

EFFECT OF ALLOWABLE REDUCTION ON POOL OIL PRODUCTION AND RESERVOIR WITHDRAWLS

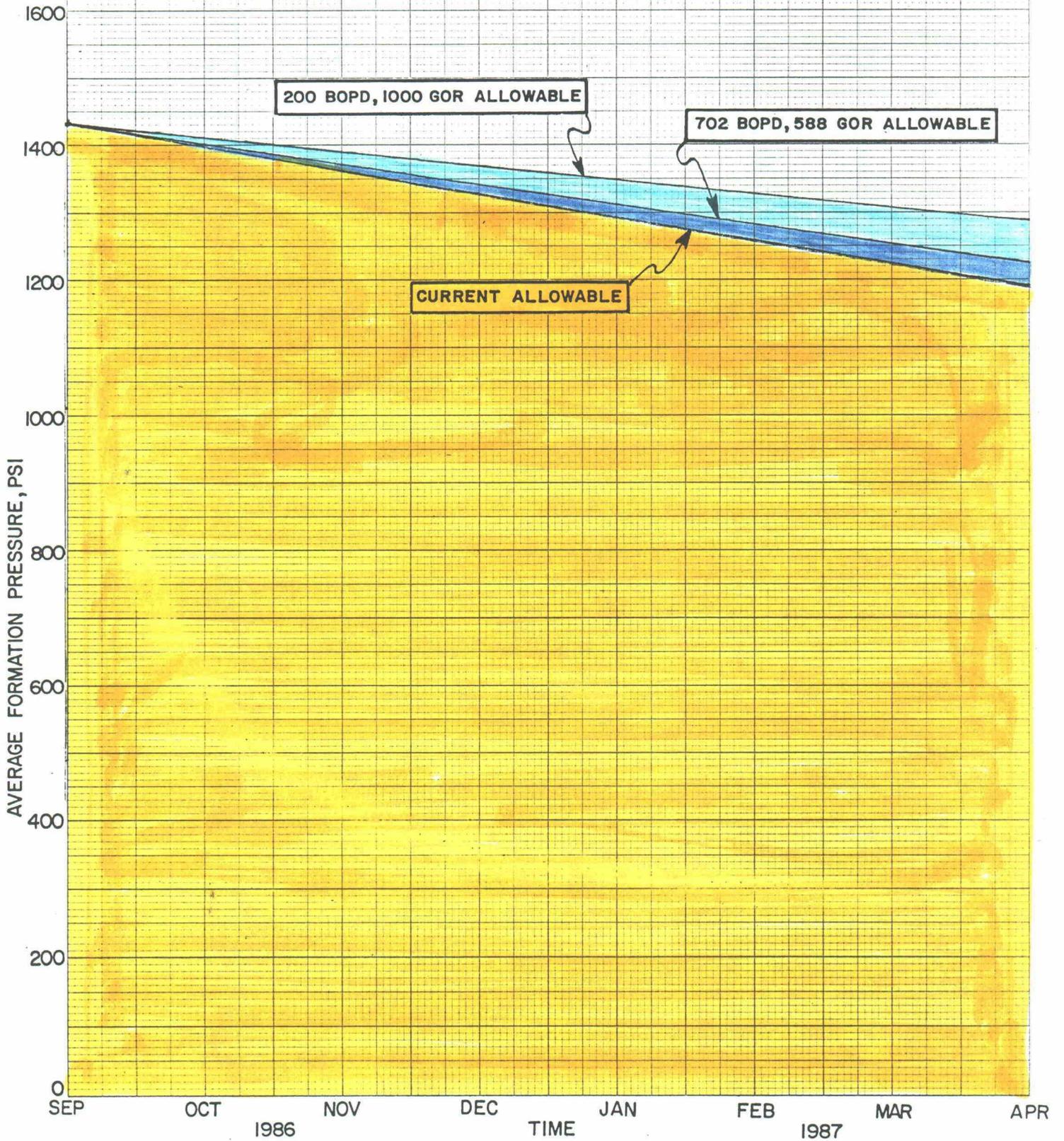
SUMMARY	ALLOWABLE	702 BOPD	588 CU FT/80		
OIL BY OPERATOR	4/86	6/86	% PROPOSED	%	
	OIL	OIL	INCR	OIL	INCR
AMOCO			0.0		0.0
DUGAN	26	138	430.8	138	430.8
MALLON	1,699	1,619	-4.7	1,157	-31.9
MERIDIAN	437	343	-21.5	343	-21.5
MARRION	13		-100.0		-100.0
MESA GRANDE	753	806	7.0	790	5.0
MCHUGH	1,875	2,800	49.3	2,495	33.1
MOBIL			0.0		0.0
READING & BATES			0.0		0.0
TOTAL GAVILAN POOL AREA	4,803	5,706	18.8	4,923	2.5
BMG	948	1,065	12.3	750	-20.9
TOTAL STUDY AREA	5,751	6,771	17.7	5,673	-1.3

RB BY OPERATOR	4/86	6/86	% PROPOSED	%	
	RB	RB	INCR	RB	INCR
AMOCO			0.0		0.0
DUGAN	45	269	498.0	272	504.4
MALLON	3,253	4,107	26.2	2,787	-14.3
MERIDIAN	1,279	1,156	-9.6	1,155	-9.7
MARRION	117		-100.0		-100.0
MESA GRANDE	3,658	3,077	-15.9	2,645	-27.7
MCHUGH	4,844	7,828	61.6	6,261	29.3
MOBIL			0.0		0.0
READING & BATES			0.0		0.0
TOTAL GAVILAN POOL AREA	13,196	16,437	24.6	13,120	-0.6
BMG	1,350	2,247	66.5	1,441	6.8
TOTAL STUDY AREA	14,546	18,685	28.5	14,562	0.1

EFFECT OF ALLOWABLE REDUCTION ON POOL OIL PRODUCTION AND RESERVOIR WITHDRAWALS

SUMMARY	ALLOWABLE	200 BOPD	1000 CU FT/80		
OIL BY OPERATOR		4/86	6/86	% PROPOSED	%
		OIL	OIL	INCR	OIL INCR
AMOCO				0.0	0.0
DUGAN		26	138	430.8	430.8
MALLON		1,699	1,619	-4.7	-62.0
MERIDIAN		437	343	-21.5	-47.1
MARRION		13		-100.0	-100.0
MESA GRANDE		753	806	7.0	3.2
MCHUGH		1,875	2,800	49.3	-16.7
MOBIL				0.0	0.0
READING & BATES				0.0	0.0
TOTAL GAVILAN POOL AREA		4,803	5,706	18.8	-30.2
BMG		948	1,065	12.3	-46.3
TOTAL STUDY AREA		5,751	6,771	17.7	-32.9
RB BY OPERATOR		4/86	6/86	% PROPOSED	%
		RB	RB	INCR	RB INCR
AMOCO				0.0	0.0
DUGAN		45	269	498.0	504.4
MALLON		3,253	4,107	26.2	-53.5
MERIDIAN		1,279	1,156	-9.6	-40.4
MARRION		117		-100.0	-100.0
MESA GRANDE		3,658	3,077	-15.9	-37.6
MCHUGH		4,844	7,828	61.6	-19.5
MOBIL				0.0	0.0
READING & BATES				0.0	0.0
TOTAL GAVILAN POOL AREA		13,196	16,437	24.6	-33.8
BMG		1,350	2,247	66.5	-32.3
TOTAL STUDY AREA		14,546	18,685	28.5	-33.7

PROJECTED FORMATION PRESSURE OVER  
TIME BASED ON JUNE 1986 PRODUCTION  
RATE - 5706 BOPD  
PRODUCTION/PRESSURE COEFFICIENT  
5000 BOPD/PSI



PRODUCTION CONSEQUENCES OF PROPOSED  
ALLOWABLE REDUCTION  
THREE-MONTH PERIOD  
BASED ON JUNE 1986 PRODUCTION

	Current Allowable	-	Applicant's Proposal	=	Immediate Loss
Oil Production, bbls.	513,540	-	301,770	=	(211,770)
Gas Production, MCF	738,990	-	386,640	=	(352,350)

REVENUE CONSEQUENCES OF PROPOSED  
ALLOWABLE REDUCTION  
THREE-MONTH PERIOD  
BASED ON JUNE 1986 PRODUCTION

	Current Allowable	-	Applicant's Proposal	=	Immediate Loss
New Mexico Production Taxes	\$ 745,113	-	\$ 427,772	=	(\$317,341)
Working Interest Revenue	6,896,510	-	4,009,318	=	(2,887,192)
Royalty Interest Revenue	<u>985,215</u>	-	<u>572,760</u>	=	<u>(412,455)</u>
Total	\$8,626,688		\$5,009,850		(\$3,616,838)

Assumes: Average Royalty - 1/8  
Oil Price - \$15.00/B0  
Gas Price - \$1.25/MCF

ECONOMIC COST OF REPRESSURIZATION  
THREE-MONTH PERIOD  
BASED ON JUNE 1986 PRODUCTION

	Current Allowable	-	Applicant's Proposal	=	Reduction
Reservoir Voidage, bbls.	1,479,330	-	785,610	=	693,720
Gas Volume Required, MCF	831,060	-	441,360	=	389,700
Cost of Gas	\$1,246,590	-	\$662,040	=	\$584,550

Assumes: Gas Price - \$1.25/MCF  
Injection Costs - \$0.25/MCF  
Gas Formation Volume Factor = 1.78 RB/MCF

BEFORE THE	
OIL CONSERVATION COMMISSION	
Santa Fe, New Mexico	
Case No. <u>8946-1150</u>	File No. <u>10</u>
Submitted by <u>Koch</u>	
Hearing Date <u>8/22/86</u>	

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Case No. 8946

KOCH EXPLORATION COMPANY

SUMMARY OF POSITION

Koch is a major owner of the production which the Application here seeks to restrict. As a major owner, Koch is as interested as anyone in assuring the greatest ultimate oil recovery from the Gavilan Pool. That is why we have participated in the owner's study which has been mentioned and why we have conducted our own independent studies.

We conclude the ultimate recovery from the Gavilan Pool will not be enhanced by further limiting oil production. Whether the reservoir drive mechanism is a secondary gas cap, as Mallon-Mesa Grande concludes, or merely solution gas, the Commission's current regulations will allow maximum recovery, at least through March 1987, without damaging the Gavilan Pool.

Conversely, the proposed production cut will drastically cut income of owners like Koch and income of royalty owners. The State of New Mexico will lose significant tax revenue. All are already suffering from perhaps the worst depression the Oil Industry has ever seen.

All that hardship is to no purpose because Gavilan will not benefit from the energy saved. Even if all the studies are completely wrong, and the reservoir would benefit from higher pressure, the drastic cut proposed would save only a meaningless few pounds of pressure.

In any event, even if a few pounds should be saved, the Application would cut oil production, when free gas production is the culprit. If the Commission chooses to further limit production, the rational way to conserve reservoir energy is to conserve free gas. Therefore, we have proposed alternatively that gas production should be limited to the solution gas ratio of 588 SCF per STB with oil production still restricted by the existing depth bracket allowable to 702 BOPD.

OIL CONSERVATION DIVISION

MR. STAMETS

BENSON-MONTIN-GREER DRILLING CORP.  
EXHIBITS IN CASE NO. 8950  
BEFORE THE OIL CONSERVATION DIVISION OF THE  
NEW MEXICO DEPARTMENT OF ENERGY AND MINERALS

AUGUST 7, 1986

BEFORE THE	
OIL CONSERVATION COMMISSION	
New Mexico	
Case No.	8950 Exhibit No. 1
By	BENSON-MONTIN-GREER
Witness Date	8-7-86

BENSON-MONTIN-GREER DRILLING CORP.  
EXHIBITS IN CASE NO. 8950  
BEFORE THE OIL CONSERVATION DIVISION OF THE  
NEW MEXICO DEPARTMENT OF ENERGY AND MINERALS

AUGUST 7, 1986

INDEX

SECTION A. Application.

SECTION B. Orientation maps.

- Item 1. Plat showing well spacing and drilled density of pools in the vicinity of the Gavilan pool as of November, 1983 (time of spacing hearing for Gavilan).
- Item 2. Plat showing for Boulder, West Puerto Chiquito and Lindrith Gallup-Dakota the per-acre effective hydrocarbon pore space volumes for the Mancos formation.

SECTION C. Structural contour map.

SECTION D. A comparison of the permeability/porosity relation for reservoirs of sandstone matrix porosity with those of fracture porosity only.

- Item 1. Relation of permeability to porosity for sandstone reservoirs as evidenced by Bulnes and Fittings, AIME Transactions 1945, Volume 160 (2 pages - gold).
- Item 2. Graph showing relation of permeability to porosity for sandstone reservoirs and fracture reservoirs.
- Item 3. Graph of Item 2 above with arbitrarily selected "A", "B" and "C" characteristics.
- Item 4. Graph of Item 3 above with data extended to higher permeabilities and porosities.
- Item 5. Graph of per acre oil in place as dependent on transmissibility and calculated from the number of feet shown and "A", "B" and "C" characteristics identified on Item 3 above (yellow).
- Item 6. Fracture permeability described by Muskat (2 pages - white).

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SECTION D. Continued.

- Item 7. Schedule showing calculated values of permeability and porosity for fracture systems of horizontal flow and a fixed number of equal-width fractures per foot. (Calculated from Muskat's basic formula and law of parallel flow assuming an impermeable matrix.) (1 page - white).
- Item 8. Sample calculation by Craft and Hawkins of fracture permeability for fracture .005" wide and for one fracture per foot in formation of very low matrix permeability. (2 pages - pink, note calculated value about the same as red point plotted on graph under Item 2 above.)
- Item 9. Sample calculation by Aguilera of fracture permeability for fracture .01" wide and for one fracture per foot in formation of very low matrix permeability. (2 pages - blue, note calculated value about the same as blue point plotted on graph under item 2 above.)

SECTION E. Lithology of reservoir rock.

Page 1. General description.

Page 2. Results of interference tests evidence the fact that the reservoir pore space consists of fracture porosity only, with no contribution from a "matrix" porosity (green).

SECTION F. Solution gas drive recovery for fractured reservoirs.

Item 1. Relative permeability of fractured formations (blue).

Item 2. Comparison of oil recoveries from fractured reservoir and typical sand reservoir.

SECTION G. Comparison of depletion rates: Canada Ojitos Unit with Gavilan.

SECTION H. Opposition arguments identified and refuted.

Page 1. Introduction (yellow).

Page 2. Opposition argument: A change in allowables during development of a field is an improper regulation since it adversely impacts industry's plans made at an earlier time (pink).

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SECTION H. Continued.

Page 3. Opposition argument: Allowable change will cause economic hardship (blue).

Page 4. Opposition argument: Reduction in production rates from current levels, if undertaken, should be proportional to current rates of production (green).

SECTION I. Proposed order.

BEFORE THE  
OIL CONSERVATION DIVISION  
NEW MEXICO DEPARTMENT OF ENERGY AND MINERALS

IN THE MATTER OF THE APPLICATION  
OF BENSON-MONTIN-GREER DRILLING  
CORP. FOR AMENDMENT TO THE SPECIAL  
RULES AND REGULATIONS OF THE WEST  
PUERTO CHIQUITO-MANCOS OIL POOL  
AS PROMULGATED BY DIVISION ORDER  
R-3401, AND TO ESTABLISH TEMPORARY  
SPECIAL PRODUCTION ALLOWABLE LIMITATIONS AND GAS-OIL RATIO LIMITATIONS,  
RIO ARRIBA COUNTY, NEW MEXICO.

Case 8950

APPLICATION

Comes now, BENSON-MONTIN-GREER DRILLING CORP., by and through its undersigned attorneys, and hereby applies to the New Mexico Oil Conservation Division for the establishment of a Temporary Gas-Oil Ratio limitation of not more than 1000 cubic feet of gas for each barrel of oil produced and an allowable of not more than 400 barrels of oil per day per 640-acre spacing and proration unit for the West Puerto Chiquito-Mancos Oil Pool, Rio Arriba County, New Mexico, OR IN THE ALTERNATIVE, a similar production limitation formula that will preserve reservoir energy and prevent waste, and in support thereof would show:

1. Applicant is the operator of the Canada Ojitos Unit from which oil is produced from the West Puerto Chiquito-Mancos Oil Pool, Rio Arriba County, New Mexico.

2. At the request of the applicant, the Oil Conservation Division entered Division Order R-3401 creating and adopting Special Rules and Regulations for the West Puerto Chiquito-Mancos Oil Pool (BMG West Puerto Chiquito-Mancos Pressure Maintenance

Project), Rio Arriba County, New Mexico.

3. Currently available geologic and engineering data demonstrates that the statewide GOR and allowables applied to the West Puerto Chiquito-Mancos Oil Pool are resulting in the inefficient use of the reservoir energy and are causing waste to occur.

4. That the reservoir characteristics of the subject pool justify the establishment of a temporary gas-oil limitation of 1,000 cubic feet of gas per barrel of oil and a production limitation on allowables of not more than 400 barrels of oil per day per 640-acre spacing unit.

5. That applicant believes that a gas-oil ratio of not more than 1,000 and a daily allowable of not more than 400 barrels a day per well is necessary in order to prevent waste, increase ultimate oil recovery, and to preserve reservoir energy.

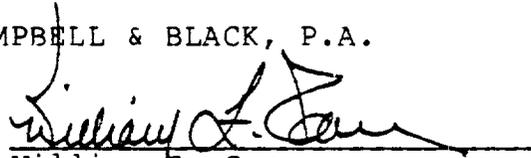
6. That in order to prevent waste and protect correlative rights immediate action needs to be taken to reduce the GOR and the production rates on pool wells for a period of not less than 90 days.

WHEREFORE, applicant requests that the Division set this matter for hearing and that after notice and hearing the Division establish a temporary special 1,000 to 1 GOR and a maximum allowable of 400 barrels of oil per day per 640-acre spacing unit, for the West Puerto Chiquito-Mancos Oil Pool, OR IN THE ALTERNATIVE, a similar production limitation formula that will preserve reservoir energy and prevent waste.

Respectfully submitted,

CAMPBELL & BLACK, P.A.

By

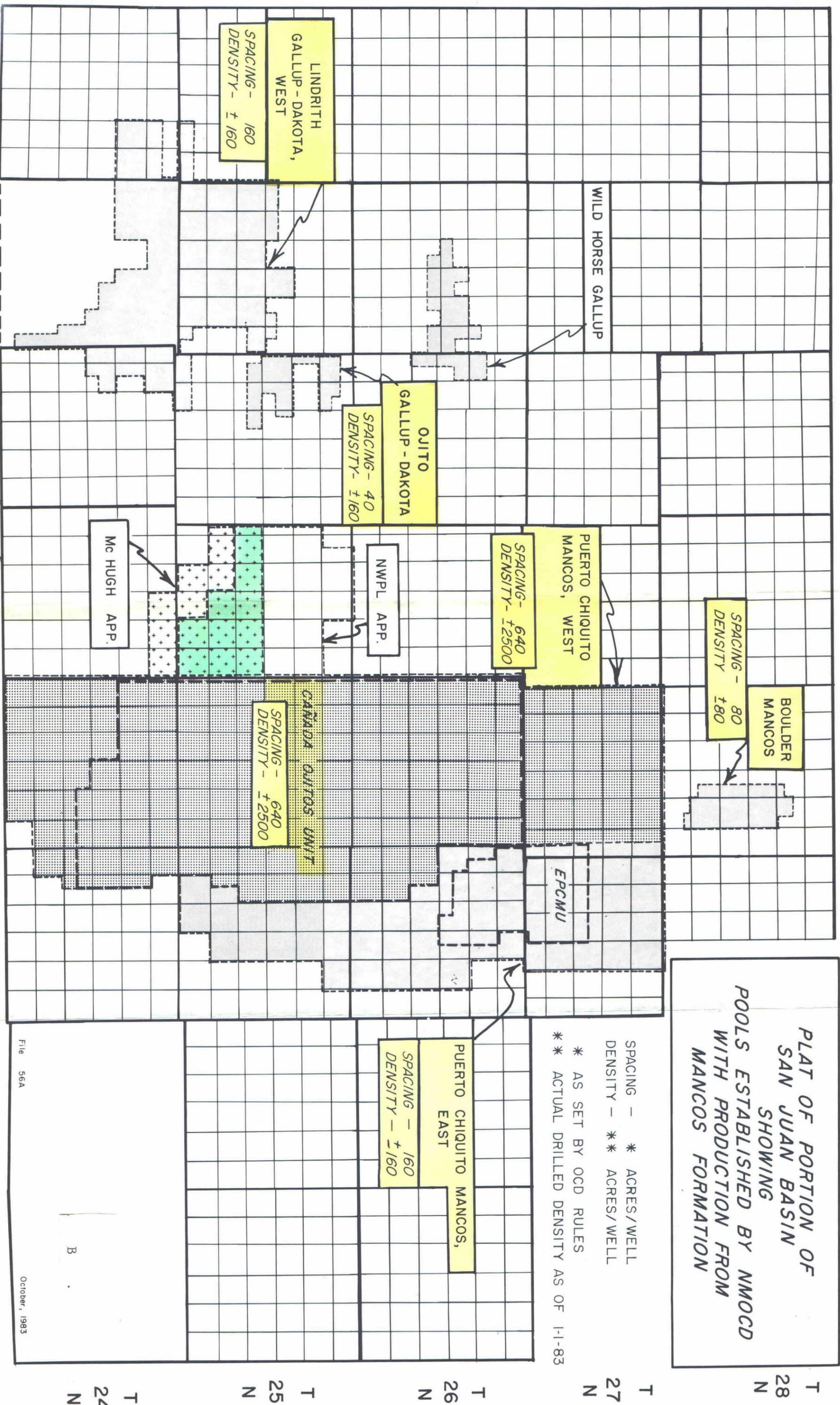
A handwritten signature in cursive script, appearing to read "William F. Carr", written over a horizontal line.

William F. Carr  
Post Office Box 2208  
Santa Fe, New Mexico 87501  
(505) 988-4421

ATTORNEYS FOR BENSON-MONTIN-  
GREER DRILLING CORP.

R 5 W      R 4 W      R 3 W      R 2 W      R 1 W      R I E      R 2 E      R 3 E

**PLAT OF PORTION OF  
SAN JUAN BASIN  
SHOWING  
POOLS ESTABLISHED BY NMOCED  
WITH PRODUCTION FROM  
MANCOS FORMATION**



SPACING - \* ACRES/WELL  
 DENSITY - \*\* ACRES/WELL  
 \* AS SET BY OCD RULES  
 \*\* ACTUAL DRILLED DENSITY AS OF 1-1-83

LINDRITH  
 GALLUP - DAKOTA,  
 WEST  
 SPACING - 160  
 DENSITY - ± 160

WILD HORSE GALLUP

OJITO  
 GALLUP - DAKOTA  
 SPACING - 40  
 DENSITY - ± 160

PUERTO CHIQUITO  
 MANCOS, WEST  
 SPACING - 640  
 DENSITY - ± 2500

NWPL APP.

Mc HUGH APP.

BOULDER  
 MANCOS  
 SPACING - 80  
 DENSITY ± 80

CANADA OJITOS UNIT  
 SPACING - 640  
 DENSITY - ± 2500

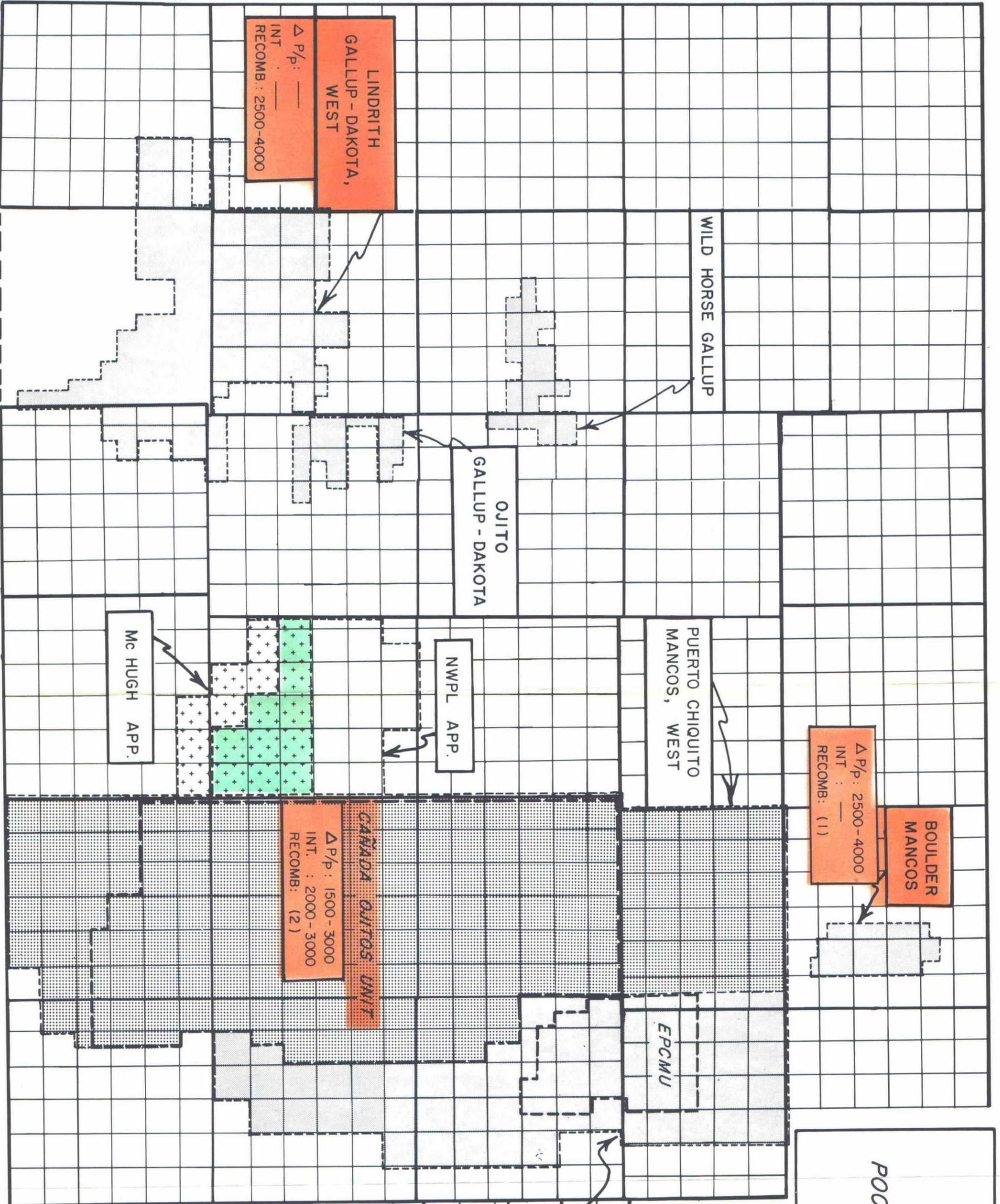
EPCMU

PUERTO CHIQUITO  
 MANCOS,  
 EAST  
 SPACING - 160  
 DENSITY - ± 160

T 28 N  
 T 27 N  
 T 26 N  
 T 25 N  
 T 24 N

R 5 W R 4 W R 3 W R 2 W R 1 W R 1 E R 2 E R 3 E

**PLAT OF PORTION OF  
SAN JUAN BASIN  
SHOWING  
POOLS ESTABLISHED BY NMOC D  
WITH PRODUCTION FROM  
MANCOS FORMATION**



NOTES:  
 (1) Gas Not Sold & Metered  
 Reported GOR's May Not  
 Be Sufficiently Accurate.  
 (2) N.A. Gas Injection Project

Reservoir Per Acre Volume Of Effective  
 Hydrocarbon Pore Space Determined By:  
 $\Delta P/P$   
 AREA  
 Comparison Of Production/Pressure  
 Coefficients At Different Fractions Of  
 Undersaturated Oil.

INT.  
 TEST  
 By Direct Calculation Of Interference  
 Test Data

RECOMB.  
 By Recombination To Initial Reservoir  
 Conditions Of Estimated Ultimate  
 Recovery Of Gas And Oil.

T 28 N  
 T 27 N  
 T 26 N  
 T 25 N  
 T 24 N