MAP GQ 82 - NW

MISSISSIPPI GEOLOGICAL, ECONOMIC AND
TOPOGRAPHICAL SURVEY

WILLIAM HALSELL MOORE
Director and State Geologist

GENERAL GEOLOGY AND MINERAL RESOURCES OF THE MENDENHALL WEST QUADRANGLE, MISSISSIPPI

GEOLOGIC MAP AND MINERAL RESOURCES SUMMARY

By
JAMES H. MAY

WATER RESOURCES SUMMARY

By
JOHN C. MARBLE

QUADRANGLE LOCATION

JACKSON, MISSISSIPPI

1976

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MAP GQ 82 - NW

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By
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And
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STATE OF MISSISSIPPI

Hon. Charles Clifton Finch .... Governor

MISSISSIPPI GEOLOGICAL, ECONOMIC AND
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GENERAL GEOLOGY AND MINERAL RESOURCES OF THE MENDENHALL WEST QUADRANGLE, MISSISSIPPI

James H. May

ABSTRACT

The Mendenhall West Quadrangle is located near the center of Simpson County in south-central Mississippi. It is within the parallels 31°52′30″ and 32°00′ north latitude and the meridians 89°52′30″ and 90°00′ west longitude. Primary access is by U. S. Highway 49; State Highways 13, 43, and 28; and the Illinois Central Gulf Railroad.

The Quadrangle is located in the Gulf Coastal Plain physiographic unit and the more local Pine Hills physiographic province. The topography varies from rugged hills to flat flood plains.

Stratigraphic units exposed are of Quaternary and Tertiary age. The Quaternary includes Holocene and Pleistocene deposits. The Tertiary includes Miocene and, possibly Pliocene deposits. The units in ascending order are the Catahoula Formation of Miocene age; a local unit referred to in this report as the Post-Catahoula Unit of Miocene-Pliocene age; the Citronelle Formation of Pliocene-Pleistocene age; terrace deposits of Pleistocene to undetermined age; and alluvium of Holocene age.

The Mendenhall West Quadrangle is located along the east side of the synclinal structure known as the Mississippi Embayment. Subsurface salt domes influence the structural geology of the area and are important in the production of oil and gas. The regional dip of the strata is about 10 feet per mile for the uppermost unit increasing with depth to about 22 feet per mile for the lowermost unit, the Catahoula.

Mineral resources being utilized include oil, gas, silt, sand, gravel and water. Merit Oil Field has produced 2,931,315 barrels of oil and 13,098,204,000 cubic feet of gas since its discovery in 1959 (cumulative thru October 1975). Kaolinitic clays in the area should be considered for potential use as an additive for high-alumina clay products. Fresh ground-water supplies for the Mendenhall West Quadrangle are adequate for present use. Wells can be developed in the sands of the Kosciusko, Cockfield, Forest Hill, Miocene and "Citronelle" units. The Miocene sands are the most widely used. The overall quality of the surface water is excellent.

INTRODUCTION

PURPOSE

This report contains results of the geological, hydrological and mineralogical investigation of the Mendenhall West Quadrangle, Mississippi. The purposes of the investigation were to locate and evaluate the mineral resources of actual or potential economic value;

to determine the areal extent, thickness and lithology of the geologic units; and to study the surface and subsurface water resources within the area of the quadrangle.

LOCATION

The Mendenhall West Quadrangle is located near the center of Simpson County in south-central Mississippi. It is within the parallels 31°52'30" and 32°00' north latitude and the meridians 89°52'30" and 90°00' west longitude. Primary access is by U. S. Highway 49, which trends northwest-southeast across the northeast corner of the quadrangle; State Highway 13, which runs north-south along the eastern part of the quadrangle; State Highway 43, which roughly parallels the Strong River in a northeast-southwest direction; and State Highway 28, which crosses the southwest corner. The Illinois Central Gulf Railroad roughly parallels Highway 43 from Mendenhall to Pinola, and extends northwestward from Mendenhall through D'lo toward Braxton.

PHYSICAL FEATURES

The quadrangle is located in the physiographic region of Mississippi referred to as the Pine Hills. The topography is dominated by the alluvial plain of the Strong River which flows diagonally southwest across the quadrangle. The alluvial plain is greater than a mile in width along most of its traverse. The alluvial plains of the Strong and its tributaries are the only large flat areas in the study area. With the exceptions of the flood plains, the topography is characterized by rugged hills. The highest elevation, 518 feet, is in the extreme southeastern corner and the lowest elevation, approximately 220 feet, is in the channel of the Strong River in the southwestern corner. The major drainage is provided by the Strong River. Large tributaries entering the Strong in this area are Indian, Dabbs, Sanders, Rials, Allen, and Westville Creeks.

ACKNOWLEDGMENTS

The writer is grateful for the assistance and cooperation which was given by the residents of the Mendenhall, D'Lo and Pinola areas.

Special acknowledgments are extended to the representatives of Masonite and other wood products companies for granting access to the acreage under their jurisdiction.

Acknowledgment is also due: Dr. James P. Minyard, State Chemist, for chemical analyses; Dr. Karl A. Riggs, for clay identification; Wendell B. Johnson, for X-ray analyses assistance; Dr. William B. Hall, for clay ceramic tests; Frederic F. Mellen for fossil identification and consulting; and Dr. Ervin Otvos for heavy mineral data.

The staff of the Mississippi Geological Survey was very helpful in all phases of the investigation.

GENERAL GEOLOGY

The strata exposed in the Mendenhall West area are Tertiary and Quaternary in age. The Quaternary includes Holocene and Pleistocene deposits, while the Tertiary includes Miocene and, possibly, Pliocene deposits. Data are also presented for the Oligocene age Vicksburg Group. The formations of the Vicksburg Group do not crop out in the study area, but contain excellent marker beds which were used for correlation purposes.

The exposed formations are composed mainly of non-marine clay, silt, sand, and gravel. Locally the beds may be indurated. Excluding certain terrace deposits, they represent a regressive offlapping sequence that extends vertically from the top of the Oligocene strata to the present land surface. The offlapping units near the surface contain coarser clastic material than those at greater depths. The electrical log in Figure 1a indicates the repetitive nature of these units. The time units involved in this sequence are difficult to differentiate.

The formations as shown on the geologic map are named to conform more or less to past priorities in nomenclature. It should be noted that the term "Citronelle" is especially subject to criticism concerning its current usage (Isphording and Lamb, 1971). Alt (1974) believes that portions of the high level terraces formerly designated as "Citronelle" are Miocene in age. In the writer's opinion, data acquired during the study of the Mendenhall area could easily be interpreted to support the Miocene age of some of the more inland high level terrace deposits.

The conceptual sedimentary model (Figure 1b) of the downdip Miocene by Doris Curtis (1970) can easily be modified and shifted updip to account for the repeating stratigraphic units found in the area of this report. The gross effect of these offlapping units could produce a blanket-like deposit of coarse clastics. However, these clastics would be progressively older toward the source area.

The strata dip to the southwest at the approximate rate of 10 feet per mile for the "Citronelle," increasing with depth to about 22 feet per mile for the Catahoula. The dip steepens in the vicinity of D'Lo. This change in dip could be the result of a relatively shallow piercement-type salt dome located just east of D'Lo.

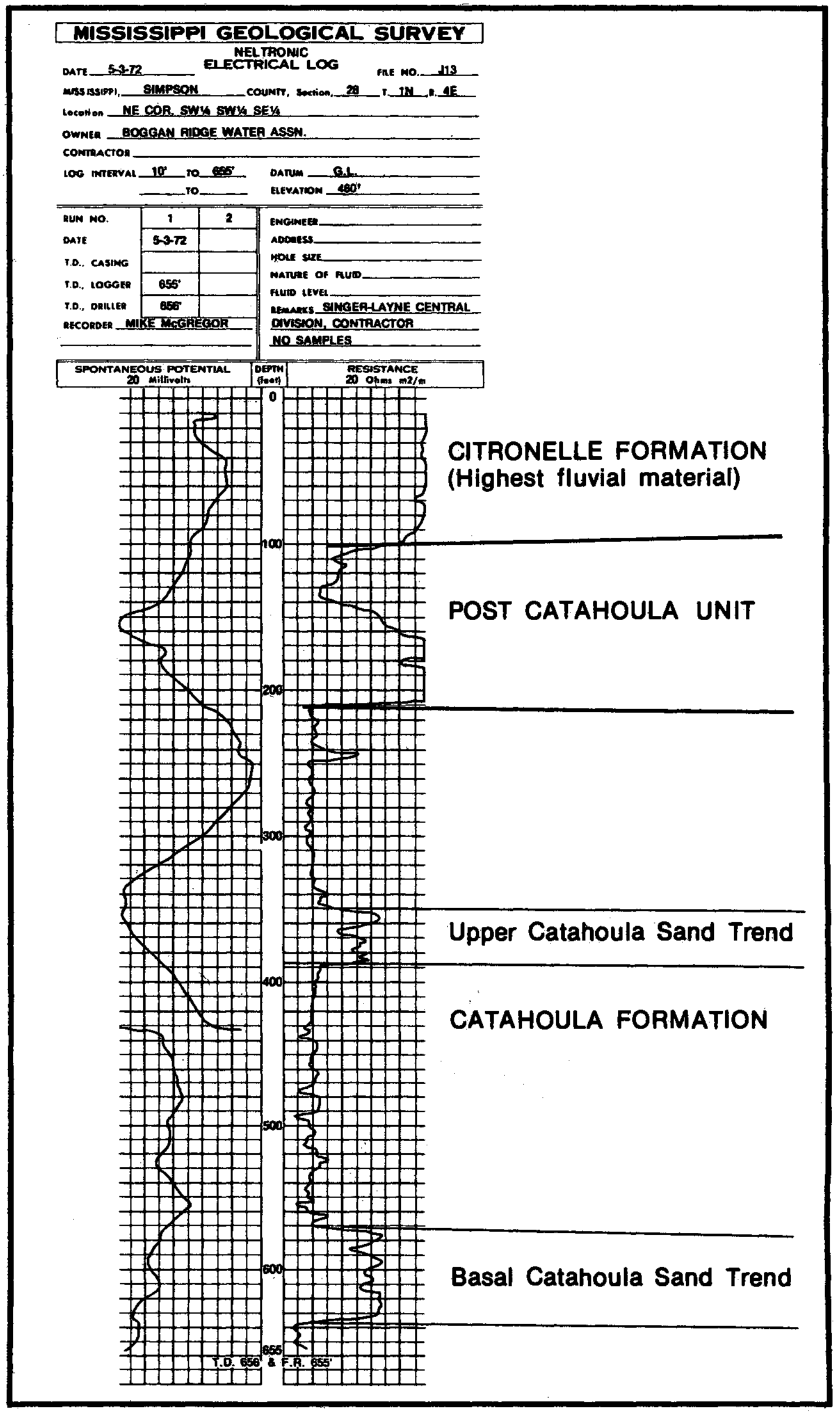


Figure 1a. - Electrical Log oт Strata in Area of Mendenhall West Quadrangle.

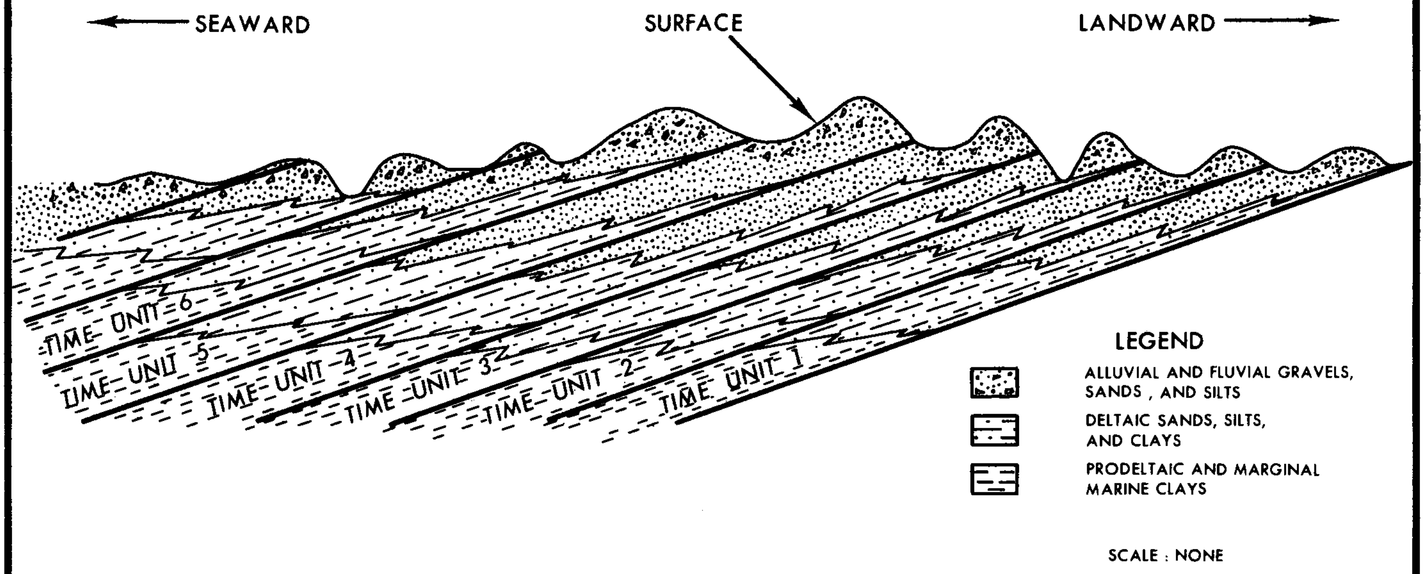


Figure 1b - Conceptual dip section of upper strata in Simpson County area as modified from a model of downdip Miocene strata by Doris Curtis (1970).

MIOCENE SERIES

CATAHOULA FORMATION

The term "Catahoula" was introduced by A. C. Veatch (Veatch, 1905) for exposures in Catahoula Parish, Louisiana. The Catahoula is recognized across the southern part of Mississippi, in Louisiana and Texas to the west, and in Alabama and Georgia to the east. It is correlative with the Tampa Limestone of Florida.

The Catahoula Formation in the Mendenhall area has a varied lithology. This lithology is indicative of fluvial to marginal-deltaic environments of deposition. The strata exhibit many characteristics of a regressive, offlap sequence of sediments (Rainwater, 1964). Despite the fact that some of the beds are discontinuous, test hole data indicate that certain mappable trends exist within the formation.

A coarse to very coarse, poorly sorted, sand commonly occupies the basal interval of the Catahoula. This sand is predominantly quartz, but contains minor amounts of chert, muscovite, pyrite and various heavy minerals. Small gravel size (>2mm) quartz and chert are common in this interval. This sand trend is normally about 35 to 65 feet thick. Where the thickness exceeds 60 feet, the sand interval characteristically contains clay or silt lenses.

Much of the material in this lower Catahoula interval was deposited in a high-energy environment as compared to the material in the remainder of the formation. This lower clastic interval is a primary fresh water aquifer of local residents.

An argillaceous silt commonly separates the Catahoula from the underlying Vicksburg Group. In some areas, however, channel sands of the basal Catahoula have been deposited on an erosional surface that extends down into the upper strata of the Vicksburg Group.

The unconformable nature of the lower Catahoula contact (MacNeil, 1944) could be the reason for the scarcity of Upper Oligocene strata (Chickasawhay Stage) in this area. Rare fossil fragments and glauconitic intervals found in the lower Catahoula could indicate erosional remnants of Chickasawhay Stage material. The Chickasawhay sequence is well developed in eastern Mississippi (May, 1974).

Another mappable sand trend is present near the top of the Catahoula. This medium- to coarse-grained sand is not as persistent as the basal sand, but can serve locally as an aquifer. It contains fine black chert gravel near its updip limit. These sand deposits are about 35-45 feet thick.

The remainder of the Catahoula is composed mostly of argillaceous silt and fine sand. It is typically greenish-gray in the subsurface and weathers to light-gray on the surface. The less than 2 micron size fraction of the greenish-gray material is usually high in percentage of montmorillonite and illite, but the same size fraction of the light-gray material on the surface is higher in kaolinite. Opal and volcanic glass shards are also present in these sediments. Some of the finer material was deposited in lakes or other low energy environments.

The opal (cristobalite), barite nodules, pyrite, manganese oxide, and other concretions present in the sediments of the Mendenhall area are similar to the weathered materials that are found in the tuffaceous Catahoula deposits in Karnes County, Texas. The Catahoula in Texas is well known as a source of uranium ore. Barite nodules weighing three to five pounds were collected from the Catahoula Formation north of the Mendenhall West Quadrangle in Sec. 12, T.2N., R.1 E. Manganese nodules containing 32.8% manganese in the form of hollandite were collected south of the study area in Sec. 6, T.10 N., R.3 E. from the Post-Catahoula Unit. Small accumulations of manganese were noted in Catahoula sediments.

Metallic mineral "spheres", "granules", or "nodules", are recorded in many of the test hole sample descriptions. Some of these are in an oxidized state; others are carbonate, sulfide, and, possibly sulfate. Iron is the principal cation and manganese is subordinate. Barium may also be present in some of the mineral aggregates. Inasmuch as "ankerite" spherules or pellets long have been regarded as characteristic or diagnostic of the Catahoula Formation in deep well cuttings, the following summary may be of value to the researcher:

Mineral aggregates in test holes drilled in the Mendenhall West Quadrangle.

Test Hole	Depth	Description	Formation
82C-4	122'-172'	Many pyrite granules	Catahoula
82C-7	0'-17'	Moderate-red, ferruginous, nodules	Post-Catahoula Unit
	153'-176'	Siderite spheres about 1 mm	Catahoula
82C-8	46'-60'	Ferruginous nodules	Post-Catahoula Unit
	74'-79'	Same	Same
	79'-90'	Same	Same
82C-9	259'-287'	Many pyritic granules	Catahoula
	287'-310'	Same	Same
82C-11	70'-76'	Pyrite granules	Catahoula
	76'-128'	Same	Same
	188'-310'	Same	Same
82C-12	351'-388'	Pyrite crystal granules	Catahoula
82C-18	64'-90'	Sand-size spherical ferruginous particles.	Post-Catahoula Unit
82C-19	70'-84'	Reddish-brown ferruginous nodules	Post-Catahoula Unit
	110'-120'	Manganiferous granules	Same
82C-25	229'-248'	Pyrite granules	Catahoula

A heavy mineral analysis of loosely cemented sandstone exposed in the Highway 49 roadcut in the NE/4 of Section 27, T.2 N., R.4 E., gave the following results: kyanite 56.5%, rutile 2.0%, staurolite 23.0%, tourmaline 6.0% and zircon 12.5%. The content of opaques in the total heavies was 68%. This data was provided by Dr. Ervin Otvos of the Mississippi Gulf Coast Research Laboratory.

Fossil plants were collected from several outcrops outside the area of the quadrangle. A fossil leaf has been tentatively identified as a member of Sapotaceae. Spherical fossils collected from the top of the Highway 49 roadcut located in the NE/4 of Section 27, T.2 N., R.4 E., were identified by Frederic Mellen as siliceous charophytes.

Many excellent outcrops of Catahoula are visible in the stream valleys and roadcuts. Some of the more impressive outcrops can be observed at the following localities:

(1) the Highway 49 roadcut one-half mile east of the Strong River, in the N/2 of Section 27, T.2 N., R.4 E., light-gray and light-brown lenticular standstone and siltstone ledges are exposed.

(2) 150 feet west of the Highway 43 bridge on Rials Creek, in the NW/4 of Section 17, T.1 N., R.4 E., ledges of Catahoula form a waterfall and rapids in Rials Creek.

(3) southwest of where county road crosses Strong River, in the NW/4 of Section 26, T.1 N., R.3 E., indurated standstone and siltstone ledges cause rapids in the river.

The maximum thickness of the Catahoula in this area is about 450 feet. The dip is approximately 20 feet per mile to the southwest. The dip increases slightly with depth.

"POST CATAHOULA UNIT"

The "Post Catahoula Unit" could possibly correlate with the Hattiesburg Formation as defined across the southern part of Mississippi by Bicker, 1969, Luper, 1972, and May 1974. The original reference to the Hattiesburg was by L. C. Johnson in 1893, concerning clay in the vicinity of Hattiesburg, Mississippi. It should be understood, however, that the Pleistocene, Pliocene, and Miocene boundaries are unresolved in this area and correlations must be made with unusual care.

In any event, this unit appears to be a continuation of the major regressive sequence initiated in the early Miocene. The time units that are involved have not been differentiated.

Unfortunately no method of dating these stratigraphic units is known at present. Palynological data is being collected and studied. Perhaps as advances in the field of palynology are made in the Coast area, these complex sediments may be dated.

The "Post Catahoula Unit" is a locally mappable unit consisting of an upper argillaceous silt interval and a lower fluvial sand and gravel interval.

The lower part of this unit is made up of medium- to coarse-grained, poorly sorted sand. The sand is mostly subangular to rounded quartz. Gravel size quartz and chert are common. The chert is typically gray or black where unweathered. A ferruginous ledge normally marks the base of this interval both in the subsurface and on the surface. On the outcrop this interval could easily be mistaken for a "Citronelle" or other terrace deposit.

The upper part of this unit consists of argillaceous silt and fine sand. On the surface it is characterized by hematite and manganese concretions. The clay size fraction is generally very rich in kaolinite. The concretions and kaolinite are believed to be the result of weathering. Downdip and below the water table the sediments contain more montmorillonite than kaolinite.

Parts of the "Post Catahoula Unit" can be observed at the following localities:

(1) in the SW/4 of Section 16, T.1 N., R.4 E., near oil well site, 400 yards north of intersection of oil field road and gravel road to Merit, kaolinitic silts and ferruginous nodules are exposed in road cut.

(2) in the SW/4 of Section 22, T.1 N., R.4 E., in the east roadcut of Highway 13, 550 yards south of Rials Creek, partially indurated argillaceous silts are exposed.

(3) in the SE/4 of Section 25, T.1 N., R.3 E., on the southwest side of gravel road 150 feet northwest of intersection with Highway 13, gray, silty clay and ferruginous nodules are visible.

(4) in the NW/4 of Section 3, T.1 N., R.4 E., on the north roadcut of an asphalt road where it makes a sharp bend from a north-south direction to an east-west direction, ferruginous nodules are present in red sand.

The maximum thickness of the "Post Catahoula Unit" penetrated during this study is 132 feet. The dip is about 20 feet per mile in a slightly west of south direction.

PLIOCENE-PLEISTOCENE SERIES

"CITRONELLE FORMATION"

The type locality for the "Citronelle" is the exposures in the vicinity of Citronelle, Alabama. This name was applied by Matson (1916) to sediments which he considered to be Pliocene in age. The correlation of the "Citronelle" in the Mendenhall area with the material at the type locality is not attempted. The age of these high level sands and gravels in south Mississippi has historically been designated as Pliocene or Pleistocene (Moore, 1965, Bicker, 1969 and May 1974). The assumption has also been that this material forms, or once formed, a continuous blanket-like deposit. Test hole data, however, indicates the presence of "relic," or bedrock terraces, at intervals below the base of the "Citronelle." As these subsurface sands and gravels extend to the surface, the implications are that many of these high level terraces might be much older than previously suspected. As these repetitive cycles of sand and gravel cropout they might easily give the impression of a continuous blanket deposit. This could place the term "Citronelle," as applied to sediments in central Mississippi, in an even more dubious position than the one it has occupied in its controversial past. In the future, palynology may prove helpful in dating these materials. The "Citronelle Formation," as restricted to this report, is the highest terrace material (topographically) in the study area. It also contains the coarsest clastic material of all the units designated on the geologic map. The coarse size and poor sorting of the sediments and the absence of marine fossils (except for the transported chert-replaced Paleozoic fossils) suggest a high energy fluvial environment of deposition and a continuation of regressive strata.

The "Citronelle" is composed mainly of ferruginous, coarse sand and gravel. The gravel is multicolored chert and quartz. The sand consists of subrounded to rounded quartz. The chert nodules are the result of chert replacement of Paleozoic limestone. Many Paleozoic fossil forms such as crinoid stems, brachiopods, and corals are preserved in the chert. Banded agates and silicified wood are common. Discontinuous lenses of pink and white kaolinitic clay are found throughout this unit. The lower section is characterized by a clay ball conglomerate and a basal indurated ferruginous ledge.

Figure 2 shows the cumulative curves derived from selected sieve analyses of "Citronelle" samples. The analyses were performed by the Mississippi State Highway Department.

Although varying amounts of gravel are in some of the other units, any sizable gravel deposits will probably be located underlying the areas of the geologic map shown as "Citronelle." Most of the commercial gravel and sand operations are located within the outcrop area of this unit. (See Economic Geology Section and Test Hole Descriptions). Outcrops of "Citronelle" material are exposed at the following localities:

(1) in the SE/4 of Sec. 25, T.1 N., R.3 E., and the W/2 of Sec. 30, T.1 N., R.4 E., approximately 400 yards southeast of Illinois Central Gulf Railroad northwest of Highway 43, a large sand and gravel pit is presently in operation.

(2) in the NE/4 of Sec. 16, T.1 N., R.4 E., about 100 yards east of Fellowship Church, along both sides of Highway 13, ferruginous sands and gravels are exposed.

(3) in the NE/4 of Sec. 9, T.1 N., R.3 E., 200 feet south of north section line, east of gravel road, 20 to 30 feet of sand and gravel are visible.

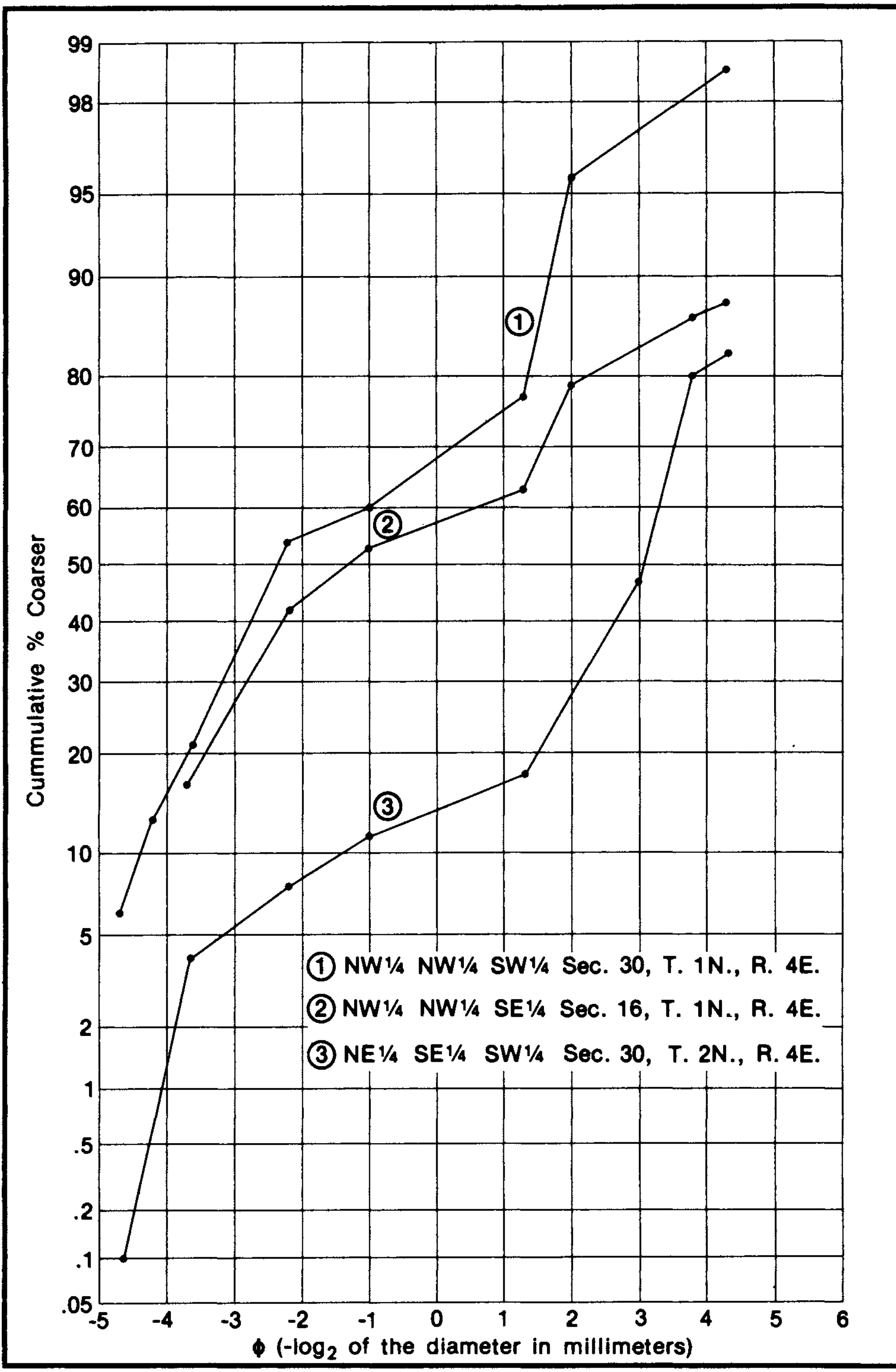


Figure 2. - Data derived from selected sieve analyses performed by Miss. State Highway Dept. (Samples from "Citronelle" Formation)

(4) in the S/2 of Sec. 30, T.2 N., R.4 E., about 300 feet north of south section line, on west side of asphalt road, is an intermittently used sand and gravel pit.

The maximum thickness of the "Citronelle" in the study area is approximately 150 feet. The thickest gravel intervals penetrated were in test holes 82C-19, 82C-23, and 82C-27 (See Test Hole Data section).

The dip of this unit is difficult to determine because of the unconformable nature of the lower contact. The dip is approximately 10 feet per mile in a slightly west of south direction.

TERRACE DEPOSITS

Terrace deposits cover many of the hills which are topographically lower than the base of the material designated as "Citronelle." Basically these deposits consist of any weathered and/or reworked terrace material that is not included in the "Citronelle" or in present-day alluvial plains.

The determination of the origin of these deposits is difficult. They are tentatively assigned to the Pleistocene because it is assumed that many of these lower level terraces were a result of the fluctuation of sea level which occured during Pleistocene glaciation (Moore, 1965 and Baughman, 1971). Several factors, however, must be considered in relation to dating of these terraces. Modern streams continue the process of transporting the higher terrace material to lower elevations. This material is often slumped and mixed with the material of lower terraces. The possibility of graveliferous subsurface "relic" terraces projecting to the surface is another important factor that must be considered in the dating of any particular terrace. This subsurface material, when weathered and possibly reworked, closely resembles terraces of much younger age.

The terrace deposits are composed mainly of multicolored, iron-stained, fine- to coarse-grained, subangular to rounded quartz sand. They contain some quartz and chert gravel which is similar to that in the "Citronelle," but usually much less abundant. Local clay lenses are also present. These deposits can be mined for small amounts of sand and gravel for local use.

The thickness of the terrace deposits is quite variable. The dips were not determined due to the sporadic occurrence of these deposits.

HOLOCENE SERIES

ALLUVIUM

The alluvium is the most recent depositional material in the study area. This alluvium is a result of a dynamic system that is in operation today.

Streams are relentlessly in the process of eroding materials such as gravel, sand, and clay from higher elevations and depositing them in their flood plains. As a result of these processes, over one-third of the total surface area of the quadrangle is covered by alluvial material.

The Strong River has developed an extensive flood plain that is over 2 miles wide at its confluence with Sanders Creek about 2 miles southwest of Merit. The Strong and other major streams meander across relatively wide flood plains containing oxbow lakes which indicates an "old age" stage in geologic development of their valleys.

The alluvial area, as presented on the geologic map, can also be interpreted as flood-prone areas. Of course all areas shown as alluvium do not flood, but most are comparatively low in elevation. In some areas slightly older low lying terraces are shown as alluvium.

The alluvium is composed mainly of yellowish-brown to grayish-orange, angular to well-rounded, poorly sorted, quartz sand. Coarser materials, including chert gravel and wood fragments, are present near the base of the sediments. Silty dark clays containing abundant organic matter are characteristic of backswamp deposits that often overlie old meander scars within the alluvial plains.

The average thickness of the alluvium penetrated in the Strong River flood plain is 21 feet. The thickness of the alluvium is subject to variation, especially along the smaller streams where it can be very thin.

STRUCTURE

The geology of the study area is influenced structurally by its location along the east side of the synclinal Mississippi Embayment. The dip of the near-surface strata, as stated earlier, is about 10 feet per mile for the "Citronelle", increasing with depth to 25 feet per mile for the Glendon Formation. The direction of dip is to the southwest. An increase in dip in the vicinity of D'Lo is probably the expression of the D'Lo Salt dome, a piercement-type dome.

A structural contour map was constructed using the top of the Oligocene age Glendon limestone as datum. The Glendon is a widespread, easily mappable, formation that is readily distinguishable on electric logs.

The increase in dip in the D'Lo area is easily detected on the structural contour map. Also an anomalous widening of the contour lines can be seen in the area of Merit Oil Field. Unusual widening of the contours was noted in several areas along the western side of the quadrangle.

Other indications of deep structure may be reflected on the surface by the straightness of the Strong River flood plain south of Merit Field as compared to the flood plain north of the Field, the variation in surface geology on opposite sides of the River in this same area, and the lineation along Buck Branch which parallels the straightness of the Strong River flood plain.

The electric logs used in preparing the cross sections are listed below: (Logs are on file at the Mississippi Geological Survey office at 2525 N. West Street, Jackson, Mississippi).

Section A-A'—A—Mississippi Geological Survey (M.G.S.), 82C-23; B—Water Well Services Company, AA Chicken Farm, water well #J5; C—M.G.S., 82C-13; D—Phillips Petroleum Company, #1 Zellerbach "B"; E—K. E. Thompson Well Service, Joe Buckley water well #J10; F—M.G.S., 82C-27; G—M.G.S., 82C-7; H—Jett Drilling Company, T. G. Cox #1; I—M.G.S., 82C-6; J—K. E. Thompson Well Service, Dan Henderson water well #J12; K—M.G.S., 82C-25; L—Water Well Service Company, T. H. Morgan water well #J6; M—M.G.S., 82C-3; N—M.G.S., 82C-26; O—Griner Drilling Company, Town of Mendenhall, Test Hole #1; P—M.G.S., 82C-1; Q—K. E. Thompson Well Service, Fabe Jones water well #C19; R—Singer Layne, Town of D'Lo #D22; and S—M.G.S. 82C-2.

Section B-B'—A—M.G.S., 82C-18; B—M.G.S., 82C-24; C—M.G.S., 82C-17; D—M.G.S., 82C-19; E—Phillips Petroleum Company, #1 Zellerbach "B"; F—K. E. Thompson Well Service, Robert Smith water well #H4; G—M.G.S., 82C-21; H—M.G.S., 82C-16; I—M.G.S., 82C-11; J—K. E. Thompson Well Service, William Jackson water well #C23; K—M.G.S., 82C-20; L—K. E. Thompson, operator, Woodrow Skiffer water well #D3; M—K. E. Thompson Well Service, Rosie Barnes water well #D15; N—K. E. Thompson Well Service, Clyde Hamilton water well #D10; O—M.G.S., 82C-4; P—K. E. Thompson Well Service, Louis Hayes water well #C7; Q—Griner Drilling Service, Town of D'Lo #D13; and R—Singer Layne, Town of D'Lo #D22.

Section C-C'—A—S and R Drilling Service, Burney Banks water well #H2; B—M.G.S., 82C-17; C—Phillips Petroleum Company, #1 Zellerbach "B"; D—M.G.S., 82C-19; E—K. E. Thompson Well Service, Robert Smith water well #H4; F—M.G.S., 82C-13; G—M.G.S., 82C-16; H—M.G.S., 82C-10; I—M.G.S., 82C-12; J—M.G.S., 82C-11; K—Water Well Service Company, C. M. Mitchell water well #C9; L—Water Well Service Company, W. W. Shorter water well #C2; M—M.G.S., 82C-9; N—K. E. Thompson Well Service, J. A. Leming water well #C15; and O—M.G.S., 82C-5.

ECONOMIC GEOLOGY

One of the prime objectives of the study was to locate and identify mineral resources which have potential for economic development.

Representative surface and subsurface samples were collected from various formations within, and adjacent to, the study area. Certain preliminary tests were performed on some of the more interesting materials. The results of these tests will not suffice for plant or process design, but are intended to guide the prospective producer to specific areas of interest. Geologic knowledge of an area can be a valuable tool in the location and utilization of mineral deposits.

The mineral resources being utilized at present are oil, gas, sand, gravel, and silt (Figure 3). Other mineral resource possibilities include clays for use in ceramics, structural clay products, and as high alumina clays. Surface and subsurface water are extremely valuable resources and are discussed in detail in the Water Resources Section.

OIL AND GAS

The oil and gas industry is the most important mineral industry in the quadrangle study area. Merit Oil Field has produced 2,931,315 barrels of oil and 13,098,204,000 cubic feet of gas since its discovery in 1959 (cumulative thru October 1975.) The field is located in Sections 23, 24 and 25, T.1 N., R.3 E., and Sections 7, 9, 16, 17, 18, 19 and 20, T.1 N., R.4 E.

Production in the field is from six different reservoirs. The producing horizons are the Paluxy (3 different zones), the Rodessa-Cox, the North Rodessa and the Sligo. The shallowest production is from a depth of 11,530 feet and the deepest is from 13,830 feet.

The structures involved in the hydrocarbon traps are anticlinal and domal for the Paluxy, faulted anticline for the Rodessa-Cox, stratigraphic trap for the North Rodessa, and stratigraphic trap for the Sligo. The producing formations are lower Cretaceous in age.

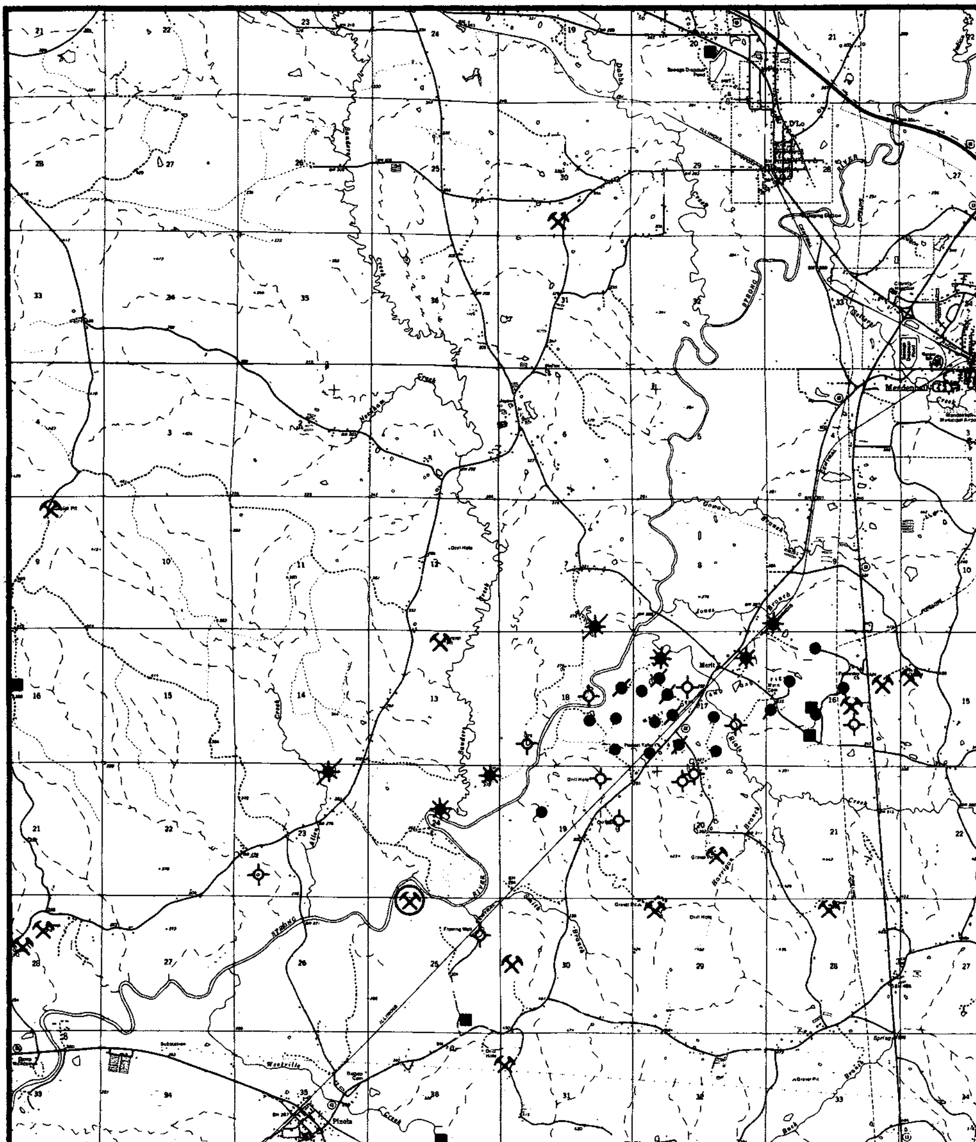
The oil and gas data was compiled from the production bulletins of the Mississippi State Oil and Gas Board.

SAND AND GRAVEL

Sand and gravel for use in surfacing county roads have been mined locally for many years. At the time of this report large quantities of material were being transported from the immediate area for use as road fill and in hot mix asphalt. One pit located one and one-quarter miles northeast of Pinola was producing at a rate exceeding 1,000 tons per day. The larger pits are producing from the "Citronelle." A pit in Section 24, T.1 N., R.3 E., is mined for recent alluvial silt and fine-grained sand to be used as a binding material in asphalt mix. Table 1 presents selected sieve analyses from several localities in the area covered by the quadrangle.

CLAYS

No clays are being mined at present. The possibility, however, of significant kaolinite-rich deposits is indicated. Selected samples were tested from several areas. The test results showed the clay size fraction (<2 microns) of the samples from these areas contains a



- ⚒ Gravel and Sand Pits
- Ⓧ Silt Pit (Used as binder for asphalt)
- ■ Areas where tests of selected samples indicated the presence of kaolinitic materials
- ○ Active location
- ● Oil well
- ✷ Gas well
- ⌖ Dry hole
- Abandoned oil well
- Abandoned gas well

Figure: 3 - Mineral Resources Location Map.

high percentage of kaolinite. These localities are indicated on the mineral resources map.

In the SW/4 of Section 16, T.1 N., R.4 E., seventeen feet of kaolinitic silt were cored (Test Hole 82C-7). The chemical analyses of the 2-4 foot and 10-12 foot interval are shown below:

Lab Number	514,575	514,576
Samples Marked	2'-4'	10'-12'
Moisture (H_2O)	0.5%	0.5%
Silica (SiO_2)	54.0%	54.0%
Alumina (Al_2O_3)	40.1%	43.0%
Iron Oxide (Fe_2O_3)	4.58%	2.29%
Lime (CaO)	0.48%	0.17%
Magnesia (MgO)	0.32%	0.13%

Table I

Mechanical Analyses of Selected Gravel Samples From Pits in the Mendenhall West Quadrangle Area

Sieve Size	SW/4 Section 30, T.2 N., R.4 E. (% passing)	SE/4 Section 16, T.1 N., R.4 E. (% passing)	SW/4 Section 30, T.1 N., R.4E. (% passing)
1"	99.9	—	96.1
3/4"	—	—	87.2
1/2"	95.8	83.3	79.1
No. 4	92.2	59.8	46.0
No. 10	88.3	46.8	40.0
No. 40	82.8	37.1	23.2
No. 60	53.1	20.7	4.4
No. 200	20.0	13.9	—
No. 270	17.4	12.1	1.2
% Silt	3.7	11.3	1.0
% Clay	13.7	14.5	2.0

Source: Mississippi State Highway Department

Dr. Karl A. Riggs of Mississippi State University performed detailed X-ray analysis of the less than 2 micron size fraction and stated that the 2-4 foot interval contained mainly kaolinite with minor illite and possibly mixed layer illite. The 10-12 foot interval is mainly kaolinite with minor illite.

Ceramic tests of material from test hole 82C-7 gave the following results:

Firing Temp. °F	Firing Shrinkage, %		Water Absorption, %	
	2-4'	10-12'	2-4'	10-12'
1850	0.9	—	20.0	17.2
1950	2.7	2.2	15.5	13.2
2050	4.0	2.8	13.8	14.4
2100	4.5	3.2	—	—

Dr. William B. Hall, who conducted the tests stated that this material is too pure to be used by itself, but would make an excellent additive to any of the brick clays in the State, or could be used as kaolin clay for additives to other ceramic bodies besides brick.

The sample from the 10-12 foot interval fired white while the 2-4 foot interval fired pink.

The X-ray diffractograms of several other selected samples that were high in kaolinite are shown in Figure 4.

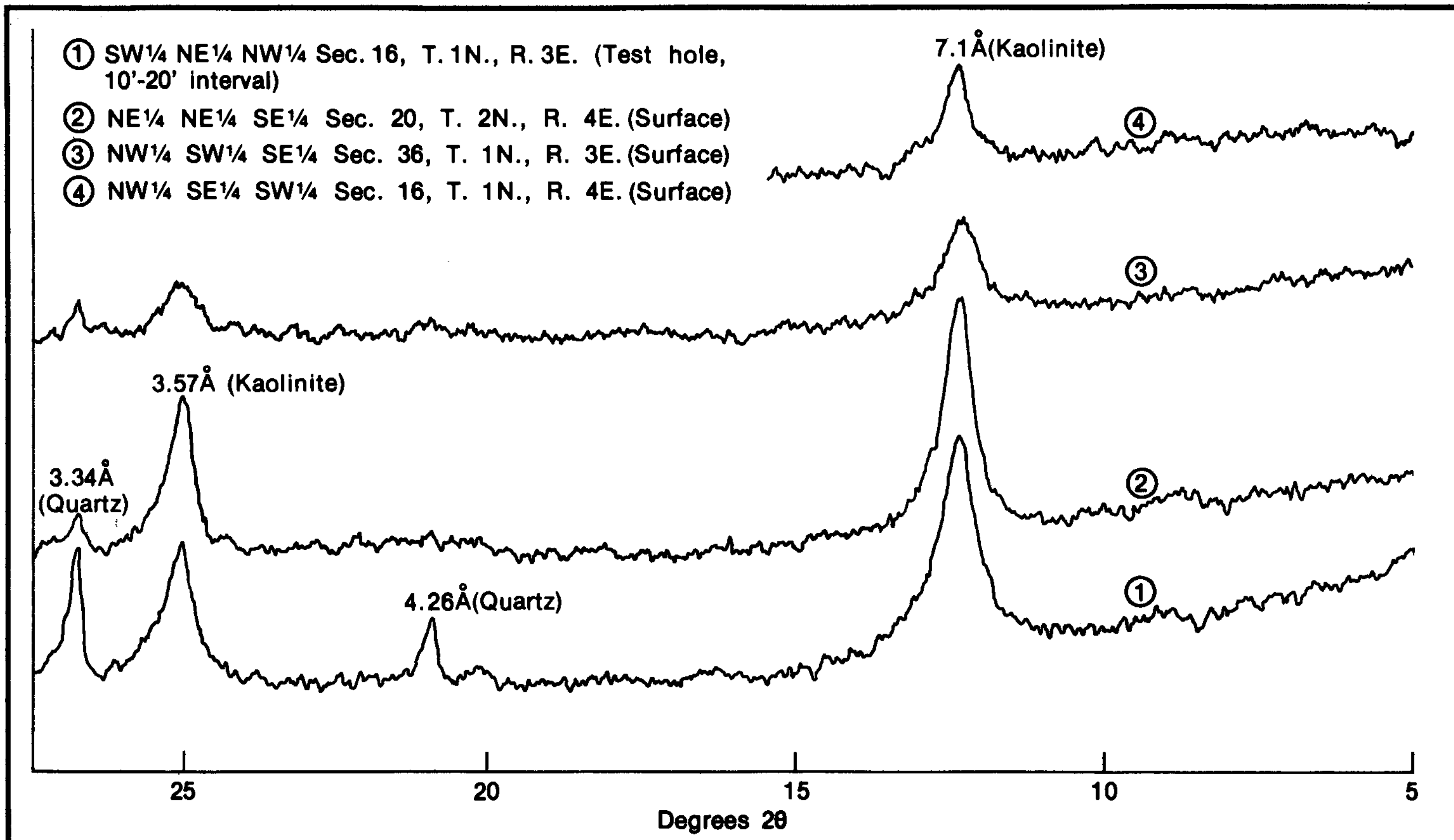


Figure 4. - X-ray Diffractograms (<2 Micron Size) of Selected Samples (Unglycolated at room temperature).

TEST HOLE DATA

The following are detailed descriptions of cuttings and cores from test holes drilled or cored during the geologic and mineralogic study of the Mendenhall West Quadrangle. The prefix 82C locates the 15 minute quadrangle within the State and shows which 7.5 minute quadrant is involved. The samples were washed and dried prior to microscopic examination. The color code used in describing samples is taken from the standard color chart of the Geological Society of America.

All the samples described below were obtained by the use of the Survey's Failing 1500 Holemaster rig. Electric logs measuring self potential and resistivity were run on most of the test holes with the Survey's Widco or Neltronic electrical logger.

The following described samples are cataloged and stored in the Survey's Sample Library, where they are available for public observation.

All thicknesses and depths are expressed in feet.

82C-1

Location: NE/4, SW/4, NW/4, Sec. 27, T.2 N., R.4 E.

Elevation: 385 feet Date: May 19, 1975

Depth	Thickness	Description
		Post-Catahoula Unit
15	15	Sand, dark-yellowish-orange, medium- to coarse-grained, subangular to well-rounded quartz, ferruginous, poorly sorted; ledge at base.
		Catahoula Formation
42	27	Clay, light-gray, silty to arenaceous, brittle.
57	15	Sand, light-brown to grayish-orange, fine- to medium-grained, subangular to subrounded quartz, micaceous, ferruginous.
71	14	Silt, yellowish-gray, argillaceous, brittle, micaceous.
86	15	Sand, yellowish-gray, fine- to medium-grained, micaceous, ferruginous.
94	8	Clay, yellowish-gray, silty.
115	21	Silt, yellowish-gray, argillaceous, micaceous.
120	5	Clay, yellowish-gray, silty, blocky.
136	16	Sand, yellowish-gray, fine-grained, argillaceous, micaceous.
150	14	Sand, yellowish-gray, medium- to very coarse-grained, subangular to well-rounded quartz, poorly sorted; abundant smoky quartz and black chert.
155	5	Silt, yellowish-gray, argillaceous.
162	7	Sand, yellowish-gray, fine- to medium-grained, mostly subangular quartz; much black chert; partially indurated.
230	68	Silt, yellowish-gray, argillaceous, micaceous; waxy clay at 190 feet; numerous pyrite granules.
244	14	Sand, yellowish-gray, medium-grained, unconsolidated, mostly subangular to subrounded quartz; abundant black chert; scattered well-rounded, frosted quartz grains.
250	6	Clay, grayish-yellow, silty.

Note: Fresh material was greenish-gray from a depth of 86 feet to bottom of hole.

82C-2

Location: NW/4, SE/4, NW/4, Sec. 22, T.2 N., R.4 E.

Elevation: 295 feet Date: May 20, 1975

Depth	Thickness	Description
		Alluvium
17	17	Sand, light-brown, medium- to coarse-grained; some pea gravel.
		Catahoula Formation
60	43	Clay, dark-gray to greenish-gray, silty.
68	8	Sand, greenish-gray, fine- to medium-grained, scattered black grains.
155	87	Sand, greenish-gray, fine-grained, argillaceous, partially indurated.
178	23	Sand, greenish-gray, fine- to medium-grained.
190	12	Clay, dark-brown, silty, carbonaceous.
240	50	Sand, light-gray, fine- to medium-grained, some black grains.
248	8	Sand, light-gray, coarse-grained, black chert.
280	32	Clay, greenish-gray to dark-gray, silty.
		Bucatunna Formation
316	36	Clay, dark-gray, silty, carbonaceous.
		Byram Formation
328	12	Marl, greenish-gray, fossiliferous.
		Glendon Formation
329	1	Limestone, light-gray, fossiliferous.

82C-3

Location: SW/4, SE/4, NW/4, Sec. 4, T.1 N., R.4 E.

Elevation: 295 feet Date: May 26, 1975

Depth	Thickness	Description
		Alluvium
22	22	Sand, yellowish-brown, medium- to coarse-grained, manganiferous, ferruginous; poorly sorted; gravel at base.
		Catahoula Formation
49	27	Silt, yellowish-gray, argillaceous, micaeous, brittle.
56	7	Sand, yellowish-gray, medium-grained, subangular quartz; partially indurated.
70	14	Silt, yellowish-gray, arenaceous, micaceous, argillaceous.
87	17	Sand, yellowish-gray, medium- to coarse-grained, subangular quartz, micaceous.
182	95	Silt, yellowish-gray, argillaceous, micaceous.
203	21	Sand, yellowish-gray, medium-grained, subangular quartz, micaceous, scattered black chert.
240	37	Silt, yellowish-gray, argillaceous, pyritic, micaceous.
244	4	Sand, yellowish-gray, fine- to medium-grained, argillaceous, scattered dark grains.
250	6	Silt, yellowish-gray, argillaceous, micaceous.

Note: Fresh material was greenish-gray in color from a depth of 22 feet to 250 feet.

82C-4

Location: SW/4, NW/4, NE/4, Sec. 30, T.2 N., R.4 E.

Elevation: 325 feet — Date: May 27, 1975

Depth	Thickness	Description
		Catahoula Formation
20	20	Silt, light-gray, argillaceous (smooth clay), ferruginous.
33	13	Sand, light-gray, medium-grained, subangular quartz, well-sorted, micaceous; black chert.
40	7	Clay, light-olive-gray, waxy.
70	30	Silt, light-olive-gray, argillaceous, ferruginous staining.
74	4	Sand, yellowish-gray, medium-grained, subangular quartz, micaceous.
112	38	Silt, yellowish-gray, argillaceous, brittle.
122	10	Sand, yellowish-gray, fine-grained, subangular quartz, well-sorted, micaceous.
172	50	Silt, very light-gray, argillaceous; many pyrite granules; indurated sand streak.
182	10	Sand, yellowish-gray, fine-grained, micaceous, subangular quartz.
188	6	Silt, yellowish-gray, argillaceous.
238	50	Sand, very light-gray, fine- to medium-grained, clean, micaceous; contains smoky quartz and black chert.
243	5	Silt, medium-gray, argillaceous, carbonaceous particles, pyritic.
249	6	Sand, light-gray, medium-grained, subangular quartz; black chert and smoky quartz.
260	11	Clay, yellowish-gray, silty, micaceous, some ferruginous staining.
		Note: Fresh material was greenish-gray from a depth of 33 feet to 260 feet.

82C-5

Location: SW/4, NE/4, SW/4, Sec. 21, T.2 N., R.3 E.

Elevation: 465 feet — Date: May 29, 1975

Depth	Thickness	Description
		Citronelle Formation
17	17	Sand, yellowish-orange, medium- to coarse-grained, subangular to well-rounded quartz, poorly sorted; some pea gravel; ferruginous ledge at 17 feet.
		Post-Catahoula Unit
34	17	Silt, very light-gray, kaolinitic, black manganese stain; more argillaceous in lower part.
50	16	Sand, pale-orange, fine- to medium-grained, subangular to rounded quartz, micaceous; some pea-size quartz.
59	9	Sand, very pale-orange, fine-grained, well-sorted, micaceous, kaolinitic; ledge at 69 feet.

		Catahoula Formation
70	11	Silt, very light-gray, kaolinitic, micaceous.
80	10	Silt, medium-gray, argillaceous, partially indurated.
114	34	Silt, greenish-gray, argillaceous, brittle, micaceous.
130	16	Sand, yellowish-gray, silty, micaceous; argillaceous streak.
142	12	Sand, grayish-orange, medium- to coarse-grained, subangular to rounded quartz.
154	12	Silt, yellowish-gray, arenaceous.
168	14	Sand, yellowish-gray, medium- to coarse-grained, subangular to rounded quartz, poorly sorted.
190	22	Silt, grayish-orange, argillaceous; some bentonitic clay particles.
204	14	Silt, yellowish-gray, argillaceous.
214	10	Sand, yellowish-gray, fine- to medium-grained, mostly subangular quartz, pyritic, micaceous.
232	18	Silt, yellowish-gray, argillaceous.
239	7	Siltstone, medium-gray, hard, brittle.
290	51	Silt, yellowish-gray, argillaceous, pyritic; sandy streak at 260 feet, coarse sand.

Note: Fresh material was greenish-gray from a depth of 80 to 290 feet.

82C-6

Location: NW/4, SW/4, NW/4, Sec. 15, T.1 N., R.4 E.

Elevation: 440 feet Date: June 2, 1975

Depth	Thickness	Description
		Citronelle Formation
9	9	Gravel, multicolored, quartz, and chert, up to one inch in diameter, arenaceous, ferruginous; grayish-pink clay at 8 feet.
20	11	Sand, grayish-orange, medium- to coarse-grained, subangular to well-rounded quartz, argillaceous, ferruginous; some small gravel.
44	24	Gravel, multicolored, quartz and chert, up to one and one-half inch diameter; argillaceous streaks.
58	14	Sand, grayish-orange, fine- to medium-grained, subangular to rounded quartz, argillaceous.
66	8	Sand, grayish-orange, medium-grained; some pea gravel.
88	22	Sand, yellowish-orange, fine- to medium-grained, subangular quartz, micaceous, ferruginous.
		Post-Catahoula Unit
120	32	Silt, medium-gray to yellowish-gray, argillaceous to arenaceous, ferruginous; very kaolinitic in part.
152	32	Sand, light-gray, medium- to coarse-grained, subangular to well-rounded quartz, micaceous.
160	8	Clay, medium dark-gray, silty, carbonaceous.
168	8	Sand, light-gray, medium- to very coarse-grained, subangular to well-rounded quartz, abundant black chert (crinoid stem imprint in black chert).
		Catahoula Formation
190	22	Silt, light-gray to reddish-brown, arenaceous, ferruginous.

82C-7

Location: SE/4, NE/4, SW/4, Sec. 16, T.1 N., R.4 E.

Elevation: 340 feet Date: June 4, 1975

Depth	Thickness	Description
		Post-Catahoula Unit
17	17	Silt, light-gray, kaolinitic; ferruginous moderate-red nodules.
29	12	Sand, light-gray, very-fine, kaolinitic.
40	11	Sand, grayish-orange to light-gray, medium-grained; pea gravel.
94	54	Sand, light-gray to grayish-orange, medium- to very-coarse-grained, subangular to well-rounded quartz (black inclusions in some quartz), poorly sorted; some black chert grains; ferruginous siltstone ledge at base.
		Catahoula Formation
153	59	Silt, yellowish-gray, argillaceous, arenaceous, brittle, some ferruginous staining.
176	23	Silt, yellowish-gray, kaolinitic; siderite spheres about 1 mm diameter.
206	30	Sand, yellowish-gray, fine-grained, argillaceous streaks, micaceous.
222	16	Clay, olive-gray, silty to arenaceous.

Note: Fresh material was greenish-gray from a depth of 94 feet to 222 feet.

82C-8

Location: NW/4, NW/4, SE/4, Sec. 16, T.1 N., R.4 E.

Elevation: 425 feet Date: June 5, 1975

Depth	Thickness	Description
		Citronelle Formation
22	22	Gravel, multicolored, quartz and chert, arenaceous (many well-rounded quartz grains); light-red clay streaks.
31	9	Sand, reddish-brown, fine- to medium-grained, ferruginous.
46	15	Silt, yellowish-orange, argillaceous.
		Post-Catahoula Unit
60	14	Silt, light-gray, kaolinitic, ferruginous nodules.
74	14	Sand, grayish-pink, medium- to coarse-grained; much well-rounded quartz.
79	5	Sand, light-gray, fine-grained, kaolinitic; ferruginous nodules.
90	11	Silt, light-gray, kaolinitic; ferruginous nodules.

82C-9

Location: NE/4, SE/4, SW/4, Sec. 28, T.2 N., R.3 E.

Elevation: 420 feet Date: June 10, 1975

Depth	Thickness	Description
		Terrace Deposit
9	9	Sand, yellowish-orange, medium- to coarse- grained, subangular to well-rounded quartz, poorly sorted; rare gravel.

		Post-Catahoula Unit
30	21	Silt, yellowish-gray, argillaceous, micaceous.
40	10	Silt, medium-gray, argillaceous, carbonaceous, micaceous.
		Catahoula Formation
73	33	Silt, light- to medium-gray, argillaceous, brittle; small amount of ferruginous stain.
84	11	Sand, light-gray, fine-grained, micaceous, indurated in part, white matrix.
92	8	Silt, yellowish-gray, argillaceous.
107	15	Sand, light-gray, fine-grained, micaceous, partially indurated.
116	9	Silt, yellowish-gray, argillaceous.
125	9	Sand, yellowish-gray, fine-grained, micaceous.
219	94	Silt, yellowish-gray, argillaceous, micaceous, some ferruginous stain, 2 foot sand streak at 150 feet.
223	4	Sand, yellowish-gray, fine-grained, micaceous.
259	36	Silt, yellowish-gray, argillaceous, micaceous.
287	28	Sand, yellowish-gray, fine-grained; many pyrite granules; argillaceous streaks.
310	23	Sand, yellowish-gray, medium-grained, subrounded quartz; numerous pyrite granules.
		Note: Fresh material was greenish-gray from 84 feet to 310 feet.

82C-10

Location: NW/4, NW/4, NE/4, Sec. 9, T.1 N., R.3 E.

Elevation: 470 feet Date: June 12, 1975

Depth	Thickness	Description
		Citronelle Formation
10	10	Gravel, multicolored, chert and quartz, arenaceous; chert with fossil imprints; quartz sand commonly well-rounded.
30	20	Sand, dark-yellowish-orange, medium- to coarse-grained, mostly well-rounded quartz, ferruginous; some pea gravel.
		Post-Catahoula Unit
48	18	Silt, pale-red-purple to grayish-orange, argillaceous, manganese cementation, ferruginous.
80	32	Silt, light-brown to light-gray, arenaceous, ferruginous, micaceous.
92	12	Silt, light-gray, arenaceous, micaceous.
122	30	Silt, medium-gray, micaceous, carbonaceous; ferruginous in lower part.
141	19	Sand, medium-gray to light-brown, fine-grained, argillaceous, ferruginous, carbonaceous.
162	21	Gravel, multicolored, mostly pea-size, arenaceous, ferruginous, well-rounded; ledge at base.
		Catahoula Formation
182	20	Silt, yellowish-gray, arenaceous, argillaceous; ferruginous staining in upper part.
205	23	Sand, yellowish-gray, fine-grained, micaceous, black manganese cemented particles; mostly white matrix.
240	35	Clay, yellowish-gray (greenish-gray when fresh), silty.

82C-11

Location: SE/4, SE/4, SE/4, Sec. 34, T.2 N., R.3 E.

Elevation: 400 feet Date: June 17, 1975

Depth	Thickness	Description
		Terrace Deposit
20	20	Sand, yellowish-orange, fine- to medium-grained, subangular quartz, ferruginous, micaceous.
		Post-Catahoula Unit
46	26	Sand, light-brown, medium-grained, micaceous, ferruginous; some coarse sand and weathered white chert.
		Catahoula Formation
60	14	Silt, multicolored, argillaceous, brittle, ferruginous in part.
76	16	Sand, yellowish-gray, fine-grained, argillaceous; pyrite granules.
128	52	Silt, yellowish-gray, argillaceous to arenaceous; pyrite granules.
160	32	Sand, yellowish-gray, fine-grained, argillaceous, micaceous.
170	10	Sand, light-gray, fine-grained, silty.
188	18	Silt, yellowish-gray, argillaceous, brittle, partially indurated; streaks of fine micaceous sand.
310	122	Sand, yellowish-gray, fine-grained, subangular quartz, argillaceous, pyrite granules.

82C-12

Location: NE/4, SE/4, NE/4, Sec. 4, T.1 N., R.3 E.

Elevation 415 feet Date: June 26, 1975

Depth	Thickness	Description
		Post-Catahoula Unit
10	10	Sand, dark-yellowish-orange, fine-grained, subangular to subrounded quartz, ferruginous.
32	22	Sand, grayish-orange, fine-grained, subangular to subrounded quartz; white clay.
76	44	Sand, very pale-orange, fine- to coarse-grained, mostly subangular quartz, some smoky quartz, kaolinitic; ferruginous particles.
94	18	Sand, light-brown, fine- to medium-grained, ferruginous, argillaceous.
		Catahoula Formation
103	9	Silt, light-brown, argillaceous, ferruginous.
110	7	Sand, very pale-orange, fine-grained, argillaceous, micaceous, some ferruginous material.
180	70	Silt, very pale-orange to yellowish-gray (greenish-gray when fresh) arenaceous, argillaceous.
200	20	Sand, yellowish-gray, (greenish-gray when fresh), fine-grained, argillaceous, micaceous.
351	151	Silt, yellowish-gray (greenish-gray when fresh) argillaceous, arenaceous, pyritic; smooth clay in lower 10 feet.
388	37	Sand, yellowish-gray, fine- to medium-grained, many pyrite crystal granules.

393	5	Clay, medium-gray, silty.
404	11	Sand, yellowish-gray, medium- to coarse-grained, mostly subangular quartz, argillaceous.
445	41	Clay, medium-gray, silty, carbonaceous.
540	95	Sand, medium-gray to yellowish-gray, fine-to medium-grained, black chert in sand; argillaceous streaks.
		Bucatunna Formation
553	13	Clay, dark-gray, silty, arenaceous, carbonaceous.
		Glendon Formation
554	1	Limestone, yellowish-gray, fossiliferous (Pecten sp. noted); very hard.

82C-13

Location: SE/4, NE/4, SW/4, Sec. 16, T.1 N., R.3 E.

Elevation: 400 feet Date: June 30, 1975

Depth	Thickness	Description
		Citronelle Formation
24	24	Sand, yellowish-orange, medium-grained, subangular quartz, well-sorted, ferruginous, micaceous.
		Post-Catahoula Unit
50	26	Silt, yellowish-gray, kaolinitic, ferruginous.
91	41	Sand, very pale-orange, coarse- to very coarse-grained, subangular to well-rounded quartz, poorly sorted, ferruginous stain on grains in upper part; abundant dark-gray and black chert; invertebrate fossil imprints in chert.
100	9	Silt, yellowish-orange, argillaceous, ferruginous.
		Catahoula Formation
120	20	Sand, pale-orange to light-brown, medium-grained, ferruginous.
177	57	Clay, medium-gray (greenish-gray when fresh), silty to arenaceous, micaceous, blocky.
187	10	Silt, light-gray (greenish-gray when fresh), argillaceous, micaceous.
205	18	Clay, light-gray, silty, blocky.
281	76	Silt, light-gray to medium-gray, argillaceous, ferruginous stain at 220 feet.

82C-14

Location: SW/4, NE/4, NW/4, Sec. 16, T.1 N., R.3 E.

Elevation: 390 feet Date: July 2, 1975

Depth	Thickness	Description
		Post-Catahoula Unit
8	8	Silt, reddish-brown, arenaceous, ferruginous.
20	12	Silt, light-gray, kaolinitic. Note: lost circulation

82C-15

Location: SE/4, SW/4, SE/4, Sec. 21, T.1 N., R.3 E.

Elevation: 345 feet — Date: July 2, 1975

Depth	Thickness	Description
		Post-Catahoula Unit
10	10	Clay, moderate-red, silty, ferruginous.
30	20	Sand, grayish-orange, fine- to coarse-grained, poorly sorted, subangular to subrounded quartz; dark iron stain on some grains.
66	36	Sand, pale-orange, medium- to coarse-grained, angular to well-rounded quartz.
72	6	Clay, moderate-red and light-gray, arenaceous.
98	26	Sand, grayish-orange, medium-grained, ferruginous, argillaceous streak; ledge at 98 feet.
114	16	Sand, light-brown, coarse-grained, well-rounded quartz; ferruginous ledge at 114 feet.
		Catahoula Formation
184	70	Clay, yellowish-gray (greenish gray before weathering), silty, brittle, micaceous, ferruginous in part (158'-162').
188	4	Clay, yellowish-gray to white, silty, kaolinitic.
200	12	Sand, yellowish-gray, (oxidized), fine, red and white clay particles.
230	30	Silt, yellowish-gray (greenish-gray when unweathered), argillaceous, micaceous.
244	14	Sand, yellowish-gray, fine- to medium-grained; ledge at base.
300	56	Silt, yellowish-gray, argillaceous, micaceous, black carbonaceous material; sandy in lower part.

82C-16

Location: SW/4, NW/4, NW/4, Sec. 11, T.1 N., R.3 E.

Elevation: 385 feet — Date: July 3, 1975

Depth	Thickness	Description
		Terrace Deposit
10	10	Sand, yellowish-orange, fine-grained, ferruginous, argillaceous.
		Post-Catahoula Unit
19	9	Sand, pale-yellowish-orange, fine-grained, subangular quartz, ferruginous.
40	21	Sand, very pale-orange, coarse-grained, subangular to subrounded quartz, poorly sorted, micaceous.
59	19	Sand, reddish-orange, very coarse-grained, subrounded quartz, poorly sorted, ferruginous; some chert pea gravel.
75	16	Silt, multicolored, argillaceous, ferruginous; hard siltstone ledge at 75 feet.
		Catahoula Formation
130	55	Silt, light-gray, (greenish-gray when fresh), argillaceous, micaceous; brittle opaline masses in silt at 90-100 foot interval.

82C-17

Location: SE/4, SE/4, NW/4, Sec. 26, T.1 N., R.3 E.

Elevation: 265 feet — Date: July 7, 1975

Depth	Thickness	Description
		Alluvium
10	10	Sand, grayish-orange, medium-grained, subangular to well-rounded quartz, silty.
22	12	Sand, pale-orange, very-coarse, mostly well-rounded quartz, poorly sorted; gravel at base.
		Catahoula Formation
30	8	Sand, pale-orange, medium- to coarse-grained, well-rounded quartz, poorly sorted; heavy minerals.
40	10	Silt, yellowish-gray, argillaceous.
159	119	Clay, yellowish-gray, blocky, silty, micaceous; arenaceous streaks.
179	20	Sand, yellowish-gray, fine-grained, subangular quartz, micaceous; scattered dark grains.
220	41	Silt, yellowish-gray, argillaceous.
223	3	Sand, yellowish-gray, fine-grained, rare glauconite, calcareous particles.
230	7	Silt, yellowish-gray, argillaceous.
		Note: Fresh material was greenish-gray from a depth of 30 feet to 230 feet.

82C-18

Location: SW/4, SW/4, SW/4, Sec. 36, T.1 N., R.3 E.

Elevation: 335 feet — Date: July 9, 1975

Depth	Thickness	Description
		Post-Catahoula Unit
10	10	Silt, grayish-orange, arenaceous, manganiferous particles, white kaolinitic particles, thin ferruginous ledge at 4 feet.
64	54	Silt, dark yellowish-orange to pale-pink, arenaceous, ferruginous; weathered kaolinitic clay; manganiferous particles.
90	26	Silt, grayish-orange, argillaceous, contains sand-size spherical ferruginous particles.
100	10	Sand, very pale-orange, fine-grained, subangular to subrounded quartz; ferruginous claystone ledge at bottom.
		Catahoula Formation
131	31	Clay, medium-dark-gray to olive-gray, silty, carbonaceous, micaceous, pyritic, laminated.
134	3	Sand, medium-gray, fine-grained, one pea size black chert pebble.
199	65	Clay, yellowish-gray (greenish-gray when unweathered), silty, brittle.
204	5	Sand, yellowish-gray, fine-grained, subangular quartz.
250	46	Silt, yellowish-gray (greenish-gray when unweathered), arenaceous; some smooth clay.

82C-19

Location: NE/4, SW/4, SW/4, Sec. 30, T.1 N., R.4 E.

Elevation: 430 feet Date: July 10, 1975

Depth	Thickness	Description
		Citronelle Formation
14	14	Sand, dark-yellowish orange, coarse-grained, rounded quartz, poorly sorted, ferruginous; some pea gravel.
54	40	Gravel, multicolored, up to 1½ inch diameter, arenaceous, ferruginous; white kaolinitic clay; ferruginous ledge at 54 feet.
		Post-Catahoula Unit
70	16	Silt, reddish-brown, argillaceous, ferruginous.
84	14	Silt, yellowish-gray, argillaceous, micaceous; reddish-brown ferruginous nodules.
104	20	Sand, multicolored, coarse-grained, rounded quartz, poorly sorted, argillaceous.
110	6	Silt, yellowish-gray, kaolinitic; ledge at base.
120	10	Sand, reddish-brown, medium-grained, rounded quartz; manganiferous granules.
127	7	Sand, yellowish-gray, coarse-grained, rounded quartz, poorly-sorted, kaolinitic.
135	8	Sand, yellowish-gray, fine-grained, argillaceous.
185	50	Sand, pale-orange, very coarse-grained, rounded to well-rounded quartz, poorly sorted, kaolinitic; ferruginous ledge at base.
		Catahoula Formation
192	7	Silt, dark-gray, argillaceous.
200	8	Sand, yellowish-gray, medium-grained, silty.
210	10	Silt, medium-gray, argillaceous.

82C-20

Location: NE/4, SE/4, NW/4, Sec. 31, T.2 N., R.4 E.

Elevation: 380 feet Date: July 14, 1975

Depth	Thickness	Description
		Post-Catahoula Unit
10	10	Sand, yellowish-orange, medium- to coarse-grained, mostly subangular quartz, poorly sorted, ferruginous.
22	12	Sand, pale yellowish-orange, coarse-grained, subangular to well-rounded quartz, poorly sorted.
		Catahoula Formation
36	14	Silt, light-gray to light-brown, arenaceous, ferruginous, brittle.
58	22	Silt, light-gray to greenish-gray, finely arenaceous.
69	11	Sand, light-gray, medium-grained, subangular quartz, micaceous.
80	11	Clay, yellowish-gray, silty, blocky.
89	9	Sand, yellowish-gray, very fine-grained, argillaceous.
100	11	Silt, yellowish-gray, argillaceous, brittle.

82C-21

Location: SW/4, NW/4, SW/4, Sec. 13, T.1 N., R.3 E.

Elevation: 300 feet Date: July 14, 1975

Depth	Thickness	Description
		Terrace Deposit
8	8	Sand, yellowish-orange, medium-grained, argillaceous, ferruginous.
21	13	Sand, very pale-orange, medium-grained, subangular to rounded quartz; pea gravel at base.
		Catahoula Formation
28	7	Silt, light-brown, argillaceous, micaceous, brittle.
80	52	Silt, light-gray, argillaceous, micaceous, brittle.
84	4	Sand, yellowish-gray, fine-grained, subangular quartz, micaceous, silty; scattered dark grains.
100	16	Silt, yellowish-gray, argillaceous, micaceous.

82C-22

Location: SE/4, NW/4, SE/4, Sec. 31, T.1 N., R.4 E.

Elevation: 445 feet Date: July 15, 1975

Depth	Thickness	Description
		Citronelle Formation
10	10	Gravel, multicolored, mostly pea-size quartz and chert; abundant well-rounded quartz sand.
22	12	Gravel, multicolored, mostly pea-size quartz and chert; fossil imprints.
30	8	Gravel, reddish-brown, pea-size, ferruginous stain.
		Note: Lost circulation.

82C-23

Location: NE/4, NW/4, SE/4, Sec. 31, T.1 N., R.4 E.

Elevation: 455 feet Date: July 16, 1975

Depth	Thickness	Description
		Citronelle Formation
50	50	Gravel, multicolored, up to 2 inches in diameter; very clean; many fossil imprints in chert.
60	10	Sand, moderate-orange-pink, coarse-grained, graveliferous, argillaceous.
85	25	Sand, pale-orange, medium-grained, mostly well-rounded quartz; some gravel, kaolinitic clay.
100	15	Sand, reddish-brown, argillaceous, ferruginous.
		Post-Catahoula Unit
110	10	Silt, pale-orange to light-brown, argillaceous, ferruginous.
122	12	Silt, very pale-orange, arenaceous, kaolinitic.
142	20	Sand, light-gray to light-brown, medium-grained, argillaceous (kaolinitic matrix), ferruginous.

158	16	Sand, yellowish-orange, medium- to coarse-grained, subangular to well-rounded quartz, ferruginous; argillaceous streaks.
180	22	Sand, pale-orange, medium- to coarse-grained, subangular to well-rounded quartz; kaolinitic matrix.
216	36	Sand, very pale-orange, medium- to coarse-grained, subangular to well-rounded quartz; black chert, pea gravel in lower part.
229	13	Sand, grayish-orange, silty, argillaceous, ferruginous; siltstone ledge at 228 feet.
		Catahoula Formation
238	9	Silt, dark-gray, argillaceous to arenaceous; strong fetid odor.
250	12	Silt, greenish-gray, argillaceous.

82C-24

Location: SE/4, SW/4, SE/4, Sec. 25, T.1 N., R.3 E.

Elevation: 370 feet Date: July 17, 1975

Depth	Thickness	Description
		Post-Catahoula Unit
10	10	Silt, light-gray, argillaceous, ferruginous particles.
20	10	Silt, light-gray to reddish-brown, argillaceous, ferruginous.
36	16	Sand, light-gray to reddish-brown, very fine-grained to medium-grained, mostly subangular quartz, ferruginous, micaceous; some well-rounded quartz.
64	28	Sand, grayish-orange to very pale-orange, fine- to medium-grained, argillaceous (kaolinitic), silty.
110	46	Sand, very pale-orange, medium- to coarse- grained, subangular quartz, some black chert and smoky quartz, micaceous.
128	18	Silt, orange-pink, argillaceous, ferruginous; indurated ledge at 118 feet.
		Catahoula Formation
140	12	Silt, grayish-orange, argillaceous, some ferruginous staining.
205	65	Clay, grayish-orange, silty, blocky.
222	17	Sand, grayish-orange, fine-grained, silty, argillaceous (kaolinitic matrix).
250	28	Silt, very pale-orange, argillaceous.

82C-25

Location: SE/4, SE/4, SW/4, Sec. 8, T.1 N., R.4 E.

Elevation: 275 feet Date: July 21, 1975

Depth	Thickness	Description
		Alluvium
9	9	Sand, yellowish-brown, argillaceous, carbonaceous, ferruginous.
21	12	Sand, very light-gray, coarse-grained, subangular to well-rounded quartz, scattered dark grains; gravel at base.

		Catahoula Formation
52	31	Clay, yellowish-gray, silty, brittle.
62	10	Sand, yellowish-gray, fine-grained, subangular quartz, micaceous.
83	21	Silt, yellowish-gray, argillaceous, micaceous; 2 inch ledge at 78 feet.
90	7	Sand, yellowish-gray, fine-grained, subangular quartz, micaceous.
99	9	Silt, yellowish-gray, argillaceous.
112	13	Sand, light-gray, very fine-grained, argillaceous.
148	36	Silt, yellowish-gray, argillaceous.
151	3	Sandstone, yellowish-gray, fine-grained.
203	52	Silt, yellowish-gray, argillaceous, micaceous.
210	7	Sand, yellowish-gray, fine-grained, silty, micaceous.
217	7	Silt, yellowish-gray, argillaceous, micaceous.
229	12	Sand, yellowish-gray, fine-grained, subangular quartz, micaceous.
248	19	Silt, yellowish-gray, argillaceous, micaceous, pyrite granules.
251	3+	Sandstone, light-gray, fine-grained, silty.

Note: Fresh material was greenish-gray from a depth of 21 feet to 251 feet.

82C-26

Location: SE/4, SE/4, NE/4, Sec. 4, T.1 N., R.4 E.

Elevation: 355 feet Date: July 24, 1975

Depth	Thickness	Description
		Post-Catahoula Unit
14	14	Sand, light-brown, silty, some chert gravel, ferruginous.
25	11	Sand, reddish-orange, medium-grained, mostly subangular quartz, micaceous, ferruginous.
		Catahoula Formation
37	12	Clay, dark-gray, smooth-textured, blocky.
50	13	Sand, dark-gray to yellowish-gray, fine-grained, subangular, micaceous.
69	19	Sand, grayish-orange, fine-grained, silty, ferruginous, argillaceous streaks; several hard ledges.
105	36	Silt, yellowish-gray (greenish-gray when fresh), silty; thin streaks of tough blocky clay.
130	25	Sand, yellowish-gray (greenish-gray when fresh), fine-grained, subangular quartz, micaceous, well-sorted.
156	26	Sand, yellowish-gray, medium-grained, subangular quartz, argillaceous streaks, micaceous.
180	24	Silt, yellowish-gray, kaolinitic, arenaceous.

82C-27

Location: SE/4, SW/4, SE/4, Sec. 22, T.1 N., R.4 E.

Elevation: 480 feet Date: August 5, 1975

Depth	Thickness	Description
		Citronelle Formation
20	20	Sand, light-brown, medium-grained, subangular to well-rounded quartz, ferruginous.

40	20	Sand, light-brown, very coarse-grained, well-rounded quartz, ferruginous; some badly weathered chert gravel.
45	5	Sand, light-brown, coarse-grained, dark ferruginous staining, well-rounded.
68	23	Gravel, multicolored, mostly pea size; quartz with some weathered chert; pink clay.
90	22	Sand, reddish-orange, very coarse-grained, mostly well-rounded quartz, poorly sorted, ferruginous; some pea gravel.
125	35	Gravel, multicolored, up to 3/4 inch diameter, weathered chert; coarse-sand, kaolinitic clay.
		Post-Catahoula Unit
164	39	Silt, multicolored, argillaceous, arenaceous.
204	40	Sand, light-gray, medium-grained, kaolinitic.
		Catahoula Formation
240	36	Silt, light-gray, argillaceous, arenaceous, ferruginous nodules, (poor samples).

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WATER RESOURCES SUMMARY

John C. Marble

INTRODUCTION

An evaluation of surface- and ground-water resources is a great benefit to all people of the study area. Information has been gathered selectively for this report and an earnest attempt is made to present it in such a manner that it can be a useful tool for planning and development in the area.

The Mendenhall West Quadrangle has an abundance of clean surface and ground water. The Strong River and smaller streams could furnish water supplies requiring very little treatment. In most places, aquifers underlying the study area have sand developments suitable for construction of water wells.

Cooperation of well drillers, well owners, and Federal and State agencies and officials was extremely helpful in the preparation of this report. Information contributed by these individuals and agencies enhanced the thoroughness of this report and aided in an orderly presentation and tabulation of data.

SURFACE WATER

Large amounts of surface water of good quality are available for use in the study area. Streamflow variation with respect to time and place, however, dictates the use of storage facilities if large demands are to be met.

The low-flow characteristics of streams are the controlling factors in determining the usefulness of streams as sources of supply. The maximum water supply that could be obtained from a stream is equal, in theory, to its average flow. It is impossible to achieve this due to evapotranspiration, evaporation, seepage into the ground, and legal restrictions. It is still possible, however, to obtain supplies greater than the natural minimum flow by the use of storage facilities and reservoirs.

Lowland flooding is a seasonal phenomenon, generally occurring at least once a year. Major floods may inundate flood plains to depths of 3 to 7 feet and commonly damage roads and farm lands in the affected area. The maximum stage of record (since 1928) on the Strong River at D'Lo occurred January 7, 1950, and equaled the 1900 flood; both floods were about 7 feet above the general level of the flood plain (Newcome, Tharpe, and Oakley, 1972, p. 16).

The overall quality of the surface water is excellent. Chemical analyses of water from selected stream sites are shown in Table 2. The water is characterized by low iron, chloride, pH, and mineralization.

Table 2 – Chemical analyses of water from selected streams in the Mendenhall West Quadrangle, Simpson County, Mississippi.

Sample Number	Date of Collection	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Calcium Carbonate ($CaCO_3$)	Sodium (Na)	Chloride (Cl)	Sodium Chloride (NaCl)	Magnesium (Mg)	Potassium (K)	Fluoride (F)	Sulfate (SO_4)	Nitrate (NO_3)	Bicarbonate (HCO_3)	Hardness as ($CaCO_3$) Calcium Magnesium	Hardness as ($CaCO_3$) Non-Carbonate	Total Hardness	Dissolved Solids	Specific Conductance Micromhos at 25 C°	pH	Alkalinity	Temperature C°	Color	Remarks
							Dissolved constituents and hardness given in milligrams per liter																	
C1	5-6-76	16.50	-	-	17.60	-	12.50	20.60	-	-	-	-	-	-	-	-	-	-	62	6.2	-	18.5	-	
D1	5-4-76	17.50	-	-	21.15	-	15.0	24.75	-	-	-	-	-	-	-	-	-	-	80	6.4	-	16.0	-	
D2	5-4-76	23.00	-	-	14.10	-	10.0	16.50	-	-	-	-	-	-	-	-	-	-	39	6.4	-	15.0	-	
D3	5-4-76	13.00	-	-	14.10	-	10.0	16.50	-	-	-	-	-	-	-	-	-	-	40	6.5	-	16.0	-	
*D4	12-23-65	9.80	.02	7.4	-	6.4	4.9	-	0.9	2.2	0.1	6.6	0.0	29	22	0.0	22	87	95	6.0	-	-	20	
*do	1-25-66	7.70	.09	5.5	-	4.6	6.9	-	1.0	1.5	0.1	10.0	0.3	11	18	9.0	27	58	67	6.2	-	-	30	
*do	3-11-66	12.00	.18	5.9	-	6.9	9.1	-	0.8	1.1	0.0	8.0	0.3	19	18	2.0	20	64	76	6.3	-	-	40	
*do	5-20-66	6.50	.03	4.0	-	3.4	1.7	-	0.5	2.0	0.1	6.0	0.4	13	12	1.0	13	35	41	5.9	-	-	20	
*do	7-1-66	10.00	.00	6.3	-	7.8	12.0	-	1.3	1.1	0.0	4.0	0.2	21	21	4.0	25	63	88	6.0	-	-	5	
*do	8-29-66	10.00	.00	5.0	-	8.8	14.0	-	1.3	1.8	0.0	4.8	0.1	21	18	1.0	19	64	89	6.0	-	-	5	
*do	9-23-66	8.40	.03	3.3	-	7.6	7.8	-	1.0	3.0	0.0	6.4	0.2	15	12	0.0	12	65	80	5.5	-	-	15	
*do	4-9-70	11.00	.21	7.2	-	8.0	8.8	-	1.0	1.7	0.1	8.8	0.6	22	22	4.0	26	71	85	6.6	-	-	20	
*do	7-28-71	9.90	.11	3.7	-	5.0	5.8	-	0.2	1.0	0.1	1.2	1.2	12	10	0.0	10	64	52	5.9	-	-	50	
do	5-4-76	16.00	-	-	14.10	-	10.0	16.50	-	-	-	-	-	-	-	-	-	-	67	6.4	-	16.5	-	
D5	5-4-76	20.00	-	-	21.15	-	15.0	24.75	-	-	-	-	-	-	-	-	-	-	65	6.3	-	15.5	-	
D6	5-4-76	21.00	-	-	21.15	-	15.0	24.75	-	-	-	-	-	-	-	-	-	-	75	6.3	-	16.0	-	
J1	5-4-76	13.00	-	-	18.33	-	5.0	21.45	-	-	-	-	-	-	-	-	-	-	40	6.7	-	15.5	-	
J2	5-4-76	15.00	-	-	21.15	-	10.0	24.75	-	-	-	-	-	-	-	-	-	-	41	6.3	-	17.0	-	
J3	5-4-76	16.50	-	-	17.60	-	12.5	20.60	-	-	-	-	-	-	-	-	-	-	65	6.3	-	18.5	-	
J4	5-4-76	12.50	-	-	14.10	-	10.0	16.50	-	-	-	-	-	-	-	-	-	-	29	6.3	-	18.5	-	
J5	5-4-76	12.00	-	-	42.30	-	30.0	49.50	-	-	-	-	-	-	-	-	-	-	120	6.3	-	23.0	-	
J6	5-4-76	14.00	-	-	14.10	-	10.0	16.50	-	-	-	-	-	-	-	-	-	-	67	6.3	-	16.0	-	
J7	5-4-76	13.00	-	-	14.10	-	10.0	16.50	-	-	-	-	-	-	-	-	-	-	25	6.3	-	17.0	-	
J8	5-4-76	13.00	-	-	14.10	-	10.0	16.50	-	-	-	-	-	-	-	-	-	-	26	6.3	-	17.0	-	
J9	5-4-76	14.00	-	-	7.05	-	5.0	8.25	-	-	-	-	-	-	-	-	-	-	42	5.9	-	19.5	-	
J10	5-4-76	13.50	-	-	21.15	-	15.0	24.75	-	-	-	-	-	-	-	-	-	-	24	6.3	-	16.0	-	
J11	5-4-76	14.00	-	-	14.10	-	10.0	16.50	-	-	-	-	-	-	-	-	-	-	22	6.4	-	17.0	-	
H1	5-6-76	13.50	-	-	7.05	-	5.0	8.25	-	-	-	-	-	-	-	-	-	-	31	6.3	-	20.0	-	
H2	5-6-76	14.50	-	-	14.10	-	10.0	16.50	-	-	-	-	-	-	-	-	-	-	54	6.4	-	20.0	-	
H3	5-6-76	15.50	-	-	21.15	-	15.0	24.75	-	-	-	-	-	-	-	-	-	-	58	6.4	-	20.5	-	
H4	5-6-76	15.00	-	-	14.10	-	10.0	16.50	-	-	-	-	-	-	-	-	-	-	36	5.7	-	21.5	-	
H5	5-6-76	16.00	-	-	21.15	-	15.0	24.75	-	-	-	-	-	-	-	-	-	-	60	6.2	-	20.0	-	

*U.S. Geological Survey Analyses   All others are Mississippi Geological Survey Analyses

An individual or industry planning to utilize surface water in an area should collect water samples for chemical analysis during various stages of streamflow. These analyses will give ranges of chemical constituents in the water and plans can be made to cope with the changes of chemical quality. Floods and other unusual phenomena will temporarily alter water chemistry, but should not present major problems with water quality.

Pollution is evidenced in many streams in Mississippi. Streams in the Mendenhall West Quadrangle, however, are virtually pollution free. It is indeed fortunate that this situation exists, and people living in the study area should take steps to prevent future pollution of the streams.

GROUND WATER

Ground-water supplies for the Mendenhall West Quadrangle are adequate for present use. Proper planning and development should alleviate many problems often associated with the development of these and future supplies.

The Kosciusko Formation of the Claiborne Group is the deepest aquifer from which fresh ground water is available. The base of the Kosciusko is approximately 1600 feet below mean sea level in the northern part of the study area, and approximately 1850 feet below mean sea level in the southern part. Aquifers in the Kosciusko Formation vary in thickness from a few feet to 145 feet in the study area. Sand thicknesses average approximately 75 feet. Thinner sand developments are characteristically lenticular and correlation in the subsurface is a problem.

Information available indicates wells could be completed in the Kosciusko aquifer with yields approaching 800-1000 gpm (gallons per minute). Deep static water levels (approximately 200 feet above mean sea level) are to be expected.

No wells are completed in the Kosciusko Formation in the study area; consequently, no chemical analyses are available. Chemical quality of water from the Kosciusko Formation, however, should be good. The water is expected to be colored (probably in the range of 100-150 units), which may discourage utilization of the aquifer.

The Cockfield Formation of the Claiborne Group could furnish fresh water throughout the study area. Depth of the base of the Cockfield Formation varies from approximately 950 feet below mean sea level near D'Lo to 1144 feet below mean sea level near Pinola.

The Cockfield Formation is characteristically thinner than the underlying Kosciusko, averaging 300 feet in thickness. Sand developments vary in thickness from 10 feet to 35 feet and are commonly lenticular in nature.

In localities where thick sands are developed, construction of wells capable of producing 200-400 gpm may be possible. Static water levels should be approximately 200 feet above mean sea level.

Chemical and physical properties of water from the Cockfield Formation are expected to be about the same as water from the Kosciusko Formation.

The Forest Hill Formation contains fresh water, but due to the presence of shallower Miocene sands, is not used in the study area. Depth of the base of the Forest Hill ranges from approximately 250 feet below mean sea level near D'Lo to 394 feet below mean sea level near Pinola. The Forest Hill Formation averages 150 feet in thickness in the study area.

One well completed in the Forest Hill in nearby Georgetown, Mississippi, yields water that is more mineralized than that of the underlying Kosciusko and Cockfield aquifers. Color is a problem in Georgetown, with values approaching 200 units. The color of water from the Forest Hill in the study area is expected to be approximately 75-100 units.

The sands of Miocene age are without a doubt the most important of the study area. Sand thicknesses are from a few feet to 100 feet. Sand thicknesses average approximately 45 to 50 feet. Wells producing 100-200 gpm are common in the Mendenhall West Quadrangle and surrounding area. Where sand developments are thick, larger yields may be possible.

The base of the Miocene sediments ranges from approximately 10 feet above mean sea level in the northern part of the Mendenhall West Quadrangle to approximately 200 feet below mean sea level in the southern part.

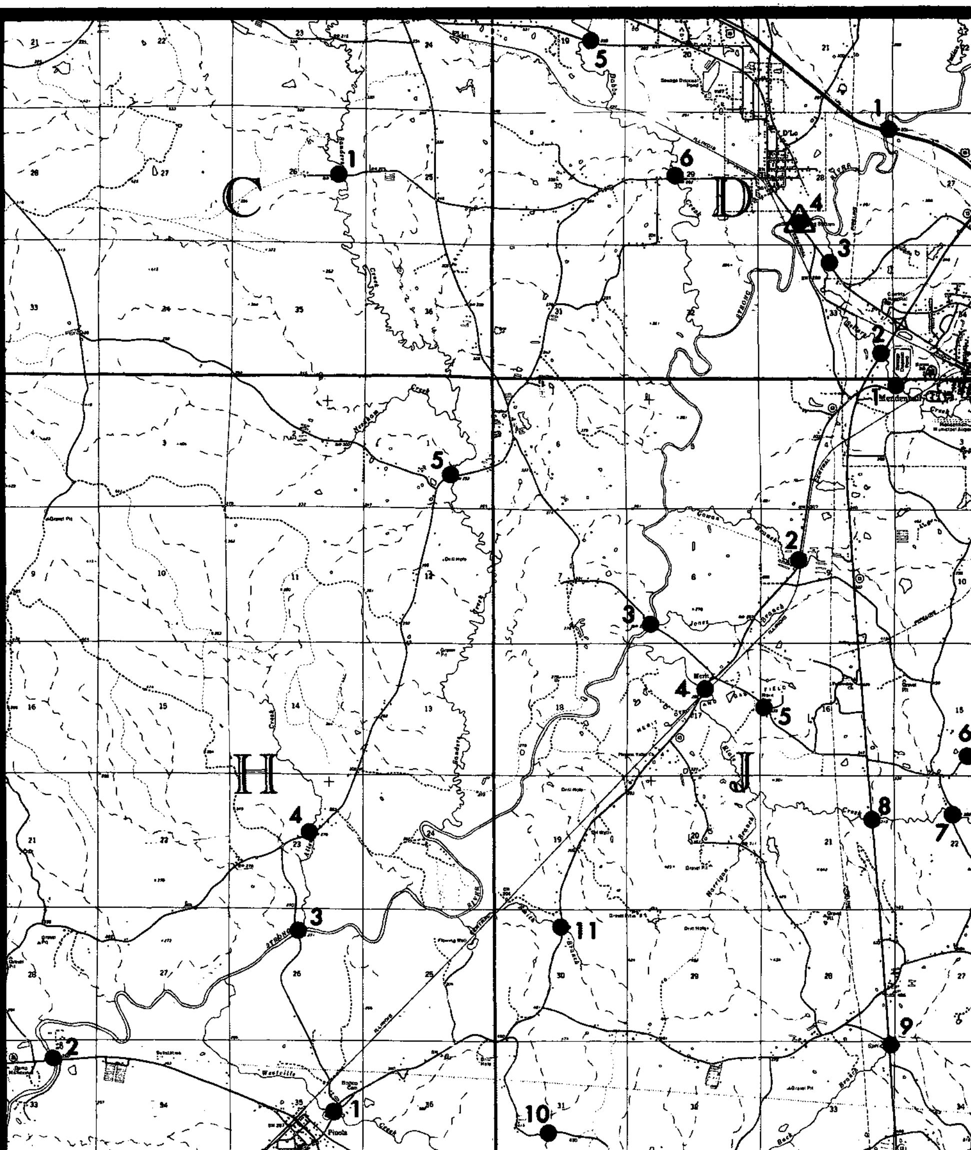
Water levels in the Miocene sands should be approximately 200-300 feet above mean sea level in the study area.

Water from the Miocene sands is usually of excellent quality. Low pH values and high iron content are sometimes a problem. Treatment of the water by aeration may remedy both of these problems. The use of air, where feasible, to raise the water in small wells may also help in the removal of iron and the raising of pH values.

The "Citronelle" Formation could be utilized for water supply in the Mendenhall West Quadrangle. Typical yields of wells completed in the "Citronelle" in adjoining areas range from 100-500 gpm.

Water table conditions and imperfectly confined aquifers can be expected in this unit. Static water levels should be in the range of 350-500 feet above mean sea level.

Water quality is generally good in the "Citronelle". Low pH and high iron concentrations are to be expected.



SURFACE-WATER DATA POINTS OF THE MENDENHALL WEST QUADRANGLE, SIMPSON COUNTY, MISSISSIPPI.

EXPLANATION

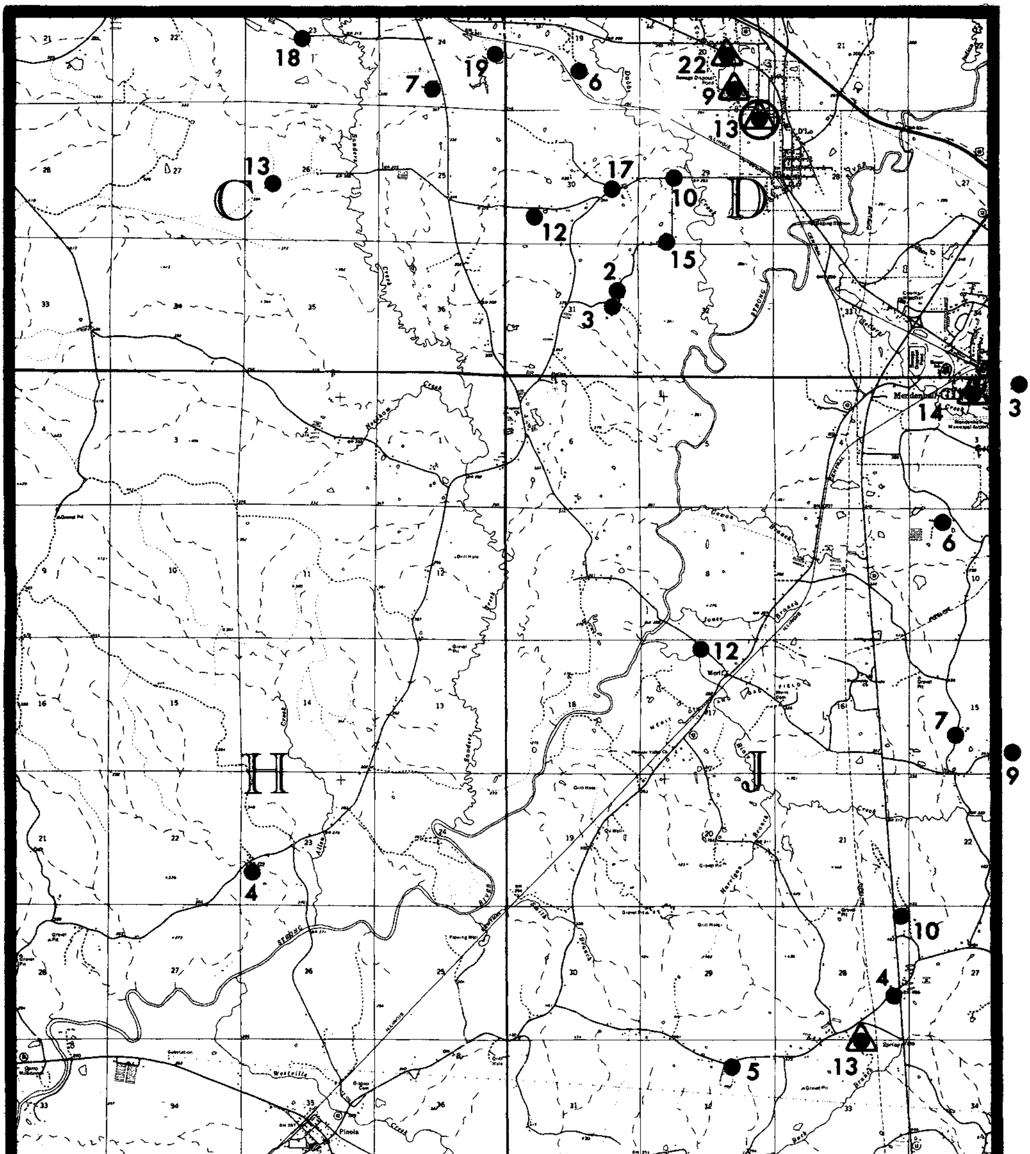
● Sample Location

▲ Sample Location and Gaging Station

SCALE

0 1 2 MILES

Figure 5



GROUND-WATER DATA POINTS OF THE MENDENHALL WEST QUADRANGLE, SIMPSON COUNTY, MISSISSIPPI.

EXPLANATION

● [1] Well Location and Number △ Chemical Analysis ○ Pumping Test

SCALE

0 1 2 MILES

Figure 6

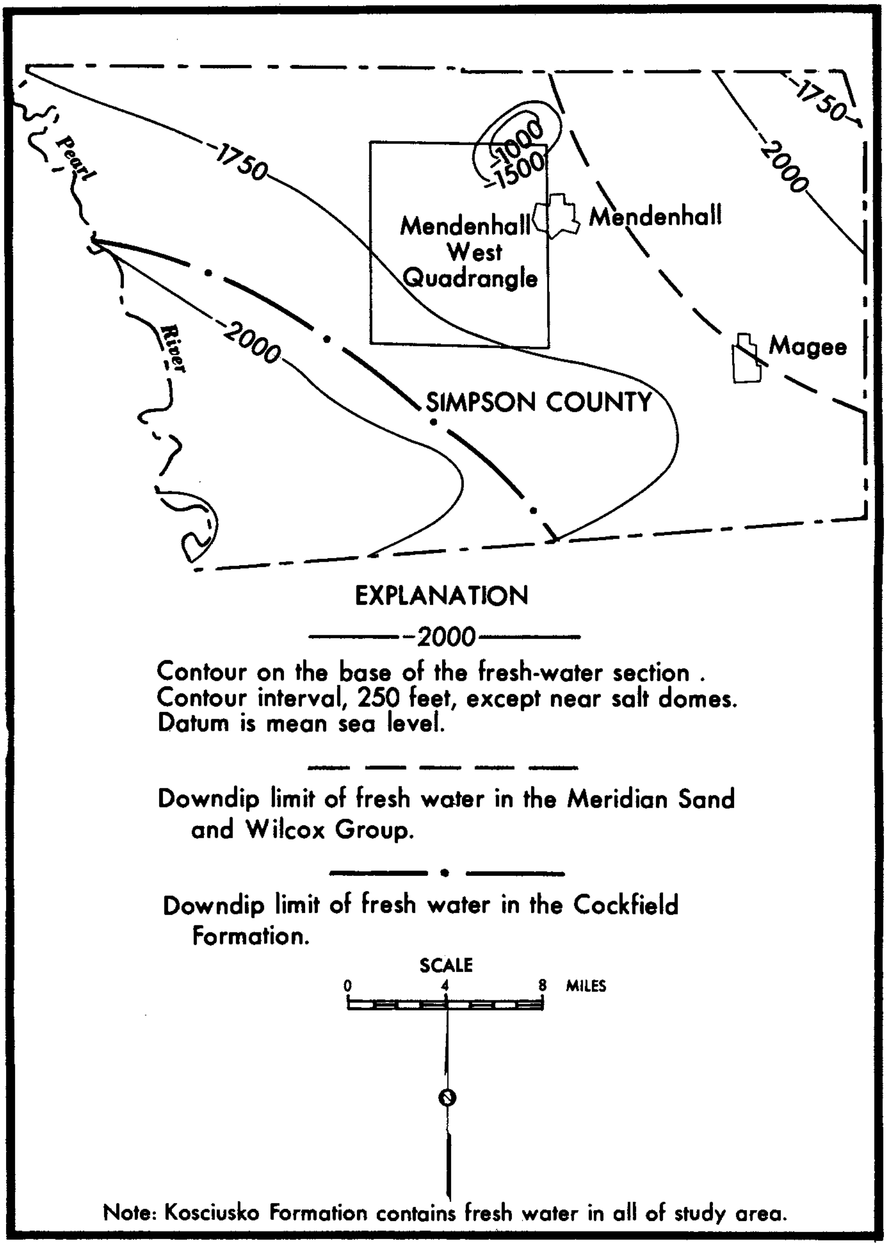


Figure 7–Contours on the base of the fresh-water section in the Mendenhall West Quadrangle and Simpson County, Miss. (after Newcome, et al., 1972.)

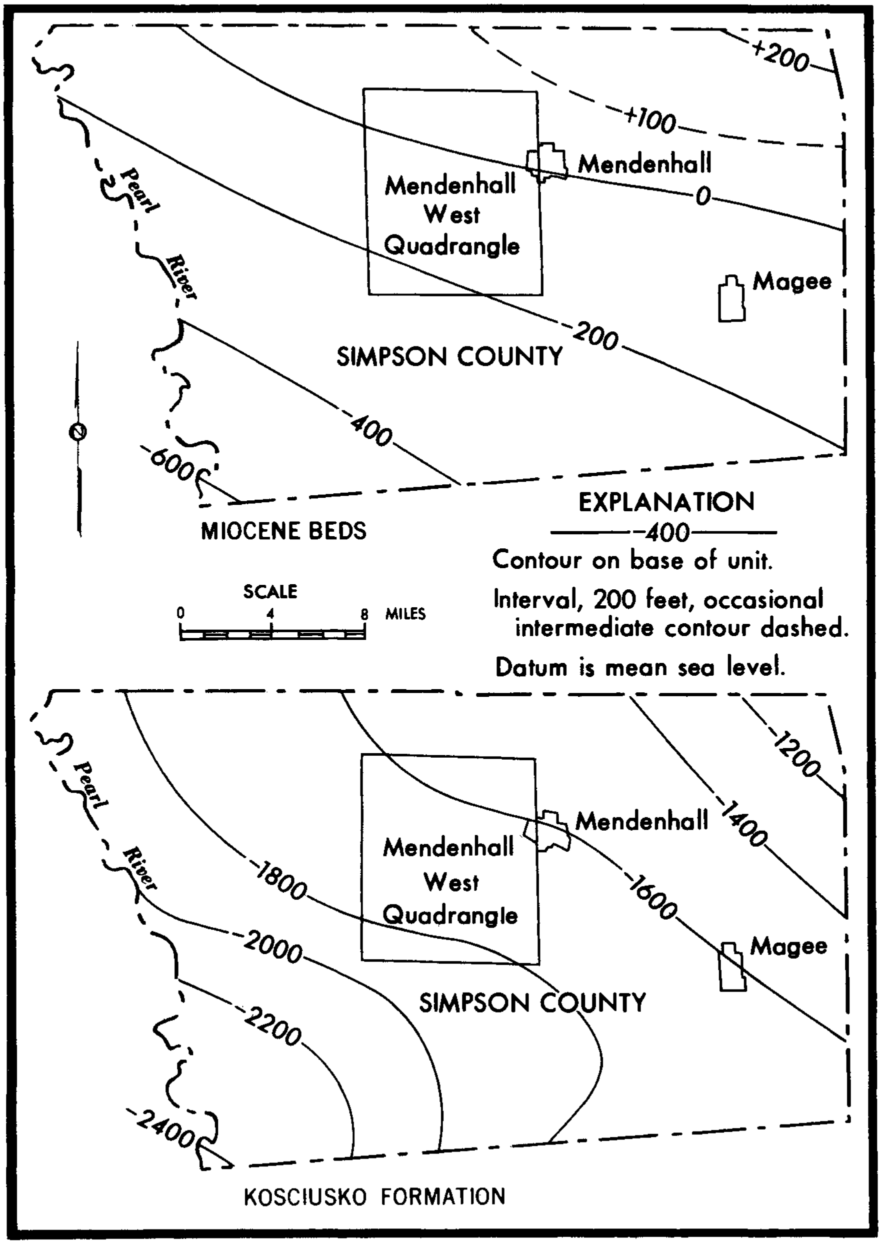


Figure 8—Contours on the base of two major aquifer systems in the Mendenhall West Quadrangle and Simpson County, Miss. (after Newcome, et al., 1972.)

Table 3 – Records of selected wells in the Mendenhall West Quadrangle, Simpson County, Mississippi

Method of Lift: A, Air; C, Cylinder; F, Natural flow; J, Jet; N, None; P, Pitcher; T, Turbine; S, Submersible; B, Bucket.

Well No: Numbers correspond to those on well location maps, chemical–analysis tables, and pumping tests.

Water Level: M, measured; R, reported; O, observed;

Use of Well: D, Domestic; I, Industrial; IR, Irrigation; N, None; O, Observation; P, Public Supply; S, Stock; T, Test; A, Abandoned; M, Municipal.

Well No.	Owner	Year Drilled	Altitude of land surface datum (feet)	Depth (feet)		Casing diameter (inches)	Water level		Method of lift	Water bearing unit	Use	Yield		Remarks C, Chemical Analysis E, Electric Log (TD) P, Pumping Test
				Well	Top of screen		Above (+) or below LSD (feet)	Date of measurement				Gallons per min.	Date	
C7	Louis Hayes	1960	370	210	open end	4	84	1968	J	M	D	20	1968	E
C13	Billy Warren	1969	326	245	230	2	50	1969	J	M	D	40	1969	E
C18	Carlton Mooney	1971	337	264	254	2	68	1971	J	M	D	10	1971	E
C19	Fabe Jones	1972	325	210	200	2	60	1972	J	M	D	6	1972	E
D2	James Jones	1967	383	340	330	2	135	1967	J	M	D	–	–	E
D3	Woodrow Skiffer	1967	392	350	340	2	135	1967	J	M	D	4	1967	E
D6	J.C. Lancaster	1967	323	232	open end	2	80	1967	J	M	D	5	1967	E
D9	Town of D'Lo	1965	320	262	222	6	59	1967	T	M	P	–	–	E, C
D10	Clyde Hamilton	1968	300	126	open end	–	35	1968	–	M	D	–	–	
D12	Evelyn Works	1969	362	290	280	2	96	1969	A	M	D	30	1969	E
D13	Town of D'Lo	1969	310	256	209	12¾	47.17	1969	T	M	P	150	1969	E, C, P
D15	Rosie Barnes	1970	330	180	170	2	60	1970	J	M	D	6	1970	E
D17	Effie Tiller	1970	350	160	open end	2	90	1970	–	M	D	–	–	E, Well not completed
D22	Town of D'Lo	1973	335	259	199	12	83	1973	T	M	D	120	1973	E
H4	Robert J. Smith	1971	282	380	370	2	14	1971	J	M	D	–	–	E
J3	Town of Mendenhall	1967	383	341	269	10	95	1967	–	M	M	342	1967	E
J4	G.R. Sherman	1966	473	397	–	4	–	–	A	M	D	–	–	E
J5	A A Chicken Farm	1967	473	246	236	4	80	1967	S	M?	D	15	1967	E
J6	T.H. Morgan	1967	438	440	430	4	60	1967	S	M	D	10	1967	E
J7	T.D. Norman	1967	417	148	143	–	90	1967	J	M?	D	–	–	E, unused
J9	George Grubbs	1968	343	172	166	2	105	1968	J	M?	D	6	1968	E
J10	Joe P. Buckley	1968	430	414	404	2	168	1968	A	M	D	10	1968	E
J12	Don Henderson	1970	280	235	225	2	60	1968	J	M	D	20	1970	E
J13	Boggan Ridge Water Ass'n	1972	460	629	579	16	182	1972	T	M	P	400	1972	E, C
J14	Town of Mendenhall	1972	305	336	268	10¾	47	1972	T	M	M	400	1972	E, C

Table 4 –Chemical analyses of water from selected wells in the Mendenhall West Quadrangle, Simpson County, Mississippi

Well No.	Depth (ft)	Water Bearing Unit	Date Analyzed	Silica (SiO_2)	Iron (Fe) Lab Value	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total Dissolved Solids	Hardness as $CaCO_3$	Specific Conductance (micromhos at 25°C)	pH Lab Value	Temperature (°F)	Color
Dissolved constituents and hardness given in milligrams per liter																					
*D9	262	Miocene	2–6–75	–	.1	2.4	1.7	94	2.8	–	–	70.61	17	.3	–	260.56	13	–	7.3	–	–
*D13	256	Miocene	2–6–75	–	.1	2.4	2.9	100	3.5	–	–	90.65	19	.3	–	290.32	18	–	7.3	–	–
+J13	629	Miocene	4–18–74	–	.6	–	–	–	–	–	–	–	10	–	–	–	28	–	7.3	–	–
*J14	336	Miocene	3–8–73	–	.0	1.8	.8	73.83	–	–	–	38.02	12	.2	–	193.28	17.6	–	7.3	–	–

*Analysis by Mississippi State Board of Health

+Analysis by Engineering Service of Jackson, Mississippi

Table 5 — Water-quality tolerances for industrial applications.

(American Water Works Association, 1950, Water quality and treatment, p. 67, table 3-4. Remarks: A, no corrosiveness; B, no slime formation; C, conformance to Federal drinking water standards; D, Al_2O_3 less than 8 ppm, SiO_2 less than 25 ppm, Cu less than 5 ppm. Chemical constituents in parts per million.)

Industrial Use	Turbidity	Color	Fe	Mn	Fe+Mn	Hardness	Alkalinity	pH	Total solids	Remarks
Air conditioning 1/	.....	.....	0.5	0.5	0.5	.....	.....	.....	.....	A,B
Baking	10	10	0.2	0.2	0.2	(?)	.....	.....	.....	C
Boiler feed:										
0-150	20	80	.....	.....	.....	75	.....	8.0+	3000-1000	
150-250	10	40	.....	.....	.....	40	.....	8.5+	2500-500	
250 psi and up	5	5	.....	.....	.....	8	.....	9.0+	1500-100	
Canning:										
Legumes	10	.....	0.2	0.2	0.2	25-75	.....	.....	.....	C
General	10	.....	0.2	0.2	0.2	.....	.....	.....	.....	C
Carbonated beverages 3/	2	10	0.2	0.2	0.3	250	50	.....	850	C
Confectionery	.....	.....	0.2	0.2	0.2	.....	.....	(4)	100	
Cooling 5/	50	.....	0.5	0.5	0.5	50	.....	.....	.....	A,B
Ice (row water) 6/	1-5	5	0.2	0.2	0.2	.....	30-50	.....	300	C
Laundering	.....	.....	0.2	0.2	0.2	50	.....	.....	.....	
Plastics, Clear, uncolored	2	2	0.02	0.02	0.02	.....	.....	.....	200	
Paper and pulp 7/										
Groundwood	50	20	1.0	0.5	1.0	180	.....	.....	.....	A
Kraft pulp	25	15	0.2	0.1	0.2	100	.....	.....	300	
Soda and sulfite	15	10	0.1	0.05	0.1	100	.....	.....	200	
Light paper, HL-grade	5	5	0.1	0.05	0.1	50	.....	.....	200	B
Rayan (viscose) pulp:										
Production	5	5	0.05	0.03	0.05	8	50	.....	100	D
Manufacture	0.3	.....	0.0	0.0	0.0	55	.....	7.8-8.3	.....	
Tanning 8/	20	10-100	0.2	0.2	0.2	50-135	135	8.0	.....	
Textiles:										
General	5	20	0.25	0.25	.....	20	.....	.....	.....	
Dyeing	5	5-20	0.25	0.25	0.25	20	.....	.....	.....	
Wood scouring 10/	.....	70	1.0	1.0	1.0	20	.....	.....	.....	
Cotton bandage	5	5	0.2	0.2	0.2	20	.....	.....	.....	

1/ Waters with algae and hydrogen sulfide odors are most unsuitable for air conditioning.
2/ Some hardness desirable.
3/ Clear, odorless, sterile water for syrup and carbonation. Water consistent in character. Most high-quality filtered municipal water not satisfactory for beverages.
4/ Hard candy requires pH of 7.0 or greater, as low value favors inversion of sucrose, causing sticky product.
5/ Control of corrosion is necessary as is also control of organisms, such as sulfur and iron bacteria, which tend to form slimes.
6/ $Ca(HCO_3)_2$ particularly troublesome. $Mg(HCO_3)_2$ tends to greenish color. CO_2 assists to prevent cracking. Sulfates and chlorides of Ca, Mg, Na should each be less than 300 ppm (white butts).
7/ Uniformity of composition and temperature desirable. Iron objectionable since cellulose absorbs iron from dilute solutions. Manganese very objectionable, clogs pipelines and is oxidized to permanganates by chlorine, causing reddish color.
8/ Excessive iron, manganese, or turbidity creates spots and discoloration in tanning of hides and leather goods.
9/ Constant composition; residual alumina less than 0.5 ppm.
10/ Calcium, magnesium, iron, manganese, suspended matter, and soluble organic matter may be objectionable.

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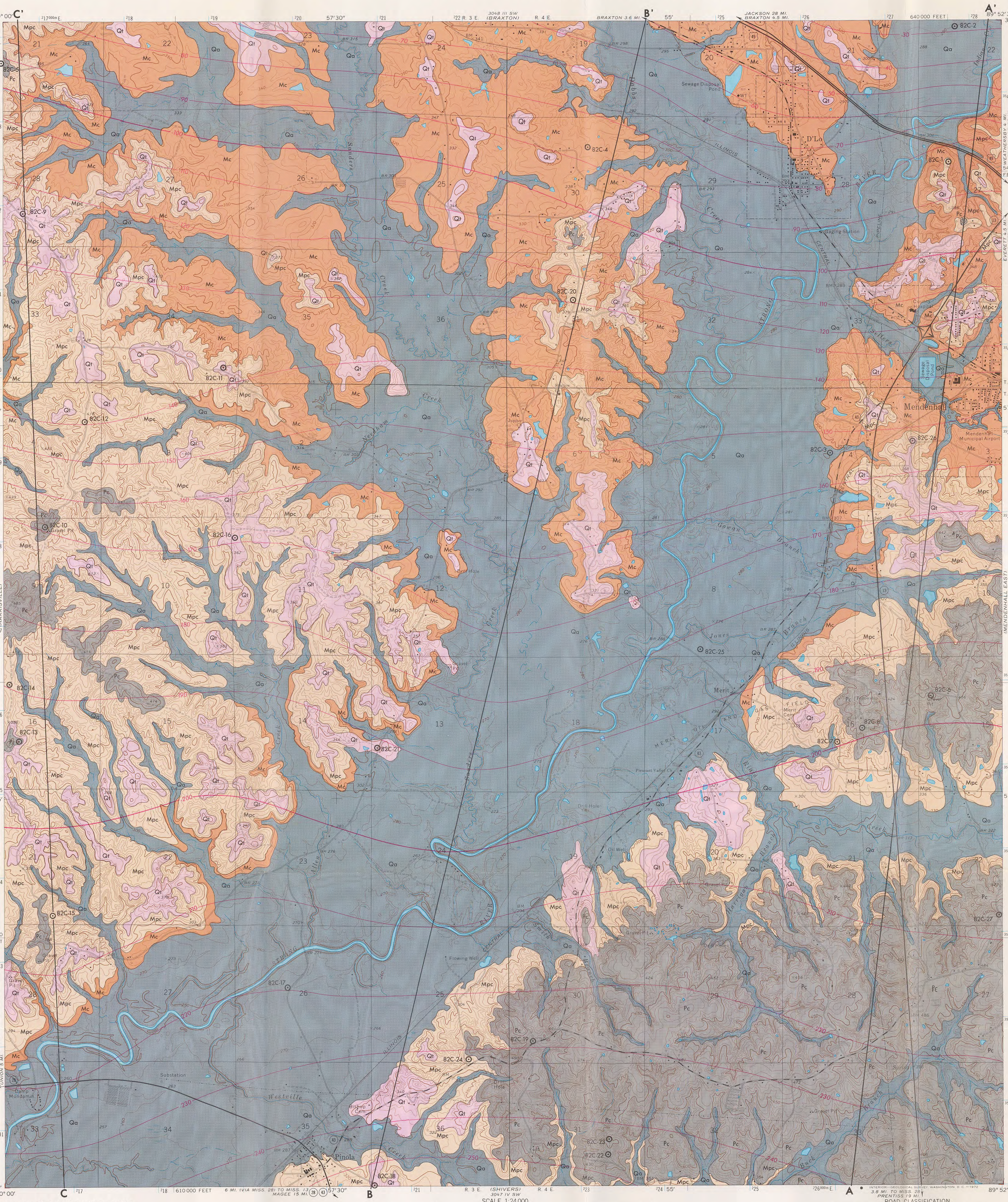
MISSISSIPPI GEOLOGICAL, ECONOMIC AND TOPOGRAPHICAL SURVEY

WILLIAM HALSELL MOORE, STATE GEOLOGIST



Base from U. S. Geological Survey, 1970

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1970 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

ROAD CLASSIFICATION

Primary highway, all weather, hard surface

Secondary highway, all weather, hard surface

Light-duty road, all weather, improved surface

Unimproved road, fair or dry weather

U. S. Route

State Route

LEGEND

QUATERNARY

HOLOCENE

Qa

Alluvium - Sand, yellowish-gray, fine-to coarse-grained; pea gravel, multicolored, predominantly quartz; clay and silt lenses; includes low terraces.

PLEISTOCENE

Qt

Terrace deposits - Sand, reddish-brown, fine-to coarse-grained; occasional gravel, multicolored, chert and quartz; local clay lenses.

Pc

Citronelle Formation - Sand, reddish-brown to pale orange, fine- to coarse-grained, ferruginous; gravel, multicolored, chert and quartz; local clay lenses. This is the highest fluvial material in the area. May be of Pliocene age in part.

PLIOCENE ?

TERTIARY

MIOCENE

Mpc

Post-Catahoula Unit - Silt and clay, gray to very light-gray, kaolinitic; sand, yellowish-gray, fine-to coarse-grained; gravel, multicolored. Locally mappable unit consisting of a highly oxidized upper silt and clay interval and a lower fluvial sand and gravel interval. Gravel is similar to that in the Citronelle and may be Pliocene in age.

Mc

Catahoula Formation - Sand, light-gray to greenish-gray, fine-to coarse-grained; argillaceous silt and silty clay; locally indurated.

OLIGOCENE

Ov

VICKSBURG GROUP

Bucatunna Formation - Clay, dark-gray, carbonaceous, bentonitic; sand lenses.

Byram Formation - Marl, greenish-gray, fossiliferous; locally indurated.

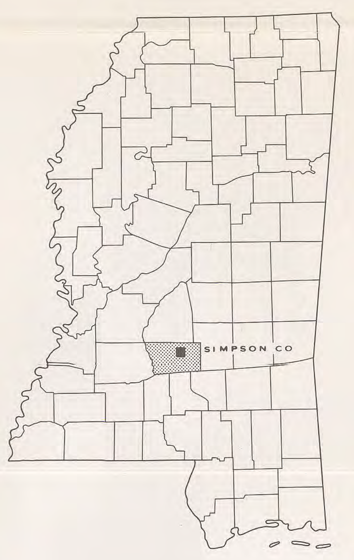
Glendon Formation - Limestone and marl, greenish-gray fossiliferous; hard ledges.

-200

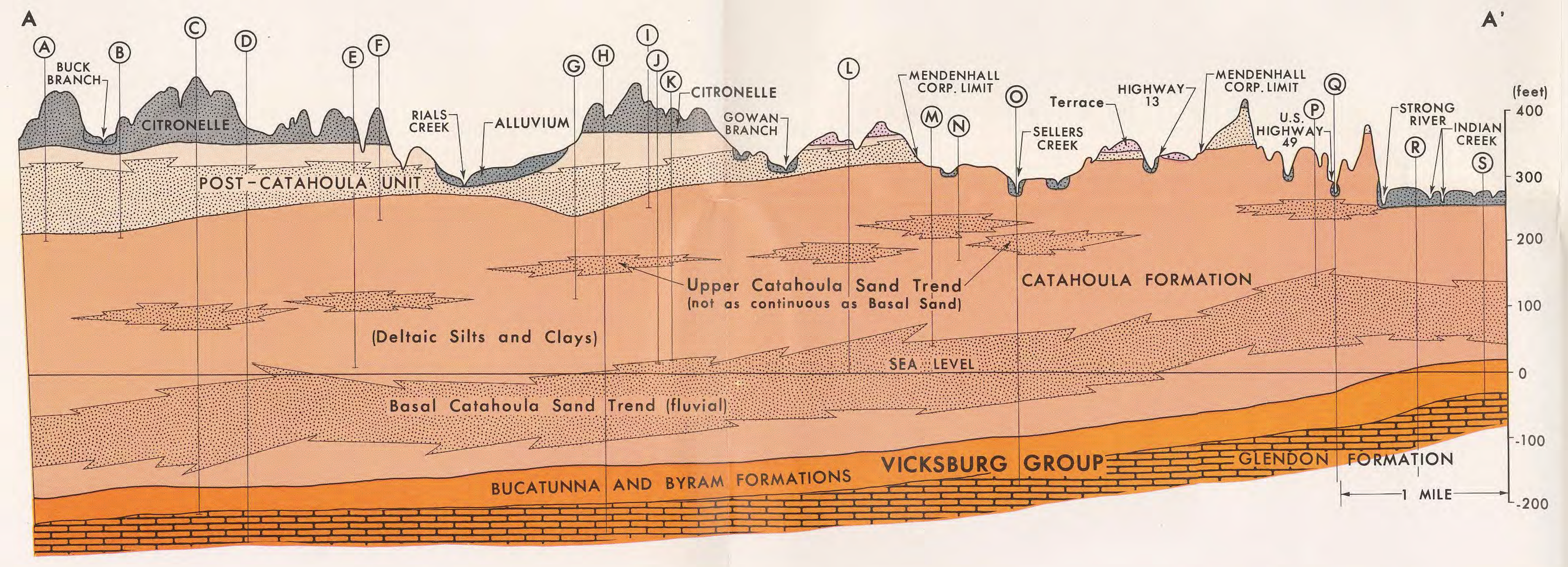
Structure Contours

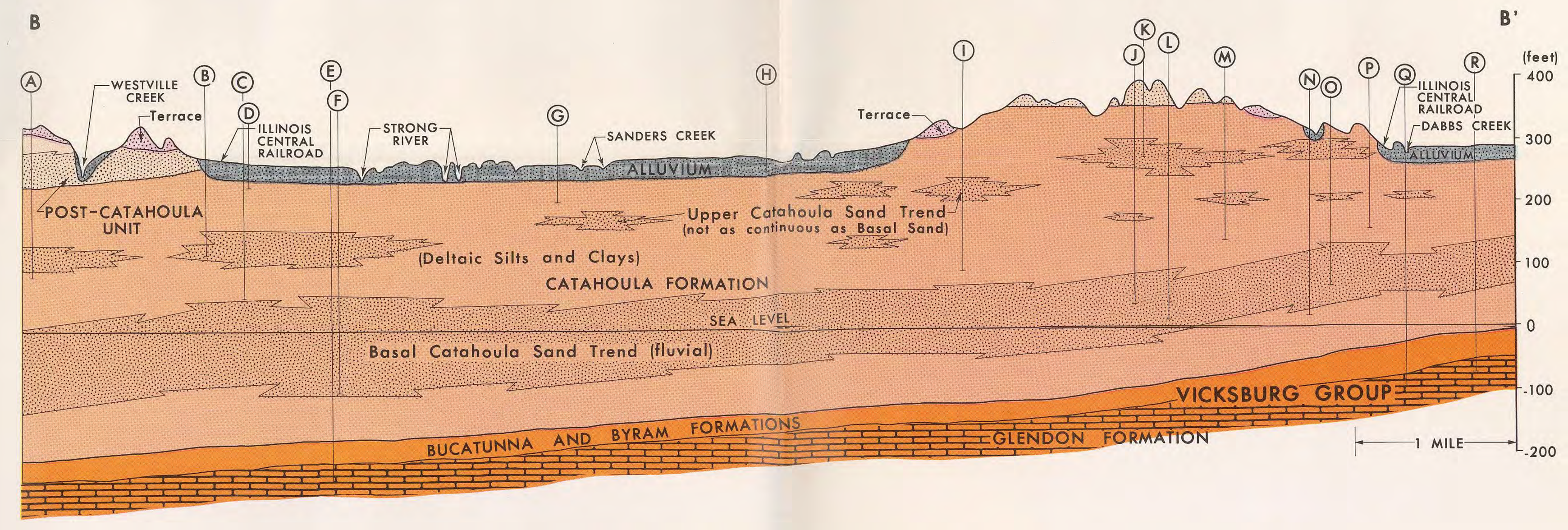
Drawn to indicate the top of the Glendon Limestone. Contour interval is 10 feet.

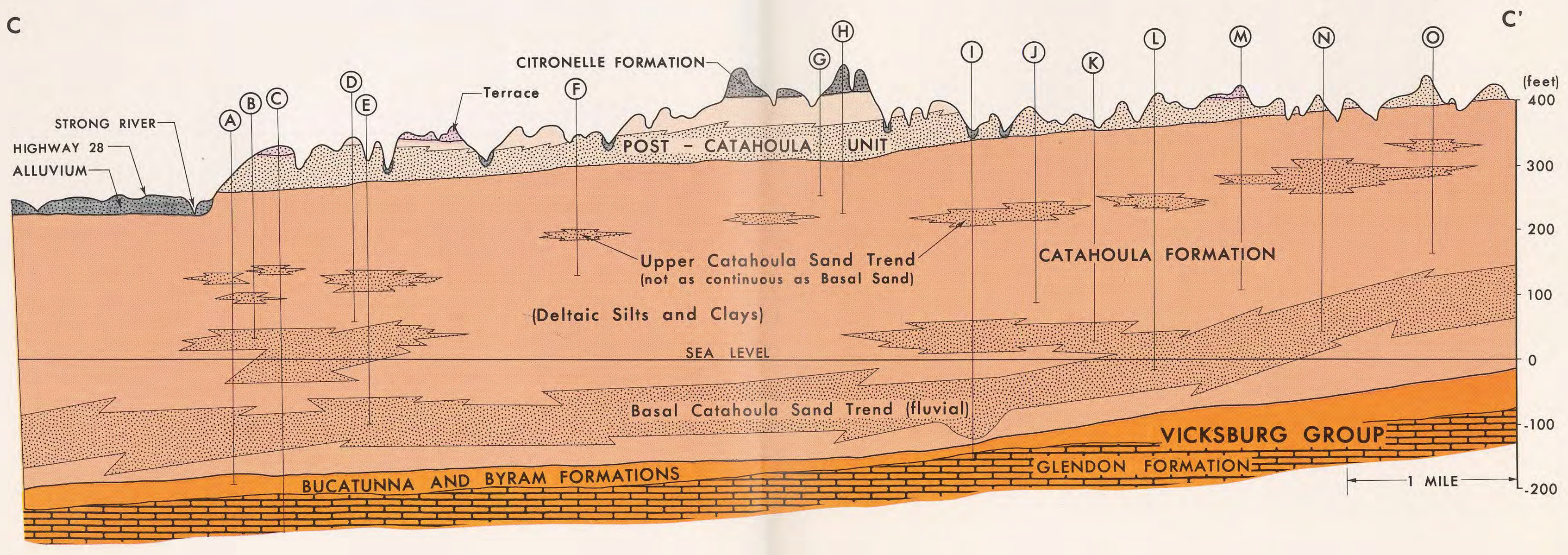
⊙ Mississippi Geological Survey test holes



QUADRANGLE LOCATION







Ⓐ Indicates Test Hole Locations
Note: Control Projected Perpendicular to Line of Section.
(Refer to Pamphlet for Test Hole Information)

GEOLOGIC MAP OF THE MENDENHALL WEST QUADRANGLE, MISSISSIPPI

By
JAMES H. MAY

1976