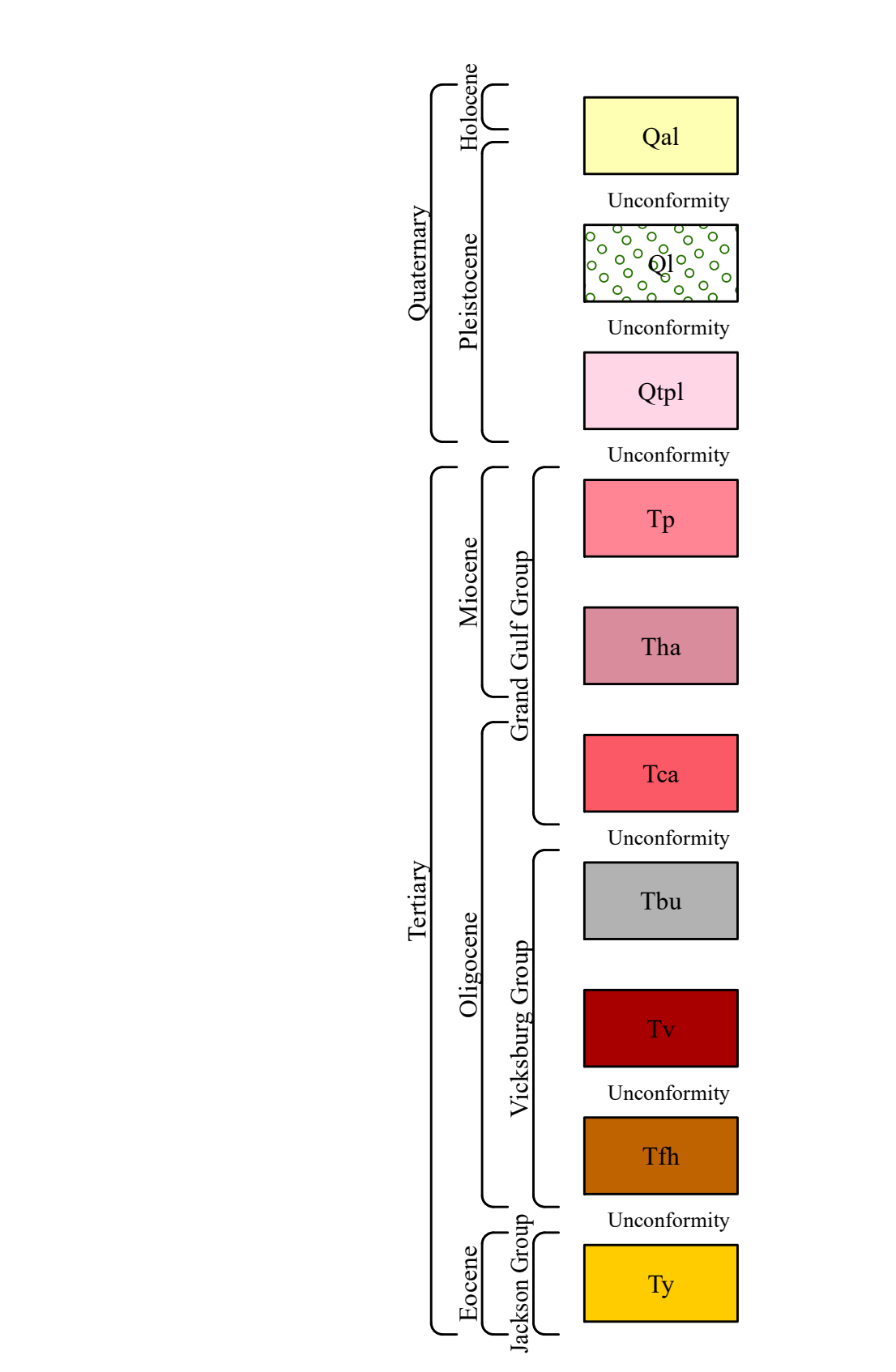


Correlation of Map Units



Descriptions of Map Units

- Qal Alluvium (Holocene to Pleistocene)**
Sand, yellow to brownish-white in color, fine- to coarse-grained, subrounded to rounded, predominantly quartzose, locally graveliferous containing aggregate derived from the Pre-loess Terrace deposits and Miocene Subcrop, 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. Thickness is interpreted to be approximately 10 feet.
- Ql 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 (caliche, loess dolls). Loess can be locally and sparsely fossiliferous, commonly containing tests or stemlike remains of pulmonate gastropods and less commonly containing fossils of Pleistocene vertebrates.
- Qtp 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 scarified 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, which overlie the Pascagoula Formation unconformably. Two distinct terraces are identified: one heavily eroded terrace perched approximately 340 feet above MSL in elevation and one younger, completely preserved terrace beneath the loess with a base perched between 20-40 feet above MSL with a relic alluvial plain surface at approximately 135 feet above MSL represented as a clay bed. This ancestral Mississippi River, Pre-loess Terrace Deposit is a first order terrace of the Mississippi River and is likely the "Natchez Formation" of the previous literature. Preliminary radiometric dating places the abandonment of this alluvial terrace during the height of the last glacial maxima, approximately 20,000 years B.P. The escarpment between the lower Pre-loess terrace and the adjacent uplands is approximated due to being masked by a thick mantle of loess. Borehole data constrained the escarpment to the approximate location of Saint Catherine Creek for a significant area of the quadrangle. "Head-of-hollow," terrace-derived valley-fill deposits are common at lower elevations and are isolated to valley walls adjacent to the erosional remnants of the higher of the two terrace deposits. These deposits are of such limited extent as not to warrant representation on this map.
- Tha Hattiesburg Formation (Miocene)**
Dolitic sands, silts, and clays. Clay, blue-green, gray, brown, weathers pink to off-white, silty to sandy, locally lignitic; sand, gray, pale yellow to white, fine- to coarse-grained, cross-bedded to massive with bedded pea gravels (gravels consist of black, grey, brown chert, and milky quartz, are highly polished, sub-angular to well rounded), often indurated to sandstones and siltstones at surface, predominantly quartzose with lesser amounts of chert, metaquartzite, mica, and heavy minerals, slightly glauconitic in places, silicified and coalified wood common. The Pascagoula Formation conformably overlies the Hattiesburg Formation. Total thickness is not encountered in this quadrangle but is estimated to be approximately 1,320 feet.
- Tca Catahoula Formation (Oligocene)**
Dolitic 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, lignitic common in basal clays. Often indurates to opaline-cemented sandstones and rare 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 approximately 560 feet.
- Tth Bucatunna Formation (Oligocene)**
Clay, dark brown to dark gray, weathers light brown to light gray, carbonaceous, silty to sandy, micaceous, laminated to massive, sparsely fossiliferous. The Bucatunna Formation conformably overlies the Byram Formation. Thickness is approximately 40 feet except where Catahoula Formation channels have incised.
- Tt Vicksburg Limestone Undifferentiated (Oligocene)**
Includes the Byram Formation, Glendon Limestone, Marianna Limestone, and Mint Spring Formation. The Glendon Limestone is white to gray, 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 murchisoni* in the Marianna Limestone and *Lepidocyclina supra* in the Glendon Limestone and the echinoid *Clypeaster rogersi*. The Vicksburg Limestone unconformably overlies the Forest Hill Formation. Thickness is approximately 70 feet.
- Tth Forest Hill Formation**
Dolitic sands, silts, and clays. Sand, fine-grained, silty, quartzose; Clay, carbonaceous, laminated, lignitic and silicified wood common. Lignitic plant fossils common along fissile partings in clays. The Forest Hill Formation unconformably overlies the Yazoo Formation. Total thickness is approximately 50 feet.
- Ty Yazoo Formation (Eocene)**
Locally referred to as the Yazoo Clay. Clay, bluish-green to bluish gray, weathers yellowish brown to tan, montmorillonitic, calcareous, silty, locally fossiliferous, locally contains, framboidal pyrite. The Yazoo Formation conformably overlies the Moody's Branch Formation. Total thickness is approximately 390 feet.

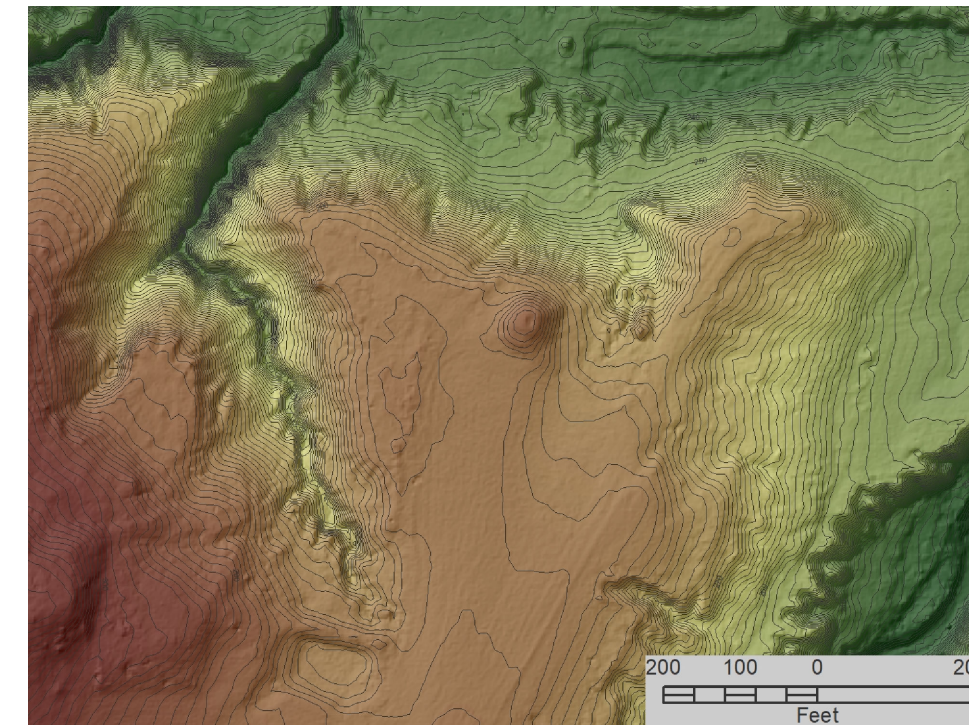
Field Photographs



The southern terminus of the Natchez Trace Parkway. This 444-mile scenic roadway transects three states, almost 500 million years of earth history, and more than 13,500 years of human history. Section 73, Township 7N, Range 2W.



An import native American cultural earthworks site constructed during the Woodland, late Coles Creek cultural period around A.D. 900-1200 from loess-derived soil (Balmoral and Gordon Phases). This site persisted through the Mississippian, Plaquemine period into the protohistoric from A.D. 1200-1700 (Atina, Foster, and Emerald Phases). The lidar derived bare earth hill shade of the site with color-coded elevation and 1-foot contours depicts the site's association with the natural environment. The large round site at a vantage over the edge of a small first terrace of the adjacent drainage. It is guarded by a ravine to the southwest, separating it from the adjacent, aggressive loess terrain uplands it and bordered to the northeast by freshwater from a stream choked with an exquisite source of Pre-loess Terrace gravel for tool lithic manufacturing. Section 46, Township 7N, Range 2W.



Pre-loess Terrace Gravels from the Pleistocene ancestral Mississippi River are an important economic resource for the area where the loess overburden is relatively thin. These terrace gravels, along with the loess cover constitute an important host for unconfined groundwater and recharge to both groundwater aquifers and surface water to streams in the region. Section 39, Township 7N, Range 1W.



Pleistocene loess deposits (aeolian glacial silt) exhibiting a typical nearly vertical face exposed in a road cut in Section 44, Township 7N, Range 2W. Old roadways and trails in the Loess Bluff Region commonly exhibit a sunken road affect from repeated use over time and the natural character exhibited by erosion of the thick loess soil.



Late Miocene age silty clays of the Pascagoula Formation outcropping through the alluvium of a tributary of Saint Catherine Creek. The bedrock includes reworked loess silt and Pre-loess Terrace sand and gravel. Section 47, Township 7N, Range 2W.

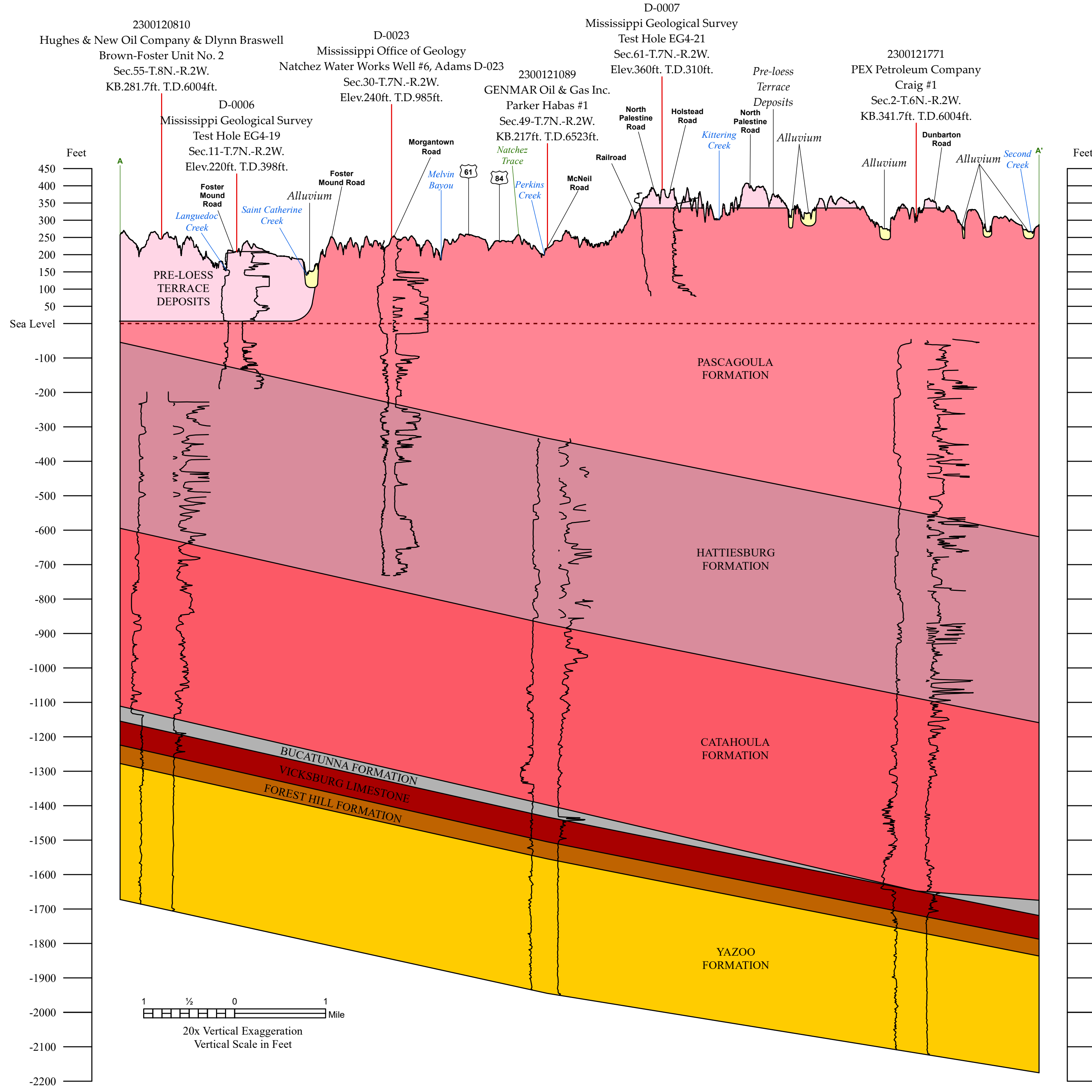


Unconformable contact between the massive, late Pleistocene loess deposits (above) and bedded sands and gravels and mid-Pleistocene ancestral Mississippi River Pre-loess Terrace Deposits. Section 39, Township 7N, Range 1W.

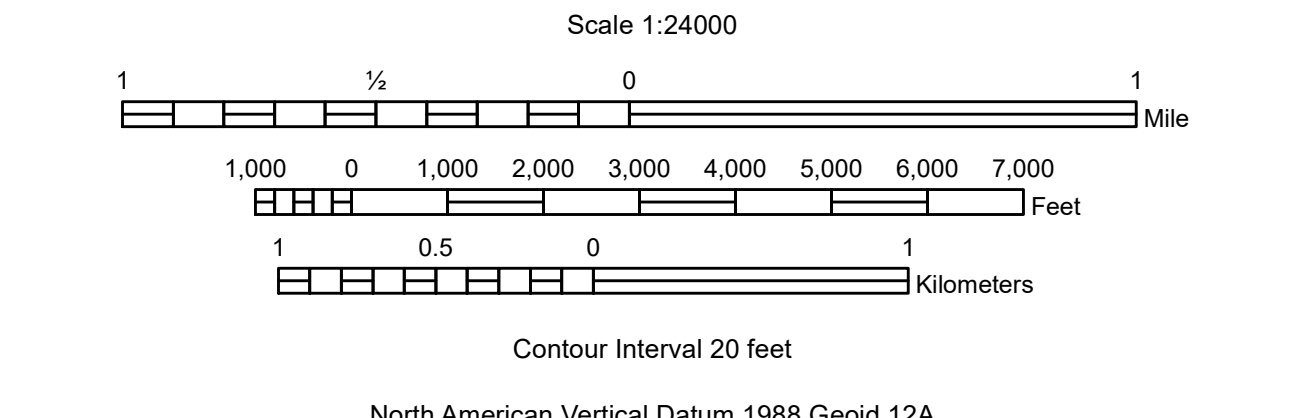


Slightly-weathered outcrop of a bed of late Miocene age silty clays of the Pascagoula Formation exposed along a stream channel, exhibiting the anoxic gley coloration from the high-alumina clay and blocky-orange pattern produced by chemical weathering of concentrations of framboidal iron-sulfide minerals. Section 47, Township 7N, Range 2W.

Structural Cross-Section of the Washington 7.5-Minute Geologic Quadrangle



Base Map produced by the Mississippi Geological Survey
Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983
Units: Meter
Declination: World Magnetic Model, January 1, 2023, estimated Magnetic North declination to 7.5-Minute WASHINGTON quadrangle, 091°18'44"W, 31°33'44"N, center area is 0.61° west of True North ± 0.35°. Annual rate of declination change is approximately 0.10° west per year.
BaseMap Data sourced from <https://narrs.mississippi.edu/>.
Contours are derived from LIDAR data.
Borehole data from Mississippi Office of Geology and Mississippi Oil and Gas Board.



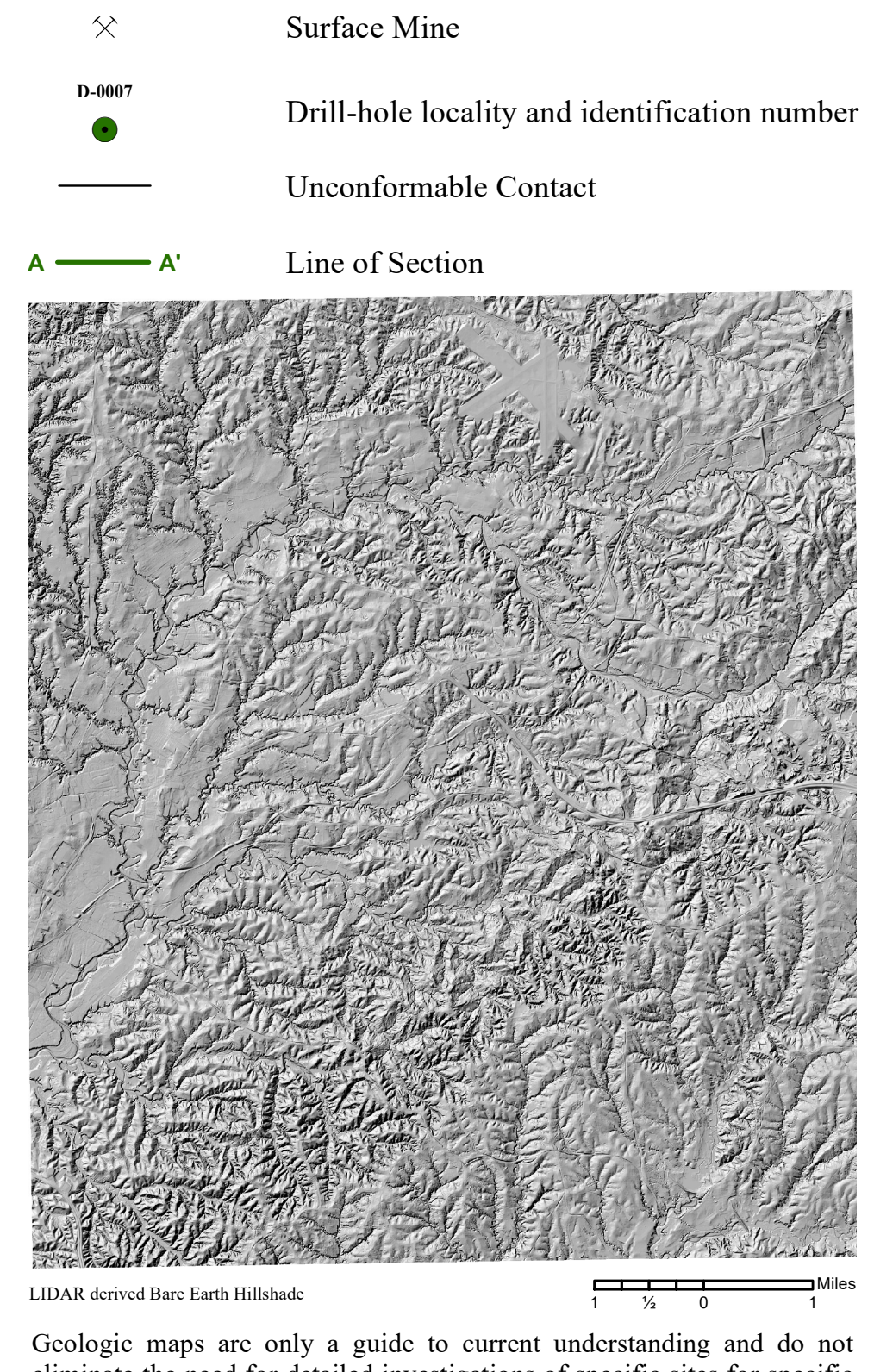
**Mississippi Office of Geology
Open-File Report 335**

This geologic map was funded by the United States National Park Service, Geologic Resources Division. The Survey expresses gratitude to the New Family for facilitation of field work in the Washington Quadrangle area.

**GEOLOGIC MAP of the WASHINGTON
7.5-MINUTE QUADRANGLE
Adams County, Mississippi
2022**

Geology by
Jonathan R. Leard, RPG, James E. Starnes, RPG, and Timothy J. Palmer, RPG

Mississippi Department of Environmental Quality
Mississippi Office of Geology - Surface Mapping Division
Mississippi Geological Survey
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Jackson, Mississippi 39225



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