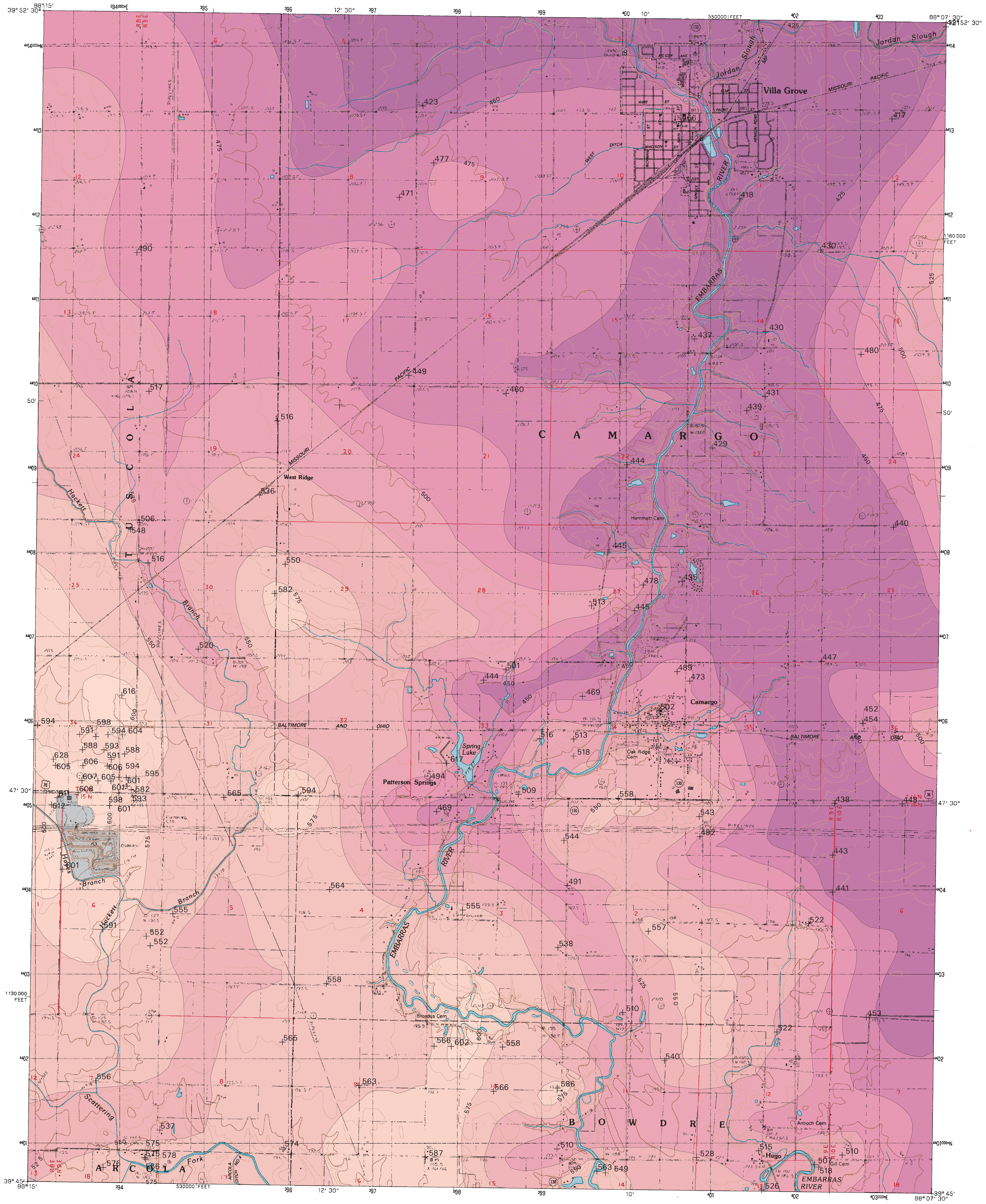
Department of Natural Resources
ILLINOIS STATE GEOLOGICAL SURVEY
Illinois Geologic Quadrangle Map: IGQ Villa Grove-BT
William W. Shilts, Chief
1999

TOPOGRAPHIC MAP OF BEDROCK SURFACE

Villa Grove Quadrangle, Douglas County, Illinois

C. Pius Weibel



Scale 1:24,000

0 — 2 miles
0 — 2 kilometers
0 — 2000 feet

BASE MAP CONTOUR INTERVAL 1.5 METERS
Base map compiled at the Illinois State Geological Survey (ISGS)
from Digital Raster Graphic data (1982) provided by the U.S. Geological Survey.
1927 North American datum
Universal Transverse Mercator projection - Zone 16

DISCLAIMER: This map was prepared for the purpose of quadrangle mapping, resource evaluation, and regional planning. It is based on interpretations of available data obtained from a variety of sources. Certain locations may not have been field-verified or the data may not have been rigorously reviewed. The accuracy of the unverified data and the interpretations based upon them are not guaranteed by the Illinois State Geological Survey.

FOR FURTHER INFORMATION CONTACT:

Illinois State Geological Survey
Natural Resources Building
615 East Peabody Drive
Champaign, IL 61820- 6964

(217) 333- 4747

http://www.isgs.uiuc.edu

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1	2	3
4		5
6	7	8

1 Tolono
2 Villa Grove NW
3 Longview
4 Tuscola
5 Murdock
6 Arcola
7 Hindsboro
8 Oakland

NORTH

ADJOINING 7.5-MINUTE QUADRANGLES

Acknowledgements

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Geologic History of the Bedrock Surface

The bedrock surface is the top of the lithified Paleozoic rock that underlies the generally unlithified Quaternary (Pleistocene and recent) sediments and soil. The hills and valleys (topography) of this surface are formed mostly by processes of physical erosion, which are similar to modern fluvial and glacial erosion in regions where bedrock occurs at the surface and in regions where continental glaciers occur (e.g., Greenland). Exactly when this erosion occurred is problematic, but it could have begun as early as the end of the Cretaceous Period. Most of the topography of this irregular surface, however, probably was formed during the early part of the Pleistocene Epoch (Kempton and others, 1991). The most prominent features produced by this event are large buried bedrock valleys separated by uplands (see regional map, Figure A). The Pesotum bedrock valley, a tributary to the Mahomet bedrock valley, straddles the northern edge of the Villa Grove Quadrangle. A major tributary bedrock valley of the Pesotum traverses most of the eastern half of the quadrangle. During the Pleistocene Epoch, the region was subjected to multiple advances and retreats of continental glaciation. The bedrock surface probably had been substantially modified by both glacial and fluvial processes prior to the entire area being buried by glacial deposits.

Map Use

This map of the topography of the bedrock surface is useful (1) for delineating buried bedrock valleys where sand sand gravel deposits commonly form very productive aquifers, (2) for defining flow patterns and recharge/discharge pathways of aquifers, (3) for predicting the amount and distribution of shallow economically significant rocks (shallow coal, limestone, and dolomite deposits), (4) as a predictive guide for drilling operations and geophysical surveys, (5) as a base map for detailed mapping of the geology of the bedrock, and (6) as a confining basal map for mapping the lower part of the overlying unlithified Quaternary sediments.

Mapping Methods

This map is based on data derived from well records in the Geological Records Library of the Illinois State Geological Survey. The well types used included water, petroleum, coal, and stratigraphic borings. The contour map was produced using Dynamic Graphics' EarthVision (EV) software. Location and elevation data were entered, a grid of the surface was produced using a grid cell size of just greater than 700 feet, and the grid was contoured. A 3-dimensional depiction of the bedrock surface is shown in Figure B. The contoured grid was manually edited using EV's graphic editor to produce a more geologically realistic surface. Environmental Systems Research Instiitute's Arc/Info software was used for a final refining of the contours and for the overall compilation of the map.

Data Distribution

The distribution of the data, along with 1,000-foot wide buffers around well locations, are shown in Figure C. The buffer contours on this map indicate a relative measure of the extrapolation of the elevation of the bedrock surface away from well locations. For example, extrapolated elevations within the 1,000-foot buffer may be more reliable than those within the 5,000-foot buffer. Users of this map need to be aware that the accuracy of the well records used for this project varies. The accuracy of the records is very difficult to quantify. The reliability of the accuracy of the records is not shown in Figure C.

References

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 Illinois Map 5, map scale 1:500,000.

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

Kempton, J. P., W. H. Johnson, P. C. Heigold, and K. Cartwright, 1991, Mahomet bedrock valley *in* east-central Illinois—Topography, glacial drift stratigraphy and hydrology, in W. N. Melhorn and J. P. Kempton, editors, Geology and Hydrogeology of the Teays-Mahomet Bedrock Valley System, Geological Society of America Special Paper 258, p. 9–124.

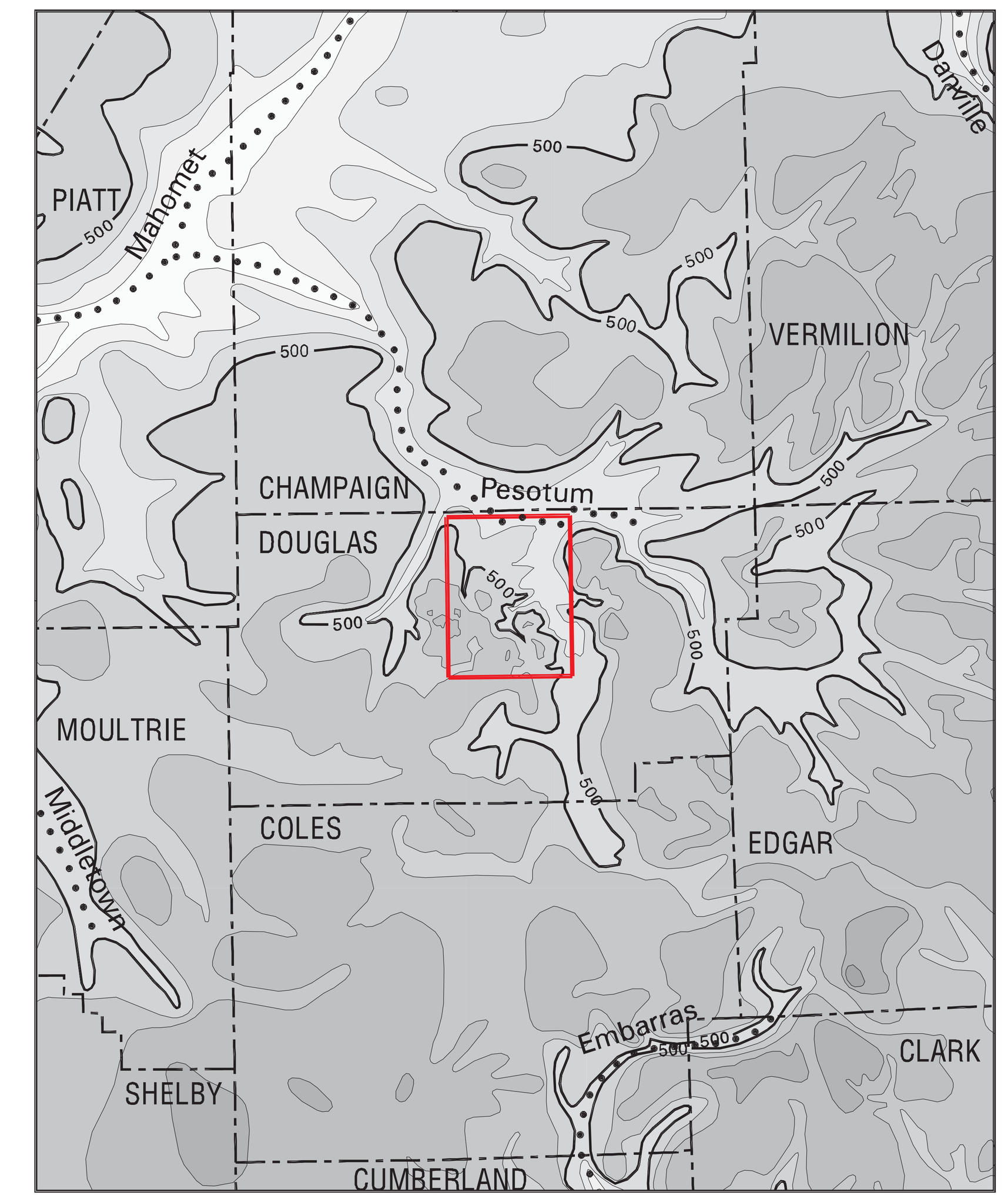
Contour Interval 25 Feet
Elevation Datum Mean Sea Level

- Less than 425
- 425 - 450
- 450 - 475
- 475 - 500
- 500 - 525
- 525 - 550
- 550 - 575
- 575 - 600
- Greater than 600
- Quarry
- Water
- + 452 Well Location with Bedrock Elevation

View of the Tuscola Quarry (Section 6, T. 15 N., R. 9 E.), looking west. The quarry is the only site in the quadrangle where the bedrock surface is exposed. The dolomite and limestone forming the vertical wall of the quarry consist of the Devonian Lingle and Grand Tower Formations.

Several deep stratigraphic borings were completed for this project. The geologist (C. P. Weibel) is examining rock core that was extracted from the bedrock by the drilling rig in the background.

Figure A. Regional Bedrock Surface Topography



Contour Interval 50 feet
Elevation Datum Mean Sea Level

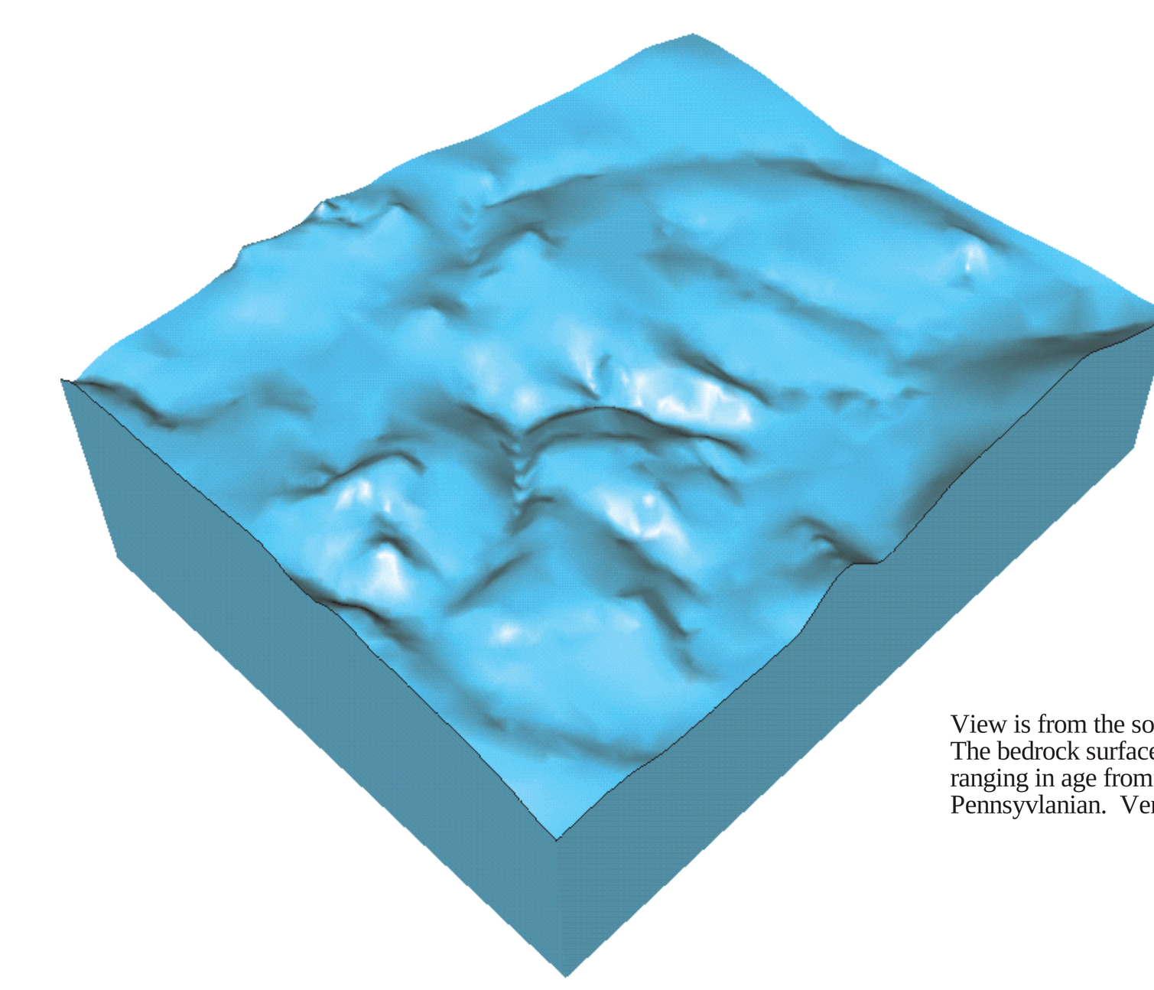
- Above 700
- 650 - 700
- 600 - 650
- 550 - 600
- 500 - 550
- 450 - 500
- 400 - 450
- 350 - 400
- Below 350
- Axis of buried bedrock valley

0 — 10 Miles
0 — 10 Kilometers

Scale 1:500,000

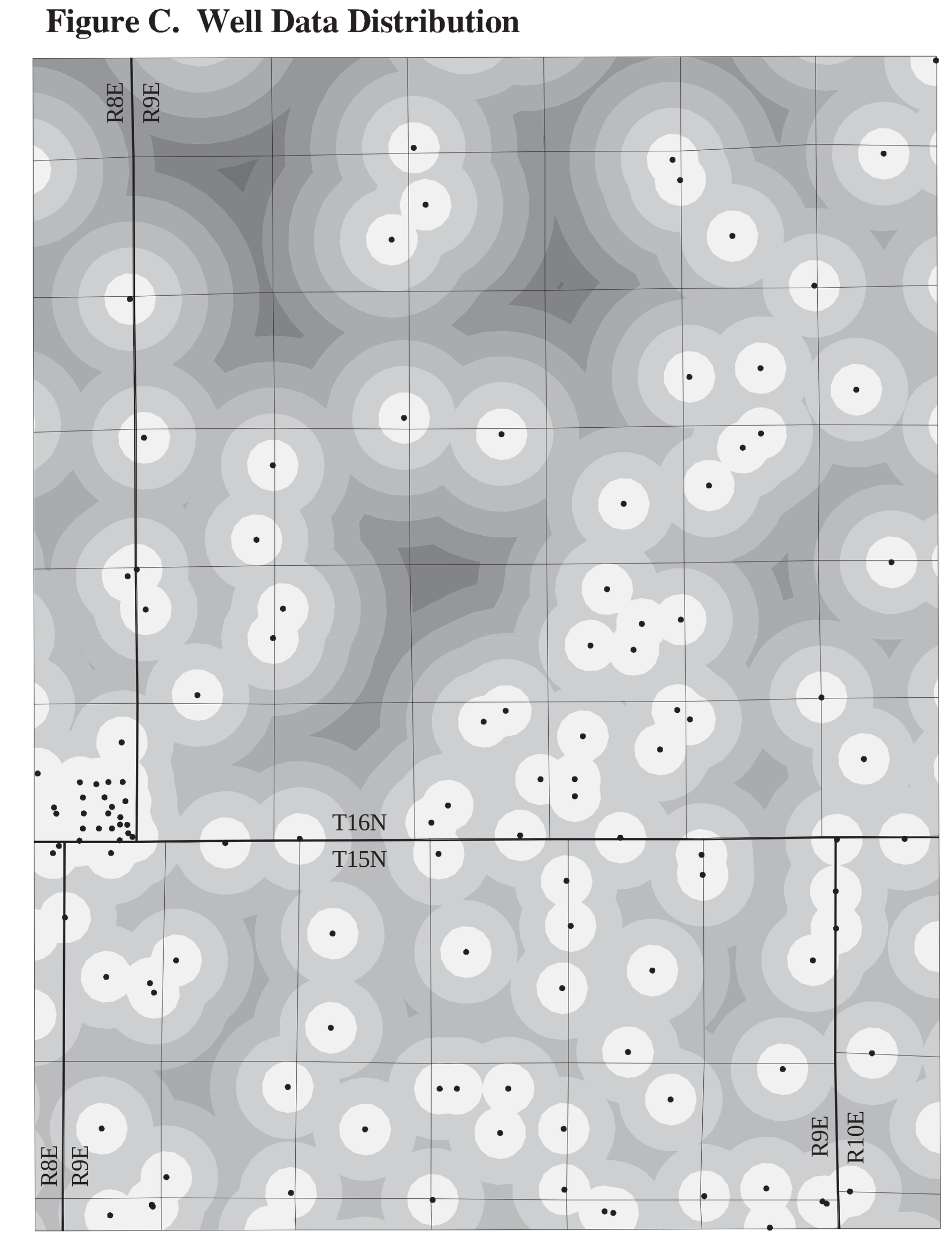
Modified after Horberg (1950) and Herzog and others (1994).

Figure B. 3-Dimensional View of Bedrock Surface



View is from the southeast towards the northwest. The bedrock surface consists of Paleozoic strata ranging in age from Middle Devonian to Middle Pennsyvlanian. Vertical exaggeration 25X.

Figure C. Well Data Distribution



Distance from well (feet)

- 1,000
- 2,000
- 3,000
- 4,000
- 5,000
- 6,000
- 7,000
- Well location

0 1 2 3 4 Miles
0 1 2 3 4 Kilometers

Scale 1:62,500