

Case No.

555

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Application, Transcript,  
Small Exhibits, Etc.

CASE 555: Lowry et al Operating Account  
Pilot pressure maintenance plant in 26 in.  
6 W, South Blanco-Tocito Pool

EARLOUGHIER ENGINEERING

PETROLEUM CONSULTANTS - CORE ANALYSES

3316 EAST 21ST STREET

TULSA, OKLAHOMA

June 18, 1953

Lowry et al Operating Account  
616 East Central Avenue  
Albuquerque, New Mexico

Re - Core Analysis  
Federal Well No. 11-52-85  
Sec. 4, T. 26-N., R. 6-W.  
Rio Arriba County, New Mexico

Gentlemen:

Attached are results of analysis, together with profile and summary,  
covering core received from your above well.

Yours very truly

EARLOUGHIER ENGINEERING



R. C. Earloughier, Engineer

JMR s

Encl - 2

cc - T. G. Lowry  
A. C. McLee  
G. F. Moulton  
G. L. Yates

EARLOUGHER ENGINEERING  
CORE SUMMARY

Company Lowry et al Operating Account Lease Federal Well No. 11-52-85

Location Approximately 610 feet South of North line, 670 feet East of West line SW4

Section 4 Twp. 26-N. Rge. 6-W. County Rio Arriba State New Mexico

Formation Cored Tocito sand Type Core 4-inch Diamond

Date Cored 6-5-53 Date Shot \_\_\_\_\_ Coring Fluid Oil emulsion

Depths:	Top of core, black shale	6643.0 feet
	Top of oil sand	6658.3 "
	Bottom of oil sand	6670.5 "
	Net feet of oil sand	11.2
	Bottom of core, black shale	6690.5 "
	Total feet cored	47.5
	Feet analyzed	20.0

Shot Record: Set Packer \_\_\_\_\_ Feet

Depth, Feet		Feet	Shell Diameter	Quarts Per Foot	Quarts Total
From	To				

Completion Data:

Hrs. well stood after coring \_\_\_\_\_; Feet Fluid in Hole \_\_\_\_\_ (Oil \_\_\_\_\_ Water \_\_\_\_\_)

Clean-out time, hrs. \_\_\_\_\_; Initial production, bbls. day \_\_\_\_\_ (Oil \_\_\_\_\_ Water \_\_\_\_\_)

Remarks: The interval from 6643.0 to 6690.5 feet was diamond cored and core sampled by Lowry Oil Company. Coring was commenced and completed in black shale. The entire upper part of the cored section from 6643.0 to 6672.7 feet was sealed in cans at the well and shipped to our laboratory in Tulsa for analysis. Two additional samples were received from the shale cored from 6674.4 to 6687.2 feet. Analysis was limited to the section between depths 6653.8 and 6674.7 feet.

(Continued following page)

Results of analyses indicate 11.2 net feet of oil sand between depths 6658.3 and 6670.5 feet. The data are summarized in two sections on the basis of variation in permeability. Section one contains 8.6 net feet of sand with permeability in the range 0.1 to 5 millidarcys. Section two contains 2.6 net feet of sand having permeability values above 6 millidarcys. The entire oil sand section is grey, calcareous shaly sand and was 91 per cent insoluble in cold HCl.

PERMEABILITY

The permeability is low throughout the oil sand with the weighted average being 5.1 millidarcys. The 8.6 net feet of sand in section one has an average permeability of 0.9 millidarcys compared with the average of 19 millidarcys for the 2.6 net feet of more permeable sand in section two. Permeability capacity is 57 foot-millidarcys.

POROSITY

Weighted average porosity of the oil sand is 11.2 per cent with section one showing an average of 10.4 and section two an average of 13.7 per cent.

PER CENT SATURATION

This well was cored with oil emulsion mud and shows a relatively high average oil saturation of 31 per cent. The average core water saturation is 23 per cent which represents average connate water.

OIL CONTENT

Average oil content of the oil sand is 273 barrels per acre-foot with section one showing an average of 234 and section two an average of 404 barrels per acre-foot.

LABORATORY FLOODING TESTS

Laboratory water flooding tests on twelve samples from the oil sand section yielded no oil recovery from any of the samples analyzed. The over-all average residual oil saturation after flooding was 35 per cent which is approximately 4 per cent higher than the

average of adjacent samples. The high residual oil saturation together with the lack of any measurable oil recovery in these laboratory flooding tests may result from the use of oil emulsion mud for coring.

All samples were flooded with fresh water and the average radial permeability to water for the low permeability sand in section one was 0.068 millidarcys and for the more permeable sand in section two, 0.46 millidarcys. These data indicate that the more permeable sand in section two has a permeability to water approximately 7 times greater than the sand in section one whereas the permeability to air for section two is approximately 21 times higher than that of section one.

Eight of the above mentioned twelve samples from the oil sand section were flooded at a very high pressure of approximately 920 psi. All other samples were flooded with a maximum pressure of 70 psi. No oil recovery was effected at 920 psi and the rate of water through-put increased in the order of magnitude that might be expected for such increase in pressure.

Eight additional core samples were flooded in the laboratory. These samples had been exposed to the air for approximately 48 hours before flooding. The samples were milled to 2½" O.D. prior to flooding whereas the previous flood tests were on full diameter fresh cores.

The eight dry core samples were flooded with fresh water for 11 hours and then with synthetic brine for an additional 8 hours. Some plugging due to use of fresh water was evident especially in the samples with the highest permeability. Average permeability to the fresh water was 0.84 millidarcy at 30 psi, and 0.50 millidarcy at 70 psi. The average permeability to brine was 0.42 millidarcy at 70 psi. The full diameter fresh core samples indicated an average permeability to fresh water of 0.13 millidarcy at 70 psi.


The eight dry cores indicated an average residual oil saturation of 36 per cent compared with the average residual of 35 per cent for the twelve fresh flood samples. None of the fresh core samples yielded any measurable oil recovery while three of the dry core samples showed recoveries varying from 5 to 9 barrels per acre-foot.

CONCLUSIONS

1. Net feet of oil sand is 11.2 located between depths 6658.3 and 6670.5 feet.
2. The oil sand has a low average permeability of 5.1 millidarcys and low average porosity of 11.2 per cent. Permeability capacity is 57 foot-millidarcys with the majority of this being contained in 2.6 net feet of the oil sand section.
3. The core shows a relatively high average oil saturation of 31 per cent and no oil recovery was effected in the laboratory water flooding tests. This may be due to the oil emulsion mud used for coring.
4. The estimated primary oil recovery by gas expansion is 113 barrels per acre-foot or 1270 barrels per acre from the area of which this core is representative.
5. If reservoir pressure is maintained by an efficient water drive it is possible that an additional oil recovery of 65 barrels per acre-foot or approximately 730 barrels per acre may be obtained.

Respectfully submitted

EARLOUGHER ENGINEERING

  
J. M. Robinson, Engineer

JMR 6

LOWRY, ET AL OPERATING ACCOUNT

FEDERAL WELL NO. 11-52-85

ACID SOLUBILITY TESTS

<u>Sample No.</u>	<u>Depth. Ft.</u>	<u>% Acid Insoluble **</u>
42	6657.3	66. *
46	6658.4	83.
49	6659.3	94.
53	6660.5	97.
56	6661.6	87.
59	6662.6	64. *
62	6663.6	94.
65	6664.5	93.
68	6665.5	81.
72	6666.6	95.
75	6667.7	92.
78	6668.6	91.
81	6669.6	96.
83	6670.3	91.
87	6671.6	80. *
Average		<u>91.</u>

\* Not included in averages.

\*\* Percent insoluble in, cold 15% HCl.

## EARLOUGHER ENGINEERING

COMPANY LOWRY, et al Operating Account

LEASE Federal

WELL NO. 11-52-85

Sec.	Formation	Depth, Ft.		Net Ft. of Sand	Avg. Por.	Avg. Core Saturation		Core Oil Content		Permeability		Flood Pot Residuals				Oil Recovery Bot./Acres	
		From	To			Oil	Water	Avg. B/A. Ft.	Total B/Ac.	Avg. Md.	Capacity Ft. x md.	Saturation		Oil Content		Diff.	Flood Pot
												Oil	Water	B/A. Ft.	B/Ac.		
1	0.1 to 5. md	6658.3	6670.5	8.6	10.4	29.	23.	234.	2010.	0.9	7.7	37.	50.	291.	2500.	-0-	+
2	Above 6. md	6658.3	6670.5	2.6	13.7	38.	22.	404.	1050.	19.	49.	33.	59.	352.	920.	110.	+
1&2		6658.3	6670.5	11.2	11.2	31.	23.	273.	3060.	5.1	57.	35.	52.	306.	3420.	-0-	+



## EARLOUGHER ENGINEERING

### RESULTS OF CORE ANALYSES

COMPANY Lowry, et al Operating Account

WELL Federal No. 11-52-85

Sample No.	Depth Feet	Perm. Md.	Porosity Per Cent	Per Cent Saturation			Avg. Oil Content Bbl./A. Ft.	Remarks
				Oil	Water	Total		
32	6653.9	--	4.3	24.	76.	100.	81.*	
34	6654.5	--	--	--	--	--	--	
35	6654.9	--	7.9	11.	54.	65.	69.*	
38	6655.9	--	--	--	--	--	--	
39	6656.3	0.4	6.9	12.	54.	66.	62.*	
42	6657.3	IMP	3.5	38.	44.	82.	100.*	
43	6657.6	0.1	--	--	--	--	-- *	
45	6658.2	0.3	--	--	--	--	-- *	
46	6658.4	0.5	8.7	33.	31.	64.	220.	
48	6659.0	0.5	--	--	--	--	--	
49	6659.3	0.9	10.4	36.	16.	52.	290.	
53	6660.5	0.3	13.8	17.	22.	39.	190.	
54	6660.9	48.	--	--	--	--	--	
55	6661.3	18.	--	--	--	--	--	
56	6661.6	9.2	15.4	35.	20.	55.	420.	
57	6661.9	47.	--	--	--	--	--	
58	6662.3	IMP	--	--	--	--	-- *	
59	6662.6	0.3	6.3	23.	11.	34.	100.*	
60	6662.9	5.6	--	--	--	--	--	
61	6663.2	4.9	--	--	--	--	--	
62	6663.6	8.6	12.0	41.	24.	65.	380.	
63	6663.9	11.	--	--	--	--	--	
64	6664.2	0.8	--	--	--	--	--	
65	6664.5	2.6	13.1	30.	15.	45.	300.	
67	6665.2	1.1	--	--	--	--	--	
68	6665.5	0.1	9.1	35.	10.	45.	250.	
71	6666.3	0.8	--	--	--	--	--	
72	6666.6	1.5	10.6	34.	14.	48.	280.	
75	6667.7	1.0	10.5	19.	34.	53.	150.	
76	6668.0	0.5	--	--	--	--	--	
78	6668.6	0.9	9.0	19.	44.	63.	130.	
79	6669.1	IMP	--	--	--	--	-- *	
80	6669.4	cracked	--	--	--	--	--	
81	6669.6	0.6	9.2	29.	23.	52.	200.	
83	6670.3	1.8	9.2	33.	17.	50.	240.	
84	6670.7	0.1	--	--	--	--	-- *	
87	6671.6	0.1	4.7	36.	23.	59.	130.*	

## SUMMARY

Depth, Feet		Feet of Sand	Average Permeability	Average Porosity	Avg. Oil Sat.	Avg. Water Sat.	Avg. Oil Content Bbl./A. Ft.
From	To						

## RESULTS OF CORE ANALYSES

Page -2-

COMPANY Lowry, et al Operating Account

WELL Federal No. 11-52-85

Sample No.	Depth Feet	Perm. Md.	Porosity Per Cent	Per Cent Saturation			Avg. Oil Content Bbl./A. Ft.	Remarks
				Oil	Water	Total		
88	6671.9	IMP	--	--	--	--	-- *	
90	6672.7	IMP	5.2	25.	75.	100.	100.*	
91	6674.6	--	5.1	28.	72.	100.	110.*	
* Exclude from average								

## SUMMARY

Depth, Feet		Feet of Sand	Average Permeability	Average Porosity	Avg. Oil Sat.	Avg. Water Sat.	Avg. Oil Content Bbl./A. Ft.
From	To						

# EARLOUGHER ENGINEERING

## RESULTS OF LABORATORY FLOODING TESTS

COMPANY Lowry, et al Operating Account

LEASE Federal

WELL NO. 11-52-85

Sample No.	Depth	Porosity	Perm. Approx.	Before Flooding 1/			Max. Press. Psi.	Fresh Water Through C.C.	Time Min.	Flood Pot Residual			Flood Pot Oil Recovery Bbl./A. Ft.	Radial Perm. to Water, Md. @Psi		
				Oil Sat.	Water Sat.	Oil Content Bbl./A. Ft.				Oil Sat.	Water Sat.	Oil Content Bbl./A. Ft.		70.	410.	920.
*F-35	6654.9	7.9	--	21.	--	130.	70.	-0-	749.	21.	60.	130.	-0-	-0-		
*F-39	6656.3	6.9	0.4	18.	--	98.	70.	6.	749.	18.	65.	98.	-0-	0.005		
*F-42	6657.3	3.5	-0-	35.	--	94.	70.	5.	749.	35.	45.	94.	-0-	0.003		
F-46	6658.4	8.7	0.5	43.	--	290.	70.	27.	749.	43.	44.	290.	+	0.018	0.012	0.011
F-49	6659.3	10.4	0.9	34.	--	280.	70.	70.	749.	26.	45.	280.	+	0.033		
F-53	6660.5	13.8	0.3	26.	--	420.	70.	330.	749.	35.	58.	420.	+	0.25	0.19	0.17
F-56	6661.6	15.4	9.2	35.	--	170.	70.	22.	749.	35.	4.	170.	+	0.83	0.42	0.51
*F-59	6662.6	6.3	0.3	35.	--	290.	70.	206.	629.	31.	60.	290.	+	0.082	0.11	0.11
F-62	6663.6	12.0	8.6	31.	--	420.	70.	493.	629.	41.	50.	420.	-0-	0.245	0.004	0.004
F-65	6664.5	13.1	2.6	41.	--	320.	70.	12.	629.	45.	44.	320.	-0-	0.008	0.064	0.058
F-68	6665.5	9.1	0.1	45.	--	310.	70.	202.	629.	38.	54.	310.	+	0.006		
F-72	6666.6	10.6	1.5	38.	--	290.	70.	7.	629.	36.	43.	290.	+	0.004		
F-75	6667.7	10.5	1.0	36.	--	240.	70.	5.	629.	35.	44.	240.	+	0.028	0.04	0.08
F-78	6668.6	9.0	0.9	35.	--	230.	70.	33.	629.	32.	57.	230.	+	0.017	0.018	0.016
F-81	6669.6	9.2	0.6	32.	--	280.	70.	24.	629.	39.	52.	280.	+	0.011		
F-83	6670.3	9.2	1.8	39.	--	200.	70.	18.	555.	55.	24.	200.	-0-	0.132	0.107	0.114
*F-87	6671.6	4.7	0.1	55.	--							Average				
Samples above are fresh cores flooded with tap water, full diameter core.																
Samples below are dry cores, milled to 2-1/2" O. D. and flooded first with tap water and then with brine.																
F-51	6660.0	10.3	1.0	31.	--	250.	70.	43.	660.	30.	25.	240.	2	0.00	0.03	0.03
F-55	6661.3	17.7	48.	30.	--	410.	70.	3,607.	660.	29.	48.	400.	5.	1.32	1.11	0.95
F-61	6662.9	12.7	5.6	37.	--	360.	70.	4,982.	660.	36.	59.	350.	5.	2.37	1.40	1.04
F-64	6664.2	10.3	0.8	44.	--	350.	70.	1,253.	660.	44.	61.	350.	+	0.24	0.41	0.39
*F-70	6666.0	4.7	IMP	52.	--	190.	70.	27.	660.	52.	48.	190.	+	0.00	0.01	0.01
F-82	6670.0	8.0	0.2	36.	--	230.	70.	168.	660.	36.	58.	230.	+	0.03	0.05	0.07
F-86	6671.2	6.4	0.1	39.	--	200.	70.	68.	660.	39.	43.	200.	+	0.04	0.02	0.03
*F-89	6672.3	4.7	IMP	29.	--	110.	70.	-0-	660.	29.	36.	110.	+	0.00	0.00	0.01
* Not included in averages.																
Radial Perm. to Fresh Water Brine																
														30.	70.	70.
														0.84	0.50	0.42

1/ Unless otherwise noted, oil content and saturation before flooding equals flood pot oil recovery plus flood pot residual.

[illegible]

Lowry et al Operating Account

South Blanco Tocito Pool

PROPOSED EXPERIMENTAL PRESSURE MAINTENANCE PROGRAM

PURPOSE:

The purpose of the proposed experimental pressure maintenance program is to evaluate the possibilities of increasing ultimate oil recovery from the South Blanco Tocito Pool by the injection of water. Providing formation characteristics are adaptable to water injection, ultimate oil recovery will be increased by water displacing oil in the pore space, providing an extraneous energy source to move oil to the well bores, and provide for the more efficient use of gas presently in solution with the oil.

SOURCE OF WATER:

There are a number of water sands present in the area of the South Blanco Tocito Pool. Present plans contemplate the converting of an uneconomic Pictured Cliffs Gas well to a water supply well. This well (PC - 89) is located in the NW/4 SW/4 Section 3, T26N, R6W, Rio Arriba County, New Mexico. Water sands from 1700 feet to 2400 feet are considered good potential sources for injection water.

PROGRAM PROPOSED FOR EXPERIMENTATION:

It is proposed to inject initially 1500 barrels of water per day into the Tocito formation. One well, Federal T-134, will be used as an injection well providing the stipulated volume of water can be injected. If it is necessary to use two wells to provide sufficient injection capacity, Federal T-109 will also be converted. It is contemplated that maximum injection pressures will be 3000 p.s.i.

PROPOSED INJECTION WELLS:

Federal T-134

Location:	660FNL, 1980FWL, Sec. 10, T26N, R6W
Elevation:	6,550' DF
Drilling commenced:	April 29, 1950
Drilling completed:	July 19, 1950
Commenced producing:	August 21, 1952
Surface Pipe:	13 3/8" OD casing @ 312', with 350 sks cement
Intermediate Pipe:	9 5/8" OD casing @ 2,990', w/500 sks cement
Production Pipe:	7" OD casing @ 7210', w/300 sks cement.
	Milled out 7" casing 6728' - 6770' to produce from Tocito formation.
Total depth:	7,562 feet
Plugged back total depth:	6,770 feet

Federal T-134 (continued)

Acid Treatment: 1st treatment: 500 gallons mud acid  
2nd treatment: 2,000 gal. acid after shot  
Shot record: 120 quarts SMO  
Initial Potential: 37.9 barrels of oil per day.  
Present Production: Approximately 10 barrels of oil per day.

Federal T-109

Location: 660' FSL, 660' FWL, Sec. 3, T26N, R6W.  
Elevation: GL 6,484'  
Drilling commenced: February 23, 1952  
Drilling completed: March 30, 1952  
Commenced Producing: May 5, 1952  
Surface Pipe: 10 3/4" OD casing set @ 480' w/250 sks cement  
Production Pipe: 7 5/8" OD casing set @ 6,674' w/175 sks cement  
Tubing: 2" EUE set @ 6,700'  
Total depth: 6,735'  
Acid treatment: None  
Shot Record: Not shot  
Initial Potential: 135 barrels of oil per day.  
Present Production: Approximately 75 barrels of oil per day.

EXPANSION OF WATER INJECTION PROGRAM:

The expansion of the pressure maintenance program will depend on the success achieved for the experimental program. To maintain reservoir pressure on a fieldwide basis will require additional volumes of water to be injected and the use of additional water injection wells. It will be necessary to observe the experimental program for a period of time in order to determine the feasibility and proper planning of a fieldwide program.



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY  
P. O. Box 965  
Farmington, New Mexico

IN REPLY REFER TO:

July 3, 1953

Lowry et al Operating Account  
616 East Central Avenue  
Albuquerque, New Mexico

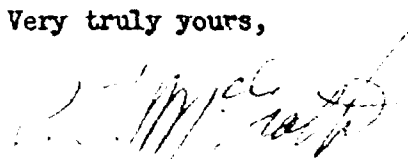
Gentlemen:

Receipt is acknowledged of your request of June 29, 1953, to attempt a pressure maintenance program by water injection in the South Elanco Tocito Pool.

Your proposed program is hereby approved.

Please submit, in duplicate, to this office a weekly report of your progress showing the amount of water injected daily, the injection pressure, the hourly rate of injection, the daily production, any changes in flowing pressure noted and any other pertinent data.

Very truly yours,

  
P. T. McGrath,  
District Engineer

PTMcGrath:lk

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PHOTO-COPIES  
By R. M. MITCHELL, Inc.  
2100 E. 11th St.



NEW MEXICO OIL CONSERVATION COMMISSION

SANTA FE, NEW MEXICO

IN THE MATTER OF THE APPLICATION  
OF LOWRY, ET AL OPERATING ACCOUNT  
FOR THE APPROVAL OF A PILOT PRES-  
SURE MAINTENANCE PROGRAM BY WATER  
INJECTION IN ONE OR BOTH OF TWO  
WELLS, SAID INJECTION WELLS LOCATED  
IN SW $\frac{1}{4}$ SW $\frac{1}{4}$  SECTION 3, NE $\frac{1}{4}$ NW $\frac{1}{4}$  SECTION  
10, TOWNSHIP 26 NORTH, RANGE 6 WEST  
IN THE SOUTH BLANCO-TOCITO POOL,  
RIO ARriba COUNTY, NEW MEXICO

*Case 555*

PETITION

TO THE OIL CONSERVATION COMMISSION  
SANTA FE, NEW MEXICO

COMES the undersigned, Lowry et al Operating Account with offices at 616 Central Avenue East, Albuquerque, New Mexico, and petitions this Commission for an order approving the institution of a pilot secondary recovery program in the South Blanco-Tocito Pool, Rio Arriba County, New Mexico by the injection of water in Lowry et al Operating Account's well Federal 1-134 located in the NE $\frac{1}{4}$ NW $\frac{1}{4}$  Section 10, or Federal 7-35-109 located SW $\frac{1}{4}$ SW $\frac{1}{4}$  Section 3, both in Township 26 North, Range 6 West, N.M.P.M., or both.

In support of which Petitioner would show the Commission as follows:

1. The South Blanco-Tocito Pool, Rio Arriba County, New Mexico has been defined by order of the Commission, and is productive of oil in commercial quantities from the Tocito sand encountered at a depth of approximately 6,600 feet.

2. That full geological information has heretofore been presented to the Commission on the South Blanco-Tocito Pool in Commission Case No. 537, which information Petitioner respectfully requests the Commission to take notice of in connection with this application.

3. That petitioner proposes to inject water at the rate of approximately 1,500 barrels per day, more or less, in either one

or both of the wells herein designated as water injection wells.

4. That said water injection is proposed as a pilot program for the purpose of determining the feasibility of a secondary recovery program at this stage in the development of the South Blanco-Tocito Pool.

5. That Petitioner is operator of all leases affected by the proposed order, and will be operator of the proposed project.

WHEREFORE Petitioner requests the Commission, after notice and hearing as required by law and the Rules and Regulations of the Commission, to enter its order approving water injection in Lowry et al Operating Account's Federal 1-134, NE $\frac{1}{4}$ NW $\frac{1}{4}$  Section 10, or Federal 7-35-109, SW $\frac{1}{4}$ SW $\frac{1}{4}$  Section 3, both in Township 26 North, Range 6 West, N.M.P.M., or both wells, as a pilot pressure maintenance program, together with such other provisions as in the judgment of the Commission may be deemed fit and proper.

Respectfully submitted,

LOWRY et al OPERATING ACCOUNT

By Jason W. Kellahin  
Jason W. Kellahin, Attorney  
P. O. Box 361  
Santa Fe, New Mexico

NEW MEXICO OIL CONSERVATION COMMISSION

SANTA FE, NEW MEXICO

IN THE MATTER OF THE HEARING  
CALLED BY THE OIL CONSERVATION  
COMMISSION OF THE STATE OF  
NEW MEXICO FOR THE PURPOSE OF  
CONSIDERING:

CASE NO. 555

ORDER NO. R-349

THE APPLICATION OF LOWRY ET AL  
OPERATING ACCOUNT FOR THE AP-  
PROVAL OF A PILOT PRESSURE  
MAINTENANCE PROGRAM BY WATER  
INJECTION IN ONE OR BOTH OF  
TWO WELLS, SAID INJECTION WELLS  
LOCATED IN SW $\frac{1}{4}$ SW $\frac{1}{4}$ , SEC. 3, AND  
NE $\frac{1}{4}$ NW $\frac{1}{4}$  SEC. 10, TOWNSHIP 26 N.  
RGE. 6 WEST, IN THE SOUTH BLANCO-  
TOCITO POOL, RIO ARriba COUNTY,  
NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION

This cause came on for hearing at 9 o'clock a.m. on July 16, 1953, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission".

Now, on this 27<sup>th</sup> day of July, 1953, the Commission, a quorum being present, having considered the testimony adduced at said hearing and the exhibits offered therein, and being fully advised in the premises,

FINDS:

1. That due notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

2. That the Petitioner's request to institute a pressure maintenance program in the South Blanco-Tocito Pool, Rio Arriba County, New Mexico, by water injection, utilizing either one or both of two proposed injection wells, is in the interests of conservation, will probably result in an increased production of oil that might otherwise be lost, thereby preventing waste, and that

correlative rights of others interested in the pool will be protected, and that the application should therefore be granted.

3. That a pressure maintenance program by water injection in the South Blanco-Tocito Pool is of an experimental nature, and periodic reports should be submitted to the Commission by the Petitioner, disclosing its acts and doings in the matter.

4. That in the event prorationing of oil is instituted in the South Blanco-Tocito Pool, the Commission recognizes that consideration should be given to loss of production by utilization of the two wells, Federal T-134, and Federal T-109 as injection wells, and that any proration order issued should recognize emergency conditions which might arise in the conduct of a pressure maintenance program by water flooding, and therefore such proration order should be flexible enough to cover such possible emergency conditions.

5. That subsequent to submission of this application, the well designation system in use by the Petitioner has been changed with approval of the Commission, and that the proposed injection wells, Federal 1-134 and Federal 7-55-109 are now designated as Federal T-134 and Federal T-109, respectively.

6. That no objection has been made to the granting of this application.

IT IS THEREFORE ORDERED:

1. That the application of Lowry et al Operating Account for permission to institute a pressure maintenance program in the South Blanco-Tocito Pool by injecting water into either or both Federal T-134, NE $\frac{1}{4}$ SW $\frac{1}{4}$ , Sec. 10, and Federal T-109, SW $\frac{1}{4}$ SW $\frac{1}{4}$ , Sec. 3, both in Township 26 North, Range 6 West, N.M.P.M. should be, and the same hereby is approved.

2. That the permission is hereby granted to inject water in said injection wells, water to enter the Tocito sands, producing horizon of the South Blanco-Tocito Pool, Rio Arriba County, New Mexico.

3. That in the event prorationing of oil production is instituted in the South Blanco-Tocito Pool, Rio Arriba County, New Mexico, the operator shall submit to the Commission a plan for transferring allowables from injection wells to other producing wells in the Pool, together with a plan which will, insofar as possible, take care of emergency conditions which may arise as a result of the proration of production in the pool.

4. That the Operator, Petitioner herein, shall submit monthly reports to the Commission showing the monthly oil production and water production, and the amount of water injected into the reservoir through each injection well bore.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

NEW MEXICO OIL CONSERVATION COMMISSION

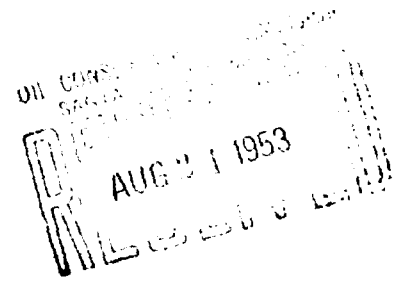
  
Edwin L. Mechem, Chairman

  
E. S. Walker, Member

  
R. R. Spurrier, Secretary

S E A L

August 20, 1953



Mr. R. R. Spurrier  
Post Office Box 871  
Santa Fe, New Mexico

Re: South Blanco Tocito Pool  
Rio Arriba County, N. M.

Dear Mr. Spurrier:

We acknowledge receipt of New Mexico Oil Conservation Commission Order #R-349, dated July 27, 1953, granting approval for Lowry et al Operating Account to conduct a pilot pressure maintenance program for the above captioned Pool. I wish to express my appreciation to the Commission for approving Lowry's plans for a pressure maintenance program for the Pool, and for the past cooperation you have given to our mutual problems.

Shipment of some of the equipment needed for our program has been delayed and it is believed that it will be the latter part of September, 1953, before we will be able to commence water injection.

Again I wish to express my appreciation for the Commission's approval.

Yours very truly,

(Signed) A. F. HOLLAND  
A. F. Holland

AFH:eg

cc: Mr. W. B. Hacey, Chief Engineer, Oil Conservation Commission  
Mr. Jason W. Kellahin, Attorney at Law, Santa Fe, New Mexico

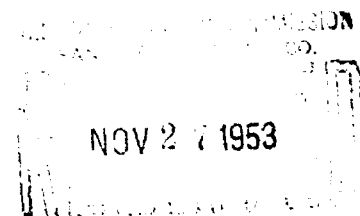
# Lowry Oil Company

616 Central Avenue S.E.

Albuquerque, New Mexico

November 25, 1953

*Case 555*



Mr. R. R. Spurrier  
N. M. Oil Conservation Commission  
Post Office Box 871  
Santa Fe, New Mexico

Re: Pressure Maintenance Program  
South Blanco Tocito Pool

Dear Mr. Spurrier:

As previously reported, water injection was commenced on October 7, 1953 for the South Blanco Tocito Pool, Rio Arriba County, New Mexico. During subject month, the Lowry et al Operating Account T-134 well was used for injection purposes, and a total of 14,511 barrels of water was injected. Production data for the Lowry operated properties, during the month of October, 1953, was as follows:

Well No.	Monthly Oil Production, Barrels	Monthly Water Production, Barrels	Monthly Gas Production, M.C.F.
T-179	4,405	0	6,235
T-132	2,410	0	2,060
T-157)	5,296	176	8,621
T-109)	1,753	0	
T-182)	0	0	0
T-207)	5,332	0	12,745
T-129)	5,349	0	
T-177)	2,406	0	16,710
T-127)	5,690	0	
T-85	429	0	671
T-125	2,184	0	2,350
	35,254	176	49,392

Mr. R. R. Spurrier  
N. M. Oil Conservation Commission

November 25, 1953

- 2 -

As could be expected, mechanical failures of equipment were numerous during the initial stages of this pressure maintenance program, and there was considerable down-time during the month. The water injected, therefore, during the month, was not as much as we had hoped to achieve.

Yours very truly,

*A. F. Holland*  
A. F. Holland

AFH:eg



OIL CONSERVATION COMMISSION  
P. O. BOX 871  
SANTA FE, NEW MEXICO

September 24, 1953

C  
O  
P  
Y

Mr. Thomas B. Scott, Jr., President  
Brookhaven Oil Company  
P. O. Box 644  
Albuquerque, New Mexico

Dear Mr. Scott:

This will acknowledge your letter of September 22nd  
with enclosed letter addressed to the Commission.

With reference to Case No. 555, which is Lowry's  
Pilot Water Injection in the South Blanco-Tocito Pool case, you  
are hereby advised that the case was properly advertised and due  
hearing was held. The proper time for the filing of your objection  
was at the time of the hearing.

You may, however, apply for re-hearing, as our rules  
and regulations provide and the Commission will be glad to consider  
your petition.

Very truly yours,

R. R. Spurrier  
Secretary and Director

RRS:vc

BROOKHAVEN OIL COMPANY

FIRST NATIONAL BANK BUILDING

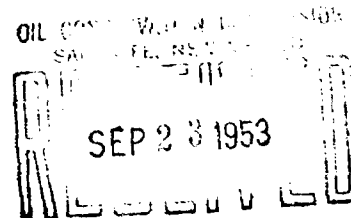
(MAIL) P. O. BOX 644

Albuquerque, New Mexico

PHONE 7-8853

TELETYPE AQ-96

September 22, 1953.



Mr. R. R. Spurrier  
New Mexico Oil Conservation Commission  
State Capitol  
Santa Fe, New Mexico

Dear Dick:

Would you please put the attached letter before the proper people and in the proper hands.

I believe it is very dangerous for the Commission to approve such projects just because there is no objection. I believe before such projects as spacing, repressuring, water flooding are determined ~~on~~ by your Commission, that all interested parties should be required to be notified by petition and that the Commission should not consider such projects without certification of such notices.

Very kindest regards,

BROOKHAVEN OIL COMPANY

*Tom Scott*

Thos. B. Scott, Jr.  
President

TFS:ms

Enc. - Letter to Commission

BROOKHAVEN OIL COMPANY

FIRST NATIONAL BANK BUILDING

(MAIL) P. O. BOX 644

Albuquerque, New Mexico

PHONE 7-8853

TELETYPE AQ-96

September 22, 1953.

New Mexico Oil Conservation Commission  
State Capitol  
Santa Fe, New Mexico

Att: Mr. R. R. Spurrier, Secretary

Dear Mr. Spurrier:

I notice in the Docket: Regular Hearing July 16, 1953, before your Commission, there was a Case No. 555 - Application of Lowry et al Operating Account for approval of a pilot pressure maintenance program for water injection in the South Blanco-Tocito Pool, Rio Arriba County.

I note the order of the Commission, Case No. 555, Order No. R-349, approving the application of Lowry for permission to institute a pressure maintenance program in the above area; that permission is granted to inject water in injection wells, etc. The Commission takes note that no objection was made to the granting of this application.

Please be advised that the Lowry Company contacted neither the Brookhaven Oil Company or the Dacresa Corporation either previous or after the hearing. These corporations own acreage adjoining and within the Lowry block in Township 26 North, Ranges 6 and 7 West, and also have overriding royalties on Lowry leases. Please be advised that the above corporations object very strongly to a water flooding program at this time and I believe that all interested parties should be notified of such a program by the Lowry people and a rehearing had before your Commission.

Very truly yours,

BROOKHAVEN OIL COMPANY

*Thos B Scott, Jr.*

Thos. B. Scott, Jr.  
President

DACRESA CORPORATION

*Thomas B Scott, Jr.*

Thomas B. Scott, Jr.  
President

TLS:s

Case  
555

Mr. Graham —

Is this OK —

And shall it

be processed?

Vancey

Mr. G. H. H.

7-28-53

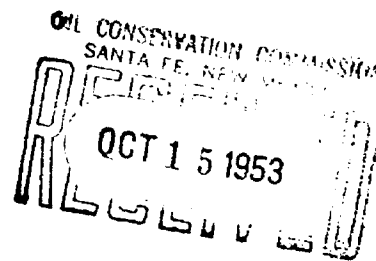
BUTLER PAPER COMPANY

# Lowry Oil Company

616 Central Avenue S.E.

Albuquerque, New Mexico

October 13, 1953



Mr. H. M. Spurrier  
New Mexico Oil Conservation Commission  
Post Office Box 971  
Santa Fe, New Mexico

Re: Pressure Maintenance Program  
South Glance Tooto Pool

Dear Mr. Spurrier:

This is to advise that water injection for the South Glance Tooto Pool was commenced on October 7, 1953, in conformance with New Mexico Oil Conservation Commission Order R-349, dated July 27, 1953. At the present time, well 1-104 is being used as a water injection well.

Monthly reports, as required by the above mentioned Order, will be furnished, commencing with the month of October, 1953.

The cooperation of the Oil Conservation Commission on matters relating to the South Glance Tooto Pool have been greatly appreciated.

Very truly,

*A. J. H. H. H.*

A. J. H. H. H.

Very truly,

A. J. H. H. H.

June 29, 1953

United States Department of the Interior  
Geological Survey  
Post Office Box 965  
Farmington, New Mexico

Attention: Mr. P. T. McGrath,  
District Engineer

Re: South Blanco Tocito Pool,  
Rio Arriba County, New Mexico

Gentlemen:

Lowry et al Operating Account proposes conducting an experimental pressure maintenance program for our properties of the South Blanco Tocito Pool, Rio Arriba County, New Mexico. This program contemplates the use of water as a repressuring medium and the source of water is to be from fresh water sands in the area, occurring from the surface to a depth of approximately 2400'. Initially it is proposed that approximately 1500 barrels of water per day be injected into the Tocito formation in order to help maintain reservoir pressure, thereby greatly increasing ultimate oil recovery from the pool. In order to accomplish this experimental program, it is proposed that either one or both of the following wells be converted to water injection wells:

SF 079035-A - Federal 1-134: This well is located 660' from the North line and 1900' from the West line of Section 10, Township 26N, Range 6W, Rio Arriba County, New Mexico. The well was completed at a plugged back total depth of 6770', and is productive from the Tocito formation for the interval 6728' - 6770'.

W 03551 - Federal 7-35-109: This well is located 660' from the South line and 660' from the East line of Section 3, Township 26N, Range 6W, Rio Arriba County, New Mexico. This well was completed at a total depth of 6735', and is productive from the Tocito formation for the interval 6684' - 6735'.

U. S. Department of the Interior  
Geological Survey

Attention: Mr. McGrath

- 2 -

June 29, 1953

Our plans are to attempt to inject the desired volumes of water into Federal T-134, and if sufficient quantities can be injected into this well then 7-35-109 will not be used as an injection well. As it is highly doubtful that this one well will provide sufficient injection capacity, approval is being requested to use either one or both of the above detailed wells for injection purposes.

We would like to emphasize that this program will be on an experimental basis to determine the feasibility of the injection of greater volumes of water in order to maintain reservoir pressure and increase ultimate oil recovery from the reservoir. As this pool produces from a solution gas drive, pressure maintenance, with water, if successful, will greatly increase ultimate oil recovery by providing additional energy to the reservoir.

Attached is a plat showing the wells of the South Blanco Tootie Pool and the proposed water injection wells. This program will be placed in effect within the next two or three months and we respectfully request your approval.

Yours very truly,

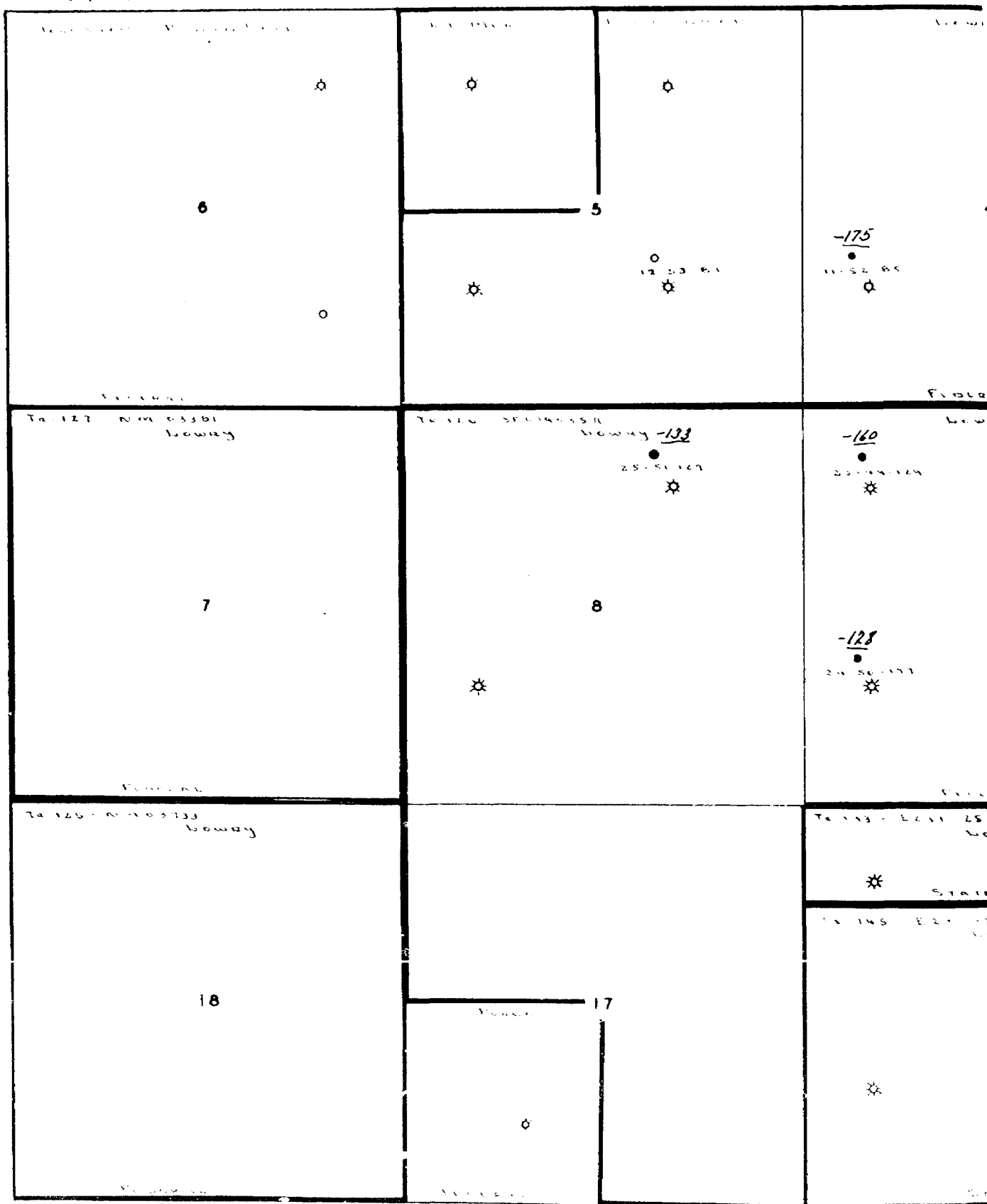
*A. V. Holland*  
A. V. Holland

AFH:eg  
encls

RECEIVED

JUL 1 1953

U. S. GEOLOGICAL SURVEY  
WASHINGTON, D. C.



LOWRY OIL COMPANY  
T 26 N - R 6 W  
RIO ARRIBA COUNTY, N. M.





TOCITO POOL  
COUNTY, N. M.

BEFORE THE  
OIL CONSERVATION COMMISSION  
STATE OF NEW MEXICO

-----

CASE 555: In the matter of the application of Lowry et al Operating Account for the approval of a pilot pressure maintenance program by water injection in one or both of two wells, said injection wells located in SW/4 SW/4 Section 3 and NE/4 NW/4 Section 10, Township 26 North, Range 6 West, NMPM, in the South Blanco-Tocito Pool, Rio Arriba County, New Mexico.

-----  
TRANSCRIPT OF HEARING

July 16, 1953

Date

BEFORE: Honorable Ed. L. Mechem, Governor  
Honorable E. S. Walker, Land Commissioner  
Honorable R. R. Spurrier, Director, OCC

STATE OF NEW MEXICO )


ss

COUNTY OF BERNALILLO)

I HEREBY CERTIFY That the within transcript of proceedings before the Oil Conservation Commission is a true record of the same to the best of my knowledge, skill, and ability.

DONE at Albuquerque, N. M., this 28th day of  
July 1953

My Comm. Ex.:  
August 4, 1956

  
E. E. Greeson  
Notary - Reporter

MR. SPURRIER: The next case would be 555.

MR. KELLAHIN: If the Commission please, Jason Kellahin, on behalf of Lowry et al Operating Account.

If the Commission please, this is an application for approval of pressure maintenance procedures by instituting water flooding on a test basis in the South Blanco-Tocito Pool. As the Commission will recall, we presented rather extensive geological and engineering information in connection with the application in Case 537. And it is with the thought that we would not care to burden the Commission with the repetition of a considerable amount of that testimony, we would like to ask the Commission to take notice of the geological and engineering testimony and exhibits that were offered in that case in connection with the application in this case, and particularly to those exhibits which reflect data on permeability and porosity and other engineering information which is pertinent to this case, including core analyses and well logs and surveys that have already been made and presented to the Commission.

MR. PURRIER: Very well.

          O          

A. F. HOLLAND,

having been first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Will you state your name, please?

A My name is A. F. Holland.

Q By whom are you employed, Mr. Holland?

A By Lowry Oil Company.

Q What is your position with Lowry Oil Company?

A I am an engineer.

Q Have you testified before the Commission in previous cases?

A Yes, sir, I have.

MR. KELLAHIN: Are the qualifications of the witness acceptable to the Commission?

MR. SPURRIER: They are.

Q Mr. Holland, could you describe briefly to the Commission what is proposed in connection with your pilot pressure maintenance program in the South Blanco-Tocito Pool?

A I have an exhibit prepared more or less outlining the plans for an experimental pressure maintenance program for the South Blanco field. (Marked Exhibit A.)

What we can propose to do is to initiate a pilot program for the injection of water into the South Blanco-Tocito Field or Pool to evaluate the feasibility of a field-wide pressure maintenance program.

We propose to select one well, our T-134, and inject approximately 1500 barrels a day of water into this well.

3b

There is some chance that the one well will not accept that much water. And in view of that we are requesting permission to also use our Federal T-109, if it is necessary to have an additional well to meet the required amount of water.

Q The designations you are giving those wells -- are they the same as reflected in the application, Mr. Holland?

A They are not. We have requested permission and received approval from the Commission to revise our well-numbering procedure. And we have retained only the last number of the former number system we used, preceded by the designation "T." In the application the well was designated as Federal 1-134.

Q What formation do you propose to inject water into?

A Into the Tocito formation.

Q Is water available for that purpose?

A We are at the present time converting an uneconomic gas well into a water supply well, and plan to test the well to determine what the water potential is.

Q Under whose control are the leases in the South Blanco-Tocito Pool, Mr. Holland?

A At the present time, Lowry Operating Account has the

only production from that pool.

Q They are the only producer?

A We are the only producer.

Q Have you prepared a plat showing the location of the input wells and the water source?

A We have a plat showing all of the producing wells and drilling wells of the South Blanco Pool. We would like to introduce it as an exhibit. (Marked Exhibit B.)

Q Does this plat, Mr. Holland, reflect the lease ownership as well as the location of the wells?

A Yes, sir, it does; it shows all producing wells from the pool and all drilling wells.

Q How are the proposed input wells designated on the plat?

A As T-109 and T-134.

Q Are those the wells that have the red circles?

A They are circled in red.

Q Where is the water source? Is that shown on the plat?

A It is the gas well just north of T-109. It isn't designated on this plat but it was our PC-89 well.

Q That would be in the southwest quarter of Section 3?

A In the southwest quarter of Section 3, Township 26 North, Range 6 West.

Q And does that plat show the ownership of the ad-

joining lease?

A Yes, sir.

Q Now, have you obtained any additional core information on the proposed input wells, Mr. Holland?

A Since the hearing for statewide field rules, we have cored and have had core analyses made of one additional well. That is our well T-85.

Q And do you have that with you?

A Yes, sir, I have.

(Marked Exhibit C.)

Q Have you any statement to make in regard to this core analysis?

A The only statement I wish to make is that tests-water injection tests - were conducted on the cores, and additional oil recovery from the formation was predicated on the basis of that.

Q Does this analysis reflect the possible success of the proposed program?

A It does. It predicts additional oil recovery by water injection.

Q Do you have logs of the proposed injection wells, T-134 and T-109?

A I have the written record of the oil log on both T-134 and T-109 that we would like to introduce.

(Marked Exhibits D and E.)

Q Do you have an electric well log on one of the wells?

A I have a Lane-Wells radioactive log on T-134 and a Schlumberger electrical log on T-109, that we would like to introduce. And in addition to those, I have the enlarged Schlumberger electrical log of the Tocito producing section from these wells.

Q Have you any statement you care to make in connection with these well logs?

A Just that they are surveys of the wells taken on completion, and do indicate the nature of the different formations in the South Blanco area.

(Marked Exhibits F, G and H.)

Q Now, have you made a temperature survey on these wells, Mr. Holland?

A At the time of completion, after setting the casing on top of -- or through -- the producing zones, we did conduct temperature surveys on the proposed water injection wells to assure that a good cementing operation was performed.

Q What would those surveys reflect in connection with the cementing job?

A They reflect that for Federal T-134 that the top of the cement was approximately 1900 feet above the Tocito formation, and for the well T-109, the top of the cement was ap-



proximately 1200 feet above the Tocito zone.

Q Do they reflect a good cementing program?

A They are an indication there was a successful cementing program, and during the production history of the wells no difficulty was encountered in production.

(Marked Exhibits I and J.)

Q Have you made any surveys of your proposed water well as the source of your water?

A We have a Schlumberger electrical log on the well we propose to convert to a water supply well. I would like to introduce that as an exhibit. And there are a series of water sands from 1700 feet to approximately 2400 feet that are considered good potential supply for injection water. This well was formerly the Lowry Operating Account Federal PC-89. And it is located in the southwest quarter of Section 3, Township 26 North, Range 6 West.

And I would like to state that we are testing the well. And if those tests prove successful, that will be the water source. If not, there are other water sands in the area we might test, to be tested.

(Marked Exhibit K.)

Q Is the ownership of the lands in the South Blanco-Tocito Pool - is that largely federal acreage?

A All producing wells at the present time are on Federal lease.

Q Have you presented this proposed water flooding program to the United States Geological survey?

A We have. We have outlined our program to them and requested and received their approval to conduct the program.

Q Do you have a letter to that effect?

A I have copies of the letter we received from the United States Geological Survey authorizing the program.

(Marked Exhibit L.)

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Q In the event the Commission sees fit to grant permission for this pressure maintenance program as now proposed, would there be any need for special consideration to take care of any special conditions which might arise?

A We believe the occasion will arise where, because of water injection, the field will need special treatment.

Q As a result of utilizing these two wells for water injection, will that reduce your production of oil from those wells?

A Those wells will no longer be oil producers. And at such time as the field is prorated, we would like to have the right to transfer the allowables from those wells to other wells of the pool.

Q Is there anything you care to add to your testimony, Mr. Holland.

A No, except as such time as the program has been in

effect for a period of time, and if it does prove successful, we will probably want to expand the program and attempt to maintain reservoir pressure on a fieldwide basis. And at such time we will request, need to request, additional injection wells, and other features.

Q In the event the Commission sees fit to grant this application, would you be willing to make periodic reports on the work that is done and the results thereof to the Commission?

A We are willing to furnish whatever reports the Commission desires.

MR. KELLAHIN: I believe that's all.

MR. SPURRIER: Are there any questions of this witness?

MR. KELLAHIN: I would like to offer at this time in evidence the exhibits which have been marked, Exhibits A through L.

MR. SPURRIER: Is there objection to these exhibits? Without objection, they will be admitted.

MR. KELLAHIN: That completes our case, if the Commission please.

MR. SPURRIER: If there is no question of the witness, the witness may be excused.

(Witness excused.)

MR. SPURRIER: We will take a five-minute recess  
and take the case under advisement.

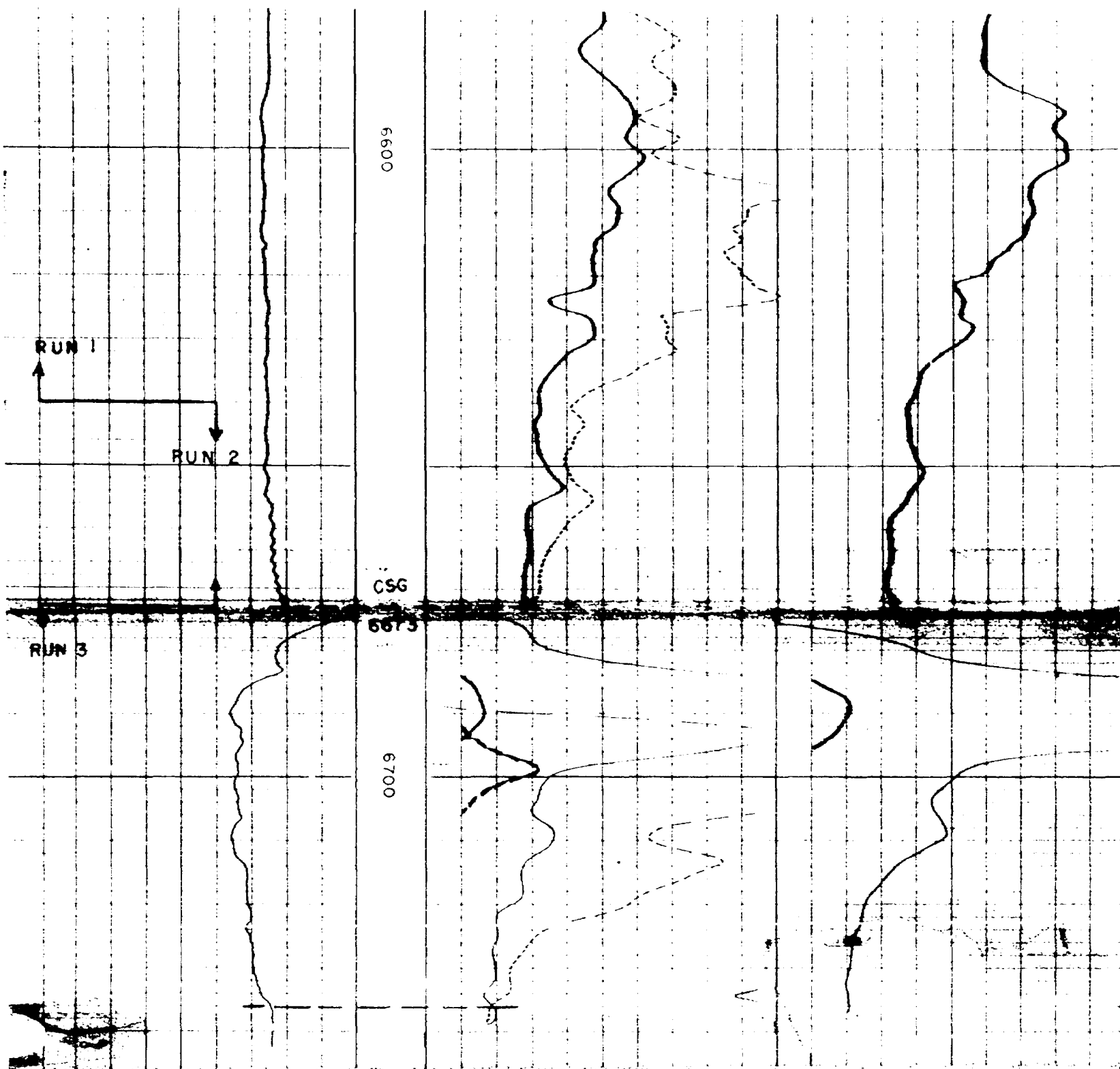
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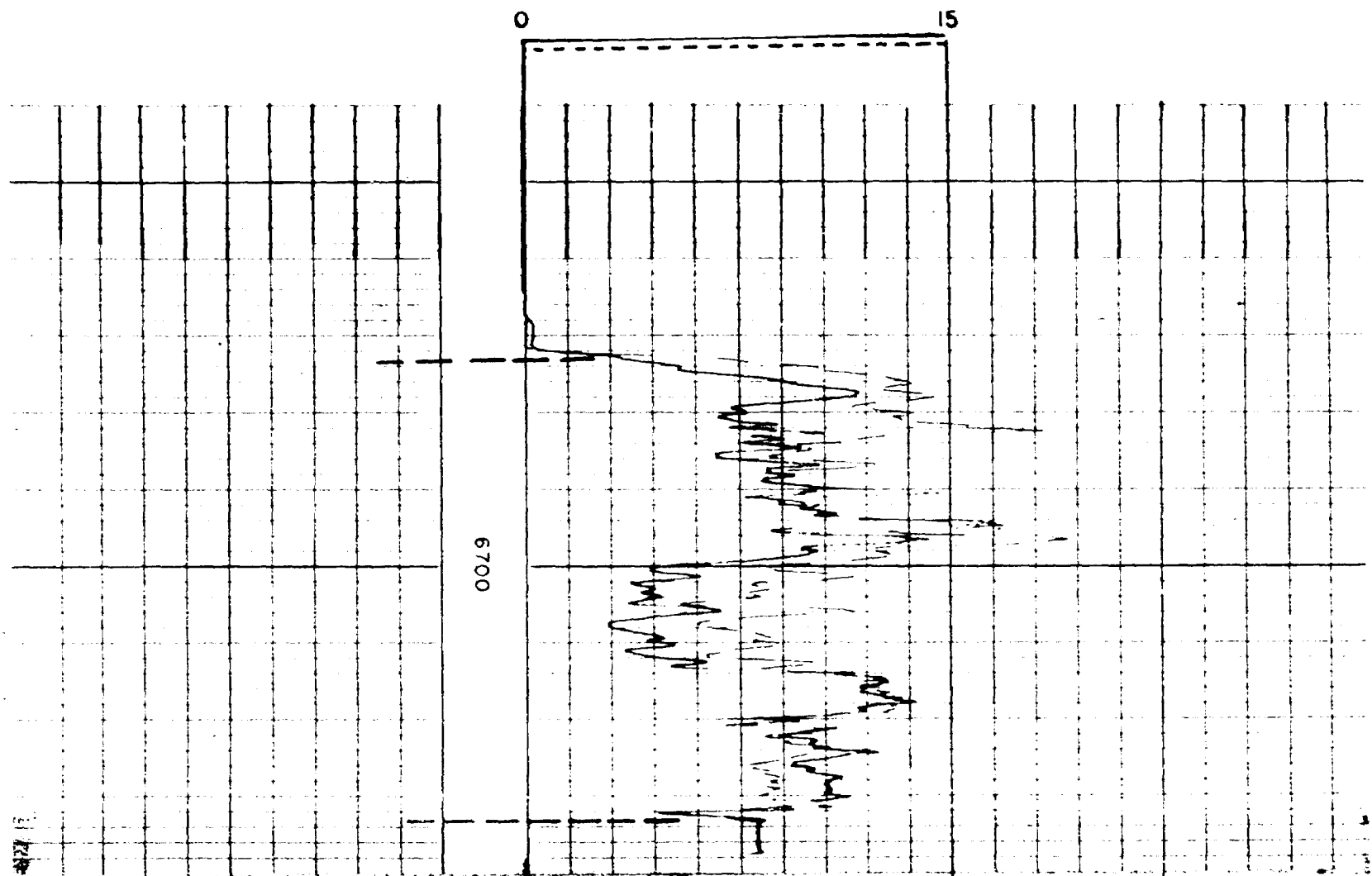
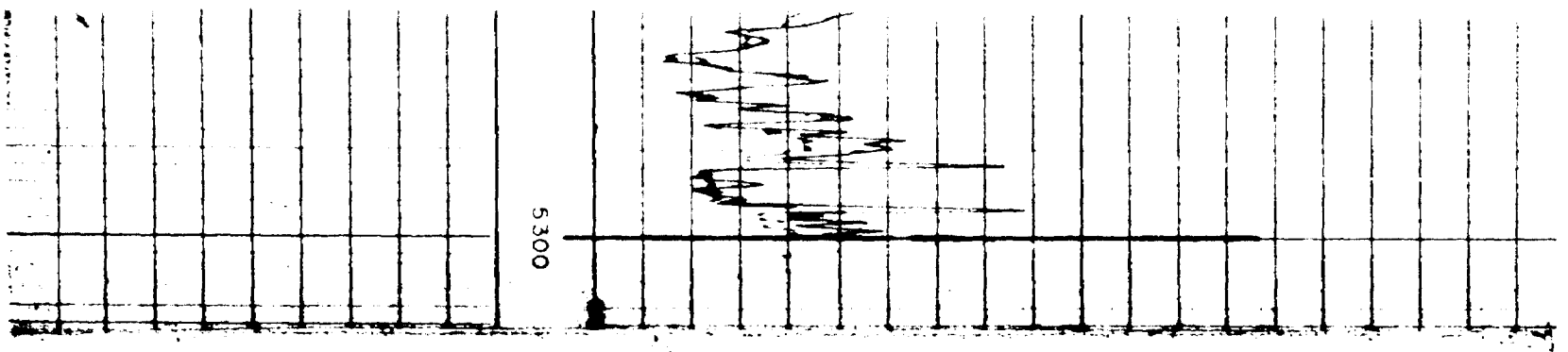
LOWRY ET AL  
FEDERAL 1-134  
ELEV 6550 OF

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C.R. 0  
6733

LATERAL

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100% NORMAL

15

LOWRY, J. H.  
FEDERAL 7-35-109  
SEC. 3-26N-6W  
R10 ANKISA, NEW MEXICO  
ELEV. 6434' G.L.