ECONOMIC GEOLGY OF SIMPSON COUNTY KENTUCKY

E. R. Branson

COUNTY REPORT 3

Prepared as part of the cooperative geologic mapping program with the United States Geological Survey
ECONOMIC GEOLOGY OF SIMPSON COUNTY, KENTUCKY

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KENTUCKY GEOLOGICAL SURVEY

University of Kentucky, Lexington

County Report 3 Series X, 1969
UNIVERSITY OF KENTUCKY

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LETTER OF TRANSMITTAL

October 17, 1968

Dr. Lewis W. Cochran
Vice President for Research
University of Kentucky

Dear Dr. Cochran:

The Kentucky Geological Survey is publishing the third in a series of reports on the economic geology of the counties of Kentucky. This report, by E. R. Branson, is on the *Economic Geology of Simpson County, Kentucky*.

This study is a part of the cooperative geologic mapping program by the Kentucky Geological Survey and the United States Geological Survey. The use of this report and the new 7½-minute geologic maps that cover Simpson County may activate further economic development in the County.

Respectfully submitted,

WALLACE W. HAGAN
Director and State Geologist
Kentucky Geological Survey
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ECONOMIC GEOLOGY
OF SIMPSON COUNTY, KENTUCKY

E. R. Branson

ABSTRACT
This is the third in a series of reports on the economic geology of Kentucky counties. Much of the information is provided by the detailed maps resulting from the current Kentucky Geological Survey-United States Geological Survey cooperative geologic mapping program.
Petroleum, natural gas, and limestone are the only mineral commodities being produced in Simpson County at the present time. Future potential includes additional oil and gas pools in zones currently being produced as well as in deeper zones as yet little explored, and other commercial limestone deposits. Ceramic material may occur in the County but no demand for such is in the foreseeable future.

INTRODUCTION
Reports in this series are made possible by the fortunate combination of two comprehensive mapping programs. The first was the State-Federal cooperative topographic mapping of the entire State of Kentucky on a scale of 1:24,000 or about 21/2 inches per mile. Each map covers an area of 71/4 minutes of longitude and latitude embracing about 59 square miles. More than 763 such maps covering areas lying wholly or partially within Kentucky are required to cover the entire State. These topographic maps are constantly being revised as area development demands and as funds are available.
The topographic maps provide the accurate bases for the current comprehensive program of mapping the entire State geologically. This Kentucky Geological Survey-United States Geological Survey mapping program is now in its 9th year and has resulted in the publication of more than 333 geologic maps with about 139 others in various stages of completion. The program is active and its status is subject to almost daily change.
The published topographic and geologic maps can be purchased from the Kentucky Geological Survey, Lexington; the Kentucky Department of Commerce, Frankfort; and the U. S. Geological Survey, Washington, D. C.
The intention is to cover the entire State by county reports on economic geology; this report is the third in the series. Reports will be written as published information becomes available. Many counties are nearing complete coverage by published geologic maps, and a considerable acceleration of the economic reports should occur, publication funds allowing.
Information used in this report on Simpson County is largely that assembled through the cooperative geologic mapping program, from meager published and unpublished reports and maps, from facts gathered on trips to the County, and from conversations with numerous individuals. This report has been prepared to assemble all available information under one cover in calling attention to rock or mineral deposits exploited in the past and those currently being produced, and to serve as a guide to those that might be found in the future.
The economy of Simpson County is based principally on agriculture, although industrial employment has reached considerable proportions; and at the present time the only mineral commodities being produced are petroleum, natural gas, and limestone. Sand and gravel used in the surfacing of secondary roads have at times been recovered.
Simpson County lies within the boundaries of 9 topographic quadrangles mapped on the scale of 1:24,000 or about 21/2 inches to the mile. None of these lies entirely within the County, and three contain only very small parts of Simpson County. The quadrangles are listed below and their locations are shown on the accompanying index map (Fig. 1).

Quadrangles—Portions of Counties
1. Adairville—Simpson and Logan, Ky.; Robertson, Tenn.
2. Auburn—Simpson and Logan, Ky.
4. Franklin—Simpson, Ky.; Robertson and Sumner, Tenn.
5. Hickory Flat—Simpson and Allen, Ky.; Sumner, Tenn.
6. Prices Mill—Simpson and Logan, Ky.; Robertson, Tenn.

Acknowledgments

The writer desires to extend thanks to the many individuals who have helped him in the preparation of this paper, especially to Mr. Charles Colley, Superintendent, and to other men at the Southern Stone Company quarry north of Franklin. He also wishes to thank his colleagues on the Kentucky Geological Survey and the Department of Geology of the University of Kentucky. Geologists of the U. S. Geological Survey have been of great assistance, but the material as here presented does not necessarily reflect their opinions.

GEOGRAPHIC SETTING

Simpson County lies on the southern boundary of the State about equidistant between the eastern and western extremities of the border with Tennessee. It is bounded to the east mainly by Allen County, Sulphur Fork of Drakes Creek forming the dividing line; on the north mainly by Warren County; on the west by Logan County; and on the south by the State of Tennessee. The north, west, and south boundaries do not follow natural features but are arbitrarily drawn, with some irregularities on the southern border reportedly due to political shenanigans.

The area of Simpson County is 239 square miles, and the 1900 census lists the population at 11,548, ranking it as 92d in size and 74th in population among Kentucky's 120 counties. Franklin, the county seat, with a population in 1900 of 5,319, is the only town of any size.

A branch of the Louisville & Nashville Railroad, which carries freight only, serves Simpson County and connects the main line at Bowling Green with a branch line at Gallatin, Tenn. The County has a good paved-road system, the main highways

Figure 1. Index map of 7½-minute quadrangles covering Simpson County.
being Interstate 65 and U. S. 31W (north-south from Bowling Green to Nashville, Tenn.) and Ky. 100 (east-west through Franklin).

The topography of Simpson County is even to gently undulating, its uniformity having resulted from erosion and solution. Surface elevations are in general highest to the southeast and lowest to the northwest, although they range from a low of about 480 feet above sea level where the West Fork of Drakes Creek leaves the County near its northeast corner (Drake quadrangle) to a high of 928 feet at the apex of Pilot Knob, an isolated hill area in the northwest part of the County (Auburn quadrangle). Elevations, in general, are in the 600-700-foot range in the northern and western parts of the County, and in the 700-800-foot range in the southern-central and southeastern parts; they go below the 600-foot level only along major drainage.

Almost all of Simpson County is underlain by soluble limestones. Circulating ground water has produced a network of underground caverns and thousands of sinkholes many of which are the result of the collapse of cave roofs. The type of terrain thus formed is often referred to as karst topography. Some of the smaller streams of the County disappear into sinkholes or caves and seldom reappear. Where the waters of these streams ultimately reach the surface and enter major drainage has never been determined. It does not appear likely that any of Simpson County's caves could be commercially developed, as evidence is that they are water filled, at least most of the time.

No large streams are found in Simpson County. The Red River flows across the southern part of the county, its major branch being Sulphur Creek. Other drainage considered as major is Lick Creek and the West, Middle, and Sulphur Forks of Drakes Creek.

Although small in size, Simpson County is one of the best and most productive of the agricultural counties, as it has little land not adaptable to cultivation.

HISTORIC BACKGROUND

Simpson County was established in 1819 from parts of Logan and Warren Counties and became Kentucky's 63d county in order of formation. It was named in honor of Captain John Simpson, one of the many Kentucky victims of the massacre following the disastrous Battle of the River Raisin in 1813 in southeastern Michigan. Franklin, the county seat and principal community, is named for Benjamin Franklin. A famous thoroughfare of travel, the turnpike between Bowling Green, Ky., to the north, and Nashville, Tenn., to the south, once traversed the County, passing through Franklin. This is now almost the exact route of U. S. Highway 31W. A branch of the Louisville & Nashville Railroad parallels this route.

Apparently no particularly notable incidents have been recorded in the history of Simpson County. Indian relics have been found in some abundance, and a mound containing skeletons of a prehistoric Indian race was excavated many years ago near Franklin.

GEOLOGIC SETTING

Simpson County is a part of the geologic and physiographic province called the Mississippian Plateau and lies on the northwest flank of the Cincinnati arch (Fig. 2). Regional dips of the outcropping rocks are, in the main, to the northwest at a rate of about 20 feet per mile. The regional pattern is interrupted by many local flexures some of which are of the type that have served as traps for petroleum or natural gas.

Plate 1 (in pocket) is a generalized geologic map of Simpson County compiled from the published detailed geologic maps of the Kentucky Geological Survey-U. S. Geological Survey cooperative mapping program. The scale of this map (1:125,000) allows for only generalities, and any serious study of the geology of the County requires the examination of the much larger maps published at a scale of 1:24,000 or about 2½ inches to the mile.

STRATIGRAPHY

The formations exposed in Simpson County are all Mississippian in age with the exception of the stream deposits, which are Quaternary. Rocks of Mississippian, Devonian, Silurian, and Ordovician ages have been penetrated in drilled wells. At the time of this investigation (1969) no wells had been drilled in the County below the Middle Ordovician, so there is no information about the lower part of the stratigraphic section. A generalized columnar section is shown in Figure 3.

Exposed Rocks

Mississippian

The oldest exposed formation in Simpson County is the Fort Payne Formation, named from exposures at Fort Payne, De Kalb County, Ala. The formation
is exposed only along drainage in the extreme southeastern part of the County (Hickory Flat quadrangle), where about 40 feet of it can be seen at the surface. The Fort Payne consists of dolomitic siltstone and limestone and detrital limestone containing lenses of chert and many large crinoid stems. It is yellowish gray to gray in color and is medium to coarse grained. The unit weathers to form a yellowish-brown soil containing chert fragments and nodules, quartz geodes, and crinoid stems. The exposed portion of the Fort Payne in Simpson County has no apparent commercial value.

Warsaw and Salem Limestones are named for Warsaw, Hancock County, Ill., and for Salem, Washington County, Ind. They are exposed in the southeastern and eastern parts of Simpson County, in the Drake, Franklin, and Hickory Flat quadrangles, where they reach a maximum thickness of 150 feet. The formations consist of limestone and siltstone. The limestone is detrital in the main, medium olive gray, coarse to very coarse grained, and contains numerous lenses and nodules of chert. The siltstone is dolomitic, yellow gray to medium gray in color, and contains quartz geodes and some chert. The formations are very fossiliferous and
<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>SERIES</th>
<th>FORMATION AND MEMBER</th>
<th>LITHOLOGY</th>
<th>THICKNESS IN FEET</th>
<th>DESCRIPTION</th>
<th>ECONOMIC POSSIBILITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUATERNARY</td>
<td>Alluvium</td>
<td></td>
<td></td>
<td>0-35</td>
<td>Clay, silt, sand, gravel</td>
<td>Sand and gravel</td>
</tr>
<tr>
<td>Chester</td>
<td>Corkwood</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Girkin</td>
<td></td>
<td></td>
<td>20+</td>
<td>Sandstone; some shale beds</td>
<td>*Flagstone</td>
</tr>
<tr>
<td></td>
<td>Ste. Genevieve</td>
<td></td>
<td></td>
<td>160-180</td>
<td>Limestone, oolitic in part; sandstone bed locally</td>
<td>*Road metal; Agricultural limestone; Limestone aggregate; Building stone</td>
</tr>
<tr>
<td>MISSISSIPPIAN</td>
<td>Meramec</td>
<td></td>
<td></td>
<td>190-250</td>
<td>Limestone, oolitic in part; cherty near base</td>
<td>*Agricultural limestone; *Limestone aggregate; *Building stone; Oil and gas</td>
</tr>
<tr>
<td>St. Louis</td>
<td></td>
<td></td>
<td></td>
<td>230-260</td>
<td>Limestone, usually cherty; beds of shale; many grudes</td>
<td>*Oil and gas; Limestone aggregate</td>
</tr>
<tr>
<td>Salem</td>
<td></td>
<td></td>
<td></td>
<td>100-150</td>
<td>Limestone, cherty in part; beds of shale; geodeses</td>
<td>*Oil and gas; Limestone aggregate</td>
</tr>
<tr>
<td>Warsaw</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Osage</td>
<td>Port Payne</td>
<td></td>
<td></td>
<td>140-220</td>
<td>Siltstone, dolomitic; bed of limestone; shale at base equivalent to New Providence</td>
<td>*Oil and gas</td>
</tr>
<tr>
<td></td>
<td>“Beaver”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEVONIAN</td>
<td></td>
<td></td>
<td></td>
<td>50±</td>
<td>Shale, black, usually a sandstone or sandy dolomite at base</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>SELLERSBURG-JEFFERSONVILLE</td>
<td></td>
<td></td>
<td></td>
<td>15-80</td>
<td>Limestone</td>
<td>*Oil</td>
</tr>
<tr>
<td>NIAGARAN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Louisville</td>
<td></td>
<td></td>
<td></td>
<td>0-50</td>
<td>Dolomite</td>
<td>*Oil</td>
</tr>
<tr>
<td>Weldon</td>
<td></td>
<td></td>
<td></td>
<td>2-10</td>
<td>Shale</td>
<td>*Oil</td>
</tr>
<tr>
<td>Laurel</td>
<td></td>
<td></td>
<td></td>
<td>10-50</td>
<td>Dolomite</td>
<td>*Oil</td>
</tr>
<tr>
<td>Osgood</td>
<td></td>
<td></td>
<td></td>
<td>2-15</td>
<td>Shale</td>
<td>*Oil</td>
</tr>
<tr>
<td>ALEXANDRIAN</td>
<td></td>
<td></td>
<td></td>
<td>10-20</td>
<td>Dolomite</td>
<td>Oil</td>
</tr>
<tr>
<td>ORDOVICIAN</td>
<td>Cumberland to “Trenton”</td>
<td></td>
<td></td>
<td>511+</td>
<td>Dolomite, silty dolomite, shale, and siltstone</td>
<td></td>
</tr>
</tbody>
</table>

- *Oil-producing zones
- *Gas-producing zones
- *Zones now quarried
- *Zones formerly quarried
- *Some present or past production

Figure 3. Generalized geologic section for Simpson County.
have an abundant fauna of small fossils such as foraminifera, ostracoda, gastropoda, and brachiopoda. There are also several pelletal beds. They weather to a reddish-brown soil containing quartz geodes and numerous nodules and lenses of chert. Some oil and gas have been produced from the Warsaw-Salem, and these formations are a potential source for additional supplies. The Warsaw-Salem could be developed for limestone aggregate, agricultural limestone, and, possibly, building stone.

*St. Louis Limestone*, named from exposures at St. Louis, Mo., is exposed over a wide area of Simpson County and attains a maximum thickness of about 260 feet. It is mainly limestone but contains beds of siltstone. The limestone is detrital, medium dark gray to brown gray and medium to coarse grained, and contains numerous balls and nodules of chert and many large rugose corals. It is interbedded with gray lithographic to fine-grained limestone. The siltstone is calcareous or dolomitic, light yellow gray to medium gray, and cherty. The formation weathers to reddish-brown soil containing angular fragments of iron-stained chert, chert balls and nodules, and silicified corals. Some of the St. Louis could be used for limestone aggregate and agricultural limestone, but better sources are available in the underlying and overlying formations. The St. Louis has produced minor amounts of petroleum in the area but cannot be considered as a potential source of any importance because over much of Simpson County it lies at the surface and also appears to lack porosity.

*Ste. Genevieve Limestone*, named for Ste. Genevieve County, Mo., is most completely exposed in the northwestern part of Simpson County. Although the complete section crops out only in the Auburn quadrangle, a greater thickness is found in the north-central part of the County, in the Woodburn quadrangle, where the uppermost beds have been removed by erosion. The Ste. Genevieve is limestone, light gray, tan, and buff, fine grained to coarsely detrital, oolitic in much of its thickness, very fossiliferous, and contains calcite-lined vugs. The upper few feet contains nodules and beds of chert. Most of the Ste. Genevieve is an important quarry rock and has been used for agricultural limestone, limestone aggregate, and building stone. In some areas it has been used for chemical limestone but not in Simpson County. It is also an important source of petroleum in some areas but it is too close to the surface in Simpson County to be productive.

The *Girkin Formation*, named for the village of Girkin in Warren County, is exposed in Simpson County only in the Auburn quadrangle, in the northwestern part of the County. It is from 160 to 180 feet thick and is essentially a limestone, light gray to pale yellow gray, fine to coarse grained, and oolitic; locally it contains geodes, chert, and fossils. The upper part is coarse grained; the lower part is oolitic, with quartz rosettes, calcite-lined vugs, dark-gray to black chert nodules, and lenses and stringers of chert. A sandstone 5 feet thick occurs locally about 45 feet above the base of the formation. It is light tan, very fine to fine grained, and well cemented. The Girkin has been extensively quarried for building stone in nearby counties, but in Simpson County it has been used only for road metal.

The *Big Clifty Sandstone Member* of the Golconda Formation, named from exposures along a creek of the same name in Grayson County, is found in Simpson County only on the tops of hills at Pilot Knob and vicinity, in the Auburn quadrangle, where it reaches a maximum thickness of about 20 feet, the entire section not being present. It is mainly sandstone, buff to tan to brown, very fine to fine grained, iron stained, and thin to massive bedded. Some gray shale generally occurs at the base. The Big Clifty is an important reservoir for petroleum in other areas where it is buried in the subsurface. In Simpson County it has been quarried locally for flagstone.

**Quaternary**

Alluvium consists of clays, silts, sands, and gravels, and is found along most major drainage where it averages about 20 feet in thickness; it reaches a maximum thickness of 35 feet. The material is intermixed and contains impurities undesirable for most uses, but some of the sand and gravel has been used in the surfacing of secondary roads.

**Unexposed Rocks Penetrated in Drilled Wells**

**Mississippian**

Although only about 40 feet of Fort Payne is exposed in Simpson County an additional maximum of 180 feet has been encountered in drilled wells. This subsurface part of the formation consists of siltstone and dolomitic limestone, with considerable chert in nodules and beds. A bed of porous crystalline limestone called the "Beaver" occurs erratically in the lower 100 feet of the Fort Payne. It has yielded some petroleum in Simpson County (see
Fig. 3). Locally at the base of the Fort Payne is 5 to 15 feet of green shale, the equivalent of the New Providence Shale of other areas. A minor amount of petroleum has been produced from the Fort Payne, but except for the "Beaver" the formation appears to have little potential in Simpson County.

Devonian

Underlying the Fort Payne is the Chattanooga Shale, named for Chattanooga, Tenn. It is a black shale, averaging about 50 feet in thickness, usually with a few feet of dark-brown sandstone or sandy sucrosic dolomite at its base. The Chattanooga is easily recognized and is very widespread in occurrence; thus it is the most commonly used marker for structural interpretation. In Simpson County it has no commercial value, although in other areas, particularly the Appalachian region, it yields considerable amounts of gas.

Sellersburg and Jeffersonville Limestones, named for Sellersburg and Jeffersonville, Clark County, Ind., are gray, tan, and brown, medium to coarsely crystalline limestones with a combined thickness of 15 to 80 feet. They constitute the uppermost members of the so-called "Corniferous." (In this paper, following oil-industry usage, the "Corniferous" includes all formations between the base of the Chattanooga Shale and the top of the Ordovician.) The Sellersburg and Jeffersonville are among the most important reservoirs for petroleum in Simpson County.

Silurian

Louisville Dolomite, named for Louisville, Jefferson County, is a fine-to medium-grained, gray dolomite from 0 to 50 feet thick. It is one of the petroleum-producing members of the "Corniferous" in Simpson County.

Waldron Shale, named for Waldron, Shelby County, Ind., is a gray shale, usually about 6 feet thick in Simpson County. Because it is soft and washes out it is difficult to find in drill-hole samples.

Laurel Dolomite, named for Laurel, Franklin County, Ind., is the "Blue Sand" of drillers. It is a fine- to medium-grained dolomite with a very noticeable bluish cast in well cuttings—thus the name "Blue Sand." The Laurel is a very important petroleum reservoir in south-central Kentucky and is one of the members of the "Corniferous." In Simpson County it is from 10 to 50 feet thick.

Osgood Shale, named for Osgood, Ripley County, Ind., is a bed of green or green and red shale, from 2 to 15 feet thick. Like the Waldron, it is difficult to find in well cuttings.

Brassfield Dolomite, named for Brassfield, Madison County, is a medium- to coarse-grained or sucrosic, gray and yellowish-tan to golden dolomite, the "Yellow Cap" of drillers. Although it is a very important reservoir for petroleum it has yet to be found productive in Simpson County. It is the basal member of the "Corniferous" and is usually from 10 to 20 feet thick.

Ordovician

The deepest penetration of the Ordovician reliably recorded in Simpson County is 511 feet in a test well in Carter Coordinate sec. 1-B-36. The formations drilled consist of a monotonous series of interbedded gray to dark-gray, fine-grained to crystalline limestones and dark-gray shales. Because of similarity in lithologies no attempt is made to name or delineate the formations making up this section. It is almost a certainty that the uppermost formation of the Ordovician is the Cumberland, and it is probable that the well bottomed in the "Trenton."

Deeper Rocks

Information from deep test wells drilled in adjacent counties indicates that there is at least 5,000 feet of Ordovician and Cambrian sediments, as yet unexplored, underlying Simpson County. These sedimentary rocks are thought to rest on a basement of Precambrian igneous and metamorphic rocks.

ECONOMIC GEOLOGY

Oil and limestone are the most important mineral products of Simpson County, and natural gas, sand, and gravel contribute minor amounts to the economy. Production of oil and gas has fluctuated considerably and there is no reason to doubt that additional reservoirs will be found. There is an adequate supply of limestone for the foreseeable future, and the County is entirely able to meet demands. Demand and quality requirements will determine the development of local sand and gravel resources.

Oil and Gas

Oil in commercial quantities has been produced in Simpson County only since 1918, although prospecting started about 50 years previously. The presence of oil in the County was called to attention by oil seeps in springs and by the many water wells, particularly in an area east of Franklin, which were ruined by the invasion of crude oil. No records have
been found, and probably none were kept, of the early drilled wells, and without doubt none of these wells produced oil in quantities sufficient to arouse interest. One reference (Shaw and Mather, 1919) mentions shallow wells producing gas east of Franklin. This is probably accurate, as quite a number of shallow gas wells were drilled in Simpson County, with the product consumed locally. The same reference states that a well east of Franklin was drilled in 1903 to a depth of 1,500 feet and bottomed in the "Trenton." Fair shows of oil were reported just below the black shale (Chattanooga) and near the bottom of the hole ("Trenton").

World War I supplied impetus for the development of oil production in Simpson County. The first named oil pool of record is Hall, discovered in 1918. However, production records for years previous to 1921 are not available, and it is probable that the total production from the County did not exceed 25,000 barrels up to that time. In 1921, 18,684 barrels was produced and sold. The all-time peak of production through 1967 was reached the following year, 1922, when a total of 55,041 barrels was marketed. The following year saw a precipitous decline in production, followed by a gradual leveling off except for a peculiar break in production in 1931, probably accountable for by the very low price of petroleum in a depression year. From 1941 through 1954, Simpson County's oil production stayed below 1,000 barrels a year and reached an all-time record low in 1952 when only 193 barrels was marketed. In 1955 discoveries reversed the downward trend, and a new peak of production was reached in 1960, with a recorded 38,452 barrels being sold. The usual decline has been experienced through 1966 but has not been as precipitous or regular, indicating that development did not entirely stop or new production fail to be found following the 1960 peak. Table 1 gives Simpson County oil production from 1921 through 1967. Figure 4 presents this information graphically.

As in most of the Kentucky counties in which petroleum has been produced for a considerable length of time, the records are poor to nonexistent, and the locations, depths, formations drilled, and production histories are indefinite. Apparently by far the greatest part of the production from Simpson County is from the so-called "Comiferous." As previously stated, this oil-industry term includes all formations between the base of the Chattanooga Shale and the top of the Ordovician—in this case the Devonian Sellersburg-Jeffersonville and the

<table>
<thead>
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<th>Year</th>
<th>Barrels</th>
<th>Year</th>
<th>Barrels</th>
<th>Year</th>
<th>Barrels</th>
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<tr>
<td>1921</td>
<td>18,684</td>
<td>1933</td>
<td>2,508</td>
<td>1945</td>
<td>835</td>
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<td>55,041</td>
<td>1934</td>
<td>3,022</td>
<td>1946</td>
<td>659</td>
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<td>1923</td>
<td>22,319</td>
<td>1935</td>
<td>2,004</td>
<td>1947</td>
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<tr>
<td>1924</td>
<td>10,604</td>
<td>1936</td>
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<td>8,953</td>
<td>1937</td>
<td>1,728</td>
<td>1949</td>
<td>853</td>
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<td>1926</td>
<td>7,089</td>
<td>1938</td>
<td>1,727</td>
<td>1950</td>
<td>577</td>
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<td>1927</td>
<td>5,268</td>
<td>1939</td>
<td>1,341</td>
<td>1951</td>
<td>290</td>
<td>1963</td>
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<td>1928</td>
<td>4,001</td>
<td>1940</td>
<td>1,677</td>
<td>1952</td>
<td>193</td>
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<td>1929</td>
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<td>1941</td>
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<td>2,583</td>
<td>1942</td>
<td>437</td>
<td>1954</td>
<td>443</td>
<td>1966</td>
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<td>991</td>
<td>1955</td>
<td>3,633</td>
<td>1967</td>
<td>5,582</td>
</tr>
<tr>
<td>1932</td>
<td>2,802</td>
<td>1944</td>
<td>582</td>
<td>1956</td>
<td>12,537</td>
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</table>

Total 340,135 barrels
Figure 4. Graph showing Simpson County oil production, 1921-1967.
Silurian Louisville, Laurel, and (as yet non-productive) Brassfield. A small part of Simpson County production has been obtained from zones above the “Corniferous,” namely the Mississippian Salem-Warsaw, and possibly the “Beaver,” a porous limestone in the lower part of the Fort Payne Formation.

All of the zones previously mentioned have potentiality for additional production, either from new discoveries or from revival of old pools through secondary-recovery methods. The unexplored Ordovician and Cambrian rocks probably offer the greatest possibility for substantial new production, but the considerable expense involved and apparent lack of interest at the present time will probably delay their evaluation until some time in the future.

A combination generalized structure and oil and gas pool map is to be found in the pocket (Pl. 2). The structure is that as interpreted on the top of the Chattanooga Shale and has been compiled from the published 71/2-minute-quadrangle geologic maps of the current mapping program and from meager control from drilled wells; control is particularly sparse in the western part of the County. The Chattanooga, because it is very widespread in occurrence and is readily recognized, is the best structural marker for Simpson County as well as for a very large part of Kentucky. There are interval variations between the Chattanooga and overlying and underlying formations that must be taken into account, these depending largely upon the relative position to the Cincinnati arch. In general the thinnest intervals can be expected on the apex of the arch, with thickening occurring down-dip on the flanks.

The controlling factor in the accumulation of oil in Simpson County seems to be porosity of the reservoir rocks. Anticlinal structure here, as in most places, offers the best chance for accumulation of petroleum, but some anticlines are underlain by rocks so tightly cemented that no reservoir is possible. On the other hand, porosity development on the flanks of anticlinal or monoclinal structures, and in a few cases in synclinal lows surrounded by nonporous media, has led to the trapping of oil and/or gas. In exploring for petroleum the most favorable prospect is still the anticline, but other factors to be considered are porosity, stratigraphic wedge-outs, trends, alignments, and direct evidences such as oil seeps and shows of oil in drilled and abandoned wells.

Some natural gas is being produced in Simpson County, and at times in the past the amount has been considerable. A few wells capable of producing gas in commercial quantities for a short period of time are capped for want of a ready market. All of the gas that has been produced in the County has been consumed locally. (The use of unprocessed natural gas for home consumption can be dangerous.) Unless new sources of natural gas can be found, probably in the deeper, unexplored formations, the reserves in Simpson County are sufficient only for limited local use.

No scientifically oriented programs for the secondary recovery of petroleum have as yet been tried in Simpson County. There seems to be no reason why such programs could not be successful, but these should not be undertaken without adequate geologic and engineering advice; otherwise they could lead to considerable loss in time and money.

Disregarding the report of a 1,500-foot well east of Franklin, only 8 wells are of record in Simpson County as having reached depths below 1,000 feet, the deepest having a total depth of 1,415 feet [up to the time the text was written]. Seven wells, including only two of the above, reached the Ordovician. One of these, located in Carter Coordinate sec. 1-B-36, Franklin quadrangle, penetrated 511 feet of the Ordovician and probably reached the “Trenton.” Where available, the locations of the above-mentioned wells are shown on the pool map (Pl. 2).

The following is a generalized composite log of the Simpson County stratigraphic section made up from information gathered from the microscopic examination of cuttings from 34 wells. (Lithologic descriptions of these cuttings are on open file at the Kentucky Geological Survey in Lexington.) It was necessary to combine several well logs, as no one well penetrates the entire section. There are a number of discrepancies between the lithologies as here given and those discussed in the “Stratigraphy” section. These represent in part the difference between the rocks exposed at the surface and their makeup in the subsurface, and in part the great variation in the rocks from well to well. Oil-and-gas-producing zones are indicated in Figure 3.

* In July 1968 an unsuccessful test in sec. 21-D-36 was completed at a total depth of 3,675 feet, making this by far the deepest well in the County. The well is considered to have penetrated the Copper Ridge Dolomite (Cambrian) portion of the Knox (E. N. Wilson, Kentucky Geological Survey, written communication, 1968).—Ed.
<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Disc.</th>
<th>Location (Center Coord.)</th>
<th>Structure</th>
<th>Producing zone(s)</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>1.</td>
<td>Adams</td>
<td>post-1925</td>
<td>22, 23-C-34</td>
<td>Monocline</td>
<td>&quot;Corniferous&quot;</td>
<td>Location approximate. No logs available</td>
</tr>
<tr>
<td>2.</td>
<td>Bull</td>
<td>post-1925</td>
<td>15-G-38</td>
<td></td>
<td></td>
<td>Location approximate. No logs available</td>
</tr>
<tr>
<td></td>
<td>Bunch</td>
<td>1920</td>
<td>21-C-35</td>
<td>Monocline</td>
<td>&quot;Corniferous&quot;</td>
<td>In Woodburn</td>
</tr>
<tr>
<td>3.</td>
<td>Butt</td>
<td></td>
<td></td>
<td>Monocline</td>
<td>&quot;Corniferous&quot; (Jeffersonville?)</td>
<td>Location approximate</td>
</tr>
<tr>
<td></td>
<td>Crowlisk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>In Flat Rock Consolidated</td>
</tr>
<tr>
<td>4.</td>
<td>Flat Rock Consolidated</td>
<td>1919</td>
<td>13, 14, 17, 18, 23, 24,</td>
<td>Anticline and nose</td>
<td>Salem–Warsaw and &quot;Corniferous&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>25-C-36; 5-B-36</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Gold City East</td>
<td>1959</td>
<td>1-G-37; 5-C-38; 21-D-37; 25-D-38</td>
<td>Anticline</td>
<td>&quot;Beaver&quot; and &quot;Corniferous&quot;</td>
<td>Revival of Slate</td>
</tr>
<tr>
<td>6.</td>
<td>Hagan</td>
<td>1919</td>
<td>2-C-37</td>
<td>Monocline</td>
<td>&quot;Corniferous&quot;</td>
<td>Location approximate</td>
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<tr>
<td>7.</td>
<td>Hall</td>
<td>1918</td>
<td>24-L-35</td>
<td>Monocline</td>
<td>Salem–Warsaw</td>
<td>In Flat Rock Consolidated</td>
</tr>
<tr>
<td>8.</td>
<td>Harkers</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hickory Flat Consolidated</td>
<td>1919</td>
<td>3, 4, 7, 8, 14, 15-C-37</td>
<td>Monocline</td>
<td>Fort Payne (gas) and Laurel</td>
<td>In Woodburn</td>
</tr>
<tr>
<td></td>
<td>Mitchell</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pearl</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>In Woodburn</td>
</tr>
<tr>
<td>9.</td>
<td>Pearson</td>
<td>post-1925</td>
<td>23, 24-D-37</td>
<td>Monocline</td>
<td>&quot;Corniferous&quot;</td>
<td>Location approximate</td>
</tr>
<tr>
<td>10.</td>
<td>Pepper</td>
<td>post-1925</td>
<td>1, 2-B-34</td>
<td>Monocline</td>
<td>&quot;Corniferous&quot;</td>
<td>Location approximate. No logs available</td>
</tr>
<tr>
<td>12.</td>
<td>Prices Mill</td>
<td>post-1925</td>
<td>17, 24-C-34</td>
<td>Monocline</td>
<td>&quot;Corniferous&quot;</td>
<td>No logs available</td>
</tr>
<tr>
<td>13.</td>
<td>Pugh</td>
<td>1921</td>
<td>17, 18, 23, 24-E-35</td>
<td>Monocline</td>
<td>&quot;Corniferous&quot; (Devonian and Silurian)</td>
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</tr>
<tr>
<td>14.</td>
<td>Reeder</td>
<td>1921</td>
<td>3-C-36; 23-D-36</td>
<td>Monocline</td>
<td>&quot;Corniferous&quot;</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Robinson</td>
<td>1920</td>
<td>1, 2-D-34</td>
<td>Monocline</td>
<td>Salem–Warsaw</td>
<td>In Wall</td>
</tr>
<tr>
<td></td>
<td>Roy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>Salem Church</td>
<td>1958</td>
<td>16, 17-D-37</td>
<td>Anticline and nose</td>
<td>&quot;Corniferous&quot;</td>
<td>Possibly a revival</td>
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<tr>
<td></td>
<td>Slate</td>
<td>post-1925</td>
<td>1-C-37; 5-C-38; 21-D-37</td>
<td>Anticline</td>
<td>&quot;Corniferous&quot;</td>
<td>Consolidated with Gold City East</td>
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<tr>
<td>17.</td>
<td>Stringer</td>
<td>1919</td>
<td>16, 25-D-38</td>
<td>Anticline</td>
<td>&quot;Corniferous&quot; (Laurel?)</td>
<td>In Mt. Aerial Consolidated (mostly in Allen County)</td>
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<tr>
<td></td>
<td>Temperance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Location unknown</td>
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<tr>
<td>18.</td>
<td>Union Chapel Gas</td>
<td>1919</td>
<td>12, 19-C-35</td>
<td>Anticline</td>
<td>Silurian</td>
<td>Abandoned before 1951, revived in 1984</td>
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<tr>
<td>19.</td>
<td>Wall</td>
<td>1920</td>
<td>13, 14, 17, 18-D-34</td>
<td>Monocline</td>
<td>&quot;Corniferous&quot; (Jeffersonville?)</td>
<td>Mainly in Logan County</td>
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<td>20.</td>
<td>Woodburn</td>
<td>1920</td>
<td>3-D-36</td>
<td>Fault line closure</td>
<td>&quot;Corniferous&quot; (Devonian and Silurian)</td>
<td>Mainly in Warren County</td>
</tr>
</tbody>
</table>
Composite well log for Simpson County

Thickness in feet

Surface ................................................................. 5

Mississippian

*St. Genevieve*—Limestone, tan to brown, dense, sucrosic to crystalline, oolitic and pelletal, little chert ................................................................. 230

*St. Louis*—Limestone with thin shale partings, gray, tan, and brown, dense to crystalline, cherty .... 220

*Salem*—Limestone, tan and brown, crystalline, partly oolitic and pelletal; abundant small fossils ................................................................. 95

*Warsaw*—Limestone with thin shale partings, gray, fine-grained to crystalline, cherty; streaks of gypsum ................................................................. 30

*Fort Payne*—Limestone and some siltstone, gray and white, very fine-grained, very cherty; some gypsum ................................................................. 135

*New Providence*—Shale, green, calcareous; thin beds of white limestone ................................................................. 12

Devonian

*Chattanooga*—Shale, black, with 8 feet of dark-brown, finely crystalline, sandy dolomite at base ................................................................. 50

*Sellersburg*-*Jeffersonville*—Dolomite, gray to light-gray, sucrosic to crystalline ................................................................. 50

Silurian

*Louisville*—Dolomite, gray to dark-gray, granular to crystalline ................................................................. 50

*Walden*—Shale, gray ................................................................. 10

*Laurel*—Dolomite, sucrosic to crystalline, bluish-gray ................................................................. 35

*Osgood*—Shale, greenish-gray, with red streaks .... 15

*Brassfield*—Dolomite, gray to yellowish, sucrosic to crystalline ................................................................. 10

Ordovician

*Cumberland* to “Trenton” (undivided)—Dolomite, gray to dark-gray, dense to finely crystalline, shaly in part; shale, dark-gray, calcareous ...... 511 +

Locations of the named oil and gas pools of Simpson County are shown on Plate 2. Key wells are shown by conventional symbols. Of the estimated 1,000 wells drilled in the County, information is available (particularly as to location) on less than 100. There are 26 named oil and gas pools in Simpson County, but consolidation and duplication have reduced the number to 18 in current use. Hall, in Carter Coordinate secs. 21-E-34 and 25-E-35, discovered in 1918, was the first named oil pool in the County. The last important development started in 1955 and reached its peak in 1960, and both exploration and development since have been relatively inactive. The larger oil pools, Flat Rock Consolidated, Fugh, and Wall, are largely abandoned.

Table 2 is a list of the oil and gas pool names and—if available—discovery dates, locations by Carter Coordinate, type of structure, producing zones, and other pertinent data. The pool numbers correspond to those on the map (Pl. 2), although a few unnamed pools are also shown on the map.

**Limestone**

The only limestone quarry currently active in Simpson County is that of the Southern Stone Company (Fig. 5) about 6 miles north of Franklin, in the Woodburn quadrangle, a short distance west of U. S. Highway 31W. Limestone being quarried is the Ste. Genevieve, and about 75 feet of the formation is being worked. The product is used for aggregate and agricultural limestone, and some is rough cut for building stone. A partial analysis of the rock from this quarry is given in Table 3.

There are several abandoned limestone quarries in Simpson County. One rather large quarry also mined the Ste. Genevieve just to the east of the Southern Stone Company’s active operation, but was abandoned a number of years ago. A quarry at Prices Mill supplied limestone from the St. Louis for bridge abutments in that area. The St. Louis was quarried for crushed rock 0.3 mile west of Middleton, near the southwest corner of the Auburn quadrangle. The St. Louis also was recently quarried in northeastern Simpson County just south of the Warren County line (Drake quadrangle) for use in construction of Interstate Highway 65; the quarry site is on the west side of Interstate 65.

Although the St. Louis Limestone is exposed over a wide area of Simpson County and has physical properties making it usable in part for some things, better rock is available. Other quarries could be opened in the Ste. Genevieve, and the Girkin is possibly of sufficient extent to be mined. Any exploration program would require some core drilling, an open-face cut, and physical and chemical analyses of the rock.

![Figure 5. Southern Stone Company quarry, about 6 miles north of Franklin.](image-url)
### Table 3. Partial Analysis of Ste. Genevieve Limestone from Southern Stone Company Quarry 6 Miles North of Franklin. Data from Kentucky Department of Highways (1959, p. 99)

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<th>PHYSICAL TESTS</th>
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<th>CHEMICAL ANALYSIS</th>
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<td>Specific gravity</td>
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<td>0.7</td>
<td>26.7</td>
</tr>
<tr>
<td>2.71</td>
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<tr>
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<td>72.7</td>
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</tr>
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</tr>
<tr>
<td>2.70</td>
<td>1.3</td>
<td>28.2</td>
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<td></td>
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<tr>
<td>2.71</td>
<td>1.0</td>
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<td>2.52</td>
<td>3.2</td>
<td>27.1</td>
</tr>
<tr>
<td>2.70</td>
<td>5.9</td>
<td>24.4</td>
</tr>
</tbody>
</table>

*Metal content.

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**Sand and Gravel**

Sand and gravel for the surfacing of secondary roads are available from alluvial deposits in Simpson County and have been so used, but the deposits have a high silt and chert content and are of little economic importance at present.

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**Clay and Shale**

The alluvial deposits of the County have a considerable clay content but contain too much sand and gravel to be of commercial use. None of the shales or siltstones exposed in the Fort Payne, Warsaw-Salem, or St. Louis in Simpson County have the qualities for ceramic use. Probably the only source of raw material in Simpson County would be the red residual clays resulting from the decomposition of limestones—if deposits free of chert and rock fragments could be located. These would be suitable only for the manufacture of ordinary brick and tile.
Water

Simpson County does not have large supplies of either ground or surface water, although these supplies are adequate for domestic use. Any industry needing large amounts of water should research the situation thoroughly before moving into the area. The ground-water supply is discussed in U. S. Geological Survey Hydrologic Investigations Atlas HA-32, by R. F. Brown and T. W. Lambert (1962), entitled Availability of Ground Water in Allen, Barren, Edmonson, Green, Hart, Logan, Metcalfe, Monroe, Simpson, and Warren Counties, Kentucky.

Other Mineral Commodities

The Big Clifty Sandstone Member of the Golconda Formation was quarried on a knob adjacent to Pilot Knob. This now abandoned quarry yielded flagstone for local use.

No occurrence of vein minerals has been reported in Simpson County and probably no commercial deposits exist.

REFERENCES

Miller, Raymond, and Crabb, D. H., 1930, Geologic map of Simpson County, Kentucky: Kentucky Geol. Survey, ser. 6, scale 1 in. = 1 mi.
Shelton, W. A., 1925, Oil and gas map of Simpson County, Kentucky: Kentucky Geol. Survey, ser. 6, scale 1 in. = 1 mi.
GENERALIZED OIL AND GAS AND STRUCTURE MAP OF SIMPSON COUNTY, KENTUCKY

By
E.R. Branson
1969