Revised March 23, 2017

RECEIVED:	REVIEWER:	TYPE:	APP NO:
8/31/2017	MAM	DHC	pMAM1724355 40

ABOVE THIS TABLE FOR OCD DIVISION USE ONLY

NEW MEXICO OIL CONSERVATION DIVISION
- Geological & Engineering Bureau –
1220 South St. Francis Drive, Santa Fe, NM 87505

ADMINISTRATIVE APPLICATION CHECKLIST

THIS CHECKLIST IS MANDATORY FOR ALL ADMINISTRATIVE APPLICATIONS FOR EXCEPTIONS TO DIVISION RULES AND REGULATIONS WHICH REQUIRE PROCESSING AT THE DIVISION LEVEL IN SANTA FE

Applicant: Cimarex Energy Co. Of Colorado **OGRID Number:** 162683
Well Name: Estill AD Federal #2 **API:** 30-015-33336
Pool: White City; Penn (Gas), Purple Sage, Wolfcamp (Gas) **Pool Code:** 87280, 98220

RECEIVED OCD
2017 AUG 31 P 3:23

SUBMIT ACCURATE AND COMPLETE INFORMATION REQUIRED TO PROCESS THE TYPE OF APPLICATION INDICATED BELOW DHC-4801

1) **TYPE OF APPLICATION:** Check those which apply for [A]
A. Location – Spacing Unit – Simultaneous Dedication
☐NSL ☐NSP(PROJECT AREA) ☐NSP(PRORATION UNIT) ☐SD

B. Check one only for [I] or [II]
[I] Commingling – Storage – Measurement
☒DHC ☐CTB ☐PLC ☐PC ☐OLS ☐OLM
[II] Injection – Disposal – Pressure Increase – Enhanced Oil Recovery
☐WFX ☐PMX ☐SWD ☐IPI ☐EOR ☐PPR

FOR OCD ONLY
☐ Notice Complete
☐ Application Content Complete

2) **NOTIFICATION REQUIRED TO:** Check those which apply.
A. ☐ Offset operators or lease holders
B. ☐ Royalty, overriding royalty owners, revenue owners
C. ☐ Application requires published notice
D. ☐ Notification and/or concurrent approval by SLO
E. ☐ Notification and/or concurrent approval by BLM
F. ☐ Surface owner
G. ☐ For all of the above, proof of notification or publication is attached, and/or,
H. ☒ No notice required

3) **CERTIFICATION:** I hereby certify that the information submitted with this application for administrative approval is **accurate** and **complete** to the best of my knowledge. I also understand that **no action** will be taken on this application until the required information and notifications are submitted to the Division.

Note: Statement must be completed by an individual with managerial and/or supervisory capacity.

Amithy Crawford
Print or Type Name

Signature

8/31/2017
Date

432-620-1909
Phone Number

acrawford@cimarex.com
e-mail Address

State of New Mexico
Energy, Minerals and Natural Resources Department

Susana Martinez
Governor

Tony Delfin
Acting Cabinet Secretary

David R. Catanach, Division Director
Oil Conservation Division

Administrative Order DHC-4801
Order Date: December 6, 2016
Application Reference Number: pMAM1634054132

Cimarex Energy Co. of Colorado
600 North Marienfeld Street, Suite 600
Midland, Tx. 79701

Attention: Ms. Amithy Crawford

Estill AD Federal Well No. 2
API No. 30-015-33336
Unit H, Section 19, Township 24 South, Range 26 East, NMPM
Eddy County, New Mexico

Pool	WHITE CITY; PENN (GAS)	Gas (87280)
Names:	WC; BLACK RIVER; WOLFCAMP,SW(G)	Gas (97693)

Reference is made to your recent application for an exception to Division Rule 19.15.12.9A. NMAC of the Division Rules and Regulations to permit the above-described well to commingle production from the subject pools in the wellbore.

It appears that the subject well qualifies for approval for such exception pursuant to the provisions of Division Rule 19.15.12.11A. NMAC, and since reservoir damage or waste will not result from such downhole commingling, and correlative rights will not be violated thereby, you are hereby authorized to commingle the production as described above and any Division Order which authorized the dual completion or otherwise required separation of the zones is hereby placed in abeyance.

In accordance with Division Rule 19.15.12.11A (6) NMAC, the production attributed to any commingled pool within the well shall not exceed the allowable applicable to that pool.

As per the application, the assignment of allowable and allocation of oil and gas production from the subject well for the White City; Penn (Gas) Pool and WC; Black River; Wolfcamp, SW(G) shall be based on the remaining gas in place (RGIP) calculations, which in turn is based on a combination of cumulative production, offset analogy production and well log analysis for each pool.

Assignment of allowable and allocation of production from the well shall be as follows:

WC; BLACK RIVER; WOLFCAMP, SW(G) POOL	Pct. Oil: 74	Pct. Gas: 74
WHITE CITY; PENN (GAS)	Pct. Oil: 26	Pct. Gas: 26

It is also understood that notice of this application, pursuant to Division Rule 19.15.4.12 A (6), is not required since the interest ownership between the zones to be commingled is common throughout.

REMARKS: The operator shall notify the Division's District II office upon implementation of commingling operations.

This Order is subject to like approval from the Bureau of Land Management.

Pursuant to Division Rule 19.15.12.11B. NMAC, the commingling authority granted herein may be rescinded by the Division Director if conservation is not being best served by such commingling.

David R. Catanach

David R. Catanach
Director

DRC/mam

cc: New Mexico Oil Conservation Division – Artesia
Bureau of Land Management - Carlsbad

Cimarex Energy Co.
202 S. Cheyenne Ave.
Suite 1000
Tulsa, Oklahoma 74103-4346
PHONE: 918.585.1100
FAX: 918.585.1133

CIMAREX

Michael McMillian
Oil Conservation Division
New Mexico Department of Energy,
Minerals and Natural Resources
1220 South Saint Francis Drive
Santa Fe, New Mexico 87505

Re: Estill AD Federal 2
API 30-015-33336
Section 19, Township 24 South, Range 26 East, N.M.P.M.
Eddy County, New Mexico.

Dear Mr. McMillian:

The Estill AD Federal 2 well is located in the NE/4 of Sec. 19, 24S, 26E, Eddy County NM.

Cimarex is the operator of the NE/4 of Sec. 19, 24S, 26E, Eddy County, NM as to all depths from the surface of the earth to 12,068'. Ownership within these depths in the NE/4 are identical.

Sincerely,

Caitlin Pierce

Caitlin Pierce
Production Landman
cpierce@cimarex.com
Direct: 432-571-7862

District I
1625 N. French Drive, Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources Department

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, New Mexico 87505

APPLICATION FOR DOWNHOLE COMMINGLING

Form C-107A
Revised June 10, 2003

APPLICATION TYPE
_X_ Single Well
___ Establish Pre-Approved Pools
EXISTING WELLBORE
_X_ Yes ___ No

Cimarex Energy Co. of Colorado — Operator
600 N. Marienfeld St., Ste. 600; Midland, TX 79701 — Address

Estill AD Fed — Lease
002 — Well No.
H-9-24S-26E — Unit Letter-Section-Township-Range
Eddy — County

OGRID No.____ Property Code____ API No. 30-015-33336 Lease Type: _X_ Federal ___ State___ Fee

DATA ELEMENT	UPPER ZONE	LOWER ZONE
Pool Name	Purple Sage Wolfcamp Gas	White City; Penn (Gas)
Pool Code	98220	87280
Top and Bottom of Pay Section (Perforated or Open-Hole Interval)	8418'-9756'	9947'-10215'
Method of Production (Flowing or Artificial Lift)	Flowing	Flowing
Bottomhole Pressure (Note: Pressure data will not be required if the bottom perforation in the lower zone is within 150% of the depth of the top perforation in the upper zone)	Within 150% of top perf	Within 150% of top perf
Oil Gravity or Gas BTU (Degree API or Gas BTU)	Oil: 51.8° API Gas: 1225.8 BTU dry / 1204.6 BTU wet @ 14.73 psi	Oil: 53.5° API Gas: 1142.4 BTU dry / 1122.6 BTU wet @ 14.73 psi
Producing, Shut-In or New Zone	New Zone	New Zone
Date and Oil/Gas/Water Rates of Last Production. (Note: For new zones with no production history, applicant shall be required to attach production estimates and supporting data.)	Date: N/A Rates: 105 BOPD, 1706 MCFPD, 1038 BWPD	Date: N/A Rates: 22 BOPD, 349 MCFPD, 213 BWPD
Fixed Allocation Percentage (Note: If allocation is based upon something other than current or past production, supporting data or explanation will be required.)	Oil 83 Gas 83	Oil 17 Gas 17

ADDITIONAL DATA

Are all working, royalty and overriding royalty interests identical in all commingled zones? Yes_X_ No____
If not, have all working, royalty and overriding royalty interest owners been notified by certified mail? Yes____ No____

Are all produced fluids from all commingled zones compatible with each other? Yes_X_ No____

Will commingling decrease the value of production? Yes____ No_X_

If this well is on, or communitized with, state or federal lands, has either the Commissioner of Public Lands or the United States Bureau of Land Management been notified in writing of this application? Yes_X_ No____

NMOCD Reference Case No. applicable to this well: DHC-4801

Attachments:
C-102 for each zone to be commingled showing its spacing unit and acreage dedication.
Production curve for each zone for at least one year. (If not available, attach explanation.)
For zones with no production history, estimated production rates and supporting data.
Data to support allocation method or formula.
Notification list of working, royalty and overriding royalty interests for uncommon interest cases.
Any additional statements, data or documents required to support commingling.

PRE-APPROVED POOLS

If application is to establish Pre-Approved Pools, the following additional information will be required:

List of other orders approving downhole commingling within the proposed Pre-Approved Pools
List of all operators within the proposed Pre-Approved Pools
Proof that all operators within the proposed Pre-Approved Pools were provided notice of this application.
Bottomhole pressure data.

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

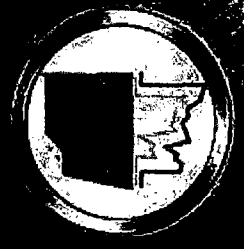
SIGNATURE [signature] TITLE Regulatory Analyst DATE 9/1/2017

TYPE OR PRINT NAME Amithy Crawford TELEPHONE NO. 432-620-1909

E-MAIL ADDRESS acrawford@cimarex.com

Cimarex Energy Company
Estill AD Fed #2

Completion Profiler



Completion Profile Analysis

Company	*Cimarex Energy Company*
Well Name	*Estill AD Fed #2*
Field	*White City Penn*
Location	*Eddy County, New Mexico*
Customer Name	*Steven A. Runyan*
Date of Survey	*July 28, 2017*
Date of Analysis	*August 14, 2017*
Logging Engineer	*Paulo Rios*
Analyst	*Derrick George*

Table of Contents

Survey Objectives

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

Logging Procedures

Date	Time	Comment
07/28	07:30	Arrive on location
07/28	08:20	Gauge run start
07/28	09:45	Gauge run stop
07/28	09:57	Program Completion Profile String
07/28	10:48	Start GIH pass
07/28	11:23	Stop GIH pass
07/28	11:43	Start logging passes
07/28	12:44	Stop logging passes
07/28	12:45	Start out of well pass
07/28	13:30	Stop out of well pass
07/28	13:35	Start download
07/28	13:55	Stop download
07/28	15:00	Rig down

Interval Logged: [From 8,400 to 9,730 ft.]
60 ft/min

Well Information

Casing: 4.500" 11.6 lb/ft surface to 12,300 ft PBTD: 10,365 ft

Tubing: 2.375" 4.7 lb/ft surface to 8,390 ft

Perforations:

Perforation Data																							
Stage 6 - Wolfcamp																							
8,418	to	8,419	8,432	to	8,433	8,442	to	8,443	8,456	to	8,457	8,476	to	8,477
8,504	to	8,505	8,516	to	8,517	8,534	to	8,535	8,548	to	8,549	8,562	to	8,563
8,572	to	8,573	8,582	to	8,583	8,595	to	8,596	8,602	to	8,603	8,611	to	8,612
8,618	to	8,619	8,630	to	8,631	8,645	to	8,647	8,664	to	8,666	8,672	to	8,675
Stage 5 - Wolfcamp																							
8,989	to	8,990	9,000	to	9,001	9,010	to	9,011	9,018	to	9,019	9,025	to	9,026
9,032	to	9,033	9,042	to	9,043	9,051	to	9,052	9,066	to	9,067	9,084	to	9,085
9,101	to	9,102	9,176	to	9,177	9,188	to	9,189	9,197	to	9,198	9,212	to	9,213
9,227	to	9,228	9,247	to	9,248	9,258	to	9,260	9,270	to	9,272	9,286	to	9,290
Stage 4 - Wolfcamp																							
9,310	to	9,311	9,318	to	9,319	9,327	to	9,328	9,335	to	9,336	9,343	to	9,344
9,352	to	9,353	9,359	to	9,360	9,369	to	9,370	9,383	to	9,384	9,390	to	9,391
9,400	to	9,401	9,407	to	9,408	9,415	to	9,416	9,422	to	9,423	9,430	to	9,431
9,440	to	9,441	9,455	to	9,456	9,468	to	9,470	9,480	to	9,482	9,490	to	9,493
Stage 3 - Wolfcamp																							
9,575	to	9,576	9,582	to	9,583	9,594	to	9,595	9,599	to	9,600	9,614	to	9,615
9,624	to	9,625	9,636	to	9,637	9,643	to	9,644	9,651	to	9,652	9,658	to	9,659
9,672	to	9,673	9,686	to	9,687	9,694	to	9,695	9,705	to	9,706	9,713	to	9,714
9,725	to	9,726	9,734	to	9,736									
Stage 2 - Wolfcamp																							
9,756	to	9,757	9,764	to	9,765	9,775	to	9,776	9,782	to	9,783	9,788	to	9,789
9,800	to	9,801	9,811	to	9,812	9,820	to	9,821	9,827	to	9,828	9,834	to	9,835
9,844	to	9,845	9,861	to	9,862	9,872	to	9,873	9,884	to	9,885	9,894	to	9,895
9,905	to	9,906	9,913	to	9,915									
Stage 1 - Cisco Canyon																							
9,981	to	9,982	10,022	to	10,023	10,079	to	10,080	10,099	to	10,100	10,128	to	10,129
10,144	to	10,145	10,170	to	10,171	10,195	to	10,196	10,213	to	10,215			

Tool String

The 1.70" 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.

Results

The following table summarizes the production from each frac stage.

MEASURED SURFACE RATES Flow Rates Reported at STP				
	Tubing	Gas	Oil	Water
	Psi	MCFD	BFPD	BFPD
Avg	300 psi	1261 Mcf/d	105 bpd	429 bpd

GAS / OIL / WATER PRODUCTION PROFILE Flow Rates Reported at STP									
Zone Intervals feet	Q-Gas MCFD	Qp-Gas MCFD	Percent of Total	Q-Oil BFPD	Qp-Oil BFPD	Percent of Total	Q-Water BFPD	Qp-Water BFPD	Percent of Total
Surface to 8418	1264.3 Mcf/d		100.00 %	105.13 bpd		100.00 %	427.88 bpd		100.00 %
Stage 6 - Wolfcamp			26.90 %			26.90 %			69.73 %
8418 to 8675	1264.3 Mcf/d	340.1 Mcf/d		105.13 bpd	28.28 bpd		427.88 bpd	298.36 bpd	
Stage 5 - Wolfcamp			22.28 %			22.28 %			25.81 %
8989 to 9290	924.3 Mcf/d	281.7 Mcf/d		76.85 bpd	23.43 bpd		129.52 bpd	110.44 bpd	
Stage 4 - Wolfcamp			26.97 %			26.97 %			1.54 %
9310 to 9493	642.5 Mcf/d	341.0 Mcf/d		53.43 bpd	28.36 bpd		19.07 bpd	6.61 bpd	
Stage 3 - Wolfcamp			6.70 %			6.70 %			1.01 %
9575 to 9726	301.5 Mcf/d	84.7 Mcf/d		25.07 bpd	7.05 bpd		12.47 bpd	4.32 bpd	
Flow Contribution from Below Log Depth			17.15 %			17.14 %			1.91 %
9730 to Below	216.8 Mcf/d		17.15 %	18.02 bpd		17.14 %	8.15 bpd		1.91 %

Completion Profile Analysis

The following table summarizes the production from each producing interval.

GAS / OIL / WATER PRODUCTION PROFILE Flow Rates Reported at STP										
Zone Intervals feet	Q-Gas MCFD	Qp-Gas MCFD	Percent of Total	Q-Oil BFPD	Qp-Oil BFPD	Percent of Total	Q-Water BFPD	Qp-Water BFPD	Percent of Total
Surface to 8418	1264.3 Mcf/d		100.00 %	105.13 bpd		100.00 %	427.88 bpd		100.00 %
Stage 6 - Wolfcamp			26.90 %			26.90 %			69.73 %
8418 to 8419	1264.3 Mcf/d	229.9 Mcf/d	18.19 %	105.13 bpd	19.12 bpd	18.19 %	427.88 bpd	15.62 bpd	3.65 %
8432 to 8433	1034.4 Mcf/d	2.8 Mcf/d	0.22 %	86.01 bpd	0.23 bpd	0.22 %	412.27 bpd	24.43 bpd	5.71 %
8442 to 8443	1031.6 Mcf/d	3.4 Mcf/d	0.27 %	85.78 bpd	0.28 bpd	0.27 %	387.84 bpd	14.36 bpd	3.36 %
8456 to 8457	1028.2 Mcf/d	2.8 Mcf/d	0.22 %	85.49 bpd	0.23 bpd	0.22 %	373.47 bpd	5.84 bpd	1.36 %
8476 to 8477	1025.4 Mcf/d	2.4 Mcf/d	0.19 %	85.26 bpd	0.20 bpd	0.19 %	367.64 bpd	64.72 bpd	15.13 %
8504 to 8505	1023.0 Mcf/d	3.6 Mcf/d	0.29 %	85.06 bpd	0.30 bpd	0.29 %	302.91 bpd	17.43 bpd	4.07 %
8516 to 8517	1019.4 Mcf/d	2.9 Mcf/d	0.23 %	84.76 bpd	0.24 bpd	0.23 %	285.48 bpd	10.50 bpd	2.45 %
8534 to 8535	1016.5 Mcf/d	3.1 Mcf/d	0.25 %	84.52 bpd	0.26 bpd	0.25 %	274.98 bpd	8.33 bpd	1.95 %
8548 to 8549	1013.4 Mcf/d	2.8 Mcf/d	0.22 %	84.26 bpd	0.23 bpd	0.22 %	266.65 bpd	32.65 bpd	7.63 %
8562 to 8563	1010.7 Mcf/d	2.8 Mcf/d	0.22 %	84.03 bpd	0.23 bpd	0.22 %	234.00 bpd	12.73 bpd	2.98 %
8572 to 8573	1007.8 Mcf/d	2.7 Mcf/d	0.21 %	83.80 bpd	0.22 bpd	0.21 %	221.26 bpd	10.54 bpd	2.46 %
8582 to 8583	1005.2 Mcf/d	3.4 Mcf/d	0.27 %	83.58 bpd	0.28 bpd	0.27 %	210.73 bpd	4.42 bpd	1.03 %
8595 to 8596	1001.8 Mcf/d	3.1 Mcf/d	0.25 %	83.30 bpd	0.26 bpd	0.25 %	206.31 bpd	12.89 bpd	3.01 %
8602 to 8603	998.7 Mcf/d	2.9 Mcf/d	0.23 %	83.04 bpd	0.25 bpd	0.23 %	193.41 bpd	10.97 bpd	2.57 %
8611 to 8612	995.7 Mcf/d	2.9 Mcf/d	0.23 %	82.79 bpd	0.25 bpd	0.23 %	182.44 bpd	6.47 bpd	1.51 %
8618 to 8619	992.8 Mcf/d	40.0 Mcf/d	3.16 %	82.55 bpd	3.32 bpd	3.16 %	175.97 bpd	3.85 bpd	0.90 %
8630 to 8631	952.8 Mcf/d	21.7 Mcf/d	1.71 %	79.23 bpd	1.80 bpd	1.71 %	172.12 bpd	11.79 bpd	2.76 %
8645 to 8647	931.2 Mcf/d	1.8 Mcf/d	0.15 %	77.43 bpd	0.15 bpd	0.15 %	160.33 bpd	8.12 bpd	1.90 %
8664 to 8666	929.3 Mcf/d	2.8 Mcf/d	0.22 %	77.27 bpd	0.23 bpd	0.22 %	152.21 bpd	6.83 bpd	1.60 %
8672 to 8675	926.6 Mcf/d	2.3 Mcf/d	0.18 %	77.04 bpd	0.19 bpd	0.18 %	145.38 bpd	15.86 bpd	3.71 %
Stage 5 - Wolfcamp			22.28 %			22.28 %			25.81 %
8989 to 8990	924.3 Mcf/d	7.6 Mcf/d	0.60 %	76.85 bpd	0.63 bpd	0.60 %	129.52 bpd	5.57 bpd	1.30 %
9000 to 9001	916.7 Mcf/d	7.5 Mcf/d	0.60 %	76.22 bpd	0.63 bpd	0.60 %	123.95 bpd	7.91 bpd	1.85 %
9010 to 9011	909.1 Mcf/d	7.5 Mcf/d	0.59 %	75.59 bpd	0.62 bpd	0.59 %	116.04 bpd	7.74 bpd	1.81 %
9018 to 9019	901.6 Mcf/d	7.6 Mcf/d	0.60 %	74.97 bpd	0.63 bpd	0.60 %	108.30 bpd	5.58 bpd	1.31 %
9025 to 9026	894.0 Mcf/d	7.6 Mcf/d	0.60 %	74.33 bpd	0.63 bpd	0.60 %	102.72 bpd	3.21 bpd	0.75 %
9032 to 9033	886.4 Mcf/d	8.4 Mcf/d	0.67 %	73.71 bpd	0.70 bpd	0.67 %	99.51 bpd	8.04 bpd	1.88 %
9042 to 9043	878.0 Mcf/d	7.1 Mcf/d	0.57 %	73.00 bpd	0.59 bpd	0.57 %	91.47 bpd	4.57 bpd	1.07 %
9051 to 9052	870.9 Mcf/d	7.1 Mcf/d	0.56 %	72.41 bpd	0.59 bpd	0.56 %	86.89 bpd	5.27 bpd	1.23 %
9066 to 9067	863.7 Mcf/d	2.7 Mcf/d	0.21 %	71.82 bpd	0.22 bpd	0.21 %	81.63 bpd	10.11 bpd	2.36 %
9084 to 9085	861.1 Mcf/d	2.7 Mcf/d	0.21 %	71.60 bpd	0.22 bpd	0.21 %	71.52 bpd	4.29 bpd	1.00 %
9101 to 9102	858.4 Mcf/d	2.7 Mcf/d	0.21 %	71.37 bpd	0.22 bpd	0.21 %	67.23 bpd	5.38 bpd	1.26 %
9176 to 9177	855.7 Mcf/d	3.4 Mcf/d	0.27 %	71.15 bpd	0.28 bpd	0.27 %	61.85 bpd	4.98 bpd	1.16 %
9188 to 9189	852.3 Mcf/d	3.7 Mcf/d	0.29 %	70.87 bpd	0.31 bpd	0.29 %	56.88 bpd	3.97 bpd	0.93 %
9197 to 9198	848.6 Mcf/d	3.5 Mcf/d	0.28 %	70.56 bpd	0.29 bpd	0.28 %	52.91 bpd	1.91 bpd	0.45 %
9212 to 9213	845.1 Mcf/d	3.6 Mcf/d	0.29 %	70.27 bpd	0.30 bpd	0.29 %	51.00 bpd	5.10 bpd	1.19 %
9227 to 9228	841.5 Mcf/d	3.4 Mcf/d	0.27 %	69.97 bpd	0.28 bpd	0.27 %	45.90 bpd	3.62 bpd	0.85 %
9247 to 9248	838.1 Mcf/d	2.4 Mcf/d	0.19 %	69.69 bpd	0.20 bpd	0.19 %	42.27 bpd	3.57 bpd	0.84 %
9258 to 9260	835.7 Mcf/d	20.0 Mcf/d	1.59 %	69.49 bpd	1.67 bpd	1.59 %	38.70 bpd	2.98 bpd	0.70 %
9270 to 9272	815.7 Mcf/d	6.4 Mcf/d	0.51 %	67.82 bpd	0.53 bpd	0.51 %	35.72 bpd	2.93 bpd	0.68 %
9286 to 9290	809.2 Mcf/d	166.7 Mcf/d	13.18 %	67.29 bpd	13.86 bpd	13.18 %	32.79 bpd	13.72 bpd	3.21 %

Stage 4 - Wolfcamp				**26.97 %**			**26.97 %**			**1.54 %**
9310	to **9311**	642.5 Mcf/d	4.7 Mcf/d	**0.37 %**	53.43 bpd	0.39 bpd	**0.37 %**	19.07 bpd	1.44 bpd	**0.34 %**
9318	to **9319**	637.9 Mcf/d	4.1 Mcf/d	**0.33 %**	53.04 bpd	0.34 bpd	**0.33 %**	17.64 bpd	0.28 bpd	**0.07 %**
9327	to **9328**	633.7 Mcf/d	1.5 Mcf/d	**0.12 %**	52.69 bpd	0.12 bpd	**0.12 %**	17.36 bpd	0.27 bpd	**0.06 %**
9335	to **9336**	632.2 Mcf/d	1.5 Mcf/d	**0.12 %**	52.57 bpd	0.12 bpd	**0.12 %**	17.09 bpd	0.26 bpd	**0.06 %**
9343	to **9344**	630.8 Mcf/d	1.5 Mcf/d	**0.12 %**	52.45 bpd	0.12 bpd	**0.12 %**	16.83 bpd	0.27 bpd	**0.06 %**
9352	to **9353**	629.3 Mcf/d	1.5 Mcf/d	**0.12 %**	52.32 bpd	0.12 bpd	**0.12 %**	16.56 bpd	0.26 bpd	**0.06 %**
9359	to **9360**	627.8 Mcf/d	1.5 Mcf/d	**0.12 %**	52.20 bpd	0.12 bpd	**0.12 %**	16.29 bpd	0.27 bpd	**0.06 %**
9369	to **9370**	626.3 Mcf/d	1.5 Mcf/d	**0.12 %**	52.08 bpd	0.13 bpd	**0.12 %**	16.03 bpd	0.27 bpd	**0.06 %**
9383	to **9384**	624.8 Mcf/d	1.5 Mcf/d	**0.12 %**	51.95 bpd	0.12 bpd	**0.12 %**	15.76 bpd	0.28 bpd	**0.07 %**
9390	to **9391**	623.3 Mcf/d	9.6 Mcf/d	**0.76 %**	51.83 bpd	0.80 bpd	**0.76 %**	15.48 bpd	0.27 bpd	**0.06 %**
9400	to **9401**	613.7 Mcf/d	23.3 Mcf/d	**1.85 %**	51.03 bpd	1.94 bpd	**1.85 %**	15.21 bpd	0.28 bpd	**0.07 %**
9407	to **9408**	590.4 Mcf/d	3.2 Mcf/d	**0.25 %**	49.09 bpd	0.27 bpd	**0.25 %**	14.93 bpd	0.28 bpd	**0.07 %**
9415	to **9416**	587.1 Mcf/d	3.2 Mcf/d	**0.25 %**	48.82 bpd	0.26 bpd	**0.25 %**	14.65 bpd	0.27 bpd	**0.06 %**
9422	to **9423**	584.0 Mcf/d	3.2 Mcf/d	**0.25 %**	48.56 bpd	0.27 bpd	**0.25 %**	14.38 bpd	0.26 bpd	**0.06 %**
9430	to **9431**	580.8 Mcf/d	2.6 Mcf/d	**0.21 %**	48.29 bpd	0.22 bpd	**0.21 %**	14.12 bpd	0.28 bpd	**0.06 %**
9440	to **9441**	578.1 Mcf/d	62.0 Mcf/d	**4.90 %**	48.07 bpd	5.15 bpd	**4.90 %**	13.84 bpd	0.28 bpd	**0.07 %**
9455	to **9456**	516.2 Mcf/d	27.9 Mcf/d	**2.21 %**	42.92 bpd	2.32 bpd	**2.21 %**	13.56 bpd	0.28 bpd	**0.07 %**
9468	to **9470**	488.3 Mcf/d	60.2 Mcf/d	**4.76 %**	40.60 bpd	5.01 bpd	**4.76 %**	13.28 bpd	0.28 bpd	**0.07 %**
9480	to **9482**	428.0 Mcf/d	118.7 Mcf/d	**9.39 %**	35.59 bpd	9.87 bpd	**9.39 %**	13.00 bpd	0.27 bpd	**0.06 %**
9490	to **9493**	309.4 Mcf/d	7.9 Mcf/d	**0.62 %**	25.72 bpd	0.65 bpd	**0.62 %**	12.73 bpd	0.27 bpd	**0.06 %**
Stage 3 - Wolfcamp				**6.70 %**			**6.70 %**			**1.01 %**
9575	to **9576**	301.5 Mcf/d	18.3 Mcf/d	**1.45 %**	25.07 bpd	1.52 bpd	**1.45 %**	12.47 bpd	0.27 bpd	**0.06 %**
9582	to **9583**	283.2 Mcf/d	0.6 Mcf/d	**0.05 %**	23.55 bpd	0.05 bpd	**0.05 %**	12.20 bpd	0.27 bpd	**0.06 %**
9594	to **9595**	282.6 Mcf/d	0.6 Mcf/d	**0.04 %**	23.49 bpd	0.05 bpd	**0.04 %**	11.93 bpd	0.28 bpd	**0.07 %**
9599	to **9600**	282.0 Mcf/d	0.5 Mcf/d	**0.04 %**	23.45 bpd	0.04 bpd	**0.04 %**	11.65 bpd	0.26 bpd	**0.06 %**
9614	to **9615**	281.5 Mcf/d	3.7 Mcf/d	**0.29 %**	23.41 bpd	0.31 bpd	**0.29 %**	11.39 bpd	0.26 bpd	**0.06 %**
9624	to **9625**	277.8 Mcf/d	4.2 Mcf/d	**0.33 %**	23.10 bpd	0.35 bpd	**0.33 %**	11.13 bpd	0.27 bpd	**0.06 %**
9636	to **9637**	273.6 Mcf/d	3.7 Mcf/d	**0.29 %**	22.75 bpd	0.31 bpd	**0.29 %**	10.86 bpd	0.28 bpd	**0.07 %**
9643	to **9644**	269.9 Mcf/d	3.2 Mcf/d	**0.26 %**	22.44 bpd	0.27 bpd	**0.26 %**	10.58 bpd	0.28 bpd	**0.07 %**
9651	to **9652**	266.7 Mcf/d	3.1 Mcf/d	**0.25 %**	22.17 bpd	0.26 bpd	**0.25 %**	10.30 bpd	0.27 bpd	**0.06 %**
9658	to **9659**	263.5 Mcf/d	3.7 Mcf/d	**0.29 %**	21.91 bpd	0.31 bpd	**0.29 %**	10.03 bpd	0.26 bpd	**0.06 %**
9672	to **9673**	259.9 Mcf/d	9.3 Mcf/d	**0.73 %**	21.61 bpd	0.77 bpd	**0.73 %**	9.77 bpd	0.28 bpd	**0.07 %**
9686	to **9687**	250.6 Mcf/d	9.0 Mcf/d	**0.72 %**	20.84 bpd	0.75 bpd	**0.72 %**	9.50 bpd	0.28 bpd	**0.07 %**
9694	to **9695**	241.5 Mcf/d	5.7 Mcf/d	**0.45 %**	20.08 bpd	0.47 bpd	**0.45 %**	9.22 bpd	0.26 bpd	**0.06 %**
9705	to **9706**	235.9 Mcf/d	6.6 Mcf/d	**0.52 %**	19.61 bpd	0.55 bpd	**0.52 %**	8.96 bpd	0.27 bpd	**0.06 %**
9713	to **9714**	229.3 Mcf/d	6.0 Mcf/d	**0.48 %**	19.06 bpd	0.50 bpd	**0.48 %**	8.69 bpd	0.28 bpd	**0.07 %**
9725	to **9726**	223.2 Mcf/d	6.4 Mcf/d	**0.51 %**	18.56 bpd	0.54 bpd	**0.51 %**	8.41 bpd	0.26 bpd	**0.06 %**
Flow Contribution from Below Log Depth				**17.15 %**			**17.14 %**			**1.91 %**
9730	to **Below**	216.8 Mcf/d		**17.15 %**	18.02 bpd		**17.14 %**	8.15 bpd		**1.91 %**

Analysis Summary

1. The gauge ring tagged at ~9,917 feet. On the trip out of the hole, the gauge ring was dragging and ~700 pounds of added pull was needed to get the tool to a depth it moved freely. The logging tool tagged ~186 feet shallower than the gauge ring tool; at ~9,731 feet. On the trip out of the hole, the logging tool was also dragging and, again, ~700 pounds of added pull was needed to get the tool to a depth it moved freely. The company man on location made the call to end the logging run.

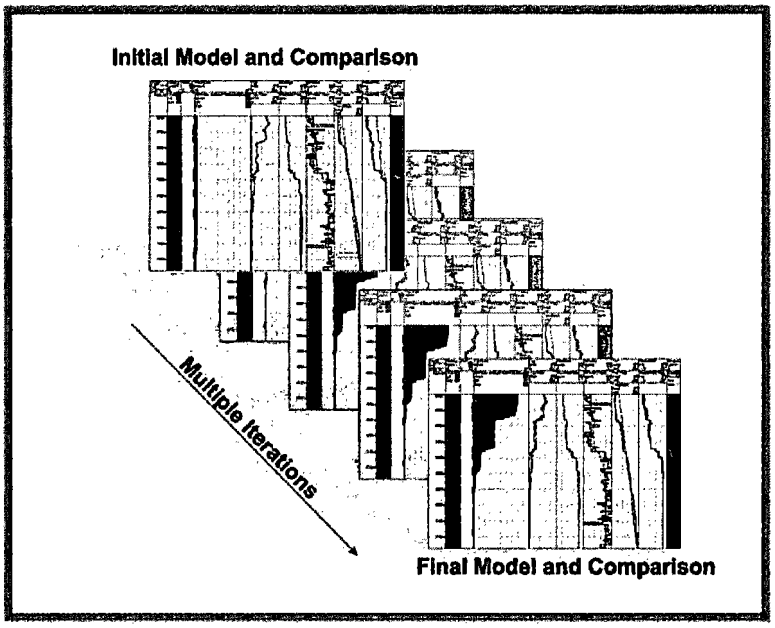
2. With having limited data to process, the confidence in this analysis is lower than normal.

3. The perforations below 9,730 feet were not logged due to wellbore restrictions. Total production from these intervals was calculated based on the data below the 9,725 - 9,726 feet perforations.

4. The analysis was conducted as 3-phase. The oil production of 105 BOPD is too low to accurately quantify. The downhole oil rate, at 100% flow, accounts for approximately 7% of the total mass flow and about 4.5% 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.

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

Completion Profile Analysis

Well Information

Parameters used for Analysis

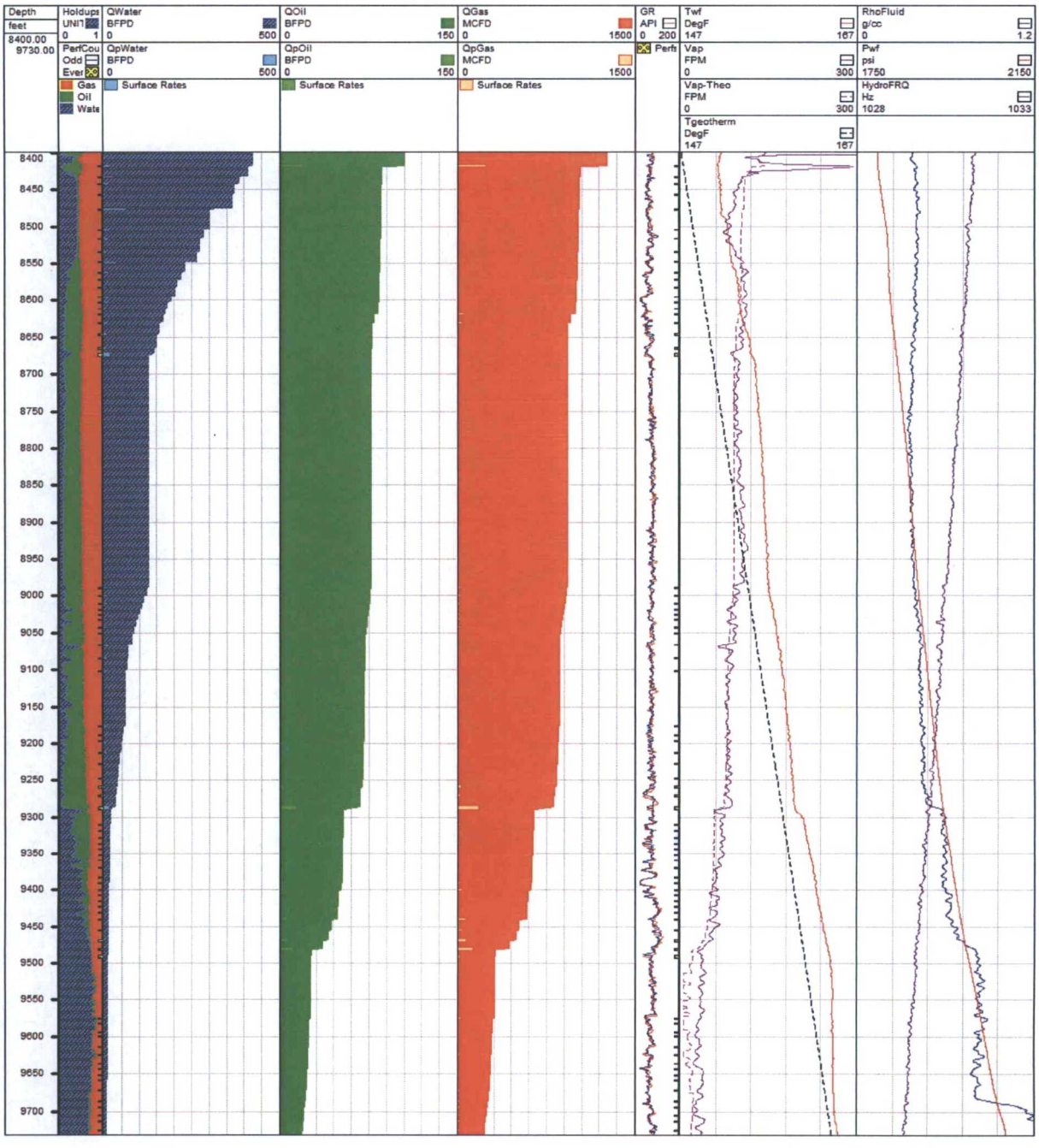
SPGG	UNITY	.682
APIOil	UNITY	52.3
DPipe	in	4.00
PipeAngle	DegAng	14.7
Geotherm	°F/ft	.0129
TgeoRef	°F	164
DgeoRef	ft	9675

Downhole Measured and Computed Parameters

Depth	Pwf	Twf	ρ_{gas}	ρ_{oil}	ρ_{water}	RhoFluid	B_{gas}	Vap
feet	psi	DegF	g/cc	g/cc	g/cc	g/cc	UNITY	FPM
8400.00	1796	152	.0996	.740	1.01	.374	.00838	460
8495.00	1813	152	.100	.740	1.01	.399	.00831	78.7
8590.00	1823	154	.101	.739	1.01	.392	.00829	112
8685.00	1840	155	.101	.739	1.01	.358	.00825	101
8780.00	1857	156	.102	.738	1.01	.357	.00819	101
8875.00	1871	156	.103	.738	1.01	.374	.00813	108
8970.00	1885	157	.103	.738	1.01	.385	.00808	101
9065.00	1902	158	.104	.738	1.01	.431	.00803	85.6
9160.00	1919	159	.105	.737	1.01	.437	.00798	80.0
9255.00	1937	160	.105	.737	1.01	.449	.00792	83.4
9350.00	1961	162	.106	.736	1.01	.598	.00786	74.2
9445.00	1987	163	.107	.736	1.01	.644	.00778	61.9
9540.00	2019	164	.109	.736	1.01	.828	.00768	37.6
9635.00	2050	164	.110	.736	1.01	.823	.00756	21.6
9730.00	2089	165	.112	.735	1.01	1.38	.00743	32.9

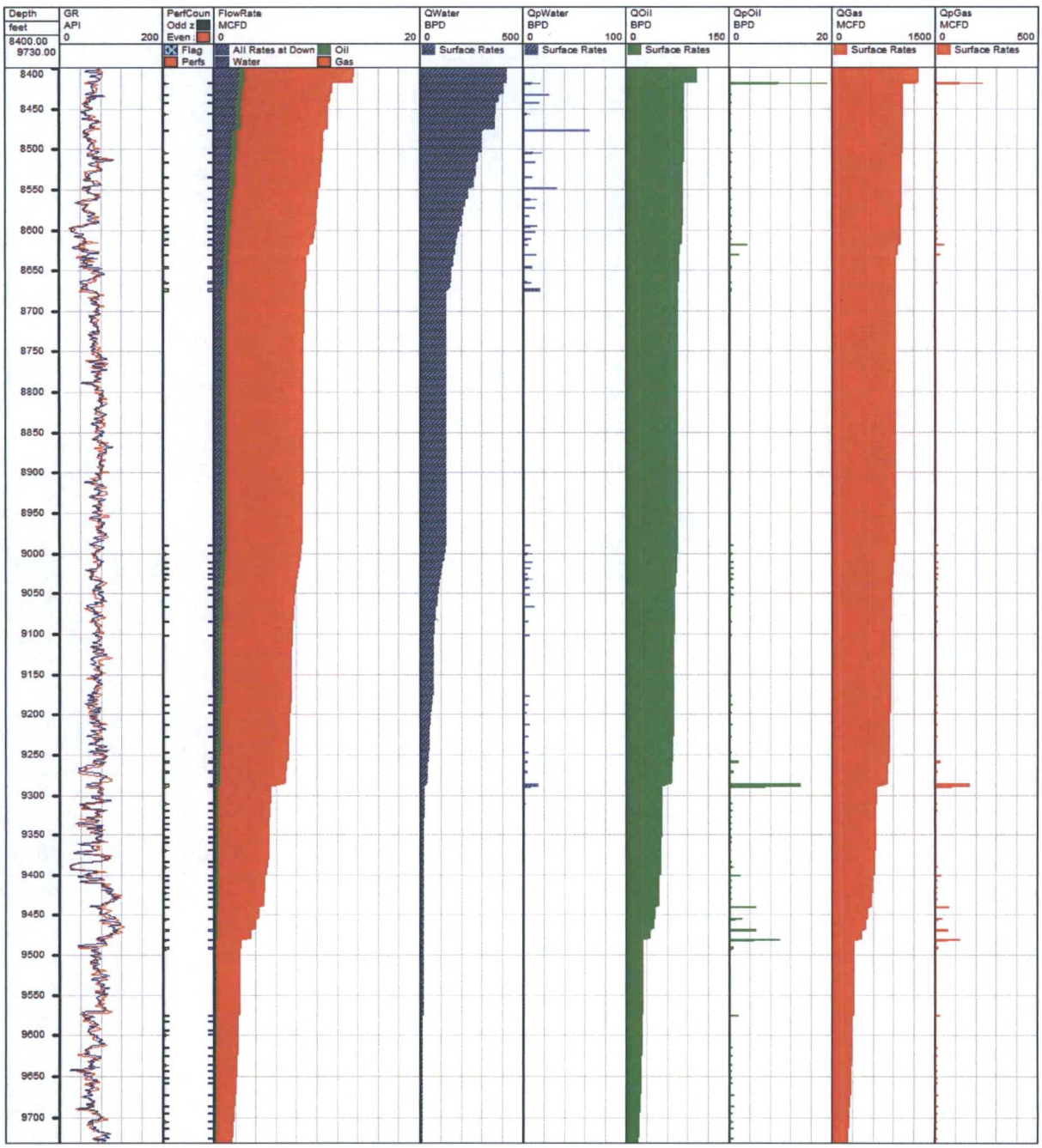
Completion Profile Analysis

Model Results With Recorded Data



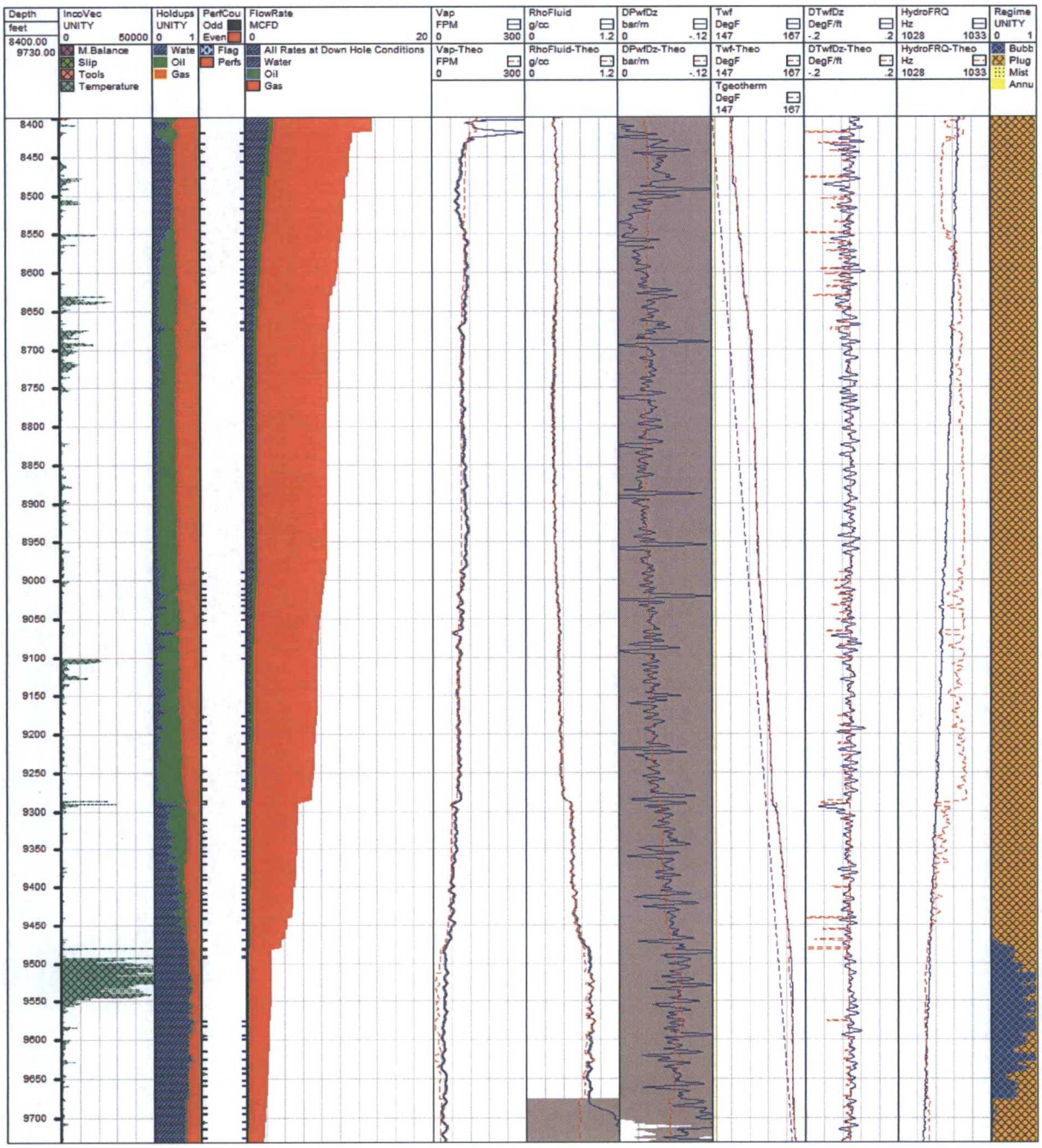
Completion Profile Analysis

Production Rates At Surface Conditions



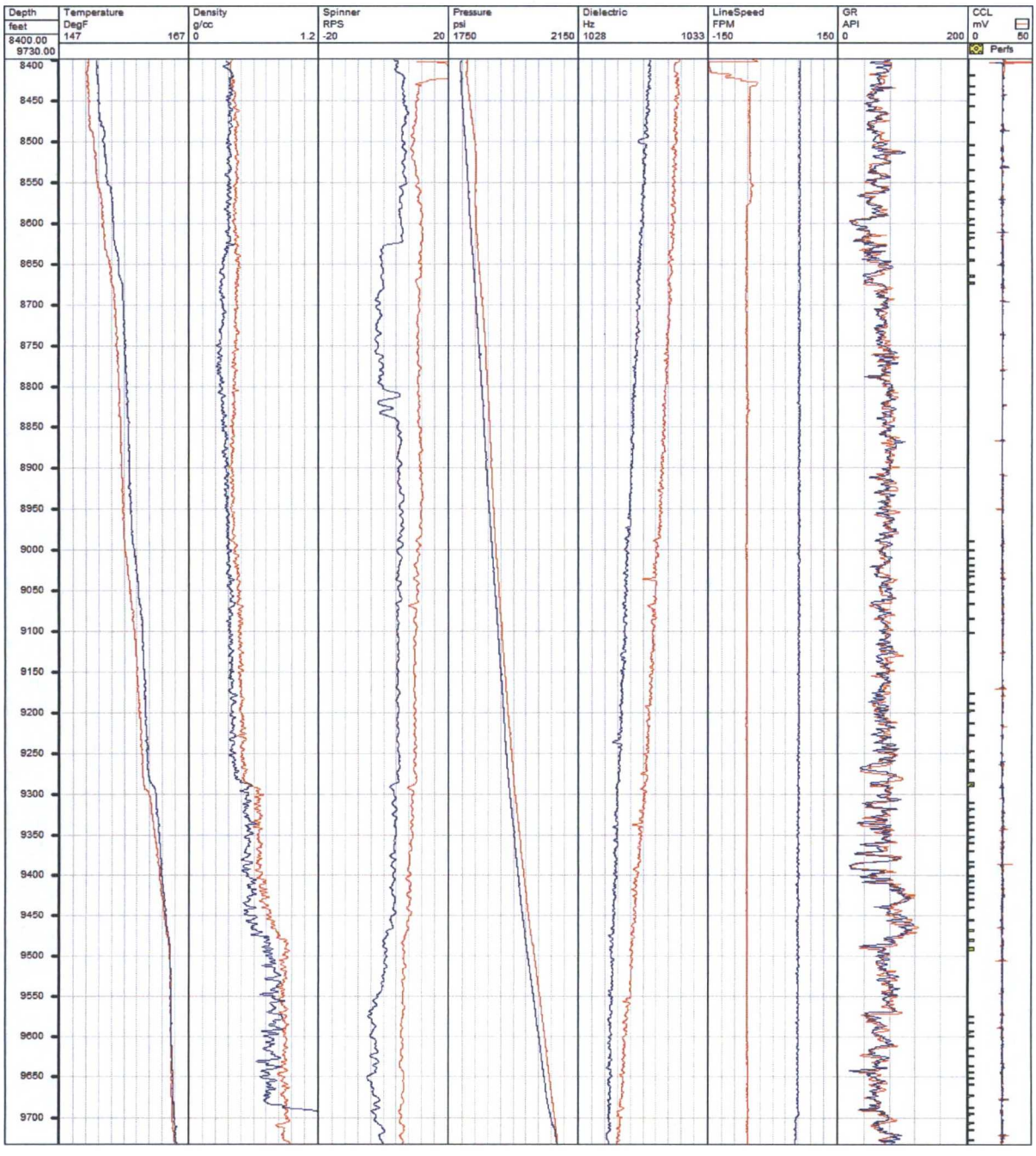
Completion Profile Analysis

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

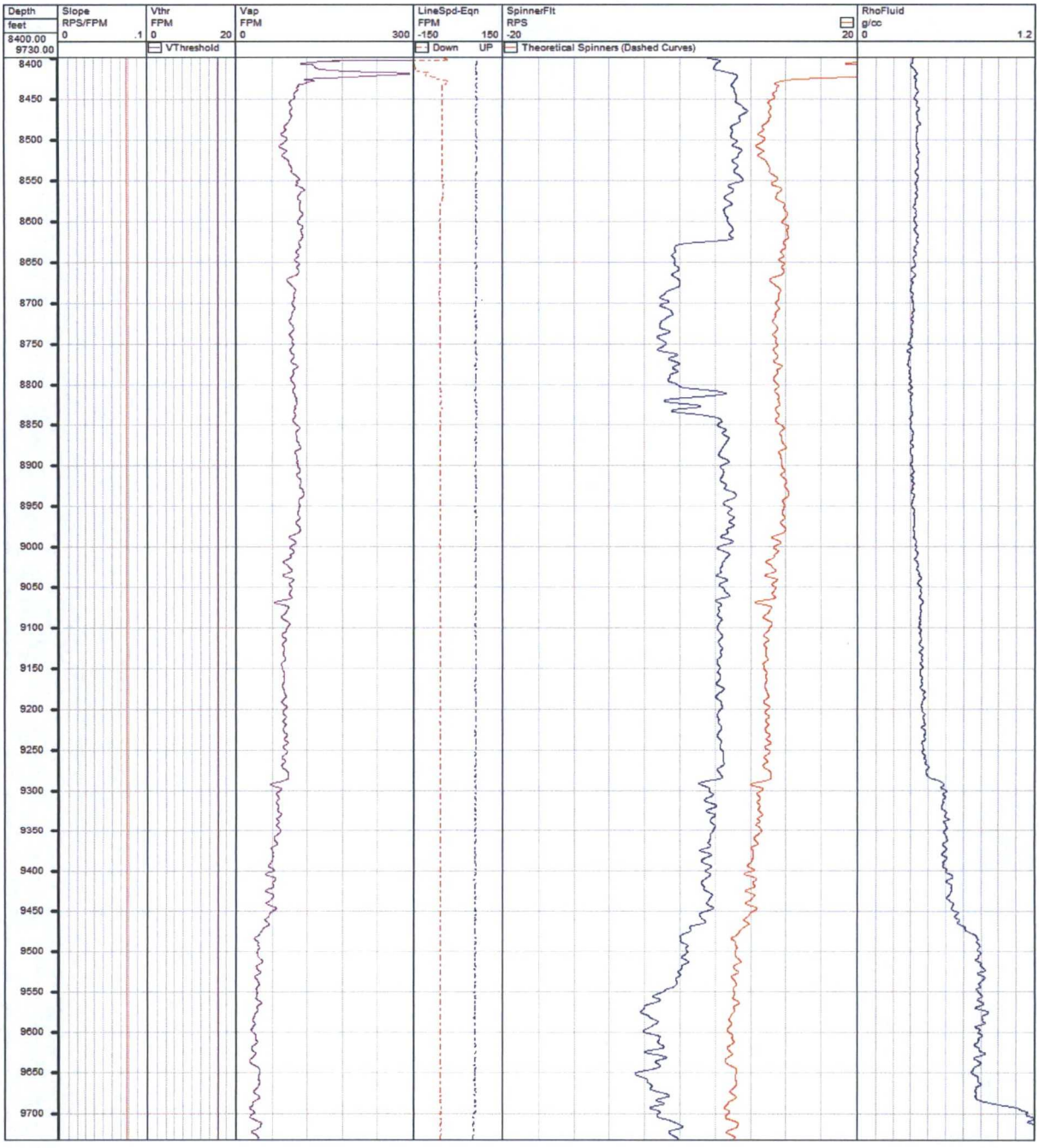


Completion Profile Analysis

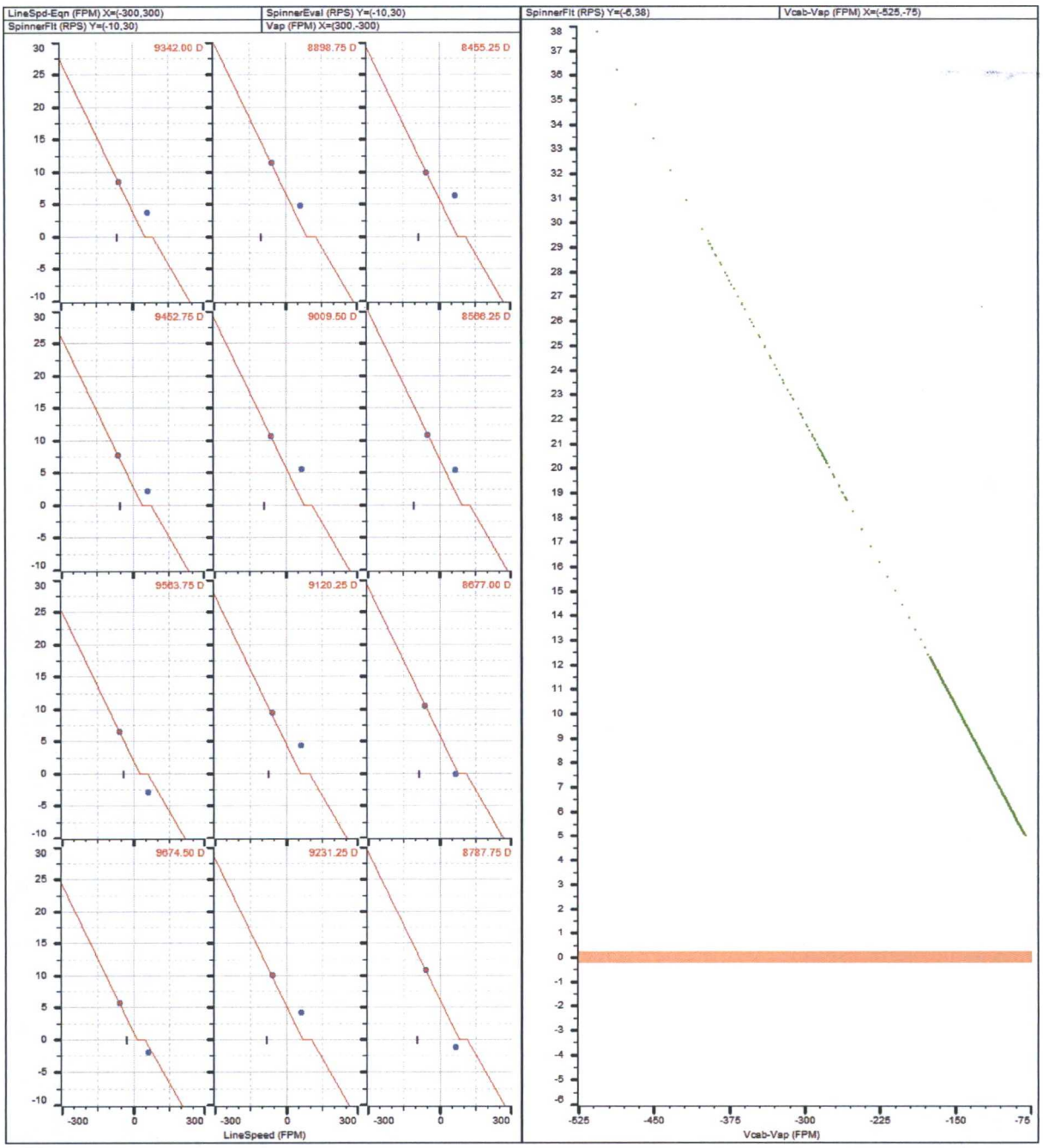
Overlay of all Log Data



Apparent Fluid Velocity Derived from Spinner

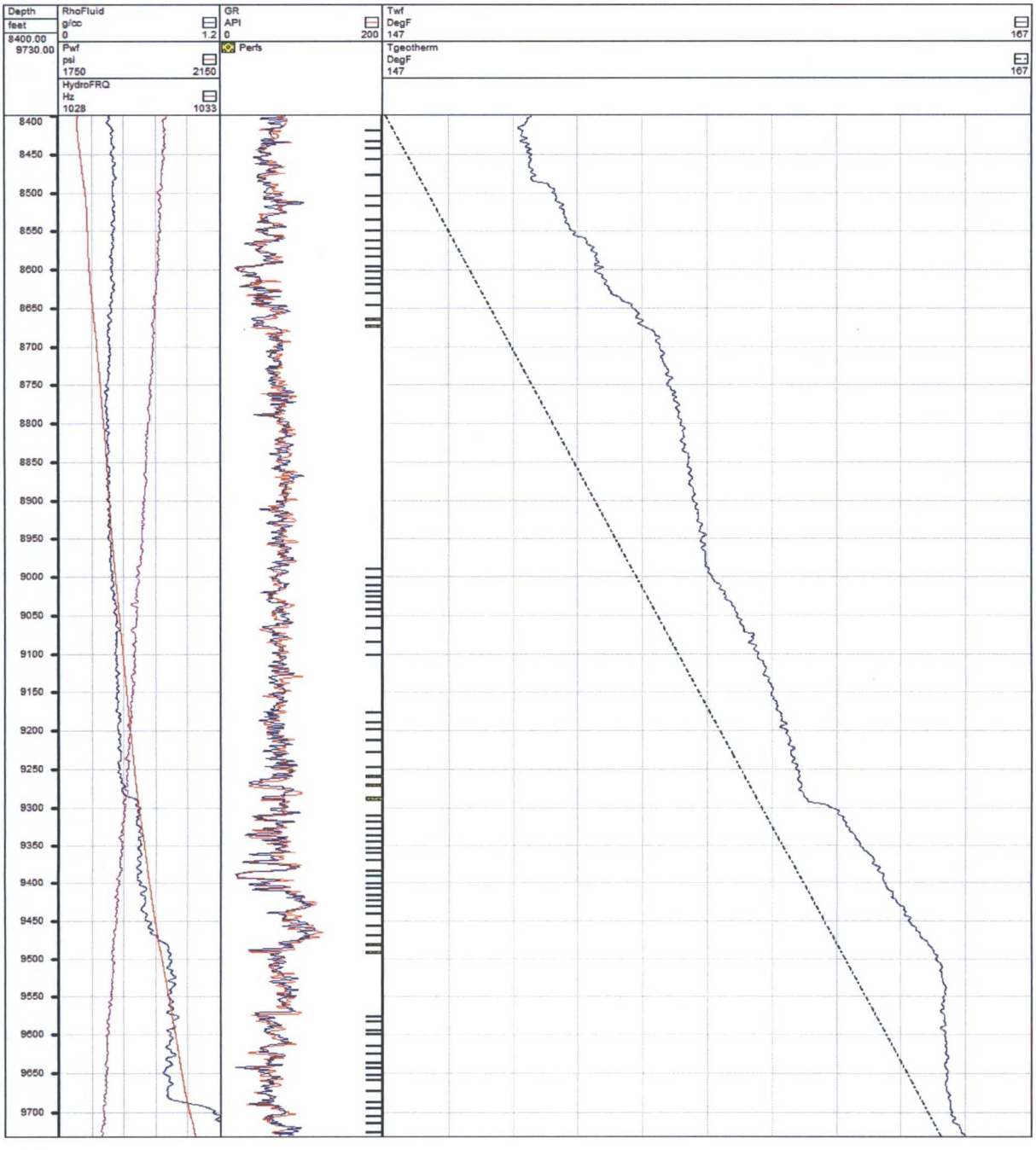


Spinner Calibration Plots
Relationship between R.P.S. and Fluid Velocity (fpm)



Completion Profile Analysis

Geothermal Gradient



Definitions

Curve Name	Description
Holdup	Holdups
PerfCount	Perforations
QGas	Total Gas Production at surface conditions
QpGas	Incremental Gas Production at surface conditions
QOil	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
SpinnerFlt	Spinner
DPipe	Inside diameter of the casing/tubing across logged interval
PipeAngle	Average pipe angle across logged interval
APIOil	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

DISTRICT I
P.O. Box 1980, Hobbs, NM 88241-1980

DISTRICT II
P.O. Drawer DD, Artesia, NM 88211-0719

DISTRICT III
1000 Rio Brazos Rd., Aztec, NM 87410

DISTRICT IV
P.O. BOX 2088, SANTA FE, N.M. 87504-2088

State of New Mexico
Energy, Minerals and Natural Resources Department

Form C-102
Revised February 10, 1994
Submit to Appropriate District Office
State Lease - 4 Copies
Fee Lease - 3 Copies

OIL CONSERVATION DIVISION
P.O. Box 2088
Santa Fe, New Mexico 87504-2088

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number	Pool Code	Pool Name
30-015-33336	87280	White City; Penn (Gas)

Property Code	Property Name	Well Number
	ESTILL AD FEDERAL	2

OGRID No.	Operator Name	Elevation
162683	GRUY PETROLEUM MANAGEMENT COMPANY	3430'

Surface Location

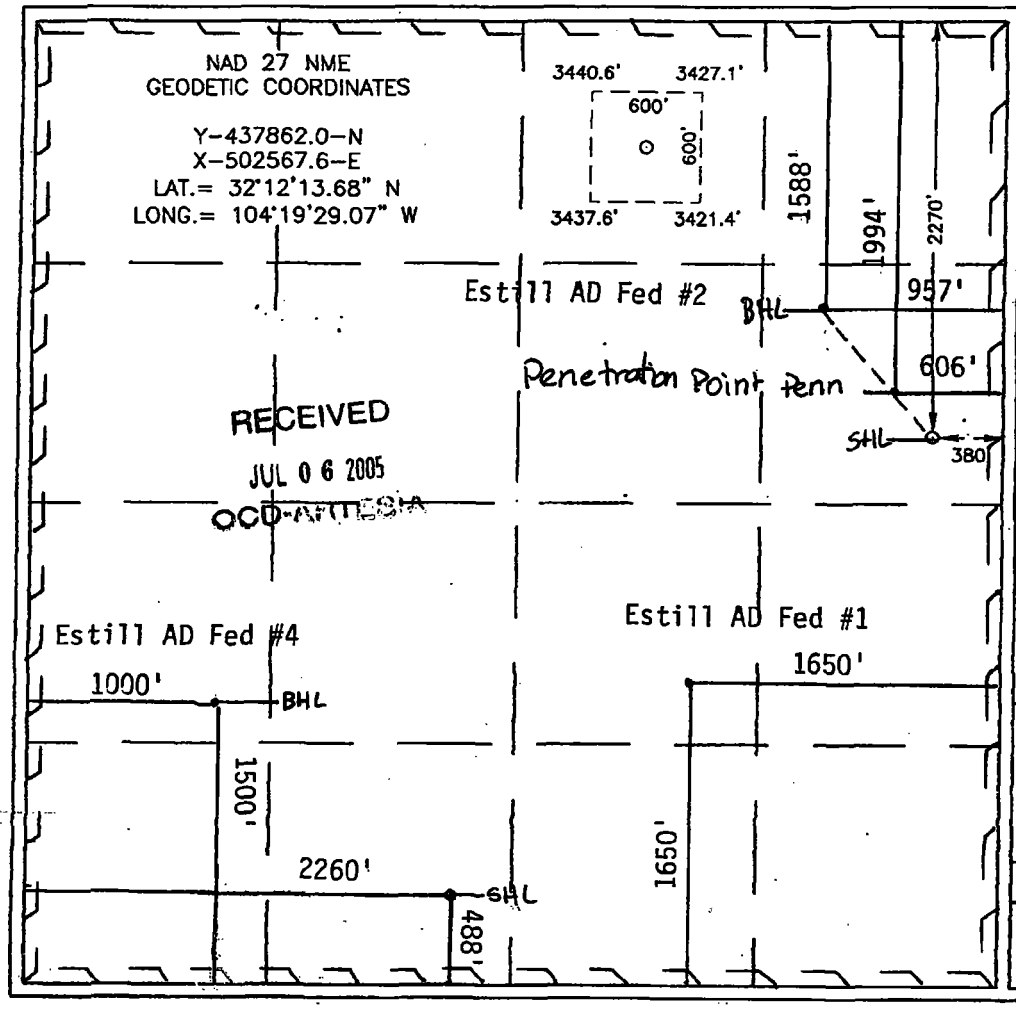
UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
H	19	24 S	26 E		2270	NORTH	380	EAST	EDDY

Bottom Hole Location If Different From Surface

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
H	19	24-S	26-E		1588	NORTH	957	EAST	EDDY

Dedicated Acres	Joint or Infill	Consolidation Code	Order No.
640	Y		

NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION



OPERATOR CERTIFICATION

I hereby certify the the information contained herein is true and complete to the best of my knowledge and belief.

Zeno Farris

Signature

Zeno Farris

Printed Name

Mgr Operations Admin

Title

July 5, 2005

Date

SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervison, and that the same is true and correct to the best of my belief.

JANUARY 26, 2004

Date Surveyed LMP

Signature & Seal of Professional Surveyor

GARY L. EDSON
NEW MEXICO
REGISTERED PROFESSIONAL SURVEYOR

Gary L. Edson 2/2/04

04.11.0008

Certificate No. GARY EDSON 12641

District I
1625 N. French Dr., Hobbs, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-9720
District III
1000 Rio Brazos Road, Aztec, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-102
Revised August 1, 2011
Submit one copy to appropriate District Office

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

1 API Number	2 Pool Code	3 Pool Name
30-015-33336	98220	Purple Sage – Wolfcamp Gas

4 Property Code	5 Property Name	6 Well Number
	Estill AD Federal	2

7 OGRID No.	8 Operator Name	9 Elevation
162683	Cimarex Energy Co. of Colorado	3430'

10 Surface Location

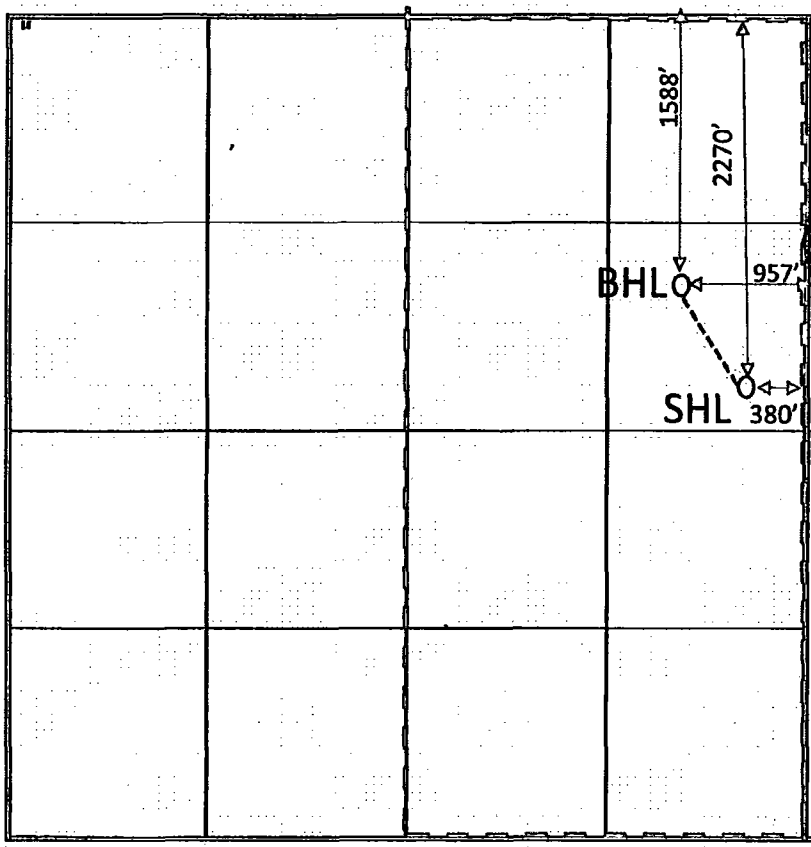
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
H	19	24S	26E		2270'	North	380'	East	Eddy

11 Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
H	19	24S	26E		1588'	North	957'	East	Eddy

12 Dedicated Acres	13 Joint or Infill	14 Consolidation Code	15 Order No.
320			

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.



17 OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

3/20/2017
Signature Date

Amithy Crawford
Printed Name

acrawford@cimarex.com
E-mail Address

18 SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

Date of Survey

Signature and Seal of Professional Surveyor:

Certificate Number