

GEOLOGICAL REPORT
ANADARKO PRODUCTION COMPANY
MOORE "B" #1
NE NE
SECTION 26-33S-41W
MORTON COUNTY, KANSAS

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NE NE Section 26-33S-41W
Morton County, Kansas

GENERAL INFORMATION

APC INTEREST: 100%

ELEVATION: 3321' Ground Level

CONTRACTOR: DaMac Drilling Company

DRILLING COMMENCED: 3:00 P.M. February 24, 1974

DRILLING COMPLETED: 6:00 A.M. March 10, 1974

SIZE HOLE DRILLED: 7-7/8"

MUD TYPE: Water Base Chemical Mud

CASING: 8-5/8" at 1453'

TOTAL DEPTH: 5800' RTD
5805' LTD

D&A Below Council Grove

GEOLOGICAL INFORMATION

DATUM: 3321' Ground Level

SAMPLES EXAMINED & DESCRIBED: 1453-1547 feet & 2800 feet - TD

DRILLING TIME PLOTTED: Surface casing to TD

FORMATION TOPS AND STRUCTURAL COMPARISON:

	APC Moore B-1 NE NE <u>26-33S-41W</u>	APC Heintz C-1 NW NW <u>26-33S-41W</u>	
B/Cimarron-T/Red Cave	+ 1860	+ 1877	17' low
Winfield	+ 1110	+ 1131	21' low
Council Grove	+ 873	+ 887	14' low
Penn-Wabaunsee	+ 465	+ 465	Flat
Topeka	+ 232	+ 223	9' high
Toronto	- 226	- 224	2' low
Marmaton	- 911	- 924	13' high
Morrow	- 1544	- 1581	37' high
Lower "G"	- 1922	- 1993	71' high
Keyes	- 2016	- 2080	74' high
Mississippian Chester	- 2031	- 2125	94' high
Ste. Genevieve	- 2073	- 2165	92' high
St. Louis	- 2213	- 2312	99' high

ZONES OF INTEREST & DRILLSTEM TESTS:

Red Cave	1453-1547' OA	Sandstone; very fine grained, red & greenish-white, interbedded w/ red shale. <u>DST #1, 1450-1547'</u> , TO 30 minutes w/strong blow. TO 30 minutes w/strong blow. Recovered 633' MFW + 120' SM, no show. ISIP 436# (45), FP's 62-252#, 282-370#, FSIP 436# (45).
Topeka	3125-3157' OA	Limestone; gray, fine crystalline and white, light gray, fine crystalline, some fossiliferous, inter-crystalline & pin-point porosity, 15 units gas increase. <u>DST #8, 3125-55'</u> , TO 30 minutes, GTS 3 minutes, ga 18.5 MCF/10, 15.7 MCF/20 & 8.95 MCF/30. TO 30 minutes, gas ga 7.5 MCF thruout. Recovered 930' GCMSW (approx 9.5 bbls). ISIP 504# (45), FP's 252-310#, 365-436#, FSIP 504# (45). <u>DST #9, 3143-54'</u> , TO 30 minutes w/ GTS 3 minutes, ga 4 MCF/10, 7 MCF/20 & 8.3 MCF/30. TO 30 minutes, gas ga 3.92 MCF/10, 4 MCF/20, 5.64 MCF/30. Recovered 570' GCMSW (approx 6 bbls). ISIP 482# (45), FP's 161-229#, 229-298#, FSIP 482# (45).

ZONES OF INTEREST & DRILLSTEM TESTS (CONT'D):

Swope (Kansas City)	4144-60'	Limestone; medium grained, oolitic & fossiliferous, some casts, some loose oolites, 40 units gas increase. <u>DST #7, 4095-4158'</u> , TO 30 minutes w/weak blow, incr to strong. TO 30 minutes w/strong blow decr. Recovered 870' DM, no show. Packer leaking & severe plugging action. ISIP 1269# (45), FP's 422-518#, 486-647#, FSIP 1215# (45).
Cherokee	4607-4620'	Limestone; gray-buff, medium crystalline, fossiliferous, pin-point & inter-crystalling porosity, brilliant fluorescence, streaming cut, 32+ units gas increase. <u>DST #6, 4560-4616'</u> , TO 30 minutes w/weak blow incr to fair. TO 30 minutes w/weak blow incr to strong. Recovered 400' SGCWM w/rainbow show of oil. ISIP 367# (45), FP's 206-252#, 252-252#, FSIP 275# (45).
Upper Morrow	4960-5000'	Purdy zone; sandstone, white, very fine grained, glauconitic, glassy interbedded w/shale, gray-green, micaceous.
	5000-5016'	"M" sand zone; interbedded white very fine grained, glauconitic sandstone & gray-green shale.
	5016-5024'	"W" sand zone; sandstone, white, very fine grained, glauconitic, tite.
	5024-5088'	"H" sand zone; mostly shale, light-medium gray, some silty, w/sandstone, white & some brown, very fine grained, glassy, occasionally calcareous, scattered fluorescence & streaming cut. <u>DST #5, 4842-5166'</u> , TO 30 minutes w/strong blow. TO 30 minutes w/strong blow. Recovered 658' DM, no show. ISIP 1507# (45), FP's 163-206#, 296-339#, FSIP 1322# (45).
Lower Morrow	5252-5286'	Lower "G"; sandstone, very fine to fine grained, glauconitic & calcareous. <u>DST #3, 5220-5272'</u> , TO 30 minutes w/weak blow incr to fair. TO 30 minutes w/fair blow. Recovered 500' WCDM + 40' SW. ISIP 1283# (45), FP's 138-229#, 243-275#, FSIP 1283# (45).

ZONES OF INTEREST & DRILLSTEM TESTS (CONT'D):

Lower Morrow	5337-5352'	Keyes; sandstone, coarse grained. DST #4, 5284-5422', TO 30 minutes w/weak blow. TO 30 minutes w/weak blow, died in 25 minutes. Recovered 625' DM, no show, no water. ISIP 1146# (45), FP's 390-413#, 413-413#, FSIP 1100# (45).
Mississippian	5560-5575'	Limestone; faintly oolitic, chalky, no show.
St. Louis	5622-5638'	Limestone; light gray-brown, fine-medium crystalline, some visible inter-crystalline porosity, brilliant fluorescence, streaming cut. DST #2, 5520-5655', TO 30 minutes w/weak blow, incr to good. TO 30 minutes w/good blow. Recovered 480' DM, no show. ISIP 1603# (45), FP's 206-183#, 275-321#, FSIP 1420# (45).

GEOLOGICAL DISCUSSION:

This wildcat was drilled to partially evaluate reversionary acreage in central Morton County, Kansas, in the Cimarron Valley area. The location was selected on a seismic high on a subsurface structural feature and evaluated several potential zones in the upper and middle Pennsylvanian along with the basal Pennsylvanian Morrow and Mississippian St. Louis.

Because of parted surface pipe and lost circulation in the Wolf-campian series, no drillstem tests were run during drilling after the initial Red Cave test. After total depth was reached and logs run, eight drillstem tests were taken with generally negative results. These tests were probably definitive but this method of total evaluation after logs is certainly not preferred.

An analysis of the test from the top down follows:

On the Red Cave, the Moore was low to the Heintz "C" #1 to the west as per regional dip. The drillstem test taken on the Red Cave along with the samples run through the interval established conclusively the presence of reservoir in the Red Cave. Since the Moore structure was not yet evident to provide a trapping mechanism, the recovery was filtrate and salt water.

The Council Grove was of sufficient interest in the Moore "B" to warrant further testing, so casing was run through the interval.

The upper Admire had a 62 unit methane increase and calculated possibly productive from the logs. This zone is awaiting further evaluation through production casing.

The Topeka had two zones of porosity with reservoir facies developed in the Moore "B". Two drillstem tests recovered measurable gas along with much filtrate and some salt water. The zones were abandoned as non-commercial.

The Moore "B" gained structure slowly through the Greenwood, Toronto, Lansing and upper Kansas City, but had no reservoir developed in these zones. In the lower Kansas City group, the Swope limestone exhibited a new porosity development with a 40-unit methane increase. A marginally acceptable drillstem test of this interval recovered only mud indicating again insufficient reservoir development.

A sample show of oil was recorded in Marmaton samples but, because of insignificant zone thickness here and no favorable log data, this zone was not pursued further.

The mid-Cherokee had a limestone developed with oil and gas shows. A drillstem test over the interval recovered oil and gas shows along with salt water and further indicated very poor reservoir development.

In the Upper Morrow, a Purdy interval sand is developed. I have interpreted this sand as being the shoreward side of an offshore bar. The sand is argillaceous to some extent and is calcareous. Shows were recorded in the sand, but a drillstem test indicated no reservoir development.


Below the Purdy, the "M" and "W" sands are present but only as remnants. The "H" sand zone is present in the Moore as a clay or shale filled channel. Sixty-eight feet of channel cut and fill are present, but no sand was deposited here.

In the Lower Morrow, the upper "G" appears to have thinned considerably and is virtually absent. The lower "G" is present, however, and was drillstem tested. The sand was wet in spite of being 71 feet high to the Heintz.

The basal Pennsylvanian-upper Mississippian interface is of much interest here. The Moore "B" is on or near the apex of a fairly large pre-Pennsylvanian structure with a magnitude on the order of 100 feet. The Keyes sand has essentially pinched out along the crest of this feature and is seen thinning from 34 feet of porous sand in the Heintz to the west to five feet of tite sand in the Moore "B". A drillstem test was taken with no fluid recovery from this Keyes sand. All indications are that a field discovery, possibly quite similar to the original Cimarron Valley Keyes field, will eventually be made on the flank of this structural feature.

The upper "A" St. Louis porosity was not present in this test. The lower "A" St. Louis porosity was present as mapped but no reservoir was developed. Chalk, rather than oolites, was present in the lower "A" porosity zone.

In summary, this test encountered the predicted structure and apparently verifies the seismic and subsurface interpretation of the area. Adequate reservoir development was generally lacking. The interpretations of environments of deposition in the Morrow still appear to be valid. The Keyes is now a prime prospective zone and the Upper Morrow sands are still prospective. Data from this test will be studied to determine the proper recommendations for further activity in this area.



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