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REPORT OF INVESTIGATION

PAWNEE COUNTY, KANSAS

BURDETT FIELD

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NORTH BURDETT PROSPECT

SECTION 11, TOWNSHIP 21 SOUTH, RANGE 20 WEST
PAWNEE COUNTY, KANSAS

APRIL 15, 1966

INTRODUCTION

The prospect is predicated on drilling an offset to an old dry hole in Sec. 11-21S-20W that had some 54 feet of Mississippi Chat (Chert) that drill stem tested gas ~~with no saltwater being found~~. water free

The log and drill stem test data of the old well to be offset compare favorably to a well that was washed down and completed in the Mississippi Chat for a potential of 3 million cu. ft. of gas per day in June, 1961. ~~The latter well is located~~ some six miles south in Sec. 4-22S-20W.

1-A

GEOLOGY AND DRILLING HISTORY

The Welch & Olsson No. 1 Bryant in the SW SE NW Sec. 11-21S-20W is the highest well in the ~~whole~~ area, structurally, and is on a pronounced subsurface anticline. The Osage section of the Mississippian is the subcrop with Cherokee shales resting on the Osage. This section weathers or leaches into the best "chat". The best Mississippian production is found with such conditions.

The B.E. Ash No. 1-A Smith in the NW NW SE Sec. 4-22S-20W is also on a pronounced subsurface structure but of much smaller areal extent.

A Schlumberger Laterolog, Microlaterolog, Caliper, Gamma Ray and Neutron log is enclosed on the No. 1 Bryant with Geological tops and drill stem test data ~~appropriately~~ marked.

A Schlumberger Laterolog, Microlaterolog, Gamma Ray and Caliper Log is enclosed on the No. 1 Smith (Ditus) with appropriate information marked.

The following is the drill stem test data on the two wells:

Welch & Olsson No. 1 Bryant, Miss. Chat 4225-79, (54 ft.)

DST 4225-40 (15 ft.) tool open 1 hour, gas to surface in 15 minutes, recovered 62 ft. of gas cut mud, no~~thing salty~~ SW, bottom hole pressure 1340 psi.

DST 4240-52 (12 ft.) tool open 1 hour, recovered 30 ft. of gas cut mud, bottom hole pressure 660 psi.

DST 4252-78 (26 ft.) tool open 1 hour, recovered 62 ft. of mud, very slight show of oil, bottom hole pressure 760 psi, no~~thing salty~~ SW.

B.E. Ash No. 1-A Smith (now D.R. Lauck No. 1 Ditus) Miss. Chat 4305-46 (41 ft.).

DST 4299-4320 (21 ft.) tool open 1 hour, gas to surface in 25 minutes, recovered 70 ft. of gas cut mud, bottom hole pressure 1300 psi.

DST 4322-47 (25 ft.) tool open 2 hours, gas to surface in 10 minutes, recovered 90 ft. of gas cut mud, bottom hole pressure 1320 psi.

DST 4353-58 (5 ft.) tool open 1½ hours, recovered 30 ft. of mud, few specks of oil, bottom hole pressure, 0 psi.

The logs of the two wells were analyzed and compared quantitatively by Schlumberger engineers with the result that the No. 1 Bryant exhibits better reservoir characteristics than the 1-A Smith (No. 1 Ditus). Therefore it is safe to assume that a well offsetting the No. 1 Bryant would make as good a well with prudent completion procedures.

In the Perry Ranch pool on the Commanche-Barber County lines, major companies as well as independents are pleased with gas developments in the Mississippi Chat that quite often have no better drill stem tests.

The possibility of oil production cannot be altogether ignored in further development as there are several fields to the north that produce from Cherokee sands (Pennsylvanian) just above the chat. These sands could develop on the flanks of the structure. Oil may be found down dip in the chat before reaching the water level.

COMPLETION AND PRODUCTION HISTORY

In May, 1961 the B.E. Ash No. 1-A Smith was entered by D.R. Lauck as the No. 1 Ditus and pipe set on the Mississippi. Perforations in the chat 4335-40 tested 1,800,000 cu. ft. of gas per day after fracture treatment with sand and oil. A plug was set above these perforations and the top zone perforated and treated for a potential of 3,000,000 cu. ft. of gas per day with some 10 bbls oil per million ft. of gas.

Shortly thereafter Lauck washed down the No. 1 Jones, originally drilled as the Superior No. 1 Norris in the NE NE NE Sec. 9-22S-20W and 1/2 mile southeast of the Ditus. The Jones was completed as a similar well in the Mississippian chat.

To date these two wells have been shut in for lack of a market.

D.R. Lauck Oil Co. Inc. entered the No. 1 Bryant also in 1961 to attempt completion in the Mississippian chat. Casing was set on bottom at 4515 and cemented with 700 gallons of Latex cement, 5½" - 14# casing was used, top of cement 4010 ft.

The following is a daily record from Lauck files:

Sept. 9, 1961
Moved in Confer Drlg. Co. Rigged up and swabbed hole down to top of float 4487 and test dry.

Sept. 10, 1961
Rigged up Perforators Inc. Run collar log and perforated, 4264-4270 - 6 shots per ft. Recovered good show of gas after perforating. Acidized by Dowell down 5½" casing into perf. 4264-4270 with 500 gal. mud acid, max. pressure 1550, pressure break to 900# and treated same. 1 min. pressure drop 700#, 3 min. 525#, 5 min. 450#. Swabbed load back and test well producing water and show of gas.

Sept. 11, 1961
Continued swab testing, well producing 5 bbls. S.W.P.H. slight show oil and gas. Run lab test on water found not to be Miss. water. Shut down for bad roads.

Sept. 15, 1961
Rigged up tubing tools, run 2" tubing with Baker tool and squeezed perforations 4264-4270 with 140 sacks cement 4500# pressure. Pulled tubing and shut down.

Sept. 18, 1961
Swabbed hole down and drilled squeeze cement out of pipe and test dry.

Sept. 19, 1961
Rigged up Perforators Inc. Run cement bond log and found all indications necessary to prove acid channeling from top of Miss. to base of Kinderhook which was covered completely by squeeze job. Perforated 4261-4267 - 6 S.P.F. dumped fluid in hole and run tornado frac gun and shot 1 at 4263 and 1 at 4265. Swabbed hole down and test. No production recovery. Acidized by Dowell down 5½" casing into perf. 4261-4267 with 250 gal. B.D.A. acid, max. pressure 1550# finish 1000#, 1 min. pressure drop 825#, 3 min. 750#, 5 min. 700#. Swabbed hole down did not recover acid water. Acidized down 5½" casing with 500 gal. regular acid, max. pressure 1350# and treat 1050#, 1 min. pressure drop 875#, 3 min. 675#, 5 min. 550#. Swabbed hole down.
Sept. 20, 1961
Found 625' acid water in hole over night which had not been recovered. Swabbed down and test dry with show of formation gas. Rigged up Dowell and frac down 5½" casing with 3000# sand and 3000 gal. lease oil into perf. 4261-4267, max pressure 1400# finish treatment, 1 min, pressure drop 900#, 3 min. 800#, 5 min. 650#. Bled pressure off and began swabbing load back, swabbed to max. depth 1500# down. Could not swab lower, recovered 100 Bbls. and well began flowing into test tand 3/4" choke 220# pressure well flowed 58 bbls. 1st hour and 46 bbls. second hour. Well dropped to 13 bbls. and began showing water. Continued flowing well until frac oil had returned. Put well on test at rate of 20 bbls. S. water per hour 1% frac oil, 9 hour test 3/4" choke 60# operating pressure. Shut well in 5 min. and opened 3/4" choke, well produced 6 B.S.W. 2 hours. Due to hole loading with water and killing pressure. Shut well in did not gauge gas volume due to fluid volume. Well loaded until no shut in pressure could be recorded. Gas flow estimated near 1,000 MCF with 20 bbls saltwater per hour. Water analysis again indicates Kinderhook sandstone water.

D&A April, 1962

From the above it is concluded that the Bryant B-1 was plugged due to mechanical failure and that the setting of casing definitely proved the gas present. The production department of D.R. Lauck Oil Co. Inc. concurs.

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RESERVES

Quantitative log data (by Schlumberger engineers)
Upper zone, 4229-43 (14 ft.)
Rw = .05 @ 100 degrees F., ROS = 30% Di = 3d
Rmf = .057 F = 13
From the above, porosity is 20% plus.
Connate water content is 45-50%.

Lower zone, 4261-78 (17 ft.)
Porosity is 15 to 20%.
Connate water content is 45-55%.

Reserve Calculations:
Upper zone

Pay thickness (14 ft.)	use 12 ft.
Porosity 20% plus	use 18%
Connate water content	50%
Reservoir pressure	1355 psia
Reservoir temperature, 107 degree F.	567 Degree F. abs.
Abandonment pressure, 50 psi	65 psia.

$$\text{MCF/ac-ft.} = \frac{P}{T} \times \frac{T2}{} \times (1-Cw) \times \frac{P1-P2}{Pb} \times 43{,}560$$

$$\text{MCF/ac-ft.} = .18 \times \frac{520}{567} \times (1-.50) \times \frac{(1355-65)}{14.65} \times 43{,}560 = 316 \text{ MCF}$$

Upper zone reserves, 320 acre spacing = 316 x 12 x 320 = 1,210,000
Lower zone reserves, 320 acre spacing = 264 x 14 x 320 = 1,182,000

Total, upper & lower zone 2,392,000MCF

Total estimated reserves, upper and lower zones; 2,392,000 MCF
The supercompressibility factor is not known and was left out of calculations. It would increase the reserves slightly.

Northern Natural Gas Co. has a line 3 miles north of the well. They try to take 1/20 of the reserves per year, not to exceed 25% of the well's potential. From this, a two or three year pay out could be expected.

The usual contract with this market is of 20 year duration, paying 14½¢ per MCF the first 5 years with an escalation clause of 1¢ per MCF every 5 years.

Before abandonment the gas would have to be compressed to enter the gathering system. Compression charges should ~~be more than offset by the escalation clause~~.
paid by No. Nat. (See Letter From No. Nat.)

The sale price is based on 950 BTU gas and the BTU content of the gas in the No. 1 Ditus in 756, giving a market price of 11¢ per MCF. However, the Helium content is over 2.7% and should more than offset the BTU penalty.

From the above, it is recommended that the No. 1 Bryant be drilled, pipe set, and the chat tested for commercial gas.

Respectfully Submitted,

L. Carlisle