

Completion Profiler







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MEASURED SOLUTIONS





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Survey Objectives

- Identify gas producing intervals.
- Identify oil producing intervals.
- Identify the source of water production.
- Quantitative production profile.

Logging Procedures

Date	Time	Comment
12/06	07:00	Arrive on location
12/06	09:00	Gauge run start
12/06	11:50	Gauge run stop
12/06	11:51	Program Completion Profile String
12/06	12:00	Start GIH pass
12/06	13:12	Stop GIH pass
12/06	13:18	Start logging passes
12/06	15:30	Stop logging passes
12/06	15:32	Start out of well pass
12/06	16:35	Stop out of well pass
12/06	16:45	Start download
12/06	17:30	Stop download
12/06	18:00	Rig down

Interval Logged: [From 8,409 to 9,977 ft.] 60 ft/min 90 ft/min 120 ft/min

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Well Information

Casing:	5.500"	17.0 lb/ft	surface to 12,245 ft PBTD: 10,350 ft
Tubing:	2.375"	4.6 lb/ft	surface to 8,392 ft

Perforations:

						Perfor	atior	n Data						
		-			_	Stage 6	- Wo	lfcamp						
8,440	to	8,441	8,452	to	8,453	8,460	to	8,461	8,469	to	8,470	8,477	to_	8,478
8,485	to	8,486	8,492	to	8,493	8,502	to	8,503	8,512	to	8,513	8,522	to	8,523
8.533	to	8,534	8,542	to	8,543	8,552	to	8,553	8,564	to	8,565	8,575	to	8,5 <u>76</u>
8,587	to	8,588	8,597	to	8,598	8,610	to_	8,612	8,624	to	8,626	8,630	to	8,633
						Stage 5	- Wo	olfcamp						
9,012	to	9,013	9,025	to	9,026	9,041	to	9,042	9,050	to	9,051	9,064	to	9,065
9,072	to	9,073	9,087	to	9,088	9,118	to	9,119	9,154	to	9,155	9,1 <u>62</u>	to	9,163
9,176	to	9,177	9,188	to	9,189	9,197	to	9,198	9,210	to	9,211	9,226	to	9,227
9,231	to	9,232	9,240	to	9,241	9,247	to	9,248	9,256	to	9,258	<u>9,262</u>	to	9,265
		_												
						Stage 4	<u>- Wo</u>	olfcamp		_		·		
9,298	to	9,299	9,311	to	9,312	9,317	to	9,31 <u>8</u>	9,326	to	9,327	9,3 <u>38</u>	to	9,339
9,351	to	9,352	9,361	to	9,362	9,370	to	9,371	9,376	to	9,377	9,382	to	9,383
9,388	to	9,389	9,400	to	9,401	9,409	to	9,410	<u>9,418</u>	to	9,419	9,427	to	9,428
9,442	to	9,443	9,454	to	9,455	9,478	to	9,479	9,488	to	9,490	9,498	to_	9,501
						Stage 3	- Wo	olfcamp						
9,660	to	9,661	9,670	to	9,671	9,678	to	9,679	9,689	to	9,690	9,700	to	9,701
9,705	to	9,706	9,710	to	<u>9,711</u>	9,724	to	9,725	9,734	to	9,735	9,743	to	9,744
9,757	to	9,758	9,766	to	<u>9,767</u>	9,776	to	9,777	9,784	to	9,7 <u>85</u>	9,796	to	9,797
9,812	to	9,813	9,828	to	_9,829_	9,842	to	9,843	9,859	to	9,861	9,875	to_	9,878
				_									_	
					S	tage 2 -	Cisc	o Canyo	<u>n</u>			0.005		0.000
9,900	to	9,901	9,909	to	9,910	9,918	to	9,919	9,927	to	9,928	9,935	10	9,936
9,941	to	9,942	9,948	to	9,949	9,957	to	9,958	9,964	to	9,965	9,972		9,973
9,985	to	9,986	9,991	to	9,992	10,000	to	10,001	10,006	to	10,007	10,012		10,013
10,021	to	10,022	10,034	to	10,035	10,044	to	10,045	10,058	to	10,060	1 10,068	10	10,071
ļ							<u> </u>				·			
				<u> </u>		stage 1 -	CISC		n 10.100		10 100	10 140		10 1/2
10,094	to	10,095	10,112	to	10,113	10,122	to	10,123	10,132	<u></u>	10,133	10,142	10	10,143
10,158	to	10,159	10,171	to	10,172	10,182	to	10,183	10,190	10	10,191	10,200		10,201
10,210	to	10,211	10,223	to	10,224	10,242	to	10,243	10,256	το •••	10,257	10,200	10 to	10,207
10,285	to	10,286	10,290	to	10,291	10,304	to	10,305	<u>10,312</u>	το	10,314	10,318	0	10,321





Tool String

The 1.700" Completion Profiler string comprised the following sensors:

Battery housing; RS-232/CCL; Memory/CPU; Gamma Ray; Pressure/Temperature Combo; Centralizer; Induction Collar Locator; Fluid Density; Fluid Dielectric; Centralizer; Spinner Flowmeter.

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Results

The following table summarizes the production from each frac stage.

MEASURED SURFACE RATES												
					FI	ow Rates Reported	at STP					
	T	ubing		Gas			Oil			Water		
		Pal		MCFD			BFPD		BFPD			
Avg	2	00 psi		1015 Mcf/d			20 bpd		270 bpd			
Min				572 Mct/d								
Max				1353 MCI/0								
					GAS / OIL / V	WATER PRODU	CTION PROFI	LE				
					FI	ow Rates Reported	at STP					
Zone	Inte	rvals	Q-Gas	Qp-Gas	Percent	Q-011	Qp-Oli	Percent	Q-Water	Qp-Water	Percent	
	feet		MCFD	MCFD	of Total	BFPD	BFPD	of Total	BFPD	BFPD	of Total	
Surface	to	8440	1054.9 Mct/d		100.00 %	20.47 bpd		100.00 %	267.52 bpd		100.00 %	
		Stage	6 - Wolfcamp		18.57 %			18.57 %			47.22 %	
8440	to	8633	1054.9 Mcf/d	195.9 Mcf/d		20.47 bpd	3.80 bpd		267.52 bpd	126.33 bpd		
		Stage	5 - Wolfcamp		12.56 %			12.56 %			22.13 %	
9012	to	9265	859.0 Mct/d	132.5 Mcf/d		16.67 bpd	2.57 bpd		141.19 bpd	59.20 bpd		
[
		Stage	4 - Wolfcamp		8.75 %			8.75 %			12.83 %	
9298	to	9501	726.6 Mct/d	92.3 Mct/d		14.10 bpd	1.79 bpd		81.99 bpd	34.32 bpd		
		Stage	3 - Wolfcamp		28.07 %			28.07 %			12.44 %	
9660	to	9878	634.2 Mct/d	296.1 Mcf/d		12.31 bpd	5.74 bpd		47.67 bpd	33.28 bpd		
							*					
Stage 2 - Cisco Canyon 22.70 %								22.70 %			5.13 %	
9900 to 9973 338.2 Mct/d 239.4 Mct/d						6.56 bpd	4.65 bpd		14.40 bpd	13.71 bpd		
Flow Contribution from Below Log Depth 9.36								9.36 %			0.26 %	
9977	to	Below	98.8 Mct/d		9.36 %	1.92 bpd		9.36 %	0.68 bpd		0.26 %	





The following table summarizes the production from each producing interval.

GAS / OIL / WATER PRODUCTION PROFILE													
					Flo	w Rates Reported	at STP						
Zone	Inter	vals	Q-Gas	Op-Gas	Percent	Q-01)	Qp-Oll	Percent	Q-Water	Qp-Water	Percent		
	feet		MCFD	MCFD	of Totai	BFPD	BFPD	of Total	BFPD	BFPD	of Total		
Surface	to	8440	1054.9 Mc1/d		100.00 %	20.47 bpd		100.00 %	267.52 bpd		100.00 %		
		Stage	6 - Wolfcamp		18.57 %			18.57 %			47.22 %		
8440	to	8441	1054.9 Mcf/d	29.9 Mcf/d	2.84 %	20.47 bpd	0.58 bpd	2.84 %	267.52 bpd	18.95 bpd	7.08 %		
8452	to	8453	1025.0 Mcf/d	64.4 Mct/d	6.10 %	19.89 bpd	1.25 bpd	6.10 %	248.57 bpd	0.72 bpd	0.27 %		
8460	to	8461	960.6 Mct/d	1.5 Mct/d	0.15 %	18.64 bpd	0.03 bpd	0.15 %	247.86 bpd	26.67 bpd	9.97 %		
8469	to	8470	959.1 Mct/d	1.9 Mct/d	0.18 %	18.61 bpd	0.04 bpd	0.18 %	221.19 bpd	12.63 bpd	4.72 %		
8477	to	8478	957.2 Mct/d	1.9 Mct/d	0.18 %	18.57 bpd	0.04 bpd	0.18 %	208.56 bpd	10.64 bpd	3.98 %		
8485	to	8486	955.3 Mcf/d	1.7 Mct/d	0.16 %	18.54 bpd	0.03 bpd	0.16 %	197.92 bpd	8.10 bpd	3.03 %		
8492	to	8493	953.6 Mct/d	2.0 Mct/d	0.19 %	18.50 bpd	0.04 bpd	0.19 %	189.82 bpd	4.05 bpd	1.52 %		
8502	to	8503	951.6 Mct/d	4.9 Mcf/d	0.47 %	18.46 bpd	0.10 bpd	0.47 %	185.77 bpd	4.05 bpd	1.52 %		
8512	to	8513	946.7 Mcf/d	7.0 Mct/d	0.66 %	18.37 bpd	0.14 bpd	0.66 %	181.71 bpd	5.53 bpd	2.07 %		
8522	to	8523	939.7 Mct/d	4.5 Mcf/d	0.43 %	18.23 bpd	0.09 bpd	0.43 %	176.19 bpd	7.95 bpd	2.97 %		
8533	to	8534	935.2 Mct/d	9.6 Mct/d	0.91 %	18.14 bpd	0.19 bpd	0.91 %	168.23 bpd	2.58 bpd	0.96 %		
8542	to	8543	925.6 Mct/d	8.9 Mct/d	0.85 %	17.96 bpd	0.17 bpd	0.85 %	165.66 bpd	3.86 bpd	1.44 %		
8552	to	8553	916.6 Mct/d	9.7 Mcf/d	0.92 %	17.79 bpd	0.19 bpd	0.92 %	161.80 bpd	4.68 bpd	1.75 %		
8564	to	8565	907.0 Mct/d	9.2 Mct/d	0.87 %	17.60 bpd	0.18 bpd	0.87 %	157.11 bpd	5.97 bpd	2.23 %		
8575	to	8576	897.8 Mct/d	1.0 Mct/d	0.10 %	17.42 bpd	0.02 bpd	0.10 %	151.14 bpd	1.88 bpd	0.70 %		
8587	to	8588	896.7 Mct/d	0.9 Mcf/d	0.09 %	17.40 bpd	0.02 bpd	0.09 %	149.26 bpd	1.03 bpd	0.39 %		
8597	to	8598	895.8 Mct/d	1.1 Mcf/d	0.10 %	17.38 bpd	0.02 bpd	0.10 %	148.23 bpd	0.98 bpd	0.37 %		
8610	to	8612	894.8 Mct/d	9.0 Mct/d	0.85 %	17.36 bpd	0.17 bpd	0.85 %	147.24 bpd	2.38 bpd	0.89 %		
8624	to	8626	885.8 Mct/d	6.0 Mct/d	0.57 %	17.19 bpd	0.12 bpd	0.57 %	144.86 bpd	0.77 bpd	0.29 %		
8630	to	8633	879.8 Mcf/d	20.8 Mcf/d	1.97 %	17.07 bpd	0.40 bpd	1.97 %	144.09 bpd	2.90 bpd	1.08 %		
					1								
		Stag	e 5 - Wolfcamp		12.56 %			12.56 %			22.13 %		
9012	to	9013	859.0 Mct/d	24.1 Mcf/d	2.28 %	16.67 bpd	0.47 bpd	2.28 %	141.19 bpd	1.02 bpd	0.38 %		
9025	to	9026	835.0 Mcf/d	3.5 Mct/d	0.33 %	16.20 bpd	0.07 bpd	0.33 %	140.17 bpd	1.89 bpd	0.71 %		
9041	to	9042	831.5 Mct/d	2.5 Mct/d	0.23 %	16.13 bpd	0.05 bpd	0.23 %	138.29 bpd	2.33 bpd	0.87 %		
9050	to	9051	829.0 Mcf/d	2.2 Mcf/d	0.21%	16.08 bpd	0.04 bpd	0.21 %	135.96 bpd	1.31 bpd	0.49 %		
9064	to	9065	826.8 Mcf/d	1.7 Mct/d	0.16 %	16.04 bpd	0.03 bpd	0.16 %	134.65 bpd	2.04 bpd	0.76 %		
9072	to	9073	825,2 Mcf/d	2.2 Mcf/d	0.21 %	16.01 bpd	0.04 bpd	0.21 %	132.61 bpd	1.16 bpd	0.43 %		
9087	to	9088	823.0 Mcf/d	40.4 Mct/d	3.83 %	15.97 bpd	0.78 bpd	3.83 %	131.45 bpd	2.19 bpd	0.82 %		
9118	to	9119	782.6 Mct/d	1.1 Mcf/d	0.11 %	15.18 bpd	0.02 bpd	0.11 %	129.27 bpd	4.51 bpd	1.69 %		
9154	to	9155	781.5 Mcf/d	1.3 Mct/d	0.12 %	15.16 bpd	0.03 bpd	0.12 %	124.76 bpd	5.23 bpd	1.96 %		
9162	to	9163	780.2 Mct/d	1.2 Mct/d	0.11 %	15.14 bpd	0.02 bpd	0.11 %	119.53 bpd	1.16 bpd	0.43 %		
9176	to	9177	779.0 Mct/d	1.2 Mct/d	0.11 %	15.11 bpd	0.02 bpd	0.11 %	118.37 bpd	2.04 bpd	0.76 %		
9188	to	9189	777.8 Mct/d	1.6 Mcf/d	0.15 %	15.09 bpd	0.03 bpd	0.15 %	116.33 bpd	1.75 bpd	0.66 %		
9197	to	9198	776.2 Mct/d	1.1 Mct/d	0.10 %	15.06 bpd	0.02 bpd	0.10 %	114.58 bpd	1.30 bpd	0.49 %		
9210	to	8211	775.2 Mct/d	1.1 Mct/d	0.11 %	15.04 bpd	0.02 bpd	0.11 %	113.28 bpd	1.89 bpd	0.71 %		
9226	 to	9227	774.1 Mct/d	7.5 Mct/d	0.71 %	15.02 bpd	0.15 bpd	0.71 %	111.38 bpd	2.33 bpd	0.87 %		
9231	to	9232	766.6 Mct/d	10.3 Mcf/d	0.98 %	14.87 bpd	0.20 bpd	0.98 %	109.05 bpd	1.71 bpd	0.64 %		
9240	tn	9241	756.3 Mcf/d	5.6 Mcf/d	0.53 %	14.67 bpd	0.11 bpd	0.53 %	107.35 bpd	1.31 bpd	0.49 %		
0247	to	9249	750.6 Mcf/d	8.7 Mct/d	0.83 %	14.56 bpd	0.17 bpd	0.83 %	106.04 bpd	1.02 bpd	0.38 %		
0256		9258	741.9 Mcf/d	10.3 Mcf/d	0.98 %	14.40 bpd	0.20 bod	0.98 %	105.02 bpd	10.26 bpd	3.84 %		
9262	to	9265	731.6 Mct/d	5,1 Mct/d	0.48 %	14.20 bpd	0.10 bpd	0.48 %	94.76 bpd	12.77 bpd	4.77 %		





	Stage 4 - Wolfcamp				8.75 %			8.75 %			12.83 %
9298	to	9299	726.6 Mct/d	4.8 Mct/d	0.46 %	14.10 bpd	0.09 bpd	0.46 %	81.99 bpd	1.02 bpd	0.38 %
9311	to	9312	721.7 Mct/d	5.2 Mct/d	0.49 %	14.00 bpd	0.10 bpd	0.49 %	80.97 bpd	1.89 bpd	0.71 %
9317	to	9318	716.5 Mct/d	4.5 Mct/d	0.43 %	13.90 bpd	0.09 bpd	0.43 %	79.07 bpd	1.85 bpd	0.69 %
9326	to	9327	712.1 Mct/d	5.4 Mct/d	0.51 %	13.82 bpd	0.10 bpd	0.51 %	77.22 bpd	1.31 bpd	0.49 %
9338	to	9339	706.7 Mct/d	7.5 Mct/d	0.71 %	13.71 bpd	0.15 bpd	0.71 %	75.91 bpd	1.74 bpd	0.65 %
9351	to	9352	699.2 Mct/d	2.5 Mcf/d	0.24 %	13.57 bpd	0.05 bpd	0.24 %	74.17 bpd	1.89 bpd	0.71 %
9361	to	9362	696.7 Mct/d	2.5 Mcf/d	0.24 %	13.52 bpd	0.05 bpd	0.24 %	72.28 bpd	1.45 bpd	0.54 %
9370	to	9371	694.2 Mct/d	2.5 Mcf/d	0.24 %	13.47 bpd	0.05 bpd	0.24 %	70.82 bpd	1.31 bpd	0.49 %
9376	to	9377	691.7 Mct/d	0.6 Mct/d	0.06 %	13.42 bpd	0.01 bpd	0.06 %	69.51 bpd	1.85 bpd	0.69 %
9382	to	9383	691.1 Mct/d	1.1 Mcf/d	0.10 %	13.41 bpd	0.02 bpd	0.10 %	67.67 bpd	1.86 bpd	0.69 %
9388	to	9389	690.0 Mct/d	0.8 Mict/d	0.08 %	13.39 bpd	0.02 bpd	0.08 %	65.81 bpd	1.85 bpd	0.69 %
9400	to	9401	689.2 Mct/d	5.5 Mct/d	0.52 %	13.37 bpd	0.11 bpd	0.52 %	63.96 bpd	1.74 bpd	0.65 %
9409	to	9410	683.7 Mct/d	4.5 Mct/d	0.42 %	13.27 bpd	0.09 bpd	0.42 %	62.22 bpd	1.31 bpd	0.49 %
9418	to	9419	679.2 Mct/d	5.0 Mct/d	0.47 %	13.18 bpd	0.10 bpd	0.47 %	60.91 bpd	1.31 bpd	0.49 %
9427	to	9428	674.2 Mct/d	20.0 Mcf/d	1.90 %	13.08 bpd	0.39 bpd	1.90 %	59.60 bpd	1.31 bpd	0.49 %
9442	to	9443	654.2 Mct/d	1.3 Mct/d	0.12 %	12.69 bpd	0.03 bpd	0.12 %	58.29 bpd	2.18 bpd	0.82 %
9454	to	9455	652.9 Mct/d	1.2 Mct/d	0.11 %	12.67 bpd	0.02 bpd	0.11 %	56.11 bpd	1.74 bpd	0.65 %
9478	to	9479	651.7 Mct/d	12.5 Mcf/d	1.18 %	12.65 bpd	0.24 bpd	1.18 %	54.36 bpd	3.49 bpd	1.31 %
9488	to	9490	639.2 Mct/d	2.5 Mct/d	0.23 %	12.40 bpd	0.05 bpd	0.23 %	50.87 bpd	1.60 bpd	0.60 %
9498	to	9501	636.8 Mct/d	2.5 Mct/d	0.24 %	12.36 bpd	0.05 bpd	0.24 %	49.27 bpd	1.60 bpd	0.60 %
		Stage	e 3 - Wolfcamp		28.07 %			28.07 %			12.44 %
9660	to	Stage 9661	3 - Wolfcamp 634.2 Mct/d	45.6 Mct/d	28.07 % 4.32 %	12.31 bpd	0.88 bpd	28.07 % 4.32 %	47.67 bpd	1.72 bpd	12.44 % 0.65 %
9660 9670	to to	Stage 9661 9671	3 - Wolfcamp 634.2 Mct/d 588.6 Mct/d	45.6 Mct/d 5.5 Mct/d	28.07 % 4.32 % 0.52 %	12.31 bpd 11.42 bpd	0.88 bpd 0.11 bpd	28.07 % 4.32 % 0.52 %	47.67 bpd 45.95 bpd	1.72 bpd 1.45 bpd	12.44 % 0.65 % 0.54 %
9660 9670 9678	to to to	Stage 9661 9671 9679	634.2 Mct/d 588.6 Mct/d 583.2 Mct/d	45.6 Mct/d 5.5 Mct/d 4.5 Mct/d	28.07 % 4.32 % 0.52 % 0.43 %	12.31 bpd 11.42 bpd 11.32 bpd	0.88 bpd 0.11 bpd 0.09 bpd	28.07 % 4.32 % 0.52 % 0.43 %	47.67 bpd 45.95 bpd 44.50 bpd	1.72 bpd 1.45 bpd 1.16 bpd	12.44 % 0.65 % 0.54 % 0.44 %
9660 9670 9678 9689	to to to	Stage 9661 9671 9679 9690	3 - Wolfcamp 634.2 Mct/d 588.6 Mct/d 583.2 Mct/d 578.6 Mct/d	45.6 Mct/d 5.5 Mct/d 4.5 Mct/d 4.9 Mct/d	28.07 % 4.32 % 0.52 % 0.43 % 0.46 %	12.31 bpd 11.42 bpd 11.32 bpd 11.23 bpd	0.88 bpd 0.11 bpd 0.09 bpd 0.10 bpd	28.07 % 4.32 % 0.52 % 0.43 % 0.46 %	47.67 bpd 45.95 bpd 44.50 bpd 43.33 bpd	1.72 bpd 1.45 bpd 1.16 bpd 1.60 bpd	12.44 % 0.65 % 0.54 % 0.44 % 0.60 %
9660 9670 9678 9689 9700	to to to to to	Stage 9661 9671 9679 9690 9701	634.2 Mct/d 588.6 Mct/d 588.2 Mct/d 578.6 Mct/d 578.7 Mct/d	45.6 Mct/d 5.5 Mct/d 4.5 Mct/d 4.9 Mct/d 6.1 Mct/d	28.07 % 4.32 % 0.52 % 0.43 % 0.46 % 0.58 %	12.31 bpd 11.42 bpd 11.32 bpd 11.23 bpd 11.13 bpd	0.88 bpd 0.11 bpd 0.09 bpd 0.10 bpd 0.12 bpd	28.07 % 4.32 % 0.52 % 0.43 % 0.46 % 0.58 %	47.67 bpd 45.95 bpd 44.50 bpd 43.33 bpd 41.73 bpd	1.72 bpd 1.45 bpd 1.16 bpd 1.60 bpd 1.60 bpd	12.44 % 0.65 % 0.54 % 0.44 % 0.60 %
9660 9670 9678 9689 9700 9705	to to to to to	Stage 9661 9671 9679 9690 9701 9706	634.2 Mct/d 588.6 Mct/d 588.2 Mct/d 578.6 Mct/d 573.7 Mct/d 567.6 Mct/d	45.6 Mct/d 5.5 Mct/d 4.5 Mct/d 4.9 Mct/d 6.1 Mct/d 2.9 Mct/d	28.07 % 4.32 % 0.52 % 0.43 % 0.46 % 0.58 % 0.28 %	12.31 bpd 11.42 bpd 11.32 bpd 11.23 bpd 11.13 bpd 11.01 bpd	0.88 bpd 0.11 bpd 0.09 bpd 0.10 bpd 0.12 bpd 0.06 bpd	28.07 % 4.32 % 0.52 % 0.43 % 0.46 % 0.58 % 0.28 %	47.67 bpd 45.95 bpd 44.50 bpd 43.33 bpd 41.73 bpd 40.13 bpd	1.72 bpd 1.45 bpd 1.16 bpd 1.60 bpd 1.60 bpd 0.73 bpd	12.44 % 0.65 % 0.54 % 0.44 % 0.60 % 0.60 % 0.27 %
9660 9670 9678 9689 9700 9705 9710	to to to to to to to to	Stage 9661 9671 9679 9690 9701 9706 9711	634.2 Mct/d 588.6 Mct/d 588.6 Mct/d 578.6 Mct/d 573.7 Mct/d 567.6 Mct/d 564.7 Mct/d	45.6 Mct/d 5.5 Mct/d 4.5 Mct/d 4.9 Mct/d 6.1 Mct/d 2.9 Mct/d 3.4 Mct/d	28.07 % 4.32 % 0.52 % 0.43 % 0.46 % 0.58 % 0.28 %	12.31 bpd 11.42 bpd 11.32 bpd 11.23 bpd 11.13 bpd 11.01 bpd 10.96 bpd	0.88 bpd 0.11 bpd 0.09 bpd 0.10 bpd 0.12 bpd 0.06 bpd 0.07 bpd	28.07 % 4.32 % 0.52 % 0.43 % 0.46 % 0.58 % 0.28 % 0.32 %	47.67 bpd 45.95 bpd 44.50 bpd 43.33 bpd 41.73 bpd 40.13 bpd 39.41 bpd	1.72 bpd 1.45 bpd 1.16 bpd 1.60 bpd 1.60 bpd 0.73 bpd 0.73 bpd	12.44 % 0.65 % 0.54 % 0.60 % 0.60 % 0.60 % 0.27 %
9660 9670 9678 9689 9700 9705 9710 9724	to to to to to to to to to	Stage 9661 9671 9679 9690 9701 9706 9711 9725	634.2 Mct/d 588.6 Mct/d 588.6 Mct/d 578.6 Mct/d 573.7 Mct/d 567.6 Mct/d 564.7 Mct/d 561.3 Mct/d	45.6 Mct/d 5.5 Mct/d 4.5 Mct/d 4.9 Mct/d 6.1 Mct/d 2.9 Mct/d 3.4 Mct/d 0.1 Mct/d	28.07 % 4.32 % 0.52 % 0.43 % 0.46 % 0.58 % 0.28 % 0.32 % 0.01 %	12.31 bpd 11.42 bpd 11.32 bpd 11.23 bpd 11.13 bpd 11.13 bpd 11.01 bpd 10.96 bpd 10.89 bpd	0.88 bpd 0.11 bpd 0.09 bpd 0.10 bpd 0.12 bpd 0.06 bpd 0.07 bpd 0.00 bpd	28.07 % 4.32 % 0.52 % 0.43 % 0.46 % 0.58 % 0.28 % 0.32 % 0.01 %	47.67 bpd 45.95 bpd 44.50 bpd 43.33 bpd 41.73 bpd 40.13 bpd 39.41 bpd 38.68 bpd	1.72 bpd 1.45 bpd 1.16 bpd 1.60 bpd 1.60 bpd 0.73 bpd 0.73 bpd 2.04 bpd	12.44 % 0.65 % 0.54 % 0.60 % 0.60 % 0.60 % 0.27 % 0.27 % 0.27 %
9660 9670 9678 9689 9700 9705 9710 9724 9734	to t	Stage 9661 9671 9679 9690 9701 9706 9711 9725 9735	634.2 Mct/d 588.6 Mct/d 588.6 Mct/d 578.6 Mct/d 573.7 Mct/d 567.6 Mct/d 564.7 Mct/d 561.3 Mct/d 561.1 Mct/d	45.6 Mct/d 5.5 Mct/d 4.5 Mct/d 4.9 Mct/d 6.1 Mct/d 2.9 Mct/d 3.4 Mct/d 0.1 Mct/d 1.4 Mct/d	28.07 % 4.32 % 0.52 % 0.43 % 0.46 % 0.58 % 0.28 % 0.32 % 0.01 % 0.13 %	12.31 bpd 11.42 bpd 11.32 bpd 11.23 bpd 11.13 bpd 11.01 bpd 10.96 bpd 10.89 bpd	0.88 bpd 0.11 bpd 0.09 bpd 0.10 bpd 0.12 bpd 0.06 bpd 0.07 bpd 0.00 bpd 0.03 bpd	28.07 % 4.32 % 0.52 % 0.43 % 0.46 % 0.58 % 0.28 % 0.32 % 0.01 % 0.13 %	47.67 bpd 45.95 bpd 44.50 bpd 43.33 bpd 41.73 bpd 40.13 bpd 39.41 bpd 38.68 bpd 36.64 bpd	1.72 bpd 1.45 bpd 1.16 bpd 1.60 bpd 1.60 bpd 0.73 bpd 0.73 bpd 2.04 bpd 1.45 bpd	12.44 % 0.65 % 0.54 % 0.60 % 0.60 % 0.27 % 0.27 % 0.76 % 0.54 %
9660 9670 9678 9689 9700 9705 9705 9710 9724 9734 9734	to to to to to to to to to to to to to t	Stage 9661 9671 9679 9690 9701 9706 9711 9725 9735 9744	634.2 Mct/d 588.6 Mct/d 588.6 Mct/d 578.6 Mct/d 578.6 Mct/d 567.6 Mct/d 564.7 Mct/d 561.3 Mct/d 561.1 Mct/d 559.7 Mct/d	45.6 Mct/d 5.5 Mct/d 4.5 Mct/d 4.9 Mct/d 6.1 Mct/d 2.9 Mct/d 3.4 Mct/d 0.1 Mct/d 1.4 Mct/d 20.4 Mct/d	28.07 % 4.32 % 0.52 % 0.43 % 0.46 % 0.58 % 0.28 % 0.32 % 0.01 % 0.13 % 1.93 %	12.31 bpd 11.42 bpd 11.32 bpd 11.33 bpd 11.13 bpd 11.01 bpd 10.96 bpd 10.89 bpd 10.89 bpd 10.86 bpd	0.88 bpd 0.11 bpd 0.09 bpd 0.10 bpd 0.12 bpd 0.06 bpd 0.07 bpd 0.00 bpd 0.03 bpd 0.40 bpd	28.07 % 4.32 % 0.52 % 0.43 % 0.46 % 0.58 % 0.28 % 0.32 % 0.01 % 0.13 % 1.93 %	47.67 bpd 45.95 bpd 44.50 bpd 43.33 bpd 41.73 bpd 40.13 bpd 39.41 bpd 38.68 bpd 36.64 bpd 35.19 bpd	1.72 bpd 1.45 bpd 1.16 bpd 1.60 bpd 1.60 bpd 0.73 bpd 0.73 bpd 2.04 bpd 1.45 bpd 1.31 bpd	12.44 % 0.65 % 0.54 % 0.60 % 0.60 % 0.27 % 0.27 % 0.76 % 0.54 % 0.49 %
9660 9670 9678 9689 9700 9705 9710 9724 9724 9734 9743 9757	to	Stage 9661 9671 9679 9690 9701 9706 9711 9725 9735 9744 9758	634.2 Mct/d 588.6 Mct/d 588.6 Mct/d 578.6 Mct/d 573.7 Mct/d 567.6 Mct/d 564.7 Mct/d 561.3 Mct/d 561.1 Mct/d 559.7 Mct/d 539.4 Mct/d	45.6 Mct/d 5.5 Mct/d 4.5 Mct/d 4.9 Mct/d 6.1 Mct/d 2.9 Mct/d 3.4 Mct/d 0.1 Mct/d 1.4 Mct/d 20.4 Mct/d 1.9 Mct/d	28.07 % 4.32 % 0.52 % 0.43 % 0.46 % 0.58 % 0.28 % 0.28 % 0.01 % 0.13 % 1.93 % 0.18 %	12.31 bpd 11.42 bpd 11.32 bpd 11.33 bpd 11.13 bpd 11.01 bpd 10.96 bpd 10.89 bpd 10.89 bpd 10.86 bpd 10.87 bpd	0.88 bpd 0.11 bpd 0.09 bpd 0.10 bpd 0.12 bpd 0.06 bpd 0.07 bpd 0.00 bpd 0.03 bpd 0.40 bpd 0.04 bpd	28.07 % 4.32 % 0.52 % 0.43 % 0.46 % 0.58 % 0.28 % 0.28 % 0.32 % 0.01 % 0.13 % 1.93 % 0.18 %	47.67 bpd 45.95 bpd 44.50 bpd 43.33 bpd 41.73 bpd 40.13 bpd 39.41 bpd 38.68 bpd 36.64 bpd 35.19 bpd 33.88 bpd	1.72 bpd 1.45 bpd 1.16 bpd 1.60 bpd 0.73 bpd 0.73 bpd 2.04 bpd 1.45 bpd 1.31 bpd 2.04 bpd	12.44 % 0.65 % 0.54 % 0.60 % 0.60 % 0.27 % 0.27 % 0.76 % 0.54 % 0.49 % 0.76 %
9660 9670 9678 9689 9700 9705 9710 9724 9734 9734 9743 9757 9766	to to to to to to to to to to to	Stage 9661 9671 9679 9690 9701 9706 9711 9725 9735 9735 9744 9758	634.2 Mct/d 588.6 Mct/d 588.6 Mct/d 578.6 Mct/d 578.6 Mct/d 567.6 Mct/d 564.7 Mct/d 561.3 Mct/d 561.1 Mct/d 559.7 Mct/d 539.4 Mct/d 537.5 Mct/d	45.6 Mcl/d 5.5 Mcl/d 4.5 Mcl/d 4.9 Mcl/d 6.1 Mcl/d 2.9 Mcl/d 3.4 Mcl/d 1.4 Mcl/d 20.4 Mcl/d 1.9 Mcl/d 1.9 Mcl/d 2.1 Mcl/d	28.07 % 4.32 % 0.52 % 0.43 % 0.46 % 0.58 % 0.28 % 0.28 % 0.32 % 0.01 % 0.13 % 1.93 % 0.18 % 0.20 %	12.31 bpd 11.42 bpd 11.32 bpd 11.33 bpd 11.13 bpd 11.01 bpd 10.96 bpd 10.89 bpd 10.89 bpd 10.86 bpd 10.86 bpd 10.47 bpd	0.88 bpd 0.11 bpd 0.09 bpd 0.10 bpd 0.12 bpd 0.06 bpd 0.07 bpd 0.00 bpd 0.03 bpd 0.40 bpd 0.04 bpd 0.04 bpd	28.07 % 4.32 % 0.52 % 0.43 % 0.46 % 0.58 % 0.28 % 0.28 % 0.32 % 0.01 % 0.13 % 1.93 % 0.18 % 0.20 %	47.67 bpd 45.95 bpd 44.50 bpd 43.33 bpd 41.73 bpd 40.13 bpd 39.41 bpd 38.68 bpd 36.64 bpd 35.19 bpd 33.88 bpd 31.84 bpd	1.72 bpd 1.45 bpd 1.16 bpd 1.60 bpd 0.73 bpd 0.73 bpd 2.04 bpd 1.45 bpd 1.31 bpd 2.04 bpd 1.31 bpd	12.44 % 0.65 % 0.54 % 0.60 % 0.60 % 0.27 % 0.27 % 0.27 % 0.76 % 0.49 % 0.49 %
9660 9670 9678 9689 9700 9705 9710 9724 9734 9734 9757 9766 9776	to to to to to to to to to to to to	Stage 9661 9679 9690 9701 9706 9711 9725 9735 9744 9758 9767 9777	634.2 Mct/d 588.6 Mct/d 588.6 Mct/d 578.6 Mct/d 578.6 Mct/d 567.6 Mct/d 567.6 Mct/d 561.3 Mct/d 561.1 Mct/d 559.7 Mct/d 539.4 Mct/d 535.4 Mct/d	45.6 Mct/d 5.5 Mct/d 4.5 Mct/d 4.9 Mct/d 6.1 Mct/d 2.9 Mct/d 3.4 Mct/d 1.4 Mct/d 1.9 Mct/d 20.4 Mct/d 1.9 Mct/d 2.1 Mct/d 1.8 Mct/d	28.07 % 4.32 % 0.52 % 0.43 % 0.46 % 0.58 % 0.28 % 0.28 % 0.32 % 0.13 % 1.93 % 0.18 %	12.31 bpd 11.42 bpd 11.32 bpd 11.23 bpd 11.13 bpd 11.01 bpd 10.96 bpd 10.89 bpd 10.89 bpd 10.86 bpd 10.86 bpd 10.47 bpd 10.43 bpd	0.88 bpd 0.11 bpd 0.09 bpd 0.10 bpd 0.12 bpd 0.06 bpd 0.07 bpd 0.07 bpd 0.00 bpd 0.03 bpd 0.40 bpd 0.04 bpd 0.04 bpd	28.07 % 4.32 % 0.52 % 0.43 % 0.46 % 0.58 % 0.28 % 0.28 % 0.32 % 0.13 % 1.93 % 0.18 % 0.20 % 0.18 %	47.67 bpd 45.95 bpd 44.50 bpd 43.33 bpd 41.73 bpd 40.13 bpd 39.41 bpd 38.68 bpd 36.64 bpd 35.19 bpd 33.88 bpd 31.84 bpd 30.54 bpd	1.72 bpd 1.45 bpd 1.16 bpd 1.60 bpd 0.73 bpd 0.73 bpd 2.04 bpd 1.45 bpd 1.31 bpd 2.04 bpd 1.31 bpd 1.31 bpd 1.45 bpd	12.44 % 0.65 % 0.54 % 0.60 % 0.60 % 0.27 % 0.27 % 0.27 % 0.76 % 0.54 % 0.49 % 0.76 %
9660 9670 9678 9689 9700 9705 9700 9705 9770 9724 9734 9734 9757 9766 9776 9784	to	Stage 9661 9679 9690 9701 9706 9711 9725 9735 9744 9758 9767 9777 9785	634.2 Mct/d 588.6 Mct/d 588.6 Mct/d 578.6 Mct/d 573.7 Mct/d 567.6 Mct/d 567.6 Mct/d 561.3 Mct/d 561.1 Mct/d 559.7 Mct/d 539.4 Mct/d 533.5 Mct/d 533.5 Mct/d	45.6 Mct/d 5.5 Mct/d 4.5 Mct/d 4.9 Mct/d 6.1 Mct/d 2.9 Mct/d 3.4 Mct/d 1.4 Mct/d 20.4 Mct/d 1.9 Mct/d 2.1 Mct/d 1.8 Mct/d 1.8 Mct/d 2.2 Mct/d	28.07 % 4.32 % 0.52 % 0.43 % 0.46 % 0.58 % 0.28 % 0.28 % 0.32 % 0.13 % 0.13 % 0.13 % 0.18 % 0.20 %	12.31 bpd 11.42 bpd 11.32 bpd 11.33 bpd 11.13 bpd 11.01 bpd 10.96 bpd 10.89 bpd 10.89 bpd 10.86 bpd 10.86 bpd 10.47 bpd 10.43 bpd 10.35 bpd	0.88 bpd 0.11 bpd 0.09 bpd 0.10 bpd 0.12 bpd 0.06 bpd 0.07 bpd 0.00 bpd 0.03 bpd 0.03 bpd 0.40 bpd 0.04 bpd 0.04 bpd 0.04 bpd	28.07 % 4.32 % 0.52 % 0.43 % 0.46 % 0.58 % 0.28 % 0.28 % 0.28 % 0.13 % 0.13 % 0.13 % 0.18 % 0.20 %	47.67 bpd 45.95 bpd 44.50 bpd 43.33 bpd 41.73 bpd 40.13 bpd 39.41 bpd 38.68 bpd 36.64 bpd 35.19 bpd 33.88 bpd 31.84 bpd 30.54 bpd 29.08 bpd	1.72 bpd 1.45 bpd 1.16 bpd 1.60 bpd 1.60 bpd 0.73 bpd 0.73 bpd 2.04 bpd 1.45 bpd 1.31 bpd 1.31 bpd 1.45 bpd 1.45 bpd 1.16 bpd	12.44 % 0.65 % 0.54 % 0.60 % 0.60 % 0.27 % 0.27 % 0.27 % 0.76 % 0.54 % 0.49 % 0.76 % 0.49 % 0.54 % 0.49 %
9660 9670 9678 9700 9705 9710 9724 9724 9734 9734 9757 9766 9776 9784 9796	to	Stage 9661 9679 9690 9701 9706 9711 9725 9735 9744 9758 9767 9777 9785 9797	3 - Wolfcamp 634.2 Mct/d 588.6 Mct/d 588.6 Mct/d 578.6 Mct/d 577.7 Mct/d 567.6 Mct/d 561.3 Mct/d 559.7 Mct/d 539.4 Mct/d 537.5 Mct/d 537.5 Mct/d 533.4 Mct/d 533.5 Mct/d 533.5 Mct/d 531.4 Mct/d	45.6 Mct/d 5.5 Mct/d 4.5 Mct/d 4.9 Mct/d 6.1 Mct/d 2.9 Mct/d 3.4 Mct/d 0.1 Mct/d 1.4 Mct/d 20.4 Mct/d 2.1 Mct/d 2.1 Mct/d 1.8 Mct/d 2.2 Mct/d 2.3 Mct/d	28.07 % 4.32 % 0.52 % 0.43 % 0.58 % 0.28 % 0.28 % 0.32 % 0.32 % 0.13 % 1.93 % 0.18 % 0.20 % 0.18 % 0.20 % 0.21 %	12.31 bpd 11.42 bpd 11.32 bpd 11.33 bpd 11.13 bpd 11.13 bpd 11.01 bpd 10.96 bpd 10.89 bpd 10.89 bpd 10.86 bpd 10.47 bpd 10.43 bpd 10.35 bpd 10.35 bpd	0.88 bpd 0.11 bpd 0.09 bpd 0.10 bpd 0.12 bpd 0.06 bpd 0.07 bpd 0.00 bpd 0.03 bpd 0.03 bpd 0.04 bpd 0.04 bpd 0.04 bpd 0.04 bpd 0.04 bpd	28.07 % 4.32 % 0.52 % 0.43 % 0.46 % 0.58 % 0.28 % 0.28 % 0.32 % 0.32 % 0.13 % 1.93 % 0.18 % 0.20 % 0.21 %	47.67 bpd 45.95 bpd 44.50 bpd 43.33 bpd 41.73 bpd 39.41 bpd 38.68 bpd 36.64 bpd 35.19 bpd 33.88 bpd 31.84 bpd 30.54 bpd 29.08 bpd 27.92 bpd	1.72 bpd 1.45 bpd 1.60 bpd 1.60 bpd 0.73 bpd 0.73 bpd 2.04 bpd 1.45 bpd 1.31 bpd 1.31 bpd 1.45 bpd 1.45 bpd 1.16 bpd 1.74 bpd	12.44 % 0.65 % 0.54 % 0.60 % 0.60 % 0.27 % 0.49 % 0.54 % 0.54 % 0.54 %
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-		Stage 2	- Claco Canyor)	22.70 %			22.70 %			5.12 %
9900	to	9901	338.2 Mct/d	31.4 Mct/d	2.98 %	6.56 bpd	0.61 bpd	2.98 %	14.40 bpd	3.34 bpd	1.25 %
9909	to	9910	306.8 Mct/d	34.4 Mcf/d	3.26 %	5.95 bpd	0.67 bpd	3.26 %	11.05 bpd	1.31 bpd	0.49 %
9918	to	9919	272.3 Mct/d	7.5 Mct/d	0.71 %	5.28 bpd	0.15 bpd	0.71 %	9.74 bpd	1.31 bpd	0.49 %
9927	to	9928	264.9 Mct/d	5.6 Mcf/d	0.53 %	5.14 bpd	0.11 bpd	0.53 %	8.43 bpd	1.31 bpd	0.49 %
9935	to	9936	259.2 Mct/d	6.3 Mcf/d	0.60 %	5.03 bpd	0.12 bpd	0.60 %	7.13 bpd	1.16 bpd	0.44 %
9941	to	9942	252.9 Mct/d	18.0 Mcf/d	1.70 %	4.91 bpd	0.35 bpd	1.70 %	5.96 bpd	0.87 bpd	0.33 %
9948	to	9949	234.9 Mcf/d	52.4 Mcf/d	4.97 %	4.56 bpd	1.02 bpd	4.97 %	5.09 bpd	1.02 bpd	0.38 %
9957	to	9958	182.6 Mct/d	41.9 Mct/d	3.97 %	3.54 bpd	0.81 bpd	3.97 %	4.07 bpd	1.31 bpd	0.49 %
9964	to	9965	140.7 Mcf/d	29.9 Mcf/d	2.84 %	2.73 bpd	0.58 bpd	2.84 %	2.76 bpd	1.02 bpd	0.38 %
9972	to	9973	110.7 Mct/d	12.0 Mcf/d	1.14 %	2.15 bpd	0.23 bpd	1.14 %	1.74 bpd	1.06 bpd	0.40 %
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Flow	Cont	ribution	from Below Los	Depth	9.36 %			9.36 %			0.26 %
9977	to	Below	98.8 Mcf/d		9.36 %	1.92 bpd		9.36 %	0.68 bpd		0.26 %

Analysis Summary

- 1. The analysis was conducted as 3-phase. The oil production of 20 BOPD is too low to accurately quantify. The downhole oil rate, at 100% flow, accounts for ~2 % of the total mass flow and ~1 % of the total volumetric rate, assuming free gas entry and solution gas breaking out downhole. The GOR is assumed to be even across all zones.
- 2. The perforations below 9,977 feet were not logged due to wellbore restrictions. Total production from these intervals was calculated based on the data below the 9,972 9,973 feet perforations.





Brief Description of Process

The analysis is performed using a global stochastic optimization technique.

In this technique an initial flow model is estimated. Then from this model the theoretical log responses are derived. The theoretical responses are compared to all available data and the model is adjusted until the best possible match of the theoretical and actual data is obtained.

A comparison between the model responses and the recorded data is shown in this report. Good correlation between the



theoretical and log data curves indicates that the flow model is in agreement with the log data and the actual well production profile. Discrepancies between the theoretical and raw data curves can be due to tool deficiencies, conflicts between the parameters or conditions that make the underlying empirical models (such as flow regimes) less applicable.

- The flow regimes were determined, directly from the flow rates and holdups, according to the Taitel-Dukler analytic model.
- The profile factors, to calculate the average effective fluid velocity from the apparent velocity, were based on the Reynolds number, calculated from the phase velocities and phase properties.
- Where gas was present the density, heat capacity and Joule-Thompson coefficients were derived from the Lee Kesler Pitzer equation of states.
- Solution gas in oil was derived from the Vasquez and Beggs or Oistein Glaso correlation.

The analysis was performed in five steps:

- The data preparation to filter the data, compute gradients and error estimates.
- The flow meter analysis to compute the apparent velocity.

- The profile determination to identify the potential producing and/or injecting zones.

- The computation of the flow rates (model) by global optimization.
- The computation of surface production rates and reporting



Service States in the



Model Results With Recorded Data

RhcFlu grcc 175 0 2Cil 822 BFPD 300 0 QGas MCFD 30 0 QpGas MCFD Depth feet 8409.00 9977.0 Holdups CWate Util1222 BFPD 0 1 0 CR Twf API ⊡ DegF 1500 0 200 185 ES Perfs Vep FPM 0 10 PerfCcu C Odd Bi Ever 20 0 Gas Oil 20 Vate 175 0 Fwf 50 1520 OcWate BFPD 0 OpOil BFPD 2120 1600 30 300 0 Vap-Th FPM Surfa Hydri Hz 160 1055 Surface Rate Surface Rate 1025 Tgect DegF 155 Ę Stewart way 8460 8520 8580 8840 -vury vis land 8700 8760 8620 Wowwwwwwwwwwww 8680 8940 9000 3060 9120 9180 9240 and a stand of the 9300 8360 9420 When monormy 9480 9543 R 9600 9660 9720 9760 9940 9900 9960

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Production Rates At Surface Conditions

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Flow Model at Downhole Conditions With Comparison of Theoretical Response to Recorded Data

Depth	IncoVac UNITY	Holdups UNITY	ParfCou Cdd 🞆	FicwRete MCFD	Vep FFM	=ľ	Rhofluid g/cc 🗲	DPwfCz ber/m	8	Twf DegF	8	DTwfDz DegF/fl E	Hydro FRQ Hz	8	Regime UNITY
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6510 W Sam Houston Parkway, Houston, TX 77041 +1-713-328-2320





Overlay of all Log Data

Depth	Temperature DesE	Density	Spinner	Pressure	Dielectric Hz	LineSpeed FPM	GR CCL API mV	F
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Completion Profile Analysis



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Apparent Fluid Velocity Derived from Spinner

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Spinner Calibration Plots Relationship between R.P.S. and Fluid Velocity (fpm)



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and a constant

Geothermal Gradient

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Completion Profile Analysis

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Well Parameter	I Information rs used for Analy	rsis	
SPGG	UNITY	.682	
APIOil	UNITY	52.3	
DPipe	in	4.90	
PipeAngle	DegAng	0	
Geotherm	°F/ft	.0120	
TgeoRef	۴F	174	
DgeoRef	ft	9977	

Downhole Measured and Computed Parameters

Depth	Pwf	Twf	Pgas	Poll	Pwater	RhoFluid	Bgas	Vap
feet	psi	DegF	g/cc	g/cc	g/cc	g/cc	UNITY	FPM
8409.00	1552	156	.0840	.738	1.00	.617	.00993	81.5
8521.00	1577	157	.0853	.738	1.00	.604	.00978	78.3
8633.00	1608	161	.0863	.737	1.00	.627	.00967	63.2
8745.00	1639	161	.0879	.737	1.00	.627	.00949	55.2
8857.00	1670	162	.0896	.736	1.00	.603	.00932	109
8969.00	1700	162	.0911	.736	1.00	.587	.00916	111
9081.00	1728	163	.0926	.736	1.00	.601	.00901	110
9193.00	1759	164	.0941	.736	1.00	.626	.00887	103
9305.00	1791	166	.0953	.735	1.00	.657	.00875	87.3
9417.00	1823	168	.0968	.734	1.00	.680	.00862	91.6
9529.00	1858	169	.0984	.734	1.00	.714	.00848	77.0
9641.00	1892	170	.100	.734	1.00	.716	.00834	75.3
9753.00	1929	171	.102	.733	1.00	.788	.00820	67.3
9865.00	1968	173	.103	.733	1.00	.812	.00807	40.1
9977.00	2027	174	.106	.732	1.00	1.24	.00785	23.0





Definitions

Curve Name	Description
Holdup	Holdups
PerfCount	Perforations
QGas	Total Gas Production at surface conditions
QpGas	Incremental Gas Production at surface conditions
QOI	Total Oil Production (if present downhole) at surface conditions
QpOil	Incremental Oil Production (if present downhole) at surface conditions
QWater	Total Water Production at surface conditions
QpWater	Incremental Water Production at surface conditions
GR	Gamma Ray/SpectraScan
Twf	Average Temperature
Vap	Apparent Velocity
Vap-Theo	Theoretical Apparent Velocity
Tgeotherm	Geothermal Gradient
RhoFluid	Average Fluid Density
Pwf	Average Pressure
HydroFrq	Average Fluid Dielectric
Flowrate	Total Flowrate at downhole conditions
Vap	Apparent Velocity
Vap-Theo	Theoretical Apparent Velocity
RhoFluid	Average Fluid Density
RhoFluid-Theo	Theoretical Average Fluid Density
DPwfDz	Differential Pressure
DPwfDz-Theo	Theoretical Differential Pressure
Twf	Average Temperature
Twf-Theo	Theoretical Average Temperature
Tgeotherm	Geothermal Gradient
DTwfDz	Differential Temperature
DTwfDz-Theo	Theoretical Differential Temperature
Regime	Flow Regimes
Temperature	Temperature Passes
Density	Fluid Density Passes
Spinner	Spinner Passes
Pressure	Pressure Passes
Linespeed	Linespeed Passes
Slope	Spinner Slope
Vthr	Spinner Threshold
SpinnerFit	Spinner
DPipe	Inside diameter of the casing/tubing across logged interval
PipeAngle	Average pipe angle across logged interval
APIOII	Degree API of the oil
SPGG	Specific Gravity of the gas
TgeoRef	Reference Temperature for Geothermal Gradient calculations
DgeoRef	Reference Depth for Geothermal Gradient calculations
Goetherm	Geothermal Gradient across logged interval





Tool Specifications		A		TM
O.D. 1-11/16 in. (42.86 mm) Length 11.9 ft. (3.63 m) in combination 23.28 ft. (7.1 m) stand alone		Completic	on Prot	
Pressure Rating 15,000 psi (103421.4 Kpa) Temperature Rating 350 F (177 C)				
Flow Measurement		C- Cells	23.28 π. 5 84.5 lbs.	
Measurement of fluid velocity is made using the Spinner Flowmeter. This is calibrated by making logging passes at different line speeds to establish the relationship between instrument velocity in feet/minute and the spinner response in revolutions/second (RPS). With this relationship the measured RPS can be converted to fluid velocity in fi/minute. With a known pipe I. D. this can be used to calculate the flow rate in BPD. $Q_{gPD} = ft/min x 1.4 x 1.D.^2$	28.375" 9 lbs.	D-Celk Pressure / Temperature Combo,Tool	: 89.5 lbs. 78" 18.5 lbs. 23.5 lbs.	Battery Housing C - Cell Batteries O - Cell Batteries
Mass flow rate can be computed using the Temperature data. This is based on an enthalpy model, taking into consideration; kinetic energy, frictional and Joule-Thompson heating as well as conduction and convection into the formation.	23" 10 lbs.	Roller Centralizer	19°	RS-232 Port / CCL
In gas wells the volumetric fraction of liquids (water) can be very small. Therefore water production may not be quantifiable by velocity measurement alone Because of water's high mass relative to gas, mass flowrate computed from the <i>Temperature</i> data can be better at quantifying the water production.			39.5"	Memory / CPU
Holdup Measurement	24"	Induction-Collar Locator	10.5 lbs.	
Holdup (γ) - The fraction of each phase in the wellbore (Water, Oil, Gas fraction) This should no be confused with Cut. i.e. 100% water holdup exists in the static rathole but does not flow.				
The Fluid Density instrument uses a small gamma ray source and a gamma ray detector to measure the density of the wellbore fluid mixture. The mixture density is used to calculate the holdup fraction.	28"	Fluid Identification Tool	28.375" 9 lbs.	Pressure / temperature Combo Tool
Ywater (Pmixture · Pgas)/(Pwater · Pgas)	7 lbs.	Gamma-Gamma Density &	23	Roller
/For two-pha se gasswater production] D: denssty (ganvec)		Fluid Dielectric	10 lbs. \	Centralizer
The Fluid Dielectric instrument works like an electric capacitor. The capacitor plates are exposed to the wellbore fluids and are a fixed size and distance apart. The value of the capacitance will change as the dielectric of the fluids between the plates change. The instrument response like			24 ⁻ 6.5 bs.	Induction-Collar Locator
then used to calculate the hydrocarbon and wate fractions. This is possible because of the unique dietectric constant of water, oil and gas. Water = 78, Oil = 4 and Gas = 1	23" . 10 lbs.	, Roller ′ Centralizer	28" 7 lbs.	Fluid Identification Tool Gamma-Gamma Density & Fluid Dielectric
The Pressure data can also be used to corroborate the fluid holdup measurements. This is done by measuring the pressure gradient or the derivative of the pressure curve with respect to depth. This resulting curve in psi/ft can be used to determine the water and gas fractions.			23° / \ 10 lbs. \	Roller Centralizer
Note: In three phase flow both fluid density and dielectri measurements are necessary. The dielectric i used to determine the water holdup then the densit is used to calculate the remaining gas and o	15.3" 2.5 lbs, s	Spinner Flowmeter	16.5" 2.5 bs.	Spinner Flowmeter

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