



The Macksburg Oil Field

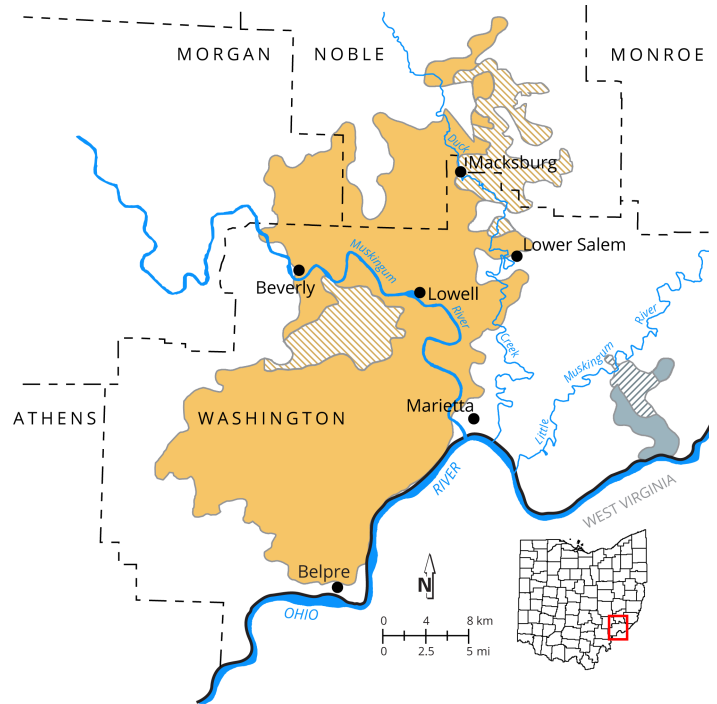
Ohio has a rich history of energy production, including the extraction of commodities such as coal, natural gas, and oil. Located near the town of Caldwell in Noble County lies one of the nation's first oil-producing wells. Drilled in 1814, the Thorla-McKee well is named after the two men responsible for its development, Silas Thorla and Robert McKee. At the time the well was developed, Thorla and McKee intended to extract salt (as brine) from the well. Oil was unprofitable to settlers during the early nineteenth century as there was no means of refining it for use. However, the two men soon realized there was a market for black crude. Once the brine and oil were separated in a barrel, they used a blanket to soak up the oil. The oil was then wrung out into bottles and sold as "Seneca Oil" to be used for joint and nerve ailments. South of Caldwell in the Duck Creek Valley (Washington County) is the town of Macksburg, which would become the site of one of Ohio's first producing oil fields.

Drilling history of the area

Considered one of the earliest producing oil fields in Ohio, the "Macksburg" oil field surrounds the town of Macksburg in Washington County (fig. 1). Drilling began in 1860 on a piece of land owned by William Rayley. In a joint endeavor, Rayley allowed James Dutton, Alden T. Warren, and John Smithson to drill on his land fronting Duck Creek. The location was chosen for drilling because of the oil seepage that was clearly visible on the surface of the creek. Early accounts recall swimmers in Duck Creek emerging out of the water with a film of oil on their skin. These areas were known at the time to be indicative of oil-producing locations.

The main field of oil production was thought to be only in the vicinity of Macksburg in the Duck Creek Valley. Macksburg wells were relatively shallow and produced an excessive amount of water, which generated extra cost to the operator because of the increased amount of casing required. In 1861, oil had been discovered in an adjacent oil field in southeastern Washington County. Known as the Cow Run oil field, the discovery attracted drillers for a brief time. However, many of the wells were abandoned because of the outbreak of the Civil War, declining oil prices from inflation, relatively short production, and the cost to transport the oil. But after the war, interest in the Macksburg renewed. During a land survey conducted by a private producer in 1872, a well originally drilled in 1865 was located and found to be pumping approximately five barrels per day. This well was soon rejuvenated and began pumping 50 barrels per day. The increased production and the recent completion of the Cleveland & Marietta Railroad once again sparked the attention of operators.

In 1874, a Macksburg well drilled to a depth of 140 feet produced 150 barrels per day. For the next three



Legend

| Macksburg oil field | Cow Run oil field | |
|---------------------|-------------------|-----------------|
| Gas | Gas | County boundary |
| Oil | Oil | Cities |

Figure 1. Map showing the locations of the Macksburg and Cow Run oil fields in southeastern Ohio.

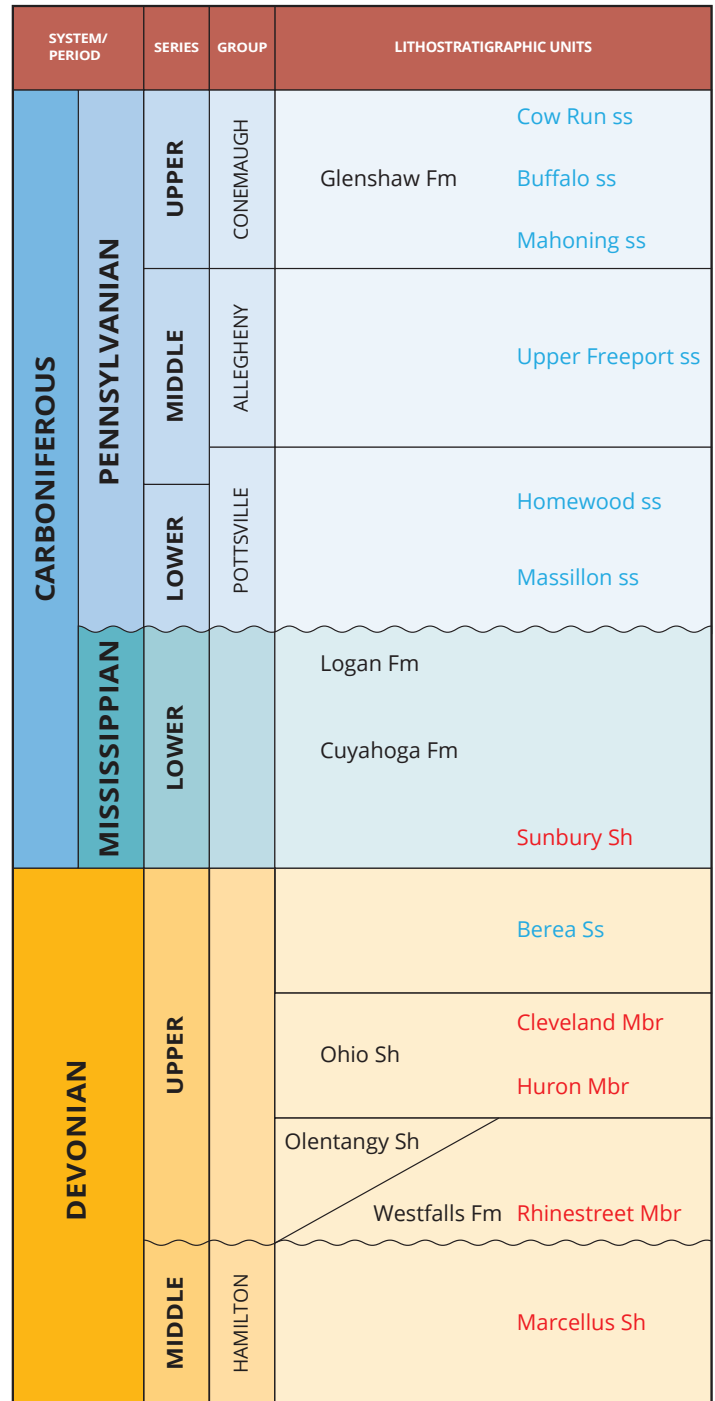
years, an estimated 33 additional wells were placed in the Macksburg oil field. In 1883, a well was drilled farther outside the initial field of production. This well produced in excess of 100 barrels per day and was the first of the large Berea Sandstone producers. This high-producing well opened the possibility of extending the field into the nearby hills and valleys. By 1885, over 5,000 acres were confirmed to be productive territory. In March 1885, monthly production reached 21,600 barrels, which increased to 79,700 barrels by July of that year. Yearly production peaked in 1886 with 703,945 barrels. From that point forward, production slowly decreased and many of the operators moved outside the Macksburg field to expand operations in several other areas of southeastern Ohio. By 1900, the town of Macksburg was again a small farming community with nothing but the remnants of a once-booming hub of oil production.

Geology

Production of oil and natural gas in Washington County is a direct result of the geology of the area which lies within a region known as the Appalachian Basin. The principal source beds that account for hydrocarbons associated with the Appalachian Basin are the Ordovician-age Point Pleasant Formation, the Devonian-age Marcellus Shale, the Rhinestreet Shale Member of the West Falls Formation, the Huron Member and Cleveland Member of the Ohio Shale, and the Lower Mississippian Sunbury Shale (fig. 2). These source beds were deposited as muddy bottom sediments in a nutrient-rich inland sea. A low-oxygen environment facilitated the preservation of these organic-rich sediments before burial. Over time, these sediments began to be buried by various sequences of sand, silt, and clay, and the heat and pressure from within the earth began to essentially cook the organic sediments to create hydrocarbons. Migration of hydrocarbons is dependent on rock and fluid properties, including porosity, permeability, pressure, and temperature. Hydrocarbons migrate through porous and permeable rock units until they either reach the surface as seepage or become trapped under confining (impermeable, nonporous) rock layers. In the case of the Macksburg field, hydrocarbons accumulated in porous layers as hydrocarbon reservoirs, which could be explored and produced by drilling.

Structural features and/or irregularities in the subsurface account for many of the oil-and-gas accumulations. These structural features and irregularities, formed when rock beds are folded by tectonic forces, consist of domes, ravines, "noses," and terraces. The accumulation of oil and gas is largely dependent on local structure, permeability, and porosity of reservoir rocks. The target rock units for oil production in the Macksburg field are Devonian- to Pennsylvanian-age sandstones. During the Pennsylvanian, eastern Ohio was dominated by vast low-lying coastal plains, deltas, and coastal swamps. Rocks deposited during this period indicate a dynamic coastal region where the shoreline rose and fell multiple times over the course of tens of millions of years. The sandstones capturing these hydrocarbons in the Macksburg are Late Devonian to Late Pennsylvanian in age, and include the Berea, Massillon, Homewood, Upper Freeport, Mahoning, Buffalo, and Cow Run.

The development of the Macksburg and surrounding sites led the way for the development of oil and gas production in Ohio. Although the Macksburg field had many setbacks, it is credited with expanding oil-and-gas exploration in Ohio.



Fm = Formation Mbr = Member Sh = Shale Ss = Sandstone
Ls = Limestone ~~~~~ Unconformity

References & Further Reading

Spencer, J.A., and Camp, M.J., 2008, Ohio oil and gas: Charleston, Arcadia Publishing, Images of America Series, 127 p.

Figure 2. Simplified lithostratigraphic column showing the rock units relevant to the Macksburg oil field and vicinity. Hydrocarbon-producing units (blue) and source rocks (red) are shown on the right side of the column.