Entered September 13, 1965
R S P

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION COMMISSION ON ITS OWN MOTION TO CONSIDER THE ADOPTION OF A NEW "MANUAL OF BACK-PRESSURE TESTING OF NATURAL GAS WELLS" FOR THE STATE OF NEW MEXICO.

CASE No. 3283
Order No. R-2964

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. on August 11, 1965, at Santa Fe, New Mexico, before Examiner Daniel S. Nutter.

NOW, on this 13th day of September, 1965, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

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

(2) That an Industry Committee appointed by the Commission has prepared a new "Manual for Back-Pressure Testing of Natural Gas Wells" and recommends the adoption of said manual.

(3) That said manual is patterned after the "Manual of Back-Pressure Testing of Gas Wells" published by the Interstate Oil Compact Commission.

(4) That adoption of the proposed "Manual for Back-Pressure Testing of Natural Gas Wells" will enable the Commission to more efficiently and effectively administer the laws of the State of New Mexico and the Commission's Rules and Regulations concerning the prevention of waste and the protection of correlative rights as related to natural gas production.

(5) That certain forms should be amended and certain new forms adopted by the Commission to facilitate adoption of the proposed manual.

(6) That certain rules and regulations of the Commission should be amended to facilitate adoption of the proposed manual.

IT IS THEREFORE ORDERED:

(1) That the "Manual for Back-Pressure Testing of Natural Gas Wells," contained in the record of this case as OCC Exhibit No. 1, is hereby adopted by the Commission.

(2) That Commission Forms C-122 and C-122-C are hereby amended to conform with Exhibits A and B of this order.

(3) That new Commission Forms C-122-D, C-122-E, C-122-F, and C-122-G, as shown in Exhibits C, D, E, and F of this order, are hereby adopted.

(4) That Rule 1100-D of the Commission Rules and Regulations is hereby amended as follows:

(a) By striking the phrase "Form C-122 Multi-Point Back Pressure Test for Gas Wells" and interlineating in lieu thereof the phrase "Form C-122 Multi-point and One Point Back Pressure Test for Gas Well."

(b) By striking the phrase "C-122-C One-Point Back Pressure Test for Gas Wells" and interlineating in lieu thereof the phrase "Form C-122-C Deliverability Test Report."

(c) By adding the phrase "C-122-D Worksheet for Calculation of Static Column Wellhead Pressure (P_w)."

(d) By adding the phrase "C-122-E Worksheet for Stepwise Calculation of (Surface) (Subsurface) Pressure (P_c & P_w) (P_f & P_s)."

(e) By adding the phrase "C-122-F Worksheet for Calculation of Wellhead Pressures (P_c or P_w) from Known Bottomhole Pressure (P_f or P_s)."

(f) By adding the phrase "C-122-G Worksheet for Calculation of Static Column Pressure at Gas Liquid Interface."

(5) That Rule 1122 of the Commission Rules and Regulations is hereby amended to read in its entirety as follows:

"RULE 1122. MULTIPOINT AND ONE POINT BACK PRESSURE TEST FOR GAS WELL (Form C-122)
GAS WELL TEST DATA SHEET - SAN JUAN BASIN (Form C-122-A)
INITIAL POTENTIAL TEST DATA SHEET (Form C-122-B)
DELIVERABILITY TEST REPORT (Form C-122-C)
WORKSHEET FOR CALCULATION OF STATIC COLUMN WELLHEAD PRESSURE (P_w) (Form C-122-D)
WORKSHEET FOR STEPWISE CALCULATION OF (SURFACE) (SUBSURFACE) PRESSURE (P_c & P_w) (P_f & P_s) (Form C-122-E)
WORKSHEET FOR CALCULATION OF WELLHEAD PRESSURES (P_c or P_w) FROM KNOWN BOTTOMHOLE PRESSURE (P_f or P_s) (Form C-122-F)
WORKSHEET FOR CALCULATION OF STATIC COLUMN PRESSURE AT GAS LIQUID INTERFACE (Form C-122-G)

The above forms shall be submitted to the appropriate District Office of the Commission in accordance with the provisions of the "Manual for Back-Pressure Testing of Natural Gas Wells," Rule 401 of the Commission Rules and Regulations, and applicable special pool rules and proration orders. These forms shall be submitted in DUPLICATE except Form C-122-A which shall be submitted in TRIPLICATE."

(6) That this order shall become effective January 1, 1966.

(7) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

JACK M. CAMPBELL, Chairman

GUYTON B. HAYS, Member

A. L. PORTER, Jr., Member & Secretary

S E A L

esr/

NEW MEXICO OIL CONSERVATION COMMSSION

MULTIPOINT AND ONE POINT BACK PRESSURE TEST FOR GAS WELL

Form C-122
Revised 9-1-65

Type Test ☐ Initial ☐ Annual ☐ Special				Test Date	
Company		Connection			
Pool		Formation			Unit
Completion Date	Total Depth		Plug Back TD	Elevation	Farm or Lease Name
Csg. Size / Wt. / d / Set At			Perforations: From To		Well No.
Tbg. Size / Wt. / d / Set At			Perforations: From To		Unit Sec. Twp. Rge.
Type Well – Single – Bradenhead – G.G. or G.O. Multiple			Packer Set At		County
Producing Thru	Reservoir Temp. °F @	Mean Annual Temp. °F	Baro. Press. – P_a		State

L	H	Gg	% CO_2	% N_2	% H_2S	Prover	Meter Run	Taps

	FLOW DATA					TUBING DATA		CASING DATA		
NO.	Prover Line Size X Orifice Size	Press. p.s.i.g.	Diff. h_w	Temp. °F		Press. p.s.i.g.	Temp. °F	Press. p.s.i.g.	Temp. °F	Duration of Flow
SI										
1.										
2.										
3.										
4.										
5.										

RATE OF FLOW CALCULATIONS

NO.	Coefficient (24 Hour)	$\sqrt{h_w P_m}$	Pressure P_m	Flow Temp. Factor Ft.	Gravity Factor Fg	Super Compress. Factor, Fpv	Rate of Flow Q, Mcfd
1							
2							
3							
4							
5							

NO.	P_r	Temp. °R	T_r	Z
1				
2.				
3.				
4.				
5				

Gas Liquid Hydrocarbon Ratio _____ Mcf/bbl.
A.P.I. Gravity of Liquid Hydrocarbons _____ Deg.
Specific Gravity Separator Gas _____ XXXXXXXXX
Specific Gravity Flowing Fluid XXXXX _____
Critical Pressure _____ P.S.I.A. _____ P.S.I.A.
Critical Temperature _____ R _____ R

P_c _____ P_c^2 _____

NO	P_t^2	P_w	P_w^2	$P_c^2 - P_w^2$
1				
2				
3				
4				
5				

(1) $\frac{P_c^2}{P_c^2 - P_w^2} =$ _____ (2) $\left[\frac{P_c^2}{P_c^2 - P_w^2}\right]^n =$ _____

AOF = Q $\left[\frac{P_c^2}{P_c^2 - P_w^2}\right]^n =$ _____

Absolute Open Flow _____ Mcfd @ 15.025 Angle of Slope θ _____ Slope, n _____

Remarks: _____

Approved By Commission:	Conducted By:	Calculated By:	Checked By:

Exhibit A
Order No. R-2964

NEW MEXICO OIL CONSERVATION COMMISSION

DELIVERABILITY TEST REPORT

Form C-122-C
Revised 9-1-65

Type Test ☐ Initial ☐ Annual ☐ Special						Test Date		
Company				Connection				
Pool				Formation			Unit	
Completion		Total Depth		Plug Back TD		Elevation	Farm or Lease Name	
Csg. Size	Wt.	d	Set At	Perforations: From	To		Well No.	
Tbg. Size	Wt.	d	Set At	Perforations: From	To		Unit Sec. Twp. Rge.	
Type Well – Single – Bradenhead – G.G. or G.O. Multiple				Packer Set At			County	
Producing Thru	Reservoir Temp. °F @		Mean Annual Temp. °F	Baro. Press. – P_a			State	
L	H	Gg.	% CO_2	% N_2	% H_2S	Prover	Meter Run	Taps

	FLOW DATA				TUBING DATA		CASING DATA		
NO.	Prover Line Size X Choke Orifice Size	Press. p.s.i.g.	Diff. hw	Temp. °F	Press. p.s.i.g.	Temp. °F	Press. p.s.i.g.	Temp. °F	Duration of Flow
SI									
1.									

NO.	Coefficient (24-Hour)	$\sqrt{h_w P_m}$	Pressure P_m	Flow Temp. Factor Ft	Gravity Factor Fg	Super Compress. Factor Fpv	Rate of Flow Q, Mcfd
1.							

NO.	P_r	Temp. R.	T_r	Z

Gas Liquid Hydrocarbon Ratio _____ Mcf/bbl.
A.P.I. Gravity of Liquid Hydrocarbons _____ Deg.
Specific Gravity Separator Gas _____ XXXXXXXXXX
Specific Gravity Flowing Fluid XXXXX _____
Critical Pressure _____ p.s.i.a. _____ p.s.i.a.
Critical Temperature _____ R _____ R

P_d _____
P_d^2 _____
P_c _____ P_c^2 _____
Pf _____ Pf^2 _____

NO.	P_t	P_t^2	$P_c^2 - P_t^2$	P_w	P_w^2	$P_c^2 - P_w^2$	P_s	P_s^2	$P_f^2 - P_s^2$

$$\left[\frac{P_c^2 - P_d^2}{P_c^2 - P_w^2}\right] = [\quad\quad] = \_\_\_\_\_$$

$$\text{Log}\left[\frac{P_c^2 - P_d^2}{P_c^2 - P_d^2}\right] = \_\_\_\_\_$$

$$\left[\frac{P_c^2 - P_d^2}{P_c^2 - P_w^2}\right]^n = \_\_\_\_\_$$

$$n\ \text{Log}\left[\frac{P_c^2 - P_d^2}{P_c^2 - P_w^2}\right] = \_\_\_\_\_$$

$$\text{Deliv.} = Q\left[\frac{P_c^2 - P_d^2}{P_c^2 - P_w^2}\right]^n$$

Deliv. _____ Mcfd
n _____
(Source of n)

Commission _____
Company _____
Others _____

Exhibit B
Order No. R-2964

WORKSHEET FOR CALCULATION OF STATIC COLUMN WELLHEAD PRESSURE (P_w)

Form C-122D
Adopted 9-1-65

COMPANY _____ LEASE _____ WELL NO. _____ DATE _____

LOCATION: Unit _____ Section _____ Township _____ Range _____

L _____ H _____ L/H _____ G _____ % CO_2 _____ % N_2 _____ % H_2S _____

d _____ F_r _____ GH _____ P_{cr} _____ (TABLE IX & X) T_{cr} _____ (TABLE IX & X)

LINE										
1 Q_m										
2 T_w (W.H. °R)										
3 T_s (B.H. °R)										
4 $T = (\frac{T_w + T_s}{2})$										
5 Z (Est.)										
6 TZ										
7 GH/TZ										
8 e^S (Table XIV)										
9 $1-e^{-S}$ (Table XIV)										
10 P_t										
11 $P_t^2/1000$										
12 F_r (Table XV)										
13 $F_c = F_r$ TZ										
14 $F_c Q_m$										
15 $L/H (F_c Q_m)^2$										
16 $F_w = L/H (F_c Q_m)^2 (1-e^{-S})$										
17 $P_w^2 = P_t^2 + F_w$										
18 $P_s^2 = e^S P_w^2$										
19 P_s										
20 $P = (\frac{P_t + P_s}{2})$										
21 $P_r = (P/P_{cr})$										
22 $T_r = (T/T_{cr})$										
23 Z (Table XI)										

One copy to be filed in District Office (Work copy acceptable)

Exhibit C
Order No. R-2964

WORK SHEET FOR STEPWISE CALCULATION (SUBSURFACE) (SURFACE) PRESSURE (P_f & P_s) (P_c & P_w)

Form C-122E
Adopted 9-1-65

COMPANY _____ LEASE _____ WELL NO. _____ DATE _____

LOCATION: Unit _____ Section _____ Township _____ Range _____

L _____ H _____ L/H _____ G _____ % CO_2 _____ % N_2 _____ % H_2S _____

d _____ F_r _____ Q_m _____ M^2cfd (L/H) $(F_rQ_m)^2$ _____ P_{cr} _____ TABLE IX & X T_{cr} _____ TABLE IX & X

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H											
2	GH											
3	37.5GH											
4	P_c or P_n											
5	P_r											
6	T											
7	T_r											
8	Z											
9	P/Z P/Z	$\bar{4}\div\bar{8}$										
10	P/TZ	$\bar{9}\div\bar{6}$										
11	$(P/TZ)^2/1000$	$(\bar{10})^2/1000$										
12	$L/H(F_rQ_m)^2$											
13		$\bar{11}+\bar{12}$										
14	I_n	$\bar{10}\div\bar{13}$										
15	$M=P_n-P_{n-1}$											
16	$N=I_n+I_{n-1}$											
17	M x N	$\bar{15}\times\bar{16}$										
18	Σ(M x N)	$\Sigma\bar{17}$										

Exhibit D
Order No. R-2964

One copy to be filed in District Office (Work copy acceptable)

WORK SHEET FOR CALCULATION OF WELLHEAD PRESSURES (P_c or P_w)

FROM KNOWN BOTTOM HOLE PRESSURE (P_f or P_s)

Form C-122F
Adopted 9-1-65

COMPANY _____ LEASE _____ WELL NO. _____ DATE _____

LOCATION: Unit _____ Section _____ Township _____ Range _____

L _____ H _____ L/H _____ G _____ % CO_2 _____ % N_2 _____ % H_2S _____

GH _____ P_{cr} _____ (TABLE IX & X) T_{cr} _____ (TABLE IX & X)

LINE		1	2	3	4	5	6	7	8
1	T_w(W.H. °R)								
2	T_s(B.H. °R)								
3	$T=(\frac{T_w + T_s}{2})$								
4	Z (Est.)								
5	TZ								
6	GH/TZ								
7	e^s(Table XIV)								
8	P_f or P_s								
9	P_f^2 or P_s^2								
10	$P_c^2 = P_f^2/e^s$ or $P_w^2 = P_s^2/e^s$								
11	P_c or P_w								
12	$P=(\frac{P_w + P_s}{2})$ or $(\frac{P_c + P_f}{2})$								
13	$P_r = (P/P_{cr})$								
14	$T_r = (T/T_{cr})$								
15	Z (Table XI)								

One copy to be filed in District Office (Work copy acceptable)

Exhibit E
Order No. R-2964

WORKSHEET FOR CALCULATION OF STATIC COLUMN PRESSURE AT GAS LIQUID INTERFACE

Form C-122G
Adopted 9-1-65

COMPANY _____ LEASE _____ WELL NO. _____ DATE _____

L _____ H _____ L/H _____ G _____ % CO_2 _____ % N_2 _____ % H_2S _____

d _____ F_r _____ GH _____ P_{cr} _____ (TABLE IX & X) T_{cr} _____ (TABLE IX & X)

LINE											
1	Q_m										
2	T_w (W.H. °R)										
3	T_s (BH °R)										
4	$T = (\frac{T_w + T_s}{2})$										
5	Z (Est.)										
6	TZ										
7	GH/TZ										
8	e^s (Table XIV)										
9	$1 - e^{-s}$ (Table XIV)										
10	P_c										
11	P_c^2										
12	F_r (Table XV)										
13	$F_c = F_r TZ$										
14	$F_c Q_m$										
15	$L/H (F_c Q_m)^2$										
16	$F_w = L/H(F_c Q_m)^2(1-e^{-s})$										
17	$P_w^2 = P_t^2 + F_w$										
18	$P_f^2 = e^s P_c^2$										
19	P_f										
20	$P = (\frac{P_c + P_f}{2})$										
21	$P_r = \frac{P}{P_{cr}}$										
22	$T_r = \frac{T}{T_{cr}}$										
23	Z (Table XI)										

One copy to be filed in District Office (Work copy acceptable)

Exhibit F
Order No. R-2964