

SURFACE INFORMATION

2695' то 2757'

EUGENE SALOGA

State_

County_

Tester_

Test Interval_

TOOL. HOLE & MUD DATA

Vell Flowed		Amo	ount	Type Test	CONVENTIO	
NO	7	п		Formation Tested	CHASE GR	OUP
		2		Elevation		Ft
				All Depths Measured F	rom_KELLY	BUSHING
					SEQUENCE	
		2	* * * * * * * * * * * * * * * * * * * *	Tool	Size/Type	Depth/Length/
				DRILL PIPE	4 ¹ / ₂ FH	2665'3.8"
Reversed Out		Amo	ount	CROSS-OVER SUB	3=00 FH	
NO				4-STAGE SHUT-IN	3 ¹ / ₂ FH	
, , , , , , , , , , , , , , , , , , , ,				HYDRAULIC TOOL	3 ¹ / ₂ "FH	
and the second of the second o				CROSS-OVER SUB	4 ¹ / ₂ FH	
			et	PACKER-BOB TAIL	6 5/8"	2695
				PERF. ANCHOR	3=10FH	111
Recovered		Amo	ount	CROSS-OVER SUB	3=10 FH	1 *
GAS CUT MUD	×	150'(2.1)	3 BBLS)	DRILL COLLARS	4 ¹ / ₂ H−90	33'
		0		DOUBLE PIN SUB	4½"R	1 *
		-		CROSS-OVER SUB	3 ¹ / ₂ FH	*
	-	· =		PERF. ANCHOR	3 ¹ / ₂ "FH	5'
8 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			: , , ,	RECORDER CARRIER	4 7/8°T	6 '
				RECORDER CARRIER	4 7/8"L	4 •
			0			
Maximum Surface Pressure	_					
Description (Rate of Flow)	Time	Pressure (P.S.I.G.)	Surface Choke			
Opened Tool	0414	_ '	3/4"			
CLOSED FOR INITIAL SHUT-IN	0419		_			
RE-OPENED TOOL	0449	we			lu lu	
STRONG BLOW THROUGHOUT TEST		ž.				×
CLOSED FOR FINAL SHUT-IN	0649	_	-	191		
PULLED PACKER LOOSE	0719	_	_			
		11	12			
			1			100
				Total Depth 2	757	F
				Main Hole Size 7 7	Rat Hole	Size
				Casing Size 8 5	Liner	Size TypeSTARCI
				Bottom Choke Size	Mud	Type 37ARC
				Mud Wt10.0	Mud Visc 20.	osity
		-		Water Loss	20.	Oc.c
		5.4		Cushion Type	Amount	Pressure
Remarks: SLID TOOL 8° TO BOTTON	A WHEN C	DENED		_		_
Remarks: SETB TOOL O TO BOTTON	VI VVIILIV C					7
9	1			TI	ME DATA	
					Hrs.	Mir
G					Hrs	30 Min
8 V (4)					2Hrs	Min
					Hrs	30 Min
			· ·			
Customer SAME AS BELOW.						
Costolitet		19				
Company TIME PET. CO.; 815	NOINU	VAT'L BLDG .	; WICHITA	, KANSAS	Date	6-25-63
Well BOLINGER #1				LD CAT LOC	ation CNW NE	7-29-21 w

_Casing Test #

Field Report No.___

No. DST Reports Requested

03390 A

Test Approved By MR. TOBY ELSTER

Formation Test #___



Pressure Breakdown Data

Date 6-25-63				ield Report No.	033	390 A
Recorder NoT_505	Capaci	ty3000#	Re	ecorder Depth	2747	
Recorder RunINSIDE	Clock Travel _	0.020	inches per min.	Well T	emperature	°F.
Point		Pressure		Time Gi	ven	Time Computed
A Initial Hydrostatic Mud B Initial Shut-in C Initial Flow D Final Flow E Final Shut-in F Final Hydrostatic Mud		1576 766 127 111 695 1560	Opened Tool Initial Flow Initial Shut-in Final Flow Final Shut-in	0414 5 30 120 30	Mins. Mins. Mins.	7 Mins. 30 Mins. 115 Mins. 32 Mins.
Remarks:	c-I c-2 c-3	81 89 85				

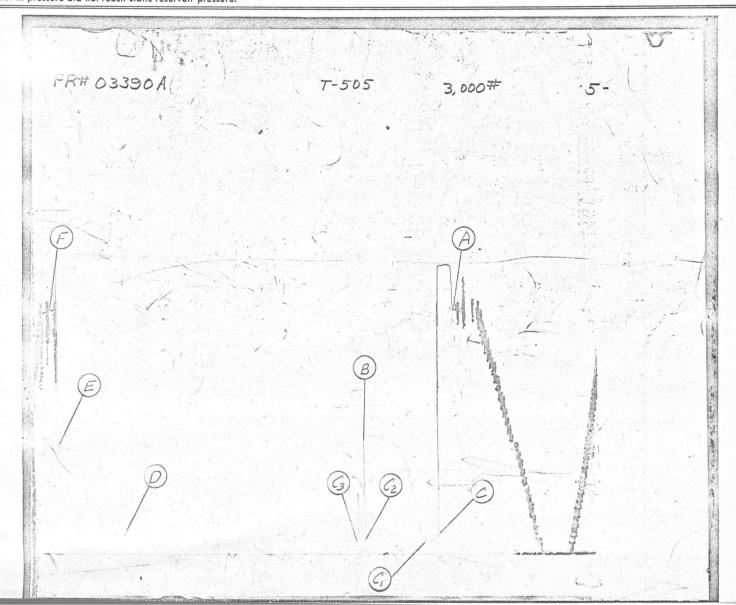
			F	RESSURE INC	REMENTS				
				INITIAL S			FINAL SHU	JT-IN	
of_	kdown: mins. a crement of	nd a final	of_		increments and a final	В	Breakdown: 10 increments of 3 mins, and a final increment of 2 mins.		
Point Minutes	Pressure	<u>T + △t</u>	Point Minutes	Pressure	<u>T + △t</u>	Point Minute	s Pressure	<u>T + △t</u>	
			c-1 0	81		D ()		
			3	188			3 253		
			6	388			3 401		
			9	558			502		
			12	652		12		M-459-	
			15	700		15			
			18	726		18			
			21	740		2	And in the last of		
			24	752		24			
			27	759		27			
į.			в 30	766		30			
						E 32			
					6				
	u u								
	7.6								
		The same of the sa							
						_			



Field Report No. 03390 A

Recorder No.	T-505	INSIDE		
Capacity (P.S.I.G.)	3000	INOTE		
Recorder Depth	2747'			
Pressure Gradient P.S.I./Ft.				
Well Temperature °F.	100			
A Initial Hydrostatic Mud	1576			
B Initial Shut-in	* 766			
C Initial Flow	127			
D Final Flow	111		Constitute of the	
E Final Shut-in	* 695			
F Final Hydrostatic Mud	1560			
Remarks: c-1	81			
c-2	89			
c-3	85			

^{*}Shut in pressure did not reach static reservoir pressure.





SPECIAL DATA ANALYSIS

FIELD REPORT #03391 A

JULY 10, 1963

This appears to be a test of a good formation and a good mechanical test. The test was conducted in such a manner that the data obtained should be adequate for reliable analysis.

- I. Well Bore Damage: The calculated estimated damage ratio of 2.56 indicates that well bore damage is present at the time and conditions of this test. This value infers that the rate of production observed during this test may be increased 2.56 times if the well bore damage were removed.
- 2. Permeability: The calculated transmissibility factor of 29520 MD.-ft./cp. indicates an average effective permeability to $\underline{\sf GAS}$ of 41.98 MD. for the $\underline{\sf IO}$ foot porous interval. This value was calculated assuming the $\underline{\sf GAS}$ Gravity to be 0.70 and selecting appropriate values for $\underline{\sf GAS}$ viscosity and deviation from the perfect $\underline{\sf GAS}$ Laws from the literature.
- 3. Reservoir Pressure: Extrapolation of the initial shut-in pressure build-up plot indicates a reservoir pressure of 1686 p.s.1.G. at recorder depth.
- 4. RADIUS OF INVESTIGATION: THE RADIUS OF INVESTIGATION OF THIS TEST IS 58 FEET BASED ON A WEIGHT AVERAGE POROSITY OF 10.6%.
- 5. General Comments: This is a test of a good permeability gas interval. An acid treatment for the removal of well bore damage alone should be sufficient to result in a commercial completion.

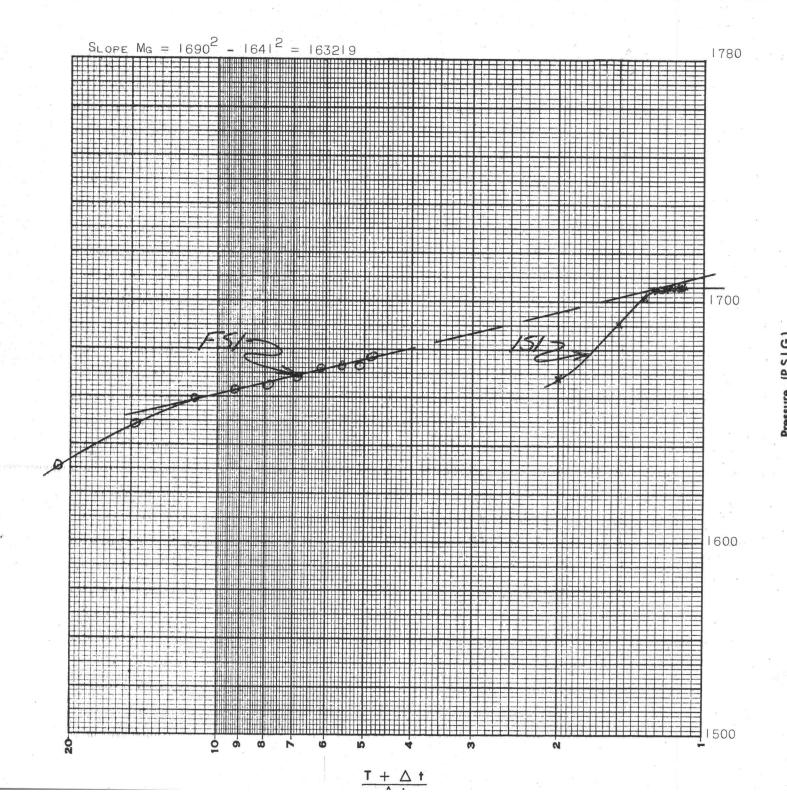
JAMES D. HILLHOUSE EVALUATION ENGINEER

Time Petroleum Company
Bolinger #1, Ford County, Kansas
Test #2, 5034! to 5124!

Recorder No. T-505

Field Report No. 03391 A

Estimated Damage Ratio	EDR	2.56		Effective Transmis	ssibility	Kh μZ	29520	Md-ft.
Maximum Reservoir Pressure	Po	1686	P.S.I.G.	Flow Rate	,	Qg	5110	MCF/Day
Slope of Shut-in Curve	Mg	1.6x10	⁵ PSI ² /log cycle	Flow Rate		Q		
Potentiometric Surface (Datum Plane, Sea Level)	PS	1183	ft.	Flow Rate		Q	, c	
Radius of Investigation		58	ft.	K (Effective to	GAS).	41.98	Md.



Assumptions made for Calculations for Gas Recoveries

- 1. Q is taken as steady state flow and unless stated otherwise at standard conditions 14.7 P.S.I. and 60° F.
- 2. P_f is formation flowing pressure at steady state flow.
- 3. Formation flow is taken as single phase flow. If liquid (condensate) is produced at surface, condensation is assumed to have occurred in drill pipe.
- 4. Radial flow is assumed
- 5. Unless given, gas specific gravity is assumed to be 0.7 (air 1.0) and having critical temperature at 390° Rankin and critical pressure of 666 P.S.I.A.
- 6. Other standard radial flow, steady state assumptions.

Empirical Equations:

1.
$$EDR = \frac{1}{log \ T \ + \ 2.65} \quad \left[\frac{P_o^{\ 2} \ - \ P_f^{\ 2}}{M_g} \right] \ \ Where \ M_g = \ \frac{\triangle \ P^2}{log \ cycle}$$

2. Transmissibility
$$\frac{Kh}{\mu Z} = \frac{1637 \, ^{\circ} T_f Q}{M_g}$$

3. P.S. =
$$\left[P_o \times 2.309 \text{ ft.}\right]$$
 Recorder depth to sea level.

Symbols		Dimensions	Symbols		Dimensions
B c EDR	Formation volume factor Fluid compressibility Estimated damage ratio	vol./vol. vol./vol./psi.	Q Q _o Q _w	Rate of flow during test Rate of oil flow during test Rate of water flow during test	Bbls./day Bbls./day Bbls./day
f h J K	Formation porosity Producing interval Productivity index Permeability	fractional feet Bbls./day/PSI Millidarcies	Q _g r _w t	Rate of gas flow during test Well bore radius Final shut-in time period Increment time of final shut-in	MCF/day inches minutes
M _g P _f P _{fsi} P _{isi} P _o P. S.	Slope of shut-in build up Final flowing pressure Final shut-in pressure at time t Initial shut-in pressure Maximum reservoir pressure Potentiometric surface	PSI ² /log cycle PSI PSI PSI PSI ft.	Τ °Τ _ε μ Ζ <u>Kh</u> or <u>Kh</u> μ Β μ Ζ	time period Open flow time period Formation temperature Fluid viscosity Gas deviation factor (Compressibility Transmissibility factor	minutes °Rankin Centipoise factor) Md. — ft. Cp.

In making any interpretation, our employees will give Customer the benefit of their best judgment as to the correct interpretation. Nevertheless, since all interpretations are opinions based on inferences from electrical, mechanical or other measurements, we cannot, and do not, guarantee the accuracy or correctness of any interpretations, and we shall not be liable or responsible, except in the case of gross or wilful negligence on our part, for any loss, costs, damages or expenses incurred or sustained by Customer resulting from any interpretation made by any of our agents or employees.



Date	7.	-4-63				Field Repo	ort No033	391 A
Recorder N	No	-505	Capacity	,_3,000#	Recorder Depth 5,120			
Recorder R	Run I r	NSIDE	_ Clock Travel		inches pe			
Point				Pressure			Time Given	Time Computer
A Initial	Hydrostatic	Mud		2785				<u> </u>
B Initial	Shut-in			1686	Opened Tool		350	
C Initial	Flow			957	Initial Flow		Mi	
D Final F	Flow			928	Initial Shut-in		30 Min	
E Final S	Shut-in			1657	Final Flow		20 Min	
F Final H	tydrostatic h	Aud		2729	Final Shut-in		30 Mi	ns. 32 Mins
Remarks:			c-3	976				
Brea of_	kdown:min	increments	S Br	PRESSURE I	NCREMENTS SHUT-IN O increments s. and a final	of_	3mins.	increments and a final
Brea of_ inc	kdown:min	increments s, and a final mins.	S Br	PRESSURE I	SHUT - IN O increments	of_ in	kdown:	increments and a final 2 mins.
Brea ofinc	kdown:min	increments	S Br	PRESSURE I	O increments s. and a final	of_	kdown:10	increments and a final
Brea ofinc	kdown:min	increments, and a final mins.	Br Point Minutes	PRESSURE I INITIAL reakdown: of of The search of the	Oincrements s. and a finalmins. T + \triant t \triant t	of_ in Point Minutes	kdown:(3mins.crement of	increments and a final $\frac{2}{2}$ mins. $\frac{T + \Delta t}{\Delta t}$
Brea of_ inc	kdown:min	increments, and a final mins.	Point Minutes	PRESSURE I INITIAL Teakdown: Of 3 min increment of. Pressure 0 936 3 1648	SHUT-IN O increments s. and a final mins. $T + \Delta t$ Δt 2.000	Point Minutes	kdown:(3mins.crement of	increments and a final mins. $\frac{T + \Delta t}{\Delta t}$ 42.00
Brea ofinc	kdown:min	increments, and a final mins.	Point Minutes	PRESSURE I INITIAL reakdown: of 3 min increment of Pressure 0 936 3 1648 6 1671	SHUT-IN O increments s. and a final — mins. T + \(\Delta t \) 2.000 1.500	Point Minutes D 0 3 6	Pressure 928 1577 1611	increments and a final mins. T + \(\Delta t \) 42.00 21.50
Brea ofinc	kdown:min	increments, and a final mins.	Point Minutes	PRESSURE I INITIAL reakdown: of of Pressure 0 936 3 1648 6 1671 9 1682	SHUT-IN O increments s. and a final — mins. T + \(\Delta t \) 2.000 1.500 1.333	Of_ in Point Minutes D O 3 6 9	kdown:10 3mins. crement of	increments and a final mins. T + \(\Delta t \) 42.00 21.50 14.66
Brea ofinc	kdown:min	increments, and a final mins.	Point Minutes	PRESSURE I INITIAL reakdown: of 3min increment of Pressure 0	SHUT-IN Oincrements s. and a finalmins. T + \(\Delta t \) 2.000 1.500 1.333 1.250	Point Minutes	Pressure 928 1577 1611 1628 1639	increments and a final mins.
Brea ofinc	kdown:min	increments, and a final mins.	Point Minutes	PRESSURE I INITIAL reakdown: 1 of 3 min increment of Pressure 0 936 3 1648 6 1671 9 1682 2 1685 5 1686	SHUT-IN Oincrements s. and a finalmins. T + \(\Delta t \) 2.000 1.500 1.333 1.250 1.200	D 0 3 6 9 12 15	Pressure 928 1577 1611 1628 1639 1643	increments and a final 2 mins. T + \Delta t \Delta t 42.00 21.50 14.66 11.25 9.20
Brea ofinc	kdown:min	increments, and a final mins.	Point Minutes	PRESSURE I INITIAL reakdown: 1 of 3 min increment of Pressure 0 936 3 1648 6 1671 9 1682 2 1685 5 1686 8 1686	SHUT-IN O increments s. and a final mins. T + \(\Delta t \) 2.000 1.500 1.333 1.250 1.200 1.167	D 0 3 6 9 12 15 18	Pressure 928 1577 1611 1628 1639 1643 1645	increments and a final 2 mins. T + \(\Delta t \)
Brea ofinc	kdown:min	increments, and a final mins.	Point Minutes	PRESSURE I INITIAL reakdown: 1 of 3 min increment of Pressure 0 936 3 1648 6 1671 9 1682 2 1685 5 1686 8 1686 1 1686	SHUT-IN O increments s. and a final mins. T + \Delta t \Delta t 2.000 1.500 1.333 1.250 1.200 1.167 1.143	D 0 3 6 9 12 15 18 21	Pressure 928 1577 1611 1628 1639 1643 1645 1648	increments and a final 2 mins.
Brea ofinc	kdown:min	increments, and a final mins.	Point Minutes C-I I 2	PRESSURE I INITIAL reakdown: 1 of 3 min increment of Pressure 0 936 3 1648 6 1671 9 1682 2 1685 5 1686 8 1686 1 1686 4 1686	SHUT-IN O increments s. and a final mins. T + \(\Delta t \) 2.000 1.500 1.333 1.250 1.250 1.200 1.167 1.143 1.125	D 0 3 6 9 12 15 18 21 24	Pressure 928 1577 1611 1628 1639 1643 1645 1648 1652	increments and a final 2 mins.
Brea ofinc	kdown:min	increments, and a final mins.	Point Minutes	PRESSURE I INITIAL reakdown: 1 of 3 min increment of Pressure 0 936 3 1648 6 1671 9 1682 2 1685 5 1686 8 1686 1 1686 4 1686 7 1686	SHUT-IN O increments s. and a final mins. T + \Delta t \Delta t 2.000 1.500 1.333 1.250 1.200 1.167 1.143	D 0 3 6 9 12 15 18 21	Pressure 928 1577 1611 1628 1639 1643 1645 1648	increments and a final 2 mins.



SURFACE INFORMATION

Well Flowed Amount GAS Reversed Out Amount NO Recovered Amount NO FLUID RECOVERED 39# Maximum Surface Pressure Description (Rate of Flow) Pressure (P.S.I.G.) Surface Choke Time 1350 3/4" Opened Tool GAS TO SURFACE 1351 CLOSED FOR INITIAL SHUT-IN 1355 RE-OPENED TOOL 1425 1630MCF/DAY GAS 1426 5 GAS 23 OMCF/DAY 1427 10 2830MCF/DAY GAS 1428 15 331 OMOF/DAY GAS 1429 20 3780MCF/DAY GAS 1430 25 4070MCF/DAY GAS 1433 28 4260MCF/DAY GAS 1435 30 5020MCF/DAY GAS 1445 38 5020MCF/DAY GAS 1500 38 5020MCF/DAY GAS 1515 38 GAS 5020MCF/DAY 1525 38 5020MCF/DAY GAS 1555 39 5110MGF/DAY GAS 1610 39 Remarks: GAS 5110MCF/DAY 1625 39 CLOSED FOR FINAL SHUT-IN 1625 EQUALIZED MUD 1655 PULLED PACKER LOOSE 1705 LOCATION: C-N W-NE 7-29-21W GAS RATES MEASURED ON PITOT TUBE. REMARKS CONTINUED UNDER TOOL SEQUENCE.

TOOL, HOLE & MUD DATA

TOOL, HOLL	a mos sai	
Type Test	CONVENT	IONAL
Formation Tested		
		F•Ft.
All Depths Measured Fro		
	SEQUENCE	
1001	SEQUENCE	Depth/Length/
Tool	Size/Type	I.D.
DRILL PIPE	4 ¹ / ₂ FH	4821 3.8"
CIRCULATING SUB	4½ FH	
DRILL PIPE	4 <u>₹</u> " FH	180' 3.8"
CROSS-OVER SUB	3½" FH	
4-STAGE SHUT-IN	3= FH	
HYDRAULIC TOOL	3½" FH	
CROSS-OVER SUB	$4\frac{1}{2}$ FH	
BOB-TAIL PACKER	6 5/8"	5034'
PERF. ANCHOR		10'
CROSS-OVER SUB	4 ½ 11 н-90	1 *
DRILL COLLAR	4 1 н-90	63' 2.25"
DOUBLE PIN SUB	41 FH	1 1
CROSS-OVER SUB	3=" FH	. •
PERF. ANCHOR	31 FH	5'
RECORDER CARRIER	4 7/8" T	6'
RECORDER CARRIER	4 7/8" L	4 9
REMARKS:		
PRODUCTIVE INTERV	AL EST	POROSITY
5036 * то 5038 *		7%
5041 то 5043		10=%
5052' то 5053'		12%
5091' то 5093'		11 1 2 %
5113' то 5116'		12%
Total Depth 5124 Main Hole Size 7 7/8 Casing Size 8 5/8 Bottom Choke Size 3/2 Mud Wt. 10.0	Rat Hole S Liner S Mud Ty Mud Viscos	47
Cushion Type	Amount	Pressure
	_	-
		387
TIME	DATA	
Initial Flow	Hrs.	5 Mins.
Initial Shut-in -		Mins.
Final Flow2	Hrs.	Mins.
Final Shut-in		Mins.
		7711175.

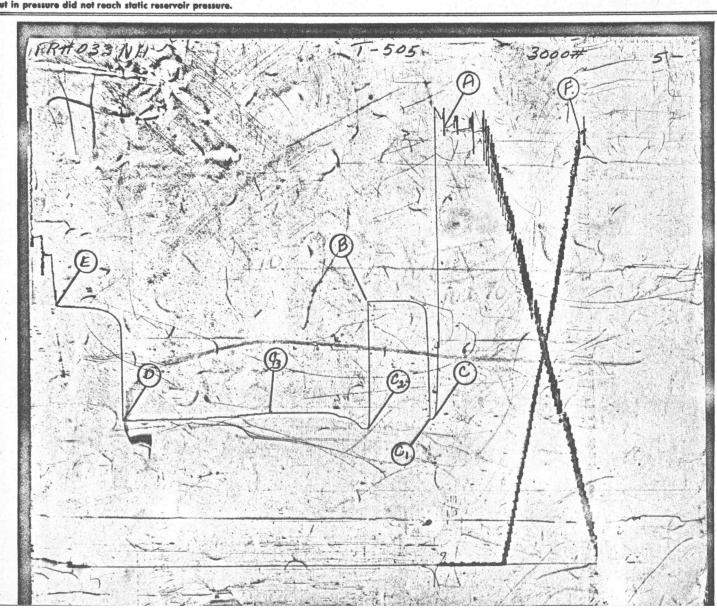
Customer	SAME AS BELOW				
Company	TIME PETROLEUM	COMPANY; 815	UNION NATIONAL BLDG.;	WICHITA, KANSAS	Date 7-4-63
Well	BOLINGER #1		Field WILD CAT		
Test Interval	5034' то 5124'		Formation Test #	C	Test #
County	FORD	State	KANSAS	Field Report No	03391 A
Tester	EUGENE SALOGA	Test Approved	By MR. TOBY ELSTER	No. DST Reports Requ	



Field Report No. 03391 A

Recorder No.	T-505	INSIDE			
Capacity (P.S.I.G.)	3,000				
Recorder Depth	5,120	* ***			
Pressure Gradient P.S.I./Ft.			17 May 2 State 17 State	LUNE BAYERS	
Well Temperature °F.	116				
A Initial Hydrostatic Mud	2785				
B Initial Shut-in	1686				
C Initial Flow	957				
D Final Flow	928		Para Perlandungan		N CERTA ANDA PRO
E Final Shut-in	* 1657				
F Final Hydrostatic Mud	2729				
Remarks: C-1	936				
c=2	877				
c-3	976				hatika kelebahat

^{*}Shut in pressure did not reach static reservoir pressure.





SPECIAL DATA ANALYSIS

FIELD REPORT #03393 A

JULY 10, 1963

This appears to be a test of a poor formation and a good mechanical test. The test was conducted in such a manner that the data obtained should be adequate for reliable analysis.

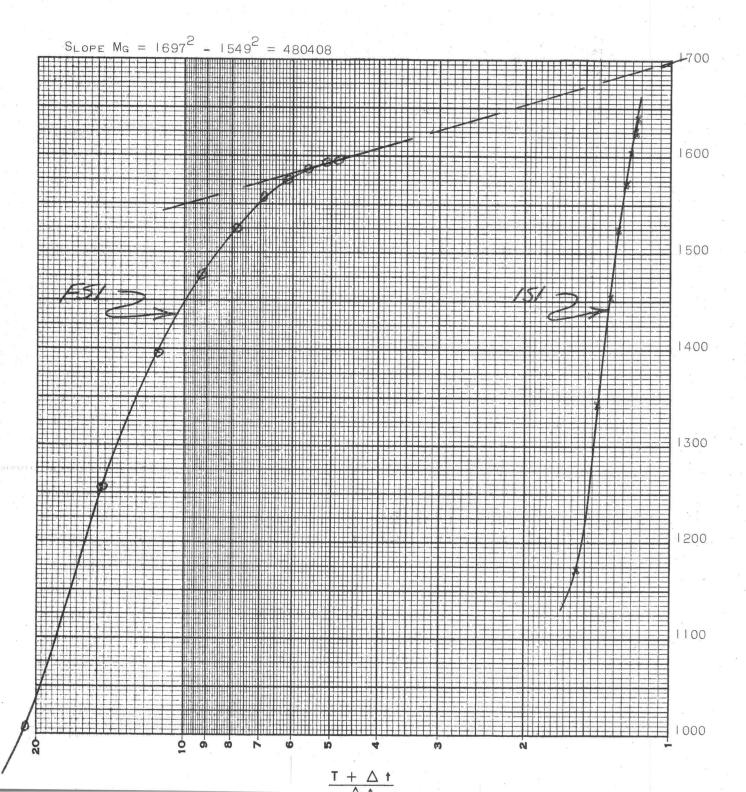
- I. Well Bore Damage: The calculated estimated damage ratio of 1.26 indicates that well bore damage is present at the time and conditions of this test. This value infers that the rate of production observed during this test may be increased 1.26 times if the well bore damage were removed.
- 2. Permeability: The calculated transmissibility factor of 79.12 MD.-FT./CP. INDICATES AN AVERAGE EFFECTIVE PERMEABILITY TO GAS OF 0.03 MD. FOR THE 37 FOOT TEST INTERVAL. THIS VALUE WAS CALCULATED ASSUMING THE GAS GRAVITY TO BE 0.70 AND SELECTING APPROPRIATE VALUES FOR GAS VISCOSITY AND DEVIATION FROM THE PERFECT GAS LAWS FROM THE LITERATURE.
- 3. Reservoir Pressure: Extrapolation of the final shut-in pressure build-up plot indicates a reservoir pressure of 1697 p.s.i.g. at recorder depth. The initial shut-in period was too short to give reliable data.
- 4. RADIUS OF INVESTIGATION: THE PERMEABILITY OF THE ZONE IS SO LOW THAT THE RADIUS OF INVESTIGATION WAS NOT CALCULATED.
- 5. General Comments: This is a test of a very low permeability gas zone. Some well bore damage is present but a practical completion is unlikely even with a large fracture treatment.

JAMES D. HILLHOUSE EVALUATION ENGINEER

TIME PETROLEUM COMPANY
BOLINGER #1, FORD COUNTY, KANSAS
TEST #3, 5158' TO 5195'

OHNSTON TESTERS Gas Reservoir Engineering Data

Estimated Damage Ratio	EDR	1.26	Effective Transmissibility	Kh μ Z	79.12	Md-ft.
Maximum Reservoir Pressure	P _o	1697 P.S.I.G.	Flow Rate	Qg	40.4	MCF/Day
Slope of Shut-in Curve	Mg	4.8x10PSI2/log cycle	Flow Rate	Q	Ď.	3 ,
Potentiometric Surface (Datum Plane, Sea Level)	PS	1143 ft.	Flow Rate	Q		9.
Radius of Investigation		ft.	K (Effective to GAS).	0.03	Md.



Assumptions made for Calculations for Gas Recoveries

- 1. Q is taken as steady state flow and unless stated otherwise at standard conditions 14.7 P.S.I. and 60° F.
- 2. $P_{\rm f}$ is formation flowing pressure at steady state flow.
- 3. Formation flow is taken as single phase flow. If liquid (condensate) is produced at surface, condensation is assumed to have occurred in drill pipe.
- 4. Radial flow is assumed
- 5. Unless given, gas specific gravity is assumed to be 0.7 (air 1.0) and having critical temperature at 390° Rankin and critical pressure of 666 P.S.I.A.
- 6. Other standard radial flow, steady state assumptions.

Empirical Equations:

1.
$$EDR = \frac{1}{\log T + 2.65} \left[\frac{P_o^2 - P_f^2}{M_g} \right]$$
 Where $M_g = \frac{\triangle P^2}{\log \text{ cycle}}$

2. Transmissibility
$$\frac{\text{Kh}}{\mu \text{ Z}} = \frac{1637 \, ^{\circ} \text{T}_{\text{f}} \text{Q}}{\text{M}_{\text{g}}}$$

3. P.S. =
$$\left[P_o \times 2.309 \text{ ft.}/PSI\right]$$
 Recorder depth to sea level.

Symbols		Dimensions	Symbols		Dimensions
В	Formation volume factor	vol./vol.	Q	Rate of flow during test	Bbls./day
c	Fluid compressibility	vol./vol./psi.	Q _o	Rate of oil flow during test	Bbls./day
EDR ·	Estimated damage ratio	39 11 9 40 11 12	Q _w	Rate of water flow during test	Bbls./day
f	Formation porosity	fractional	Qg	Rate of gas flow during test	MCF/day
h	Producing interval	feet	r _w	Well bore radius	inches
J	Productivity index	Bbls./day/PSI	t "	Final shut-in time period	minutes
K	Permeability	Millidarcies	∆t	Increment time of final shut-in	
Mg	-Slope of shut-in build up	PSI ² /log cycle		time period	minutes
$P_{\rm f}$	Final flowing pressure	PSI	Т	Open flow time period	minutes
$P_{\mathtt{fsi}}$	Final shut-in pressure at time t	PSI	°T _f	Formation temperature	°Rankin
P_{isi}	Initial shut-in pressure	PSI	μ	Fluid viscosity	Centipoise
P_{o}	Maximum reservoir pressure	PSI	z	Gas deviation factor (Compressibility	
P. S.	Potentiometric surface	ft.	$\frac{Kh}{\mu} B \frac{Kh}{\mu} Z$	Transmissibility factor	Md. — ft.

In making any interpretation, our employees will give Customer the benefit of their best judgment as to the correct interpretation. Nevertheless, since all interpretations are opinions based on inferences from electrical, mechanical or other measurements, we cannot, and do not, guarantee the accuracy or correctness of any interpretations, and we shall not be liable or responsible, except in the case of gross or wilful negligence on our part, for any loss, costs, damages or expenses incurred or sustained by Customer resulting from any interpretation made by any of our agents or employees.



			Pressure	Breakdo	wn Data			
Date	7-	6-63				Field Repo	ort No03	393 A
Recorder	No	505	_ Capacity _	3,000#				
Recorder	Run IN	SIDE Clock	Travel	0.02134	inches per	min.	Well Temper	ature!4°F.
Point		·		essure	v		Time Given	Time Computed
B Initial C Initial D Final E Final	Shut-in Flow Flow Shut-in	ud		2786 640 32 26 596 2783	Opened Tool Initial Flow Initial Shut-in Final Flow Final Shut-in	3	57 5 Min 0 Min 0 Min 0 Min	ns. 30 Mins. 118 Mins.
	American property		C-	31				
Remarks:			c-2	27				
					NCREMENTS			
	akdown: mins.	increments	Brea		increments	11		increments
	crement of				s. and a final mins.		mins. crement of	and a finalmins.
in Point	crement of	mins.	Point Minutes	Pressure	mins	Point	crement of	$\frac{2}{\mathbf{T} + \Delta \mathbf{t}}$
in Point	crement of	mins.	Point Minutes	Pressure 31 523	$ \begin{array}{c} $	Point Minutes D 0 3	Pressure 26 612	$\frac{2 \text{mins.}}{\Delta t}$ 42.00
in Point	crement of	mins.	Point Minutes C-I 0 3 6	Pressure 31 523 907	mins. $T + \Delta t$ Δt 2.667 1.834	Point Minutes D 0 3 6	Pressure 26 612 1008	$\frac{2}{\Delta t}$ mins. $\frac{1 + \Delta t}{\Delta t}$ 42.00 21.50
in Point	crement of	mins.	Point Minutes	Pressure 31 523 907 1173	2.667 2.834 1.556	Point Minutes D 0 3 6 9	Pressure 26 612 1008 1256	$\frac{2}{\text{mins.}}$ $\frac{1 + \Delta t}{\Delta t}$ $\frac{42.00}{21.50}$ 14.66
in Point	crement of	mins.	Point Minutes C-I 0 3 6	Pressure 31 523 907	2.667 1.834 1.556 1.407	Point Minutes D 0 3 6 9 12	Pressure 26 612 1008 1256 1395	$\frac{2}{\Delta t}$ mins. $\frac{1 + \Delta t}{\Delta t}$ $\frac{42.00}{21.50}$ $\frac{14.66}{11.25}$
in Point	crement of	mins.	Point Minutes	Pressure 31 523 907 1173 1344	2.667 1.834 1.556 1.407	Point Minutes D 0 3 6 9 12	Pressure 26 612 1008 1256 1395 1476	$\frac{2}{\text{mins.}}$ $\frac{1 + \Delta t}{\Delta t}$ $\frac{42.00}{21.50}$ 14.66 11.25 9.20
in Point	crement of	mins.	Point Minutes	Pressure 31 523 907 1173 1344 1454 1525	2.667 1.834 1.556 1.407	Point Minutes D 0 3 6 9	Pressure 26 612 1008 1256 1395	$\frac{2}{\Delta t}$ mins. $\frac{1 + \Delta t}{\Delta t}$ $\frac{42.00}{21.50}$ $\frac{14.66}{11.25}$
in Point	crement of	mins.	Point Minutes	Pressure 31 523 907 1173 1344 1454 1525 1572 1604	mins. T + \(\Delta t \) 2.667 1.834 1.556 1.407 1.333 1.278 1.238 1.208	Point Minutes D 0 3 6 9 12 15 18 21 24	Pressure 26 612 1008 1256 1395 1476 1525 1557	$\frac{2}{\Delta t}$ mins. $\frac{1 + \Delta t}{\Delta t}$ 42.00 21.50 14.66 11.25 9.20 7.83
in Point	crement of	mins.	Point Minutes	Pressure 31 523 907 1173 1344 1454 1525 1572 1604 1625	2.667 2.667 1.834 1.556 1.407 1.333 1.278 1.238 1.208 1.185	Point Minutes D 0 3 6 9 12 15 18 21 24 27	Pressure 26 612 1008 1256 1395 1476 1525 1557 1575 1587	2 mins. T + \(\Delta t \) 42.00 21.50 14.66 11.25 9.20 7.83 6.86 6.13 5.57
in Point	crement of	mins.	Point Minutes	Pressure 31 523 907 1173 1344 1454 1525 1572 1604	mins. T + \(\Delta t \) 2.667 1.834 1.556 1.407 1.333 1.278 1.238 1.208	Point Minutes D 0 3 6 9 12 15 18 21 24 27 30	Pressure 26 612 1008 1256 1395 1476 1525 1557 1575 1587 1593	2 mins. T + \(\Delta t \) 42.00 21.50 14.66 11.25 9.20 7.83 6.86 6.13 5.57 5.10
in Point	crement of	mins.	Point Minutes	Pressure 31 523 907 1173 1344 1454 1525 1572 1604 1625	2.667 2.667 1.834 1.556 1.407 1.333 1.278 1.238 1.208 1.185	Point Minutes D 0 3 6 9 12 15 18 21 24 27	Pressure 26 612 1008 1256 1395 1476 1525 1557 1575 1587	2 mins. T + \(\Delta t \) 42.00 21.50 14.66 11.25 9.20 7.83 6.86 6.13 5.57
in Point	crement of	mins.	Point Minutes	Pressure 31 523 907 1173 1344 1454 1525 1572 1604 1625	2.667 2.667 1.834 1.556 1.407 1.333 1.278 1.238 1.208 1.185	Point Minutes D 0 3 6 9 12 15 18 21 24 27 30	Pressure 26 612 1008 1256 1395 1476 1525 1557 1575 1587 1593	2 mins. T + \(\Delta t \) 42.00 21.50 14.66 11.25 9.20 7.83 6.86 6.13 5.57 5.10
in Point	crement of	mins.	Point Minutes	Pressure 31 523 907 1173 1344 1454 1525 1572 1604 1625	2.667 2.667 1.834 1.556 1.407 1.333 1.278 1.238 1.208 1.185	Point Minutes D 0 3 6 9 12 15 18 21 24 27 30	Pressure 26 612 1008 1256 1395 1476 1525 1557 1575 1587 1593	2 mins. T + \(\Delta t \) 42.00 21.50 14.66 11.25 9.20 7.83 6.86 6.13 5.57 5.10
in Point	crement of	mins.	Point Minutes	Pressure 31 523 907 1173 1344 1454 1525 1572 1604 1625	2.667 2.667 1.834 1.556 1.407 1.333 1.278 1.238 1.208 1.185	Point Minutes D 0 3 6 9 12 15 18 21 24 27 30	Pressure 26 612 1008 1256 1395 1476 1525 1557 1575 1587 1593	2 mins. T + \(\Delta t \) 42.00 21.50 14.66 11.25 9.20 7.83 6.86 6.13 5.57 5.10
in Point	crement of	mins.	Point Minutes	Pressure 31 523 907 1173 1344 1454 1525 1572 1604 1625	2.667 2.667 1.834 1.556 1.407 1.333 1.278 1.238 1.208 1.185	Point Minutes D 0 3 6 9 12 15 18 21 24 27 30	Pressure 26 612 1008 1256 1395 1476 1525 1557 1575 1587 1593	2 mins. T + \(\Delta t \) 42.00 21.50 14.66 11.25 9.20 7.83 6.86 6.13 5.57 5.10
in Point	crement of	mins.	Point Minutes	Pressure 31 523 907 1173 1344 1454 1525 1572 1604 1625	2.667 2.667 1.834 1.556 1.407 1.333 1.278 1.238 1.208 1.185	Point Minutes D 0 3 6 9 12 15 18 21 24 27 30	Pressure 26 612 1008 1256 1395 1476 1525 1557 1575 1587 1593	2 mins. T + \(\Delta t \) 42.00 21.50 14.66 11.25 9.20 7.83 6.86 6.13 5.57 5.10
in Point	crement of	mins.	Point Minutes	Pressure 31 523 907 1173 1344 1454 1525 1572 1604 1625	2.667 2.667 1.834 1.556 1.407 1.333 1.278 1.238 1.208 1.185	Point Minutes D 0 3 6 9 12 15 18 21 24 27 30	Pressure 26 612 1008 1256 1395 1476 1525 1557 1575 1587 1593	2 mins. T + \(\Delta t \) 42.00 21.50 14.66 11.25 9.20 7.83 6.86 6.13 5.57 5.10
in Point	crement of	mins.	Point Minutes	Pressure 31 523 907 1173 1344 1454 1525 1572 1604 1625	2.667 2.667 1.834 1.556 1.407 1.333 1.278 1.238 1.208 1.185	Point Minutes D 0 3 6 9 12 15 18 21 24 27 30	Pressure 26 612 1008 1256 1395 1476 1525 1557 1575 1587 1593	2 mins. T + \(\Delta t \) 42.00 21.50 14.66 11.25 9.20 7.83 6.86 6.13 5.57 5.10



Amount

Amount

Amount

Surface Choke

3/4"

90'(.44BBLS.)

Pressure (P.S.I.G.)

Time

0057

0102

0132

0142

0152

0217

0232

0302

0332

0332

0402

0405

5|58' to 5|95'; 5|6|' to 5|65'; 7.8%, 5|64' to 5|69';

8%, 5169' to 5171'; 11%, 5174' to 5176'; 7%, 5180' to 5182'; 11%, 5186' to 5200'; 11%

SURFACE INFORMATION

Well Flowed

Reversed Out

Recovered

GAS CUT MUD

Maximum Surface Pressure_____

CLOSED FOR INITIAL SHUT-IN

40.45MCF/DAY

Remarks: LOCATION: C NW NE 7-29-21W PRODUCTIVE INTERVAL AND POROSITY

CLOSED FOR FINAL SHUT-IN

Description (Rate of Flow)

GAS 34.69MCF/DAY

GAS 34.69MCF/DAY

GAS 38.78MCF/DAY

GAS 40.45MCF/DAY

PULLED PACKER LOOSE

Opened Tool_

RE-OPENED TOOL

GAS TO SURFACE

EQUALIZED MUD

NO

GAS

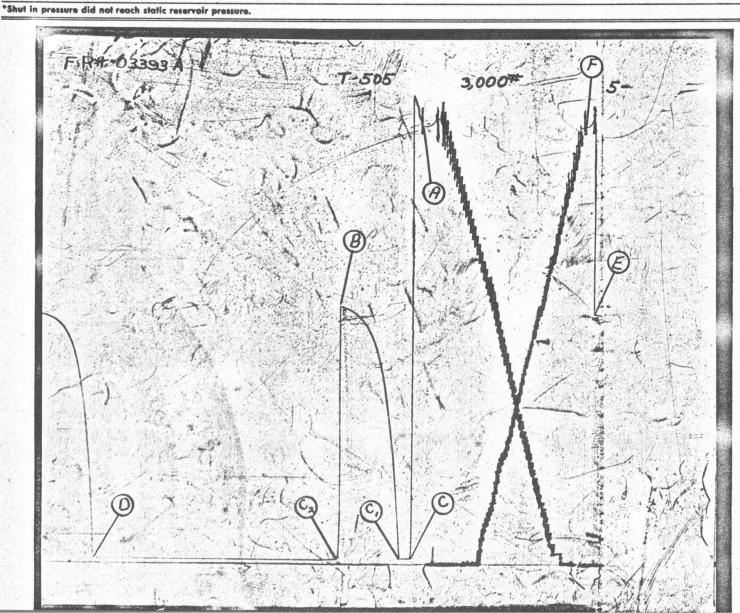
TOOL, HOLE	& MUD DAT	ΓA
Type Test	CONVENT	IONAL
Formation Tested	MISS。	
Elevation	2410 D.	FFt.
All Depths Measured Fr		
COLUMN TO SECURE AND ADDRESS OF THE PROPERTY OF THE PARTY	SEQUENCE	
NAMES OF THE PARTY AND ADDRESS OF THE PARTY		Depth/Length/
Tool	Size/Type	I.D.
DRILL PIPE	4호** FH	4945 3.8"
CIRCULATING SUB	4½" FH	1
DRILL PIPE	4½ FH	90' 3.8"
DRILL COLLARS	4 1 н-90	90' 2,25"
CROSS=OVER SUB	3½" R	
4-STAGE SHUT-IN	3=11 FH	ч
HYDRAULIC TOOL	3½" FH	
CROSS-OVER SUB	41 FH	
BOB-TAIL PACKER	8 5/8"	5158'
PERF. ANCHOR	3½" FH	27'
RECORDER CARRIER	4 7/8" T	6.
	4 7/8" L	4.
RECORDER CARRIER	4 1/0 L	17
		3
		,
	(e) ±	
<u> </u>		
Total Depth 5195		Ft
Main Hole Size 7 7/	8" p., Hala 6	Size =
Cusing Size	A 89	
bollom Choke Size	//\Ud I	17
7110d 111.	Mud Visco	SITY
Water Loss		c.c.
Cushion Type	Amount	Pressure
-	_	
		8
TIM	E DATA	
Initial Flow	Hrs	5 Mins
Initial Shut-in	Hrs	30 Mins.
Final Flow2	Hrs	Mins.

						Final Shut-in	· · ·	Hrs	30	Mins
Customer	SAME AS BELOW		CONCRETE THE STATE OF THE STATE							
, ,	TIME PETROLEUM	COMPANY; 81	5 UNION					Date		
Well Test Interval_	BOLINGER #1 5158' TO 5195'			Field Formation		3 3		on <u>SEE</u> g Test #		KS
County	FORD	State	KAN	SAS	11 147	Field Re	port No	03393 A		
Tester	EUGENE SALOGA	Test Approve	d By MR.	TOBY ELS	TER	No. DST	Reports Re	quested	5x	



03393 A Field Report No._

Recorder No.		T-505	INSIDE		
Capacity (P.S.I.G.)		3,000	TNOTE		
Recorder Depth		5,185			
Pressure Gradient P.S.I./Ft.			Transfer to the second second		
Well Temperature °F.		114			
A Initial Hydrostatic Mud		2786			
B Initial Shut-in	*	1640			
C Initial Flow		32			
D Final Flow		26			
E Final Shut-in	*	1596			
F Final Hydrostatic Mud		2783			
Remarks: C-		31			
C-	2	27			





SPECIAL DATA ANALYSIS

FIELD REPORT #00394 A

JULY 10, 1963

This appears to be a test of a poor formation and a good mechanical test. The test was conducted in such a manner that the data obtained should have been adequate for reliable analysis; however, the formation permeability was too low to give adequate buildups in the time allotted.

RESERVOIR PRESSURE: EXTRAPOLATION OF THE INITIAL SHUT-IN PRESSURE BUILDUP PLOT INDICATES A RESERVOIR PRESSURE OF 1905 P.S.I.G. AT RECORDER DEPTH.

THIS IS THE BEST DATA AVAILABLE FROM THESE BUILDUPS. THIS VALUE SHOULD BE USED WITH CAUTION.

JAMES D. HILLHOUSE EVALUATION ENGINEER

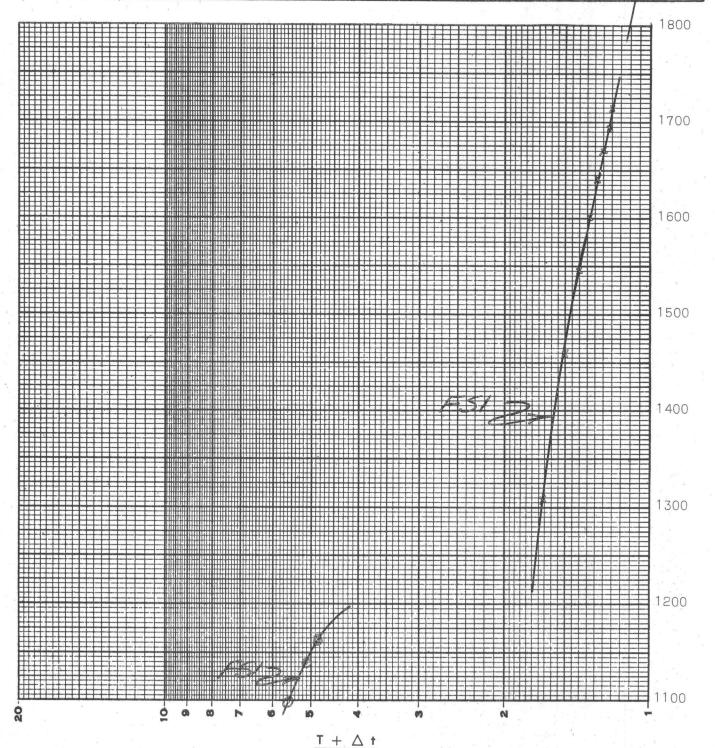
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Reservoir Engineering Data

OHNSTON TESTERS

Field Report No. ____03394 A

Estimated Damage Ratio	EDR			Effective Transmissibility	<u>Kh</u> μB	Md-ft. Cp.
Maximum Reservoir Pressure	P _o	1 905	P.S.I.G.	Effective Transmissibility	<u>Kh</u> μB	Md-ft. Cp.
Slope of Shut-in Curve	М		PSI/log cycle	Flow Rate	Q	Bbl./day
Potentiometric Surface (Datum Plane, Sea Level)	PS		ft.	Flow Rate	Q	Bol./day
Productivity Index	PI		Bbl./day/PSI	Gas Oil Ratio	GOR	¢F∕BЫ.
Radius of Investigation		391	ft.	K (Effective to)	Md.



Assumptions made for Calculations for Liquid Recoveries

- 1. Q is taken as steady state flow.
- 2. Pf is formation flowing pressure at steady state flow.
- Formation flow is taken as single phase flow.
 If gas is produced at surface, phase separation is assumed to have occurred in drill pipe.
- 4. Radial flow is assumed.
- 5. Where PVT data is not available then it is assumed that:

Effective permeability, K, will fall between	1 to 200 md
Formation porosity, f, will fall between	0.1 to 0.3
Fluid compressibility, c, will fall between	10 ⁻⁶ to 10 ⁻⁴
Fluid viscosity, μ, will fall between	0.05 to 50 cp.
Well bore radius, r _w , will fall between	$.3\frac{7}{8}$ " to $4\frac{3}{8}$ "
Which gives an average value for the function $\log \frac{K}{f \mu c r_{w}^2}$ of	5.5

6. Other standard radial flow, steady state assumptions.

Empirical Equations:

1. EDR =
$$\frac{1}{\log T + 2.65} \left[\frac{P_o - P_f}{M} \right]$$

2. Transmissibility
$$\frac{Kh}{\mu B} = \frac{162.6Q}{M}$$

3. P.I. =
$$\frac{Q}{P_o - P_f}$$

4. P.S. =
$$\left[P_{o} \times 2.309 \text{ ft./PSI}\right]$$
 - Recorder depth to sea level.

Symbols		Dimensions	Symbols		Dimensions
В	Formation volume factor	vol./vol.	Q	Rate of flow during test	Bbls./day
c	Fluid compressibility	vol./vol./psi.	Q _o	Rate of oil flow during test	Bbls./day
EDR	Estimated damage ratio		Q _w	Rate of water flow during test	Bbls./day
f	Formation porosity	fractional	Qg	Rate of gas flow during test	MCF/day
h	Producing interval	feet	r _w	Well bore radius	inches
J	Productivity index	Bbls./day/PSI	t	Final shut-in time period	minutes
K	Permeability	Millidarcies	∆t	Increment time of final shut-in	
M	Slope of shut-in build up	PSI/log cycle		time period	minutes
P_{f}	Final flowing pressure	PSI	Т	Open flow time period	minutes
P _{fsi}	Final shut-in pressure at time t	PSI	°T _f	Formation temperature	°Rankin
P_{isi}	Initial shut-in pressure	PSI	μ	Fluid viscosity	Centipoise
P_o	Maximum reservoir pressure	PSI	Z	Gas deviation factor (Compressibility f	actor)
P. S.	Potentiometric surface	ft.	$\frac{\text{Kh or Kh}}{\mu \text{ B}}$	Transmissibility factor	Md. — ft.

In making any interpretation, our employees will give Customer the benefit of their best judgment as to the correct interpretation. Nevertheless, since all interpretations are opinions based on inferences from electrical, mechanical or other measurements, we cannot, and do not, guarantee the accuracy or correctness of any interpretations, and we shall not be liable or responsible, except in the case of gross or wilful negligence on our part, for any loss, costs, damages or expenses incurred or sustained by Customer resulting from any interpretation made by any of our agents or employees.



			Pressure	Breakdo	own Data			
Date	7-	7-63				Field Repo	ort No.	03394 A
Recorder N	No	505	Capacity _	3000#				5265'
	Run nuS		lock Travel		inches per	min.	Well Temperate	ure°F
Point		* ×	Pi	ressure			Time Given	Time Computed
B Initial C Initial D Final F E Final S F Final F	Shut-in Flow Flow Shut-in Hydrostatic <i>I</i>	Mud	1 1 2 C-1 C-2	163 804 40 50	Opened Tool Initial Flow Initial Shut-in Final Flow Final Shut-in		0015 05 Mins 30 Mins 120 Mins 30 Mins	. 30 Mins.
				INITIAL			Final Shut	- N
Breakdown:increments ofmins. and a final increment ofmins.			of_	min	10_increments s. and a final mins.	of_	kdown: 10 3 mins. corement of	and a final
Point Minutes	Pressure	<u>T + △t</u>	Point Minutes	Pressure	<u>T + ∆t</u>	Point Minutes	Pressure	<u>T + △t</u>
			C-1 0 3 6 9	40 385 1003 1308	3.000 2.000 1.667	D 0 3 6 9	89 179 370 575	42.00 21.50 14.68
1		1	10	4				11 07

increment ofmins.			- 11	crement of		increment of 2 mins.		
Point Minutes	Pressure	<u>T + △t</u>	Point Minutes	Pressure	<u>T + △t</u>	Point Minutes	Pressure	T + △t
			C-1 0	40		D O	89	Name of the last o
				385	3.000		179	42.00
			6	1003	2.000	6.	370	21.50
			9	1308	1.667	9	575	14.68
			12	1.459	1.500	12	713	11.03
			15	1546	1.400	15	814	9.20
		× "	18	1601	1.333	18	909	7.83
			21	1642	1.286	21	983	6.85
			24	1671	1.250	24	1048	6.13
			27	1694	1.222	27	1099	5.56
			B 30	1715	1.200	30	1139	5.10
		8 A				E 32	1163	4.84
					340			
				-			ani.	
		5		AT .				
11 11 00	-				3 3			
		8		11				
	8	,			17			
						1 3 3		
		2						
			-11			1		



SURFACE INFORMATION

Well Flowed Amount NO. **Reversed Out** Amount NO Recovered Amount MUD WITH A FEW SPECKS OF OIL 90' GAS CUT MUD WITH A FEW SPECKS OF OIL 60' TOTAL RECOVERED IN BARRELS (1.83)Maximum Surface Pressure_ Pressure (P.S.I.G.) Surface Choke Description (Rate of Flow) Time 0015 Opened Tool_ CLOSED FOR INITIAL SHUT-IN 0020 RE-OPENED TOOL 0050 BY-PASSED MUD 0110 BY-PASSED MUD 0150 CLOSED FOR FINAL SHUT-IN 0250 EQUALIZED MUD 0320 PULLED PACKER LOOSE 0325 PRODUCTIVE INTERVAL POROSITY Remarks:__ 5233' TO 5235' 5% 5240' TO 5243' 1 4% 5244' to 5249' 10% 5268' TO 5270' TOP SAMPLE: 1% OIL & 99% MUD BOTTOM SAMPLE: 1% OIL & 99% MUD

TOOL, HOLE & MUD DATA

Type Test	CONVENT	IONAL
Formation Tested	MISS.	
	2410 в.	
All Depths Measured Fro		
	SEQUENCE	
Tool	Size/Type	Depth/Length/ I.D.
DRILL PIPE	4 ¹ / ₂ "FH	5022'3.8"
CIRCULATING SUB	4=11FH	-
DRILL PIPE	4 2 "FH	90'3.8"
DRILL COLLAR	4 ² "H-90	90'2.50"
DOUBLE-PIN SUB	42"FH	
	4 <u>1</u> "R	
CROSS-OVER SUB	4 <u>1</u> 1 FH	
	3 <u>2</u> "R	
4-STAGE SHUT-IN	3 2"	
HYDRAULIC TOOL	3111	
CROSS-OVER SUB	3 ¹ / ₂ "FH	
SHOULD OVER BOD	4½"R	
PACKER BOB-TAIL	6 5/8"	5234'
PERF. ANCHOR	3 ¹ / ₂ "FH	31'
RECORDER CARRIER	4 7/8"T	6'
	4 7/8"L	4.
RECORDER CARRIER	4 1/8"	4
Total Depth 5275 Main Hole Size 7 7/8	"Rat Hole S	Ft.
Casing Size 8 5/8	Liner S	
Bottom Choke Size 3		pe STARCH
Mud Wt10	Mud Viscos	. 17
Water Loss 11.2		C.C.
Cushion Type	Amount	Pressure
	NONE	
		8
	DATA	
Initial Flow	Hrs	Mins.
Initial Shut-in	Hrs	30 Mins.
Final Flow2	Hrs	Mins.
Final Shut-in	Hrs	30Mins.
A STATE OF THE STA		

Customer	SAME AS BELOW	×					
		015	-				
Company	TIME PETROLEUM	co.; 815 l	UNION NATIL BLI	DG.; WICHITA		Date	7-7-63
Well	BOLINGER #1		Field_	WILD CAT		Location C NW NE	7-29-21w
Test Interval	5234° to 5275°		Formati	ion Test #	A	_Casing Test #	
							1 5
County	FORD	State	KANSAS	6 8	_Field Repor	t No	03394 A
Tester	EUGENE SALOGA	_Test Approve	ed By MR. TOBY	ELSTER		orts Requested	5 x



Field Report No. 03394 A

Recorder No.	T-505	INSIDE		
Capacity (P.S.I.G.)	3000 .		MARKET SERVE	
Recorder Depth	5265			
Pressure Gradient P.S.I./Ft.				
Well Temperature °F.	116			
A Initial Hydrostatic Mud	2806			
B Initial Shut-in	*1715			753777. V.St.
C Initial Flow	40			
D Final Flow	89		Called nittle and	
Final Shut-in	*1163			
F Final Hydrostatic Mud	2804			
Remarks: C-1	40	1 - C. 1 - C. 1 - C. 2 - L. 2		
C-2	50			

^{*}Shut in pressure did not reach static reservoir pressure.

