Bedrock Topography of Spring Bay Quadrangle

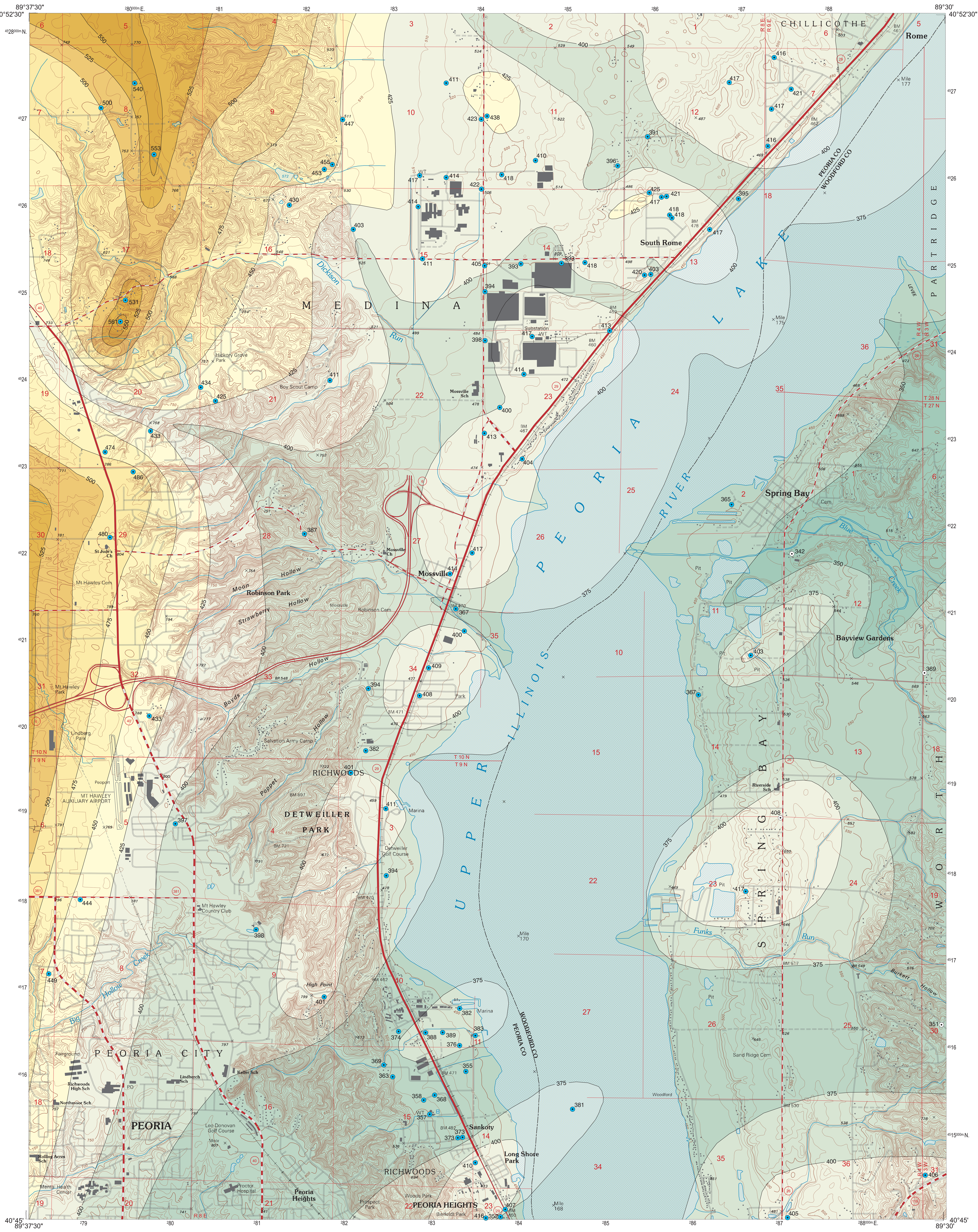
Peoria and Woodford Counties, Illinois

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

Illinois Geologic Quadrangle Map
IGQ Spring Bay-BT

C. Pius Weibel and Andrew J. Stumpf

2005



Bedrock Topography

The bedrock surface is the top of the lithified rock that underlies the Quaternary glacial and postglacial sediments. The geologic unit at the bedrock surface is the shale-dominated Pennsylvanian Carbondale Formation (Willman et al. 1967). The bedrock is not exposed anywhere in the quadrangle. The sediment overlying the bedrock consists of Quaternary diamicton (a mixture of gravel, sand, silt, and clay), sand, gravel, and wind-blown silt (loess). The elevation of this surface in the Spring Bay Quadrangle ranges from about 340 feet to more than 550 feet above mean sea level. This map displays two major landscape elements: (1) a very broad buried bedrock valley incised by a deeper, narrower channel and, (2) to the west, uplands that are more than 150 feet above the buried valley. A broad terrace, demarcated by the 400-foot contour, occurs between this western valley wall and the deep, narrow channel to the east. This terrace is dissected by numerous tributaries that drained the uplands to the west (fig. 1).

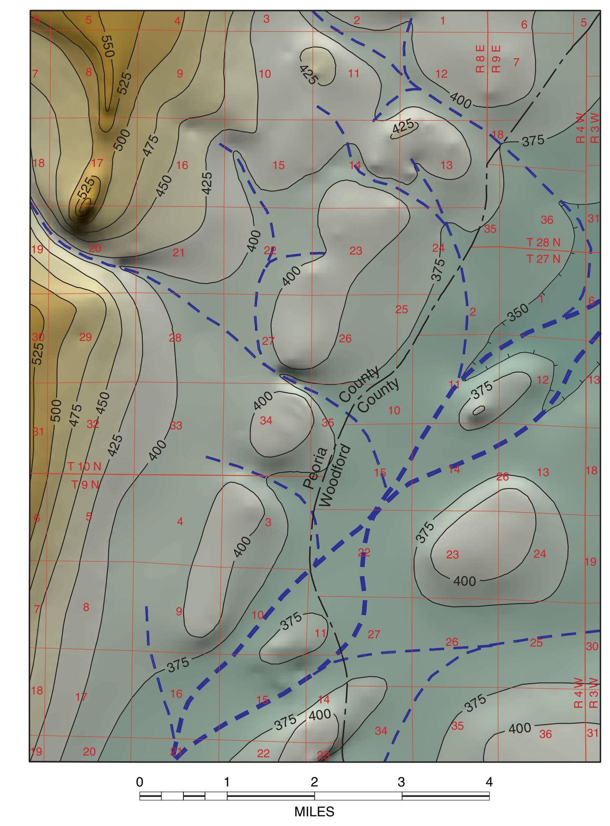


Figure 1 Shaded relief map of the bedrock surface. Superimposed contours have an interval of 25 feet. Note that the western side of the bedrock valley is about 1 to 2 miles west of the modern western valley wall. Blue dashed lines indicate the fluvial drainage patterns prior to the onset of Quaternary glaciation. The thicker lines mark the southwest-trending main channel of the ancient river valley; thinner lines indicate tributaries. Although the lowest elevations of the bedrock surface (hachured contour) within the quadrangle are in the upstream part of the main channel, regional analysis indicates that flow was to the southwest.

During the Quaternary Period, the area was subjected to multiple advances and retreats of continental glaciers that resulted in the complex evolution of the river valley system, which includes elements of the ancient Mississippi River and the modern Illinois River. Prior to about 25,000 years ago (Curry 1998), the Mississippi River flowed southeastward through what is now a buried bedrock valley stretching from northwest Whiteside County to near the village of Henry (Leverett 1895, Horberg 1950). From Henry, the ancient river flowed southward approximately along the path of the modern Illinois River, including the eastern part of the quadrangle. Wisconsin Episode glaciers completely covered the quadrangle, depositing till and sands and gravels. These sediments filled many of the pre-existing bedrock valleys, including the ancient Mississippi Valley, from near Sheffield, Bureau County, to near the southern edge of Peoria. The Mississippi River was forced to abandon its course through central Illinois to flow along its present course at the western state boundary (Shaffer 1954). The abandoned portion of the ancient Mississippi Valley below Peoria subsequently became the main trunk of the modern Illinois River valley. Within the study area, the Illinois River subsequently has eroded into the unconsolidated drift deposits, but this fluvial down-cutting has not been sufficient to reach the bedrock surface.

Map Use

This map is useful for delineating the locations of buried bedrock valleys where sand and gravel deposits commonly constitute very productive aquifers and for defining flow patterns and recharge/discharge pathways of these aquifers. The map is essential for accurate prediction of the volume and distribution of shallow, economically significant deposits of coal and construction stone. It is a useful predictive guide for drilling operations, construction and engineering projects, and geophysical surveys and as a base map from which geological units and bedrock structures can be delineated. This bedrock surface is the lower limiting surface that must be integrated into three-dimensional models of the overlying Quaternary sediments.

Mapping Methods

This map is based on selected data from subsurface borings held at the Geological Records Unit of the Illinois State Geologic Survey. The data comprise 126 borings (104 within and 22 adjacent to the quadrangle) that, within the quadrangle, consist mostly of water wells. Locations and bedrock elevations were entered into a spreadsheet. A grid of the bedrock surface with a cell size of 88 × 113 feet was created from the spreadsheet and contoured using Dynamic Graphics Inc. EarthVision software. Manually drawn contours for the bedrock topography map were produced by overlay and comparison of the grid map, the software-generated contours, the statewide bedrock topographic map (Herzog et al. 1994), and the data points. This map was compiled using Environmental Systems Research Institute ArcInfo software.

Data Distribution

The distribution of the well data with 1,000-foot contours is shown in figure 2. The buffer contours indicate a qualitative measure of the reliability of the elevation data extrapolated beyond well locations. The bedrock topography in areas having more data is less speculative than the topography in areas with few data. For example, bedrock contours within the 1,000-foot buffer are more reliable than those between the 4,000- and 5,000-foot buffers. Users of this map also should be aware that the accuracy of the boring locations and the lithological data are of variable quality.

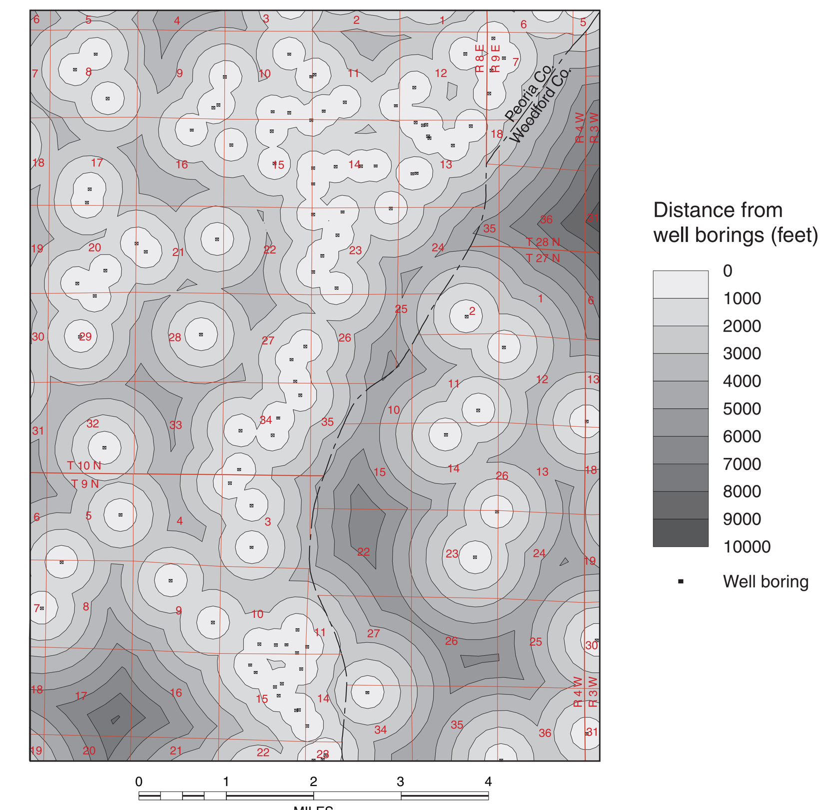


Figure 2 Well data distribution map. Data points are surrounded by 1,000-foot contours, indicating the relative reliability of the bedrock surface elevations interpreted between the data points.

References

Curry, B.B., 1998, Evidence at Lomax, Illinois, for mid-Wisconsin (~40,000 yr B.P.) position of the Des Moines Lobe and for diversion of the Mississippi River by the Lake Michigan Lobe (20,350 yr B.P.): Quaternary Research, v. 50, no. 2, p. 128–138.

Herzog, B.L., B.J. Stiff, C.A. Chenoweth, K.L. Warner, J.B. Sieverling, and C. Avery, 1994, Buried bedrock surface of Illinois: Illinois State Geological Survey, Map 5, 1:500,000.

Horberg, L., 1950, Bedrock topography of Illinois: Illinois State Geological Survey, Bulletin 73, 111 p.

Leverett, F., 1895, The preglacial valleys of the Mississippi and its tributaries: Journal of Geology, v. 3, p. 744–745.

Shaffer, P.R., 1954, Extension of Tazewell glacial substage of western Illinois and eastern Iowa: Geological Society of America Bulletin 65, p. 443–456.

Willman, H.B., J.C. Frye, J.A. Simon, K.E. Clegg, D.H. Swann, E. Atherton, C. Collinson, J.A. Lineback, and T.C. Buschbach, 1967, Geologic map of Illinois: Illinois State Geological Survey, 1:500:000.

Base map compiled by Illinois State Geological Survey from digital data provided by the United States Geological Survey. Topography compiled from imagery dated 1946. Revised and updated from imagery dated 1995. Field checked 1996.

North American Datum of 1983 (NAD 83)
Projection: Transverse Mercator
10,000-foot ticks: Illinois State Plane Coordinate system, west zone (Transverse Mercator)
1,000-meter ticks: Universal Transverse Mercator grid system, zone 16

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SCALE 1:24 000

1 1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

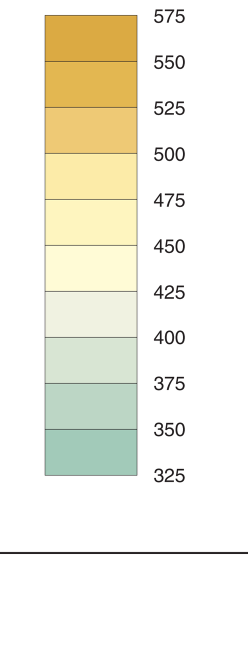
1 .5 0 1 KILOMETER

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 collected by C.P. Weibel and A.J. Stumpf, 2001–2003.

Digital cartography by M. Barrett, Illinois State Geological Survey.



Data Type

- Water well to bedrock
- Other boring to bedrock

Note: Data symbol labels indicate elevation in feet above mean sea level.

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

1905-2005 ISGS Illinois State Geological Survey

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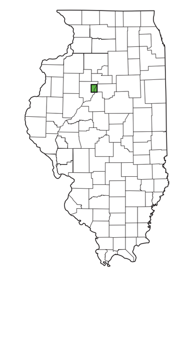
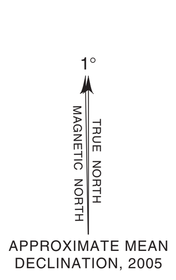


1	2	3
4		5
6	7	8

ADJOINING QUADRANGLES
1 Edelstein
2 Rome
3 Chillicothe
4 Dunlap
5 Germantown Hills
6 Peoria West
7 Peoria East
8 Washington



APPROXIMATE MEAN DECLINATION, 2005

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Unimproved road
State Route