George H. Ryan, Governor

Department of Natural Resources
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# BEDROCK GEOLOGIC MAP

## Collinsville Quadrangle, Madison and St, Clair Counties, Illinois

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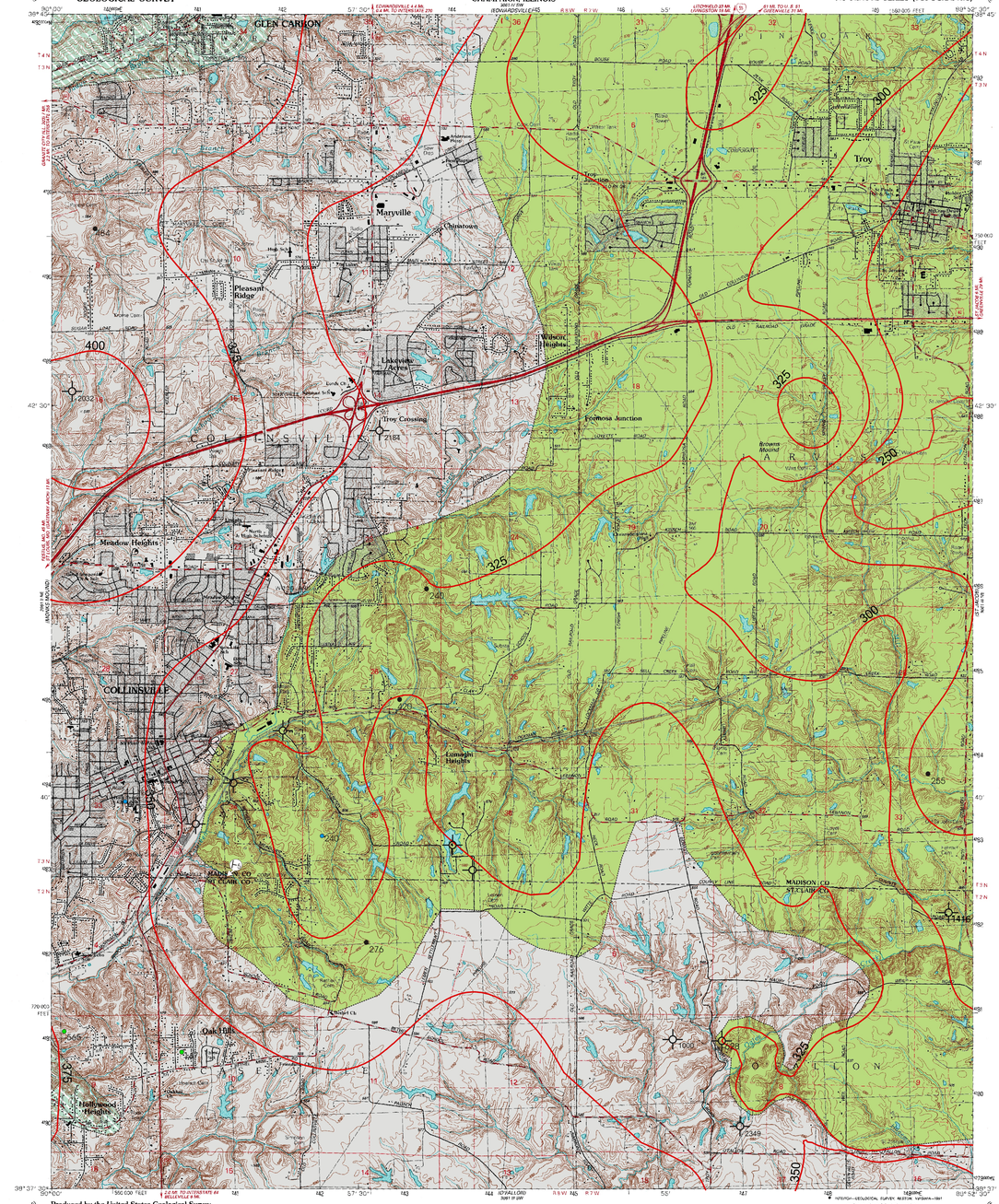
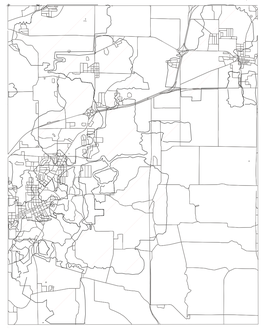
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF ILLINOIS
DEPARTMENT OF ENERGY AND NATURAL RESOURCES
GEOLOGICAL SURVEY DIVISION
CHAMPAIGN, ILLINOIS

COLLINSVILLE QUADRANGLE
ILLINOIS
7.5 MINUTE SERIES (TOPOGRAPHIC)




Mined out area map of the Collinsville Quadrangle

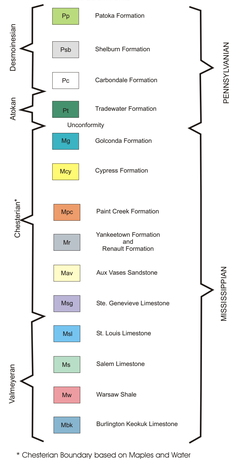


scale 1:96,000
1 inch = 8000 ft

EXPLANATION

Quaternary deposits have been removed from map.

Graphic Column Units




* Chesterian Boundary based on Maples and Waterfall

**LINE SYMBOLS: Dotted where concealed**

Contact

A ——— A' Line of cross section

325 Structure contour based on top of Herrin Coal; CI= 25 feet

**SYMBOLS**

Strike and dip of bedding; taken from structure contour

**DRILL HOLES: Subsurface data used to construct map. Number indicates depth of boring**

255 coal test

601 water well

125 stratigraphic boring

1605 oil test hole (dry)

| SYSTEM | SERIES | Group | Subgroup | FORMATION | Member or Bed | Graphic Column | THICKNESS (feet) | DESCRIPTION UNIT |
|---|---|---|---|---|---|---|---|---|
| PENNSYLVANIAN | DESMOINESIAN | | | Patoka | | | 84-112 | A |
| | | | | Shelburn | Piasa Ls<br>Bankston Fork Ls<br>Anna Shale/ Brereton Ls<br>Herrin Coal | | 38-80<br>3-8<br>17-30<br>6-9<br>5-8 | B |
| | | | | Carbondale | Springfield?<br>Colchester Coal | | 85-110<br>1.5 | C |
| | Atokan | | | Tradewater | | | 0-60 | D |
| | CHESTERIAN | | | Golconda | Haney<br>Fraileys Shale<br>Beech Creek | | 100<br>42 | E |
| | | | | Cypress | | | 40 | F |
| | | | | Paint Creek | | | 40 | G |
| | | | | Yankeetown and Renault | | | 40-50 | H |
| | | | | Aux Vases | | | 30-40 | I |
| | | | | St. Genevieve Limestone | | | 0-80 | J |
| Mississippian | | Valmeyeran | Mammoth Cave Megagroup | St. Louis Limestone | | | 270 | K |
| | | | | Salem Limestone | | | 130 | L |
| | | | | Warsaw Shale | | | 90 | M |
| | | | | Burlington-Keokuk Limestone | | | 280 | N |

Patoka: A. Siltstone , fine sandstone, and shale. Siltstones are gray with blue-green tint, the lower few feet is commonly a red siltstone to shale. Mica, carbon traces, and calcareous siltstones are common. Sandstones are gray to light gray sublithic arenite to quartz arenite and are thin and discontinuous. Shales are typically associated with the siltstones. The basal contact is conformable.

Shelburn B. Shales, limestones, and siltstones. Shales are soft blue-gray to green-gray, black, and red and may be variegated. A red shale is present below the uppermost limestone in parts of the quadrangle. Limestones within this unit are brownish gray to dark gray. Silty, argillaceous and fossiliferous lime mudstones and fossil wackestones are locally present. The shale is soft and is variegated with a bluish green shale in places. The basal limestone is a dark gray, argillaceous and fossiliferous wackestone. It exhibits nodular bedding and is locally replaced by a black, fissile, fossiliferous shale. The basal contact is sharp with the underlying unit.

Carbondale Formation C. Shale, siltstone, sandstone, limestone, and coal. Siltstones are green-gray variegated, red and dark gray. Pyrite is common along with carbon traces and mica. Coal is well developed in a number of horizons within this unit.. All of the coals are rooted, vitreous and alternate bright to dull-banded. The unit is dominated by shales with siltstone intervals. The shale is dark gray carbonaceous and pyritic. Shaly limestones occur within the thick interval are composed of thin discontinuous, dark gray beds. The base of the unit is marked by a two foot thick rooted coal bed. The unit is conformable with the underlying formation.

Tradewater Formation D. Sandstone and shale. Sandstones are composed of well sorted, micaceous quartz arenites. Medium gray to dark gray shales are interbedded with the sandstone beds. Coals are thin and discontinuous. The shale is also brown and gray mottled, soft and plastic with pyrite. The shale or claystone is the dominant lithology and commonly shows rooting. This unit is unconformable with the limestones below.

Golconda E. Limestone and shale. The upper carbonate beds are light gray, oolitic grainstones and dark to medium gray fossil packstones. A red shale bed occurs below the upper carbonate where it is not eroded. Shale is the dominant lithology within this unit. It is typically dark gray and has silty interbeds. The shale is weakly fissile or weathers in platlets. A lower silty dolomitic thin limestone has a conformably sharp contact with the underlying sandstone.

Cypress F. Sandstone. This unit is composed of a white to light gray fine to medium grained, quartz arenite that is shaly. The shale is a minor component but occurs as wavy or flaser bedding in the upper part of the formation. Occasionally thin carbonaceous laminae to impure coals are found in the upper part as well. The mid-to-lower portion of the unit is composed of thick to medium bedded and cross bedded sandstone beds.

Paint Creek Group G. Limestone, shale and sandstone. This unit contains highly variable limestones and shales in the upper part. The limestones are light gray fossiliferous grainstones and packstones that locally contain oolitic facies and red stained fossil echinoderm fragments. The limestone beds are interbedded with green and red claystones and greenish gray shales. Sandstone beds are a minor lithologic component. The sandstone is a light gray, fine grained, quartz arenite. Most of the beds pinch out laterally and can be traced only locally. The thick shale is calcareous and also contains a thin red claystone bed.. The basal limestone has fossil packstones and argillaceous fossil wackestones. The contact with the unit below is sharp but conformable.

Yankeetown and Renault H. Limestone, shale and sandstone.

Aux Vases I. Sandstone. The sandstone is a white, fine grained quartz arenite. It contains greenish shale rip-up clasts, sand-filled dessication marks and ripple marks in the upper part. Locally, the sandstone grades into calcareous sandstone and limey sandstone with abraded bioclasts. The lower portion is dominated by sandstone but also contains occasional shale laminae. The lower contact is unconformable.

Ste Genevieve Limestone J. Limestone, dolomite, chert, and siltstone. Limestones are tan-brown to light gray and contain laminated tidallites, wackestones to grainstones composed of rounded and broken fossils. Bedding styles range from tabular to undulatory. Cross-beds are present in grainstone facies. The unit has a dirty gray-brown grainy appearance. The diagnostic character of this formation is alternating beds of laminated, fine-grained (calcisilitite) facies with coarse bioclastic, peloidal, to oolitic grains that depict shoaling-upward cycles. Dolomites are brown and have moldic porosity. Cherts are light gray and may be bioclastic and occur between grainstones and laminated beds as elliptical nodules. Siltstones are brown to light gray and thinly bedded, typically less than 1 inch thick. Oolitic beds are rare. Fossils include spiriferid and productid brachiopods, rugose corals, conularids, and crinoids. Ramose, fenestrate, encrusting, and bifoliate bryozoans are also present. The contact with the underlying unit is gradational.

St Louis Limestone K. Limestone, sandy limestone, limestone breccia, calcareous siltstone, and shale. Light gray to medium gray dense lime-mudstone with fossil wackestones. Part of the unit contains quartz sand and subangular limestone breccia clasts. Oolitic grainstones, greenish oncolitic packstones, peloidal grainstones, stromatolitic boundstones, and carbonate intraclastic conglomerates make up a highly variable mix of microfacies. Aerocyathus floriformis, a colonial coral, occurs in the upper part of the basal portion of this formation. A. floriformis is wide spread near the base of the unit. Yellowish dolostone beds are also present in this formation. Gray to dark gray chert occurs as nodules and stringers. Siltstones are calcareous and greenish. The shales are greenish gray and reddish brown, calcareous, soft, and non-fissile.

Salem Limestone L. Limestone, dolomite, mudstone, and siltstone. Medium-gray, crinoidal, bryozoan wackestones and packstones that contain a few brachiopods. In the lime-mudstone beds Archimedes sp. are preserved with coil and fronds attached. Dolostone beds are gray-brown, thinly bedded, and contain chlorite-rich shale clasts with some small quartz geodes. The upper half of the unit is dominated by shaly limestone and dolostone beds. The lower half contains bluish gray mudstones up to 20 feet thick interbedded with thin lime-mudstones. Conularids and gastropods occur in the shaly portion of this unit. Siltstones are calcareous and fossiliferous and thinly bedded in the lower part. Quartz geodes are common in the shaly sequences. The basal contact is sharp and conformable with the underlying carbonate beds.

Warsaw M. Cherty limestone, sandy limestone, calcareous siltstone, and shale. Light gray to white crinoidal grainstones dominate and are interbedded with nodular and bedded light gray to black cherts. The cherts are white when weathered, and some have bioclasts of crinoids and brachiopods. The unit is characterized by alternating layers of light gray to white crinoidal grainstones with beds of argillaceous and sandy limestones. This cyclic sequence of crinoidal limestone over sandy cross-bedded limestone is common in the lower part of the unit. Large spirifers are common along with crinoids, bryozoans, and corals. Siltstones are dark gray with a greenish tint and are calcareous. Calcite and quartz filled vugs from 0.5 to 2 inches in diameter have been described within this unit. The unit is conformable with the underlying unit.
Burlington

Burlington and Keokuk Limestones N. Limestone. White to light brownish-gray crinoidal grainstones and packstones that contain abundant chert nodules are the dominant characteristics of this formation. The upper part has coarser bioclasts than the lower part. Glauconite is common in the upper part. Cherts are white to opaque or gray to bluish-gray and contain crinoid molds and silica replaced "ghosts". Spicules are also commonly seen in the chert nodules. The lower portion of the unit is a finer grained carbonate that contains silt, clays and dolomite however, coarse crinoidal facies are still present.

**Introduction and General Stratigraphy**

The Collinsville Quadrangle is located east of St Louis, Missouri. It is situated on the Sparta Shelf, a basement high stemming off of the Ozark Dome. The dome is a Precambrian high that has influenced deposition throughout the Paleozoic. Bedrock exposures are poor and found only in northwest flowing tributaries to Canteen Creek, in the southwestern corner of the quadrangle. Exposures of bedrock are composed of limestone, siltstone, sandstone, and shale beds of the Shelburn Formation, Demoinsian Series (Middle Pennsylvanian). The rocks strike northeast to north and have a regional dip of 2Eto 5E to the east. Most of the data was gathered from subsurface boreholes for oil, coal, water, and an ISGS stratigraphic test hole.

At the surface, the only unit observed was the Middle Pennsylvanian Shelburn Formation. Subsurface data shows the Patoka, Shelburn, Carbondale and the Tradewater Formations which represent the middle portion of the Pennsylvanian System. The upper Mississippian is composed of a thinned Chesterian section. The Chesterian is comprised (youngest to oldest) of Golconda Formation, Cypress Sandstone, Paint Creek Formation, Yankeetown Siltstone, Renault Limestone, Aux Vases Sandstone and The Ste. Genevieve Limestone. These units are thin in the area and thicken eastward or into the basin east of the Sparta Shelf. Valmeyerian rocks are not condensed over the Sparta Shelf like the upper Mississippian but the Devonian section is highly reduced. Only a thin Upper Devonian section of New Albany Shale is present on the shelf within the study area. The Silurian ranges from 100 to 200 feet thick.

No faults were found in the quadrangle or penetrated in the boreholes. Except for the Sparta Shelf no structural features were encountered in the quadrangle.

An angular relationship exists between the overlying Pennsylvanian strata and the underlying Chesterian strata. The Chesterian strata gets younger progressively eastward and subcrops below the Tradewater Formation. In the Millstadt and Columbia Quadrangles, steep 12E to 22E dips are seen in the Chesterian rocks below the Pennsylvanian (Devera, in press). Movements on the Sparta Shelf are suspected but no faulting has been observed in the Collinsville Quadrangle.

The bedrock surface contains a large, deep, pre-glacial valley in the southwestern corner of the quadrangle (see bedrock topography inset). It contains 174 feet of Pleistocene and Holocene sediments. Pre-Illinoisan till occurs in the lower 40 feet of this valley. The ISGS drilled a core to 564 feet from the surface within this valley. Other pre-glacial valleys are suspected from the northeast along Burdick Branch and Schoolhouse Branch.

Above the Paleozoic rock there is a sequence of two pre-Illinoisan tills the Glasford Formation and Illinoisan and Wisconsinan silts.

**Economic Geology**

**Oil and Gas**

Eleven petroleum tests were drilled in the Collinsville Quadrangle between the years of 1916 and 1956. Of these wells one had a show of oil. L.L. Benoist, drilled an oil test in 1942 that had a show of oil at 2,021 feet below the surface in Section 17, T.2N., R.7W. A wall packer was set at 2021 to 2022'6". The test showed a small trace of oil but was not of commercial value. The test was conducted within the Trenton (Kimmswick Limestone). The hole was plugged and abandoned, November 3rd, 1942.

There are two known producing horizons in the area the Silurian dolomite and the Trenton Limestone. However, there is no oil production in the Collinsville Quadrangle. Potential exists where the Herrin Coal (#6 Coal) is at a higher elevation than the regional trend. This is an indication of Silurian reef build-up which creates drape in the surrounding strata around the framework-building corals. In the aforementioned Benoist well the Herrin Coal was drilled at 162 feet from the surface, 40 to 50 feet above regional elevation for this coal in this area. No shows were reported from the Silurian.

**Coal**

Over 18 coal mines occur in the Collinsville Quadrangle. The oldest is the Lumaghi Coal Company that put in a mine in 1878 located below the east side of Collinsville, IL. The last coal mine in the area was Troy Domestic Mining Company that stopped production in 1953. Nearly half of the areal extent of the quadrangle has been mined (See inset of mined-out-area by Scott Elrick, 2000).

The main coal that was mined in the area was the Herrin #6 Coal. It is a vitreous, bright banded, bituminous coal. The Herrin is the dominant producing horizon in the Illinois Basin. This coal ranges in depth from 200 feet at the western edge of the quadrangle to 250 feet at the eastern side of the quadrangle reflecting the regional dip basinward.

**References**

Devera, J.A. (in press), Geology of the Columbia Quadrangle, Illinois State Geological Survey, IGQ Series

Elrick, S., 2000, Mines of the Collinsville and Freeburg Quadrangles, Illinois State Geological Survey, Coal Section, Mined-Out-Area Maps, published as a CD.

Produced by the United States Geological Survey
Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1986. Field checked 1988. Map edited 1991
Supersedes map dated 1974
Projection and 10,000-foot grid ticks: Illinois coordinate system, west zone (transverse Mercator)
1000-meter Universal Transverse Mercator grid, zone 16
1927 North American Datum
To place on the predicted North American Datum 1983, move the projection lines 2 meters south and 8 meters east as shown by dashed corner ticks

Gray tint indicates areas in which only landmark buildings are shown

Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photographs. This information is unchecked

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
AND ILLINOIS GEOLOGICAL SURVEY, CHAMPAIGN, ILLINOIS 61820
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION

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

COLLINSVILLE, ILL.
38089/478-TF-024
1991
DMA 3061III NW-SERIES V863

Digital Cartography
F. Brett Denny

ADJOINING 7.5-MINUTE QUADRANGLES

1 Wood River
2 Edwardsville
3 Marine
4 Monks Mound
5 St. Jacob
6 French Village
7 O'Fallon
8 Lebanon

For further information about this map contact:
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**Acknowledgments**

This map is one of a series prepared for the USGS 7.5-minute Collinsville Quadrangle by a multidisciplinary team of geologists from the Illinois State Geological Survey (ISGS). This series will characterize surface landscapes and surface, bedrock, and engineering geology and will delineate coal, and sand and gravel resources.