Quaternary Geologic Map of the Henderson Area, Henderson County, Kentucky

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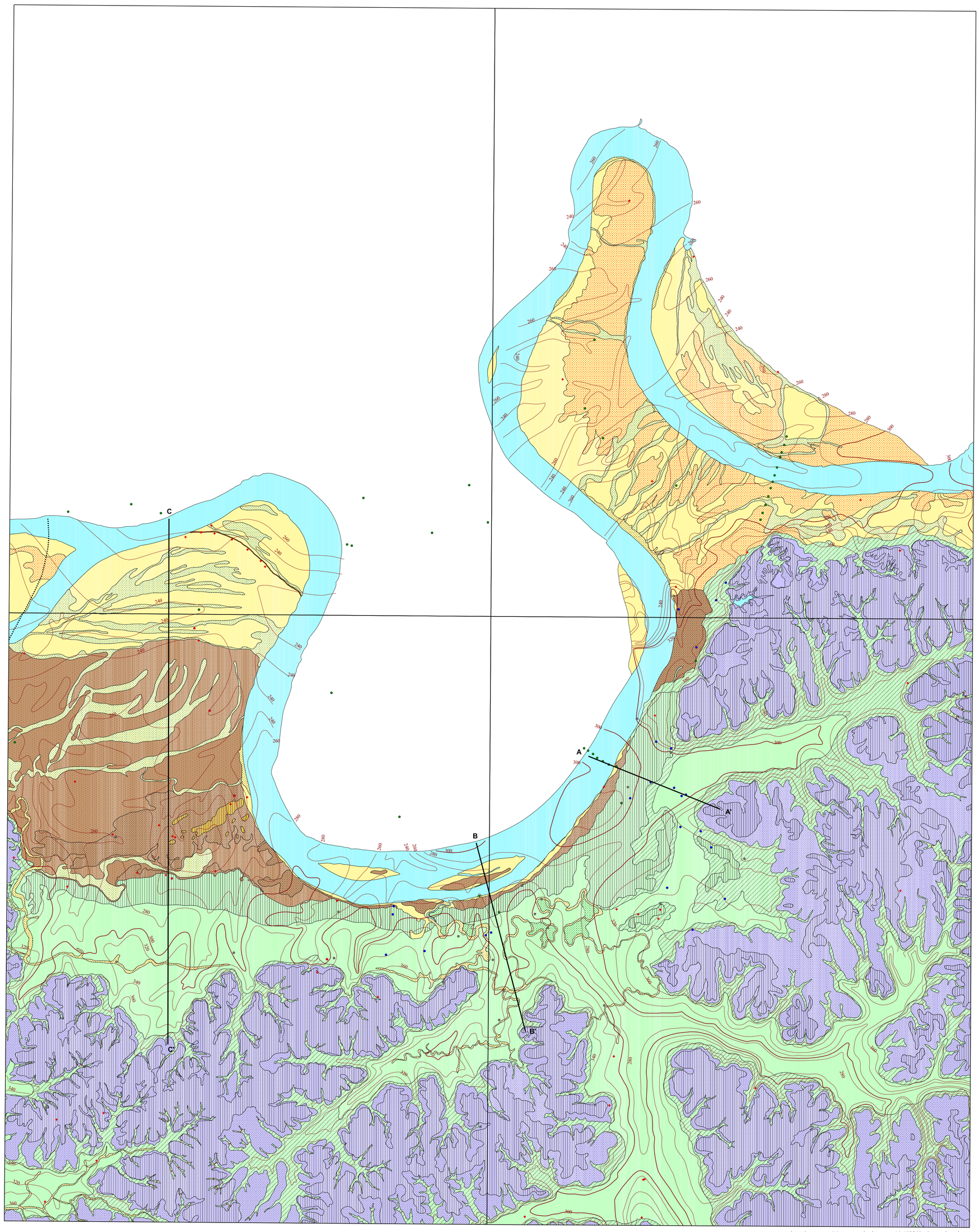

universal transverse Mercator projection, zone 16, 1927 North American datum

DISCUSSION

The study area is along the unglaciated Ohio River valley in northwestern Kentucky. The Ohio River is deeply alluviated with Pleistocene outwash and Holocene alluvium reworked from older valley-fill deposits. Adjacent uplands are blanketed by Pleistocene loess derived from the broad Ohio River alluvial plain. Original geologic mapping in the study area (Johnson, 1973a, 1973b, 1973c, 1974) focused on bedrock geology and only subdivided identified Quaternary loess and alluvium overlying Pennsylvanian bedrock. Regional studies (e.g. Ray, 1965) identified and delineated additional, distinct Quaternary units and demonstrated the need for more detailed mapping and subdivision of Quaternary geologic deposits in the area.

This study differentiates nonlithified geologic materials in the Kentucky portion of four 7.5-minute USGS quadrangles in Henderson County, Kentucky: Evansville South, Henderson, West Franklin, and Wilson. Map units were delineated on the basis of surface mapping, hand augering and shallow hydraulic coring, and examination of aerial stereophotos. Digital datasets utilized included 10-meter USGS Digital Elevation Models and Digital Orthophoto Quadrangles. Soil maps (Converse and Cox (1967) provided an additional overview of deposits and landforms. Bedrock topography was previously mapped by Ball (1973), Norris (1974), and Smith and Ball (1973, 1974). For this study bedrock topography was estimated from previously published subsurface data extracted from Harvey (1956) and Gallaher (1964), supplemented by newer data extracted from Kentucky Geological Survey petroleum well-log, coal-borehole, and water-well databases. Preliminary information from Cone Penetration Testing supplemented subsurface data. Cross sections were constructed using data from the KGS subsurface databases, supplemented by logs and diagrams reported in Harvey (1956) and Gallaher (1964).

EXPLANATION

Map Units
- Water
- Qal
- Qafpl
- Qas
- Qatb
- Qelt
- Qafp
- Qat1
- Qat2
- Qes
- Qltl
- Qlt
- Qltm
- Qel
- Psh

- Field/Surface observations
- Cone Penetrometer Locations
- Water Wells
- Coal Boreholes
- Miscellaneous Subsurface Data
- Terrace Margin
- Fault
- 7.5-minute Quadrangles

Bedrock Topography
- Contours
- Index contours

MAP UNIT DESCRIPTIONS

Qal – ALLUVIUM, youngest alluvium (Holocene): clayey-to-silty sand and clayey silt deposited in tributary stream channels and along the Ohio River as channel banks and point bars. The Ohio River bedload consists of medium-to-course sand and moderately sorted, sub-to-well rounded pebble-cobble gravels with diverse clast lithologies that include sandstone, coal, and shale from local Pennsylvanian exposures, granite, chert, gneiss, and minor limestone.

Qafpl– ALLUVIUM, levees and overwash deposits (Holocene): fine silty sand and silt deposited during flood events, forms natural levees adjacent to the Ohio River channel.

Qas – ALLUVIUM, sloughs (Holocene): organic-rich clayey silt, silty clay, and clay within low lying areas on Qafp and Qat1. Sloughs are poorly drained pathways that channel water off of the floodplain. They can retain standing water for months which creates anoxic conditions that form dark gray and black colors. Areas that retain water year-round form bogs and cypress swamps.

Qatb – ALLUVIUM, tributary floodplain (Holocene): poorly sorted clayey silt and silt deposited by meandering triburaties. These areas are either forested or cultivated cropland.

Qelt – COLLUVIUM AND ALLUVIUM, creep and slope wash (Holocene): predominantly silt and very fine sand transported down hillslopes in rills, gullies, as slopewash, and by creep and frost heaving. Mantles slopes in relatively thin sheets overlying Qel and forms the toe at the base of hillslopes; also exists as slump blocks of shale and loess on steeper slopes in Audubon State Park.

Qafp – ALLUVIUM, modern floodplain (Holocene): poorly sorted silt, clay, and fine sand occupying low-lying areas along the Ohio River as silt drapes, clay plugs, massive beds, or fine sand sheets near channel margins. Bar and swale topography is common on the floodplain surface, and surface relief can vary by 10 feet or more. Floodwaters are removed from the floodplain through natural channels, sloughs, man-made channels, and field tiling. Areas of the floodplain that are not cultivated for cropland are dominated by maple and oak forest; surface elevations are between 350 and 360 ft above sea level.

Qat1 – ALLUVIUM, terrace deposit (Pleistocene): fine-to-coarse sand, silty sand, and pebble gravels deposited by the Ohio River in anastomosing or braided channels that carried sediment-laden water from melting Wisconsinan ice sheets. Sands typically exhibit cross-trough stratification and gravels are typically lenticular. The Qat1 terrace is occasionally inundated during large floods on the Ohio River and is overlain by poorly sorted overbank silt and clay typical of the modern floodplain. The surface topography is more subdued than the modern floodplain; surface elevations are between 360 and 370 ft above sea level.

Qat2 – ALLUVIUM, terrace deposit (Pleistocene): fine-to-coarse sand, silty sand, and pebble-to-cobble gravels deposited by the Ohio River in braided channels that transported sediment-laden water from melting Illinoian ice sheets. Sands typically exhibit cross-trough stratification and gravel layers are typically lenticular. The terrace surface is blanketed with loess and dune sand; over 100 ft thick; surface elevations are between 380 and 390 ft above sea level.

Qes – EOLIAN, sand dunes (Holocene): fine calcareous sand deposited on the Qat2 terrace

Qltl– EOLIAN, loess (Pleistocene): pale yellowish (10 YR 7/6) clayey silt and very fine sand that contains fossil mollusk shells and calcareous concretions; deposited on Qlt terrace and is thickest adjacent to the Ohio River valley; regionally known as the Peoria Loess; up to 20 ft thick.

Qlt – LACUSTRINE, slackwater terrace (Pleistocene): laminated dark gray silty clay and clay deposited by lakes formed when glacial outwash in the Ohio River impounded tributaries. Clays are dark gray and laminated, and the unit interfingers with Qat2 in the subsurface; surface is overlain by loess similar to Qel and slopes away from the Ohio River to a flat, featureless plain; surface elevations are between 380 and 390 ft above sea level.

Qltm – LACUSTRINE, slackwater terrace margins (Pleistocene): dark gray silt and silty clay deposited by lakes formed when glacial outwash in the Ohio River impounded tributaries; unit interfingers with Qel and Qlt in the subsurface.

Qel – EOLIAN, loess (Pleistocene): pale yellowish (10 YR 7/6) clayey silt and very fine sand that contains fossil mollusk shells and calcareous concretions; deposited on bedrock uplands and is thickest adjacent to the Ohio River valley; regionally known as the Peoria Loess; up to 20 ft thick.

Psh – BEDROCK (Pennsylvanian): shale, sandstone, and coal of the Sturgis Formation.

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1 0 1 2 3 Miles

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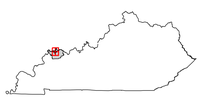
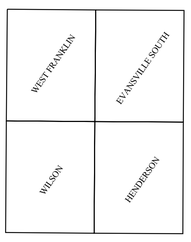
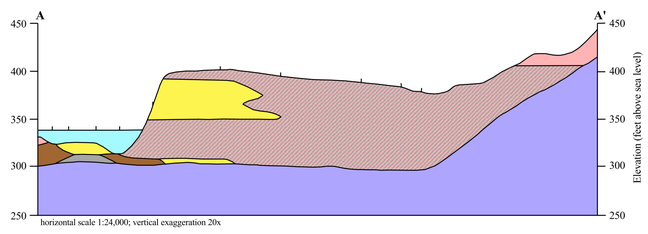
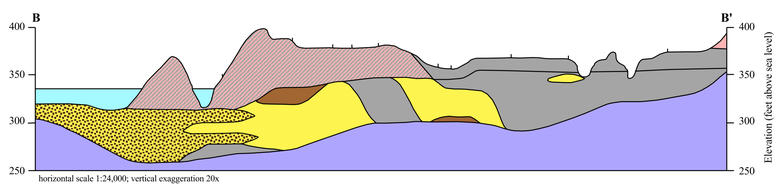
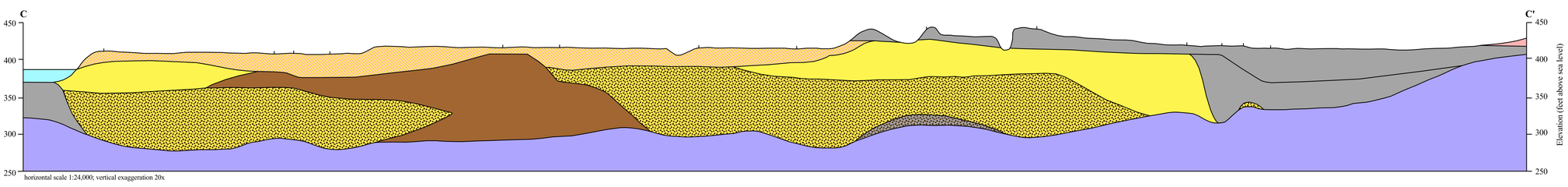
MAP SCALE 1:36,000

BEDROCK TOPOGRAPHY CONTOUR INTERVAL 20 FEET



Location of study area.



USGS 7.5-minute quadrangles in the study area.

Cross Section Legend
- Ohio River
- clay
- clay with gravel
- silt and clay
- silt
- silt and sand
- sand
- sand and gravel
- gravel
- bedrock