PRESS BULLETIN NUMBER 8.

July 8, 1920.

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OSAGE-NEWCASTLE OIL FIELD.

Owing to the comparatively recent discovery of oil in commercial quantities near Osage, Wyoming, many inquiries have come into this office in regard to the oil possibilities of the area covering approximately the following townships:

T. 44 N., Rgs. 61, 62, and 63 W.
T. 45 N., Rgs. 61, 62, and 63 W.
T. 46 N., Rgs. 62 and 63 W.

This article is issued for the purpose of giving the public a general idea of the conditions existing in the Osage-Newcastle area and is not the result of a detailed survey. It is understood that the United States Geological Survey will publish a bulletin on this field sometime during the coming winter. The accompanying sketch shows the surface geology and the trend of oil development. There are, however, a number of wells drilling to the south and southwest of Newcastle and a few around Osage that are not shown on this map.

This area lies southwest of the C. B. & Q. Railway between Osage and Newcastle and practically parallels the railroad. Prospecting and development are also extending to the northwest of Osage as far as Upton and Thornton and the southeast of Newcastle as far as Ardmore, South Dakota.

Structurally, this area is a portion of the southwesterly dipping monocline which lies on the southwestern flank of the Black Hills Uplift, which in itself is a huge, elongated dome containing a core of granite and metamorphic rocks and representing a vertical displacement of about 9000 feet. The normal dip of the monocline is about 4 or 5 degrees, but in a number of places the dip is greatly increased, as for instance from two to four miles west of Newcastle where it ranges from 50 to 60 degrees. Also to the southeast of Newcastle very steep dips have been recorded. It was noticed that an outcrop of Greenhorn limestone marked a zone of steeply dipping rocks south and southeast of Osage and that the strata flattened both to the northeast and southwest of this zone. This change in dip, or terracing, probably is one of the controlling influences in the accumulation of oil, especially in the Osage portion of the area. Other structural changes were also noted, such as slight folding, especially northwest of Osage, and there is also the probability of considerable faulting in a zone of almost vertical outcrops near Newcastle.

The stratigraphy of the area is discussed in U. S. Geological Folio No. 107. Following is a geologic column taken from that and other sources and checked up in the field to a certain extent.

System	Formation	Character	Thickness ft.		Depth ft.
Quaternary	Surface deposits	Sand, gravel, loam --- -	5 -	25	25
Upper Cretaceous	Laramie	Soft buff sandstones with iron-stained concretions and carbonaceous shales		800	825
	Fox Hills	Thin hard sandstones and sandy shales	75	150	925

Upper Cretaceous (Cont.)	Pierre shale	Dark gray shale with concretions and thin sands	1250	2175
	Niobrara	Gray calcareous shale and chalk weathering yellow	200	2375
	Carlile shale	Gray shale with thin beds of brown sandstone	700	3075
	Greenhorn limestone	Hard gray limestone weathering brown	50	3125
	Graneros shale	Dark gray to black shale and light sandy shales containing oil sand (Muddy) 200 ft. from base	1000	4125
	Dakota sandstone	Massive gray and buff sandstones	75	4200
Lower Cretaceous	Fuson shale	Gray and red shales	25	4225
	Lakota sandstone	Massive cross-bedded gray to buff sandstone with coal beds and conglomerate	175	4400
	Morrison shale	Sandy shales colored gray, buff, green, and maroon	150	4550
Jurassic	Sundance	Gray reddish sandy shales with thin limestone Massive gray and buff sandstone	350	4900
Triassic	Spearfish "Red Beds"	Red sandy shale and sandstone (gypsum beds)	500	5400
Permian	Minnekahta limestone	Thin bedded gray limestone	40	
	Opeche	Red sandy shale and red sandstone	70	5510
Pennsylvanian	Minnelusa sandstone	Hard white and gray sandstone Buff and gray limey sandstone	600	6110
Mississippian	Pahasapa limestone	Red shales Massive gray limestone	700	6810

The commercially oil bearing sands in this district are confined, as far as we know now, to the Graneros, or lower Benton, formation. The principal sand is from 25 to 40 feet thick and lies near the base of the Graneros. Above this sand there are about 110 feet of sandy shales overlain by another but much thinner oil bearing sand. The lower sandstone outcrop lies northeast of the railroad and parallels it from Osage to Newcastle and the same is true of the Dakota sandstone which comes to the surface a little farther to the northeast. At several points, notably a short distance west of Newcastle, there are occurrences of oil springs in the Graneros oil sand outcrop. For many years oil has been obtained at these seeps for local use as lubricants.

It is believed that many of the shallow wells near Osage are obtaining the oil from the thin upper sand and the sandy shales, while the deeper wells, especially the gushers in Section 19, T. 46 N., R. 63 W., have tapped the lower sand. It is not believed that any of the wells are producing from the Dakota or Lakota sandstones. It is quite likely that the Dakota sandstone will be found to be water bearing in this area. However, there is a possibility that the Lakota and lower sands may be found to be oil bearing in places, and if so the oil will undoubtedly be a heavy black oil with an asphaltum base.

Attention is called to the fact that all the producing wells are to the southwest and west of the outcrop of the oil sand and that the nearest well is about a mile from the crop measured on the line of the dip. It is also a fact

that the flowing wells are about three miles from the outcrop. Apparently, therefore, some change has taken place in the structure or in the character of the formation between the wells and the outcrop to retain or trap the oil which ordinarily would have been pushed out of the sand by hydrostatic pressure. We have in this field an example of a monoclinal structure, containing commercial petroleum, similar to some of those in the Mid-Continent fields and quite unlike any structural conditions as yet discovered in Wyoming.

There are several theories as to what causes accumulation in this field, or particularly speaking, as to what forms the trap for the oil. The principal theories may be summed up as follows:

First, terracing or slight folding.

Second, faulting or fissuring between the outcrop and production.

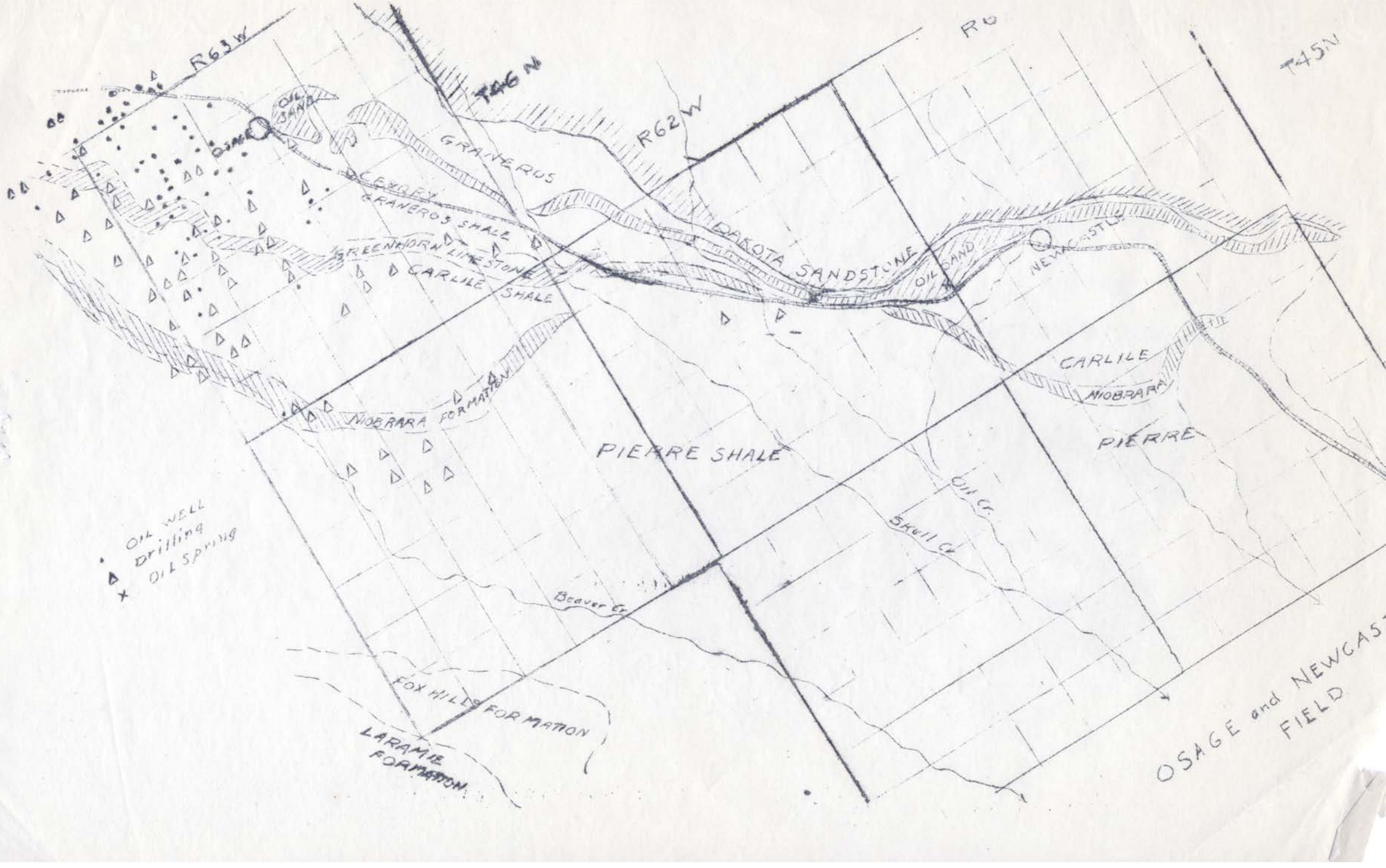
Third, lenticular sands.

Fourth, water pressure in the syncline which is sufficient to hold the oil up on the flank of the monocline but not great enough to force it out of the sand.

A combination of the first and second theories seems to fit the facts more nearly than the others. There is evidence of folding northwest of Osage and also some evidence of faulting and compacting between Osage and Newcastle. A faulted or crushed and compacted formation would tend to seal in the oil as well as a reversal in dip. It is also probably true that the water pressure on the sand is not to be compared with that in most of the other fields of the State, as for instance Lance Creek where the pressure on the oil sand is more than 1000 pounds to the square inch.

The total capacity of this field in oil production is unknown at the present time, as most of the wells are capped. There are a large number of shallow, or shale, wells which are reported to yield from 5 to 25 barrels per day on the pump. The flowing wells on Section 19 are said to have a capacity of from 250 to 300 barrels per day.

At first the field was largely prospected by the smaller wildcat companies and individual operators, but recently many of the larger companies have taken holdings and are rapidly putting down test wells. Among these are the Midwest Refining Company, the Carter Oil Company, the Ohio Oil Company, the Union Oil Company, the Producers and Refiners Corporation, the Sinclair Oil Company and others. The end of this season should see the limits of production fairly well defined in this particular district. Quite a large territory is thus being tested out and there are possibilities of other pools being developed in addition to the one near Osage. It is more reasonable to assume that there will be several oil bearing areas found paralleling the outcrop of the formations and within a certain distance thereof, rather than to assume that the contiguous country will be one solid or continuous oil field and it is not improbable that many of the deeper wells to the southwest will be outside of the limits of production. However, the prospects are very good for a real oil field and it is advantageous that much of this territory can be tested at a comparatively small drilling cost.


R63W
T46N
R62W
R6
T45N
OIL SAND
GRANEROS
GRANEROS SHALE
GREENHORN LIMESTONE
CARLILE SHALE
DAKOTA SANDSTONE
OIL SAND
NEWCASTLE
CARLILE
NIOBRARA
PIERRE
NIOBRARA FORMATION
PIERRE SHALE
OIL WELL
Drilling
OIL SPRING
Oil Cr.
Skull Cr.
Beaver Cr.
FOX HILLS FORMATION
LARAMIE FORMATION
OSAGE and NEWCASTLE FIELD