

Qot1g Alluvium, reworked outwash, Green River scrollwork terrace (Pleistocene - Holocene)
Fine to coarse sand and gravel, with local lenses of silt and clay; gravel includes chert, quartzite, sandstone, siltstone, igneous and metamorphic rocks, limestone, and coal; lithologically similar to adjacent outwash terraces; surface mantled with alluvial silty sand and sandy silt; 30 to 45 feet (10 to 15 m) thick; surface forms well-developed, well-and-swale topography on Ohio River low terrace; deposited as point bar deposits by meandering postglacial Green River; overlies older outwash deposits (Qot2); contact is approximate, inferred from surface topography.

Qot1 Alluvium, outwash, low terrace (Pleistocene - Holocene)
Fine to coarse sand and gravel, with local lenses of silt and clay; gravel includes chert, quartzite, sandstone, siltstone, igneous and metamorphic rocks, limestone, and coal; lithologically similar to high outwash terrace (Qot2); surface forms well-developed, low-relief terrace along Ohio River valley; deposited as glacial outwash reworked by late glacial or post-glacial Ohio River; overlies older outwash deposits (Qot2); contact is sharp, drawn at scarp of next higher terrace or upland; floods occasionally.

Qot2 Alluvium, outwash, high terrace (Pleistocene)
Fine to coarse sand and gravel, with local lenses of silt and clay; gravel includes chert, quartzite, sandstone, siltstone, igneous and metamorphic rocks, limestone, and coal; lithologically similar to adjacent outwash terraces; surface mantled with collan and alluvial silty sand and sandy silt; up to 170 feet (52 m) thick; surface forms well-developed, dissected terrace along Ohio River valley; deposited as glacial outwash; represents maximum valley filling by glacial outwash valley train deposits; overlies bedrock (Pz) or older alluvial deposits (not differentiated); contact is sharp, drawn at scarp of adjacent terrace or upland; age estimated to be 120,000 to 22,000 years old; most of terrace surface is above historic flood zone.

Qot Loess (Pleistocene-Holocene)
Silt, clayey silt, and fine sand deposited by wind; typically massive; unit thickest (up to 60 feet) near Ohio River valley and thins gradually to the south; mantles bedrock upland; mapped as bedrock where less than 3 to 5 ft (1 to 1.6 m) thick in uplands; no mapped where locally found on lacustrine terrace (Qtm) and high outwash terraces (Qot2); estimated to range in age from 22,500 to 10,000 years old; locally includes thin layers of loess inferred to be older than 30,000 years.

Qes Sand dunes (Pleistocene - Holocene)
Very fine to fine sand; locally contains lenses of clayey silt; thickness uncertain, base not observed; deposited by wind in long, linear ridges; mantled by loess up to 15 ft (5 m) thick.

Qas4 Alluvium, abandoned Green River channel (Pleistocene)
Clayey silt, silty sand, and silty clay; 30 to 45 feet (10 to 15 m) thick; forms sinuous, low-lying trough inset into Green River paleovalley (Qapq); represents an abandoned channel of Green River as it migrated across the high terrace (Qot2); overlies older outwash (Qot2); contact sharp, identified by surface topography; floods occasionally.

Qapq Alluvium, Green River paleovalley (Pleistocene)
Silty sand, clayey silt and silty clay with minor chert gravel; 30 to 45 feet (10 to 15 m) thick; includes Beds at Hubert Court of Ray (1965); forms broad, linear trough inset into and overlying deposits of adjacent high outwash terrace (Qot2) and lacustrine terrace (Qtm); represents abandoned Pleistocene paleovalley of the Green River; contact is sharp, drawn at scarp of adjacent high outwash or lacustrine terrace; wood from about 40 feet deep has been radiocarbon dated to 23,150 ± 500 ybp (Ray, 1965).

Qtm Upland marginal lacustrine deposits (Pleistocene)
Clayey silt, silt, and fine sand; thickness uncertain; surface forms moderate slope and benches upland areas bordering lacustrine deposits (Qot); represents complex transition between lacustrine deposits and loess mantled upland; deposits include loess, loess-derived slopewash, colluvium, lacustrine silt and clay, and lacustrine shoreline deposits; contacts gradational and approximate, mapped on the basis of topographic expression.

Qt Slackwater deposits, lacustrine terrace (Pleistocene)
Clayey silt and silty clay; 30 to 45 feet (10 to 15 m) thick, thicker in tributary valleys; overlying complex deposits of sand, silt, clay and minor gravel; locally mantled by loess (similar to Qes, not mapped); forms prominent low-relief terrace in tributary valleys and sheltered portions of Ohio River valley; unit deposited in lacustrine and slackwater environments associated with alluviation of the Ohio River valley by glacial outwash and resulting impoundment of tributary valleys; underlying material is of apparent mixed fluvial and fluvio-lacustrine origin; contact with fluvial units is sharp, drawn on scarps separating adjacent terraces; contact with collan and upland units (Qot, Qes, Qtm) is gradational and approximate, inferred by surface topography; estimated to range in age from 23,000 to 18,000 years old.

QTg Upland gravel (Pleistocene-Pleistocene)
Gravel and medium to coarse sand; pebbles include brown, patina chert, quartz, and silicified fossils; locally cemented by iron oxide; thickness uncertain; unit found on uplands, covered by loess and poorly exposed; comparable to the Luce Gravel of Ray (1965).

Pz Bedrock and residuum (Paleozoic)
Consolidated shale, sandstone, coal, and overlying poorly sorted regolith, comprising the core of the uplands in the study area; includes areas of loess thinner than 3 to 5 ft (1 to 1.6 m).

a#1 Artificial fill, engineered fill (Modern)
Compacted material used as fill for the construction of roads, railroads, buildings, floodwalls, and other engineered structures. Present in all areas of development; mapped only where fill significantly changes the elevation.

a#2 Artificial fill, mine spoil (Modern)
Disturbed bedrock and regolith produced from mining operations.

a#3 Artificial fill, other (Modern)
Chaotic, unconsolidated fill material; includes material dredged from creeks to form artificial levees. Mapped only where fill is distinct.

rw New water (Modern)
Areas of former land which have been removed by active erosion or dredging since the completion of original topographic mapping.

GEOLOGIC SUMMARY

GEOLOGIC SETTING
The regional project area is located in the lower Ohio River Valley, and includes the confluence of the Green River with the Ohio River. The landscape of the map area is characterized by low-relief bedrock uplands separated by broad alluvial valleys. Although the area is south of the Pleistocene glacial limit, the Ohio River served as a major outlet for glacial meltwater and entrained sediment during glacial stages. Rapid accumulation of glacial outwash in the main Ohio River Valley and along the mouths of tributaries led to impoundment and extensive deposition of slackwater and lacustrine sediment in the tributary valleys. This lacustrine deposit has a complex and gradational transition with loess mantled adjacent uplands. The loess was primarily derived from the valley-bottom outwash. The uplands are underlain by Pennsylvanian relatively flat-lying, coal-bearing strata.

GEOLOGIC BEHAVIOR
The Quaternary deposits identified in the map area exhibit a wide range of grain size and geotechnical behaviors. Grain size distribution is one of the primary factors affecting the behavior of soils for geotechnical, hydrogeologic, and agricultural applications. The grain size distribution of unconsolidated sediments is dominantly controlled by the conditions under which the material was deposited. Low energy environments allow the deposition of fine-grained materials. High energy deposits limit deposition to only coarser grained materials. Eolian processes produce very well sorted (poorly graded) materials. Fluvial processes produce moderate sorting; colluvial processes produce poorly sorted deposits.

HAZARDS
Flooding is a nearly annual occurrence along the Ohio River. Floods in the late winter or early spring commonly inundate low-lying areas in the floodplain. Larger floods occur roughly every 10 to 20 years (eg. 1913, 1945, 1964, 1997), and cover parts of the low terraces. The maximum flood of record in the valley was in 1937, flooding river towns throughout the valley. Only structures on the highest outwash terraces and the lacustrine terrace (Qtm) were spared flood damage. The impact of flooding is reflected in land-use patterns through the area. Older homes and businesses have survived on the lacustrine and high outwash terraces, and on the highest parts of low terraces (Qot1, Qot10, Qot1g). Trailers and less expensively built homes are constructed on the low terraces. Only barns are found on the high parts of the floodplains (Qatp). The floodplain and low parts of the low terraces are dominantly left to woodlands or used for row-crop agriculture. Most livestock husbandry in the alluvial valleys has been abandoned and is now restricted to upland areas above the 10- to 20-year flood zone. The low-relief lacustrine terrace is locally very poorly drained.

The silt soils that dominate the loess-mantled uplands are highly erodible. Soil piping and associated cover collapses are common hazards as ground water seeps through the silt and is commonly perched above fraggans. Great care must be taken during agricultural operations not to mobilize and lose this valuable resource.

The map area is proximal to the Wabash Valley Seismic Zone and the New Madrid Seismic Zone. Small earthquakes have been felt in the area relatively frequently. The significant thicknesses of unconsolidated sediment (locally as much as 140 feet in the regional map area) raise concerns about ground motion amplification of seismic waves and potential liquefaction. The variations in lithology and thickness between materials in different map units will likely cause different responses of these materials to seismic shaking.

EXPLANATION

— Contact
- - - Approximate contact
--- Concealed fault

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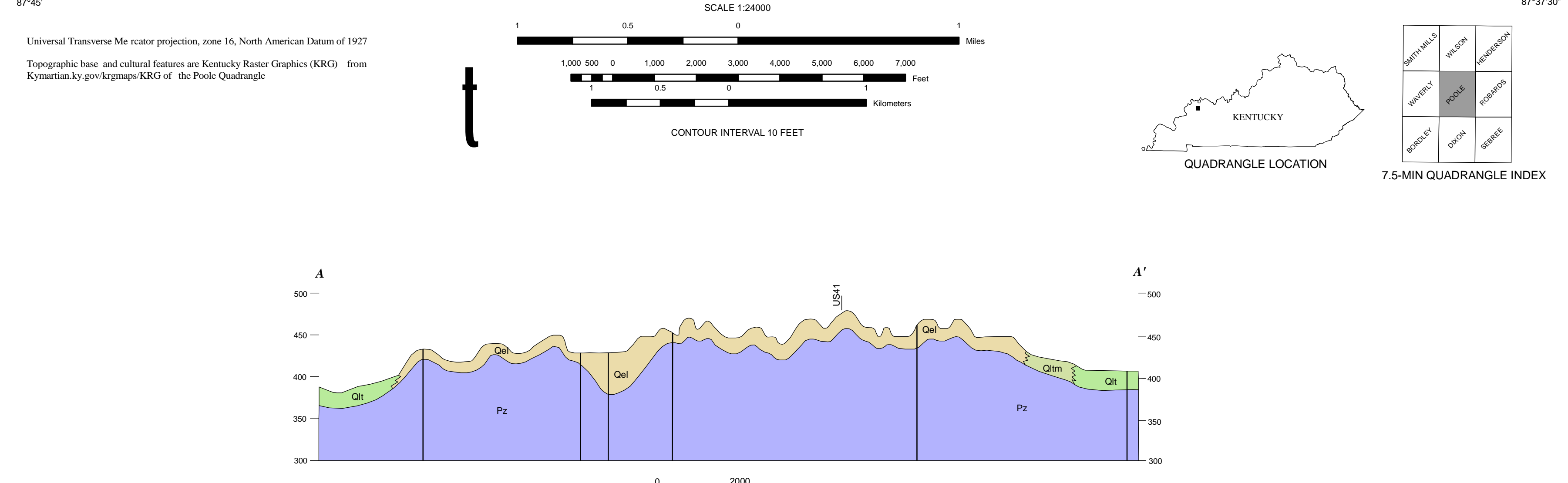
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**QUATERNARY GEOLOGIC MAP OF THE POOLE
7.5-MINUTE QUADRANGLE, WESTERN KENTUCKY**
By Michael L. Murphy
2007