Prepared in cooperation with the U.S. Geological Survey,
Dallas L. Peck, Director, under the Cooperative
Geologic Mapping Program (COGEOMAP)

Illinois Department of Energy and Natural Resources
ILLINOIS STATE GEOLOGICAL SURVEY
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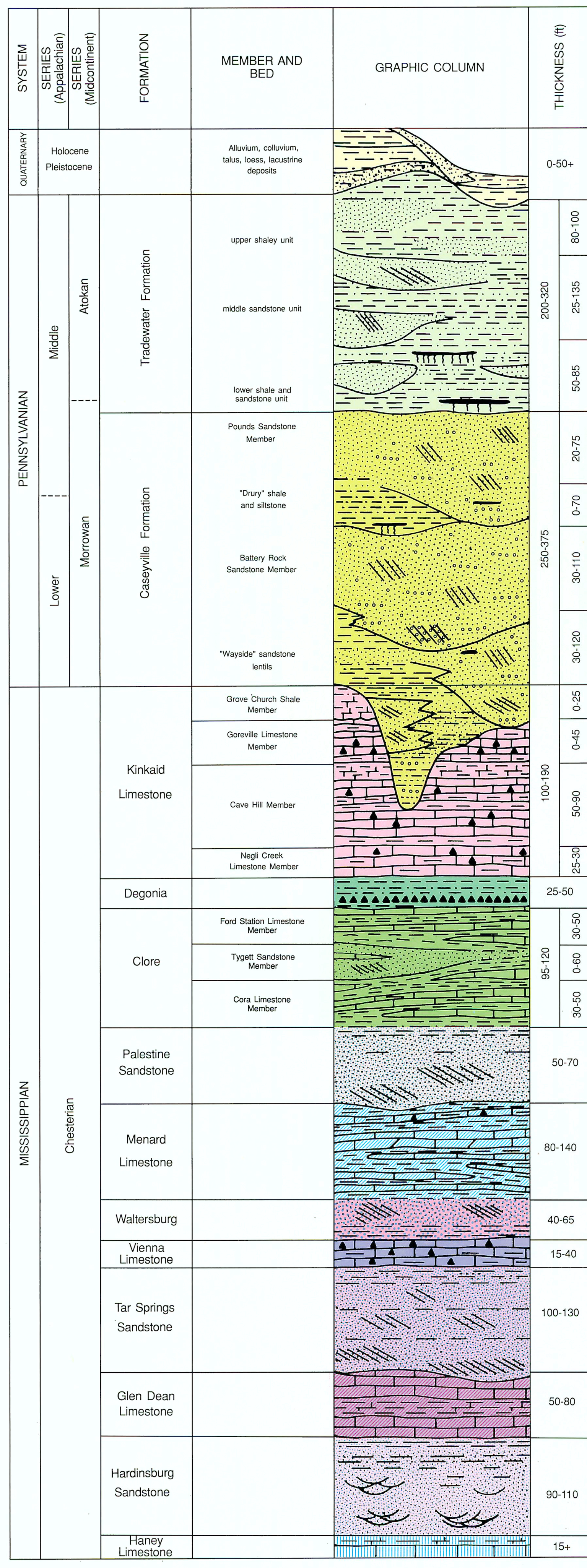
Geologic Map of the
WALTERSBURG QUADRANGLE, ILLINOIS
IGQ-8



Description unit	Thickness (ft)	Description
A	0-50+	**A** Alluvium (undifferentiated). Upland sequence consists of bedrock residuum (yellowish brown, clay to clay loam, commonly arenaceous or with sandstone pebbles), Roxana Silt (yellowish brown to light brownish gray loess, locally arenaceous), and Peoria Loess (yellowish brown to light gray loess). Valley sequence consists of Cahokia Alluvium (yellowish brown to gray silt, silt loam, and silty clay) overlying Equality Formation (gray to dark gray clay, silty clay, silty clay loam; contains rare shell fragments). Slopes are covered by Peyton Colluvium (bedrock float and reworked loess, silt to boulder-sized, rounded to angular, poorly sorted).
B	80-100	**B** Interbedded shale, siltstone, and sandstone. Shale is dark gray to black and fissile. Siltstone is gray to brown and laminated. Sandstone is light gray to orange brown and quartzose; mica is rare. Bedding is less than 1-ft thick; ripple marks, shale clasts, and partings are common in sandstone.
C	25-135	**C** Sandstone. Light gray to dark brown, medium grained, well sorted, medium to well indurated, quartzose; mica and ferromagnesian minerals are rare to common. Quartz granules and shale clasts are rare. Interbedded locally with very dark gray fissile shale or very dark gray to brown laminated siltstone. Liesegang banding, crossbeds, and ripple marks are common. Bedding is 0.25 to 1.25 ft thick; unit forms ledges 10 to 20 ft high.
D	50-85	**D** Interbedded shale, sandstone, and coal. Shale is gray to dark gray, fissile, and silty, contains plant fossils, and is locally micaceous. Sandstone is white to brown, fine to medium grained, well sorted, well indurated, and quartzose; ferromagnesian minerals and mica are rare to common. Liesegang banding and ripple marks are rare to common. Bedding is thin (< 1 ft) to massive; unit forms local 5- to 20-ft-high ledges. Coal near base is discontinuous, 2.5 to 3.5 ft thick, and possibly equivalent to Bell (Kentucky) or Tunnel Hill Coal Beds. Coal near top is 2 to 2.5 ft thick and contains 0.2-ft-clay parting, and upper half is argillaceous; possibly equivalent to Smith Coal Bed (Kentucky).
E	20-75	**E** Sandstone. White to light brown, medium to coarse grained, medium sorted, medium to well indurated, and quartzose; ferromagnesian minerals are rare. White to gray white, subrounded to rounded quartz pebbles are common and granules are rare. Crossbeds and ripple marks are common. Bedding is 0.5 to 2 ft thick and forms bluffs 10 to 40 ft high. A local thin (0.4 ft) coal lens is near the base of the unit.
F	0-70	**F** Shale and siltstone. Shale is gray to dark gray and fissile. Siltstone is gray, micaceous, argillaceous, and contains local carbonaceous plant fossils. Thin (0.5 ft) coal lens occurs in lower portion. Unit is poorly exposed.
G	30-110	**G** Sandstone. Light gray to reddish brown, very fine to coarse grained, poorly to well sorted, and quartzose; ferromagnesian minerals and mica are rare. Gray white, subrounded to rounded quartz granules and pebbles are common to abundant. Pebble conglomerate lenses occur near base. Plant casts are rare. Crossbeds and ripple marks are common. Bedding is 0.2 ft to massive; unit forms bluffs 5 to 60 ft high.
H	30-120	**H** The sandstone along Hayes Creek is tan to light brown, very fine to medium grained, well sorted, medium to well indurated, and quartzose; ferromagnesian minerals are rare. Shale clasts are rare. Ripple marks and crossbeds are common. Bedding is 0.5 ft thick to massive and forms ledges 5 to 40 feet high. Intervening strata are poorly exposed, composed of light gray to dark gray, fissile, shale, and locally contain plant fossils. The sandstone within and bordering the the Dixon Springs Graben is white to brown, very fine to coarse grained, medium to well indurated, and quartzose; ferromagnesian minerals and mica are rare. Rounded to subrounded quartz pebbles and shale clasts are rare to abundant. Liesegang banding is rare. Gray siltstone and light to dark gray shale interbeds are common. Plant fossils, trace fossils, ripple marks, and crossbeds are locally abundant. Lenticular conglomeratic sandstone and thin (1 to 1.3 ft) coal occur locally. Bedding is less than 0.5 ft to massive; unit forms ledges and bluffs 10 to 80 ft high.
I	0-25	**I** Shale. Gray green, fissile, calcareous, and fossiliferous (brachiopods and bryozoans). Few lenticular beds of limestone are light gray, lutitic to fine grained, and 0.1 to 0.2 ft thick. Unit is poorly exposed.
J	0-45	**J** Limestone. Gray to grayish brown, fine to medium grained, bioclastic, fossiliferous (bryozoans and gastropods), and interbedded with argillaceous limestone. Layers of gray chert nodules are locally common. Bedding is 1 to 2 ft thick and slumped; unit forms low bench and is poorly exposed.
K	50-90	**K** Shale and limestone. Shale is gray to gray green to maroon, and fissile, and contains few interbeds of thin (0.1 to 0.2 ft) siltstone. Limestone is gray to gray brown, lutitic to very coarse grained, bioclastic, fossiliferous (brachiopods, bryozoans, and pelmatozoans), and interbedded with argillaceous limestone beds (0.7 to 0.8 ft thick). Layers of gray chert nodules are rare. Bedding is 1 to 2 ft thick and slumped; unit is poorly exposed.
L	25-30	**L** Limestone. Gray to grayish brown, lutitic to coarse grained, contains scattered bioclasts;and fossils (abundant pelmatozoans, gastropods, and brachiopods, and few corals, cephalopods, and bryozoans). Layers of gray to dark gray lenticular chert nodules are common. Local shale interbeds in upper part are grayish green, fissile, weakly calcareous, 2 to 3 ft thick, and poorly exposed. Limestone bedding is 0.1 to 3 ft thick and locally undulatory. Unit locally forms poor bench, 10 to 25 ft high, and is often slumped and the site of springs.
M	25-50	**M** Shale, siltstone, sandstone, and chert. Shale is gray to light brown to variegated, and weakly fissile. Bedding is less than 0.5 to 3 ft thick. Siltstone is grayish green to light brown, and well indurated. Ripple marks locally present. Bedding is 0.1 to 0.8 ft thick. Sandstone is light grayish green to brown, very fine grained, well sorted, medium to well indurated, quartzose, and locally silty, argillaceous, or contains shale interbeds. Ripple marks are present. Bedding is 0.1 to 0.5 ft thick. Prominent chert beds near base are gray to yellowish brown, and well indurated. Ripple marks are rare. Bedding is 0.3 to 1.5 ft thick. Chert is 2 to 5 ft thick, generally fractured, and slumped. Resistant chert bed forms ledge and is excellent marker bed. Chert is underlain by thin siltstone or shale bed.
N	30-50	**N** Limestone. Gray to brown, lutitic to medium grained; contains coarse-grained bioclasts and fossils (abundant brachiopods and pelmatozoans, common bryozoans, and few rugose corals). Argillaceous beds are common. Shale interbeds are light gray to dark gray, fissile, and poorly indurated. Siltstone in upper portion is grayish green to light brown, laminated, rarely micaceous, and has 0.1- to 4-ft-thick bedding. Siltstone is up to 7 ft thick. Beds weather to hourglass-shaped blocks. Bedding is 0.1 to 2.5 ft thick. Limestone beds are commonly slumped and form poor bench 5 to 15 ft high.
O	0-60	**O** Sandstone. Pinkish tan to brown, fine to medium grained, medium sorted, and quartzose. Bedding is 0.1 to 0.4 ft thick and poorly defined. Thin (<0.1 ft) silty sandstone interbeds are locally present. Crossbeds are abundant and ripple marks are common. A lenticular, gray to dark gray, fine- to medium-grained, bioclastic limestone, ranging from 0.8 to 6 ft thick, is present in the upper portion. Limestone bedding is 0.6 to 1.0 ft thick, and beds weather into hourglass shapes. Member thins to less than 3 ft thick, is locally absent in east half of quadrangle, and composed of a single sandstone bed containing abundant brachiopod molds.
P	30-50	**P** Limestone. Gray to light brown, fine to coarse grained, lutitic with coarse-grained bioclasts, and fossiliferous (abundant brachiopods and pelmatozoans, common gastropods, bryozoans, and few rugose corals). Argillaceous limestone beds are common. Shale interbeds are gray to dark gray, fissile, and in beds 1 to 6 ft thick. Limestone beds are 0.3 to 2 ft thick, often slumped, and weather to hourglass-shaped blocks. Limestone forms poor bench up to 10 ft high. Unit is poorly exposed.
Q	50-70	**Q** Sandstone. Gray green to brown, very fine to medium grained, well sorted, and quartzose; ferromagnesian minerals, mica, and calcareous cement are rare. Sandstone is locally silty; carbonaceous plant fragments are rare. Ripple marks and crossbeds are common. Interbedded light gray to light brown, fissile, shale in the lower part. Bedding is 0.1 to 5 ft thick and is locally irregular or undulating. Lower portion crops out in 5- to 35-ft-high bluffs; upper portion is poorly exposed.
R	80-140	**R** Limestone interbedded with shale. Limestone is gray to brown, lutitic to medium grained with scattered coarse-grained bioclasts, and is poorly to medium sorted. Shale is light gray to dark gray, fissile, noncalcareous to calcareous, and up to 5 ft thick. Brachiopods, bryozoans, pelmatozoans, gastropods, and rugose corals are common. Small, light gray to dark brown chert nodules occur in the upper and lower beds in lenticular layers 0.2 to 0.4 ft thick. Buff, dolomitized limestone beds in middle portion are 4 to 5 ft thick. Limestone bedding is 0.1 to 2 ft thick and irregular or undulatory. Unit forms benches 3 to 15 ft high and often slumped; sinkholes and springs are common.
S	40-65	**S** Sandstone. Light tan to dark orange brown, very fine to medium grained, medium sorted, medium to well indurated, locally silty, and quartzose; ferromagnesian minerals and clay are rare. Crossbeds and ripple marks are locally common. Bedding is 0.1 to 2.5 ft thick and wavy or irregular, and forms ledges less than 5 ft thick. Unit is poorly exposed.
T	15-40	**T** Limestone. Gray to grayish brown, lutitic to coarse grained, and bioclastic. Irregular to lenticular shaped, gray to brown chert nodules, scattered and in layers, are abundant and weather readily into tripoli. Pelmatozoans and bryozoans are common. Bedding is 0.4 to 1.2 ft thick. Beds are often slumped and form discontinuous low ledge.
U	100-130	**U** Sandstone. White to brown, very fine to fine grained, well sorted, well indurated, and quartzose; ferromagnesian minerals are rare. Ripple marks are common and crossbeds are locally abundant. Lower portion varies from thin bedded (0.1 ft) to massive, and forms ledges 15 to 30 ft high. Middle portion consists of sandstone alternating with shale and siltstone; forms ledges 5 to 15 ft high. Upper portion is poorly exposed and consists of thin, silty, sandstone lentils interbedded with gray fissile shale and light gray to yellow brown micaceous siltstone. Bedding is laminated to 0.1 ft thick. Carbonaceous plant fragments and ripple marks are common.
V	50-80	**V** Limestone. Gray to dark gray, fine to very coarse grained, medium sorted, bioclastic, and oolitic. Pelmatozoans, solitary corals, blastoids, bryozoans, and brachiopods are common. Crossbeds are rare. Bedding is 0.2 to 2.0 ft thick. Unit is poorly exposed. Sinkholes are common.
W	90-110	**W** Sandstone. White to orange brown, fine grained, well sorted, well indurated, and quartzose; ferromagnesian minerals and mica are rare. Clay coatings on grains are rare. Crossbeds are common, and ripple marks are present. Bedding is 0.3 to 1.0 ft thick and often undulatory or lenticular. Unit forms 5- to 15-ft-high ledges; upper portion is poorly exposed.
X	15+	**X** Shale and limestone. Shale is gray, calcareous, fissile and overlies brown to gray, coarse grained, bioclastic limestone. Unit is very poorly exposed.

STRUCTURAL GEOLOGY

The Waltersburg Quadrangle is on the southern margin of the Illinois Basin. Three major southwest-trending sets of parallel faults—the Lusk Creek, Raum, and Hobbs Creek Fault Zones—transect the quadrangle. These post-Pennsylvanian faults are part of a northeast-trending fault system in the western portion of the Illinois-Kentucky Fluorspar District. Except in areas near the faults, strata through most of the quadrangle dip 2° to 5° to the northwest.

The Lusk Creek Fault Zone bounds the northwest side of the Dixon Springs Graben. Mississippian strata of the Waltersburg Formation, Menard Limestone, Palestine Sandstone, and Clore Formation on the upthrown northwest side are juxtaposed against Pennsylvanian strata of the Tradewater Formation on the downthrown southeast side of the fault zone. Generally the fault zone is about 600 feet wide, but locally it increases to as much as 1,600 feet wide. The fault zone contains slices of strata ranging from St. Louis(?) Limestone (Mississippian) to Tradewater Formation (Pennsylvanian). Maximum vertical displacement across the fault zone, estimated from stratigraphic juxtapositions, is about 750 feet. Drilling data, confidential seismic data, and associated drag folds indicate that the fault planes dip toward the southeast. Small horsts within the fault zone expose strata older than the strata on adjacent sides of the fault zone.

The Raum Fault Zone parallels the Lusk Creek and Hobbs Creek Fault Zones and bisects the Dixon Springs Graben. The throw is a few feet to several hundred feet down to the northwest. The fault zone consists of a single fault or two or more subparallel fault slices and generally is narrow, less than 150 feet wide, except where it branches at the southwest corner of the quadrangle. Similarly to the Lusk Creek Fault Zone, small horsts occur within the Raum Fault Zone. Subsurface data, seismic data, and associated drag folds indicate the fault plane dips to the northwest.

The Dixon Springs Graben is bounded on the southeast side by the Hobbs Creek Fault Zone. The fault zone generally consists of two subparallel faults that range from 3,600 to 6,650 feet apart. The fault block between these bounding faults is offset by subparallel faults forming small grabens within the zone. Rocks within the fault block are similar in age to the strata on the upthrown northwest side. Greater displacement occurs along the southeast bounding fault. Maximum vertical displacement estimated from stratigraphic displacements, is about be 250 feet across the fault zone. Seismic data support the field mapping interpretation that most faults in this zone are normal.

We interpret the surface faults to be the result of two episodes of deformation. The first episode, which probably occurred during the latest Pennsylvanian or Permian, was compressional and moved hanging wall strata upward along the Lusk Creek and Raum Fault Zones. During the second episode, which was extensional and probably occurred during the early Mesozoic, strata on the hanging wall moved downward, generally along a different fault plane. The narrow horsts in the Lusk Creek and Raum Fault Zones are slices of rock uplifted during the compressional episode but not downthrown during the extensional episode.

A broad, discontinuous, asymmetric syncline occurs between the Lusk Creek and Raum Fault Zones. The axis of the syncline is adjacent to the Lusk Creek Fault Zone. Dips on the northwest flank are steeper than dips on the southeast flank. We interpret the syncline as a drag fold that formed during the extensional episode of deformation.

Joints in Pennsylvanian sandstones in the quadrangle are generally oriented either parallel or perpendicular to fault traces. Locally joint systems appear to control the orientation of valleys and ravines within the Dixon Springs Graben.

ECONOMIC GEOLOGY

The principal geologic resources in the Waltersburg Quadrangle are limestone for construction and agriculture and sandstone for construction. Small deposits of fluorite and related minerals have been mined locally, suggesting that additional resources may be present in the quadrangle. Resources of coal are small. Coal beds are too thin and discontinuous to exploit economically, although a few small coal mines were operated in the past. A few exploration wells for oil and gas have been drilled, but all were dry and abandoned.

Limestone resources of southernmost Illinois, including the Waltersburg Quadrangle, were evaluated in a regional study by Lamar (1959). The Kinkaid Limestone contains the thickest limestone beds in the quadrangle and has the best potential as limestone for production of construction aggregate, agricultural limestone, and road rock for local use. Locally, however, the Kinkaid contains shale beds and chert nodules that lower the quality of the stone and make it unsuitable for most commercial uses. The Kinkaid may have some potential as a source of material for manufacture of Portland cement. The Goreville Limestone Member of the Kinkaid was quarried about 1 1/2 miles south of Eddyville, near the northern edge of the quadrangle. Weller et al. (1952) reported that the Kinkaid Limestone was also quarried at the Clay Diggings Mine in the E 1/2, Sec. 16, T12S, R6E. However, analysis of the complex structure at the site suggests that the Ste. Genevieve(?) Limestone and other limestones may have been quarried instead. The Glen Dean Limestone and Cora Limestone, Clore Formation, generally contain shale beds and are too thin to be quarried. The Menard Limestone contains shale beds and chert nodules, but locally may have limestone beds thick enough to be used for agricultural limestone and road aggregate. The Vienna Limestone is thin and contains abundant chert nodules in many places. Sandstone from the "Wayside" Member, Caseyville Formation, is quarried in the northeast corner of Sec. 27, T12S, R6E for use as flagstone. Similar rock crops out to the southwest along Beatty Branch and to the southeast in Flick Branch valley.

The quadrangle is on the western margin of the Illinois-Kentucky Fluorspar District. Several abandoned fluorite mines and prospect pits occur along the Lusk Creek Fault Zone. Vein deposits of fluorite, galena, and sphalerite were mined from the Clay Diggings Mine during the 1940s (Weller et al., 1952). The prospect pits are northeast of the mine, on the ridge just north of Rose Ford. Discarded mineral test cores found in the NE 1/4, Sec. 14, T12S, R6E indicate local prospecting along the Raum Fault Zone.

The Tunnel Hill(?) Coal Bed was strip-mined south of the Mount Zion Church in the center, S 1/2, S 1/2, Sec 12, T13S, R5E but the mine has been reclaimed and the coal is no longer exposed. According to unpublished Illinois State Geological Survey field notes (1934, 1977, 1978), the bed was 2.5 to 3.5 feet thick at the mine site, but it thinned laterally to the north and northeast. An unnamed coal crops out on the ridge between Lusk Creek and Beatty Branch. The coal bed is discontinuous, has maximum thicknesses ranging from 2 feet to more than 3 feet, and locally has a 0.1- to 0.3-foot clay parting. The coal was strip-mined from a small area in the center, SE 1/4, SE 1/4, Sec. 29, T12S, R6E. The same coal also was mined in the NW 1/4, Sec. 14, T12S, R6E and in the center, N 1/2, NE 1/4, Sec. 22, T12S, R6E. Other coals that crop out in the quadrangle are thinner and more restricted laterally.

Three oil and gas exploration wells have been drilled in the quadrangle. The Minton-Baker No. 1 Well was drilled in the NW 1/4, NW 1/4, NE 1/4, Sec. 24, T13S, R5E to the Mississippian Haney Limestone at a depth of 610 feet. The Austin Roberts No. 1 Well was drilled in the NW 1/4, NE 1/4, SE 1/4, Section 10, T13S, R6E to the Devonian Lingle Limestone at a depth of 3,802 feet. The Rodger, Barger et al. No. 1 Well was drilled in the NE 1/4, NE 1/4, SE 1/4, SE 1/4, Sec 18, T13S, R6E to the Mississippian Ste. Genevieve Limestone at a total depth of 1,000 feet. Shows of oil were not reported, and all three wells were abandoned.

REFERENCES

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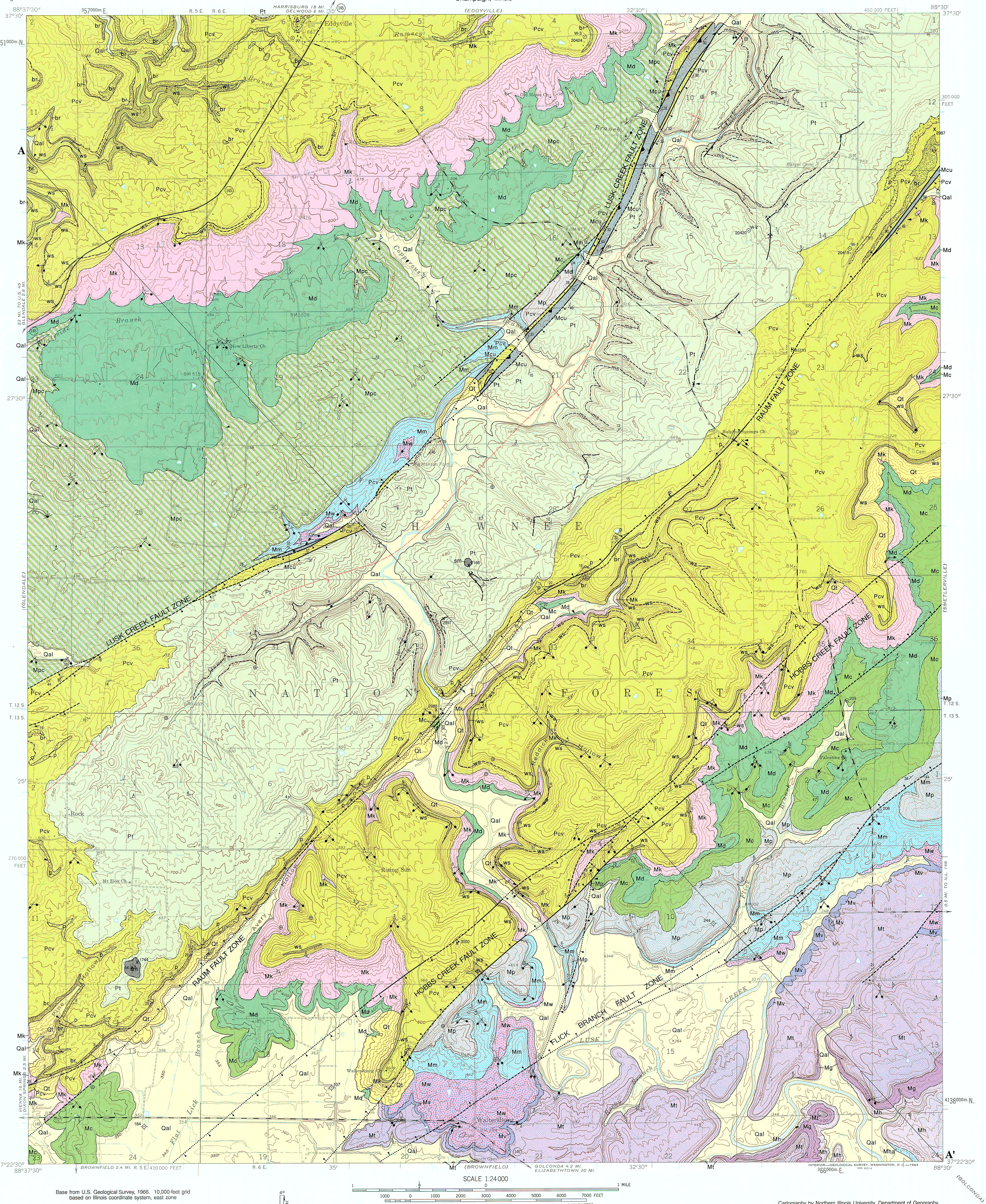
Weller, J. M., R. M. Grogan, and F. E. Tippie, 1952, Geology of the Fluorspar Deposits of Illinois: Illinois State Geological Survey, Bulletin 76, 147 p.

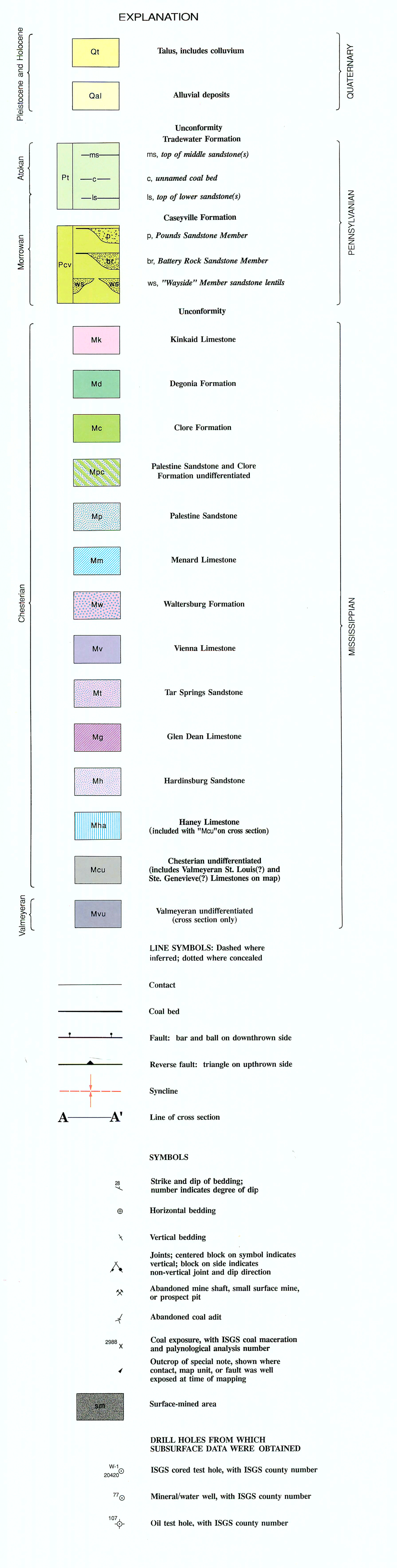


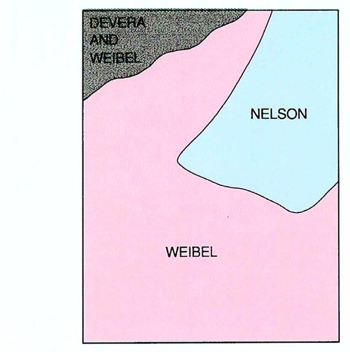
Base from U.S. Geological Survey, 1966. 10,000-foot grid based on Illinois coordinate system, south zone

NOTE: A detailed report on the geology of this quadrangle will be published in the Illinois State Geological Survey Bulletin Series, entitled "Geology of the Waltersburg Quadrangle, Pope County, Illinois," by C. P. Weibel and W. J. Nelson.

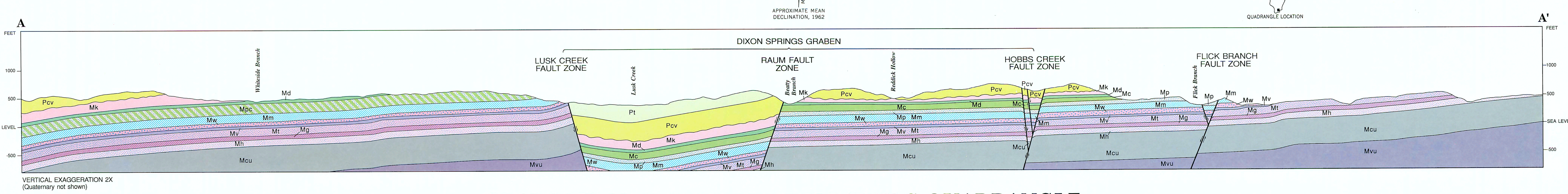
Cartography by Northern Illinois University, Department of Geography Laboratory for Cartography and Spatial Analysis. Leonard A. Walther. Supplemental drafting by: Jacquelyn L. Hannah, Illinois State Geological Survey

Geology compiled from 1985 to 1989





Index map showing areas geologically surveyed by authors



VERTICAL EXAGGERATION 2X
(Quaternary not shown)

GEOLOGIC MAP OF THE WALTERSBURG QUADRANGLE, POPE COUNTY, ILLINOIS

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1991