

Figure No. 1

21	22	23	
MCH-87.5% DPC-12.5% FEE	MCH-87.5% DPC-12.5% FEE	GULF SF 079332 NWE 01385	NMP NM 01385
28 MCH-37.5% DPC-12.5% KENAI-50.0% NM-23039	27 MCH-87.5% DPC-12.5% FEE NM-23038 NM-43759 NWA-100%	MCH-1/2 DPC-1/2 FEE GULF SF 079332	26 MCH-10.8375% DPC-1.5625% SRC-87.5% NWP NM 01385
33 GULF SF 079332	34 MCH-37.5% DPC-12.5% KENAI-50.0% NM-23038	35 MCH-10.8375% DPC-1.5625% SRC-87.5% NWP NM 01385	

T-25-N, R-2-W, NMPM
Rio Arriba County, New Mexico

OFFSET OPERATORS

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Gulf Oil Corporation (GULF)
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Northwest Exploration Company (NWE)
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Northwest Pipeline Corporation (NWP)
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Southland Royalty Company (SRC)
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Denver, CO 80202

Kenai Oil and Gas, Inc. (KENAI)
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Denver, CO 80202

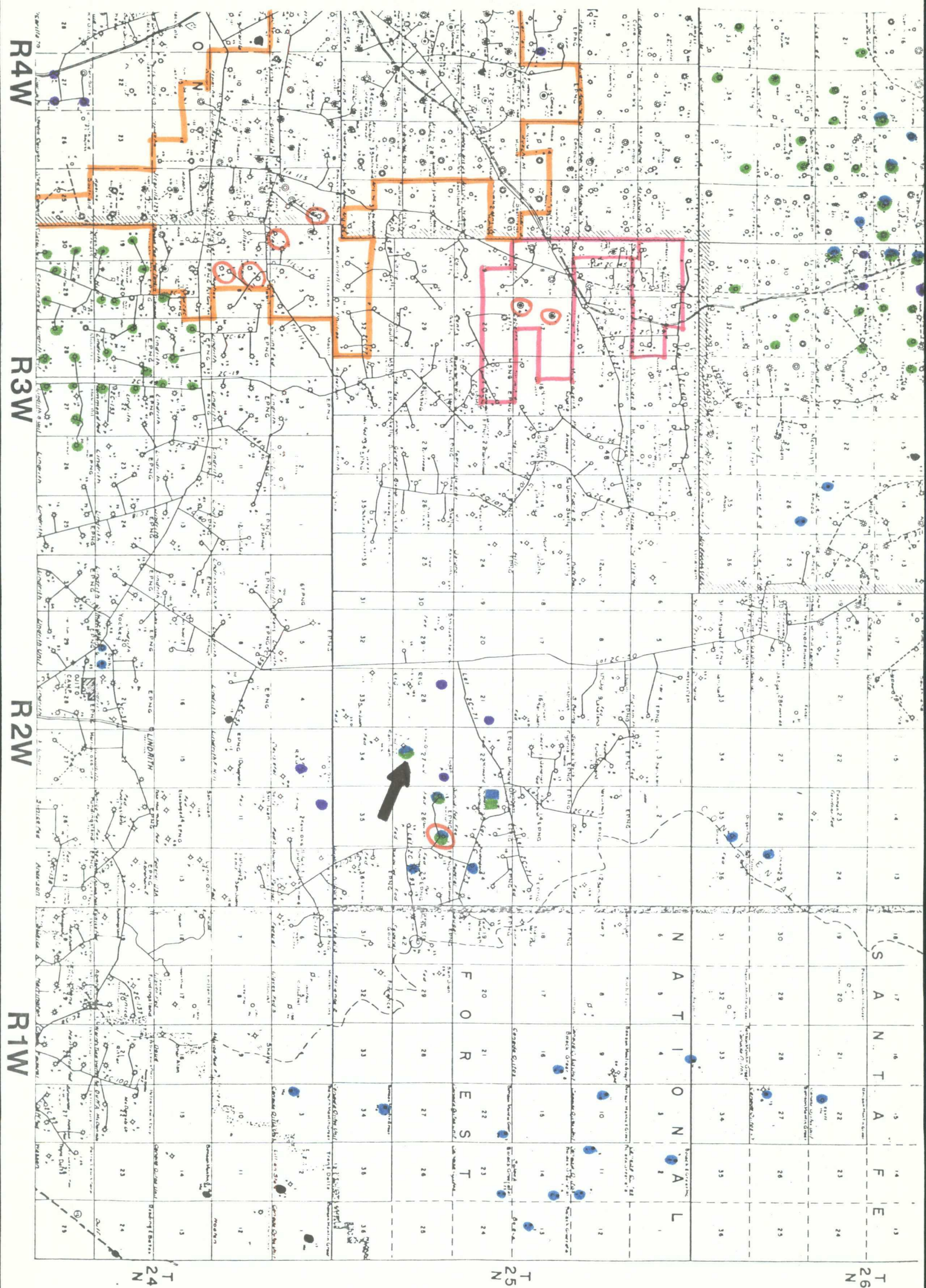


Figure No. 2

- KEY
- ➔ Subject Well
 - West Lindrith Gallup-Dakota Pool
 - Ojito (Gallup)-Dakota Pool
 - Commingled Gallup-Dakota Well
 - Dakota Well
 - Gallup Well
 - Well completed in Gallup & Dakota
 - Uncompleted Gallup Well
 - Plugged & Abandoned Gallup or Dakota
 - Wells used for production data

Top of Niobrara
@ 6498'

Mancos
Interval

6600
6700
6800
6900
7000
7100
7200
7300
7400
7500

Base of Niobrara
@ 7496'

lost 125 bbls. mud @ 6589'

Jerome P. McHugh
Native Son #2 Well
Unit N - Sec. 27, T25N R2W
Rio Arriba County, New Mexico
Welex - Gamma-Induction Log
10-31-83
Elev. = 7329' KDB
Figure No. 3

lost 400 BM @ 6869'

lost 1350 bbls. mud @ 6981'

lost 1000 bbls. mud @ 7330'

Hard Sand mud
Loss - No Volume
Reported.

SHORT NORMAL 100

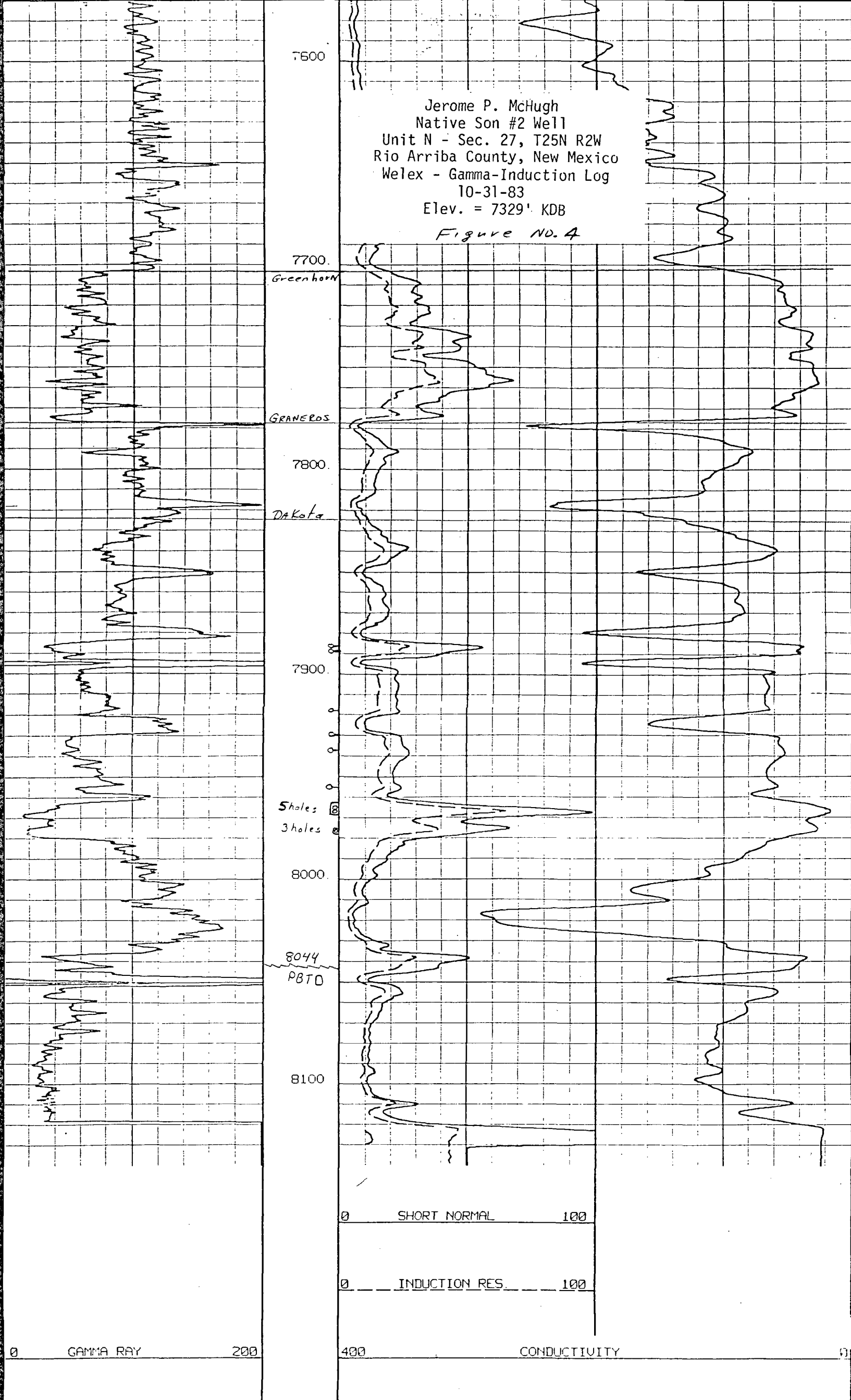
INDUCTION RES 100

GAMMA RAY 200

CONDUCTIVITY

Jerome P. McHugh
Native Son #2 Well
Unit N - Sec. 27, T25N R2W
Rio Arriba County, New Mexico
Welex - Gamma-Induction Log
10-31-83
Elev. = 7329' KDB

Figure NO. 4



Northwest Exploration
Gruelin No. 1
Gruelin Marcos / Basin Dakota
R - 26 - 25N - 2W

FIGURE No. 5

Total well stream plotted

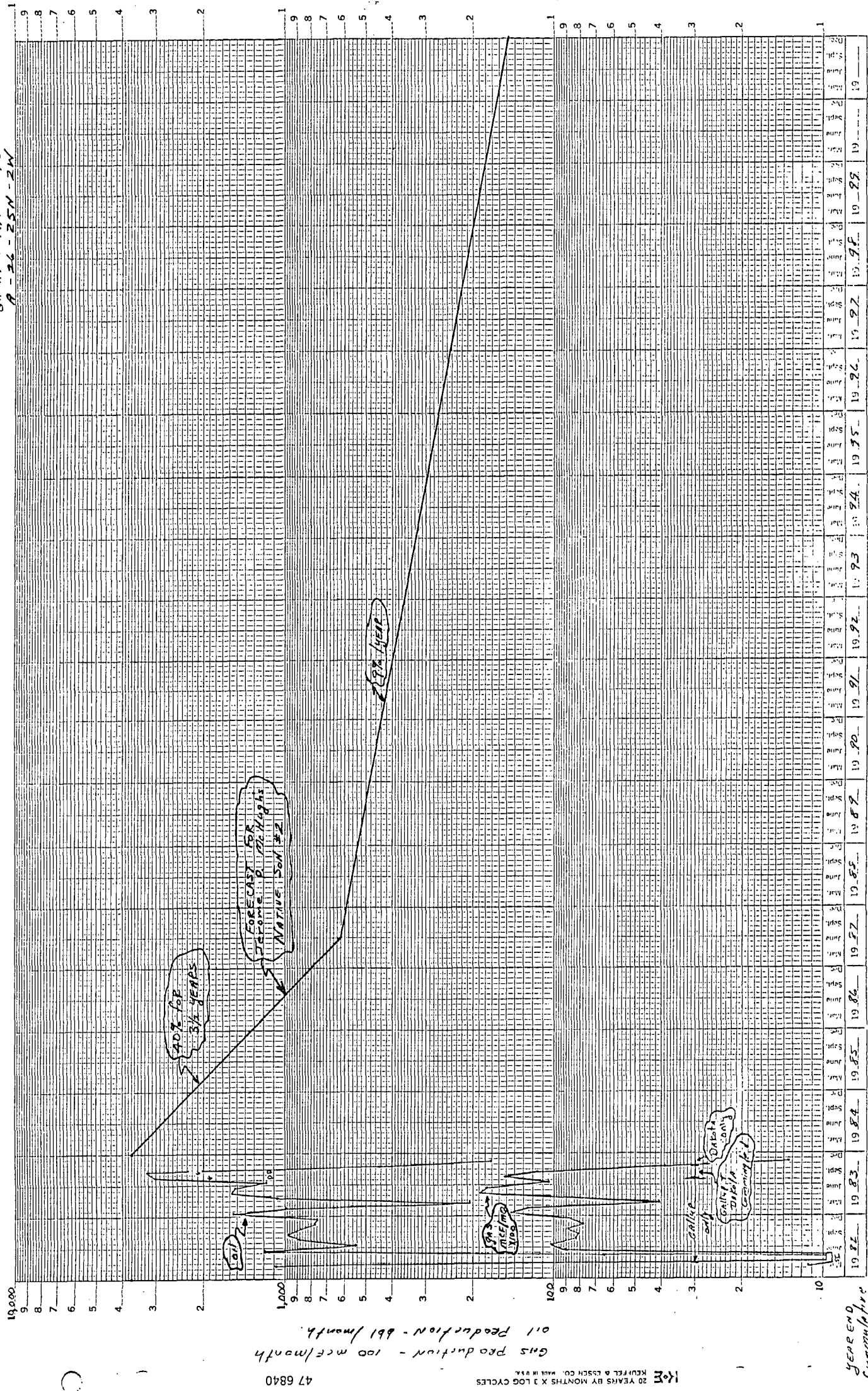
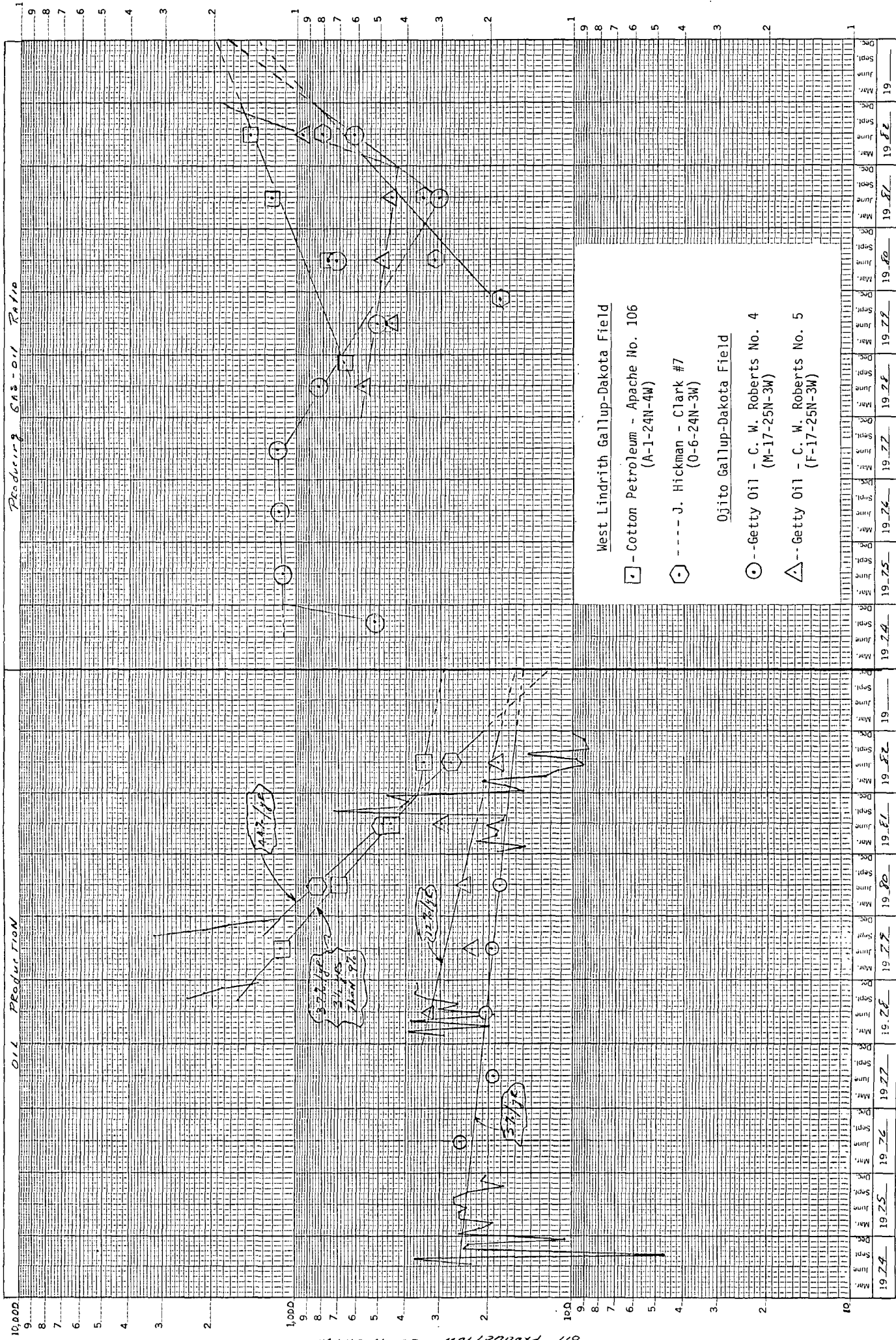


Figure No. 5



Figure No. 6

GAS-oil Ratio - bbl/bbl x 10
Oil Production - bbl/month



WELL DATA

Commingleed Gallup-Dakota Wells
General Area of Jerome P. McHugh's Wells in
Townships 24 and 25 North, Range 2 West
Rio Arriba County, New Mexico

Operator	Well Name	Location U-S-T-R	Initial		Actual Init.Prod. BOPD-GOR	Oil Production			Gas Production			Cumulative Oil Prod. 1-1-83 - Bbl	Estimated Ultimate Recovery-Bbl	
			Potential BOPD-GOR	1526		Production Factor Actual/IP	Initial Decline %/Yr-Yrs	Stabilized Decline % / Yr	Gas Prod. Factor Actual/IP	Incline Rate %/Yr				
<u>West Lindrith Gallup-Dakota Field</u>														
Cotton Petroleum	- Apache No. 106	A-1-24N-4W	97 -	1526	53 - 6400	55%	37 - 3½	9	4.19	25	41,254	76,800		
J. Hickman	- Clark No. 7	O-6-24N-3W	150 -	2666	43 - 1800	29%	44 - --	-	0.68	57	28,209	49,200*		
Mobil Oil	- W.D. Hughes No.5	M-8-24N-3W	28 -	179	9 - 1670	32%	29 - --	-	9.33	19	3,675	12,000*		
Mobil Oil	- Jillson No. 4	E-8-24N-3W	35 -	857	18 - 840	51%	21 - --	-	0.98	39	7,828	38,500*		
<u>Ojito Gallup-Dakota Field</u>														
Getty Oil	- C.W. Roberts No. 4	M-17-25N-3W	9 -	12,220	8 - 11,000	-	5 - --	5	0.90	5	21,087	48,000		
Getty Oil	- C.W. Roberts No. 5	F-17-25N-3W	NR -	4,850	12 - 5,800	-	12 - --	12	1.20	-	14,131	27,200		
6 Well Average			64 -	3,716	24 - 4,585	42%	33 - --	9	1.23	29		41,950		

* Estimated assuming maintaining initial decline rate for a total of 3½ years from the date of first production and then stabilizing at an annual decline rate of 9%

Table No. 1

MANCOSA-DAKOTA WELL DATA
Gavilan Area
Rio Arriba County, New Mexico

Well Name	Location/D U-S-T-R	Sequence Drilled	KB Elev.	Spud Date	CASING		Completion Date	MANCOSA ZONE		DAKOTA ZONE	
					Surface	Production		Perfs	BOPD @ GOR	Perfs	BOPD @ GOR
Jerome P. McHugh											
Janet #1	A 27-25N-2W	2	7253	11-16-82	9-5/8 @ 211'	4-1/2 @ 7958'	2-17-83	6689-7000	73 @ 2753	7740-7869	43 @ 1047
Janet #2	I 21-25N-2W	3	7197	3-31-83	8-5/8 @ 205	4-1/2 @ 8057	9-1-83	6657-7055	60 @ 3000	7841-7994	36 @ 1111
E.T. #1	C 28-25N-2W	4	7170	4-25-83	9-5/8 @ 220	4-1/2 @ 8081	9-19-83	6643-7025	96 @ 5219	7747-8033	18 @ 1833
Wright Way #1	C 2-24N-2W	6	7329	5-24-83	9-5/8 @ 245	4-1/2 @ 8182	9-29-83	6760-7072	51 @ 6000	7865-8141	27 @ 2000
Mother Lode #1	H 3-24N-2W	7	7333	6-13-83	9-5/8 @ 224	4-1/2 @ 8248	9-2-83	6765-7070	63 @ 5190	7861-8108	15 @ 2200
Native Son #2	N 27-25N-2W	10	7329	10-8-83	9-5/8 @ 224	4-1/2 @ 8133	11-18-83	6802-7485	233 @ 1882	7886-7977	58 @ 3824
Northwest Exploration											
Gavilan #1	A 26-25N-2W	1	7467	12-26-81	9-5/8 @ 540	4-1/2 @ 8240	3-21-82	6821-7562	62 @ 8790 ^B	7879-8026	B
Gavilan #1E	E 26-25N-2W	5	7319	5-15-83	9-5/8 @ 278	4-1/2 @ 8159	7-23-83	6804-7366	32 @ 11,700	7822-7918	10.2@3400
Northwest Pipeline											
Rucker Lake #1	G 23-25N-2W	9	7309	Location							
Rucker Lake #2	K 24-25N-2W	8	7396	7-12-83	9-5/8 @ 522	4-1/2 @ 8155	8-26-83	6825-7484	193 @ 1200	---	---
Rucker Lake #3	L 25-25N-2W		7408	6-15-83	9-5/8 @ 384	5-1/2 @ 7560	8-10-83	6808-7538	145 @ 2089	---	---
Rucker Lake #4	J 25-25N-2W		7448	Location							
Mesa Grande Resources											
Gavilan-Howard #1	F 23-25N-2W	11	7294	10-10-83	8-5/8 @ 200	5-1/2 @ 8010	WOCT	---	---	---	---

A Also referred to as "Gallup"

B Commingled with Dakota

C Cemented 7" casing @ 6070' & also completed Greenhorn 7653-7708' with IP of 9.8 BOPD with GOR = 2510

D Surveyed Locations: Janet #1 790' FNL - 790' FEL, Janet #2 1850' FSL - 790' FEL, E.T. #1 1100' FNL - 1600' FWL, Wright Way #1 950' FNL - 1650' FWL, Mother Lode #1 1730' FNL - 860' FEL, Native Son #2 1020' FSL - 1670' FWL; Gavilan #1 930' FNL - 910' FEL, Gavilan #1E 1850' FNL - 990' FWL; Rucker Lake #1 2270' FNL - 2275' FEL, Rucker Lake #2 1450' FSL - 1520' FWL, Rucker Lake #3 1760' FSL - 940' FWL, Rucker Lake #4 2060' FSL - 1740' FEL; Gavilan-Howard #1 1850' FNL - 1651' FWL

Table No. 2

open hole Log Evaluation
Jerome P. MelHugh - Native Son #2

DAKOTA

Perforations	Pay ft.	ϕ %	Sw %	PRIMARY- SECONDARY	Remarks
7886-88	2	5	?	S	
7919	1	"	"	S	
7950	2	6	"	S	
7938	1	6	"	S	
7955	1	8	"	S	
7963-69	4	5	"	S	
"	2	7 1/2	≤ 48%	P	gas effect on FDC/CNL
7975-77	2	9	≤ 51%	P	
TOTAL	15	$\bar{\phi} = 6.7\%$			

4 ft Primary $\bar{\phi} = 8.25\%$
11 ft Secondary $\bar{\phi} = 6.10\%$

MANCOS

Perforations	Pay ft.	$\bar{\phi}$ %	Primary Secondary	Remarks
6802	1	16	S	Shaley
6816	1	13	"	
6836	2	13	"	
6844	1	12	"	
6849	1	15	"	
6853	1	14	"	
6869-75	5	?	P	Lost 400 bbl mud - Fractured.
6881	2	?	P	
6898-6904	5	?	P	
6913	2	11	P	
6927-31	2	?	S	
6939-41	2	?	"	
6953	2	21	"	Shaley
6965	1	?	"	
6977	2	11	P	Lost 1350 bbl mud - Fractured. - GR indicates to be Shaley.
6983-91	2	15	P	
"	2	14	P	
7023	2	10	P	
7029-39	1	17	S	Shaley
"	1	16	"	"
"	1	17	"	"
"	1	15	"	"
7049	1	15	"	"
7053	1	15	"	"
7061	1	15	"	"
7066	2	27?	"	Dolomite? by log x-plot.
7070	1	15	"	Shaley
7073	1	15	"	"
7080	1	14	"	Dolomite by log x-plot.
7087	1	9	"	
7326	1	17	P	Lost 1000 bbl mud - Fractured
7394	1	14	S	
7436	2	?	P	Lost some mud - Volume
7466	2	8?	S	Shaley Not Reported
7475	1	12?	"	"
7478	1	5?	"	"
7485	1	3?	"	"

58

$\bar{\phi} = 14\%$. (Actually only 39' included in
Average as 19' had questionable
 ϕ due to hole Rugosity)

25 ft Primary $\bar{\phi} = 12.6\%$ (14 ft of questionable)
33 ft Secondary $\bar{\phi} = 15.1\%$ ϕ

Table No. 2 (Continued)

Native Son No. 2

NOTES:

1. The distinction between primary and secondary pay was based upon several factors: sample description, drilling breaks, SP development, sample shows, and shale content based upon the GR curve.

Primary pay is expected to contribute significantly to productivity.

Secondary pay is not expected to significantly contribute to production, but exhibits sufficient potential to perforate.

2. In both Mancos and Dakota intervals, there are no sands thick enough to accurately measure R_t (thin bed effect). This is complicated by a fairly high shale content in most intervals. An average S_w of 40% is believed to be typical to both zones in other fields and where S_w calculations could be approximated, values of 40% were indicated.

Table No. 3
Jerome P. McHugh
Native Son No. 2

Estimate of Ultimate Recovery

A. Commingled well stream - projected performance:

1. Reference Figure No. 5 and No. 6.
2. Anticipated sustained production performance - 1st month's average = 42% of IP and declining at 40% per year then stabilize at 9%.
3. IP Summary

	<u>BOPD</u>	<u>MCFD</u>	<u>BWPD</u>	<u>GOR</u>
Mancos	233	440	34	1,882
Dakota	58	223	34	3,824
Total	291	663	68	2,278

4. 42% of IP = 291 BOPD x .42 = 122 BOPD
= 3,700 BO/Month.
5. Economic Limit - operating expense approx. \$1,350/month.
At end of life GOR will be approx. 10,000;
therefore, approx. revenue per bbl. oil approx.
(1 BO x 29.60) + (10 MCF x 2.82 x 1.20)
= \$63.44 with gas sales.
Opex = 1,350 / 63.44 x .85 x .92 x 30.4 = 0.9 BOPD

Ultimate recovery: (3,700 - 620) x 23.5 + (620 - 30) 127.2
= 72,380 + 75,020
= 147,400 BO

B. Split of production between zones:

1. Volumetric calculations do not give realistic results in the Mancos interval, however, are believed to be fairly accurate in the Dakota.
2. Mancos recovery will be greatly influenced by natural fracturing and the natural fractures may, to a lesser degree influence production in the Dakota.
3. Volumetric recovery factors:

	<u>Mancos</u>	<u>Dakota</u>
Mid-perf Datum	7,144'	7,932'
BHP at Datum, ^a psig	1,690	2,674
BH temperature at Datum - °F	166	179
Estimated Solution GOR - SCF/B	500	1,000
Estimated oil FVF - RB/STB	1.33	1.52
Oil Recovery Factor ^b - % OIP		
Primary Pay	?	5%
Secondary Pay	?	0.5%

Notes: a - Mancos BHP determined to be 1,663 psig at 7,200' from build up in Gavilan #1. Dakota BHP was measured to be approximately 2,600 psi at 7,900' on a 132 hr build up in the Gavilan #1.

b - estimated for Solution gas drive.

Dakota Rsrv: $[7,758 \times 320A \times 4' \times .0825 \times (1 - .40) / 1.52] .05 +$
 $[7,758 \times 320A \times 11 \times .061 \times (1 - .40) / 1.52] .005$
 $= 16,170 + 3,290$
 $= 19,460 \text{ STB} \longrightarrow \underline{19,500 \text{ STB}}$

Table No. 3 (Continued)

Native Son No. 2

Gas Rsrv: An overall average GOR of 3500 SCF/STB is estimated based upon testing of the Dakota in the Gavilan area. Therefore, ultimate gas recoveries = $19,500 \times 3.5$
= 68.2 MMCF

Mancos Rsrv: Ultimate recovery - Dakota volumetric Rsrv
: $147,400 - 19,500$
= 127,900 STB

Gas Rsrv: An overall average GOR of 10,200 SCF/STB is estimated based upon performance of wells in Gavilan area and in Lindrith Gallup (gas) Field. Therefore, ultimate gas recoveries = $127,900 \text{ STB} \times 10,200$
= 1,304.6 MMSCF

RESERVE SUMMARY:

	<u>Mancos</u>	<u>Dakota</u>	<u>Total</u>
Oil	127,900 (87%)	19,500 (13%)	147,400
Gas	1,304.6 (95%)	68.2 (5%)	1,372.8

Table No. 4
 ALLOCATION FACTORS FOR
 COMMINGLED MANCOS-DAKOTA WELLS
 Townships 24 and 25 North, Range 2 West
 Rio Arriba County, New Mexico

Well and NMOCD Commingling Order No.						
	Janet No. 1	Janet No. 2	E. T. No. 1	Mother Lode No. 1	Wright Way No. 1	Native Son No. 2
	R-7258	R-7312	R-7366	R-7365	R-7367	Proposed
<u>OIL</u>						
Mancos	63%	75%	84%	79%	67%	87%
Dakota	37%	25%	16%	21%	33%	13%
<u>GAS</u>						
Mancos	82%	90%	94%	91%	85%	95%
Dakota	18%	10%	6%	9%	15%	5%