STRATIGRAPHICAL AND STRUCTURAL CONDITIONS IN THE SIOSI OIL FIELD

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Location. The Siosi oil field is located near the Wabash River and approximately twenty-two miles southwest of Terre Haute. The field lies partly in Fairbanks Township of Sullivan County and partly in Prairie Township in Vigo County. The producing area lies in Sections 31 and 32 and in Sections 5 and 6. The nearest producing area, from Pennsylvania strata, lies in the southeastern part of Fairbanks Township. The nearest producing area from Devonian strata was the Riley field which is now abandoned.

Relief. The surface along the Vigo-Sullivan boundary line descends within the field from an elevation of 525 feet above sea level on the east to an elevation of 446 feet above sea at the Scott No. 4 well on the west side of the field. For the most part the surface of the field slopes westward with a low gradient toward the Wabash River. The elevation of the highest producing well is 525 feet above sea and the elevation of the lowest producing well is 446 feet above sea. During the flood stages of the Wabash River a part of the field is inundated.

Geology. The geological formations exposed at the surface in the Siosi field are of Recent and Pleistocene age. Beneath the surficial formations occur rocks which belong to Pennsylvanian, Mississippian, Devonian and Silurian periods of geological time.

Pleistocene and Post-Pleistocene Formations. Formations which belong to these two epochs cover the surface of the area. They consist of soils, clays, sands and gravels. Dune-like hills of sand have been formed along the border of the bottom lands. The thickness of these formations varies from a few feet to as much as one hundred feet. Some of the wells record a thickness of 85 feet of gravel at the base of the Pleistocene.

The Pennsylvanian Formations. Three divisions of the Pennsylvanian are represented in the field, viz: Post-Allegheny, Allegheny, and Pottsville. The formations of the series consist of sandstones, shales, thin limestones and intercalated beds of coal. Over a large part of the area there are at least three beds of minable coal. The maximum thickness of the coal is seven feet and the average of three beds is more than five feet. The total thickness of the Pennsylvanian sediments in the area ranges from 800 to 900 feet. Differences in thickness are due to pre-Pennsylvanian erosion which left an irregular surface on which the Pennsylvanian sediments were deposited. The contact of the Pennsylvanian with the underlying Mississippian cannot always be determinded since shales of the younger formation may rest upon shales of the older or sandstones of the younger upon sandstones of the older.

"Proc. Ind. Acad. Sci., vol. 41, 1931 (1932)."

18—47716

The Pennsylvanian formations have produced some gas in the Siosi area, but no commercial supplies of petroleum have been found in its formation, although about six miles away toward the south strata of that age have produced petroleum in commercial quantities.

A Typical Pennsylvanian Section

The following section represents the geological formations and their thicknesses as they have been encountered in wells drilled in the field.

Shale, blue, plastic	50 feet.
Coal	5 feet.
Shale, light gray	95 feet.
Coal	5 feet.
Shale, gray	75 feet.
Shale, black	5 feet.
Coal	7 feet.
Shale, blue	150 feet.
Shale, limey	5 feet.
Sand, soft	140 feet.
Shale, blue	95 feet.
Sand	45 feet.
Shale	70 feet.

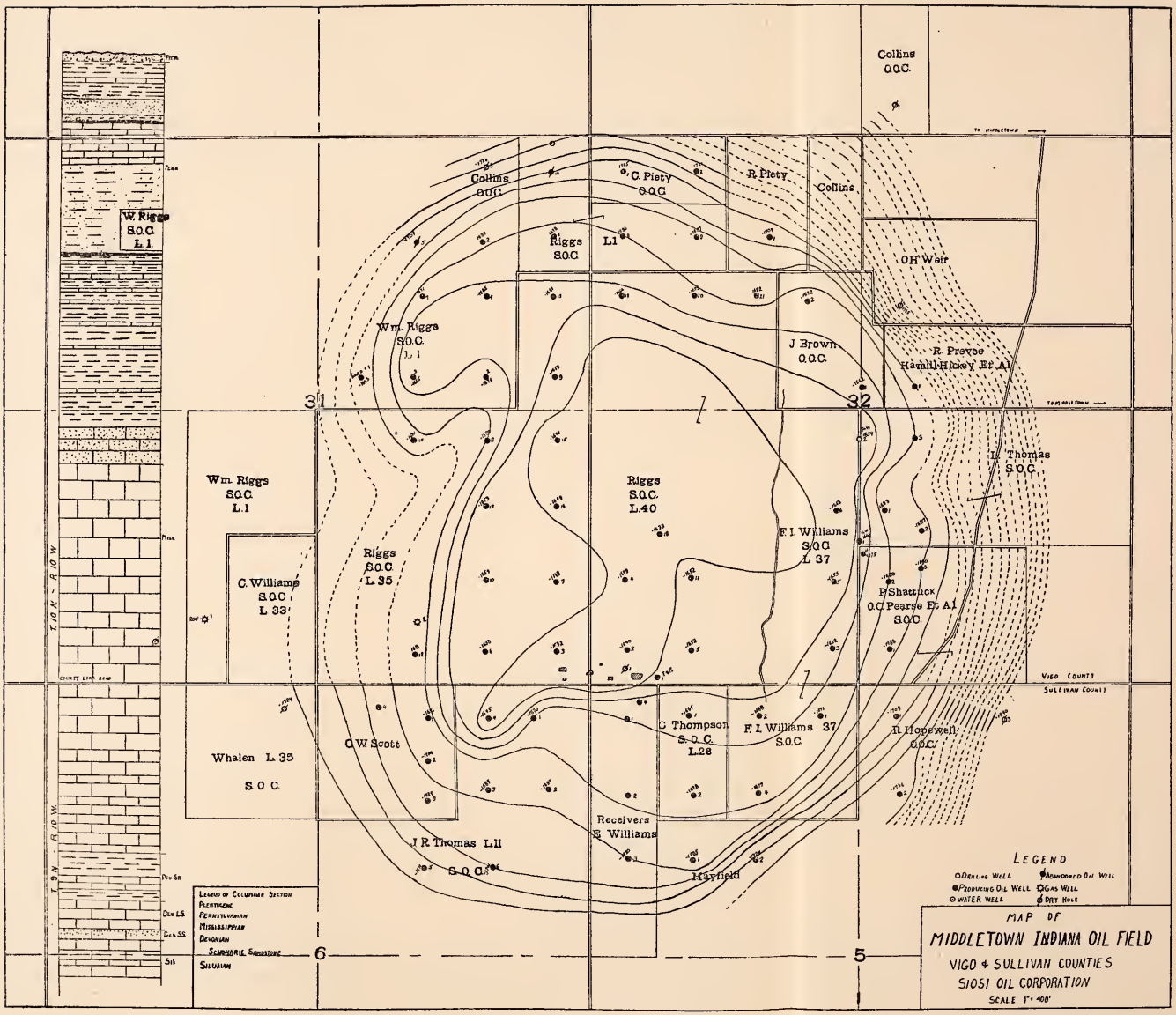
The Chester Formations. Beneath the Pottsville series in the Siosi field there is a group of formations consisting of limestones, shales, and sandstones which are assigned to the Chester division of the Mississippian period. The thickness of the group within the area varies from 75 to 150 feet. Interpretations based on some of the logs of the wells might serve to increase the range in thickness.

Small quantities of gas and some indications of oil have been reported from some of the limestones and sandstones of the group but no commercial quantities of either substance have been produced in the Siosi field from Chester formations. In other parts of Indiana, notably in the southwestern part, a large number of petroliferous horizons have been found in Chester formations. The porosity of the Chester sandstones aids in the circulation of petroleum and water where structural conditions are favorable.

Chester Section

A study of the well logs of the area indicates that the following formations of the Chester are present:

Blue shale, hard	10 feet.
Sand, hard, gray	15 feet.
Limestone, gray, broken	10 feet.
Limestone, hard	5 feet.
Shale, soft, green	10 feet.
Limestone	20 feet.
Shale	10 feet.


Collins
O.O.C.
C. Piety
O.O.C.
R. Piety
Collins
W. Riggs
S.O.C.
L. 1
Riggs
S.O.C
L1
O.H. Weir
Wm. Riggs
S.O.C.
L. 1
J. Brown
O.O.C.
R. Prevoe
Hamill-Hickey Et Al
31
32
Wm. Riggs
S.O.C.
L.1
Riggs
S.O.C.
L.40
I. Thomas
S.O.C.
F.I. Williams
S.O.C
L 37
Riggs
S.O.C
L. 35
C. Williams
S.O.C
L 33
P. Shattuck
O.C. Pearse Et Al
S.O.C.
VIGO COUNTY
SULLIVAN COUNTY
C. Thompson
S.O.C.
L.28
F.I. Williams 37
S.O.C
R. Hopewell
O.O.C.
C.W. Scott
Whalen L. 35
S O C
Receivers
E. Williams
J.R. Thomas L.11
S.O.C.
Mayfield
6
5
T.10N - R.10W
LEGEND
Drilling Well
Abandoned Oil Well
Producing Oil Well
Gas Well
Water Well
Dry Hole
Legend of Columbia Section
Pleistocene
Pennsylvanian
Mississippian
Devonian
Scherrville Sandstone
Silurian
MAP OF
MIDDLETOWN INDIANA OIL FIELD
VIGO & SULLIVAN COUNTIES
SIOSI OIL CORPORATION
SCALE 1" = 400'

Only the members of the lower Chester group appear to be present in the Siosi area. The Paoli, the Mooretown, the Beaver Bend, the Sample, the Reelsville and the Elwren are probably present because these formations have been identified in outcrops northeast of the Siosi area.

Older Mississippian Formations. The formations older than the Paoli which are present in the Siosi field include the St. Genevieve, St. Louis, Salem and Harrodsburg limestones. The term "Big Lime" as used by the drillers in the Siosi field includes the Paoli limestones and all the limestones named above. Since the upper part of the Borden formation is highly calcareous it is often included in the "Big Lime". The formations consist essentially of white and gray limestones which are hard and cherty in some horizons, and granular and soft in others. In some parts of Indiana some of these limestones contain oil-bearing horizons but in the Siosi field they contain neither oil or gas in commercial quantities.

Borden Formation. In some parts of the Siosi field the upper part of the Borden formation is marked by the presence of a thin bed of shale. The upper part of the Borden is generally calcareous and is often classed as limestone by the driller. A microscopic examination of the drillings from some wells will reveal the presence of flakes of shale and sand grains. No petroleum was found in the Borden in the Siosi field but small quantities of gas occur in some horizons.

Kinderhook Formations. The Kinderhook formations include the Rockford (Goniatite) limestone member and some associated shales and sandstones. The group usually consists of an upper sandstone member which is called the Carper sand and which has been found to be an oil producing horizon in Illinois. Beneath the Carper is a thin shale member which is gray or green in color and rests upon a thin limestone (Rockford). A green colored shale lies below the Rockford and rests upon the surface of the New Albany shale. From fossil evidence collected in other areas it is probable that the green shale overlying the New Albany shale is of Devonian age.

The Devonian Formations. Beneath the Kinderhook limestone in the Siosi field there are four formations of Devonian age. In the western part of Indiana these formations are called the New Albany shale, the Sellersburg limestone, the Jeffersonville limestone, and the Pendleton sandstone of Schoharie age.

New Albany Shale. A dark colored kerogen bearing shale which is often called "Cinnamon shale" by the drillers is present throughout the Siosi area. Some drillers limit the term "Cinnamon" to the lower part of the New Albany and call the upper part the black shale. The upper portion is in some places darker in color while the lower part is of a brown or cinnamon color. When examined in thin sections under the microscope the mineral matter which constitutes the larger portion of the shale is seen to contain particles of resinous matter which are largely in the form of spores and spore cases. Upon the application of heat to the shale the resinous matter is converted into gas and a shale oil from which some of the products of petroleum can be obtained.

The New Albany shale in the Siosi field ranges from 95 to 125 feet in thickness. It contains small quantities of gas, but is not a commercial gas-producing horizon such as that of the Laconia field in Harrison County. By using the upper surface of the New Albany shale as a key horizon a domelike structure is revealed. This structure does not differ materially from the one produced when the top of the Sellersburg limestone is used as a key horizon.

The Devonian Limestones. The Sellersburg limestone lies just beneath the New Albany shale in the Siosi field. It is a bluish-gray limestone which is somewhat shaly in its upper portion and is very porous. It forms an oil-producing horizon in the Siosi field and in the Riley field. It is thought to be of Hamilton age.

The Jeffersonville limestone lies below the Sellersburg. When seen in exposures it is a gray, crystalline limestone, occurring in thick layers, and extremely fossiliferous in certain horizons. The thickness of the formation in the Siosi field ranges from twenty to thirty feet. It is not petriliferous in this area.

The Jeffersonville limestone is considered of Onondaga age.

The Pendleton Sandstone. Below the Jeffersonville limestone in the Siosi field there is a calcareous, granular formation which in many places is a true quartz sand, but which in other places should be classed as a sandy limestone. The formation usually has a very open texture and contains many well-rounded quartz grains. It contains large quantities of gas and oil in the Siosi field. Wells drilled into this sand have been known to flow for several days under the gas pressure. Many of the earlier wells which were drilled reached only the Sellersburg producing-horizon, but many of these wells have been deepened to the Pendleton sand and a larger production obtained. The thickness of the sand varies from a few feet to thirty feet.

Silurian Limestones. A series of limestones of Silurian age lie below the last mentioned formation. In some horizons these limestones are very porous and where the proper structural conditions were present they have been productive petroleum horizons.

GEOLOGICAL FORMATIONS OF THE FIELD

Post-Pleistocene—soils, sands and clays.

Pleistocene formations—clays, sands and gravels.

Pennsylvanian formations—

- Post-Allegheny formations—shales, coals, sandstones.
- Allegheny formations—sandstones, shales, limestones and coals.
- Pottsville formations—shales, sandstones, coals, clays.

Mississippian formations—

- Chester formations—shales, limestones and sandstones.
- St. Genevieve formations—limestones.
- St. Louis formations—limestones.
- Salem formations—limestones.
- Harrodsburg formations—limestones.
- Borden formation—shales, silts and limestones.
- Rockford formation—limestone.

Devonian formations—
New Albany formation—shale.
Sellersburg formation—limestone.
Jeffersonville formation—limestone.
Pendleton formation—sandstone.
Silurian formations—limestones.

THE STRUCTURAL MAP

The structural conditions, so far as they can be determined from data now in hand, are outlined on the accompanying map. The key horizon used is the upper surface of the Sellersburg limestone.

As may be seen from the accompanying map, in which the contour interval used has a value of ten feet, the surface of the key horizon descends from an elevation of —1639, the highest point, to an elevation of —1840 in a southeasterly direction, to a similar elevation in a northeasterly direction, to an elevation of —1730 in a northwesterly direction and to an elevation of —1720 in a southwesterly direction. Drilling operations have outlined the structure fairly well. If there are any minor structures on the borders of the main structure such have not been encountered by the drill.

TYPICAL WELL LOGS FROM THE SIOSI FIELD

Log of well No. 5 in Section 32, T. 10 N, R. 10 W. Drilled by the Siosi Oil Corporation. Completed in December, 1927. Elevation 470 feet.

Formations	Feet	Feet	
Soil		6	Recent
Shale	9	15	
Limestone	15	20	
Shale	20	80	
Limestone	80	83	
Shale	83	90	
Sandstone	90	100	
Shale	100	410	
Sandstone	410	440	
Shale	440	485	
Sandstone	485	515	Pennsylvanian
Shale	515	560	
Sandstone	560	580	
Shale	580	585	
Limestone	585	590	
Shale	590	650	
Sandstone	650	710	
Shale	710	725	
Sandstone	725	763	
Shale	763	885	
Sandstone	885	925	
Shale	925	950	
Shale	950	975	
Sandstone	975	995	Chester
Shale	995	1005	
Sandstone	1005	1040	

Formations	Feet	Feet	
Limestone	1040	1885	St. Genevieve, St. Louis, Salem, Harrodsburg
Shale	1885	1965	
Sandstone	1965	1985	Borden
Shale	1985	2000	
Limestone	2000	2005	Kinderhook
Shale	2005	2085	New Albany
Shale	2085	2125	
Limestone	2125	2162	Sellersburg
Oil at	2133		

Initial production 60 barrels in 24 hours.

Log of well No. 13 in Section 31, T 10 N, R10 W, drilled by the Siosi Oil Corporation, completed in July 1928. Elevation, 450.5.

Formation	Feet	Feet	
Gravel		84	Pleistocene
Shale, soft	84	90	
Sandstone	90	120	
Shale	120	315	
Limestone	315	320	
Shale	320	330	
Sandstone	330	375	
Shale	375	450	
Sandstone	450	485	Pennsylvanian
Shale	485	650	
Sandstone	650	660	
Shale	660	705	
Sandstone	705	750	
Shale	750	860	
Sandstone	860	885	
Shale	885	930	
Sandstone	930	950	Chester
Shale	950	960	
Limestone	960	975	
Sandstone	975	1040	St. Genevieve, St. Louis
Limestone	1040	1870	Salem, Harrodsburg
Shale	1870	1935	
Sandstone	1935	1950	Borden
Shale	1950	1975	
Sandstone	1975	1990	
Shale	1990	2112	New Albany
Limestone	2112	2199	Sellersburg, Jeffersonville

Initial production 130 barrels.

Number of Wells on Leases

Hopewell Lease	3 wells
F. I. Williams Lease	6 wells
Shattuck Lease	4 wells
L. Thomas Lease	3 wells
Thomas and Williams (line wells)	2 wells
Prevoe Lease	1 well
Weir Lease	1 well
Collins Lease	3 wells
Riggs Lease No. 1	7 wells
Riggs Lease No. 35	10 wells
Riggs Lease No. 40	7 wells
C. Thompson Lease No. 28	2 wells
Mayfield Lease	2 wells
E. Williams Lease	4 wells
J. Thomas Lease	6 wells
Whalen Lease	1 well

DAILY PRODUCTION IN BARRELS OF SOME OF THE WELLS IN THE SIOSI FIELD

Day	Wells															
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	52		20	25	64	57	49	59	40	37	33	30	13	21	29	32
2	46	54	14	21	50	58	55	57	39	57	24	20	33	32	77	45
3	20	56	21	22	71	55	67	50	46	63	29	28	24	35	32	31
4	49	50	21	23	52	57	57	12	86	86	29		24	32	29	36
5	55	40	18	24	44	52	52	47	39	59		44	26	36	34	45
6	48	40	30	22	39	10	56	50	39	68	57	90	24	38	35	50
7	49	90	15	22	54	33	61	54	32	51	32	37	24	36	39	37
8	48	34	16	20	39	52	50	51	37	65	24	25	20	22	23	28
9	54	38	16	24	42	55	54	49			25	16	35	26	36	26
10	47			11		54	37	56		39	14	14	12		30	35
11	53	33	16	20	39	52	50	51	34	65	27	21	23	31	33	
12	51	29	16	26	50	49	55	45	79	63	27	25	25	39		39
13	51	41	17	22	49	52	53	40	71	27	36	20	27	31	32	25
14	53	41	15	28	42	47	12	53	38	49	37	40	35	35	20	34
15	49	39		24	42	54	50	55	40	71	23	48	21	31	29	30
16	51	43		24	21	51	45	53	38	58	20	39	50	30	36	39
17	52	39		22	57	51	50	57	40	56	28	31	22	31	32	41
18	48	41			47	54	54	49	48		18		20	31	27	30
19	49	39		19	50	44	54	53	38	49	22	51	20	19	30	26
20	51	36		27	28	53	48	54	31	51	30	46	20	20	35	10
21	47	34		26	55	53	56	49	33	53		48	21	35	32	30
22	47	38		15	36	55	34	52	35	59			20	31	28	32
Total.....	1070	855	235	467	971	1098	1099	1096	883	1126	535	673	539	642	698	701

The writer is indebted to Mr. A. F. Lager, Superintendent of the Siosi Corporation and to the following members of his field party in 1931: Paul Kerr, Maurice Felgar, Rex Rader, Courtney Boone, Ronald Rogers, and Thomas Mooney.