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SURFICIAL GEOLOGY OF OAKVILLE QUADRANGLE
MONROE COUNTY, ILLINOIS AND ST. LOUIS COUNTY, MISSOURI

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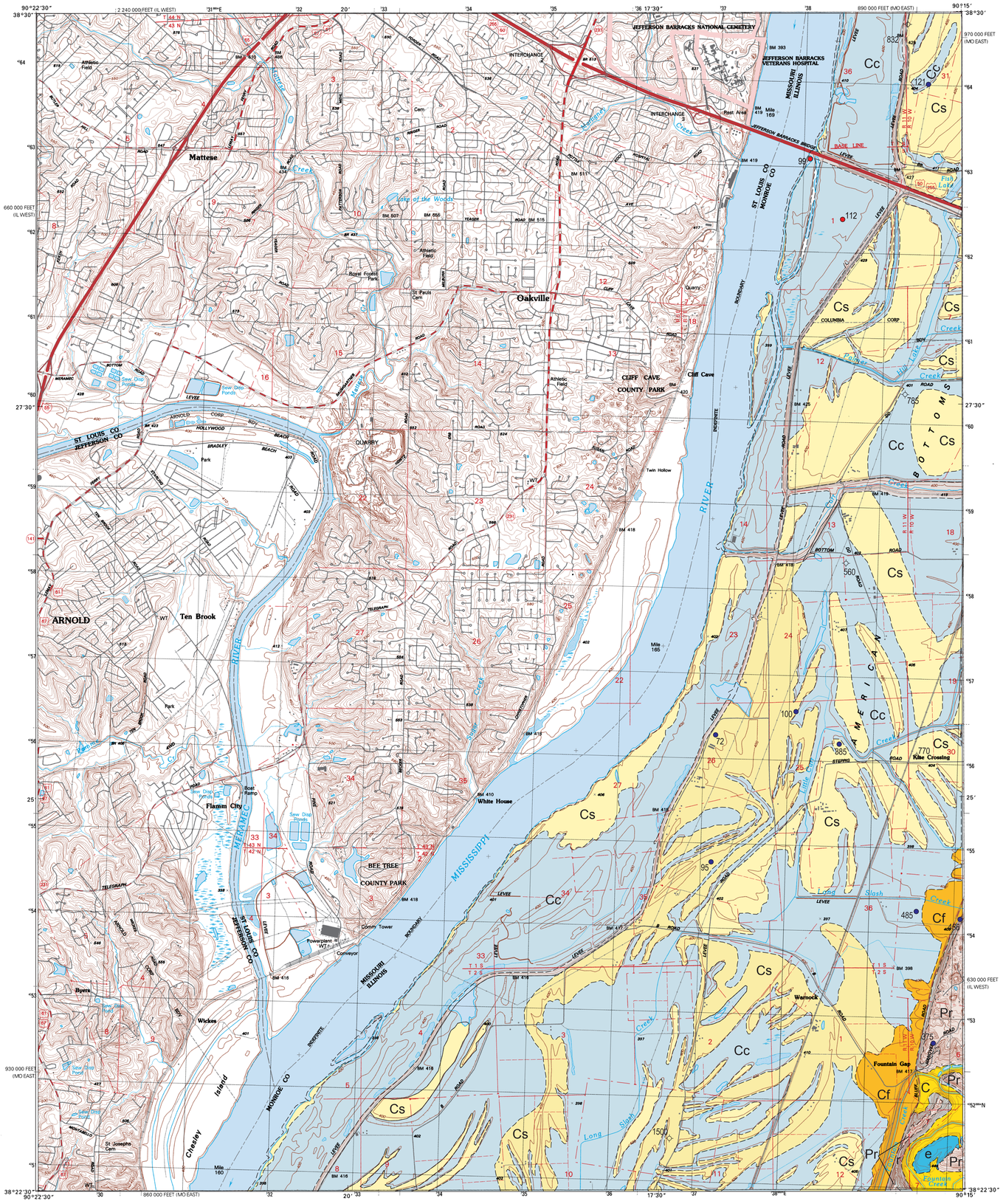

QUATERNARY DEPOSITS

Description	Unit	Interpretation
HUDSON EPISODE (~12,000 years before present (B.P.) to today)		
	Disturbed Ground D	Significant areas of earth material disrupted by human activity; includes areas of construction and fill such as quarries, levees, and interstate roads and interchanges.
Dominated by silt with minor amounts of clay, with occasional sand and gravel; gravel dominated by limestone clasts and chert; Moderately well stratified to poorly stratified at the mouth of Fountain Creek. Silt principally occurs in the area. Thickness of this unit varies from 20 to 35 feet near the mouth of Fountain Creek.	Cahokia Formation C	Alluvium (river sediment) derived from the colluvium; gravel clasts originated from the local bedrock; silt principally derived from thick loess deposits that occur in the area.
Silt, sand, and rock talus with minor amounts of clay; 10 to 18 feet thick over sandy Cahokia Formation; may contain thin fine sand beds; overlies sand, silty sand, or clay	Cahokia Formation (fan deposits) Cf	Alluvial fan deposits; occur at the mouths of streams that drain from the Mississippi River bluff; for example, fan deposits can be observed at Fountain Gap in the Oakville Quadrangle; these deposits are underlain by slackwater clayey deposits or sandy point bar deposits.
Clay and silty clay over sandy Cahokia; 5 to 50 feet thick; clay can also be deposited over sand or Cs and gravel of the Henry Formation.	Cahokia Formation (clayey facies) Cc	Backswamp deposits in abandoned meander channels or backswamp areas that originated from the Mississippi River; typically seen as modern elongate wetland environments in the American Bottoms.
Sand fine to coarse over Henry Formation, typically fines upward; silts mixed with sand in the upper 3 feet becomes coarser sand between medium to coarse grained down to about 70 to 80 feet where coarse sands and gravels of the Henry Formation are found; total depth to bedrock and thickness ranges from about 90 to 120 feet.	Cahokia Formation (sandy facies) c-s	Alluvial point bar deposits
WISCONSIN EPISODE (~75,000 - 12,000 years B.P.)		
Silt and clay, laminated to massive, up to 40 feet thick;	Equality Formation e	Slackwater lake deposits; found in terrace deposits within Fountain Creek; these sediments were deposited by backwater ponding of the Mississippi River during flood events due to glacial melt waters; plant remains can also occur.
Sand well sorted, medium grained to fine gravel with common igneous, and sedimentary erratic pebbles; ranges from 0 to 50 feet thick and occurs just above limestone bedrock in the alluvial valley.	Henry Formation (not differentiated on map below C, Cf, Cc, Cs, and e)	Outwash deposited in the Mississippi River Valley related to advances of upper midwestern glaciers that did not reach the study area.
Yellow-brown silt, thicker in bluff areas (30-40') but can be colluvial where bedrock slopes are steep; another silt below the Peoria Silt (Roxana Silt) is pinkish-brown to brownish gray and is thinner by 30-75% than the Peoria Silt above.	Peoria and Roxana Silts pr	Loess; the upper three to four feet of the silt is a forest soil (Alfisol).
ILLINOIS EPISODE (~200,000 - 130,000 years B.P.)		
Diamicton that occurs above the local bedrock, composed of a pebbly silt and clay mixture that is gray, and oxidizes to yellow-brown to orange brown; limestone, shale, and chert clasts are locally derived from bedrock and comprise the pebbles; igneous and metamorphic erratics are not so common in the study area.	Glasford Formation (not differentiated on map below pr)	Near-surface till; loess cover, the till is overlain by loess of Wisconsinan Age which are undifferentiated on the map.
PALEOZOIC BEDROCK		
The bedrock below the Quarternary in the study area is composed of Valmeyeran carbonate rocks; dense gray lime-mudstones and cherty lime-mudstones of Mississippian Age.	Near-surface bedrock r	

385 Water well (depth in feet)

770 Oil well, dry hole (depth in feet)

99 Engineering boring (depth in feet)

Base map compiled by Illinois State Geological Survey from digital data provided by the United States Geological Survey. Topography compiled from imagery dated 1986. Planimetry derived from imagery taken 1993 and other sources. Photoinspected using imagery taken 1998.

North American Datum of 1983 (NAD 83)
Projection: transverse Mercator
10,000-foot ticks: Missouri (east zone), and Illinois (west zone) State Plane coordinate systems, (transverse Mercator)
1,000-meter grid: Universal Transverse Mercator grid, zone 15

SCALE 1:24 000

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER

BASE MAP CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Released by the authority of the State of Illinois: 2003

Geology based on fieldwork by J. Devera, 2003.

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ADJOINING QUADRANGLES
1 Kirkwood
2 Webster Groves
3 Cahokia
4 Maxville
5 Columbia
6 Herculaneum
7 Valmeyer
8 Waterloo

APPROXIMATE MEAN DECLINATION, 1999

ROAD CLASSIFICATION
Primary highway, hard surface
Secondary highway, hard surface
Light duty road, hard or improved surface
Unimproved road
Interstate Route
U.S. Route
State Route

Introduction

The Oakville 7.5' Quadrangle lies about 15 miles south of St. Louis, Missouri. The Illinois part consists mainly of floodplain deposits on the American Bottoms with a small portion of bedrock bluffs in the southeastern corner of the map. Near-surface deposits on the uplands are dominated by thick loess (up to 50'), windblown silt, derived from the last glacial advance (Wisconsin Episode). The loess is underlain by glacial till of the previous glaciation (Illinois Episode). In the Mississippi River Valley, up to about 120 feet of fluvial deposits including clay, silt, sand and gravel accumulated above bedrock during the Wisconsinan glaciation and postglacial times.

The underlying bedrock is dominated by Mississippian carbonate rock with a small portion of limestone and shaly limestone of upper Ordovician age (Denny, in preparation). A large unconformity between the upper Ordovician and Mississippian rocks occurs in the quadrangle. Bedrock outcrops along the Mississippi Valley bluffs in the southeastern corner of the quadrangle are composed of the Salem and St. Louis Limestones.

Illinois Episode deposits occur in the small upland area in the southwestern corner of the quadrangle. The sediment is composed of a thin gray diamicton or the Glasford Formation. The till is less than 5 feet thick due to erosion on the steep bedrock slopes or thinner glacial ice. Striations with a direction N77°W were found in the Columbia Quadrangle just east of the study area. This indicates ice directional advance slightly south of east (Grimley, in preparation).

Wisconsin Episode sediments are composed of loess deposits in the upland areas. The source of the loess was eolian deflation from outwash sediment in the broad American Bottoms north and west of the quadrangle. Loess deposits consist of Peoria and Roxana Silts, with Peoria Silt being between 30% to 100% thicker than the Roxana Silt (McKay, 1979). Both units are dominantly silt with generally < 5% sand and about < 20 % clay when unweathered. Roxana Silt was deposited between about 55,000 and 28,000, 14C years before present, whereas Peoria Silt was deposited between about 25,000 and 12,000 14C years before present (McKay, 1979; Grimley et al., 1998). Lacustrine sediments can be found near the mouth of Fountain Gap. Here a terrace composed of laminated silt and clay of the Equality Formation was deposited in a backwater lake as meltwater flooded Fountain Creek during the Wisconsin Episode.

Deposits in the Mississippi River Valley consist of consist of several varieties and ages of water-laid sediments with an overall fining upward, grain size, sequence. The oldest and coarsest sediment is Wisconsinan sand and gravels of the Henry Formation. This basal alluvium unit is about 50 feet thick. Older mid-Pleistocene fluvial deposits associated with Illinoisan and pre-Illinoisan glaciations have presumably been eroded prior to this deposition. Above the Henry Formation is a well sorted medium to fine sand unit with little gravel. This middle layer is interpreted to be Cahokia Formation (postglacial), based on textural changes and previous studies of the valley train sediments (Bergstrom and Walker, 1956; Willman and Frye, 1970). The upper sediments in a valley consist of a mixture of sandy point bar deposits and silty clay swale fills or backswamp and abandoned channel deposits. Based on regional stratigraphy and radiocarbon dates of 2500 years on material in younger Goose Lake meander (White et al., 1984; Booth and Koldenhoff,1999), channel abandonment occurred between about 6000 and 2500 14C years before present. Young alluvial fan deposits, containing silty redeposited loess and local bedrock talus is seen at the mouth of Fountain Creek and emanates from the bluff in places. The fan deposits appear to overlap meander scar deposits so the upper fan sediments are younger than 2500 14C years old. Much of the new fan development is probably due to early land clearing and farming in the area during historical times.

Natural Resources

Groundwater

Henry Formation sand and gravel and Cahokia Formation sand in the Mississippi River flood plain is the most significant aquifer of this quadrangle. Yields from this aquifer are good; however, the potential for contamination is high because of the relatively thin discontinuous covering of silt and clay that ranges from 0 to 50 feet in thickness. Groundwater on the upland areas are primarily from limestone or bedrock aquifers.

Sand and Gravel

There is sand and gravel in the American Bottoms but sand is the dominant clastic component. Up to 90 feet of sand with some gravel occur in the Mississippi River Valley. Dredging operations for sand is mainly north of the study area. Sands in the northern part of the American Bottoms are obtained below the clayey silt and fine grained sand alluvium from 60 to 90 feet. The sand is mainly used for fill and cement. The gravel content is low, somewhat limiting the use by the construction industry.

Environmental Hazards

Mass Wasting

Erosion, undercutting and slumping of thick loess deposits at bluff edges are a potential hazard (Killey et al., 1985) Slumps in this area commonly occur when water collects on top of the clayey Sangamon Geosol or Glasford Formation, at the base of a relatively permeable loess. Water can also collect between the Peoria and Roxana Silts. Higher pore water pressures in these perched water tables increases the likelihood of slumping or failure in areas of steep slopes along the Mississippi River bluffs. Loess thickness decreases eastward away from the bluffs. In the Oakville Quadrangle loess thickness varies between 30 and 50 feet in the southeastern corner where the bluffs occur.

Karst

Sinkholes are common on the bluffs where bedrock is composed of the St. Louis Limestone. The presence of water and a dense thin bedded limestone that is fractured or jointed on steep bluffs, where loess thins, are requisites for karst development. Sinkholes can be connected to underground caverns. Dip on the St. Louis Limestone is 2° east which is a part of the western limb of the Columbia Syncline. The dip, along with sinkhole development and east-west jointing, have created solution pipes that drain water into the bluff eastward toward the Columbia Syncline. Karst aquifers are highly susceptible to contamination because groundwater recharge flows quickly into cavernous bedrock and is not filtered by fine sediment or permeable fine-grained bedrock. Karstic regions also pose a hazard to building foundations because of the danger of sinkhole widening and collapse.

Soil Erosion

Steep slopes in the southeastern part of the quadrangle are subject to severe soil erosion due to the nature of loessial soils. Upland areas mapped as Glasford Till with overlying loess (Peoria and Roxana Silt), have loose, windblown, near-surface silt deposits that are soft and weakly cohesive, and have low shear resistance. These loess deposits are easily eroded by running water during heavy rainfalls. Runoff during rainstorms can quickly erode into and enlarge rills and gullies, accelerating the process of erosion, as water is channeled into the drainage system of Fountain Creek. Early agricultural practices also contribute to the amount of sediment eroded into watersheds.

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