

## OILFIELD RESEARCH LABORATORIES

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October 19, 1956

Mr. Mack C. Colt  
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Dear Sir:

Enclosed herewith is the oil reserves study with respect to water-flooding the Squirrel sand underlying the Blohm and Allen County Farm leases in your Colony Block, Allen County, Kansas.

Water-flooding of the subject acreage is made attractive by reason of wider than average shoestring formation at this point and by reason of advantages of flooding or pressure maintenance before the end of primary depletion. These attractive features are offset by the remoteness of these leases from the already existing water pressure facilities. It is concluded that flooding of the Blohm and County Farm leases can be done to a limited degree with reasonable expense until more elaborate facilities are justified.

Sincerely yours,

OILFIELD RESEARCH LABORATORIES

*Ray N. Plummer*  
Ray N. Plummer

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Estimate of Oil Reserves  
Blohm & County Farm Leases  
MACK G. COLT, PRODUCER  
Allen County, Kansas

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CHANUTE, KANSAS  
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Estimate of Oil Reserves  
Blohm & County Farm Leases  
MACK C. COLT, PRODUCER  
Allen County, Kansas

INTRODUCTION

The following reserves study is submitted as a supplement to the reserves study made in April, 1956. This study considers only the Blohm and County Farm leases of the Colony Block. The Squirrel sand reservoir on these two leases has been expanded and it is felt that some re-evaluation of this area with respect to possible water-flooding should be made. Reference to the initial reserves report is made for primary production history, well data and physical equipment.

NEW DEVELOPMENT

During 1956, there have been a total of seven wells drilled to the west of the old development trend. These new wells, 3 on the County Farm Lease, and 4 on the Blohm Lease, have partially defined a different producing trend. Additional development on the adjoining Brown Lease also aided in the definition of the new trend. All of the recently drilled wells have shown virgin characteristics in production.

The Squirrel sand reservoir on the Colony Block is found in a very narrow shoestring extending from 5 or 6 miles in length. Taking into consideration that the original development of the Colony shoestring was done in the 1930's to 1940's, they are now considered in the stripper stage. The Blohm and County Farm leases were first drilled in 1947 and they both have shown a typical stripper decline throughout their productive life. Since this original development has been confined to a very narrow trend,

it seems unusual to find any widened area in the trend.

This new development has produced with apparently original bottom hole characteristics so that it would be expected to be separate from the old development. These unusual facts have brought about the present study with the idea of possibly water-flooding while some original pressure still exists.

Reference to the map in the back of this report will show that the sand thickness contours seem to indicate parallel trend with the old development that connects in the vicinity of Blohm No. 7 and No. 8. The line formed by dry holes indicates that the trend does not extend to the north, while offset production to the south and west of the Blohm Lease indicates that this production extends southward. With the limited control, it is difficult to predict just what the geological origin of this new development might have been. Some theories are known which might be plausible explanations of this condition but they do not seem to warrant a discussion at this time.

At the present time the Allen County Farm has about 18.4 proven productive acres with a slight possibility that this trend extends northward across the lease to make possible 8.7 unproven acres. The Blohm Lease has 19.5 proven productive acres with a good possibility of 29.7 unproven acres.

#### OIL PRODUCTION

Since this shoestring Squirrel sand is considered as a typical stripper producing formation, some idea of the ultimate oil recovery is desired. There have been 6 wells cored and analysed from the Blohm and County Farm leases. The analyses on these were not complete, so as to give any indication of water-flood characteristics. Available core data is listed as

Table I in the back of this report. The calculated recovery, both primary and water-flood were calculated by making certain assumptions not necessarily determined by laboratory results. Using the available core data and referring to similar conditions on the Alexander Lease in this Colony shoestring, it is felt that the producing formation on the Blohm and County Farm leases would be responsive to water-flooding. Water injection was started on the Alexander Lease in October of 1955, and water-flood response was noticed in November of 1955. Water-flooding history throughout the past year has shown that this Squirrel formation is very tight. The tightness or low permeability of the formation is discouraging but not altogether hopeless.

The spacing on the Alexander Lease is 220 feet by about 450 feet or about 2.3 acres per five spot pattern. Considerable thought was given to increasing the water-flood pattern on the Blohm and County Farm leases in order to show a better pay out, but the formation effective permeability seems to indicate that a 250' by 660' or 3.8 acre spacing would be the practical maximum.

#### RECOVERY FACTORS

At the present time the cumulative primary production on the Blohm and County Farm leases is about 54 barrels per acre foot for the developed acreage. It is estimated that the total primary recovery will be 104 barrels per acre foot for an average net sand thickness of 9.5 feet giving a primary recovery of 990 barrels per acre. The estimated water-flood recovery is 210 barrels per acre foot or 1,995 barrels per acre for the average net sand thickness of 9.5 feet, after sweep efficiencies are taken into consideration.

OIL RESERVES

A detail of the gross oil reserves data is given in Table II in the back of this report. As of 9/15/56, there have been 19,443 barrels of gross oil produced from the developed acreage on the Blohm and County Farm leases. Primary reserves are calculated to be 37,340 barrels of gross oil, and water-flood reserves are calculated to be 74,200 barrels of gross oil. The total gross reserves of 111,540 barrels less the cumulative production as of 9/15/56, leaves a remaining gross oil reserves of 92,097 barrels. The total of 38.4 acres of unproven and undeveloped area is estimated to contain 2,000 barrels per acre or 76,800 barrels of gross oil. These unproven reserves are merely indicative of the reserve potential and are not considered as authentic.

OPERATIONS

Of the total Colony shoestring, it is estimated that there are about 300 productive acres. These 300 acres can be served by one water-flood plant. It is felt that the total productive acreage in the vicinity of the Blohm and County Farm leases does not justify the construction of a new water-flood plant.

In order to utilize the present water-flood facilities over the complete shoestring, it would be necessary to lay approximately four to five miles of high pressure trunk water line and to make some facilities for disposal of produced water on the ends of the shoestring. Calculations show that a trunk line of 4 inch I.D. size reducing to 3 inch would not lose over 24 p.s.i. at the extreme ends of the line. The produced water may be adequately treated and injected into the high pressure trunk line so that an additional salt water return line to the plant would not be necessary.

The immediate construction of a small water plant to serve the acreage in question could serve as a future produced water disposal plant. A dry hole in the vicinity of the Blohm or County Farm leases might be completed to supply adequate water for pilot testing the subject area. This would save the questionable expense of the long trunk line from the Alexander water plant, until it can be more thoroughly justified.

The water-flood development of the old shoestring area on the Blohm and County Farm leases will be dictated by existing producing wells. The following tabulation lists the locations of proposed water input locations:

- 1. 1320' S. of N. Line, 1730' E. of W. Line, Sec. 34, W.I.
- 2. 1755' S. of N. Line, 1745' E. of W. Line, Sec. 34, W.I.
- 3. 1990' S. of N. Line, 1885' E. of W. Line, Sec. 34, Oil
- 4. 2210' S. of N. Line, 1750' E. of W. Line, Sec. 34, W.I.
- 5. 2640' S. of N. Line, 1730' E. of W. Line, Sec. 34, W.I.
- 6. 2210' N. of S. Line, 1500' E. of W. Line, Sec. 34, W.I.
- 7. 1760' N. of S. Line, 1500' E. of W. Line, Sec. 34, W.I.

The above locations provide for water-flooding the old production trend. The new trend development spacing is suggested as 250' by 500' between like wells or 2.9 acres to form a staggered line drive pattern. This smaller than maximum spacing is regulated by the necessity of utilizing the already existing oil wells offsetting the Brown lease. The 250' by 488' pattern will space a row of water input wells along the north County Farm line and along the south Blohm line. Further development to the north and south can be spaced 250' by 660'.

Respectfully submitted,

*Ray A. Plummer*

MACK C. GOLT, PRODUCER

Blohm & County Farm Leases

Allen County, Kansas

Table II

Reserves Data

	<u>Blohm</u>	<u>County Farm</u>	<u>Total</u>
Average net sand thickness, feet	8.7	10.3	9.5
Proven acres	19.5	18.4	37.9
Possible unproven acres	29.7	8.7	38.4
Primary Reserves			
Recovery, B/A.Ft.	104.	104.	104.
B/Acre	905.	1,071.	990.
Barrels	17,640.	19,700.	37,340.
Water-flood Reserves			
Recovery, B/A.Ft.	210.	210.	210.
B/Acre	1,827.	2,161.	1,995.
Barrels	35,600.	38,600.	74,200.
Total Gross Oil Reserves			
Barrels/Acre	2,732.	3,232.	2,985.
Barrels	53,240.	58,300.	111,540.
Cumulative Production 9-15-56	9,104.	10,339.	19,443.
Est. Remaining Gross Oil Reserves			
9-15-56	44,136.	47,961.	92,097.
Possible Unproven Reserves			
Barrels/Acre	2,000.	2,000.	2,000.
Barrels, Gross	59,400.	17,400.	76,800.

FOX RIVER BOND

MACK C. COLT, PRODUCER

Blohm & County Farm Leases

Allen County, Kansas

Table III

Summary Data

Total number of acres	200
Total number of proven oil productive acres	37.9
Total number of oil wells as of 10-1-56	17
Total number of wells cored and the sand analyzed, as of 9-15-56	6
Name of oil producing zone	Squirrel
A.P.I. gravity of oil, degrees @ 60°F.	32
Average net sand thickness, feet	9.5
Total estimated primary oil reserves, barrels	37,340
Total estimated primary oil reserves, barrels/acre	990
Total estimated water-flood oil reserves, barrels	74,200
Total estimated water-flood oil reserves, barrels/acre	1,995
Total estimated water-flood oil reserves, barrels/acre ft.	210
Total estimated oil reserves, (primary & secondary), barrels	111,540
Total estimated oil reserves, (primary & secondary), barrels/acre	2,985
Gross oil production as of 9-15-56, barrels	19,443
Gross oil production as of 9-15-56, barrels/acre	513
Estimated remaining gross oil reserves as of 9-15-56, barrels	92,097
Estimated remaining gross oil reserves as of 9-15-56, barrels/acre	2,472

Estimate of Oil Reserves  
Blohm & County Farm Leases  
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Allen County, Kansas

Table I  
Core Analysis Data

Lease	Well No.	Depth of Sand, Ft.		Feet of Permeable Sand	Percent Porosity	Percent Saturation Oil	Percent Saturation Water	Oil Content		Permeability, Md.		Calculated Oil Recovery			Feet of Floodable Sand	Facker Setting Feet	Plug Back, Feet
		Top	Bottom					Bbls/A.Ft.	Bbls/A.	Air	Effective	Primary Bbls/A.	Water-Flooding Bbls/A.Ft.	Bbls/A.			
Blohm 7-31-56	8-AO	823.0	834.0	9.1	-	-	-	-	-	-	0.531	-	-	-	5.5	825.0	832.0
Blohm 8-16-56	9-AO	818.0	832.5	13.5	19.1	48.8	26.8	720	10,380	22.7	-	1,000	423	4,400	10.4	821.0	831.5
Blohm 8-11-56	10-AO	815.0	832.0	16.0	17.1	48.5	32.1	656	11,149	19.2	-	850	337	3,200	9.5	820.0	829.5
Blohm 8-10-56	11-AO	817.0	840.1	9.0	15.6	32.4	49.6	404	4,564	18.1	-	500	415	2,200	5.3	826.0	832.5
County Farm 6-12-56	11-AO	791.2	810.0	12.4	19.6	40.4	44.5	618	9,701	46.8	-	1,200	405	3,200	7.9	796.0	806.0
County Farm 8-21-56	12-AO	791.0	814.4	19.7	16.7	45.4	34.6	606	13,686	28.1	-	1,400	416	5,200	12.5	799.0	812.0

Average estimated primary recovery, Bbls/acre - 990.  
Average estimated water-flood recovery, Bbls/acre - 3,640.  
Average estimated water-flood recovery, Bbls/Acre ft. - 399.\*  
Average floodable pay sand thickness, feet - 9.1

\* Calculated from partial core analysis.  
It is assumed that all sand is floodable.  
Allowances were made for permeability distribution.  
No allowance made for sweep efficiency.

