KENTUCKY GEOLOGICAL SURVEY
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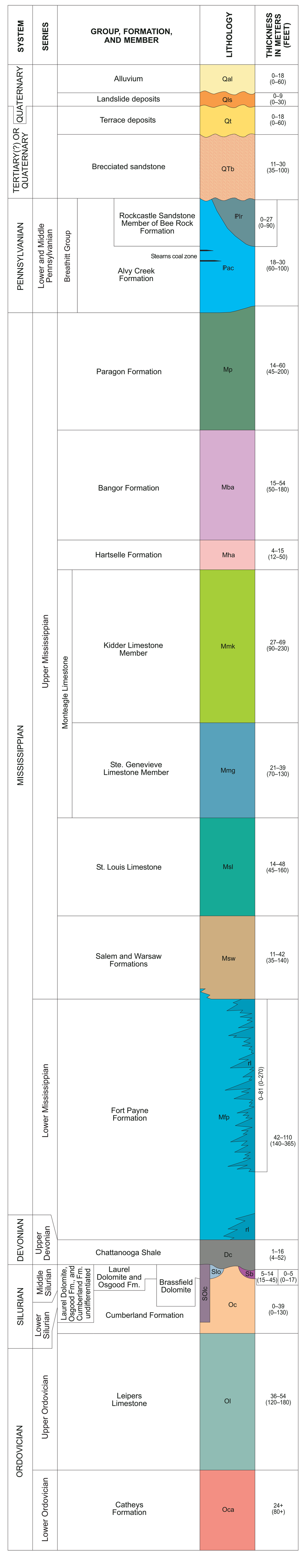

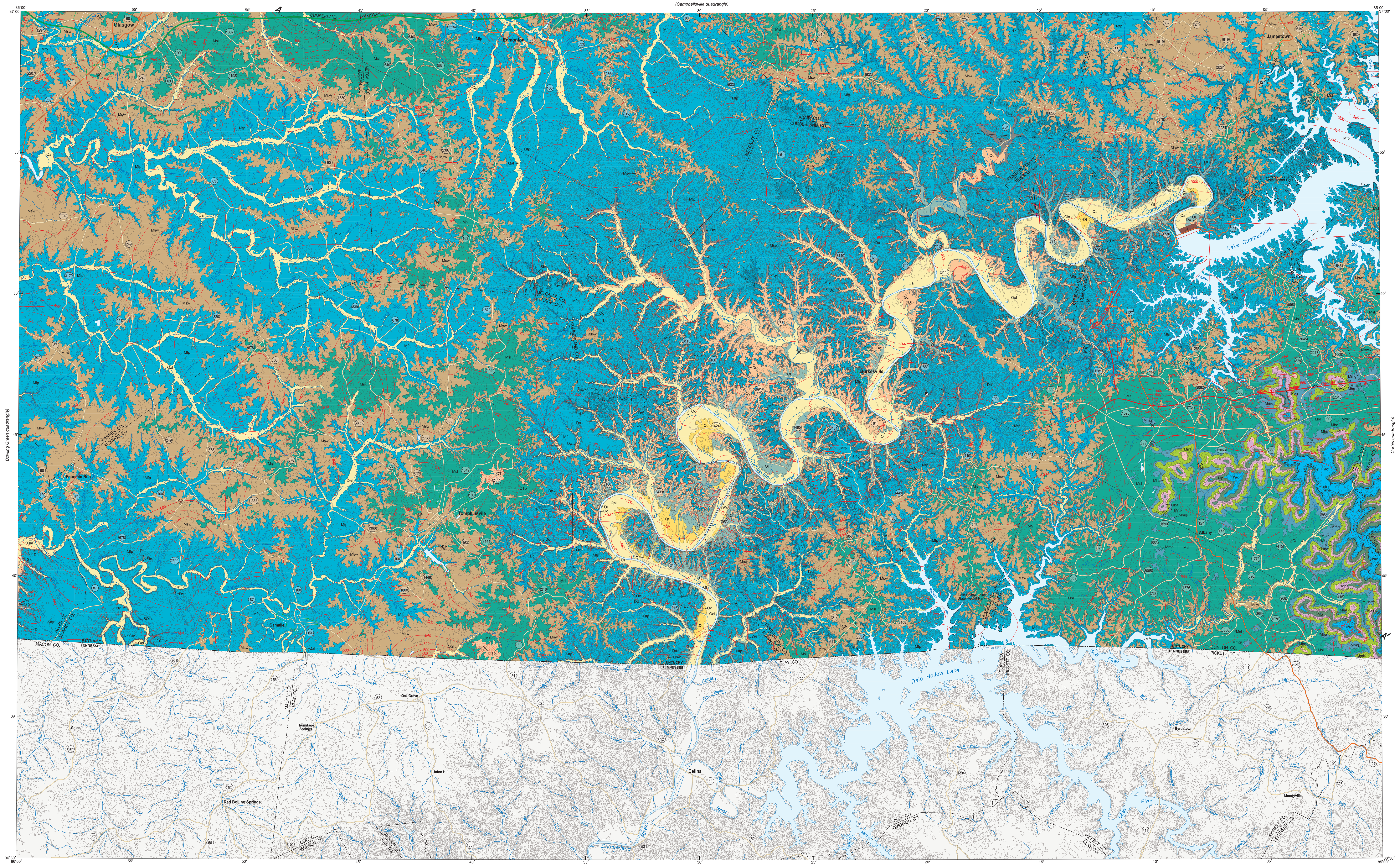

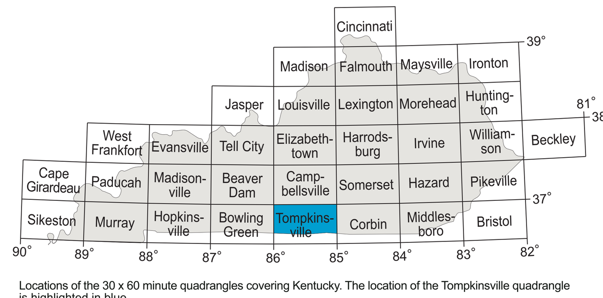

Locations of the 30 x 60 minute quadrangles covering Kentucky. The location of the Tompkinsville quadrangle is highlighted in blue.

ACKNOWLEDGMENTS: This map was digitally generated from 1:24,000-scale geologic maps under the STATEMAP Program authorized by the National Geologic Mapping Act of 1992, Grant No. 03HQPA0003, and was funded in part by the U.S. Geological Survey National Cooperative Geologic Mapping Program.

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GEOLOGIC MAP OF THE TOMPKINSVILLE 30 x 60 MINUTE QUADRANGLE, SOUTH-CENTRAL KENTUCKY

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Cartography by Terry D. Hounshell

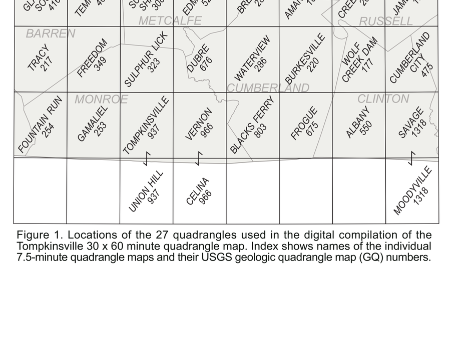

Figure 1. Locations of the 27 quadrangles used in the digital compilation of the Tompkinsville 30 x 60 minute quadrangle map.

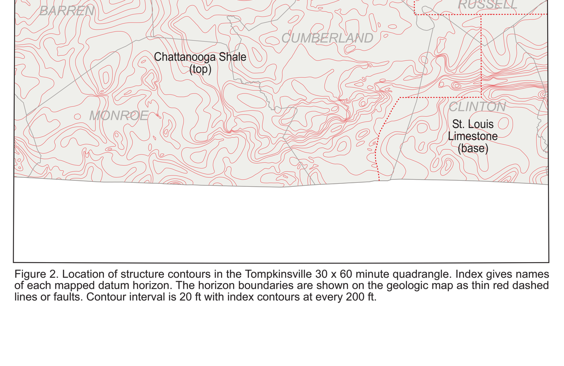

Figure 2. Location of structure contours in the Tompkinsville 30 x 60 minute quadrangle.

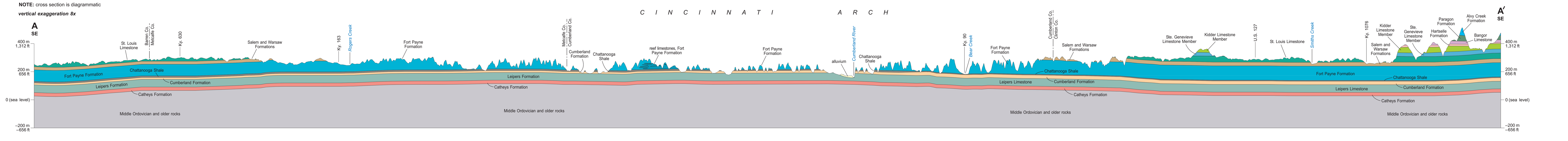

Table 1. Total cumulative oil production and most recently available annual oil production for counties in the Tompkinsville area, compared to state's yearly production.

County	Total oil production through 2006 (million barrels)	County oil production through 2006 (million barrels)	Percent of total production for 2006
Adair	3.964	43,773	2.02
Barren	4.294	10,477	0.48
Clinton	8.005	43,717	2.01
Cumberland	4.123	29,668	1.37
Metcalfe	2.958	11,535	0.53
Monroe	0.914	353	0.02
Russell	0.546	3,736	0.17
TOTAL	24.804	143,259	6.60

The majority of the producing strata occur in rocks of Ordovician age. The source rock for most of the oil and gas deposits in this area is thought to be the Upper Devonian black shale. The major producing zones in the Ordovician rocks are, in ascending order:

- The Knox Group: Wells in this group occur in most of the quadrangle. Many producing wells are on paleokarst highs and erosional remnants, but some production is fracture-related.
- The Murfreesboro Formation: Wells from this formation also occur primarily in the eastern half of the quadrangle. Producing areas are in randomly occurring localized porosity regions.
- The High Bridge Group (equivalent to the Stones River Group of Tennessee): Wells from this group occur in the eastern half of the quadrangle. Production is primarily from fractured reservoirs, possibly associated with secondary dolomites (hydrothermal alteration resulting in secondary porosity).
- The Lexington Limestone (also called Trenton and Sunnybrook): Wells from this formation occur in many areas of this quadrangle. "Sunnybrook" refers to a bioclastic unit within the Lexington and below the Granville (see below). Producing areas occur in localized porosity zones, with the exception of a few fracture-controlled linear pools.
- The Granville sands (drillers' term for a coarse-grained limestone porosity zone within the Lexington Limestone): Wells from this zone occur in the eastern half of the quadrangle. These limestone sands are thin, often lenticular, porous, bioclastic zones associated with beach strand lines, offshore bars, and tidal deposits. They sometimes form narrow, arcuate structures as much as 20 mi long.
- The Leipers Limestone: Wells from this formation occur in the western half of the quadrangle. The geology of these reservoirs is similar to that of the Granville.
- The Corniferous (a drillers' term referring to miscellaneous producing intervals between the Devonian shales and the Silurian Brassfield Formation, or Ordovician rocks if the Brassfield is missing): Wells from this producing zone occur primarily in the northwestern corner of the quadrangle. Traps in the Corniferous are typically erosional remnants associated with an angular unconformity capped by the Chattanooga Shale.
- Limestone reef production in the Tompkinsville quadrangle includes some producing zones above the Devonian shale in the Mississippian Fort Payne Formation. Producing areas are distributed throughout the quadrangle and correspond to isolated, crinoid-rich, and often highly compartmentalized carbonate bioherms. These bioherms at the base of the Fort Payne are locally known as the "Beaver sand."

Coal

The southeastern corner of the quadrangle lies within the Eastern Kentucky Coal Field but only minor amounts of coal have been produced in the quadrangle. Most of the coals are thin and discontinuous. A coal seam, in part of mineable thickness, underlies most of Poplar Mountain, Short Mountain, and County Line Ridge in the eastern part of Clinton County. According to the Kentucky Geological Survey's coal production database, as of 2000, Clinton County has produced approximately 2.25 million short tons of coal. There was some early mining in this county from 1869 through 1879, but it did not begin in earnest until 1942. From 1942 through 1971, underground mining produced approximately 1 million short tons and from 1984 through 1988 produced nearly 0.5 million short tons. Since 2000 there has been no further coal mining in Clinton County.

A very small part of Wayne County is in this quadrangle and adjacent to Clinton County. This county has produced approximately 6 million short tons of coal, only a small amount of which was from this quadrangle. Its mining history closely parallels that of Clinton County, except for the early years. Coal mining ceased in Wayne County in1989.

INDUSTRIAL MINERALS

Limestone

The limestone and dolomite deposits in this quadrangle are extensive and easily accessible. Since the late 1980's, the value of quarried limestone, on a statewide basis has exceeded that of both oil and natural gas (Anderson and Dever, 2001).

The Monteagle Limestone is most common in the southeastern corner of this quadrangle. Test samples in the Savage-Moodyville and Albany 7.5-minute quadrangles demonstrate that the Monteagle is of chemical grade (more than 95 percent $CaCO_3$) and is available in large quantities. Tests from nearby areas indicated that much of the oolitic limestone of the upper part of the Ste. Genevieve Limestone and the lower part of the upper member of the Monteagle Limestone averages more than 97 percent calcium carbonate (Stokley and McFarlan, 1952). These limestones are also suitable for agricultural lime, construction material, or manufacturing purposes.

The Salem and Warsaw Limestones are exposed in large areas of this quadrangle. The quality of this limestone is highly variable. In some areas it contains abundant shale and in other places chert. There are, however, large areas in the Amandaville 7.5-minute quadrangle where chert and shale are rare and the limestone is a relatively pure. Samples of the Salem and Warsaw Limestone near the western border of the quadrangle, demonstrated that it is suitable for use in power plants that use atmospheric fluidized-bed combustion to reduce their SO_2 and NO_x emissions. Pilot-plant tests using this limestone showed SO_2 emissions of approximately 1 lb/million Btu and NO_x emissions of 0.2 lb/million Btu. These levels were both below the emission standards of 2 and 0.6 lb, respectively (Barron and others, 1991). These limestones also constitute a potential source of crushed rock for aggregate and for agriculture, and perhaps for other types of industrial stone.

The St. Louis, Fort Payne, and Leipers Limestones are similar to the Salem and Warsaw Limestones in that their quality is highly variable. The quality of the St. Louis, Fort Payne, and Leipers Limestones ranges from subchemical grade to being interbedded with siltstone and chert. These limestones also are a potential source of stone for agricultural use and road material.

The early settlers quarried the limestone and used the blocks for bridge abutments, mills, and homes. Dimension stone can be obtained from the even-bedded dolomite of the Cumberland Formation and from parts of the St. Louis, Warsaw, and reef deposits in the Fort Payne, and has been used locally for construction.

Three limestone quarries are operating in this quadrangle (Broyles and Malone, 2009). Total production from these quarries is estimated to be less than 1 million tons per year (W.H. Anderson, KGS, personal communication, 2003). The quarry northwest of Burksville, in the Waterview 7.5-minute quadrangle, is in the Leipers Limestone, the quarry in the Tompkinsville 7.5-minute quadrangle is in the Salem and Warsaw Limestones, and the quarry at the south end of Grider Mountain in the Albany 7.5-minute quadrangle is in the Ste. Genevieve Limestone and Kidder Limestone Members of the Monteagle Limestone. These quarries primarily produce construction aggregate.

Sandstone

Sandstone suitable for building stone could be quarried from the Hartselle Sandstone on Huddleston and Grider Mountains and from the upper parts of the Salem and Warsaw Formations in the southeastern part of the Albany 7.5-minute quadrangle. These sandstone units are commonly well cemented, fine- to medium-grained, and thin- to thick-bedded. Both have been used locally for building stone.

Porous sandstone derived from weathered, sandy Warsaw Limestone in the northern part of the Jamestown 7.5-minute quadrangle is reported to have been used for at least one building in the area. The sandstone can be quarried with a shovel when first exposed, but "case hardens" upon drying.

Sand and Gravel

Large deposits of well-sorted quartzose sand, mapped as brecciated sandstone, are exposed in the Tompkinsville 7.5-minute quadrangle. This sand has been used locally as mortar sand and for use in finish cement. Much clay is mixed with the sand, and the material must be washed before it can be used. The uniformity of grain size, easy access, and large tonnages available suggest that these deposits could serve as a commercial source of sand for mortar or allied purposes.

Sand, a possible source of concrete, foundry, or plaster aggregate, is present as a sandstone lens as much as 20 ft thick in the Creelsboro 7.5-minute quadrangle.

HYDROGEOLOGY

ENGINEERING GEOLOGY

Karst Hazards

REFERENCES CITED