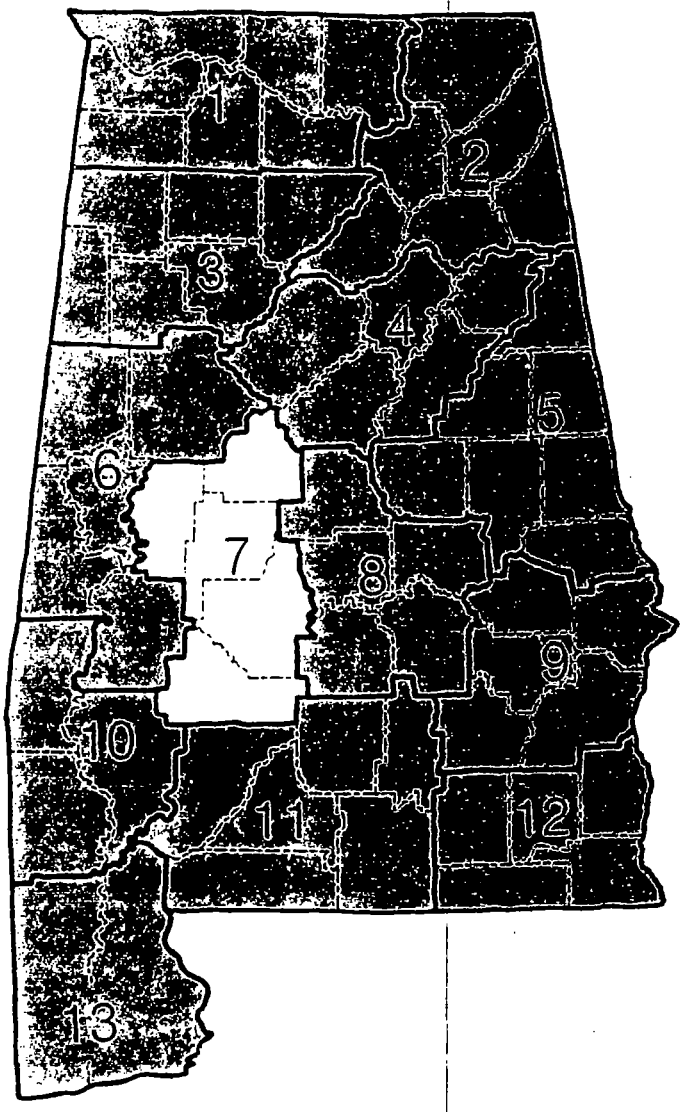

EXPLANATION
RECHARGE AREAS OF THE MAJOR AQUIFERS
(Areas susceptible to contamination)
Recharge area of the Nanafalia-Clayton aquifer
Recharge area of the Eutaw aquifer
Recharge area of the Tuscaloosa aquifer
AREA HIGHLY SUSCEPTIBLE TO CONTAMINATION IF MAJOR DRAWDOWNS FROM PUMPING OCCUR
38 PUBLIC WATER–SUPPLY WELL—Numbers correspond to those given in table 2
Study area
TALLADEGA NATIONAL FOREST
HALE COUNTY
TUSCALOOSA COUNTY
GREENE COUNTY
Demopoli
Thomaston
Dayton
Old Spring Hill
Siddonsville
Lake Mark Hanna
Dollarhide Swamp
Hunting Club
Forkland
Lookout Tower
Sylvan
Snoddy
Big Sandy Creek
Dry Creek
Little Dry Creek
Powell Creek
Chickasaw Bogue
Octagon
MARENGO COUNTY
8,9
5
7
14
13
12
15
16
20
18
17
19
23
24

# REFERENCE 7

WATER-RESOURCES INVESTIGATIONS REPORT 87-4109

# GEOHYDROLOGY AND SUSCEPTIBILITY OF MAJOR AQUIFERS TO SURFACE CONTAMINATION IN ALABAMA; AREA 7

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U.S. GEOLOGICAL SURVEY
in cooperation with the
ALABAMA DEPARTMENT OF
ENVIRONMENTAL MANAGEMENT

# GEOHYDROLOGY AND SUSCEPTIBILITY OF MAJOR AQUIFERS TO SURFACE CONTAMINATION IN ALABAMA; AREA 7

by Will S. Mooty

U.S. GEOLOGICAL SURVEY

Water-Resources Investigations Report 87-4109

Prepared in cooperation with the

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Tuscaloosa, Alabama

1987

# GEOHYDROLOGY AND SUSCEPTIBILITY OF MAJOR AQUIFERS TO SURFACE CONTAMINATION IN ALABAMA; AREA 7

By Will S. Mooty

## ABSTRACT

The U.S. Geological Survey, in cooperation with the Alabama Department of Environmental Management, is conducting a series of geohydrologic studies to delineate the major aquifers and their susceptibility to land surface contamination in Alabama. The geohydrology and susceptibility to land surface contamination of the seven major aquifers in Area 7--Bibb, Dallas, Hale, Perry, and Wilcox Counties are described in this report. Aquifers in the northern part of the study area are in Paleozoic limestone and dolomite formations. Deposits in the central part of the study area are predominately of Cretaceous age and contain the Coker, Gordo, and Eutaw aquifers. Although the southern part of the study area has many deposits of Tertiary age, the Ripley Formation of Cretaceous age is the major aquifer. The recharge area for each aquifer is roughly equivalent to its outcrop area.

The major Paleozoic limestone and dolomite aquifers are in the Conasauga Formation and the Copper Ridge and Chepultepec Dolomites of the Knox Group. In these formations, ground water occurs in secondary openings that are along solutionally enlarged fractures and joints, and in caverns. Sinkholes, often a direct link from the land surface to the water table, are common in this area. The susceptibility of these aquifers to surface contamination is high because of the direct link that sinkholes provide and because of the high permeability of the soils and the downstream location of much of the recharge area from the large metropolitan areas of the neighboring counties. Ground-water movement generally follows the direction of the streams and valleys in the area.

The Coker, Gordo, Eutaw, and Ripley aquifers are of Cretaceous age. They are composed of unconsolidated clastic deposits with intergranular porosity. These aquifers may yield up to 1,500 gallons per minute to properly constructed wells. Ground-water movement in the central and southern part of the study area generally is downdip to the southwest. Although the characteristics of these aquifers make them susceptible to contamination, recharge occurs in predominantly rural areas that makes the probability of contamination unlikely. However, the susceptibility of these aquifers to contamination also is high in areas of sinkholes or where flat terrain increases the rate of recharge to the aquifers.

The alluvial and terrace deposits along the major rivers are normally areas of ground-water discharge. However, if enough ground-water withdrawal occurred in these deposits, they would change from an area of discharge to an area of recharge. Due to the permeability of these deposits and the flat terrain where they occur, these areas would be highly susceptible to surface contamination.

Other reports that contain information on the geology and ground-water resources of the area are "Geology of the Alabama Coastal Plain" (Copeland, 1968); "Notes on Deposits of Selma and Ripley Age in Alabama" (Monroe, 1941); "Geology and Ground-Water Resources of Wilcox County, Alabama" (LaMoreaux and Toulmin, 1959); "Ground-Water Resources of the Cretaceous Area of Alabama" (Carlston, 1944); "The Physical Setting" (Moore, 1976); "Geology and Water Availability of Dallas County, Alabama" (Scott and others, 1981); "Water Availability and Geology of Hale County, Alabama" (Davis and others, 1975); "Water Availability in Bibb County, Alabama" (Causey and others, 1978); "Mineral, Water, and Energy Resources of Wilcox County, Alabama" (Geological Survey of Alabama, 1969); "Water Availability in Perry County, Alabama" (Reed and others, 1972); "Geology of Perry County, Alabama" (Reed, 1972); "Areal Geology of Jefferson County, Alabama, Atlas 15" (Kidd, 1979); and "Engineering Geology of Jefferson County, Alabama, Atlas 14" (Szabo and others, 1979).

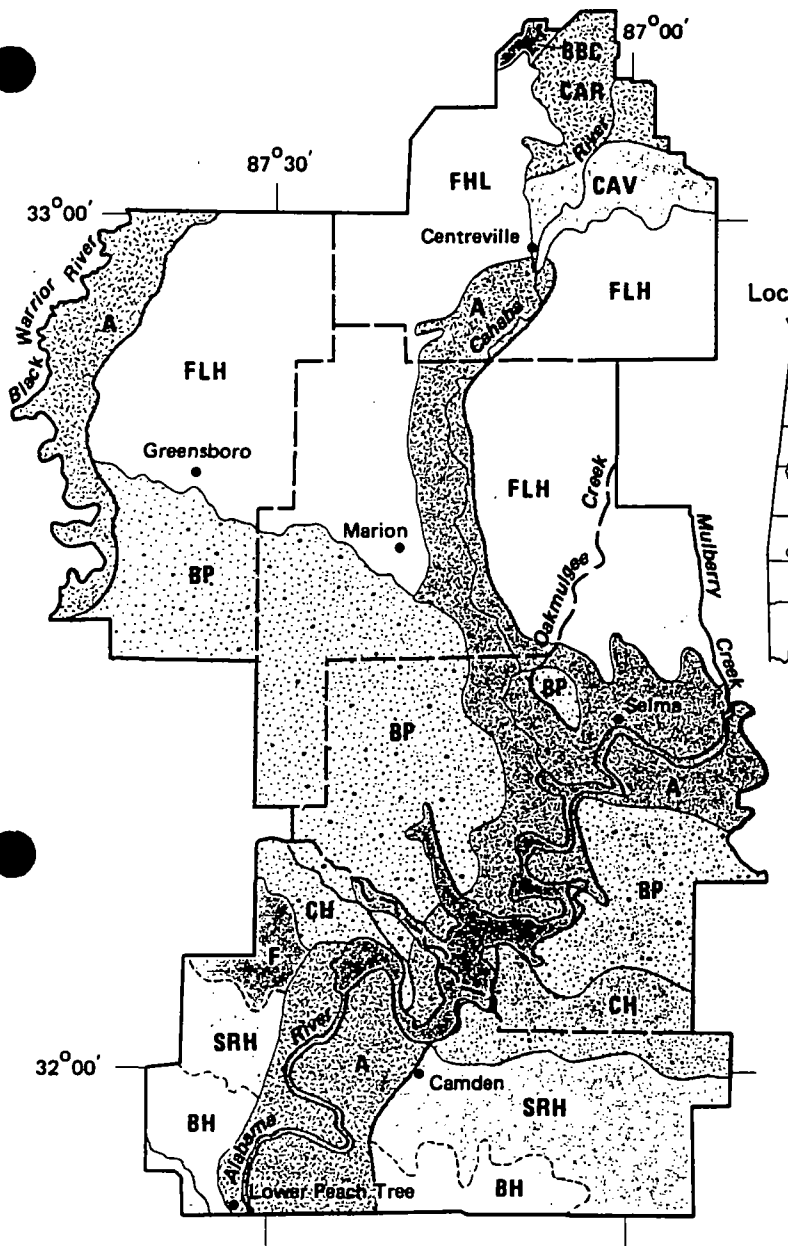
## Physical Features

Study Area 7 lies entirely within the East Gulf Coastal Plain physiographic section except for the northeastern one-third of Bibb County, which is in the Alabama Valley and Ridge physiographic section (fig. 1). The northeastern section of Bibb County consists of the Birmingham-Big Canoe Valley, Cahaba Ridges, and Cahaba Valley districts (Sapp and Emplaincourt, 1975). The Alabama Valley and Ridge physiographic section consists mainly of northeastward-trending ridges and valleys. The altitudes of valley floors are about 400 feet above sea level and the ridges are about 600 feet above sea level. Drainage in the area is southward to the Cahaba River.

Southwestern Bibb County and northern Hale, Dallas, and Perry Counties are in the Fall Line Hills district of the East Gulf Coastal Plain physiographic section. This area mainly consists of flat to moderately rolling sandy uplands dissected by deeply entrenched southward-flowing streams. The land surface ranges in altitude from about 250 feet above sea level at the town of Greensboro to about 625 feet above sea level near the junction of Bibb, Hale, and Tuscaloosa Counties.

Parts of Hale County near the Black Warrior River, and parts of Bibb, Perry, Dallas, and Wilcox Counties near the Cahaba and Alabama Rivers are in the Alluvial-Deltaic Plain district of the East Gulf Coastal Plain physiographic section. This area is characterized by broad, flat flood plains and terraces. Much of the area is periodically inundated by floods on these rivers. The land surface ranges in altitude from about 250 feet above sea level at the town of Centreville to about 50 feet above sea level near the community of Lower Peach Tree.

Southern Hale and Perry Counties and parts of central and southern Dallas County are in the Black Prairie district of the East Gulf Coastal Plain physiographic section. The Black Prairie, named for the black soil that is common in the area, is a gently- to moderately-rolling prairie that is characterized by extensive grasslands and few trees. The land surface in the area ranges from about 250 feet above sea level at the town of Uniontown to




**EXPLANATION**

**PHYSIOGRAPHIC DISTRICTS**

Alabama Valley and Ridge physiographic section

- CAV — Cahaba Valley
- CAR — Cahaba Ridges
- BBC — Birmingham–Big Canoe Valley

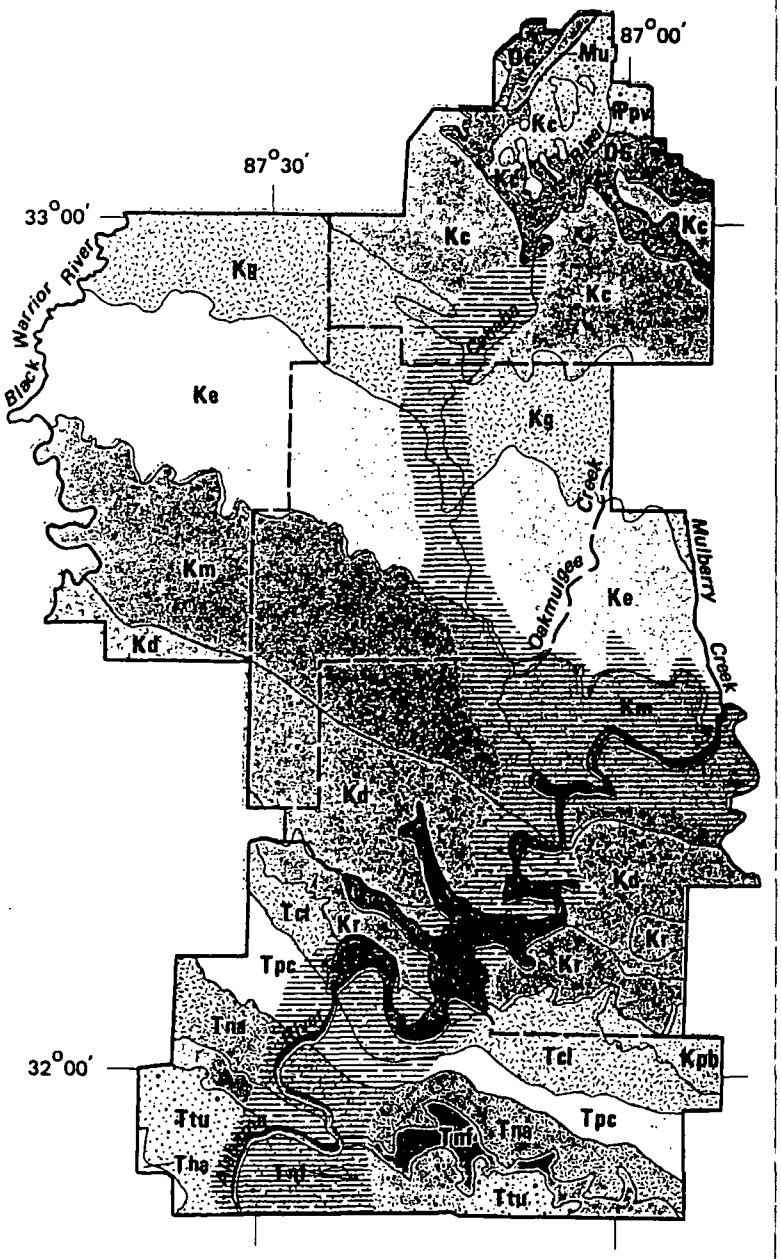
East Gulf Coastal Plain physiographic section

- FLH — Fall Line Hills
- BP — Black Prairie
- SRH — Southern Red Hills
- F — Flatwoods Subdistrict
- BH — Buhrstone Hills Subdistrict
- LH — Lime Hills
- CH — Chunnenuggee Hills
- A — Alluvial Plain

—— BOUNDARY OF PHYSIOGRAPHIC DISTRICT

---- BOUNDARY OF PHYSIOGRAPHIC SUBDISTRICT

Figure 1.--Physiographic regions of the study area.




Modified from M. E. Davis, 1980, and G. I. Adams, 1926

**EXPLANATION**

**GEOLOGIC UNITS**

| | | |
|---|---|---|
| Areas overlain by alluvial and terrace deposits | Holocene and Pleistocene | Quaternary |
| Tha — Hatchetigbee Formation | Paleocene | Tertiary |
| Ttu — Tuscahoma Sand | Paleocene | Tertiary |
| Tnf — Nanafalia Formation | Paleocene | Tertiary |
| Tnb — Naheola Formation | Paleocene | Tertiary |
| Tpc — Porters Creek Formation | Paleocene | Tertiary |
| Tcl — Clayton Formation | Paleocene | Tertiary |
| Kpb — Prairie Bluff Chalk | Upper Cretaceous | Cretaceous |
| Kr — Ripley Formation | Upper Cretaceous | Cretaceous |
| Kd — Demopolis Chalk | Upper Cretaceous | Cretaceous |
| Km — Mooreville Chalk | Upper Cretaceous | Cretaceous |
| Ke — Eutaw Formation | Upper Cretaceous | Cretaceous |
| Kg — Gordo Formation | Upper Cretaceous | Cretaceous |
| Kc — Coker Formation | Upper Cretaceous | Cretaceous |
| Ppv — Pottsville Formation | Middle and Lower Pennsylvanian | Pennsylvanian |
| Mu — Upper Mississippian formations | Upper Mississippian | Mississippian |
| Ordovician and Cambrian formations | | Ordovician and Cambrian |

Figure 2.--Generalized geology of the study area.

blocky clay with some sand in the upper 50 feet. The upper member consists of about 20 feet of green-brown sandy clay and silt with interbeds of calcareous sandstone. The Porters Creek Formation is not an aquifer in the study area.

The Naheola Formation crops out intermittently across central Wilcox County. It is about 200 feet thick near the Alabama River and thins to about 80 feet in eastern Wilcox County. The lower member, the Oak Hill Member, consists of laminated, silty, clay containing interbeds of fine-grained sand and a thin bed of lignite near the top. The upper member, the Coal Bluff Marl Member, consists of laminated sand and clay about 20 to 40 feet thick. The Naheola Formation is not a major aquifer in the study area.

The Nanafalia crops out in west-central and southern Wilcox County. It is up to 200 feet thick and is divided into three members. The basal member, the Gravel Creek Sand Member, consists of medium- to fine-grained, crossbedded sand with lenses of fine gravel. It is less than 60 feet thick. The middle member, the fossiliferous "Ostrea Thirsae beds," consists of silty clay, calcareous sand, and sandy shell marl about 30 to 60 feet thick. The upper member, the Grampian Hills Member, consists of 80 to 110 feet of yellowish-green to gray indurated clay and claystone. Within the claystone are lenses of coarse glauconitic sand.

The Tuscahoma Sand crops out in southwestern and south-central Wilcox County. Its thickness is about 275 feet and consists of nonfossiliferous gray interlaminated fine-grained sand and clayey silt. The basal sand beds are about 60 feet thick and are fine-grained and olive-gray to green in color. The upper member, the Bells Landing Marl Member is 6 to 10 feet thick along the Alabama River.

The Hatchetigbee and Tallahatta Formations are of Eocene age. Together, the Hatchetigbee and Tallahatta Formations and the Tuscahoma Sand comprise the part of the Lisbon aquifer that is within the study area. The Lisbon is a major aquifer south of the study area. The Hatchetigbee overlies the Tuscahoma Sand and ranges from about 200 to 300 feet thick and consists of fine- to medium-grained, calcareous sand with interlaminated clay and shale; it crops out in a small area of southwestern Wilcox County. The Tallahatta Formation occurs in small outliers in extreme southwestern Wilcox County.

None of the Tertiary deposits are major aquifers within the study area, but are major aquifers further downdip in Monroe and Clarke Counties where several public water systems tap them. Some private wells in Wilcox County tap the major aquifers in the Nanafalia, Clayton, and Tuscahoma Formations.

## Quaternary Deposits

Quaternary deposits overlie older formations throughout a large part of the study area. These deposits consist of alluvial sediments and terrace deposits associated with the flood plains of present and ancestral large streams. They consist mainly of gravel, sand, silt, and clay. The alluvial deposits generally range in thickness from 0 to 60 feet, but are as much as 80 feet thick in some places. Terrace deposits are up to 100 feet thick.

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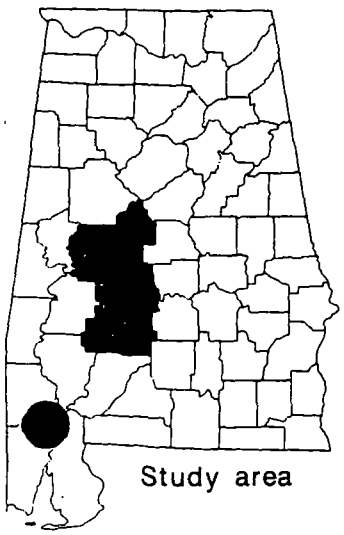
Table 1.--Records of public water-supply wells and springs in the study area--Continued

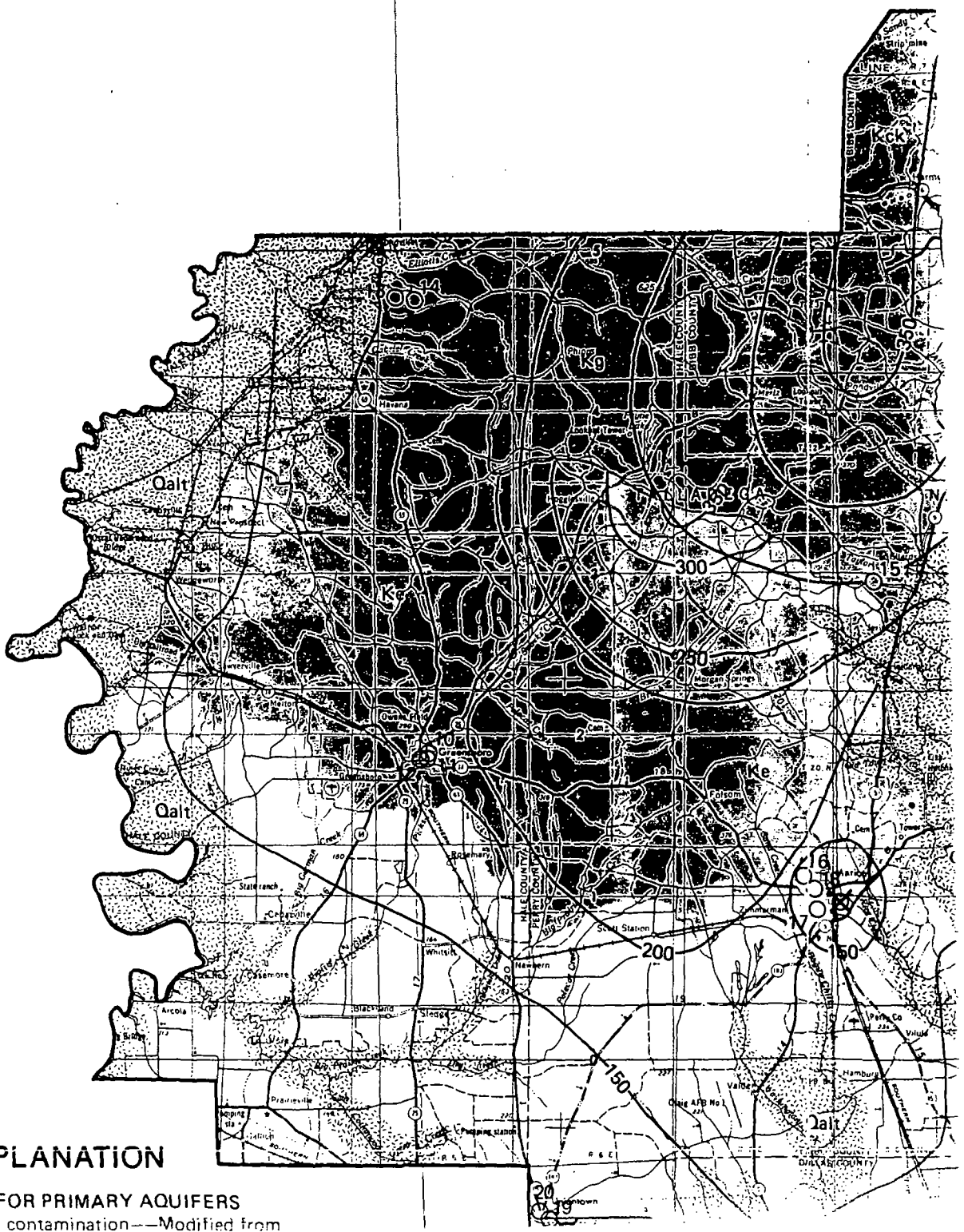
| Well number | Geographic coordinate number | Well owner | Driller and year drilled | Well depth (feet) | Well diam. (inches) | Water bearing unit | Altitude of land surface | Water level above (+) or below Land Surface Datum | Date of measurement | Method of lift | Use of well | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 3242110873533 | Greensboro Utilities Dept. | Layne-Central Co. 1957 | 706 | 18,10 | Kg | 287 | 117 | 1957 | T | P | Casing: 18 in. from surface to 621 ft; 10 in. from 537 to 635.5 ft; 10 in. screen between 635.5 and 705.5 ft; 12 in. gravel wall from 606 to 706 ft. Drawdown 17 ft after 8 hrs pumping 618 gal/min in 1957. |
| 11 | 3242100873540 | Greensboro Utilities Dept. | Layne-Central Co. 1929 | 390 | 18, 8 | Ke | 258 | 84 | 1929 | T | N | Casing: 18 in. from surface to 100 ft; 8 in. from surface to 370 ft; 8 in. screen between 370 and 390 ft. |
| 12 | 3242160873523 | Greensboro Utilities Dept. | Layne-Central Co. 1950 | 710 | 16,8 | Kg | 259 | 89.4 | 1952 | T | P | Casing:16 in. from surface to 630 ft; 8 in. screen between 630 and 700 ft; 8 in. from 700 to 710 ft. Drawdown 23 ft after 8 hrs pumping 545 gal/min in 1950. |
| 13 | 3257150873709 | Moundville Water Works | Graves Well Drilling 1972 | 233 | 16 | Kg | 180 | 58 | 5-87 | T | P | Reported pump capacity 500 gal/min. |
| 14 | 3257110873627 | Moundville Water Works | Graves Well Drilling 1981 | 240 | 16 | Kg | 200 | 26 | 5-87 | T | P | Reported pump capacity 500 gal/min. |
| 15 | 3248120871703 | Perry Co. Water & Fire | Graves Well Drilling 1981 | 600 | 8 | Kc | 260 | 55 | 5-25-87 | T | P | Casing: 8 in. from surface to 494 ft; 4 in. screen from 494 to 537 ft; 106 ft of lap pipe. |
| 16 | 3238090872026 | Marion Water Dept. | Layne-Central Co. 1970 | 674 | 16,10 | Kg | 360 | | | T | P | Casing: 16 in. from surface to 405 ft; 10 in. from 325 to 405 ft; 10 in. screen between 410 and 450 ft. and between 560 and 600 ft. |
| 17 | 3237160871933 | Marion Water Dept. | Layne-Central 1963 | 391 | 16,10 | Ke | 315 | 163.42 | 10-21-86 | T | P | Casing: 16 in. from surface to 292 ft; 297 ft; 10 in. screen from 297 to 347 ft. |
| 18 | 3237560872003 | Marion Water Dept. | Layne-Central Co. | 516 | 18 | Kg | 350 | | | T | P | Casing 513 ft. Reported pump capacity 800 gal/min. |

DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

PREPARED IN COOPERATION
ALABAMA DEPARTMENT OF E
MANAGEMENT



Study area




## EXPLANATION

RECHARGE AREAS FOR PRIMARY AQUIFERS
(Areas susceptible to contamination—Modified from

# EXPLANATION

RECHARGE AREAS FOR PRIMARY AQUIFERS
(Areas susceptible to contamination--Modified from Adams and others, 1926).

- Qalt — Alluvial and terrace deposit aquifers.
- Tallahatta not shown due to scale.
- Tha — Hatchetigbee } Lisbon aquifer
- Ttu — Tuscahoma Sand } Lisbon aquifer
- Tnf — Nanafalia aquifer
- Kr — Ripley aquifer
- Ke — Eutaw aquifer } Tuscaloosa aquifer
- Kg — Gordo aquifer } Tuscaloosa aquifer
- Kck — Coker aquifer
- O€ — Cambrian–Ordovician Limestone and Dolomite aquifers
- €c — Conasauga aquifer

—200— POTENTIOMETRIC CONTOUR OF THE TUSCALOOSA AQUIFER--Shows altitude at which water level would have stood in tightly cased wells (1982). Hachures indicate depression. Contour interval 50 feet. Datum is sea level.

—0— POTENTIOMETRIC CONTOUR OF THE EUTAW AQUIFER--Shows altitude at which water level would have stood in tightly cased wells (1982). Hachures indicate depression. Contour interval 50 feet. Datum is sea level.

—50— POTENTIOMETRIC CONTOUR OF THE RIPLEY AQUIFER--Shows altitude at which water level would have stood in tightly cased wells (1982). Hachures indicate depression. Contour interval 50 feet. Datum is sea level.

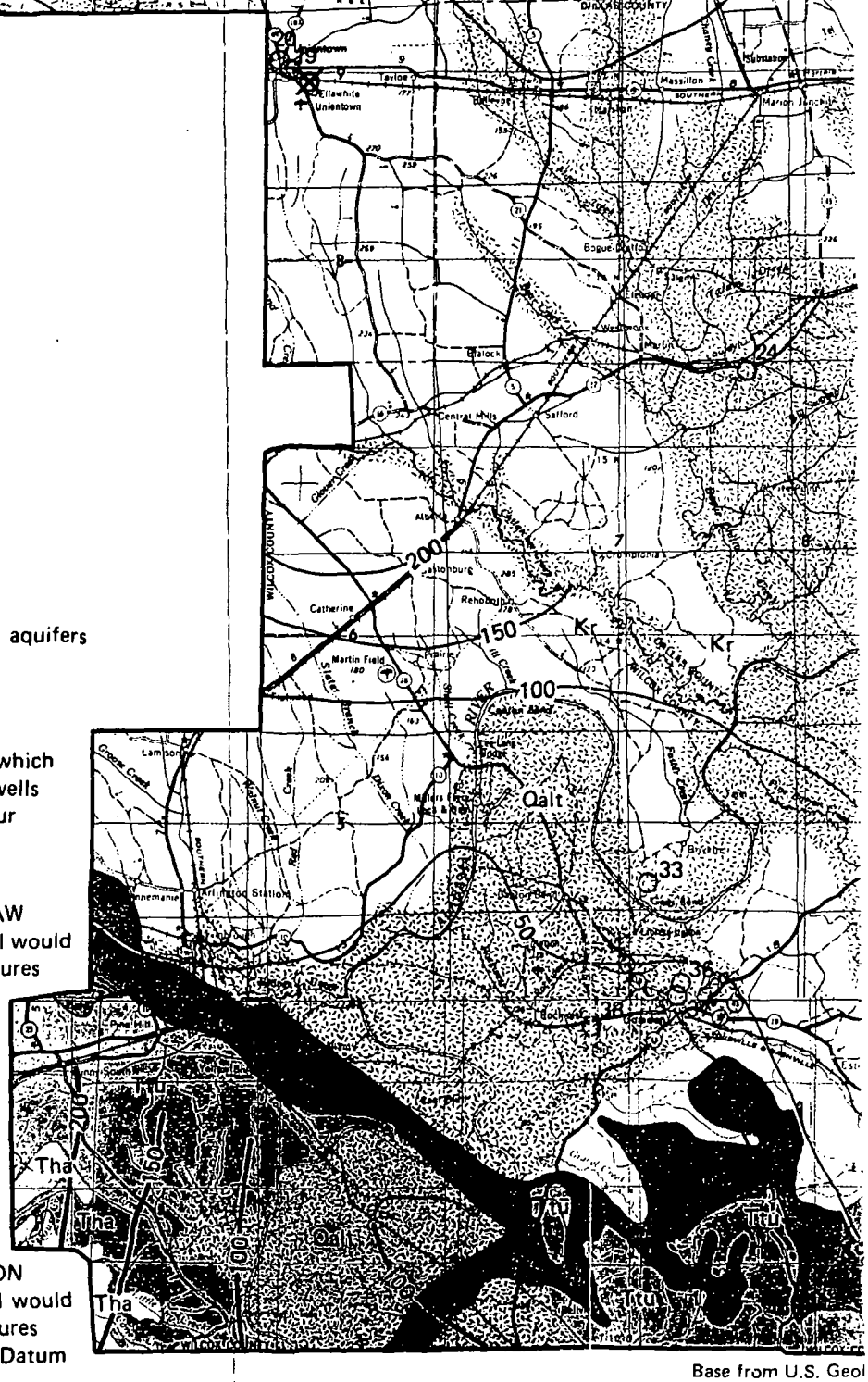
—100— POTENTIOMETRIC CONTOUR OF THE LISBON AQUIFER--Shows altitude at which water level would have stood in tightly cased wells (1982). Hachures indicate depression. Contour interval 50 feet. Datum is sea level.

AQUIFER BOUNDARY CONCEALED BY ALLUVIAL AND TERRACE DEPOSITS

1 PUBLIC WATER–SUPPLY WELL--Numbers correspond to those given in table 1.

2 PUBLIC WATER–SUPPLY SPRING--Numbers correspond to those given in table 1.

ABANDONED PUBLIC WATER–SUPPLY WELL.

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revised 1969: Mont

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0 5 10 15 20 K

RECHARGE AREAS AND POTENTIOMETRIC SURFACES OF THE MA
TO CONTAMINATION, AND LOCATIONS OF PUBLIC

# REFERENCE 8

# REFERENCE 9

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620.

APPROXIMATE SCALE

600 0 600 FEET

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM
## FLOOD INSURANCE RATE MAP

TOWN OF
MOUNDVILLE,
ALABAMA
HALE AND TUSCALOOSA
COUNTIES

**ONLY PANEL PRINTED**

**COMMUNITY-PANEL NUMBER**
**010096 0005 B**

**EFFECTIVE DATE:**
**JULY 18, 1985**

Federal Emergency Management Agency

# KEY TO MAP

| | |
|---|---|
| Zone Designations* | ZONE C<br>ZONE A<br>ZONE C |
| Base Flood Elevation Line With Elevation In Feet** | 513 |
| Base Flood Elevation in Feet Where Uniform Within Zone** | (EL 987) |
| Elevation Reference Mark | RM7× |
| Zone D Boundary | |
| River Mile | •M1.5 |

**Referenced to the National Geodetic Vertical Datum of 1929

## *EXPLANATION OF ZONE DESIGNATIONS

| ZONE | EXPLANATION |
|---|---|
| A | Areas of 100-year flood; base flood elevations and flood hazard factors not determined. |
| A0 | Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined. |
| AH | Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined. |
| A1-A30 | Areas of 100-year flood; base flood elevations and flood hazard factors determined. |
| A99 | Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined. |
| B | Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading) |
| C | Areas of minimal flooding. (No shading) |
| D | Areas of undetermined, but possible, flood hazards. |
| V | Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined. |
| V1-V30 | Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined. |

## NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

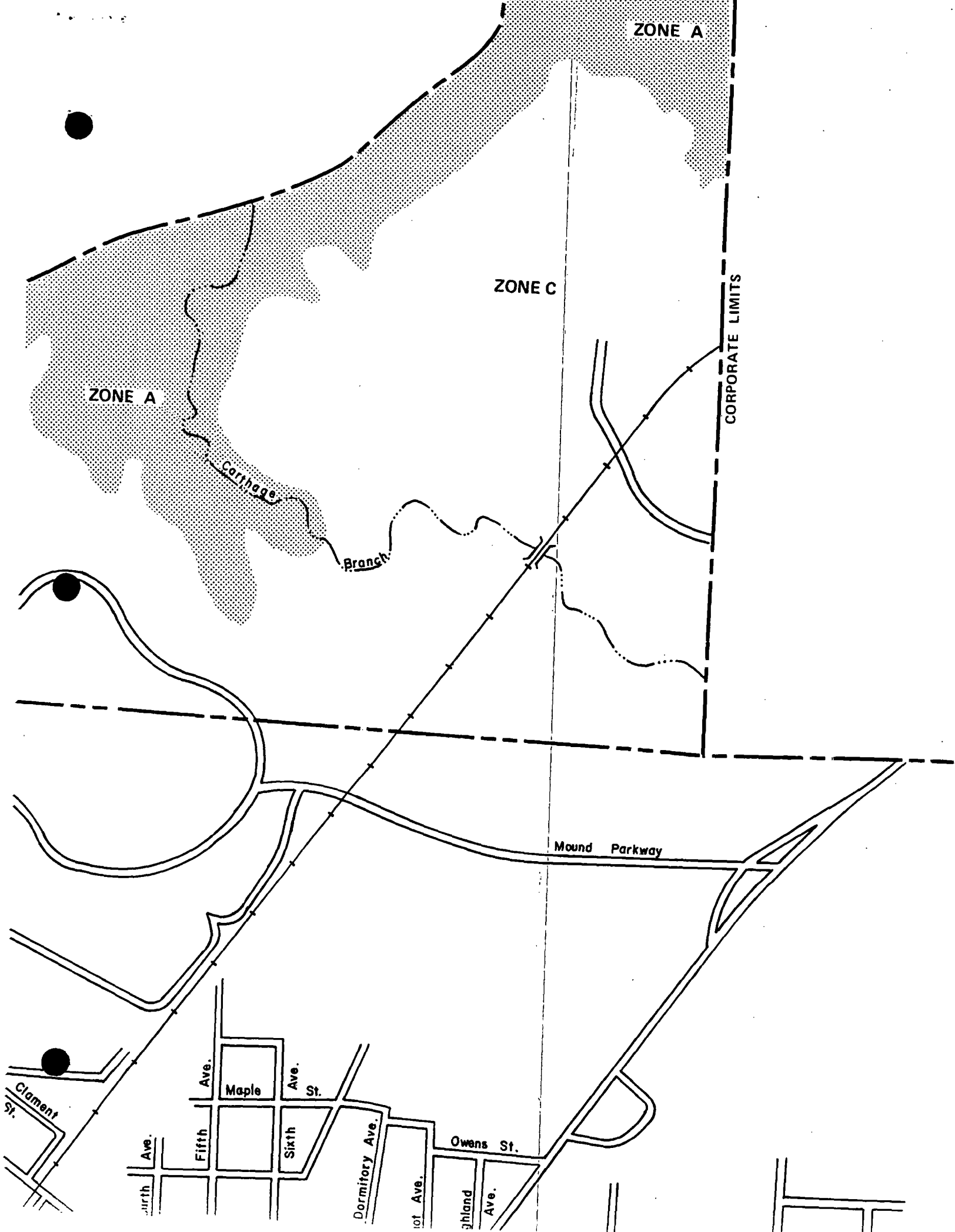
For adjoining map panels, see separately printed Map Index.

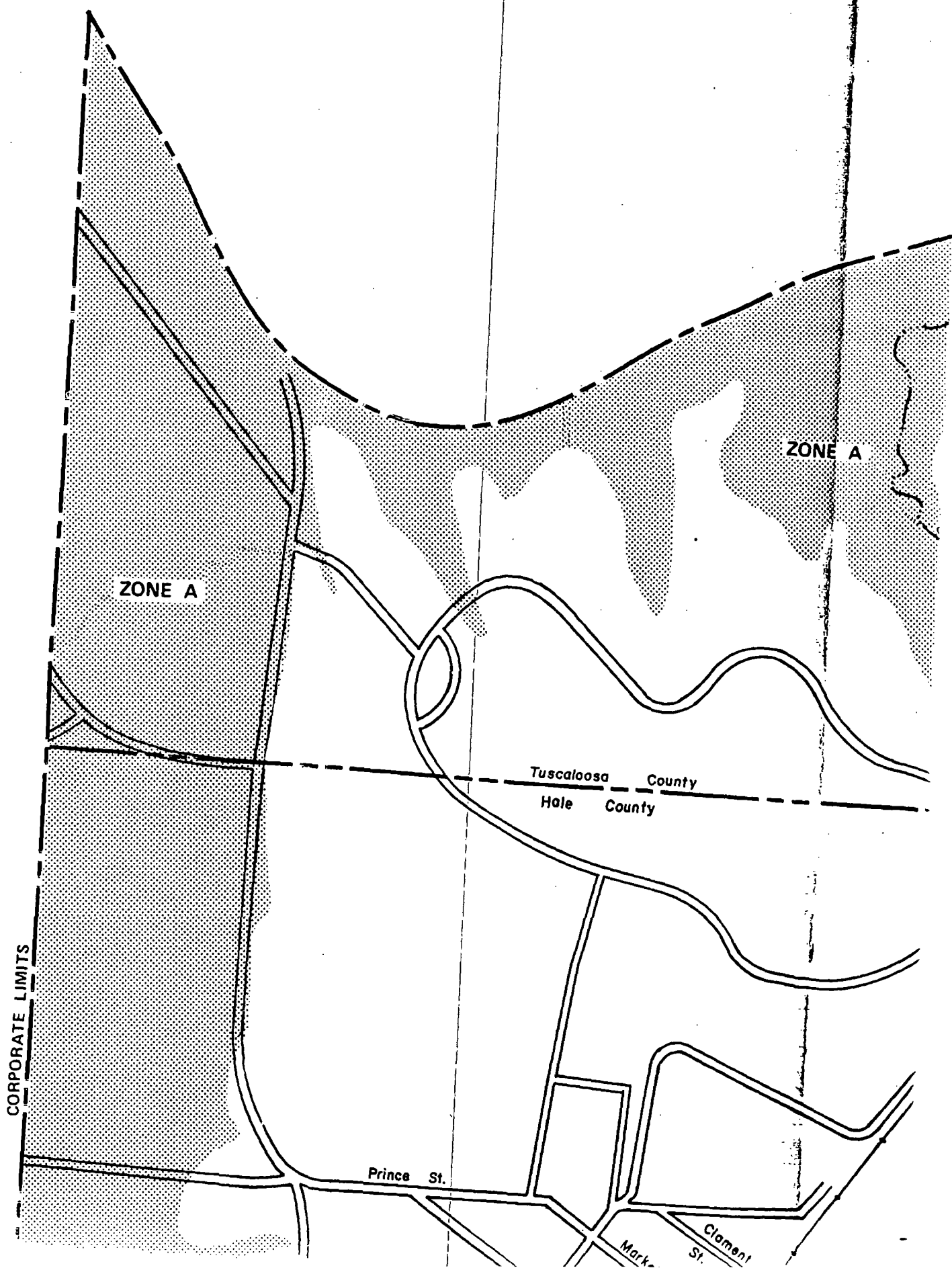
INITIAL IDENTIFICATION:

JUNE 21, 1974

FLOOD HAZARD BOUNDARY MAP REVISIONS:

TE LIMITS


ZONE A
ZONE C
ZONE A
CORPORATE LIMITS
Carthage
Branch
Mound Parkway
Clament St.
Ave.
Maple
Ave.
St.
Fifth
Sixth
Ave.
Owens St.
Dormitory Ave.
Ave.


ZONE A
ZONE A
Tuscaloosa County
Hale County
CORPORATE LIMITS
Prince St.
Clement St.

# *WATER AVAILABILITY AND GEOLOGY OF HALE COUNTY, ALABAMA*

*GEOLOGICAL SURVEY OF ALABAMA* *MAP 136*

GEOLOGICAL SURVEY OF ALABAMA

Philip E. LaMoreaux
State Geologist

DIVISION OF WATER RESOURCES

R. M. Alverson
Chief Engineer

MAP 136

# WATER AVAILABILITY AND GEOLOGY OF HALE COUNTY, ALABAMA

By Marvin E. Davis, Thomas H. Sanford, Jr.,
and Patrick O. Jefferson

UNIVERSITY, ALABAMA

1975

# WATER AVAILABILITY AND GEOLOGY OF HALE COUNTY, ALABAMA

By Marvin E. Davis, Thomas H. Sanford, Jr., and Patrick O. Jefferson


## ABSTRACT

Geologic units that underlie and crop out in Hale County include the Tuscaloosa Group, Eutaw Formation, and Selma Group of Late Cretaceous age, and terrace deposits and alluvium of Quaternary age. The Cretaceous units dip southwest about 35 feet per mile and strike northwest. They consist chiefly of deposits of sand, gravel, chalk, and clay.

Potential sources of large supplies of ground water are major aquifers in the Coker, Gordo, and Eutaw Formations; expected yields are 1.5 mgd (million gallons per day) per well. Aquifers in the Eutaw Formation are the shallowest source of ground water in most of the county.

The average annual runoff originating in Hale County is about 17 inches or 0.82 mgd per square mile. The Black Warrior River, largest potential source of surface water in the county, has an average flow of 5,800 mgd at gaging station 2-4660 near Eutaw and a median annual 7-day low flow of 349 mgd. Elliotts, Fivemile, Big Brush, and Big Prairie Creeks also are potential sources of surface water. These creeks have average flows ranging from 35 to 210 mgd and median annual 7-day low flows in excess of 2 mgd at their lower reaches.

Water from most streams in the county contains less than 10 mg/l (milligrams per liter) chloride and ranges from soft to hard. The mineral content of water from Big Brush Creek is affected by salty water from a flowing well. Ground water from the major aquifers contains less than 250 mg/l chloride, except in the extreme northwestern and west-central parts of the county, and ranges from soft to very hard. Water from the aquifers generally contains iron in excess of 0.3 mg/l except in the southern part of the county.

Water use in Hale County in 1968 was about 3.9 mgd, most of which was ground water. Less than 1 percent of the potential water resources is being utilized.


## INTRODUCTION

A statewide study of the geology and availability of water in Alabama is being conducted by the U.S. Geological Survey in cooperation with the Geological Survey of Alabama. The study is designed to map the surface geology and describe and appraise the availability of surface water and ground water of seven areas corresponding generally to river basins. The work is done and the results published on the basis of county units. The boundaries of the seven areas and the status of the studies in these areas are shown in figure 1.

This report is for Hale County and describes the general geology and water availability of part of the study area designated "Water Resources of Upper Tombigbee-Black Warrior River Basin (Ala-6-C)." The purpose of this report is to present (1) basic information on the water resources of Hale County in such a manner that a rapid appraisal and comparison with the water resources of other counties can be made by interested people, and (2) a geologic map at a scale of 1 inch equals 1 mile.

Several published reports containing geologic and hydrologic information for Hale County are listed in the selected references. Previous investigations of the geology and water resources in the county have been confined to small specific areas or included in reconnaissance studies with several other counties. Reports by Peirce and Geurin (1959) and Peirce (1967) contain information on the low flow, average flow, and flow duration of selected streams and discussions of physical and climatological features of Hale County and all or part of 13 other counties in west-central Alabama. Those reports, however, are not presented pictorially so as to compare surface-water data in Hale County with other counties in Alabama.

## PHYSIOGRAPHY AND DRAINAGE

Hale County is in the East Gulf Coastal Plain section of the Coastal Plain physiographic province (Fenneman, 1938, p. 65-83). The East Gulf Coastal Plain section is subdivided into physiographic belts extending diagonally across several counties in Alabama. The delineation of the belts is based

on distinctive topographic features and generally represent erosional characteristics of outcropping geologic units. Two of these belts are represented in Hale County: the Fall Line Hills and the Black Prairie belt.

The Fall Line Hills belt is underlain by sand, clay, and gravel which, though poorly consolidated, are capable of supporting steep slopes. The topography is fairly rugged and dissected, especially near streams. The Black Prairie belt is represented by gently rolling hills of low relief, and receives its name from the black residual soil formed on underlying chalk beds. Low, flat flood plains border the Black Warrior River and flat to gently rolling terrace uplands extend eastward as far as Moundville and Havana.

The Black Warrior River flows southward along the western boundary of Hale County. Tributaries of the river drain all of the county except for a very small area near Gallion, where the drainage is to the Tombigbee River.

Most streams in Hale County head near the eastern boundary and flow westward to the Black Warrior River. Major streams which drain the Fall Line Hills in the northern part of the county are Elliotts, Gabriel, Fivemile, and Big Brush Creeks; the upper reaches of South Sandy Creek drain the northeast corner. The Black Prairie belt in the southern part of the county is drained by Big Prairie Creek and its tributaries.

## GEOLOGY

### GENERAL GEOLOGY

Geologic units that crop out in Hale County are shown on plate 1. The units are of sedimentary origin and consist mainly of sand, gravel, chalk, and clay. These deposits range in age from Late Cretaceous to Quaternary. The Cretaceous Series includes, in ascending stratigraphic order: the Coker and Gordo Formations of the Tuscaloosa Group, the Eutaw Formation, and the Mooreville and Demopolis Chalks of the Selma Group. The Cretaceous deposits strike northwestward across the county and dip southwestward about 35 feet per mile. The total thickness of the Cretaceous deposits in Hale County ranges from about 400 feet in the northeastern part of the county to about 1,900 feet in the southwestern part. The Cretaceous units are overlain in places by sediments of Quaternary age which, on the geologic map, are subdivided into terrace deposits and alluvium (pl. 1).

### CRETACEOUS SYSTEM

#### TUSCALOOSA GROUP

The Tuscaloosa Group consists of the Coker and Gordo Formations. The Coker is the lower formation of the Tuscaloosa Group and is the basal unit of the Upper Cretaceous Series in Alabama. The upper part of the Coker Formation is exposed in the upper reaches of South Sandy Creek in the northeastern part of Hale County. The Coker unconformably overlies Paleozoic rocks in the northeastern part of the county and Lower Cretaceous deposits in the remaining part (Boswell and others, 1965, fig. 8). The formation ranges in thickness from about 500 to 600 feet and consists of olive-gray to yellowish-gray mottled sandy clay and yellowish-gray fine- to coarse-grained sand and gravel. The sands become progressively finer grained and less abundant toward the top of the formation where clay predominates. Massive beds of coarse-grained sand and gravel, as much as 200 feet in thickness, generally constitute the basal part of the formation.

The Gordo Formation, the upper unit of the Tuscaloosa Group, unconformably overlies the Coker Formation and crops out in a northwestward-trending belt across the northeastern part of the county. The formation ranges in thickness from about 300 to 350 feet in the subsurface and consists of light-gray to mottled red and gray thin-bedded to massive clay and light-tan to brown sand

and chert gravel. Poorly sorted coarse-grained sand and chert gravel beds are prevalent in the lower part of the formation. The base of these sand and gravel beds is generally defined as the contact between the Coker and Gordo Formations. The upper part of the formation consists of laminated to massive clay and lenticular beds of sand.

### EUTAW FORMATION

The Eutaw Formation, as mapped in Hale County, includes all beds between the Tuscaloosa Group and the Selma Group. In some counties in western Alabama the deposits between the overlying Selma Group and the underlying Tuscaloosa Group have been designated as the McShan Formation in the lower part and the Eutaw Formation in the upper part. However, because of the difficulty in determining the contact between the McShan and Eutaw Formations in the subsurface and at outcrops east of the Black Warrior River, these deposits were not differentiated in Hale County (pl. 1).

The Eutaw Formation crops out in a northwestward-trending belt 10 to 12 miles wide through the north-central part of the county. The formation is about 400 feet thick in the subsurface and consists of gray to yellowish-brown glauconitic sand, laminated clay, and dark-gray shale. A massive bed of fine- to medium-grained glauconitic sand, which contains fossil shells and locally a few thin beds of light-gray calcareous hard sandstone, comprises the upper part of the formation. The lower part of the formation consists of thin to massive beds of fine- to coarse-grained glauconitic sand interbedded with layers of light-gray to gray laminated clay. Locally, sand beds are thin or absent in the middle part of the formation.

### SELMA GROUP

The Mooreville Chalk rests disconformably on the Eutaw Formation and crops out in a northwestward-trending belt about 10 to 12 miles wide in the southern part of Hale County. The formation is about 300 feet thick and consists chiefly of dark bluish-gray fossiliferous silty chalk in the subsurface, which weathers to white or light yellowish gray at outcrops. Two or more beds of hard limestone, separated by soft silty clay, generally are present in the upper 15 to 50 feet of the formation. The basal 3 to 6 feet of the Mooreville Chalk in Hale County is generally composed of compact calcareous fossiliferous sandstone.

The Demopolis Chalk overlies the Mooreville Chalk and crops out in a belt as much as 4 miles wide just north of the southern boundary of Hale County. The unit in Hale County is less than 200 feet thick, which probably includes only the lower part; it is more than 400 feet thick southward in Marengo County. The Demopolis is composed mainly of a light-gray fossiliferous chalk in the subsurface and weathers to very light gray or white at outcrops. The basal part of the Demopolis Chalk consists of a thin bed of fossiliferous silty chalk that contains the index fossil *Diploschiza cretacea*. The basal beds are overlain by nearly pure chalk which, according to published analyses (Emmons and Hayes, 1904, p. 445-446), contains from 75 to 90 percent calcium carbonate ($CaCO_3$).

### QUATERNARY SYSTEM

Terrace deposits overlie older rocks along the flanks of the valley of the Black Warrior River and its major tributaries. These alluvial sediments were deposited by ancestral streams and, since their deposition, have been eroded into isolated, benchlike remnants that range in areal extent from a few acres to several square miles at different elevations above the flood plain. The deposits generally are less than 50 feet thick and consist of lenticular beds of poorly sorted gravel, sand, and clay.

Alluvium underlies the flood plains of major streams in Hale County. These deposits consist of lenticular beds of sand, gravel, clay, and silt, and generally are less than 50 feet thick.

The terrace deposits and alluvium merge near the edges of the flood plains and in places the contact between them cannot be distinguished because of lithological similarity; therefore, some of the lower terrace deposits are mapped as alluvium (pl. 2).

## SOURCE AND OCCURRENCE OF WATER

The source of all fresh water in Hale County is precipitation which occurs mainly in the form of rain. Annual rainfall averages about 52 inches and is fairly evenly distributed throughout the year. Part of the rainfall runs off directly into streams; part is returned to the atmosphere by evapotranspiration; and part percolates downward to replenish underground reservoirs. The average annual runoff from the county is about 17 inches or 0.82 mgd (million gallons per day) per square mile.

The occurrence of ground water and the flow of streams in Hale County are governed largely by the physical characteristics of geologic units. A summary of the geologic units in the county, their water-bearing characteristics, and chemical quality of water obtained from aquifers are given in table 1.

## AVAILABILITY OF WATER

### GROUND WATER

The major aquifers that yield water to wells in Hale County are beds of sand in the Coker, Gordo, and Eutaw Formations. Terrace deposits and alluvium contain sand and gravel aquifers that yield small quantities of water for domestic and stock supplies; however, they may yield larger supplies. The Mooreville and Demopolis Chalks consist of relatively impermeable chalk and clay beds and generally do not yield water to wells; however, they have a significant influence on ground-water conditions because they confine water in underlying aquifers and retard downward percolation of water from overlying aquifers.

The evaluation of the availability of ground water in Hale County is based on records for 308 wells and 2 springs. Their locations are shown on plate 2 and the data collected are tabulated in table 2.

Water table conditions occur throughout Hale County except in lowland areas near the Black Warrior River and near streams in the outcrop area of the Mooreville and Demopolis Chalks (pl. 1). Where the aquifers are overlain by relatively impermeable beds of chalk, the water becomes confined and is under hydrostatic pressure exerted by the weight of water in the same aquifer at higher elevations. Water in a well tapping a confined aquifer will rise above the top of the aquifer and in lowland areas will flow at the land surface. Such aquifers are termed artesian and the imaginary surface to which the water will rise under artesian conditions is called the potentiometric surface. An artesian well will flow if the potentiometric surface is above the land surface. The area of artesian flow in Hale County is shown on plate 2.

Ground water generally moves from areas of recharge toward areas of discharge. The rate of movement is dependent on the hydraulic gradient and permeability of the aquifer. The direction of flow of ground water in Hale County is generally southwestward and downdip from areas of outcrop. Recharge to the aquifers is derived from rainfall on these outcrop areas within and immediately north of the county.

The generalized bases of the three major aquifers are shown by contour lines on plate 2. A subsurface profile of the southwestward-dipping aquifers and their potentiometric surfaces are shown on plate 2. To estimate the depth below land surface necessary to drill to the base of a major aquifer, add the elevation above mean sea level of the proposed well site to the contour line nearest the site. For example, if the elevation of the well site is 200 feet above sea level and the nearest contour line for the

aquifer is 600 feet below sea level, the depth necessary to reach the base of the aquifer would be 800 feet. A compilation of driller's and sample logs are given in table 3.

Sand and gravel beds in the Coker Formation comprise a major aquifer throughout Hale County. The formation ranges in thickness from 500 to 600 feet and is composed of about 50 percent sand and gravel. The thicker and coarser grained sand beds generally occur in the lower part of the formation. Data from test wells in counties adjacent to Hale County indicate that the basal 200 feet of the formation is chiefly sand and gravel. Although sand beds throughout the formation yield water, the basal beds of sand and gravel comprise the major aquifer.

Depths to the base of the Coker Formation range from about 400 feet below land surface in the northeastern part of the county to about 1,900 feet in the southwestern part. The formation is not tapped by wells in the southern part of Hale County because of its excessive depth and because shallower aquifers yield large quantities of water. Data for 35 wells tapping the Coker Formation in the northern part of the county are included in table 2.

Well C-4, which taps the major aquifer, reportedly had a drawdown of 25 feet while producing about 200 gpm (gallons per minute), indicating a specific capacity of 8 gpm per foot of drawdown. The specific capacity of this well indicates a potential production of 1,000 gpm with a pumping level of about 150 feet below land surface. On the basis of these data, it is estimated that wells with capacities of 1.5 mgd could be constructed in the major aquifer of the Coker Formation in Hale County.

Sand and gravel beds in the Gordo Formation are a major aquifer in Hale County. The formation ranges in thickness from about 300 to 350 feet; however, the lower 150 to 200 feet of the formation, which consists predominantly of poorly sorted sand and gravel, is the major aquifer. Sand beds in the upper part of the formation are relatively thin and generally yield only small to moderate quantities of water to wells.

The depth to the base of the Gordo aquifer ranges from 300 feet below land surface in the northern part of the county (pl. 2) to about 1,300 feet in the southwestern part. The aquifer is not tapped by wells in the southern part of the county because of its excessive depth and because large amounts of water are available from the overlying Eutaw aquifer.

Data for 55 wells tapping the Gordo Formation in the northern part of Hale County are included in table 2. Wells P-13 and P-14, completed in the lower part of the Gordo, produce 618 and 545 gpm with drawdowns of 17 and 23 feet, respectively. The specific capacities of these wells indicate a potential production of 1,000 gpm with pumping levels about 150 feet below land surface. In areas of lower elevation where the water level or potentiometric surface is near or above the land surface, it is estimated that the lower part of the formation will yield about 1,000 gpm to individual wells with a pumping level about 50 feet below surface. On the basis of these data, it is estimated that the Gordo aquifer will yield 1.5 mgd to individual wells in central and southern parts of Hale County and will yield smaller quantities in the northern part where the aquifer is sufficiently saturated (pl. 2).

Sand beds in the Eutaw Formation are a major aquifer in Hale County. The formation is about 400 feet thick and consists generally of thin clay and sand beds with thicker and coarser grained sand beds in the lower part. A massive bed of sand occurs in the upper part of the formation; however, it is relatively fine grained and yields less water than the basal sand beds. Composition of the Eutaw Formation is estimated to be about 50 percent sand, although individual sand beds probably do not exceed 60 feet in thickness.

The depth to the base of the Eutaw aquifer ranges from about 300 feet below land surface in the vicinity of Greensboro to about 900 feet in the southwestern part of the county. The Eutaw Formation is not only a source of large water supplies, but is also the shallowest source of ground water for domestic and stock supplies in most of southern Hale County. Data for 225 wells tapping the Eutaw Formation are included in table 2.

Wells P-11 and P-16, completed in the middle part of the Eutaw Formation, yield 80 and 200 gpm, respectively. Well S-13, which taps the lower part of the formation, flows 100 gpm. Well V-13, which taps the lower part of the Eutaw, yields 295 gpm. The specific capacities of wells P-11, P-16, and S-13 range from 1.5 to 7 gpm per foot of drawdown. These and other available data indicate that the lower part of the Eutaw Formation will yield 1.5 mgd to individual wells in Hale County generally south of Greensboro, and will yield smaller supplies in the northern part of the county where the aquifer is sufficiently saturated (pl. 2).

Ground water occurs in the terrace deposits and alluvium in Hale County but, because of the heterogeneity of the deposits, individual aquifers are difficult to define. The deposits generally are less than 50 feet thick and consist of lenticular beds of poorly sorted gravel, sand, and clay. In general, aquifers in the deposits yield sufficient water for domestic or stock use. Wells of large capacity probably could be constructed in the low terrace deposits and alluvium along the Black Warrior River where the aquifers are hydraulically connected with the river. Data for nine wells tapping the terrace deposits or alluvium are included in table 1.

A well that will supply 10 gpm is considered adequate for normal domestic needs. All geologic units, except the Mooreville and Demopolis Chalks, that crop out in or underlie Hale County are potential sources of sufficient water for domestic use.

Domestic supplies may be obtained at depths of less than 50 feet from aquifers in terrace deposits and alluvium in the valleys of the Black Warrior River and its major tributaries. In areas of low to moderate relief, north of the Eutaw-Mooreville geologic contact (pl. 1) and east of the flood plain of the Black Warrior River, wells ranging in depth from 50 to 200 feet are required to tap aquifers in outcropping formations that will yield as much as 10 gpm. In areas of high relief, particularly in the northeastern part of the county, wells ranging in depth from 300 to 400 feet may be necessary to tap an aquifer.

In the area of outcrop of the Mooreville and Demopolis Chalks the shallowest source of ground water for domestic supplies generally is from sand beds in the upper part of the underlying Eutaw Formation. Chalk beds overlying the Eutaw Formation generally do not yield water to wells, and alluvium in this area is usually thin and may not yield sufficient quantities of water for domestic supply. Figure 2 shows by contour lines the elevation of the top of the Eutaw Formation. To estimate the depth from the land surface to the top of the formation at specific well sites, follow the method outlined in the preceding explanation, whereas depths are determined to the bases of the major aquifers. The depth below land surface to the top of the Eutaw Formation ranges from less than 5 feet near the Eutaw-Mooreville contact (pl. 1) to about 500 feet in the southwestern part of the county. Aquifers, capable of yielding domestic supplies, generally occur less than 100 feet below the top of the formation.

## SURFACE WATER

### AVERAGE FLOW

The long-term average flow of a stream, the arithmetic mean of all discharges for a long period of time, is a useful statistic for

## SURFACE WATER

Surface water may undergo changes in chemical quality as it moves rapidly from one environment to another. In general, surface water tends to carry increasing loads of dissolved material as it moves downstream, although the mineral concentration may be reduced by increased runoff or by inflow of less mineralized water. Dissolved minerals in surface water result, in part, from natural causes—the solvent action of water on soil and rock and, in part, from cultural causes—the activities of man that add minerals and other pollutants to the water.

The results of chemical analyses of water collected from streams since September 1965 at network and project stations in Hale County are tabulated in table 5. Chemical-quality records prior to November 1965 have been published in Alabama Geological Survey Circular 36, U.S. Geological Survey Water-Supply Paper 1947, and annual water-quality reports for Alabama.

Water from most streams in the county contains less than 20 mg/l chloride and ranges from soft to hard. Based on chemical analyses of water collected prior to the period for this report, the iron content and color of water in some streams may be objectionable for certain industrial uses.

Water from streams which drain sand and clay deposits in the northern part of Hale County is less mineralized than water from streams which drain calcareous rocks in the southern part of the county. The chloride content and hardness of water from Big Brush Creek is affected by a flowing well (L-6) discharging salty water into Dry Creek, a tributary to Big Brush Creek (pl. 3, inset). Analyses of water samples collected from Big Brush Creek and Dry Creek at specific locations indicate the effects of the chemical quality of the water from the flowing well on water in Big Brush Creek during base flow conditions (table 5).

## UTILIZATION OF WATER

The total use of water in Hale County in 1968 was estimated to be about 3.9 mgd, most of which was ground water; surface water was used only for stock supplies. The table below indicates that approximately 68 percent was used for municipal and industrial supplies, 31 percent for rural-domestic and stock supplies, and less than 1 percent for school supplies.

Estimated water use in Hale County, 1968

| Use | Gallons per day |
|---|---|
| Municipal | |
| Greensboro | 1,260,000 |
| Moundville | 65,000 |
| Akron | 21,000 |
| Industrial | 1,390,000 |
| Rural-domestic and stock | 1,120,000 |
| Rural schools | 21,000 |
| Total use | 3,877,000 |

## WEDGEWORTH WELL

The Wedgeworth well (L-6), shown in figure 5, is in the west-central part of Hale County near Wedgeworth, Alabama. It was drilled as an oil test well in 1922 to a depth of 1,490 feet (Carlston, 1944, p. 106-108; and table 1). During the drilling of the well a small flow of fresh water was found at a depth of 536 feet and cased off. A water-bearing bed was tapped at a depth of 1,410 feet which yielded about 2,500 gpm of warm salty water. The well was completed as a flowing water well and the water used for recreational purposes.

Figure 5 shows the flow of water from the well in 1922 at a reported rate of 2,500 gpm; and in 1968, at a measured rate of 900 gpm. The measured flow from the well was 1,240 gpm in 1944. The discharge pipe of the well is about 10 feet above the land surface, and the water is used to supply fish ponds.

The elevation of the base of the Coker Formation at well L-6 is estimated to be about 960 feet below sea level and 320 feet above the water-bearing zone which yields

Table 1.—*Summary of geologic units, lithology, and availability and quality of ground water in Hale County*

| System | Series | Geologic unit | | Thickness (feet) | Lithology | Availability of water | Quality of water |
|---|---|---|---|---|---|---|---|
| Quaternary | Holocene and Pleistocene | Alluvium | | 0-50± | Sand; gravel; clay; silt. | Yields adequate water supplies for domestic use; potential source of large supplies of water where aquifers are hydraulically connected with the Black Warrior River. | Water generally is of good quality; locally contains iron in excess of 0.3 mg/l. |
| | Pleistocene | Terrace deposits | | 0-50± | Gravel; sand; clay. | Yields adequate water supplies for domestic use; potential source of large supplies of water where aquifers are hydraulically connected with the Black Warrior River. | Water generally is of good quality; locally contains iron in excess of 0.3 mg/l. |
| Cretaceous | Upper Cretaceous | Selma Group | Demopolis Chalk | 0-200± | Chalk, light-gray, fossiliferous. | Relatively impermeable; not a source of ground water. | |
| | | | Mooreville Chalk | 300 | Chalk, dark bluish-gray, silty, fossiliferous; compact calcareous fossiliferous sandstone in basal part of unit; hard limestone in upper part of unit. | Relatively impermeable; not a source of ground water. | |
| | | Eutaw Formation | | 400± | Sand, gray to yellowish-brown, glauconitic; clay, light-gray to gray, laminated; shale, dark gray; thin to massive beds of fine- to coarse-grained glauconitic sand and light-gray to gray laminated clay in lower part; fine- to medium-grained fossiliferous glauconitic sand and, locally, thin beds of hard light-gray calcareous sandstone in upper part. | Principal aquifer in southern part of county; potential source of large supplies of water; will yield 1.5 mgd to individual wells from sand beds in lower part of formation in southern part of county; source of small supplies in northern part where unit is sufficiently saturated. | Water is soft to very hard; generally contains iron in excess of 0.3 mg/l from middle and lower parts of unit in central part of county. Water is soft and low in iron content from upper part of unit in southern part of county. Chloride content of water is more than 250 mg/l in extreme west-central part of county. |
| | | Tuscaloosa Group | Gordo Formation | 300-350 | Sand and gravel, light-gray to brown; clay, light-gray to mottled red and gray; poorly sorted coarse-grained sand and chert gravel in lower part of formation; upper part consists of laminated to massive clay and lenticular sand beds. | Principal aquifer at Akron; potential source of large supplies of water; will yield 1.5 mgd to individual wells from sand beds in lower part of formation in central and southern parts of county; source of small to moderate supplies in northern part. | Water generally is soft; contains iron in excess of 0.3 mg/l except in local areas. Water is very hard and high in iron and chloride content in the extreme west-central part of the county. |
| | | | Coker Formation | 500-600 | Sand, yellowish-gray, fine- to coarse-grained; gravel; clay, olive-gray to yellowish-gray, sandy; clay predominates in upper part of formation; basal part of formation consists of coarse-grained sand and gravel. | Principal aquifer at Moundville; potential source of large supplies of water; will yield 1.5 mgd to individual wells from sand and gravel beds in lower part of formation in entire county. | Water is soft to very hard; contains iron in excess of 0.3 mg/l except in local areas. Chloride content of water is more than 250 mg/l in the extreme northwestern part of county. |

Table 2.—*Records of wells and springs in Hale County*

Well or spring: Numbers correspond to those on plate 2 and tables 3 and 4.
Depth of well and water level: Reported depths are given in feet; measured depths are given in feet and tenths. S indicates a spring.
Altitude: By aneroid barometer.

Method of lift: C, cylinder; Cf, centrifugal or shallow-well piston; F, flowing; J, jet; M, manual; N, none; T, turbine.
Use of water: D, domestic; Ind, industrial; N, none; O, observation; P, public supply; S, stock.

Water-bearing unit: Kl, Lower Cretaceous(?); Kck, Coker Formation; Kg, Gordo Formation; Ke, Eutaw Formation; Qt, terrace deposits; Qal, alluvium.

| Number | Owner | Driller | Year completed | Depth of well (feet) | Diameter of well (inches) | Water-bearing unit | Altitude of land surface (feet) | Water level: Above (+) or below land surface (feet) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A-1 | John Hopkins | ..... | 1937 | 28.2 | 36 | Kg | ..... | 24.4 | 1-16-61 | M | D | Casing: 36-in from surface to 28.2 ft. |
| A-2 | U.S. Forest Service | W. J. Bozeman and Son | 1955 | 193 | 4, 2 | Kck | 332 | 30.1 | 12-19-55 | J | D | Casing: 4-in from surface to 116 ft; 2-in from 116 to 125 ft; 2-in screen from 125 to 139 ft; none below. See driller's log. |
| A-3 | Ruby Johnson | ..... | 1957 | 46.3 | 36 | Kg | ..... | 42.5 | 1-16-61 | M | D, S | Casing: 36-in from surface to 46.3 ft. |
| B-1 | Paul Griffin | ..... | ..... | 28.0 | 42 | Kg | ..... | 24.9 | 1-13-61 | M | D | Casing: 42-in from surface to 28 ft. |
| B-2 | Venoy Terry | Black Belt Drilling Co | 1957 | 160 | 4, 2½ | Kck | 330 | 10.0 | 4-23-57 | J | D | Casing: 4-in from surface to 131 ft; 2½-in screen from 131 to 137 ft; none below. Electric log in files of U.S. Geol. Survey. See driller's log. |
| B-3 | Robert McCray | ..... | ..... | S | ..... | Kg | ..... | ..... | ..... | Cf | D, S | Spring. Estimated flow 0.5 gpm on 9-9-57. |
| B-4 | Otis Davis | Causey Drilling Co | 1963 | 97 | 4 | Kck | 272 | 65 | 1963 | J | D, S | Casing: 4-in from surface to 97 ft. |
| B-5 | ....do | Cole Supply Co | 1950 | 504 | 6 | Kck | 208 | 18 | 9-10-57 | C | D, S | |
| B-6 | Raymond and Earl Sims | ..... | ..... | 350 | 4 | Kck | 170 | + 4<br>+ .7 | 9-11-57<br>12-12-63 | N | N | Estimated flow 0.5 gpm on 9-11-57. No flow on 12-12-63. |
| B-7 | R. F. Lewis | ..... | 1916 | 495 | 3 | Kck | ..... | ..... | ..... | F, J | D, S | Measured flow 4 gpm on 1-10-61. Reported to contain objectionable quantity of iron. |
| B-8 | Miss Lettice Howell | Causey Drilling Co | 1949 | 80 | 5 | Qt, Kg | 209 | 51.6 | 9-12-57 | J | D, S | |
| B-9 | ....do | Black Belt Drilling Co | 1951 | 210 | 4, 2 | Kck | 190 | ..... | ..... | J | D, S | Casing: 4-in from surface to 81 ft; 2-in from 81 to 158 ft; 1½-in perforated from 158 to 210 ft. See driller's log. |
| B-10 | Wallace Davis | ..... | ..... | 417 | ..... | Kck | ..... | 7 | 9-10-57 | Cf | D, S | |
| B-11 | Rufus Kelly | Causey Drilling Co | 1957 | 105 | 5 | Kck | 272 | 68.0 | 9-10-57 | J | D, S | Casing: 5-in from surface to 99 ft; 5-in screen from 99 to 105 ft. |
| B-12 | A. S. Wilson | ..... | 1956 | 29 | 2 | Kg | ..... | ..... | ..... | M | D, S | |
| B-13 | A. D. Rogers | Causey Drilling Co | 1951 | 135 | 4, 2 | Kg | 285 | 105 | 4-6-51 | J | D | Casing: 4-in from surface to 129 ft; 2-in screen from 129 to 135 ft. Driller's log in files of U.S. Geol. Survey. |
| B-14 | Lewis King | ..... | ..... | 25 | 36 | Kg | ..... | 21 | 1-12-61 | Cf | D, S | Casing: 36-in from surface to 25 ft. |
| B-15 | Mrs. D. E. Sims | Causey Drilling Co | 1950 | 78 | 4, 2 | Kg | ..... | 50 | 10-31-50 | C | D, S | Casing: 4-in from surface to 72 ft; 2-in screen from 72 to 78 ft. Driller's log in files of U.S. Geol. Survey. |
| B-16 | James Johnson | ....do | 1954 | 103 | 4, 2 | Kck | 238 | 60.2 | 9-11-57 | J | D, S | Casing: 4-in from surface to 97 ft; 2-in screen from 97 to 103 ft. |

Table 2.–*Records of wells and springs in Hale County*–Continued

| Number | Owner | Driller | Year completed | Depth of well (feet) | Diameter of well (inches) | Water-bearing unit | Altitude of land surface (feet) | Water level: Above (+) or below land surface (feet) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B-17 | Kulkie Carolton | ..... | 1958 | 30 | 36 | Kg | ..... | ..... | ..... | Cf | D, S | |
| B-18 | Porter Hill | Causey Drilling Co | 1952 | 86 | 5 | Kg | 205 | 22.2 | 9-12-57 | J | D, S | |
| B-19 | Nehema Catos | ..... | 1949 | 42 | 36 | Kg | ..... | 22.2 | 1-13-61 | J | D, S | |
| C-1 | Mound State Park | ..... | 1938 | 515 | 6 | Kck | 144 | ..... | ..... | F | N | Mound State Park Water Well No. 2. |
| C-2 | W. F. Wiggins | ..... | ..... | 400 | 4 | Kck | 157 | ..... | ..... | F | D, S | Flow is reported to increase when river rises. |
| C-3 | City of Moundville | Layne-Central Co | 1934 | 463 | 8 | Kck | 165 | ..... | ..... | T | P | Casing: 8-in from surface to 434 ft; 8-in screen between 434 and 454 ft; none below. Driller's log in files of U.S. Geol. Survey. |
| C-4 | ....do | ....do | 1957 | 428 | 16, 6 | Kck | 166 | 3.0<br>32 | 11-22-57<br>12-12-63 | T | P | Casing: 16-in from surface to 390 ft; 6-in from 332 to 398 ft; 6-in screen between 398 and 428 ft. Gravel pack from 390 to 428 ft. Pump capacity 200 gpm. Drawdown reported 25 ft while pumping 200 gpm. See sample and driller's logs. |
| C-5 | W. F. Wiggins | ..... | ..... | ..... | 2 | ..... | ..... | ..... | ..... | F | D | Measured flow 2.8 gpm on 1-4-61. |
| C-6 | Allen Acres, Inc | ..... | ..... | 300 | 3 | Kck | 119 | ..... | ..... | F | D | Measured flow 15 gpm on 1-4-61. |
| C-7 | Stella Wilson | Bill Dalton | 1949 | 417 | 2 | Kck | ..... | ..... | ..... | F | S | Casing: 2-in from surface to 380 ft; none below. Measured flow 4.5 gpm on 1-4-61. |
| C-8 | ....do | ....do | 1949 | 355 | 2 | Kck | ..... | ..... | ..... | F | D, S | Casing: 2-in from surface to 313 ft; none below. Estimated flow 14 gpm on 1-4-61. |
| C-9 | U.S. Corps of Engineers | ..... | ..... | ..... | 4 | Kck | 110 | ..... | ..... | F | N | Estimated flow 15 gpm on 1-4-61. |
| C-10 | Horn Brothers | ..... | ..... | ..... | 3 | Kck | ..... | ..... | ..... | F | S | Estimated flow 4 gpm on 1-11-61. |
| C-11 | J. Tom Perry | ..... | 1931 | 400 | 4 | Kck | 146 | ..... | ..... | F | D, S | Estimated flow 15 gpm on 9-11-57 and 3 gpm on 1-11-61. |
| C-12 | J. L. Tidmore, Jr. | Black Belt Drilling Co | 1952 | 40 | 2 | Qt | 170 | ..... | ..... | J | D, S | Casing: 2-in from surface to 40 ft. Driller's log in files of U.S. Geol. Survey. |
| C-13 | W. O. Chandler | ..... | 1930 | 470 | ..... | Kck | ..... | ..... | ..... | F | D, S | Estimated flow 2 gpm on 1-11-61. |
| C-14 | Roy Davis | Black Belt Drilling Co | 1954 | 260 | 4, 2 | Kck | 213 | 47 | 8-17-54 | J | D, S | Casing: 4-in from surface to 104 ft; 2-in from 104 to 260 ft; perforated from 220 to 260 ft. Driller's log in files of U.S. Geol. Survey. |
| C-15 | John Bedsoe | ..... | 1950 | 560 | 4 | Kck | ..... | ..... | ..... | F | D, S | Measured flow 12 gpm on 1-11-61. |
| C-16 | Andrew Taylor | Causey Drilling Co | 1951 | 440 | 4 | Kck | ..... | ..... | ..... | F | D | Measured flow 9.8 gpm on 1-4-61. |
| C-17 | ....do | ....do | 1953 | 250 | 2 | Kg, Kck | 121 | ..... | ..... | F | S | Casing: 2-in from surface to 250 ft. Measured flow 9.5 gpm on 1-12-61. Sample log in files of U.S. Geol. Survey. |
| C-18 | ....do | ..... | 1920 | 450 | 4 | Kck | ..... | ..... | ..... | F | D, S | Measured flow 8.3 gpm on 1-12-61. |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C-19 | Olin L. Owens | Joe Abernathy | 1940 | 500 | 4 | Kck | ..... | ..... | ..... | F | D, S | Measured flow 6.4 gpm on 1-12-61. |
| C-20 | Ebert Sludge | ..... | ..... | 450 | ..... | Kck | ..... | ..... | ..... | F | D, S | Measured flow 12 gpm on 1-13-61. |
| C-21 | Guines-Rosenwald School | ..... | 1949 | ..... | 1½ | Qt | 164 | ..... | ..... | M | P | |
| C-22 | Emmett Massey | Black Belt Drilling Co | 1951 | 260 | 4, 2 | Kg | 226 | ..... | ..... | J | N | Casing: 2-in from surface to 241 ft. Reported to contain [illegible] |
| C-23 | [illegible] | [illegible] | [illegible] | [illegible] | 4 | [illegible] | [illegible] | | | [illegible] | [illegible] | [illegible] |
| C-24 | [illegible] | Black Belt Drilling Co | ..... | 120 | 4, 2 | Kg | 192 | ..... | ..... | J | D, S | Casing: 4-in from surface to 105 ft; 2-in screen from 105 to 120 ft. Driller's log in files of U.S. Geol. Survey. |
| E-1 | U.S. Corps of Engineers | ..... | 1905 | ..... | 4 | ..... | 96 | ..... | ..... | F | D | Measured flow 13.6 gpm on 12-20-60. |
| E-2 | W. B. Marrow | ..... | 1960 | 46 | 2 | Qal, Kg | 100 | ..... | ..... | ..... | D | Supplies 16 summer cottages. |
| E-3 | J. A. Moore | ..... | 1948 | 16 | 2 | Qal | 100 | ..... | ..... | M | D | |
| E-4 | Harris Stewart | Black Belt Drilling Co | 1951 | 300 | 4, 2 | Kg | 124 | 4.4 | 7- 9-63 | M | D, S | Casing: 4-in from surface to 45 ft; 2-in from surface to 207 ft; none below. Measured flow 27.7 gpm on 10-11-51. Flow was reported to have stopped in 1961 or 1962. Driller's log in files of U.S. Geol. Survey. |
| E-5 | City of Akron | ....do | 1953 | 530 | 4, 2 | Kck | 135 | ..... | ..... | F | P | Casing: 4-in from surface to 37 ft; 2-in from 37 to 530 ft. Measured flow 6.7 gpm on 7-9-63. Used as public fountain. Driller's log in files of U.S. Geol. Survey. |
| E-6 | ....do | H. W. Peerson Drilling Supply Co. | 1956 | 360 | 8, 4 | Kg | 134 | + 2.3 | 8- 7-56 | F, T | P | Test hole drilled to 554 ft. Casing: 8-in from surface to 269 ft; 4-in from 289 to 350 ft; 4-in screen from 269 to 289 ft and 350 to 360 ft. Measured flow 8.6 gpm on 7-9-63 (pump off). Reported drawdown 11 ft after 1 hr pumping 84 gpm. Maximum usage 21,000 gpd. Water is aerated for removal of iron. See driller's log. |
| E-7 | Akron School | Black Belt Drilling Co | 1954 | 100 | 6 | Ke | 133 | 7.9 | 7- 9-63 | J | N | Casing: 6-in from surface to 45 ft; none below. Driller's log in files of U.S. Geol. Survey. |
| E-8 | Miller Lumber Co. | ..... | ..... | ..... | 2 | ..... | 113 | ..... | ..... | F | D, S | Measured flow 2 gpm on 12-20-60. |
| E-9 | ....do | ..... | 1920 | ..... | 4 | ..... | 107 | ..... | ..... | F | D, S | Measured flow 2 gpm on 12-22-60. |
| E-10 | J. R. Bailey | Black Belt Drilling Co | 1956 | 300 | 4 | Ke | 135 | ..... | ..... | F | S | Casing: 4-in from surface to 60 ft; none below. Measured flow 15.8 gpm on 12-23-60. Supplies 10 head of cattle. Driller's log in files of U.S. Geol. Survey. |
| E-11 | H. A. Bailey | ..... | 1955 | 480 | 4, 2 | Ke, Kg | 133 | ..... | ..... | F | S | Casing: 4-in from surface to 41 ft; 2-in from surface to 480 ft. Water flows from 2 zones. Measured flow 5 gpm from 4-in pipe which is 1.8 ft above surface and 28 gpm from 2-in pipe which is 3.2 ft above surface on 12-22-60. See driller's log. |

Table 3.—*Sample and drillers' logs of wells in Hale County*

(Driller's log unless specified as sample log.)

Well A-2
Owner: U.S. Forest Service
Driller: W. J. Bozeman and Son

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Sand, fine-grained, and gravel, and layers of clay | 20 | 20 |
| Rock | 1 | 21 |
| Sand and gravel, and layers of clay | 31 | 52 |
| Clay | 2 | 54 |
| Sand and layers of hard yellow clay | 20 | 74 |
| Sand, red | 12 | 86 |
| Rock | 2 | 88 |
| Clay, red and blue layers | 30 | 118 |
| Sand, soft, clean | 22 | 140 |
| Clay and rock | 1 | 141 |
| Sand, fine-grained, hard | 30 | 171 |
| Clay, hard | 2 | 173 |
| Sand, fine-grained, hard | 20 | 193 |

Well B-2
Owner: Venoy Terry
Driller: Black Belt Drilling Co.

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Soil and red clay | 10 | 10 |
| Clay, colored, and sandy clay | 10 | 20 |
| Clay, yellow and hard streak of sand | 10 | 30 |
| Hard streaks and sand | 10 | 40 |
| Clay, yellow, sandy | 10 | 50 |
| Clay, yellow, sandy, and pea gravel | 10 | 60 |
| Clay, yellow, sandy | 10 | 70 |
| Clay, colored | 10 | 80 |
| Clay, colored, and fine sand | 10 | 90 |
| Sand, fine-grained, and colored clay flakes | 30 | 120 |
| Clay and sand | 10 | 130 |
| Sand and clay flakes | 15 | 145 |
| Clay | 15 | 160 |

Well C-4
Owner: City of Moundville
Driller: Layne-Central Co.

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Clay | 8 | 8 |
| Sand, muddy | 23 | 31 |
| Rock | 1 | 32 |
| Sand | 10 | 42 |
| Rock | 1 | 43 |
| Sand, and streaks of clay | 9 | 52 |
| Clay | 158 | 210 |
| Clay, rock, and gravel | 17 | 227 |
| Sand, fine | 10 | 237 |
| Clay | 16 | 253 |
| Sand, packed | 5 | 258 |
| Shale | 86 | 344 |
| Sand, and streaks of soft clay | 19 | 363 |
| Sand, packed, and thin streaks of clay | 24 | 387 |
| Sand, packed (softer than above) | 10 | 397 |
| Sand, packed (cut better) | 10 | 407 |
| Sand, packed | 21 | 428 |
| Clay, sandy | 4 | 432 |

Well C-4
Owner: City of Moundville
Driller: Layne-Central Co.

Sample Log

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| *Coker Formation* | | |
| Sand, yellowish-orange, fine- to coarse-grained, subangular to angular, slightly iron stained | 22 | 22 |

Well C-4—Continued

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| *Coker Formation*—Continued | | |
| Sand, yellowish-orange, fine to very coarse grained, angular to subrounded, heavily iron stained; mica | 22 | 44 |
| Sand, yellowish-orange, medium to very coarse grained, angular to well rounded, iron stained, slight amount of weathered chert | 22 | 66 |
| Sand, orange, fine to very coarse grained, angular to rounded, iron stained; reddish-brown clay | 23 | 89 |
| Sand, light-brown, very fine to coarse-grained, angular to subangular, iron stained, micaceous | 23 | 112 |
| Sand, light-brown, very fine to coarse-grained, angular to subangular, iron stained, micaceous; reddish-brown and grayish-orange clay | 23 | 135 |
| Sand, yellowish-brown, very fine to medium-grained, angular to subangular, iron stained, micaceous; reddish-brown and grayish-orange clay | 69 | 204 |
| Gravel, fine to medium, quartz and chert pebbles, varicolored, subangular to well rounded; yellowish-brown, very fine to fine-grained, angular to subangular, iron stained sand; red to grayish-orange clay | 23 | 227 |
| Clay, light-gray; yellowish-brown fine- to medium-grained angular to subrounded slight iron-stained sand; small to medium quartzose gravel and chert; trace of sandstone | 22 | 249 |
| Clay, light-brown to yellowish-brown, very fine to coarse-grained, angular to subrounded, micaceous; slightly iron stained sand | 23 | 272 |
| Clay, gray, very micaceous, slightly carbonaceous; lignite; slight amount of sand and gravel | 22 | 294 |
| Clay, gray, very micaceous, slightly carbonaceous; lignite; slight amount of sand | 23 | 317 |
| Sand, yellowish-brown, very fine to fine-grained, angular, micaceous; gray very micaceous slightly carbonaceous clay | 23 | 340 |
| Clay, gray, very micaceous, slightly carbonaceous; yellowish-brown very fine to coarse-grained angular to subangular sand | 23 | 363 |
| Sand, yellowish-brown, medium- to coarse-grained; angular to subrounded, micaceous | 22 | 385 |
| Sand, yellowish-gray, medium- to coarse-grained, angular to subrounded | 23 | 408 |
| Sand, yellowish-gray, medium- to coarse-grained, angular to subrounded, micaceous | 23 | 431 |

Modified from sample description by
Randall Fleming
Geological Survey of Alabama

Well E-6
Owner: City of Akron
Driller: H. W. Peerson Drilling Supply Co.

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Clay, sandy | 10 | 10 |
| Clay and gravel | 3 | 13 |
| Clay, and streaks of gravel | 7 | 20 |
| Sand, fine, and gravel (lost returns) | 10 | 30 |
| Clay, sandy, hard | 14 | 44 |
| Sand, coarse | 10 | 54 |
| Clay, red, gummy | 8 | 62 |
| Sand, medium- to coarse-grained | 5 | 67 |
| Gumbo | 5 | 72 |
| Clay, gummy | 11 | 83 |
| Clay, red, gummy | 15 | 98 |
| Sand, medium- to coarse-grained | 41 | 139 |
| Sand, fine- to medium-grained, and streak of rock | 5 | 144 |
| Sand, fine- to medium-grained | 2 | 146 |
| Clay, gummy | 3 | 149 |
| Sand, medium- to coarse-grained | 15 | 164 |
| Sand, medium- to coarse-grained, and thin streaks of clay and rock | 21 | 185 |
| Sand, white, fine-grained | 9 | 194 |
| Clay, hard, gummy | 5 | 199 |
| Sand, medium- to coarse-grained, hard, packed | 6 | 205 |
| Sand, fine- to medium-grained, hard, packed, and streaks of rock | 11 | 216 |
| Gumbo, hard, gummy | 10 | 226 |
| Gumbo, and streaks of rock | 15 | 241 |

Table 4.—*Chemical analyses of water from wells and springs in Hale County*

*Well numbers correspond to those on plate 2 and in table 2 and 3.*
Water-bearing unit: Kl, Lower Cretaceous Series(?); Kck, Coker Formation; Kg, Gordo Formation; Ke, Eutaw Formation; Qt, terrace deposits; Qal, alluvium.

| Number | Well owner | Date of collection | Water-bearing unit | Well depth (feet) | Milligrams per liter | | | | | | | | | | | | | Hardness as $CaCO_3$ | | Specific conductance (micromhos at 25° C) | pH | Temperature | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Carbonate ($CO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids (calculated) | Calcium, magnesium | Noncarbonate | | | °C | °F |
| [1] A-1 | John Hopkins | 1-16-61 | Kg | 28.2 | ..... | ..... | .... | .... | ..... | .... | ..... | ..... | .... | 4 | ..... | ..... | ..... | 50 | ..... | ..... | 6.7 | 17 | 62 |
| [1] A-2 | U.S. Forest Service | 9-13-57 | Kck | 193 | ..... | ..... | .... | .... | ..... | .... | ..... | ..... | .... | 10 | ..... | ..... | ..... | 20 | ..... | ..... | 6.1 | ... | ... |
| [1] A-3 | Ruby Johnson | 1-16-61 | Kg | 46.3 | ..... | ..... | .... | .... | ..... | .... | ..... | ..... | .... | 60 | ..... | ..... | ..... | 40 | ..... | ..... | ... | ... | ... |
| [1] B-1 | Paul Griffin | 1-13-61 | Kg | 28.0 | ..... | ..... | .... | .... | ..... | .... | ..... | ..... | .... | 70 | ..... | ..... | ..... | 20 | ..... | ..... | 6.8 | ... | ... |
| [1] B-2 | Venoy Terry | 9-10-57 | Kck | 160 | ..... | 0.50 | .... | .... | ..... | .... | ..... | ..... | .... | 20 | ..... | ..... | ..... | 50 | ..... | ..... | 6.2 | ... | ... |
| [1] B-3 | Robert McCray | 9- 9-57 | Kg | Spring | ..... | ..... | .... | .... | ..... | .... | ..... | ..... | .... | 20 | ..... | ..... | ..... | 30 | ..... | ..... | 6.3 | 20 | 68 |
| B-4 | Otis Davis | 12- 4-63 | Kck | 97 | ..... | .81 | .... | .... | ..... | .... | 11 | 0 | .... | 2.0 | ..... | ..... | ..... | 11 | 2 | ..... | 6.0 | ... | ... |
| [1] B-5 | ....do | 9-10-57 | Kck | 504 | ..... | ..... | .... | .... | ..... | .... | ..... | ..... | .... | 10 | ..... | ..... | ..... | 110 | ..... | ..... | 6.1 | 20 | 68 |
| [1] B-6 | Raymond and Earl Sims | 9-11-57 | Kck | 350 | ..... | ..... | .... | .... | ..... | .... | ..... | ..... | .... | 10 | ..... | ..... | ..... | 30 | ..... | ..... | 6.8 | 20 | 68 |
| [1] B-7 | R. F. Lewis | 9-12-57 | Kck | 495 | ..... | ..... | .... | .... | ..... | .... | ..... | ..... | .... | 10 | ..... | ..... | ..... | 100 | ..... | ..... | 6.5 | 20 | 68 |
| [1] B-8 | Miss Lettice Howell | 9-12-57 | Qt, Kg | 80 | ..... | .44 | .... | .... | ..... | .... | ..... | ..... | .... | 10 | ..... | ..... | ..... | 100 | ..... | ..... | 6.7 | ... | ... |
| [1] B-9 | ....do | 9-12-57 | Kck | 210 | ..... | .11 | .... | .... | ..... | .... | ..... | ..... | .... | 10 | ..... | ..... | ..... | 10 | ..... | ..... | 7.6 | ... | ... |
| [1] B-10 | Wallace Davis | 9-10-57 | Kck | 417 | ..... | ..... | .... | .... | ..... | .... | ..... | ..... | .... | 10 | ..... | ..... | ..... | 40 | ..... | ..... | 6.7 | ... | ... |
| [1] B-11 | Rufus Kelly | 9-10-57 | Kck | 105 | ..... | .12 | .... | .... | ..... | .... | ..... | ..... | .... | 10 | ..... | ..... | ..... | 120 | ..... | ..... | 6.5 | ... | ... |
| [1] B-12 | A. S. Wilson | 1-13-61 | Kg | 29 | ..... | ..... | .... | .... | ..... | .... | ..... | ..... | .... | 40 | ..... | ..... | ..... | 20 | ..... | ..... | ... | ... | ... |
| [1] B-13 | A. D. Rogers | 9-10-57 | Kg | 135 | ..... | .20 | .... | .... | ..... | .... | ..... | ..... | .... | 20 | ..... | ..... | ..... | 10 | ..... | ..... | 7.0 | ... | ... |
| [1] B-14 | Lewis King | 1-12-61 | Kg | 25 | ..... | ..... | .... | .... | ..... | .... | ..... | ..... | .... | 20 | ..... | ..... | ..... | 10 | ..... | ..... | 7.4 | ... | ... |
| [1] B-15 | Mrs. D. E. Sims | 9-10-57 | Kg | 78 | ..... | ..... | .... | .... | ..... | .... | ..... | ..... | .... | 10 | ..... | ..... | ..... | 30 | ..... | ..... | 7.0 | ... | ... |
| [1] B-16 | James Johnson | 9-11-57 | Kck | 103 | ..... | .88 | .... | .... | ..... | .... | ..... | ..... | .... | 10 | ..... | ..... | ..... | 30 | ..... | ..... | 6.8 | 19 | 67 |
| [1] B-17 | Kulkie Carolton | 1-13-61 | Kg | 30 | ..... | ..... | .... | .... | ..... | .... | ..... | ..... | .... | 20 | ..... | ..... | ..... | 50 | ..... | ..... | 6.1 | ... | ... |
| [1] B-18 | Porter Hill | 9-12-57 | Kg | 86 | ..... | ..... | .... | .... | ..... | .... | ..... | ..... | .... | 20 | ..... | ..... | ..... | 10 | ..... | ..... | 7.7 | ... | ... |
| [1] B-19 | Nehema Catos | 1-13-61 | Kg | 42 | ..... | ..... | .... | .... | ..... | .... | ..... | ..... | .... | 30 | ..... | ..... | ..... | 30 | ..... | ..... | ... | ... | ... |
| C-1 | Mound State Park | 3-25-63 | Kck | 515 | ..... | ..... | .... | .... | ..... | .... | 110 | 2 | .... | 460 | ..... | ..... | ..... | 285 | 191 | ..... | 8.4 | 20 | 68 |
| [1] C-2 | W. F. Wiggins | 1- 4-61 | Kck | 400 | ..... | .73 | .... | .... | ..... | .... | ..... | ..... | .... | 50 | ..... | ..... | ..... | 100 | ..... | ..... | 6.7 | 19 | 66 |
| C-3 | City of Moundville | 9- 9-60 | Kck | 463 | ..... | ..... | 24 | 5.8 | [2] 3.4 | .... | 106 | 0 | 5.2 | 2.0 | 0.2 | 0.0 | ..... | 84 | 0 | 183 | 7.9 | ... | ... |
| C-3 | ....do | 12-12-63 | Kck | 463 | ..... | .96 | .... | .... | ..... | .... | 108 | 0 | .... | 2.0 | ..... | ..... | ..... | 86 | 0 | ..... | 7.7 | ... | ... |
| C-4 | ....do | 9- 9-60 | Kck | 428 | ..... | ..... | 24 | 5.1 | [2] 2.4 | .... | 108 | 0 | .8 | 1.5 | .1 | .1 | ..... | 81 | 0 | 175 | 8.0 | ... | ... |
| C-4 | ....do | 12-12-63 | Kck | 428 | ..... | 1.1 | .... | .... | ..... | .... | 106 | 0 | .... | 1.0 | ..... | ..... | ..... | 88 | 1 | ..... | 7.8 | ... | ... |
| [1] C-5 | W. F. Wiggins | 1- 4-61 | Kck | ..... | ..... | ..... | .... | .... | ..... | .... | ..... | ..... | .... | 50 | ..... | ..... | ..... | 70 | ..... | ..... | 7.2 | ... | ... |
| C-6 | Allen Acres, Inc. | 12-12-63 | Kck | 300 | ..... | .78 | .... | .... | ..... | .... | 107 | 0 | .... | 517 | ..... | ..... | ..... | 270 | 182 | ..... | 7.0 | 18 | 65 |
| C-7 | Stella Wilson | 12-12-63 | Kck | 417 | ..... | .06 | .... | .... | ..... | .... | 115 | 0 | .... | 24 | ..... | ..... | ..... | 59 | 0 | ..... | 7.3 | 18 | 65 |
| C-8 | ....do | 12-12-63 | Kck | 355 | ..... | .09 | .... | .... | ..... | .... | 109 | 0 | .... | 124 | ..... | ..... | ..... | 120 | 31 | ..... | 7.3 | 18 | 64 |
| C-9 | U.S. Corps of Engineers | 12-12-63 | Kck | ..... | ..... | 1.4 | .... | .... | ..... | .... | 109 | 0 | .... | 292 | ..... | ..... | ..... | 190 | 101 | ..... | 7.6 | 18 | 65 |
| [1] C-10 | Horn Brothers | 1-11-61 | Kck | ..... | ..... | ..... | .... | .... | ..... | .... | ..... | ..... | .... | 410 | ..... | ..... | ..... | 150 | ..... | ..... | 7.2 | 19 | 67 |
| [1] C-11 | J. Tom Perry | 1-11-61 | Kck | 400 | ..... | .41 | .... | .... | ..... | .... | ..... | ..... | .... | 4 | ..... | ..... | ..... | 70 | ..... | ..... | 7.4 | 19 | 67 |
| [1] C-12 | J. L. Tidmore, Jr. | 12-12-63 | Qt | 40 | ..... | .20 | .... | .... | ..... | .... | ..... | ..... | .... | 4 | ..... | ..... | ..... | 10 | ..... | ..... | 7.3 | ... | ... |
| [1] C-13 | W. O. Chandler | 1-11-61 | Kck | 470 | ..... | ..... | .... | .... | ..... | .... | ..... | ..... | .... | 10 | ..... | ..... | ..... | 90 | ..... | ..... | 7.4 | 19 | 66 |
| C-14 | Roy Davis | 12-12-63 | Kck | 260 | ..... | 1.2 | .... | .... | ..... | .... | 21 | 0 | .... | 2.0 | ..... | ..... | ..... | 12 | 0 | ..... | 6.7 | ... | ... |
| [1] C-15 | John Bedsoe | 1-11-61 | Kck | 560 | ..... | ..... | .... | .... | ..... | .... | ..... | ..... | .... | 110 | ..... | ..... | ..... | 110 | ..... | ..... | 7.8 | 20 | 68 |
| C-16 | Andrew Taylor | 12-12-63 | Kck | 440 | ..... | .51 | .... | .... | ..... | .... | 113 | 0 | .... | 530 | ..... | ..... | ..... | 308 | 215 | ..... | 7.2 | 19 | 66 |
| C-17 | ....do | 1-12-61 | Kg, Kck | 250 | ..... | .27 | .... | .... | ..... | .... | 115 | 0 | .... | 478 | ..... | ..... | ..... | 232 | 138 | ..... | 7.4 | 18 | 65 |
| [1] C-18 | ....do | 1-12-61 | Kck | 450 | ..... | ..... | .... | .... | ..... | .... | ..... | ..... | .... | 270 | ..... | ..... | ..... | 280 | ..... | ..... | 7.4 | 19 | 67 |
| [1] C-19 | Olin L. Owens | 1-12-61 | Kck | 500 | ..... | ..... | .... | .... | ..... | .... | ..... | ..... | .... | 310 | ..... | ..... | ..... | 190 | ..... | ..... | 6.6 | 19 | 67 |
| [1] C-20 | Ebert Sludge | 1-13-61 | Kck | 450 | ..... | ..... | .... | .... | ..... | .... | ..... | ..... | .... | 10 | ..... | ..... | ..... | 90 | ..... | ..... | 6.5 | 20 | 68 |
| [1] C-21 | Guinea-Rosenwald School | 1-13-61 | Qt | ..... | ..... | .62 | .... | .... | ..... | .... | ..... | ..... | .... | 10 | ..... | ..... | ..... | 10 | ..... | ..... | 6.1 | ... | ... |
| [1] C-23 | Andrew Taylor | 1-12-61 | Kck | 400 | ..... | .30 | .... | .... | ..... | .... | ..... | ..... | .... | 500 | ..... | ..... | ..... | 200 | ..... | ..... | 5.9 | 19 | 66 |
| C-24 | Osmone Coleman | 12- 5-63 | Kg | 120 | ..... | .33 | .... | .... | ..... | .... | 11 | 0 | .... | 1.0 | ..... | ..... | ..... | 10 | 1 | ..... | 5.7 | ... | ... |
| [1] E-1 | U.S. Corps of Engineers | 12-20-60 | ..... | ..... | ..... | .06 | .... | .... | ..... | .... | ..... | ..... | .... | 1,520 | ..... | ..... | ..... | 50 | ..... | ..... | 7.2 | 19 | 66 |
| [1] E-2 | W. B. Morrow | 12-20-60 | Qal, Kg | 46 | ..... | ..... | .... | .... | ..... | .... | ..... | ..... | .... | 30 | ..... | ..... | ..... | 20 | ..... | ..... | 6.7 | 17 | 62 |

Table 5.—*Chemical analysis of water from streams in Hale County*

(Station numbers correspond with those on plate 3.)

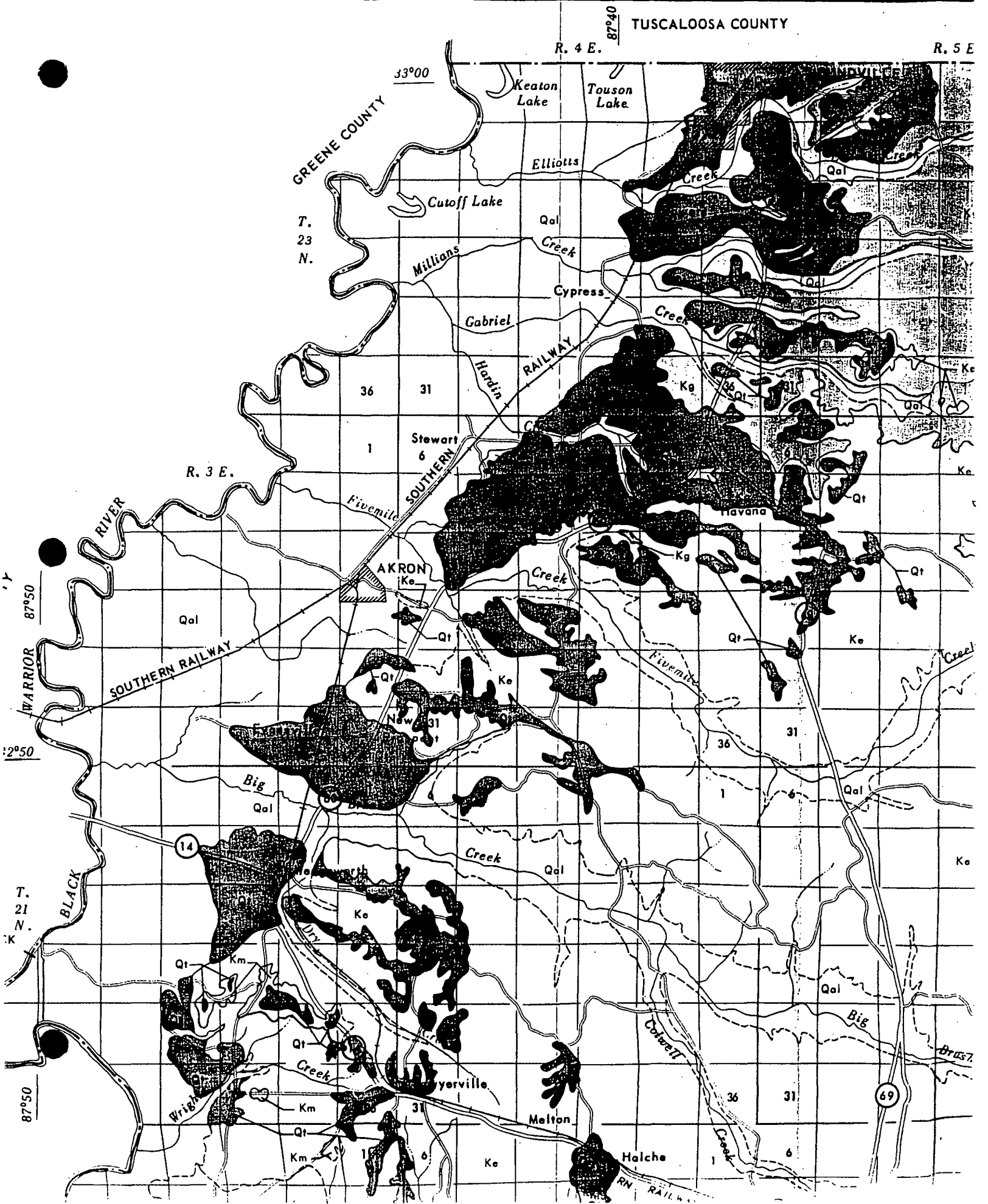
| Number | Stream name | Date of collection | Stream discharge (mgd) | Milligrams per liter: Bicarbonate ($HCO_3$) | Carbonate ($CO_3$) | Chloride (Cl) | Hardness as $CaCO_3$: Calcium, magnesium | Hardness as $CaCO_3$: Noncarbonate | Specific conductance (micromhos at 25° C) | pH | Temperature °C | Temperature °F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2-4654.93 | Elliotts Creek near Moundville. | 2- 4-66 | [1] 15.1 | 8 | 0 | 3.4 | 15 | 8 | ..... | 7.5 | 4 | 39 |
| | | 2- 8-67 | 29.5 | 6 | 0 | 1.8 | 5 | 0 | 21 | 6.5 | 4 | 39 |
| | | 4- 6-67 | 9.6 | 12 | 0 | 2.2 | 10 | 0 | 27 | 7.3 | 22 | 72 |
| | | 10-24-67 | 7.8 | 12 | 0 | 2.2 | 8 | 0 | 24 | 7.0 | 16 | 61 |
| 2-4654.94 | Elliotts Creek below Moundville Sewage Lagoon. | 2- 4-66 | 15.1 | 8 | 0 | 3.6 | 12 | 5 | ..... | 7.6 | 4 | 39 |
| 2-4654.95 | Gabriel Creek near Moundville. | 10-24-67 | 7.1 | 11 | 0 | 2.2 | 6 | 0 | 28 | 6.4 | 17 | 62 |
| 2-4654.96 | Whatley Branch near Moundville. | 11-26-65 | .9 | 14 | 0 | 5.4 | 15 | 4 | 35 | 7.4 | 18 | 65 |
| | | 1- 4-66 | 1.6 | 10 | 0 | 5.4 | 20 | 12 | 35 | 7.3 | 12 | 53 |
| | | 2-12-66 | 147 | 3 | 0 | .6 | 6 | 4 | 14 | 6.8 | 14 | 57 |
| | | 3-31-66 | 1.9 | 0 | 0 | 4.8 | 9 | 2 | 24 | 7.5 | 16 | 61 |
| | | 5-23-66 | 1.4 | 12 | 0 | 2.4 | 15 | 5 | 28 | 7.4 | 22 | 71 |
| | | 7-10-66 | .3 | 12 | 0 | 3.8 | 12 | 2 | 30 | 7.5 | 28 | 82 |
| 2-4655.00 | Fivemile Creek near Greensboro. | 11-26-65 | 12.6 | 8 | 0 | 6.4 | 8 | 1 | 32 | 6.3 | 14 | 58 |
| | | 1- 4-66 | 68.5 | 8 | 0 | 5.4 | 18 | 11 | 30 | 7.3 | 12 | 53 |
| | | 3- 7-66 | 115 | 4 | 0 | 2.6 | 5 | 0 | 21 | 6.1 | 9 | 48 |
| | | 4-22-66 | 62.1 | 10 | 0 | 2.4 | 10 | 2 | 28 | 6.2 | 20 | 68 |
| | | 6- 8-66 | 4.6 | 10 | 0 | 2.8 | 18 | 10 | 30 | 7.3 | 23 | 74 |
| | | 7-13-66 | 2.6 | 19 | 0 | 2.2 | 18 | 2 | 40 | 7.5 | 26 | 79 |
| | | 8- 5-66 | 7.3 | 12 | 0 | 1.6 | 15 | 5 | 32 | 7.1 | 24 | 76 |
| | | 11-18-66 | 17.2 | 10 | 0 | 2.0 | 12 | 4 | 29 | 6.9 | 12 | 54 |
| | | 12-27-66 | 18.2 | 8 | 0 | 2.8 | 10 | 3 | 25 | 6.8 | 5 | 41 |
| | | 4- 6-67 | 15.5 | 14 | 0 | 3.0 | 12 | 1 | 36 | 7.2 | 22 | 71 |
| | | 10-24-67 | 4.5 | 13 | 0 | 2.4 | 10 | 0 | 35 | 6.2 | 16 | 60 |
| 2-4659.00 | Big Brush Creek near Greensboro. | 2- 9-67 | 127 | 10 | 0 | 4.4 | 10 | 2 | 42 | 6.3 | 4 | 40 |
| | | 4- 6-67 | 21.6 | 22 | 0 | 3.6 | 15 | 0 | 49 | 7.4 | 19 | 66 |
| | | 10-24-67 | 1.8 | 28 | 0 | 3.0 | 24 | 1 | 65 | 6.9 | 14 | 58 |
| 2-4659.44 | Big Brush Creek above Dry Creek near Wedgeworth. | 4- 5-67 | 42.1 | 22 | 0 | 4.0 | 18 | 0 | 57 | 7.4 | 19 | 66 |
| | | 10-24-67 | 5.6 | 36 | 0 | 6.6 | 26 | 0 | 93 | 6.9 | 17 | 62 |
| 2-4659.49 | Dry Creek near Akron. | 4- 5-67 | 3.2 | 32 | 0 | 920 | 302 | 276 | 2,920 | 7.1 | 19 | 67 |
| | | 10-24-67 | 1.4 | 89 | 0 | 2,230 | 761 | 688 | 7,530 | 7.2 | 20 | 68 |
| 2-4659.50 | Big Brush Creek near Wedgeworth. | 2- 9-67 | 198 | 8 | 0 | 15 | 15 | 8 | 72 | 6.3 | 6 | 42 |
| | | 4- 5-67 | 42.1 | 22 | 0 | 62 | 38 | 20 | 253 | 7.3 | 19 | 66 |
| | | 10-24-67 | 7.1 | 45 | 0 | 460 | 185 | 148 | 1,730 | 7.0 | 17 | 62 |
| 2-4660.00 | Black Warrior River near Eutaw. | 2- 9-67 | [2] 7,110 | 22 | 0 | 6.4 | 40 | 22 | 133 | 6.7 | ... | ... |
| | | 4- 5-67 | [2] 1,940 | 24 | 0 | 8.0 | 35 | 15 | 121 | 7.0 | 20 | 68 |
| | | 10-24-67 | [2] 1,940 | 26 | 0 | 10 | 48 | 27 | 179 | 7.0 | 20 | 68 |
| 2-4665.00 | Big Prairie Creek near Gallion. | 2- 9-67 | 146 | 128 | 0 | 5.2 | 128 | 23 | 259 | 7.6 | 6 | 43 |
| | | 4- 3-67 | 23.5 | 156 | 0 | 7.2 | 135 | 7 | 298 | 8.1 | 22 | 72 |
| | | 10-24-67 | 4.4 | 178 | 0 | 9.2 | 129 | 0 | 351 | 7.5 | 15 | 59 |
| 2-4666.00 | Little Prairie Creek near Newbern. | 2- 9-67 | 9.6 | 148 | 0 | 9.4 | 135 | 14 | 296 | 7.3 | 5 | 41 |
| | | 4- 5-67 | 1.8 | 146 | 0 | 10 | 122 | 2 | 300 | 7.9 | 25 | 77 |
| | | 10-24-67 | .9 | 134 | 0 | 8.6 | 81 | 0 | 282 | 8.0 | 17 | 63 |
| 2-4668.00 | Big German Creek near Greensboro. | 2- 9-67 | 14.5 | 98 | 0 | 5.8 | 90 | 10 | 200 | 7.1 | 6 | 43 |
| | | 4- 5-67 | 4.7 | 104 | 0 | 5.4 | 85 | 0 | 200 | 8.1 | 22 | 71 |
| | | 10-24-67 | 1.9 | 118 | 0 | 5.6 | 91 | 0 | 234 | 7.5 | 16 | 61 |

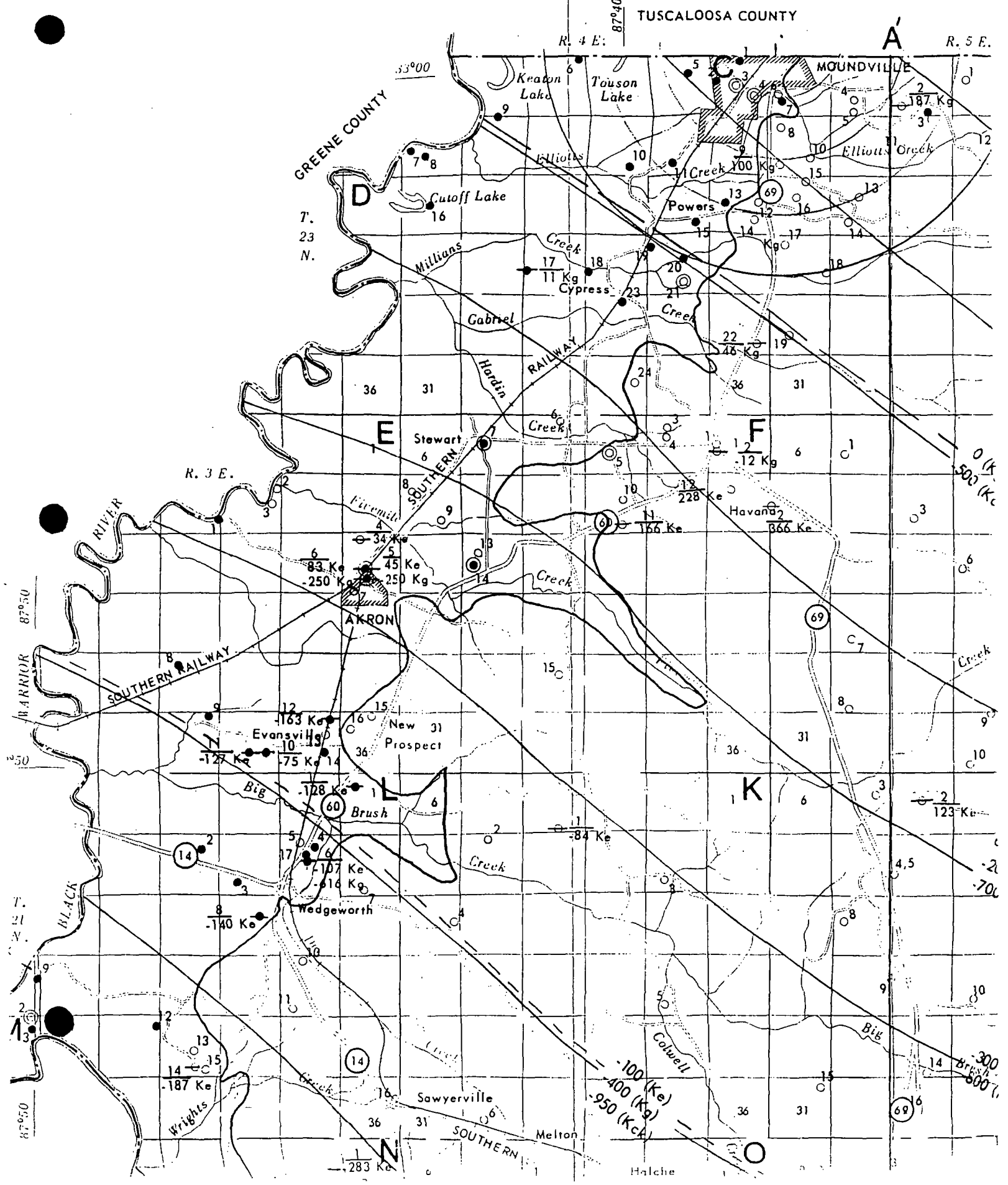
[1] Measured discharge for Elliotts Creek below Moundville sewage lagoon.
[2] Estimated.

Table 6.—*Evaluation of potential water supplies at selected locations in Hale County*

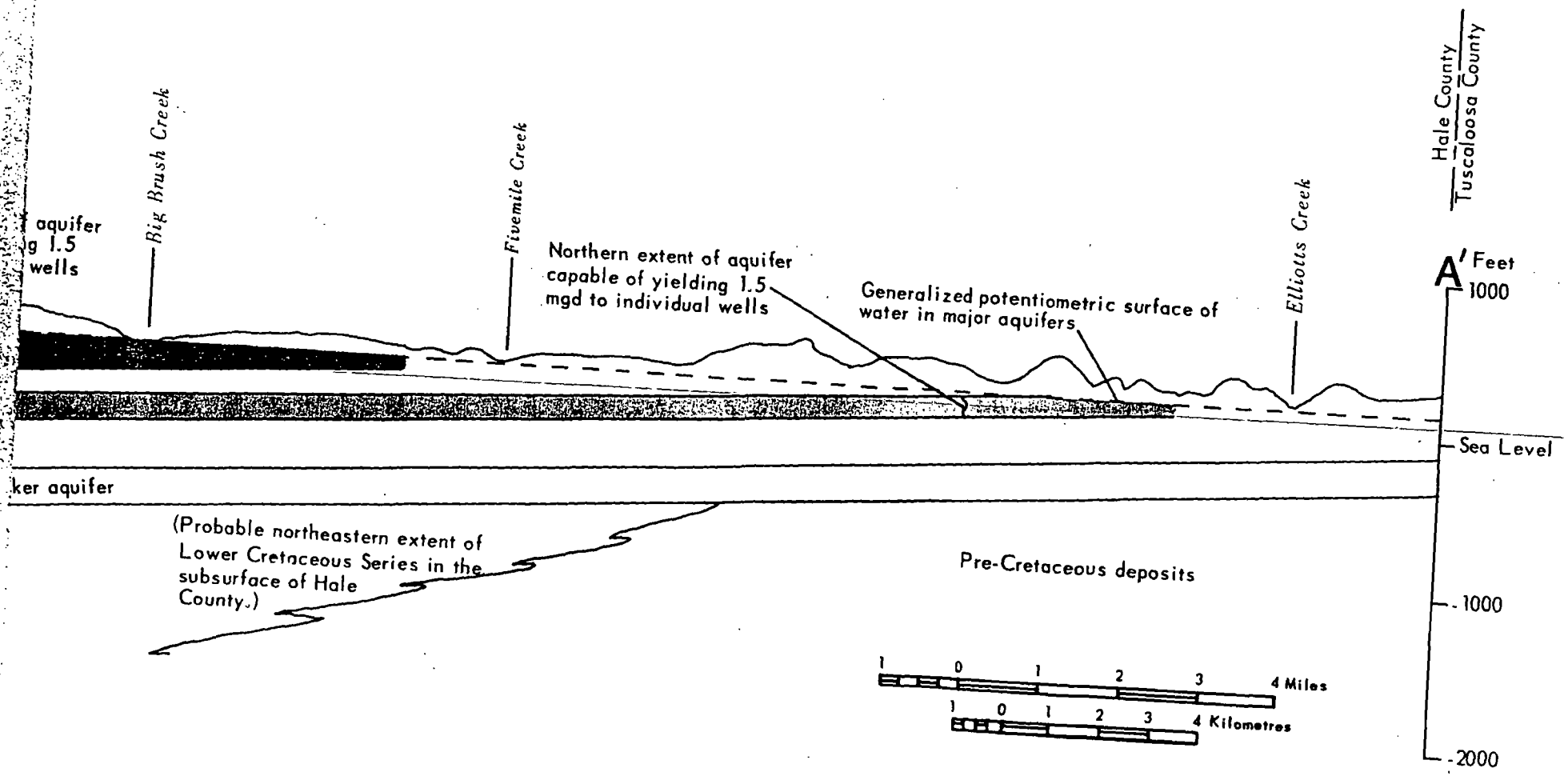
| Location | Altitude (feet above mean sea level) | Ground water: Principal water-bearing unit | Ground water: Depth below land surface to base of principal water-bearing unit (feet) | Ground water: Quantity available per well (mgd) | Ground water: Quality of water | Surface water: Stream | Surface water: Approximate distance from location (miles) | Surface water: Average streamflow (mgd) | Surface water: 7-day $Q_2$ (mgd) | Surface water: Quality of water |
|---|---|---|---|---|---|---|---|---|---|---|
| Moundville | 165 | Coker | 550 | 1.5 | Moderately hard; iron content may exceed 0.3 mg/l. | Elliotts Creek | 0 | 25 | 6.5 | Soft; mineral content low. |
| | | | | | | Black Warrior River | 5 | 5,230 | [1]..... | Soft; mineral content low. |
| | | Eutaw | 110 | .1 | Soft, iron content may exceed 0.3 mg/l. | Fivemile Creek | 1 | 83 | 3.2 | Soft; mineral content low; iron content may exceed 0.3 mg/l at times. |
| Akron | 135 | Gordo | 410 | 1.5 | Soft; iron content may exceed 0.3 mg/l. | Black Warrior River | 2 | 5,550 | [1]..... | Soft; mineral content low. |
| | | Coker | 910 | 1.5 | Soft; low mineral content. | | | | | |
| | | Eutaw | 420 | 1.5 | Moderately hard; iron content may exceed 0.3 mg/l. | | | | | |
| Greensboro | 290 | Gordo | 720 | 1.5 | Soft; low mineral content. | Big Brush Creek | 4 | 94 | 1.5 | Soft; mineral content low. |
| | | Coker | 1,270 | 1.5 | Chloride content probably less than 250 mg/l. | | | | | |
| | | Eutaw | 510 | 1.5 | Soft to moderately hard; iron content may exceed 0.3 mg/l. | | | | | |
| Newbern | 210 | Gordo | 860 | 1.5 | Soft; iron content may exceed 0.3 mg/l. | Big Prairie Creek | 2.5 | 50 | Less than 1 | Moderately hard to hard, low mineral content. |
| | | Coker | 1,410 | 1.5 | Chloride content probably less than 250 mg/l. | | | | | |
| | | Eutaw | 840 | 1.5 | Soft; no iron problem. | | | | | |
| Prairieville | 170 | Gordo | 1,190 | 1.5 | May be hard to very hard; iron content may exceed 0.3 mg/l. | Big Prairie Creek | 2.5 | 143 | 1.6 | Moderately hard to hard; low mineral content. |
| | | Coker | 1,790 | 1.5 | Chloride content probably less than 250 mg/l. | | | | | |
| | | Eutaw | 270 | 1.5 | Soft; iron content may exceed 0.3 mg/l. | Big Brush Creek | 1.5 | 154 | 3.3 | Soft to very hard; mineral content of water affected by flowing salt-water well discharging into Dry Creek near Wedgeworth. |
| Wedgeworth | 130 | Gordo | 570 | 1.5 | May be hard to very hard; iron content may exceed 0.3 mg/l. | | | | | |
| | | Coker | 1,120 | 1.5 | Soft to moderately hard; no iron problem. | Black Warrior River | 3.5 | 5,800 | [1]350 | Soft; low mineral content. |
| | | Gordo | 420 | 1.0 | Soft to very hard; iron content may exceed 0.3 mg/l. | | | | | |
| Hogglesville | 370 | | | | | Fivemile Creek | 2 | 31 | 1 | Soft; low mineral content. |
| | | Coker | 920 | 1.5 | Soft to moderately hard; iron content may exceed 0.3 mg/l. | | | | | |
| | | Eutaw | 530 | 1.5 | Soft; no iron problem. | Big German Creek | .7 | 24 | Less than 1 | Moderately hard; low mineral content. |
| Cedarville | 140 | Gordo | 880 | 1.5 | Soft; iron content may exceed 0.3 mg/l; low mineral content. | Black Warrior River | 5 | 5,970 | [1]..... | Soft; low mineral content. |
| | | Coker | 1,430 | 1.5 | Chloride content probably less than 250 mg/l. | | | | | |

[1] 7-day $Q_2$ affected by controlled regulation.

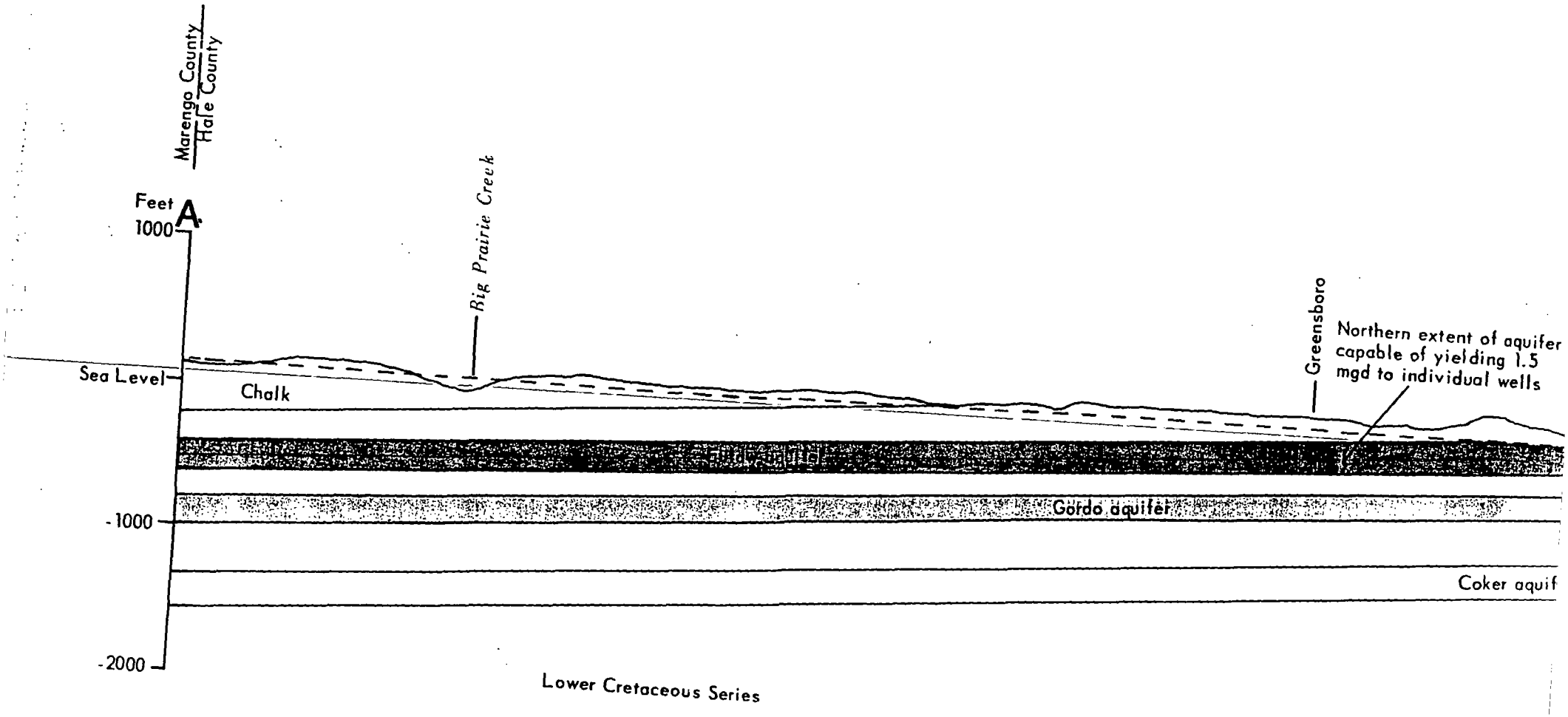

TUSCALOOSA COUNTY
GREENE COUNTY
R. 4 E.
R. 5 E
R. 3 E.
T. 23 N.
T. 21 N.
33°00
87°40
87°50
Keaton Lake
Touson Lake
Elliotts
Creek
Cutoff Lake
Millians
Cypress
Gabriel
Hardin
RAILWAY
SOUTHERN
Stewart
Fivemile
AKRON
Havana
SOUTHERN RAILWAY
WARRIOR
RIVER
BLACK
Big
Dry
Cottrell
Melton
Halche
Qal
Qt
Ke
Kg
Km
36
31
1
6
14
69


TUSCALOOSA COUNTY
GREENE COUNTY
MOUNDVILLE
Keaton Lake
Touson Lake
Elliotts Creek
Cutoff Lake
Powers
Millians Creek
Cypress
Gabriel Creek
Hardin
RAILWAY
SOUTHERN
Stewart
Firemile Creek
Havana
AKRON
SOUTHERN RAILWAY
BLACK WARRIOR RIVER
Evansville
New Prospect
Big Brush Creek
Wedgeworth
Sawyerville
Wrights Creek
Colwell Creek
Melton
Halche
R. 4 E.
R. 5 E.
R. 3 E.
T. 23 N.
T. 21 N.
A
A'
D
E
F
K
L
N
O
-100 (Ke)
-400 (Kg)
-950 (Kc)

MAP 136 PLATE 2

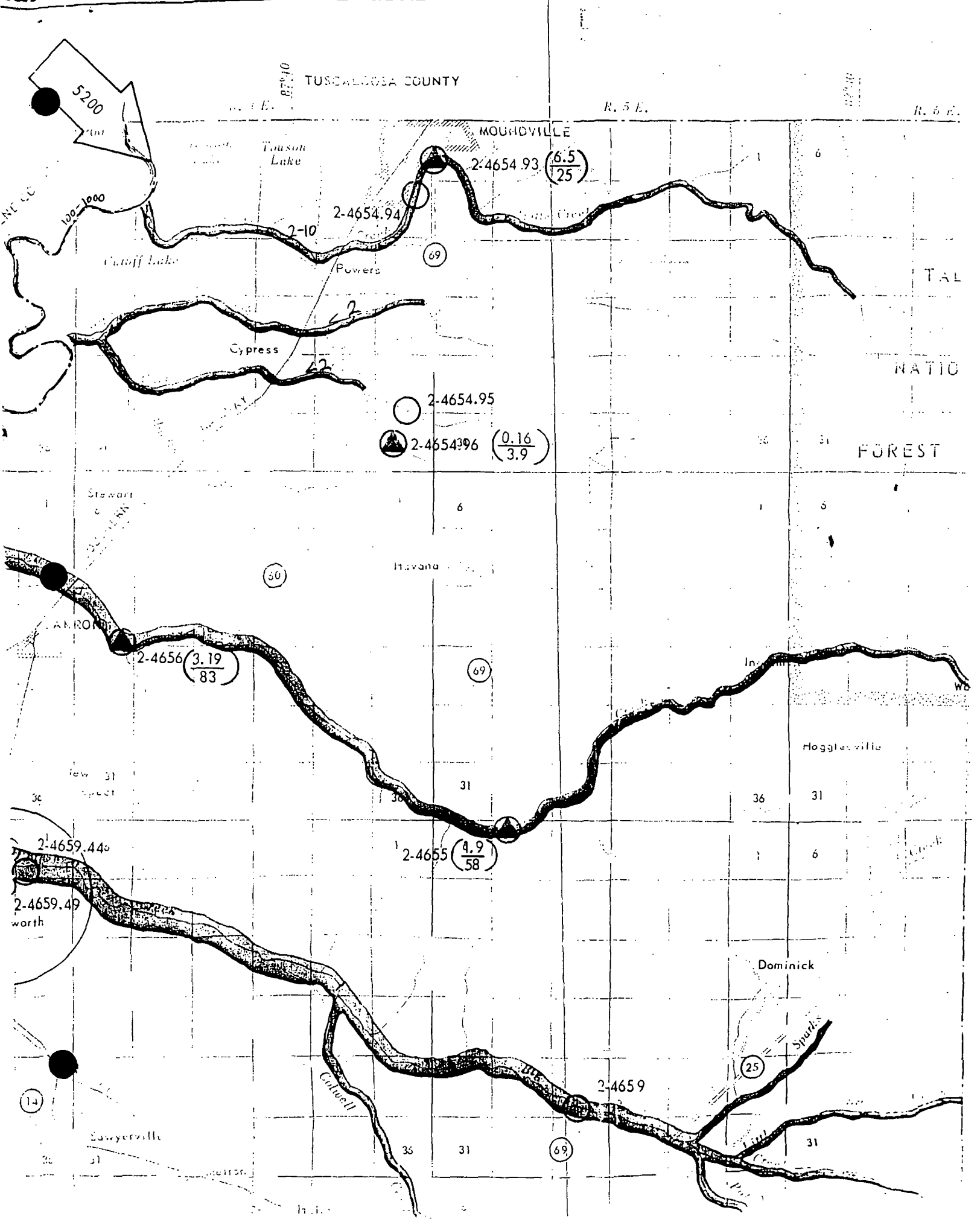



A′, Hale County

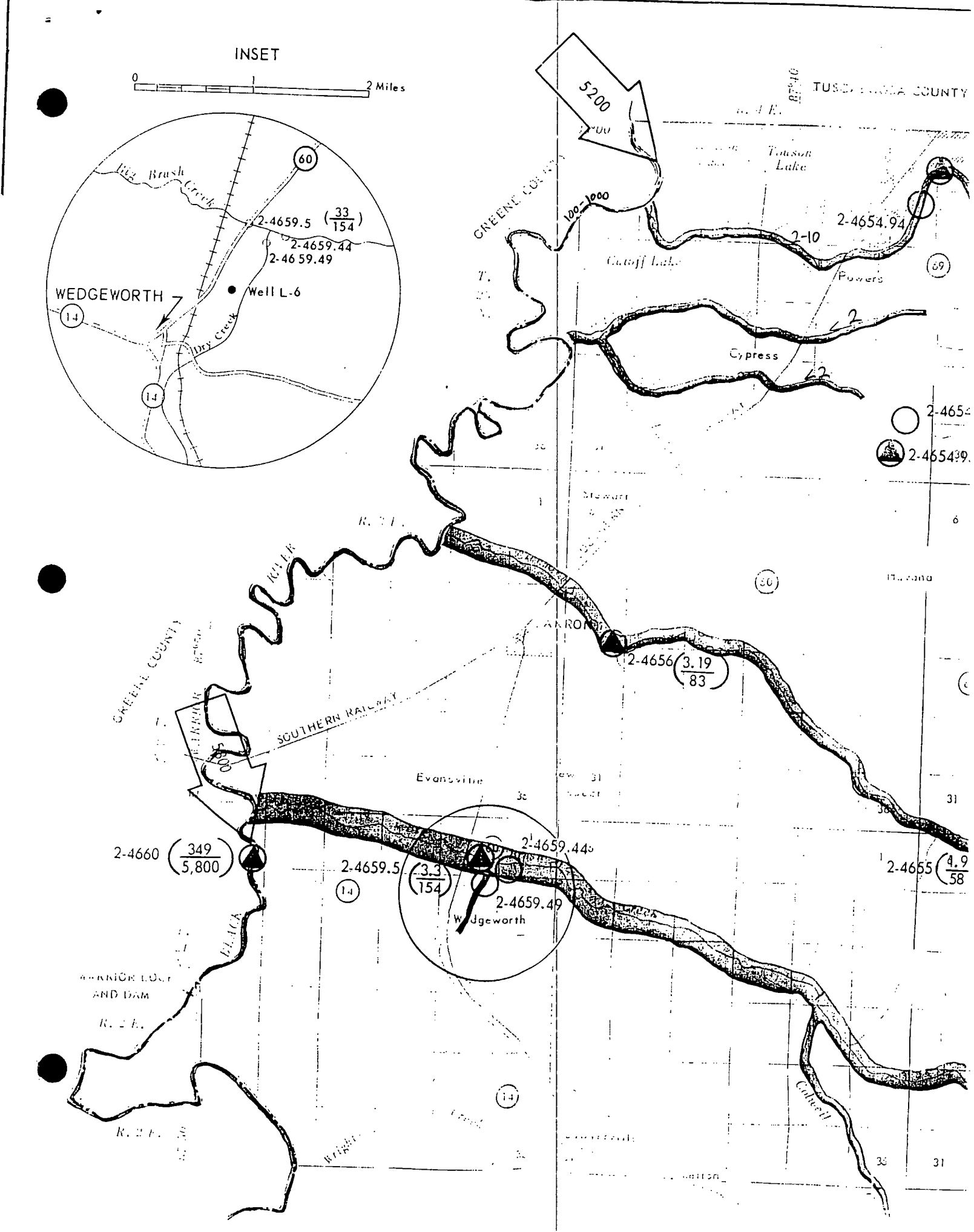


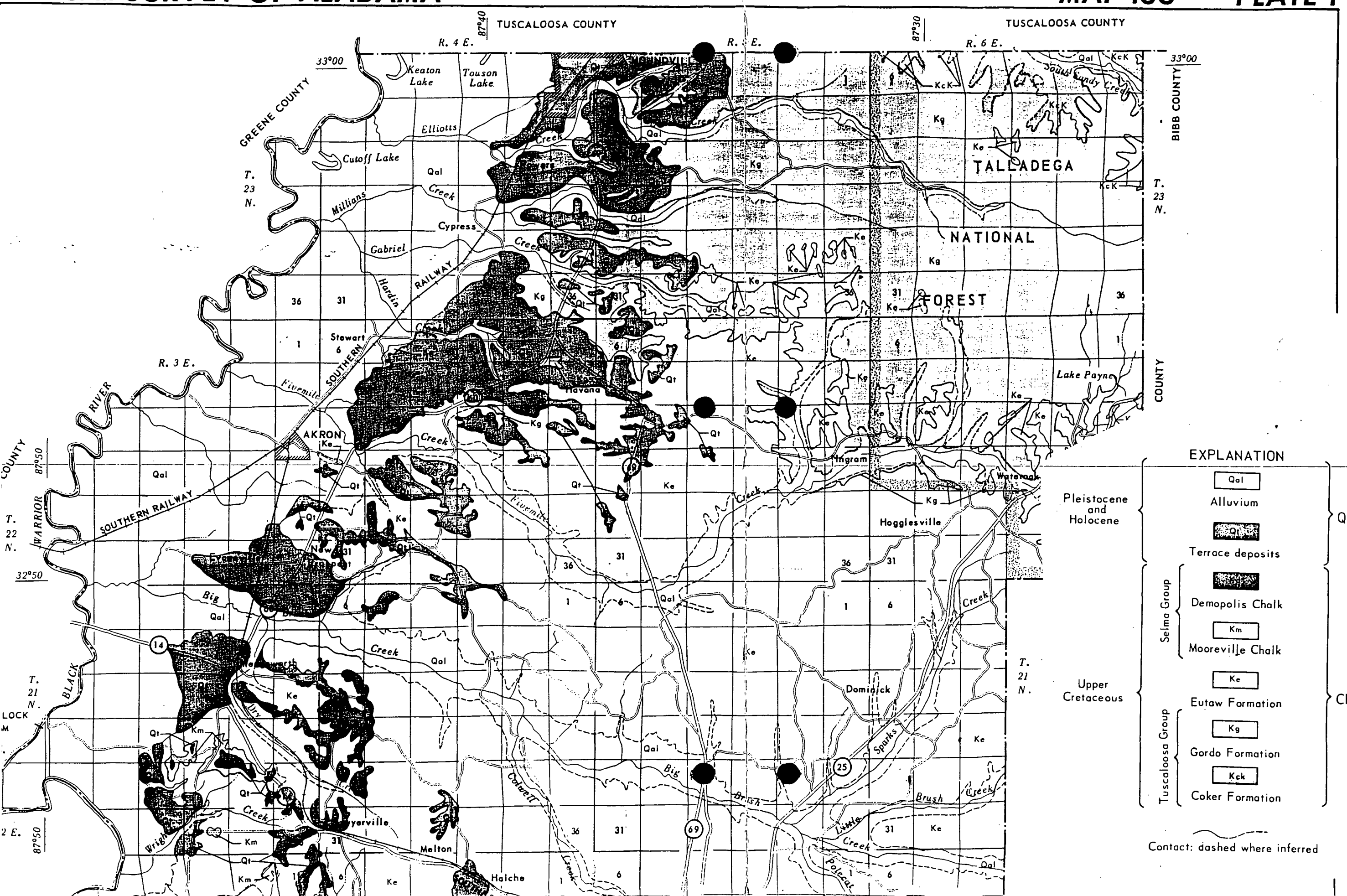

Hydrogeologic section A-A', Hale

# ALABAMA


TUSCALOOSA COUNTY
R. 5 E.
R. 6 E.
MOUNDVILLE
Tauson Lake
2-4654.93 (6.5/25)
2-4654.94
2-10
Cutoff Lake
Powers
Cypress
2-4654.95
2-4654.96 (0.16/3.9)
NATIO
FOREST
Stewart
Havana
2-4656 (3.19/83)
Hoggatsville
2-4655 (4.9/58)
2-4659.44
2-4659.49
Dominick
Sparks
Colwell
2-4659
Sawyerville

# GEOLOGICAL SURVEY OF ALABAMA

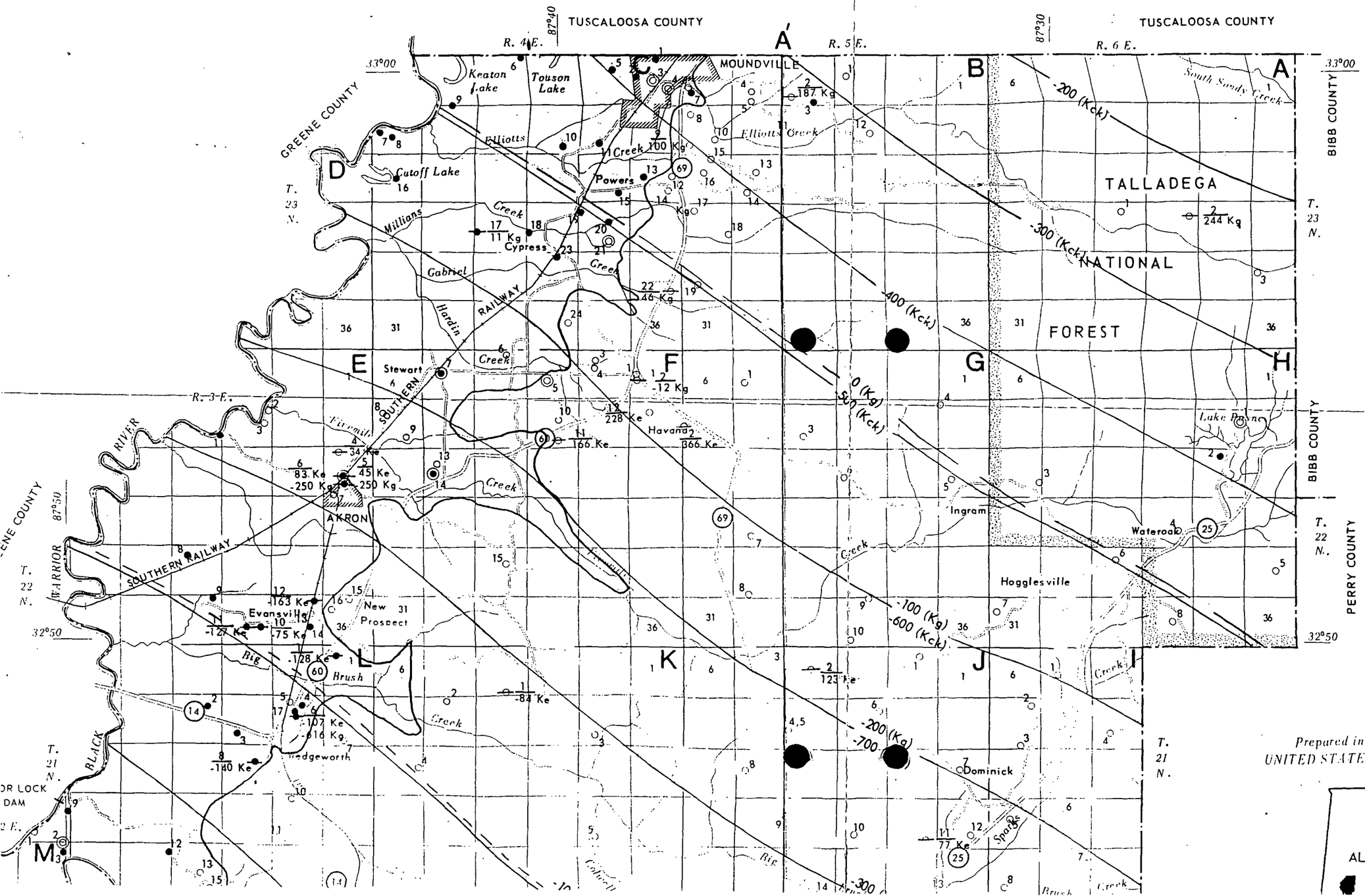





EXPLANATION

| | | | |
|---|---|---|---|
| Pleistocene and Holocene | Qal | Alluvium | QUATERNARY |
| | Qt | Terrace deposits | |
| Upper Cretaceous | Selma Group | Demopolis Chalk | CRETACEOUS |
| | | Km Mooreville Chalk | |
| | Ke | Eutaw Formation | |
| | Tuscaloosa Group | Kg Gordo Formation | |
| | | Kck Coker Formation | |

Contact: dashed where inferred

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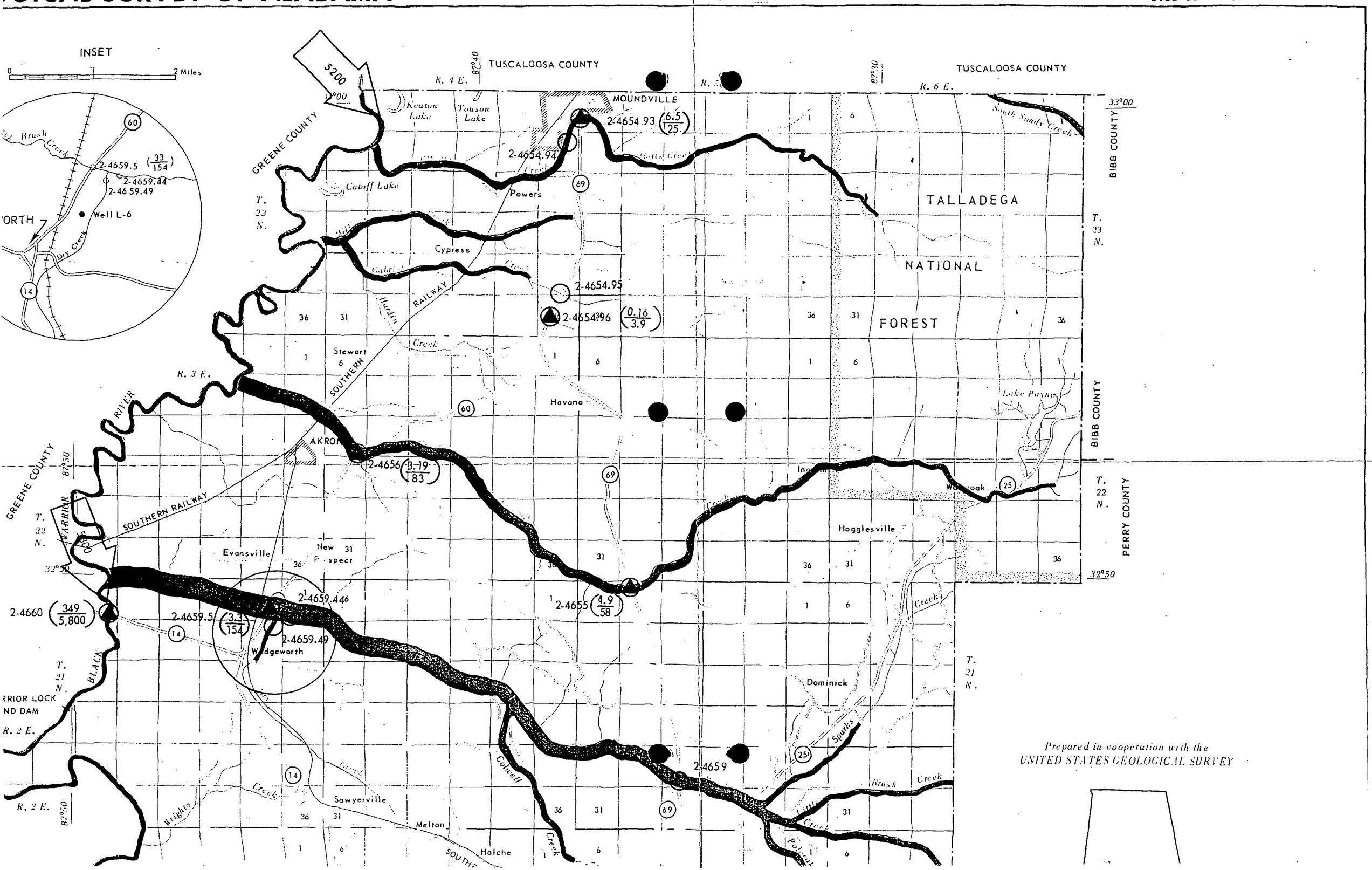
UNITED STATES GEOLOGICAL SURVEY




*Prepared in cooperation with the*
*UNITED STATES GEOLOGICAL SURVEY*

# REFERENCE 10

Alabama School Populations
1992

to get total school populations add:

$\underbrace{\text{total faculty} + \text{total enrollment}}_{A} + \underbrace{\text{total staff}}_{B}$



TOTAL NUMBER OF PUPILS AND FACULTY BY SCHOOL BY COUNTY

| COUNTY | SCHOOL | TOTAL FACULTY | TOTAL ENROLLMENT |
|---|---|---|---|
| AUTAUGA COUNTY | AUTAUGA COUNTY ALT SCHOOL | 1 | |
| AUTAUGA COUNTY | AUTAUGAVILLE ELEMENTARY SCH | 23 | 337 |
| AUTAUGA COUNTY | AUTAUGAVILLE HIGH SCHOOL | 22 | 288 |
| AUTAUGA COUNTY | BILLINGSLEY HIGH SCHOOL | 38 | 652 |
| AUTAUGA COUNTY | MARBURY SCHOOL | 36 | 649 |
| AUTAUGA COUNTY | PRATTVILLE ELEMENTARY SCH | 40 | 841 |
| AUTAUGA COUNTY | PRATTVILLE INTERMEDIATE SCH | 41 | 897 |
| AUTAUGA COUNTY | PRATTVILLE JUNIOR HIGH SCH | 43 | 846 |
| AUTAUGA COUNTY | PRATTVILLE KINDERGARTEN SCH | 32 | 483 |
| AUTAUGA COUNTY | PRATTVILLE HIGH SCHOOL | 71 | 1,343 |
| AUTAUGA COUNTY | PRATTVILLE PRIMARY SCHOOL | 52 | 839 |
| BALDWIN COUNTY | BALDWIN COUNTY HIGH SCHOOL | 71 | 1,326 |
| BALDWIN COUNTY | BALDWIN CO REG DETENT CTR | 2 | 11 |
| BALDWIN COUNTY | BAY MINETTE MIDDLE SCHOOL | 55 | 876 |
| BALDWIN COUNTY | BAY MINETTE INTERMEDIATE | 30 | 458 |
| BALDWIN COUNTY | BAY MINETTE ELEMENTARY | 47 | 723 |
| BALDWIN COUNTY | NORTH BALDWIN ALT SCHOOL | 3 | |
| BALDWIN COUNTY | DAPHNE HIGH SCHOOL | 51 | 1,010 |
| BALDWIN COUNTY | DAPHNE MIDDLE SCHOOL | 31 | 536 |
| BALDWIN COUNTY | DAPHNE INTERMEDIATE SCHOOL | 16 | 353 |
| BALDWIN COUNTY | DAPHNE ELEMENTARY SCHOOL | 42 | 705 |
| BALDWIN COUNTY | DELTA ELEMENTARY SCHOOL | 19 | 273 |
| BALDWIN COUNTY | ELBERTA ELEMENTARY SCHOOL | 37 | 605 |
| BALDWIN COUNTY | ELSANOR SCHOOL | 14 | 209 |
| BALDWIN COUNTY | FAIRHOPE MIDDLE SCH | 56 | 913 |
| BALDWIN COUNTY | FAIRHOPE INTERMEDIATE SCH | 38 | 727 |
| BALDWIN COUNTY | FAIRHOPE RESOURCE CENTER | 27 | 452 |
| BALDWIN COUNTY | FAIRHOPE ELEMENTARY | 65 | 952 |
| BALDWIN COUNTY | FOLEY ELEMENTARY | 55 | 768 |
| BALDWIN COUNTY | FOLEY MIDDLE SCHOOL | 34 | 594 |
| BALDWIN COUNTY | FOLEY HIGH SCHOOL | 70 | 1,256 |
| BALDWIN COUNTY | FOLEY INTERMEDIATE | 22 | 353 |
| BALDWIN COUNTY | GULF SHORES MIDDLE SCHOOL | 19 | 343 |
| BALDWIN COUNTY | GULF SHORES ELEMENTARY SCH | 27 | 457 |
| BALDWIN COUNTY | LOXLEY ELEMENTARY | 24 | 317 |
| BALDWIN COUNTY | LOXLEY MIDDLE SCHOOL | 7 | 125 |
| BALDWIN COUNTY | PERDIDO ELEMENTARY SCHOOL | 25 | 402 |
| BALDWIN COUNTY | PINE GROVE ELEMENTARY SCH | 24 | 312 |
| BALDWIN COUNTY | ROBERTSDALE ELEMENTARY SCH | 60 | 891 |
| BALDWIN COUNTY | ROBERTSDALE HIGH SCHOOL | 45 | 806 |
| BALDWIN COUNTY | ROSINTON SCHOOL | 6 | 121 |
| BALDWIN COUNTY | SILVERHILL SCHOOL | 24 | 405 |
| BALDWIN COUNTY | SPANISH FORT SCHOOL | 40 | 716 |
| BALDWIN COUNTY | STAPLETON SCHOOL | 9 | 107 |
| BALDWIN COUNTY | SUMMERDALE ELEMENTARY SCH | 26 | 390 |
| BALDWIN COUNTY | SWIFT CONSOLIDATED ELEM SCH | 7 | 132 |
| BALDWIN COUNTY | VAUGHN SCHOOL | 4 | |
| BARBOUR COUNTY | BAKER HILL SCHOOL | 17 | 247 |

# TOTAL NUMBER OF PUPILS AND FACULTY BY SCHOOL BY COUNTY

| COUNTY | SCHOOL | TOTAL FACULTY | TOTAL ENROLLMENT |
|---|---|---|---|
| GREENE COUNTY | BIRDINE ELEMENTARY SCHOOL | 12 | 170 |
| GREENE COUNTY | EATMAN ELEMENTARY SCHOOL | 12 | 165 |
| GREENE COUNTY | EUTAW HIGH SCHOOL | 32 | 565 |
| GREENE COUNTY | CARVER JUNIOR HIGH SCHOOL | 31 | 553 |
| GREENE COUNTY | PARAMOUNT HIGH SCHOOL | 57 | 881 |
| HALE COUNTY | AKRON COMMUNITY SCHOOL EAST | 17 | 240 |
| HALE COUNTY | AKRON COMMUNITY SCHOOL WEST | 19 | 279 |
| HALE COUNTY | GREENSBORO PUBLIC EAST SCH | 57 | 1,011 |
| HALE COUNTY | GREENSBORO PUBLIC WEST SCH | 49 | 795 |
| HALE COUNTY | HALE COUNTY HIGH SCHOOL | 19 | 353 |
| HALE COUNTY | MOUNDVILLE ELEMENTARY SCH | 28 | 451 |
| HALE COUNTY | SUNSHINE HIGH SCHOOL | 28 | 449 |
| HENRY COUNTY | ABBEVILLE MIDDLE SCHOOL | 21 | 371 |
| HENRY COUNTY | ABBEVILLE ELEMENTARY SCHOOL | 47 | 673 |
| HENRY COUNTY | ABBEVILLE HIGH SCHOOL | 33 | 416 |
| HENRY COUNTY | HEADLAND ELEMENTARY SCHOOL | 40 | 667 |
| HENRY COUNTY | HEADLAND MIDDLE SCHOOL | 19 | 370 |
| HENRY COUNTY | HEADLAND HIGH SCHOOL | 31 | 401 |
| HOUSTON COUNTY | ASHFORD HIGH SCHOOL | 48 | 716 |
| HOUSTON COUNTY | ASHFORD ELEMENTARY SCHOOL | 52 | 714 |
| HOUSTON COUNTY | COTTONWOOD HIGH SCHOOL | 51 | 819 |
| HOUSTON COUNTY | HARMON JUNIOR HIGH SCHOOL | 11 | 102 |
| HOUSTON COUNTY | HOUSTON COUNTY HIGH SCHOOL | 42 | 634 |
| HOUSTON COUNTY | REHOBETH HIGH SCHOOL | 77 | 1,342 |
| HOUSTON COUNTY | WEBB JUNIOR HIGH SCHOOL | 33 | 519 |
| HOUSTON COUNTY | WICKSBURG HIGH SCHOOL | 41 | 666 |
| HOUSTON COUNTY | CARVER MIDDLE SCHOOL | 38 | 616 |
| HOUSTON COUNTY | BEVERLYE MIDDLE SCHOOL | 39 | 626 |
| HOUSTON COUNTY | CLOVERDALE ELEMENTARY SCH | 36 | 470 |
| HOUSTON COUNTY | DOTHAN HIGH SCHOOL | 76 | 1,269 |
| HOUSTON COUNTY | GIRARD AVE ELEMENTARY SCH | 30 | 379 |
| HOUSTON COUNTY | GIRARD MIDDLE SCHOOL | 33 | 538 |
| HOUSTON COUNTY | GRANDVIEW ELEMENTARY SCHOOL | 28 | 411 |
| HOUSTON COUNTY | HEARD ELEMENTARY SCHOOL | 34 | 467 |
| HOUSTON COUNTY | HIGHLANDS ELEMENTARY SCHOOL | 26 | 432 |
| HOUSTON COUNTY | HONEYSUCKLE MIDDLE SCHOOL | 38 | 646 |
| HOUSTON COUNTY | KELLY SPRINGS ELEM SCHOOL | 35 | 499 |
| HOUSTON COUNTY | MONTANA ST ELEMENTARY SCH | 24 | 411 |
| HOUSTON COUNTY | NORTHVIEW HIGH SCHOOL | 80 | 1,458 |
| HOUSTON COUNTY | SELMA ST ELEMENTARY SCHOOL | 33 | 421 |
| HOUSTON COUNTY | SOUTHSIDE ELEMENTARY SCHOOL | 29 | 474 |
| HOUSTON COUNTY | STRINGER ST ELEMENTARY SCH | 28 | 446 |
| HOUSTON COUNTY | WILSON ST ELEMENTARY SCHOOL | 27 | 424 |
| INVALID COUNTY | MT MEIGS CAMPUS - WALLACE | 33 | 234 |
| JACKSON COUNTY | BRIDGEPORT MIDDLE SCHOOL | 12 | 237 |
| JACKSON COUNTY | BRIDGEPORT ELEMENTARY SCH | 17 | 270 |
| JACKSON COUNTY | BRYANT SCHOOL | 14 | 235 |
| JACKSON COUNTY | DUTTON ELEMENTARY SCHOOL | 11 | 197 |

STATE OF ALABAMA - DEPARTMENT OF EDUCATION
LEA PERSONNEL SYSTEM (EDLPT471)

TOTAL NUMBER OF PUPILS AND FACULTY BY SCHOOL BY COUNTY

| COUNTY | SCHOOL | TOTAL FACULTY | TOTAL ENROLLMENT |
|---|---|---|---|
| TALLADEGA COUNT | HAL HENDERSON ELEM SCHOOL | 18 | 302 |
| TALLADEGA COUNT | RAYMOND L YOUNG ELEM SCHOOL | 16 | 273 |
| TALLADEGA COUNT | TALLADEGA HIGH SCHOOL | 68 | 998 |
| TALLADEGA COUNT | ZORA ELLIS JUNIOR HIGH SCH | 36 | 634 |
| TALLADEGA COUNT | DIXON MIDDLE SCHOOL | 15 | 268 |
| TALLAPOOSA COUN | ALEXANDER CITY MIDDLE SCH | 39 | 644 |
| TALLAPOOSA COUN | BENJAMIN RUSSELL HIGH SCH | 66 | 996 |
| TALLAPOOSA COUN | JIM PEARSON SCHOOL | 63 | 924 |
| TALLAPOOSA COUN | NATHANIEL H STEPHENS ELEM | 37 | 574 |
| TALLAPOOSA COUN | WILLIAM L RADNEY ELEM SCH | 33 | 574 |
| TALLAPOOSA COUN | DADEVILLE ELEMENTARY SCHOOL | 48 | 765 |
| TALLAPOOSA COUN | DADEVILLE HIGH SCHOOL | 39 | 662 |
| TALLAPOOSA COUN | EDWARD BELL HIGH SCHOOL | 27 | 336 |
| TALLAPOOSA COUN | HORSESHOE BEND HIGH SCHOOL | 49 | 728 |
| TALLAPOOSA COUN | REELTOWN HIGH SCHOOL | 46 | 751 |
| TUSCALOOSA COUN | HOLT ELEMENTARY SCHOOL | 47 | 697 |
| TUSCALOOSA COUN | BROOKWOOD ELEMENTARY SCHOOL | 48 | 841 |
| TUSCALOOSA COUN | BROOKWOOD HIGH SCHOOL | 59 | 1,008 |
| TUSCALOOSA COUN | BUHL ELEMENTARY SCHOOL | 13 | 178 |
| TUSCALOOSA COUN | COTTONDALE ELEMENTARY SCH | 37 | 636 |
| TUSCALOOSA COUN | CRESTMONT ELEMENTARY SCHOOL | 25 | 388 |
| TUSCALOOSA COUN | MAXWELL ELEMENTARY SCHOOL | 28 | 427 |
| TUSCALOOSA COUN | ENGLEWOOD ELEMENTARY SCHOOL | 43 | 708 |
| TUSCALOOSA COUN | FLATWOODS ELEMENTARY SCHOOL | 25 | 350 |
| TUSCALOOSA COUN | HILLCREST HIGH SCHOOL | 47 | 723 |
| TUSCALOOSA COUN | HILLCREST MIDDLE SCHOOL | 46 | 713 |
| TUSCALOOSA COUN | HOLT HIGH SCHOOL | 68 | 995 |
| TUSCALOOSA COUN | HUNTINGTON PLACE ELEM SCH | 30 | 560 |
| TUSCALOOSA COUN | MATTHEWS ELEMENTARY SCHOOL | 43 | 607 |
| TUSCALOOSA COUN | MYRTLEWOOD ELEMENTARY SCH | 23 | 305 |
| TUSCALOOSA COUN | NORTHPORT JUNIOR HIGH SCH | 45 | 714 |
| TUSCALOOSA COUN | NORTHSIDE HIGH SCHOOL | 33 | 479 |
| TUSCALOOSA COUN | REGIONAL EDUCATION CENTER | 24 | 78 |
| TUSCALOOSA COUN | RIVERSIDE JUNIOR HIGH SCH | 46 | 766 |
| TUSCALOOSA COUN | TUSCALOOSA COUNTY HIGH SCH | 85 | 1,320 |
| TUSCALOOSA COUN | TUSC CO STUDENT ADJUST CTR | 15 | 81 |
| TUSCALOOSA COUN | TUSC REGIONAL DETENTION CTR | 1 | 71 |
| TUSCALOOSA COUN | VANCE ELEMENTARY SCHOOL | 29 | 428 |
| TUSCALOOSA COUN | VESTAVIA ELEMENTARY SCHOOL | 37 | 652 |
| TUSCALOOSA COUN | WALKER ELEMENTARY SCHOOL | 34 | 523 |
| TUSCALOOSA COUN | WESTWOOD ELEMENTARY SCHOOL | 20 | 345 |
| TUSCALOOSA COUN | ALBERTA ELEMENTARY SCHOOL | 28 | 309 |
| TUSCALOOSA COUN | ARCADIA ELEMENTARY SCHOOL | 25 | 346 |
| TUSCALOOSA COUN | CENTRAL ELEMENTARY SCHOOL | 14 | 148 |
| TUSCALOOSA COUN | CENTRAL HIGH SCH W CAMPUS | 81 | 1,340 |
| TUSCALOOSA COUN | EASTWOOD MIDDLE SCHOOL | 49 | 718 |
| TUSCALOOSA COUN | NORTHINGTON ELEMENTARY SCH | 42 | 569 |
| TUSCALOOSA COUN | OAKDALE ELEMENTARY SCHOOL | 16 | 181 |

STATE OF ALABAMA - DEPARTMENT OF EDUCATION
LEA PERSONNEL SYSTEM (EDLPT471)

TOTAL NUMBER OF PUPILS AND FACULTY BY SCHOOL BY COUNTY

| COUNTY | SCHOOL | TOTAL FACULTY | TOTAL ENROLLMENT |
|---|---|---|---|
| TUSCALOOSA COUN | OAK HILL SPEC ED FACILITY | 18 | 132 |
| TUSCALOOSA COUN | PARKVIEW LEARNING CENTER | 20 | 201 |
| TUSCALOOSA COUN | SKYLAND ELEMENTARY SCHOOL | 41 | 569 |
| TUSCALOOSA COUN | STAFFORD ELEMENTARY SCHOOL | 34 | 457 |
| TUSCALOOSA COUN | STILLMAN HEIGHTS ELEM SCH | 30 | 366 |
| TUSCALOOSA COUN | MARTIN L KING JR ELEM SCH | 38 | 451 |
| TUSCALOOSA COUN | TUSCALOOSA MIDDLE SCHOOL | 49 | 782 |
| TUSCALOOSA COUN | CENTRAL HIGH EAST CAMPUS | 70 | 1,098 |
| TUSCALOOSA COUN | UNIVERSITY PLACE ELEM SCH | 29 | 313 |
| TUSCALOOSA COUN | VERNER ELEMENTARY SCHOOL | 49 | 871 |
| TUSCALOOSA COUN | WOODLAND FORREST ELEM SCH | 33 | 573 |
| TUSCALOOSA COUN | WESTLAWN MIDDLE SCHOOL | 52 | 811 |
| WALKER COUNTY | MADDOX MIDDLE SCHOOL | 35 | 595 |
| WALKER COUNTY | MEMORIAL PARK ELEM SCHOOL | 21 | 336 |
| WALKER COUNTY | T R SIMMONS ELEMENTARY SCH | 29 | 508 |
| WALKER COUNTY | NORTH HIGHLAND SCHOOL | 9 | 54 |
| WALKER COUNTY | WALKER HIGH SCHOOL | 66 | 1,032 |
| WALKER COUNTY | WEST JASPER ELEMENTARY SCH | 24 | 307 |
| WALKER COUNTY | CARBON HILL ELEMENTARY SCH | 28 | 440 |
| WALKER COUNTY | CARBON HILL JUNIOR HIGH SCH | 13 | 264 |
| WALKER COUNTY | CARBON HILL HIGH SCHOOL | 24 | 320 |
| WALKER COUNTY | BANKHEAD MIDDLE SCHOOL | 24 | 347 |
| WALKER COUNTY | CORDOVA ELEMENTARY SCHOOL | 21 | 312 |
| WALKER COUNTY | CORDOVA HIGH SCHOOL | 18 | 325 |
| WALKER COUNTY | CURRY ELEMENTARY SCHOOL | 24 | 420 |
| WALKER COUNTY | CURRY MIDDLE SCHOOL | 23 | 400 |
| WALKER COUNTY | CURRY HIGH SCHOOL | 29 | 512 |
| WALKER COUNTY | DORA HIGH SCHOOL | 31 | 555 |
| WALKER COUNTY | EMPIRE JUNIOR HIGH SCHOOL | 12 | 156 |
| WALKER COUNTY | FARMSTEAD JUNIOR HIGH SCH | 36 | 612 |
| WALKER COUNTY | LUPTON JUNIOR HIGH SCHOOL | 31 | 495 |
| WALKER COUNTY | MARTIN HIGH SCHOOL | 23 | 394 |
| WALKER COUNTY | OAKMAN ELEMENTARY SCHOOL | 27 | 400 |
| WALKER COUNTY | OAKMAN HIGH SCHOOL | 20 | 347 |
| WALKER COUNTY | PARRISH ELEMENTARY SCHOOL | 22 | 304 |
| WALKER COUNTY | PARRISH HIGH SCHOOL | 16 | 271 |
| WALKER COUNTY | SIPSEY JUNIOR HIGH SCHOOL | 20 | 326 |
| WALKER COUNTY | SUMITON ELEM/MIDDLE SCHOOL | 43 | 747 |
| WALKER COUNTY | T S BOYD ELEMENTARY SCHOOL | 31 | 445 |
| WALKER COUNTY | TOWNLEY JUNIOR HIGH SCHOOL | 12 | 201 |
| WALKER COUNTY | WALKER COUNTY ALT SCHOOL | 2 | |
| WALKER COUNTY | VALLEY JUNIOR HIGH SCHOOL | 30 | 473 |
| WASHINGTON COUN | CHATOM ELEMENTARY SCHOOL | 28 | 491 |
| WASHINGTON COUN | CHATOM MIDDLE SCHOOL | 16 | 275 |
| WASHINGTON COUN | FRANK W BOYKIN ELEM SCH | 19 | 220 |
| WASHINGTON COUN | FRUITDALE HIGH SCHOOL | 34 | 477 |
| WASHINGTON COUN | LERCY HIGH SCHOOL | 40 | 691 |
| WASHINGTON COUN | MCINTOSH HIGH SCHOOL | 25 | 301 |

STATE OF ALABAMA - DEPARTMENT OF EDUCATION
LEA PERSONNEL SYSTEM (EDLPT472)

TOTAL NUMBER OF STAFF BY SCHOOL BY COUNTY

| COUNTY | SCHOOL | TOTAL STAFF |
|---|---|---|
| ETOWAH COUNTY | OSCAR W ADAMS ELEM SCHOOL | 27 |
| ETOWAH COUNTY | EMMA SANSOM HIGH SCHOOL | 16 |
| ETOWAH COUNTY | EURA BROWN ELEMENTARY SCH | 7 |
| ETOWAH COUNTY | GEORGE W FLOYD ELEM SCHOOL | 19 |
| ETOWAH COUNTY | GADSDEN HIGH SCHOOL | 13 |
| ETOWAH COUNTY | GENERAL FORREST MIDDLE SCH | 12 |
| ETOWAH COUNTY | JESSIE DEAN SMITH ELEM SCH | 7 |
| ETOWAH COUNTY | LITCHFIELD HIGH SCHOOL | 13 |
| ETOWAH COUNTY | MITCHELL ELEMENTARY SCHOOL | 7 |
| ETOWAH COUNTY | RAY THOMPSON ELEMENTARY SCH | 11 |
| ETOWAH COUNTY | STRIPLIN ELEMENTARY SCHOOL | 12 |
| ETOWAH COUNTY | WALNUT PARK ELEMENTARY SCH | 7 |
| FAYETTE COUNTY | BERRY ELEMENTARY SCHOOL | 7 |
| FAYETTE COUNTY | BERRY HIGH SCHOOL | 6 |
| FAYETTE COUNTY | FAYETTE COUNTY HIGH SCHOOL | 10 |
| FAYETTE COUNTY | FAYETTE MIDDLE SCHOOL | 12 |
| FAYETTE COUNTY | HUBBERTVILLE SCHOOL | 7 |
| FAYETTE COUNTY | FAYETTE ELEMENTARY SCHOOL | 17 |
| FRANKLIN COUNTY | BELGREEN HIGH SCHOOL | 9 |
| FRANKLIN COUNTY | EAST FRANKLIN JR HIGH SCH | 4 |
| FRANKLIN COUNTY | PHIL CAMPBELL HIGH SCHOOL | 13 |
| FRANKLIN COUNTY | RED BAY HIGH SCHOOL | 16 |
| FRANKLIN COUNTY | THARPTOWN JUNIOR HIGH SCH | 6 |
| FRANKLIN COUNTY | VINA HIGH SCHOOL | 7 |
| FRANKLIN COUNTY | COLLEGE AVE ELEMENTARY SCH | 11 |
| FRANKLIN COUNTY | RUSSELLVILLE MIDDLE SCHOOL | 13 |
| FRANKLIN COUNTY | RUSSELLVILLE HIGH SCHOOL | 16 |
| FRANKLIN COUNTY | WEST ELEMENTARY SCHOOL | 16 |
| GENEVA COUNTY | COFFEE SPRINGS HIGH SCHOOL | 11 |
| GENEVA COUNTY | GENEVA COUNTY ELEM SCHOOL | 12 |
| GENEVA COUNTY | GENEVA COUNTY HIGH SCHOOL | 6 |
| GENEVA COUNTY | GENEVA COUNTY MIDDLE SCHOOL | 1 |
| GENEVA COUNTY | SAMSON ELEMENTARY SCHOOL | 10 |
| GENEVA COUNTY | SAMSON HIGH SCHOOL | 13 |
| GENEVA COUNTY | SLOCOMB ELEMENTARY SCHOOL | 8 |
| GENEVA COUNTY | SLOCOMB MIDDLE SCHOOL | 1 |
| GENEVA COUNTY | SLOCOMB HIGH SCHOOL | 13 |
| GENEVA COUNTY | GENEVA HIGH SCHOOL | 13 |
| GENEVA COUNTY | MULKEY ELEMENTARY SCHOOL | 16 |
| GENEVA COUNTY | GENEVA MIDDLE SCHOOL | 4 |
| GREENE COUNTY | BIRDINE ELEMENTARY SCHOOL | 9 |
| GREENE COUNTY | EATMAN ELEMENTARY SCHOOL | 12 |
| GREENE COUNTY | EUTAW HIGH SCHOOL | 12 |
| GREENE COUNTY | CARVER JUNIOR HIGH SCHOOL | 18 |
| GREENE COUNTY | PARAMOUNT HIGH SCHOOL | 23 |
| HALE COUNTY | AKRON COMMUNITY SCHOOL EAST | 7 |
| HALE COUNTY | AKRON COMMUNITY SCHOOL WEST | 10 |
| HALE COUNTY | GREENSBORO PUBLIC EAST SCH | 19 |

TOTAL NUMBER OF STAFF BY SCHOOL BY COUNTY

| COUNTY | SCHOOL | TOTAL STAFF |
|---|---|---|
| HALE COUNTY | GREENSBORO PUBLIC WEST SCH | 21 |
| HALE COUNTY | HALE COUNTY HIGH SCHOOL | 8 |
| HALE COUNTY | MOUNDVILLE ELEMENTARY SCH | 9 |
| HALE COUNTY | SUNSHINE HIGH SCHOOL | 11 |
| HENRY COUNTY | ABBEVILLE MIDDLE SCHOOL | 13 |
| HENRY COUNTY | ABBEVILLE ELEMENTARY SCHOOL | 25 |
| HENRY COUNTY | ABBEVILLE HIGH SCHOOL | 13 |
| HENRY COUNTY | HEADLAND ELEMENTARY SCHOOL | 25 |
| HENRY COUNTY | HEADLAND MIDDLE SCHOOL | 13 |
| HENRY COUNTY | HEADLAND HIGH SCHOOL | 12 |
| HOUSTON COUNTY | ASHFORD HIGH SCHOOL | 18 |
| HOUSTON COUNTY | ASHFORD ELEMENTARY SCHOOL | 20 |
| HOUSTON COUNTY | COTTONWOOD HIGH SCHOOL | 20 |
| HOUSTON COUNTY | HARMON JUNIOR HIGH SCHOOL | 5 |
| HOUSTON COUNTY | HOUSTON COUNTY HIGH SCHOOL | 19 |
| HOUSTON COUNTY | REHOBETH HIGH SCHOOL | 23 |
| HOUSTON COUNTY | WEBB JUNIOR HIGH SCHOOL | 17 |
| HOUSTON COUNTY | WICKSBURG HIGH SCHOOL | 13 |
| HOUSTON COUNTY | CARVER MIDDLE SCHOOL | 13 |
| HOUSTON COUNTY | BEVERLYE MIDDLE SCHOOL | 15 |
| HOUSTON COUNTY | CLOVERDALE ELEMENTARY SCH | 15 |
| HOUSTON COUNTY | DOTHAN HIGH SCHOOL | 36 |
| HOUSTON COUNTY | GIRARD AVE ELEMENTARY SCH | 17 |
| HOUSTON COUNTY | GIRARD MIDDLE SCHOOL | 13 |
| HOUSTON COUNTY | GRANDVIEW ELEMENTARY SCHOOL | 16 |
| HOUSTON COUNTY | HEARD ELEMENTARY SCHOOL | 19 |
| HOUSTON COUNTY | HIGHLANDS ELEMENTARY SCHOOL | 18 |
| HOUSTON COUNTY | HONEYSUCKLE MIDDLE SCHOOL | 17 |
| HOUSTON COUNTY | KELLY SPRINGS ELEM SCHOOL | 25 |
| HOUSTON COUNTY | MONTANA ST ELEMENTARY SCH | 14 |
| HOUSTON COUNTY | NORTHVIEW HIGH SCHOOL | 41 |
| HOUSTON COUNTY | SELMA ST ELEMENTARY SCHOOL | 23 |
| HOUSTON COUNTY | SOUTHSIDE ELEMENTARY SCHOOL | 20 |
| HOUSTON COUNTY | STRINGER ST ELEMENTARY SCH | 15 |
| HOUSTON COUNTY | WILSON ST ELEMENTARY SCHOOL | 14 |
| INVALID COUNTY | MT MEIGS CAMPUS - WALLACE | 10 |
| JACKSON COUNTY | BRIDGEPORT MIDDLE SCHOOL | 3 |
| JACKSON COUNTY | BRIDGEPORT ELEMENTARY SCH | 9 |
| JACKSON COUNTY | BRYANT SCHOOL | 6 |
| JACKSON COUNTY | DUTTON ELEMENTARY SCHOOL | 6 |
| JACKSON COUNTY | FLAT ROCK SCHOOL | 8 |
| JACKSON COUNTY | HOLLYWOOD SCHOOL | 6 |
| JACKSON COUNTY | JACKSON CTY ALTERNATIVE SCH | 1 |
| JACKSON COUNTY | MACEDONIA SCHOOL | 8 |
| JACKSON COUNTY | NORTH JACKSON HIGH SCHOOL | 13 |
| JACKSON COUNTY | NORTH SAND MOUNTAIN SCHOOL | 12 |
| JACKSON COUNTY | PAINT ROCK VALLEY HIGH SCH | 6 |
| JACKSON COUNTY | PISGAH HIGH SCHOOL | 19 |

# TOTAL NUMBER OF STAFF BY SCHOOL BY COUNTY

| COUNTY | SCHOOL | TOTAL STAFF |
|---|---|---|
| ST CLAIR COUNTY | ST CLAIR COUNTY HIGH SCHOOL | 25 |
| ST CLAIR COUNTY | STEELE JUNIOR HIGH SCHOOL | 9 |
| SUMTER COUNTY | KINTERBISH JUNIOR HIGH SCH | 21 |
| SUMTER COUNTY | LIVINGSTON HIGH SCHOOL | 8 |
| SUMTER COUNTY | NORTH SUMTER JR HIGH SCHOOL | 18 |
| SUMTER COUNTY | SUMTER COUNTY HIGH SCHOOL | 10 |
| SUMTER COUNTY | LIVINGSTON JUNIOR HIGH SCH | 54 |
| SUMTER COUNTY | YORK WEST END JR HIGH SCH | 29 |
| TALLADEGA COUNT | A H WATWOOD ELEMEMTARY SCH | 16 |
| TALLADEGA COUNT | B B COMER HIGH SCHOOL | 37 |
| TALLADEGA COUNT | CHARLES R DREW MIDDLE SCH | 12 |
| TALLADEGA COUNT | CHILDERSBURG ELEMENTARY SCH | 13 |
| TALLADEGA COUNT | CHILDERSBURG HIGH SCHOOL | 14 |
| TALLADEGA COUNT | CHILDERSBURG MIDDLE SCH | 21 |
| TALLADEGA COUNT | TALLADEGA CTY CENTRAL HIGH | 8 |
| TALLADEGA COUNT | FAYETTEVILLE HIGH SCHOOL | 14 |
| TALLADEGA COUNT | MUNFORD HIGH SCHOOL | 16 |
| TALLADEGA COUNT | OPHELIA S HILL ELEM SCH | 24 |
| TALLADEGA COUNT | SYCAMORE SCHOOL | 20 |
| TALLADEGA COUNT | LINCOLN HIGH SCHOOL | 12 |
| TALLADEGA COUNT | LINCOLN ELEMENTARY SCHOOL | 10 |
| TALLADEGA COUNT | STEMLEY ROAD ELEM SCHOOL | 17 |
| TALLADEGA COUNT | WINTERBORO HIGH SCHOOL | 18 |
| TALLADEGA COUNT | EAST HIGHLAND MIDDLE SCHOOL | 8 |
| TALLADEGA COUNT | INDIAN VALLEY ELEM SCHOOL | 25 |
| TALLADEGA COUNT | MOUNTAINVIEW ELEMENTARY SCH | 12 |
| TALLADEGA COUNT | PINECREST ELEMENTARY SCHOOL | 12 |
| TALLADEGA COUNT | SYLACAUGA HIGH SCHOOL | 15 |
| TALLADEGA COUNT | C L SALTER ELEMENTARY SCH | 17 |
| TALLADEGA COUNT | EVELYN D HOUSTON ELEM SCH | 15 |
| TALLADEGA COUNT | GRAHAM ELEMENTARY SCHOOL | 15 |
| TALLADEGA COUNT | HAL HENDERSON ELEM SCHOOL | 11 |
| TALLADEGA COUNT | RAYMOND L YOUNG ELEM SCHOOL | 10 |
| TALLADEGA COUNT | TALLADEGA HIGH SCHOOL | 19 |
| TALLADEGA COUNT | ZORA ELLIS JUNIOR HIGH SCH | 20 |
| TALLADEGA COUNT | DIXON MIDDLE SCHOOL | 11 |
| TALLAPOOSA COUN | ALEXANDER CITY MIDDLE SCH | 11 |
| TALLAPOOSA COUN | BENJAMIN RUSSELL HIGH SCH | 10 |
| TALLAPOOSA COUN | JIM PEARSON SCHOOL | 12 |
| TALLAPOOSA COUN | NATHANIEL H STEPHENS ELEM | 7 |
| TALLAPOOSA COUN | WILLIAM L RADNEY ELEM SCH | 7 |
| TALLAPOOSA COUN | DADEVILLE ELEMENTARY SCHOOL | 23 |
| TALLAPOOSA COUN | DADEVILLE HIGH SCHOOL | 5 |
| TALLAPOOSA COUN | EDWARD BELL HIGH SCHOOL | 10 |
| TALLAPOOSA COUN | HORSESHOE BEND HIGH SCHOOL | 17 |
| TALLAPOOSA COUN | REELTOWN HIGH SCHOOL | 17 |
| TUSCALOOSA COUN | HOLT ELEMENTARY SCHOOL | 18 |
| TUSCALOOSA COUN | BROOKWOOD ELEMENTARY SCHOOL | 17 |

STATE OF ALABAMA - DEPARTMENT OF EDUCATION
LEA PERSONNEL SYSTEM (EDLPT472)

TOTAL NUMBER OF STAFF BY SCHOOL BY COUNTY

| COUNTY | SCHOOL | TOTAL STAFF |
|---|---|---|
| TUSCALOOSA COUN | BROOKWOOD HIGH SCHOOL | 13 |
| TUSCALOOSA COUN | BUHL ELEMENTARY SCHOOL | 7 |
| TUSCALOOSA COUN | COTTONDALE ELEMENTARY SCH | 16 |
| TUSCALOOSA COUN | CRESTMONT ELEMENTARY SCHOOL | 14 |
| TUSCALOOSA COUN | MAXWELL ELEMENTARY SCHOOL | 11 |
| TUSCALOOSA COUN | ENGLEWOOD ELEMENTARY SCHOOL | 16 |
| TUSCALOOSA COUN | FLATWOODS ELEMENTARY SCHOOL | 8 |
| TUSCALOOSA COUN | HILLCREST HIGH SCHOOL | 14 |
| TUSCALOOSA COUN | HILLCREST MIDDLE SCHOOL | 15 |
| TUSCALOOSA COUN | HOLT HIGH SCHOOL | 13 |
| TUSCALOOSA COUN | HUNTINGTON PLACE ELEM SCH | 13 |
| TUSCALOOSA COUN | MATTHEWS ELEMENTARY SCHOOL | 24 |
| TUSCALOOSA COUN | MYRTLEWOOD ELEMENTARY SCH | 9 |
| TUSCALOOSA COUN | NORTHPORT JUNIOR HIGH SCH | 18 |
| TUSCALOOSA COUN | NORTHSIDE HIGH SCHOOL | 9 |
| TUSCALOOSA COUN | REGIONAL EDUCATION CENTER | 15 |
| TUSCALOOSA COUN | RIVERSIDE JUNIOR HIGH SCH | 17 |
| TUSCALOOSA COUN | TUSCALOOSA COUNTY HIGH SCH | 24 |
| TUSCALOOSA COUN | TUSC CO STUDENT ADJUST CTR | 13 |
| TUSCALOOSA COUN | VANCE ELEMENTARY SCHOOL | 9 |
| TUSCALOOSA COUN | VESTAVIA ELEMENTARY SCHOOL | 12 |
| TUSCALOOSA COUN | WALKER ELEMENTARY SCHOOL | 14 |
| TUSCALOOSA COUN | WESTWOOD ELEMENTARY SCHOOL | 9 |
| TUSCALOOSA COUN | ALBERTA ELEMENTARY SCHOOL | 13 |
| TUSCALOOSA COUN | ARCADIA ELEMENTARY SCHOOL | 10 |
| TUSCALOOSA COUN | CENTRAL ELEMENTARY SCHOOL | 9 |
| TUSCALOOSA COUN | CENTRAL HIGH SCH W CAMPUS | 37 |
| TUSCALOOSA COUN | EASTWOOD MIDDLE SCHOOL | 21 |
| TUSCALOOSA COUN | NORTHINGTON ELEMENTARY SCH | 26 |
| TUSCALOOSA COUN | OAKDALE ELEMENTARY SCHOOL | 8 |
| TUSCALOOSA COUN | OAK HILL SPEC ED FACILITY | 33 |
| TUSCALOOSA COUN | PARKVIEW LEARNING CENTER | 8 |
| TUSCALOOSA COUN | SKYLAND ELEMENTARY SCHOOL | 15 |
| TUSCALOOSA COUN | STAFFORD ELEMENTARY SCHOOL | 16 |
| TUSCALOOSA COUN | STILLMAN HEIGHTS ELEM SCH | 13 |
| TUSCALOOSA COUN | MARTIN L KING JR ELEM SCH | 18 |
| TUSCALOOSA COUN | TUSCALOOSA MIDDLE SCHOOL | 21 |
| TUSCALOOSA COUN | CENTRAL HIGH EAST CAMPUS | 30 |
| TUSCALOOSA COUN | UNIVERSITY PLACE ELEM SCH | 14 |
| TUSCALOOSA COUN | VERNER ELEMENTARY SCHOOL | 17 |
| TUSCALOOSA COUN | WOODLAND FORREST ELEM SCH | 13 |
| TUSCALOOSA COUN | WESTLAWN MIDDLE SCHOOL | 21 |
| WALKER COUNTY | MADDOX MIDDLE SCHOOL | 14 |
| WALKER COUNTY | MEMORIAL PARK ELEM SCHOOL | 12 |
| WALKER COUNTY | T R SIMMONS ELEMENTARY SCH | 15 |
| WALKER COUNTY | NORTH HIGHLAND SCHOOL | 10 |
| WALKER COUNTY | WALKER HIGH SCHOOL | 22 |
| WALKER COUNTY | WEST JASPER ELEMENTARY SCH | 14 |

# REFERENCE 11

# Demographic Profile

## 1990 CENSUS
## Alabama Counties and Cities By Race

Alabama State Data Center
Center for Business and Economic Research
College of Commerce and Business Administration
The University of Alabama

| | Race | | | | | |
|---|---|---|---|---|---|---|
| | Total | White | Black | Other races | Hispanic origin | Housing units |
| eKalb County..... | 54651 | 52980 | 1028 | 643 | 215 | 22939 |
| 18 years and over | 40744 | 39666 | 694 | 384 | 132 | |
| Elmore County..... | 49210 | 37850 | 11039 | 321 | 270 | 19497 |
| 18 years and over | 36418 | 28496 | 7696 | 226 | 171 | |
| Escambia County..... | 35518 | 24326 | 10046 | 1146 | 169 | 14356 |
| 18 years and over | 26051 | 18450 | 6840 | 761 | 112 | |
| Etowah County..... | 99840 | 85274 | 13799 | 767 | 331 | 41787 |
| 18 years and over | 75251 | 65349 | 9299 | 603 | 208 | |
| Fayette County..... | 17962 | 15717 | 2190 | 55 | 78 | 7555 |
| 18 years and over | 13360 | 11801 | 1523 | 36 | 48 | |
| Franklin County..... | 27814 | 26463 | 1249 | 102 | 101 | 11772 |
| 18 years and over | 20910 | 19978 | 867 | 65 | 73 | |
| Geneva County..... | 23647 | 20682 | 2824 | 141 | 121 | 10416 |
| 18 years and over | 17757 | 15821 | 1837 | 99 | 67 | |
| Greene County..... | 10153 | 1966 | 8181 | 6 | 24 | 4162 |
| 18 years and over | 6811 | 1641 | 5165 | 5 | 9 | |
| Hale County..... | 15498 | 6255 | 9214 | 29 | 57 | 6370 |
| 18 years and over | 10616 | 4772 | 5829 | 15 | 36 | |
| Henry County..... | 15374 | 9918 | 5395 | 61 | 92 | 7056 |
| 18 years and over | 11273 | 7667 | 3561 | 45 | 64 | |
| Houston County..... | 81331 | 61513 | 18954 | 864 | 464 | 33196 |
| 18 years and over | 58858 | 46249 | 12041 | 568 | 301 | |
| Jackson County..... | 47796 | 44696 | 1968 | 1132 | 208 | 19768 |
| 18 years and over | 35482 | 33503 | 1342 | 637 | 140 | |
| efferson County..... | 651525 | 418317 | 228521 | 4687 | 2745 | 273097 |
| 18 years and over | 488937 | 328268 | 157208 | 3461 | 1970 | |
| Lamar County..... | 15715 | 13805 | 1862 | 48 | 71 | 6617 |
| 18 years and over | 11725 | 10434 | 1253 | 38 | 52 | |
| Lauderdale County..... | 79661 | 71560 | 7695 | 406 | 313 | 33522 |
| 18 years and over | 60580 | 55008 | 5275 | 297 | 207 | |
| Lawrence County..... | 31513 | 24563 | 4798 | 2152 | 102 | 12212 |
| 18 years and over | 22874 | 18702 | 3095 | 1077 | 65 | |
| Lee County..... | 87146 | 64889 | 20407 | 1850 | 552 | 36636 |
| 18 years and over | 68058 | 52769 | 13846 | 1443 | 435 | |
| Limestone County..... | 54135 | 46658 | 7127 | 350 | 261 | 21455 |
| 18 years and over | 40529 | 35087 | 5197 | 245 | 179 | |
| Lowndes County..... | 12658 | 3185 | 9456 | 17 | 60 | 4792 |
| 18 years and over | 8263 | 2513 | 5742 | 8 | 40 | |
| Macon County..... | 24928 | 3443 | 21340 | 145 | 103 | 9818 |
| 18 years and over | 18286 | 2780 | 15397 | 109 | 87 | |
| Madison County..... | 238912 | 184197 | 48116 | 6599 | 2984 | 97855 |
| 18 years and over | 180157 | 142174 | 33542 | 4441 | 1971 | |
| Marengo County..... | 23084 | 11314 | 11745 | 25 | 75 | 914 |
| 18 years and over | 16091 | 8524 | 7550 | 17 | 40 | |
| Marion County..... | 29830 | 28759 | 967 | 104 | 65 | 12597 |
| 18 years and over | 22508 | 21733 | 712 | 63 | 39 | |
| Marshall County..... | 70832 | 69361 | 1087 | 384 | 289 | 30225 |
| 18 years and over | 53366 | 52343 | 766 | 257 | 180 | |
| obile County..... | 378643 | 254853 | 117872 | 5918 | 3164 | 15122 |
| 18 years and over | 270610 | 190842 | 75791 | 3977 | 2223 | |

Note: The population counts set forth herein are subject to possible correction for undercount or overcount. The U.S. Department of Commerce is considering whether to correct these counts and will publish corrected counts, if any, not later than July 15, 1991.

| | Race | | | | | |
|---|---|---|---|---|---|---|
| | Total | White | Black | Other races | Hispanic origin | Housing units |
| Monroe County..... | 23968 | 14320 | 9372 | 276 | 94 | 9633 |
| 18 years and over | 16590 | 10597 | 5806 | 187 | 57 | |
| Montgomery County..... | 209085 | 119420 | 87312 | 2353 | 1624 | 84525 |
| 18 years and over | 151701 | 92603 | 57450 | 1648 | 1136 | |
| Morgan County..... | 100043 | 89122 | 10081 | 840 | 584 | 40419 |
| 18 years and over | 74027 | 66930 | 6538 | 559 | 383 | |
| Perry County..... | 12759 | 4503 | 8219 | 37 | 36 | 4807 |
| 18 years and over | 8757 | 3719 | 5009 | 29 | 25 | |
| Pickens County..... | 20699 | 12002 | 8645 | 52 | 50 | 8379 |
| 18 years and over | 14805 | 9369 | 5401 | 35 | 33 | |
| Pike County..... | 27595 | 17814 | 9548 | 233 | 108 | 11506 |
| 18 years and over | 20729 | 14208 | 6348 | 173 | 89 | |
| Randolph County..... | 19881 | 15138 | 4686 | 57 | 53 | 8728 |
| 18 years and over | 14696 | 11650 | 3012 | 34 | 37 | |
| Russell County..... | 46860 | 28473 | 18088 | 299 | 301 | 19633 |
| 18 years and over | 34380 | 21762 | 12396 | 222 | 199 | |
| St. Clair County..... | 50009 | 45138 | 4561 | 310 | 209 | 20382 |
| 18 years and over | 36699 | 33259 | 3230 | 210 | 131 | |
| Shelby County..... | 99358 | 90715 | 7718 | 925 | 525 | 39201 |
| 18 years and over | 72167 | 66406 | 5147 | 614 | 337 | |
| Sumter County..... | 16174 | 4759 | 11369 | 46 | 78 | 6545 |
| 18 years and over | 11202 | 3869 | 7291 | 42 | 54 | |
| Talladega County..... | 74107 | 50970 | 22773 | 364 | 490 | 29861 |
| 18 years and over | 53614 | 38551 | 14805 | 258 | 416 | |
| Tallapoosa County..... | 38826 | 28493 | 10212 | 121 | 71 | 17312 |
| 18 years and over | 28899 | 22100 | 6718 | 81 | 52 | |
| Tuscaloosa County..... | 150522 | 109398 | 39377 | 1747 | 948 | 58740 |
| 18 years and over | 114857 | 86831 | 26623 | 1403 | 704 | |
| Walker County..... | 67670 | 63042 | 4405 | 223 | 224 | 28427 |
| 18 years and over | 50560 | 47546 | 2847 | 167 | 139 | |
| Washington County..... | 16694 | 10984 | 4623 | 1087 | 51 | 6625 |
| 18 years and over | 11611 | 8033 | 2916 | 662 | 32 | |
| Wilcox County..... | 13568 | 4203 | 9353 | 12 | 40 | 5119 |
| 18 years and over | 8956 | 3297 | 5649 | 10 | 30 | |
| Winston County..... | 22053 | 21925 | 57 | 71 | 59 | 10254 |
| 18 years and over | 16621 | 16530 | 38 | 53 | 37 | |
| Abbeville city..... | 3173 | 2039 | 1115 | 19 | 15 | 1320 |
| 18 years and over | 2362 | 1587 | 762 | 13 | 10 | |
| Adamsville city..... | 4161 | 3493 | 659 | 9 | 12 | 1554 |
| 18 years and over | 3138 | 2685 | 446 | 7 | 11 | |
| Addison town..... | 626 | 624 | - | 2 | - | 286 |
| 18 years and over | 493 | 491 | - | 2 | - | |
| Akron town..... | 468 | 97 | 371 | - | 5 | 220 |
| 18 years and over | 320 | 78 | 242 | - | 5 | |
| Alabaster city..... | 14732 | 13032 | 1617 | 83 | 80 | 5144 |
| 18 years and over | 10280 | 9137 | 1087 | 56 | 48 | |
| Albertville city..... | 14507 | 14267 | 182 | 58 | 77 | 6238 |
| 18 years and over | 10896 | 10721 | 132 | 43 | 49 | |
| Alexander City city..... | 14917 | 10684 | 4184 | 49 | 18 | 6170 |
| 18 years and over | 11043 | 8317 | 2696 | 30 | 12 | |

Note: The population counts set forth herein are subject to possible correction for undercount or overcount. The U.S. Department of Commerce is considering whether to correct these counts and will publish corrected counts, if any, not later than July 15, 1991.

Table 1. Selected Population and Housing Characteristics: 1990
Hale County, Alabama

The population counts set forth herein are subject to possible correction for undercount or overcount. The United States Department of Commerce is considering whether to correct these counts and will publish corrected counts, if any, not later than July 15, 1991. The user should note that there are limitations to many of these data. Please refer to the technical documentation provided with Summary Tape File 1A for a further explanation on the limitations of the data.

| | |
|---|---|
| Total population | 15,498 |
| SEX | |
| Male | 7,235 |
| Female | 8,263 |
| AGE | |
| Under 5 years | 1,233 |
| 5 to 17 years | 3,649 |
| 18 to 20 years | 684 |
| 21 to 24 years | 696 |
| 25 to 44 years | 4,111 |
| 45 to 54 years | 1,376 |
| 55 to 59 years | 602 |
| 60 to 64 years | 676 |
| 65 to 74 years | 1,284 |
| 75 to 84 years | 887 |
| 85 years and over | 300 |
| Median age | 31.8 |
| Under 18 years | 4,882 |
| Percent of total population | 31.5 |
| 65 years and over | 2,471 |
| Percent of total population | 15.9 |
| HOUSEHOLDS BY TYPE | |
| Total households | 5,397 |
| Family households (families) | 3,983 |
| Married-couple families | 2,679 |
| Percent of total households | 49.6 |
| Other family, male householder | 210 |
| Other family, female householder | 1,094 |
| Nonfamily households | 1,414 |
| Percent of total households | 26.2 |
| Householder living alone | 1,319 |
| Householder 65 years and over | 744 |
| Persons living in households | 15,232 |
| Persons per household | 2.82 |
| GROUP QUARTERS | |
| Persons living in group quarters | 266 |
| Institutionalized persons | 264 |
| Other persons in group quarters | 2 |
| RACE AND HISPANIC ORIGIN | |
| White | 6,255 |
| Black | 9,214 |
| Percent of total population | 59.5 |
| American Indian, Eskimo, or Aleut | 20 |
| Percent of total population | 0.1 |
| Asian or Pacific Islander | 9 |
| Percent of total population | 0.1 |
| Other race | - |
| Hispanic origin (of any race) | 57 |
| Percent of total population | 0.4 |

| | |
|---|---|
| Total housing units | 6,370 |
| OCCUPANCY AND TENURE | |
| Occupied housing units | 5,397 |
| Owner occupied | 4,267 |
| Percent owner occupied | 79.1 |
| Renter occupied | 1,130 |
| Vacant housing units | 973 |
| For seasonal, recreational, or occasional use | 206 |
| Homeowner vacancy rate (percent) | 1.9 |
| Rental vacancy rate (percent) | 8.6 |
| Persons per owner-occupied unit | 2.83 |
| Persons per renter-occupied unit | 2.79 |
| Units with over 1 person per room | 439 |
| UNITS IN STRUCTURE | |
| 1-unit, detached | 4,085 |
| 1-unit, attached | 77 |
| 2 to 4 units | 236 |
| 5 to 9 units | 58 |
| 10 or more units | 83 |
| Mobile home, trailer, other | 1,831 |
| VALUE | |
| Specified owner-occupied units | 2,164 |
| Less than $50,000 | 1,471 |
| $50,000 to $99,999 | 603 |
| $100,000 to $149,999 | 61 |
| $150,000 to $199,999 | 19 |
| $200,000 to $299,999 | 6 |
| $300,000 or more | 4 |
| Median (dollars) | 34,900 |
| CONTRACT RENT | |
| Specified renter-occupied units paying cash rent | 756 |
| Less than $250 | 719 |
| $250 to $499 | 36 |
| $500 to $749 | 1 |
| $750 to $999 | - |
| $1,000 or more | - |
| Median (dollars) | 79 |
| RACE AND HISPANIC ORIGIN OF HOUSEHOLDER | |
| Occupied housing units | 5,397 |
| White | 2,432 |
| Black | 2,958 |
| Percent of occupied units | 54.8 |
| American Indian, Eskimo, or Aleut | 7 |
| Percent of occupied units | 0.1 |
| Asian or Pacific Islander | - |
| Percent of occupied units | - |
| Other race | - |
| Hispanic origin (of any race) | 18 |
| Percent of occupied units | 0.3 |

Table 1. Selected Population and Housing Characteristics: 1990
Tuscaloosa County, Alabama

The population counts set forth herein are subject to possible correction for undercount or overcount. The United States Department of Commerce is considering whether to correct these counts and will publish corrected counts, if any, not later than July 15, 1991. The user should note that there are limitations to many of these data. Please refer to the technical documentation provided with Summary Tape File 1A for a further explanation on the limitations of the data.

| | |
|---|---|
| Total population | 150,522 |
| SEX | |
| Male | 72,645 |
| Female | 77,877 |
| AGE | |
| Under 5 years | 9,647 |
| 5 to 17 years | 26,018 |
| 18 to 20 years | 13,035 |
| 21 to 24 years | 13,347 |
| 25 to 44 years | 45,090 |
| 45 to 54 years | 13,777 |
| 55 to 59 years | 6,201 |
| 60 to 64 years | 6,328 |
| 65 to 74 years | 9,868 |
| 75 to 84 years | 5,510 |
| 85 years and over | 1,701 |
| Median age | 30.6 |
| Under 18 years | 35,665 |
| Percent of total population | 23.7 |
| 65 years and over | 17,079 |
| Percent of total population | 11.3 |
| HOUSEHOLDS BY TYPE | |
| Total households | 55,354 |
| Family households (families) | 37,355 |
| Married-couple families | 28,653 |
| Percent of total households | 51.8 |
| Other family, male householder | 1,508 |
| Other family, female householder | 7,194 |
| Nonfamily households | 17,999 |
| Percent of total households | 32.5 |
| Householder living alone | 14,272 |
| Householder 65 years and over | 4,795 |
| Persons living in households | 141,179 |
| Persons per household | 2.55 |
| GROUP QUARTERS | |
| Persons living in group quarters | 9,343 |
| Institutionalized persons | 3,574 |
| Other persons in group quarters | 5,769 |
| RACE AND HISPANIC ORIGIN | |
| White | 109,398 |
| Black | 39,377 |
| Percent of total population | 26.2 |
| American Indian, Eskimo, or Aleut | 253 |
| Percent of total population | 0.2 |
| Asian or Pacific Islander | 1,264 |
| Percent of total population | 0.8 |
| Other race | 230 |
| Hispanic origin (of any race) | 948 |
| Percent of total population | 0.6 |

| | |
|---|---|
| Total housing units | 58,740 |
| OCCUPANCY AND TENURE | |
| Occupied housing units | 55,354 |
| Owner occupied | 34,023 |
| Percent owner occupied | 61.5 |
| Renter occupied | 21,331 |
| Vacant housing units | 3,386 |
| For seasonal, recreational, or occasional use | 306 |
| Homeowner vacancy rate (percent) | 1.3 |
| Rental vacancy rate (percent) | 5.2 |
| Persons per owner-occupied unit | 2.72 |
| Persons per renter-occupied unit | 2.27 |
| Units with over 1 person per room | 1,920 |
| UNITS IN STRUCTURE | |
| 1-unit, detached | 35,253 |
| 1-unit, attached | 1,033 |
| 2 to 4 units | 5,160 |
| 5 to 9 units | 2,763 |
| 10 or more units | 7,078 |
| Mobile home, trailer, other | 7,453 |
| VALUE | |
| Specified owner-occupied units | 24,705 |
| Less than $50,000 | 8,552 |
| $50,000 to $99,999 | 12,646 |
| $100,000 to $149,999 | 2,299 |
| $150,000 to $199,999 | 648 |
| $200,000 to $299,999 | 393 |
| $300,000 or more | 167 |
| Median (dollars) | 62,100 |
| CONTRACT RENT | |
| Specified renter-occupied units paying cash rent | 19,513 |
| Less than $250 | 9,514 |
| $250 to $499 | 9,195 |
| $500 to $749 | 667 |
| $750 to $999 | 93 |
| $1,000 or more | 44 |
| Median (dollars) | 254 |
| RACE AND HISPANIC ORIGIN OF HOUSEHOLDER | |
| Occupied housing units | 55,354 |
| White | 42,004 |
| Black | 12,709 |
| Percent of occupied units | 23.0 |
| American Indian, Eskimo, or Aleut | 90 |
| Percent of occupied units | 0.2 |
| Asian or Pacific Islander | 478 |
| Percent of occupied units | 0.9 |
| Other race | 73 |
| Hispanic origin (of any race) | 290 |
| Percent of occupied units | 0.5 |

Alabama Agricultural Experiment Station
Auburn University, Auburn University, Alabama
David H. Teem, Acting Director
April 1986

# Vertebrate Animals of Special Attention

# Alabama in Need

# REFERENCE 12

# VERTEBRATE ANIMALS OF ALABAMA IN NEED OF SPECIAL ATTENTION

*Edited by*

ROBERT H. MOUNT
Professor of Zoology-Entomology

*Published by*

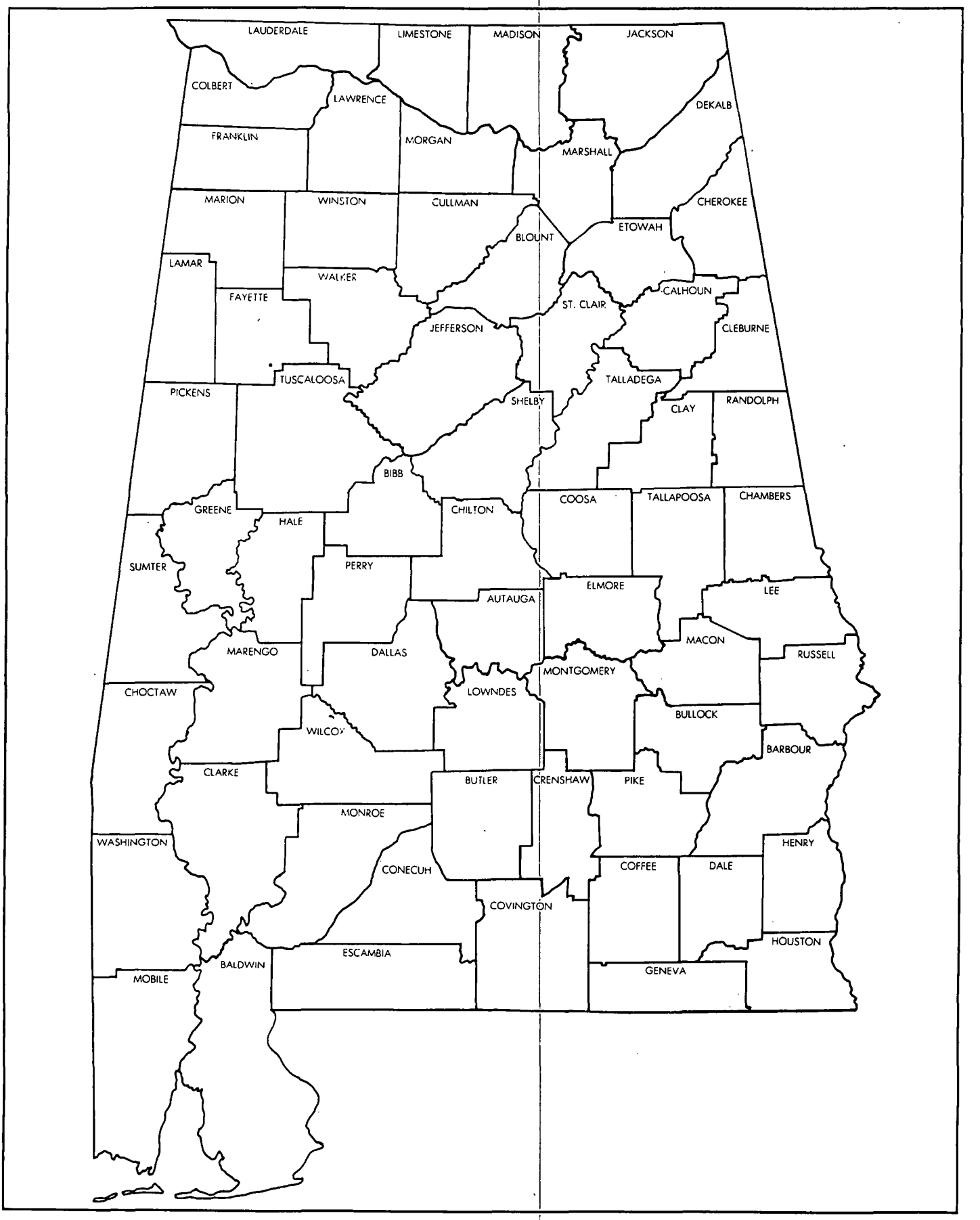
Alabama Agricultural Experiment Station
Auburn University
David H. Teem, Acting Director

*As A Contribution To*

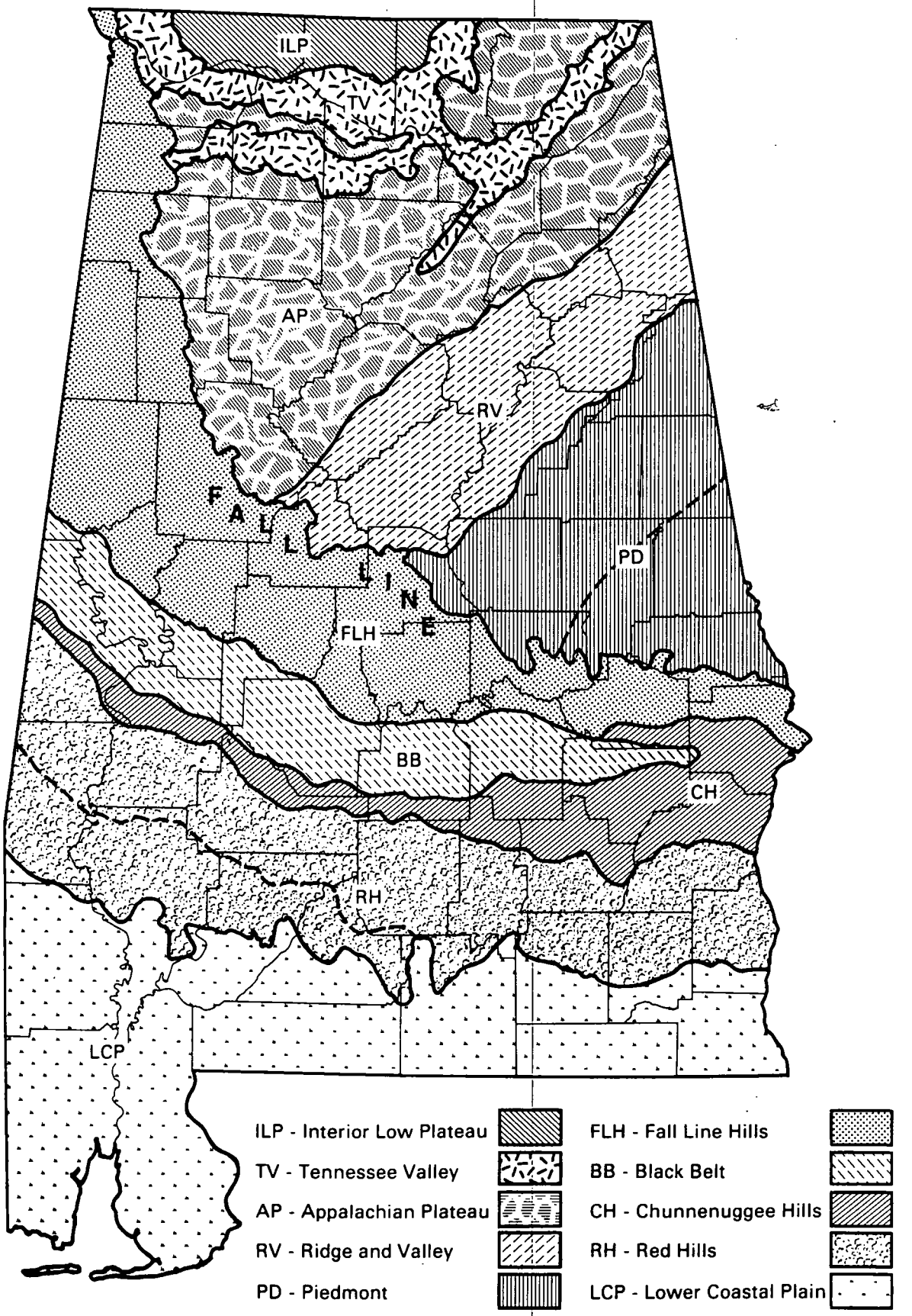
Alabama's Nongame Wildlife Program

*In Cooperation With*

Game and Fish Division
Alabama Department of Conservation
and Natural Resources
Charles D. Kelley, Director




**Counties of Alabama.**




Natural Regions of Alabama (George W. Folkerts).

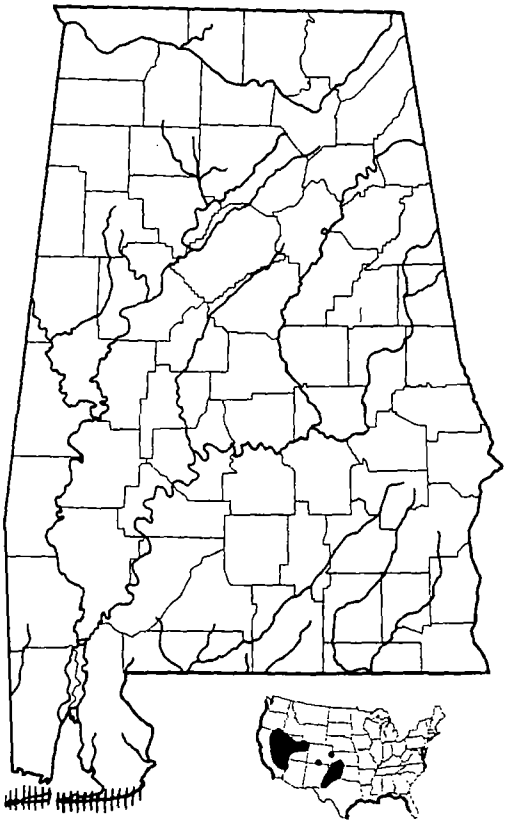
The Snowy Plover requires undisturbed, sandy beaches and, more so than most other creatures, its numbers are greater on islands. The Piping and Snowy plovers appear to be complementary sister species. The more cosmopolitan Snowy Plover is replaced in the northeast by the Piping Plover, which winters with it on the Gulf Coast where there appears to be no competition.

BASIS FOR STATUS CLASSIFICATION. In recent decades, the Snowy Plover's critical beaches have been subjected to excessive human activity. Some human recreation is not detrimental, but when a great many people take part or when the activity includes vehicles, the beach as a habitat for wild creatures, plant and animal, suffers.

Development of beaches is an even more serious threat because it is permanent. The building of houses, apartments, and other structures on the beach has become excessive.

RECOMMENDATIONS. Although legislation exists to limit the use of off-road vehicles, it is often violated and should be more vigorously enforced. The few remaining relatively pristine beaches in Alabama should be kept as natural as possible. Recreational use of beaches should be regulated to the extent practicable to avoid unnecessary disturbance of the fragile habitat. The public should constantly be reminded that the plant and animal life associated with the coast are important in making it attractive.

Ideally, no human intrusion at all is best for the Snowy Plover, especially during breeding. If possible, Sand and Pelican islands, the western portion of Dauphin Island, Fort Morgan, and some part of the Alabama Point area should be set aside as sanctuaries.



**Range of the Snowy Plover.**

SELECTED REFERENCES


AMERICAN BIRDS, 1971-1983 (Audubon Field Notes, 1947-1970, Vols. 1-24) Vols. 25-37 Bi-Monthly, National Audubon Society, New York; four issues contain season reports, one the Christmas Count, all of which contain distributional data on the Snowy Plover.

CHAPMAN, F. M. 1966. Handbook of Birds of Eastern North America. Dover, N.Y. 581 pp.

HARRISON, C. 1978. A Field Guide to the Nests, Eggs, and Nestlings of North American Birds. Collins, Glasgow. 416 pp.

IMHOF, T. A. 1976. Alabama Birds, Second Ed. Univ. Ala. Press, Tuscaloosa. 445 pp.



PREPARED BY: Thomas A. Imhof, 1036 Pike Road, Birmingham, Alabama 35218.


## Endangered

### RED-COCKADED WOODPECKER

*Picoides borealis* (Vieillot)
Family Picidae
Order Piciformes

OTHER NAMES. None.

DESCRIPTION. The Red-cockaded Woodpecker is about the size of the Hairy Woodpecker, which it resembles except it has a zebra-like back, a black crown and a large white cheek patch. Male birds have a small red spot near the ear; otherwise the sexes are similar. Length 20 cm (8½ inches).

**FIG. 66. Red-cockaded Woodpecker (Ed Tyberghein).**

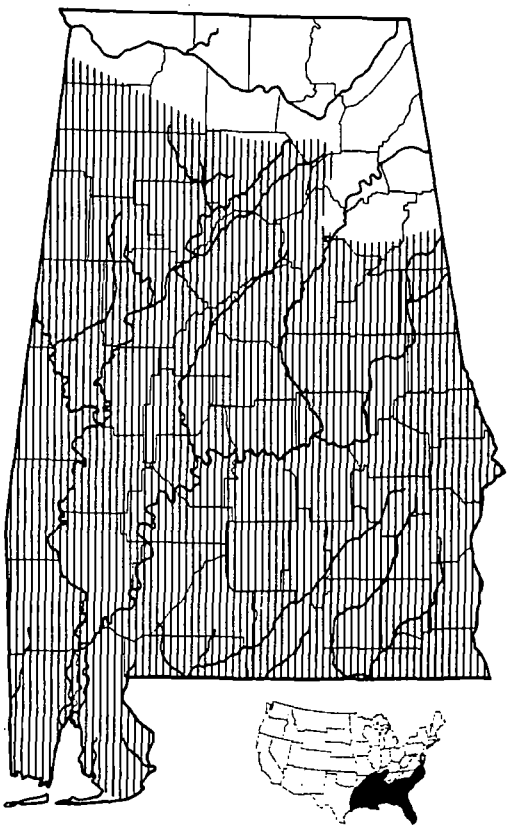
RANGE. This woodpecker is resident from eastern Oklahoma, Kentucky, and southern Maryland south to eastern Texas and southern Florida. In Alabama, it is found locally in most of the State south of the Tennessee River.

HABITAT. Red-cockaded Woodpeckers reside in open pine woods. Requirements include living mature pines hav-

ing dead hearts, within which the birds excavate their nest cavities. Optimal habitat has, in addition, interspersed stands of young pines, which provide good sites for foraging.

LIFE HISTORY AND ECOLOGY. Red-cockaded woodpeckers travel through open pine woods in small bands searching limbs, twigs, and cones for the insects that comprise the main portion of their food. Some seeds are also eaten. This species invariably nests in the aforementioned mature pines. The nest hole is dug into the center of the tree and angles upward until the dead heartwood is reached. The bird then digs straight down for about 30 cm (1 foot). Small holes are pecked above and below the nest entrance, allowing sap to flow and cover the surface around the hole and downward for about 1 m or so. The sticky surface apparently tends to repel such predators as snakes and flying squirrels. Two to 6 glossy white eggs are laid in the cavity. Old cavities are used for roosting.

BASIS FOR STATUS CLASSIFICATION. The culling of "substandard" trees and the increasingly extensive areas devoted to short-rotation forestry have greatly reduced Red-cockaded Woodpecker populations. Large pine trees with dead hearts are undesirable in the view of commercial foresters, and many have been removed. Many forest managers, knowing the endangered status of this species, now leave the nesting trees as well as a few large trees that surround them. At the present time, the extent of the area that should be left alone to enable a nesting colony to survive indefinitely is unknown. It has been estimated, however, that the home range size may approach 80 ha (200 acres). THE SPECIES IS CONSIDERED ENDANGERED BY THE UNITED STATES DEPARTMENT OF THE INTERIOR.



**Range of the Red-cockaded Woodpecker.**

RECOMMENDATIONS. Life history and habitat studies on the Red-cockaded Woodpecker are underway throughout the range. These studies are being coordinated through the Endangered Species Office of the U. S. Fish and Wildlife Service. Until concrete information is available on the species' requirements, little can be done to assure that the population can be brought out of danger. All corporate and individual owners of large tracts of forestland should be kept informed of current research and encouraged to set aside a few acres of trees surrounding Red-cockaded Woodpecker nesting sites.

SELECTED REFERENCES


IMHOF, T. A. 1976. Alabama Birds. Second Ed., Univ. of Ala. Press, Tuscaloosa. 445 pp.

ROBBINS, C. S., B. BRUUN, AND H. S. ZIM. 1966. Birds of North America. Golden Press, N.Y.

U. S. FISH AND WILDLIFE SERVICE. 1976. Red-cockaded Woodpecker Recovery Plan. U.S. Fish and Wildl. Serv., Washington, D.C.



PREPARED BY: James E. Keeler, 3576 N. Georgetown Dr., Montgomery, Alabama 36109


## Endangered

### BACHMAN'S WARBLER

*Vermivora bachmani* (Audubon)
Family Emberizidae
Order Passeriformes

OTHER NAMES. None.

DESCRIPTION. Length: 11.5 cm (4.5 inches). Adult males with yellow forehead and chin and black cap and throat, or bib. Amount of black in the cap and throat patch varies. Upper parts olive-green and under parts yellow except for white undertail coverts. Adult females with yellow forehead, gray crown and cheeks, and prominent yellow eye ring. Breast buff-colored or only slightly yellowish. Both adult males and females have noticeable yellow shoulder patch, not always stressed in field guides, which may be a useful field mark. Immatures buff below, brown above, and have whitish eye ring.

RANGE. Breeding has been recorded only in Alabama, Arkansas, Kentucky, Missouri, and South Carolina. The species has also been recorded in Florida, Georgia, Indiana, Louisiana, Mississippi, North Carolina, Oklahoma, and Virginia. The winter range is Cuba, including the Isle of Pines. The present distribution is unknown, and no populations are known.

HABITAT. Bachman's Warbler frequents, or formerly frequented, mature hardwood bottoms and headwater swamps where openings permit the development of second growth vegetation. Apparently it does not inhabit swamps that are subject to flooding for extended periods of time. From descriptions of 32 nesting habitats in the southern Coastal Plain reported between 1897 and 1919, the plant communities used for nesting were sweet bay-swamp tupelo-red maple associ-

# REFERENCE 13

**U.S. FISH AND WILDLIFE SERVICE**

***FISH AND WILDLIFE ENHANCEMENT***

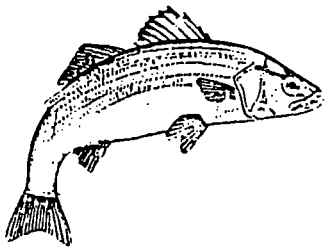
DAPHNE, ALABAMA

**Date:** 4/21/94

**To:** Bonnie Temple,

As requested here is an updated Alabama County Species List. I do not have a complete Miss. list (we only work in the coastal counties). Please contact the Vicksburg FO for that list. 601-638-1891

Call if you have questions. Celeste



This is the current listings by county. The list is updated each quarter. Current as of April 20, 1994.

Bet

## ENDANGERED SPECIES BY COUNTY LIST

**STATE: ALABAMA**

| | CERTAINTY OF OCCURRENCE | GROUP | STATUS |
|---|---|---|---|
| BAT, INDIANA *(Myotis sodalis)* | POSSIBLE | MAMMAL | E |
| SNAKE, EASTERN INDIGO *(Drymarchon corais couperi)* | POSSIBLE | REPTILE | T |
| **COUNTY: GREENE** | | | |
| MUSSEL, FLAT PIGTOE *(Pleurobema marshalli)* | KNOWN | CLAM | E |
| MUSSEL, HEAVY PIGTOE *(Pleurobema taitianum)* | KNOWN | CLAM | E |
| MUSSEL, INFLATED HEELSPLITTER *(Potamilus inflatus)* | KNOWN | CLAM | T |
| MUSSEL, ORANGE-NACRE MUCKET *(Lampsilis perovalis)* | KNOWN | CLAM | T |
| MUSSEL, OVATE CLUBSHELL *(Pleurobema perovatum)* | KNOWN | CLAM | E |
| MUSSEL, SOUTHERN CLUBSHELL *(Pleurobema decisum)* | KNOWN | CLAM | E |
| MUSSEL, SOUTHERN COMBSHELL *(Epioblasma penita)* | KNOWN | CLAM | E |
| MUSSEL, STIRRUP SHELL *(Quadrula stapes)* | KNOWN | CLAM | E |
| STORK, WOOD *(Mycteria americana)* | POSSIBLE | BIRD | E |
| **COUNTY: HALE** | | | |
| MUSSEL, INFLATED HEELSPLITTER *(Potamilus inflatus)* | KNOWN | CLAM | T |
| STORK, WOOD *(Mycteria americana)* | POSSIBLE | BIRD | E |
| WOODPECKER, RED-COCKADED *(Picoides borealis)* | KNOWN | BIRD | E |
| **COUNTY: HENRY** | | | |
| BAT, INDIANA *(Myotis sodalis)* | POSSIBLE | MAMMAL | E |
| EAGLE, BALD *(Haliaeetus leucocephalus)* | KNOWN | BIRD | E |
| STORK, WOOD *(Mycteria americana)* | POSSIBLE | BIRD | E |
| TRILLIUM, RELICT *(Trillium reliquum)* | KNOWN | PLANT | E |

**COUNTY: HOUSTON**

## ENDANGERED SPECIES BY COUNTY LIST

**STATE: ALABAMA**

| | CERTAINTY OF OCCURRENCE | GROUP | STATUS |
|---|---|---|---|
| *(Cyprinella caerulea)* | | | |
| WOODPECKER, RED-COCKADED *(Picoides borealis)* | KNOWN | BIRD | E |
| COUNTY: TALLAPOOSA | | | |
| BAT, INDIANA *(Myotis sodalis)* | POSSIBLE | MAMMAL | E |
| EAGLE, BALD *(Haliaeetus leucocephalus)* | KNOWN | BIRD | E |
| COUNTY: TUSCALOOSA | | | |
| BAT, INDIANA *(Myotis sodalis)* | POSSIBLE | MAMMAL | E |
| MUSSEL, DARK PIGTOE *(Pleurobema furvum)* | KNOWN | CLAM | E |
| MUSSEL, FINE-LINED POCKETBOOK *(Lampsilis altilis)* | KNOWN | CLAM | T |
| MUSSEL, ORANGE-NACRE MUCKET *(Lampsilis perovalis)* | KNOWN | CLAM | T |
| MUSSEL, OVATE CLUBSHELL *(Pleurobema perovatum)* | KNOWN | CLAM | E |
| MUSSEL, SOUTHERN CLUBSHELL *(Pleurobema decisum)* | KNOWN | CLAM | E |
| TURTLE, FLATTENED MUSK *(Sternotherus depressus)* | KNOWN | REPTILE | T |
| WOODPECKER, RED-COCKADED *(Picoides borealis)* | KNOWN | BIRD | E |
| COUNTY: WALKER | | | |
| BAT, INDIANA *(Myotis sodalis)* | POSSIBLE | MAMMAL | E |
| BUTTONS, MOHR'S BARBARA'S *(Marshallis mohrii)* | KNOWN | PLANT | T |
| MUSSEL, OVATE CLUBSHELL *(Pleurobema perovatum)* | KNOWN | CLAM | E |
| MUSSEL, TRIANGULAR KIDNEYSHELL *(Ptychobranchus greeni)* | KNOWN | CLAM | E |
| TURTLE, FLATTENED MUSK *(Sternotherus depressus)* | KNOWN | REPTILE | T |
| COUNTY: WASHINGTON | | | |
| MUSSEL, INFLATED HEELSPLITTER *(Potamilius inflatus)* | KNOWN | CLAM | T |
| SNAKE, EASTERN INDIGO | POSSIBLE | REPTILE | T |

# REFERENCE 14

STATE OF ALABAMA
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
64 NORTH UNION STREET
MONTGOMERY, ALABAMA 36130

GUY HUNT
GOVERNOR

JAMES D. MARTIN
COMMISSIONER

WM. C. "BILL" GOOLSBY
ASSISTANT COMMISSIONER

DIVISION OF GAME AND FISH
CHARLES D. KELLEY
DIRECTOR

SAM L. SPENCER
ASSISTANT DIRECTOR

March 19, 1992

**M E M O R A N D U M**

TO: District Supervisors

FROM: William C. Reeves *William C Reeves*
Assistant Chief of Fisheries

RE: Alabama Endangered Species List

The attached list was provided by Non-Game Coordinator Jim Woehr for your use and files.

WCR:ms

Attachment

cc: Fred Harders
Joe Addison
Danny Thompson
Stan Cook
Jon Hornsby

## ALABAMA

## FEDERALLY LISTED ENDANGERED/THREATENED SPECIES

10/16/91

| TAXA | PRIORITY | STATUS | COMMON/SCIENTIFIC NAMES | Distribution |
|---|---|---|---|---|
| **Mammals** (7) | 6C | E | Florida panther (*Felis concolor coryi*) | Statewide |
| | 8 | E | Gray bat (*Myotis grisescens*) | Tennessee Valley to Conecuh Co. |
| | 5 | E | Red wolf (*Canis rufus*) | Statewide |
| | 3C | ECH | Alabama beach mouse (*Peromyscus polionotus ammobates*) | Coastal,Baldwin C |
| | 8 | ECH | Indiana bat (*Myotis sodalis*) | Extreme North |
| | 3C | ECH | Perdido Key beach mouse (*Peromyscus polionotus trissyllepsis*) | Coastal,Baldwin C |
| | 5C | ECH | West Indian (Florida) Manatee (*Trichechus manatus*) | Coastal waters |
| **Birds** (9) | 5 | E | Bachman's warbler (*Vermivora bachmanii*) | Statewide |
| | 5 | E | Eskimo curlew (*Numenius borealis*) | Statewide |
| | 5 | E | Ivory-billed woodpecker (*Campephilus principalis* | South, west-centr |
| | 8C | E | Red-cockaded woodpecker (*Picoides borealis*) | Statewide |
| | 5C | E | Wood stork (*Mycteria americana*) | Statewide |
| | 8C | E,T | Bald eagle (*Haliaeetus leucocephalus*) | Statewide |
| | 5C | E,T | Piping plover (*Charadrius melodus*) | Coastal |

| TA | PRIORITY | STATUS | COMMON/SCIENTIFIC NAMES | DISTRIBUTION |
|---|---|---|---|---|
| | 9 | ECH | American peregrine falcon (*Falco peregrinus anatum*) | Statewide |
| | 15 | T | Arctic peregrine falcon (*Falco peregrinus tundrius* | Statewide |
| **Reptiles** (10) | 2 | E | Kemp's (Atlantic) ridley sea turtle (*Lepidocheyls kempii*) | Coastal waters |
| | 2C | E,T | Green sea turtle (*Chelonia mydas*) | Coastal waters |
| | 1C | ECH | Hawkbill sea turtle (=carey) (*Eretmochelys imbricata*) | Coastal waters |
| | 13 | ECH | Leatherback sea turtle (*Dermochelys coriacea*) | Coastal waters |
| | 12 | T | Eastern indigo snake (*Drymarchon corais couperi*) | Extreme South |
| | 14 | T | Flattened musk turtle (*Sternotherus depressus*) | Upper Black Warri River System |
| | 8 | T | Gopher tortoise (*Gopherus polyphemus*) | South |
| | 7C | T | Loggerhead sea turtle (*Caretta caretta*) | Coastal waters |
| | 14 | T(S/A) | American alligator (*Alligator mississippiensis*) | Coastal plain |
| | 2 | E | Alabama red-bellied turtle (*Pseudemys alabamensis*) | Mobile-Tensaw Delta Region |

| TAXA | PRIORITY | STATUS | COMMON/SCIENTIFIC NAMES | DISTRIBUTION |
|---|---|---|---|---|
| **Amphibians** (1) | 7 | T | Red Hills salamander (*Phaeognathus hubrichti*) | South Central |
| **FISH** (10) | 5 | E | Boulder Darter (=Elk River) (*Etheostoma nothonotus*) sp. | North Alabama |
| | ? | E | Cahaba shiner (*Notropis cahabae*) | Cahaba River |
| | 2 | E | Watercress darter (*Etheostoma nuchale*) | Jefferson County |
| | 1 | ECH | Alabama cavefish (*Speoplatyrhinus poulsoni*) | Lauderdale County |
| | 5 | ECH | Amber darter (*Percina antesella*) | Upper Coosa River |
| | ? | T | Gulf sturgeon (*Acipenser oxyrhynchus desotoi*) | Coastal Delta |
| | 10 | T | Pygmy sculpin (*Cottus pygmaeus*) | Calhoun County |
| | 11 | T | Snail darter (*Percina tanasi*) | Madison County<br>Jackson County |
| | 8C | TCH | Slackwater darter (*Etheostoma boschungi*) | Madison,Lauderdal<br>Limestone Countie |
| | 11 | TCH | Spotfin chub (*Hybopsis monacha*) | Lauderdale County<br>Colbert County |
| **Mollusks** (22) | 5 | E | Alabama lamp pearly mussel (*Lampsilis virescens*) | Paint Rock River<br>Hurricane Creek |
| | 4 | E | Cracking pearly mussel (*Hemistena* (=*Lastena*) *lata*) | Tennessee River |

| TA | PRIORITY | STATUS | COMMON/SCIENTIFIC NAMES | DISTRIBUTION |
|---|---|---|---|---|
| | 5C | E | Cumberland monkeyface pearly mussel (Quadrula intermedia) | Tennessee River |
| | 5C | E | Curtus' mussel (Pleurobema curtum) | Tombigbee River |
| | ? | E | Fanshell (Cyprogenia stegaria (=C.irrorata) | Tennessee River |
| | 5 | E | Fine-rayed pigtoe (Fusconia cuneolus) | Paint Rock River |
| | 5C | E | Judge Tait's mussel (Pleurobema taitianum) | Tombigbee River, Sipsey River |
| | 4 | E | Little-wing pearly mussel (Pegias fabula) | Tennessee River |
| | 5 | E | Marshall's mussel (Pleurobema marshalli) | Tombigbee River |
| | 5 | E | Orange-footed pearly mussel (Plethobasus cooperianus) | Tennessee River |
| | 5 | E | Pale lilliput pearly mussel (Toxolasma (=Carunculina) cylindrellus) | Paint Rock River, Hurricane Creek |
| | 2C | E | Penitent mussel (Epioblasma penita) | Tombigbee River Buttahatchie Rive |
| | 5 | E | Pink mucket pearly mussel (Lampsilis orbiculata) | Tennessee River Paint Rock River |
| | ? | E | Purple cat's paw mussel (Epioblasma(=Dysnomia) obliquata obliquata) | Tennessee River |
| | 5 | E | Ring pink mussel (Obovaria retusa) | Tennessee River |
| | 5 | E | Shiny pigtoe (Fusconaia edgariana) | Paint Rock River |

| TAXA | PRIORITY | STATUS | COMMON/SCIENTIFIC NAMES | DISTRIBUTION |
|---|---|---|---|---|
| | 5 | E | Stirrup shell (*Quadrula stapes*) | Tombigbee River, Sipsey River |
| | 5 | E | Turgid-blossom pearly mussel (*Epioblasma*(=*Dysnomia*) *turgidula*) | Tennessee River |
| | 5 | E | White wartyback pearly mussel (*Plethobasus cicatricosus*) | Tennessee River |
| | 6 | E | Yellow-blossom pearly mussel (*Epioblasma*(=*Dysnomia*)*florentina florentina* | Tennessee River |
| | ? | T | Inflated heelsplitter (*Potamilus inflatus*) | Black Warrior Riv to Mobile Bay |
| | ? | E | Tulotoma snail (*Tulotoma magnifica*) | Coosa River Syste |
| **Arthropods** | | | | |
| *Crustacea* (1) | | | | |
| | 5 | E | Alabama cave shrimp (*Palaemonias alabamae*) | Shelta Cave, Madison County |
| *Insecta* (1) | | | | |
| | ? | E | American burying beetle (*Nicrophorus americanus*) | Statewide |
| **Plants** | | | | |
| (14) | 6 | E | Alabama canebrake pitcher-plant (*Sarracenia rubra* ssp.*alabamensis*) | Central Alabama |
| | 2 | E | Alabama leather flower (*Clematis socialis*) | Northeast Alabama |
| | 8 | E | Green pitcher plant (*Sarracenia oreophila*) | Northeast Alabama |

| TAXA | PRIORITY | STATUS | COMMON/SCIENTIFIC NAMES | DISTRIBUTION |
|---|---|---|---|---|
| | 8 | E | Harperella<br>*Ptilimnium nodosum*(=*P.fluviatile*) | Northeast Alabama |
| | ? | E | Leafy prairie-clover<br>(*Dalea foliosa*) | North Alabama |
| | 8 | E | Pondberry<br>(*Lindera melissifolia*) | Wilcox County |
| | 8 | E | Relict trillium<br>(*Trillium reliquum*) | Southeast Alabama |
| | ? | E | Tennessee yellow-eyed grass<br>(*Xyris tennesseensis*) | North Alabama |
| | 9 | T | American hart's-tongue fern<br>(*Phyllitis scolopendrium* | North Alabama |
| | 11 | T | Kral's water-plantain<br>(*Sagittaria secundifolia*) | North Alabama |
| | 13 | T | Little amphianthus<br>(*Amphianthus pusillus*) | Piedmont |
| | ? | T | Lyrate bladder-pod<br>(*Lesquerella lyrata*) | North Alabama |
| | 8 | T | Mohr's Barbara's buttons<br>(*Marshallia mohrii*) | North Alabama |
| | 8 | T | Price's potato-bean<br>(*Apios priceana*) | North to South Central |

Total Animal Species: 61
Plant Species: 14

Status: E - endangered
CH- critical habitat has been designated
T - threatened
T(S/A)-threatened by similarity appearance

# REFERENCE 15

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Water Division - Water Quality Program

Chapter 335-6-11
Water Use Classifications
For Interstate and Intrastate Waters

SEP 1993
ADEM
SPECIAL PROJECTS

Table of Contents

335-6-11-.01 The Use Classification System
335-6-11-.02 Use Classifications

335-6-11-.01 The Use Classification System

(1) Use classifications utilized by the State of Alabama are as follows:

| | |
|---|---|
| Public Water Supply | PWS |
| Swimming and Other Whole Body Water-Contact Sports | S |
| Shellfish Harvesting | SH |
| Fish and Wildlife | F&W |
| Agricultural and Industrial Water Supply | A&I |
| Industrial Operations | IO |
| Navigation | N |
| Outstanding Alabama Water | OAW |

(2) Use classifications apply water quality criteria adopted for particular uses based on existing utilization, uses reasonably expected in the future, and those uses not now possible because of correctable pollution but which could be made if the effects of pollution were controlled or eliminated. Of necessity, the assignment of use classifications must take into consideration the physical capability of waters to meet certain uses.

(3) Those use classifications presently included in the standards are reviewed informally by the Department's staff as the need arises, and the entire standards package, to include the use classifications, receives a formal review at least once each three years. Efforts currently underway through local 201 planning projects will provide additional technical data on certain streams in the State, information on treatment alternatives, and applicability of various management techniques, which, when available, will hopefully lead to new decisions regarding use classifications. Of particular interest are those segments which are currently classified for any usage which has an associated degree of quality criteria considered to be less than that applicable to a classification of "Fish and Wildlife." As rapidly as it can be demonstrated that new classifications are feasible on these segments from an economic and technological viewpoint, based on the information being generated pursuant to staff studies and the planning efforts previously outlined, such improvement will be sought.

(14) THE WARRIOR RIVER BASIN

INTRASTATE WATERS

| Stream | From | To | Classification(s) |
|---|---|---|---|
| WARRIOR RIVER | TOMBIGBEE RIVER | Five miles upstream from Big Prairie Creek | S/F&W |
| WARRIOR RIVER | Five miles upstream from Big Prairie Creek | Eight miles upstream from Big Prairie Creek | PWS/S/F&W |
| WARRIOR RIVER | Eight miles upstream from Big Prairie Creek | Warrior Lock and Dam | S/F&W |
| WARRIOR RIVER | Warrior Lock and Dam | Oliver Lock and Dam | F&W |
| WARRIOR RIVER | Oliver Lock and Dam | Hurricane Creek | F&W[1] |
| WARRIOR RIVER | Hurricane Creek | Bankhead Lock and Dam | S/F&W[1] |
| WARRIOR RIVER | Bankhead Lock and Dam | Junction of Locust and Mulberry Forks | PWS/S/F&W |
| Locust Fork | Junction of Locust and Mulberry Forks | Jefferson County Highway 61 (Maxine) | PWS/S/F&W |
| Locust Fork | Jefferson County Highway 61 (Maxine) | U. S. Highway 31 | F&W |
| Locust Fork | U. S. Highway 31 | County road between Hayden and County Line | PWS/F&W |
| Locust Fork | County road between Hayden and County Line | Its source | F&W |
| Mulberry Fork | Junction of Locust and Mulberry Forks | Burnt Cane Creek (9 miles below Cordova) | PWS/S/F&W |
| Mulberry Fork | Burnt Cane Creek (9 miles below Cordova) | Frog Ague Creek (Cordova) | PWS/F&W |
| Mulberry Fork | Frog Ague Creek (Cordova) | Junction of Mulberry and Sipsey Forks | PWS/F&W |
| Mulberry Fork | Junction of Mulberry and Sipsey Forks | Its source | F&W |
| Sipsey Fork | Junction of Mulberry and Sipsey Forks | Lewis Smith Dam | PWS/F&W |

[1]Applicable dissolved oxygen level below existing impoundments is 4.0 mg/l.

INTRASTATE WATERS (cont.)

| Stream | From | To | Classification |
|---|---|---|---|
| Lake Lewis Smith on Sipsey Fork | Lewis Smith Dam | Three miles upstream from Lewis Smith Dam | PWS/S/F |
| Lake Lewis Smith on Sipsey Fork | Three miles upstream from Lewis Smith Dam | Reservoir limits | S/F&W |
| Sipsey Fork | Lake Lewis Smith | Sandy Creek | F&W |
| Sipsey Fork and tributaries | Sandy Creek | Its source | F&W[3] |
| Big Prairie Creek | Head of backwater above Demopolis Lock and Dam on WARRIOR RIVER | Its source | F&W |
| Cottonwood Creek | Big Prairie Creek | Its source | F&W |
| White Creek | WARRIOR RIVER | Its source | F&W |
| Big Brush Creek | WARRIOR RIVER | Its source | F&W |
| Colwell Creek | Big Brush Creek | Its source | F&W |
| Minter Creek | WARRIOR RIVER | Its source | F&W |
| Five Mile Creek | WARRIOR RIVER | Payne Lake in Talladega National Forest | F&W |
| Payne Lake in Talladega National Forest | | | S |
| Elliotts Creek | WARRIOR RIVER | Its source | F&W |
| Cypress Creek | WARRIOR RIVER | Its source | F&W |
| North River | WARRIOR RIVER | City of Tuscaloosa's water supply reservoir dam | F&W |
| North River | City of Tuscaloosa's water supply reservoir dam | Binnion Crek | PWS/S |
| North River | Binnion Creek | Its source | F&W |
| Binnion Creek | North River | Its source | F&W |
| Cedar Creek | North River | Its source | F&W |

[3]The special designation of Outstanding National Resource Water applies to this segment.

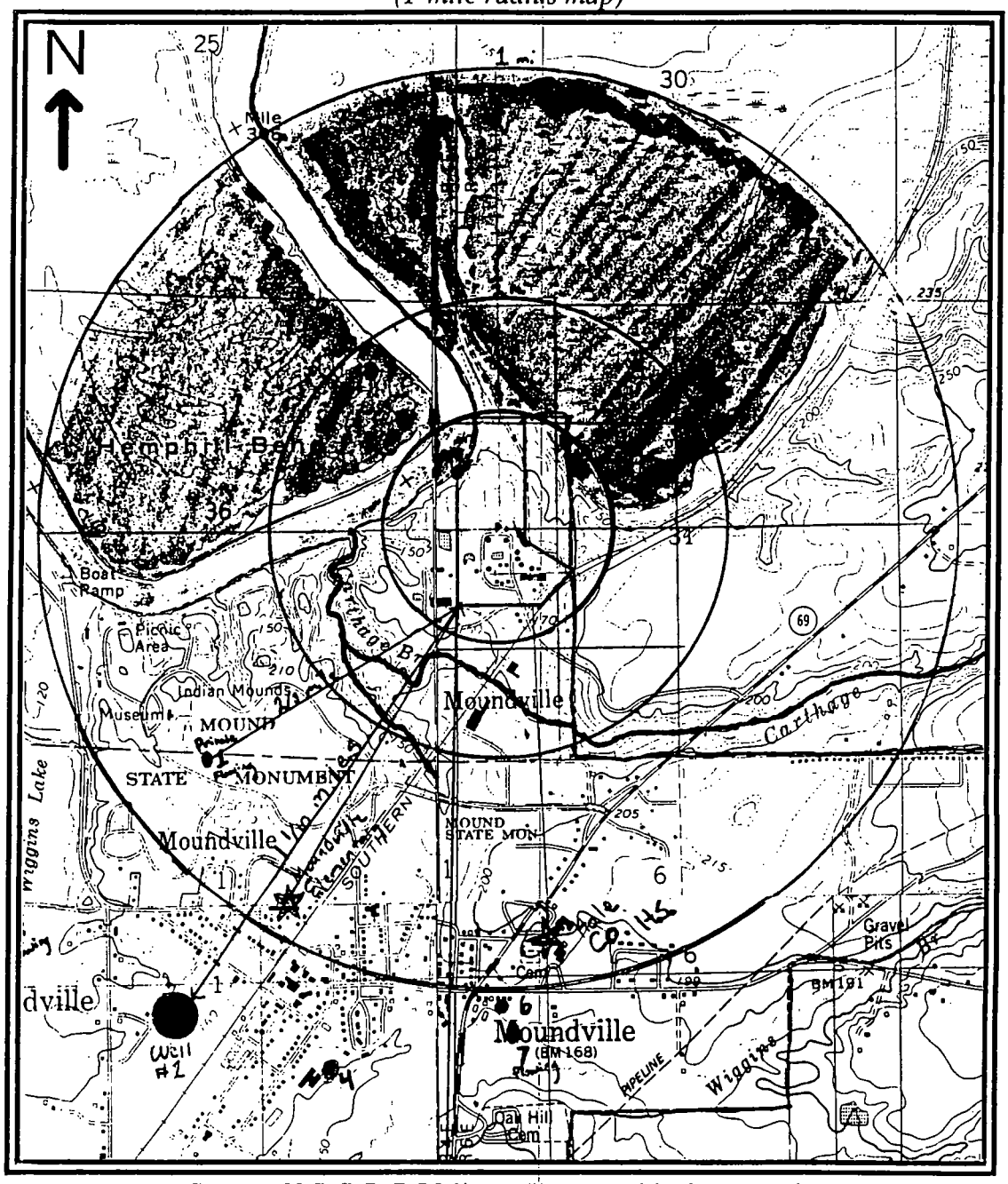
INTRASTATE WATERS (cont.)

| Stream | From | To | Classification(s) |
|---|---|---|---|
| Clear Creek | North River | Bays Lake Dam | F&W |
| Clear Creek | Bays Lake Dam | Its source | PWS |
| Hurricane Creek | WARRIOR RIVER | Its source | F&W |
| Yellow Creek | WARRIOR RIVER | City of Tuscaloosa's water supply reservoir dam | F&W |
| Yellow Creek | City of Tuscaloosa's water supply reservoir dam | Its source | PWS |
| Davis Creek | WARRIOR RIVER | Its source | F&W |
| Blue Creek | WARRIOR RIVER | Its source | F&W |
| Big Yellow Creek | WARRIOR RIVER | Its source | S/F&W |
| Valley Creek | WARRIOR RIVER | Head of backwater above Bankhead Lock and Dam | F&W |
| Valley Creek | Head of backwater above Bankhead Lock and Dam | County road crossing 1 1/2 miles NE of Johns | A&I |
| Valley Creek | County road crossing 1 1/2 miles NE of Johns | Opossum Creek | IO |
| Valley Creek | Opossum Creek | Its source | A&I |
| Opossum Creek | Valley Creek | Its source | IO |
| Village Creek | Locust Fork | Its source | A&I |
| Five Mile Creek | Locust Fork | Ketona | A&I |
| Five Mile Creek | Ketona | Its source | F&W |
| Turkey Creek | Locust Fork | Its source | F&W |
| Cunningham Branch | Turkey Creek | Its source | F&W |
| Self Creek | Locust Fork | Town of Bradford's water supply intake | F&W |
| Self Creek | Town of Bradford's water supply intake | Its source | PWS |

# FIGURES

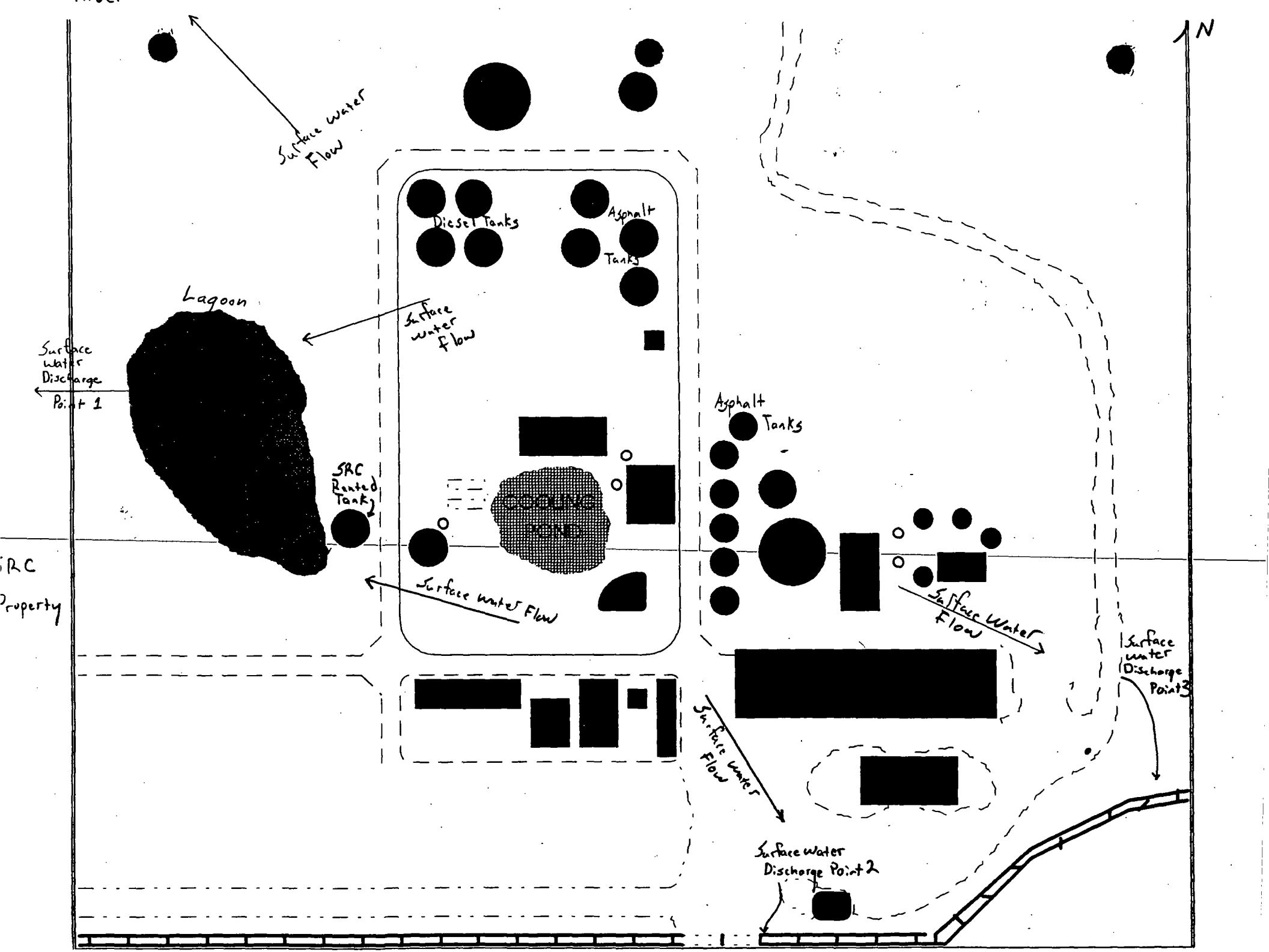
# FIGURE 1

**FIGURE 1**
**Cracker Asphalt Facility Site**
*(1-mile radius map)*




Source: U.S.G.S. 7.5 Minute Topographic Quadrangle

# FIGURE 2


N
Surface water Flow
Diesel Tanks
Asphalt Tanks
Lagoon
Surface water Flow
Surface water Discharge Point 1
Asphalt Tanks
SRC Rented Tank
COOLING POND
SRC Property
Surface water Flow
Surface Water Flow
Surface water Discharge Point 3
Surface water Flow
Surface Water Discharge Point 2

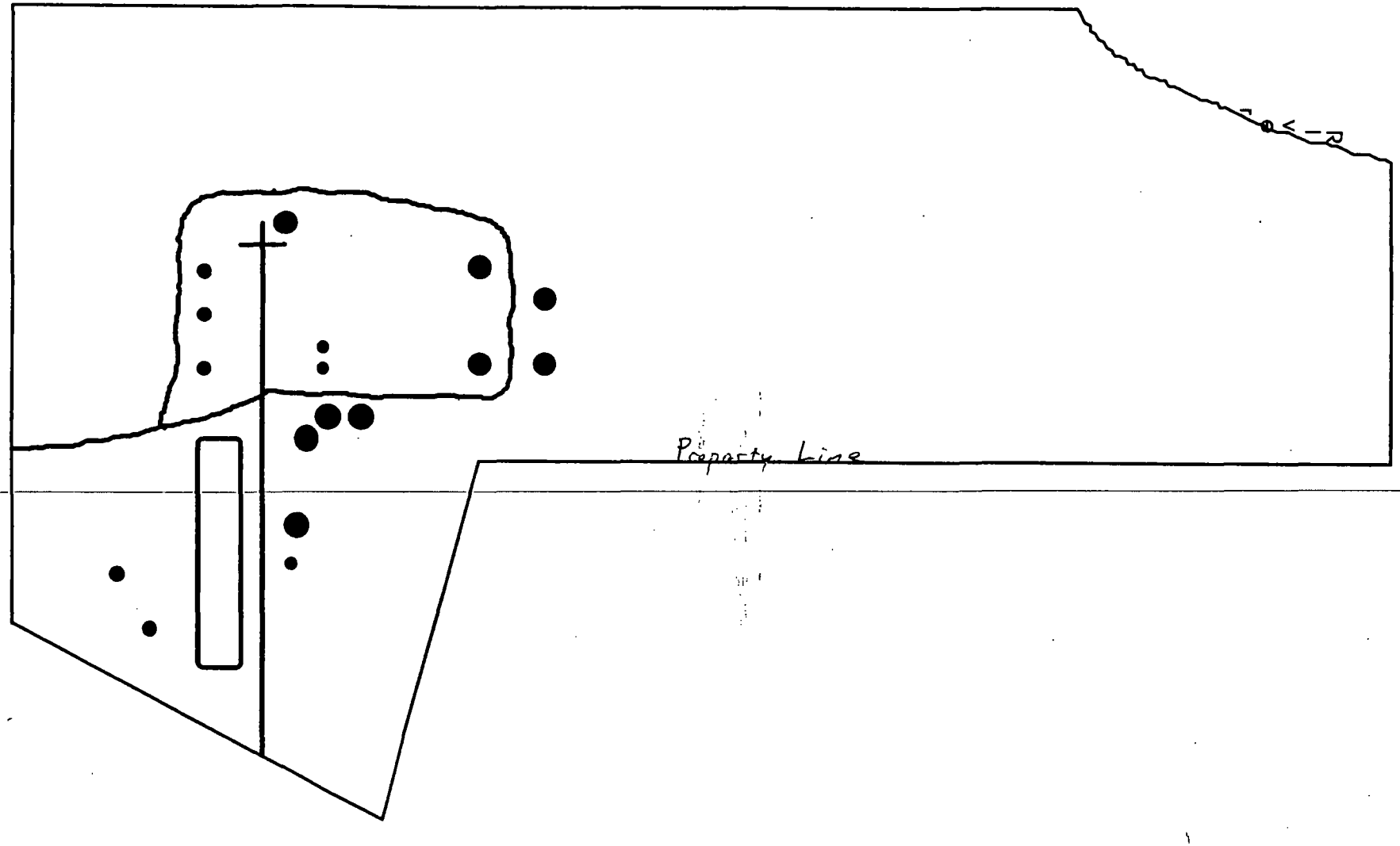

Property Line

Photo 1:

Photo 2:

Photo 3:

Photo 4:

Photo 5:

Photo 6:

Photo 7:

Photo 8:

Photo 9:

Photo 10:

Photo 11:

Photo 12:

Photo 13:

Photo 14:

Photo 15:

Photo 16:

Photo 17:

Photo 18:

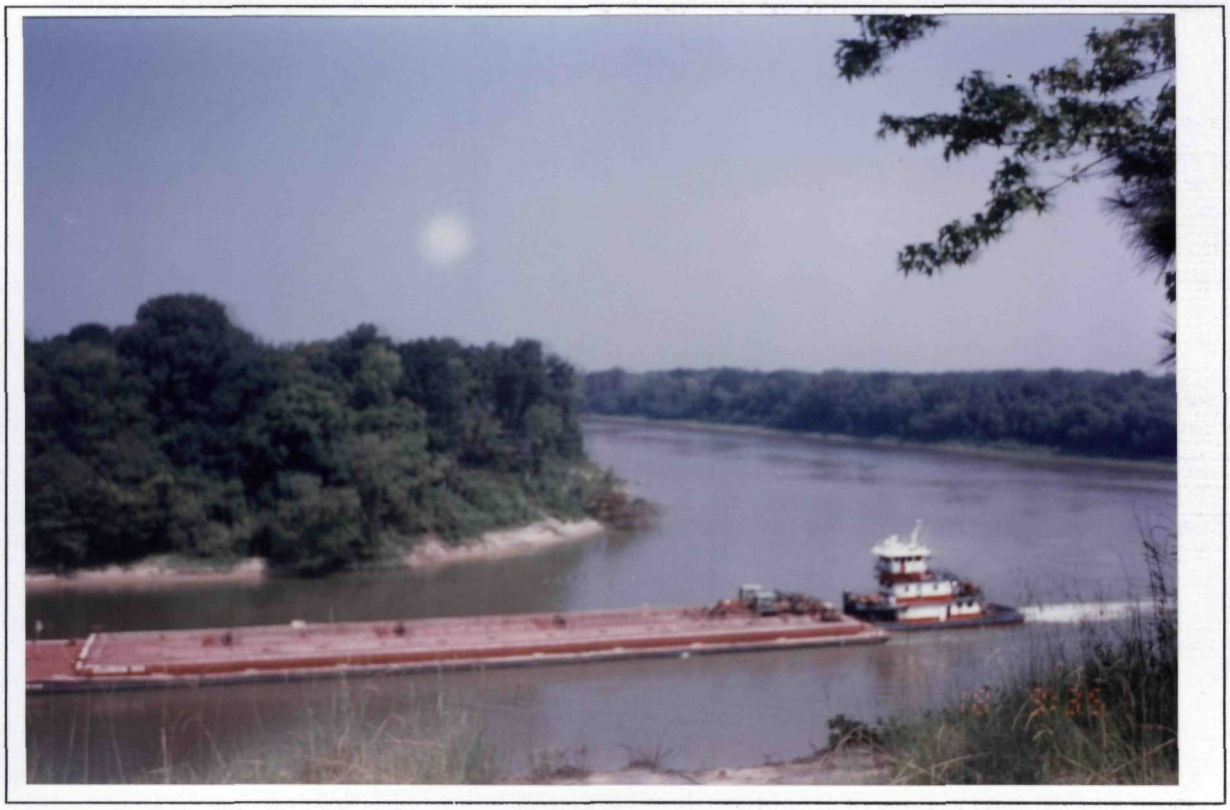


Photo 19:

Photo 20:

Photo 21:

Photo 22:

Photo 23:

Photo 24:

Photo 25:

Photo 26:

Photo 27:

Photo 28:

Photo 29:

Photo 30:

Photo 31:

# APPENDICES

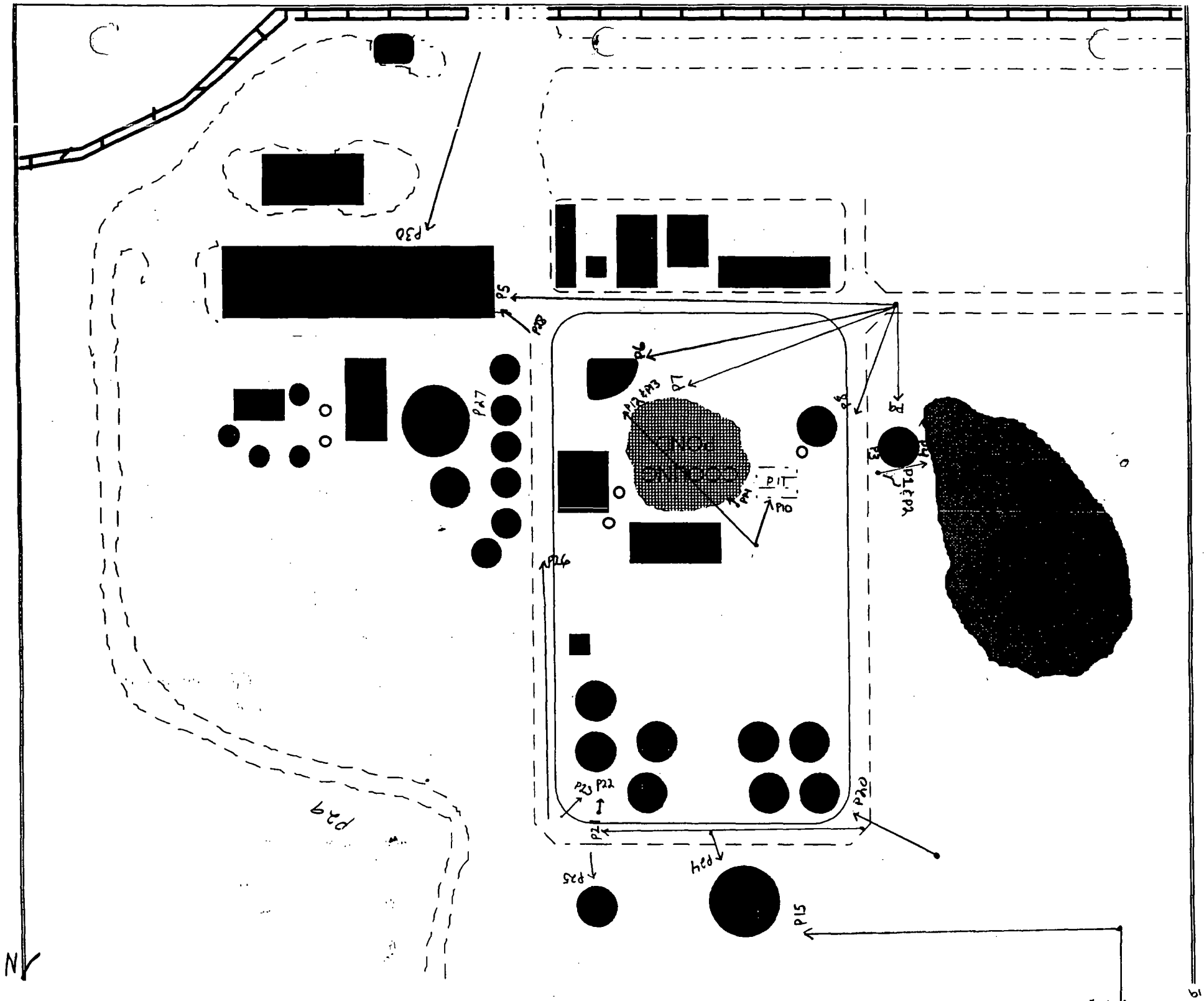
# APPENDIX A

## PHOTO LOG

SITE NAME: Cracker Asphalt
SITE NUMBER: 6243
DATE PHOTOS TAKEN: August 18, 1994

| PHOTO # | DESCRIPTION |
|---|---|
| 1 | Tank leased to SRC & Lagoon in back |
| 2 | " " |
| 3 | Waste left Behind by SRC |
| 4 | bear at SRC Tank * Note Sheen on water |
| 5 | looking east from SW Corner of CAF |
| 6 | " " |
| 7 | looking Northeast from SW Corner of CAF |
| 8 | looking Northeast from SW Corner of CAF |
| 9 | looking north from SW Corner of Site |
| 10 | looking South at Skimmer trenches |
| 11 | Skimmer trench * Note Sheen on water |
| 12 | looking SE at Sediment filled Cooling pond |
| 13 | " " |
| 14 | looking East at Cooling Pond |
| 15 | looking west from point 100 yards South of NW Corner |
| 16 | looking north from point 100 yards South of NW Corner |
| 17 | looking at river at NW corner of Site |
| 18 | Geology of River Bank at NW Corner of Site |
| 19 | looking at River from NW Corner of Site |
| 20 | looking at Diesel tanks at NW Corner of Site road |
| 21 | looking east down northern Site road |
| 22 | looking at asphalt material on ground at NE Corner of Site road |
| 23 | tanks at NE Corner of Site Road |
| 24 | large tank north of northern Site road |
| 25 | Smaller tank north of northern Site road |
| 26 | looking South down eastern Site road |
| 27 | tanks in Southeast Section of Site |
| 28 | large building used to make tank heads |
| 29 | Methane well located east of Site |
| 30 | Entrance to Cracker Asphalt |
| 31 | looking East down river from Mandeville Park |
| ~~32~~ | tank northwest corner of Site can be seen in photo |
| ~~33~~ | |
| ~~34~~ | |
| ~~35~~ | |
| ~~36~~ | |

See Map for better description of Photo location



P30
P5
P28
P6
P7
P12 & P13
P27
P11
P10
P26
P23
P22
P21
P20
P25
P24
P15
P29
N

# APPENDIX B

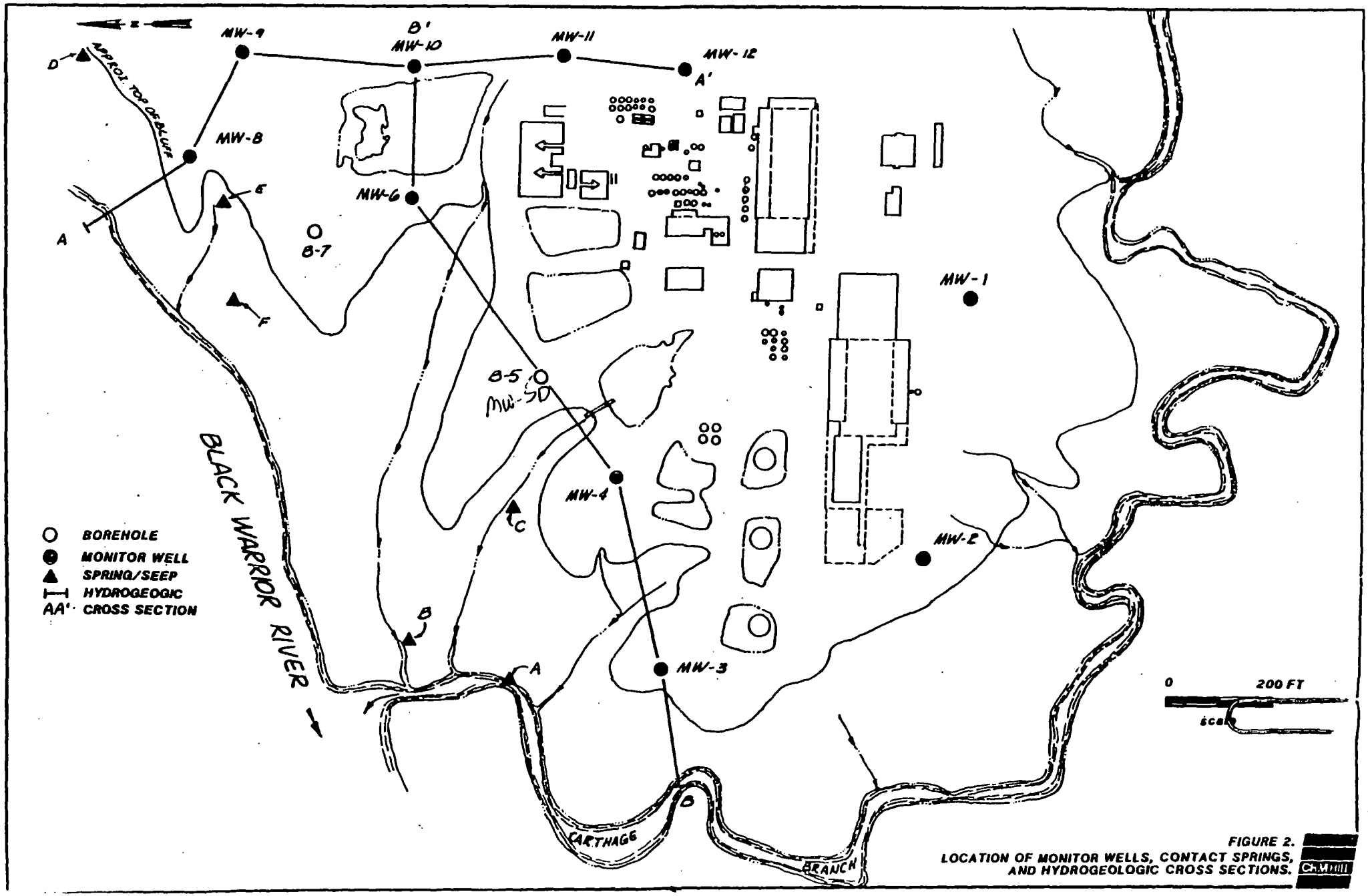



FIGURE 2.
LOCATION OF MONITOR WELLS, CONTACT SPRINGS, AND HYDROGEOLOGIC CROSS SECTIONS.

**Southern Resins - Lawter International**
**Tuscaloosa County**

| WELL NO. | DATE | BENZENE ug/l | ETHYL-BENZENE ug/l | PROPYL-BENZENE ug/l | TOLUENE ug/l | 1,3,5 TRIMETHYL BENZENE ug/l | 1,2,4 TRIMETHYL BENZENE ug/l | M/P-XYLENE ug/l | STYRENE ug/l | DICYCLO-PENTADIENE mg/l | NAPHTHALENE mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-1 | 03/16/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 06/26/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 09/25/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 12/13/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 06/07/91 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 12/12/91 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 03/13/92 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 09/16/92 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 06/09/93 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 10 | <0.005 | <0.005 |
| | 12/30/93 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| MW-2 | 03/16/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 06/26/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 09/25/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 12/13/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 06/07/91 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 12/12/91 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 03/13/92 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 09/16/92 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 06/09/93 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 7.1 | <0.005 | <0.005 |
| | 12/30/93 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| MW-3 | 03/16/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.01 | <0.01 |
| | 06/26/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 09/25/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 12/13/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 06/07/91 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 12/12/91 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 03/13/92 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 09/16/92 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 06/09/93 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 12/30/93 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| MW-4 | 03/16/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.01 | <0.01 |
| | 06/26/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 09/25/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 12/13/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 06/07/91 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 12/12/91 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 03/13/92 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 09/16/92 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 06/09/93 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 12/30/93 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |

**Southern Resins - Lawter International**
**Tuscaloosa County**

| WELL NO. | DATE | BENZENE ug/l | ETHYL-BENZENE ug/l | PROPYL-BENZENE ug/l | TOLUENE ug/l | 1,3,5 TRIMETHYL BENZENE ug/l | 1,2,4 TRIMETHYL BENZENE ug/l | M/P-XYLENE ug/l | STYRENE ug/l | DICYCLO-PENTADIENE mg/l | NAPHTHALENE mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-5 | 03/16/90 | 20 | 10.2 | 45.2 | 5 | 77.6 | 53.3 | 21.6 | 37.6 | 0.13 | <0.01 |
| | 06/26/90 | 97 | 35 | 16 | 27 | 27 | 98 | 200 | <5.0 | 0.012 | 0.303 |
| | 09/25/90 | 74 | 6 | <5.0 | 11 | 35 | 86 | 211 | <5.0 | 0.008 | 0.098 |
| | 12/13/90 | 73 | 30 | 11 | 21 | 43 | 109 | 220 | <5.0 | 0.015 | 0.266 |
| | 06/07/91 | 85.9 | <5.0 | <5.0 | 15.4 | 45.5 | 134 | 287 | 9.45 | 0.0203 | 0.67 |
| | 12/13/91 | 87.7 | 52.8 | 21.4 | 23 | 31.4 | 124 | 324 | 16.2 | 0.02 | 0.805 |
| | 03/13/92 | 83.7 | 12.6 | <5.0 | 17.1 | 37.7 | 97.5 | 264 | 10.3 | 0.0257 | 0.241 |
| | 09/16/92 | 39.6 | 46.7 | <5.0 | <5.0 | 26.8 | 67.8 | 186 | 5.81 | 0.0182 | 0.183 |
| | 06/09/93 | 60.9 | 43.5 | 17.6 | 19.8 | 24.6 | 69.7 | 173 | 7.7 | 0.0177 | 0.41 |
| | 12/30/93 | 105 | 77.6 | 25.8 | 28.4 | 26.1 | 92.3 | 361 | 10 | 0.0259 | 0.388 |
| MW-6 | 03/16/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 2.58 | 2.11 |
| | 06/26/90 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 2.7 | 1.9 | <0.5 | 0.0014 | 0.0101 |
| | 09/25/90 | <25.0 | <25.0 | <25.0 | <25.0 | 206 | 188 | 418 | <25.0 | 0.876 | <0.005 |
| | 12/13/90 | 379 | 186 | 46 | 41 | 347 | 373 | 669 | 328 | 1.004 | <0.005 |
| | 06/07/91 | <25.0 | 22.9 | 9.51 | <25.0 | 198 | 219 | 314 | 56.4 | 1.54 | 2.18 |
| | 12/13/91 | <12.5 | <12.5 | <12.5 | <12.5 | 19.5 | 148 | 213 | 33.8 | 1.42 | 2.45 |
| | 03/13/92 | <12.5 | <12.5 | <12.5 | <12.5 | <12.5 | 19.4 | 44.1 | <12.5 | 0.433 | 0.131 |
| | 09/16/92 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 31.3 | 39.9 | 7.15 | 0.247 | 0.225 |
| | 06/09/93 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 0.502 | 0.0163 |
| | 12/30/93 | 9.6 | <5.0 | <5.0 | <5.0 | 18.3 | 128 | 169 | 9.5 | 1.46 | 0.464 |
| MW-8 | 03/16/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.01 | <0.01 |
| | 06/26/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 09/25/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 12/13/90 | 7.06 | <5.0 | <5.0 | <5.0 | <5.0 | 10.2 | 10.7 | <5.0 | <0.005 | 0.015 |
| | 06/07/91 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 12/13/91 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 5.11 | 6.1 | <5.0 | 0.00795 | 0.0119 |
| | 03/13/92 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 09/16/92 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | 0.0249 |
| | 06/09/93 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 12/30/93 | 6.6 | <5.0 | <5.0 | <5.0 | <5.0 | 11.3 | 11.7 | <5.0 | <0.005 | 0.0392 |
| MW-9 | 03/16/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.01 | <0.01 |
| | 06/26/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 09/25/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 12/13/90 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 06/07/91 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 12/13/91 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 03/13/92 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 09/16/92 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | 0.00513 |
| | 06/09/93 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <0.005 | <0.005 |
| | 12/30/93 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 9.3 | 6.8 | <5.0 | 0.005 | 0.0173 |

**Southern Resins - Lawter International**
**Tuscaloosa County**

| WELL NO. | DATE | BENZENE ug/l | ETHYL-BENZENE ug/l | PROPYL-BENZENE ug/l | TOLUENE ug/l | 1,3,5 TRIMETHYL BENZENE ug/l | 1,2,4 TRIMETHYL BENZENE ug/l | M/P-XYLENE ug/l | STYRENE ug/l | DICYCLO-PENTADIENE mg/l | NAPHTHALENE mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-10 | 03/16/90 | 5 | <5 | 6 | <5 | 107 | 133 | 36.2 | 100 | 0.551 | 0.611 |
| | 06/26/90 | <100 | <100 | <100 | <100 | <100 | 121 | 453 | <100 | 0.266 | 1.08 |
| | 09/25/90 | 12 | <10 | <10 | <10 | 39 | 112 | 269 | <10 | 0.211 | 0.053 |
| | 12/13/90 | 35 | 86 | 37 | 46 | 67 | 150 | 462 | 106 | 0.302 | 0.818 |
| | 06/07/91 | 43.7 | 120 | 44.5 | 31.9 | 199 | 715 | 761 | 152 | 0.943 | 0.943 |
| | 12/13/91 | <25 | <25 | <25 | <25 | <25 | 30.8 | 128 | <25 | 0.343 | 1.55 |
| | 03/13/92 | 40 | 106 | 39.6 | 35.4 | 55.3 | 289 | 367 | 51.9 | 0.468 | 1.08 |
| | 09/16/92 | <12.5 | 18.5 | <12.5 | <12.5 | <12.5 | 49.3 | 121 | <12.5 | 0.321 | 0.633 |
| | 06/09/93 | 8.8 | 17.4 | <8.5 | <8.5 | 14.7 | 82 | 108 | <8.5 | 0.38 | 2.76 |
| | 12/30/93 | <8.5 | 25.3 | 16.2 | <8.5 | <8.5 | <8.5 | 28.8 | <8.5 | 0.178 | 0.39 |
| MW-11 | 03/16/90 | 10.8 | 11.8 | 266 | <5 | 1373 | 908 | 42 | 71.6 | 2.86 | 1.14 |
| | 06/26/90 | <250 | 402 | <250 | <250 | <250 | 3420 | 4090 | 514 | 0.39 | 2.59 |
| | 09/25/90 | <100 | 669 | 211 | 162 | 946 | 2240 | 4790 | 815 | 0.391 | 2.06 |
| | 12/13/90 | 232 | 860 | 439 | 162 | 1610 | 4740 | 4580 | 714 | 0.596 | 2.94 |
| | 06/07/91 | 198 | 817 | 430 | 132 | 1400 | 5240 | 3830 | 614 | 0.485 | 5.59 |
| | 12/13/91 | <250 | 443 | <250 | <250 | 746 | 3860 | 2830 | 337 | 0.436 | 2.59 |
| | 03/13/92 | <250 | 739 | 415 | <250 | 1100 | 3860 | 4130 | 500 | 0.542 | 2.39 |
| | 09/16/92 | 217 | 629 | 396 | <125 | 1050 | 3300 | 3400 | 392 | 0.485 | 2.96 |
| | 06/09/93 | 225 | 702 | 205 | 147 | 1120 | 3190 | 3540 | 366 | 0.656 | 2.59 |
| | 12/30/93 | 253 | 649 | 356 | 112 | 993 | 4980 | 3490 | 330 | 0.6 | 2.94 |
| MW-12 | 03/16/90 | <5 | 8.4 | 42 | <5 | 126 | 79.3 | 32.4 | 54.2 | 0.207 | 0.022 |
| | 06/26/90 | <100 | <100 | <100 | <100 | <100 | 339 | 710 | <100 | <0.1 | 0.46 |
| | 09/25/90 | <25 | 101 | 46 | 36 | 135 | 348 | 737 | 122 | 0.027 | 0.461 |
| | 12/13/90 | 56 | 191 | 96 | 78 | 250 | 607 | 1040 | 217 | 0.072 | 0.774 |
| | 06/07/91 | 43.6 | 164 | 74.1 | 69.1 | 236 | 567 | 932 | 206 | 0.0752 | 1.04 |
| | 12/13/91 | 96.9 | 194 | 82.8 | 78.4 | 208 | 482 | 1110 | 194 | 0.113 | 0.937 |
| | 03/13/92 | 91.1 | 238 | 127 | 100 | 237 | 650 | 1220 | 248 | 0.115 | 0.723 |
| | 09/16/92 | 133 | 272 | 129 | 127 | 290 | 614 | 1310 | 339 | 0.186 | 0.732 |
| | 06/09/93 | 105 | 163 | 34.7 | 104 | 238 | 610 | 1030 | 172 | 0.132 | 1.36 |
| | 12/30/93 | 116 | 395 | 129 | 111 | 275 | 1850 | 5230 | 255 | 0.181 | 1.08 |

87-163-WO-29

106

STATE OF ALABAMA
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
MONTGOMERY, ALABAMA

LABORATORY: (X) Montgomery ( ) Mobile ( ) Birmingham

Sample Type: Potable Water [ ] Landfill Leachate [ ] Toxic Extraction [ ] Composite [ ]
Surface Water [ ] Hazardous Wastesite [ ] Ignitability [X] Grab [ ]
Soil/Sediment [ ] Groundwater [ ] Corrosivity [ ] Container P [ ]
Wastewater [ ] Waste (Special Handling) [ ] Reactivity [ ] G [ ]

Source Tank Spillage Wesselhoeft Inc

Location Moundville AL

( ) Discharge from _____ (Point Source) to _____ (Receiving Water)

Comments _____ Preservative(s) None Glass

Check group of compounds or individual parameters

☐ Volatile Compounds

| ✓ | Method | ☐ GC ☐ GC/MS | Date 10/23 | Conc ug/l |
|---|---|---|---|---|
| | Methylene Chloride | | | |
| | Trichlorofluoromethane | | | |
| | 1,1-Dichloroethene | | | |
| | 1,1-Dichloroethane | | | |
| | Trans-1,2-Dichloroethene | | | |
| | Chloroform | | | |
| | 1,2-Dichloroethane | | | |
| | 1,1,1-Trichloroethane | | | |
| | Carbon Tetrachloride | | | |
| | Bromodichloromethane | | | |
| | 1,2-Dichloropropane | | | |
| | Trichloroethylene | | | |
| ✓ | Benzene | | | <10 |
| | Dibromochloromethane | | | |
| | 1,1,2-Trichloroethane | | | |
| | 2-Chloroethyl vinyl ether | | | |
| | Bromoform | | | |
| | 1,1,2,2-Tetrachloroethane | | | |
| | Tetrachloroethylene | | | |
| ✓ | Toluene | | | <10 |
| | Chlorobenzene | | | |
| ✓ | Ethyl Benzene | | | <10 |

☐ Miscellaneous

| ✓ | Method | ☐ GC ☐ GC/MS | Date | Conc |
|---|---|---|---|---|
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Fred Mason 10-7-86 10:45 Fred Mason 10-7-86 12:20

SAMPLE COLLECTED BY (Signature) DATE/TIME RELINQUISHED BY (Signature) DATE/TIME

RECEIVED BY (Signature) DATE/TIME RELINQUISHED BY (Signature) DATE/TIME

RECEIVED BY (Signature) DATE/TIME RELINQUISHED BY (Signature) DATE/TIME

B. Karentzee 10/7/86

RECEIVED IN LAB BY (Signature) DATE/TIME LABORATORY I.D. NO.

SEND REPORT TO: Fred Mason

ADEM FORM 237 4/85

87-164-WD-30

106

STATE OF ALABAMA
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
MONTGOMERY, ALABAMA

LABORATORY: [X] Montgomery ( ) Mobile ( ) Birmingham

Sample Type: Potable Water [ ] Landfill Leachate [ ] Toxic Extraction [ ] Composite [ ]
Surface Water [ ] Hazardous Wastesite [ ] Ignitability [ ] Grab [X]
Soil/Sediment [ ] Groundwater [ ] Corrosivity [ ] Container P [ ]
Wastewater [ ] Waste (Special Handling) [ ] Reactivity [ ] G [ ]

Source Asphalt Lagoon Wesselhoeft Inc

Location Moundville AL.

( ) Discharge from _____ (Point Source) to _____ (Receiving Water)

Comments _____ Preservative(s) _____

Check group of compounds or individual parameters

[ ] Base/Neutral Compounds

| ✓ | Method [ ] GC [ ] GC/MS | Date | Conc |
|---|---|---|---|
| | Bis (2-chloroethyl) ether | | |
| | 1,3- Dichlorobenzene | | |
| | 1,4- Dichlorobenzene | | |
| | 1,2- Dichlorobenzene | | |
| | Bis (2-Chloroisopropyl) ether | | |
| | Hexachloroethane | | |
| | N-nitroso-di-n-propylamine | | |
| | Nitrobenzene | | |
| | Isophorone | | |
| | Bis (2-Chloroethoxy) methane | | |
| | 1,2,4-Trichlorobenzene | | |
| ✓ | Naphthalene | | < 5 |
| | Hexachlorobutadiene | | |
| | Hexachlorocylopentadiene | | |
| | 2-Chloronaphthalene | | |
| | Acenaphthylene | | |
| | Dimethylphthalate | | |
| | 2,6-Dinitrotoluene | | |
| | Acenaphthene | | |
| | 2,4-Dinitrotoluene | | |
| | Fluorene | | |
| | 4-Chlorophenyl phenyl ether | | |
| | Diethyl phthalate | | |
| | N-nitrosodiphenylamine | | |
| | 1,2-Diphenylhydrazine | | |
| | 4-Bromophenyl phenyl ether | | |
| | Hexachlorobenzene | | |
| | Phenanthrene | | |
| | Anthracene | | |
| | Dibutyl phthalate | | |

| | | | |
|---|---|---|---|
| | Fluoranthene | | |
| | Pyrene | | |
| | Benzidine | | |
| | Butyl benzyl phthalate | | |
| | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | | |
| | Benzo (a) anthracene | | |
| | Chrysene | | |
| | 3,3'-Dichlorobenzidine | | |
| | Bis (2-ethylhexyl) phthalate | | |
| | Di-n-octyl phthalate | | |
| | Benzo (b) fluoranthene | | |
| | Benzo (k) fluoranthene | | |
| | Benzo (a) pyrene | | |
| | Indeno (1,2,3-cd) pyrene | | |
| | Dibenzo (a,h) anthracene | | |
| | Benzo (g,h,i,) perylene | | |
| | N-nitrosodimethylamine | | |

Styrene + Dicylopentadiene Present but no standard

[ ] Acid Compounds

| ✓ | Method [ ] GC [ ] GC/MS | Date | Conc |
|---|---|---|---|
| | Phenol | | |
| | 2-Chlorophenol | | |
| | 2-Nitrophenol | | |
| | 2-4-Dimethylphenol | | |
| | 2-4-Dichlorophenol | | |
| | 4-Chloro-3-methylphenol | | |
| | 2,4,6-Trichlorophenol | | |
| | 2,4-Dinitrophenol | | |
| | 4-Nitrophenol | | |
| | 2-Methyl-4,6-dinitrophenol | | |
| | Pentachlorophenol | | |

| SAMPLE COLLECTED BY (Signature) | DATE/TIME | RELINQUISHED BY (Signature) | DATE/TIME |
|---|---|---|---|
| Fred Mason | 10-7-86 10:30 | Fred Mason | 10-7-86 12:22 |
| RECEIVED BY (Signature) | DATE/TIME | RELINQUISHED BY (Signature) | DATE/TIME |
| | | | |
| RECEIVED BY (Signature) | DATE/TIME | RELINQUISHED BY (Signature) | DATE/TIME |
| B Rosenthal | 10/7/86 | | |
| RECEIVED IN LAB BY (Signature) | DATE/TIME | LABORATORY I.D. NO. | |

SEND REPORT TO: Fred Mason

ADEM FORM 335 4/85

STATE OF ALABAMA
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
MONTGOMERY, ALABAMA

LABORATORY: (X) Montgomery ( ) Mobile ( ) Birmingham

Sample Type: Potable Water [ ] Landfill Leachate [ ] Toxic Extraction [ ] Composite [ ]
Surface Water [ ] Hazardous Wastesite [ ] Ignitability [ ] Grab [X]
Soil/Sediment [ ] Groundwater [ ] Corrosivity [ ] Container P [ ]
Wastewater [ ] Waste (Special Handling) [ ] Reactivity [ ] G [ ]

Source Asphalt Lagoon - Wesselhoeft Inc.

Location Moundville, AL.

( ) Discharge from _____ (Point Source) to _____ (Receiving Water)

Comments _____ Preservative(s) _____

Check group of compounds or individual parameters

☐ Volatile Compounds

| ✓ | Method | ☐ GC ☐ GC/MS | Date 10/23 | Conc ug/l |
|---|---|---|---|---|
| | Methylene Chloride | | | |
| | Trichlorofluoromethane | | | |
| | 1,1-Dichloroethene | | | |
| | 1,1-Dichloroethane | | | |
| | Trans-1,2-Dichloroethene | | | |
| | Chloroform | | | |
| | 1,2-Dichloroethane | | | |
| | 1,1,1-Trichloroethane | | | |
| | Carbon Tetrachloride | | | |
| | Bromodichloromethane | | | |
| | 1,2-Dichloropropane | | | |
| | Trichloroethylene | | | |
| ✓ | Benzene | | | <10 |
| | Dibromochloromethane | | | |
| | 1,1,2-Trichloroethane | | | |
| | 2-Chloroethyl vinyl ether | | | |
| | Bromoform | | | |
| | 1,1,2,2-Tetrachloroethane | | | |
| | Tetrachloroethylene | | | |
| ✓ | Toluene | | | <10 |
| | Chlorobenzene | | | |
| ✓ | Ethyl Benzene | | | <10 |

☐ Miscellaneous

| ✓ | Method | ☐ GC ☐ GC/MS | Date | Conc |
|---|---|---|---|---|
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Fred Mason 10-7-86-1030 Fred Mason 10-7-86 12:22

SAMPLE COLLECTED BY (Signature) DATE/TIME RELINQUISHED BY (Signature) DATE/TIME

RECEIVED BY (Signature) DATE/TIME RELINQUISHED BY (Signature) DATE/TIME

RECEIVED BY (Signature) DATE/TIME RELINQUISHED BY (Signature) DATE/TIME

D. Kaventhie 10/7/86

RECEIVED IN LAB BY (Signature) DATE/TIME LABORATORY I.D. NO.

SEND REPORT TO: Fred Mason

ADEM FORM 237 4/85

STATE OF ALABAMA
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
MONTGOMERY, ALABAMA

LABORATORY: (X) Montgomery ( ) Mobile ( ) Birmingham

Sample Type: Potable Water [ ] Landfill Leachate [ ] Toxic Extraction [ ] Composite [ ]
Surface Water [ ] Hazardous Wastesite [ ] Ignitability [X] Grab [ ]
Soil/Sediment [ ] Groundwater [ ] Corrosivity [ ] Container P [ ]
Wastewater [ ] Waste (Special Handling) [ ] Reactivity [ ] G [ ]

Source Tank Spillage Wessel hoeft Inc

Location Moundville AL.

( ) Discharge from _____ (Point Source) to _____ (Receiving Water)

Comments _____ Preservative(s) None - Glass

Check group of compounds or individual parameters

| ☐ Base/Neutral Compounds | | | |
|---|---|---|---|
| ✓ | Method ☐ GC ☐ GC/MS | Date 10/1/86 | Conc. ug/l |
| | Bis (2-chloroethyl) ether | | |
| | 1,3- Dichlorobenzene | | |
| | 1,4- Dichlorobenzene | | |
| | 1,2- Dichlorobenzene | | |
| | Bis (2-Chloroisopropyl) ether | | |
| | Hexachloroethane | | |
| | N-nitroso-di-n-propylamine | | |
| | Nitrobenzene | | |
| | Isophorone | | |
| | Bis (2-Chloroethoxy) methane | | |
| | 1,2,4-Trichlorobenzene | | |
| ✓ | Naphthalene | | <5 |
| | Hexachlorobutadiene | | |
| | Hexachlorocylopentadiene | | |
| | 2-Chloronaphthalene | | |
| | Acenaphthylene | | |
| | Dimethylphthalate | | |
| | 2,6-Dinitrotoluene | | |
| | Acenaphthene | | |
| | 2,4-Dinitrotoluene | | |
| | Fluorene | | |
| | 4-Chlorophenyl phenyl ether | | |
| | Diethyl phthalate | | |
| | N-nitrosodiphenylamine | | |
| | 1,2-Diphenylhydrazine | | |
| | 4-Bromophenyl phenyl ether | | |
| | Hexachlorobenzene | | |
| | Phenanthrene | | |
| | Anthracene | | |
| | Dibutyl phthalate | | |

| | | | |
|---|---|---|---|
| | Fluoranthene | | |
| | Pyrene | | |
| | Benzidine | | |
| | Butyl benzyl phthalate | | |
| | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | | |
| | Benzo (a) anthracene | | |
| | Chrysene | | |
| | 3,3'-Dichlorobenzidine | | |
| | Bis (2-ethylhexyl) phthalate | | |
| | Di-n-octyl phthalate | | |
| | Benzo (b) fluoranthene | | |
| | Benzo (k) fluoranthene | | |
| | Benzo (a) pyrene | | |
| | Indeno (1,2,3-cd) pyrene | | |
| | Dibenzo (a,h) anthracene | | |
| | Benzo (g,h,i,) perylene | | |
| | N-nitrosodimethylamine | | |

~~Styrene~~ + Dicylopenta diene Present but NO standard

| ☐ Acid Compounds | | | |
|---|---|---|---|
| ✓ | Method ☐ GC ☐ GC/MS | Date | Conc |
| | Phenol | | |
| | 2-Chlorophenol | | |
| | 2-Nitrophenol | | |
| | 2-4-Dimethylphenol | | |
| | 2-4-Dichlorophenol | | |
| | 4-Chloro-3-methylphenol | | |
| | 2,4,6-Trichlorophenol | | |
| | 2,4-Dinitrophenol | | |
| | 4-Nitrophenol | | |
| | 2-Methyl-4,6-dinitrophenol | | |
| | Pentachlorophenol | | |

Fred Moore 10-7-86 10:45 — SAMPLE COLLECTED BY (Signature) DATE/TIME

Fred Moore 10-7-86 12:20 — RELINQUISHED BY (Signature) DATE/TIME

RECEIVED BY (Signature) DATE/TIME

RELINQUISHED BY (Signature) DATE/TIME

RECEIVED BY (Signature) DATE/TIME

RELINQUISHED BY (Signature) DATE/TIME

B. Rauntree 10/7/86
RECEIVED IN LAB BY (Signature) DATE/TIME

LABORATORY I.D. NO.

SEND REPORT TO: Fred Moore

ADEM FORM 235 4/85

# ATTACHMENTS

# ATTACHMENT 1

SITE DISCOVERY FORM

Part 1: Information necessary to add a site to CERCLIS

ACTION A

EPA ID: ALD XXXXXXXXX

SITE NAME: Cracker Asphalt SOURCE: T (R=EPA, T=STATE)

STREET: Cracker Road CONG DIST: __ (Optional)

CITY: Moundville ZIP: 35474 -____

COUNTY NAME: Hale COUNTY CODE: ____ (Optional)

LATITUDE: __ / __ / __ LONGITUDE: __ / __ / ____ (Optional)

INVENTORY IND: Y REMEDIAL IND: Y REMOVAL IND: N FED FAC IND: N

RPM NAME: Brian Farrier RPM PHONE: 404 - 347 - 5065 (EPA Project Office)

SITE DESCRIPTION: (Optional)

This facility ceased operations several years ago. Areas of contaminated soils are observable on the property. Waste materials were left intanks at the site and have spillled to the ground. Groundwater contamination is suspected. Wesselhoeft has acquired ownership of the property.

Part 2: Other site information

DATE SITE FIRST REPORTED: 01 / 12 / 94 REPORTED BY: Kathy Keller

REASON FOR LISTING: This site is suspected to be contributing to groundwater contamination which is known to exist in this area. Groundwater to surface water discharge in the nearby Black Warrior River is a concern which needs evaluation.

# ATTACHMENT 2

# WESSELHOEFT, INC.

P. O. Box 3323 ESS

TUSCALOOSA, ALABAMA 35404


April 30, 1986

Mr. Fred C. Mason, III
Alabama Department of Environmental Management
Ground Water Section/Water Division
1751 Federal Drive
Montgomery, Alabama 36130

Dear Mr. Mason:

I was sorry to miss your visit at the FAB plant in Moundville. The tank is for above ground service - diesel storage and as such does not require the underground protection.

I am anxious to know more about the pond. Is the cause of its pollution the chemical plant adjoining our property - Lawter?

I tried to call you today and was told you would be on the road for an indefinite period.

Please let me hear from you.

Sincerely,

WESSELHOEFT, INC.

Conrad Wesselhoeft

Conrad Wesselhoeft


TELEPHONE (205) 553-8129 or 553-1079 — 59 CHEROKEE HILLS

# ADEM

## ALABAMA
## DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

George C. Wallace
Governor

Leigh Pegues, Director

1751 Federal Drive
Montgomery, AL
36130
205/271-7700

Field Offices:

Unit 806, Building 8
225 Oxmoor Circle
Birmingham, AL
35209
205/942-6168

P.O. Box 953
Decatur, AL
35602
205/353-1713

2204 Perimeter Road
Mobile, AL
3[illegible]
20[illegible]79-2336

May 6, 1986

**MEMORANDUM**

TO: J.P. Martin
Industrial Branch

FROM: Fred Mason FCM
Groundwater Section

SUBJECT: Southern Resins/Lawter Chemicals/Cracker Asphalt Inspections
Tuscaloosa County

On Tuesday April 29, 1986, I conducted a follow-up evaluation of the Southern Resins plant near Moundville, Alabama. The following observations were made:

1. Red leachate with a hydrocarbon sheen appearance was discharging above a clay layer below the north bluff lagoon. This leachate disappears to the subsurface either to creek bed alluvium or to a gray sand below the clay layer.

2. Leachate was also observed in the drainage below the middle/polishing pond.

3. Sludge deposits were observed in the north bluff pond, the middle pond, and the "u" shaped pond.

4. Sludge spillage was observed in the containment area around the storage tank used by Southern Resins on the Cracker Asphalt plant site. This could affect the wells on the property line, i.e. wells 12, 11, 10, and 9. The Cracker Asphalt lagoon sludge level is low due to lack of rainfall.

5. Discharge from the T-pipe lagoon to Carthage Branch was excessively foamy. This foam discharge has been reported by the public in the past and by a worker at Mound State Park.

Southern Resins/Lawter Chemicals proposes to close the north bluff lagoon, and clean up and dispose of contaminated soils defined by the $CH_2M$ Hill study. They propose, further, to continue monitoring the contaminated terrace and Gordo aquifers, assuming they will discharge contaminants naturally. This proposal should be considered since a massive clay confining unit outcrops along the Black Warrior River and leachate springs are discharging from above this clay layer.

Additional investigation and sampling by ADEM of wells abandoned at Mound State Park and in Moundville will be initiated.

Contact was also made with John Elliott, Superintendent for Cracker Asphalt. Elliott was observed building a bare steel storage tank. He was advised of the UST Program, and of the need to close or permit the asphalt lagoon. The owner of Cracker Asphalt, Conrad Wesselhoeft, 759-8142 beeper, 553-1079 home, 371-2263, 553-8129, Wesselhoeft Inc., P O Box 3323 ESS, Tuscaloosa, AL 35404 will be contacted about the lagoon violation.

/jd
cc: Treena Piznar, Industrial Branch
Cracker Asphalt File

# ADEM

## ALABAMA
## DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

George C. Wallace
Governor

Leigh Pegues, Director

1751 Federal Drive
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Decatur, AL
35602
205/353-1713

2204 Perimeter Road
Mobile, AL
3661[illegible]
205/[illegible]-2336

May 6, 1986

**CERTIFIED MAIL - P563838385**
**RETURN RECEIPT REQUESTED**

Mr. Conrad Wesselhoeft
Wesselhoeft, Inc.
P O Box 3323 ESS
Tuscaloosa, AL 35404

Dear Mr. Wesselhoeft:

RE: Notice of Violation

On Tuesday, April 29, 1986, Fred Mason inspected your Moundville, AL facility. This inspection was related to a groundwater contamination evaluation at the Southern Resins Plant (Lawter Chemicals).

The evaluation indicates groundwater moves downgradient from your property on to the Lawter property and discharges at the bluff and at drainages to the Black Warrior River. Data from monitoring wells along the property line and below your asphalt sludge lagoon indicate contaminated groundwater is moving on to the Lawter property.

It should be noted that discharges from wastewater lagoons to surface water and groundwater must be permitted under the Alabama Water Pollution Control Act (National Pollutant Discharge Elimination System [NPDES]) regulations and guidelines Code of Alabama 1975 §22-22-1 to §22-22-14.

The Alabama Department of Environmental Management (ADEM) has directed Lawter Chemicals to close their unused lagoons or upgrade those lagoons which are in use to include impermeable liners as required by the NPDES.

As a result of the April 29 inspection and subsequent investigation it is apparent that your facility does not have an NPDES Permit for the asphalt lagoon.

Pursuant to Code of Alabama 1975, §22-22-9(f), you are hereby notified that your facility in Moundville is in violation of Chapter 5.3.1 and subject to enforcement action thereafter.

Not later than thirty (30) days after receipt of this notice, you are required to file with the Department a full written report showing the

steps that have been taken and are being taken to correct this violation. Such report should be mailed or delivered to the undersigned at the Department. Failure to file a report as required by this notice is a violation of the Alabama Water Pollution Control Act, Code of Alabama 1975, §22-22-1 et seq., as amended, for which civil penalties or criminal fines of up to $25,000 per day may be imposed.

Should you have any questions concerning this matter, please contact Fred Mason of the Groundwater Section at 205/271-7831.

Sincerely,

Charles R. Horn

Charles R. Horn, Chief
Water Division

CRH/FCM/jd
cc: Fred Mason, ADEM-Groundwater Section
Treena Piznar, ADEM-Industrial Branch

ENVIRONMENTAL TESTING & ENGINEERING

*Located in the Foster, Brooks, Riley & Stephens Building*
3500 Skyland Blvd., E. / P.O. Box 6001 / Tuscaloosa, AL 35405
Telephone (205) 556-5050

May 27, 1986

RECEIVED
JUN
WATER DIVISION

Mr. Fred Mason
Alabama Dept. of Environmental Management
1751 Federal Drive
Montgomery, AL 36130

Dear Mr. Mason:

Enclosed, in response to the notice of violation issued on 5/6/86, is an engineering report on the investigation of the site of Wesselhoeft, Inc., near Moundville, Alabama. Please feel free to contact me should you have comments or require further information. Thank you.

Sincerely,

Environmental Testing & Engineering
(a division of Engineering Plus, Inc.)

John K. Haddock

John K. Haddock, P.E.
Alabama Reg. No. 12998

cc: Mr. Conrad Wesselhoeft, Wesselhoeft, Inc.

# PRELIMINARY INVESTIGATION AND ENVIRONMENTAL ASSESSMENT OF THE SITE OF WESSELHOEFT, INC. NEAR MOUNDVILLE, ALABAMA

May 27, 1986

## INTRODUCTION

On April 29, 1986, the site of Wesselhoeft, Inc. near Moundville, Alabama was inspected by ADEM in relation to a groundwater contamination evaluation at the adjacent Southern Resins Plant (Lawter Chemicals). The evaluation had indicated that groundwater moving downgradient from the Wesselhoeft site may have contributed to groundwater contamination beneath the Lawter site. Groundwater from a monitoring well (designated MW11 in the Lawter investigation) located just below the asphalt sludge pond on the Wesselhoeft site was found to contain contaminants which are generally associated with petroleum related industrial processing. The Lawter investigation concluded that the monitoring well was downgradient from the sludge pond and that the contaminants were entering the subsurface aquifer from the materials contained in the inactive pond. During the inspection of the Wesselhoeft site it was noted that the sludge pond contained some water which was discharging to surface waters due to surface runoff during rainfall events. A subsequent Notice of Violation from ADEM dated May 6, 1986 cited the pond discharge and the groundwater contamination problem and required that a full written report showing the steps that have been taken and are being taken to correct this violation be submitted to ADEM.

This report will attempt to satisfy the requirements included in the notice of violation. The report will document an investigation of the site, including visual inspections of all tanks and ponds, location of flow patterns across the site, location of potential sources of contamination of groundwater or surface water. The report will also examine the possibility of closing out the sludge lagoon and will present preliminary design information on control of spillage and rainwater from around the tanks used for storage on site. This report should satisfy the immediate requirements of ADEM and should provide the information required to proceed with a disposition of the pond and further investigation of the groundwater contamination situation if dictated by ADEM. Reguardless of ADEM's groundwater requirements the pond must be either permitted or closed out and the preliminary report will provide information which will be valuable in the decision as to disposition of the pond or its contents.

## SITE DESCRIPTION AND FIELD RECONNAISANCE

The site of Wesselhoeft, Inc. is located about 2 miles to the north of Moundville, Alabama (see Vicinity Map in Figure 1). The site, as shown in Figure 2, consists of approximately 25 acres adjacent to the Warrior River in Tuscaloosa County. The site is bounded to the northwest by the river, to the north and east by a large lowland area

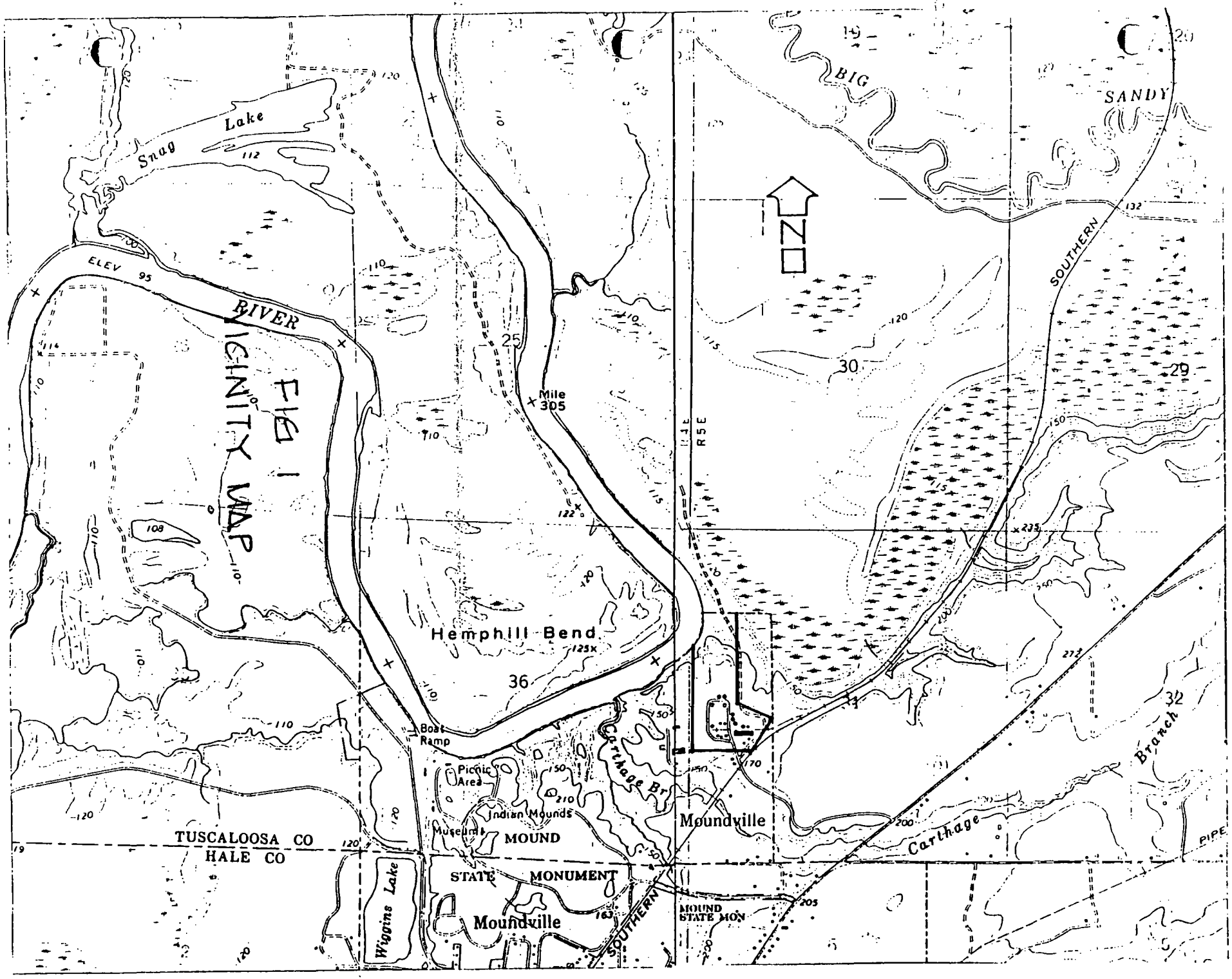


FIG 1
VICINITY MAP
Snag Lake
ELEV 95
RIVER
BIG
SANDY
SOUTHERN
Mile 305
Hemphill Bend
Boat Ramp
Picnic Area
Indian Mounds
Museum
MOUND
STATE MONUMENT
Moundville
Carthage Br
Carthage
Branch
PIPE
TUSCALOOSA CO
HALE CO
Wiggins Lake
MOUND STATE MON
R4E
R5E
N
25
30
29
36
32

FIG 2

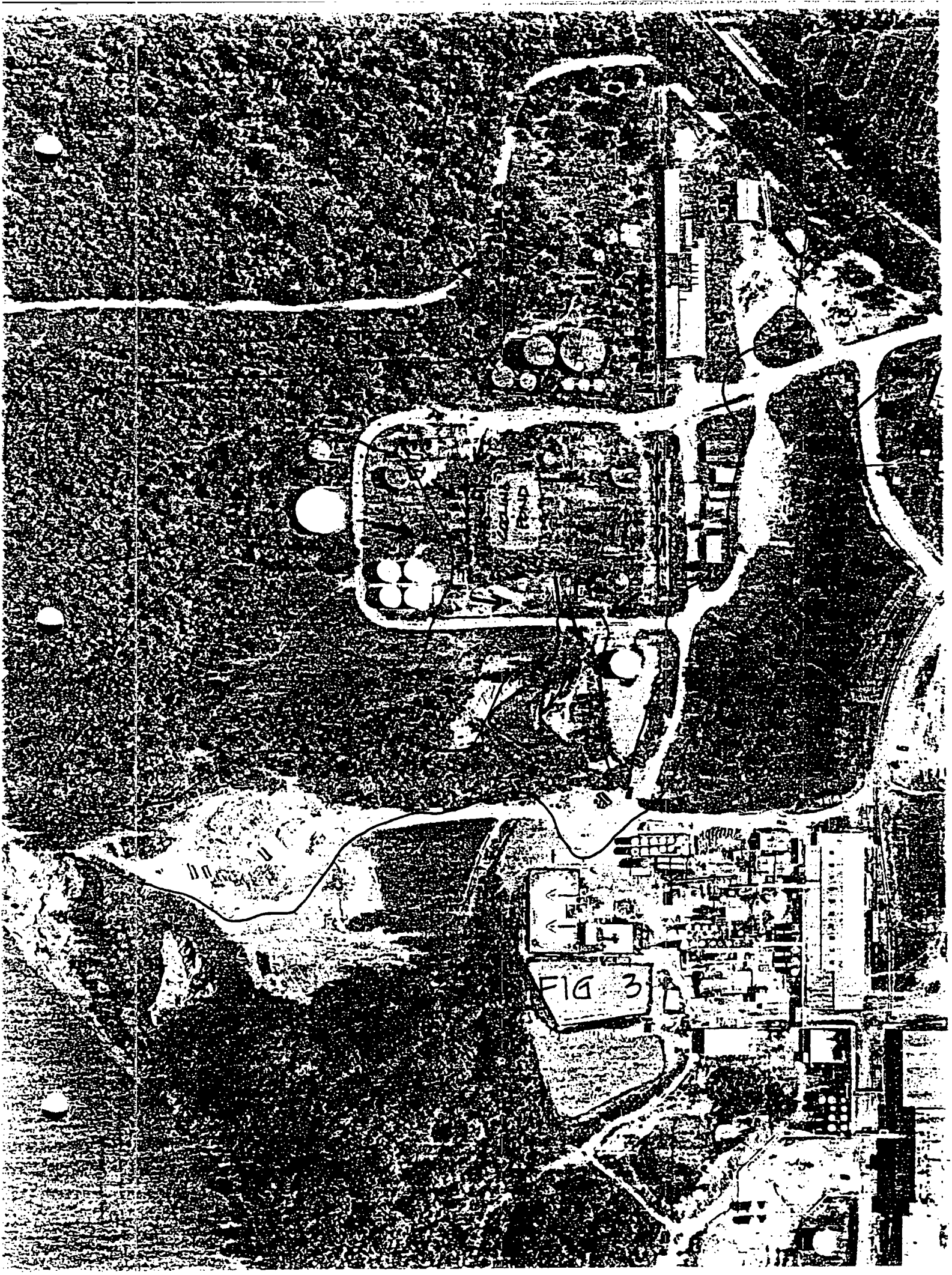


FIG 3

draining back into the river, to the south by tracks of the Southern Railroad, and to the west by Southern Resins, a division of Lawter Chemicals. The southern 2/3 of the property is situated upon a relatively level plateau, gently sloping to the south and to the west. The northern 1/3 of the property slopes steeply to the river and to the marshy area to the east of the site. The site, which was previously owned by the Cracker Asphalt Co., an asphalt refining and storage operation, has many large tanks (approximately 5 million gallons total capacity) and abandoned petroleum processing equipment. This operation was shut down in 1967 and the site has been vacant until recently, when Wesselhoeft, Inc. began making use of the office, warehouses and shops in the metals fabricating business. Wesselhoeft also makes use of the large open areas of the site for storage of scrap structural steel and leases one of the large tanks to Southern Resins for storage of a petroleum solvent which is a by-product of its operation.

Though most of the large tanks on the property are empty and have been completely cleaned, some still contain various amounts of heavy oils or hardened asphalts. These petroleum residues are thick and viscous and there is very little potential for leakage or spillage. The abandoned piping system also is plugged in some locations by these hardened residues. A large cooling pond, located in the center of the old process area contains about 200,000 gallons of water. This pond is isolated by a trench which directs the runoff around the pond and off the site to the west (see Figure 3 for general site drainage patterns). Runoff from the trench system passes through asphalt skimmers, two large (appx. 45'x10'x8' deep) concrete basins which were previously used to skim the floating oils and asphalts from the surface of the runoff from the plant site. One of the basins is presently filled with a heavy oil or asphalt and the other is filled with water with a thin layer of sediment in the bottom. The water then passes through a large settling pond prior to leaving the site through a ditch leading to the Warrior River. The pond has been filled almost to capacity with silt and sediment from the site through the years (see Appendix A for a more complete description of the pond and a characterization of its contents). The water contained in the pond, which is limited to a "ditch" around the inside perimeter of the pond, has a strong petroleum odor and a floating sheen on the surface.

The northern 1/3 of the site bordering the river is covered with thick forest while the southern 2/3 has been cleared and is now covered with thick ground cover and scrub brush. Surface soils are generally sandy clayey silts with moderate permeability. Subsurface soils, as evidenced from shallow borings and from cuts to the east and west of the site, become higher in clay content, probably with lower permeability.

Aside from the tank leased by Lawter, a quick visual inspection of the ground surface around the tanks revealed very little evidence of leakage or spillage. The Lawter tank, with a capacity of about 350,000 gallons, is located inside a diked area to the south of the sediment pond. There is evidence of spillage from this tank and the water contained inside the diked area has a strong odor and a petroleum sheen on the surface. A ditch along the railroad tracks,

which was previously used to collect spillage from the loading facilities was noted to contain some hardened asphalt or heavy oils.

## LABORATORY ANALYSES

Laboratory analyses were performed on the water contained in the cooling pond, the asphalt skimmers, the sediment pond, and the diked area around the tank leased to Lawter. The results of the analyses of these liquids can be seen in Table I. Table II in Appendix A shows the results of the analysis of the sludge and sediment materials from soil borings in the sediment pond (Figure A-1 in Appendix A shows the locations of these borings). The analyses performed were chosen for a general indication of the quality of the water and materials from the various sites. There were no organics analyses (gc/ms) performed on the samples.

TABLE I
LABORATORY ANALYSIS OF WATER SAMPLES

| | | Cooling Pond | Lawter Tank Dike Area | Lagoon | Asphalt Skimmer |
|---|---|---|---|---|---|
| 1. | Conductivity (umho/cm) | 195.0 | 47.0 | 52.0 | 40.0 |
| 2. | Chlorides (mg/l) | 2.5 | 3.0 | 1.5 | 1.0 |
| 3. | C.O.D. (mg/l) | 16.0 | 104.0 | 24.0 | 48.0 |
| 4. | T.S.S. (mg/l) | 13.0 | 21.0 | 13.0 | 5.0 |
| 5. | pH (s.u.) | 7.2 | 6.4 | 6.0 | 6.0 |
| 6. | Iron (mg/l) | 1.083 | 4.167 | 0.625 | 0.125 |
| 7. | Manganese (mg/l) | 0.038 | 0.114 | 0.019 | < 0.001 |
| 8. | Phenols (mg/l) | 0.30 | 0.30 | 0.20 | 0.30 |

## CONCLUSIONS AND RECOMMENDATIONS

From the above information, it appears that the site has become stabilized during its period of inactivity as a petroleum processing facility, and that some attention in a few localized areas could result in adequate protection of the surface and groundwater quality. The site has excellent ground cover, requiring very little if any sediment control. The large tanks are either empty or contain very viscus or heavy materials with little chance for a major spill and the hardened asphaltic materials on the ground over the site present few more problems environmentally than a paved parking lot. The metals fabricating business operated by Wesselhoeft, Inc. generates no wastewater discharge of any kind, and there appears to be no need for the stabilization pond on the site.

The major present spill potential from the site exists with the tank leased by Lawter. As previously mentioned, this tank is surrounded by

a dike system, however, there are some modifications which need to be implemented for adequate control of the contents. Of course, any of the tanks which are put into operation at a later date would also need to be modified for spill control. These modifications are noted in the following general and specific recommendations for environmental control of the site.

The potential for contamination of groundwater and surface water from the Wesselhoeft site can be broken down into the following general categories:

1. Leachate from residues or residual materials remaining on site from past activities.

2. Release of rainwater or runoff contained in contaminated storage or treatment facilities.

3. Spillage, leakage, or discharge from on-site tanks, vessels, or processes.

4. Sediment from on-site surface disturbances.

5. Migration of contaminants from adjacent operations.

In order to control contamination from categories 1 and 2 above, it is recommended that any residues or residual materials remaining from past operations be stabilized and isolated from surface runoff and from subsurface aquifers. Any existing treatment facilities, such as the asphalt skimmer tanks, should be either closed out completely or cleaned well and renovated for reuse. Disposal of the contaminated solid materials or sludges in the sediment pond (lagoon) will present a problem, therefore, it is recommended that the pond be completely dewatered, the materials stabilized in place, possibly by solidification with lime or cement dust, and covered with an impermeable cap, graded for drainage of runoff, and sodded for protection from erosion, as detailed in Appendix A.

Is this an acceptable closure?

One of the more immediate needs for the site involves the modifications to the containment area around the tank which is leased to Lawter Chemicals. Though the tank appears to be very sound, there has obviously been some spillage as the stored product is added to the tank or removed from the tank. The surface soils inside the containment area are sandy and probably permeable enough to allow some percolation. It is recommended that some type of catch basin or sump be constructed in the inlet/outlet area of the tank for control of spillage. The spilled product which should amount to a very small quantity may be either pumped back into the tank or taken to the Lawter wastewater treatment facility for disposal. This basin should be isolated from the contained rainwater and the entire containment area should be lined with a low permeability clay material and kept very clean so that the rainwater may be discharged by opening an effluent valve. The effluent valve would allow containment of large spills which would be treated prior to disposal. The containment area would require extensive cleanup following a spill to avoid contamination of water from successive rainfalls. Appendix B gives

details for the management of tank farms and containment areas. These procedures should be followed for any of the other tanks which are subsequently placed into operation. Spill containment should also be implemented for any tanks, trucks, or rail cars entering the facility and for any process placed into operation which have the potential for spill or leakage of hazardous or controlled materials.

In the absence of a sedimentation pond (assuming removal of the existing pond), it would be necessary to control any on-site surface disturbance at or near its source. Sediment control structures such as silt fences, hay bales, or small ponds may be used for small disturbed areas on site. Large surface disturbances or reactivation of the industrial facility may require the installation of a large sediment pond at some point prior to leaving the site. This could be accomplished at the north of the existing pond with a small amount of recontouring work.

Though some petroleum residues remain on site from past activities, the greatest potential for environmental problems probably stems from the possibility that materials from leased tanks could be released to the environment. Adequate management should eliminate this problem, however, it is strongly recommended that the responsibility for any materials stored on site in leased tanks be concisely spelled out in legal terms in a lease contract. The leasee should be prepared to sign "hold harmless" clauses accepting responsibility for his stored materials and to pay extra for the extensive management requirements for protection of the environment. The leasee should accept responsibility for disposal of spilled materials and should provide documentation that he either has the capacity for treatment of these materials or the financial ability to pay for acceptable disposal. The leasor could probably expect to be responsible for leaks in <u>his</u> tank and therefore should require strict documentation of the nature of the stored materials to ensure against corrosion of the tank. The leasor should prepare a spill prevention plan as required by EPA and should update this plan with the addition of any different materials stored on site. The leasee should be prepared to pay for the updating of these plans. The plan should include emergency response plans depending upon the nature of the stored materials.

# APPENDIX A

## APPENDIX A

### SEDIMENT POND (LAGOON) DESCRIPTION AND MATERIAL CHARACTERIZATION AND REHABILITATION AND STABILIZATION RECOMMENDATIONS

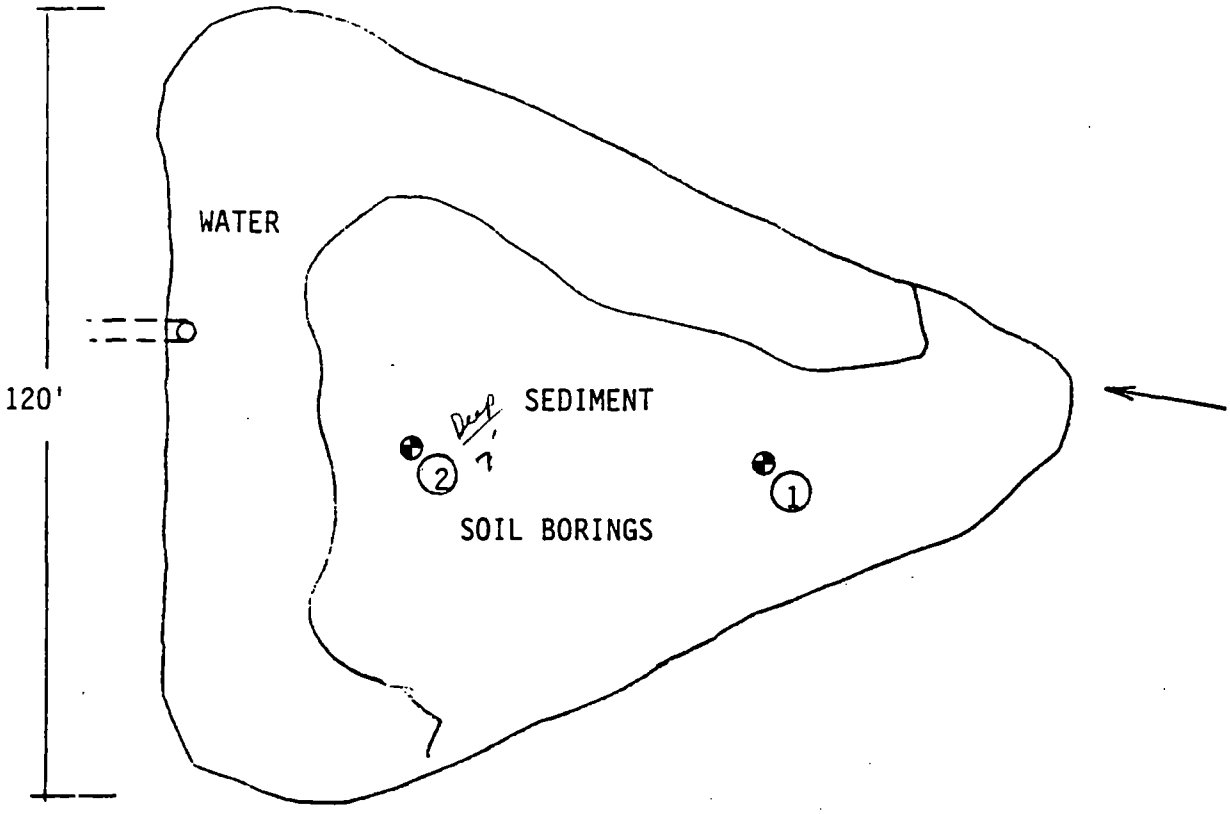
he sediment pond or lagoon was constructed for control of sediment nd runoff from the plant site during the time that the plant was in peration. During the operation, there was obviously very little round cover over the site since there is so much sediment in the ond. Figure A-1 shows a plan of the the present conditions of the ond. The water surface, which originally covered an area of about ).4 acres has now been reduced to about 2400 ft2 by the sediment. Soil borings into the sediment (borings #1 and #2 shown in Figure A-1) evealed that the soil materials contained black hydrocarbon aterials. These materials were most prevalent from the depths of bout 6" below the surface down to a depth of about 4'. Volatile olids analyses were used as indicators of the hydrocarbon content f the soil materials. As can be seen from Table II, a composite of he materials between the depth of 6" and 5' revealed considerably igher volatile solids content than those below the 5' depth. The aterial from the 5' depth was a silt with very fine sand and lower olatile solids, indicating that the borings may have passed out of he sediment and into the lining material. Though the borings were onducted near the water in the pond, there was no water encountered n the borings, indicating that there is very little water movement in he sediment materials, probably due to the asphaltic materials in the oids of the sandy sediment.

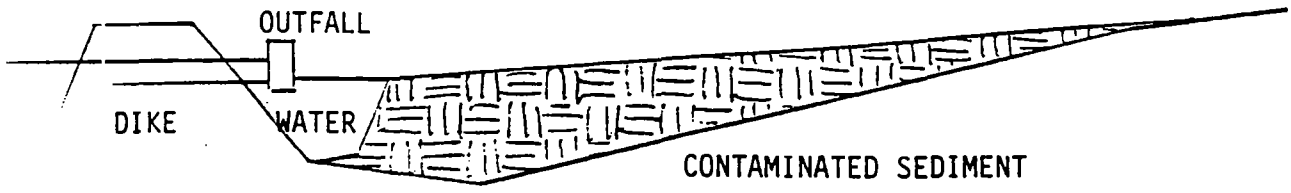
TABLE II
LABORATORY ANALYSES OF SOIL SAMPLES FROM LAGOON

| | BORING # 1 | | BORING # 2 | | |
|---|---|---|---|---|---|
| BORING DEPTH | Composite 6"-4' | 5' | Composite 6"-4' | 5' | 7' |
| 1. Moisture Content (%) | 14.3 | 14.6 | 11.5 | 10.7 | 10.9 |
| 2. Volatile Solids (%) | 4.8 | 3.6 | 3.1 | 2.5 | 2.3 |

Figure A-2 shows the recommended procedure for stabilization and rehabilitation of the pond. The following is a step-by-step procedure for closing out the pond:

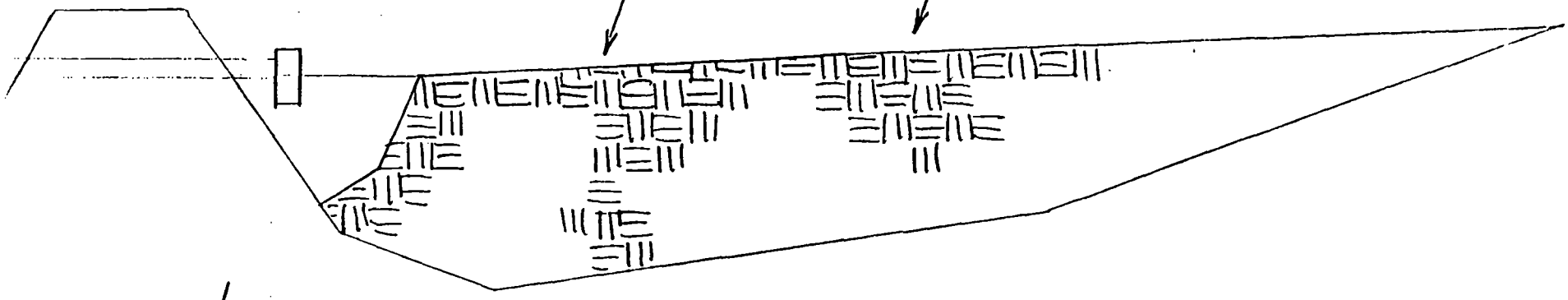
1. Drain water from pond, treat if necessary, and discharge.
2. Plug outflow pipe with concrete.
3. Stabilize material in pond using lime, cement, or kiln dust. Apply the lime at the rate of about 10% by weight, adding water if necessary, and mix well using a backhoe or suitable equipment.
4. Grade and compact material uniformly inside pond dikes.
5. Cover stabilized material with a low permeability clay cap,

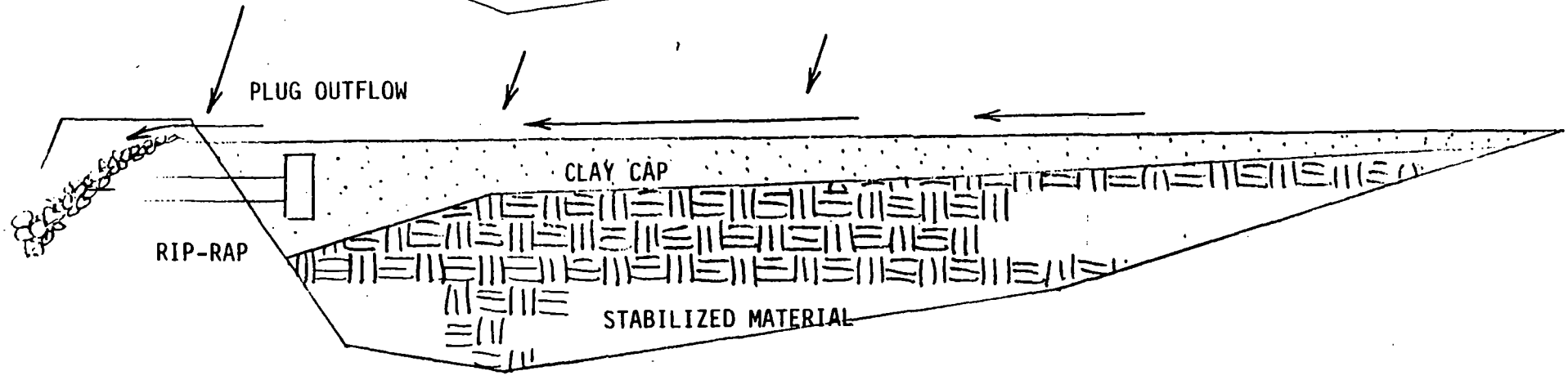

WATER
120'
SEDIMENT
Deep
7'
2
1
SOIL BORINGS


OUTFALL
DIKE
WATER
CONTAMINATED SEDIMENT

NATIONAL 42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE

EXISTING CONDITIONS






PROPOSED MODIFICATIONS

compact well, and contour to drain rapidly. Establish thick sod or suitable ground cover.

The pond should be graded to drain all runoff to the low point of the dike leading to the ditch draining the site. The slope toward the ditch should be rip-rapped or sodded to prevent erosion.

# APPENDIX B

# TANK FARM MANAGEMENT

# APPENDIX B

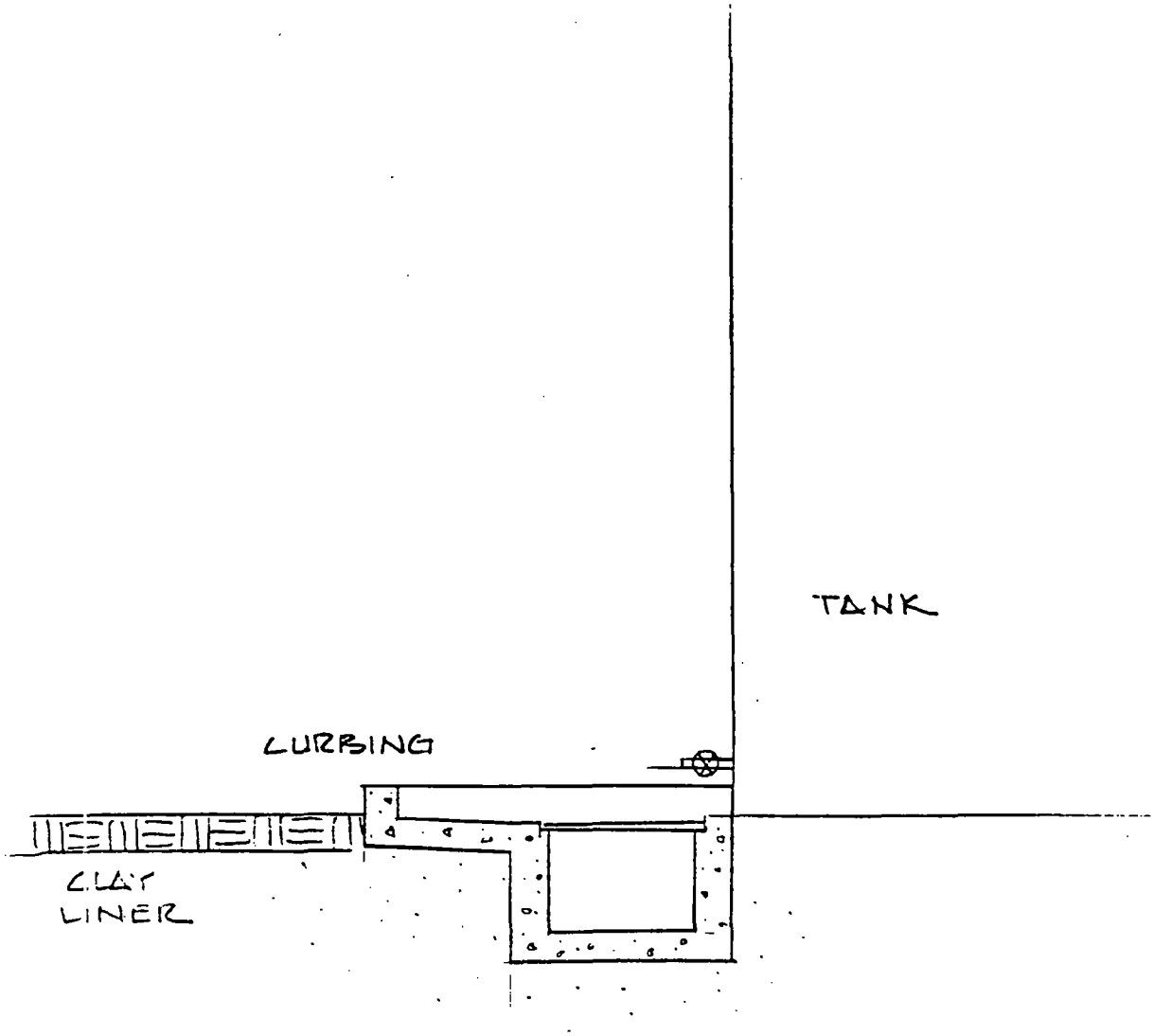
## TANK FARM MANAGEMENT

The storage of large volumes of liquid substances in storage tanks may create the potential for spills or leakage to the environment. A tank farm management plan may reduce or eliminate this potential for contamination. Dikes should be constructed to contain the entire capacity of the tank and the containment area should be lined with a low permeability material to prevent percolation into the soil. Figure B-1 shows a general plan for the construction of a dike system for containment of spills or leakage from storage tanks.

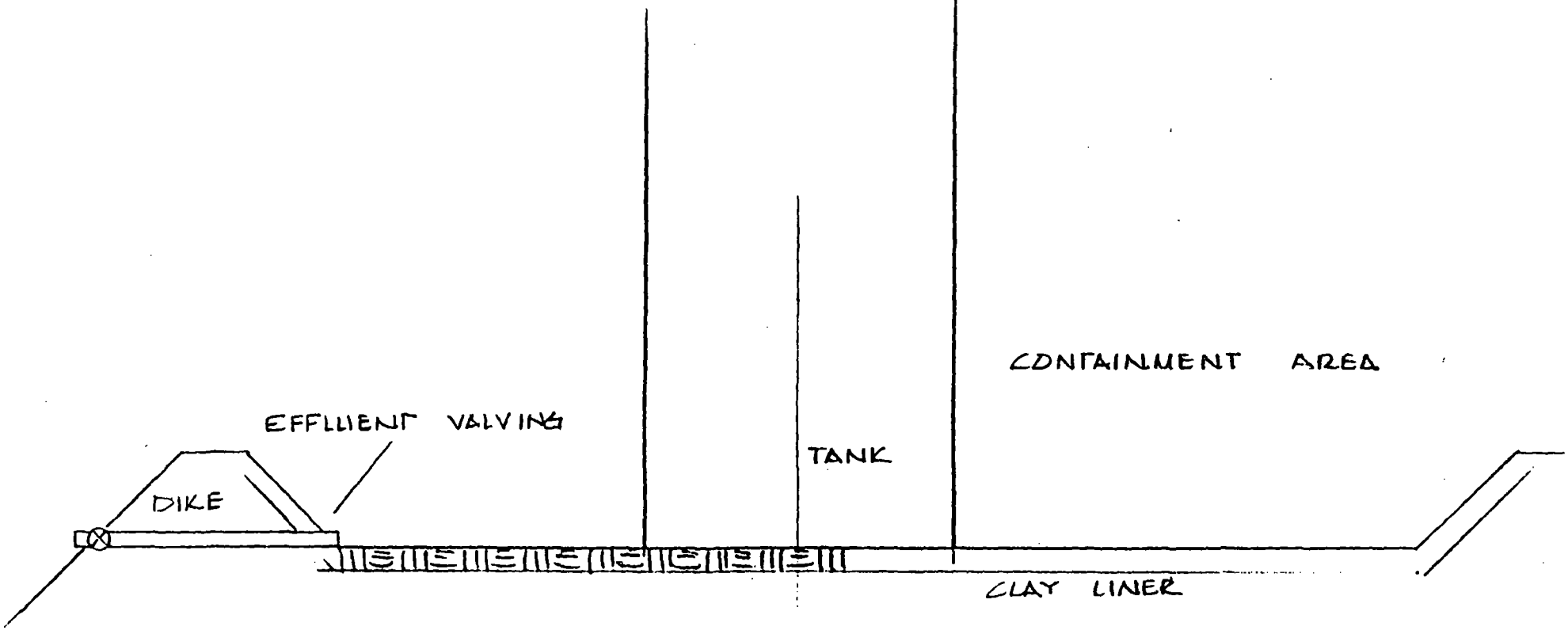
The materials are usually pumped into the tank and withdrawn from a valve at the base of the tank. A great spill potential from most tanks of this type occurs when the operator adds or removes material. In order to reduce this potential, a sump should be included to catch spills or drips from the valve. Generally the leakage is very small and can be pumped out and returned to the tank or easily disposed through the waste treatment system of the operator. Figure B-2 shows a general design of a spill control sump.

A major problem in the management of tank farms is the control of rainwater falling inside the dike area. The rainwater may become contaminated with the stored materials preventing release without treatment. The spill control sump as mentioned in the preceeding paragraph may prevent the routine contamination, however, some provision for disposal must be available for large contamination problems, such as a large spill or leak into the containment area with a large volume of stored rainwater. The containment area should be designed with an effluent valve which remains closed at all times. The operator may open the valve and release uncontaminated rainwater as necessary. Should a large spill occur, the product or contaminated rainwater should be quickly pumped back into the tank or disposed in an acceptable manner. Following a spill and removal of the material from the containment area, the floor and dikes must be cleaned up and decontaminated prior to the next rainfall.

The tank should be inspected for leaks and damage on a regular basis. Problems should be corrected immediately.




SPILL COLLECTION SUMP


CONTAINMENT AREA
EFFLUENT VALVING
TANK
DIKE
CLAY LINER

# ADEM

## ALABAMA
## DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

George C. Wallace
Governor

Leigh Pegues, Director

1751 Federal Drive
Montgomery, AL
36130
205/271-7700

Field Offices:

Unit 806, Building 8
225 Oxmoor Circle
Birmingham, AL
35209
205/942-6168

P.O. Box 953
Decatur, AL
35602
205/353-1713

2204 Perimeter Road
Mobile, AL
366[illegible]
205[illegible]-2336

June 12, 1986

Mr. Conrad Wesselhoeft
Wesselhoeft, Inc.
P O Box 3323 ESS
Tuscaloosa, AL 35404

Dear Mr. Wesselhoeft:

RE: Response to ADEM Notice of Violation
Engineering Report Review

Review of the engineering report submitted by Environmental Testing and Engineering (ETE) is complete. This report was in response to ADEM's Notice of Violation issued to you on May 6, 1986.

Our review indicates that groundwater contamination was not adequately addressed in this report. We recommend that monitoring wells be installed around identified source areas and that groundwater samples be tested for volatiles, base neutrals, and acid extractable compounds. To facilitate this effort your consultant is invited to visit our offices and review previous hydrogeological work conducted at the adjacent plant site.

Approval of your proposed lagoon closure plan will depend on the results of the requested groundwater evaluation. A schedule for this work effort should be submitted as soon as possible. If we can assist you or your consultant, feel free to contact Fred Mason of the Groundwater Section at 205/271-7831.

Sincerely,

Charles R. Horn

Charles R. Horn, Chief
Water Division

CRH/FCM/jd
cc: Fred Mason, ADEM-Water Division
John Haddock, Environmental Testing & Engineering

MILLER, HAMILTON, SNIDER & ODOM
ATTORNEYS & COUNSELLORS AT LAW
254-256 STATE STREET
POST OFFICE BOX 46
MOBILE, ALABAMA 36601
(205) 432-1414
TELECOPIER (205) 433-4106

PALMER C. HAMILTON
JOHN C. H. MILLER, JR.*
JAMES B. NEWELL, JR.
LEWIS G. ODOM, JR.*
RONALD A. SNIDER
THOMAS TROY ZIEMAN, JR.
MICHAEL D. WATERS*
BRADLEY R. BYRNE
GEORGE A. LEMAISTRE, JR.*
RICHARD P. WOODS
JEROME E. SPEEGLE
DANIEL B. GRAVES**
M. KATHRYN KNIGHT
MARK J. TENHUNDFELD
MATTHEW C. McDONALD
JOSEPH R. SULLIVAN
GEORGE A. LEMAISTRE
OF COUNSEL

*ADMITTED ALABAMA AND DISTRICT OF COLUMBIA
**ADMITTED ALABAMA AND FLORIDA

September 17, 1986

SEP 1986
RECEIVED
ADEM
WATER DIVISION

CERTIFIED MAIL/
RETURN RECEIPT REQUESTED

Freedom of Information or Public
Access to Information Request to
The Water Division of the Alabama
Department of Environmental Management
Mr. Leigh Pegues, Director
Alabama Department of Environmental Management
1751 Federal Drive
Montgomery, Alabama 36130

Dear Mr. Pegues:

This letter will request that your office provide me copies of the following materials pursuant to Section 6-1-.03 of the Rules and Regulations of the Alabama Department of Environmental Management and pursuant to Sections 22-22-9, 22-22-A-5, 22-22-A-6 and 22-22-A-8 of the Alabama Code:

All correspondence, administrative orders, pleadings and any and all other writings in the files of the Alabama Department of Environmental Management, Water Division, relating to any investigation, inspection, or other action by and/or between the Alabama Department of Environmental Management and Conrad Wesselhoeft, individually and d/b/a Wesselhoeft, Inc. from June 10, 1986 through the present.

In compliance with the applicable regulations, I promise to pay reasonable charges incurred for search and copying costs. Please send me your invoice along with the copies which I have requested. I look forward to your response within ten (10) days of the date of this letter, or earlier, if possible.

Thank you very much for your assistance and cooperation in this matter.

Very truly yours,

M. Kathryn Knight

M. Kathryn Knight
For the Firm

MKK/prt

SEP 1986
RECEIVED
ADEM
PERMIT DIVISION

file

# ADEM

## ALABAMA
## DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

George C. Wallace
Governor

Leigh Pegues, Director

1751 Federal Drive
Montgomery, AL
36130
205/271-7700

Field Offices:

Unit 806, Building 8
225 Oxmoor Circle
Birmingham, AL
35209
205/942-6168

P.O. Box 953
Decatur, AL
35602
205/353-1713

2204 Perimeter Road
Mobile, AL
3661[illegible]
205/4[illegible]-2336

September 25, 1986

MEMORANDUM

TO: Olivia Hudgins
Office of General Counsel

FROM: Charles Horn, Chief
Water Division
Groundwater Section

SUBJECT: Wesselhoeft Inc. Groundwater Contamination, Tuscaloosa County

It has come to my attention that a plant site located in Moundville, Alabama and owned by Wesselhoeft Inc. has an asphalt lagoon and storage tanks that have contaminated a shallow groundwater aquifer. The Water Division has sent Mr. Conrad Wesselhoeft, site owner, a notice of violation of the Alabama Water Pollution Act. The Division has also requested that a groundwater assessment be conducted. Mr. Wesselhoeft has not responded to the assessment request. I therefore refer this matter to the Office of General Counsel for the appropriate action.

Please find attached a statement of findings, proposed order requirements, legal referral checklist, a copy of the NOV, and a June 12, 1986 letter.

Please contact Fred Mason for further information.

CRH/FM/vrh

Attachment

cc: Treena Piznar

**Findings of Fact**
**Wesselhoeft Inc.**
**P.O. Box 3323 ESS**
**Tuscaloosa, AL 35404**

1. An asphalt sludge lagoon is located on property owned by Conrad Wesselhoeft. This property is located north of the city of Moundville, Alabama.

2. A groundwater monitoring well (MW-11) located on the Lawter Chemical Co. plant site, downgradient from the asphalt sludge lagoon, is contaminated with the following compounds.

   Benzene
   Toluene
   Ethyl Benzene
   Styrene
   Naphthalene
   Dicylopentadiene

3. Petroleum product storage tanks and treatment facilities are located on the plant site. These tanks are leased for storage. Spillage has been identified around a tank leased by Lawter Chemical Co.

4. A groundwater monitoring well MW-12 located on the Lawter Chemical Co. plant site, downgradient from the item #3 tank leased by Lawter, is contaminated with the following compounds:

   Naphthalene
   Dicyclopentadiene
   Benzene
   Toluene
   Ethyl Benzene
   Acetone
   Styrene
   O-Cresol

5. Contaminated groundwater moves from the Wesselhoeft property onto the Lawter Chemical Co. property. This was defined as a result of a study of the hydrogeology by a Lawter consultant, $CH_2M$ Hill.

6. A sample of oil taken from a container near a storage tank located on the Wesselhoeft site was found to contain high levels of Toluene and Ethyl Benzene (see attached).

## Proposed Order Requirements

Wesselhoeft, Inc. should assess groundwater contamination on its site by conducting the following evaluations:

1. Within 30 days analyze asphalt lagoon sludge and other potential point sources for volatile, base neutral compounds, and any other compounds

identified by the Department.

2. Within 90 days install piezometers on site to evaluate groundwater flow direction.

3. Within 180 days install monitoring wells at identified point sources to include the asphalt sludge lagoon, and the Lawter leased storage tank to sample groundwater and analyze for identified compounds.

4. Within 270 days submit a report written by a qualified geologist or geotechnical engineer which documents the groundwater contamination at the Wesselhoeft Inc. site. This report must delineate the vertical and horizontal extent of the contaminant plume.

5. Within 270 days submit plans for closure or control of identified point sources. This will include plans for cleanup of groundwater contamination.

6. Verbal reports must be made every 30 days. Written progress reports must be submitted every 90 days.

FM/vrh

STATE OF ALABAMA
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
MONTGOMERY, ALABAMA

BORA[redacted]: (X) Montgomery ( ) Mobile ( ) Birmingham

mple Type:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Potable Water | [ ] | Landfill Leachate | [ ] | Toxic Extraction | [ ] | Composite | [ ] |
| Surface Water | [ ] | Hazardous Wastesite | [ ] | Ignitability | [X] | Grab | [ ] |
| Soil/Sediment | [ ] | Groundwater | [ ] | Corrosivity | [ ] | Container P | [ ] |
| Wastewater | [ ] | Waste (Special Handling) | [ ] | Reactivity | [ ] | G | [ ] |

urce Tank Spillage Wesselhoeft Inc

cation Moundville AL

) Discharge from _____ (Point Source) to _____ (Receiving Water)

mments _____ Preservative(s) none Glass

Check group of compounds or individual parameters

☐ Volatile Compounds

| ✓ | Method | ☐ GC ☐ GC/MS | Date | Conc |
|---|---|---|---|---|
| | Methylene Chloride | | | |
| | Trichlorofluoromethane | | | |
| | 1,1-Dichloroethene | | | |
| | 1,1-Dichloroethane | | | |
| | Trans-1,2-Dichloroethene | | | |
| | [redacted]oroform | | | |
| | 1,2-Dichloroethane | | | |
| | 1,1,1-Trichloroethane | | | |
| | Carbon Tetrachloride | | | |
| | Bromodichloromethane | | | |
| | 1,2-Dichloropropane | | | |
| | Trichloroethylene | | | |
| ✓ | Benzene | | | |
| | Dibromochloromethane | | | |
| | 1,1,2-Trichloroethane | | | |
| | 2-Chloroethyl vinyl ether | | | |
| | Bromoform | | | |
| | 1,1,2,2-Tetrachloroethane | | | |
| | Tetrachloroethylene | | | |
| ✓ | Toluene | | | |
| | Chlorobenzene | | | |
| ✓ | Ethyl Benzene | | | |

☐ Miscellaneous

| ✓ | Method | ☐ GC ☐ GC/MS | Date | Conc |
|---|---|---|---|---|
| | | | | |
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Fred Mason 10-7-[illegible] Fred Mason 10-7-[illegible] 12:20

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CEIVED IN LAB BY (Signature) DATE/TIME LABORATORY I.D. NO.

ND REPORT TO: Fred Mason

DEM FORM 237 4/85

STATE OF ALABAMA
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
MONTGOMERY, ALABAMA

LABORATORY: (X) Montgomery ( ) Mobile ( ) Birmingham

Sample Type:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Potable Water | [ ] | Landfill Leachate | [ ] | Toxic Extraction | [ ] | Composite | [ ] |
| Surface Water | [ ] | Hazardous Wastesite | [ ] | Ignitability | [X] | Grab | [ ] |
| Soil/Sediment | [ ] | Groundwater | [ ] | Corrosivity | [ ] | Container P | [ ] |
| Wastewater | [ ] | Waste (Special Handling) | [ ] | Reactivity | [ ] | G | [ ] |

Source Tank Spillage Wesselhoeft Inc

Location Moundville AL

( ) Discharge from _____ (Point Source) to _____ (Receiving Water)

Comments _____ Preservative(s) None - Glass

Check group of compounds or individual parameters

☐ Base/Neutral Compounds

| ✓ | Method ☐ GC ☐ GC/MS | Date | Conc |
|---|---|---|---|
| | Bis (2-chloroethyl) ether | | |
| | 1,3- Dichlorobenzene | | |
| | 1,4- Dichlorobenzene | | |
| | 1,2- Dichlorobenzene | | |
| | Bis (2-Chloroisopropyl) ether | | |
| | Hexachloroethane | | |
| | N-nitroso-di-n-propylamine | | |
| | Nitrobenzene | | |
| | Isophorone | | |
| | Bis (2-Chloroethoxy) methane | | |
| | 1,2,4-Trichlorobenzene | | |
| ✓ | Naphthalene | | |
| | Hexachlorobutadiene | | |
| | Hexachlorocylopentadiene | | |
| | 2-Chloronaphthalene | | |
| | Acenaphthylene | | |
| | Dimethylphthalate | | |
| | 2,6-Dinitrotoluene | | |
| | Acenaphthene | | |
| | 2,4-Dinitrotoluene | | |
| | Fluorene | | |
| | 4-Chlorophenyl phenyl ether | | |
| | Diethyl phthalate | | |
| | N-nitrosodiphenylamine | | |
| | 1,2-Diphenylhydrazine | | |
| | 4-Bromophenyl phenyl ether | | |
| | Hexachlorobenzene | | |
| | Phenanthrene | | |
| | Anthracene | | |
| | Dibutyl phthalate | | |
| | Fluoranthene | | |
| | Pyrene | | |
| | Benzidine | | |
| | Butyl benzyl phthalate | | |
| | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | | |
| | Benzo (a) anthracene | | |
| | Chrysene | | |
| | 3,3'-Dichlorobenzidine | | |
| | Bis (2-ethylhexyl) phthalate | | |
| | Di-n-octyl phthalate | | |
| | Benzo (b) fluoranthene | | |
| | Benzo (k) fluoranthene | | |
| | Benzo (a) pyrene | | |
| | Indeno (1,2,3-cd) pyrene | | |
| | Dibenzo (a,h) anthracene | | |
| | Benzo (g,h,i,) perylene | | |
| | N-nitrosodimethylamine | | |

☐ Acid Compounds

| ✓ | Method ☐ GC ☐ GC/MS | Date | Conc |
|---|---|---|---|
| | Phenol | | |
| | 2-Chlorophenol | | |
| | 2-Nitrophenol | | |
| | 2-4-Dimethylphenol | | |
| | 2-4-Dichlorophenol | | |
| | 4-Chloro-3-methylphenol | | |
| | 2,4,6-Trichlorophenol | | |
| | 2,4-Dinitrophenol | | |
| | 4-Nitrophenol | | |
| | 2-Methyl-4,6-dinitrophenol | | |
| | Pentachlorophenol | | |

Fred Mason 10-7-86 10:45 Fred Mason 10-7-86 12:20

SAMPLE COLLECTED BY (Signature) DATE/TIME RELINQUISHED BY (Signature) DATE/TIME

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[illegible] 10/7/86

RECEIVED IN LAB BY (Signature) DATE/TIME LABORATORY I.D. NO.

SEND REPORT TO: Fred Mason

ADEM FORM 235 4/85

STATE OF ALABAMA
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
MONTGOMERY, ALABAMA

LABORATORY: (X) Montgomery ( ) Mobile ( ) Birmingham

Sample Type:

| | | | |
|---|---|---|---|
| Potable Water [ ] | Landfill Leachate [ ] | Toxic Extraction [ ] | Composite [ ] |
| Surface Water [ ] | Hazardous Wastesite [ ] | Ignitability [ ] | Grab [X] |
| Soil/Sediment [ ] | Groundwater [ ] | Corrosivity [ ] | Container P [ ] |
| Wastewater [ ] | Waste (Special Handling) [ ] | Reactivity [ ] | G [ ] |

Source Asphalt Lagoon Wesselhoeft Inc

Location Mounds. Ala.

( ) Discharge from _____ (Point Source) to _____ (Receiving Water)

Comments _____ Preservative(s) _____

Check group of compounds or individual parameters

[ ] Base/Neutral Compounds

| ✓ | Method [ ] GC [ ] GC/MS | Date | Conc |
|---|---|---|---|
| | Bis (2-chloroethyl) ether | | |
| | 1,3- Dichlorobenzene | | |
| | 1,4- Dichlorobenzene | | |
| | 1,2- Dichlorobenzene | | |
| | Bis (2-Chloroisopropyl) ether | | |
| | Hexachloroethane | | |
| | N-nitroso-di-n-propylamine | | |
| | Nitrobenzene | | |
| | Isophorone | | |
| | Bis (2-Chloroethoxy) methane | | |
| | 1,2,4-Trichlorobenzene | | |
| ✓ | Naphthalene | | |
| | Hexachlorobutadiene | | |
| | Hexachlorocyclopentadiene | | |
| | 2-Chloronaphthalene | | |
| | Acenaphthylene | | |
| | Dimethylphthalate | | |
| | 2,6-Dinitrotoluene | | |
| | Acenaphthene | | |
| | 2,4-Dinitrotoluene | | |
| | Fluorene | | |
| | 4-Chlorophenyl phenyl ether | | |
| | Diethyl phthalate | | |
| | N-nitrosodiphenylamine | | |
| | 1,2-Diphenylhydrazine | | |
| | 4-Bromophenyl phenyl ether | | |
| | Hexachlorobenzene | | |
| | Phenanthrene | | |
| | Anthracene | | |
| | Dibutyl phthalate | | |

| | | | |
|---|---|---|---|
| | Fluoranthene | | |
| | Pyrene | | |
| | Benzidine | | |
| | Butyl benzyl phthalate | | |
| | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | | |
| | Benzo (a) anthracene | | |
| | Chrysene | | |
| | 3,3'-Dichlorobenzidine | | |
| | Bis (2-ethylhexyl) phthalate | | |
| | Di-n-octyl phthalate | | |
| | Benzo (b) fluoranthene | | |
| | Benzo (k) fluoranthene | | |
| | Benzo (a) pyrene | | |
| | Indeno (1,2,3-cd) pyrene | | |
| | Dibenzo (a,h) anthracene | | |
| | Benzo (g,h,i,) perylene | | |
| | N-nitrosodimethylamine | | |

Styrene + Dicyclopentadiene

[ ] Acid Compounds

| ✓ | Method [ ] GC [ ] GC/MS | Date | Conc |
|---|---|---|---|
| | Phenol | | |
| | 2-Chlorophenol | | |
| | 2-Nitrophenol | | |
| | 2-4-Dimethylphenol | | |
| | 2-4-Dichlorophenol | | |
| | 4-Chloro-3-methylphenol | | |
| | 2,4,6-Trichlorophenol | | |
| | 2,4-Dinitrophenol | | |
| | 4-Nitrophenol | | |
| | 2-Methyl-4,6-dinitrophenol | | |
| | Pentachlorophenol | | |

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|---|---|---|---|---|---|
| Fred Mason | 10-7-86 | 1030 | Fred Mason | 10-7-86 | 12:22 |
| SAMPLE COLLECTED BY | (Signature) | DATE/TIME | RELINQUISHED BY | (Signature) | DATE/TIME |
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SEND REPORT TO: Fred Mason

ADEM FORM 235 4/85

STATE OF ALABAMA
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
MONTGOMERY, ALABAMA

LABORATORY: (X) Montgomery ( ) Mobile ( ) Birmingham

Sample Type:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Potable Water | [ ] | Landfill Leachate | [ ] | Toxic Extraction | [ ] | Composite | [ ] |
| Surface Water | [ ] | Hazardous Wastesite | [ ] | Ignitability | [ ] | Grab | [X] |
| Soil/Sediment | [ ] | Groundwater | [ ] | Corrosivity | [ ] | Container P | [ ] |
| Wastewater | [ ] | Waste (Special Handling) | [ ] | Reactivity | [ ] | G | [ ] |

Source Asphalt Lagoon - Wessuhoeft Inc.

Location Moundville AL.

( ) Discharge from _____ (Point Source) to _____ (Receiving Water)

Comments _____ Preservative(s) _____

Check group of compounds or individual parameters

| ☐ Volatile Compounds | | | | |
|---|---|---|---|---|
| ✓ | Method | ☐ GC ☐ GC/MS | Date | Conc |
| | Methylene Chloride | | | |
| | Trichlorofluoromethane | | | |
| | 1,1-Dichloroethene | | | |
| | 1,1-Dichloroethane | | | |
| | Trans-1,2-Dichloroethene | | | |
| | Chloroform | | | |
| | 1,2-Dichloroethane | | | |
| | 1,1,1-Trichloroethane | | | |
| | Carbon Tetrachloride | | | |
| | Bromodichloromethane | | | |
| | 1,2-Dichloropropane | | | |
| | Trichloroethylene | | | |
| ✓ | Benzene | | | |
| | Dibromochloromethane | | | |
| | 1,1,2-Trichloroethane | | | |
| | 2-Chloroethyl vinyl ether | | | |
| | Bromoform | | | |
| | 1,1,2,2-Tetrachloroethane | | | |
| | Tetrachloroethylene | | | |
| ✓ | Toluene | | | |
| | Chlorobenzene | | | |
| ✓ | Ethyl Benzene | | | |

| ☐ Miscellaneous | | | | |
|---|---|---|---|---|
| ✓ | Method | ☐ GC ☐ GC/MS | Date | Conc |
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Fred Mason 10-7-86-1030 Fred Mason 10-7-86 12:22

SAMPLE COLLECTED BY (Signature) DATE/TIME RELINQUISHED BY (Signature) DATE/TIME

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D. [illegible] 10/7/86

RECEIVED IN LAB BY (Signature) DATE/TIME LABORATORY I.D. NO.

SEND REPORT TO: Fred Mason

ADEM FORM 237 4/85

Wesselhoeft Meeting

1. Note on Table 5 there are no acid extractable compounds in property line well.

2. Lead is only metal violating Ins

Conrad Wesselhoeft. 1958 purchased site: Bankruptcy sale

Page: 1

Name: Fred Mason

Date: 9-24-96

PHONE CONVERSATION RECORD

STATE OF ALABAMA
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

onversation With: Conrad Wesselhoeft Phone No.: 205/553-8129

ompany: Wesselhoeft, Inc. Location: Tuscaloosa, AL.

OTES: Contacted Mr. Wesselhoeft to determine the status of this project. Wesselhoeft indicated that he had gotten estimates for installing monitoring wells and found these to be beyond what he could afford. He indicated that he is contacting agencies to get assistance but has had very little success.

I requested that he send me a letter detailing his efforts to date. He agreeded to this request.

# MESSAGE

TO: FRED

DATE: 5/12 TIME: 8:41

FROM: JOHN HADDUCK

Environmental Testing & Engineering

556-5050

AREA CODE NUMBER EXT.

- [x] TELEPHONED
- [x] PLEASE CALL
- [ ] URGENT
- [ ] CAME BY
- [ ] RETURNED CALL
- [ ] WANTS TO SEE YOU
- [ ] WILL CALL
- [ ] OTHER

MESSAGE: Called May 12, 86

Wanted data on MW-11 So. Resins.

Is responding Engineer for Conrad Wesselhoeft.

RECEIVED BY:

ADEM Form 139 2/84

# WESSELHOEFT, INC.

P. O. Box 3323 ESS

TUSCALOOSA, ALABAMA 35404


September 30, 1986

OCT 1986 RECEIVED ADEM

Mr. Fred Mason
ADEM
1751 Federal Drive
Montgomery, Alabama 36130

Re: Cracker Asphalt Moundville
Adjacent to Lawter Chemical

Dear Mr. Mason:

Following our meeting in June '86 at your office in Montgomery, Environmental Testing & Environmental prepared an estimate of the cost of the work suggested by your office:

| | | |
|---|---|---|
| 2 | - Soil Samples | $2,900 |
| 3 | - Walls | 3,600 |
| | Geologist | 1,000 |
| | | $7,500 |

and submitted an invoice of $240.00 bringing their total billing to $1,704.00. It was plain to see that the cost of soil studies, water samples as well as the corrective measures to bring my wife's property into compliance was totally beyond my financial capacity.

I have devoted July, August and September in trying to find some government agency which could assist financially in pursuing the necessary program. I have spoken with officials of the Town of Moundville, local business people with knowledge of government and government offices in Atlanta. I am given to understand that there is a belief that there is some government agency which does give financial assistance in cases such as this. People are continuing to look. Nothing concrete has presented itself.

I will notify you just as soon as I hear something.

Very truly yours,

WESSELHOEFT, INC.

Conrad Wesselhoeft

Conrad Wesselhoeft

sjw

TELEPHONE (205) 553-8129 or 553-1079 — 59 CHEROKEE HILLS

MILLER, HAMILTON, SNIDER & ODOM
ATTORNEYS & COUNSELLORS AT LAW
254-256 STATE STREET
POST OFFICE BOX 46
MOBILE, ALABAMA 36601

(205) 432-1414
TELECOPIER (205) 433-4106

PALMER C. HAMILTON
JOHN C. H. MILLER, JR.*
JAMES B. NEWELL, JR.
LEWIS G. ODOM, JR.*
RONALD A. SNIDER
THOMAS TROY ZIEMAN, JR.
MICHAEL D. WATERS*
BRADLEY R. BYRNE
GEORGE A. LEMAISTRE, JR.*
RICHARD P. WOODS*
JEROME E. SPEEGLE
DANIEL B. GRAVES**
M. KATHRYN KNIGHT
MARK J. TENHUNDFELD
MATTHEW C. McDONALD
JOSEPH R. SULLIVAN
GEORGE A. LEMAISTRE
OF COUNSEL

*ADMITTED ALABAMA AND DISTRICT OF COLUMBIA
**ADMITTED ALABAMA AND FLORIDA

OCT 1986
RECEIVED
WATER DIVISION

October 13, 1986

CERTIFIED MAIL/
RETURN RECEIPT REQUESTED

Freedom of Information or Public
Access to Information Request of
The Water Division of the Alabama
Department of Environmental Management
Mr. Leigh Pegues, Director
Alabama Department of Environmental Management
1751 Federal Drive
Montgomery, Alabama 36130

Dear Mr. Pegues:

This letter will request that your office provide me copies of the following materials pursuant to Section 6-1-.03 of the Rules and Regulations of the Alabama Department of Environmental Management and pursuant to Sections 22-22-9, 22-22-A-5, 22-22-A-6 and 22-22-A-8 of the Alabama Code:

All correspondence, administrative orders, pleadings and any and all other writings in the files of the Alabama Department of Environmental Management, Water Division, relating to any investigation, inspection, or other action by and/or between the Alabama Department of Environmental Management and Conrad Wesselhoeft, individually and d/b/a Wesselhoeft, Inc. from September 17, 1986, through the present.

In compliance with the applicable regulations, I promise to pay reasonable charges incurred for search and copying costs. Please send me your invoice along with the copies which I have requested. I look forward to your response within ten (10) days of the date of this letter, or earlier, if possible.

Thank you very much for your assistance and cooperation in this matter.

Very truly yours,

M. Kathryn Knight

M. Kathryn Knight
For the Firm

MKK/prt

# ADEM

## ALABAMA
## DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

George C. Wallace
Governor

Leigh Pegues, Director

1751 Federal Drive
Montgomery, AL
36130
205/271-7700

Field Offices:

Unit 808, Building 8
225 Oxmoor Circle
Birmingham, AL
35209
205/942-6168

P.O. Box 953
Decatur, AL
35602
205/353-1713

2204 Perimeter Road
Mobile, AL
3[illegible]
20[illegible]79-2336

December 5, 1986

CERTIFIED MAIL 266617341
RETURN RECEIPT REQUESTED

Conrad Wesselhoeft
Wesselhoeft, Inc.
P.O. Box 3323 ESS
Tuscaloosa, Alabama 35404

Dear Mr. Wesselhoeft:

Enclosed please find a proposed Administrative Order which requires Wesselhoeft, Inc. to take certain actions with regard to the discharge of pollutants into waters of the State. This Order is not final, and we will provide you with an opportunity to present evidence and show cause why this Order should not be made final.

If you wish an opportunity to discuss the Order, members of our staff will be available at 10:00 a.m. on Tuesday, December 23, 1986 at our offices at 1751 Federal Drive, Montgomery, Alabama.

You are not required to attend this meeting, but if you have any questions, objections, or additional evidence to put before the Department, you should do so at that time. If you wish, you may be represented by counsel.

If you have any questions, please feel free to contact me at (205) 271-7855.

Sincerely,

Olivia Hardy Hudgins
Associate General Counsel

OHH/rdg

Enclosures

cc: Fred Mason, Water Division
Groundwater Section

DRAFT

ALABAMA DEPARTMENT OF

ENVIRONMENTAL MANAGEMENT

| | |
|---|---|
| IN THE MATTER OF<br><br>WESSELHOEFT, INC.<br>TUSCALOOSA COUNTY, ALABAMA | ORDER NO. 87- -WP |

FINDINGS OF FACT

Pursuant to the provisions of the Alabama Department of Environmental Management Act, Code of Alabama 1975, §§ 22-22A-1 to 22-22A-15 (1984), the Alabama Water Pollution Control Act, Code of Alabama 1975, §§ 22-22-1 to 22-22-14 (1984), and the National Pollutant Discharge Elimination System administered by the Alabama Department of Environmental Management (hereinafter, "the Department") and approved by the Administrator of the U.S. Environmental Protection Agency pursuant to the Federal Water Pollution Control Act § 402, 33 U.S.C. § 1342, the Department makes the following FINDINGS OF FACT:

1. Wesselhoeft, Inc. (hereinafter, "Wesselhoeft") owns property in Tuscaloosa County, Alabama on which is located an asphalt sludge lagoon.

2. Code of Alabama 1975, § 22-22-9(j)(6) (1984) provides that "every person, prior to discharging any new or increased pollution into any waters of the state shall apply to the [Department] in writing for a permit and must obtain such permit before discharging such pollution."

3. Wesselhoeft has neither applied to the Department for a permit to discharge pollutants nor obtained a permit to discharge pollutants.

4. Samples from the asphalt sludge lagoon indicate that benzene, toluene, and ethyl benzene are contained in the lagoon.

5. A groundwater monitoring well located downgradient from Wesselhoeft's asphalt sludge lagoon is contaminated with benzene, toluene, and ethyl benzene.

6. The results of a hydrogeology study reveal that the contaminated groundwater moves from the area of the asphalt sludge lagoon to the area of the groundwater monitoring well, indicating that the asphalt sludge lagoon owned by Wesselhoeft is discharging pollutants into the groundwater, a water of the state.

## ORDER

Based upon the foregoing FINDINGS OF FACT and pursuant to Code of Alabama 1975, §§ 22-22A-5(10), 22-22-9(c), 22-22-9(j), and 22-22-9(l) (1984), it is hereby ORDERED:

A. That not later than January 30, 1987, Wesselhoeft shall have the asphalt sludge lagoon analyzed for volatile, and base neutral compounds. Wesselhoeft shall also have any other point sources which are identified by the Department in writing to Wesselhoeft analyzed for volatile, and base neutral compounds not later than 30 days after having received such notice.

B. That not later than 30 days after receipt of notice by the Department in writing of any other analyses which are necessary, Wesselhoeft shall have said analyses performed on the asphalt sludge lagoon and any other point source which the Department has identified to Wesselhoeft in writing.

C. That not later than April 1, 1987, Wesselhoeft shall install piezometers on site to evaluate groundwater flow direction.

D. That not later than July 1, 1987, Wesselhoeft shall install monitoring wells at the asphalt sludge lagoon to sample groundwater and to analyze said samples for the compounds identified in paragraphs A & B above.

E. That not later than 180 days after receipt of notice in writing by the Department of any other point sources which must be monitored, Wesselhoeft shall install monitoring wells at said point sources to sample groundwater and to analyze said samples for the compounds identified in paragraphs A & B above.

F. That not later than October 1, 1987, Wesselhoeft shall submit to the Department a report prepared by a qualified geologist or geotechnical engineer which documents the groundwater contamination at the Wesselhoeft site. Said report must delineate the vertical and horizontal extent of the contaminated plume.

G. That not later than October 1, 1987, Wesselhoeft shall submit to the Department plans for closure or control of identified point sources. Said report shall include plans for cleanup of groundwater contamination.

H. That not later than January 30, 1987, Wesselhoeft shall commence making verbal reports to the Department of its progress toward compliance with this Order, and said reports shall continue to be made every 30 days until the Department releases Wesselhoeft in writing from this requirement.

I. That not later than April 1, 1987, Wesselhoeft shall commence making written reports to the Department of its progress toward compliance with this Order, and said reports shall continue to be made every 90 days until the Department releases Wesselhoeft in writing from this requirement.

J. That the failure to comply with the provisions of this Order shall constitute cause for the commencement of legal action for the recovery of civil penalties, criminal fines, or other appropriate relief by the Department or others against Wesselhoeft.

K. That the issuance of this Order does not preclude the Department or others from seeking civil penalties, criminal fines, or other appropriate sanctions or relief against Wesselhoeft for the violatons stated herein.

ORDERED and ISSUED this ____ day of _____ 1986.

_____

Leigh Pegues, Director
Alabama Department of Environmental Management
1751 Federal Drive
Montgomery, Alabama 36130
(205) 271-7700

File

# ADEM

## ALABAMA
## DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

James W. Warr, Director

Jim Folsom
Governor

Mailing Address:
PO BOX 301463
MONTGOMERY AL
36130-1463

Physical Address:
1751 Cong. W. L.
Dickinson Drive
Montgomery, AL
36109-2608

(205) 271-7700
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Field Offices:

110 Vulcan Road
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35209-4702
(20[illegible] 942-6168
F[illegible]1-1603

400 Well Street
P.O. Box 953
Decatur, AL
35602-0953
(205) 353-1713
FAX 340-9359

2204 Perimeter Road
Mobile, AL
36615-1131
(205) 450-3400
FAX 479-2593

June 16, 1994

**CERTIFIED MAIL P 014 550 440**
**RETURN RECEIPT REQUESTED**

Mr. Conrad Wesselhoeft
Wesselhoeft, Inc.
P. O. Box 3323 ESS
Tuscaloosa, Alabama 35404

Dear Mr. Wesselhoeft:

RE: **NOTICE OF VIOLATION**
Wesselhoeft, Inc.
Moundville, Tuscaloosa/Hale County, Alabama
Groundwater Incident No. GW 94-5-6

After a site visit on May 17, 1994 and review of the groundwater data obtained from a monitoring well system at an adjacent facility (Lawter International), it has been determined that hydrocarbon contamination in groundwater is migrating from the above referenced property. Review of the groundwater quality data and the results of the site visit indicate that an unpermitted release of pollutants to Waters of the State has occurred from the facility which is a violation of Alabama law, specifically Title 22 §§ 22-22-9(i)(3) et. seq., (1990 Replacement Vol.) Code Of Alabama (1975). Therefore:

1. The facility must conduct a groundwater quality assessment by fully defining the horizontal and vertical extent of groundwater contamination. This should be demonstrated by installing monitoring wells to determine groundwater conditions. The assessment should included a monitoring plan for determining rate, extent and concentrations of contamination on a quarterly basis. The facility will have forty-five (45) days from the date of this letter to submit an assessment plan, and will have ninety (90) days from the approval date of the assessment plan to conduct the assessment and submit a finalized groundwater quality assessment report.

2. During the site visit, it was stated that several of the above ground storage tanks have been cleaned out by potential users. It was determined during the visit that the material removed from the tanks were placed within the dike areas of the various tanks and were not properly disposed. Within forty-five (45) days from the date of this letter, the facility should submit a detailed report outlining the cleaning activities conducted. The report should also include a plan to assess the horizontal and vertical extent of soil contamination due to the material removed from the various tanks, and a remediation plan to remove all storage tank debris and the contaminated soils.

The investigation must be conducted in accordance with accepted geological practices and by a geologist or engineer experienced in hydrogeological investigations. Upon review of the completed assessment, the Department may require a corrective action plan to be developed and implemented.

Printed on Recycled Paper

Should there be any questions concerning these requirements, please contact Ms. Kathleen D. Keller at 205/271-7964.

Sincerely,

Charles R. Horn, Chief
Water Division

CRH/KK/pm

P 014 550 440

# Receipt for Certified Mail

No Insurance Coverage Provided
Do not use for International Mail
(See Reverse)

| | |
|---|---|
| Sent to | |
| Street and No. | |
| P.O., State and ZIP Code | |
| Postage | $ |
| Certified Fee | |
| Special Delivery Fee | |
| Restricted Delivery Fee | |
| Return Receipt Showing to Whom & Date Delivered | |
| Return Receipt Showing to Whom, Date, and Addressee's Address | |
| TOTAL Postage & Fees | $ |
| Postmark or Date | |

PS Form 3800, June 1991

SENDER: 6-16-94

Complete items 1 and/or 2 for additional services.
Complete items 3, and 4a & b.
Print your name and address on the reverse of this form so that we can return this card to you.
Attach this form to the front of the mailpiece, or on the back if space does not permit.
Write "Return Receipt Requested" on the mailpiece below the article number.
The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):
1. ☐ Addressee's Address
2. ☐ Restricted Delivery
Consult postmaster for fee.

3. Article Addressed to:
Mr Conrad Wesselhoeft
Wesselhoeft Inc
P.O. Box 3323 E 55
Tuscaloosa, Al 35404

4a. Article Number P014550440

4b. Service Type
☐ Registered ☐ Insured
☐ Certified ☐ COD
☐ Express Mail ☐ Return Receipt for Merchandise

7. Date of Delivery JUN 20 1994

5. Signature (Addressee)

6. Signature (Agent)

8. Addressee's Address (Only if requested and fee is paid)

Form 3811, December 1991 ... 382-714 COMESTIC RETURN RECEIPT

Thank you for using Return Receipt Service.

# ATTACHMENT 3

RECORD OF COMMUNICATION

PROJECT NAME Cracker Asphalt ID # 6243

COMMUNICATIONS WITH: Conrad Wesselhoeft

LOCATION: Moundville PHONE: ——

RECORDED BY: J. Stamps

RE: Site Visit for PA (August 18, 1994)

SUBJECT: Site History

SUMMARY OF COMMUNICATIONS: During the site visit Mr. Conrad Wesselhoeft said: 1) he purchased the old Cracker site in a bankruptcy sale that took place in 1968. Cracker Asphalt Company previously used the site as a asphalt refining and storage company for a little over one year before becoming bankrupt. 2) Mr. Wesselhoeft uses the site's buildings and occaisionally has leased one of the AST's to Southern Resins Company.

3) At the time of the site visit none of the tanks were being used.

4) SRC stored by-product petroleum solvents in the 350,000 gallon AST.

5) The bank of Moundville still owns the northern portion of the site.

6) The northern portion of the site does not have any tanks or buildings on it.

7) There is a Indian Mound on the north end of the property.

RECORD OF COMMUNICATION

PROJECT NAME Cracker Asphalt ID # 6243

~~COMMUNICATIONS WITH:~~ Field Notes

LOCATION: Moundville ~~PHONE:~~

RECORDED BY: Stamps

~~RE:~~

~~SUBJECT:~~

SUMMARY ~~OF COMMUNICATIONS~~:

1) Land around site: North - pine trees & River; West - Lauter Chemical Plant & Moundville State Park; East - methane wells and pine trees and Swamp; South - railroad tracks, house and farmland.

2) 1/2 Mile Radius - B&W Tank heads (on site), Lauter Chemical Plant, Moundville park, 2 gas stations, grocery store, video store & 3 houses

3) On Site Population - 20 workers at B&W Tanks
60 workers at Lauter Chemical Plant

P2

# ATTACHMENT 4

ENVIRONMENTAL TESTING & ENGINEERING
(A Division of Engineering Plus, Inc.)
P.O. Box 715
Highway 69 North
Northport, Alabama 35476
(205)339-0216

July 27, 1994

Ms. Kathleen Keller
Alabama Department of Environmental Management
Groundwater Branch
1751 Dickinson Drive
Montgomery, AL 36130

Dear Ms. Keller:

Re: Notice of Violation
Wesselhoeft, Inc.
Moundville, Tuscaloosa/Hale County, Alabama
Groundwater Incident No. BW 94-5-6

Enclosed is a Preliminary Groundwater Assessment Plan for the above-referenced facility. As can be seen from the plan, Mr. Conrad Wesselhoeft, President of Wesselhoeft, Inc. proposes to conduct the investigation at a very paced rate to minimize any major capitol investment and allow the site to pay for its own remediation, rather than having to finance a major project over a short term. The property is already mortgaged and the corporation has only limited borrowing capabilities.

Please examine this plan and forward your comments or recommendations to Wesselhoeft, Inc. after your review. Please send me copies of any correspondence so that I can keep my files updated. Thank you.

Sincerely,

Environmental Testing & Engineering
(A Division of Engineering Plus, Inc.)

John K. Haddock, P.E.
Alabama Reg. No. 12998
President

cc: Mr. Conrad Wesselhoeft, Wesselhoeft, Inc.

# PROPOSED GROUNDWATER ASSESSMENT PLAN
# FOR THE SITE OF WESSELHOEFT, INC.
# NEAR THE TOWN OF MOUNDVILLE, ALABAMA

JULY 27, 1994

PREPARED BY

ENVIRONMENTAL TESTING & ENGINEERING
(A Division of Engineering Plus, Inc.)
P.O. Box 715
Highway 69 North
Northport, Alabama 35476
(205)339-0216

# PROPOSED GROUNDWATER ASSESSMENT PLAN FOR THE SITE OF WESSELHOEFT, INC. NEAR THE TOWN OF MOUNDVILLE, ALABAMA

JULY 27, 1994

Environmental Testing & Engineering has been requested to prepare a plan for the investigation of groundwater contamination problems at the site of Wesselhoeft, Inc. in Moundville, Alabama. The problem came to the attention of The Alabama Department of Environmental Management (ADEM) when monitoring wells on the adjacent Southern Resins/Lawter Chemical Company site revealed hydrocarbon contaminants at unacceptable concentrations downgradient from the Wesselhoeft site. A Notice of Violation from ADEM, dated June 16, 1994 imposed requirements for conducting assessments of the groundwater quality and of soil contamination potential.

The property owner, Wesselhoeft, Inc., contends that the contamination was present prior to his occupation of the site and that he does not have the financial capability of a large site investigation, much less a major remediation project. Mr. Conrad Wesselhoeft, President of the corporation has proposed to conduct the investigation in phases requiring minimal financial investment on an evenly paced basis.

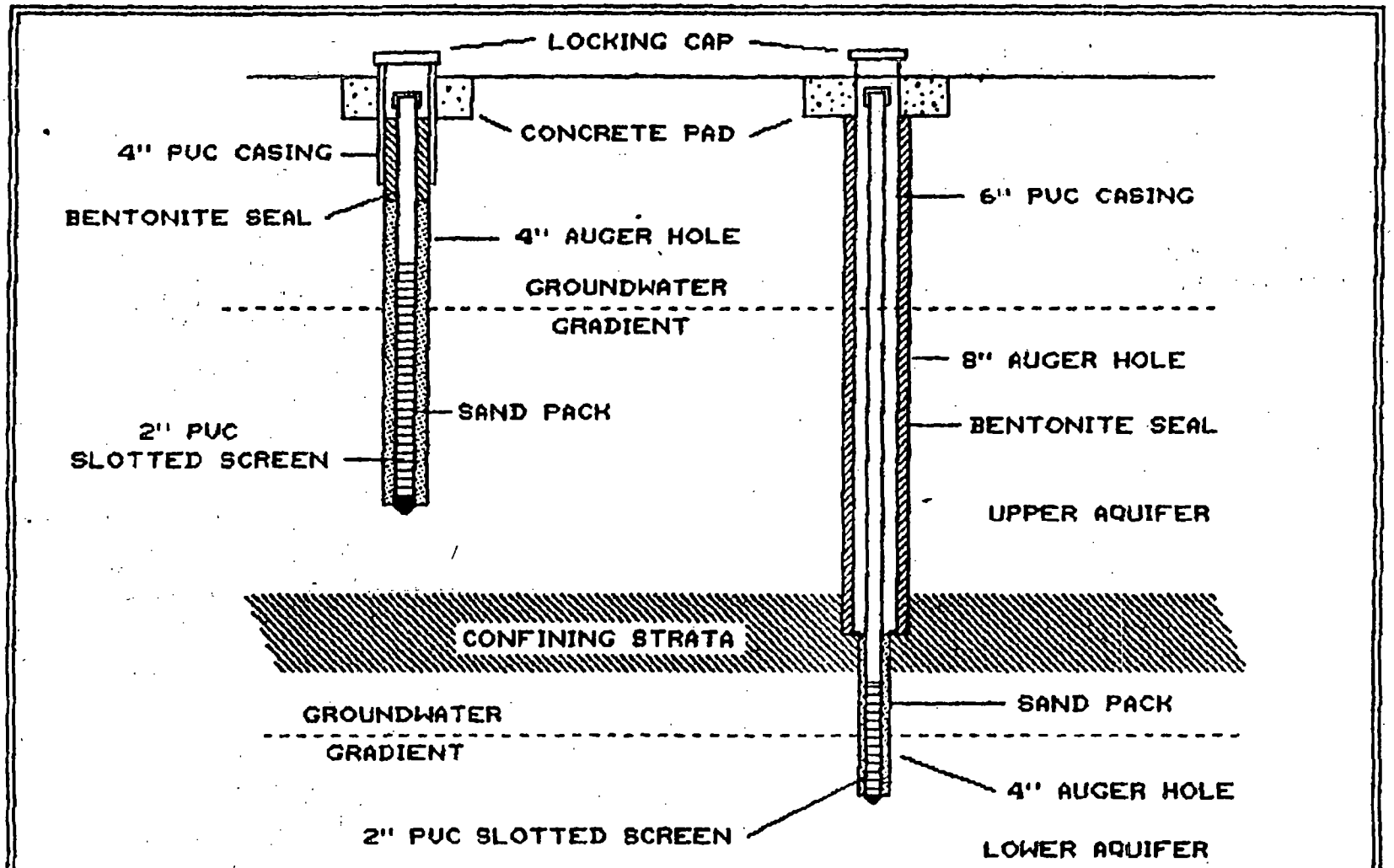
An earlier investigation has theorized that the contaminants are probably originating from the abandoned sediment basin near the southwest corner of the approximately 25 acre parcel of property. The basin collected sediment from the asphalt operations and the contaminants, probably originating from minor releases during the operation of the plant were trapped in the wet silts. These contaminants are probably being released slowly through the silty clay which was used as a liner for the basin. The large storage tanks on the site are either empty or contain very viscous or heavy materials with very little chance for a major release. The materials removed from the tanks were probably very stable and there should not have been major contamination from these sources. The present operations and the activities on the site since Wesselhoeft's occupation have not used the materials present as contaminants in the groundwater and therefore the contamination should be present in a limited area.

The Lawter investigation provided numerous downgradient monitoring wells which Wesselhoeft proposes to utilize in his investigation. The information is of public record and available for use in the Wesselhoeft report. During the investigation it was found that the groundwater near the southwest corner of the property was a depth of about 21 feet beneath the surface. We propose to install one preliminary monitoring or observation well in the vicinity of the abandoned settling basin to the east of the Lawter/Wesselhoeft west property line. The well will be drilled to the groundwater depth with a small trailer-mounted auger rig and a 2" diameter well installed. Relatively undisturbed samples will be collected with a hand auger at various depths (3 samples) and analyzed for the contaminants found in the Lawter wells in the area. The samples will also be analyzed for total petroleum hydrocarbons. The groundwater collected from the well will also be analyzed for these parameters. The drilling will be

carefully logged and samples saved for future reference. The location of the next well will be determined after a review of the results of the initial well and this process will continue until the horizontal extent of the contamination has be determined. Eventually, after location of the contamination area, a deeper well will be drilled and cased through the surface aquifer. The well will be screened in the next aquifer to assess the vertical contaminant potential.

Soil samples will be collected around the large storage tanks and around the site to locate any hydrocarbon contamination. The samples will be analyzed for total petroleum hydrocarbons. A remediation plan will be prepared for any contaminated soils located during the investigation.

In conclusion, the shallow aquifer beneath the site has probably been contaminated to some degree for many years due to the heavy industrial activity in the area. The aquifer is relatively limited in areal extent and probably discharges slowly into the nearby Black Warrior River. There is very little, if any use of the aquifer as a water supply and no apparent use of the aquifer for potable water, therefore the situation does not constitute an emergency requiring immediate attention. The problem appears to lend itself to a paced investigation and remediation plan.




**GROUNDWATER MONITORING WELL DETAILS**

ENVIRONMENTAL TESTING & ENGINEERING
(A Division of Engineering Plus, Inc.)
P.O. Box 715 Northport, Alabama 35476
(205) 339-0216

# ATTACHMENT 5

RECORD OF COMMUNICATION

PROJECT NAME Crackar Asphalt ID # 6243

COMMUNICATIONS WITH: Moundville Water Works

LOCATION: PHONE: (205) 371-2641

RECORDED BY: N Stamps

RE: Public wells

SUBJECT:

SUMMARY OF COMMUNICATIONS:

1) Moundville has two wells in use

2) Blended System - 50% from each well

3) 1,348 purchasers

4) Hale Co. buys 300,000 gal. $H_2O$ each day

# ATTACHMENT 6

RECORD OF COMMUNICATION

PROJECT NAME Cracker Asphalt ID # 6243

COMMUNICATIONS WITH: Hale County Water System

LOCATION: PHONE: (205) 624-8868

RECORDED BY: A. Stamps

RE: Public Water Supply

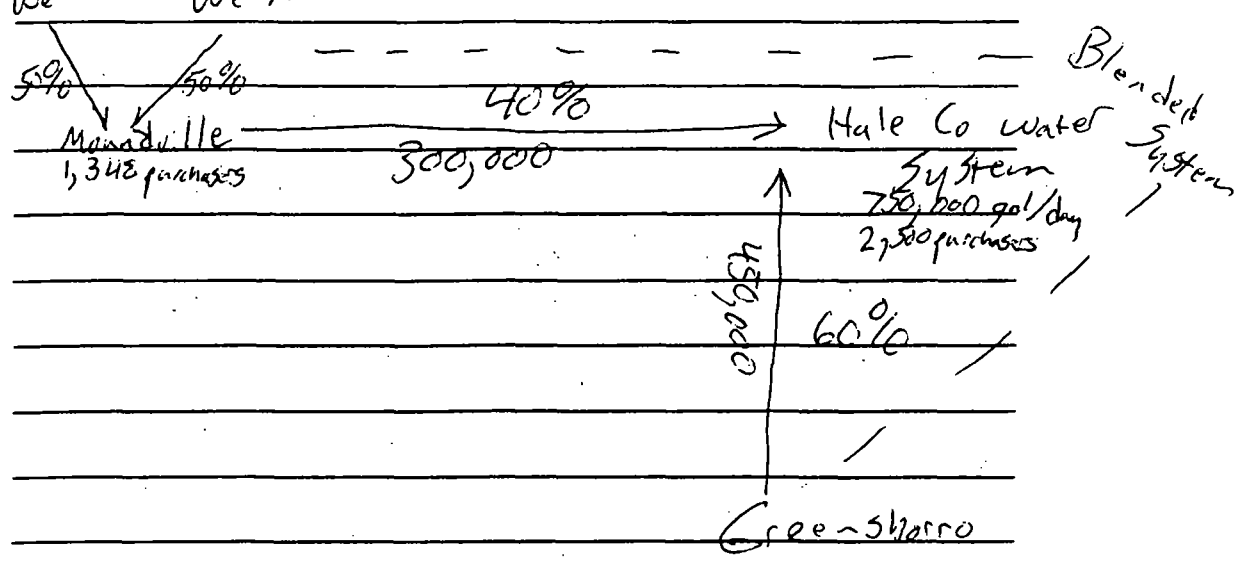
SUBJECT:

SUMMARY OF COMMUNICATIONS:

1) 300,000 gal of $H_2O$ bought from Moundville each day.

2) $H_2O$ from Moundville mixed with water bought from Greensboro

3) 2,500 water bills each month



# PLATES

U.S. EPA REGION IV

# SDMS

## Unscannable Material Target Sheet

DocID: 10449697 Site ID: ALD000472712

Site Name: Cracker Asphalt

Nature of Material:

| | | | |
|---|---|---|---|
| Map: | ✓ | Computer Disks: | |
| Photos: | | CD-ROM: | |
| Blueprints: | | Oversized Report: | |
| Slides: | | Log Book: | |

Other (describe): Plate 1 + 2

Amount of material:

* Please contact the appropriate Records Center to view the material *

# PLATE 1

# PLATE 2