# Geologic Study Along Highway 25 From Starkville to Carthage

TRACY WALLACE LUSK

BULLETIN 98

MISSISSIPPI GEOGRAPHICAL ECONOMIC AND TOPOGRAPHICAL SURVEY

FREDERIC FRANCIS MELLEN

DIRECTOR AND STATE GEOLOGIST

JACKSON, MISSISSIPPI

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## LETTER OF TRANSMITTAL

Office of the Geological Economic & Topographical Survey

Jackson, Mississippi

March 4, 1963

Mr. Henry N. Toler, Chairman, and
Members of the Board
Mississippi Geological Economic & Topographical Survey

Gentlemen:

We transmit herewith for publication as Survey Bulletin 98 the manuscript of Tracy Wallace Lusk entitled "Geologic study along Highway 25 from Starkville to Carthage."

This report is a continuation of cooperation with the Mississippi State Highway Department in studying the mantle-rock and bed-rock geology along the highways of the State. Good highways, especially in these days of increasing load limits, must have good road beds. As the structural stability of a highway route is directly related to the geology, these studies provide useful information for safe preventive initial construction, including the location of "fill-dirt" and "topping," and for remedial work after a failure has developed. Moreover, the highways, themselves, provide cuts and access to exposures that enable geologists and engineers opportunities to study the exposed geology of the region traversed.

The Mississippi State Highway Department provided for Survey use during this study an automobile and credit card. Power auger equipment and labor for drilling 29 test holes was also supplied, as were maps, profiles and other data.

Respectfully submitted,

Frederic F. Mellen
Director and State Geologist

FFM: js

# CONTENTS

# ILLUSTRATIONS

## FIGURES

PLATES

# GEOLOGIC STUDY ALONG HIGHWAY 25 FROM STARKVILLE TO CARTHAGE

TRACY WALLACE LUSK

## ABSTRACT

The part of the State traversed by Highway 25 comes within three physiographic provinces — the Black Prairie, the Flatwoods, and the North Central Hills.

The geologic formations are the Prairie Bluff, Clayton, Porters Creek, Fearn Springs, Ackerman, Tuscahoma, Hatchetigbee, Tallahatta, Winona, Zilpha, and Kosciusko. These range in age from the Selma group, through the Wilcox group, to the Claiborne group.

The direction of regional dip varies from about S. 60° W. at the northeast end of the highway to about S. 50° W. at the southwest end. The average regional dip is about 30 feet per mile. The general area of the Winona outcrop is the only area that shows some evidence of a structural disturbance, and several small faults are indicated.

The economic importance of clays are usually treated from the standpoint of useful productivity. However, from the standpoint of highway construction, most clays do not easily make stable foundations and add to the cost.

The outcrop belts of the Wilcox and Claiborne groups provide many areas for sand for topping and fill material.

## INTRODUCTION

The value of this the fourth such highway study should be readily apparent to the geologist working in Mississippi. A correct understanding of the outcropping sediments is essential to all projects involving foundations or mineral resources.

Mississippi Highway 25 was selected for study due to the fact that much of it had recently been re-routed and as a result, the cuts were still fresh and uncovered. Also, the stratigraphic sequence of geologic units exposed along this route is probably the most misunderstood or misinterpreted portion of the geologic column cropping out in the State. The nomenclature and geology of the beds belonging to the Wilcox group are certainly the most controversial. Even though the true scope of this study is confined to a relatively narrow strip, the recording of such valuable geologic data should be of immeasurable aid in arriving at an interpretation of the stratigraphic sequence that is satisfactory to at least most students of the Wilcox.

The recent publications by the Mississippi Geological Survey dealing directly with highway profiles have all contributed to the refinement of the method of presentation. These reports are:

Bulletin 89, "Geologic Study Along Highway 16 From Alabama Line to Canton, Mississippi," by B. W. Brown.

Bulletin 91, "Geologic Study Along Highway 80 From Alabama Line to Jackson, Mississippi," by R. R. Priddy.

Bulletin 94, "Geologic Study Along Highway 45 From Tennessee Line to Meridian, Mississippi," by D. M. Keady.

The illustrations (profiles) by Priddy in Bulletin 91 seem to offer the best practical manner for presentation. This same scheme was used by Keady and accordingly has been adopted for this report.

On the profile scales the horizontal distance between each heavy line is 5000 feet and between each small division is 500 feet. The strip map, which is provided for the purpose of showing highway direction, was taken from the official State Highway Department county map series, scale 1 inch to the mile. The slight scale differential between the profile and the strip map is the reason for the broken strip. In addition to the scale in feet, a continuous scale in miles is shown beginning with zero points at each extreme end of the profile.

The vertical scale is 50 feet between the heavy grid lines, therefore, each small division represents a distance of 5 feet. All elevations are based on mean sea level. The vertical exaggeration of 100, with respect to the horizontal scale, greatly distorts relief, but the resulting sharpened relief affords the opportunity to show bedrock detail that otherwise would not be possible.

This writer, in attempting further to refine this type of reporting, presents the text in the normal procedure for geologic reports, i.e. the stratigraphy of the entire geologic sequence studied is discussed which is followed by the structural relationships and economic geology, in the belief that a better continuity of thought is probable which should lead to a better comprehension of the study. It is also reasonable to assume that such would likewise bring about a clearer understanding of any local-

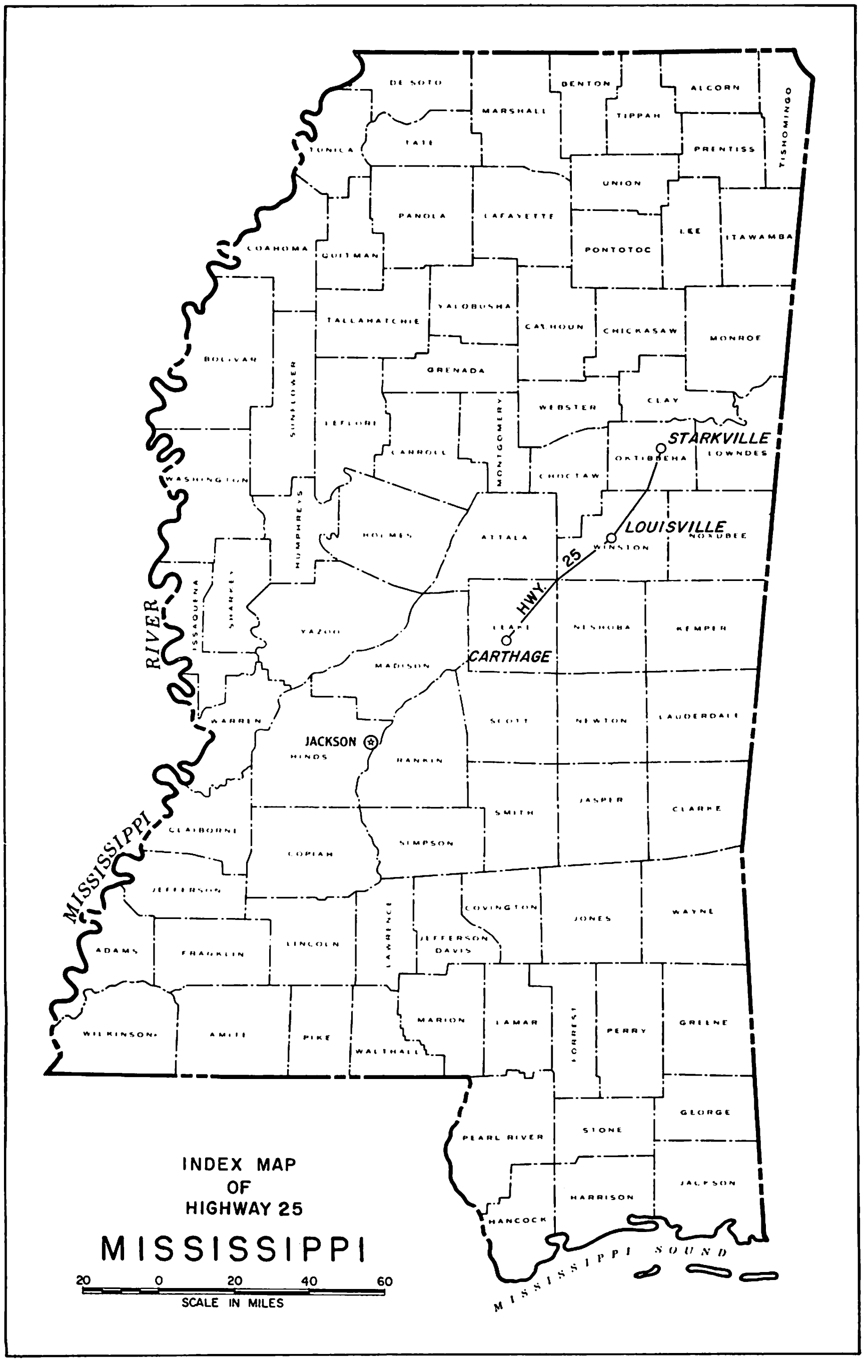


Figure 1.—Index map showing that portion of Highway 25 covered by this study.

ized area. Without a doubt the profiles will continue to be the focal points of a study of this type.

## PHYSIOGRAPHY

From the town of Starkville in Oktibbeha County to about a mile north of Carthage in Leake County, Highway 25 spans all or parts of three physiographic provinces — the Black Prairie, the Flatwoods, and the North Central Hills.

Only the extreme northeastern mile or perhaps two miles are in the Black Prairie province. This area is characterized by low rolling hills and broad valleys. The resistant nature of the outcropping rock, chalk, to erosion is the chief reason for this being an area of low relief.

The Flatwoods physiographic province is as the name implies a region of little relief. It is a relatively narrow belt that extends from the Tennessee line in northwestern Tippah County to the Alabama line in Kemper County. This region underlies approximately 17 miles of Highway 25 which extends from about two miles south of Starkville to about eight miles northeast of Louisville. The Flatwoods is fairly low and poorly drained. Except along the western edge of the belt the relief is slight, exhibiting broad valleys and broad divides. The lithologic nature of the outcropping sediments provides the reason for such topography. The outcrop belt of the Porters Creek clay makes up the Flatwoods. The western edge of the rather pure clay gives way to some sand and the relief becomes greater and sharper.

The remaining part of this highway is constructed on the North Central Hills province, which borders the Flatwoods on the southwest in this part of the State. Where the Flatwoods gives way to the North Central Hills, mile 18.3, the change is prominent, from an area of little relief to one of considerable relief. Local relief is as great as 150 feet up the northeast valley wall of Mill Creek, miles 21 to 22.5. Numerous exceptions exist that cause local deviations from the general description, such as a broad valley that has developed because of a significant stream. Probably the most noteworthy example of this is the area just northeast of Louisville, which is relatively high and lacking the characteristic relief. For about six miles northeast of Louisville, Highway 25 follows closely the break between this plateau type topography on the southeast side of the highway and the more typical hilly topography on the northwest side. Unfortunately, this portion of the highway has no profiles to illustrate this unusual type of topography.

## STRATIGRAPHY

### GENERAL STATEMENT

The stratigraphic sequence of bedrock units involved in this study are included in four geologic groups — Selma, Midway, Wilcox, and Claiborne. The entire sections of the Midway and Wilcox groups are spanned by Highway 25, whereas only the uppermost part of the Selma and approximately lower two thirds of the Claiborne groups are spanned.

The formations belonging to these groups number thirteen (Figure 2). For the most part the units are reasonably well exposed, affording an excellent opportunity for study.

### SELMA GROUP — PRAIRIE BLUFF FORMATION

Only a part of the uppermost unit of the Selma group, which is the Prairie Bluff formation, crops out along Highway 25. This formation extends from Starkville, mile 0, for a distance of approximately 1.5 miles (Plate 1). Because of the short outcrop span and lack of relief, no fresh exposures are in evidence.

Samples from auger holes, 22, 23, 24, and 25 provided the descriptive information as well as the formational boundary for profiling. Inasmuch as only the upper part of the Prairie Bluff is at the surface, the contact with the overlying formation, Clayton, is the only boundary involved.

The Prairie Bluff formation is composed of a rather dense, blue-gray chalk. It weathers to a light-gray (off-white) color with numerous joints and cracks. The chalk contains glauconite, phosphatic nodules and molds of fossils, pyrite or marcasite nodules, and muscovite mica. On the basis of a regional report (Stephenson and Monroe, 1940) and numerous other reports the chalk is generally clayey and sandy but locally it is rather high in calcium carbonate.

Figure 2
Generalized Section of Geologic Units along Highway 25
from Starkville to Carthage

| Era | System | Series | Group | Formation | Lithologic Character | Thickness (feet) |
|---|---|---|---|---|---|---|
| Cenozoic | Quaternary | Recent | | Alluvium | Sand, tan to gray, silty, fine to medium. | 0-30± |
| | Tertiary | Eocene | Claiborne | Kosciusko | Sand, tan to reddish-brown, fine to medium, massive to cross-bedded, with lesser amounts of gray clay shales and silts. | 175 incomplete |
| | | | | Zilpha | Clay, light- to dark-gray, silty to very plastic, glauconitic to non-glauconitic, carbonaceous, some zones contain selenite crystals. | 20-30 |
| | | | | Winona | Sand, highly glauconitic (greensand), fossiliferous, forms multiple zones of resistant ferruginous ledges. | 25± |
| | | | | Tallahatta: Neshoba Sand Member | Sand, light-tan to reddish-brown, fine to medium, micaceous, non-glauconitic to slightly glauconitic. | 30-90 |
| | | | | Tallahatta: Basic City Member | Clay and silt, shaly, siliceous, some semi-indurated, micaceous, glauconitic, numerous borings. | 15-75 |
| | | | | Tallahatta: Meridian Member | Sand, reddish-brown to tan, fine to medium, micaceous, non-glauconitic to glauconitic, cross-bedded, some light-gray clay shale and siltstone. | 38± |
| | | | Wilcox | Hatchetigbee | Sand, brown to tan, fine to medium, silty, micaceous, cross-bedded, (Lower part). Clay, light- to dark-gray, micaceous, plastic, carbonaceous, some lignite, selenite crystals, (Upper part). | 200± |
| | | | | Tuscahoma | Sand, reddish-brown to tan, fine to medium, micaceous, cross-bedded, and irregular zones of silt and some gray clays, some lignite. Silicified wood fragments and quartz pebbles at base. | 275-325 |
| | | | | Ackerman | Sand, reddish-brown to tan, fine to coarse, micaceous, cross-bedded and inter-bedded with silt and light-gray clay and lignite. | 330-409 |
| | | | | Fearn Springs | Sand, reddish-brown to tan, fine to coarse, cross-bedded, micaceous, some silicified wood and quartz pebble; silt, tan to purplish, cross-bedded, micaceous; small amount of light-gray clay inter-bedded. | 50-84 |
| | | | Midway | Naheola | Clay and sand, laminated, thin partings of limonite; clay, dark-gray, micaceous; sand, gray and tan, micaceous, very fine. | 70± |
| | | | | Porters Creek | Clay, dark-gray, blocky, conchoidal fracture, micaceous; weathers light-gray. | 310± |
| | | | | Clayton | Sand, tan to gray, glauconitic, calcareous; and clay, tan and gray, silty, glauconitic, calcareous. | 15-20 |
| Mesozoic | Cretaceous | Gulfian | Selma | Prairie Bluff | Chalk, blue-gray, glauconitic, clayey; weathers white. | incomplete |

The Prairie Bluff-Clayton contact is not exposed at the surface. This contact should show at about mile 1.5, however, the low relief and soil cover combine to hide this feature (Plate 1).

## MIDWAY GROUP

### CLAYTON FORMATION

The Clayton formation, which is the basal unit of the Midway group, is not well developed in this area, certainly not in its more typical lithology. From mile 1.6 to about mile 2.9 (Plate 1), the highway is constructed on probable Clayton material. The lack of relief and excellent soil cover prevent exposures of fresh bedrock.

The interval from the top of the chalk to the base of the Porters Creek clay has been mapped as Clayton. The thickness of this unit is about 20 feet.

The Clayton is composed of tan to dark-gray, micaceous, glauconitic, slightly calcareous, clay, silt, and sand. The lower contact with the Prairie Bluff chalk is distinct, however, the upper contact with the Porters Creek clay is apparently gradational. For more detailed information see Auger Holes 23, 24, 25, and 26.

### PORTERS CREEK FORMATION

The Porters Creek formation extends from mile 2.9, the approximate up-dip limit, to mile 18.1 — thus the entire outcrop belt is spanned by Highway 25 (Plate 1). However, the length of highway is not the actual width of outcrop because the road direction is not parallel to the true dip. The usual featureless topography exists and as a result fresh exposures are few. Also the fact that several prominent streams meander through the belt has further contributed to the concealment of the bedrock by deposits of alluvial material and perhaps some terrace material.

Auger Holes 25, 26, 27, 28, 29, and 21 penetrated portions of the Porters Creek (Plate 1). The samples are dark-gray, carbonaceous, tough, plastic, micaceous clay. The clay drys to a light-gray. The few exposures show the clay to weather from dark- to light-gray, and to break with a conchoidal fracture. These outcrops are located at miles 5.9, 8.8, 13.8, and 17.0 (Plate 1). The total thickness is approximately 310 feet.

The contact with the underlying Clayton formation does not show on outcrop. Auger Holes 25 and 26 cut through this zone and the findings indicate a gradational contact through a thickness as much as five feet.

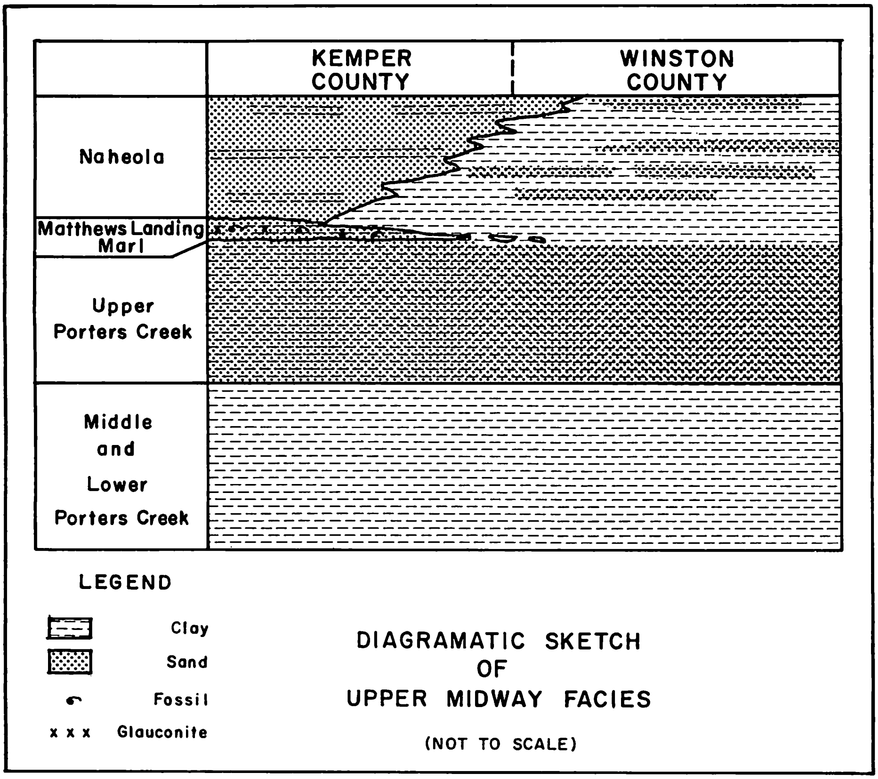


Figure 3.—Diagrammatic sketch of facies of upper Midway in Kemper and Winston Counties.

The Porters Creek-Naheola contact is not clearly definable. The absence of the Matthews Landing marl member and the apparent lithologic change that exists northwest and north of Kemper County (Figure 3) clouds the zone of contact. In Kemper County the Matthews Landing marl marks the top of the Porters Creek. This marl can be traced only a short distance into southeastern Winston County. The upper part of the Porters Creek in Kemper County consists of a laminated clay and sand which is virtually the same as the Naheola equivalent that crops out along Highway 25. The contact drawn on Plate 1, which is more or less arbitrary, is so placed because of (1) the apparent lithologic change from the underlying clay and (2) the thickness correlation with the known Naheola at this stratigraphic position.

At four localities (miles 8.8, 9.0, 13.8, and 18.0), fragments of silicified wood and quartz pebbles were observed overlying fresh Porters Creek clay (Plate 1). At each place the relief is either slightly more than the normal or near streams. This seems to be suggestive of terraces or colluvial out-wash from the Wilcox sediments.

### NAHEOLA FORMATION

The Naheola formation crops out from mile 18.0 to mile 19.4, a highway distance of 1.4 miles. The updip extremity marks the southwestern boundary of the Flatwoods physiographic province and the beginning of the North Central Hills province.

The unit herein defined as Naheola consists of laminated clay and sand, containing thin partings and concretions of limonite. The clay is dark-gray when fresh, but weathers to a light-gray. It is highly micaceous (muscovite) and the flakes are predominantly large — up to one eighth of an inch in diameter. The sand is very fine, micaceous, and gray and tan. This is the apparent equivalent of the much more sandy Naheola of Kemper County, Mississippi and western Alabama. The description is practically the same as for the upper part of the Porters Creek in Kemper County (Figure 3). This condition as well as the lower contact has been discussed under "Porters Creek Formation."

At some places in Winston County the Naheola does not actually contact with the overlying Wilcox. However, at all exposures observed at the stratigraphic horizon along Highway 25, the Naheola is the uppermost unit in the Midway. This contact is well exposed at miles 19.1 to 19.2 and 19.7 (Plate 1). The northeastern most exposure of these contacts (mile 19.1) is in a cut that clearly shows the sharp and irregular contact (Figure 4). The Naheola is composed of gray, carbonaceous, highly micaceous, laminated clay and interbedded, fine-grained, micaceous sand. Some platy limonite is present along the laminae. The material above the contact consists of interbedded fine- to medium- to coarse-grained sand, silt and clay and reworked pisolitic material. The contact at mile 19.7 is not exposed over as much distance as the one just described but the material below is the same. The overlying Wilcox that is exposed consists of medium- to coarse-grained sand and interbedded silty clay with two thin zones of reworked pisolitic material. At the contact the beds above and below dip sharply into the hill.

Figure 4.—Naheola-Fearn Springs contact showing reworked pisolitic material in the Fearn Springs. Northwest cut of highway at mile 19.1. October 23, 1962.

### BETHEDEN FORMATION

At the close of Naheola deposition and prior to the beginning of Wilcox deposition, much time elapsed which allowed the normal physical and chemical processes of erosion and weathering to take place. As a result of this prolonged period of exposure, the top of the Midway developed a residual zone which was due to the chemical processes. The Betheden has been formally defined as a formation by F. F. Mellen (Mellen, 1939). The erosional processes account for the discontinuity of the unit. At many places it has been completely eroded. At numerous places reworked bauxitic (pisolitic) material can be found in basal Wilcox sediments.

The Betheden in its complete sequence consists of bauxite or bauxitic sands or clays, kaolin, and lignite. Even though this unit is not present along Highway 25, the close proximity of the type locality and the presence of reworked pisolitic material in the lower part of the Fearn Springs (miles 19.1, 19.7, and 20.0) warrant its mention.

## WILCOX GROUP

### FEARN SPRINGS FORMATION

The Fearn Springs formation was named by Mellen (Mellen, 1939). The type locality is 0.25 mile west of the community, Fearn Springs in Winston County (NE.¼, Sec.3, T.13 N., R.14 E.).

The outcrop area of the Fearn Springs along Highway 25 extends from miles 19.1 to 22.8 (Plate 1). The thickness measured from the profile is about 50 feet. The maximum recorded thickness during this study is 84 feet in Test Hole No. 1 (Plate 3).

The exposures along the highway show the Fearn Springs to be composed chiefly of fine to coarse reddish-brown to tan, cross-bedded sand containing silicified wood fragments and some quartz pebbles. It also contains zones of purplish silt and much of the sand is silty. A small amount of light-gray clay, only, is exposed.

The Naheola-Fearn Springs contacts, both of which are near mile 19.2, exhibit a sharp erosional disconformity (Figure 4). At these localities the Fearn Springs contains pockets and stringers of reworked pisolitic material.

The Fearn Springs-Ackerman contact is disconformable and fairly well defined at miles 20.2 and 22.8 (Plate 1). At mile 20.2, the very fine, purplish, silty (mealy) sand of the Fearn Springs is overlain by a medium to coarse sand of the Ackerman (Figure 5). A zone about six inches thick containing numerous fragments of silicified wood and quartz pebbles is at the contact. In the southwest valley wall of Mill Creek (mile 22.8), the fine, mealy sand of the Fearn Springs contacts with the coarser Ackerman sand.

The Wilcox, being continental deposits of various types, was necessarily subjected to erratic patterns of deposition and erosion. Test Hole No. 2 indicates the erosion of the Fearn Springs and the subsequent deposit of a rather thick basal Ackerman sand. Only about 21 feet of the Fearn Springs remain. Mellen (Mellen,

1939) cites a locality in Winston County where the Ackerman rests directly on the Porters Creek (SE.¼, SW.¼, Sec.2, T.13 N., R.14 E.).

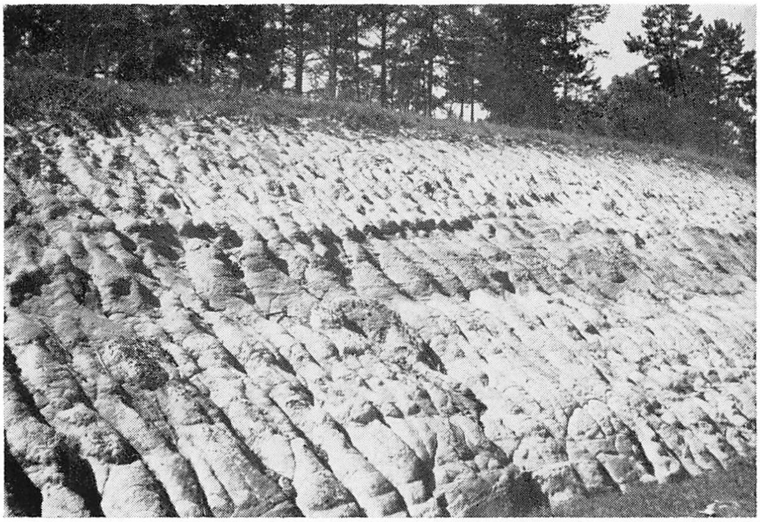

Figure 5.—Fearn Springs-Ackerman contact of the very fine silty sand overlain by a medium to coarse sand containing numerous silicified wood fragments. Northwest cut of highway at mile 20.2. October 23, 1962.

ACKERMAN FORMATION

The name "Ackerman" was first used by Lowe (Lowe, 1913) for the beds underlying the capping sand (Holly Springs) at Blantons Gap on the Illinois Central Railroad near the town of Ackerman (SW.¼, SE.¼, Sec.21, T.17 N., R.11 E., Choctaw County), which serves as the type locality.

The outcrop extends from mile 20.2 (Plate 1) to mile 35.1 (Plate 2), a total distance of 14.9 miles. The thickness calculated from the profile is 330 feet. The thickness in Test Hole No. 2 is 409 feet, which probably represents a near maximum thickness (Plate 3). Much of the Ackerman outcrop is within the area through Louisville for which there are no highway profiles.

In general the Ackerman consists of sand, silt and some clay. The sands are fine to coarse, reddish-brown to tan, highly cross-bedded and interbedded and micaceous (Figure 6). The silts have much the same characteristics with interbeds of light-gray clays. In some places the sands, silts, and clays are all interbedded.

The disconformable contact with the underlying Fearn Springs is exposed at miles 20.2 and 22.8 (Plate 1). These have been described under the preceding heading.

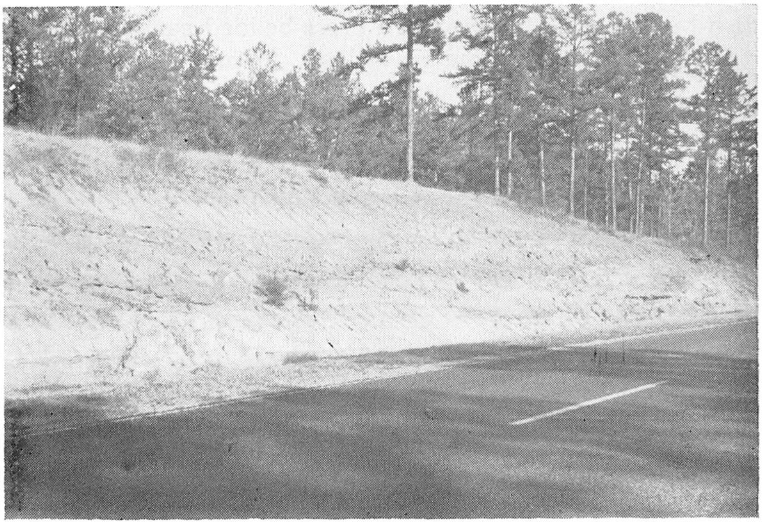

Figure 6.—Ackerman cross-bedded sand, silt, and clay. Northwest cut of highway at mile 23.0. December 4, 1962.

The upper contact with the Tuscahoma formation shows only at mile 35.1 (Plate 2). Here thin bedded silt and sand underlies the coarse basal Tuscahoma sand. Silicified wood fragments and quartz and quartzite pebbles are abundant. This contact also shows in Test Hole No. 2 (Plate 3). The log of Test Hole No. 2 shows a thick, coarse, basal Ackerman sand.

### TUSCAHOMA FORMATION

Due to the fact that the name "Holly Springs" has been virtually dropped from usage in Mississippi, the best available name for the section from the top of the Ackerman to the base of the Hatchetigbee is Tuscahoma. The type locality for the Tuscahoma is Tuscahoma Landing on the Tombigbee River in Choctaw County, Alabama.

The Tuscahoma crops out along the highway from miles 35.1 to 41.0 (Plate 2). However, the outcrop belt extends somewhat farther northeast as evidenced by exposures off the highway such as the huge sand pit about 1.5 miles southwest of Louisville (NW.¼, Sec.5, T.14 N., R.12 E.). The average thickness is about 275 feet. The thickness of this unit in Test Hole No. 3 is 325 feet (Plate 3).

The Tuscahoma formation consists chiefly of fine to medium, reddish-brown to tan, micaceous, cross-bedded sands with irregular zones of silts and some gray clays. At many localities these constituents are complexly interbedded and interlensed (Figure 7). Sand pits have been opened near the highway at miles 36.1 and 37.1.

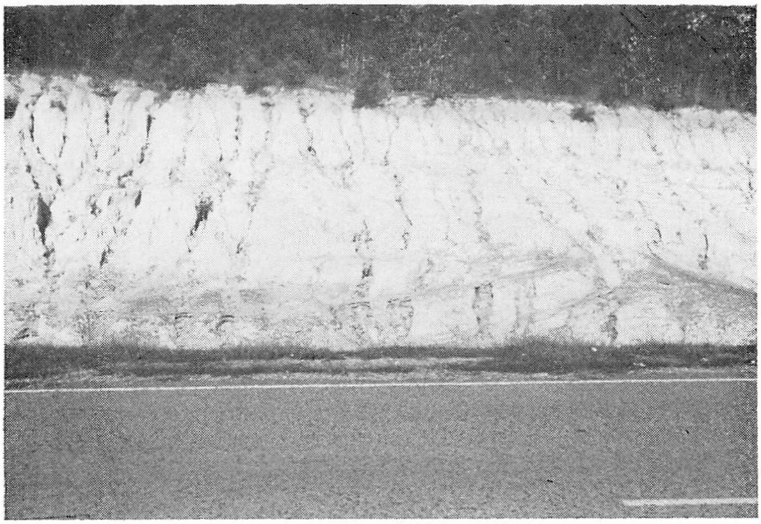

Figure 7.—Tuscahoma cross-bedded sand, silt, and clay. Northwest cut of highway at mile 38.2. October 25, 1962.

At the contact with the underlying Ackerman at mile 35.1, the basal Tuscahoma sand is tan, medium to coarse, and contains numerous fragments of silicified wood. Several quartz pebbles were observed as well as a cobble about three inches in diameter.

The Tuscahoma-Hatchetigbee disconformable contact relationship is vividly shown at mile 40.9 (Figure 8). The contact is very sharp where the Tuscahoma clay is overlain by a thin ferruginous sandstone and reddish-brown sand. The clay grades upward from dark- to light-gray. Near the base of the cut is a lense of lignite about one foot thick.

The log of Test Hole 3 describes the Tuscahoma as being a series of sands, silts and clay very similar to the underlying Ackerman.

Figure 8.—Tuscahoma-Hatchetigbee contact of a dark- to light-gray clay overlain by a reddish-brown fine to coarse sand with some quartz pebbles. Southeast cut of highway at mile 40.9. October 24, 1962.

### HATCHETIGBEE FORMATION

The type locality of the Hatchetigbee is Hatchetigbee Bluff on the Tombigbee River in Washington County, Alabama. The name was first introduced by Smith and Johnson (Smith and Johnson, 1887).

The exposed section of the Hatchetigbee extends from miles 41.0 to 48.0 (Plate 2). The total thickness is about 200 feet as determined from the log of Test Hole No. 3 (Plate 3) and the upper contact which was projected from Auger Hole 7.

The lower part of the Hatchetigbee is composed chiefly of fine to medium, cross-bedded, brown to tan, silty, micaceous sands and silts of similar character. Toward the upper part of the formation, clays become dominant. The clays are generally light- to dark-gray, micaceous, plastic and carbonaceous with some lignite. Selenite crystals are abundant in some of the clays, mile 45.1. The logs of Auger Holes 7, 8, 9, and 10 give additional descriptive information.

Along Highway 25, the Tuscahoma-Hatchetigbee contact is well exposed at only one locality, mile 41.0 (Figure 8). The basal part of the Hatchetigbee at this place consists of a fine to coarse, reddish-brown sand about 10 feet thick. Quartz pebbles are present. It overlies the Tuscahoma disconformably depicting an erosional feature.

The Hatchetigbee-Meridian contact is exposed at miles 46.2, 46.5, and 46.8. At mile 46.2, a small amount of gray lignitic clay is exposed below a 30-foot sand section. At mile 46.5, the Hatchetigbee is a dark-blue and gray clay with a thin bed of lignite at the top. Overlying this is a zone four feet thick of laminated sand and gray clay shale. At mile 46.8, it is a dark-gray to lignitic, plastic, micaceous clay with a yellow clay zone at the top.

## CLAIBORNE GROUP

### TALLAHATTA FORMATION

The Tallahatta formation along Highway 25 is composed of three members — the Meridian, Basic City, and Neshoba. Several different interpretations have been applied to the Tallahatta by as many different geologists. Some have chosen not to place the Meridian sand in the Tallahatta but rather at the top of the Wilcox. Probably the principal author advancing this nomenclature was Thomas (Thomas, 1942). The Mississippi Geological Survey has for the most part been consistent in placing the Meridian as the basal unit of the Claiborne, however, some Survey geologists have differed as to the rank assigned, whether it be member or formation. The information cited by others (Foster, 1940 and Thomas, 1942) concerning the highly variable thicknesses of these units as well as the presence of a type material of one unit being interbedded in another unit would indicate the stratigraphic equivalence, thereby further substantiating the premise that these units are members of a single formation.

#### MERIDIAN MEMBER

The name "Meridian sand" was first applied by Lowe (Lowe, 1933) as a member of the Tallahatta formation at the base of the Claiborne from type exposures in the vicinity of Meridian, Mississippi. Later Foster (Foster, 1940) applied the name Meridian to the same rock unit, but suggested its elevation to the rank of formation.

The Meridian sand is poorly exposed along Highway 25 at least where it contacts with the overlying Basic City. This can, in part, be attributed to the topography of the area.

The measured thickness is approximately 38 feet. The following section has a thickness of 36.9 feet and Auger Hole 7 has twelve feet of sand at the top before entering the Hatchetigbee formation, which on the basis of elevations adds about one foot to the section thickness.

Section of Highway 25 cut from station 218 + 75 to station 187 + 00. NW.¼, Sec.21, T.13 N., R.10 E., Winston County.

| | Feet | Feet |
|---|---|---|
| Terrace | | 15.6 |
| Sand, coarse, micaceous, reddish-brown to light-tan. Coarse ferruginous sandstone at base, pipe concretions | 15.6 | |
| Tallahatta formation | | 94.6 |
| Neshoba member | | |
| Sand, siltstone, and clay: partially covered | | |
| Sand—fine to medium, light-tan to brown, micaceous, glauconitic, streaks of clay. | | |
| Siltstone—gray and tan, micaceous, glauconitic, numerous borings. | | |
| Clay—gray to dark-gray, most near top | 30.2 | |
| (This entire part of the section is draped by the reddish-brown sand of the top interval.) | | |
| Basic City member | | |
| Siltstone, light-gray, tan staining, micaceous, numerous borings, quartz grains, glauconitic in zones or pockets especially in the upper part | 13.5 | |
| Meridian member | | |
| Sand, fine to medium, micaceous, glauconitic, highly cross-bedded, light and tan banded, streaks of gray clay in upper part, thin ferruginous sandstone at base | 11.5 | |
| Clay, silt, and sand, progressively coarser from bottom to top, dark-gray to tan, micaceous, glauconitic in coarser fractions | 7.0 | |
| Sandstone, gray and brown, friable, micaceous, glauconitic, borings | 1.4 | |
| Sand, banded brown and light-gray, highly micaceous, glauconitic, fine streak of gray clay near base | 5.0 | |

| | |
|---|---|
| Sand, reddish-brown, few quartz pebbles and silicified wood fragments, micaceous, streaks of gray silty clay | 12.0 |
| Covered (See auger hole 7) | 14.0 |

Section began in road above ditch in curve. Elevation approximately 477 feet.

Another section which exhibits the relationship of the Meridian and Basic City was examined along a county road about two miles northeast of Highway 25 from the previous section.

Section of road cut from road junction at Vowell easterly to top of hill. (S.½, NE.¼, Sec.18, T.13 N., R.10 E., Winston County).

| | Feet | Feet |
|---|---|---|
| Tallahatta formation | | 67.5 |
| Basic City member | | |
| Clay shale, light-gray, micaceous, glauconitic, fucoidal, light-gray sandstone at base | 12.0 | |
| Meridian member | | |
| Sand, reddish-brown to tan, medium, glauconitic, micaceous, interbedded with light-gray shaly clay. Interval partially covered | 11.0 | |
| Clay, dark-gray, shaly, silty, glauconitic, fucoidal near top, some sand and sand inclusions | 7.2 | |
| Sand, gray and tan, fine to medium, micaceous, compact, clayey, glauconitic, fucoidal, 10-inch band of loose sand at top overlain by thin ferruginous sandstone | 6.0 | |
| Sand, banded light and tan, medium, micaceous, glauconitic, loose, highly cross-bedded, few very small gray clay balls | 20.8 | |
| Covered, probably sand | 10.5 | |

Section began in road at twin culvert near road junction. Elevation approximately 446 feet.

The Meridian crops out from mile 46.2 to mile 48.1. The thickness measured from the profile is about 34 feet.

The sand is fine to medium, micaceous, with some quartz pebbles particularly near the base. It grades from non-glauconitic to glauconitic and contains some scattered silicified wood fragments. Some lenses and stringers of Basic City type silt and clay are interbedded in the sand. It is also generally highly cross-bedded (Figure 9).

The Meridian contacts with the underlying Hatchetigbee at miles 46.2, 46.5, and 46.8. The contact relationship is apparently disconformable. An erosional surface on the top of the Hatchetigbee is indicated at mile 46.2.

Figure 9.—Meridian-Basic City contact of cross-bedded sand and clay shale overlain by light-gray, thin bedded siltstone. Southeast cut of highway at mile 48.1. September 14, 1962.

At mile 46.8 the Meridian has at the base four feet of sand and gray clay shale overlain by about 12 feet of reddish-brown medium sand, which extends to the top of the cut. At mile 46.5 the Meridian is composed of a highly micaceous sand and shale overlying gray plastic clay of the Hatchetigbee. At mile 46.2 about 30 feet of reddish-brown sand overlies a lignitic gray clay and a few quartz pebbles were observed near the base of the sand.

### BASIC CITY MEMBER

The name "Basic" was first proposed by Lowe (Lowe, 1919) from the type locality in a deep cut along the railroad just north of Basic City in northwestern Clarke County, Mississippi. The complete name "Basic City" came into common usage later.

The Basic City is better developed in the type area than indicated by the measured sections given previously in this report. It crops out from mile 48.2 to mile 53.0 (Plate 2).

In this area the Basic City consists of relatively thin-bedded siliceous shaly clays, silts, and semi-indurated beds of the same. It is generally micaceous and glauconitic with numerous borings and some quartz grains disseminated throughout.

The contact with the underlying Meridian is gradational and not clearly definable. The top of the uppermost sand bed is considered in this report to be the contact of the Meridian and Basic City (Figure 9).

The upper contact with the Neshoba is more clearly definable, however, it is considered to be gradational and uneven. The irregularity of this contact is believed to be due to depositional conditions rather than to erosion. It can be seen at miles 48.3, 49.9, 50.3, 52.3, and 53.0.

### NESHOBA SAND MEMBER

The name "Neshoba sand" was proposed by Thomas (Thomas, 1943) "from typical exposures in and around the village of Neshoba, Neshoba County," Mississippi. He further defined it as being the unit "above the Basic City claystone and below the Winona greensand---."

The Neshoba sand is well developed in this area and well exposed. The thickness is approximately 90 feet. The outcrop span extends from mile 48.3 to mile 54.6 (Plate 2).

The Neshoba sand is fine- to medium-grained, light-tan to brown to reddish-brown, micaceous, and non-glauconitic to slightly glauconitic. The structure is generally massive, however, it is locally bedded and cross-bedded and contains some clay balls.

The contact with the underlying Basic City is rather distinct but gradational. At some places Basic City type material has been observed in the Neshoba and the sands in the Basic City are very similar to the Neshoba sands. This contact can be seen at miles 48.3, 49.9, 50.3, 52.3, and 53.0.

The contact with the overlying Winona formation is conformable. The ascending transition from non-glauconitic Neshoba sands to highly glauconitic Winona sands is gradational. This contact can be seen at miles 53.8 and 54.7 (Figure 10).

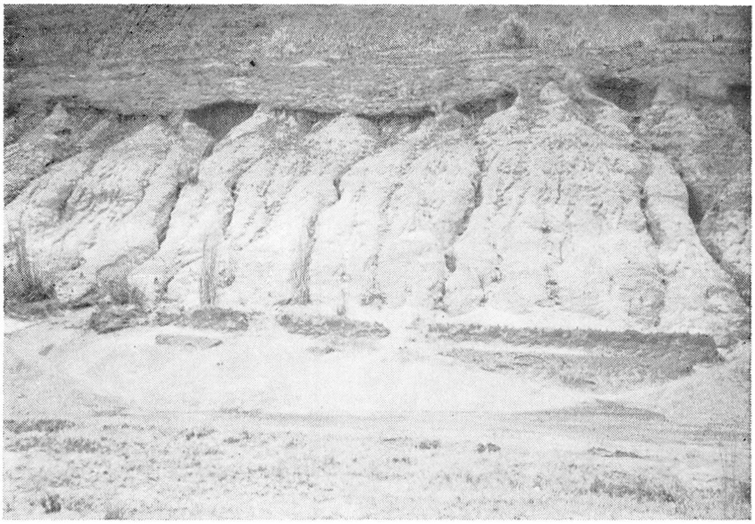

Figure 10.—Neshoba-Winona contact with yellow to tan, slightly glauconitic sand overlain by very glauconitic sand (greensand). Northwest cut of highway at mile 54.7. September 13, 1962.

## WINONA FORMATION

Winona was first proposed by Lowe (Lowe, 1919) for the lower member of the Tallahatta from exposures of glauconitic sands near Winona, Montgomery County, Mississippi. Later, Thomas (Thomas, 1942) retained the name, but restricted it to include only the greensands that lie above the Tallahatta and below the Zilpha clays and shales. Thomas also elevated the term to the rank of formation whereas it had theretofore been considered a member.

The Winona is well developed and well exposed along Highway 25. The thickness of this unit is about 25 feet as determined from the profile. The Winona consists of highly glauconitic (greensand) and fossiliferous sand that forms multiple zones of resistant ledges of ferruginous material (Figure 11). The ledges are for the most part less than one foot thick and are separated by unconsolidated zones of greensand two feet or more in thickness. The outcrop area extends from mile 53.8 to mile 57.7 (Plate 2).

The contact with the underlying Neshoba is conformable and gradational from non-glauconitic to glauconitic.

The Winona-Zilpha contact is conformable and transitional. The top of the Winona was picked at the first appearance of clay. The basal few feet of Zilpha are much the same as the Winona.

Figure 11.—Winona-Zilpha contact with fossiliferous greensands overlain by slightly glauconitic to non-glauconitic clays. Southeast cut of highway at mile 55.8. September 13, 1962.

## ZILPHA FORMATION

The name "Zilpha" was formally adopted by Thomas (Thomas, 1942), however, it had been used previously. Thomas gave it the rank of formation and established the type locality at Bucksnort Hill in Attala County (C., Sec.8, T.16 N., R.6 E.).

The extremities of the outcrop area of the Zilpha along Highway 25 are at miles 55.0 and 60.2 (Plate 2). The most downdip exposure is along the east valley wall of Lobutcha Creek. The next exposure is at mile 57.7, a distance of approximately 2.5 miles. The topographic relief through this area is much too high to show any Zilpha in its normal position.

In general, the Zilpha formation is composed of dark to light-gray and mottled clay and clay shale, silty to very plastic, glauconitic at the base to non-glauconitic towards the top. Locally selenite crystals are abundant and form prolifically on exposure. Near the top of the formation, a dark-gray to black clay zone contains plant impressions.

The base of the Zilpha is exposed at mile 55.2 at an elevation of approximately 525 feet. The contact with the underlying Winona is conformable and gradational. The Zilpha is composed of glauconitic, mottled clay. There is also the possibility of a capping of Zilpha in the cut immediately northeast at station 333 at an elevation of 542 feet. Probably the best exposure of the basal part is at mile 55.8 between stations 299 and 304 (Figure 11). The exposed thickness of the Zilpha is about 15 feet from the top of the Winona to the top of the cut.

The entire thickness of the Zilpha is exposed from station 285 (mile 55.9) where it contacts with the Winona to station 278 (mile 56) where it contacts with the overlying Kosciusko sand. The lower portion is a dark-red, glauconitic clay and the upper portion is a gray, bentonitic clay. The details of the upper contact are obscured due to the slumping of this clay zone.

The farthest downdip Winona-Zilpha contact is at mile 57.7. The transition zone between the two formations is a somewhat white, glauconitic marl. Above this zone, the Zilpha is a gray and mottled, ferruginous, glauconitic clay. The base of the Zilpha is at an elevation of 448 feet.

The Zilpha-Kosciusko contact is well exposed at mile 60.2. The Zilpha here is dark-gray to black clay grading up into a light-gray silty and sandy shale. The lower dark clay contains plant impressions. The contact is sharp where the red-brown, coarse to medium Kosciusko sand rests on the Zilpha. The contact is irregular but the median elevation is 412 feet. This contact is also well exposed at mile 56.9 (Figure 12).

The thickness of the Zilpha formation is only 20 to 30 feet and the existing topography affords little opportunity for exposures of the Zilpha-Kosciusko contact. The evidence seems to indicate that the top of the Zilpha was subjected to erosion and that some of the Zilpha clays were reworked and deposited in the Kosciusko, thus developing a disconformable contact.

Section of road cut from base of hill southeasterly to top of hill. (NW.¼, NE.¼, Sec.29, T.12 N., R.9 E., Leake County).

| | Feet | Feet |
|---|---|---|
| Koscuisko formation | | 12 |
| Sand, reddish-brown, medium | 12 | |

Zilpha

| | |
|---|---|
| Clay, gray, micaceous, bentonitic, crumbly, mottled with iron staining. Top of clay appears to be an old surface? (weathered) | 30 |
| Sand, clayey, highly glauconitic, ferruginous zone at base. Probable lower transition zone | 1 |

Elevation at base of section approximately 440 feet.

Figure 12.—Zilpha-Kosciusko contact with a shaly mottled clay overlain by a fine to medium brown sand. Northwest cut of highway at mile 56.9. September 13, 1962.

## KOSCIUSKO FORMATION

The name "Kosciusko" as first proposed by Cooke (Cooke, 1925) unquestionably included the basal portion, but did not clearly define the limits. Later, Thomas (Thomas, 1942) redefined the term "----to include all beds above the Zilpha shale and below the Wautubbee formation." Thomas also raised the Kosciusko from member status to that of a formation. The definition and rank assigned by Thomas are used in this report.

The entire section or thickness of the Kosciusko is not exposed along Highway 25. The outcrop extends from mile 56.1 to the end of the profile just north of Carthage. However, the thickness is approximately 175 feet.

The Kosciusko is composed chiefly of sand with lesser components of silts and clay shales. The sands vary from fine to medium and from massive to cross-bedded. On outcrop, the sands are predominately reddish-brown which is apparently due to oxidation by weathering, because the fresh, unweathered material is much lighter in color. The clay shales are light- to dark-gray, micaceous and silty. They are noted at or near the base and near the top. The silty portion of the unit is near the middle. It is irregularly bedded and cross-bedded to evenly bedded, micaceous and very sandy.

The contact with the underlying Zilpha formation is exposed at only a few localities as previously explained. An erosional disconformity is believed to exist at this contact due to the sharp break and the apparent reworked Zilpha material in the basal part of the Kosciusko.

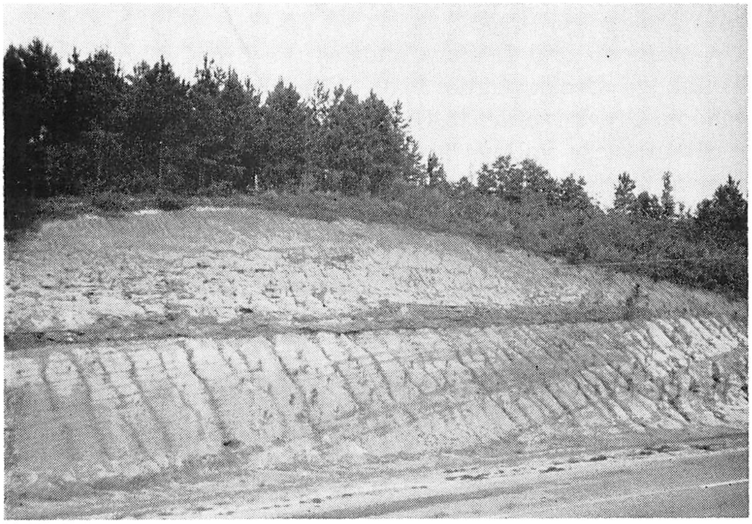

Figure 13.—Kosciusko shaly, silty, micaceous clay and reddish brown sand. The apparent dip is believed to be cross-bedding. Northwest cut of highway at mile 68.9. September 13, 1962.

The complete absence of the quartizitic material that is so well known and characteristic of the basal part of the Kosciusko is worthy of note. Through much of the unit, ferruginous sandstone float is evident in the exposures.

At mile 68.9, which is one of the southwestern most outcrops along the highway, a light- to dark-gray, shaly, silty, micaceous clay is overlain by a reddish-brown sand (Figure 13). This exposure shows the clay shale to be dipping or perhaps apparently dipping at a rather high angle southwesterly. This writer suspects this to be a form of cross-bedding rather than true dip.

## ALLUVIUM

Only in the valleys of the major streams is the alluvial fill mapped. No doubt some of the smaller stream valleys contain a thin covering of alluvium, however, these were not considered of great enough importance to warrant mapping.

The major alluvial deposits are in the valleys of Talking Warrior Creek, Chinchahoma Creek, Cypress Creek, Dry Creek, Turtle Creek (Sand Creek), Parker Slough, Noxubee Cut-off, and Noxubee River. These streams are all in Oktibbeha County from mile 6.0 to mile 13.3.

In Winston and Leake Counties the broader valleys belong to Tallahoga Creek (mile 35.0), Noxapater Creek (mile 39.5), Pinishook Creek (mile 43.4), and Lobutcha Creek (mile 60.7). The fill in these valleys is not as thick as those in Oktibbeha County as evidenced by the fact that the streams are now resting on bedrock. At low water, two thin seams of Ackerman lignite are exposed in the bed of Tallahoga Creek about 100 feet downstream from the Highway 25 bridge.

## STRUCTURE

For the most part, the structural condition of the beds is homoclinal and primary. There is very little indication of structural disturbance.

In general, Highway 25 trends northeast-southwest which closely approximates the direction of regional dip. The direction of regional dip varies from about S. 60° W. at the northeast end of the highway to about S. 50° W. at the southwest end. The average regional dip is about 30 feet per mile (about 1/3 degree).

Perhaps the most discernable disconformity is at the Midway-Wilcox contact. Even though this contact is exposed at only two localities (miles 19.1 and 19.7, Plate 1), the erosion of the top of the Midway is marked (Figure 4). The contact surface is very irregular and reworked pisolitic material is bedded in pockets and stringers in the Wilcox.

Some evidence was noted that suggests an area of several small faults between mile 53.0 and mile 57.0. At mile 53.0, the exposure of Basic City claystone was measured to dip at the rate of four degrees in a southwesterly direction (Figure 14). No other dip irregularities were noted, however, the positions of the upper and lower contacts of the Winona formation seem to suggest several small faults.

Figure 14.—Basic City shale dipping southwesterly at the rate of about 4°. Southeast cut of highway at mile 53.0. September 13, 1962.

## ECONOMIC GEOLOGY

### CLAYS

In a report of this type, clays are economically important from two aspects. The geologist usually considers clays on the basis of their use in products such as ceramics, absorbents, and light-weight aggregate, to mention only a few. However, the highway geologist and engineer usually consider clays from an entirely different economic aspect. These people are concerned with the physical and chemical characteristics of clays in regards to stability and corrosion. On one hand they represent an economic gain in terms of useful productivity and on the other hand they represent an economic loss in terms of added construction cost.

The Porters Creek clay is currently being mined and processed in Tippah County as an industrial absorbent. These clays in this area should also be suited for such uses in the event that market conditions warrant an expansion. Of course, the same can be said for any area within the outcrop belt of the Porters Creek. Some research has been conducted by the Mississippi Geological Survey (Morse and McCutcheon, 1945) on the Porters Creek clay for use as a light-weight aggregate. Perhaps additional laboratory research along this line would be advisable to attempt to discover ways to overcome economically the problems that now exist.

The Porters Creek clay presents problems to highway construction. The principal reason for these problems is that these clays possess the property of high shrinkage and expansion when dried and wetted. This not only creates movement in all directions but stimulates differential compaction, a condition that breaks up pavements even where good stable fill material has been used. The use of hydrated lime to stabilize active clays has met with reasonably good success, however, true stabilization of active clays can be established only when the clays are stabilized as deep as the permanent ground-water level or if these clays are sealed from surface water.

The highway cuts through the Fearn Springs, Ackerman, and Tuscahoma expose no clays of apparent economic value. However, previous work by Mellen and McCutcheon (Mellen and McCutcheon, 1939) in this area classify the clays of the Fearn Springs to be of significant value for a wide variety of ceramic uses. The Ackerman and Tuscahoma (Holly Springs) also have clays of potential economic value, but not as much as the Fearn Springs.

Notwithstanding the fact that the clays of the Fearn Springs, Ackerman, and Tuscahoma formations are not in evidence along the present route of Highway 25, the probable existence of these clays along other routes through this outcrop belt should be recognized. Where so encountered, they should if possible, be cut out and back filled with other material.

The uppermost unit of the Wilcox group, the Hatchetigbee formation, contains considerable amounts of clay. Highway cuts and test holes prove this to be true. The content of selenite

($CaSO_4 \cdot 2H_2O$) may be a deterrent to the use of the clay for ceramic purposes. These clays are usually highly carbonaceous.

The relative newness of the highway through the Hatchetigbee clays does not allow a satisfactory conclusion as to their stability. It is reasonable to assume that the coefficient of expansion of these clays is high and that trouble should be expected where they are not cut out and back filled.

The Zilpha formation may contain clays of some economic potential. In Attala County certain of these clays are being mined and processed for use as a bonding clay.

The clays of the Zilpha formation are noted for their instability. It is recommended highly that when these clays are encountered along routes of highway construction, that they be cut out completely. In most places this can be done because the formation is not more than 30 feet thick. Thus far Highway 25 is holding up through the Zilpha outcrop. Cuts do show slides of considerable magnitude (Figure 15).

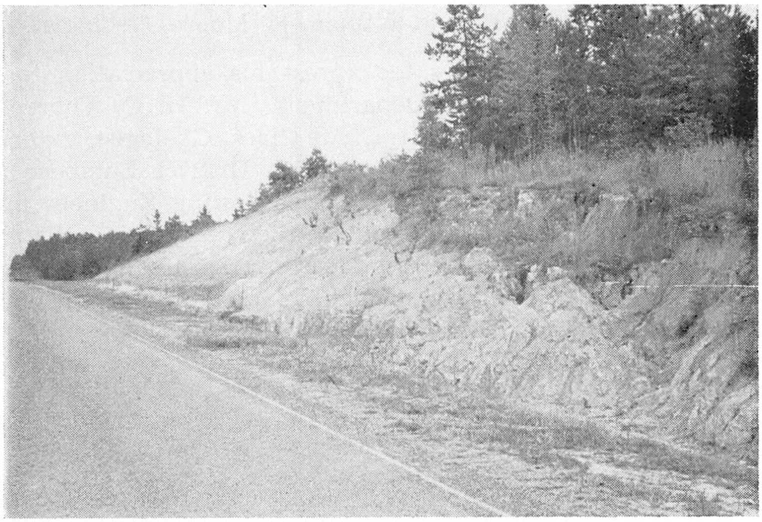

Figure 15.—Zilpha clay slide in southeast cut of highway at mile 57.0. September 13, 1962.

## SANDS

Sands suitable for topping and fill material are relatively abundant along much of Highway 25. The only barren area is from Starkville to about mile 18.5 in Winston County. Through this area, alluvial deposits and perhaps some small terraces offer the best possibility.

The possibilities for sand pits are virtually countless through the Wilcox. Numerous pits are currently open in this area. The silty sands are suited for certain phases of construction.

The Meridian and Neshoba members of the Tallahatta formation are good sources for clean sands. These sands would likely grade from medium to coarse.

The outcrop of the Kosciusko (miles 56.1 to 69.5), which is practically all sand, indicates thick deposits of clean sands and silty sands.

## ACKNOWLEDGMENTS

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## AUGER HOLE RECORDS

Auger Hole 1—158+80; Proj. F-056-1 (9) Leake County.
Elevation: 404 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| | | *Kosciusko* |
| 4 | 4 | Soil and subsoil, mottled clay and silt. |
| 4 | 8 | Silt and sand, yellow, brown, micaceous. |
| 42 | 50 | Sand, light-tan to brown, very fine, slightly micaceous, some silt streaks, clay streaks beginning at 16 feet. Water at 22 feet. |

Auger Hole 2—479+00; Proj. F-056-1 (7), Leake County.
Elevation: 404 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| | | *Kosciusko* |
| 15 | 15 | Sand, brown, medium to coarse, water at 14 feet. |
| | | *Zilpha* |
| 30 | 45 | Clay, silty, gray and tan at top grading into dark-gray to black, plastic, very tough, micaceous, carbonaceous, slightly glauconitic near base. Rock (siderite?) at 45 feet — stopped auger. |

Auger Hole 3—54+50; Proj. F-056-1 (2), Leake County.
Elevation: 390 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| 10 | 10 | Fill, sand, tan, fine to medium. |
| | | *Zilpha* |
| 11 | 21 | Clay, dark greenish-gray, glauconitic. |
| 9 | 30 | Clay, silty, glauconitic, brown and tan, sandy near base. |
| | | *Winona* |
| 29 | 59 | Sand, silty, glauconitic, water at about 35 feet, hard zone at 38 feet, fossiliferous near base. |

Auger Hole 4—177+50; Proj. F-056-1 (2), Leake County.
Elevation: 444 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| | | *Colluvium* |
| 9 | 9 | Sand, reddish-brown, medium. |
| | | *Zilpha* |
| 4 | 13 | Clay, red, yellow. |
| 11 | 24 | Silt, clay and some sand, gray to tan, glauconitic. |
| | | *Winona* |
| 21 | 45 | Sand and silt, tan, glauconitic, water at about 42 feet. |

Auger Hole 5—385+50; Proj. F-056-1 (2), Leake County.
Elevation: 525 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| 3 | 3 | Fill |
| | | *Winona* |
| 19 | 22 | Sand, reddish-brown to tan, medium, glauconitic, micaceous, very silty. |
| | | *Neshoba* |
| 13 | 35 | Sand, yellow and brown, slightly glauconitic at top grading downward to non-glauconitic. |

Auger Hole 6—430+50; Proj. F-056-1 (2), Leake County.
Elevation: 465 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| | | *Neshoba* |
| 36 | 36 | Sand, dark reddish-brown grading into a slightly lighter brown, water at 18 feet, slightly resistant zone at 33 feet. Hole stopped at possible top of Basic, auger could not penetrate below 36 feet. Dark-gray, tough, clayey sand stuck to bit. |

Auger Hole 7—205+80; Proj. F-056-1 (1), Winston County.
Elevation: 502 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| | | *Meridian* |
| 12 | 12 | Sand, tan, medium. |
| | | *Hatchetigbee* |
| 6 | 18 | Clay, dark-gray, micaceous. |
| .5 | 18.5 | Lignite, black. |
| 4.5 | 23 | Clay, light-gray, silty, micaceous. |
| 5 | 28 | Sand, gray, fine, silty, micaceous, water. |
| 22 | 50 | Clay, dark-gray, plastic, tough, micaceous, carbonaceous, very silty at base. |

Auger Hole 8—249+00; Proj. F-056-1 (1), Winston County.
Elevation: 486 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| 2 | 2 | Fill, sand, red. |
| | | *Hatchetigbee* |
| 4 | 6 | Silt and clay, tan. |
| 7 | 13 | Clay, silty, sandy, light-gray to yellow, micaceous. |
| 2 | 15 | Silt, sandy, tan and yellow, micaceous. |
| 3 | 18 | Sand, gray, very fine, silty, micaceous. |
| 2 | 20 | Silt, sandy, black, lignitic, micaceous. |

| | | |
|---|---|---|
| 30 | 50 | Clay, greenish-gray to gray, plastic, micaceous, thin streaks of lignite at 33 feet, streaks of green sandy clay and streak of lignitic clay between 35-40 feet, grading into tough gray and green clay from 40-50 feet. |

Auger Hole 9—334+40; Proj. F-056-1 (3), Winston County.
Elevation: 512 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| 4 | 4 | Sand, probably fill. |
| | | *Hatchetigbee* |
| 6 | 10 | Sand, brown, micaceous, some clay. |
| 4 | 14 | Silt, light-gray, micaceous, sandy. |
| 4 | 18 | Sand, tan and gray, micaceous, fine to medium. |
| 5 | 23 | Sand, yellow and tan, micaceous, silty, water at about 20 feet. |
| 22 | 45 | Sand and streaks of gray and greenish clay, with an increasing amount of clay at 30 feet. |
| 3 | 48 | Clay, greenish-gray, micaceous, plastic. Hole stopped at top of rock. |

Auger Hole 10—435+30; Proj. F-056-1 (3), Winston County.
Elevation: 503 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| 2 | 2 | Sand, fill. |
| | | *Hatchetigbee* |
| 7 | 9 | Sand, tan, micaceous, very clayey (gray and yellow). |
| 3 | 12 | Clay, gray, plastic. |
| 6 | 18 | Silt, tan and gray, micaceous, sandy, thin ferruginous sandstone at base. |
| | | *Tuscahoma* |
| 6 | 24 | Silt, brown and gray, micaceous, clayey. |
| 6 | 30 | Clay, gray, micaceous. |
| 20 | 50 | No recovery, probable water to T. D. |

Auger Hole 11—631+50; Proj. F-056-1 (11), Winston County.
Elevation: 510 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| | | *Tuscahoma* |
| 6 | 6 | Sand and clay, red and gray. |
| 2 | 8 | Clay, red, micaceous, silty. |
| 28 | 36 | Sand, red, fine to coarse, few clay balls. Grading into tan at 17 feet. Water at 23 feet. |
| 10 | 46 | Resistant zone, probably clay, no recovery. |
| 4 | 50 | Soft zone, probably sand, no recovery. |

Auger Hole 12—886+80; Proj. F-056-1 (11), Winston County.
Elevation: 498 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| 8 | 8 | Soil and sand, fill. |
| | | *Ackerman* |
| 9 | 17 | Silt, yellow, gray and brown, micaceous, clayey and sandy. |
| 8 | 25 | Clay, mottled at top grading into dark-gray, plastic, carbonaceous, streak of lignite at 23.5. |
| 4 | 29 | Clay, blue-gray, micaceous, plastic, slightly silty. |
| 16 | 45 | Clay, dark-gray, micaceous, plastic, silty, carbonaceous, lignitic at 39 feet, non-silty below lignitic zone, water at 45 feet, no recovery. |

Auger Hole 13—SW.¼, SW.¼, Sec.6, T.14 N., R.12 E., Winston County.

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| 2 | 2 | Soil and subsoil. |
| | | *Ackerman* |
| 7 | 9 | Silt, light-gray, clayey, grading into tan at 8 feet. |
| 22 | 31 | Clay, dark-gray, plastic, streak of tan silt at 14 feet, lignitic streaks at 20, 22, and 29 feet. |
| 19 | 50 | Silt, gray, clayey, micaceous, streaks of clay, water at about 36 feet. |

Auger Hole 14—NE.¼, NE.¼, Sec.6, T.14 N., R.12 E., Winston County.

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| 4 | 4 | Soil and sub-soil, sandy. |
| | | *Tuscahoma (?)* |
| 4 | 8 | Sand, brown, clayey, coarse. |
| | | *Ackerman* |
| 8 | 16 | Clay, mottled, tan, brown, yellow, silty. |
| 12 | 28 | Sand, brown and gray, fine, micaceous, silty, water bearing. |
| 12 | 40 | Clay, gray, micaceous, silty, carbonaceous, tough. |
| 10 | 50 | Sand (?), water, no recovery. |

Auger Hole 15—SE.¼, NE.¼, Sec.32, T.15 N., R.12 E., Winston County.

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| 2 | 2 | Soil and subsoil, sandy. |
| | | *Ackerman* |
| 5 | 7 | Silt and clay, red. |
| 8 | 15 | Clay, silty and sandy, red with tan streaks. |
| 13 | 28 | Sand, red, fine, silty, poor recovery below water at about 21 feet. Probable clay streaks at 22-23 and 27-28. |
| 22 | 50 | Water sand. |

Auger Hole 16—SW.¼, NE.¼, Sec.27, T.15 N., R.12 E., Winston County.

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| 14 | 14 | Soil and subsoil, brown, sandy, perhaps some alluvial fill. |
| | | *Ackerman* |
| 33 | 47 | Clay, dark-gray and greenish-gray, micaceous, carbonaceous, water between 20 and 25 feet, thin rock at 38 feet. |

Auger Hole 17—SE.¼, NE.¼, Sec.22, T.15 N., R.12 E., Winston County.

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| 2 | 2 | Soil and subsoil, sandy. |
| | | *Ackerman* |
| 10 | 12 | Clay, mottled to light-gray, micaceous, silt streaks. |
| 12 | 24 | Silt, tan, micaceous, dark grains, sandy and clayey. |
| 8 | 32 | Silt, gray, micaceous, dark grains, clayey, water at about 32 feet. No recovery from 32 to 50 feet. |

Auger Hole 18—C., N.½, Sec.13, T.15 N., R.12 E., Winston County.
Elevation: 486 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| | | *Ackerman* |
| 3 | 3 | Sand, tan, fine, dark grains. |
| 8 | 11 | Silt, gray, micaceous, clayey. |
| 3 | 14 | Sand, tan, fine to medium. |
| 4 | 18 | Silt, tan to brown, micaceous, clayey. |
| 15 | 33 | Clay, light-gray, micaceous, very silty. |
| 17 | 50 | Clay, dark-gray, micaceous, silty. |

Auger Hole 19—4+00; Proj. F-056-1 (8), Winston County.
Elevation: 519 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| 2 | 2 | Soil and subsoil, sandy. |
| | | *Ackerman* |
| 14 | 16 | Silt, tan to brown, micaceous, sandy, streak of gray clay at 13 feet. |
| 5 | 21 | Clay, light-gray to yellow at top grading to dark-gray, carbonaceous, some lignitic. |
| 29 | 50 | Silt, tan, micaceous, clayey. |

Auger Hole 20—99+20; Proj. F-056-1 (8), Winston County.
Elevation: 390 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| | | *Fearn Springs* |
| 7 | 7 | Clay, sand, and silt, red to brown to gray. |

| | | |
|---|---|---|
| 16 | 23 | Silt, gray and tan, micaceous, sandy. |
| 5 | 28 | Sand, light- to dark-gray, medium. |
| | | *Naheola* |
| 22 | 50 | Sand and streaks of dark-gray clay, highly micaceous, clay increasing with depth. |

Auger Hole 21—335+40; Proj. F-056-1 (8), Winston County.
Elevation: 361 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| | | *Porters Creek* |
| 13 | 13 | Clay, gray, yellow, brown, silty. |
| 37 | 50 | Clay, dark-gray, micaceous, iron stains near top. Water at 40 feet or slightly above. |

Auger Hole 22—750+80; Proj. F-056-2 (1), Oktibbeha County.
Elevation: 360 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| 8 | 8 | Soil and subsoil, brown, sandy. |
| | | *Prairie Bluff* |
| 8 | 16 | Clay, dark-brown to gray, micaceous, silty, slightly glauconitic. |
| 24 | 40 | Chalk, blue-gray, slightly glauconitic, clayey near top, harder at 22 feet. |

Auger Hole 23—666+80; Proj. F-056-2 (1), Oktibbeha County.
Elevation: 340 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| 4 | 4 | Soil and subsoil, yellow to brown, sandy. |
| | | *Clayton* |
| 6 | 10 | Clay, silty, tan. |
| 2 | 12 | Clay, silt and fine sand, dark-gray, micaceous, slightly calcareous. |
| 3 | 15 | Sand, clayey, silty, glauconitic. |
| | | *Prairie Bluff* |
| 35 | 40 | Chalk, blue-gray, micaceous, clayey. |

Auger Hole 24—626+50; Proj. F-056-2 (1), Oktibbeha County.
Elevation: 315 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| | | *Clayton* |
| 10 | 10 | Sand and silt, tan, clayey, glauconitic (?). |
| | | *Prairie Bluff* |
| 30 | 40 | Chalk, blue-gray, micaceous, glauconitic. |

Auger Hole 25—543+00; Proj. F-056-2 (1), Oktibbeha County.
Elevation: 295 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| 4 | 4 | Soil, dark-gray, clayey. |
| | | *Porters Creek* |
| 6 | 10 | Clay, dark-gray to bluish, plastic. |
| | | *Clayton* |
| 3 | 13 | Sand, tan, clayey, glauconitic, calcareous. |
| 10.5 | 23.5 | Sand, gray, clayey, glauconitic, calcareous, water at about 19 feet, rock at 23.5 feet. |
| 6.5 | 30 | Clay, gray and tan, micaceous, glauconitic, calcareous. Water badly mixed samples. |
| | | *Prairie Bluff* |
| 10 | 40 | Chalk, blue-gray, micaceous, clayey. |

Auger Hole 26—437+80; Proj. F-056-2 (1), Oktibbeha County.
Elevation: 264 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| 10 | 10 | Fill (Alluvium?) |
| | | *Porters Creek* |
| 5 | 15 | Silt and clay, light-gray, micaceous. |
| 10 | 25 | Clay, gray, micaceous, tough, silty, calcareous near base. |
| | | *Clayton* |
| 15 | 40 | Clay, blue-gray, finely micaceous, calcareous. |

Auger Hole 27—355+20; Proj. F-056-2 (1), Oktibbeha County.
Elevation: 296 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| 7 | 7 | Soil and subsoil, brown, clayey. |
| | | *Porters Creek* |
| 15 | 22 | Clay, brown to light-gray, plastic. |
| 18 | 40 | Clay, dark-gray, tough. |

Auger Hole 28—191+75; Proj. F-056-2 (3), Oktibbeha County.
Elevation: 272 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| | | *Terrace or Alluvium* |
| 9 | 9 | Sand, brown, fine to medium, silty. |
| 4 | 13 | Sand, gray, fine to medium, water. |
| | | *Porters Creek* |
| 27 | 40 | Clay, dark-gray, plastic, tough, water from 30-35 feet. |

Auger Hole 29—104+40; Proj. F-056-2 (3), Oktibbeha County.
Elevation: 281 feet

| Thickness Feet | Depth Feet | Description |
|---|---|---|
| | | *Terrace or Alluvium* |
| 3 | 3 | Sand, tan, fine to medium. |
| 1 | 4 | Sand, gray. |
| 10 | 14 | Sand, brown, fine to medium, water. |
| | | *Porters Creek* |
| 26 | 40 | Clay, dark-gray, plastic, tough. |

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## *STATEMENT OF POLICY IN STRATIGRAPHIC NOMENCLATURE*

*The Mississippi Geological Survey has many requests for "official statements" on geologic nomenclature. At the present time we do not recognize that we have any "official nomenclature." Geologic knowledge is accrual: therefore, geologic conclusions and the nomenclature of geology are subject to review and to revision.*

*The rules of stratigraphic nomenclature are understood by us, by the geologists of the Surveys of our sister States, by those of the U. S. Geological Survey and by most other geologists. They are most recently expressed by American Commission on Stratigraphic Nomenclature in its "Code of Stratigraphic Nomenclature," A. A. P. G. Bull. Vol. 45, No. 5, pp. 645-665, May, 1961.*

*The problems being studied continually by us are those of stratigraphic nomenclature and taxonomy as they affect our economic investigations. Ranking of stratigraphic units appear to change as the detail of geologic knowledge unfolds. Is this advisable, desirable, or necessary? At what degree should "usage" take precedence over "priority?" These are some of the questions that concern us.*

*We are definitely working in the direction of standardization of nomenclatural usages. We are anxious to cooperate with other departments, geologists and organizations in the simplification and better definition of our nomenclature. We feel that it is a bit too early to announce "official nomenclature," for we, too, are trying to work out of a maze of duplication, poor descriptions and misunderstandings. The geologists writing our reports consult constantly with us and with others in their selection of names, and those names used in these reports are deemed most appropriate and valid by the individual on the basis of his consultations and information available to him at the time. It has been our policy to consult with and to inform the Geologic Names Committee, U. S. Geological Survey, of which George V. Cohee is Chairman. Such matters deal with opinions on stratigraphy, clearing and reservations of new names, and advice on revisions in nomenclature or rank.*

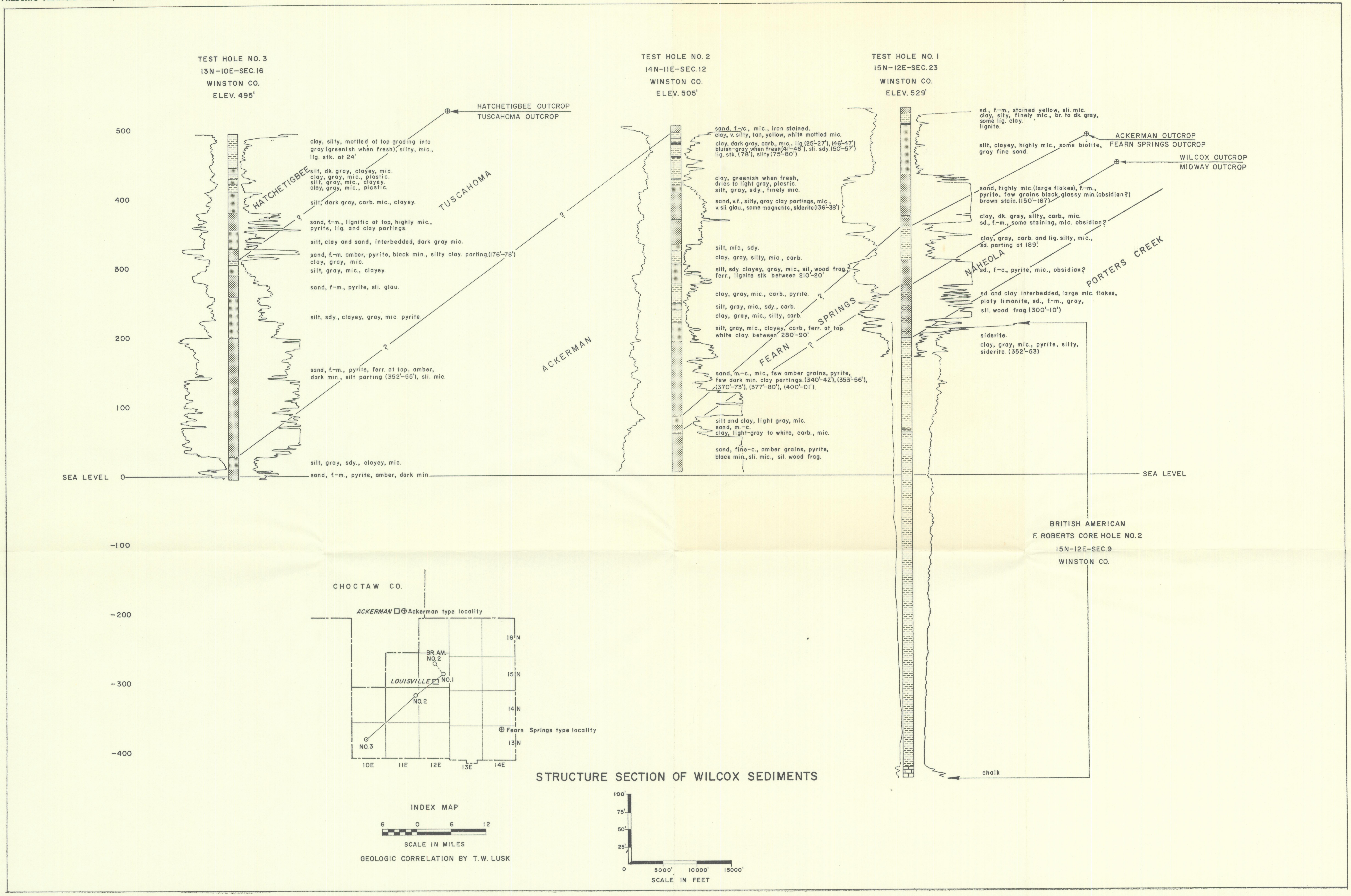
*The Staff*

*Mississippi Geological Survey*

*March* 1, 1963

# GEOLOGIC PROFILE ALONG HIGHWAY 25 FROM STARKVILLE TO LOUISVILLE

# GEOLOGIC PROFILE ALONG HIGHWAY 25 FROM LOUISVILLE TO HIGHWAY 35




STRUCTURE SECTION OF WILCOX SEDIMENTS