DATE IN	SUSPENSE	ENGINEER	LOGGED IN	TYPE	APP NO.
7/13/2016		MAM	7/13/2016	DHC	pMAM1619557895

ABOVE THIS LINE FOR DIVISION USE ONLY

How encroaching setting allocation

NEW MEXICO OIL CONSERVATION DIVISION
- 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

Application Acronyms:

[NSL-Non-Standard Location] [NSP-Non-Standard Proration Unit] [SD-Simultaneous Dedication]
[DHC-Downhole Commingling] [CTB-Lease Commingling] [PLC-Pool/Lease Commingling]
[PC-Pool Commingling] [OLS - Off-Lease Storage] [OLM-Off-Lease Measurement]
[WFX-Waterflood Expansion] [PMX-Pressure Maintenance Expansion]
[SWD-Salt Water Disposal] [IPI-Injection Pressure Increase]
[EOR-Qualified Enhanced Oil Recovery Certification] [PPR-Positive Production Response]

-DHC-3390-A
-Cimarex Energy Co of Colorado
16683

[1] **TYPE OF APPLICATION** - Check Those Which Apply for [A]

[A] Location - Spacing Unit - Simultaneous Dedication
☐ NSL ☐ NSP ☐ SD

Check One Only for [B] or [C]

[B] Commingling - Storage - Measurement
☒ DHC ☐ CTB ☐ PLC ☐ PC ☐ OLS ☐ OLM

[C] Injection - Disposal - Pressure Increase - Enhanced Oil Recovery
☐ WFX ☐ PMX ☐ SWD ☐ IPI ☐ EOR ☐ PPR

[D] Other: Specify _____

RECEIVED OCD
2016 JUL 13 P 3:00

Well
-Chosa 27 Federal com #1
30-015-32918
Poo
-Cottonwood Draw Upper Penn (G)
97354
-Sage Draw; Wolfcamp
96890
-Cottonwood Draw; Morrow
97377

[2] **NOTIFICATION REQUIRED TO:** - Check Those Which Apply, or Does Not Apply

[A] ☐ Working, Royalty or Overriding Royalty Interest Owners

[B] ☐ Offset Operators, Leaseholders or Surface Owner

[C] ☐ Application is One Which Requires Published Legal Notice

[D] ☒ Notification and/or Concurrent Approval by BLM or SLO
U.S. Bureau of Land Management - Commissioner of Public Lands, State Land Office

[E] ☐ For all of the above, Proof of Notification or Publication is Attached, and/or,

[F] ☐ Waivers are Attached

[3] **SUBMIT ACCURATE AND COMPLETE INFORMATION REQUIRED TO PROCESS THE TYPE OF APPLICATION INDICATED ABOVE.**

[4] **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	Amithy Crawford	Regulatory Analyst	7/11/2016
Print or Type Name	Signature	Title	Date

acrawford@cimarex.com
e-mail Address

CIMAREX ENERGY COMPANY
600 N. Marienfeld Street
Suite 600
Midland, TX 79701

7/11/2016

Attn: New Mexico Oil Conservation Division
1220 S. St. Francis Dr.
Santa Fe, NM 87505

Subject: Application for downhole commingle
Chosa Draw 27 Federal Com #1
30-015-32918

To Whom it May Concern:

Enclosed is the original Form C-107A (Application for Downhole Commingle) for the well mentioned above. The well was originally drilled to the Morrow formation. Currently the well is producing through the Morrow (11836'-12233'). Cimarex proposes to add additional perfs in the Penn and to recomplete into the Wolfcamp.

Please contact me if you have any questions or need any additional information.

Thank you,

Amithy Crawford
Regulatory Analyst
432-620-1909
acrawford@cimarex.com

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: Chosa Draw 27 Federal Com 1
API 30-015-32918
Section 27, Township 25 South, Range 26 East, N.M.P.M.
Eddy County, New Mexico.

Dear Mr. McMillian:

The Chosa Draw 27 Federal Com 1 well is located in the NE/4 of Sec. 27, 25S, 26E, Eddy County NM.

Cimarex is the operator of the E/2 of Sec. 27, 25S, 26E, Eddy County, NM as to all depths from the surface of the earth to the base of the Morrow formation. Ownership in the E/2 is common as to all depths.

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)

Chosa Draw 27 Federal Com (Lease) 001 (Well No.) B-27-25S-26E (Unit Letter-Section-Township-Range) Eddy (County)

OGRID No. 162683 Property Code _____ API No. 30-015-32918 Lease Type: _X_ Federal ___ State ___ Fee

DATA ELEMENT	UPPER ZONE	INTERMEDIATE ZONE	LOWER ZONE
Pool Name	Wolfcamp	Cottonwood Draw; Upper Penn	
Pool Code		97354	
Top and Bottom of Pay Section (Perforated or Open-Hole Interval)	8570-9950'	10372-10412'	
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	Producing with Added 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: 65 BOPD, 2,165 MCFPD, 516 BWPD	Date: 05/13/2016 Rates: 17 BOPD, 575 MCFPD, 137 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 79 Gas 79	Oil 21 Gas 21	

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-3390

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 Analyst DATE 7/18/2016

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
30-015-32918	97354	Cotton Draw; Upper Penn (G)

4 Property Code	5 Property Name	6 Well Number
32670	Chosa Draw 27 Federal Com	#1

7 OGRID No.	8 Operator Name	9 Elevation
162683	Cimarex Energy Co. of Colorado	3265'

10 Surface Location

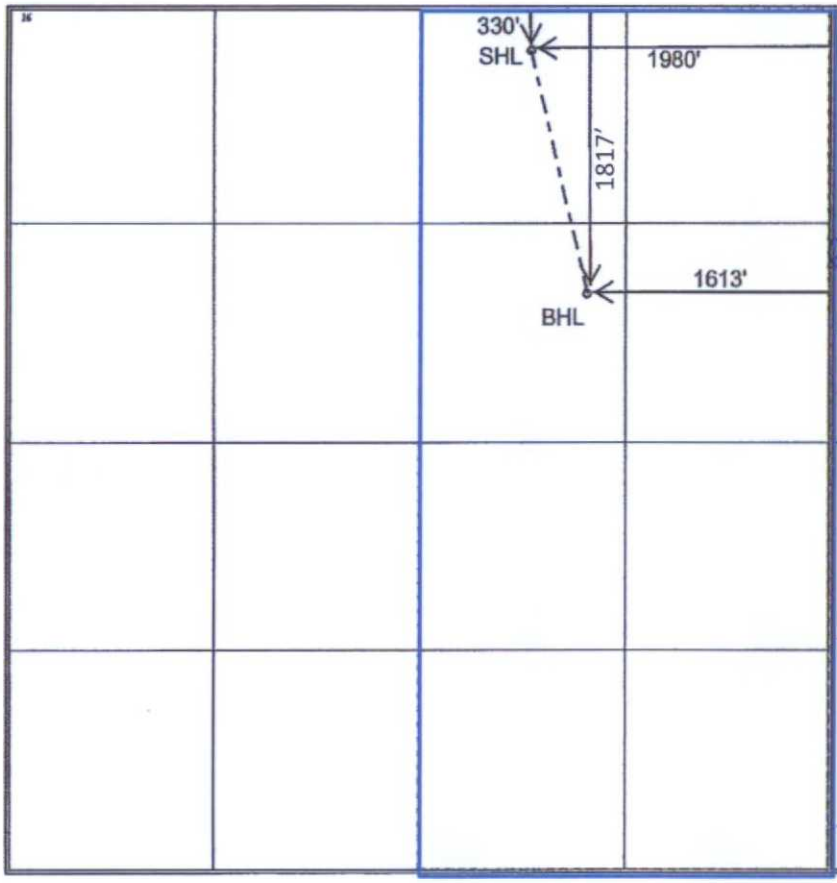
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
B	27	25-S	26-E		330'	North	1980'	East	Eddy

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
G	27	25-S	26-E		1817'	North	1613'	East	Eddy

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

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 — 5/23/2016
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
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
30-015-32918	96890	Sage Draw; Wolfcamp, East (G)

[4] Property Code	[5] Property Name	[6] Well Number
32670	Chosa Draw 27 Federal Com	#1

[7] OGRID No.	[8] Operator Name	[9] Elevation
162683	Cimarex Energy Co. of Colorado	3265'

[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
B	27	25-S	26-E		330'	North	1980'	East	Eddy

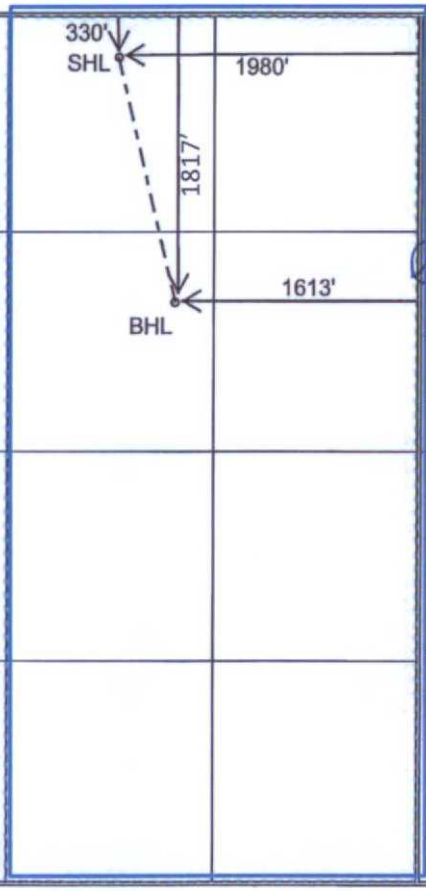
[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
G	27	25-S	26-E		1817'	North	1613'	East	Eddy

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

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.

[16]



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Signature — Date: 5/23/2016

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

LABORATORY SERVICES
Natural Gas Analysis

www.permianls.com

575.397.3713 2609 W Marland Hobbs NM 88240

For:	Cimarex Energy Attention: Mark Cummings 600 N. Marienfeld, Suite 600 Midland, Texas 79701	Sample: Identification: Company: Lease: Plant:	Sta. # 309588185 Wigeon 23 Fed Com 1 Cimarex Energy

Sample Data:	Date Sampled	7/30/2013	12:25 PM		
	Analysis Date	7/31/2013			
	Pressure-PSIA	900		Sampled by:	Taylor Ridings
	Sample Temp F	107		Analysis by:	Vicki McDaniel
	Atmos Temp F	85			

H2S = 0.3 PPM

Component Analysis

		Mol Percent	GPM
Hydrogen Sulfide	H2S		
Nitrogen	N2	0.677	
Carbon Dioxide	CO2	0.123	
Methane	C1	82.764	
Ethane	C2	9.506	2.536
Propane	C3	3.772	1.037
I-Butane	IC4	0.640	0.209
N-Butane	NC4	1.185	0.373
I-Pentane	IC5	0.335	0.122
N-Pentane	NC5	0.374	0.135
Hexanes Plus	C6+	0.624	0.270
		100.000	4.681

REAL BTU/CU.FT.		Specific Gravity	
At 14.65 DRY	1219.2	Calculated	0.6973
At 14.65 WET	1197.9		
At 14.696 DRY	1223.0		
At 14.696 WET	1202.1	Molecular Weight	20.1966
At 14.73 DRY	1225.8		
At 14.73 Wet	1204.6		

North Permian Basin Region
P.O. Box 740
Sundown, TX 79372-0740
(806) 229-8121

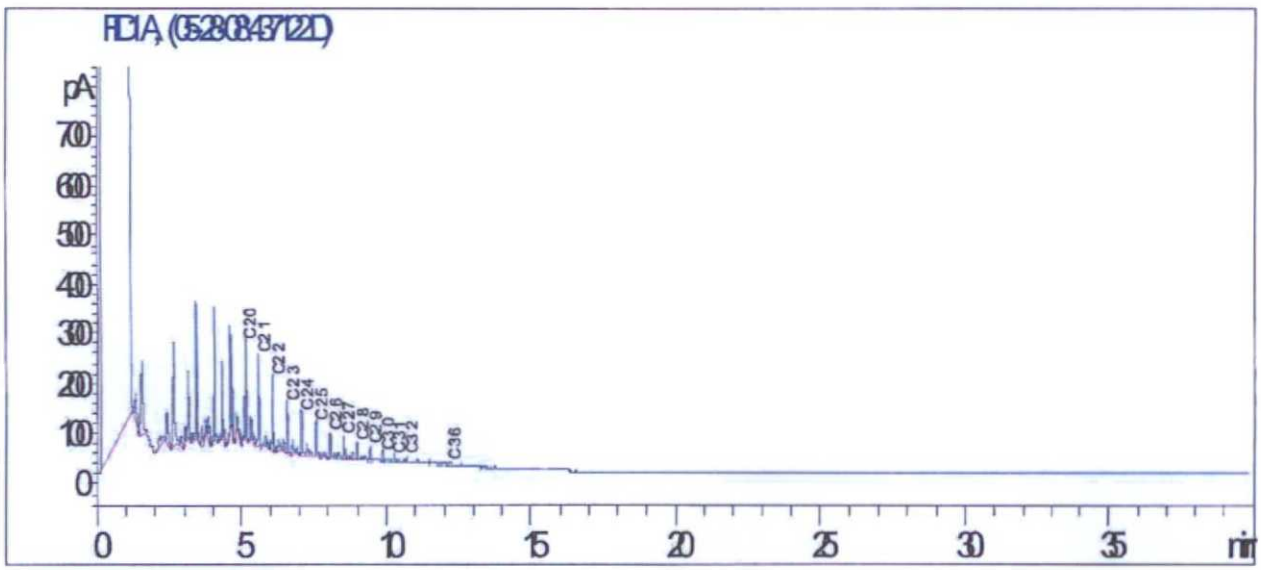
Lab Team Leader - Sheila Hernandez
(432) 495-7240

OIL ANALYSIS

Company:	CIMAREX ENERGY	Sales RDT:	44212
Region:	PERMIAN BASIN	Account Manager:	WAYNE PETERSON (575) 910-9389
Area:	CARLSBAD, NM	Analysis ID #:	3208
Lease/Platform:	WIGEON '23' FEDERAL	Sample #:	437122
Entity (or well #):	1	Analyst:	SHEILA HERNANDEZ
Formation:	WOLFCAMP	Analysis Date:	5/30/08
Sample Point:	FRAC TANK 234	Analysis Cost:	$100.00
Sample Date:	5/13/08		

Cloud Point:	<68 °F
Weight Percent Paraffin (by GC)*:	1.49%
Weight Percent Asphaltenes:	0.03%
Weight Percent Oily Constituents:	98.41%
Weight Percent Inorganic Solids:	0.07%

*Weight percent paraffin and peak carbon number includes only n-alkanes (straight chain hydrocarbons) greater than or equal to C20H42.



North Permian Basin Region
P.O. Box 740
Sundown, TX 79372-0740
(806) 229-8121
Lab Team Leader - Sheila Hernandez
(432) 495-7240

Water Analysis Report by Baker Petrolite

Company:	CIMAREX ENERGY	Sales RDT:	44212
Region:	PERMIAN BASIN	Account Manager:	WAYNE PETERSON (505) 910-9389
Area:	CARLSBAD, NM	Sample #:	43887
Lease/Platform:	WIGEON UNIT	Analysis ID #:	82014
Entity (or well #):	23 FEDERAL 1	Analysis Cost:	$80.00
Formation:	UNKNOWN		
Sample Point:	SEPARATOR		

Summary	
Sampling Date:	05/14/08
Analysis Date:	05/15/08
Analyst:	WAYNE PETERSON
TDS (mg/l or g/m3):	90873.3
Density (g/cm3, tonne/m3):	1.062
Anion/Cation Ratio:	1
Carbon Dioxide:	150 PPM
Oxygen:	
Comments:	
TEST RAN IN THE FIELD	

Analysis of Sample 43887 @ 75 °F

Anions	mg/l	meq/l	Cations	mg/l	meq/l
Chloride:	55040.0	1552.48	**Sodium:**	32207.4	1400.94
Bicarbonate:	329.4	5.4	**Magnesium:**	268.0	22.05
Carbonate:	0.0	0.	**Calcium:**	2780.0	138.72
Sulfate:	225.0	4.68	**Strontium:**		
Phosphate:			**Barium:**		
Borate:			**Iron:**	23.5	0.85
Silicate:			Potassium:		
			Aluminum:		
Hydrogen Sulfide:		0 PPM	Chromium:		
pH at time of sampling:		7.31	Copper:		
pH at time of analysis:			Lead:		
pH used in Calculation:		7.31	Manganese:		
			Nickel:		

Conditions		Values Calculated at the Given Conditions - Amounts of Scale in lb/1000 bbl										
Temp	Gauge Press.	Calcite $CaCO_3$		Gypsum $CaSO_4 * 2H_2O$		Anhydrite $CaSO_4$		Celestite $SrSO_4$		Barite $BaSO_4$		CO_2 Press
°F	psi	Index	Amount	Index	Amount	Index	Amount	Index	Amount	Index	Amount	psi
80	0	0.94	27.24	-1.11	0.00	-1.14	0.00	0.00	0.00	0.00	0.00	0.13
100	0	0.97	31.09	-1.16	0.00	-1.12	0.00	0.00	0.00	0.00	0.00	0.19
120	0	0.99	35.26	-1.20	0.00	-1.08	0.00	0.00	0.00	0.00	0.00	0.28
140	0	1.02	39.74	-1.23	0.00	-1.02	0.00	0.00	0.00	0.00	0.00	0.38

Note 1: When assessing the severity of the scale problem, both the saturation index (SI) and amount of scale must be considered.

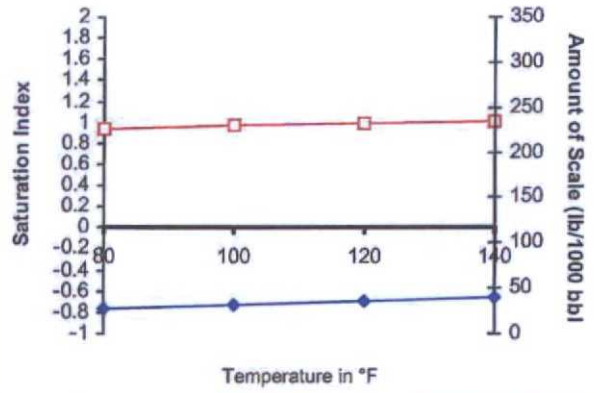
Note 2: Precipitation of each scale is considered separately. Total scale will be less than the sum of the amounts of the five scales.

Note 3: The reported CO2 pressure is actually the calculated CO2 fugacity. It is usually nearly the same as the CO2 partial pressure.

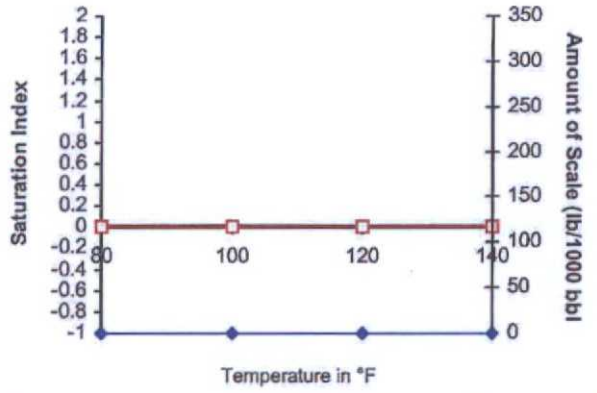
Scale Predictions from Baker Petrolite

Analysis of Sample 43887 @ 75 °F for CIMAREX ENERGY, 05/15/08

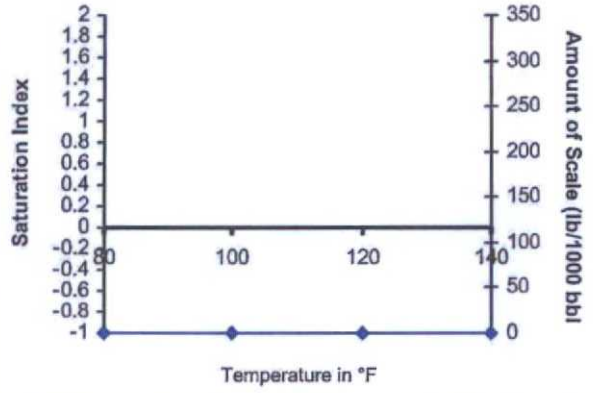
Calcite - CaCO3



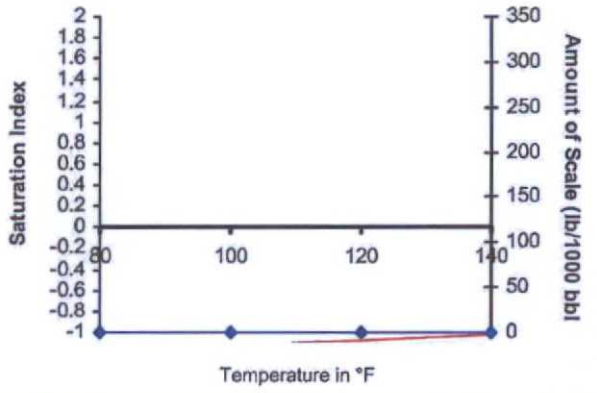
Barite - BaSO4



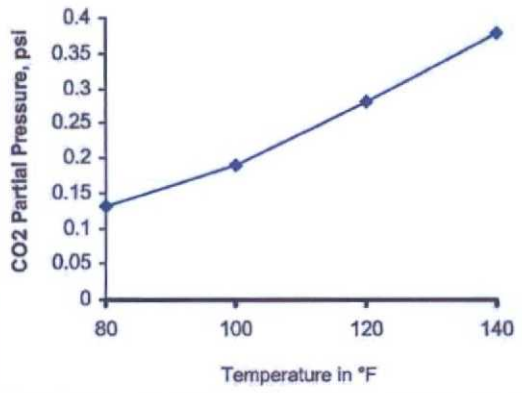
Gypsum - CaSO4*2H20



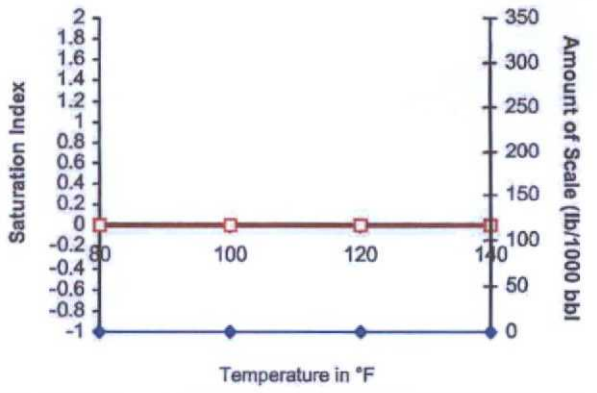
Anhydrite - CaSO4



Carbon Dioxide Partial Pressure



Celestite - SrSO4



LABORATORY SERVICES
Natural Gas Analysis

www.permianls.com

575.397.3713 2609 W Marland Hobbs NM 88240

For:	Cimarex Energy	Sample:	Sta. # 309588438
	Attention: Mark Cummings	Identification:	Taos Fed. #3 Sales
	600 N. Marienfeld, Suite 600	Company:	Cimarex Energy
	Midland, Texas 79701	Lease:	
		Plant:	

Sample Data:	Date Sampled	7/2/2014	10:30 AM		
	Analysis Date	7/9/2014			
	Pressure-PSIA	83		Sampled by:	K. Hooten
	Sample Temp F	76.4		Analysis by:	Vicki McDaniel
	Atmos Temp F	76			

H2S =

Component Analysis

		Mol Percent	GPM
Hydrogen Sulfide	H2S		
Nitrogen	N2	0.618	
Carbon Dioxide	CO2	0.172	
Methane	C1	88.390	
Ethane	C2	7.080	1.889
Propane	C3	1.966	0.540
I-Butane	IC4	0.355	0.116
N-Butane	NC4	0.569	0.179
I-Pentane	IC5	0.198	0.072
N-Pentane	NC5	0.213	0.077
Hexanes Plus	C6+	0.439	0.190
		100.000	3.063

REAL BTU/CU.FT.		Specific Gravity	
At 14.65 DRY	1136.2	Calculated	0.6445
At 14.65 WET	1116.4		
At 14.696 DRY	1139.7		
At 14.696 WET	1120.3	Molecular Weight	18.6673
At 14.73 DRY	1142.4		
At 14.73 Wet	1122.6		

North Permian Basin Region
P.O. Box 740
Sundown, TX 79372-0740
(806) 229-8121

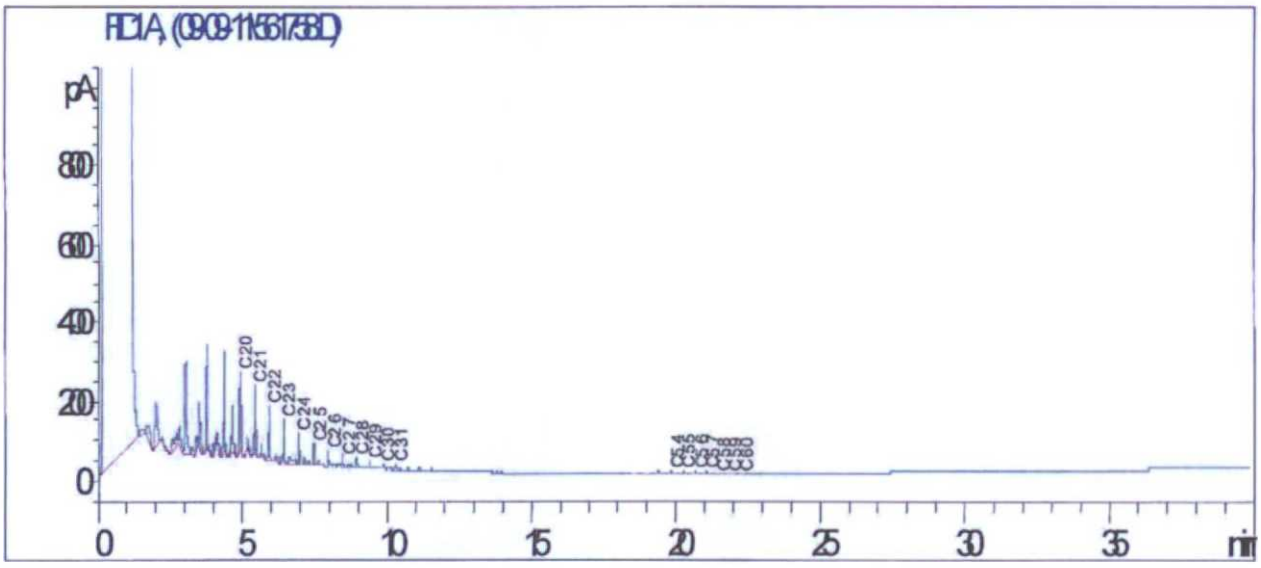
Lab Team Leader - Sheila Hernandez
(432) 495-7240

OIL ANALYSIS

Company:	CIMAREX ENERGY	Sales RDT:	33521
Region:	PERMIAN BASIN	Account Manager:	STEVE HOLLINGER (575) 910-9393
Area:	LOCO HILLS, NM	Analysis ID #:	5419
Lease/Platform:	TAOS FEDERAL LEASE	Sample #:	561758
Entity (or well #):	3	Analyst:	SHEILA HERNANDEZ
Formation:	UNKNOWN	Analysis Date:	09/13/11
Sample Point:	TANK	Analysis Cost:	$125.00
Sample Date:	08/24/11		

Cloud Point:	89 °F
Weight Percent Paraffin (by GC)*:	1.03%
Weight Percent Asphaltenes:	0.01%
Weight Percent Oily Constituents:	98.93%
Weight Percent Inorganic Solids:	0.03%

*Weight percent paraffin and peak carbon number includes only n-alkanes (straight chain hydrocarbons) greater than or equal to C20H42.



North Permian Basin Region
P.O. Box 740
Sundown, TX 79372-0740
(806) 229-8121
Lab Team Leader - Sheila Hernandez
(432) 495-7240

Water Analysis Report by Baker Petrolite

Company:	CIMAREX ENERGY	Sales RDT:	33521
Region:	PERMIAN BASIN	Account Manager:	STEVE HOLLINGER (575) 910-9393
Area:	CARLSBAD, NM	Sample #:	535681
Lease/Platform:	TAOS FEDERAL LEASE	Analysis ID #:	113272
Entity (or well #):	3	Analysis Cost:	$90.00
Formation:	UNKNOWN		
Sample Point:	SEPARATOR		

Summary	
Sampling Date:	09/28/11
Analysis Date:	10/13/11
Analyst:	SANDRA GOMEZ
TDS (mg/l or g/m3):	86836.7
Density (g/cm3, tonne/m3):	1.063
Anion/Cation Ratio:	1
Carbon Dioxide:	150 PPM
Oxygen:	
Comments:	
RESISTIVITY 0.083 OHM-M @ 75F	

Analysis of Sample 535681 @ 75 F

Anions	mg/l	meq/l	Cations	mg/l	meq/l
Chloride:	**52535.0**	**1481.82**	**Sodium:**	**28338.7**	**1232.66**
Bicarbonate:	**146.0**	**2.39**	**Magnesium:**	**417.0**	**34.3**
Carbonate:	**0.0**	**0**	**Calcium:**	**3573.0**	**178.29**
Sulfate:	**83.0**	**1.73**	**Strontium:**	**1472.0**	**33.6**
Phosphate:			**Barium:**	**22.0**	**0.32**
Borate:			**Iron:**	**34.0**	**1.23**
Silicate:			Potassium:	215.0	5.5
			Aluminum:		
Hydrogen Sulfide:		0 PPM	Chromium:		
pH at time of sampling:		6	Copper:		
pH at time of analysis:			Lead:		
pH used in Calculation:		**6**	Manganese:	1.000	0.04
			Nickel:		

Conditions		Values Calculated at the Given Conditions - Amounts of Scale in lb/1000 bbl										
Temp	Gauge Press.	Calcite $CaCO_3$		Gypsum $CaSO_4*2H_2O$		Anhydrite $CaSO_4$		Celestite $SrSO_4$		Barite $BaSO_4$		CO_2 Press
F	psi	Index	Amount	Index	Amount	Index	Amount	Index	Amount	Index	Amount	psi
80	0	-0.61	0.00	-1.46	0.00	-1.49	0.00	-0.05	0.00	1.22	11.59	1.14
100	0	-0.51	0.00	-1.51	0.00	-1.47	0.00	-0.07	0.00	1.04	10.94	1.44
120	0	-0.40	0.00	-1.54	0.00	-1.43	0.00	-0.07	0.00	0.89	10.30	1.76
140	0	-0.28	0.00	-1.57	0.00	-1.36	0.00	-0.06	0.00	0.75	9.66	2.07

Note 1: When assessing the severity of the scale problem, both the saturation index (SI) and amount of scale must be considered.

Note 2: Precipitation of each scale is considered separately. Total scale will be less than the sum of the amounts of the five scales.

Note 3: The reported CO_2 pressure is actually the calculated CO_2 fugacity. It is usually nearly the same as the CO_2 partial pressure.

Natural Gas Analysis Report
AKM Measurement Services

Sample Information

	Sample Information
Sample Name	Federal 13-4 (309588228)
Sample Notes	0 PPM H2S (RYAN)
Injection Date	2015-04-07 00:35:30

Component Results

Component Name	Norm%	GPM (Dry) (Gal. / 1000 cu.ft.)
Nitrogen	0.5574	0.000
Methane	97.3045	0.000
CO2	0.9474	0.000
Ethane	0.9072	0.243
H2S	0.0000	0.000
Propane	0.1132	0.031
iso-Butane	0.0094	0.003
n-Butane	0.0084	0.003
iso-Pentane	0.0206	0.008
n-Pentane	0.0243	0.009
Hexanes Plus	0.1076	0.047
Water	0.0000	0.000
Total:	100.0000	0.343

Results Summary

Result	Dry	Sat.
Pressure Base (psia)	14.730	
Flowing Temperature (Deg. F)	72.0	
Flowing Pressure (psia)	70.0	
Gross Heating Value (BTU / Real cu.ft.)	1014.0	996.7
Relative Density (G), Real	0.5758	0.5768
Total GPM	0.343	0.437
Total Molecular Weight	16.649	16.673

South Permian Basin Region
10520 West I-20 East
Odessa, TX 79765
(432) 498-9191
Lab Team Leader - Sheila Hernandez
(432) 495-7240

Water Analysis Report by Baker Petrolite

Company:	CIMAREX ENERGY	Sales RDT:	44203
Region:	PERMIAN BASIN	Account Manager:	MIKE EDWARDS (505) 631-9312
Area:	HOBBS, NM	Sample #:	452187
Lease/Platform:	FEDERAL '13' COM UNIT	Analysis ID #:	81247
Entity (or well #):	4	Analysis Cost	$80.00
Formation:	UNKNOWN		
Sample Point:	WATER TANK		

Summary	
Sampling Date:	4/11/08
Analysis Date:	4/16/08
Analyst:	KIMBERLY POOLE
TDS (mg/l or g/m3):	662.8
Density (g/cm3, tonne/m3):	1.001
Anion/Cation Ratio:	0.9999992
Carbon Dioxide:	50 PPM
Oxygen:	
Comments:	
SAMPLE RECEIVED ACIDIC	

Analysis of Sample 452187 @ 75 °F

Anions	mg/l	meq/l
Chloride:	**319.0**	**9.**
Bicarbonate:	**0.0**	**0.**
Carbonate:	**0.0**	**0.**
Sulfate:	**88.0**	**1.83**
Phosphate:		
Borate:		
Silicate:		
Hydrogen Sulfide:		< 10 PPM
pH at time of sampling:		5.4
pH at time of analysis:		
pH used in Calculation:		**5.4**

Cations	mg/l	meq/l
Sodium:	**185.0**	**8.05**
Magnesium:	**2.5**	**0.21**
Calcium:	**21.0**	**1.05**
Strontium:	**1.5**	**0.03**
Barium:	**0.1**	**0.**
Iron:	**30.0**	**1.08**
Potassium:	15.0	0.38
Aluminum:		
Chromium:		
Copper:		
Lead:		
Manganese:	0.700	0.03
Nickel:		

Conditions		Values Calculated at the Given Conditions - Amounts of Scale in lb/1000 bbl										
Temp	Gauge Press.	Calcite $CaCO_3$		Gypsum $CaSO_4 * 2H_2O$		Anhydrite $CaSO_4$		Celestite $SrSO_4$		Barite $BaSO_4$		CO_2 Press
°F	psi	Index	Amount	Index	Amount	Index	Amount	Index	Amount	Index	Amount	psi
80	0	-7.46	0.00	-2.18	0.00	-2.25	0.00	-1.62	0.00	0.30	0.00	0
100	0	-7.25	0.00	-2.17	0.00	-2.18	0.00	-1.59	0.00	0.16	0.00	0
120	0	-7.07	0.00	-2.16	0.00	-2.08	0.00	-1.56	0.00	0.05	0.00	0
140	0	-6.91	0.00	-2.13	0.00	-1.96	0.00	-1.51	0.00	-0.03	0.00	0

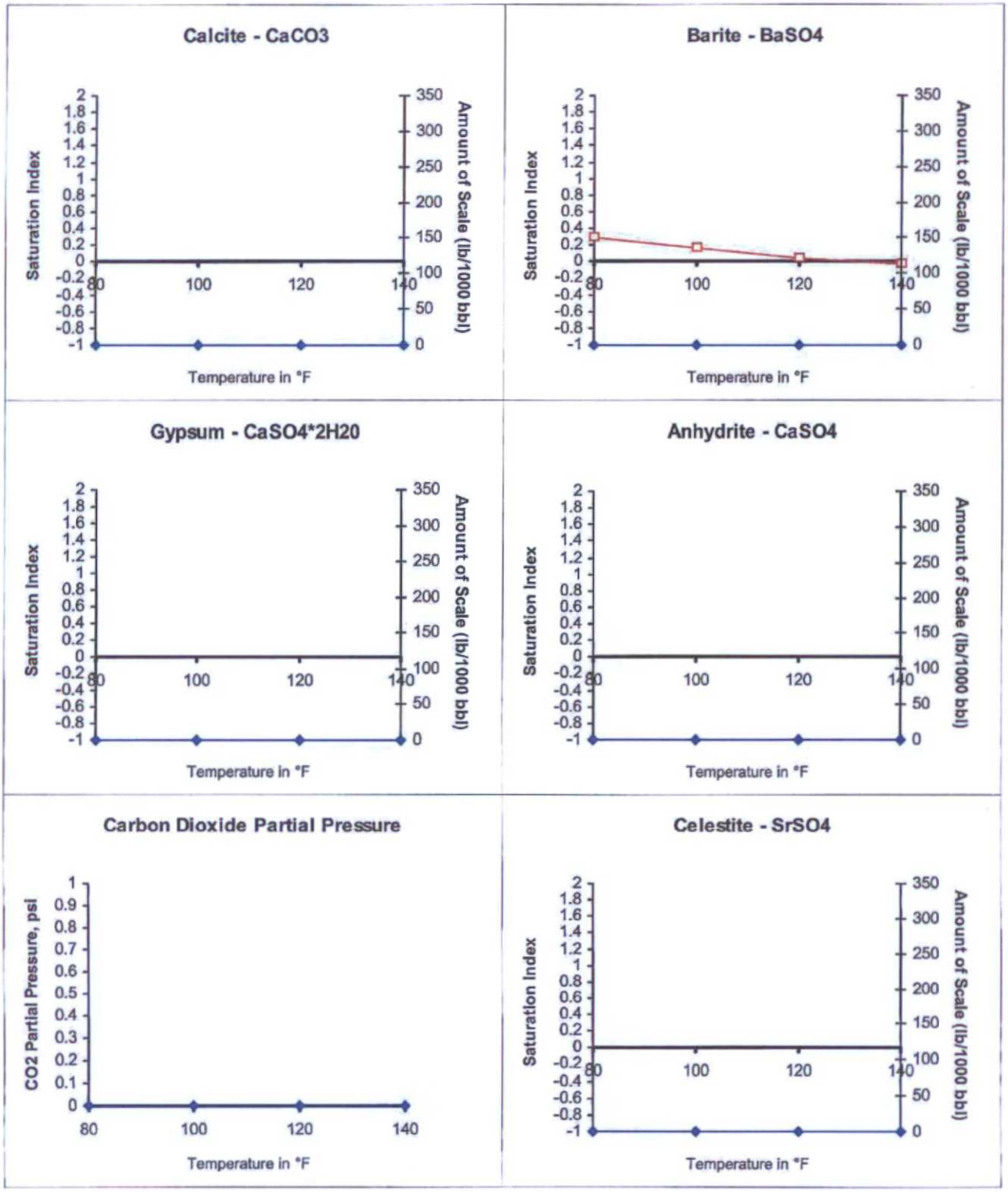
Note 1: When assessing the severity of the scale problem, both the saturation index (SI) and amount of scale must be considered.

Note 2: Precipitation of each scale is considered separately. Total scale will be less than the sum of the amounts of the five scales.

Note 3: The reported CO2 pressure is actually the calculated CO2 fugacity. It is usually nearly the same as the CO2 partial pressure.

Scale Predictions from Baker Petrolite

Analysis of Sample 452187 @ 75 °F for CIMAREX ENERGY, 4/16/08

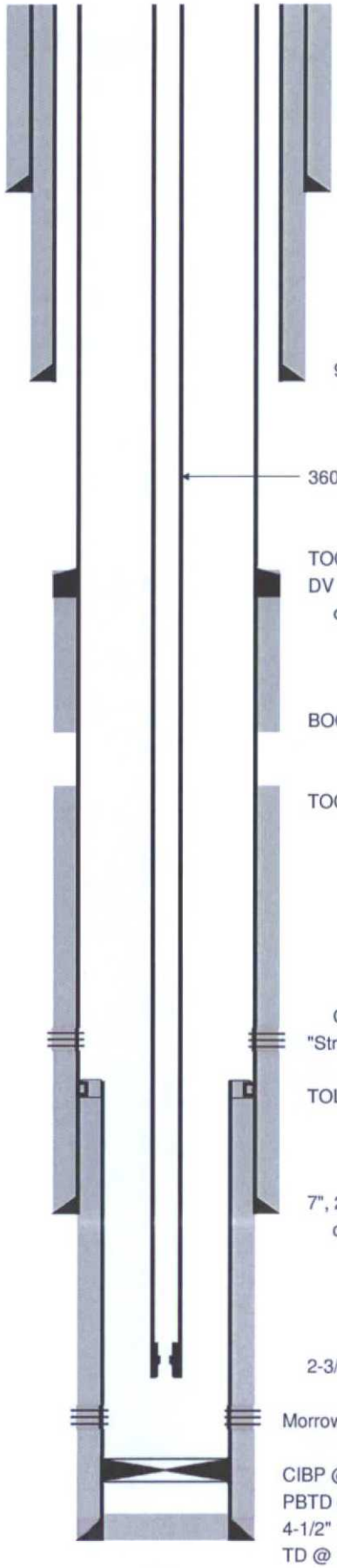


Current WBD

KB - 23' above GL

Cimarex Energy Co. of Colorado
Chosa Draw 27 Federal Com #1
SHL - 330' FNL & 1980' FEL
BHL - 1817' FNL & 1613' FEL
Sec. 27, T-25-S, R-26-E, Eddy Co., NM
S. Gengler/DP 03/10/2010; 7/7/14

DIRECTIONAL WELL>20 deg 9370-TD



13-3/8", 48 & 54.5# H-40 & J-55 csg @ 431'
cmtd w/ 490 sx, cmt circ

9-5/8", 40# NS-110HC csg @ 3200'
cmtd w/ 1050 sx, cmt circ

360 jts 2-3/8" 4.7# L-80 tbg

TOC @ 5448' per CBL
DV Tool @ 5448'
cmtd w/ 400 sx

BOC @ 7196' per CBL

TOC @ 7956' per CBL

Cisco or
"Strawn" perfs (10372' - 10412')

TOL @ 10492'

7", 26# P-110HC csg @ 10745'
cmtd w/ 550 sx

2-3/8" SN @ 11737'

Morrow perfs (11836' - 12233')

CIBP @ 12267'
PBTD @ 12287'
4-1/2" 11.6# P-110 @ 12300' cmtd w/ 160 sx
TD @ 12300'

Printed 5/20/2016

CIMAREX

Proposed WBD

KB - 23' above GL

Cimarex Energy Co. of Colorado

Chosa Draw 27 Federal Com #1

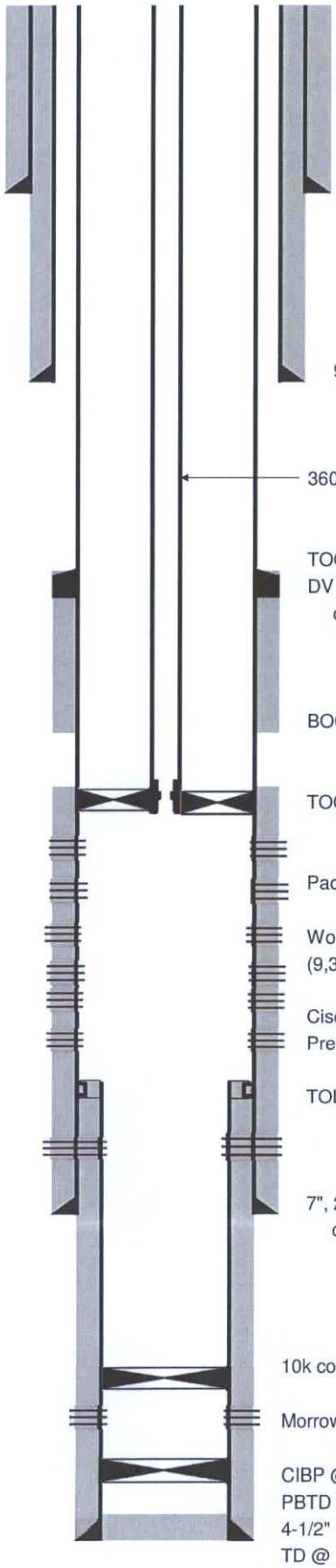
SHL - 330' FNL & 1980' FEL

BHL - 1817' FNL & 1613' FEL

Sec. 27, T-25-S, R-26-E, Eddy Co., NM

M. Karner 05/20/16

DIRECTIONAL WELL>20 deg 9370-TD



13-3/8", 48 & 54.5# H-40 & J-55 csg @ 431'
cmtd w/ 490 sx, cmt circ

9-5/8", 40# NS-110HC csg @ 3200'
cmtd w/ 1050 sx, cmt circ

360 jts 2-3/8" 4.7# L-80 tbg

TOC @ 5448' per CBL
DV Tool @ 5448'
cmtd w/ 400 sx

BOC @ 7196' per CBL

TOC @ 7956' per CBL

Packer Depth 8,520'

Wolfcamp perfs (8,570' - 8,769'), (8,825' - 9,020'),
(9,338' - 9,497'), (9,543' - 9,728'), and (9,763' - 9,950')

Cisco Canyon perfs (10,082' - 10,318'), (10,372' - 10,642')
Previous Cisco Canyon perfs (10372' - 10412')

TOL @ 10492'

7", 26# P-110HC csg @ 10745'
cmtd w/ 550 sx

10k composite flow through plug @ 11,886'

Morrow perfs (11836' - 12233')

CIBP @ 12267'
PBTD @ 12287'
4-1/2" 11.6# P-110 @ 12300' cmtd w/ 160 sx
TD @ 12300'

Printed 5/20/2016

Purpose

The present production allocation field study has been conducted by Cimarex Energy for the U.S. Bureau of Land Management (BLM) in support of the commingling applications for the company's upcoming Ciscamp completion program in the White City area. Cimarex is seeking BLM's consideration and acceptance of the herein recommended production allocation methodology, as well as, the approval of the commingling permit and proposed allocation factors for the Chosa Draw 27 Federal 1 (API: 30-015-32918) upcoming recompletion.

Scope

The prospective area of interest (AOI) is located in and around Cimarex's White City field area, in Eddy County, New Mexico. The area is specifically centered within Township 22S, Range 24E (T22S-R24E) and Township 25S, Range 28E (T25S-R28E) as shown in Exhibit 1. The main completion targets are the Cisco Canyon and the Wolfcamp formations, widely known as "Ciscamp" when completed together. Cimarex has approximately 46 prospective Ciscamp vertical well recompletions within its leasehold in the AOI (Exhibit 6A and 6B). Of these, 36 wells are located in the heart of White City, mostly within T24S-R26E and T25S-R26E (Exhibit 6C).

Introduction

Allocation of hydrocarbons producing together from different geologic sources of supply and sharing the same wellbore (commingling) has always been an important part of the petroleum industry. This practice is defined as the process of assigning the portions of the total commingled stream to each contributing formation. Allocation has many benefits (e.g. allows for the optimization of production resources, and the maximization and acceleration of oil and gas recovery), but it also has several challenges that need to be addressed in order to minimize data uncertainty. This study assesses how allocation factors have been established in the past in the study area and how well it ties to individually measured performance. The study also recommends an alternative suitable allocation method that addresses the known challenges and captures reservoir properties and reserves potential of each formation. Transparency and regulatory compliance are also fundamental criteria considered in the proposed methodology.

Objective

The objective of this study is to develop and recommend a sound production allocation *methodology for commingled Cisco Canyon and Wolfcamp completions. The approach* incorporates formation quality and/or potential reserves expectations validated and adjusted using zonal production and/or test data. The ultimate goal is to protect both royalty and working interest owners by maximizing the enhanced ultimate recovery of oil, gas and NGLs from the prospective wells, while also reducing uncertainty of zonal cumulative production data.

Eventually, more accurate production records translates into better hydrocarbon exploration and exploitation practices and results, as it enables for the proper assessment of drainage and depletion in the zones of interest.

Highlights

There are more than 10 vertical wells currently completed in the Ciscamp within the AOI. In addition, Cimarex plans to recomplete more than 40 additional wells in the Ciscamp in the next 5 years. The average enhanced ultimate recovery (EUR) from analogs in the area is: 1.6 BCF, 42 MBO and 86 MBBls of NGL per well; or approximately 74 BCF, 1.9 MMBO, 3.9 MMBBls of NGL for the 46-well recompletion program. The next proposed Ciscamp recompletion is the Chosa Draw 27 Federal 1. Details of this opportunity are discussed later in this report.

As shown in this study, the ability to simultaneously complete and produce the target formations from the start further enhances ultimate hydrocarbon recovery and significantly increases the feasibility of the Cimarex's proposed multi-well recompletion program.

Challenges of Allocation of Wellbore Commingled Production

Correct contribution allocation determination is critical as it affects gas reserves assessment and future reservoir development. However, implementing the proper methodology for such allocation can be difficult. Production logging surveys (PLS) can be used to estimate the right production contribution by zone; however, the estimation obtained from such surveys is only valid for steady-state reservoir and wellbore flow conditions and at a particular decline period in the life of the well. During normal reservoir depletion, the parameters affecting production allocation can change with time depending on multiphase flow regime, pressure and formation properties and completed flow units' deliverability. Combination of stimulated and no or barely stimulated zones also pose a challenge. Therefore, reservoir quality parameters and reserves potential could be a useful toolbox to establish and further adjust production allocation factors, when combined with production logs, or when possible, individual flow tests.

Handling of Existing Rate Contribution from Proven Developed Producing (PDP) Zone(s)

In cases when the current producing (PDP) zone(s) in a proposed recompletion has or have attractive remaining reserves, the operator will make its best effort not to abandon such zone(s) via temporary or flow-through composite bridge plug. In these cases, and for each of the produced hydrocarbon streams, Total Flowrate is given by:

Total Well Flowrate = New Completion Zone(s) Flowrate + PDP Zone(s) Flowrate **(Eq.1.1)**

where the **PDP Zone(s) Flowrate** can be established using its/their historic production trend or via Production Logging Survey (PLS), once production from this or these zone(s) has or have been re-established, drilled-out CBP or confirmed by PLS, by following the herein proposed allocation procedure.

In terms of % Allocation Contribution Factors:

Total (100%) Well Contribution = % Contribution from Cisco Canyon + % Contribution from Wolfcamp + % Contribution from PDP Zone(s) **(Eq.1.2)**

In those cases where the existing PDP Zone(s) is or are abandoned or non-productive, then:

Flowrate or % Contribution from PDP Zone(s) = 0

Total Well Flowrate = Cisco Canyon Flowrate + Wolfcamp Flowrate **(Eq.1.3)**

or in terms of % Contribution:

Total (100%) Well Contribution = % Contribution from Cisco Canyon + % Contribution from Wolfcamp **(Eq.1.4)**

Proposed Initial Production Allocation Methodology for New Completion Zone(s)

A comprehensive allocation procedure for the New Completion Ciscamp Zone(s) has been developed and is herein proposed for BLM's approval consideration (see Figure 1). The proposed approach honors the Remaining Recoverable Gas In Place (**RRGIP**) of each new target formation (in case it has prior cumulative production) and provides a path to further validate or adjust the established allocation factors (Figure 2). Incorporating reservoir quality and expected recovery into the allocation formula mitigates data uncertainty caused by short-term and unstable wellbore conditions during initial frac flowback period. This approach more accurately captures the potential reserves contribution by each of the wellbore-commingled formations during the well lifespan rather than the rate contribution during a short production timeframe. **Figure 1** describes the proposed allocation procedure to be applied to establish the contribution from the ***New Completion Zone(s).***

Further Validation and Adjustment of Allocation Factors and Zonal Flowrates

Cimarex is proposing a clear path to further validate and/or adjust the initial or currently established allocation factors, if or when needed. This process, described in Figure 2, consists of monitoring well performance, running a Production Log Survey (PLS) within the first six months of the downhole commingling after the frac load recovery period; and also later if necessary.

Figure 1: Process Flowchart for Calculation of Initial Production Allocation Factors (for the New Completion Zone(s)

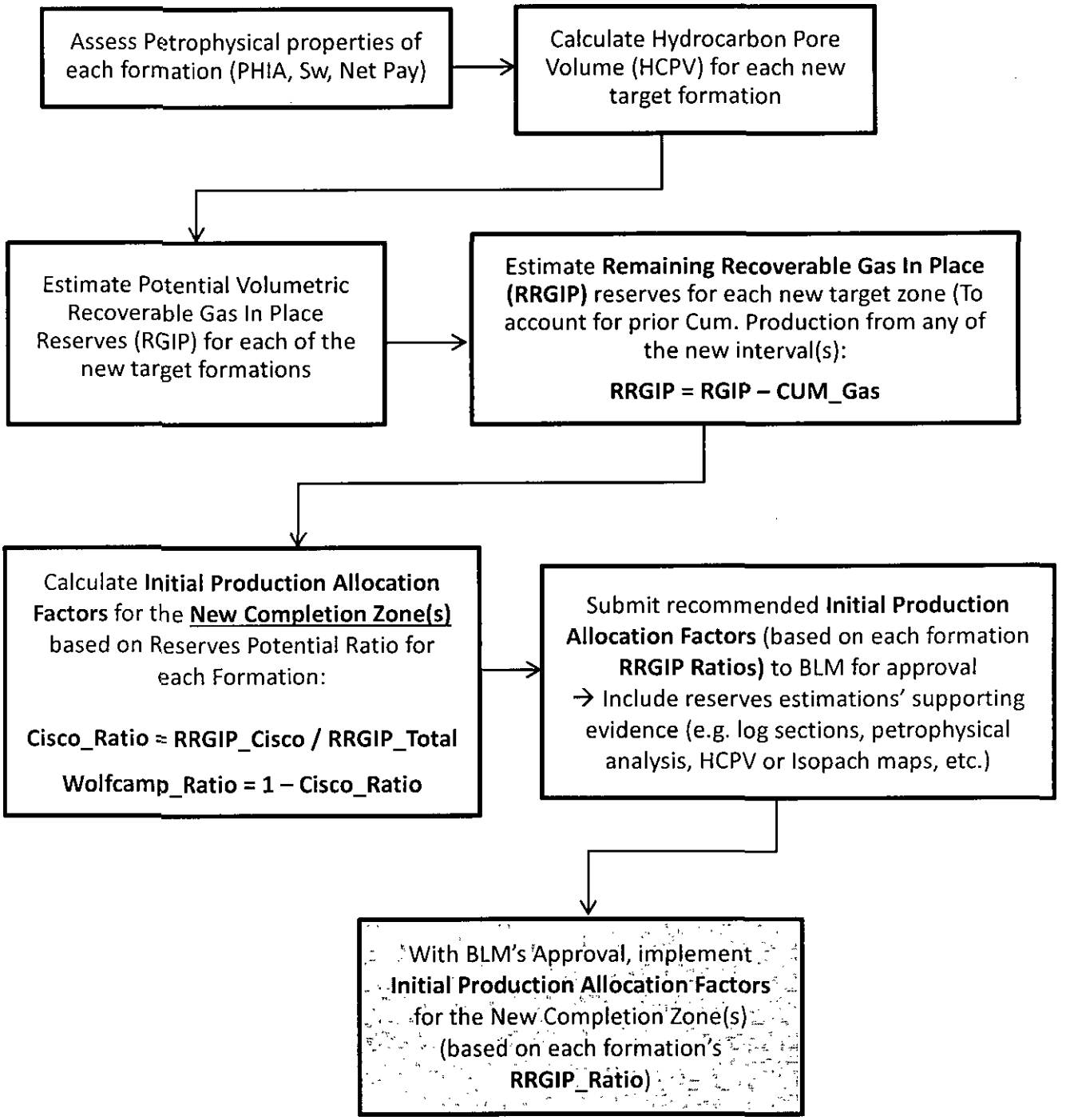
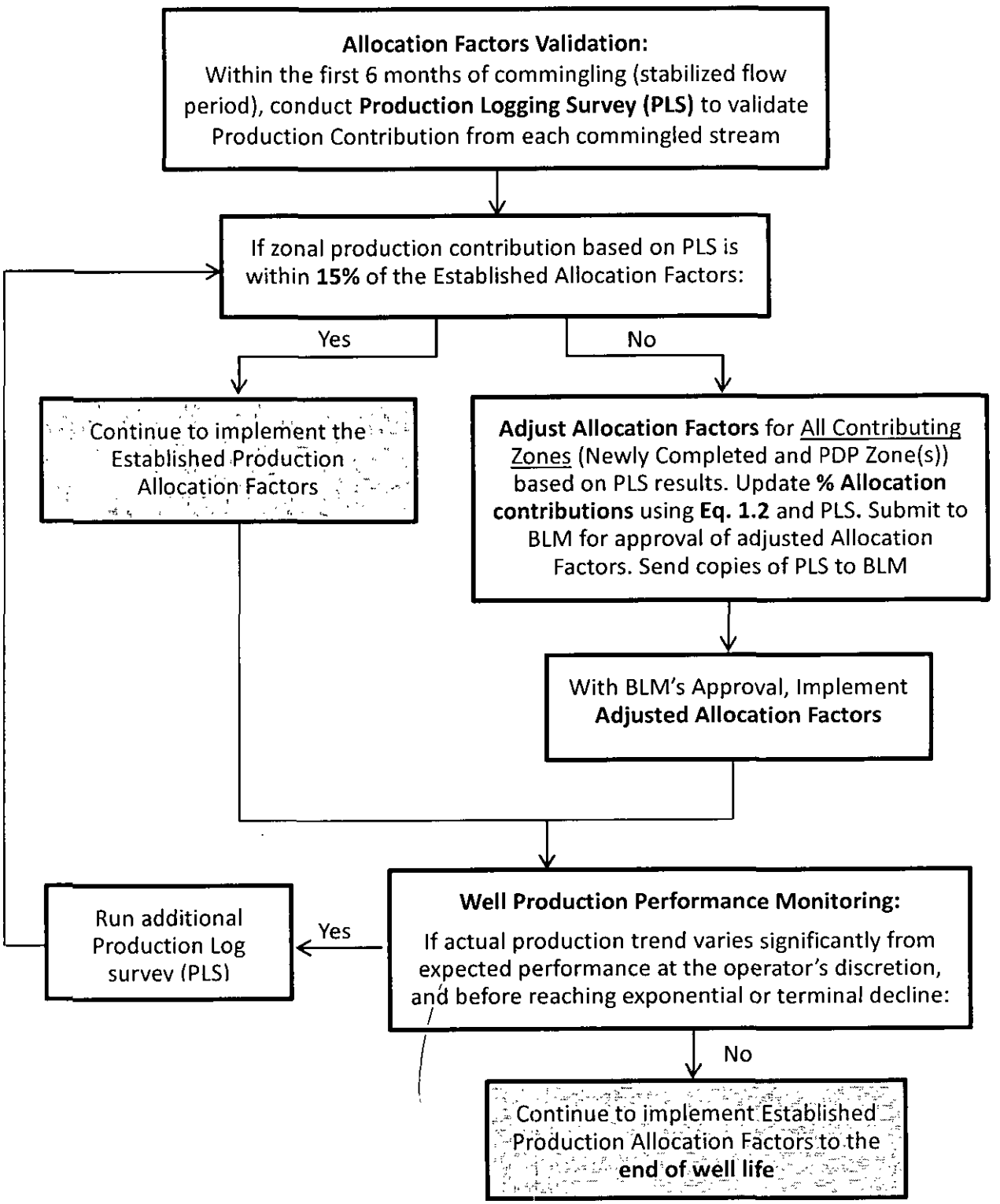


Figure 2: Process Flowchart for Validation and Adjustment of Production Allocation Factors



Verification and Justification of the Proposed Allocation Methodology

Following the herein proposed contribution allocation procedure, the ratio of production flowrate from an individual zone to the total well production flowrate should be proportional to the ratio of Remaining Recoverable Gas in Place (RRGIP) of that zone (Zone A) to the Total RRGIP for the combined zones, as follows:

$$Zone\ A\ Prod.\ = \frac{Zone\ A\ Measured\ Flowrate, MCFD}{Total\ Well\ Meas.\ Flow\ Rate, MCFD} \gg \frac{Zone\ A\_RRGIP}{Total\_RRGIP} = \boldsymbol{Zone\ A\ Alloc.\ Factor}\ \ (\boldsymbol{Eq.}\ 2)$$

The validity of this proposed allocation formula (Eq. 2) can be tested using, for example, independently measured production data recorded during a stable flow conditions from each the Cisco Canyon and the Wolfcamp formations in a well or group of analog wells. Similarly, remaining recoverable reserves (RRGIP) calculations should be estimated around such analog wells to then be used in the allocation model along with the measured flowrate ratios.

Methodology Validation Case Study:

A good Ciscamp analog illustration in the AOI is the Trinity 20 Federal 1 (API: 3001534521) that was recompleted in September 2014. For over a year and before the downhole commingling, each reservoir produced separately up tubing and the annular space and each individual contribution was recorded. During this period, the production performance was very unstable and erratic at times, especially in the Cisco Canyon, which was struggling to flow and showed clear signs of liquid loading. However, there are still several shut-in for build-up periods followed by days of steady production flow. In October 2015, and for a little over 20 continuous days, the Cisco produced at an average stable average rate of 125 MCFD (10.2%) and the Wolfcamp produced an average of 1,095 MCFD (89.8%), for a total combined average rate of 1,220 MCFD (see Exhibit 16A).

At the same time, the total estimated RRGIP near this well are 5,075 MMCF, with 560 MMCF (11%) and 4,515 MMCF (89%) projected for the Cisco Canyon and the Wolfcamp BCDE respectively. The following table summarizes the volumetric recoverable reserves estimations and calculated petrophysical parameters.

Current Completed Zone(S)	Adj. Alloc. Factor, %	Prod. Start Date	Cum. Gas, MMCF	% Cum Production Contrib.	OGIP, MMCF	RRGIP @ 85% RF, MMCF	Estim. % Prod. Allocation based on RRGIP Ratio	Net Pay, h (ft)	Avg. PHI	Avg. Sw	HCPV (1-Sw)*PHI*h
Cisco Canyon	*10.0%*	*9-14*	*54*	*5.1%*	*661*	*562*	*11.1%*	*35.5*	*0.146*	*0.159*	*4.36*
Wolfcamp BCD & E	90.0%	9-14	1,022	94.9%	5,312	4,515	88.9%	348.0	0.123	0.175	35.31
Total:	**100.0%**		**1,076**	**100.0%**	**5,973**	**5,077**	**100.0%**	**383.5**	**0.135**	**0.167**	**39.7**

Using the allocation equation (Eq. 2) and substituting the terms with actual production flowrates measured independently by zone and the estimated RRGIP for the Wolfcamp BCDE and the Cisco Canyon, results in:

Wolfcamp BCDE Allocation Factor:

$$\underbrace{89.8\%}_{\text{Actual Measured Contribution Factor}} = \underbrace{\frac{1{,}095\ MCFD}{1{,}220\ MCFD}}_{\text{Measured Prod. Rates}} \gg \underbrace{\frac{4{,}515\ MMCF}{5{,}075\ MMCF}}_{\text{Estim. Remaining Recoverable Reserves}} = \underbrace{89.0\%}_{\text{Predicted Contribution (proposed Allocation Factor)}}$$

Cisco Canyon Allocation Factor:

$$Cisco\ Canyon\ Prod.\ Allocation\ Factor = 100 - Wolfcamp\ Prod.\ Allocation\ Factor$$

$$\%\ Alloc.\ Factor = 100\% - 89.8\% = \mathbf{10.2\%}$$

As can be observed, Actual Measured Flowrate Contribution Ratio is proportional to the Reserves Ratio (Predicted Contribution Ratio) of the zone of interest. The currently established allocation factors in the Trinity 20 Federal 1 well are indeed 90% for the Wolfcamp BCDE and 10% for the Cisco Canyon, ***matching closely the results obtained using the proposed reserves ratio methodology.***

The RRGIP (RGIP – Cum Gas) is calculated using a Hydrocarbon Pore Volume (HCPV) assessment, an estimated drainage area of 10 acres, and an 85% recovery factor. The used net pay cut-offs are Avg. PHI > 10% and Sw < 25%. The HCPV, defined as hydrocarbon saturation (1-Sw) * Average porosity (PHIA) * Net Pay (h), has been mapped honoring offset subsurface data in the area and geologic interpretation (Exhibits 7 and 8). If the proposed commingling intervals have no prior cumulative production, then **RRGIP = RGIP**.

Alternative Validation of Estimated Allocation Factors

An alternate validation method of the proposed allocation factors can also be implemented using RRGIP ratios tied to historically established Allocation Factors in five nearby Ciscamp Analogs in the area, which are based on production logging and in a few cases, on individual zonal production. These factors have been, in some cases, adjusted through time, based on newly obtained production logging data (see Exhibit 11).

The alternate method is not intended for establishing the Initial Allocation Factors, but rather, as a means to confirm and/or further adjust the established allocation factors when no zonal test or production logs are available for any valid reason.

The approach is based in a correlation of historically established Cisco Canyon cumulative allocation factors and Hydrocarbon Pore Volume (HCPV) or RRGIP in the five Ciscamp analogous wells (Exhibits 13 and 14). RRGIP is preferred as it accounts for any prior cumulative production in a given well (Exhibit 12) including rock quality. There is a very good fit in the correlation between % Cisco Established Allocation Factors and RRGIP, with over 93% fit. (Exhibit 14)

The five Ciscamp analog wells were chosen due to their proximity and similarity of completion and formation properties as many of the prospective Ciscamp recompletions in the area. There are also a few solo Cisco Canyon and solo Wolfcamp vertical producers in the area that could provide additional insights on the production performance of such wells and reservoir thickness and quality. Map location, log cross-section, and production performance curves are included in Appendix B and C, as requested by BLM.

Commingling Considerations

For the most part, well spacing in the proposed commingling formations is the same, as well as public interest. Formations to be commingled are both sweet and have the same pore pressure gradient (~0.45 psi/ft). Both zones are located structurally right on top of the other. As shown in the stratigraphic cross section in Exhibit 9, the Cisco Canyon sits right below the Wolfcamp and above the Strawn intervals at an average depth of 10,400 ft. The datum depth of the Wolfcamp is approximately 9,600 ft. and is composed of the A, B, C, D and E intervals; some of which are undeveloped in parts of the field. In general, the deeper Cisco Canyon reservoir has lower rock quality development and lower productivity, making commingled completions cost-effective and justified to enable developing its reserves.

Early Commingling Justification

The Cisco Canyon combined with the Wolfcamp formation have been historically successful recompletion targets in the AOI. One of the main reasons of this success has been the ability to complete and flowback both formations together from the beginning. Specially because, in many cases, the wells have 7" casing which further prevents the well to naturally flow up the annular space, as the gas flow velocities in the annulus are far below the critical rate (see example in Exhibits 4 and 5). Even in smaller wellbores, dual-completions are not as efficient, resulting in lifting energy loss and the inability to optimize artificial lift. Therefore, completing and commingling both zones and installing artificial lift equipment from the start facilitates faster frac load flowback and improves reserves recovery efficiency, minimizing formation damage and

extending the life of the well. Stimulation of the two zones back-to-back is also cost efficient, as well as, practical to flowback and operate. Besides, the synergy between both zones enhances unloading efficiency and ultimately the recovery of hydrocarbons from both reservoirs, especially that of the deeper and tighter Cisco Canyon. On the other side, the inability to complete and commingle these zones from the start, in most cases, will discourage pursuing the Cisco Canyon, potentially leaving behind average reserves of over 500 MMCF, 12 MBO and 26 MBBls of NGL.

An example of commingling synergy and enhanced lifting capacity can be observed in the Trinity 20 Federal 1 Ciscamp producer. This well was recompleted in the Cisco and the Wolfcamp zones in September 2014 and both streams were produced independently for more than a year. The Cisco was flown through tubing while the Wolfcamp flowed through the annulus. A total average rate 1,013 mcf/d was produced right before commingling, with only nearly 10% of this gas contributed by the Cisco Canyon during the stand-alone period. As can be seen in Exhibit 16A, production from the Cisco Canyon was unstable and erratic throughout this flow period, with clear indication of fluid loading and severe slugging. After commingling both zones by the end of 2015, the combined stream averaged 1,380 mcf/d, a gas rate increase of over 36%. The contribution from the Cisco more than doubled, but more importantly, the overall production decline rate was flattened (Exhibit 16A and 16B), resulting in extended well lifespan and added hydrocarbon reserves uplift, besides cost effective operations.

Next Proposed Ciscamp Recompletion - Chosa Draw 27 Federal 1

Cimarex plans to recomplete the Chosa Draw 27 Federal 1 well (API: 30-015-32918) to the Lower and Middle part of the Cisco Canyon and the Wolfcamp. The well is located 330' FNL & 1980' FEL, Sec. 27, T25S-R26E, and has mainly produced from a highly permeable carbonate interval in the upper part of the Cisco Canyon, with a slight contribution from the Morrow. The upper Cisco was stimulated with a small acid job (not frac'd). Cumulative production to date is 496 MMCF, of which 485 MMCF are attributed to the Upper Cisco Canyon. The well is blown down once per month and makes approximately 85 MCF/month (See Exhibit 1). The new Cisco Canyon and Wolfcamp zones will be added to the existing producing ones. The Morrow will be isolated with a flow-thru composite bridge plug to allow for future production contribution. The proposed Ciscamp recompletion will be performed with 7-stage frac job, two of which will be in the Cisco Canyon (See Exhibit 3). A detailed recompletion and workover procedure is included in **Appendix D**.

Cimarex plans to commingle both zones immediately after completion. Commingling these formations from the beginning will ultimately allow for more efficient artificial lift and faster frac flowback recovery; in turn, minimizing formation damage and increasing recovery by extending

the life of the well. As observed earlier in the Trinity 20 Federal 1 case (Exhibit 16A), the commingling synergy between the Ciscamp streams will significantly improve liquid unloading by maintaining higher and more stable critical velocities for an extended period.

With the ability to commingle production from these formations, the remaining recoverable reserves are expected to be 368 MMCF and 1,409 MMCF from the Cisco Canyon (Middle and Lower) and the Wolfcamp BCD respectively (1,777 MMCF total). Total associated oil and NGL reserves are 54 MBO and 95 MBbls of NGL respectively (See Exhibit 15). In this case, the well spacing in both formations is the same (320 acres), as well as public interests (100% working interest and 79.375002% net royalty interest). Both formations are sweet.

Proposed Initial Production Allocation Factor for the Chosa Draw 27 Federal 1

Based on the herein proposed Allocation Methodology, the **Initial Allocation Factors** for the New Completion Zones are estimated as follows:

$$\boldsymbol{Wolfcamp\ \%\ Alloc.Factor} = \frac{1{,}409\ MMCF}{1{,}777\ MMCF} = \mathbf{79\%}$$

$$\boldsymbol{Cisco\ Canyon\ \%\ Alloc.Factor} = 100\% - 79\% = \mathbf{21\%}$$

Cimarex intends to set a flow-through composite bridge plug 50'-100' uphole of the current deeper producing zone (Morrow) in order to allow for future recovery of any remaining reserves in this zone, while also eliminating the concern of potential reserves loss due to cross-flow caused by depletion. Because this Morrow (PDP) zone already has an established production trend, the amount of production from this formation is expected to yield approximately 3 mcf per month. However this rate contribution will be confirmed via production log and following the herein proposed production allocation methodology to further adjust the PDP and the New Zones flowrate contributions using Eq. 1.2.

Recommendations

Based on the presented supporting evidence and potential benefits, Cimarex recommends BLM to consider granting:

1. *The acceptance of the proposed production allocation methodology developed in this study, to be implemented in future Ciscamp* completions in the scope area.

2. *The approval of the commingling permit for the* Chosa Draw 27 Federal 1 well *proposed Ciscamp recompletion, as wells as, the recommended initial allocation factors of **21%** for*

*the Cisco Canyon and **79%** for the Wolfcamp, based on the methodology developed in this study.*

Enclosed with this report are the "Downhole Commingling Applications" and supporting documents filed before BLM and the NMOCD.

Supporting Evidence and Exhibits Description

Exhibit 1 shows an area map for the offset Cisco Canyon and Wolfcamp recompletions near the Chosa Draw 27 Fed 1 indicated by the red star. It can be seen that the offset recompletions include the Liberty 24 Fed 2, Federal 13 Com 2, Federal 13 Com 3, Federal 13 Com 6, Gadwall 18 Fed Com 1, and Trinity 20 Fed Com 1.

Exhibit 2 shows the production from the Chosa Draw 27 Fed 1 throughout the life of the well. The production plot on the left side of the slide shows the production allocated to the Morrow zone, and the production plot on the right side of the slide shows the production allocated to the Cisco Canyon zone. The graph at the bottom of the slide summarizes the cumulative production from both zones by year.

The left wellbore diagram shown in Exhibit 3 is the current wellbore diagram for the Chosa Draw 27 Fed Com 1. The right wellbore diagram is the proposed wellbore diagram for the Chosa Draw 27 Fed Com 1. It can be seen from this wellbore diagram that the majority of the perfs for this recompletion (including all of the Wolfcamp perfs) will be in 7" casing. We also intend to run gas lift valves in this well, which would not be possible if we were to flow the Wolfcamp zone up the casing and produce the Cisco Canyon up the tubing.

Exhibit 4 shows the Coleman equation for critical rate. To the left is the hydraulic diameter and cross sectional area of 2-3/8" tbg, 2-7/8" tbg, a 4-1/2" csg x 2-3/8" tbg annulus, and a 7" csg x 2-3/8" tbg annulus. You can see from equation 3 that the critical gas flow rate is directly proportional to the cross sectional flow area indicated by the A in the numerator in equation 3.

Exhibit 5 shows the results of the Coleman equation for the Chosa Draw 27 Fed Com 1. Offset wells began flowing at 2,100 psi surface pressure (2,086 psi on the Trinity 20 Fed Com 1 specifically). At our expected IP of 2.096 MMCFD we would be significantly above critical rate in 2-3/8" tubing or in 2-7/8" tubing. In a 4-1/2" x 2-3/8" annulus we would be slightly below critical rate, and it is likely that we could get the well would flow, but the well would be slugging. However, in a 7" x 2-3/8" annulus we would be more than 4 times below what our critical rate needs to be, so there is no possible way that the well would flow.

Exhibit 6 shows the names of 46 additional wells in White City that could potentially be Ciscamp recompletions if the Chosa Draw 27 Fed Com 1 is successful.

Exhibit 7 shows a map of hydrocarbon pore volume (Hydrocarbon saturation multiplied by porosity multiplied by thickness) for the Cisco Canyon formation. This map also shows the location of the recompletions where Cisco Canyon and Wolfcamp are commingled. The net pay

cutoffs used to generate this map were average porosity > 10% and average water saturation < 25%.

Exhibit 8 shows a map of hydrocarbon pore volume for the Wolfcamp B, C, and D. Again, the net pay cutoffs used to generate this map were average porosity > 10% and average water saturation < 25%.

Exhibit 9 shows a cross section of the top of the Wolfcamp B to the top of the Strawn zones, whereas

Exhibit 10 shows the same cross section and wells zooming in from the top of the Cisco Canyon to the top of the Strawn zone in the nearby, analogous recompletions where the Cisco Canyon and Wolfcamp zones are commingled. These recompletions include the Chosa Draw 27 Fed Com 1, Liberty 24 Fed 2, Federal 13 Com 3, Federal 13 Com 2, Federal 13 Com 6, and Gadwall 18 Fed Com 1.

Exhibit 11 shows the API number, well name, current producing zones, starting production date, cumulative gas production allocated to the Cisco Canyon formation, cumulative gas production allocated to the Wolfcamp formation, total cumulative gas from both zones, and the allocation factor used. The bottom row shows the Chosa Draw 27 Fed Com 1 which began producing from the Cisco Canyon in February 2004 and has produced a cumulative 484,499 mcf.

Exhibit 12 shows each of the offset wells shown on the previous Exhibit, the date that the Cisco Canyon began production, the cumulative gas produced from the Cisco Canyon, the original gas in place, remaining gas in place at an 85% recovery factor, and remaining Cisco Canyon reserves based on a 10 acre drainage radius, 10% porosity cutoff, and 25% water saturation cutoff, the allocated gas volumes from the Cisco Canyon, and the net pay, average porosity, average water saturation, and hydrocarbon pore volume estimated from the hydrocarbon pore volume map. It can be seen from this exhibit that the remaining Cisco Canyon reserves is expected to be 368 MMCF, and is expected to yield an allocation factor of 23.5%.

Exhibit 13 shows a graph of the historically established Cisco Canyon production allocation factor from Ciscamp analogs in the area on the y axis, and the hydrocarbon pore volume (HCPV) on the x axis.

Exhibit 14 shows a graph of the historically established Cisco Canyon production allocation factor from Ciscamp analogs in the area on the y axis, and the recoverable gas in place (RGIP) on the x axis. It can be seen that a linear trend fits this data within 93%. Because of this, we know that by

using hydrocarbon pore volume we can determine how much will be produced from the Cisco Canyon zone, and the remainder of the production must be allocated from the Wolfcamp zone.

Exhibit 15 shows volumetrics for the offset wells and Chosa Draw 27 Fed 1 that do not incorporate the results of production logs. It can be seen that these volumetrics yield that the Wolfcamp formation is expected to produce 1,409 MMCF, or 79% of the recoverable reserves from the well, while the Cisco Canyon will produce 368 MMCF, or 21% of the recoverable reserves from the well. This alternative approach based on a Cisco / Wolfcamp formation quality and Gas reserves in Place relationship further confirms that the allocation factor for the Cisco Canyon in subject well should be between 20 to 24%.

Exhibit 16 (A,B,C) shows individual production plots for the Cisco Canyon and Wolfcamp in the Trinity 20 Federal 1 well. It also includes a log cross-section of this wells and 2 other offsets.

APPENDIX: The Appendix contains the decline curves for the wells used in the analysis described previously (Ciscamp Analogous). The estimated ultimate recovery for each well was found using these decline curves. Also included are a few solo vertical Cisco and Wolfcamp producers in the area. Appendix D is the workover procedure for the Chosa Draw 27 Federal 1 Ciscamp recompletion.

EXHIBIT 15: Wolfcamp BCD Volumetric Reserves Estimation from HCPV Map – Ciscamp Analogs

UWI (APINum)	Well / Lease Name	Prod. Start Date	Cum. Gas: Wolfcamp, MCF	Wolfcamp BCD, % Allocated Cum Gas Volumes	Wolfcamp BCD OGIP, MMCF [1]	Wolfcamp BCD RGIP @ 85% RF, MMCF	Wolfcamp BCD Remaining Reserves, MMCF	WC BCD Net Pay, h @10% PHI; 25% Sw	WC BCD Avg. PHI @10% PHI; 25% Sw	WC BCD Avg. Sw @10% PHI; 25% Sw	WC BCD SOPHIh @10% PHI; 25% Sw	
30015337850000	FEDERAL 13 COM 3	Dec-09	409,237	72%	1,516	1,289	880	245.5	0.145	0.170	29.55	
30015333440000	FEDERAL 13 COM 2	Apr-10	330,804	68%	872	741	410	135.0	0.125	0.184	13.77	
30015365710000	FEDERAL 13 COM 6	Aug-10	313,898	71%	746	634	320	113.0	0.129	0.190	11.81	
30015334960000	GADWALL 18 FEDERAL COM 1	Jun-11	492,849	72%	989	840	348	164.5	0.134	0.201	17.61	
30015336830000	LIBERTY 24 FEDERAL COM 2	Oct-13	167,025	65%	1,300	1,105	938	206.0	0.137	0.184	23.03	
30015329180000	CHOSA DRAW 27 FED #1	Feb-04	0	79%	1,658	1,409	1,409	260.0	0.140	0.175	30.02	[2]

[1] Based on 5-acre drainage and Pay cut-offs @ PHI >10% & Sw < 25%

[2] Estimated from HCPV Map interpretation (No Resistivity or Density Open hole logs Available for most of the interval)

Remaining Recoverable Reserves (RRGIP):

- Cisco Canyon = 368 MMCF (21%)
- Wolfcamp = 1,409 MMCF (79%)
- Total = **1,777 MMCF**

Reservoir Parameters Used To Compute Recoverable Gas In Place (RGIP):

- Gas Compressibility Factor (Z)……: 0.81
- Recovery Factor (%)……: 85.00
- Estimated Drainage Area (acres)…: 5
- **Net Pay Cut-offs ……: PHIA >10% & SW < 25%**
- HCPV Map/Grid: based on extensive well control and geologic interpretation

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EXHIBIT 12: Cisco Canyon Volumetric Reserves Estimation from HCPV Map – Ciscamp Analogs

UWI (APINum)	Well / Lease Name	Cisco Prod. Start Date	Cum. Gas: Cisco, MCF	Cisco OGIP, MMCF [1]	Cisco RGIP @ 85% RF, MMCF	Cisco Remaining Reserves, MMCF	Cisco, % Allocated Cum Gas Volumes	CISCO Net Pay, h (ft)	CISCO Avg. PHI	CISCO Avg. Sw	CISCO HCPV, (1-Sw)*PHI*h	
30015337850000	FEDERAL 13 COM 3	Dec-09	157,493	**713**	**606**	449	**28%**	42.8	0.134	0.160	**4.82**	
30015333440000	FEDERAL 13 COM 2	Apr-10	153,167	**784**	**666**	513	**32%**	43.5	0.147	0.159	**5.38**	
30015365710000	FEDERAL 13 COM 6	Aug-10	128,211	**692**	**588**	460	**29%**	38.5	0.134	0.155	**4.36**	
30015334960000	GADWALL 18 FEDERAL COM 1	Jun-11	191,011	**652**	**554**	363	**28%**	37.2	0.144	0.169	**4.45**	
30015336830000	LIBERTY 24 FEDERAL COM 2	Oct-13	90,179	**974**	**828**	738	**35%**	56.0	0.141	0.150	**6.73**	
30015329180000	**CHOSA DRAW 27 FED #1**	Feb-04	484,499	**1,003**	**852**	**368**	**23.5%**	58.5	0.141	0.150	**7.01**	[2]

[1] Based on 10-acre drainage and Pay cut-offs @ PHI >10% & Sw < 25%

[2] Estimated from HCPV Map interpretation (No Resistivity or Density Open hole logs Available for most of the interval)

Reservoir Parameters Used To Compute Recoverable Gas In Place (RGIP):

- Gas Compressibility Factor (Z).....: 0.81
- Recovery Factor (%).....: 85.00
- Estimated Drainage Area (acres)...: 10
- **Net Pay Cut-offs .....: PHIA >10% & SW < 25%**
- HCPV Map/Grid: based on extensive well control and geologic interpretation

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NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

BILL RICHARDSON
Governor
Joanna Prukop
Cabinet Secretary

Mark E. Fesmire, P.E.
Director
Oil Conservation Division

ADMINISTRATIVE ORDER DHC-3390

Gruy Petroleum Management Company
P.O. Box 140907
Irving, TX 75014-0907

Attention: Zeno Farris

CHOSA DRAW 27 FEDERAL COM #001
API No. 30-015-32918
Unit B, Section 27, Township 25S, Range 26E, NMPM,
EDDY County, New Mexico
COTTONWOOD DRAW;UPPER PENN (G) (97354), and
WC COTTONWOOD DRAW; MORROW (G) (97377) Pools

Dear Mr. Farris:

Reference is made to your recent application for an exception to Rule 303.A. of the Division Rules and Regulations to permit the above-described well to commingle production from the subject pools in the wellbore.

It appearing that the subject well qualifies for approval for such exception pursuant to the provisions of Rule 303.C., and that 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 303C.(1)(f), the production attributed to any commingled pool within the well shall not exceed the allowable applicable to that pool.

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

COTTONWOOD DRAW;UPPER PENN (G) Pool	*Oil-0%*	*Gas-97%*
WC COTTONWOOD DRAW; MORROW (G) Pool	*Oil-0%*	*Gas-3%*

These percentages shall be amended only with written permission of the Division.

REMARKS: The operator shall notify the Artesia District Office of the Division upon implementation of commingling operations.

Pursuant to Rule 303C(2), the commingling authority granted herein may be rescinded by the Division Director if conservation is not being best served by such commingling.

Approved at Santa Fe, New Mexico on January 18, 2005.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MARK E. FESMIRE, P.E.
Director

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