Core Analysis Report
for
LOWRY OIL COMPANY

Tocito Sandstone Reservoir

Federal 23-49-129

Pettigrew-Tocito Field
Rio Arriba County, N.M.

Petroleum Production Engineering Co.

Reservoir and Engineering Analyses

P. O. BOX 4111
TULSA, OKLAHOMA

February 20, 1953

FILE NO.
LO-834

Lowry Oil Company
616 East Central Avenue
Albuquerque, New Mexico

Attention: Mr. A. F. Holland

Subject: Routine Core Analysis
Tocito Sandstone Reservoir
Federal 23-49-129
Pettigrew Tocito Field
Rio Arriba County, New Mexico

Gentlemen:

You will find enclosed the results of the routine analysis of core samples from the Tocito Sandstone Reservoir in the Federal 23-49-129 Well in the Pettigrew Tocito Field. Both tabular and graphical presentations of the data will be found.

The core was taken between the depths of 6584.9 feet and 6627.2 feet using rotary coring tools. Samples of the recovered core, selected in the field by a representative of the Lowry Oil Company, were placed in airtight plastic bags, sealed in cans, and shipped to us for routine plug type core analysis.

In addition to the routine core analysis, gas-oil relative permeability measurements are to be effected on the four samples considered most representative of the formation. The delay in submitting the written report of the routine analysis was caused by the delay in obtaining the horizontal permeability measurements due to the special handling that was necessary to preserve the horizontal permeability plugs for the relative permeability measurements. Appropriate precautions were taken at all times to protect the plugs from exposure to air and the resulting oxidation of the residual oil.

All of the horizontal permeability measurements, with the exception of the measurements made on samples number 10, 22, 29, and 30 were made on large plugs which were drilled with a 1½ inch diameter core bit in order to obtain the maximum volume of sample for the relative permeability determinations. The horizontal permeability measurements reported for the above numbered exceptions were made on 3/4 inch diameter permeability plugs. All of the vertical permeability measurements were made on 3/4 inch diameter plugs.

Petroleum Production Engineering Co.

File No. LO-834

Arithmetic averages of the results of the analysis of the 48 samples reported herein are as follows:

Horizontal Permeability to Air (md.)	42
Vertical Permeability to Air (md.)	12
Porosity (% bulk volume)	12
Residual Oil (% pore space)	21
Total Water (% pore space)	37

This opportunity to be of service to you is sincerely appreciated.

Yours very truly,

Harold S. Deyo

HSDeyo:gad
Enclosures

Petroleum Production Laboratories, Inc.

TELEPHONE Victor-0871

Dallas, Texas

ADDRESS ALL CORRESPONDENCE TO P. O. BOX 2888

ADDRESS ALL SHIPMENTS TO 407 SOUTH HASKELL

February 19, 1953

File No. LO-834

Petroleum Production Engineering Co.
P. O. Box 4111
Tulsa, Oklahoma

Gentlemen:

Transmitted herewith are the tabular and graphical presentations of the results of the routine analysis of core samples taken from the Tocito Sandstone Reservoir in the Federal 23-49-129 Well in the Pettigrew Tocito Field, Rio Arriba County, New Mexico.

Respectfully yours,

Tom Sublette

Enclosures

Petroleum Production Laboratories, Inc.

DALLAS, TEXAS

CORE ANALYSIS REPORT

Company: Lowry Oil Company — Date: February 19, 1953

Well: Federal 23-49-129 — File No.: 10-834

Reservoir: Tocito Sandstone — Elevation:

Field: Pettigrew Tocito — Core Diameter (Inches): 3½

County: Rio Arriba — Coring Fluid:

State: New Mexico — Remarks:

NOTE: Permeability results which are less than md. are reported as zero.

Sample Number	Actual Depth, Feet	Description of Formation	PERMEABILITY Millidarcies		POROSITY %	LIQUID SATURATION % Pore Space		REMARKS
			Horizontal	Vertical		Residual Oil	Total Water	
1	6584.9-85.5	ls	0.1	0.1	4.3	9.3	60.5	w/sh strks
2	6585.5-86.0	ls	0.2	0.3	5.2	23.1	44.2	w/sh strks
3	6586.0-86.6	vy shy ls	0.3	0.2	8.7	29.9	48.3	
	6586.6-86.9	*						
4	6586.9-87.2	vy shy ls	1.1	1.0	12.7	18.9	26.0	
5	6587.2-87.6	vy shy sl cal ss	2.1	1.4	12.7	17.3	28.3	
6	6587.6-88.1	vy shy sl cal ss	2.5	0.4	13.2	18.9	24.2	
7	6588.1-88.6	vy sdy ls	7.0	0.4	11.8	20.3	28.8	
8	6588.6-89.2	cal ss	5.0	2.9	14.2	17.6	27.5	
9	6589.2-89.8	vy shy fg ss	10.5	4.3	13.3	19.5	32.3	
10	6589.8-90.1	vy shy fg ss	0.1	78	18.1	19.3	28.2	w/sh lam
	6590.1-90.2	*						
11	6590.2-90.7	vy cal fg ss	425	59	22.3	22.4	32.7	w/sh lam
12	6590.7-91.3	fg ss	192	90	20.8	26.4	33.7	
13	6591.3-91.8	fg ss	341	22	20.9	17.7	35.9	
	6591.8-92.0	*						
14	6592.0-92.6	fg ss	415	5.4	20.5	22.9	43.4	
15	6592.6-93.1	fg ss	203	48	19.0	22.1	37.9	w/sh lam
16	6593.1-93.7	fg ss	144	3.3	17.6	14.2	35.2	w/sh lam
17	6593.7-94.3	fg ss	4.6	62	17.1	13.5	35.7	w/sh lam
	6594.3-94.4	*						
18	6594.4-95.0	fg ss	221	40	18.6	19.9	32.3	
	6595.0-95.1	*						
19	6595.1-95.7	fg ss	2.3	0.5	13.7	23.4	34.3	w/sh lam
20	6595.7-96.3	ls	0.4	82	9.5	17.9	31.6	
21	6596.3-96.7	vy cal fg ss	1.4	3.3	13.3	25.6	33.8	
	6596.7-96.8	*						
22	6596.8-97.2	fg ss	18	4.0	14.9	20.1	31.5	
23	6597.2-98.0	vy shy fg ss	3.7	0.4	10.1	12.9	46.5	
	6598.0-98.2	*						
24	6598.2-99.0	vy shy fg ss	3.6	2.1	12.1	20.7	30.6	
25	6599.0-99.6	ls	1.8	76	12.7	25.2	22.0	
26	6599.6-00.2	cal fg ss	4.7	3.1	11.6	14.7	26.7	w/sh lam
	ARITHMETIC AVERAGES							

Petroleum Production Laboratories, Inc.

DALLAS, TEXAS

CORE ANALYSIS REPORT

Company: Lowry Oil Company — Date: February 19, 1953

Well: Federal 23-49-129 — File No.: LO-834

Reservoir: Tocito Sandstone — Elevation:

Field: Pettigrew Tocito — Core Diameter (Inches): 3½

County: Rio Arriba — Coring Fluid:

State: New Mexico — Remarks:

NOTE: Permeability results which are less than md. are reported as zero.

Sample Number	Actual Depth, Feet	Description of Formation	PERMEABILITY Millidarcies		POROSITY %	LIQUID SATURATION % Pore Space		REMARKS
			Horizontal	Vertical		Residual Oil	Total Water	
27	6600.2-00.7	cal fg ss	1.8	0.3	10.3	15.5	47.6	
28	6600.7-01.3	cal fg ss	1.1	0.4	8.0	21.3	18.8	
	6601.3-01.4	*						
29	6601.4-01.8	cal fg ss	0.1	0.4	7.3	21.9	20.5	
30	6601.8-02.4	vy shy fg ss	0.8	0.1	9.7	12.4	54.6	
	6602.4-03.2	*						
31	6603.2-03.8	sl cal vy fg ss	1.0	0.2	8.4	13.1	56.0	
	6603.8-07.4	*						
32	6607.4-08.0	shy ls	0.5	0.2	7.7	22.1	62.3	
	6608.0-08.6	*						
33	6608.6-09.1	shy ls	0.3	0.3	6.2	6.5	69.4	
	6609.1-09.7	*						
34	6609.7-10.0	shy cal fg ss	0.6	0.2	6.6	6.1	74.2	
	6610.0-14.5	*						
35	6614.5-14.9	vy shy cal fg ss	1.4	0.4	10.1	30.7	34.7	
	6614.9-15.1	*						
36	6615.1-15.7	vy shy cal fg ss	1.6	0.4	9.4	26.6	34.0	
37	6615.7-16.2	shy cal fg ss	1.2	0.2	9.9	23.2	39.4	
38	6616.2-16.7	shy vy fg ss	1.0	0.3	9.5	27.4	35.8	
39	6616.7-17.0	shy fg ss	0.8	0.2	8.0	21.3	45.0	
40	6617.0-17.4	shy fg ss	1.0	0.3	8.3	22.9	36.1	
41	6617.4-18.0	cal fg ss	2.8	0.4	12.4	25.8	40.3	w/sh lam
	6618.0-21.1	**						
42	6621.1-21.7	cal fg ss	2.2	0.4	15.2	33.6	36.8	w/sh lam
43	6621.7-22.5	cal fg ss	1.5	0.5	12.7	16.5	24.4	w/sh lam
44	6622.5-23.1	cal fg ss	0.3	0.6	11.1	21.6	23.4	w/sh lam
	6623.1-23.4	*						
45	6623.4-24.0	ls	0.2	0.3	7.9	30.4	36.7	
	6624.0-24.4	*						
46	6624.4-25.1	ls	0.8	0.5	9.9	19.2	32.3	
47	6625.1-25.6	fg ss	2.9	0.5	13.0	31.5	33.1	w/sh lam
	ARITHMETIC AVERAGES							

Petroleum Production Laboratories, Inc.

DALLAS, TEXAS

CORE ANALYSIS REPORT

Company: Lowry Oil Company — Date: February 19, 1953

Well: Federal 23-49-129 — File No.: LO-834

Reservoir: Tocito Sandstone — Elevation:

Field: Pattigrew Tocito — Core Diameter (Inches): 3½

County: Rio Arriba — Coring Fluid:

State: New Mexico — Remarks:

NOTE: Permeability results which are less than md. are reported as zero.

Sample Number	Actual Depth, Feet	Description of Formation	PERMEABILITY Millidarcies		POROSITY %	LIQUID SATURATION % Pore Space		REMARKS
			Horizontal	Vertical		Residual Oil	Total Water	
	6625.6-26.8	*						
48	6626.8-27.2	ls	0.4	0.5	10.6	22.6	25.5	
	ARITHMETIC AVERAGES		42	1[illegible]	12	21	37	

* The core from this depth interval was not received.

** The core from this depth interval was reported to have been lost.

Petroleum Production Laboratories, Inc.

LABORATORY AND RESERVOIR ENGINEERING ANALYSES

DALLAS, TEXAS

COREGRAPH

Company: Lowry Oil Company

Well: Federal 23-49-129

Field: Pettigrew Tocito

Reservoir: Tocito Sandstone

County: Rio Arriba

State: New Mexico

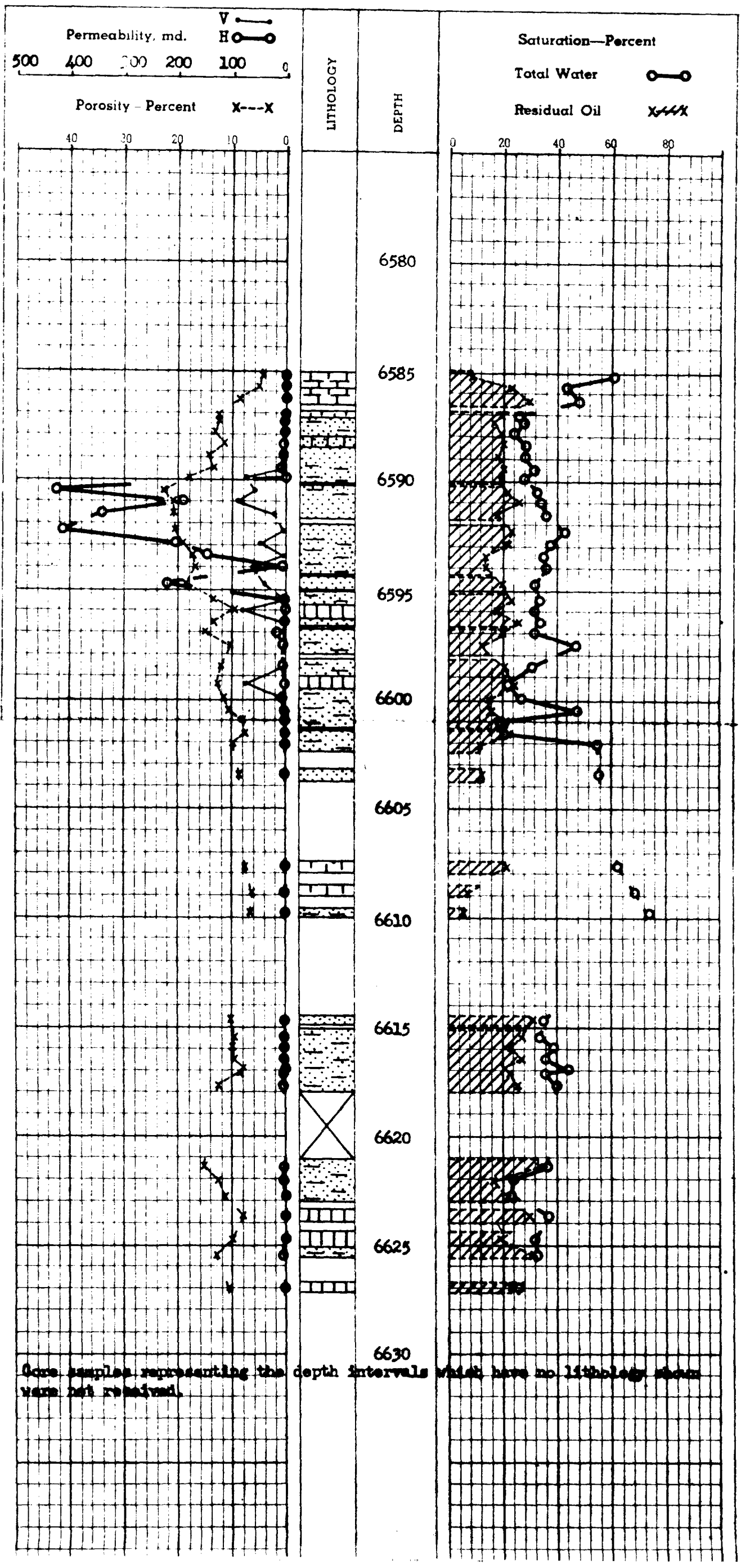
Elev:

File: LO-834

Date: February 19, 1953

Drilling Fluid:

Remarks:



Core samples representing the depth intervals which have no lithology shown were not received.

Petroleum Production Engineering Co.

Reservoir and Engineering Analyses

P. O. BOX 4111
TULSA, OKLAHOMA

April 22, 1953

FILE NO.
LO-853

Lowry Oil Company
616 East Central Avenue
Albuquerque, New Mexico

Attention: Mr. A. F. Holland

Subject: Routine Permeability and
Porosity Determinations
Tocito Sandstone Reservoir
Federal 24-50-177
Pettigrew Tocito Field
Rio Arriba County, New Mexico

Gentlemen:

The following pages present the results of the routine permeability and porosity determinations made on samples of cores from the Tocito Sandstone Reservoir in the Federal 24-50-177 Well in the Pettigrew Tocito Field. Both tabular and graphical presentations of the data will be found.

The core was taken between the depths of 6604.2 feet and 6616.4 feet using rotary coring tools. Samples of the recovered core were selected in the field by a representative of the Lowry Oil Company, sealed in cans, and submitted for combination special and routine analysis.

As was requested, an analysis was performed on each section of core received. The following measurements were made:

1. Vertical permeability measurement on a full size section of core.

2. Porosity measurement on the full size section of core used in Test 1 above.

3. Horizontal permeability measurement on a $1\frac{1}{2}$ inch diameter plug drilled from the original full size section of core.

4. Porosity measurement on a plug drilled from the original full size section of core.

The results are arranged on the tabular data sheets in the order of increasing depth. A summary of the results follows:

1. The first column of figures lists the sample numbers.

2. The second column indicates the depths from which the samples were taken.

3. The next column gives the lithology of the samples.

4. The fourth column of figures lists the vertical permeabilities to air as measured on the full size core section. These values range from a minimum of 0.01 md. to a maximum of 418 md. and average 40 md.

5. The fifth column lists the porosities as measured on the full size core section. These values vary from 4.3% to 23.2% and average 11.7%.

6. Permeabilities to air as measured on the $1\frac{1}{2}$ inch diameter horizontal plug drilled from the full size core section appear in the next column. These values vary from a minimum of 0.06 md. to a maximum of 981 md. and average 146 md.

7. The last column lists the porosities as measured on a plug taken from the original full size core section. These values vary from 4.6% to 23.8% and average 12.6%.

The graphical presentations of the results will be found following the tabular data. The first graph depicts the results determined from the full size core analysis and the second graph depicts the results determined from the plug analysis.

We sincerely appreciate this opportunity to be of service to you and hope that we may have the opportunity to serve you again in the future.

Yours very truly,

Harold S. Deyo

HSDeyo:gad
Enclosures

Petroleum Production Laboratories, Inc.

TELEPHONE Victor-0871

Dallas, Texas

ADDRESS ALL CORRESPONDENCE TO P. O. BOX 2856

ADDRESS ALL SHIPMENTS TO 407 SOUTH HASKELL

April 21, 1953

File No. LO-853

Petroleum Production Engineering Co.
P. O. Box 4111
Tulsa, Oklahoma

Gentlemen:

You will find enclosed the tabular data and graphs showing the results of the combination special and routine core analysis made on samples of cores from the Tocito Sandstone Reservoir in the Federal 24-50-177 Well, Pettigrew Tocito Field, Rio Arriba County, New Mexico.

Yours very truly,

Tom Lauderdale

Enclosures

Petroleum Production Laboratories, Inc.

DALLAS, TEXAS

ROUTINE PERMEABILITY AND POROSITY DETERMINATIONS

Company: Lowry Oil Company — Date: April 22, 1953

Well: Federal 24-50-17 — File No.: LO-853

Reservoir: Tocito Sandstone — County: Rio Arriba

Field: Pettigrew Tocito — State: New Mexico

Sample Number	Depth (Ft.)	Description of Formation	Full Size Core Analysis		Plug Analysis	
			Vertical Air Permeability (md.)	Porosity (%)	Horizontal Air Permeability (md.)	Porosity (%)
1	6604.2-04.7	vy fg cal ss	0.01	5.7	0.10	7.2
2	6604.7-05.2	shy ls - dense	0.04	4.3	0.25	4.7
3	6605.2-05.7	shy ls - dense	0.05	6.2	0.22	5.6
4	6605.7-06.2	shy ls - dense	0.05	8.7	0.26	7.3
5	6606.2-06.5	sdy shy ls - dense	0.03	5.4	0.11	7.8
6	6606.5-06.7	sdy shy ls - dense	*0.04	*6.1	***0.06	6.0
7	6606.7-07.2	shy ls - dense	0.03	8.0	0.10	6.5
8	6607.2-07.6	vy fg shy cal ss	0.04	9.8	0.43	12.0
9	6607.6-08.0	vy fg silty ss	0.22	10.3	0.78	11.3
10	6608.0-08.3	vy fg shy ss	*0.19	*11.1	***0.35	12.5
11	6608.3-08.5	vy fg shy ss	0.06	12.7	0.41	11.0
12	6608.5-09.0	fg shy ss	0.08	10.5	0.42	11.0
13	6609.0-09.5	vy fg shy ss	0.05	10.4	0.24	11.5
14	6609.5-10.5	vy fg shy ss-fractured	**8.1	11.9	0.38	13.5
15	6610.5-10.8	fy shy ss	0.07	10.2	0.20	13.0
16	6610.8-11.0	vy fg shy cal ss	*0.04	*6.3	***0.07	6.2
17	6611.0-11.5	vy fg shy cal ss	0.43	7.0	0.23	9.3
18	6611.5-11.9	fg shy ss	*0.12	*7.3	0.17	7.7

ROUTINE PERMEABILITY AND POROSITY DETERMINATIONS

Sample Number	Depth (Ft.)	Description of Formation	Full Size Core Analysis		Plug Analysis	
			Vertical Air Permeability (md.)	Porosity (%)	Horizontal Air Permeability (md.)	Porosity (%)
19	6611.9-12.2	fg shy ss	*0.09	*5.5	0.17	4.6
20	6612.2-12.7	fg ss	*14	*18.2	46	19.0
21	6612.7-13.0	fg ss	0.71	19.8	10	21.8
22	6613.0-13.3	fg ss	183	23.2	442	23.8
23	6613.3-13.9	fg ss	12	21.0	760	22.8
24	6613.9-14.2	fg ss	418	22.0	778	23.1
25	6614.2-14.5	fg ss	335	21.5	981	22.1
26	6614.5-15.0	fg sl shy ss	221	20.2	821	23.8
27	6615.0-15.4	fg ss	9.2	18.6	247	21.6
28	6615.4-15.8	fg ss	8.1	18.3	289	18.1
29	6615.8-16.1	shy ls - dense	0.04	6.9	0.24	8.4
30	6616.1-16.4	ls - dense	0.07	5.1	0.13	5.2
Arithmetic Averages			40	11.7	146	12.6

Note: In the two columns falling under the heading of "Full Size Analysis", several of the results are preceded by the symbol *. This indicates that it was not possible to perform an analysis on the full size core section and 1½ inch diameter vertical permeability plugs were drilled and analyzed. The sample preceded by the symbol ** had a vertical fracture extending through the entire length of the section which caused the permeability to be high in comparison with the other samples of similar structure.

In the "Air Permeability" column under "Plug Analysis" the symbol ***, indicates that 3/4 inch diameter horizontal permeability plugs were drilled and analyzed instead of 1½ inch diameter plugs.

Petroleum Production Laboratories, Inc.

CORE AND FLUID ANALYSES

DALLAS, TEXAS

COREGRAPH

Company: Lowry Oil Company

Well: Federal 24-50-177

Field: Pettigrew Tocito

Reservoir: Tocito Sandstone

County: Rio Arriba

State: New Mexico

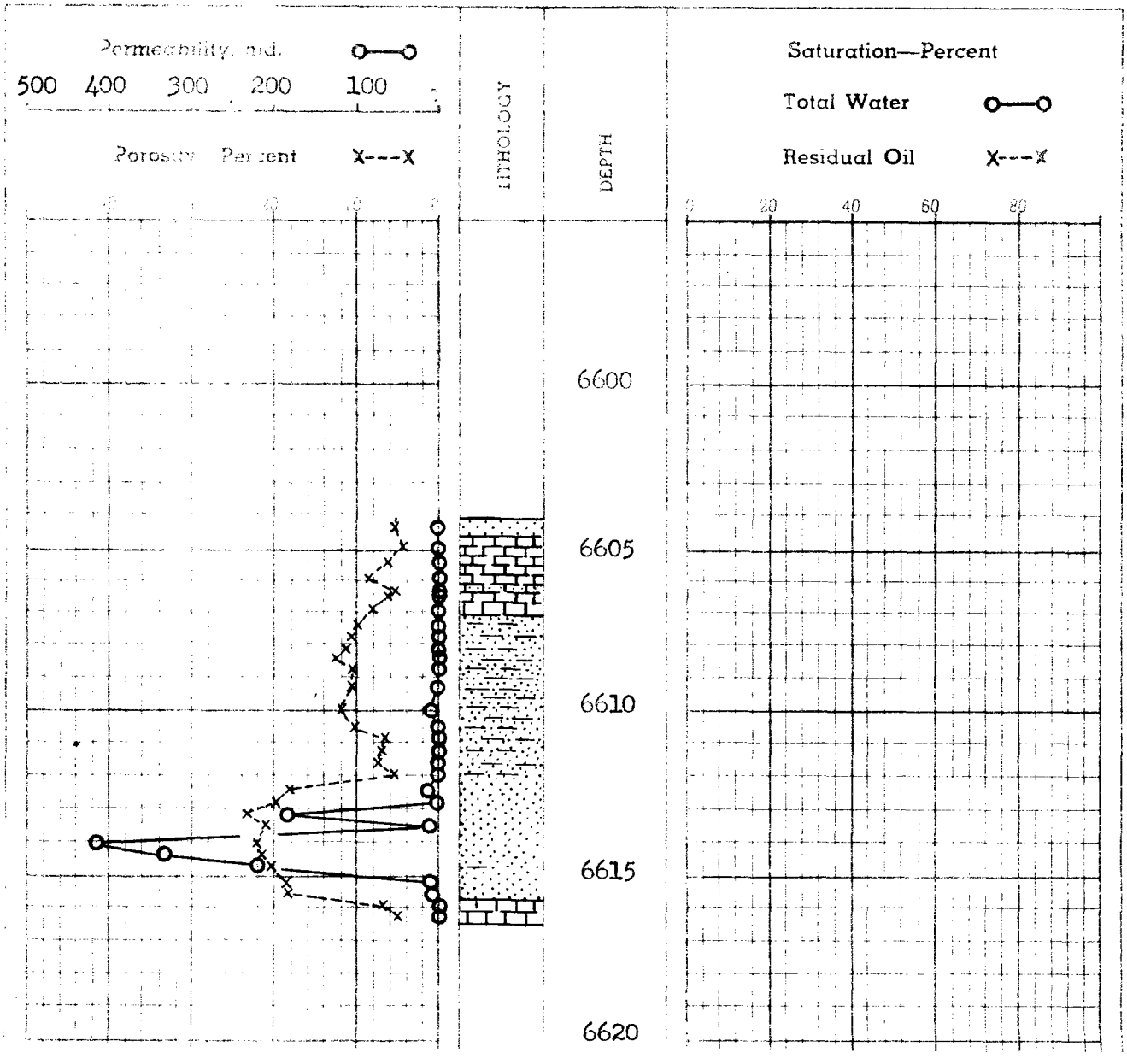
Elev:

File: LO-853

Date: April 21, 1953

Drilling Fluid:

Remarks: Results obtained from full size core analysis



Petroleum Production Laboratories, Inc.

LABORATORY AND RESERVOIR ENGINEERING ANALYSES

DALLAS, TEXAS

COREGRAPH

Company: Lowry Oil Company

Well: Federal 24-50-177

Field: Pettigrew Tocito

Reservoir: Tocito Sandstone

County: Rio Arriba

State: New Mexico

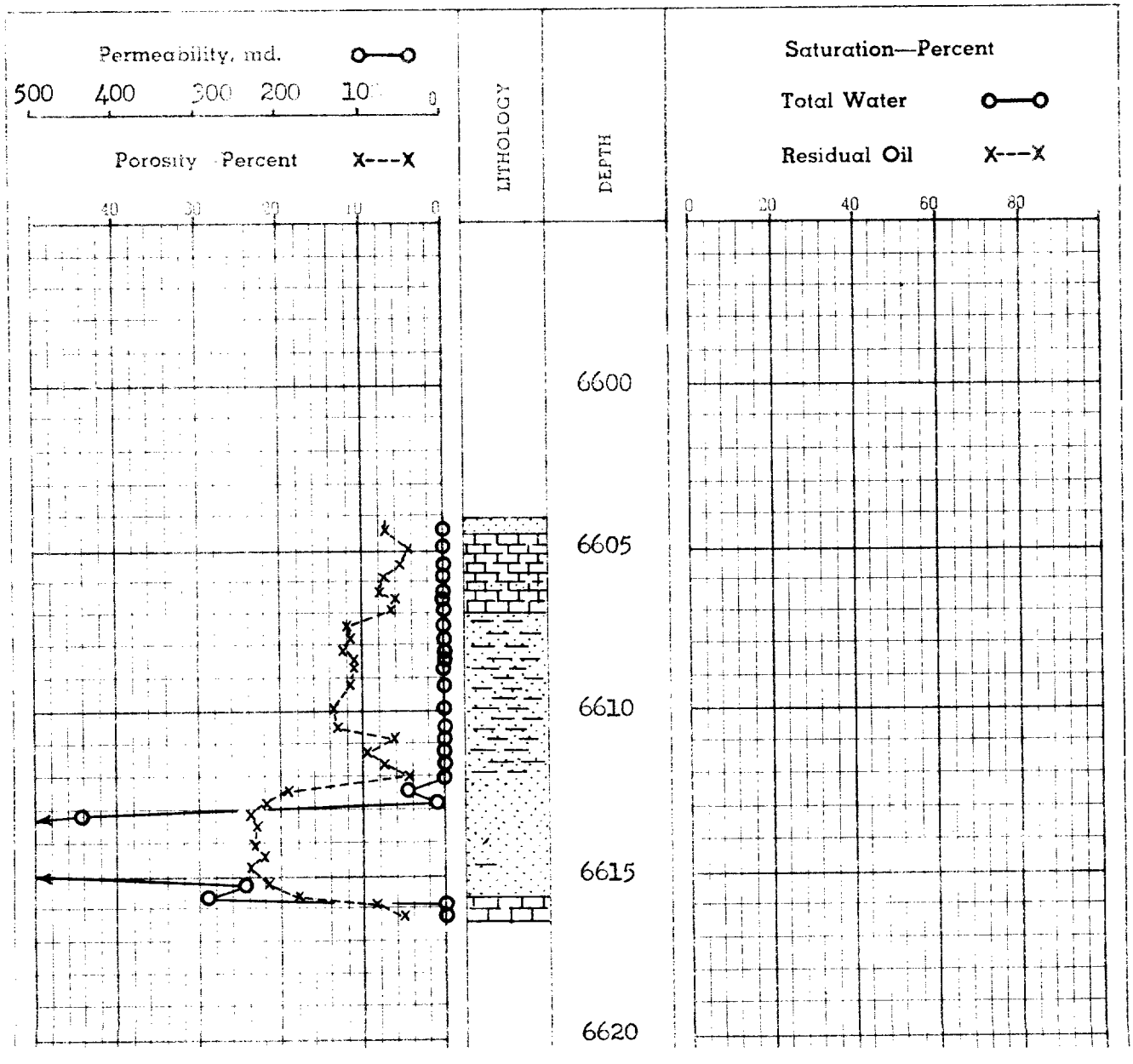
Elev:

File: LO-863

Date: April 21, 1953

Drilling Fluid:

Remarks: Results obtained from plug analysis



760
778
981
821

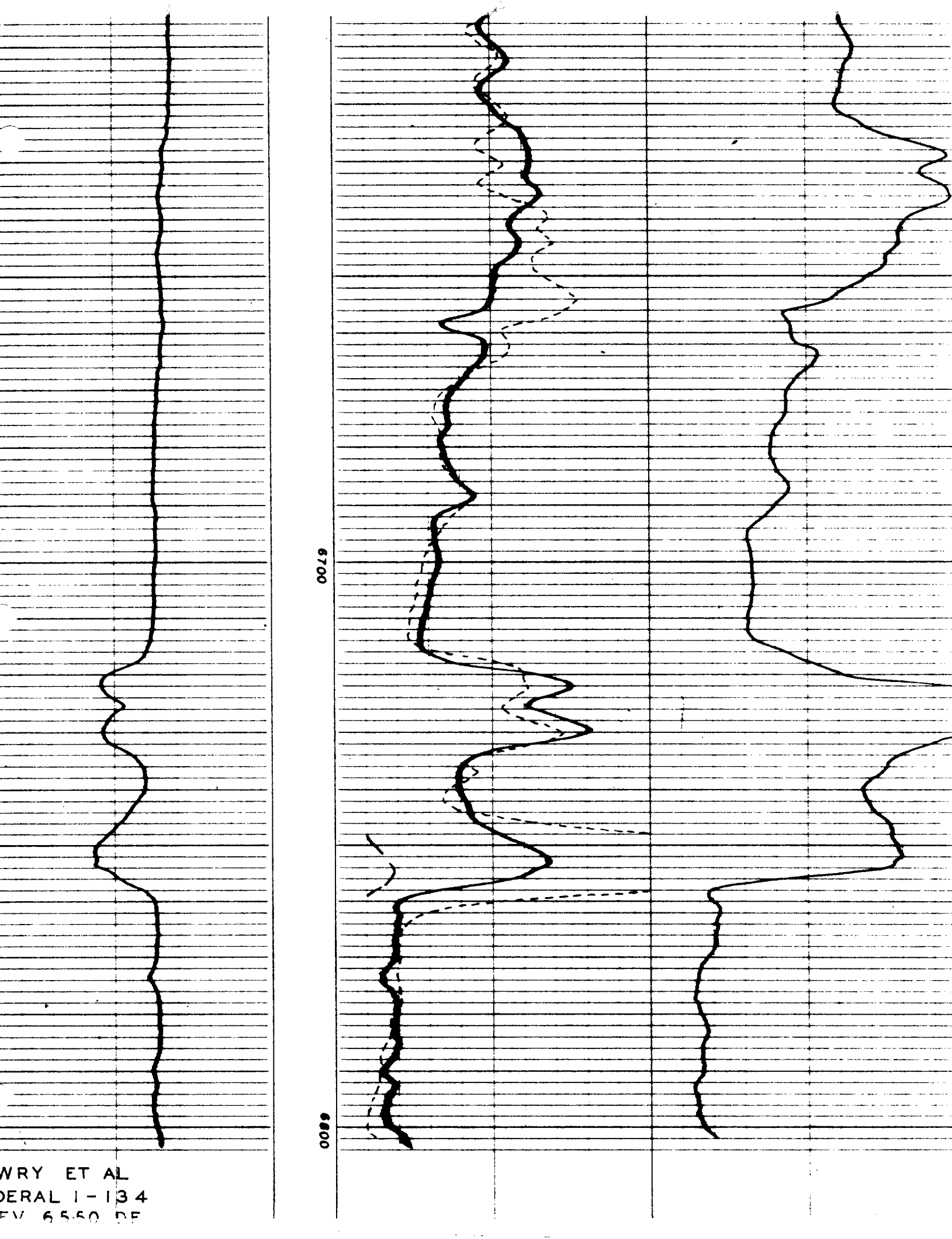
Lowry et al Operating Account

Schlumberger Electric Logs Surveys
and
Schlumberger Microlog Surveys
of
Tocito Sand

- - - - - - - - - - -

Pettigrew-Tocito Field
Rio Arriba County, N.M.

Well No.	Top of Tocito Sand	Elevation	Subsea Datum Top of Tocito Sand
Federal 1-134	6,718	6,550	-168
Federal 2-179	6,622	6,507	-115
Federal 4-13-132	6,676	6,515	-161
Federal 19-34-157	6,819	6,654	-165
Federal 7-35-109	6,682	6,494	-188
Federal 21-40-182	6,705	6,561	-144
Federal 22-45-207	6,643	6,506	-137
Federal 23-49-129	6,583	6,423	-160
Federal 24-50-177	6,605	6,477	-128
Federal 25-51-127	6,629	6,493	-136
State 1-268	6,602	6,514	-88



WRY ET AL
DERAL 1-134
EV. 6550 DF

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THOS. W. DOSWELL
SCOTT - FEDERAL NO. 2
SEC 9 — 26N — 6W
RIO ARRIBA CO., N.M.

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AMPLIFIED NORMAL

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L NRY ET AL
FEDERAL 4-13-132
SEC. 9-26N-6W
RIO ARRIBA, NEW MEXICO
ELEV. 6502 G.L.
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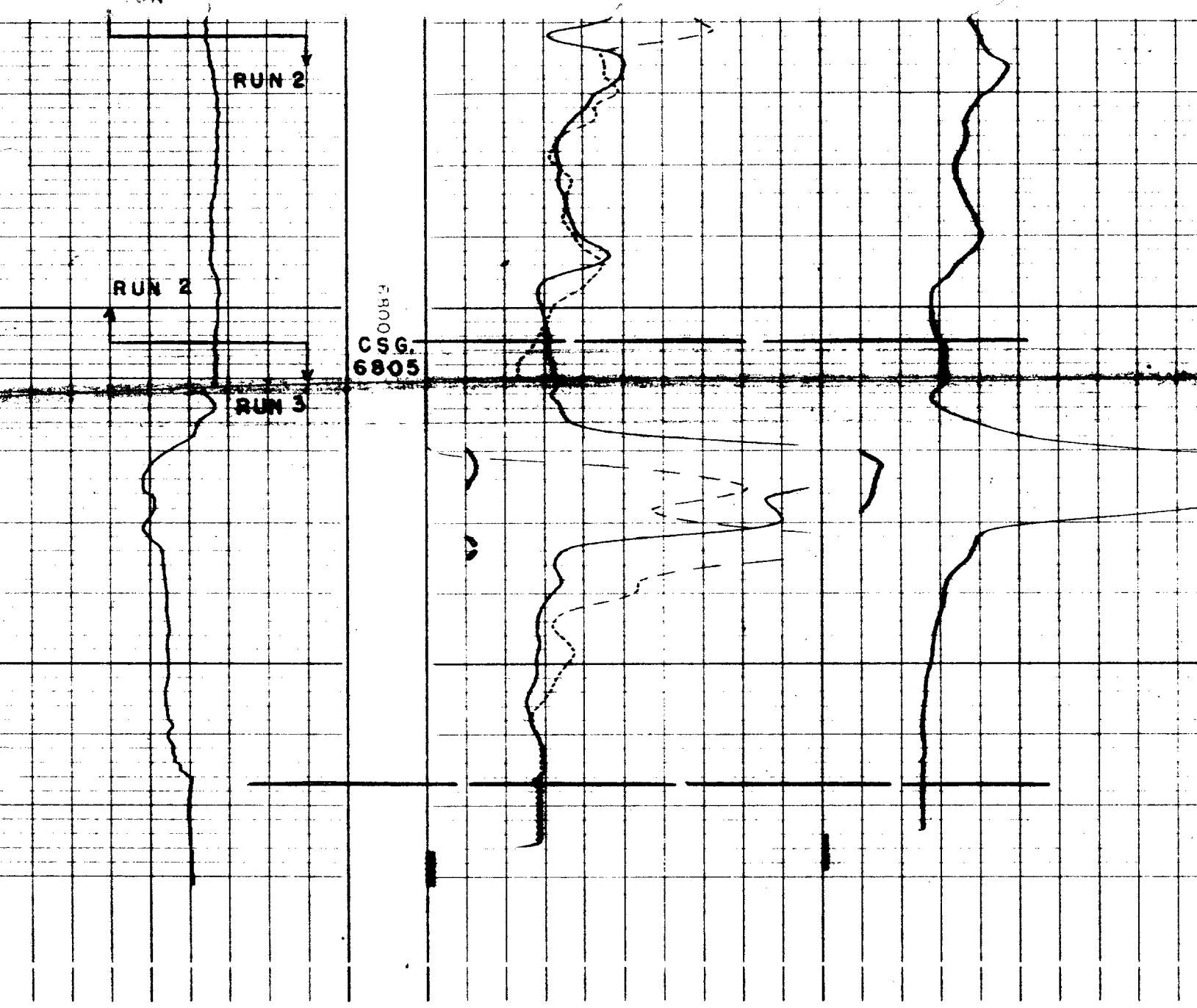
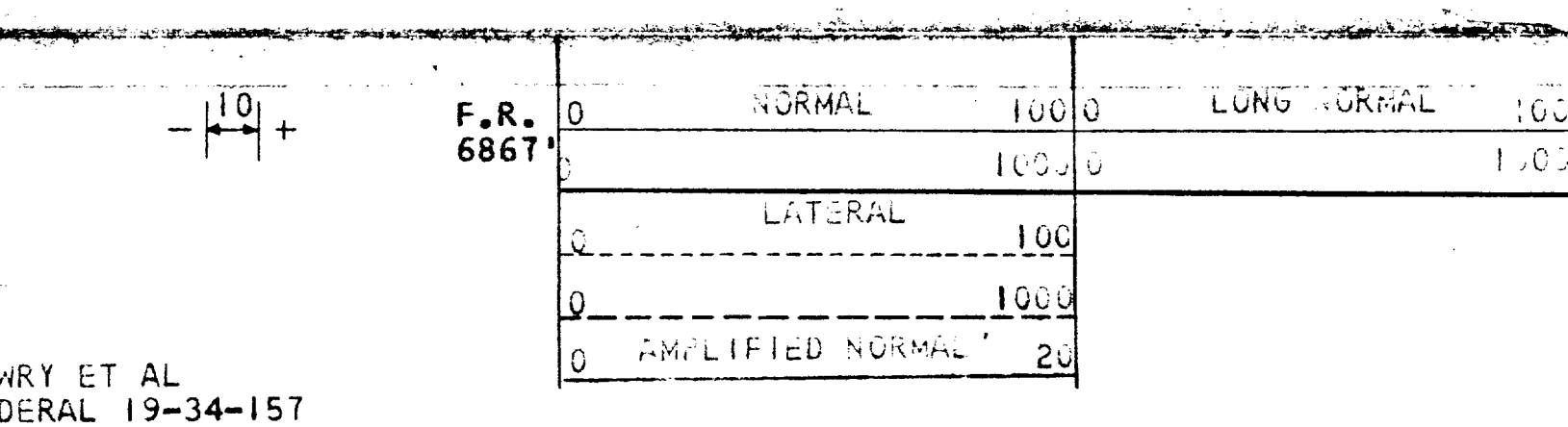
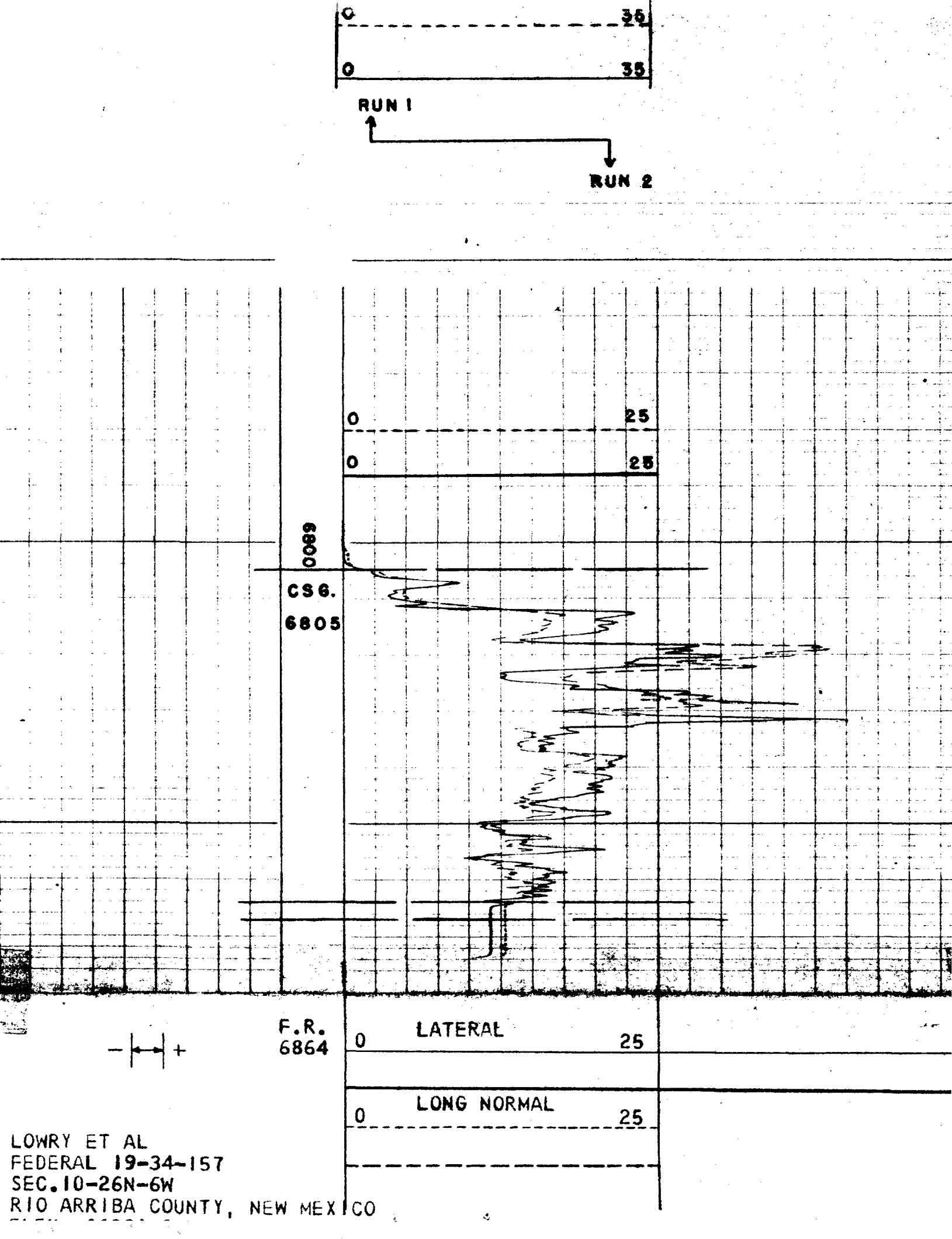




WRY ET AL
DERAL 19-34-157
C. 10-26N-6W
O ARRIBA, NEW MEXICO


0
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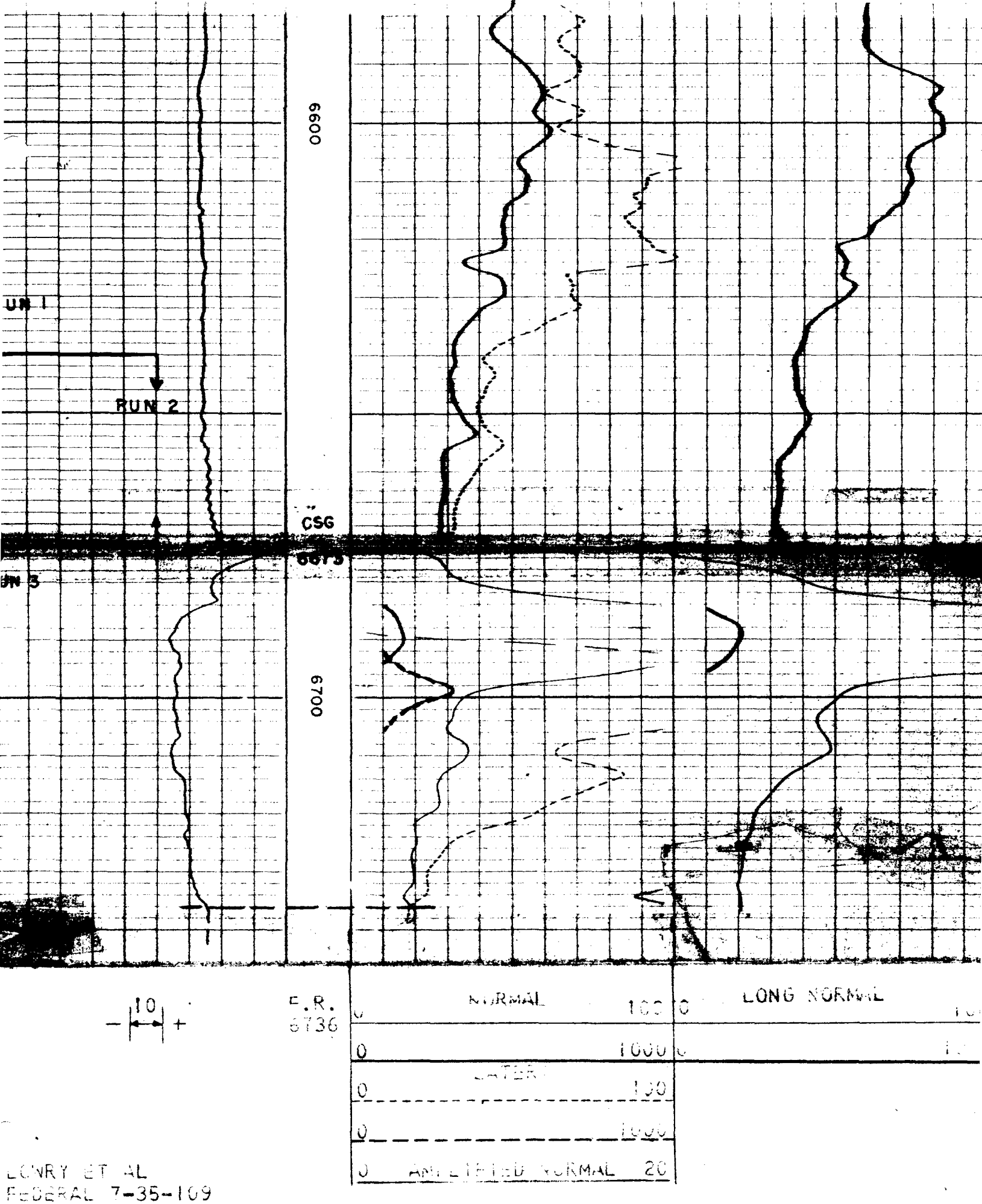
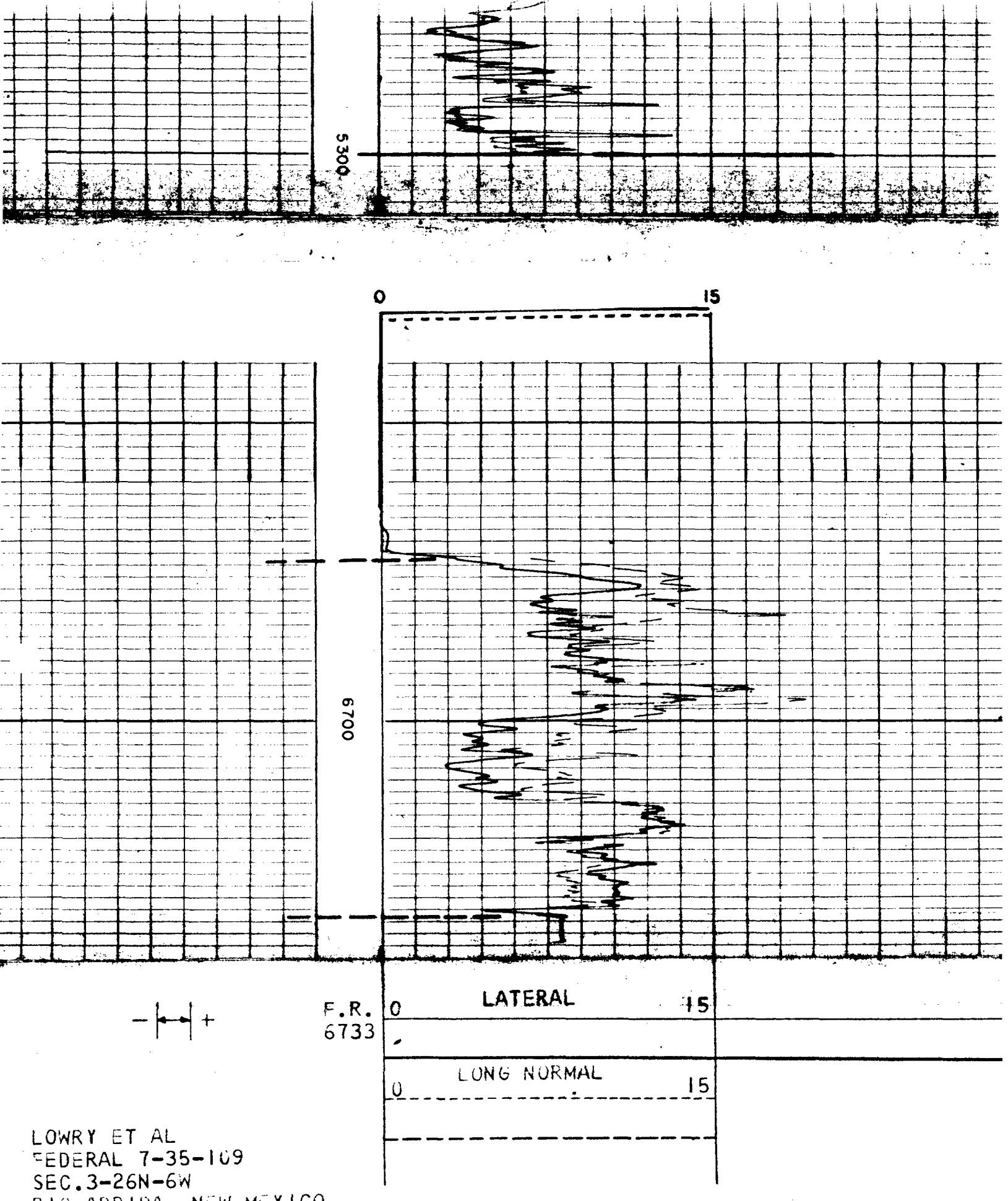
LOWRY ET AL
FEDERAL 19-34-157
SEC. 10-26N-6W
RIO ARRIBA COUNTY, NEW MEXICO



CONRY ET AL
FEDERAL 7-35-109
SEC. 3-26N-6W
RIO ARRIBA, NEW MEXICO



LOWRY ET AL
FEDERAL 7-35-109
SEC.3-26N-6W
RIO ARRIBA, NEW MEXICO
ELEV. 6484' G.L.

RUN 1

RUN 2

RUN 2

CSG

6695

RUN 3

10

F.R.
6764'

NORMAL 0 100 0

LONG NORMAL 100 0

MICROLOG

A0 = 1.5"

0 1000 0 1000 0

AM = 2"

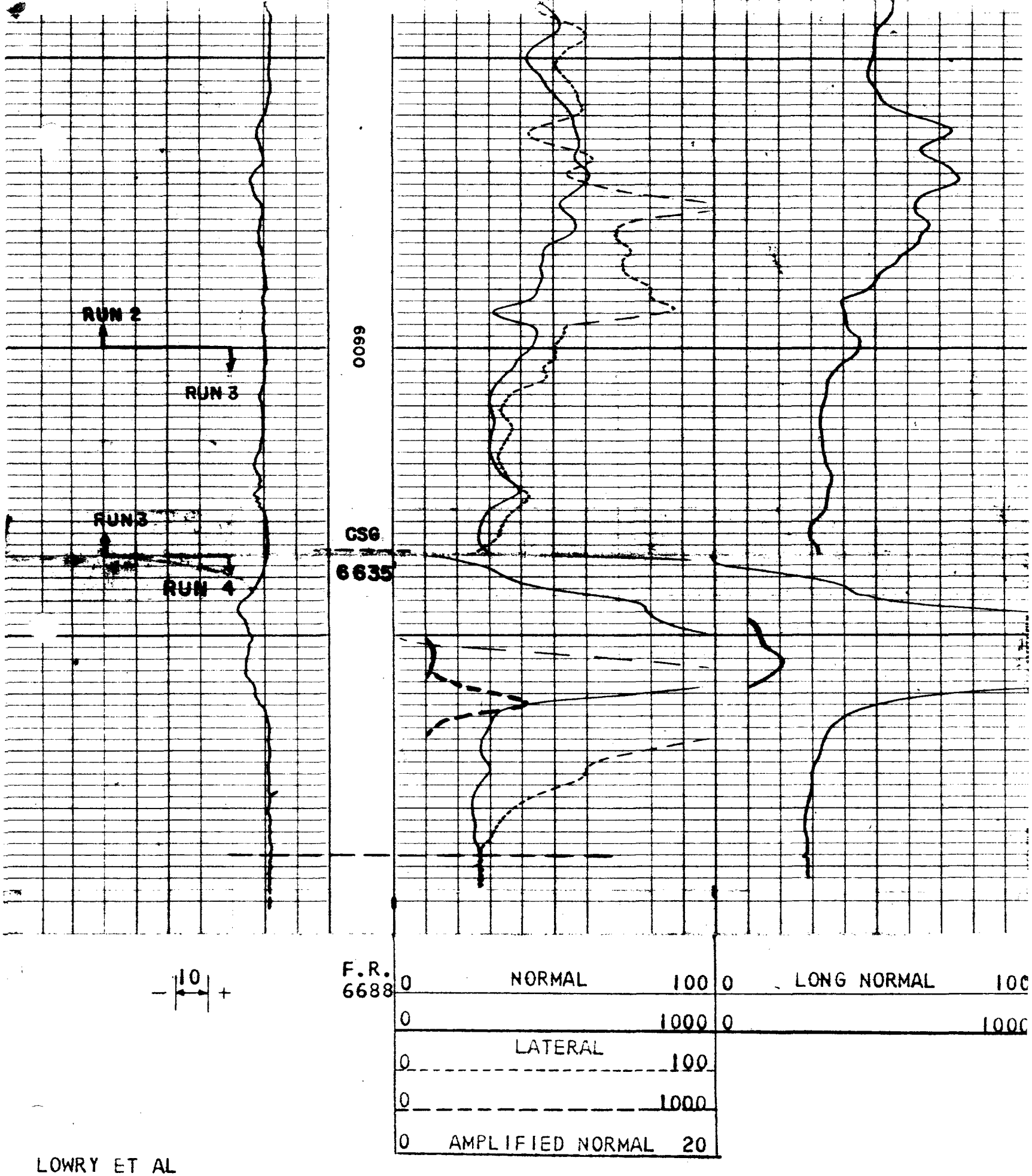
LATERAL

0 100

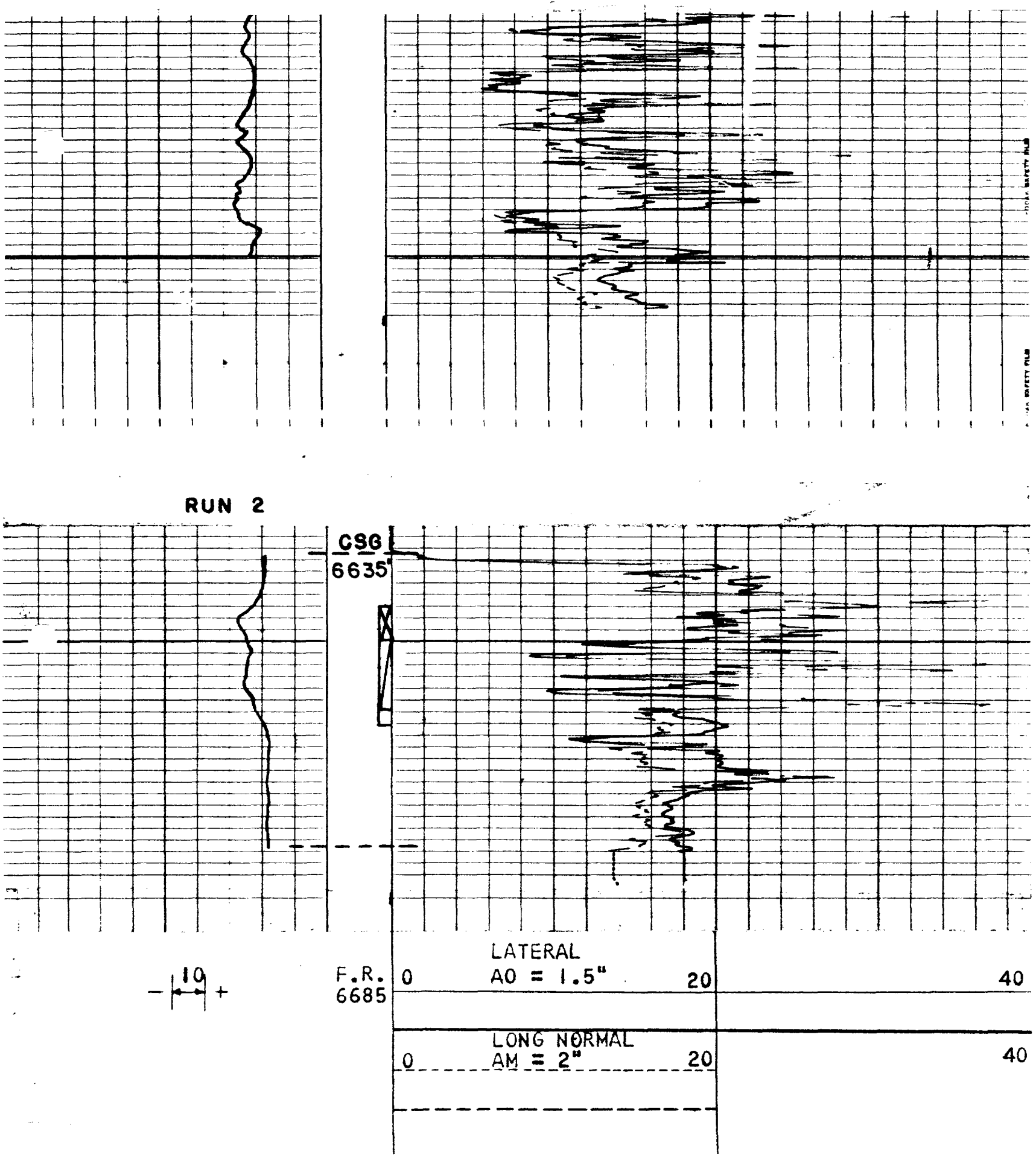
0 1000

0 AMPLIFIED NORMAL 20

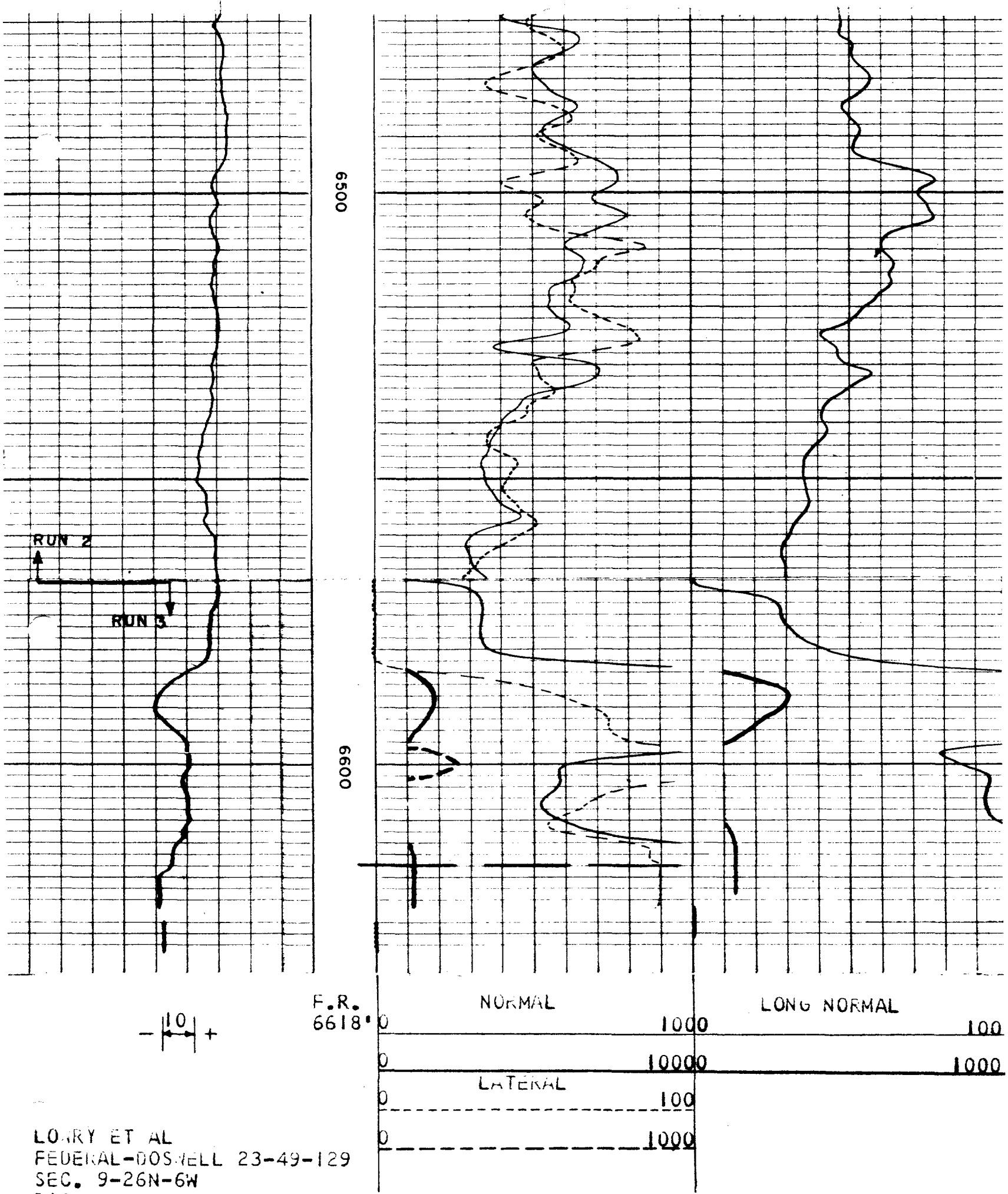
LOWRY ET AL
FEDERAL 21-40-182
SEC. 10-26N-6W
RIO ARRIBA, NEW MEXICO
ELEV. 6552' G.L.



LOWRY ET AL
FEDERAL 22-45-207
SEC. 10-26N-6W
RIO ARRIBA, NEW MEXICO

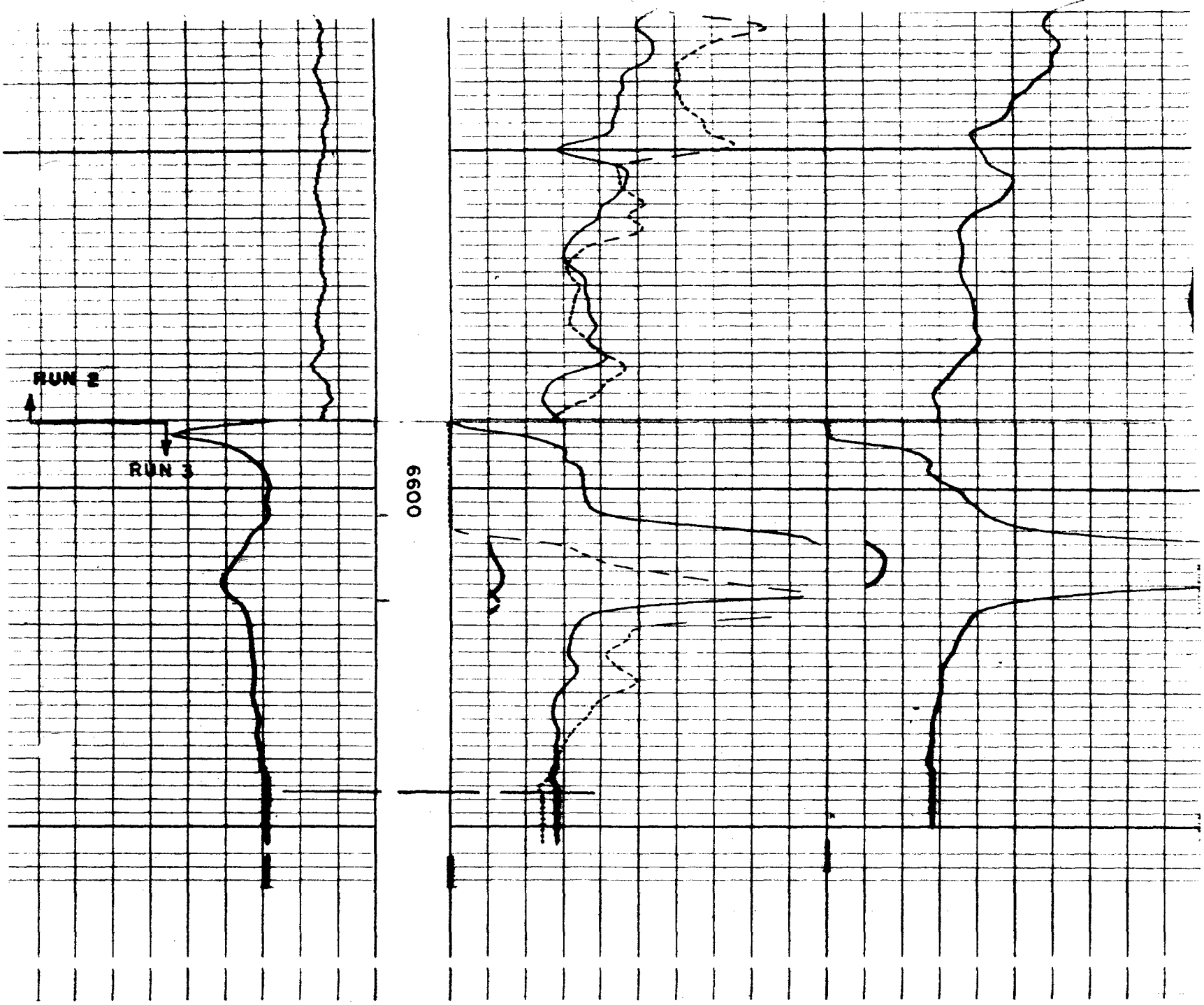


LOWRY ET AL
FEDERAL 22-45-207
SEC. 10-26N-6W
RIO ARRIBA, NEW MEXICO
ELEV. 6506' D.F.



LOWRY ET AL
FEDERAL-DOSWELL 23-49-129
SEC. 9-26N-6W
RIO ARRIBA, NEW MEXICO

LOWRY ET AL
FEDERAL-DOSWELL 23-49-129
SEC. 9-26N-6W
RIO ARRIBA, NEW MEXICO
ELEV. 6413' G.L.



10

F.R. 6645

	NORMAL		LONG NORMAL	
0		100	0	100
0		1000	0	1000
	LATERAL			
0		100		
0		1000		

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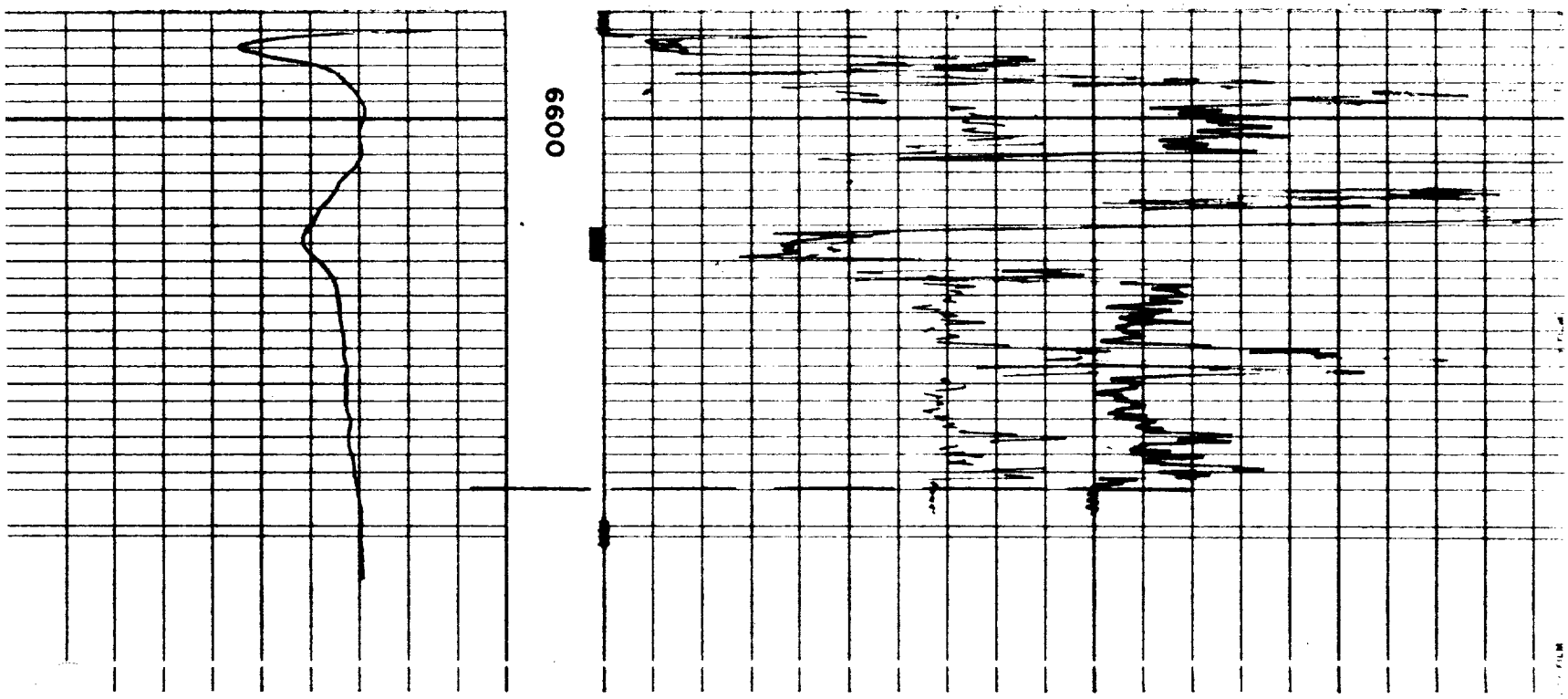
FEDERAL DOSWELL #24-50-177
SEC. 9-26N-6W
RIO ARRIBA, NEW MEXICO
ELEV. 6466' G.L.



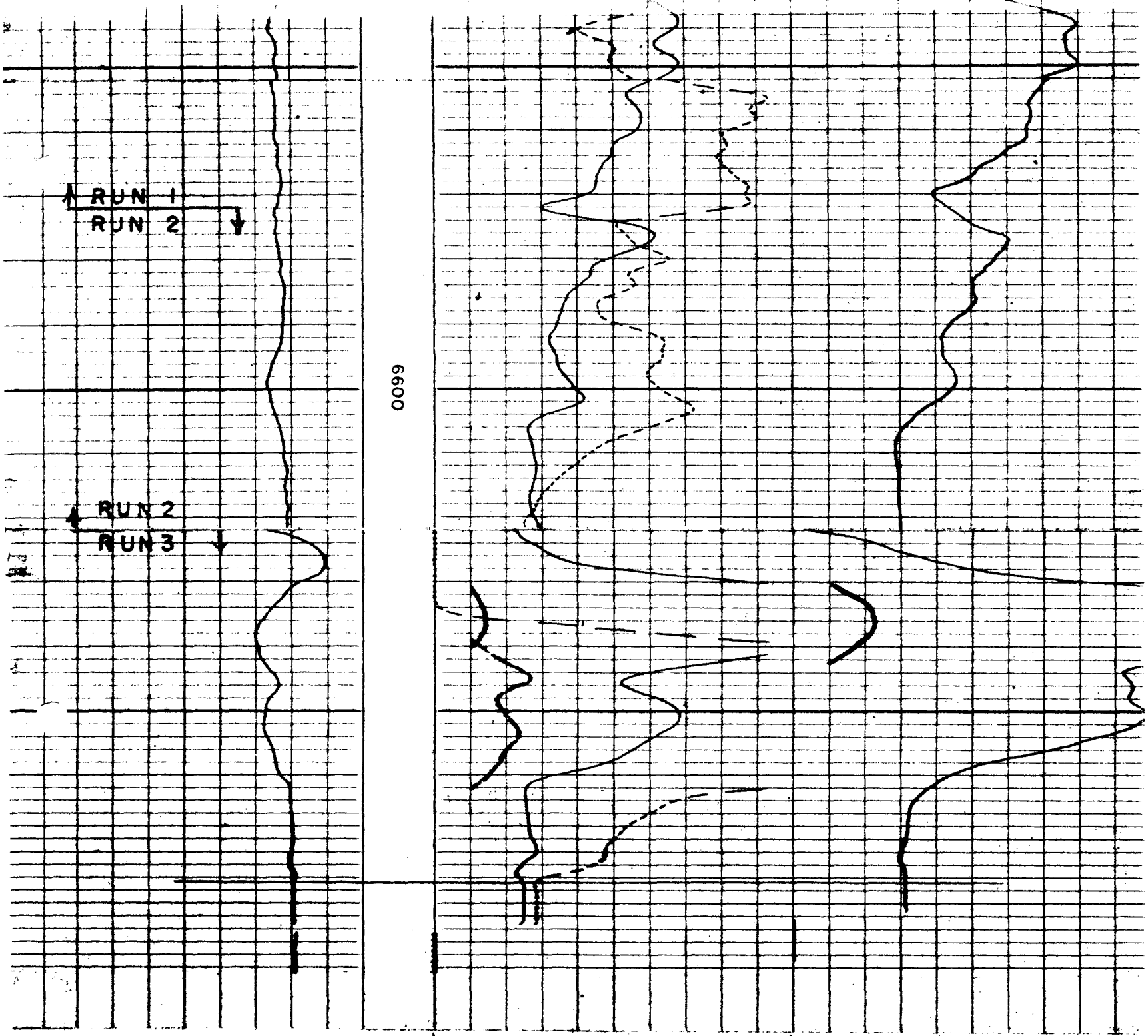
10

F.R.
6645'

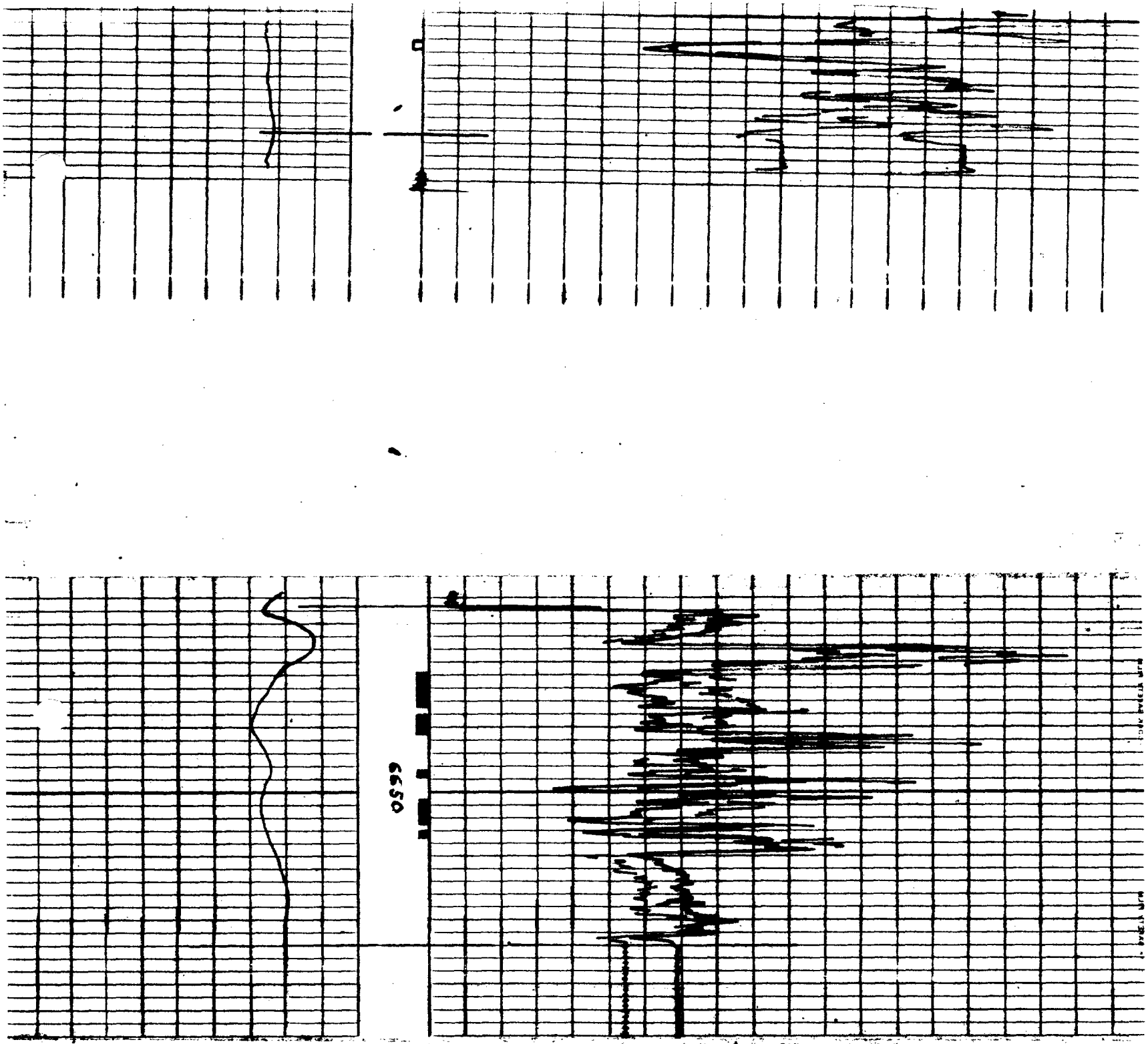
Q Micro Inverse 1"x1" 20 40

Q Micro Normal 2" 20 40

LOWRY ET AL
FEDERAL DOSWELL #24-50-177
SEC. 9-26N-6W
RIO ARRIBA, NEW MEXICO
ELEV. 6466' G.L.



LOWRY ET AL
FEDERAL DOSWELL 25-51-127
SEC. 8-26N-6W
RIO ARRIBA, NEW MEXICO
ELEV. 6482' G.L.



LOWRY ET AL
FEDERAL DOSWELL #25-51-127
SEC. 8-26N-6W
RIO ARRIBA, NEW MEXICO
ELEV. 6492' G.L.

LOWRY ET AL
STATE I-268

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WEST TEXAS ENGINEERING SERVICE, INC.

Midland, Texas

January 24, 1952

Lowry, et al
Room 213-215
616 East Central Ave.
Albuquerque, New Mexico

Attention: Mr. Hunt

Gentlemen:

Under separate cover, we have submitted a report on the analysis of a reservoir fluid sample taken by our field engineers Messrs. Cates and Black, on your Federal Doswell #4-13, Rio Arriba County, New Mexico.

The bubble point pressure was measured at 2054 pounds per square inch gauge at 175° F. Since the reservoir pressure is 2137 p.s.i.g. this indicates that the oil in the reservoir is slightly undersaturated with gas, but that gas will begin to be liberated as the pressure is reduced by withdrawal. Therefore it may be concluded that unless some pressure maintenance effect (water drive, for example) is observed your operating gas-oil ratio will start to rise fairly soon.

By differential liberation the reservoir oil at 175° F. (reservoir temperature) yielded 862 cubic feet of gas (measured at 60° F. and atmospheric pressure) per barrel of stock tank oil. During this process 1.586 barrels of saturated reservoir oil shrank to one barrel of stock tank oil. This means that the reservoir oil will shrink by about 35% of its volume before reaching the stock tank. It is my understanding that you already maintain a relatively high separator pressure. Bearing in mind the above figure of 35% shrinkage, it might be well to maintain a slight pressure on the tanks and keep the oil as low in temperature as practicable. While there is not much to be gained by raising the gravity, since this figure is already in the 40's,

this maintenance of high pressure and low temperature will keep weathering to a minimum and enable the retention of the greatest liquid volumes possible.

So much for my suggestions on the physical application of these data. Further use can be made in connection with your core analysis on this reservoir. A theoretical calculation can be made of your reserves by use of the formula:

$$\frac{7758 \times Px\ (1-C) \times RF}{1.526} = \text{Bbl. Stock Tank Oil per Acre Foot}$$

where 7758 = 1 Acre foot in Bbl. (Known)
P = % Porosity (From core analysis)
C = % Connate water (From core analysis)
RF = % Recovery factor*
1.526 = Relative liquid volume (From sample data)
Then take B.S.T.O./Ac. Ft. x sand thickness x no. of acres of estimated drainage to bore hole = ultimate recovery.

*Just an additional word regarding "RF" above. This relation can be assumed from the data at hand to be around 20 to 25 percent.

I trust that this answers your question in regard to the use of the bottomhole sample analysis. While normally the analysis is used in connection with core analysis, decline curves, subsequent tests, etc. by the operators own engineers or consultants, I am happy if this is of some use to you. It is good information to have if only to "hang on the wrench" for near future use and like virgin reservoir pressures cannot be had or estimated in the later life of the field.

Thank you for this opportunity of serving you and we are looking forward to moving in up there as soon as the volume warrents our doing so.

Very truly yours,

WEST TEXAS ENGINEERING SERVICE, Inc.

/s/ W. T. Hagler
W. T. Hagler

WTH:ech

COPY

Bottom Hole Sample Analysis

Federal Doswell # 4-13

Wildcat Field

Rio Arriba County, New Mexico

Date Sample Taken	January 2 & 3, 1952
Date Analyzed	January 11, 1952
Shut-In Prior to Sampling	24 Hours
Sampling Depth	6676'
Pressure at 6676'	2137 psi
Tubing Depth	6697'
Top of Tocito Formation	6676'
Temperature @ 6676'	175° F

TEST SUMMARY

Saturation Pressure	2054 psig
Gas in Solution @ 2054 (Differential Lib.) Gas corrected to 14.7 psi & 60° F	862 Cu. Ft./Bbl.
Relative Liquid Volume (2054 psi and 175° F)	1526 Bbl./Bbl. S. T. O.
Thermal Coefficient of Expansion (Sat. Oil & 3000 psig 73° to 150° F)	6.4×10^{-4} Cuft/Cuft/° F.
From 73° F to 175° F	6.55×10^{-4} Cuft/Cuft/psig
Compressibility Coefficient (Saturated Oil @ 175° F)	
From 2054 psi to 2180 psi	13.95×10^{-6} Cuft/cuft/psi
From 2054 psi to 2434 psi	15.40×10^{-6} Cuft/Cuft/psi
From 2054 psi to 2723 psi	15.90×10^{-6} Cuft/Cuft/psi

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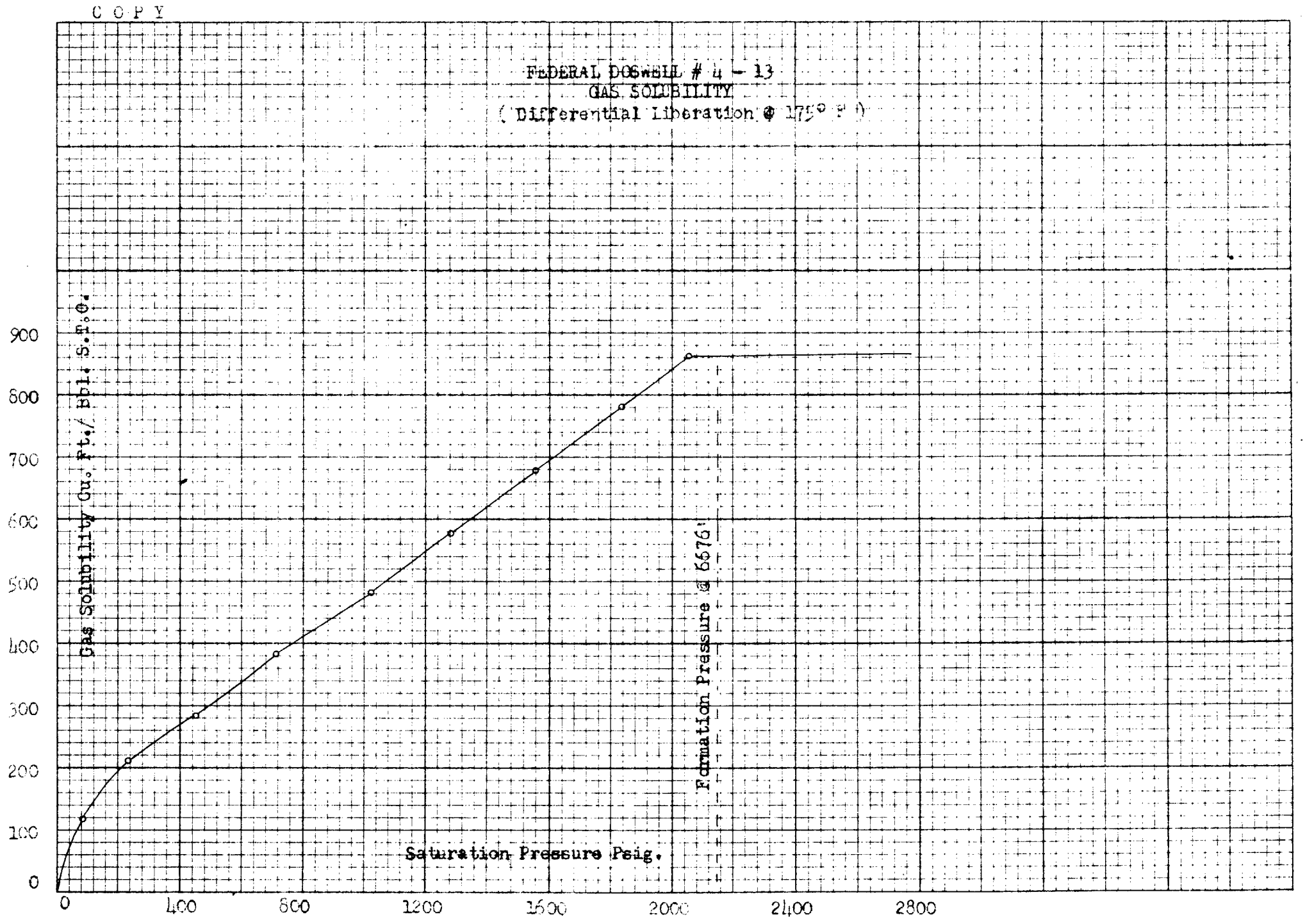

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