

STRUCTURAL GEOLOGY

The Reevesville Quadrangle is at the north edge of the Mississippi Embayment, where weakly lithified Cretaceous and Tertiary sediments overlap Paleozoic bedrock along the southern margin of the Illinois Basin. Several fault zones displace Paleozoic rocks and locally offset Cretaceous and Tertiary strata. The northeast-striking Lusk Creek, Raum, and Hobbs Creek Fault Zones compose the Dixon Springs Graben, which in turn is part of the Fluorspar Area Fault Complex. The north-trending Wartrace Fault Zone splits off the west side of the Dixon Springs Graben. These faults are the products of multiple episodes of tectonic activity dating from Cambrian through early Quaternary time.

The Lusk Creek Fault Zone forms the northwest side of the Dixon

Springs Graben. At the north edge of the quadrangle, the Lusk Creek Fault Zone is more than 1 mile wide and has a net throw of about 700 feet down to the southeast. Toward the southwest, as it disappears beneath Quaternary alluvium, the fault zone apparently narrows, and the throw decreases to about 400 feet. Narrow grabens within the Lusk Creek contain the Caseyville Formation, which is downdropped 700 feet relative to the rocks

Several small north-northeast-striking faults occur northwest of the major fault zone and form a pinnate pattern suggestive of left-lateral

The Lusk Creek and Raum Fault Zones underwent post-Pennsylvanian wrenching. The Caseyville grabens may be pull-apart structures produced by divergent wrench faulting.

The Raum Fault Zone lies along the central axis of the Dixon Springs Graben. North of the Cache Valley (Bay Creek Bottoms), the Raum is composed of three simple, parallel faults spaced 2,000 to 3,000 feet apart. South and east of Big Bay, faults outline narrow horsts and grabens. Strata in the grabens are tilted inward and buckled into narrow V-shaped synclines and anticlines. The rocks are intensely fractured, brecciated, and silicified, especially along the east side of the fault zone (cross section A-A'). A small slice of McNairy Formation (Cretaceous) is downdropped at least 200 feet in a graben along the linear valley in the NE¼, Section 23,

T14S, R4E (cross section B-B'). No fault surfaces in the Raum Fault Zone are exposed in the study area. A nearly vertical fault surface was formerly exposed in the wall of a clay pit, which is now flooded, in the NE¼, Section 23, T14S, R4E (W.A. White, Illinois State Geological Survey, personal communication 1991). Outcrops and borehole data from northeast of the Reevesville Quadrangle

indicate steeply dipping to vertical fault planes. Like the Lusk Creek Fault Zone, the Raum Fault Zone has a pinnate or en echelon pattern that suggests left-lateral wrench faulting. Most Clay individual faults in the Raum Fault Zone strike slightly oblique (counterclockwise) to the overall trend of the zone. The grabens south and east of Big Bay are probably pull-apart structures that formed during divergent

The Hobbs Creek Fault Zone outlines the eastern margin of the Dixon Springs Graben. This fault zone consists of a series of step-faults and narrow grabens. Net throw is down about 700 feet to the northwest at the south edge of the Cache Valley and decreases southward. Strata as downthrown into a graben in Sections 28, 32, and 33, T14S, R5E (cross section B-B'). An unnamed unit of organic-rich sand, silt, and clay underlies the Mounds Gravel in the core from ISGS borehole R-1. Palynological analyses indicate late Miocene to Pliocene age (R.W. Litwin and N.O. Frederiksen, U.S. Geological Survey, written communications 1995). No unit of similar age or lithology is known to be elsewhere in Illinois. Evidently the graben developed in Miocene through early Pleistocene time,

and sediments accumulated in the resulting depression. Another downdropped block, mapped as McNairy (?) but possibly including Tertiary strata, is present in the SW¼, Section 18, T14S, R5E. As recorded in a water well log, 130 feet of white, gray, and red sand and black clay underlie Quaternary alluvium and overlying bedrock. The Wartrace Fault Zone, north of Cache Valley at the west edge of the quadrangle, consists of two faults that outline a graben trending about N10° W. The central block is downthrown approximately 200 feet. The faults dip 80° to 90° and bear striations that indicate dip-slip displace-

The relationship of the Wartrace Fault Zone to the Dixon Springs Graben is unclear. The Wartrace is similar to the Little Cache Fault Zone and the Bradshaw Creek, Shiloh Church, Atwood, and Delta Faults, all of which are relatively small, isolated high-angle normal faults that strike north-northwest in southern Illinois. None of these normal faults are known to displace rocks younger than Pennsylvanian. Normal faulting in the Wartrace Fault Zone could have occurred, however, under the same stress field responsible for left-lateral strike-slip faulting in the Lusk Creek and Raum Fault Zones (R.W. Harrison, U.S. Geological Survey, written com-

The Dixon Springs Graben originated as part of a failed Cambrian intracratonic rift, the Reelfoot Rift (Kolata and Nelson 1991). The graben was subsequently reactivated several times under different stress fields. Apparently the graben sank during Chesterian time, as shown by substantial thickening of the West Baden Sandstone and Hardinsburg Formation in the graben. Activity during Pennsylvanian sedimentation was documented in the Waltersburg Quadrangle to the northeast (Weibel et al. 1993). reverse faulting, followed by normal faulting (Nelson et al. 1991, Weibel et al. 1993). Next, apparent left-lateral, divergent wrench faulting during the late Tertiary and early Quaternary Periods displaced the Mounds Gravel

and older units. However, the current stress orientation in the area of New

Madrid, Missouri, is inducing right-lateral slip along northeast-striking

aults (Rhea et al. 1994). The relationship of tectonic features in southern

Illinois to seismicity in the New Madrid area is still unclear. ECONOMIC GEOLOGY

Sand and Gravel The Mounds Gravel, excavated from small pits in the southern part of the quadrangle, has been used for surfacing local roads. The pits operate intermittently; none were active at the time of mapping. Large deposits of Mounds Gravel remain in the study area. Another potential source of sand and gravel is Quaternary alluvium in the Cache Valley (Bay Bottoms). The McNairy Formation (Cre-

silica sand, mica, and heavy minerals (Hunter 1968).

taceous) contains sand deposits that might have future value as sources of

Clay deposits from the McNairy Formation (Cretaceous) were formerly mined in and near the Reevesville Quadrangle. A pit where clay was mined for making refractory materials was opened in a small, downfaulted block of McNairy along the Illinois Central Railroad in the NE¼, Section 23, T14S, R4E. This pit was active until the late 1950s but is now flooded. A small pit where clay was mined for brickmaking circa 1900 (according to the landowner) is in the NE¼, Section 33, T14S, R5E. Lamar (1948) described clay pits near the village of Round Knob, a short distance south young as the Mounds Gravel (Pliocene to early Pleistocene?) are of the study area. Clay from these pits was used mainly for making stone-

> Oil and Gas Nine test holes for oil and gas have been drilled in the Reevesville Quadrangle. All were dry and abandoned, and no shows of hydrocarbons were reported. The deepest test hole was the Edmison and Richey No. 1 Foss, near Big Bay in the SE¼, Section 1, T14S, R4E. This well was drilled to a total depth of 3,259 feet in the Clear Creek Formation (Lower Devonian). Other tests in the study area were drilled to depths of 705 to 1,800

> feet and bottomed in Mississippian strata. The nearest oil production is in southern Saline County, about 20 miles north of the Reevesville Quadrangle. Test drilling has not exhausted petroleum prospects of the area. Some structures remain untested, for example, the anticline that passes through Allens Spring near the northeast corner of the quadrangle. Horst blocks might also provide structural or

cient for an assessment of potential stratigraphic traps.

The rather intense faulting in this area may be detrimental to petroleum exploration. Faults (especially extensional and wrench faults) may have created pathways along which hydrocarbons escaped to the surface. Faults can also cause lost circulation and create difficulty in maintaining a straight hole. A local water-well driller reported such troubles in the complexly fractured area southeast of Big Bay.

The only stone quarries known to have operated are a small limestone quarry in the Downeys Bluff Limestone about 1/4 mile south of the northeast corner of Section 13, T14S, R4E, and two small excavations in the western part of Section 26, T14S, R4E, where Chesterian sandstone was taken for use as fill along Interstate 24. Several Chesterian formations in the study area contain limestone that could be used for road gravel, aggregate, agricultural lime, and other purposes (Lamar 1959). Such formations include the Kinkaid, Menard, Glen Dean, Golconda, Downeys Bluff, and Renault Limestones. Compared with limestone deposits currently being quarried in nearby quadrangles, all limestone deposits in the Reevesville Quadrangle suffer from relatively thin limestone intervals, presence of shale interbeds and chert nodules, excessively thick overburden, fragmentation of reserve blocks by faulting, and distance to transportation or market. These drawbacks might not be serious if small amounts of stone are needed locally for uses

such as fill or riprap. The Reevesville Quadrangle lies along the western margin of the Illinois-Kentucky Fluorspar District, which contains the largest known resources of fluorite in the United States. Small fluorspar mines operated in the past in the contiguous Glendale (Devera 1991) and Waltersburg (Weibel et al. 1993) Quadrangles. These mines operated in vein deposits localized along breccia zones in the Lusk Creek, Raum, and Hobbs Creek Fault Zones. No record exists of any fluorspar mining within the Reevesville Quadrangle, and no mineralization was observed during mapping. If ore is present, it would probably be at the level of the Ste. Genevieve Limestone and the lower part of the Pope Group along northeast-trending faults.

SECTION

LUSK CREEK

FAULT ZONE

RAUM FAULT ZONE

RAUM FAULT

Edmison & Richey

ZONE

HOBBS CREEK FAULT ZONE

ISGS W.W. 138 No. R-1

WARTRACE

FAULT ZONE

VERTICAL EXAGGERATION 2X

VERTICAL EXAGGERATION 2X

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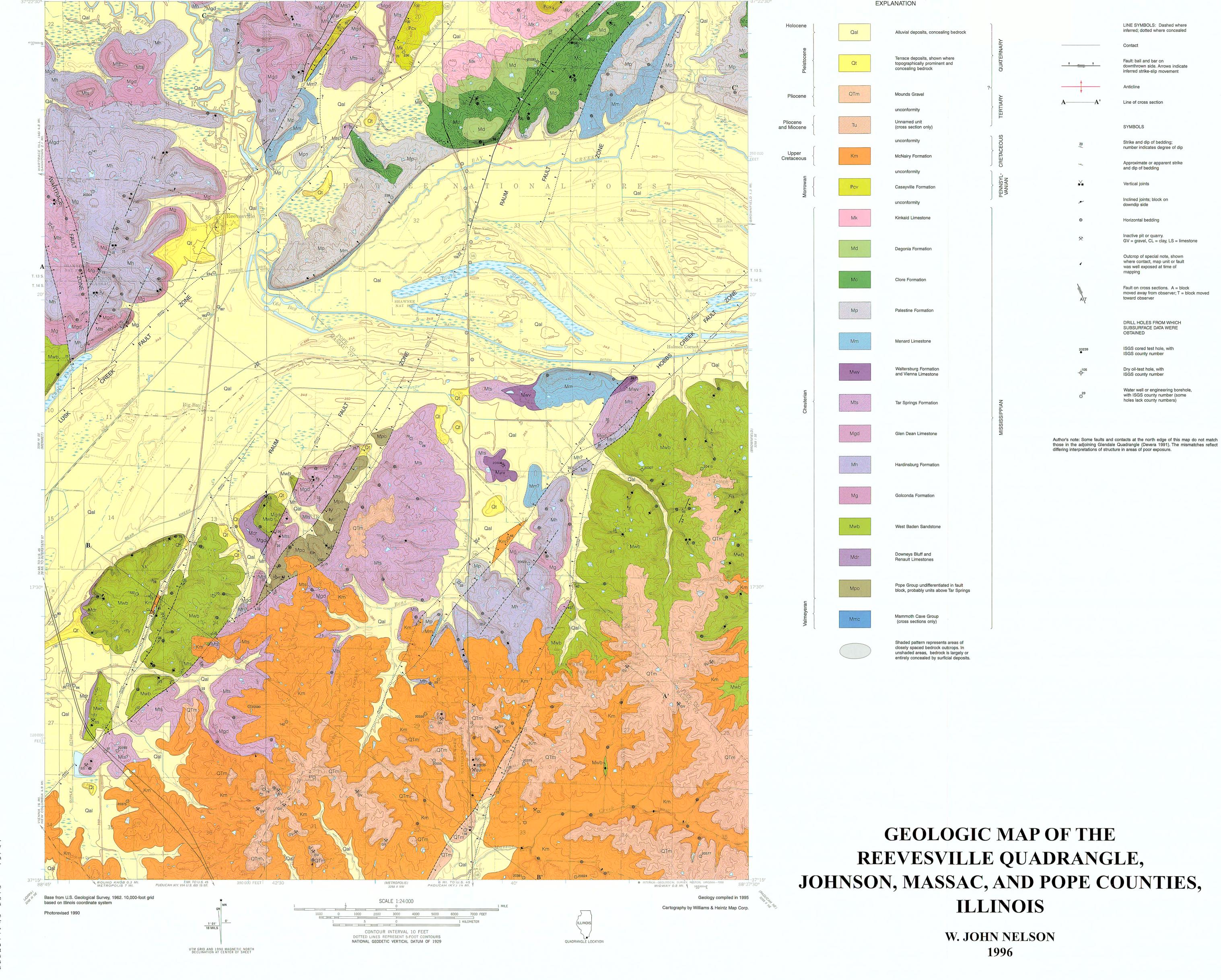
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HOBBS CREEK FAULT ZONE

LUSK

VERTICAL EXAGGERATION 2X

CREEK

FAULT ZONE

RAUM

Mwb

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Geologic Map of the

REEVESVILLE QUADRANGLE, ILLINOIS

Illinois Geologic Quadrangle 17