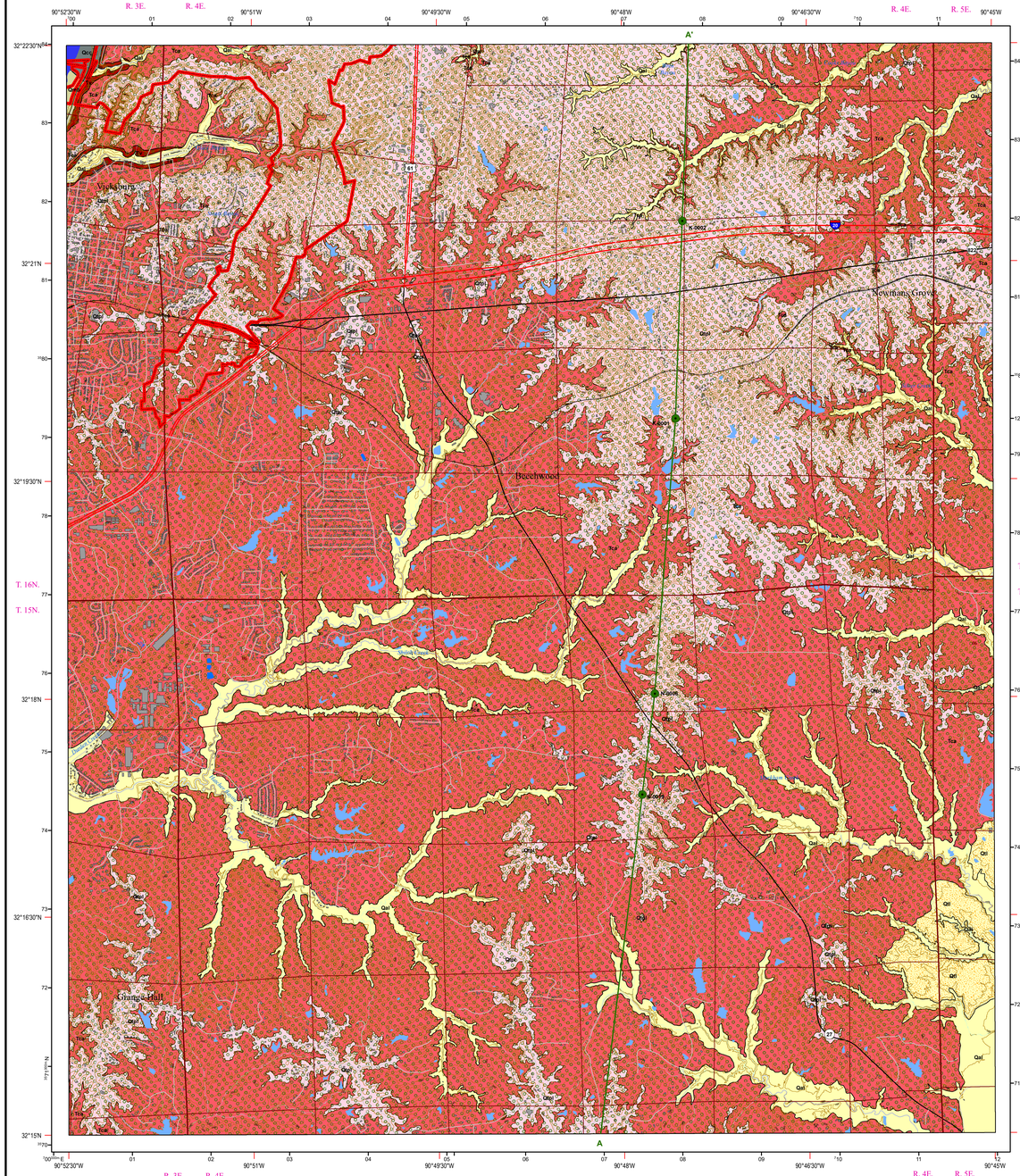
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF GEOLOGY SURFACE MAPPING DIVISION
MISSISSIPPI GEOLOGICAL SURVEY

Prepared in cooperation with
UNITED STATES GEOLOGICAL SURVEY
NATIONAL COOPERATIVE GEOLOGIC MAPPING PROGRAM

# GEOLOGIC MAP OF THE 7.5-MINUTE VICKSBURG EAST QUADRANGLE OPEN-FILE REPORT 351




Base Map produced by the Mississippi Department of Environmental Quality
Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983
Units: Meter
Declination: World Magnetic Model, December 31, 2019, estimated Magnetic North declination in 7.5-Minute Vicksburg East Quadrangle, (90°48'3.60"W, 32°18'39.06"N), center area is 1.15° west of True North ± 0.35°. Annual rate of declination change is approximately 0.08° west per year.
Basemap Data sourced from https://maris.mississippi.edu/.
Contours are derived from LIDAR data.
Borehole data from Mississippi Office of Geology.

Scale 1:24000

1 ½ 0 1 Mile
1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 Feet
1 0.5 0 1 Kilometers

Contour Interval 20 feet

North American Vertical Datum 1988 Geoid 12A

N-0019 Drill-hole locality and identification number
Unconformable Contact
A A' Line of Section
Vicksburg National Military Park

LIDAR derived Bare Earth Hillshade

1 ½ 0 1 Miles

Geologic maps are only a guide to current understanding and do not eliminate the need for detailed investigations of specific sites for specific purposes. The views and conclusions contained in this Open-File Report are those of the geologists and should not be interpreted as representing the official policies, either expressed or implied, of the State of Mississippi or of the United States Government.

Adjoining 7.5' Quadrangles

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Mississippi Office of Geology
Open-File Report 351

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# GEOLOGIC MAP of the VICKSBURG EAST 7.5-MINUTE QUADRANGLE

## Warren County, Mississippi

**2025**

Geology by

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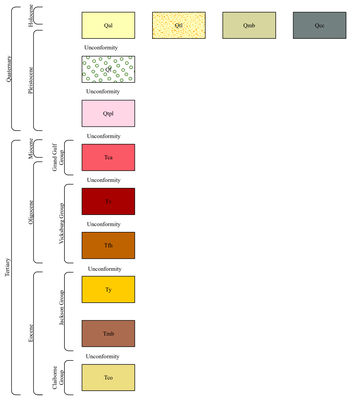
## Correlation of Map Units




## Descriptions of Map Units

**Qal — Alluvium (Holocene to Pleistocene)**
Sand, yellow- to brownish-white in color, fine- to coarse-grained, subrounded to rounded, predominately quartzose, locally graveliferous containing aggregate derived from the Pre-loess Terrace deposits, silty to clayey; humus lenses common; floodplain deposits are heavily loess-derived. Silicified wood common. Tributaries have narrow alluvial valleys and are deeply incised through the loess terrain. Stream Alluvium thickness is interpreted to be approximately 10 feet. The Mississippi River Alluvium thickness can be greater than 100 feet.

**Qtl — Stream Terrace (Holocene to Pleistocene)**
Flood Plain deposits dominantly associated with the Big Black River and its tributaries; Sand, yellow- to brownish-white in color, fine- to coarse-grained, subrounded to rounded, predominately quartzose, locally graveliferous containing aggregate derived from the Pre-loess Terrace deposits, silty to clayey; humus lenses common; floodplain deposits are heavily loess-derived. Silicified wood common. These terraces are likely locations of pre-historic archeological sites.

**Qmb — Meander Belt (Pleistocene)**
Tan to brown, fine-grained sand, silt, and clay, older soil horizons such as Pearson soil series weathered to distinctive orange color. Surface features are dominated by migrating point bar ridge and swale topography, natural levee deposits, and abandoned course channels. Cut-off channels are mapped separately. In many cases, these features have been reoccupied by younger streams.

**Qcc — Cut-Off Channel (Holocene to Pleistocene)**
Brown to black, silty to lignitic carbonaceous clay. Oxbow lakes and clay plugs of abandoned meander courses.

**Qlf — Loess (Pleistocene)**
Silt, buff to tan, pale yellow, red, gray to gray-green where in anoxic conditions, quartzose to feldspathic. Loess is considered an eolian deposit derived from glacial outwash. Loess is typically calcareous with dolomite and calcite; however, the upper portion of the loess can be deeply weathered, leached / noncalcareous, and has been commonly referred to as "brown loam." Loess deposits unconformably blanket the pre-loess topography with substantial local variations in thickness but generally thickening towards the west. In places, weathered loess contains secondary deposits of small calcareous concretions such as caliche and loess dolls. Loess can be locally and sparingly fossiliferous, commonly containing tests or steinkerns of pulmonate gastropods and less commonly containing fossils of Pleistocene vertebrates.

**Qtpl — Pre-loess Terrace Deposits (Pleistocene)**
Pleistocene ancestral Mississippi River terraces deposited prior to Pleistocene loessification. Sand, yellow, orange, purple, red, pink, fine- to coarse-grained, predominantly quartzose, cross-bedded to massive; graveliferous, pea to large cobble size clasts, boulder size ice-rafted clasts of sandstone and chert. Economically significant gravels are predominantly chert with lesser amounts of vein quartz, metaquartzite, agate, sandstone, and rare rhyolite clasts; clay, pink to white, generally occurring as discontinuous lenses and as rip-up clasts up to boulder-size. Conglomeratic ironstone ledges are common in the graveliferous sands at the base of the deposits. The base of this terrace occurs at approximately 220 ft MSL and is masked by about 40 ft of loess overburden.

**Grand Gulf Group**

**Tca — Catahoula Formation (Miocene to Oligocene)**
Deltaic sands, silts, and clays; Sand, gray, pale yellow to white, fine- to coarse-grained, cross-bedded to massive, predominantly quartzose with lesser amounts of chert, metaquartzite, mica, and heavy minerals, slightly glauconitic in places with rare thinly-bedded pea gravels, Gravels, black chert and milky quartz, highly polished, immature, subangular to well rounded; Clay, green, gray, brown, kaolinitic, weathers white to brown exhibiting a "popcorn" appearance, silty to sandy, lignite common in basal clays. Often indurates to opaline-cemented sandstones and rarer orthoquartzites where exposed, silicified wood and fossil palm common. Ironstone common where sands overlie clays. The Catahoula Formation unconformably overlies the Bucatunna Formation. Total thickness is not represented on this map.

**Vicksburg Group**

**Ty — Vicksburg Limestone Undifferentiated (Oligocene)**
Includes the Bucatunna Formation, Byram Formation, Glendon Limestone, Marianna Limestone, and Mint Spring Formation. The Bucatunna is predominantly dark brown carbonaceous clay with thinly interbedded fine sands. It contains sparse estuarine mollusks towards its base and carbonized palaeobotanical fossil remains are common throughout. The Glendon Limestone is white to grey, commonly indurated to semi-crystalline bioclastic limestone, either massive or with alternating ledges separated by thinly-bedded glauconitic marl. The Glendon Limestone commonly contains solution cavities at or near outcrop. Larger cavities usually form at the contact with the underlying Marianna Limestone. The Marianna Limestone is white to pale-yellow, soft to indurated, glauconitic marl, containing an admixture of fine-grained sands and clays in places. There is an abundance of the large Foraminifera *Lepidocyclina mantelli* in the Marianna Limestone and *Lepidocyclina supera* in the Glendon Limestone and the echinoid *Clypeaster rogersi*. Mint Springs Formation is a fossiliferous, fine-grained quartz marly sand containing the cassidulid echinoid *Rhyncholampus gouldii*. The Vicksburg Limestone unconformably overlies the Forest Hill Formation. Thickness is approximately 150 feet.

*Cross Section Units Not Exposed at the Surface*

**Tfh — Forest Hill Formation (Oligocene)**
Deltaic sands, silts, and clays. Sand, fine-grained, silty, quartzose; Clay, carbonaceous, laminated, lignite and silicified wood common, including *Palmoxylon*. Lignitic with palaeobotanical fossil remains common along fissile partings in clays. The Forest Hill Formation unconformably overlies the Yazoo Formation. Total thickness is approximately 120 feet.

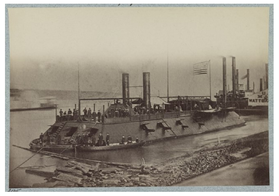
**Jackson Group**

**Ty — Yazoo Formation (Eocene)**
Locally referred to as the Yazoo Clay. Clay, bluish-green to bluish grey, weathers yellowish brown to tan, montmorillonitic, calcareous, silty, locally fossiliferous, locally contains framboidal pyrite. The fossil oyster *Pycnodonte trigonalis* are common throughout along with fossil vertebrate remains of Archaeocete whales, sharks and fish. The Yazoo Formation conformably overlies the Moodys Branch Formation. Total thickness is approximately 500 feet.

**Tmb — Moodys Branch Formation (Eocene)**
Sandy fossiliferous marl containing an abundance of marine invertebrates, particularly shells of *Glycymeris idonea* and *Venericardia apodensata* . Conformably grades into the overlying Yazoo Formation. Total thickness is approximately 15 feet.

**Tco — Cockfield Formation (Eocene)**
Clay, brown, reddish-brown to grey in color; silty to fine sandy; strongly carbonaceous to lignitic, slightly micaceous, pyritic. Carbonized and silicified palaeobotanical fossil remains common. Dominated by deltaic sands towards the base. Underlies the Moodys Branch Formation unconformably.

## Field Photographs



Historical image of the shallow-draft City Class river ironclad U.S.S. Cairo before it was sunk on the Yazoo River during battle on the morning of December 12, 1862, prior to the Siege of Vicksburg in 1863. Despite the devasating damage it recieved during battle, it was abandoned with no loss of life before sinking in 36 feet pf water. Image courtesy of the Library of Congress.

View looking south across the aggressive loess terrain from the vantage point of the main Confederate position at Vicksburg National Military Park from the Illinois Memorial. Image taken in Section 19, Township 16 North, Range 4 East.

Burials at Vicksburg National Cemetery, the location of the siege of Vicksburg. The siege was a pivotal Civil War campaign that ended on July 4, 1863, resulting in nearly 15,000 dead. Photo courtesy of the National Park Service.

Historic building of the former Vicksburg National Military Park Museum and Headquarters. Photo taken on February 11, 2022 in Section 19, Township 16 North, Range 4 East.

Image looking west from Fort Hill across hummocky loess terrain toward the Yazoo River, Vicksburg National Military Park. Photo taken in Section 12, Township 16 North, Range 4 East.

Survey Geologist James Starnes and Vicksburg National Military Park Natural Resource Manager Charles Beightol examine Upper Oligocene Catahoula sandstone overlain by Pleistocene loess in the cutbank of the stream. Photo taken in Section 32, Township 16 North, Range 4 East.

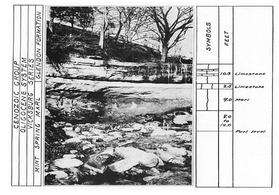
Slope failure in Pleistocene loess disrupting road infrastructure on Union Avenue in Vicksburg National Military Park highlighting the constant threat of geohazards posed by the thick loess cover throughout the geologic mapping project area. Photo taken in Section 9, Township 16 North, Range 4 East.

Survey Geologist Jonathan Leard (top) and Vicksburg National Military Park staff examine Upper Oligocene Catahoula sandstone overlain by Pleistocene loess in the cutbank of the steam. Photo taken in Section 32, Township 16 North, Range 4 East.

Cross-bedded, indurated, medium to coarse-grained sandstone of the Upper Oligocene Catahoula Formation exposed at outcrop in the Vicksburg National Military Park. Photo taken in Section 32, Township 16 North, Range 4 East.


A float block of sandy marl containing Lower Oligocene mollusk shell fossils from the shallow marine Byram Formation member of the Vicksburg Group found in the active channel of Mint Spring Bayou in the Vicksburg National Military Park. Photo taken in Section 12, Township 16 North, Range 3 West.

The falls at the type locality of the Mint Spring Formation of the Lower Oligocene Vicksburg Group at Mint Spring Bayou in the Vicksburg National Military Park. Photo taken on February 9, 2022 in Section 12, Township 16, Range 3 East.




Historic photo and interpretation of the falls at the type locality of the Mint Spring Formation of the Lower Oligocene Vicksburg Group at Mint Spring Bayou in the Vicksburg National Military Park. Figure 1 from Mississippi Geological Survey Bulletin 28: The Geologic History of the Vicksburg National Military Park Area. Photo taken on January 9, 1935 in Section 12, Township 16 North, Range 3 East.

## Structural Cross-Section of the Vicksburg East 7.5-Minute Geologic Quadrangle