Revised March 23, 2017

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RECEIVED: REVIEWER: TYPE 831207 MAM	APP NO: DHC ARIE FOR OCD DIVISION LISE ONLY ARIE FOR OCD DIVISION LISE ONLY
NEW MEXICO OIL CC - Geological & Engi 1220 South St. Francis Driv	neering Bureau – e, Santa Fe, NM 87505
ADMINISTRATIVE API THIS CHECKLIST IS MANDATORY FOR ALL ADMINISTRAT REGULATIONS WHICH REQUIRE PROCESS	PLICATION CHECKLIST VE APPLICATIONS FOR EXCEPTIONS TO DIVISION RULES AND SING 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
SUBMIT ACCURATE AND COMPLETE INFORMATION INDICAT 1) TYPE OF APPLICATION: Check those which app A. Location – Spacing Unit – Simultaneous De NSL NSP (PROJECT AREA)	N REQUIRED TO PROCESS THE TYPE OF APPLICATION ED BELOW DH 2 - 4801
 B. Check one only for [1] or [1] [1] Commingling – Storage – Measuremer DHC CTB PLC PC [1] Injection – Disposal – Pressure Increase WFX PMX SWD IPP 2) NOTIFICATION REQUIRED TO: Check those whic A. Offset operators or lease holders B. Royalty, overriding royalty owners, reve C. Application requires published notice D. Notification and/or concurrent approve E. Notification and/or concurrent approve F. Surface owner G. For all of the above, proof of notification H. No notice required 3) CERTIFICATION: I hereby certify that the information 	ht OLS OLM - Enhanced Oil Recovery EOR PPR h apply. nue owners at by SLO al by BLM n or publication is attached, and/or, tion submitted with this application for
administrative approval is accurate and compl understand that no action will be taken on this on notifications are submitted to the Division.	ete to the best of my knowledge. I also application until the required information and
Nore. Sidiement must be completed by an indiv	audi wini managenai ana/or supervisory capacity.
	8/31/2017
Amithy Crawford	Date
Print or Type Name	432-620-1909
have noted	Phone Number
Signature	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

PoolWHITE 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. Administrative Order DHC-4801 Cimarex Energy Co. of Colorado December 6, 2016 Page 2 of 2

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.

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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 Tulse, Oklahoma 74103-4346 PHONE: 918.585.1100 FAX: 918.585.1133

CIMARE

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

> 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:

Re:

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, lne

Production Landman cpierce@cimarex.com Direct: 432-571-7862 District I 1625 N. Pro

District II 1301 W. Grand A District III District IV

1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico Energy, Minerals and Natural Resources Department

APPLICATION FOR DOWNHOLE COMMINGLING

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

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	002	H-9-24S-26E	Eddy
Lease	Well No.	Unit Letter-Section-Township-Range	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	Date: N/A	Date: N/A
ostimates and supporting data.)	Rates: 105 BOPD, 1706 MCFPD, 1038 BWPD	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 Gas 83 83	Oil Gas 17 17

ADDITIONAL DATA

Are all working, royalty and overriding royalty interests identical in all commingled zones? If not, have all working, royalty and overriding royalty interest owners been notified by certified mail?	YesNo YesNo
Are all produced fluids from all commingled zones compatible with each other?	Yes X No
Will commingling decrease the value of production?	Yes NoX
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?	YesX_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.

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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 XINDY TITLE Regulatory Analyst DATE 9/1/2017
TYPE OR PRINT NAMEAmithy CrawfordTELEPHONE NO432-620-1909
E-MAIL ADDRESSacrawford@cimarex.com

Cimarex Energy Company Estill AD Fed #2

Completion Profiler





CompanyCimarex Energy CompanyWell NameEstill AD Fed #2FieldWhite City PennLocationEddy County, New MexicoCustomer NameSteven A. RunyanDate of SurveyJuly 28, 2017Date of AnalysisAugust 14, 2017Logging EngineerPaulo RiosAnalystDerrick George

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.





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Survey Objectives

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

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

Logging Procedures

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 - Wo	lfcamp						
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 - Wo	lfcamp						
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 - Wa	lfcamp				-		
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									
	-		Υ											
						Stage	2 - Wa	lfcamp				-		
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	9,80 <u>1</u>	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			

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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.

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Results

The following table summarizes the production from each frac stage.

	MEASURED SURFACE RATES													
	Flow Rates Reported at STP Tubling Gas Qil Water													
	Τι	ubing		Gas			Oil			Water				
		Psi		MCFD			BFPD			BFPD				
Avg	30)0 psi		1261 Mcf/d			105 bpd			429 bpd				
					GAS / OIL / \	NATER PRODU	CTION PROFI	LE						
					FI	ow Rates Reported	at STP							
Zone	Inter	vals	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	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				
		Stane	5 - Wolfcamp		22.28 %	<u> </u>		22.28 %			25.81 %			
8080	to	0200	024 3 Mofid	281 7 Mof/d	AL.LU /0	76 85 hpd	22.42 had	22.20 /6	100 57 bod	110.44 bod	20.01 /6			
0303		9290	524.0 WICHU	201.7 10101/0		78.65 bpu	23.43 bpu		129.52 bpu	110.44 0pu				
		Stage	e 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	Contr	ibution	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 %			





The following table summarizes the production from each producing interval.

					GAS / OIL /	WATER PRODU	CTION PROFI	ШE				
Flow Rates Reported at STP												
Zone Intervals		vals	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	8418	1264.3 Mcf/d		100.00 %	105.13 bpd	··	100.00 %	427.88 bpd		100.00 %	
<u> </u>											<u> </u>	
		Stag	e 6 - Wolfcamp	L	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 bpđ	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	e 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 %	

MEASURED SOLUTIONS ProTechnics





	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 %
	_										
		Stag	e 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	Cont	ribution	from Below Log	Depth	17.15 %			17.14 %			1.91 %
9730	to	Below	216.8 Mcf/d		17.15 %	18.02 bpd		<u>17.14 %</u>	8.15 bpd		1.91 %





Analysis Summary

- 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

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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

Well Information Parameters used for Analysis

Downhole Measured and Computed Parameters

Depth	Pwf	Twf	ρ _{gas}	ροιι	Pwater	RhoFluid	Bgas	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

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1.1.86





Model Results With Recorded Data







Production Rates At Surface Conditions







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







Overlay of all Log Data







Apparent Fluid Velocity Derived from Spinner



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MEASURED SOLUTIONS THE COMPLETION DIAGON DESIGN AND AND PROTECHNICS





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







Geothermal Gradient





COMPLETION'

ROFILER

Definitions

Curve	Name
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Description

Holdup PerfCount QGas QpGas QOil QpOil QWater QpWater GR Twf. Vap Vap-Theo Tgeotherm RhoFluid Pwf HydroFrq Flowrate Vap Vap-Theo RhoFluid RhoFluid-Theo DPwfDz DPwfDz-Theo Twf Twf-Theo Tgeotherm DTwfDz DTwfDz-Theo Regime Temperature Density Spinner Pressure Linespeed Slope Vthr SpinnerFlt DPipe PipeAngle APIOII SPGG TgeoRef DgeoRef Goetherm

Holdups Perforations Total Gas Production at surface conditions Incremental Gas Production at surface conditions Total Oil Production (if present downhole) at surface conditions Incremental Oil Production (if present downhole) at surface conditions Total Water Production at surface conditions Incremental Water Production at surface conditions Gamma Ray/SpectraScan Average Temperature **Apparent Velocity Theoretical Apparent Velocity** Geothermal Gradient Average Fluid Density **Average Pressure** Average Fluid Dielectric Total Flowrate at downhole conditions Apparent Velocity **Theoretical Apparent Velocity** Average Fluid Density **Theoretical Average Fluid Density Differential Pressure Theoretical Differential Pressure** Average Temperature Theoretical Average Temperature Geothermal Gradient **Differential Temperature** Theoretical Differential Temperature Flow Regimes **Temperature Passes** Fluid Density Passes Spinner Passes **Pressure Passes** Linespeed Passes Spinner Slope Spinner Threshold Spinner Inside diameter of the casing/tubing across logged interval Average pipe angle across logged interval Degree API of the oil Specific Gravity of the gas Reference Temperature for Geothermal Gradient calculations Reference Depth for Geothermal Gradient calculations Geothermal Gradient across logged interval

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DISTRICT -1-P.O. Box 1980, Hobbs, NN 88241-1980

DISTRICT II P.O. Drawer DD, Artenia, NM 68211-0719

DISTRICT III 1000 Rio Brazos Ed., Artec, NM 87410

DISTRICT IV P.O. BOX 2089, SANTA PE, 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

C AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT API Number Pool Code Pool Name 30-015-33336 87280 White City; Penn (Gas) Well Number **Property** Code Property Name ESTILL AD FEDERAL 2 **Operator** Name Elevation OGRID No. 162683 GRUY PETROLEUM MANAGEMENT COMPANY 3430 Surface Location UL or lot No. Feet from the Lot Idn Feet from the North/South line East/West line Section Township Range County 2270 NORTH EAST н 19 24 S 26 E 380 EDDY **Bottom Hole Location If Different From Surface** Lot Idn Feet from the North/South line UL or lot No. Section Township Range Feet from the **Bast/West** line County 19 24-S 26-E н 1588 NORTH 957 EAST EDDY Dedicated Acres Joint or Infill Consolidation Code Order No. 640 γ 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 NAD 27 NME 3440.6 3427.1 GEODETIC COORDINATES I hereby certify the the information 600' contained herein is true and complete to the Y-437862.0-N best of my knowledge and belief. 0 ß X-502567.6-E 588 LAT.= 32°12'13.68" N 40 2270' LONG.= 104'19'29.07" W m 994 3437.6 3421.4 Signature Zeno Farris Estill AD Fed #2 957' Printed Name Mgr Operations Admin Penetration Point, tenn 606 ª Title RECEIVED July 5, 2005 Date SHIL 380 JUL 0 6 2005 SURVEYOR CERTIFICATION OCD-AFTERIA 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 Estill AD Fed #1 correct to the best of my belief. Estill AD Fed #4 1650' JANUCA. 1000' JANUARY 26, 2004 BHL LMP Professional Surveyor 1500 N ME 1650' 2/04 22601 04.1/1.0008 641 488 Certificate No. GARY EDSO 12641 in Contraction PROFESSION

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16268	3			Cima	rex Ener	gy Co. of Colo	rado			3430'
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