BEDROCK GEOLOGY OF PORT BYRON QUADRANGLE
ROCK ISLAND AND HENRY COUNTIES, ILLINOIS

Prairie Research Institute
ILLINOIS STATE GEOLOGICAL SURVEY

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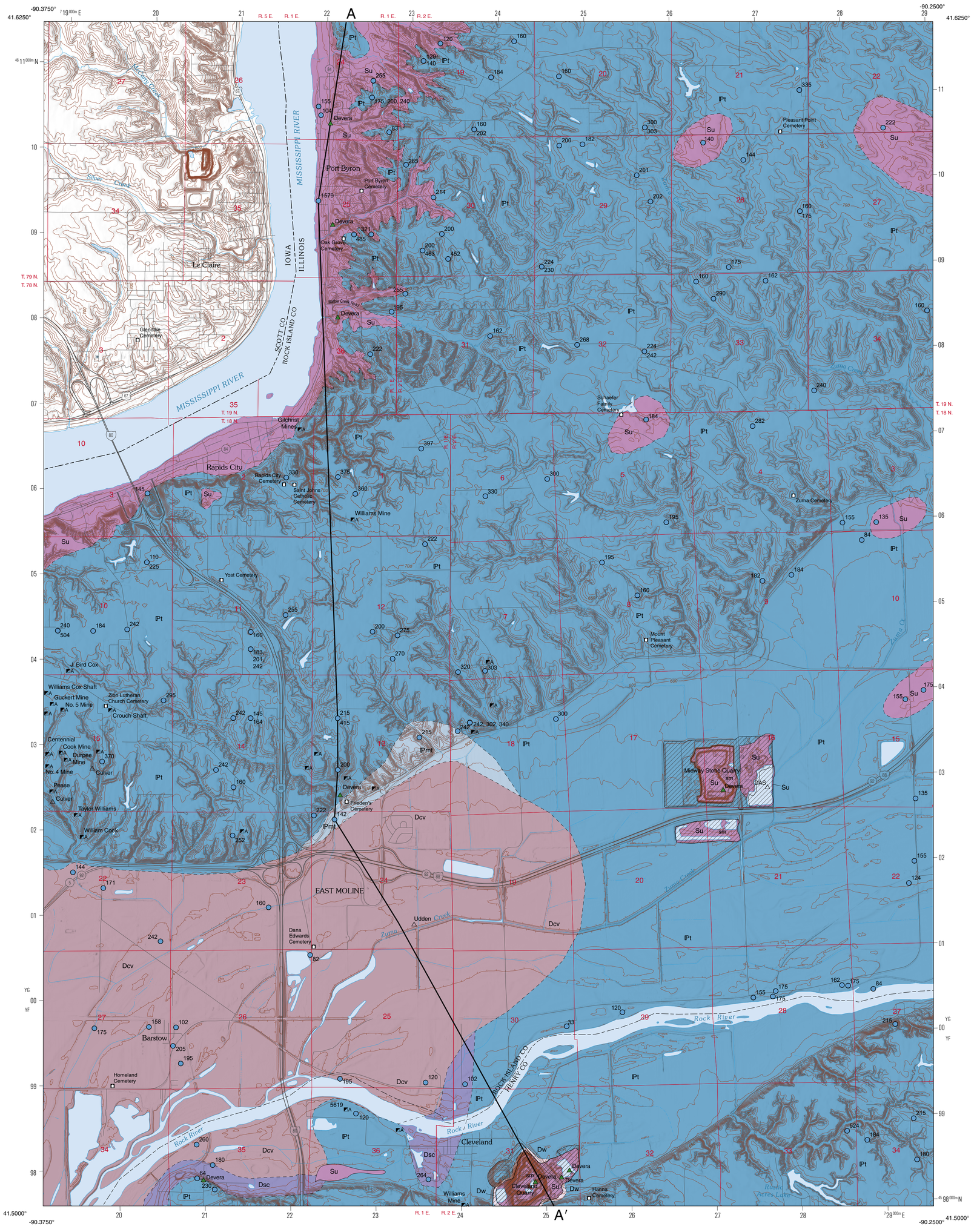
2022

STATEMAP Port Byron-BG



SYSTEM — EXPLANATION — SERIES

- sm — Surface mined area
- unconformity
- **Pennsylvanian**
  - lPt — Tradewater Formation — Desmoinesian
  - unconformity
  - lPmt — Muscatine formation — Atokan, Morrowan
- unconformity
- **Devonian**
  - Dsc — Sweetland Creek Shale — Upper Devonian
  - unconformity
  - Dcv — Cedar Valley Limestone — Middle Devonian
  - unconformity
  - Dw — Wapsipinicon Limestone — Middle Devonian
- unconformity
- **Silurian**
  - Su — Silurian undifferentiated — Upper Silurian

Drill Holes
from which subsurface data were obtained

- Water well
- ○ 125 — Numeric label indicates total depth of boring in feet.

Point Symbols

- ◩A — Shaft mine, abandoned
- △ — Outcrop from ISGS Field Notes
- ▲ — Outcrop (recent)

Line Symbols

- Contact, accurate
- Contact, inferred
- A—A′ — Line of cross section

Note: Well and boring records are on file at the ISGS Geological Records Unit and are available online from the ISGS Web site.

Outcrop labels indicate last name of observer.

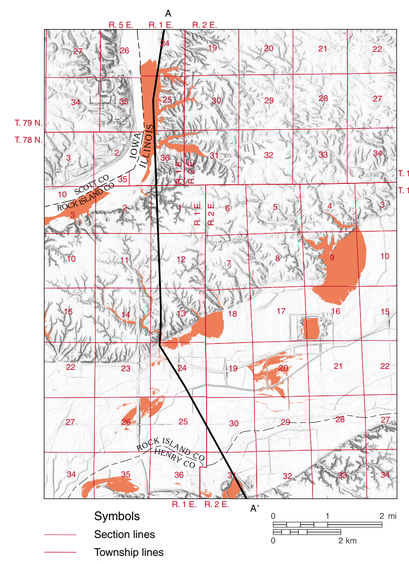


Figure 1 Showing forecasted bedrock outcrops within 5 feet of the land surface. Silurian rock dominates around Port Byron, IL and along the Mississippi River. Pennsylvanian outcrops are common in southeast flowing ravines. Scale is 1:100,000.

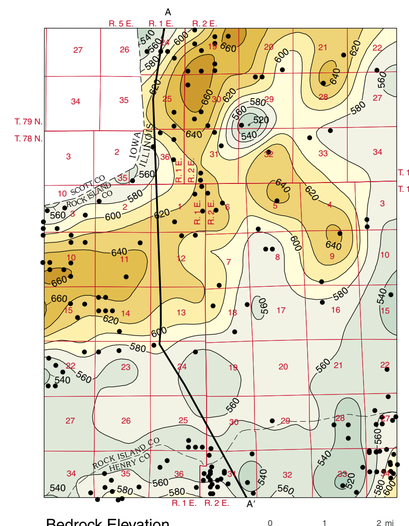


Figure 2 Bedrock topography of the Port Byron Quadrangle. Scale is 1:100,000.

Base map compiled by Illinois State Geological Survey from digital data (2021 US Topo) provided by the United States Geological Survey. Shaded relief and contours derived from lidar data from the Rock Island and Henry County collections (2020) available through ILHMP and data provided by the Iowa LiDAR Consortium (2007 and 2010).

North American Datum of 1983 (NAD 83)
Projection: 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
NATIONAL GEODETIC VERTICAL DATUM OF 1988

Geology based on field work by J.A. Devera, J.M. Krienert, C. Swiger, F. Burkett, K.R. Wilson, and J.R. Breeden, 2021–2022.

Digital cartography by Jennfier E. Carrell, Emily G. Bunse, and Ethan Lehmann, Illinois State Geological Survey.

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This map has not undergone the formal Illinois Geologic Quadrangle map review process. Whether or when this map will be formally reviewed and published depends on the resources and priorities of the ISGS.

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1	2	3
4		5
6	7	8

ADJOINING QUADRANGLES
1 McCausland
2 Cordova
3 Erie NW
4 Silvis
5 Hillsdale
6 Coal Valley
7 Green Rock
8 Geneseo

APPROXIMATE MEAN DECLINATION, 2022

ROAD CLASSIFICATION

- Interstate Route
- U.S. Route
- State Route
- Local road

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SYSTEM	SERIES	GROUP	FORMATION	MEMBER OR BED	GRAPHIC COLUMN	THICKNESS (FT)	UNIT
QUATERNARY	PLEISTOCENE AND HOLOCENE		Surficial deposits				A
PENNSYLVANIAN	DESMOINSIAN	Racoon Creek	Tradewater	Seville Ls. Rock Island Coal		50–162	B
	ATOKAN						
	MORROWAN		Muscatine (Caseyville)			30–100	C
DEVONIAN	UD[1]	NA[2]		Sweetland Creek		0–20	D
	MIDDLE DEVONIAN	Muscatatuk	Cedar Valley			0–60	E
			Wapsipinicon	Otis		0–38	F
SILURIAN	UPPER SILURIAN		Gower	Le Claire		0–45	G
			Scotch Grove	Palisades-Kepler		200	H
				Wabeek			

[1]UD refers to Upper Devonian, NA refers to New Albany Group

A Cahokia, Peoria, Equality, and Glasford formations were not mapped but mantle the bedrock in the Port Byron Quadrangle. These formations are comprised of clay, silt, sand, gravel and diamicton which contains igneous, metamorphic, and sedimentary erratics. Clay is gray to bluish gray and yellow gray and occurs in low lying terraces and in at the mouths of the north flowing ravines. Sand is light gray can be layered with clay; the grains range from fine to coarse dominated by quartz. The quartz is subrounded to rounded. Sorting is poor. Gravels are sub-angular to subrounded and comprised of chert nodules, quartz, igneous, and metamorphic rocks. Diamicton is a gray clay rich unit with silt and sand that can be interstratified with the clay and glacial erratics. Some areas the sand can be well developed and chokes the north flowing streams. The surficial material is unconformable with the underlying bedrock.

B Tradewater Formation contains shale, siltstone, sandstone with lesser amounts of limestone, coal, and chert. Shale is typically dark to medium gray but in some areas above the Rock Island Coal it is bluish gray. Most of the shales near the Rock Island Coal are carbonaceous both above the coal and lateral to the coal. The shales are fissile to non-fissile claystone and dominantly weathers in platelets. Black fissile shale is also observed and contains pyrite. Some of the claystone weathers orange. Siltstone is gray contains clay and is thin bedded grades upward into a fine, grained sandstone. The siltstone is laminated with mica common and has a wavey or crenulated appearance. Sandstone is typically a gray to tan fine grained sublitharenite that is found in coarsening upward sequences (shale to siltstone to sandstone). The sandstone is either cross bedded or tabular that contains mica and found at various levels in the unit. The Rock Island Coal Bed is lenticular and discontinuous bed that seems to occur in channels. The thickness of the coal varies from a few inches to 3 feet thick. Fossils associated with the coal are *Lepidodendron, Cordaites* and *Calamites* trees. The Seville Limestone is a dark gray, dense, argillaceous carbonate rock that overlies the Rock Island Coal, and it is also lenticular. Lateral to the limestone is calcareous shale that contains *Conostichus* and *Asterosoma* trace fossils. Locally, the Seville Limestone contains a bluish gray to white chert that has thin layers of carbonaceous material. This chert has been referred by archeologists as the “Moline Chert”. The contact is sharp to gradational in places with the sandstone unit below.

C Muscatine (Caseyville) formation is dominated by shale but also contains sandstones and siltstones with minor amounts of coal and limestone. The shale is dark gray, weathers in platelets, and occurs above and below sandstone beds. The lower sandstone is only locally found in water wells in sec. 12 and 13, T18S, R1E. At this location the sandstone unconformably overlies the Cedar Valley Formation. It is confined to a narrow width of about one mile.The sandstone is light gray, fine grained, well sorted, quartz arenite. It is thin to medium bedded and cross bedded in places. In some areas the sandstone can be fine to medium grained. The basal part of this unit is unconformable and may extend down into channels, caves and sinkholes within the Devonian carbonate rocks below. Some of the channels or paleo-canyons are dominated by shales that has large broad leaf fossils of *Lesleya* sp. *Calamites* and the three-lobed leaves of *Megalopteris* are also found in these Lower Pennsylvanian shales.

D Sweetland Creek Shale is dominated by greenish gray to dark gray shale. It is fissile and slightly calcareous and can be silty in places. The shale is massive to finely laminated. Fossils are scarce but the brachiopod *Lingula* can be common along some bedding planes. This formation is discontinuous in areas where either nondeposition or erosion has occurred. The shale can be as much as sixty feet thick. Contacts of this unit above and below are unconformable.

E Cedar Valley Formation is a fine-grained argillaceous limestone that has shaly partings and contains a diverse fauna: brachiopods, bryozoans, echinoderm debris and corals. In the upper parts of this formation at the contact with Pennsylvanian the limestone can contain red stained argillaceous crinoidal wackestones and packstones. Greenish gray shaly beds are also present. The lower part of this limestone contains numerous fossils: colonial tabulate corals *Favosites* and colonial rugose corals *Hexagonaria*, brachiopods *Independatrypa, Pentamerella, Orthospirifer*, gastropods bellerophonids, platycerids, sponges stromatoporid mounds, *Astreospongia*, crinoids and blastoids. Occasional placoderm plates and bone fragments can be found. Bedding ranges from thin to massive. Basal bed disconformable with underlying unit.

F Wapsipinicon Formation in the study area only the Otis Member of the Wapsipinicon was observed in the Cleveland Quarry (**Photo 8**). It is a light gray to greenish gray, fine to coarse-grained crystalline, slightly argillaceous, poorly fossiliferous limestone and dolostone. The limestone and argillaceous dolostones are typically unfossiliferous. Collapse breccias are common in this unit. Most of the formation is known from drill hole data and quarry exposures. The upper contact can contain paleo-karst filled with dark gray shales of the Pennsylvanian. Some areas northeast of the Cleveland Quarry yield paleo-Karst features that go through the Wapsipinicon and into the Silurian units below (**Photo 6**). The lower contact of the Wapsipinicon is unconformable with the underlying rocks.

G Gower Formation is a gray-brown weathers yellowish gray, dolostone. It is dominated by framework or mound facies, boundstones and fossil moldic wackestones. This unit is exposed only at the Cleveland Quarry and in water well south of the Rock River. Fossils are common including: crinoids *Eucalyptocrinites*, *Siphonocrinus*, Cystoids *Caryocrinites, Megacystites*, corals *Favosites* and rugose corals, brachiopods, bryozoans, nautiloids, gastropods, and trilobites *Bumastus ioxus, Calymene niagarensis* and *Cheirurus*. These rocks are high-quality, pure microcrystalline dolostone that is locally vuggy. Bedding is thick to massive irregular in places with the appearance of scattered reef debris. This unit has reef flank facies and reef core facies. The contact is gradational with the dolostone facies below.

H Scotch Grove is an interval of yellowish to gray dolostone that is mounded crinoidal dolostone and cherty dolostone. Mound facies have massive boundstone cores **(Photo 10**), as well as dipping flank facies (**Photo 9**). These mound facies are named the Palisades-Kepler Member of the Scotch Grove Formation. Lateral to the mounds is inter-mound flat lying dolostones called the Wabeek Member which is composed of sparsely fossil-moldic, dense to vuggy dolostone. Only the upper part of this formation is present in the Cleveland and Midway Quarries. Drill hole data shows that the Silurian is 408 feet thick in the Rock River bottoms near the Midway Quarry where the Silurian overlies the Ordovician Maquoketa Formation.

Introduction

The Port Byron Quadrangle lies east of the Quad Cities area and east of the Mississippi River. A small northwest portion of the quadrangle is in Iowa at Le Claire. The Rock River flows east to west in the southern part of the quadrangle. The Rock River is an underfit stream with a flood plain that is between 3 and 4 miles wide. The oldest rocks in the study area are Silurian that outcrop at the town of Port Byron, Illinois and in two quarries on the flood plain of the Rock River. Two Middle Devonian formations occur unconformably above the Silurian which are the Wapsipinicon and Cedar Valley formations. Both Devonian formations pinch-out north of the Rock River flood plain and eastward at the Midway Quarry. Pennsylvanian directly overlies the Silurian dolostones at the Midway Quarry. Farther south at the Cleveland Quarry south of the Rock River, only about twenty-five feet of lower Middle Devonian is observed in the quarry. Upper Devonian shale is thin (0 to 60’ feet) and out crops south of the Rock River in the southwestern-most corner of the quadrangle. This unit is the Sweetland Creek Shale and is found in water wells a half mile west of the Cleveland Quarry but does not occur in the quarry. The Devonian rocks are likely cut out by erosion and covered by overlying Pennsylvanian deposits. The Pennsylvanian rocks cover the eastern and northern parts of the Port Byron Quadrangle. Two formations occur, the Muscatine (formerly Caseyville) formation and the Tradewater Formation. The Muscatine formation is localized in channels, whereas the Tradewater Formation is extensive over the northeastern part of the quadrangle and north of the Rock River into the Silvis Quadrangle to the west.

One of the most important findings in the Port Byron Quadrangle is about twenty-two square miles of the northeastern corner of the quadrangle is covered by a thin veneer to over one hundred feet thick deposits of Pennsylvanian rocks. This area takes in approximately one quarter of the quadrangle. The most recent bedrock geologic map of Illinois depicts this area as Silurian (Kolata et al. 2005). This is a large area depicted in Figure 3. The current geologic map of Port Byron Quadrangle will drastically change the bedrock State map in this area.

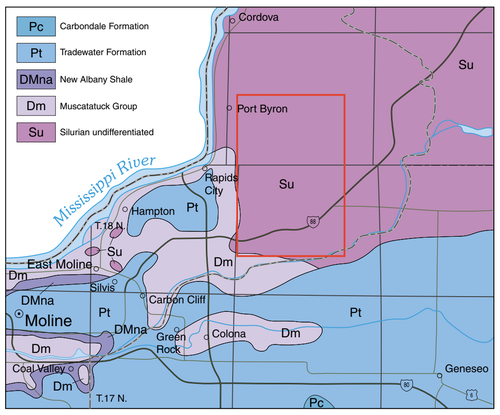

Figure 3 Partial of the Bedrock Geology of Illinois (Kolata et al. 2005) showing an area mapped as Silurian (in red rectangle) that has been found to be covered by Pennsylvanian strata. In some areas the Pennsylvanian is over 100 feet thick in paleo-karst features within the Silurian dolostone.

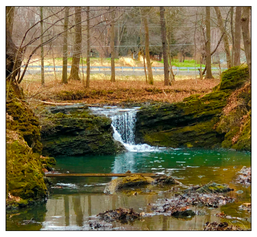

Photo 1 Gower Formation at Port Byron, IL showing the flank facies of the Le Claire Member.

Photo 2 Shows steep dips of the flank facies at another location in Port Byron, IL.

Previous Work

The earliest work in the study area was that of A. H. Worthen and J. Shaw (1873), who did the geology of Rock Island County. W.H. Norton (1889), worked on the geology of Scott County, Iowa. Stuart Weller (1906) produced the first geologic map of Illinois. An early report on the mineral resources was made by T.E. Savage and J. A. Udden (1921). The geology, mineral resources, and hydrogeology of Rock Island County have been reported for land use and regional planning (Culver 1921-1924; Brueckmann and Bergstrom 1968; Anderson 1980). A directory of coal mines within the Port Byron Quadrangle was produced by J. M. Obrad and C. Chenoweth (2011). The surficial geology of Rock Island County also showing bedrock exposures was mapped by R. C. Anderson and X. Miao (2016). The bedrock geology of Coal Valley and Sylvis Quadrangles was produced by F. Delpomdor (2021). The Silvis Quadrangle lies directly west of the study area.

How this map was completed

The geologic map of the Port Byron Quadrangle is based on the examination of plat verified water well records from the Illinois State Geological Survey’s (ILWATER) database. Twenty-eight coal mine records were also used from the ISGS (ILMINES) database. Two quarries occur in the study area, the Midway and Cleveland quarries of the River Stone Group. Outcrops of Silurian occur around Port Byron of the Gower Formation, Photos 1 and 2.

One important outcrop occurs south of the Rock River at a low-lying bluff north of Colona, Illinois. At this location, a rare outcrop of Sweetland Creek occurs (Photo 3), in the northwest corner of sec. 35, T18N, R1E.

Photo 3 Shows a rare outcrop of the Sweetland Creek Shale (Upper Devonian); Kelly Wilson for scale.

The outcrops of Pennsylvanian Tradewater Formation occur in south flowing ravines north of the Rock River bluffs. This map differs from the State Geologic map of Kolata et al. 2005 in that more Pennsylvanian is now known to occur north of the Rock River in verified water wells. Here the Tradewater Formation overlies the Silurian dolostones west of Port Byron, Illinois. This was also seen at the Midway Quarry where shales of Pennsylvanian overlie reef facies of the Silurian (Photo 4).

There is less Middle Devonian carbonate units seen in the Rock River bottoms in the east half of the quadrangle which is another area of progress from the earlier State Geologic Map. There was also a marine sandstone encountered at the Cleveland Quarry above the thin Wapsipinicon (Middle Devonian) and in places over Silurian dolostone (Photo 5).

Photo 4 Pennsylvanian Shales of the Tradewater Fm. above Silurian dolostone in the Midway Quarry.

Photo 5 Trace fossils of burrowing Sea Anemones in the Pennsylvanian sandstone overlying Middle Devonian limestone and Silurian dolostones in the Cleveland Quarry.

Figure 1 shows the sparsity of outcrops in the Port Byron Quadrangle. The data from three water wells yielded sandstone on the Middle Devonian surface. The author interprets this sandstone as the Muscatine (Caseyville) formation, which is restricted to channels and rarely occurs in the study area. Just to the west in the Silvis Quadrangle the Muscatine formation was not observed (Delpomdor 2021). Paleo-karst is present on the Silurian surface as represented by the bedrock topography in Figure 2. Over thickened Pennsylvanian sections are found in wells east of Port Byron, see Figure 2. The Tradewater ranges in thickness from tens of feet to 193 feet due to paleo-karst on the Silurian surface.

Stratigraphy

Silurian

The Silurian System is composed of dolostone, and weathers yellow but fresh surfaces are typically gray. The formation seen at exposures at Port Byron are reef flank facies of the Le Claire Member of the Gower Formation. Farther east in Illinois the Gower is equivalent to the Racine Formation. Below the Gower is the Scotch Grove Formation which occurs in the Cleveland Quarry. The Scotch Grove is also equivalent to the lower part of the Racine farther east in Illinois. The Iowa terminology makes more sense in the Quad Cities area as the facies are more like those seen in Iowa than that of northeastern Illinois, especially the Anamosa Member of the Gower Formation which is an inter-reef facies that does not occur farther east in Illinois.

All of the dolostones, Gower and Scotch Grove, are of reef facies, so the Silurian was mapped as undifferentiated in the Port Byron Quadrangle. They contain porous molds of fossils: crinoids, gastropods, corals, brachiopods, cephalopods, and trilobites. In the Midway quarry fossil casts of *Bumastus* trilobites were common along with the pentamerid brachiopods and the Tabulate coral *Favosities*. Horn coral molds also occur in both the Cleveland and Midway quarries. Paleo-karst is present in the Midway Quarry. Photo 6 shows an 18-foot-deep sinkhole that was filled with Pennsylvanian shale that has weathered away. In other areas of the quarry, up to thirty feet of karst is observed to erode into the dolostone.

Photo 6 Paleo-karst in Silurian dolostone within the Midway Quarry. Also showing reddish oxidized layer on the dolostone.

Devonian

Devonian rocks are comprised of lower Middle Devonian Wapsipinicon Formation that unconformably overly the Silurian dolostone, upper Middle Devonian Cedar Valley Formation, and Upper Devonian Sweetland Creek Formation of the New Albany Shale Group.

The Wapsipinicon occurs in the Cleveland Quarry, whereas the overlying Cedar Valley is not in the quarry. North in the Midway Quarry neither Middle Devonian unit is present. Paleo-karst occurs in the Wapsipinicon at the Cleveland Quarry gray Pennsylvanian shales occur within the sinkholes. The Wapsipinicon is a light gray to white, fine grained to lithographic limestone. Beds in this unit are brecciated in places, due to solution collapse as anhydrite and gypsum occur locally in the limestone. Fossils are rare in the Wapsipinicon because it was deposited under hypersaline conditions (Willman et al. 1975). Only a small area riming the Cleveland Quarry yields the Wapsipinicon. Elsewhere, it occurs below the Cedar Valley in the Rock River Valley.

The Cedar Valley Limestone is known only from water wells on the southwest side of the quadrangle in the Rock River Valley. It is a brown, fossiliferous wackestone that reaches a thickness of sixty feet. It is eroded eastward and not seen at the Midland Quarry. The Cedar Valley also does not occur northward in the northern half of the quadrangle where Pennsylvanian rock rest on Silurian dolostone. The notations of brown limestone in water wells refer to the Cedar Valley.

The Sweetland Creek Shale is known from one locality in the northwest corner of sec. 35, T18N, R1E (see photo 3). The rest of this unit is known from water wells south of the Rock River along a small bluff at Colona, Illinois. It is a black, fissile shale that has very few fossils. This unit is overlain by the Sub-Absorica Unconformity.

Upper Carboniferous (Pennsylvanian sub-system)

Two units comprise the Pennsylvanian sub-system the Muscatine formation (Lower Pennsylvanian) and the Tradewater Formation (Middle Pennsylvanian). The Muscatine formation is composed of gray shales and light gray, fine grained, well sorted, quartz arenites. It occurs sporadically in channels and paleo-karst of the carbonate units below. The Muscatine is better known farther west in the Coal Valley, Milan, Davenport East, and Andalusia quadrangles. In the Port Byron Quadrangle, it is known from water wells on the north side of the Rock River Valley.

The Tradewater Formation is dominantly composed of siliciclastics, gray to dark gray shales, siltstones, and sublitharenites. It also contains minor amounts of calcareous shales, thin argillaceous, ferruginous, fossil wackestones, coal and bluish to white chert.

The Seville Limestone is a dark gray, dense, argillaceous carbonate rock that overlies the Rock Island Coal; it is lenticular. Lateral to the limestone is calcareous shale that contains *Conostichus* and *Asterosoma* and other marine trace fossils assemblages. Locally, the Seville Limestone contains a bluish gray to white chert that has thin layers of carbonaceous material. This chert has been referred by archeologists as the Moline Chert. It has been found as arrowheads and were used by local native tribes. Above the limestone is a medium gray shale that is overlain by a ferruginous, tan sandstone.

The Rock Island Coal is a vitreous coal that ranges between three and four feet thick in mined areas. It occurs in twenty-eight mines within the Port Byron Quadrangle. Most of the mines were small and the coal was used for local consumption. One of the largest mines was at Rapid City, Illinois. In most places the Rock Island Coal Bed is lenticular and discontinuous. It seems to occur in channels. The thickness of the coal varies from one or two inches to four feet thick. Fossils associated with the coal are *Lepidodendron*, *Cordaites* and *Calamites* trees.

The shale in the upper Tradewater Formation can have a bluish tint. It weathers in platelets and can weather to a gummy claystone. Siltstone is thin bedded to laminated and can occasionally contain trace fossils typically when interbedded with shale. The sandstone is also medium gray with mica, carbonaceous debris, and interstitial clay.

The base of the Tradewater is unconformable with the underlying units which include the following formations: Muscatine, Cedar Valley, Wapsipinicon, or Gower. This depends on where the contact is observed.

Economic Geology

Coal

The Rock Island Coal Bed was the only stratigraphic horizon mined in the Port Byron Quadrangle, as small drift mines (Obrad and Chenoweth 2011). There are twenty-eight mines documented in the study area most operated between the mid-1800’s to 1898. However, Happy Hollow Coal Company may have operated during the Great Depression in the 1930’s. There are undocumented mines east of Port Byron that we have no record of, based on what Mr. Greg Wright told the author. On Mr. Wright’s property was a haul road up Barber Creek that brought coal to the Mississippi River. At the Illinois State Geological Survey, we have no documented mines in this area east of Port Byron, Illinois. Even when considering documented mines, little is known about production dates and tonnages, or even ownership. An interesting side note of mining around Cleveland, Henry County, Illinois was the fact that coffer dams were built to pump water out and mine coal from the bed of the Rock River on the south side of the river. The years of operation, ownership, and production are unknown for this mine, listed under index number 5619. Taylor Williams had the most extensive operations southeast of Rapid City, Illinois, running surface, shaft, and drift mines covering about five hundred acres in the study area.

Many of the smaller coal mines were confined to paleo-karst areas. In these areas coal was discovered by shallow water wells then shafts were dropped to the level of the coal. The coal was mined until it pinched out or abruptly stopped at the lateral limestone. No coal mines are currently operating in the Port Byron Quadrangle.

Limestone

There are two active quarries in the Port Byron Quadrangle: the Midway and Cleveland quarries. The aggregate mined by the River Stone Group in these two quarries is Silurian dolostone. The main uses of the dolostone are aggregate base, asphalt, concrete, rip rap, and agricultural lime. Both quarries are located within the Rock River flood plain where bedrock is close to the surface (Figure 1). The Midway Quarry is north of the Rock River whereas, the Cleveland Quarry is south of the river near the southern bluff. The Midway Quarry has Pennsylvanian shales over the Silurian dolostone (Photo 4). Paleo-karst features such as sinkholes and steep sided channels occur in the Midway Quarry as well (Photo 6).

The Cleveland Quarry has Pennsylvanian shales within the Wapsipinicon and shales with bioturbated sandstone on top of the Silurian in places where the Devonian Wapsipinicon has been removed (Photos 5 and 7).

Photo 7 Fossil wood impression in the Tradewater Formation in the Cleveland Quarry.

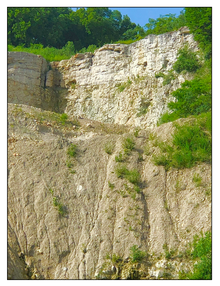

Photo 8 showing the contact with the Wapsipinicon and Silurian in the Cleveland Quarry.

Photo 9 Showing reef flank facies of the Scotch Grove Formation in the Midway Quarry.

Photo 10 Showing core reef facies in the Midway Quarry. Note the massive bedding.

Photo 11 Pyritic stalactites occurring in vugs at the Silurian/Penn. contact in the Midway Quarry.

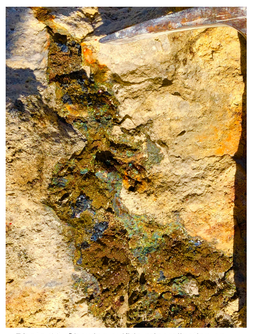

Photo 12 Showing sulfide mineralization on Silurian dolostone. The minerals shown here are pyrite, chalcopyrite, and sphalerite.

Mineralization

There are minor amounts of sulfide-rich deposits occurring within the paleo-karst where Pennsylvanian shales meet the Silurian dolostones. This was observed in the Midway Quarry (Photo 11), where pyrite occurs as stalactites on the karst surface in vugs.

The organic rich shales of the Pennsylvania provided much of the mineralization. Nodules of pyrite and marcasite along with sphalerite, chalcopyrite, and millerite are found on the contact zone with the Silurian dolostones (Photo 12).

All the mineralization is dated post-burial, meaning it is a secondary epigenetic process that occurred after the formation of the Muscatine or Tradewater Formations. Isotope analysis of the of the sulfides shows a distinct difference from other normal sulfide deposits that occur in the same region, such as MVT deposits found to the north in Jo Daviess County, Illinois. This means that the mineralization observed is a separate unique event. This leads to the conclusion that mineralization only occurs within these localized natural pockets created by the paleo-karst, rather than a massive regional deposit like in MVT’s (Garvin and Ludvigson 1992). The swamp like environments of the Pennsylvanian also likely produced a lot of acid to help the formation and alteration of the material. The same type of mineralization deposits was observed in the Columbia Quarry of Northwest Illinois and within the Conklin, Four County, and Martin-Marietta quarries of Southeast Iowa. In Scott County, Iowa at the Linwood Quarry large deposits of barite crystals occur in Pennsylvanian shales that are in Middle Devonian limestone paleo-karst. This is very different than the secondary epigenetic process that deposited the sulfides on the dolostones of the Silurian.

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