

Marmaton Formation

The Marmaton formation consists of several different potentially productive intervals.

The gas well located near the center of Section 33, T34S, R30W, is producing from a relatively thin zone of porosity developed at the very top of the Marmaton formation. This well has produced approximately 950 MMCF of gas. The rate of production of gas from this zone is presently restricted by the increasing rate of production of formation salt water. No mechanical equipment to lift the water from the productive interval has been used. With the addition of this equipment, a substantial increase of the rate of flow and eventual total recovery could be expected.

The relatively high structural position of the Marmaton formation in the #1-33 well is notable. The "high" in this well is manifested by the presence of the productive interval from which the gas is produced. A higher well, the Adams 1-32, in Sec. 32, does not have the same small productive interval at the top of the Marmaton.

The minor amount of gas produced on a drill stem test of the "second" interval of porosity in the Marmaton formation found in the #1-32 well, 167 MCF/d, along with a record amount of watery salt water affected drilling mud, is indicative of the fact that the well is probably not yet at the highest structural point of the formation in which it is structurally associated. This is encouraging in my interpretation of the structure which includes the proposed exploratory well in Sec. 4-35S-30W.

Stan 3

The Morrow Shale and Morrow Sand

The Morrow Sand is the most highly rated productive interval in Southwestern Kansas. Prediction of the location of its occurrence is also the most difficult! Offsetting good productive Morrow gas wells is often times unsuccessful. Drilling near poor wells or "good show" dry holes is often most successful.

The "shows" and production that have come from the five wells that are surrounding our proposed location are most encouraging.

The #1-32 well in NE NE Sec. 32-T34S-R30W was originally completed as a gas producing well from the Upper Morrow Sand. This zone produced approximately 74 million cubic feet of gas. At a price of no more than 17 cents per MCF, this zone was not profitable.

The dry hole located in SW NE Sec. 32 reported a drillstem test of the Morrow interval. A flow of 16 MCF/day of gas was accumulated on this drillstem test. No fluid (such as salt water) was recovered by this test. No attempt of making a producing well out of this interval was made. The initial bottom hole pressure and comparison with the final bottom hole pressure of this DST was encouraging. The initial pressure reading was 812 pounds in 40 minutes of time of closure. The final (after flow time) pressure increased to a reading of 1766 pounds. This increase was acquired by leaving the DST tool set at a shut-in condition for two hours of time. This amount of bottom hole pressure in this interval is encouraging because it is showing that the tested zone is related to a gas powered interval capable of producing natural gas without water. For any zone to

produce that amount of bottom hole pressure, without presentation of any fluid material, gas production can be expected.

Further encouragement is gained by looking at the "show" of gas that was recovered by a DST that was conducted in 1967, on the Morrow interval in the abandoned well in SW/4 NE/4 Sec. 5-T35S-R30W. At the time of running this test and the absence of the numerous wells that are now in existence, the amount of recovery and show of gas on this well was discouraging! Now however, it is encouraging because gas, in a small amount, was recovered on the test. No measure was made of the small amounts of gas at the time the DST was run. The DST did, however, record a significant amount of bottom hole pressure. A final shut-in pressure of 1,118 pounds was recorded in the final test. Recovery of gas, without any associated fluid, other than drilling mud, is encouraging.

In addition to these indications, in an eastward direction, the "old" gas productive well in the SE/4 NE/4 Sec. 4-T35S-R30W, is noted. This gas well completed in 1953 produced a total amount of gas from the upper Morrow interval of approximately 19 MMCF. This production came from the same "Upper Morrow" zone that is being considered herein, as well as an additional interval of sand near the very top of the Morrow shale. The show of gas at this interval is encouraging in that it indicates the possibility of a more significant amount of gas bearing sand to be existing in the proposed well location.

Testimony to the reasoning used to encourage the possibility of Morrow Sand production in the proposed well is found in Section 3. Two Morrow Sand gas wells are in the NE/4 of Sec. 3. The structurally lower of the two wells ~~has~~ produced 163,701 MCF of gas, while the 20 foot higher well ~~has~~ produced 364,104 MCF of gas.

An increased, higher structural position in which an increase of thickness, as well as increased efficiency of Morrow Sand in the proposed drilling location, is herein believed to be available. Ten feet of structurally high porosity with good permeability could yield 1 BCF of recoverable gas from our proposed well, with an initial flow rate of 2.5 MMCF/day.

The Kansas City Dewey Lime

The Dewey Lime interval was productive in the #1-32 Adams well in NE NE Sec 32-34S-30W. ^{Approx.} 15,000 barrels of oil has been recovered from this interval in that well. An additional 72,400 MCF of gas was also recovered with this production.

The shows of oil and gas recovered on a DST of this zone in the #1-33 Adams well, located in NE corner of SW/4 Sec. 33 was directly related to the production coming from the #1-32 well. No other apparent shows of oil or gas were recovered, or noted, on the other wells and dry holes located around the proposed drilling prospect. This fact by its self is somewhat indicative of the type of limestone material from which the production is found. This zone is of a limestone material which is somewhat different than many of the other potentially productive zones in this area.

The #1-32 well was drilled with a gas detector operating properly during drilling below 4200 feet. When the Dewey Lime was drilled, the drilling was suspended at the proper depth and circulation continued. Upon examination of the recovered amounts of the limestone cuttings, no obvious display of the presence of crude oil ~~held within~~ was recorded. The gas detector, however, did indicate a significant amount of natural gas in the drilling fluid.

Largely because of the "show of gas" and the satisfying, at that time, structural position, a drill stem test was conducted on this interval. Gas, oil and salt water was recovered by the drill stem test. The zone was proven to be productive by final completion.

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It was given an initial potential of 2620 MCF of gas per day with a volume of 46 BOPD. However, following this initial potential, this zone has produced a significant amount of water, as has the Lansing "A" Zone.

This discussion leads me to the conclusion that because of the shows of gas, oil, and saltwater indicated in this zone as well as other intervals, there is probably a structurally higher location in which the lighter hydrocarbons are separate from the heavier salt water. That location should be at our proposed drilling location.

Barragree Zone

The Barragree Zone of Council Grove formation is located at a depth of approximately 2950-3000 feet at the proposed drilling location. This zone was first proven to be gas productive in the #1 Barragree well drilled by Skelly Oil Co., in 1959, located in Sec. 25-34S-28W, Meade County, Kansas, some 15 miles east of our proposed location.

The initial potential of this discovery well, 13 MMCF/d of natural gas, created a considerable amount of enthusiasm. However, because of the inconsistent development of productive formation in this area, as well as the low price of natural gas at that time, the possibility of discovering gas from this one zone in such as our proposed exploratory well, never created much interest.

In 1966, I personally pointed out the possibility of the Council Grove interval being productive in the area of the wildcat discovery well which was completed in the Northeast corner of Sec. 32, north of our present proposal. During the time of drilling this well the gas detector became inoperative at approximately 3,100 feet. It was not replaced until drilling depth had reached approximately 4,300 feet.

Because of numerous other, deeper, productive zones in the #1-32 Adams well and the mechanical problems encountered in not having a good cement job on the completion pipe, no testing has ever been done on any of the shallow, apparently gas productive, zones in this well.

The Barragree zone was proven productive, to a minor extent, by the drill stem tests conducted on the two St. Louis zone oil producing wells located in SW/4 NE/4 Sec. 3 and NE/4 NW/4 Sec. 3, T35S, R30, in 1965 and 1966. This zone in these wells, to my knowledge, has never been produced. Because of the minor amount of structural closure near these two wells as shown by the contour map of the Barragree zone, the wells probably would not have significant recoverable reserves.

The existence of a plugged Barragree zone gas well in SW/4 NE/4 Sec. 8, T35S, R30W, is encouraging in that it shows the presence of gas in this area.

A relatively new Barragree zone gas well has just recently started producing on Sec. 12, T35S, R31W, Seward County, some 2½ miles west and one mile south of our proposed wildcat location.

With these indications, along with the presence of several individual zones of gas productive intervals in the Council Grove formation in the #1-32 Adams well in Sec. 32, the proposed drilling location in Sec. 4 appears to be very favorable for being gas productive in the Barragree Zone, as well as in other intervals of the Council Grove.

Stop 1

Lansing "A" Zone

The production developed from the Lansing "A" zone was somewhat spectacular in 1966. At the time of completing the well located in NENE Sec 32, no other wells had been drilled in Sections 29,30 or 31, of T34S, R30W. The ability of producing natural gas from the Lansing "A" zone in the Adams 1-32 was indicated by a drillstem test run on that porosity interval (4522 feet - 4542 feet). The DST resulted in a flow rate of 4,735 MCF/d of gas and an accumulation of 250 feet of oil and 214 feet of salt water in the drilling pipe ~~line~~ ^{the} during 90 minutes the tool was open. By perforating low in the zone, the well was originally completed in a way of attempting to recover oil rather than the associated natural gas. At the time of completion in 1966, gas was much less valuable than crude oil. (The highest payment for natural gas ever received on this well was 17 cents per MCF) in spite of the manner in which the well was completed, approximately 98,700 MCF of gas was produced by this Lansing "A" zone interval. In addition the zone has produced approximately ~~30,000~~ ^{20,000} barrels of oil. *The initial completion potential of this zone was 4,200 MCFBPD and 84 BOPD.*

Displayed on the structural map of the Lansing "A" zone porosity is my assumption of the structurally high formation extending south into the proposed drilling location. With a slight gain in structure over the Adams 1-32, the Lansing "A" zone could produce 50,000 barrels of oil and 500 MMCF of gas from our proposed well.

Step 2