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THE HISTORY AND DEVELOPMENT OF THE OIL AND GAS INDUSTRY IN TENNESSEE

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ABSTRACT

The discovery of oil in Tennessee was a result of pioneers drilling for salt and predates the Civil War. The first commercial production of oil in Tennessee was in 1866 from the Spring Creek field in southwestern Overton County. Minor oil and gas production has continued through the years from several rock formations of Ordovician through Pennsylvanian ages. Historically the largest producing zones in Tennessee are the Monteagle Limestone and the Ft. Payne Formation, both Mississippian in age.

Following the sizable increase in drilling activity during the 1980–1981 period and the subsequent recent change in the worldwide energy situation, the oil and gas industry in Tennessee has dwindled to a point of near non-existence.

INTRODUCTION

This brief history of the oil and gas industry in Tennessee chronicles some of the events most significant to oil and gas discoveries and operations to date. The data, incomplete as they are, were taken from previously published reports, numerous unpublished reports by the Tennessee Division of Geology, personal correspondence, and site examinations in the field.

DISCUSSION

The earliest indications of oil and gas in Tennessee were found by early settlers along the Cumberland River searching for brine for saltmaking. A number of these earliest drill holes yielded considerable quantities of oil and gas along with the brine. In several reported instances, during constant pumping the brine became exhausted and was replaced by oil, thus causing their owners to abandon the wells in disgust (Munn, 1911).

One of the earliest recorded oil wells was dug or bored in 1820 on Wolf River near the line between Clay and Pickett Counties. This well flowed sufficient amounts of oil to cover most of the river. In about 1825, a well was drilled for brine in Wayne County, Kentucky, just across the state line from Scott County, Tennessee. At a depth of less than 200 feet, large quantities of oil were encountered from the Upper Mississippian Newman Limestone. Approximately 70 years passed before successful drilling activity occurred in Scott County, later the leading oil-producing county in Tennessee (Munn, 1911).

In Hickman County around 1880, while blasting the foundation for Montgomery's Mill on the Piney River, black-looking petroleum was observed oozing from the Silurian "Meniscus Limestone." This oil was used for medicinal purposes. Petroleum seeps were also noticed coming from the "Devonian black shale" (Chattanooga Shale) at several points in the valley of the Obey River in Overton County (Safford, 1869).

In 1863, an interesting report originating in Canada described the processing of oil from bituminous shales in Canada and correlated this process to that of the Tennessee black shale. In 1859, works for extracting oil from shale were built near the town of Collingwood in Wayne County. By means of heating by wood, the shale yielded approximately 250 gallons daily, corresponding to about three percent of the rock. The cost of the crude oil from this process was said to be 14 cents per gallon. Up to half of this petroleum was converted to burning oil and the remainder to pitch, waste, and heavy oil used for lubricating purposes (Safford, 1869).

The earliest successful borings in Tennessee for petroleum occurred on Spring Creek in Overton County near the Putnam County line. From 1859 to 1870 several wells were drilled in this area. From a depth of only 19 feet, about 2000 barrels of oil were pumped from the Newman No. 1 well, drilled in 1866. After ceasing to produce, this well was deepened to a depth of 52 feet, and approximately 2000 additional barrels were pumped out. The oil from Spring Creek field was transported by road to McMinnville and rail to Nashville to be refined (Safford, 1869). Because of the difficulty of transporting the oil, the Newman No. 1 was abandoned in 1867. In 1868, it was tested again and showed potential of at least 100 barrels per day. After encountering problems with the pump valves, which necessitated the removal of the tubing, the well was deepened a second time (Safford, 1869; Ashley, 1912).

The Douglass well, drilled only 75 feet from the Newman well, produced about 80 barrels per day from a maximum depth of 22 feet. This well ceased production at the same time the Newman well first failed and apparently was never operated again (Safford, 1869).

A third well of note in the Spring Creek field was the Hoosier well, which was located about 250 feet from the Douglass well. This well, drilled in 1867, encountered oil at a depth of 35 feet and produced about 5000 barrels before failing in the fall of 1868. It was deepened to about 70 feet and again produced oil for some time.

Another significant early discovery of oil in Tennessee was the Hudson well on Jones Creek, in Dickson County, drilled in 1867. This well initially produced oil from a depth of 132 feet, but was later deepened to at least 340 feet (Safford, 1869).

In 1891, drilling in Scott County yielded oil in several wells from depths greater than 1000 feet. Wells were drilled just west of Glenmary, roughly centered in the present-day "oil patch" of Tennessee. The Scott County wells were some of the earliest wells to produce hydrocarbons from relatively deep holes (Ashley, 1910).

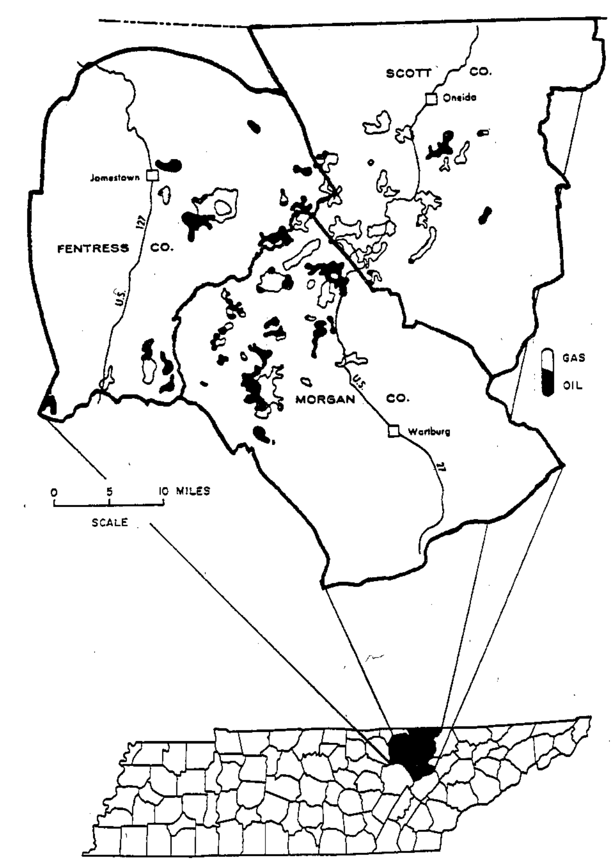
In January, 1896, a well at Bob's Bar near Riverton in Fentress County came in at 50 barrels per hour from a depth of 276 feet. After only 14 hours of operation, the oil caught fire and burned the rig. Ten months later the well was put back into production and by 1900, three years later, made over 20,000 barrels. Many wells were drilled in the Riverton area but few with any success at all (Ashley, 1910). A gas seepage has been observed near the Bob's Bar location, suggesting the possibility of a natural depressurization of the producing zones in the subsurface.

Another interesting occurrence of hydrocarbons in Tennessee is the area of gas seeps on an island several miles north of Memphis. These gas seepages have been known since the 1880s, and possibly earlier. In 1909, an organized attempt was made to test the potential of the oil and gas on Old Hen Island, where the majority of the gas seeps were located. Four wells were drilled eventually, yielding only noncommercial amounts of oil and gas. A number of additional wells were later drilled in the Memphis area as water wells, but no trace of oil or gas was ever reported from any of them (Munn, 1912).

During the early years of the petroleum industry in Tennessee, gas production was minor. There were occurrences of natural gas in many wells, but rarely did it exist in usable quantities. In a few instances a landowner could light and heat his home with gas from a well on his property.

Early oil and gas explorationists in Tennessee were intrigued with the search for hydrocarbons and apparently were not deterred by the lack of local geologic information. After early drilling results were studied, an association between the occurrences of oil and gas and the Chattanooga Shale was made (Ashley, 1910). Almost all of the oil and gas discoveries had been from zones that were stratigraphically close to the black shale. Using the available information, it seemed a safe assumption that the Chattanooga Shale was a possible source of oil or gas under the Highland Rim and the Cumberland Plateau.

OIL AND GAS FIELDS OF TENNESSEE



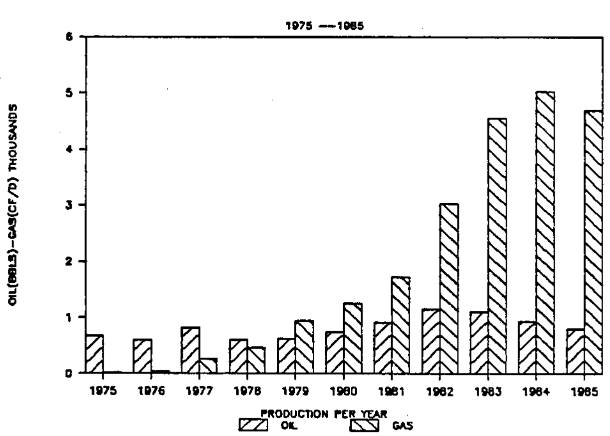
Eventually, as drilling information and methods improved, the search for oil and gas spread throughout most of Tennessee. Although there were numerous wells drilled between 1900 and 1960, a large percentage were dry. State regulation of the oil and gas industry in Tennessee began in 1968, followed shortly by the establishment of a well data system. This system contains drilling and completion information as well as production data, all of which are furnished by operators and petroleum purchasers. In 1985 there were over

10,000 wells on file at the Tennessee Division of Geology in Nashville. Because of insufficient data from operators, over a thousand wells still remained unclassified by industry standards.

In 1969, Tennessee's first million-barrel field was discovered in Scott County. Oneida West field, an early Mississippian Ft. Payne carbonate play, spurred a significant increase in the state's drilling activity and production. Numerous additional Ft. Payne discoveries were made on the northern Cumberland Plateau; many are stratigraphic traps and not related to structure. The better Ft. Payne fields are gas cap and gas-solution drive reservoirs (Statler, 1975).

Another Ft. Payne discovery of note was the Indian Creek field, Morgan County, in late 1973. The operators of Indian Creek initiated a gas re-injection and stripper program to further enhance the production capabilities of the reservoir (Statler, 1975). At the end of 1985, Indian Creek field had produced over 1.7 million barrels of oil. During the search for the Ft. Payne pays, numerous gas zones were encountered in Upper Mississippian Monteagle and Bangor Limestones. Marketed gas, in the 1970s, remained insignificant because of insufficient pipeline facilities despite the abundance of shut-in gas wells (Lindau, 1980).

TENNESSEE OIL AND GAS PRODUCTION



Moderate drilling continued through the 1970s until 1979, when activity increased significantly. In May, 1979, a Morgan County well came in at an estimated 5000 BOPD (barrels of oil per day) with a substantial but unmeasurable amount of associated gas. This well, on the Luchin lease within Douglas Branch field, apparently was from fracture porosity in the Upper Ordovician Nashville Group. After producing an undetermined amount and selling over 5000 barrels of oil in five months, the Luchin well became idle amid rumors of paraffin causing its demise.

Just two months later, the John Billings well in Overton County initially tested at 260 BOPD out of the Middle Ordovician Lebanon Limestone. At the end of 1985 this well had yielded over 120,000 barrels of oil.

September 1980 saw one of the most prolific gas discoveries in Tennessee's history. Dixie-Shamrock's Brimstone No. 1 in Scott County encountered fractured zones in the Bangor and Monteagle Limestones, both Upper Mississippian in age. This well tested at nearly 3.25 million cubic feet of gas per day. Drilling continued to be active until 1983, when the international oil glut and fluctuations in world crude prices brought domestic drilling numbers to record lows.

During the 1979–1983 upsurge in drilling activity, large leases were made by major oil companies interested in deep drilling in the eastern overthrust area of the southern Appalachians. Very little drilling was actually accomplished, resulting in only two gas discoveries of moderate significance at depths of greater than 4000 feet.

The potential for hydrocarbon discoveries in Tennessee still exists. There are numerous areas and zones on the Cumberland Plateau that are yet untested. A more extensive usage of secondary recovery technology and more conservation in the maintenance and production of oil and gas might insure the continued existence of the oil and gas industry in Tennessee.

WORKS CITED

Ashley, G.H. 1910. Outline Introduction to the Mineral Resources of Tennessee: Tennessee Geological Survey Bulletin 2–A.

Lindau, R.D. 1980. Natural Gas Well Map for the State of Tennessee. Tennessee Division of Geology.

Munn, M.J. 1911. Preliminary Report upon the Oil and Gas Developments in Tennessee: Tennessee Geological Survey Bulletin 2–E.

Munn, M.J. 1912. Explorations for Natural Gas and Oil at Memphis, Tennessee: Tennessee Geological Survey, Resources of Tennessee, Vol. 2.

Safford, J.M. 1869. Geology of Tennessee: Nashville, Tennessee.

Statler, A.T. 1975. Recent Oil and Gas Activities in Tennessee: Society of Petroleum Engineers of A.I.M.E. Paper No. SPE–5449.

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A RESURVEY OF THE VIOLETS (*VIOLA*) OF TENNESSEE

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ABSTRACT

A resurvey of the violets *(Viola)* of Tennessee is presented. A dichotomous key is provided for the twenty-two species and two varieties known to occur within the state. Comments are presented on each taxon in reference to habitat, distribution, and taxonomic and/or nomenclatural problems.

INTRODUCTION

The most recent survey of the violets in Tennessee (Russell 1958) has served us well, but work in the fields and herbaria of Tennessee convinces one of the need for an update of Russell's original work. Russell recognized 29 species and two varieties while in this study 22 species and two varieties are recognized (Table 1). The nomenclature and taxonomy of the acaulescent blue violets as presented here is based on a forthcoming completed revision of that group by this author. Abbreviated comments as to certain changes are provided.

The results of this paper are based on field and herbarium studies conducted over fourteen years. A dichotomous key is provided as well as comments on habitat, distribution, and taxonomic and nomenclatural problems when applicable. Dot distribution maps by county are also provided.

RESULTS

The primary objective is to provide a treatment that best organizes the diversity that exists in nature. Hopefully, this treatment will stimulate renewed interest in the genus and eliminate much of the taxonomic confusion. Any attempt to collect and identify violets should include a careful search for both typical and atypical specimens as well as to collect throughout the growing season so as to record seasonal changes in both habit and structure. Any morphological discontinuity, sympatry, suspected hybrid activity, etc., should be noted. Information of this nature will be quite useful for future herbarium studies of this taxonomically difficult group.

Table I. Tennessee Violets recognized in the present study as compared with those listed by Russell (1958).

Present Study	Russell (1958)
Pansies	
V. arvensis	
V. rafinesquii	*V. kitaibeliana* var. *rafinesquii*
Caulescent Yellow Violets	
V. eriocarpa	*V. pensylvanica*
V. hastata	*V. hastata*
V. tripartita	*V. tripartita* var. *tripartita*
	V. tripartita var. *glaberrima*
	V. pubescens
Caulescent White Violets	
V. canadensis	*V. canadensis*
Caulescent Blue Violets	
V. conspersa	*V. conspersa*
V. rostrata	*V. rostrata*
V. striata	*V. striata*
V. walteri	*V. walteri*
Acaulescent White Violets	
V. blanda	*V. blanda*
	V. incognita
	V. macloskeyi ssp. *pallens*
V. lanceolata	*V. lanceolata*
V. primulifolia	*V. primulifolia*
Acaulescent Yellow Violets	
V. rotundifolia	*V. rotundifolia*
Acaulescent Blue Violets	
V. cucullata	*V. cucullata*
V. hirsutula	*V. hirsutula*
V. palmata	*V. stoneana*
	V. triloba var. *triloba*
	V. triloba var. *dilatata*
V. pedata	*V. pedata*
V. sagittata var. *sagittata*	*V. sagittata*
	V. emarginata
V. sagittata var. *fimbriatula*	*V. fimbriatula*
V. septemloba var. *egglestonii*	*V. egglestonii*
V. sororia var. *sororia*	*V. sororia*
	V. papilionacea
	V. septentrionalis
V. sororia var. *missouriensis*	*V. missouriensis*