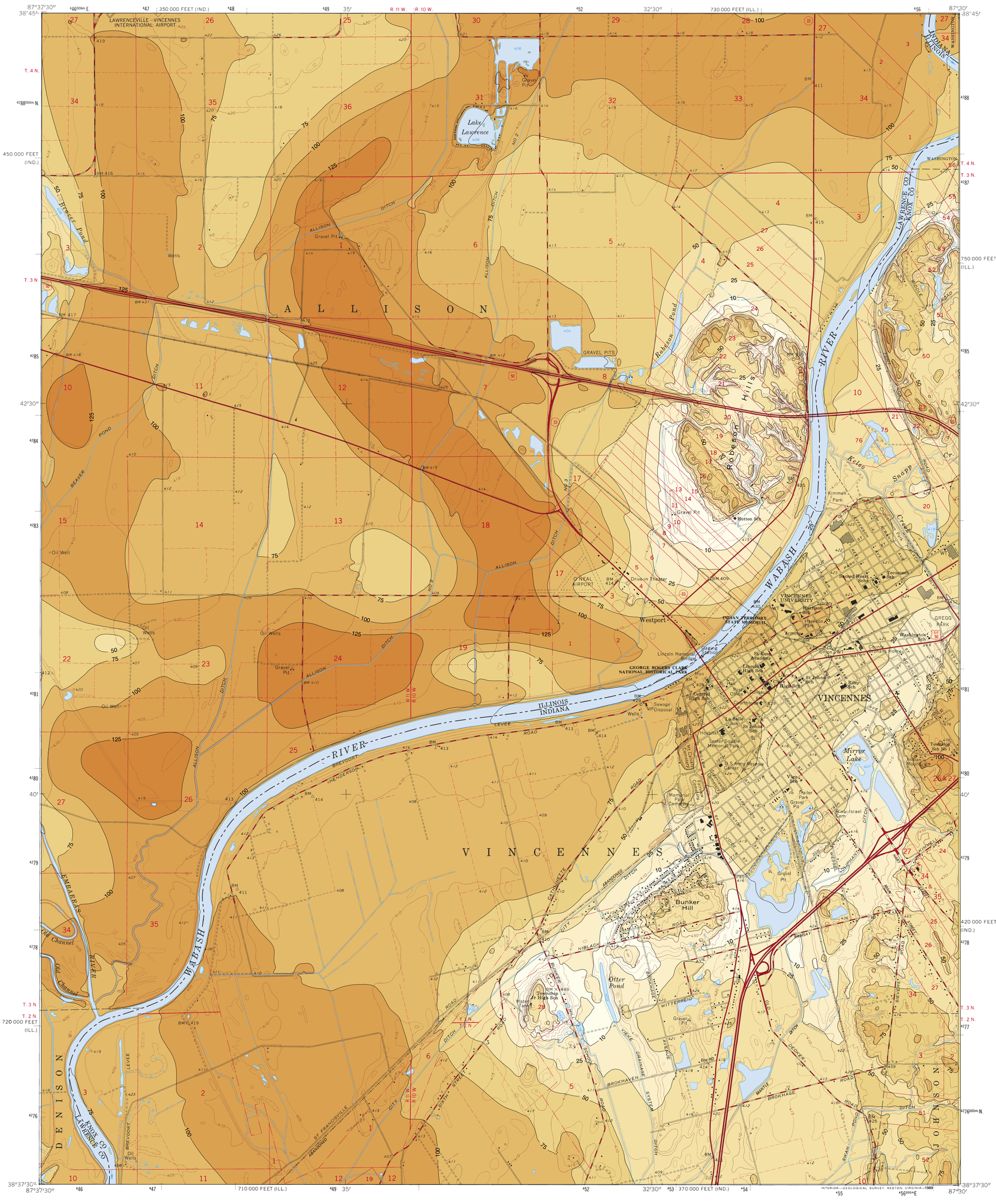
Department of Natural Resources
ILLINOIS STATE GEOLOGICAL SURVEY
William W. Shilts, Chief

DRIFT THICKNESS OF VINCENNES QUADRANGLE
KNOX COUNTY, INDIANA AND LAWRENCE COUNTY, ILLINOIS

C. Pius Weibel
2005

Illinois Preliminary Geologic Map
IPGM VIncennes-DT



Drift Thickness

This map depicts the thickness of drift, or the unlithified Quaternary glacial and post-glacial sediments that have been deposited over the bedrock. Drift also includes the modern soil, which has developed into these sediments. The thickness of the drift varies considerably across the quadrangle. Most of the variation in thickness is caused by the irregular topography of the top surface of the underlying bedrock (fig. 1). This almost entirely buried surface was probably first modified prior to the Quaternary by a smaller version of the modern Wabash River drainage system, although most of the morphology of this surface was formed later during the early and middle Quaternary (Wayne 1952, Thornbury 1958). The morphology of the modern land surface also contributed to the variation of the drift thickness. The effects of incision by the Wabash River and its tributaries are readily discernable on the shape of the drift contours. Overall, the material is thickest (more than 100 feet) in ancient bedrock channels within the Wabash River valley and the Embarras River paleo-valley (fig. 1).

The drift is thin or absent on several isolated, bedrock-based hills (e.g., Robeson Hills and Bunker Hill) and on parts of the uplands on the east side of the Wabash River. Most of the material was deposited during the Pleistocene Epoch when the region was subjected to multiple advances and retreats of continental glaciers. Early glaciation (Illinois Episode) deposited layers of till (composed of diamicton, an unsorted and nonstratified mixture of clay, silt, sand, and rock clasts) throughout the area. During the most recent glaciation (Wisconsin Episode), glacial ice did not reach as far south as the Vincennes area, but large amounts of outwash (mostly sand and gravel transported by meltwaters) were deposited within the valley. Loess (wind-blown silt and fine sand), associated with the outwash, was also deposited over most, if not all, of the quadrangle. Silt, sand, and gravel are the prevalent deposits within the Wabash River valley and its tributaries. Drift on the uplands generally is composed of loess overlying till.

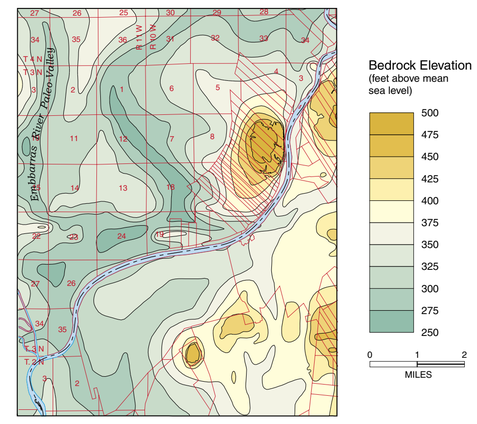


Figure 1 Bedrock topography of Vincennes Quadrangle. This surface defines the base of the drift deposits. A grid of this surface was subtracted from a grid of the land surface to produce the drift thickness map. Modified from Weibel (2005).

Map Use

This map provides information that is useful in searching for sand and gravel layers within the Quaternary deposits. Sand and gravel deposits are often important aquifers and commonly occur in both paleo-valleys and modern valleys where the drift is thick. Near-surface sand and gravel deposits may also provide potential as aggregate resources. Well drillers and geophysical surveyors can use this map to predict the depth to bedrock. Knowledge of the drift thickness also is important for determining the costs of removing shallow, economically significant deposits of coal from the bedrock.

Mapping Methods

This map is based on data from other pre-existing or recently completed maps. The map was derived from topographic maps of the bedrock surface (Weibel 2005) and of the land surface (U.S.G.S. topographic data). It was produced using Dynamic Graphics' EarthVision software to calculate the difference between digital grids of elevations of the bedrock surface and elevations of the land surface. The resultant drift thickness grid (using a grid cell size of about 66 feet) was contoured using EarthVision and converted to an exportable format. Environmental Systems Research Institute's ArcGIS software was used for a final refining of the contours and for the overall production of the map. Drift thickness contour lines also cross the top of water bodies because the surfaces of these bodies are considered to be part of the land surface. Weibel (2005) included a map displaying locations of data used to derive the digital grid of the bedrock surface. This map (fig. 2) also contains buffer contours, which indicate a qualitative measure of the reliability of the elevations of the bedrock surface extrapolated away from data sites. The data map is also relevant to the drift thickness map. For example, drift thickness contours within the 1000-foot buffer should be more reliable than those within the 5000-foot buffer.

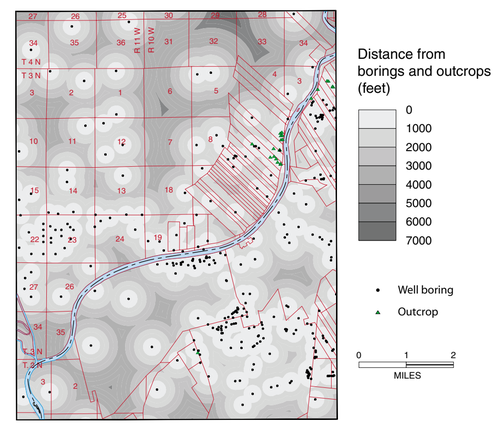


Figure 2 Data Distribution map. Map shows the distribution of subsurface and outcrop data used to construct the bedrock topography map (Weibel 2005). Data points are surrounded by 1000-foot buffers.

References

Thornbury, W.D., 1958, The geomorphic history of the Upper Wabash Valley: American Journal of Science, v. 256, p. 449–469.

Wayne, W.J., 1952, Pleistocene evolution of the Ohio and Wabash Valleys: Journal of Geology, v. 60, p. 575–585.

Weibel, C.P., 2005, Bedrock topography of Vincennes Quadrangle, Knox County, Indiana and Lawrence County, Illinois: Illinois State Geological Survey, IGQ Vincennes-BT, 1:24,000.

Base map compiled by Illinois State Geological Survey from the United States Geological Survey topographic map dated 1998. Topography compiled from imagery dated 1958 and 1962 and planetable surveys 1961 and 1965. Planimetry derived from imagery taken 1987 and other sources. Photoinspected using imagery dated 1998.

North American Datum of 1927 (NAD 27)
Projection: Transverse Mercator
10,000-foot ticks: Illinois State Plane Coordinate system, east zone and Indiana State Plane Coordinate System, west zone (Transverse Mercator)
1,000-meter ticks: Universal Transverse Mercator grid system, zone 16

Recommended citation:
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SCALE 1:24 000

1 1/2 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER

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

Released by the authority of the State of Illinois: 2005

Geology based on data analysis by C. P. Weibel, 1999-2001.

Digital cartography by C.P. Weibel and T. Goeppinger, Illinois State Geological Survey.

This Illinois Preliminary Geologic Map (IPGM) is a lightly edited product, subject to less scientific and cartographic review than our Illinois Geological Quadrangle (IGQ) series. It will not necessarily correspond to the format of IGQ series maps, or to those of other IPGM series maps. Whether or when this map will be upgraded depends on the resources and priorities of the ISGS.

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ILLINOIS DEPARTMENT OF NATURAL RESOURCES

1905-2005 ISGS Illinois State Geological Survey

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ADJOINING QUADRANGLES
1 Birds
2 Russellville
3 Oaktown
4 Lawrenceville
5 Fritchton
6 Saint Francisville
7 Decker
8 Iona, IN

APPROXIMATE MEAN DECLINATION, 2005

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Unimproved road
64 Interstate Route
50 U.S. Route
158 State Route