XXXIX. CAN WE CLASSIFY THE METHODS BY WHICH OIL FIELDS HAVE BEEN DISCOVERED?

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An attempt at a classification of petroleum deposits according to how they have been discovered is unusual but nevertheless perhaps interesting. The occassion for this paper is a classification proposed by Dr. C. N. Gould. The proposal of a classification, whether geologic or non-geologic appeared to me, at first, as being an attempt at a justification of the purely techincally trained man.

In attempting to classify circumstances responsible for the discovery of various "oil fields" or "pools", geologic or non-geologic, consideration must be given to a human being, namely, man. The element man can be grouped as to developed intelligence into two divisions, the one group consisting of those who have a technical foundation and training and the other group lacking the scholastic training, but often having much practical experience. Both groups by application have developed the sense of comparison and inference.

A strictly geological discovery may have come about as a result of a few or of a number of geological conditions familiar to the profession. Claim for individual recognition, on the part of a geologist, for the discovery of an area of production would necessitate evidence showing that the discovery was based on an interpretation resulting from information of the following character:—

A knowledge of Regional Conditions, or

A knowledge of specific local conditions as to surface structure and sedimentary conditions.

In presenting a classification, if intended for the public, due credit should be given to those whose aim is strictly a geologic interpretation and also to those who have reasoned along the very simplest geological lines. If a classification is to be attempted it should be specific. I can best illustrate my point by concrete examples, which may serve as a suggestion.

The Big Lake Pool in Reagan County, Texas, is an example in the first place of an interpretation of a regional geologic problem. The regional aspect is based on the location of the axis of the Marathon fold. This was called to the public's attention by the Bureau of Economic Geology and Technology of the University of Texas long before any actual development. The actual discovery of the oil in the area in which it was found cannot be attached to

any specific report on the immediate territory. The discovery of oil must be credited to the venturesome wildcatter, who saw in this instance principally a large block of land covered by a single lease. Further in this case the particular block of land was selected, because of its location near the supposed trend of the fold mentioned.

Here then the classification may be thus:—

General regional geologic interpretation—Big Lake Pool.
Specific geologic recommendation—None.
Wildcat drilling venture—Big Lake Pool.

Let us then consider the Westbrook Pool in Mitchell County, Texas. At the time this test was started no definite geologic evidence of a favorable regional situation was known. Direct and specific information with reference to the surface geology in and around the area of the proposed test at the time the drilling was started, was lacking. Nevertheless the venturesome spirit of the "wildcatter" on a large block of acreage prevailed. The result was a small producer in an upper horizon and at a later date in a lower horizon. So here the case was as below:—

General regional geologic interpretation—None.
Specific geologic recommendation—None.
Wildcat dirlling venture—Westbrook Pool.

Claims to recognition in the discovery of "new fields" or "pools" by the non-technically trained group are, of course, based on more simple grounds. Geographical similarities are sometimes taken into consideration. They have a method of making inferences from comparisons. It is not unusual for this group to compare the lay of the surface rocks in a new region to that in a known producing area. They make comparisons of the results of drilling, knowing certain horizons to be more or less constant. They often make use of relative elevations of tests that have been drilled and in their way correlate horizons and infer that such a condition might exist.

But the methods employed by the two groups are in many ways similar. Their interpretations may differ. One group is schooled in the theory, the other in actual experience.

Can such abroad classification as a geologic or a non-geologic discovery be established. Many geologists would claim credit for all of the development on a plea that that success has attended venture made in places where regional geologic conditions were known to be favorable. The trite expression has often been heard, after production has been obtained in some new place, that the geologists regarded the "region as a territory worth considering".

Again, have not a number of fields been discovered by persons,

who have been solely interested in the results of actual drilling? For instance: by comparison of this sand with that sand, this lime with that limestone, from relative elevations of wells, drillers, contractors and other non-technical men may have concluded that another test was justified. This character of a conclusions may have lead to the opening up of new territory. This is also geology, although the underlying principles of geology may not be fully understood. Have not even competent geologists resorted to this mode of attack where there has been little other geologic information available?

To attribute all of the development in the Ranger Pool, Eastland County, Texas, that followed the original discovery well, namely, the McClesky test "without geology" would hardly be fair to either the geologist or the wildcatter. The original McClesky test would have to be credited in the following manner:—

General regional geologic interpretation—None.
Specific geologic recommendation—None.
Wildcat drilling venture—McClesky test.

Subsequent developments in many instances, and likewise failures, no doubt can be attributed to specific recommendations. It would be a big task to trace the actual history of the initial well development in the numerous pools that have been discovered. I have in mind an instance in my own experience in Young County, Texas, when associated with the geological department of the Sinclair Oil and Gas Company. The geological department detailed a certain area in which the company held some leases that would soon expire. A favorable structural condition was found, the regional geology was favorable, sedimentation conditions, especially relating to the producing sands, were known to be erratic, as indicated by previous drilling in the area. A favorable recommendation was made. The result was the completion of one of the outstanding wells in Young county. In other words this test turned out to be a perfect geologic interpretation. This example might be classified as follows:—

General regional geologic interpretation—Moren production.
Specific geologic recommendation—Moren production.
Specific sedimentation recommendation—Doubtfull.
Wildcat drilling venture—None.

A combination of efforts might be considered. If my recollection serves me rightly, the Luling field, in so far as the first two or three tests were the efforts primarily of wildcat drilling. As far as I know there were no specific recommendations. However

regionally it was considered as territory worthy of consideration and drilling in so far as the Taylor-Navarro group of sediments were concerned. This inference was made from the development to the south of San Antonio, in Bexar county, Texas. Geology became important in this area when it was observed that there existed some faulting. A comparison with conditions in the vicinity of Mexia was made. Latter on it was determiend that the production was being obtained from a horizon entirely new to Texas namely, from the Edwards limestone, Comanchean Cretaceous. Closer observations were made and new light was thrown on the manner in which accumulation had taken place and the probable causes for this acculation. My inclination in this instance would be to credit wildcating with the original discovery of the possibility of production and subsequent successful development to geology and engineering.

Another example of which I am familiar and which can be analized is in T. 1 N., Rs. 8 and 9 W., Stephens County, Oklahoma. The original Parson-Gant test in sec. 32, T. 1 N., R. 8 W., came in as a gas well. This gas well was the forerunner of some very intensive drilling. My impression is that the geologists considered the area regionally prospective, but the original test was not drilled on any specific recommendations. Further, the region was one in which geologists believed that sedimentation was erratic so far as sand conditions were concerned. The original test would have to be credited to wildcat drilling venture.

There is still another phase in the whole situation that must be considered if a classification is attempted, namely, where shallow production is known but conditions below developed production is not known. This side of the question can also best be illustrated by a few examples.

The situation in the Tonkawa Pool, in Kay and Noble counties, Oklahoma, might serve as an example. It can be said at the outset that the area regionally was recommended.* Specific recommendations were doubtful. **This is very aptly illustrated by the character of the geological map*** which was prepared previous to the drilling of the successful, the School land No. 1 in the northeast corner of sec. 16, T. 24 N., R 1 W. It is a moral certainty that no specific

*Okla. Geol. Surv., Bull. no. 19, pp. 342-344 and map, plate XXVIII. April, 1917.

**Bull. Amer. Assoc. Petrol. Geol., vol. 8, no. 3, p. 171, under title "Structure." 1924.

***Bull. Amer. Assoc. Petrol. Geol., vol. 8, no. 3, p. 273. 1924.

recommendation could have been made on the surface geology. It is equality true that without the information available from the tests that had been drilled in the general vicinity, starting as early as 1918, that it would have been impossible to construct even a map with hypothetical contours. This early drilling coupled with the surface geology available indicated the possible occurrence of a structural feature in the area. With the drilling of the successful well additional information became available. The drilling that followed kept establishing with greater certainty the position of the expected production. It is very probable that the actual discovery well of the area as a whole, in so far as it is considered one structure, would have to be the first producing well completed at the extreme southwest end of the general structure. This probably represents the conditions so far as the upper pay horizons were concerned.

What could be expected at a greater depth?* There were diverse opinions but I dare say none were too optimistic about deeper production.** It was through the efforts of T. B. Slick, who on his lease decided to explore or in other words wildcat in a proven territory for deeper production. The result was the opening up of an unusually productive horizon. Here then you might consider a dual relation. The success of the new development must be credited to wildcat drilling venture in an area of developed production.

Again the so called Turkey Mountain, Country Club or Hominey production has proven elusive to both geologists and wildcatters. There is no question but that the finding of a large number of the geologists and again a fair number can be enumerated to the credit of others than geologists. The most striking one being that of West, Smith and Obins in sec. 1, T. 18 N., R. 12 E., Shallow production had been known for along time but no venture had ever been made towards obtaining deeper production. Before adandoning the lease a well was drilled to a greater depth than of the previous attempts. In this instance the wildcatter in shallow territory was rewarded.

A great number of other illustrations could be cited but I believe that these will suffice to bring out my point about distributing the credit for the initial venture in oil finding. A classification of all successful ventures would involve the history of the initial test. The classification could not be arbitrarily geologic and non-

*Bull. Amer. Assoc. Petrol. Geol., vol. 8, no. 3, p. 291, 1924.
**p. 291. Footnote by "Editor." Same as above.

geologic. In many instances the initial test history would show a dovetailing of the efforts of the two groups of searchers for new petroleum deposits.

In conclusion, when a problem of this nature is attempted and placed before the public consisting of drillers, contractors, non-technical men, students and technical men, who are interested in the problem of obtaining production the idea should prevail that:

Each group has its own way of interpreting data.

Both wildcatters and geologists have achieved success and likewise failures.

The future calls for a combination of all efforts.

Success demands harmony between the two groups.

Classification of efforts never did produce petroleum and never will.

Competition is one cause of successes registered.