Revised March 23, 2017

RECEIVED:	REVIEWER:	TYPE:	APP NO:
6/13/2018	MAm	DHC	pMAM1816445474

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: White City 31 Federal #3 **API:** 30-015-34300
Pool: White City; Penn (Gas), Purple Sage, Wolfcamp (Gas) **Pool Code:** 87280, 98220

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

DHC-4802-A

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

Amithy Crawford
Signature

6/13/2018
Date

432-620-1909
Phone Number

acrawford@cimarex.com
e-mail Address

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)

White City 31 Fed (Lease) 003 (Well No.) D-31-24S-26E (Unit Letter-Section-Township-Range) Eddy (County)

OGRID No.____ Property Code____ API No. 30-015-34300 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)	8,384' – 9,937'	9,937'-10,342'
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: 120 BOPD, 1650 MCFPD, 1661 BWPD	Date: N/A Rates: 5 BOPD, 69 MCFPD, 69 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 96 Gas 96	Oil 4 Gas 4

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 4802

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 Amithy Crawford TITLE Regulatory Compliance DATE 6/13/2018

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

E-MAIL ADDRESS Acrawford@cimarex.com

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
30-015-34300	98220	Purple Sage Wolfcamp Gas

[4] Property Code	[5] Property Name	[6] Well Number
33815	White City 31 Federal	3

[7] OGRID No.	[8] Operator Name	[9] Elevation
162683	Cimarex Energy Co. of Colorado	3524'

[10] Surface Location

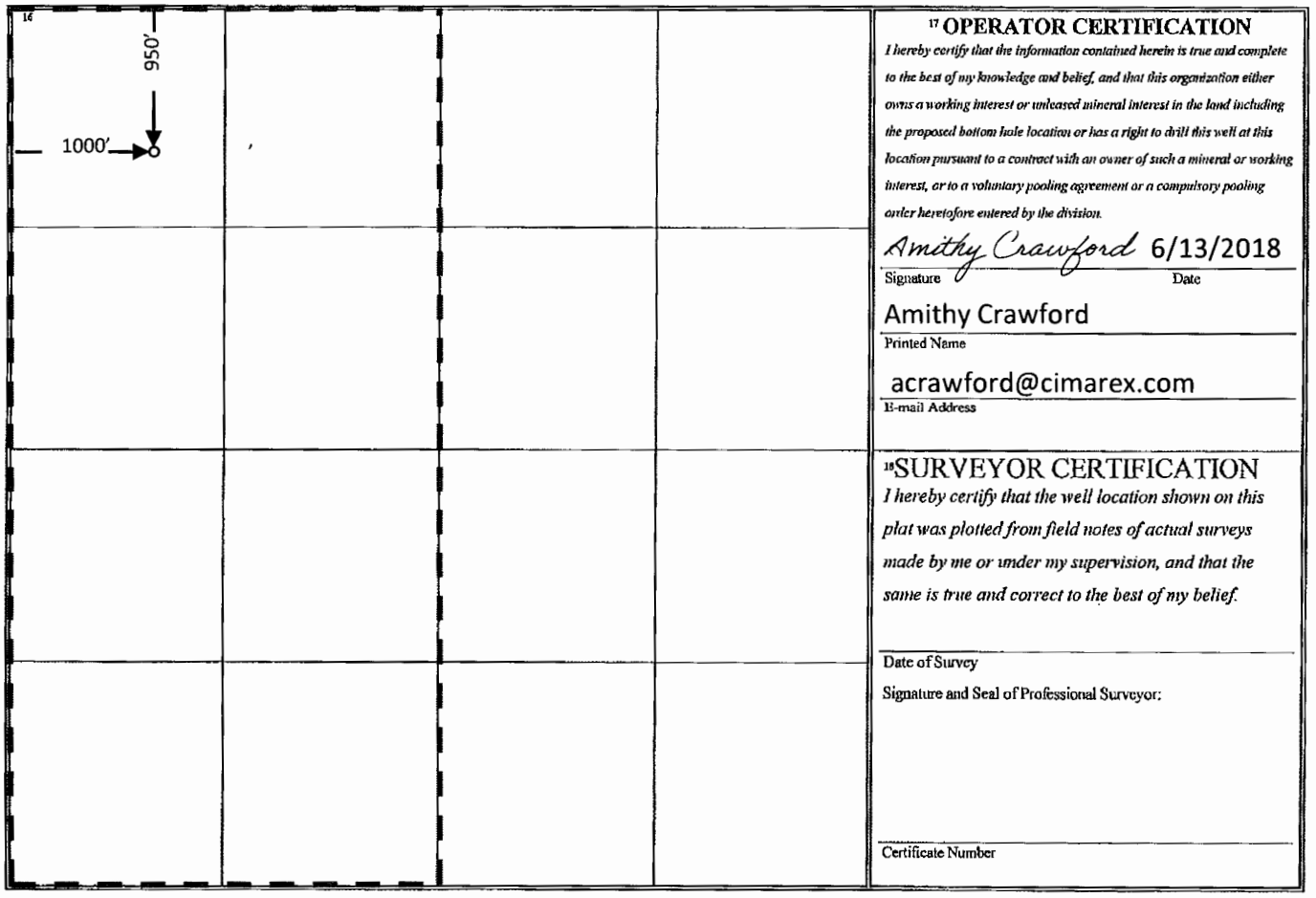
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
D	31	24S	26E		950	North	1000	West	Eddy

[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

[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.

Amithy Crawford 6/13/2018
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

District I
1625 N. French Dr., Hobbs, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720
District II
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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
30-015-34300	87280	White City; Penn (Gas)

[4] Property Code	[5] Property Name	[6] Well Number
33815	White City 31 Federal	3

[7] OGRID No.	[8] Operator Name	[9] Elevation
162683	Cimarex Energy Co. of Colorado	3524'

[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
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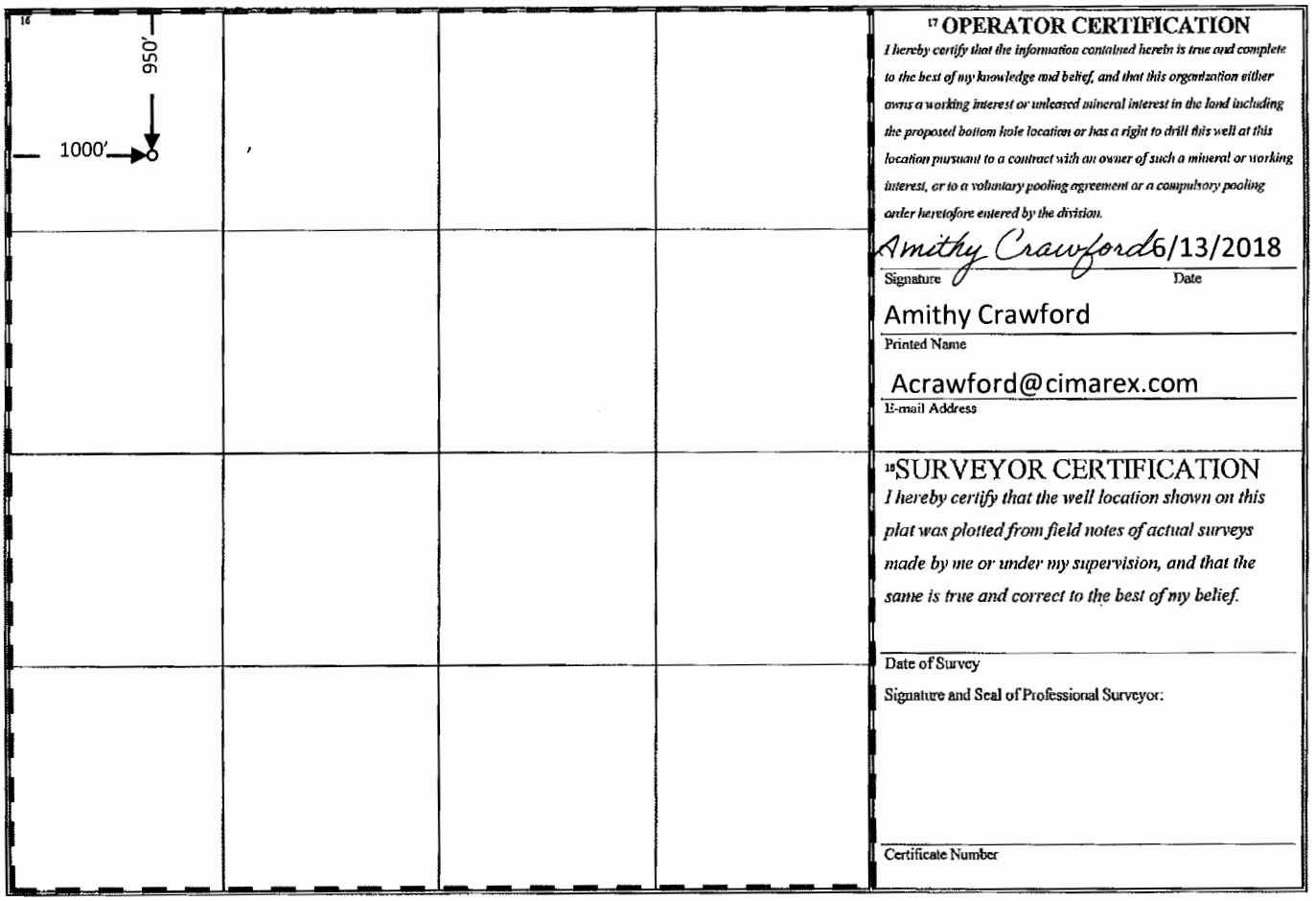
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
640			

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.



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Amithy Crawford 6/13/2018
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

Cimarex Energy Company
White City 31 Fed #3

Completion Profiler

Completion Profile Analysis

Company	*Cimarex Energy Company*
Well Name	*White City 31 Fed #3*
Field	*White City Penn*
Location	*Eddy County, New Mexico*
Customer Name	*Steven Runyan*
Date of Survey	*July 31, 2017*
Date of Analysis	*August 14, 2017*
Logging Engineer	*Paulo Rios*
Analyst	*Mike Wells*

All interpretations are opinions based on inferences from electrical or other measurements and we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful misconduct on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions set out in our current Price Schedule.

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
07/31	07:30	Arrive on location
07/31	08:30	Gauge run start
07/31	10:30	Gauge run stop
07/31	10:41	Program Completion Profile String
07/31	11:00	Start GIH pass
07/31	12:15	Stop GIH pass
07/31	12:25	Start logging passes
07/31	14:38	Stop logging passes
07/31	14:50	Start out of well pass
07/31	16:15	Stop out of well pass
07/31	16:18	Start download
07/31	16:45	Stop download
07/31	17:30	Rig down

Interval Logged: [From 8,372 to 9,914 ft.]
60 ft/min
90 ft/min
120 ft/min

Well Information

Casing: 5.500" 17.0 lb/ft surface to 12,130 ft PBTD: 11,318ft

Tubing: 2.375" 4.6 lb/ft surface to 8,333 ft

Perforation Data																							
Stage 5																							
8,456	to	8,457	8,469	to	8,470	8,478	to	8,479	8,489	to	8,490	8,501	to	8,502									
8,510	to	8,511	8,526	to	8,527	8,534	to	8,535	8,542	to	8,543	8,550	to	8,551									
8,572	to	8,573	8,582	to	8,583	8,594	to	8,595	8,600	to	8,601	8,604	to	8,605									
8,614	to	8,615	8,626	to	8,627	8,636	to	8,638	8,642	to	8,644	8,646	to	8,649									
Stage 4																							
9,080	to	9,081	9,097	to	9,098	9,109	to	9,110	9,120	to	9,121	9,130	to	9,131									
9,142	to	9,143	9,150	to	9,151	9,160	to	9,161	9,173	to	9,174	9,185	to	9,186									
9,194	to	9,195	9,204	to	9,205	9,214	to	9,215	9,222	to	9,223	9,230	to	9,231									
9,240	to	9,241	9,249	to	9,250	9,260	to	9,262	9,273	to	9,275	9,283	to	9,286									
Stage 3																							
9,307	to	9,308	9,317	to	9,318	9,324	to	9,325	9,329	to	9,330	9,339	to	9,340									
9,348	to	9,349	9,360	to	9,361	9,370	to	9,371	9,383	to	9,384	9,390	to	9,391									
9,399	to	9,400	9,412	to	9,413	9,421	to	9,422	9,433	to	9,434	9,449	to	9,450									
9,461	to	9,462	9,467	to	9,468	9,477	to	9,479	9,492	to	9,494	9,499	to	9,502									
Stage 2																							
9,699	to	9,700	9,720	to	9,721	9,735	to	9,736	9,750	to	9,751	9,764	to	9,765									
9,772	to	9,773	9,785	to	9,786	9,798	to	9,799	9,811	to	9,812	9,822	to	9,823									
9,830	to	9,831	9,842	to	9,843	9,854	to	9,855	9,860	to	9,861	9,872	to	9,873									
9,882	to	9,883	9,892	to	9,893	9,902	to	9,904	9,912	to	9,914	9,926	to	9,929									
Stage 1																							
9,947	to	9,948	9,958	to	9,959	9,966	to	9,967	9,976	to	9,977	9,985	to	9,986									
9,995	to	9,996	10,008	to	10,009	10,018	to	10,019	10,030	to	10,031	10,038	to	10,039									
10,055	to	10,056	10,063	to	10,064	10,074	to	10,075	10,086	to	10,087	10,101	to	10,102									
10,112	to	10,113	10,127	to	10,128	10,141	to	10,143	10,156	to	10,158	10,169	to	10,172									

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.

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	500 psi	599 Mcf/d			28 bpd			214 bpd	
Min									
Max									

GAS / OIL / WATER PRODUCTION PROFILE Flow Rates Reported at STP										
Zone Intervals	Q-Gas	Qp-Gas	Percent	Q-Oil	Qp-Oil	Percent	Q-Water	Qp-Water	Percent
feet	MCFD	MCFD	of Total	BFPD	BFPD	of Total	BFPD	BFPD	of Total
Surface to 8456	596.7 Mcf/d		100.00 %	27.38 bpd		100.00 %	215.71 bpd		100.00 %
Stage 5			43.05 %			43.05 %			52.98 %
8456 to 8649	596.7 Mcf/d	256.9 Mcf/d		27.38 bpd	11.79 bpd		215.71 bpd	114.29 bpd	
Stage 4			21.94 %			21.94 %			28.73 %
9080 to 9286	339.8 Mcf/d	130.9 Mcf/d		15.59 bpd	6.01 bpd		101.42 bpd	61.98 bpd	
Stage 3			17.07 %			17.07 %			11.08 %
9307 to 9502	208.9 Mcf/d	101.9 Mcf/d		9.59 bpd	4.67 bpd		39.44 bpd	23.89 bpd	
Stage 2			13.93 %			13.93 %			4.85 %
9699 to 9914	107.0 Mcf/d	83.1 Mcf/d		4.91 bpd	3.81 bpd		15.55 bpd	10.46 bpd	
Flow Contribution from Below Log Depth			4.01 %			4.01 %			2.36 %
9914 to Below	23.9 Mcf/d		4.01 %	1.10 bpd		4.01 %	5.09 bpd		2.36 %

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 8456	596.7 Mcf/d		100.00 %	27.38 bpd		100.00 %	215.71 bpd		100.00 %
Stage 5			43.05 %			43.05 %			52.98 %
8456 to 8457	596.7 Mcf/d	16.3 Mcf/d	2.73 %	27.38 bpd	0.75 bpd	2.73 %	215.71 bpd	76.61 bpd	35.52 %
8469 to 8470	580.4 Mcf/d	8.5 Mcf/d	1.43 %	26.63 bpd	0.39 bpd	1.43 %	139.10 bpd	5.37 bpd	2.49 %
8478 to 8479	571.9 Mcf/d	7.9 Mcf/d	1.33 %	26.24 bpd	0.36 bpd	1.33 %	133.72 bpd	7.31 bpd	3.39 %
8489 to 8490	564.0 Mcf/d	8.4 Mcf/d	1.41 %	25.88 bpd	0.38 bpd	1.41 %	126.42 bpd	5.04 bpd	2.34 %
8501 to 8502	555.6 Mcf/d	8.0 Mcf/d	1.34 %	25.49 bpd	0.37 bpd	1.34 %	121.37 bpd	7.01 bpd	3.25 %
8510 to 8511	547.6 Mcf/d	8.2 Mcf/d	1.37 %	25.13 bpd	0.37 bpd	1.37 %	114.37 bpd	7.22 bpd	3.35 %
8526 to 8527	539.4 Mcf/d	2.4 Mcf/d	0.40 %	24.75 bpd	0.11 bpd	0.40 %	107.15 bpd	0.71 bpd	0.33 %
8534 to 8535	537.0 Mcf/d	2.4 Mcf/d	0.39 %	24.64 bpd	0.11 bpd	0.39 %	106.44 bpd	0.69 bpd	0.32 %
8542 to 8543	534.7 Mcf/d	2.2 Mcf/d	0.37 %	24.54 bpd	0.10 bpd	0.37 %	105.75 bpd	0.99 bpd	0.46 %
8550 to 8551	532.5 Mcf/d	2.7 Mcf/d	0.45 %	24.43 bpd	0.12 bpd	0.45 %	104.76 bpd	0.27 bpd	0.12 %
8572 to 8573	529.8 Mcf/d	2.5 Mcf/d	0.42 %	24.31 bpd	0.11 bpd	0.42 %	104.49 bpd	0.30 bpd	0.14 %
8582 to 8583	527.3 Mcf/d	2.4 Mcf/d	0.40 %	24.20 bpd	0.11 bpd	0.40 %	104.19 bpd	0.51 bpd	0.24 %
8594 to 8595	524.9 Mcf/d	2.2 Mcf/d	0.38 %	24.09 bpd	0.10 bpd	0.38 %	103.69 bpd	0.41 bpd	0.19 %
8600 to 8601	522.7 Mcf/d	2.4 Mcf/d	0.41 %	23.98 bpd	0.11 bpd	0.41 %	103.28 bpd	0.14 bpd	0.06 %
8604 to 8605	520.2 Mcf/d	2.4 Mcf/d	0.40 %	23.87 bpd	0.11 bpd	0.40 %	103.14 bpd	0.29 bpd	0.14 %
8614 to 8615	517.9 Mcf/d	2.7 Mcf/d	0.45 %	23.76 bpd	0.12 bpd	0.45 %	102.84 bpd	0.33 bpd	0.15 %
8626 to 8627	515.2 Mcf/d	18.7 Mcf/d	3.14 %	23.64 bpd	0.86 bpd	3.14 %	102.51 bpd	0.41 bpd	0.19 %
8636 to 8638	496.5 Mcf/d	39.8 Mcf/d	6.67 %	22.78 bpd	1.83 bpd	6.67 %	102.11 bpd	0.35 bpd	0.16 %
8642 to 8644	456.7 Mcf/d	56.9 Mcf/d	9.53 %	20.96 bpd	2.61 bpd	9.53 %	101.75 bpd	0.21 bpd	0.10 %
8646 to 8649	399.8 Mcf/d	60.0 Mcf/d	10.05 %	18.35 bpd	2.75 bpd	10.05 %	101.55 bpd	0.13 bpd	0.06 %
Stage 4			21.94 %			21.94 %			28.73 %
9080 to 9081	339.8 Mcf/d	11.7 Mcf/d	1.96 %	15.59 bpd	0.54 bpd	1.96 %	101.42 bpd	0.16 bpd	0.07 %
9097 to 9098	328.1 Mcf/d	3.6 Mcf/d	0.60 %	15.06 bpd	0.16 bpd	0.60 %	101.26 bpd	8.89 bpd	4.12 %
9109 to 9110	324.6 Mcf/d	2.9 Mcf/d	0.48 %	14.89 bpd	0.13 bpd	0.48 %	92.37 bpd	3.09 bpd	1.43 %
9120 to 9121	321.7 Mcf/d	3.0 Mcf/d	0.51 %	14.76 bpd	0.14 bpd	0.51 %	89.28 bpd	3.10 bpd	1.44 %
9130 to 9131	318.7 Mcf/d	2.9 Mcf/d	0.48 %	14.62 bpd	0.13 bpd	0.48 %	86.19 bpd	4.45 bpd	2.07 %
9142 to 9143	315.8 Mcf/d	3.2 Mcf/d	0.53 %	14.49 bpd	0.15 bpd	0.53 %	81.73 bpd	3.91 bpd	1.81 %
9150 to 9151	312.6 Mcf/d	3.5 Mcf/d	0.59 %	14.35 bpd	0.16 bpd	0.59 %	77.82 bpd	3.17 bpd	1.47 %
9160 to 9161	309.1 Mcf/d	3.2 Mcf/d	0.53 %	14.18 bpd	0.15 bpd	0.53 %	74.66 bpd	3.29 bpd	1.53 %
9173 to 9174	305.9 Mcf/d	3.2 Mcf/d	0.54 %	14.04 bpd	0.15 bpd	0.54 %	71.37 bpd	3.89 bpd	1.81 %
9185 to 9186	302.7 Mcf/d	3.9 Mcf/d	0.65 %	13.89 bpd	0.18 bpd	0.65 %	67.47 bpd	3.55 bpd	1.64 %
9194 to 9195	298.8 Mcf/d	13.4 Mcf/d	2.25 %	13.71 bpd	0.62 bpd	2.25 %	63.93 bpd	3.82 bpd	1.77 %
9204 to 9205	285.4 Mcf/d	20.8 Mcf/d	3.48 %	13.10 bpd	0.95 bpd	3.48 %	60.11 bpd	3.35 bpd	1.55 %
9214 to 9215	264.6 Mcf/d	36.1 Mcf/d	6.04 %	12.14 bpd	1.65 bpd	6.04 %	56.76 bpd	3.68 bpd	1.71 %
9222 to 9223	228.6 Mcf/d	2.1 Mcf/d	0.35 %	10.49 bpd	0.10 bpd	0.35 %	53.08 bpd	2.81 bpd	1.30 %
9230 to 9231	226.5 Mcf/d	1.7 Mcf/d	0.29 %	10.39 bpd	0.08 bpd	0.29 %	50.27 bpd	2.16 bpd	1.00 %
9240 to 9241	224.8 Mcf/d	2.1 Mcf/d	0.36 %	10.31 bpd	0.10 bpd	0.36 %	48.12 bpd	1.21 bpd	0.56 %
9249 to 9250	222.7 Mcf/d	1.8 Mcf/d	0.31 %	10.22 bpd	0.08 bpd	0.31 %	46.90 bpd	2.67 bpd	1.24 %
9260 to 9262	220.8 Mcf/d	2.1 Mcf/d	0.36 %	10.13 bpd	0.10 bpd	0.36 %	44.24 bpd	1.24 bpd	0.58 %
9273 to 9275	218.7 Mcf/d	2.1 Mcf/d	0.36 %	10.04 bpd	0.10 bpd	0.36 %	42.99 bpd	1.78 bpd	0.83 %
9283 to 9286	216.6 Mcf/d	7.6 Mcf/d	1.28 %	9.94 bpd	0.35 bpd	1.28 %	41.22 bpd	1.77 bpd	0.82 %

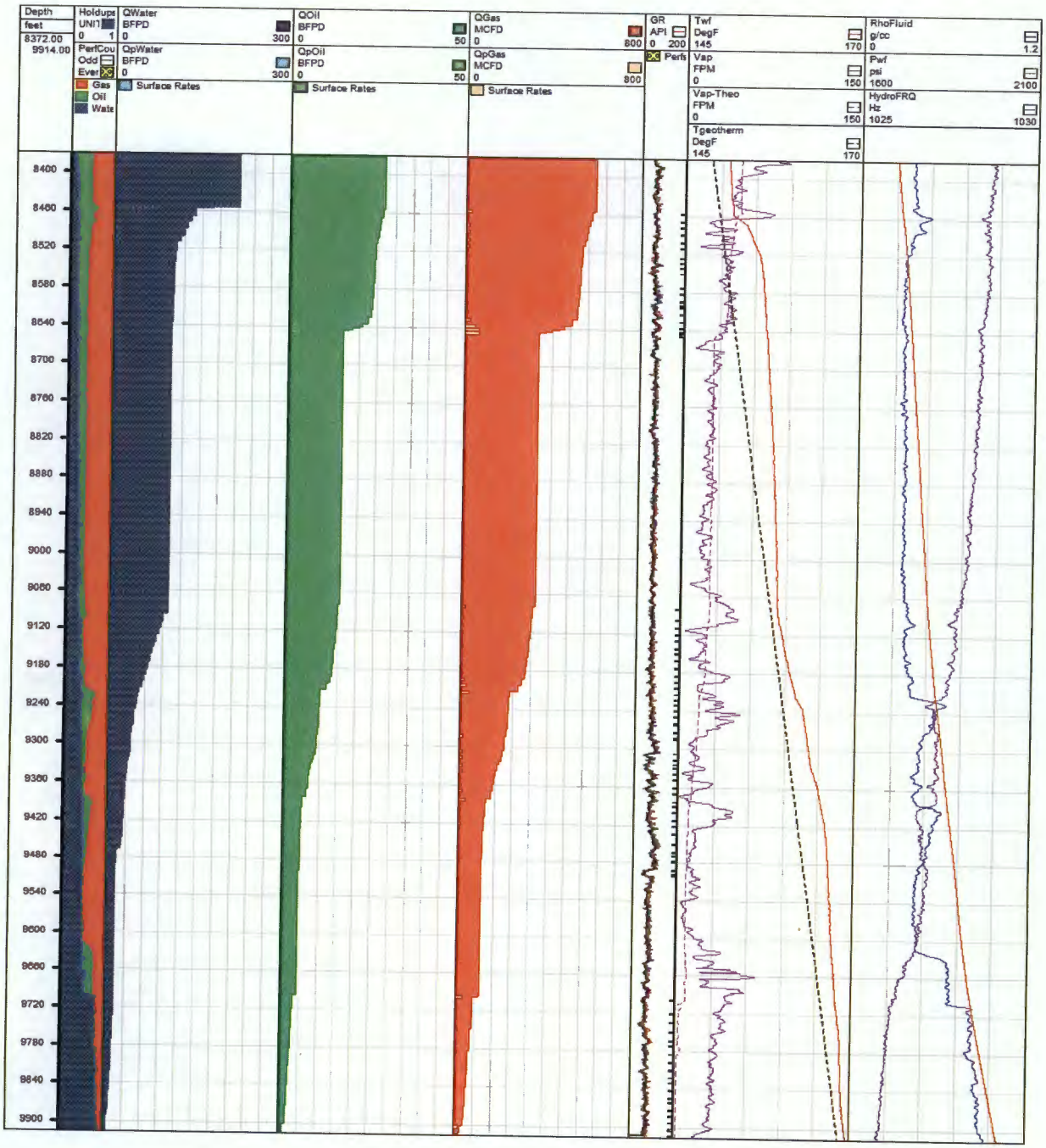
Stage 3				**17.07 %**			**17.07 %**			**11.08 %**
9307 to **9308**	208.9 Mcf/d	9.0 Mcf/d	**1.51 %**	9.59 bpd	0.41 bpd	**1.51 %**	39.44 bpd	1.50 bpd	**0.69 %**
9317 to **9318**	199.9 Mcf/d	8.6 Mcf/d	**1.44 %**	9.17 bpd	0.40 bpd	**1.44 %**	37.95 bpd	1.53 bpd	**0.71 %**
9324 to **9325**	191.3 Mcf/d	8.8 Mcf/d	**1.47 %**	8.78 bpd	0.40 bpd	**1.47 %**	36.42 bpd	1.47 bpd	**0.68 %**
9329 to **9330**	182.5 Mcf/d	8.8 Mcf/d	**1.48 %**	8.37 bpd	0.41 bpd	**1.48 %**	34.95 bpd	0.65 bpd	**0.30 %**
9339 to **9340**	173.6 Mcf/d	9.1 Mcf/d	**1.52 %**	7.97 bpd	0.42 bpd	**1.52 %**	34.30 bpd	0.53 bpd	**0.25 %**
9348 to **9349**	164.6 Mcf/d	3.1 Mcf/d	**0.52 %**	7.55 bpd	0.14 bpd	**0.52 %**	33.77 bpd	1.27 bpd	**0.59 %**
9360 to **9361**	161.5 Mcf/d	2.7 Mcf/d	**0.45 %**	7.41 bpd	0.12 bpd	**0.45 %**	32.50 bpd	1.35 bpd	**0.62 %**
9370 to **9371**	158.8 Mcf/d	8.8 Mcf/d	**1.48 %**	7.28 bpd	0.40 bpd	**1.48 %**	31.16 bpd	0.31 bpd	**0.15 %**
9383 to **9384**	149.9 Mcf/d	25.3 Mcf/d	**4.25 %**	6.88 bpd	1.16 bpd	**4.25 %**	30.84 bpd	0.75 bpd	**0.35 %**
9390 to **9391**	124.6 Mcf/d	2.9 Mcf/d	**0.49 %**	5.72 bpd	0.13 bpd	**0.49 %**	30.09 bpd	0.64 bpd	**0.30 %**
9399 to **9400**	121.7 Mcf/d	2.3 Mcf/d	**0.39 %**	5.58 bpd	0.11 bpd	**0.39 %**	29.45 bpd	0.82 bpd	**0.38 %**
9412 to **9413**	119.4 Mcf/d	2.3 Mcf/d	**0.38 %**	5.48 bpd	0.10 bpd	**0.38 %**	28.63 bpd	0.79 bpd	**0.37 %**
9421 to **9422**	117.1 Mcf/d	2.3 Mcf/d	**0.38 %**	5.37 bpd	0.10 bpd	**0.38 %**	27.84 bpd	0.55 bpd	**0.26 %**
9433 to **9434**	114.8 Mcf/d	2.1 Mcf/d	**0.34 %**	5.27 bpd	0.09 bpd	**0.34 %**	27.29 bpd	0.73 bpd	**0.34 %**
9449 to **9450**	112.8 Mcf/d	1.2 Mcf/d	**0.19 %**	5.17 bpd	0.05 bpd	**0.19 %**	26.56 bpd	0.97 bpd	**0.45 %**
9461 to **9462**	111.6 Mcf/d	0.7 Mcf/d	**0.11 %**	5.12 bpd	0.03 bpd	**0.11 %**	25.59 bpd	1.16 bpd	**0.54 %**
9467 to **9468**	111.0 Mcf/d	0.5 Mcf/d	**0.09 %**	5.09 bpd	0.02 bpd	**0.09 %**	24.43 bpd	7.53 bpd	**3.49 %**
9477 to **9479**	110.4 Mcf/d	1.0 Mcf/d	**0.18 %**	5.07 bpd	0.05 bpd	**0.18 %**	16.90 bpd	0.76 bpd	**0.35 %**
9492 to **9494**	109.4 Mcf/d	1.3 Mcf/d	**0.21 %**	5.02 bpd	0.06 bpd	**0.21 %**	16.14 bpd	0.30 bpd	**0.14 %**
9499 to **9502**	108.1 Mcf/d	1.0 Mcf/d	**0.18 %**	4.96 bpd	0.05 bpd	**0.18 %**	15.85 bpd	0.30 bpd	**0.14 %**
Stage 2			**13.93 %**			**13.93 %**			**4.85 %**
9699 to **9700**	107.0 Mcf/d	28.7 Mcf/d	**4.81 %**	4.91 bpd	1.32 bpd	**4.81 %**	15.55 bpd	0.65 bpd	**0.30 %**
9720 to **9721**	78.3 Mcf/d	2.2 Mcf/d	**0.37 %**	3.59 bpd	0.10 bpd	**0.37 %**	14.90 bpd	0.17 bpd	**0.08 %**
9735 to **9736**	76.1 Mcf/d	1.7 Mcf/d	**0.28 %**	3.49 bpd	0.08 bpd	**0.28 %**	14.73 bpd	0.71 bpd	**0.33 %**
9750 to **9751**	74.4 Mcf/d	5.7 Mcf/d	**0.96 %**	3.42 bpd	0.26 bpd	**0.96 %**	14.01 bpd	0.54 bpd	**0.25 %**
9764 to **9765**	68.7 Mcf/d	1.9 Mcf/d	**0.31 %**	3.15 bpd	0.09 bpd	**0.31 %**	13.47 bpd	0.19 bpd	**0.09 %**
9772 to **9773**	66.9 Mcf/d	1.6 Mcf/d	**0.27 %**	3.07 bpd	0.07 bpd	**0.27 %**	13.29 bpd	0.82 bpd	**0.38 %**
9785 to **9786**	65.2 Mcf/d	4.9 Mcf/d	**0.82 %**	2.99 bpd	0.22 bpd	**0.82 %**	12.46 bpd	0.76 bpd	**0.35 %**
9798 to **9799**	60.4 Mcf/d	1.6 Mcf/d	**0.28 %**	2.77 bpd	0.08 bpd	**0.28 %**	11.71 bpd	0.07 bpd	**0.04 %**
9811 to **9812**	58.7 Mcf/d	2.2 Mcf/d	**0.37 %**	2.69 bpd	0.10 bpd	**0.37 %**	11.63 bpd	0.30 bpd	**0.14 %**
9822 to **9823**	56.5 Mcf/d	1.7 Mcf/d	**0.29 %**	2.59 bpd	0.08 bpd	**0.29 %**	11.33 bpd	1.03 bpd	**0.48 %**
9830 to **9831**	54.7 Mcf/d	1.7 Mcf/d	**0.29 %**	2.51 bpd	0.08 bpd	**0.29 %**	10.31 bpd	0.23 bpd	**0.11 %**
9842 to **9843**	53.0 Mcf/d	2.0 Mcf/d	**0.33 %**	2.43 bpd	0.09 bpd	**0.33 %**	10.08 bpd	0.65 bpd	**0.30 %**
9854 to **9855**	51.1 Mcf/d	1.6 Mcf/d	**0.28 %**	2.34 bpd	0.08 bpd	**0.28 %**	9.43 bpd	0.49 bpd	**0.23 %**
9860 to **9861**	49.4 Mcf/d	1.7 Mcf/d	**0.28 %**	2.27 bpd	0.08 bpd	**0.28 %**	8.94 bpd	0.34 bpd	**0.16 %**
9872 to **9873**	47.8 Mcf/d	2.3 Mcf/d	**0.38 %**	2.19 bpd	0.11 bpd	**0.38 %**	8.60 bpd	0.62 bpd	**0.29 %**
9882 to **9883**	45.5 Mcf/d	2.1 Mcf/d	**0.36 %**	2.09 bpd	0.10 bpd	**0.36 %**	7.98 bpd	1.13 bpd	**0.52 %**
9892 to **9893**	43.3 Mcf/d	2.2 Mcf/d	**0.38 %**	1.99 bpd	0.10 bpd	**0.38 %**	6.85 bpd	1.06 bpd	**0.49 %**
9902 to **9904**	41.1 Mcf/d	15.3 Mcf/d	**2.56 %**	1.88 bpd	0.70 bpd	**2.56 %**	5.79 bpd	0.46 bpd	**0.21 %**
9912 to **9914**	25.8 Mcf/d	1.9 Mcf/d	**0.31 %**	1.18 bpd	0.09 bpd	**0.31 %**	5.33 bpd	0.25 bpd	**0.12 %**
Flow Contribution from Below Log Depth			**4.01 %**			**4.01 %**			**2.36 %**
9914 to **Below**	23.9 Mcf/d		**4.01 %**	1.10 bpd		**4.01 %**	5.09 bpd		**2.36 %**

Analysis Summary

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

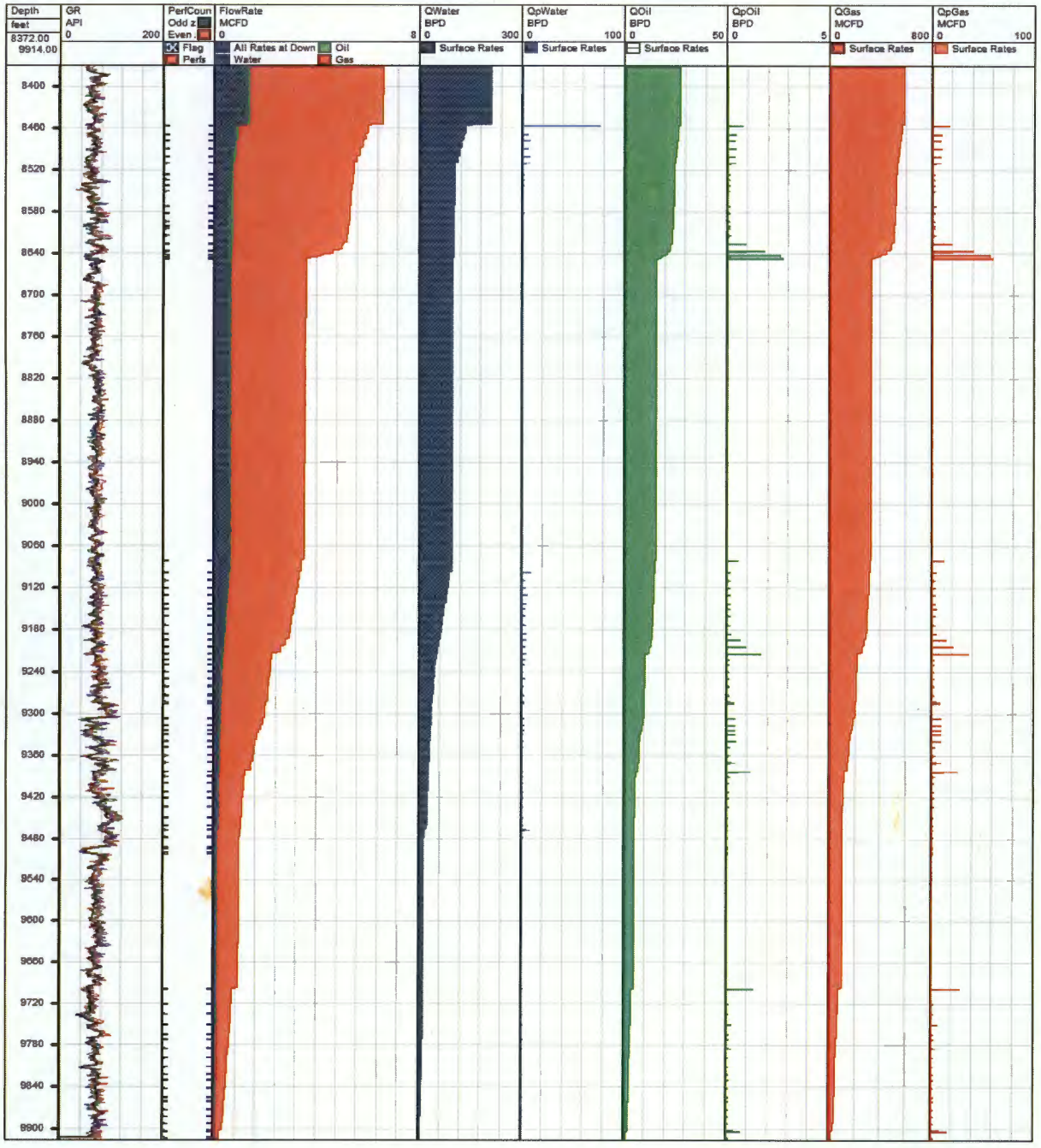
2. The perforations below 9,914 feet were not logged due to wellbore restrictions. Total production from these intervals was calculated based on the data below the 9,914 feet perforations.

Model Results With Recorded Data



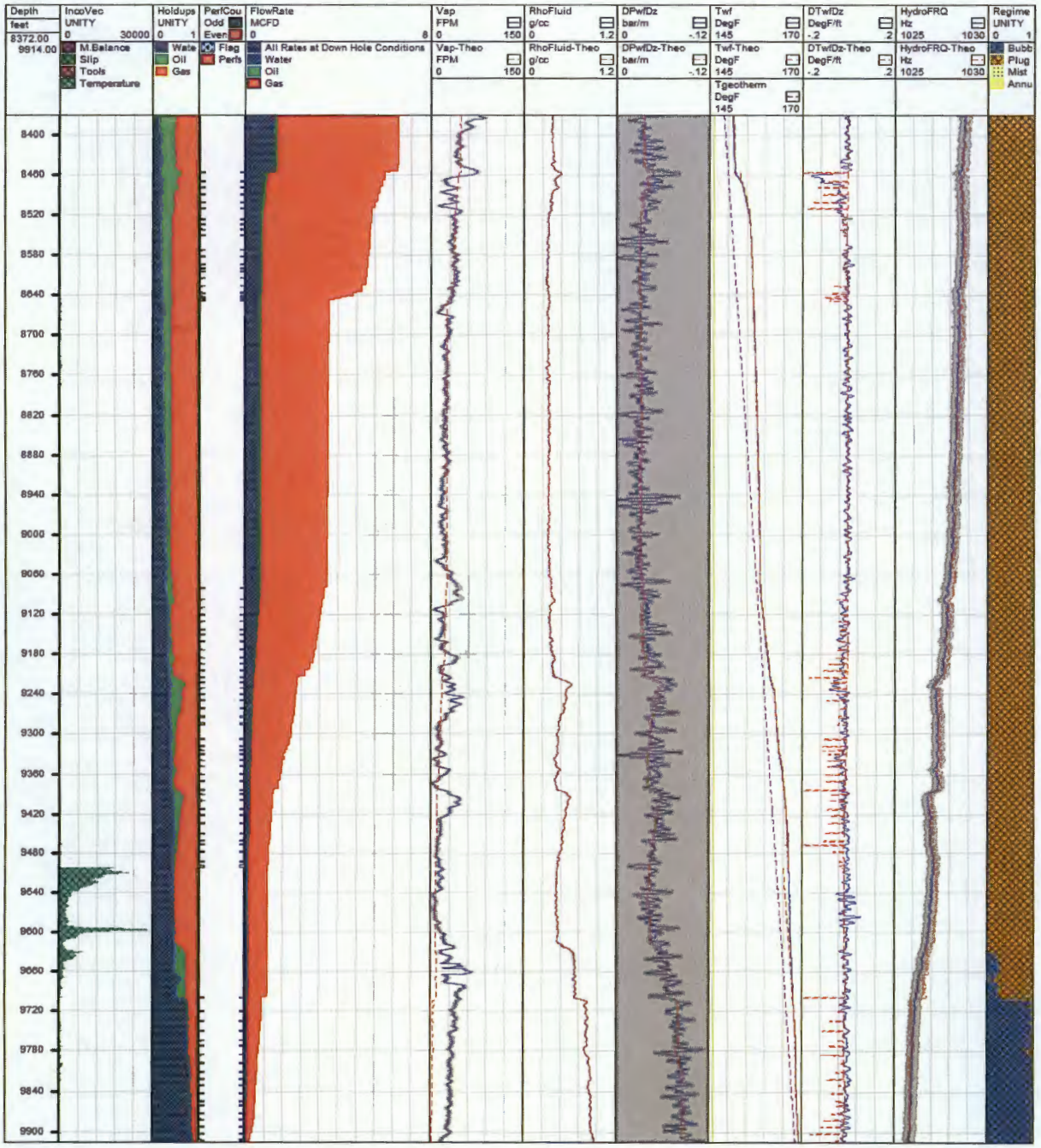
Completion Profile Analysis

Production Rates At Surface Conditions



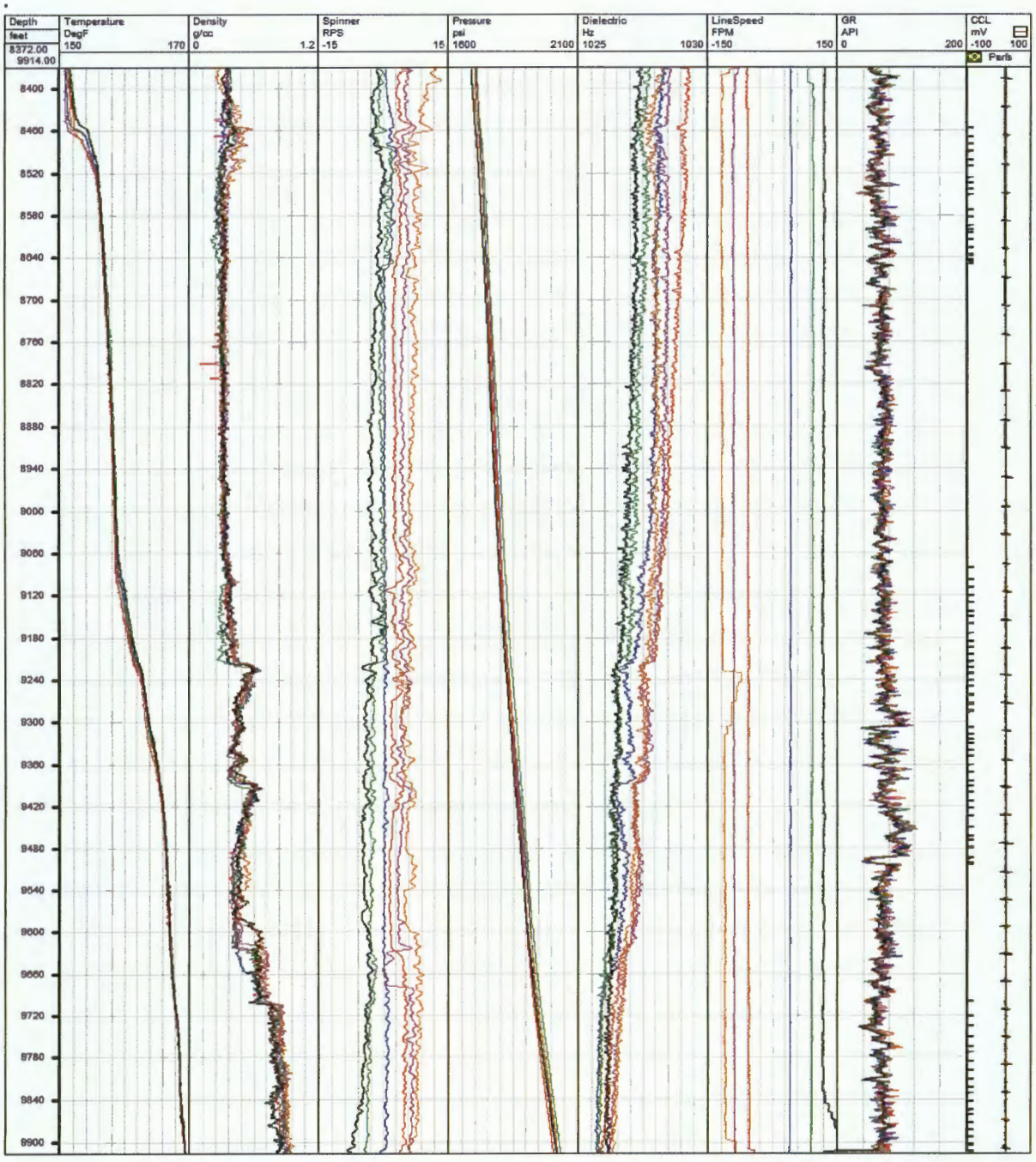
Completion Profile Analysis

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

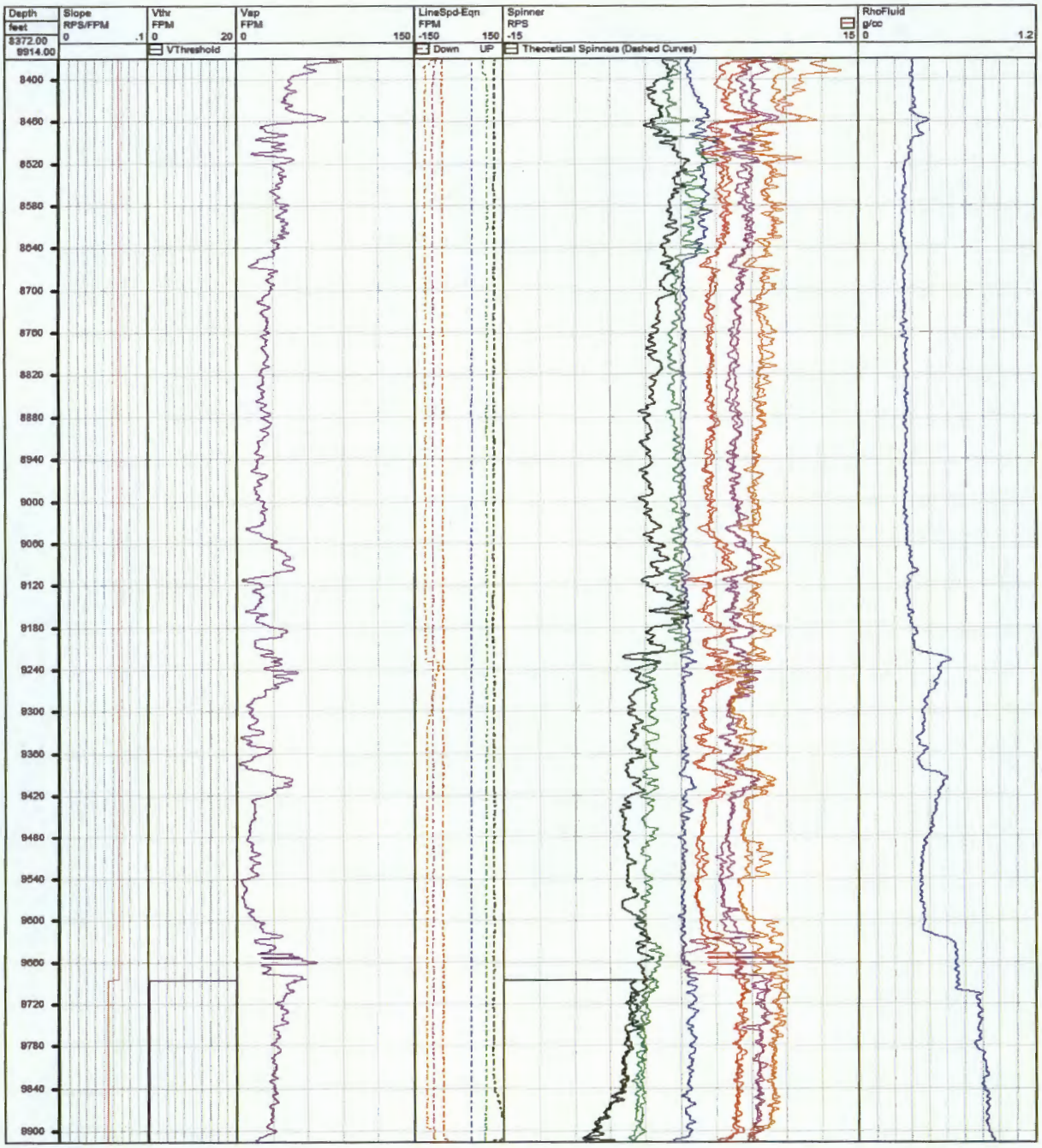


Completion Profile Analysis

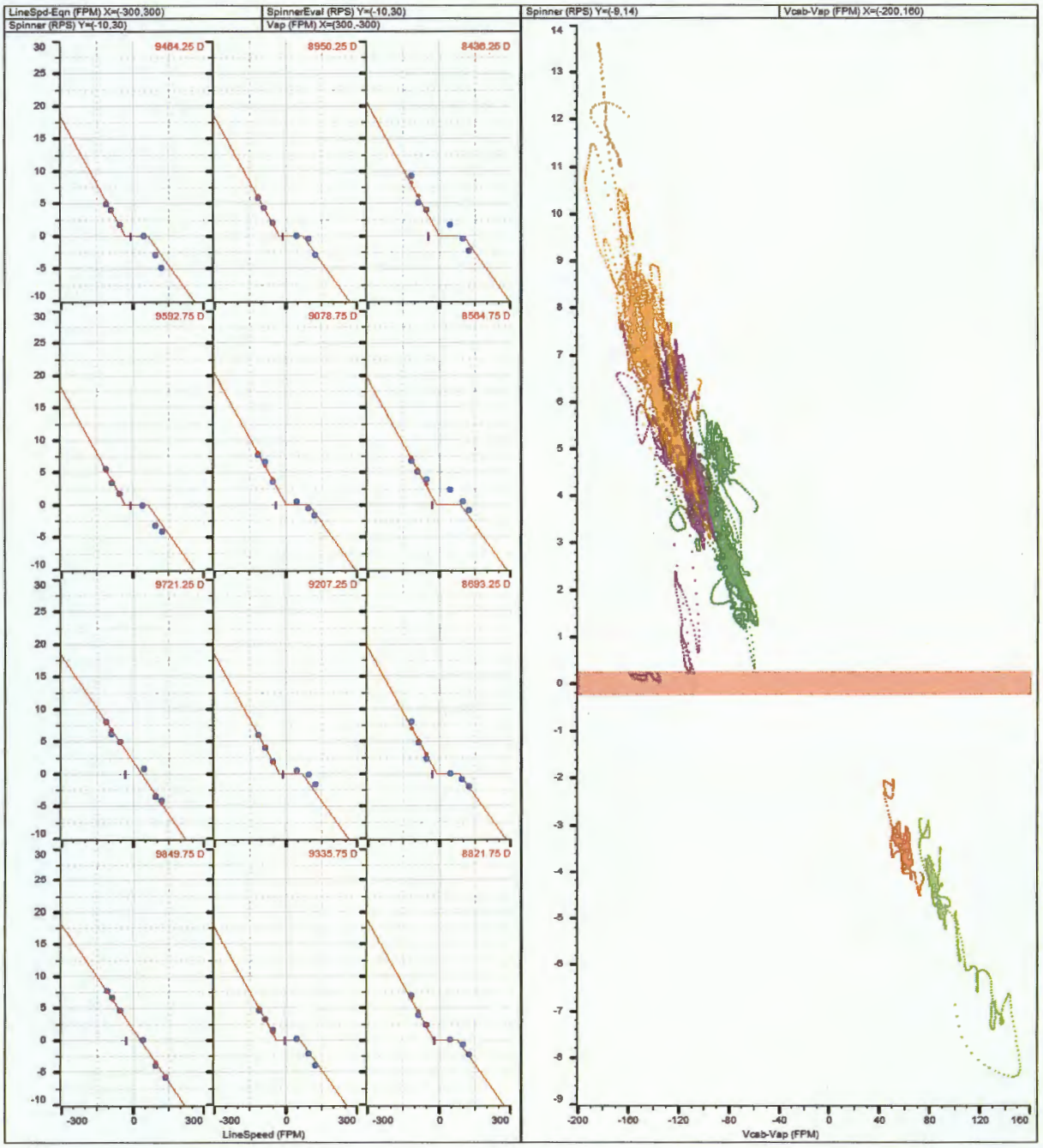
Overlay of all Log Data



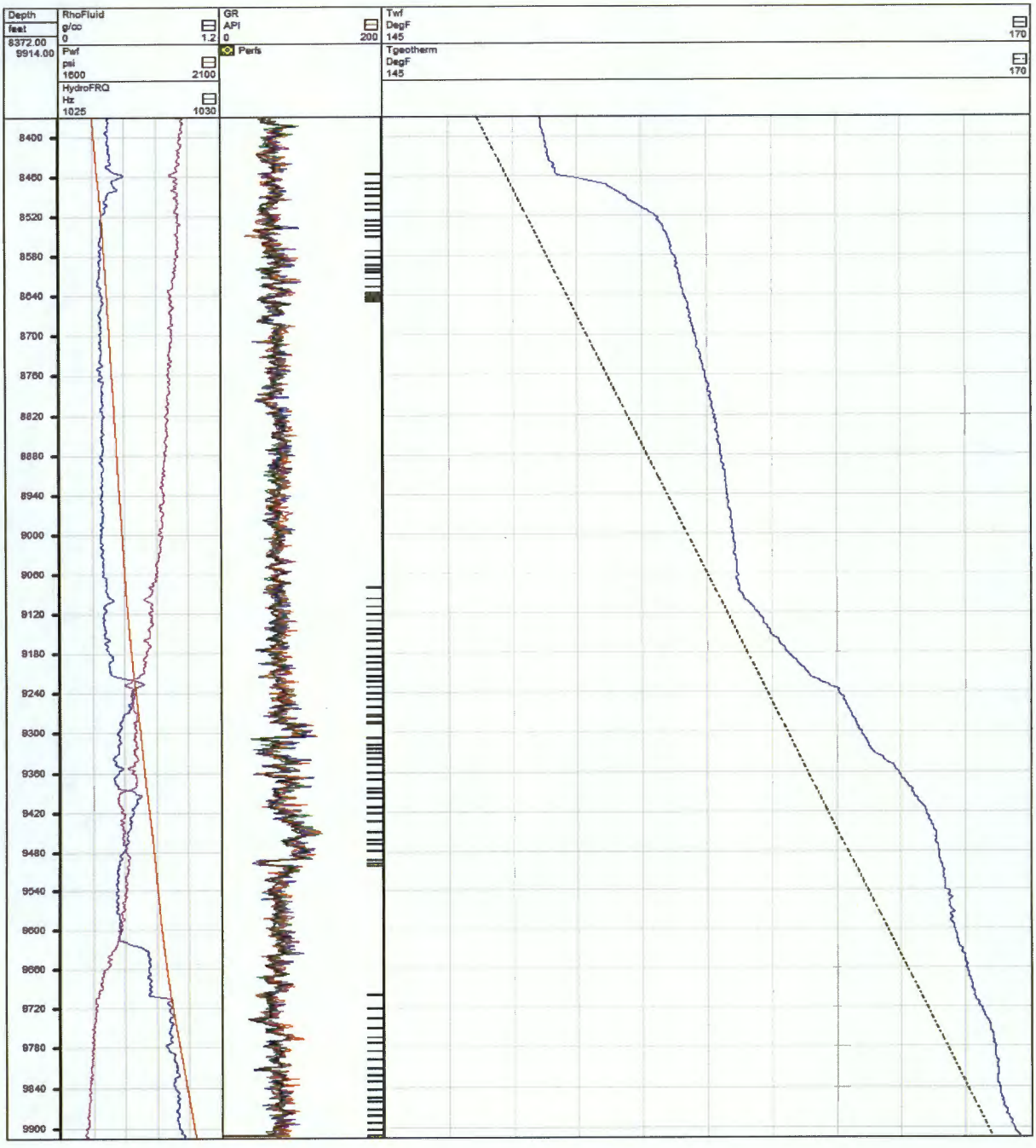
Apparent Fluid Velocity Derived from Spinner



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



Geothermal Gradient



Completion Profile Analysis

Well Information
Parameters used for Analysis

SPGG	UNITY	.682
APIOil	UNITY	51.3
Salinity	ppk	35.0
DPipe	in	4.90
PipeAngle	DegAng	0
Geotherm	°F/ft	.0129
TgeoRef	°F	168
DgeoRef	ft	9897

Downhole Measured and Computed Parameters

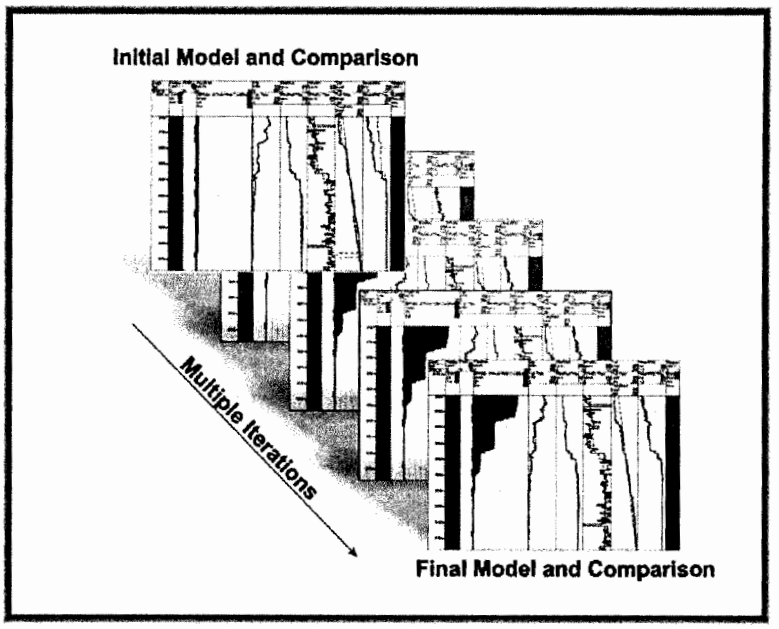
Depth	Pwf	Twf	ρ_{gas}	ρ_{oil}	ρ_{water}	RhoFluid	B_{gas}	Vap
feet	psi	°F	g/cc	g/cc	g/cc	g/cc	UNITY	FPM
8372.00	1701	151	.0941	.745	1.01	.366	.00886	79.1
8482.25	1722	154	.0945	.744	1.01	.390	.00882	30.5
8592.25	1738	156	.0949	.743	1.01	.292	.00879	36.1
8702.50	1753	157	.0955	.743	1.01	.300	.00873	26.9
8812.50	1768	158	.0962	.742	1.01	.305	.00867	20.2
8922.75	1781	158	.0969	.742	1.01	.316	.00861	18.2
9032.75	1796	159	.0976	.742	1.01	.311	.00855	21.1
9143.00	1813	160	.0983	.742	1.01	.334	.00849	19.8
9253.25	1837	163	.0988	.741	1.01	.534	.00844	44.0
9363.25	1862	165	.0996	.740	1.01	.418	.00837	15.0
9473.50	1888	166	.101	.739	1.01	.490	.00828	10.2
9583.50	1910	167	.102	.739	1.01	.438	.00820	11.4
9693.75	1940	168	.103	.739	1.01	.679	.00808	41.7
9803.75	1979	169	.105	.739	1.01	.862	.00794	29.9
9914.00	2021	170	.107	.738	1.01	.920	.00779	17.4

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

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

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
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QWater	Total Water Production at surface conditions
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DTwfDz	Differential Temperature
DTwfDz-Theo	Theoretical Differential Temperature
Regime	Flow Regimes
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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

Completion Profile Analysis

Tool Specifications

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
Pressure Rating	15,000 psi (103421.4 Kpa)
Temperature Rating	350°F (177°C)

Flow Measurement

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 ft/minute. With a known pipe I. D. this can be used to calculate the flow rate in BPD.

$Q_{BPD} = ft/min \times 1.4 \times I.D.^2$

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.

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 *Temperature* data can be better at quantifying the water production.

Holdup Measurement

Holdup (γ) - The fraction of each phase in the wellbore (Water, Oil, Gas fraction) This should not 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.

$\gamma water = (\rho mixture - \rho gas)/(\rho water - \rho gas)$

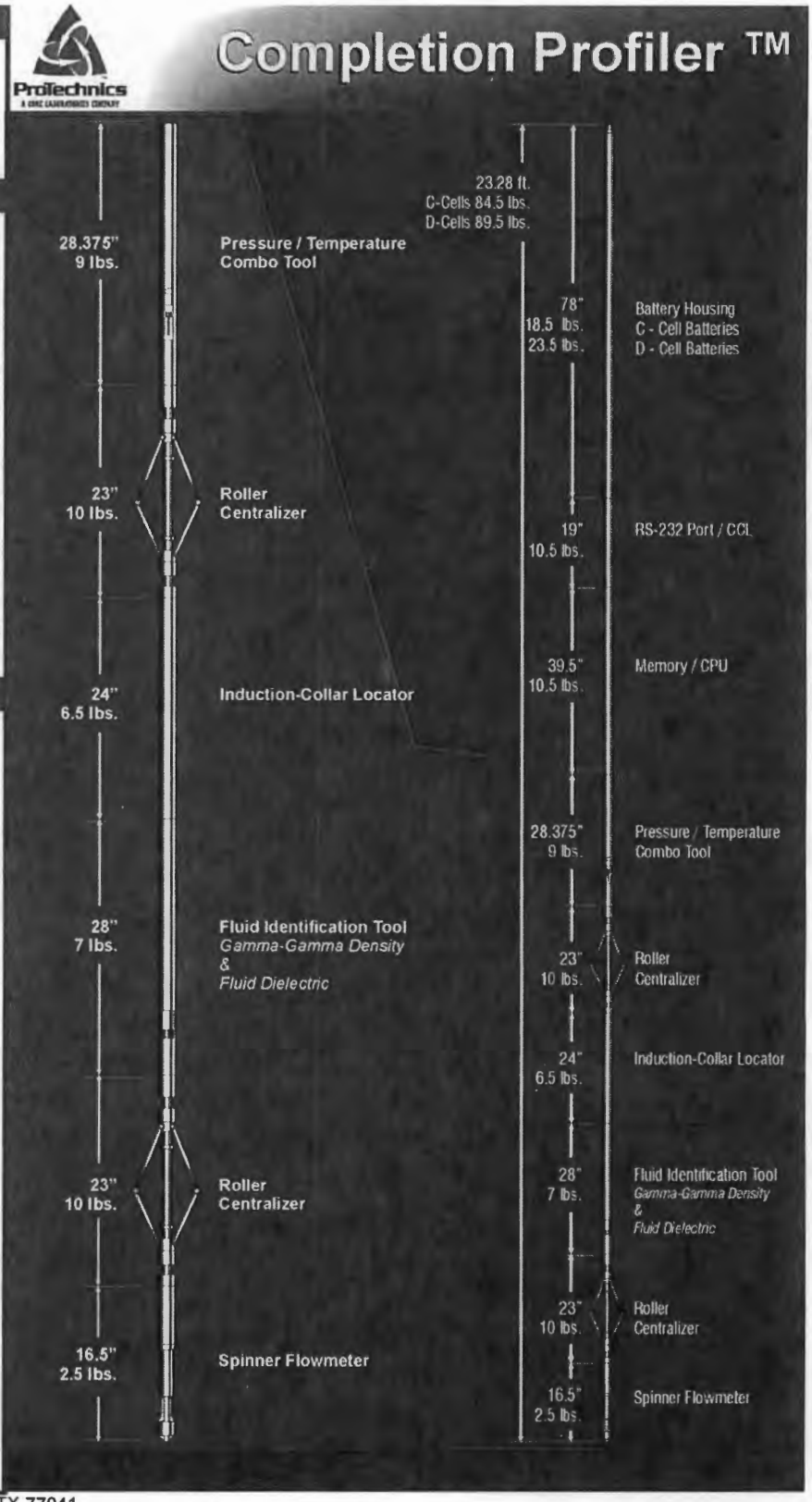
[For two-phase gas-water production]

ρ: density (gm/cc)

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 is then used to calculate the hydrocarbon and water fractions. This is possible because of the unique dielectric constant of water, oil and gas.
Water = 78, Oil = 4 and Gas = 1

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. The resulting curve in psi/ft can be used to determine the water and gas fractions.

Note:
In three phase flow both fluid density and dielectric measurements are necessary. The dielectric is used to determine the water holdup then the density is used to calculate the remaining gas and oil holdups.



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: White City 31 Federal 3
API 30-015-34300
Section 31, Township 24 South, Range 26 East, N.M.P.M.
Eddy County, New Mexico.

Dear Mr. McMillian:

The White City 31 Federal 3 well is located in the NW/4 of Sec. 31, 24S, 26E, Eddy County NM.

Cimarex is the operator of the NW/4 of Sec. 31, 24S, 26E, Eddy County, NM as to all depths from the surface of the Earth down to 12,064'. Ownership within these depths in the NW/4 are identical.

Sincerely,

Caitlin Pierce

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

State of New Mexico
Energy, Minerals and Natural Resources Department

Administrative Order DHC-4802
Order Date: Janauary 11, 2017
Application Reference Number: pMAM1701051713

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

Attention: Ms. Terri Stathem

White City 31 Federal Well No. 3
API No. 30-015-34300
Lot 1, Section 31, Township 24 South, Range 26 East, NMPM
Eddy County, New Mexico

Pool	WHITE CITY; PENN (GAS)	Gas (87280)
Names:	BLACK RIVER; WOLFCAMP, SW (GAS)	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 Black River; Wolfcamp, SW (Gas) Pool shall be based on the remaining gas in place (RGIP) calculations, which in turn is based on offset analogy production and well log analysis for each pool.

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

BLACK RIVER; WOLFCAMP, SW (GAS)	Pct. Oil: 82	Pct. Gas: 82
WHITE CITY; PENN (GAS)	Pct. Oil: 18	Pct. Gas: 18

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
Director

DRC/mam

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