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# GEOLOGICAL REPORT

## THE KNEELAND PROSPECT

The producing well in Sec. 14, T34S, R31W, Seward County, Kansas, northwest of this proposed prospect location, is in the "Kneeland" field. To the southeast of the prospect is the "Kneeland East" field.

In these fields there has been production of gas and/or oil from seven different productive intervals. The relative depths of these producing zones range from approximately 3,000 feet to approximately 6,000 feet.

The surface elevation varies rapidly in this subject area. This is due to the nearness of the Cimarron River. Erosion and lowering of surface elevation has occurred.

The minor amount of structural relief displayed on the attached structure maps is an explanation of the varying amount of interest the numerous different companies and individuals have had for lease acreage in this area. Possible interpretations of the varying amounts of information available for the well location described in this area are numerous.

As will be noted in the subject contour maps, there is a common sized structural feature displayed in the east side of Sec. 23 and the west side of Sec. 24, T34S, R31W. The similarity of this feature to that in Sec. 25, to the southeast, and that in Sec. 14 to the northwest is pointed out.

This prospect includes washing down and setting pipe on the abandoned hole in NE/4 SW/4 Sec. 24 as well as drilling of an exploratory well located at SW/4 NW/4 Sec. 24, T34S, R31W, Seward County, Kansas.

Following are explanations of these two proposals.

### Washdown Prospect Intervals

Four potential intervals of interest existing in the abandoned well, the Keating "A"-1, drilled by the Anadarko Production Company in 1970 in the NE/4 SW/4 Sec. 24 are discussed hereafter:

## KEATING ZONE

This productive interval is at 5,344 feet in the #1-24 Keating hole. It was productive at 5342 feet in the #1-23 Kneeland well in NE NE Sec. 23 drilled in 1950. This well pro-produced 12,726 bbls. of oil from the Keating interval.

This interval calculates to be productive on the electric log of the #1-24 Keating well. A DST over the zone, 5294'-5361' reported GTS/3 minutes, reported at that time as TSTM, (which presently would be reported in the actual amount of gas flow), plus a recovery of 180 feet of O & G CDM, (reportedly 10% oil).

ISIP 1032/40 min.
IFP 23-46
FFP 92-72
FSIP 940/40 min.

This is an example of how evaluation of potential zones of interest has been changed completely by the presently higher value of crude oil and natural gas.

## MARMATON FORMATION

At the top of this formation, in the dry hole in Sec. 24, is a zone of thin but apparently well developed porosity in the Marmaton limestone. By evaluation of the subject interval thru calculations of the electric logs of the drilled formation, the interval is shown to be encouragingly low as to the content of salt water. The actual calculations are: porosity 18%, saturation 23% S.W.

One oil well presently producing from this upper portion of the Marmaton formation is our #1-17 Adams well in Sec. 17-T35S-R30W, Meade County. This well was developed by our washing down the abandoned dry hole and completing it by perforating the upper Marmaton zone. Calculations of the electric logs of this well are: porosity 14%, saturation 29% S.W. These values are not as encouraging as are those shown above from the #1 Keating abandoned well in NE SW Sec. 24. A drill stem test was conducted on the subject porosity zone in the Sec. 24 well after drilling the formation to no more than four feet below the porous interval. The DST was as follows:

DST #2, 4960'-5000'
Initial tool opening/10 minutes, = 23#-23# pressure
ISIP/40 minutes, = 46# pressure
Final tool opening/40 minutes, = 23#-23# pressure
FSIP/40 minutes, = 206# pressure
Recovered from test was 60' VSO & GCM

These results do not agree at all with the presentation of encouragement given by the interpretation of the electric log of this well. Due to the nature of this productive interval and the satisfying appearance of the two types of porosity evaluation logs run on

this well which indicate good permiability in the porous zone, I am inclined to believe that the DST was not showing a true evaluation of the zone. It is believed that the true productive nature of this small interval was being "held back" by the presence of "lost circulation" material in the drilling mud system. By drilling to no more than 4 feet below the porous interval and then circulating to prepare the mud system for running the DST, the zone was almost completely withheld from allowing the flow of hydrocarbon material through the subject rocks.

This same little 3 foot porous formation in our #1-17 Adams well produced a total of 8,000 bbls. of oil in its first 15 months which amounts to an average of 17.8 BOPD. At the current price paid for such oil, the gross value of 8,000 bbls. of oil is approximately $288,000.00.

## MORROW FORMATION

The lower Morrow sand interval in the abandoned Keating zone oil well in NE NE Sec. 23, northwest of the Kneeland prospect, would have been gas productive if completion of the gas bearing sand interval would have been attempted. Production pipe was set some 220 feet above the potentially productive gas zone in this well. At the time of drilling this well, 1950, there was very little interest in attempting to complete wells as gas producers. On the original completion card of this well there was no detailed information concerning the drillstem tests run on the well. The DST did report only that the DST ran at 5,551 feet to 5,621 feet, for a time of 1 hour, recovered 40 feet of gassy mud. At that time, no descriptive display of the volume of gas was given on such completion cards, unless the calculated flow was of a million or more cubic feet per day. This was largely because the lack of interest was so great that no operator ever required measurement of gas volume of relatively small amounts.

When the #1 Keating A well in NE SW Sec. 24 was drilled, 1970, the recording of detailed information gained from drilling wells, and running drillstem tests, was much more common. After drilling this well to a total depth of 6,105 feet and logging the well, a drillstem test, of a long interval, 5510 feet to total depth at 6105 feet, was run. Due to the increased interest, as well as some increased intelligence of the operating companies, at this 20 year later time, the more exact volume of gas recovered while running this DST was accurately reported on a very fine completion card. The report reads:

> DST #5, 5510'-6105', test open 10 minutes, test shut in 40 minutes. test reopened 40 minutes. Gas to surface in 10 minutes, gas gauged 34 MCFGPD in 20 minutes, 49 MCFGPD in 30 minutes, 53 MCFGPD in 40 minutes. Fluid recovery on the DST was 280' of heavilly gas cut mud. The final bottomhole pressure on this test was 1550 lbs.

A DST of this caliber at the present time would lead to production pipe setting.

## MISSISSIPPIAN CHESTER FORMATION

There are several potential zones of interest existing in the logs of the Chester interval in the Keating #1-A well These zones should be first tested through the production pipe set on this well. The subject intervals appear very similar to those of our recent discovery made in the #1-26 Thompson well.

The structural contour of the subject Chester intervals are very similar to the display shown on the following Ste. Genevieve Formation map.

## Additional Prospect Intervals in the New Well

### COUNCIL GROVE

In this prospect there will be two potentially gas bearing Council Grove intervals - the "Iris Black" zone and the "Finney" zone.

The J. H. Huber corporation #1 Iris well located in SE SW Sec. 11-34S-31W was completed in 1962. This well's initial potential was 8,800 MCFGPD from the Council Grove formation perforated at 3,024 feet. In the same section, but a different location, NW NE Sec. 11, the #1 Gene Black well was completed by Venus Oil Company in 1970. This #1 Black, perforated at 3,106 - 3,110 feet, was completed from this same portion of the Council Grove formation with an initial potential of 3,200 MCFGPD. Both of these wells have now been abandoned. The total amount of gas from each well was not very profitable during the time of their production. However, at the present day price paid for natural gas, i.e. $2.40 per MCF, the #1 Iris well in Sec. 11 produced a net amount of $294,000.00 for working interest owners while the #1 Black well produced a total of $399,000.00 to the working interest owners.

Due to the obvious differences in development of the Council Grove formation in approximately 100 feet above and 300 feet below the "Iris Black" interval displayed by the electric logs of the two subject gas wells, it is my personal geological opinion that they are located on different structural features. The opposite of this opinion is gained by comparing the electric logs of the same subject intervals between the two wells in NE NE Sec. 23 and NE SW Sec. 24. Here the similarity of the electric log features of these two wells supports the thought of the existence of a higher structural feature between the two wells. Drilling a test well at the proposed location finding the Council Grove formation at a higher structural elevation should result in a satisfying gas well.

## LANSING "A" ZONE

The oilwells in Sec. 25 are the structurally highest Lansing "A" zone producing wells in the "Kneeland East" field. As can be seen by looking at the indications of porosity thickness in each of the producing wells, as well as dry holes to the northwest without porosity, there are no more Lansing "A" zone oil wells continuing on to the northwest from Sec. 25. The structural contour of the feature bearing the Lansing producing wells in Sec. 25 is shown somewhat similar to the feature described as being in Sections 23 and 24 as well as that shown in Sec. 14 to the northwest.

The Lansing is not expected to be productive at the proposed location of the Kneeland prospect. However, the structural features of the Lansing "A" zone indicate the structure of the underlying Kansas City formation in this general area.

## KANSAS CITY FORMATION

Some 400 feet above the Marmaton formation is the notable Dewey zone of the Kansas City age. No contour map of this interval is herein presented.

The Dewey is the second zone of the Kansas City formation located at approximately 4,600 feet. It was productive in our old Adams #1-32 well located two miles southeast of this subject location.

Due to some stratigraphic changes in the lower Lansing and at the top of the Kansas City, the Dewey zone is five feet structurally higher in the Keating #1-24 hole than in the NE NE Sec. 23. At the very top of the subject zone, electric log calculations indicate the presences of less salt water than at the very bottom of this 10 foot interval. Additional structural gain at the proposed drilling location will cause the Kansas City to be a potential zone of interest for oil and gas production.

## STE. GENEVIEVE & ST. LOUIS

The St. Louis and Ste. Genevieve have great potential value in this general area. There are in the area some cases of older wells in which no interest was displayed in these zones by the failure to drill to and test these intervals.

The oldest well drilled in Sec. 14, in the NE/4 SE/4, was reported as dry and abandoned in Jan. 1953. The deepest DST of this well was run at 5,832 feet to 5,862 feet to test the Basal Chester sand interval. As is true of most tests of this interval in this general area, the zone proved to be nonproductive. Later, in 1961, the old hole was washed down and pipe was set, 1 foot below the pre-existing total depth, at 6,150 feet. The first test of the hole was thru perforation of an eight foot interval of porosity in the St. Louis formation at approximately 6,050 feet. Following an initial acid treatment, a show of oil and gas was recovered. After

a more sizeable treatment of acid and after recovering the load fluid, a swab rate of 15 barrels of salt water and 1½ barrels of oil per hour was reported. This was an encouraging show of oil.

South of the above described test hole is the abandoned Keating Zone oil well, in the NE/4 NE/4 Sec. 23. This well, displayed on the Ste. Genevieve structure map as being on a structural closure, was not drilled into the St. Louis formation. Had it been drilled deeper, to that interval, I am sure it would have displayed good shows and possibly production from the St. Louis.

In the event the proposed test well in SW/4 NW/4 Sec. 24 is drilled to the top of the Ste. Genevieve formation, and found to be running high to the previously discussed well in NE/4 NE/4 Sec. 23, it should then be drilled deeper to test the St. Louis interval.

The three stratigraphically controlled oil zones described to be present in the OWWO prospect 1-24 well are also potentially available in the proposed new hole in the SW NW of Sec. 24. The Morrow sand gas producing intervals described in the old hole likewise may be present in the proposed new hole. Because of common royalty owners of both proposed holes it would be possible to produce stratigraphically different intervals in the Morrow should a different interval be found in the new hole.

The multiple possibilities for both the OWWO of the existing Anadarko 1-24 dry hole and the proposed new hole coupled with the economy of working on both holes with the same rig lead to my recommendation to combine the two proposed prospects into one.

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