

NOMENCLATURE

B	= Formation Volume Factor (Res Vol ÷ Std Vol)	—
c _i	= System Total Compressibility	(Vol / Vol) psi
DR	= Damage Ratio	—
h	= Estimated Net Pay Thickness	ft
k	= Permeability	md
m	{ (Liquid) Slope Extrapolated Pressure Plot (Gas) Slope Extrapolated m(P) _i Plot	psi cycle
		MM psi ² cp cycle
m(P*)	= Real Gas Potential at P*	MM psi ² cp
m(P _i)	= Real Gas Potential at P _i	MM psi ² cp
AOF ₁	= Maximum Indicated Absolute Open Flow at Test Conditions	MCFD
AOF ₂	= Minimum Indicated Absolute Open Flow at Test Conditions	MCFD
P*	= Extrapolated Static Pressure	Psig
P _f	= Final Flow Pressure	Psig
Q	= Liquid Production Rate During Test	BPD
Q _i	= Theoretical Liquid Production w/ Damage Removed	BPD
Q _g	= Measured Gas Production Rate	MCFD
r _i	= Approximate Radius of Investigation	ft
r _w	= Radius of Well Bore	ft
S	= Skin Factor	
t	= Total Flow Time Previous to Closed-in	Minutes
Δt	= Closed-in Time at Data Point	Minutes
T	= Temperature Rankine	R
φ	= Porosity	—
μ	= Viscosity of Gas or Liquid	cp
Log	= Common Log	

EQUATIONS FOR DST LIQUID WELL ANALYSIS

Transmissibility	$\frac{kh}{\mu} = \frac{162.6 \text{ OB}}{m}$	$\frac{\text{md-ft}}{\text{cp}}$
Indicated Flow Capacity	$kh = \frac{kh}{\mu}$	md-ft
Average Effective Permeability	$k = \frac{kh}{h}$	md
Skin Factor	$S = 1.151 \left[\frac{P^* - P_i}{m} - \text{LOG} \left(\frac{k(t/60)}{h \mu c r_w^2} \right) \cdot 3.23 \right] -$	—
Damage Ratio	$DR = \frac{P^* - P_i}{P^* - P_f} \frac{P_i}{0.87 \text{ mS}}$	—
Theoretical Potential w/ Damage Removed	$Q_i = Q \text{ DR}$	BPD
Approx. Radius of Investigation	$r_i = 0.032 \sqrt{\frac{k(t/60)}{h \mu c_i}}$	ft

EQUATIONS FOR DST GAS WELL ANALYSIS

Indicated Flow Capacity	$kh = \frac{1637 \text{ Q}_0 \text{ T}}{m}$	md-ft
Average Effective Permeability	$k = \frac{kh}{h}$	md
Skin Factor	$S = 1.151 \left[\frac{m(P^*) - m(P_f)}{m} - \text{LOG} \left(\frac{k(t/60)}{h \mu c r_w^2} \right) \cdot 3.23 \right] -$	—
Damage Ratio	$DR = \frac{m(P^*) - m(P_f)}{m(P^*) - m(P_f) - 0.87 \text{ mS}}$	—
Indicated Flow Rate (Maximum)	$\text{AOF}_1 = \frac{Q_i m(P^*)}{m(P^*) - m(P_f)}$	MCFD
Indicated Flow Rate (Minimum)	$\text{AOF}_2 = Q_i \sqrt{\frac{m(P^*)}{m(P^*) - m(P_f)}}$	MCFD
Approx. Radius of Investigation	$r_i = 0.032 \sqrt{\frac{k(t/60)}{h \mu c_i}}$	ft



TICKET NO. 23177200
15-JUN-86
FARMINGTON

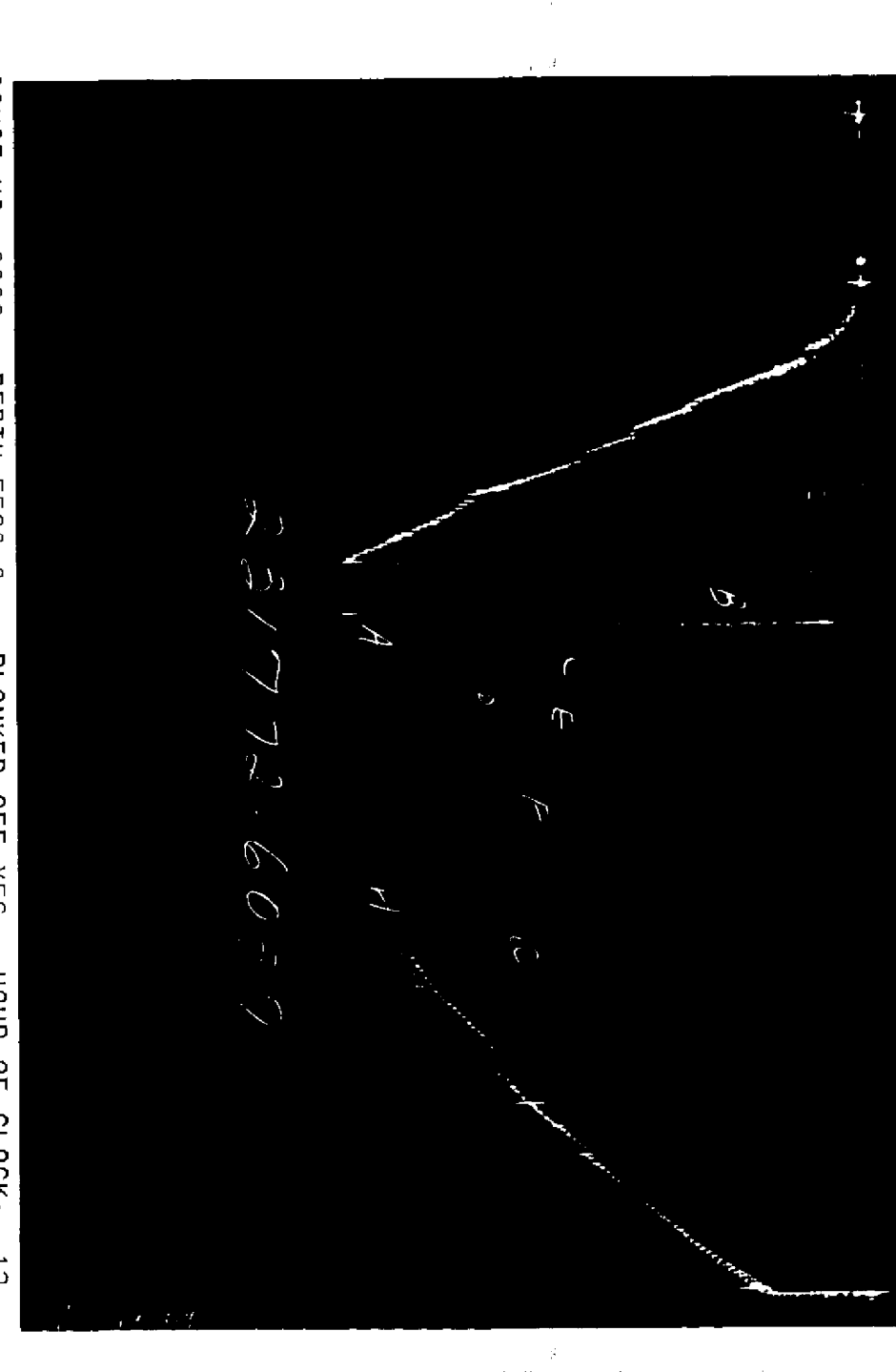
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OIL CON. DIV.
LOG-3

FORMATION TESTING SERVICE REPORT

5581.0	5583.0	41-19	18 19N 24	5581.0	5583.0	41-19	18 19N 24	5581.0	5583.0	41-19	18 19N 24
5581.0	5583.0	41-19	18 19N 24	5581.0	5583.0	41-19	18 19N 24	5581.0	5583.0	41-19	18 19N 24



ID	DESCRIPTION	PRESSURE	TIME	TYPE
A	INITIAL HYDROSTATIC	2764	2631.4	
B	INITIAL FIRST FLOW	875	844.7	F
C	FINAL FIRST FLOW	1697	1692.7	F
C	INITIAL FIRST CLOSED-IN	1697	1692.7	C
D	FINAL FIRST CLOSED-IN	2007	2003.4	C
E	INITIAL SECOND FLOW	1751	1750.7	F
F	FINAL SECOND FLOW	2007	2005.7	F
F	INITIAL SECOND CLOSED-IN	2007	2005.7	F
G	FINAL SECOND CLOSED-IN	2007	2011.1	C
H	FINAL HYDROSTATIC	2574	2582.7	



ID	DESCRIPTION	PRESSURE	TIME	TYPE
A	INITIAL HYDROSTATIC	2693	2652.3	
B	INITIAL FIRST FLOW	988	765.5	F
C	FINAL FIRST FLOW	1708	1722.9	F
C	INITIAL FIRST CLOSED-IN	1708	1722.9	C
D	FINAL FIRST CLOSED-IN	2018	2021.3	C
E	INITIAL SECOND FLOW	1762	1781.0	F
F	FINAL SECOND FLOW	2018	2023.1	F
F	INITIAL SECOND CLOSED-IN	2018	2023.1	F
G	FINAL SECOND CLOSED-IN	2018	2030.1	C
H	FINAL HYDROSTATIC	2572	2599.6	

EQUIPMENT & HOLE DATA		TICKET NUMBER: 23177200	
FORMATION TESTED: ENTRADA		DATE: 1-4-86 TEST NO: 1	
NET PAY (ft):		TYPE DST: OPEN HOLE	
GROSS TESTED FOOTAGE: 12.0		HALLIBURTON CAMP:	
Casing Perfs. (ft):		FARMINGTON	
HOLE OR CASING SIZE (in): 8.250		TESTER: D. BULL	
ELEVATION (ft): 5850.0 KELLY BUSHING		WITNESSES: MR. DUDLEY	
TOTAL DEPTH (ft): 5583.0		MUD WEIGHT (lb/gal): 5.00	
PACKER DEPTH(S) (ft): 5575.5581		MUD VISCOSITY (sec): 60	
FINEL SURFACE CHOKER (in): 0.750		ESTIMATED HOLE TEMP. (°F): 154 @ 5589.0 ft	
BOTTOM HOLE CHOKER (in): 0.750		ACTUAL HOLE TEMP. (°F): 154 @ 5589.0 ft	
MUD WEIGHT (lb/gal): 5.00		DRILLING CONTRACTOR:	
MUD VISCOSITY (sec): 60		VALVES: #2	
ESTIMATED HOLE TEMP. (°F): 154 @ 5589.0 ft		FLUID PROPERTIES FOR RECOVERED MUD & WATER	
ACTUAL HOLE TEMP. (°F): 154 @ 5589.0 ft		SOURCE	
FLUID PROPERTIES FOR RECOVERED MUD & WATER		SAMPLER DATA	
SOURCE		Pa/g at SURFACE:	
RESISTIVITY CHLORIDES		cu. ft. OF GHS:	
2.300 @ 12.9°		cc OF OIL:	
1.300 @ 50.9°		cc OF WATER: 2765.0	
1.100 @ 50.9°		cc OF MUD:	
1.090 @ 45.9°		TOTAL LIQUID cc: 2765.0	
1.090 @ 45.9°		TOTAL LIQUID cc: 2765.0	
HYDROCARBON PROPERTIES		CUSHION DATA	
OIL GRAVITY (°API):		TYPE	
GAS/OIL RATIO (cu.ft. per bbl):		AMOUNT	
GAS GRAVITY:		WEIGHT	
RECOVERED:		MEASURED FROM TESTER VALVE	
550 FEET OF WATER CUT MUD			
30 FEET OF SAND			
REMARKS:			

TYPE & SIZE	MEASURING DEVICE	TICKET NO. 23177200
TIME	CHOKE SIZE	SURFACE PRESSURE
1-4-86	PSI	NC/F
0539		
1510		
1545		
1903		
1904		
1905		
1907		
1908		
1909		
1911		
1912		
1913		
1914		
1915		
1916		
1917		
1918		
1948		
1950		
1951		
1952		
1953		
1958		
2003		
2008		
2013		
2018		
2023		
2033		
2203		
1-5-86		
0515		

LET NO: 23177200		GRADE NO: 6040			
K NO: 14121 HOUR: 12		DEPTH: 5560.0			
HALIBURTON ANALYSIS					
REF	MINUTES	PRESSURE	AP	13.61 T.M.	1.09 T.M.
FIRST FLOW					
0.0	0.0	844.7	115.2	1.0	0.552
2.0	2.0	1348.4	230.6	3.2	0.688
4.0	4.0	1180.7	230.6	4.4	0.751
6.0	6.0	1386.6	195.9	5.6	0.813
8.0	8.0	1532.1	145.5	6.1	0.414
12.0	12.0	1532.1	129.3	6.8	0.367
15.0	15.0	1681.4	31.3	7.5	0.350
16.0	16.0	1592.7		8.0	0.350
FIRST CLOSED-IN					
0.0	0.0	1682.7	255.7	1.0	0.552
2.0	2.0	1348.4	278.0	3.2	0.688
4.0	4.0	1398.7	268.1	4.4	0.751
6.0	6.0	1587.5	256.7	5.6	0.813
8.0	8.0	1586.4	255.7	6.1	0.414
12.0	12.0	1591.4	298.7	6.8	0.367
14.0	14.0	1593.4	300.7	7.5	0.350
16.0	16.0	1596.1	303.4	8.0	0.350
18.0	18.0	1597.5	304.7	8.4	0.426
20.0	20.0	1598.9	306.2	8.9	0.537
22.0	22.0	1600.4	307.5	9.3	0.537
24.0	24.0	2001.2	308.5	9.6	0.521
26.0	26.0	2001.9	309.2	9.9	0.508
28.0	28.0	2002.7	310.0	10.2	0.156
29.6	29.6	2003.4	310.7	10.4	0.187
SECOND FLOW					
0.0	0.0	1750.7	116.5		
6.0	6.0	1867.2	79.8		
12.0	12.0	1947.1	79.8		
18.0	18.0	1981.5	34.4		
24.0	24.0	2000.0	12.0		
29.6	29.6	2003.5	3.5		
44.9	44.9	2005.7	2.2		
SECOND CLOSED-IN					
0.0	0.0	2005.7		36.4	0.423
90.5	90.5	2011.1	5.4		

TICKET NO. 23177200				GRUPE NO: 603			
CLOCK NO: 10445				HOUR: 12			
CLOCK NO: 10445				DEPTH: 5500.0			

					
REF	MINUTES	PRESSURE	AP	TOTAL FATH	100-FATH

FIRST FLOW					
B	1	0.0	785.5		
	2	3.0	1165.5	420.0	
	3	6.0	1339.6	154.3	
	4	9.0	1478.5	136.8	
	5	12.0	1586.8	118.3	
	6	15.0	1697.7	100.9	
C	7	18.0	1722.9	25.1	

FIRST CLOSED-IN					
C	1	0.0	1722.9	245.2	1.8 0.445
	2	2.0	1588.0	254.1	3.2 0.683
	3	4.0	1387.0	264.1	4.6 0.853
	4	6.0	1202.1	279.2	5.3 0.475
	5	8.0	2002.1	279.2	6.2 0.414
	6	10.0	2005.8	282.9	6.9 0.387
	7	12.0	2009.4	286.6	7.5 0.350
	8	14.0	2011.6	288.7	8.0 0.305
	9	16.0	2013.9	291.0	8.5 0.262
	10	18.0	2015.8	292.5	8.9 0.254
	11	20.0	2017.8	294.3	9.3 0.237
	12	22.0	2018.4	295.5	9.6 0.222
	13	24.0	2019.0	296.2	9.9 0.208
	14	26.0	2019.7	296.9	10.2 0.195
D	15	28.0	2020.9	299.1	10.4 0.187
	16	29.5	2021.3	299.5	

SECOND FLOW					
E	1	0.0	1781.0	105.0	
	2	6.0	1885.0	77.2	
	3	12.0	1983.3	77.2	
	4	18.0	2080.7	112.6	
	5	24.0	2016.7	6.0	
	6	30.0	2020.0	3.3	
F	7	44.9	2023.1	3.1	

SECOND CLOSED-IN					
F	1	0.0	2023.1		
G	2	90.5	2030.1	7.0	36.4 0.223

REMARKS:					
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LENGTH	DEPTH
5004.0	
476.0	
1.0	5401.0
65.0	
1.0	
7.0	
5.0	5558.0
4.0	5560.0
5.0	
3.0	
6.0	5575.0
6.0	5581.0
6.0	
4.0	5590.0
	5593.0

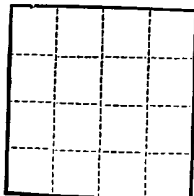
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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Land Office Sanita Fe, N.Mex.

Lease No. W-0215262

Unit _____



SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL	SUBSEQUENT REPORT OF WATER SHUT-OFF
NOTICE OF INTENTION TO CHANGE PLANS	SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING
NOTICE OF INTENTION TO TEST WATER SHUT-OFF	SUBSEQUENT REPORT OF ALTERING CASING
NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL	SUBSEQUENT REPORT OF RE-DRILLING OR REPAIR
NOTICE OF INTENTION TO SHOOT OR ACIDIZE	SUBSEQUENT REPORT OF ABANDONMENT
NOTICE OF INTENTION TO PULL OR ALTER CASING	SUPPLEMENTARY WELL HISTORY
NOTICE OF INTENTION TO ABANDON WELL	

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

March 27, 1963

Well No. 10-1 Stratis located 660 ft. from N line and 990 ft. from E line of sec. 10

NE/4 NE/4 Section 10 19N 1W 1044
(1/4 Sec. and Sec. No.) (Twp.) (Range) (Meridian)
Wilscat Sandoval New Mexico
(Field) (County or Subdivision) (State or Territory)

The elevation of the ground floor above sea level is 7000 ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

Gallup was not deep enough to well was drilled to the Dakota. Set 154' of 5 1/2" surface casing. Drilled 4 3/4" hole with air to total depth of 1589. Log tops: Gallup 46, Middle Gallup 242, Sanassee 1044, Greenhorn 1360, Greeneros 1388, sample top of first Dakota sandstone 1568. Had 300' of water fill-up from first Dakota sandstone. Set cement plugs as follows: 5 sx at 1564 (from 1539 to 1589), 5 sx at 154 (at base of surf. casing), 5 sx at surface with regulation marker in top.

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company Cities Service Oil Company

Address Box 760

Roswell, New Mexico

By Emmett Williams
Emmett Williams
Title District Manager

