STATE OF ILLINOIS
DEPARTMENT OF REGISTRATION AND EDUCATION
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PRESS BULLETIN

July 10, 1920

OIL AND GAS PROSPECTING IN PARTS OF CLARK, COLES, EDGAR, DOUGLAS, VERMILION, AND CHAMPAIGN COUNTIES

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Although any treatment of "Trenton" structure presented at this time can be only tentative and general, to meet the insistent demand for information regarding the "Trenton" in eastern Illinois, this bulletin on the subject has been prepared. The careful working up of contours on the shallow producing sands of Clark County and tests in the very slightly prospected area farther north may change these conclusions somewhat. It must be understood that we do not imply that structures or oil will not be found outside the area described.

SOUTH OF WESTFIELD

"TRENTON" DRILLING IN PROGRESS

South of Westfield in the producing area three wells are at present drilling to the "Trenton": American Oil and Development Company, in the NW¼ Sec. 5, Parker Tp.; Ohio Oil Company on Fuller, SE¼ Sec. 5, Parker Tp.; and the Kewanee on Pinnell, SE¼ Sec. 5, Parker Tp. The Ohio well on Fuller, offsetting the Smith well, came in about the same as the Smith and Pinnell wells. The Smith has settled after nine months to 10 barrels per day; its second day's pumping was 45 barrels. The American Oil and Development Company's test found oil in a crevice in the Westfield lime at about 410 feet and pumped about 150 barrels of oil the first day. The oil decreased rapidly, and it is understood the drilling will continue.

STRUCTURE

The chief horizon used to study the "Trenton" has been the top of the "Mississippi" lime, a horizon that presents several difficulties. With the chief exception of Parker Township, few productive wells have penetrated the lime, and the logs of those that did were in most cases not detailed enough to be of use. The "Mississippi" lime rises along the anticline to the north and as very few wells go through the lime to the Devonian, it is impossible to judge accurately how much of the high lime is affected by doming

or flattening, and how much by the rise to the north. The thickening of the "Mississippi" south and the doming along the axis introduce errors which must be considered in using estimates of the depths to the "Trenton" given here on the profile.

NORTH OF PARKER TOWNSHIP

North from Parker Township, the Mississippian rises in the main. The lime phase of the Mississippian (the "Mississippi" lime) thins out but the underlying sandy shale (Kinderhook) thickens. The net result to the north is a decrease in the total thickness of Mississippian, the decrease being greatest on the highest structure. On the Smith farm, Sec. 5, Parker Tp., the Mississippian is about 780 feet thick, and on the Kite farm, Sec. 8, East Oakland Tp., it is about 480 feet thick. Lack of records through the Mississippian in Westfield Township makes it impossible as yet to judge what happens in this township. In the southern part of the township the top of the "Mississippi" lime declines quickly to the north, but whether this is a true drop in the structure or whether it is in part at least caused by the thinning of the lime is not known. Tests to the "Trenton" in the southern part of Westfield Township should be confined to the known "high lime," until tests help to demonstrate that the "Trenton" is or is not dropping as quickly as does the "Mississippi." The American Development Company's test will help in giving an understanding of this point.

PARKER TOWNSHIP AND SOUTH TO LICKING TOWNSHIP

South from Sec. 5, Parker Tp., the Mississippian thickens from about 800 feet to about 1,200 feet in southern Johnson Township, where the Chester beds begin to appear above the "Mississippi" lime. The high lime in Parker Township, as shown on the map, may represent (1) a doming in the "Trenton", (2) a flattening or marked reduction in its rise along the axis of the anticline, or (3) a combination of both, the area outlined is worthy of testing for "Trenton" but it should be noted that a thickening of the Mississippian and also on the edges a thickening below the top of the "Niagara"[1] may cause the "Trenton" to be found somewhat lower around the edges of this area than in the central portion. Whether the decline in the surface of the "Mississippi" lime to the west will be vertically over the westerly drop in the "Trenton" is not known.

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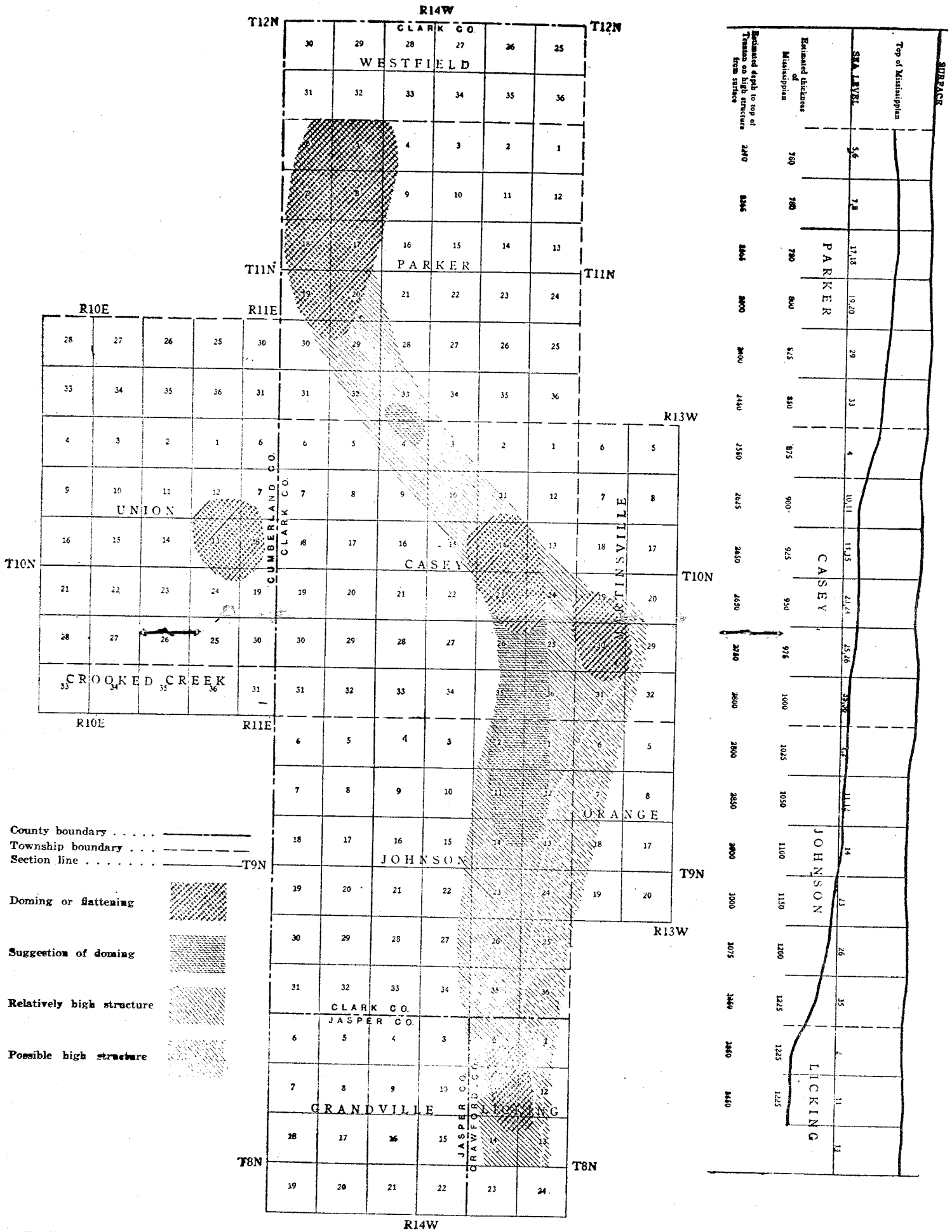
[1] The term "Niagara" as used here and throughout this press bulletin is not synonymous with the Niagaran limestone as defined geologically. It conforms with the driller's usage instead, and covers the lime immediately underlying the Devonian shale, including not only the true Niagaran but the Devonian limestone as well. Thus geologically incorrect usage of "Niagara" is retained to avoid confusion for the practical readers. With the explanation here given, geologists should not misinterpret the term but can readily read into it its correct geological meaning.

The McNary well, SE¼ Sec. 9, Parker Tp., showed an increase of about 100 feet in the interval from the top of the "Niagara" to the "Trenton", and the Lula Shover well, Sec. 1, Casey Tp., showed approximately this same increase. This indicates that the "Trenton" falls off quicker to the east than do the overlying formations, and on this account the dips in the latter should be carefully noted.

With these different influences, it is important to know how far down the dip the "Trenton" with its 130 feet of "sand" will prove profitable. Definite information on this point will be available only when more wells are drilled, but some suggestion is to be found in the fact that in the McNary well, in Sec. 9, Parker Tp., the "Trenton" lay over 100 feet lower and yet had a good showing of oil but drilled into water. A drop in the "Trenton" of 15 to 25 feet may not affect production. Within limits the porosity of the "Trenton" may have a greater effect than the elevation, and the direction of the biggest wells may follow a line of greater porosity. However, big drops in the "Trenton" are to be avoided. The O. N. Smith well found the "Trenton" only 8 feet higher than the K. and E. Young No. 84, one-half mile southeast. The Ed Pinnell well about one mile east, SE¼ Sec. 6, found the "Trenton" at the same elevation as the Smith. The Kewanee's Pinnell well had the "Trenton" about 10 feet lower and the Fuller several feet lower. This shows a doming of the "Trenton" and besides Sec. 5, where the wells are moving a location at a time, the SE.¼ Sec. 6, E.½ Sec. 7, N.½ and SW.¼ Sec. 8, E.½ Sec. 18, and W.½ Sec. 17 constitute a favorable area for "Trenton" testing. In Secs. 19 and 20 and on the edges of the area, it would be safest to expect some thickening of the Mississippian and on the east at least some thickening of the "Niagara."

Farther south in Secs. 28 and 29, although the records do not give accurate information as to the behavior of the Mississippian, indications are that it falls rapidly. In Secs. 32 and 33, Parker Tp., and Secs. 3 and 4, Casey Tp., detailed work may show a small area of flattening on the pitch of the anticline. From here south to Secs. 14 and 15, Casey Tp., there seems to be a continuance of the quick drop in the "Mississippi" lime. Here the lime indicates another flattening along the axis of the anticline, more marked as far south as Sec. 26, Casey Tp., than it is from Sec. 26, Casey Tp., to Sec. 14, Johnson Tp. In Martinsville Township in Secs. 19 and 30, and parts of 20 and 29, the lime is as high as or higher than the lime in Secs. 23, 26, and 35, Casey Tp., but what happens to the lime in Secs. 24, 25, and 36, Casey Tp., can not be determined from available logs. However, all these sections are worthy of



Preliminary map of part of Clark and adjoining counties, showing the location of favorable structure and including a profile of the top of the "Mississippi" lime with estimates of the depths to the "Trenton."

consideration. South from Sec. 31, Martinsville Tp., there is nothing to indicate how the lime is running, but in Orange Tp., Secs. 6, 7, 18, 19, 30, and 31, it may be relatively high. South from Sec. 14, Johnson Tp., no data are at hand to show any flattening of the pitch until Sec. 2, Licking Tp., is reached. Here the lime has dropped to about 360 feet below sea level. In the S.½ Sec. 2, E.½ Sec. 11, and parts of Sec. 12 and 14, there are indications of doming.

In Casey and northern Johnson townships very few wells went into the "Mississippi" lime, and in southern Johnson and Licking townships the coming in of the Chester with its alternating beds of limestone and shale 15 to 25 feet thick makes it difficult to interpret the available records.

UNION TOWNSHIP

The top of the "Mississippi" lime is about 200 feet lower in the Siggins pool than the highest structure east in Casey Township, but there is a distinct doming here in the shallow formations, and a test could be started with reasonable assurance of finding a similar structure in the "Trenton." Not only is the top of the "Mississippi" lime lower, but the Mississippian has thickened to nearly 1,100 feet. The Devonian has thickened slightly. A test in the NE.¼ Sec. 13, or NW.¼ Sec. 18, Union Tp., would reach the "Trenton" at approximately 3,000 feet.

CRAWFORD COUNTY

Mr. H. B. Zahniser of Robinson organized about thirty of the leading producers of this State to drill a test to the "Trenton" in Crawford County. The well is now about 2,300 feet deep and is at present reaming to place the 8-inch casing at that depth. The lower 1,000 feet of 8-inch to be used is 30-pound casing. This test reached the "Mississippi" lime at about 1,410 and will probably not reach the top of the "Trenton" until about 3,900 feet. At completion the well should be over 4,000 feet deep and will be, it is believed, the deepest oil test in Illinois to date. Samples from every screw are being kept.

NORTH OF WESTFIELD

PRESENT DRILLING

F. J. Casey is drilling on Gwinn, Sec. 35, T. 15 N., R. 10 E., and the Louillo Oil Company is starting the Kite No. 2 well, Sec. 8, T. 14 N., R. 14 W., both to the "Niagara"; the comunity well is drilling in Sec. 17, T. 14 N., R. 14 W.; Harrison et al on Hawkins Sec. 29, T. 14 N., R 14 W.; the Empire Oil Company in Sec. 5, T. 12 N.; and Paul Davis in Sec. 13, T. 12 N., R 14 W., all to the "Trenton." After the publication of their core test results at Oakland, the Louillo Oil Company have reserved further information for the present.

STRUCTURE

The Kite No. 1 test (curb elevation 661) SE.¼ Sec. 8, T. 14 N., R. 14 W., found the "Niagara" at 867 feet. The Empire test (curb elevation 705) SW.¼ Sec. 5, T. 12 N., R. 14 W., reached the "Niagara" at 1,195. These tests, with the Hackett diamond-drill test mentioned in a previous Press Bulletin, indicate that a zone about two miles wide east and west deserves testing from Westfield north. A line passing through the center of Sec. 8, T. 14 N., R. 14 W., and the center of Sec. 20, T. 12 N., R. 14 W., will serve as an approximate guide for the time being. It would seem at present that more of the highest structure is to be expected east than west of this line. That a doming or flattening of the pitch occurs east of Oakland has been strongly indicated. The high structure as shown on the accompanying map for Clark County, illustrates the type of variations that may be expected in the distribution of any domes in the territory north of Clark County.

The Empire test, which is expected to drill in about July 8, found the "chocolate" shale and the "Niagara" about 30 feet higher than did the Smith well, Sec. 5, Parker Tp. Although the formations might be expected somewhat higher this far north, the test is nevertheless well located for a first test considering the distance from the Westfield production. The Kite No. 1, Sec. 8, T. 14 N., R. 14 W., which reached the "Niagara" at 867 feet made a splendid show of oil from the porous dolomite discovered in the Hackett diamond-drill core, as described in our last Press Bulletin. However, water was found with the oil and outside of suggesting strongly that this horizon will prove productive elsewhere, the test was negative for the "Niagara" at that location, as it has not been possible to discover if the water encountered can be properly handled. From a recent core which penetrated below this porous dolomite, Dr. T. E. Savage has identified the following fossils: *Cyathophyllum rugosum, Cladopora expatiata, Spirifer varicosus,* and *Proetus crassimarginatus.* These are Onondaga fossils, and as they occur immediately below the dolomite, our top (namely, the Devonian) lime in the "Niagara"[1] is specifically Onondaga (Corniferous) instead of Hamilton as supposed previously. Contrary to previous ideas, we have little or no Hamilton in this section of Illinois. This occurrence of oil in dolomite is of special interest. The oil-producing horizon corresponds to that at Terre Haute, Indiana, where it was found necessary to handle great quantities of water

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to recover the oil. Nowhere else in Illinois has a considerable amount of oil shown at this horizon, and the mere fact of an accumulation, whether or not it results in production, would indicate a doming or flattening such as would offer a good chance in the "Trenton" for the locality. The top of the "Trenton" at the Kite No. 1 would be reached about 1,900 feet. At the Smith, Sec. 5, Parker Tp., (curb elevation 662), it was reached at 2,266. If the community well now drilling in Sec. 17, T. 14 N., R. 14 W., reaches the "Trenton" much below 1,900, it should not be considered as a conclusive test.

It does not look at all likely that the anticline shown at Oakland can join up with the high structure which runs northwestward from a point east of Tuscola, passing near Pesotum and between Tolono and Sadorus. In that case it will never reach LaSalle, where the LaSalle anticline outcrops. Whether it continues north, northeast, or northwest from Sec. 8, T. 14 N., R. 14 W., and whether its magnitude will diminish as it goes north, and how a decrease in its magnitude would affect oil production, all remain to be discovered. At present the general trend would be expected to be east of north.

The triangle, Tuscola-Westfield-Oakland, is a puzzle. The following suggestion is made and should be treated very conservatively especially until field work or tests prove or disprove the idea. The structure running near Pesotum, east of Tuscola, may carry on to the south and join up with the Siggins pool in Union Township, Cumberland County. If such should be the case only where a doming occurs along this zone would one expect oil production. The evidence on this point at present is too slight to warrant anything but very conservative testing.

It looks at present as if these two anticlines may inclose a wedge within which the formations lie somewhat higher than do those outside the wedge. Within the wedge this might be expected to create a zone of influence, the effect of which may be more marked in the Pennsylvanian sands than in the deeper formations. There are of course possibilities for minor structures to all depths, but these can be located only by drilling and keeping detailed logs. As the Pennsylvanian sands give shows of oil over a large area, they should be expected to be productive in places on and near the major structures bounding and within the wedge, but until these are more clearly defined, the area of possibility for shallow pay is difficult to restrict, and testing should be very conservative.

The shallow test at Longview found two sands, 275-287, and 320-335. The discussion above on shallow production applies in this locality.