ILLINOIS BASIN CONSORTIUM
ILLINOIS STATE GEOLOGICAL SURVEY
William W. Shilts, Chief
Open File Series 1997- 11

EXPLANATION

Pleistocene

River alluvium and glacial outwash: Sand, silt, clay, and gravel deposited in valleys. Predominantly alluvial deposits consisting of fine- grained overbank deposits (clay and silt) and coarse-grained stream channel deposits (sand and gravel). This unit underlies floodplains, stream terraces, and alluvial fans.

Lowland silt complex: Lake clays and loess- covered terraces consisting of laminated to massive silts and clays. The lacustrine units were deposited in slack- water lakes in tributary valleys. These deposits are underlain by fluvial sands, silts and clays (particularly the southern half of the region). South of the Wabash- Ohio confluence in Illinois, the unit includes loess- covered fluvial terraces. The lowland silt complex has not been differentiated in Kentucky and is included with river alluvium (yellow unit on map).

Glacial deposits, mainly till: A mixture of clay, silt, sand and gravel deposited by glacial ice. Occurs in upland areas, and is commonly overlain by windblown silt (loess) or sand deposits along the major river valleys.

Pliocene to Pleistocene

Unsorted to poorly sorted gravel and sand in upland areas. Predominantly slightly rounded to well rounded chert gravel that is overlain by windblown silt (loess).

Cretaceous and Tertiary

Unsorted to poorly sorted, unconsolidated fine grained to coarse grained quartz sand mixed with silt, clay and some gravel in upland areas.

Mississippian and Pennsylvanian

Limestone, dolomite, sandstone, shale and coal commonly overlain by windblown silt (loess). Near the Ohio River in southern Indiana, these loess deposits may reach thicknesses greater than 50 feet.

Other

Surface mined area

River or lake

Cities and towns; those with 1990 population of 10,000 or more are labeled

—50— Thickness of unconsolidated materials, contour interval 50 feet

Selected river or stream

Inferred limit of glaciation

State boundaries

County boundaries

Description of Geologic Materials in the Wabash River Basin Region

The surficial geologic units of the project area consist of unlithified Pleistocene and Recent sediments that range from poorly consolidated (loose and uncompacted) to over consolidated (dense and compacted). These deposits are up to 200 feet thick and overlie a variety of mostly Pennsylvanian age bedrock units. In the river valleys and lowlands, the surficial geologic materials include layers of clay, silt, sand, and gravel deposited as river alluvium and glacial outwash, fine- grained silts and clays deposited in slack- water lakes formed during glacial melt water floods, and some sand deposited in dunes. The region contains many extensive lake terraces and a wide, modern floodplain. North of the limit of glaciation, the surficial geologic units in the upland areas consist mostly of glacial till, a compacted, generally unsorted mixture of silt, clay, sand, and gravel. South of the limit of glaciation, the uplands are characterized by near- surface bedrock units that include Mississippian and Pennsylvanian limestones, dolomites, and sandstones and Cretaceous and Tertiary sand and gravel. In the upland areas, windblown silt (loess) overlies nearly all other geologic units. Loess thicknesses of 10 to 20 feet are common in the areas closest to the Wabash and Ohio River valleys, and exceed 50 feet in some areas of southern Indiana.

Relationship of Geologic Materials to Earthquake Ground Movements

The Lower Wabash River Valley region has experienced many minor to moderate earthquakes and seismologists infer that the area is capable of producing strong earthquakes in the future. When an earthquake occurs, energy is released and moves away from the focus, toward the surface. The amount of surface shaking is influenced by the distance from the focus and the thickness and type of materials present over the bedrock, (e.g., fine- grained lake deposits) can amplify earthquake ground motions. Applying Borcherdt's (1994) classification for seismic amplification to the geologic materials shown on this map: the Cretaceous/Tertiary unit, the glacial till, and lacustrine deposits may amplify bedrock movements approximately 1.5 to 2.5 times. Areas where these geologic units are more than 50 feet thick may cause even greater amplifications. At a given distance from the focus, areas underlain by the modern and Pleistocene alluvial deposits will experience the most severe shaking. Liquefaction is a process in which shaken saturated sand sediments temporarily lose their strength and behave more as a liquid than as a solid. Where alluvial deposits contain shallow water saturated sand layers (within 10 feet of the ground surface), and are greater than 8 feet thick these sand units may liquefy with intense ground shaking.

ACKNOWLEDGEMENTS

Information on the thickness of glacially derived materials is from Gray (1983), Noger (1988), and Piskin and Bergstrom, (1975). Thicknesses of glacially derived material have not been mapped in Illinois south of the limit of glaciation. About 1,170 well records were used to revise the thickness contours along the Wabash River Valley.

The map is based on interpretations of available data obtained from a variety of sources. Locations of most data points were not field verified and interpretations based on them are not certain. This map was prepared for regional planning purposes and should not be used for site- specific assessments.

This map was produced by the Illinois Basin Consortium (IBC), a joint project of the State Geological Surveys of Illinois, Indiana, and Kentucky. Contributions were made by James Drahovzal and Lance Morris, Kentucky Geological Survey; Paul DuMontelle, Barbara Stiff, Paul Jahn and Robert Bauer, Illinois State Geological Survey; and Susan Rhea, U.S. Geological Survey. Special thanks to Russell Wheeler, USGS project coordinator.

This map is one of a series of six that comprise a seismotectonic map atlas of the lower Wabash Valley and vicinity. Maps A through D are available from the USGS. for information and ordering assistance, call 1- 800- HELP- MAP. The OFS series maps (1997-11,12) are available from the Illinois State Geological Survey, for ordering information call 217- 333- ISGS.

Map No. Theme: features shown

I- 2583- A Seismicity: earthquake epicenters, areas most intensely shaken, focal mechanisms, seismograph and acclerograph locations, and locations of prehistoric earthquake-induced liquefaction. (Rhea, Wheeler, 1996).

I- 2583- B Modified Mercalli intensities. (Rhea, Wheeler, and Hopper, 1996).

I- 2583- C Geophysical survey and modeling lines, wells, and global positioning system monuments (Wheeler, Diehl, and others, 1997).

I- 2583- D Faults, basement structure, igneous rocks, and geophysical survey and modeling lines neotectonic features (Wheeler, Diehl and others, 1997).

OFS1997- 11 Surficial geology: near surface geology and thickness of unconsolidated materials (Hester, and others, 1997).

OFS1997- 12 Infrastructure: roads, pipelines, powerlines, hospitals, airports, etc. (Smith, and others, 1997).

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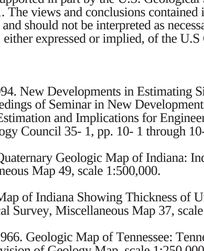

INDEX MAP SHOWING STUDY AREA

Base modified from U.S. Geological Survey digital line graph data (1989), which was digitized from U.S. Geological Survey 1:100,000-scale planimetric and topographic maps.

Albers Equal-Area Conic Projection
Standard Parallels 29.5 and 45.5
Central Meridian 88 W
National Geodetic Vertical Datum of 1929

Scale 1:250,000

5 0 5 10 15 20 25 30 Miles

5 0 5 10 15 20 25 30 Kilometers

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MAP SHOWING GEOLOGIC MATERIALS IN THE VICINITY OF THE LOWER WABASH VALLEY ILLINOIS, INDIANA, AND KENTUCKY

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