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NOTES ON A CORE BIT FOR CABLE TOOLS

By Gail F. Moulton

A core bit manufactured by the Keystone Driller Company, Joplin, Missouri, was used on a cable tool drilling stem to drill in the Eastern Gulf Company, No. 2 well on the Cisel Heirs farm in sec. 2, Wabash Twp., Wabash County. The core bit was substituted for the regular bit and run by Mr. Leavitt Gray, drilling contractor. About one foot of new hole was made in 50 minutes on the first run. The drilling rate on the second run was a little greater.

The trial of the core bit demonstrated that coring is a feasible and practical method of getting additional information. It also appears that once the drillers have become familiar with the technique of operating the core bit, the time required for drilling a well in will not be increased more than 100 per cent.

A core of the producing sand is valuable to the operator because of the assistance which it gives in the proper management of each well. The core taken from the Cisel Heirs, No. 2 well revealed that some of the sand drilled was non-productive. It also showed the character and thickness of the best producing parts of the sand. The fact that a little water was coming into the well from a sand below the casing would have caused considerable worry under usual conditions, but the core showed that the well was not being drilled into water.

A laboratory test on the core would indicate the oil content of the sand and would form a basis for computation of total oil content in barrels per acre. Later in the life of the well, such data could be used to determine the percentage of oil recovery and the advisability of applying methods

for increasing oil recovery. Information concerning the distribution of the best oil producing streaks in the sand would also serve in choosing the method of increasing recovery best adapted to local conditions.

The core taken from the Gulf well showed the condition of sorting of the sand, the porosity, the type of stratification, and the character of the grains of sand. The conditions of deposition of the sand can be determined to a considerable extent from such information, and the history of local changes fairly well interpreted.

The geologic information obtained from the core has a greater value than is immediately apparent, particularly if further coring of this sand is undertaken in the vicinity. The knowledge of depositional conditions, which are of the ocean beach type, indicates that the sand is probably present for more than the usual location distance in any direction, but that it would be found to have a very great extent parallel to the direction of the old shore line. A few additional cores should serve to indicate the shore line trend, the location and trend of the zone of maximum oil production and the probable total oil content of the sand. It should be possible not only to avoid drilling dry holes, but also to avoid drilling small wells on locations outside the best productive zone by use of cores.

In an area of numerous irregular sand lenses which occur promiscuously in a general zone of sand deposition, as is the case of the Biehl sand in the Allendale field, the determination of structure on the basis of sand correlation is both difficult and unsatisfactory. The reported occurrence of a few fossils in the shale overlying the Biehl sand suggests the presence of a fossil zone which could be recognized in cores. If such a zone could be located, it would be possible to determine the structure easily and accurately and to guide further prospecting, particularly in deeper sands, with much more assurance than is now possible.

In view of the slight additional cost of core drilling the producing zone, or zones useful in determining structure, and because of the valuable information to be obtained from the core which cannot be obtained in any other way, there is a decided economic advantage to be gained from coring.

The Illinois State Geological Survey will be glad to extend its present free service of sample study to include the examination and interpretation of cores so that the operators may have the immediate benefits to be derived from these additional data.

Thanks are due the Keystone Driller Company for their courtesy in lending the core bit equipment and also for sending Mr. Veclair C. Smith of their engineering staff to explain the use of the bit. The test was made possible, also, through the kindness of the Eastern Gulf Company and Leavitt Gray, drilling contractor. The efforts of J. E. Young, Jr. and J. W. Whiteside in furthering the project are also appreciated.

PROSPECTING FOR HOING SAND OIL POOLS

By Gail F. Moulton and J. Marvin Weller

In general, the oil pools of Illinois have accumulated on the high portions of anticlinal or dome structures. Irregularities in sand conditions have modified this occurrence considerably so that the structure of the rocks due to folding does not have complete control of the conditions. In general, the more irregular the sand, the greater the variation from simple structural control of oil accumulation. This relation is clearly shown by a comparison of conditions of accumulation of petroleum in different parts of Illinois. In Lawrence County, the presence of several productive sands practically insures production from one or more in a favorable structure. In the present development in Wabash County, the production has been found to be restricted to those portions of the favorable structures in which the erratic producing sand occurs. The Hoing sand production of western Illinois is even more irregular because its occurrence is more uncertain. The development of the Plymouth-Colmar area showed that the greater part of the production was found on a slight terrace on the side of the main dome because of the more favorable occurrence of the Hoing sand at that point.

In view of the present interest in oil development in the Hoing sand areas in western Illinois and of the difficulties attendant on prospecting in that area, some suggestions which may aid development are presented here.

From a geological point of view, the prospecting should be undertaken in three different types of areas. The best areas are those in which structures of promise are known in the surface rocks located near wells which have found the Hoing sand carrying water in unfavorable structural locations. In such areas, prospecting should be begun near the top of the structure on the side toward the test showing the presence of the Hoing sand. If the first test fails to find the Hoing sand, others should be drilled down the slope of the structure toward the well where the Hoing sand was found. If the first test finds oil and water in the Hoing sand, an attempt should be made to locate a test higher on the structure.

A second class of areas for prospecting are those in the vicinity of old wells in which a showing of oil with a considerable amount of water was found in the Hoing sand, and for which little is known regarding the structure of the upper rocks. In such areas, good results should be obtained by drilling up the dip from the earlier well. Unless there is evidence to show the direction of the dip, it should be assumed to be east and the new well located west of the first one.

A third class of areas for prospecting are those for which a favorable structure has been determined in the upper rocks but one where the sand con-

ditions of the Hoing horizon are completely unknown. In such areas, it is recommended that drilling be started on the high part of the structure. Current ideas indicate that the presence of the sand is determined by conditions which are independent of the present structure and as the highest parts of the structures would be the most favorable in the case of continuous sands, it is believed that they deserve the first test in areas for which sand conditions are unknown.

In order to insure the best results in prospecting, the operators should be guided largely by the plans of prospecting recommended in this paper, for such a logical procedure governed by the available information should insure more than average success.

RECENT PETROLEUM DEVELOPMENTS IN ILLINOIS

By Gail F. Moulton

SOUTHEASTERN FIELDS

The principal developments in the southeastern fields during the first four-month period of 1926 were in Clark and Wabash counties. Activities in Clark County consisted principally of deepening the old wells from the Carper sand at 1400 feet to the Devonian-Silurian lime at 1600 feet. Very great activity has begun in this area with the return of good weather.

In Wabash County a considerable number of wells have been completed with about the usual percentage of dry holes. The most important developments may be briefly sketched. Chas. Forman and others found a new deep sand about 225 feet below the Biehl sand in their first well on the Cisel Heirs farm in sec. 1, Wabash Twp. Henly and others got a well on the Robert Yelton farm in sec. 5, Friendsville Twp., which is slightly to the northwest of other production. Miller and others drilled in a well on the Ezra Bass farm in sec. 19, Friendsville Twp., which opened a new producing area where prospecting had been recommended by the State Geological Survey,¹ and since that time six producers averaging about 45 barrels each have been completed. An unverified report was current recently in Allendale, that Alspaugh and others had a good showing of oil in their well on the R. R. Little farm in sec. 27, Friendsville Twp. This well is an outside wildcat which would arouse interest in a large territory if it proved productive.

In Lawrence County, three tests of particular interest are being drilled. A well north of Bridgeport is reported to have been started with the purpose of making a deep test to the Trenton. This report has not been verified, but if true, the well should give very valuable information. Hartmann and others are starting a deep test on the A. J. Vaught farm in sec. 3, Russell Twp., Lawrence County. This well will be drilled to the McClosky horizon in the hope of getting production there. Phipps and Blosser completed a dry hole on the J. N. Armstrong farm in sec. 25, Dennison Twp. Smith, Andrews, and others are drilling a deep test on the Ella Smith farm in sec. 27, Dennison Twp.

CENTRAL ILLINOIS

In the Centralia district, the James Oil Company is shutting off water in its Fanny McIntosh, No. 4 well in sec. 4, Centralia Twp., Marion County, and is preparing to drill into a deep sand at 1710 feet. The Ohio Oil Company has rigged up for two wells on their adjoining property to the east.

¹ Moulton, Gail F., Further contributions to the geology of the Allendale oil field, with a revised structure map; Ill. State Geol. Survey Rpt. Inv. No. 7, 1925.

In the Sandoval pool, there is one deep test being drilled on the northwest side of the producing area. Two rigs are working in the Womac pool south of Centralia.

In Bond County, leases have been taken on the area recommended for prospecting by the Illinois State Geological Survey.² It is probable that this interesting area will be tested in the near future.

WESTERN ILLINOIS

The coming year promises to be a busy one in the vicinity of Macomb in northwestern Illinois. It is reported that W. A. Evans is drilling a well on the Neil Thorson farm just north of Augusta. Mr. Fisher is starting a test on the M. H. Williams farm in sec. 18, T. 4 N., R. 4 W., just south of Colmar.

It is reported, also, that the Ohio Oil Company and W. S. Bacon started a well on the C. B. Allison farm in sec. 22, T. 5 N., R. 4 W., on what is known as the Tennessee structure. Three tests are planned for this structure. Mr. Harve Woods has leased a block of acreage between Burnside and Carthage in Hancock County and plans to drill a test. H. M. Hainline and F. G. McClelland have been leasing in the vicinity of the Sciota dome² and contemplate drilling a test there. Rose and Lyberger are planning to drill some tests north of New Philadelphia in sec. 23, T. 6 N., R. 1 W.

SOUTHWESTERN ILLINOIS

In southwestern Illinois there is considerable activity in the vicinity of Sparta. Most of the acreage recommended for prospecting in the first number of *Illinois Petroleum* has been leased up and new developments will start soon. E. G. Mason moved his rig into the central part of sec. 1, T. 4 S., R. 6 W., near Tilden for a second test. The first well was abandoned at 1240 feet. The well on the Foster farm is drilling at 700 feet after being held up for some time by a bad fishing job. This test should be completed within a short time.

FUTURE PROSPECTS

The coming summer promises to be a time of great activity in oil prospecting in Illinois, particularly in central and western Illinois. If the greater part of this drilling is done on a geologic basis, new pools should be opened up or large areas in western Illinois condemned.

² Moulton, Gail P., Proper testing for oil structures in Illinois and some areas deserving such testing; Ill. State Geol. Survey Rept. Inv. No. 6, 1925.