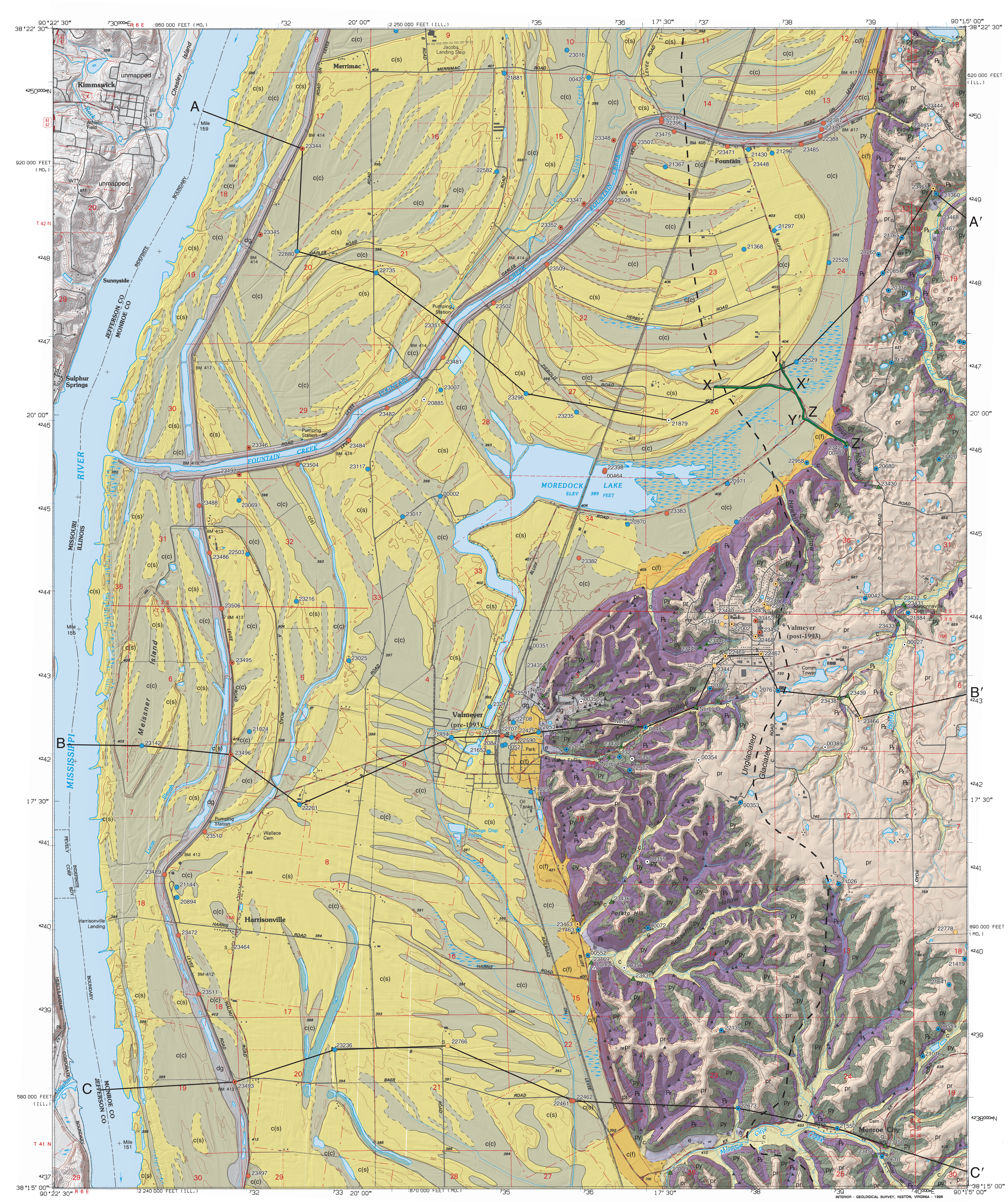
Prairie Research Institute
ILLINOIS STATE GEOLOGICAL SURVEY

SURFICIAL GEOLOGY OF VALMEYER QUADRANGLE
MONROE COUNTY, ILLINOIS

David A. Grimley, Johanna M. Gemperline, and Timothy A. Larson
2014

Illinois Geologic Quadrangle Map
IGQ Valmeyer-SG



Base map compiled by Illinois State Geological Survey from digital data (1993 Raster Feature Separates) provided by the United States Geological Survey. Shaded relief and contours derived from 2012 ISGS LiDAR (light detection and ranging) and 1996 USGS National Elevation Dataset source data.

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 15

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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, 20 FEET IN UPLANDS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

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Geology based on fieldwork by David A. Grimley, Johanna M. Gemperline, and Elizabeth J. Colville, 2011–2012. Electrical resistivity transects by Timothy A. Larson.

Digital cartography by Jennifer E. Carrell, Jane E. Johnshoy Domier, and Coy E. Potts, Illinois State Geological Survey. Shaded relief by Donald E. Luman.

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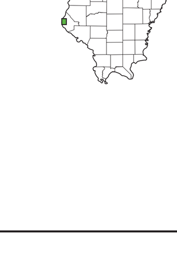
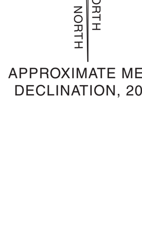
ILLINOIS STATE GEOLOGICAL SURVEY
PRAIRIE RESEARCH INSTITUTE
ILLINOIS
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Prairie Research Institute
Illinois State Geological Survey
615 East Peabody Drive
Champaign, Illinois 61820-6918
(217) 244-2414
http://www.isgs.illinois.edu



1	2	3
4		5
6	7	8

ADJOINING QUADRANGLES
1 Maxville, MO
2 Oakville
3 Columbia
4 Herculaneum, MO
5 Waterloo
6 Festus, MO
7 Selma
8 Renault



APPROXIMATE MEAN DECLINATION, 2014

ROAD CLASSIFICATION

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

MIDDLE TO LATE QUATERNARY DEPOSITS

HUDSON EPISODE (~12,000 years before present [B.P.] to today)[1]

Description	Unit	Interpretation
Fill or removed earth; significant areas of additions or disruptions of earth material by human activity; up to about 40 feet thick	Disturbed ground dg	**Anthropogenic fill** in levees, former limestone quarries, and other areas of construction; major artificial levees occur along the Mississippi River and along the Fountain Creek drainageway; includes areas of stripped land in former quarries
Silt loam to silty clay loam with beds of gravelly silt or silty gravel; particularly gravelly near the unit base; silt-rich zones or silty matrix ranges from dark brown to dark grayish brown to dark gray and is noncalcareous; crudely to well stratified; gravel is commonly chert-rich and also locally contains imbricated, flat-lying slabs of limestone (a few inches to 1 foot long); small rounded quartz pebbles (<1 inch) or pebbles of quartzite, sandstone, granitic, or mafic rocks (2 to 6 inches) are found in places in the larger or more eastern tributaries; 5 to 25 feet thick	Cahokia Formation (tributary facies) c	**Alluvium** in creek valleys tributary to the Mississippi River valley; generally silt-rich because of incorporation of loess deposits from surrounding uplands; erratic pebbles are rare and found only within or downstream of glaciated areas (e.g., Bond Creek, Monroe City Creek); historical alluvium is sometimes present in the upper 3 feet and overlies a buried A horizon in the prehistoric alluvium
Silt loam, with some gravelly zones; dark yellowish brown to brown; soft; faintly stratified; in bluffside areas, may contain rocky or gravelly zones with angular chert (<2 inches) or small limestone fragments; the matrix is noncalcareous to slightly calcareous; 5 to 30 feet thick	Cahokia Formation (silty fan deposits) c(f)	**Alluvial fan deposits** in the Mississippi River valley; mainly redeposited silty loess transported by streams in adjacent uplands; weakly developed buried soils may occur within fan deposits; rocky zones may represent a fluvial lag derived from paleolandslides or rockfalls from bluffs
Silt, silty clay loam, and silty clay; ranges from brown to olive gray to very dark gray with brown mottles; firm; may contain slickensides; massive to stratified; 5 to 60 feet thick	Cahokia Formation (clayey facies) (Mississippi River valley only) c(c)	**Backswamp, overbank, or abandoned channel deposits;** infillings in former channels and swales of the Mississippi River floodplain; underlain by Cahokia Formation sand and Henry Formation gravelly sand; contains a weak modern soil in the upper few feet
Loamy very fine sand, fine sand, and/or medium sand; includes interbeds (<5 feet) of silty clay or silt in some areas; yellowish brown to gray; near-surface very fine to fine loamy sand generally coarsens downward to medium sand below 20 or 30 feet; moderately to well sorted; weakly cohesive to loose sand; weakly laminated to well stratified; may include a surficial cap of 2 to 5 feet of alluvial silt or silty clay; the entire unit is typically 40 to 70 feet thick	Cahokia Formation (sandy facies) (Mississippi River valley only) c(s)	**Point bar and channel deposits** in the Mississippi River valley; underlain by Henry Formation gravelly sand; may have a thin cover (typically less than 5 feet) of fine-grained overbank deposits
Silt loam with chert and limestone pebbles; brown to very dark grayish brown; soft; contains ~5 to 20% rocks, mainly of limestone and chert; rocks are typically ~2 inches in size; limestone is slabby and angular and can be up to 1.5 feet in length; 5 to 20 feet thick	Peyton Formation py	**Colluvium** (sediments deposited by gravity); includes creep, slump, or landslide deposits; mostly consists of redeposited loess along with locally derived angular or slabby bedrock fragments; contains weak modern soil (typically eroded) in the upper part

WISCONSIN EPISODE (~55,000–12,000 years B.P.)

Description	Unit	Interpretation
Silt and silty clay with some fine sand; yellowish brown to gray; massive to stratified; soft to medium consistency; mapped on terraces generally at 420- to 465-foot elevations; leached to calcareous; 5 to 30 feet thick	Equality Formation e	**Slackwater lake deposits,** in backwater tributaries of the Mississippi River valley, aggraded during glacial times; occur beneath terraces along Bond Creek valley and Monroe City Creek valley (inferred); may have a loess cover of a few to several feet
Medium to coarse sand with fine gravel; yellowish brown to brownish gray; well sorted, contains sedimentary (quartz, chert, carbonate, etc.) and erratic pebbles (granite, mafics); subrounded to subangular; leached to calcareous; up to 65 feet thick	Henry Formation (cross sections only) h	**Outwash** deposited in the Mississippi River valley, related to aggradation resulting from glaciation in the upper Midwest; overlain by 30 to 80 feet of postglacial alluvium (Cahokia Formation)
Silt loam; yellowish brown to dark yellowish brown (Peoria Silt; upper unit) to slightly pinkish brown (Roxana Silt; lower unit); massive with weak soil structure; Roxana Silt ~50 to 75% as thick as Peoria Silt in uneroded areas; leached to weakly dolomitic (in thick loess areas); medium consistency; secondary carbonate along fractures; the upper few feet are altered to a heavy silt loam to silty clay loam and a more blocky structure; total loess thickness is 5 to 40 feet (typically 20 to 25 feet in uneroded areas)	Peoria and Roxana Silts pr	**Windblown silt (loess);** includes some colluvial or redeposited loess along steep slopes; modern soil (typically alfisol) development in the upper 3 to 4 feet; loess is thickest on stable upland landscapes proximal to Mississippi River valley bluffs; postdepostional erosion has removed or redeposited (by water and gravity) much of the primary loess deposits on steeply sloping areas; mapped where >5 feet thick

ILLINOIS EPISODE (~200,000–130,000 years B.P.)

Description	Unit	Interpretation
Diamicton; silty clay loam to silty clay matrix texture; yellowish brown to dark yellowish brown, becoming slightly reddish brown in weathered zones; medium to stiff consistency; pebbles mainly <2 cm of chert, sandstone, shale, and carbonate; rare erratic pebbles and rounded quartz; a few Fe oxide concentrations and Liesegang bands; Fe and Mn oxide stains on fractures; locally contains sheared inclusions of the underlying Petersburg Silt, leached to moderately dolomitic; 5 to 30 feet thick	Glasford Formation g	**Glacial till and ice-marginal sediment;** contains the solum of the Sangamon Geosol (interglacial soil) in the upper 4 to 7 feet; the upper Sangamon Geosol may locally be developed into loessal silt (Teneriffe Silt); has <5 feet of loess cover (Peoria and Roxana Silts) in mapped areas; overlies silt, colluvium, residuum, or bedrock; mapped near surface only in southeast part of quadrangle near Monroe City
Silt loam; yellowish brown; medium to very stiff consistency; massive to faintly laminated; may be calcareous in the upper portions, otherwise noncalcareous; 0 to 30 feet thick (discontinuous)	Petersburg Silt (cross sections only) pb	**Slackwater or proglacial lake deposits and loess;** lake deposits occur in former bedrock valleys or lows; loess or redeposited loess is more typical of upland flats, slopes, or small depressions; occurs immediately below the Glasford Formation and overlies the Oak formation or bedrock

TERTIARY TO EARLY-MIDDLE QUATERNARY

Description	Unit	Interpretation
Silty clay to silty clay loam to clay to pebbly clay; may be very pebbly in some zones (up to 70% pebbles) but pebble-free in other zones; ranges from reddish brown to yellowish red to strong brown; colors sometimes mottled; stiff consistency; pebbles are mainly angular chert of local derivation; massive to crudely stratified; stiff; noncalcareous with calcareous local rock fragments; irregular basal contact; 0 to 30 feet thick	Oak formation (cross sections only) QTo	**Residuum with some admixed loess and colluvium;** residual clay formed from *in situ* weathering of local bedrock, mainly during preglacial times (probably Pliocene and early Pleistocene); may locally include some weathered Yarmouth Episode accretionary deposits (Lierle Clay), middle Pleistocene loess units (e.g., Loveland Silt), or both

PALEOZOIC BEDROCK

Description	Unit	Interpretation
Bedrock exposures or bedrock within about 5 feet of land surface; limestone, dolomite, siltstone, and shale; steep (cliff-forming) slopes in upland areas are mostly underpinned by the St. Louis and Salem Limestones (commonly karstic) or the Burlington-Keokuk Limestones (typically cherty); the Warsaw Formation and Maquoketa Formation (both shale and carbonate) are less commonly exposed and generally underlie more gentle bedrock slopes; bedrock dip angles range from 5 to 25 degrees (Denny et al. 2009); includes some areas of rockfalls and landslides	Near-surface bedrock Pz	**Shallow marine, deltaic, and fluvial;** exposures in uplands are mainly of Mississippian bedrock, with St. Louis and Salem Limestones underlying uplands where karst topography is visible; the Warsaw Formation and Burlington-Keokuk Limestones underlie many nonkarstic areas; Ordovician shale and carbonate occur locally in the lower part of Dennis Hollow and in nearby areas along the axis of the Valmeyer Anticline; bedrock dipping angles are steeper proximal to the northwest- to southeast-trending axis of a structural anticline and syncline (Denny et al. 2009)

[1]The time periods for the Wisconsin Episode and the Hudson Episode are reported as calibrated radiocarbon years and can be directly compared with calendar years before 1950 (Stuiver et al. 2005).

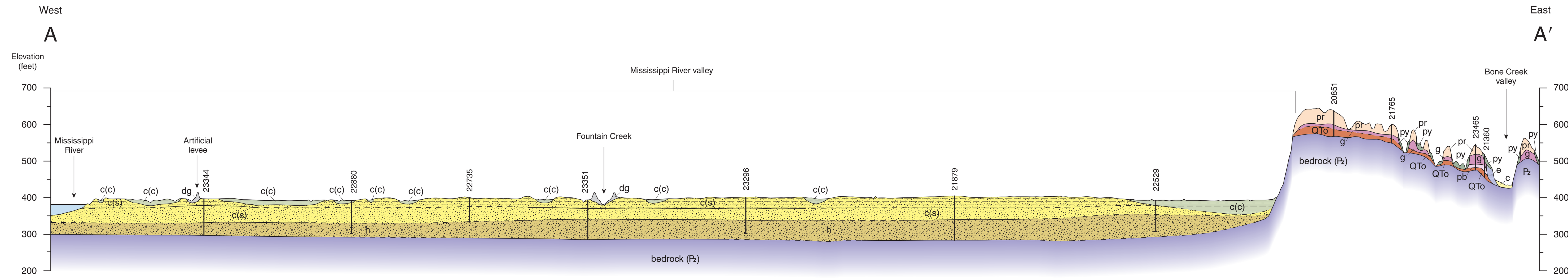
Data Type

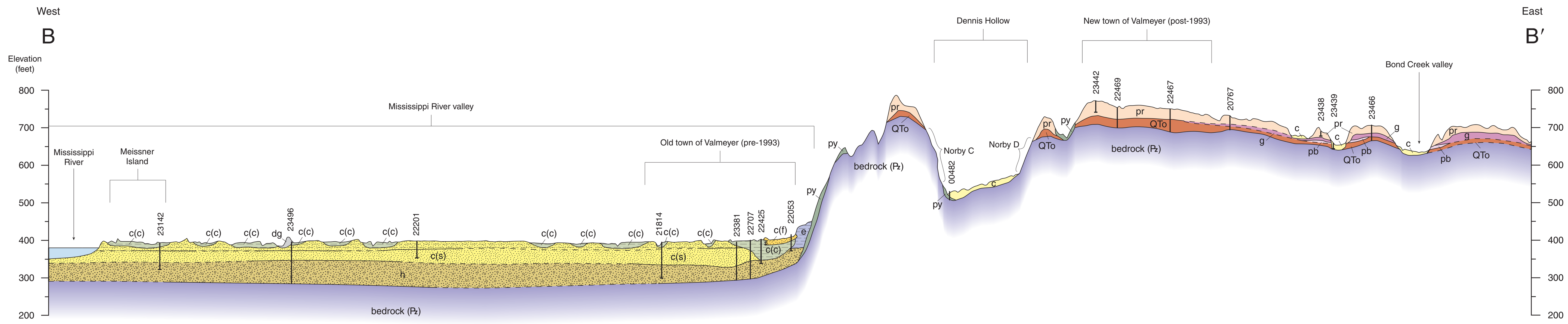
- Outcrop
- Outcrop in field notes (ISGS archives)
- Bedrock outcrops (Denny et al. 2009)
- Stratigraphic boring
- Water-well boring
- Engineering boring
- Coal boring
- Other boring, including oil and gas

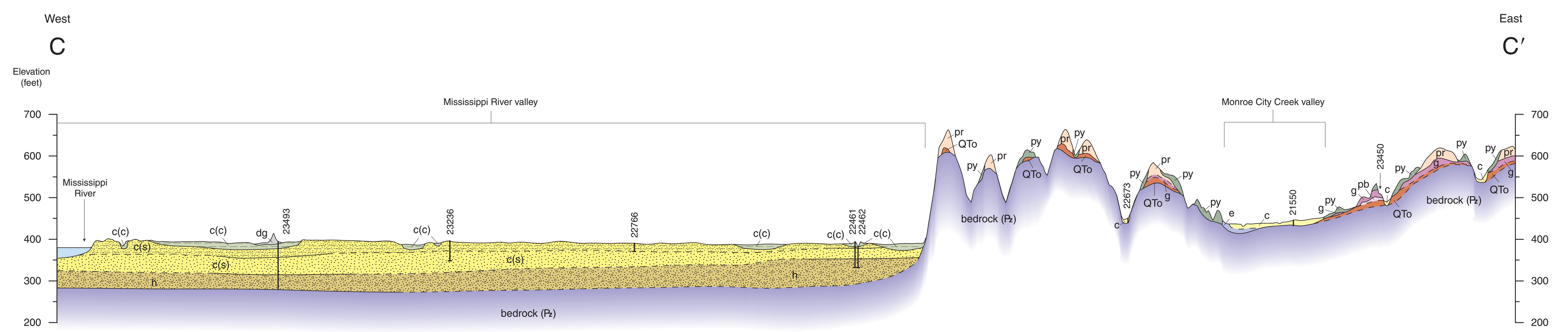
- Contact
- Inferred contact
- Line of electrical resistivity profile
- Approximate Illinois Episode terminal ice margin
- A—A′ Line of cross section

SG 26211 Labels indicate samples (S) or geophysical logs (G). Boring and outcrop labels indicate the county number. A dot indicates the boring or outcrop is to bedrock.

Note: The county number is a portion of the 12-digit API number on file at the ISGS Geological Records Unit. Most well and boring records are available online from the ISGS website.







Cross Sections

- Diamicton, massive silt, or other fine-grained sediment
- Laminated silt and clay
- Silty sand, very fine and fine sand
- Mainly fine to medium sand
- Mainly medium to very coarse sand; some gravel
- Contact
- Inferred contact

dg	Disturbed ground
c	Cahokia Formation
c(f)	Cahokia Formation (silty fan deposits)
c(c)	Cahokia Formation (clayey facies)
c(s)	Cahokia Formation (sandy facies)
py	Peyton Formation
e	Equality Formation
h	Henry Formation
pr	Peoria and Roxana Silts
g	Glasford Formation
pb	Petersburg Silt
QTo	Oak formation
Pz	Paleozoic bedrock

Horizontal scale: 1 inch = 2,000 feet
Vertical scale: 1 inch = 200 feet
Vertical exaggeration: 10×

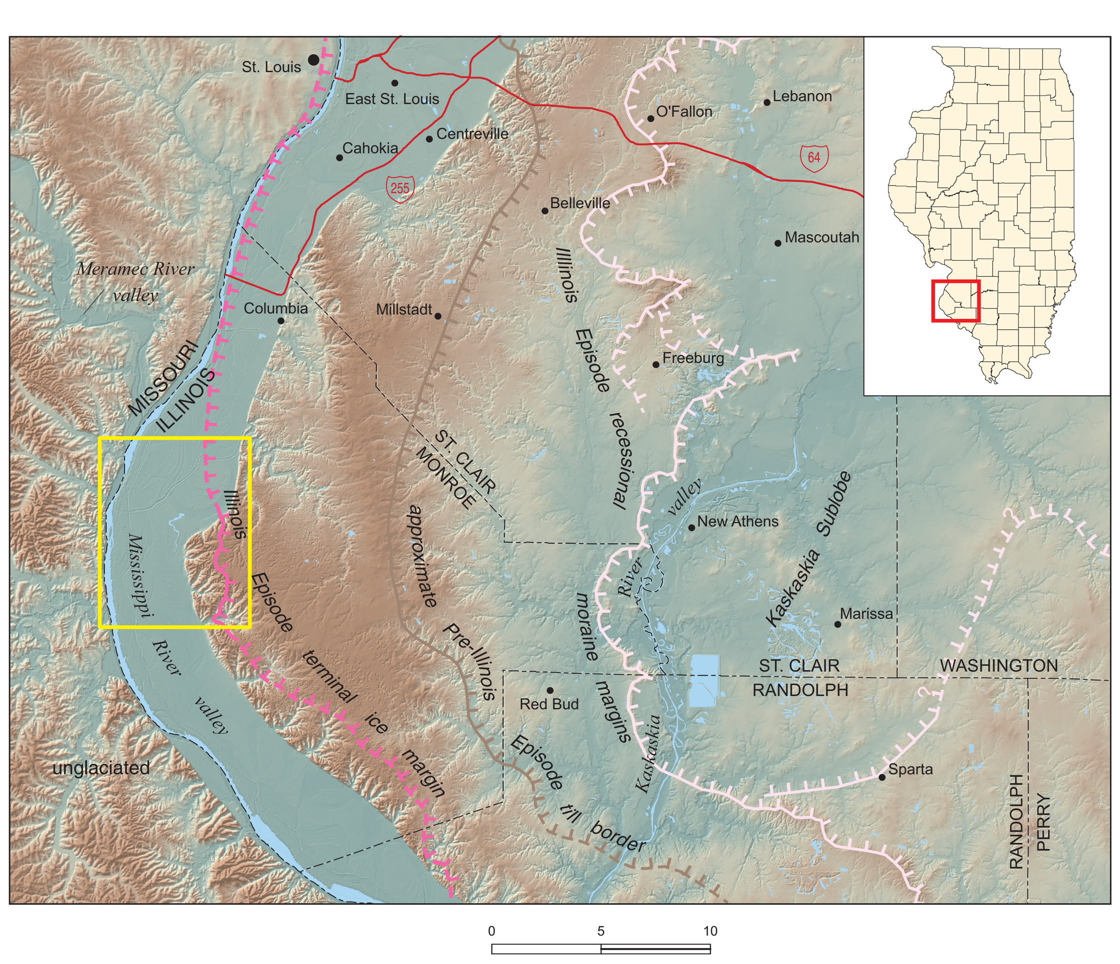


Figure M1 Shaded relief map of the St. Louis Metro East area (southern portion). The Valmeyer Quadrangle is outlined in yellow. The dark pink lines indicate the approximate Illinois Episode terminal ice margin. Recessional moraines are shown in light pink. The brown line represents the buried pre-Illinois Episode till border.

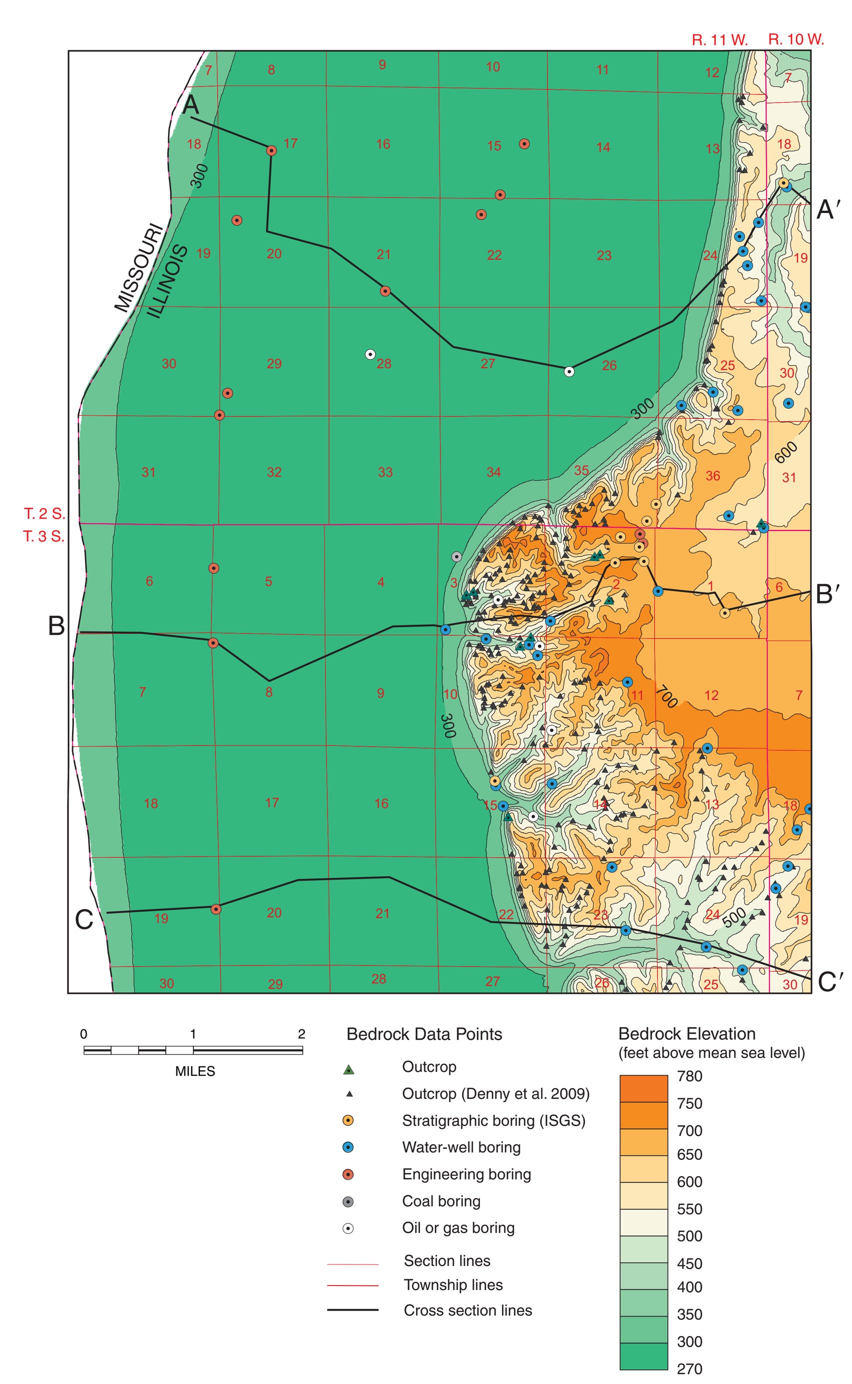


Figure M2 Bedrock topography of the Valmeyer Quadrangle. Localities of all data that reliably indicate the bedrock surface are shown (many data are not shown on the surficial map). Map scale is 1:80,000.

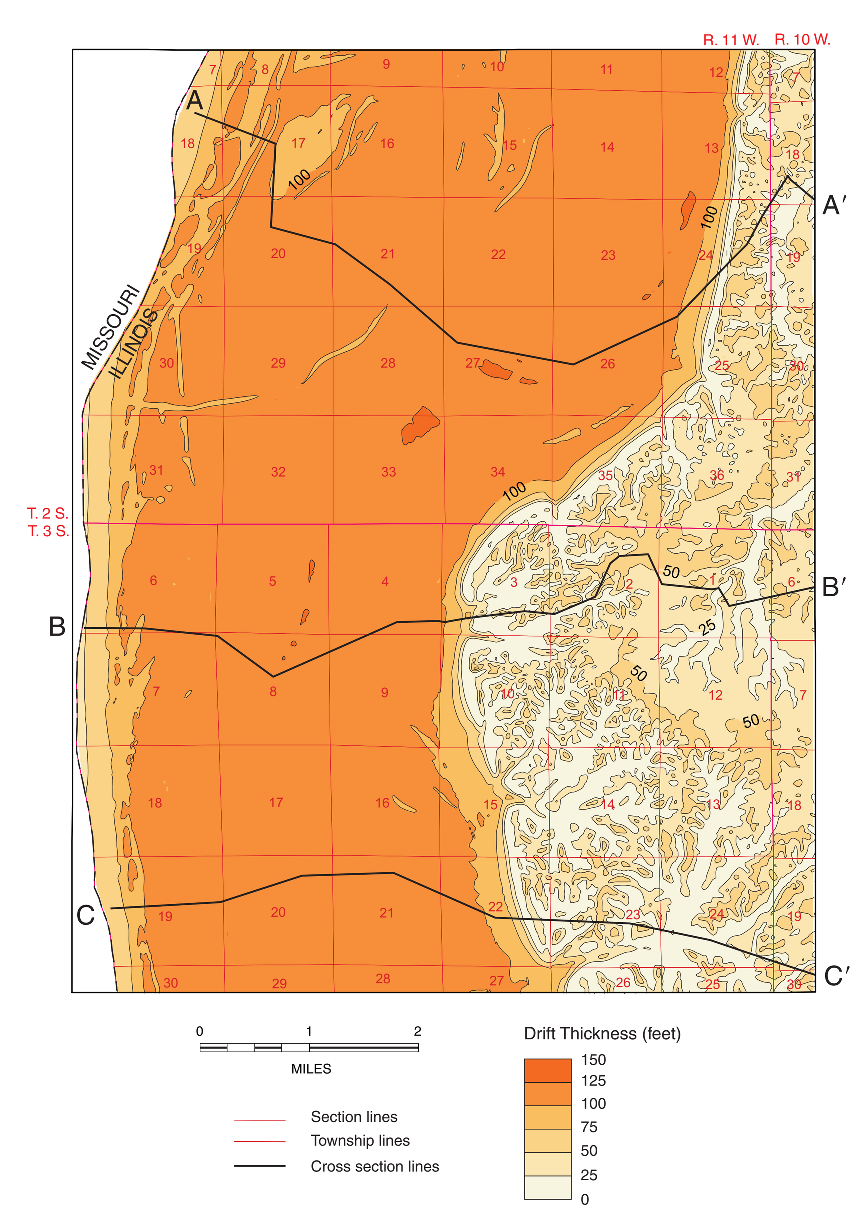


Figure M3 Drift thickness of the Valmeyer Quadrangle. Drift includes all unconsolidated sediments above bedrock (e.g., loess, till, alluvium, and lake sediment). Data point locations are the same as in Figure M2. Map scale is 1:80,000.