

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENTNMOCD
ArtesiaFORM APPROVED
OMB NO. 1004-0137
Expires: January 31, 2018**SUNDRY NOTICES AND REPORTS ON WELLS**
*Do not use this form for proposals to drill or to re-enter an abandoned well. Use form 3160-3 (APD) for such proposals.*5. Lease Serial No.
NMLC065347

6. If Indian, Allottee or Tribe Name

7. If Unit or CA/Agreement, Name and/or No.

SUBMIT IN TRIPLICATE - Other instructions on page 2

1. Type of Well

☐ Oil Well ☒ Gas Well ☐ Other

8. Well Name and No.

ESTILL AD FEDERAL 2

2. Name of Operator

CIMAREX ENERGY COMPANY OF CO

Contact: AMITHY E CRAWFORD

Mail: acrawford@cimarex.com

9. API Well No.

30-015-33336-00-S1

3a. Address

202 S CHEYENNE AVE SUITE 1000
TULSA, OK 74103.4346

3b. Phone No. (include area code)

Ph: 432-620-1909

10. Field and Pool or Estill Area

WHITE CITY

+ Pur Ple SAGE W/Fld

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)

Sec 19 T24S R26E SENE 2270FNL 380FEL

11. County or Parish, State

EDDY COUNTY, NM

12. CHECK THE APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
<input checked="" type="checkbox"/> Notice of Intent	<input type="checkbox"/> Acidize	<input type="checkbox"/> Deepen	<input type="checkbox"/> Production (Start/Resume)	<input type="checkbox"/> Water Shut-Off
<input type="checkbox"/> Subsequent Report	<input type="checkbox"/> Alter Casing	<input type="checkbox"/> Hydraulic Fracturing	<input type="checkbox"/> Reclamation	<input type="checkbox"/> Well Integrity
<input type="checkbox"/> Final Abandonment Notice	<input type="checkbox"/> Casing Repair	<input type="checkbox"/> New Construction	<input checked="" type="checkbox"/> Recomplete	<input type="checkbox"/> Other
	<input type="checkbox"/> Change Plans	<input type="checkbox"/> Plug and Abandon	<input type="checkbox"/> Temporarily Abandon	
	<input type="checkbox"/> Convert to Injection	<input type="checkbox"/> Plug Back	<input type="checkbox"/> Water Disposal	

13. Describe Proposed or Completed Operation: Clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recompleate horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports must be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompleation in a new interval, a Form 3160-4 must be filed once testing has been completed. Final Abandonment Notices must be filed only after all requirements, including reclamation, have been completed and the operator has determined that the site is ready for final inspection.

Cimarex respectfully requests approval to perforate into the wolfcamp formation. The Estill AD Federal #2 is currently producing out of the Cisco Canyon. Cimarex also proposes to downhole commingle production from the Cisco Canyon and Wolfcamp zones. Please see attached recompleation procedure for your review and approval.

The 2016 White City Area Downhole Commingle Field Study included the referenced well for commingling. The Field Study was submitted and approved by the BLM on 7/6/2016.

DHC with the NMOCD has been submitted. DHC pending.

Attachments:

SEE ATTACHED FOR
CONDITIONS OF APPROVALNATIONAL CONSERVATION
ARTESIA DISTRICT

MAR 09 2017

RECEIVED

14. I hereby certify that the foregoing is true and correct.

Electronic Submission #359498 verified by the BLM Well Information System
For CIMAREX ENERGY COMPANY OF CO, sent to the Carlsbad
Committed to AFMSS for processing by DEBORAH MCKINNEY on 12/14/2016 (1/DLM0439SE)

Name (Printed/Typed) AMITHY E CRAWFORD

Title REGULATORY ANALYST

Signature (Electronic Submission)

Date 12/01/2016

FEDERAL OR STATE OFFICE USE

Title

Office

APPROVED

FEB 27 2017

BUREAU OF LAND MANAGEMENT
CARLSBAD FIELD OFFICE

File Gas Capture Plan w/NMOCD

Under 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false or fraudulent statements or representations as to any matter within its jurisdiction.

(Instructions on page 2)

** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED **

Ref.

Additional data for EC transaction #359498 that would not fit on the form

32. Additional remarks, continued

C102s, Recompletion and commingling procedure, Current and proposed wellbore schematic, oil/water/gas analysis, and BLM commingling worksheet form.



Appendix D: Recompletion Procedure – Estill AD Fed 2

Well Data

Age of Wellbore	May 2004
KB	23' above GL
TD	12,300'
PBTD	10,365'
Casing	13-3/8" 54.5# J-55 csg @ 352'. Cmt'd w/ 450 sx, cmt circ. 9-5/8" 40# NS-110HC csg @ 1,567'. Cmt'd w/ 170 sx, cmt circ. 7" 23# NS-110HC csg @ 8,012'. 1 st stage cmt'd w/ 400 sx, cmt circ. DV Tool @ 4,809'. 2 nd stage cmt'd w/ 575 sx, cmt circ. 4-1/2" 11.6# HCP-110 FJ @ 12,300'. Cmt'd w/ 475 sx. Liner top @ 7,247'
Tubing	2-3/8" 4.7# L-80 8rd @ 9,858' (315 jts)
Prod. Perfs	Cisco Canyon (9,947' – 10,093')
Proposed Perf Intervals	Cisco Canyon (9,921' – 10,245') & Wolfcamp (8,358' – 9,921')

Procedure

Notify BLM 24 hours prior to start of workover operations.

1. Test anchors prior to MIRU PU.
2. MIRU PU, rental flare, and choke manifold.
3. Kill well with produced water if available or FW as necessary.
4. ND WH, NU 5K BOP
5. TOOH w/ 2-3/8" 4.7# L-80 tbg. Stand back Tubing.
Note: No packer in well
6. PU 4-1/2" AS-1X packer on 2-3/8" 4.7# L-80 tbg and TIH to set packer at +/- 9,897'
7. RU Pump truck and pressure test annulus behind 2-3/8" 4.7# L-80 tbg to 8,500 psi on a chart for 30 minutes with no more than 10% leak off.
8. TOOH w/ 2-3/8" 4.7# L-80 tbg and lay down tubing.
9. ND 5k BOP, RDMO PU
10. RU two 10k frac valves and flow cross
11. MIRU water transfer with frac tanks to contain water to be pumped from frac pond
12. Test frac valves and flow cross prior to frac job. Arrange for these items, manlift, forklift, and Pace testers to be on location the day before the frac job to test so that we do not have the frac waiting on a successful test the following day.
13. RU frac valves, flow cross, goat head, and wireline lubricator.
14. RIH w/ gauge ring/junk basket for 4-1/2" 11.6# P-110 csg to +/- 10,260'



CONFIDENTIAL. November 22, 2016

Production Operations – Carlsbad Region, Permian Basin
Estill AD Federal #2 - Cisco Canyon and Wolfcamp (Ciscamp)
Proposed Commingling Allocation Factors. Eddy County, NM

15. Perforate Cisco Canyon from 9,921' – 10,245'.
16. RU frac and flowback equipment.
17. Acidize and frac Cisco Canyon perfs down casing.
18. Set 10k flow through composite plug 15' uphole of top perforation
19. Test to 8,500 psi
20. Perforate Wolfcamp from 8,358' – 9,921'.
21. Acidize and frac Wolfcamp perfs down casing.
22. Set 10k flow through composite plug 15' above top perforation
23. Test to 8,500 psi
24. RD frac
25. MIRU 2" coiled tbg unit.
26. RIH w/ blade mill & downhole motor on 2" CT and drill out sand and composite plugs using freshwater for circulation. Pump sweeps each time a plug is tagged, each time a plug is drilled out, and every 60 bbls pumped.
27. Clean out to PBD 10,365'
28. POOH w/ blade mill, motor & CT
29. RDMO coiled tbg unit.
30. Flow back well for 24 hours, then SI well overnight.
31. RU wireline and lubricator.
32. RIH w/ GR/JB for 4-1/2" 11.6# P-110 to +/- 8,323'
33. RIH w/ 2-3/8" WEG, 2-3/8" pump out plug pinned for 1,500 – 2,000 psi differential pressure, 10' 2-3/8" 4.7# L-80 tbg sub w/ 1.875" XN profile nipple w/ blanking plug in place, 4-1/2" Arrowset 1X packer and on-off tool stinger w/ 1.875" X profile nipple. Set packer +/- 8,308'. From downhole up:
 - a. 2-3/8" WEG
 - b. 2-3/8" pump out plug pinned for 1,500 – 2,000 psi differential pressure
 - c. 1.875" XN profile nipple
 - d. 10' 2-3/8" 4.7# L-80 tbg sub
 - e. 4-1/2" x 2-3/8" Arrowset 1X packer and on-off tool stinger w/ 1.875" X profile nipple
34. RD WL and lubricator
35. ND goat head and frac valve, NU BOP, MIRU Pulling Unit
36. TIH w/ on/off tool overshot, GLVs, and 2-3/8" 4.7# L-80 tbg.
37. Latch overshot onto on-off tool and space out tubing
38. ND BOP, NU WH
39. RDMO pulling unit
40. RU pump truck and pump out plug. Put well on production.
41. **Run Production Log for allocation purposes after recovering load. Run additional production logs if actual production varies significantly from expected performance. Send copies of these logs to BLM and file for an adjustment of allocation factor if necessary.**

CIMAREX

Current WBD
KB - 23' above GL

Cimarex Energy Co. of Colorado

Estill AD Federal #2

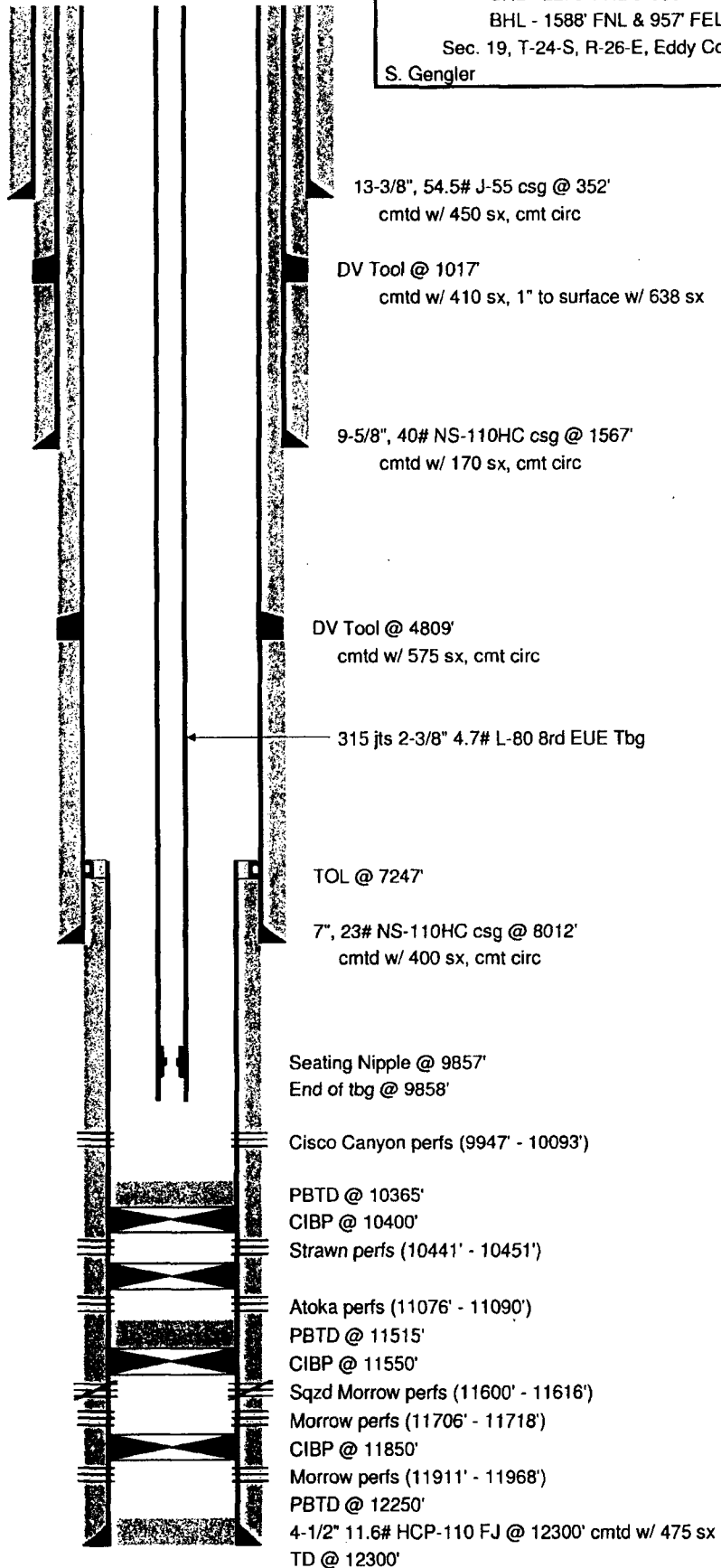
SHL - 2270' FNL & 380' FEL

BHL - 1588' FNL & 957' FEL

Sec. 19, T-24-S, R-26-E, Eddy Co., NM

S. Gengler

02/21/2012





Proposed WBD
KB - 23' above GL

Cimarex Energy Co. of Colorado

Estill AD Federal #2

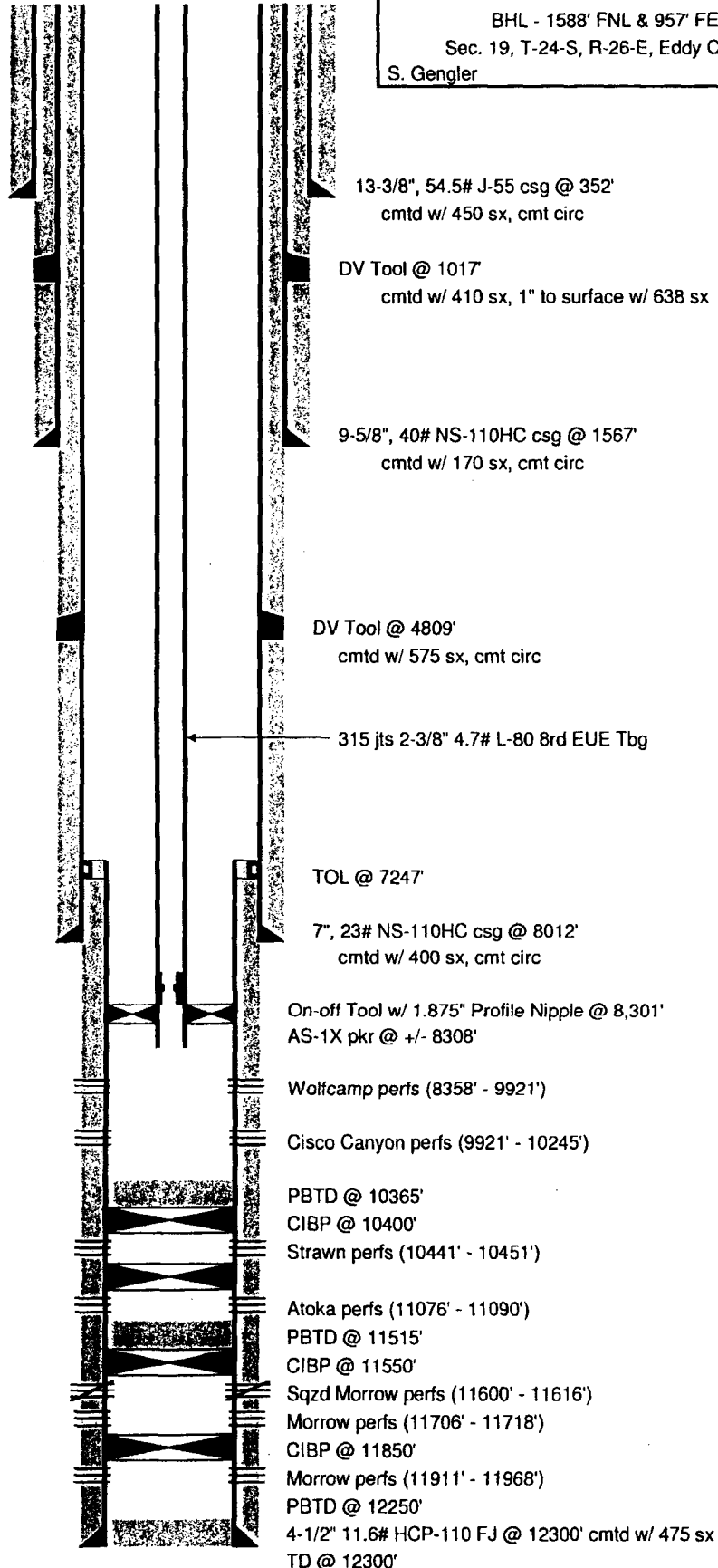
SHL - 2270' FNL & 380' FEL

BHL - 1588' FNL & 957' FEL

Sec. 19, T-24-S, R-26-E, Eddy Co., NM

S. Gengler

02/21/2012





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: Sta. # 309588185
Identification: Wigeon 23 Fed Com 1
Company: Cimarex Energy
Lease:
Plant:

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

Sampled by: Taylor Ridings
Analysis by: Vicki McDaniel

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+	<u>0.624</u>	<u>0.270</u>
		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

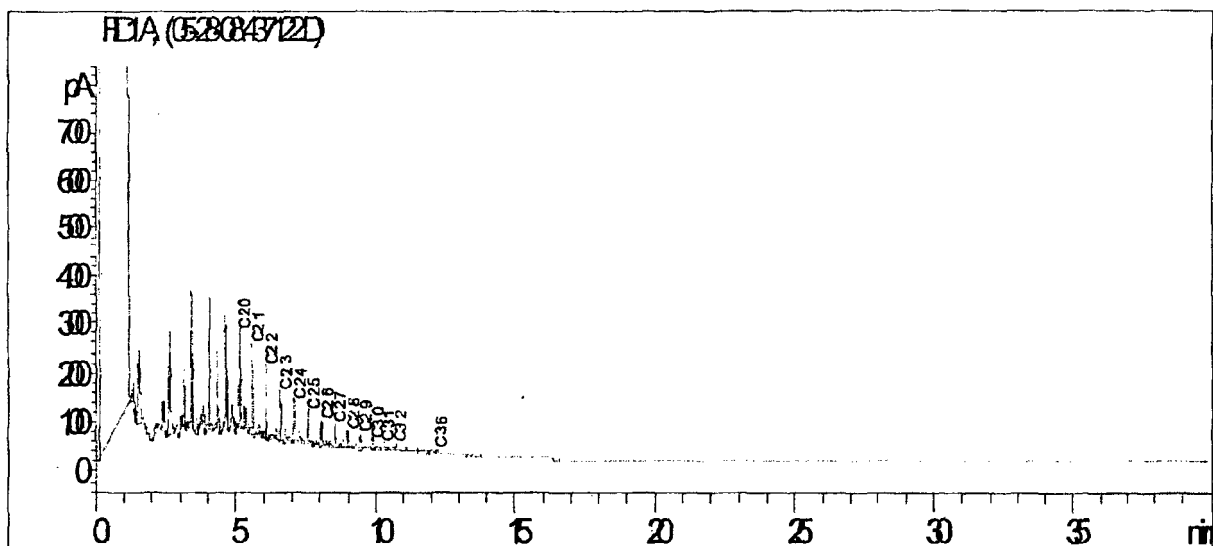
Lab Team Leader - Sheila Hernandez
(432) 495-7240

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		Analysis of Sample 43887 @ 75 °F					
Sampling Date:	05/14/08	Anions	mg/l	meq/l	Cations	mg/l	meq/l
Analysis Date:	05/15/08	Chloride:	55040.0	1552.48	Sodium:	32207.4	1400.94
Analyst:	WAYNE PETERSON	Bicarbonate:	329.4	5.4	Magnesium:	268.0	22.05
TDS (mg/l or g/m3):	90873.3	Carbonate:	0.0	0.	Calcium:	2780.0	138.72
Density (g/cm3, tonne/m3):	1.062	Sulfate:	225.0	4.68	Strontium:		
Anion/Cation Ratio:	1	Phosphate:			Barium:		
		Borate:			Iron:	23.5	0.85
		Silicate:			Potassium:		
Carbon Dioxide:	150 PPM	Hydrogen Sulfide:		0 PPM	Aluminum:		
Oxygen:		pH at time of sampling:		7.31	Chromium:		
Comments:		pH at time of analysis:			Copper:		
TEST RAN IN THE FIELD		pH used in Calculation:		7.31	Lead:		
					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 ₂ O		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.

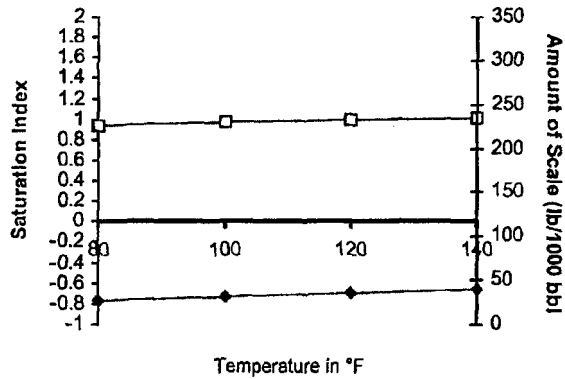
Note 2: Precipitation of each scale is considered separately. Total scale will be less than the sum of the amounts of the five scales.

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

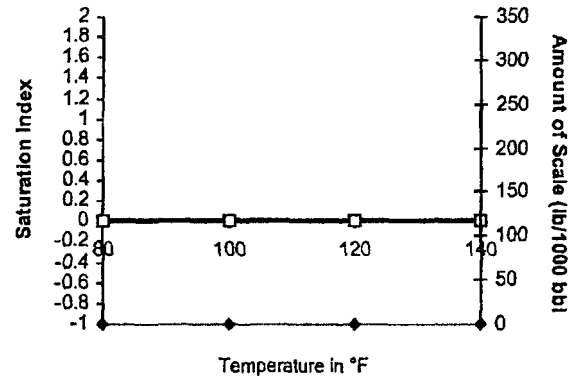
Scale Predictions from Baker Petrolite

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

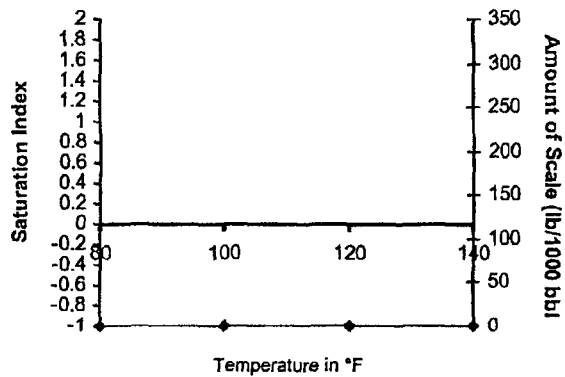
Calcite - CaCO_3



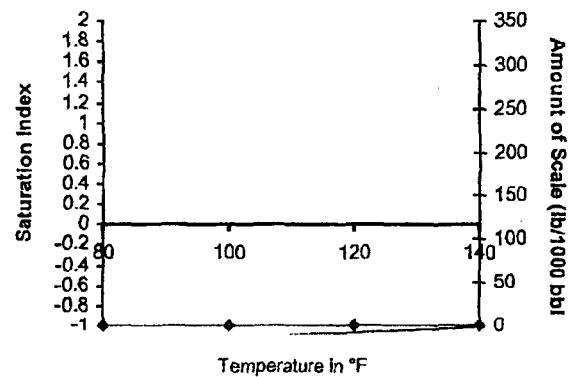
Barite - BaSO_4



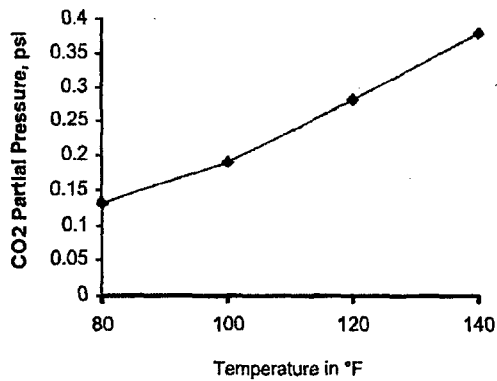
Gypsum - $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$



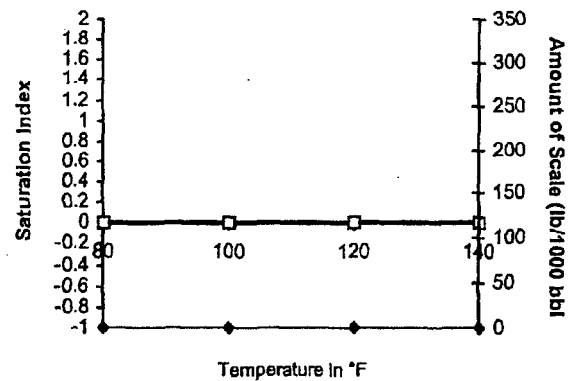
Anhydrite - CaSO_4



Carbon Dioxide Partial Pressure



Celestite - SrSO_4





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: Sta. # 309588438
Identification: Taos Fed. #3 Sales
Company: Cimarex Energy
Lease:
Plant:

Sample Data: Date Sampled 7/2/2014 10:30 AM
Analysis Date 7/9/2014
Pressure-PSIA 83
Sample Temp F 76.4
Atmos Temp F 76

Sampled by: K. Hooten
Analysis by: Vicki McDaniel

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

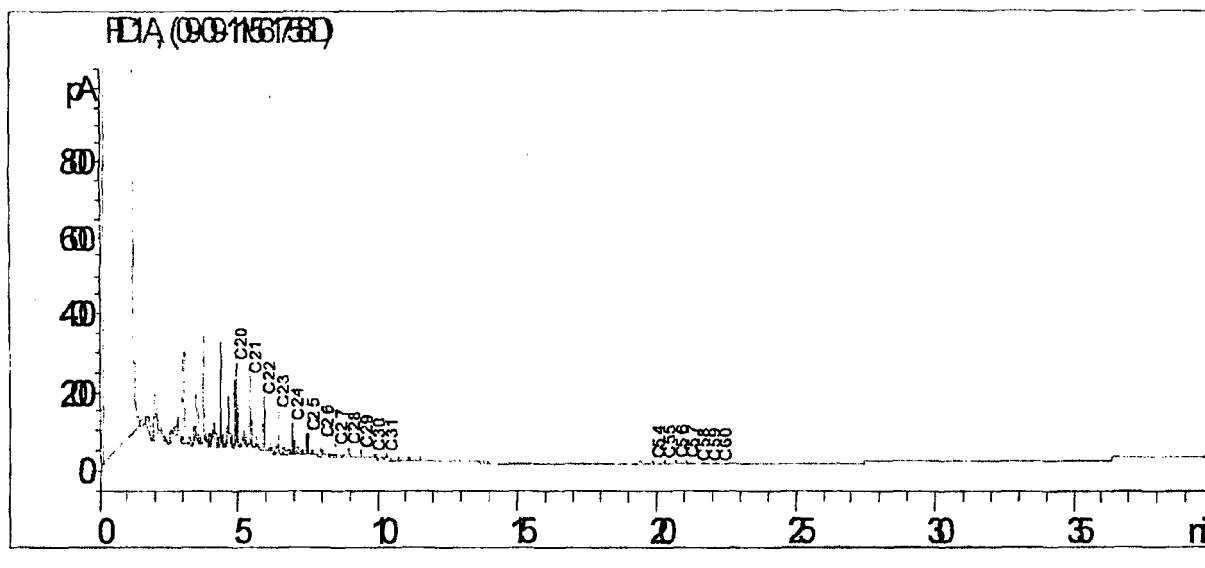
Weight Percent Paraffin (by GC)*: 1.03%

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
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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		Analysis of Sample 535681 @ 75 °F					
Sampling Date:	09/28/11	Anions	mg/l	meq/l	Cations	mg/l	meq/l
Analysis Date:	10/13/11	Chloride:	52535.0	1481.82	Sodium:	28338.7	1232.66
Analyst:	SANDRA GOMEZ	Bicarbonate:	146.0	2.39	Magnesium:	417.0	34.3
TDS (mg/l or g/m3):	86836.7	Carbonate:	0.0	0.	Calcium:	3573.0	178.29
Density (g/cm3, tonne/m3):	1.063	Sulfate:	83.0	1.73	Strontium:	1472.0	33.6
Anion/Cation Ratio:	1	Phosphate:			Barium:	22.0	0.32
		Borate:			Iron:	34.0	1.23
		Silicate:			Potassium:	215.0	5.5
Carbon Dioxide:	150 PPM	Hydrogen Sulfide:		0 PPM	Aluminum:		
Oxygen:		pH at time of sampling:		6	Chromium:		
Comments:		pH at time of analysis:			Copper:		
RESISTIVITY 0.083 OHM-M @ 75°F		pH used in Calculation:		6	Lead:		
					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 ₂ O		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 CO2 pressure is actually the calculated CO2 fugacity. It is usually nearly the same as the CO2 partial pressure.



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: Sta. # 309588185
Identification: Wigeon 23 Fed Com 1
Company: Cimarex Energy
Lease:
Plant:

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

Sampled by: Taylor Ridings
Analysis by: Vicki McDaniel

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+	<u>0.624</u>	<u>0.270</u>
		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

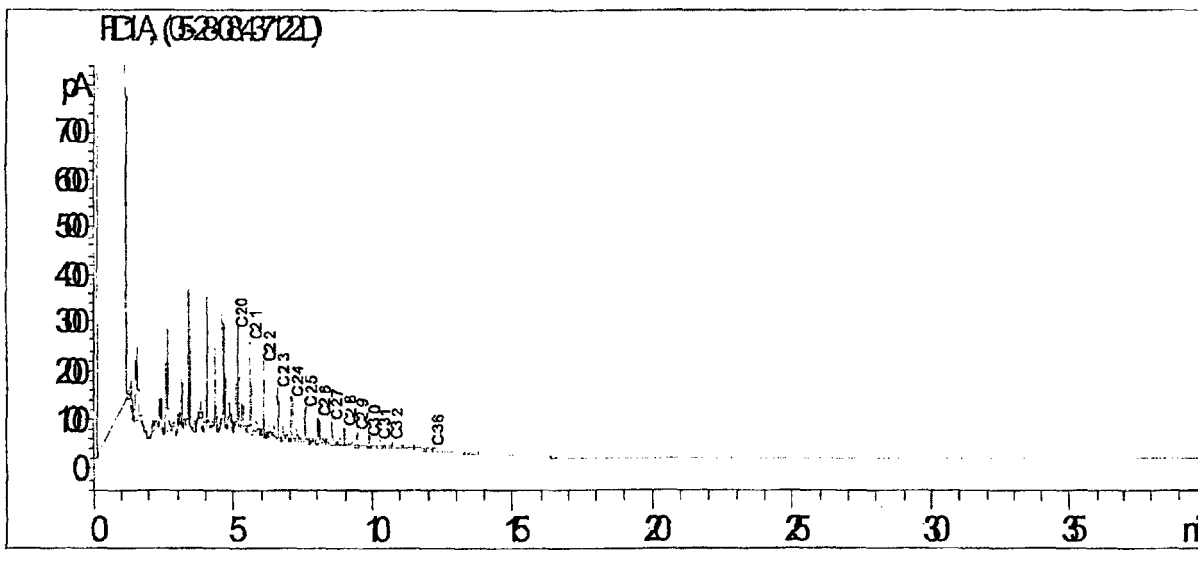
Lab Team Leader - Sheila Hernandez
(432) 495-7240

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

Water Analysis Report by Baker Petrolite

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

Summary		Analysis of Sample 43887 @ 75 °F					
Sampling Date:	05/14/08	Anions	mg/l	meq/l	Cations	mg/l	meq/l
Analysis Date:	05/15/08	Chloride:	55040.0	1552.48	Sodium:	32207.4	1400.94
Analyst:	WAYNE PETERSON	Bicarbonate:	329.4	5.4	Magnesium:	268.0	22.05
TDS (mg/l or g/m3):	90873.3	Carbonate:	0.0	0.	Calcium:	2780.0	138.72
Density (g/cm3, tonne/m3):	1.062	Sulfate:	225.0	4.68	Strontium:		
Anion/Cation Ratio:	1	Phosphate:			Barium:		
		Borate:			Iron:	23.5	0.85
		Silicate:			Potassium:		
Carbon Dioxide:	150 PPM	Hydrogen Sulfide:		0 PPM	Aluminum:		
Oxygen:		pH at time of sampling:		7.31	Chromium:		
Comments:		pH at time of analysis:			Copper:		
TEST RAN IN THE FIELD		pH used in Calculation:		7.31	Lead:		
					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 ₂ O		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

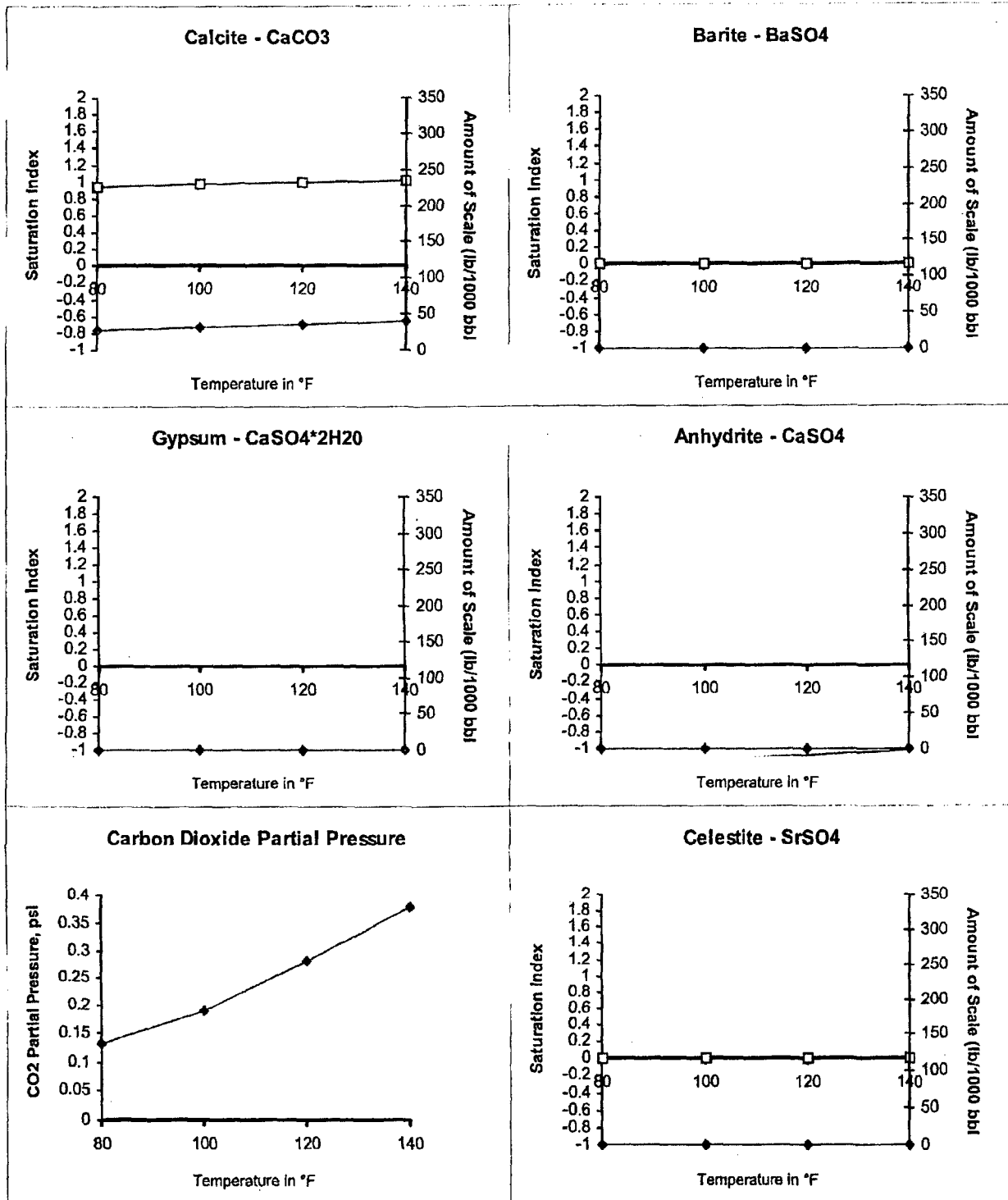
Note 1: When assessing the severity of the scale problem, both the saturation index (SI) and amount of scale must be considered.

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





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: Sta. # 309588438
Identification: Taos Fed. #3 Sales
Company: Cimarex Energy
Lease:
Plant:

Sample Data: Date Sampled 7/2/2014 10:30 AM
Analysis Date 7/9/2014
Pressure-PSIA 83
Sample Temp F 76.4
Atmos Temp F 76

Sampled by: K. Hooten
Analysis by: Vicki McDaniel

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+	<u>0.439</u>	<u>0.190</u>
		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

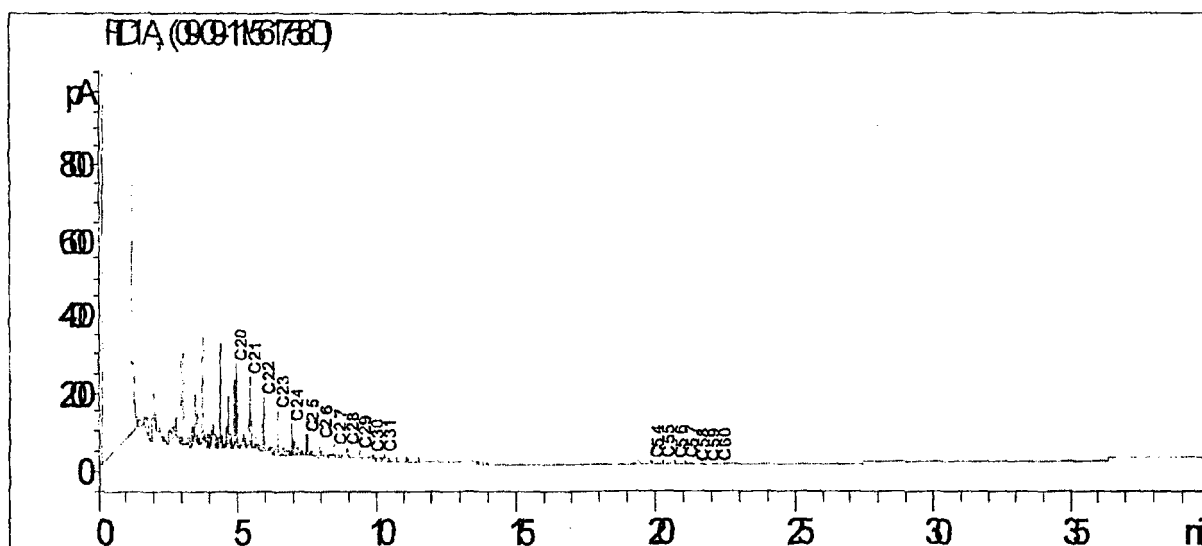
Weight Percent Paraffin (by GC)*: 1.03%

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.



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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		Analysis of Sample 535681 @ 75 F							
		Anions		mg/l	meq/l	Cations		mg/l	meq/l
Sampling Date:	09/28/11	Chloride:	52535.0	1481.82	Sodium:	28338.7	1232.66		
Analysis Date:	10/13/11	Bicarbonate:	146.0	2.39	Magnesium:	417.0	34.3		
Analyst:	SANDRA GOMEZ	Carbonate:	0.0	0.	Calcium:	3573.0	178.29		
TDS (mg/l or g/m3):	86836.7	Sulfate:	83.0	1.73	Strontium:	1472.0	33.6		
Density (g/cm3, tonne/m3):	1.063	Phosphate:			Barium:	22.0	0.32		
Anion/Cation Ratio:	1	Borate:			Iron:	34.0	1.23		
		Silicate:			Potassium:	215.0	5.5		
Carbon Dioxide:	150 PPM	Hydrogen Sulfide:		0 PPM	Aluminum:				
Oxygen:		pH at time of sampling:		6	Chromium:				
Comments:		pH at time of analysis:			Copper:				
RESISTIVITY 0.083 OHM-M @ 75F		pH used in Calculation:		6	Lead:				
					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 ₂ O		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 CO2 pressure is actually the calculated CO2 fugacity. It is usually nearly the same as the CO2 partial pressure.

Downhole Commingling Worksheet

Operator: Cimarex Energy		Lease/Well Name/API Number/Location: Estill AD Fed 2/30-015-33336/Sec. 19, T24S, R26E	
Date:			
Data		Estimated Combined Production Data	
Pool name	Bottom Formation	Upper Formation	
Pool Code	White City, Penn (Gas)	Black River, Wolfcamp, Southwest (Gas)	
State Form C-102 with dedicated Acres Provided	87280	97693	
Formation Name	640 acres	320 acres	640 acres
	Cisco Canyon	Wolfcamp	
Top and Bottom of Pay Section (Perforated or open-hole interval)	9,921'-10,245'	8,358'-9,921'	8,358' -10,245'
Method of production	Flowing	Flowing	Flowing
Bottom Hole Pressure	Within 150% of top perf	Within 150% of top perf	Within 150% of top perf
Reservoir Drive mechanism	Gas Drive	Gas Drive	Gas Drive
	Oil: 53.5" API Gas: 1142.4 BTU dry / 1122.6 BTU wet @ 14.73 psi	Oil: 51.8" API Gas: 1225.8 BTU dry / 1204.6 BTU wet @ 14.73 psi	Oil: 52.2" API Gas: 1204.1 BTU dry / 1183.3 BTU wet @ 14.7 psi
Oil gravity and/or BTU	0	0	0
Average Sulfur Content (Wt %)	Yes	Yes	
Oil sample Analysis provided	Yes	Yes	
Gas Analysis provided	Yes	Yes	
Produce Water Analysis provided	Yes	Yes	
H2S present	No	No	No
Producing, Shut-In or New Zone	New Zone	New Zone	
Date and Oil/Gas/Water rates of Last Production (new zones or no production history Operator shall attached production estimated and supporting data)	Date: N/A Expected Rate: 26 BOPD, 652 MCFD, 165 BWPD	Date: N/A Expected Rate: 74 BOPD, 1,855 MCFD, 468 BWPD	Date: N/A Expected Rate: 100 BOPD, 2507 MCFD, 633 BWPD
Average decline % (provide back up data)	7% (terminal)	7% (terminal)	7% (terminal)
Fixed Allocation Percentage	Oil: 26% Gas: 26%	Oil: 74% Gas: 74%	Oil: 100% Gas: 100%

Remarks:	Production history for analogs for both zones provided in field study appendix.
Operator Signature:	<i>[Signature]</i>
Date:	11/30/2016

Attached Supporting documents
State Form C-102 with dedicated Acres Provided
Oil sample Analysis provided (Must be current)
Gas Analysis provided (Must be current)
Produce Water Analysis provided (Must be current)
Any additional supporting data (i.e. offset well production and decline curves etc.)
*Utilize weighted average.



Objective

Cimarex is seeking approval from the U.S. Bureau of Land Management (BLM) of its proposed *commingling permit* application and the *allocation factors* for the Cisco Canyon and Wolfcamp formations in the recompletion of the ***Estill AD Federal #2*** well (API: 30-015-33336).

The proposed “allocation factors” have been estimated following BLM’s approved allocation methodology in the 2016 *Downhole Commingling Field Study “Cisco Canyon and Wolfcamp (Ciscamp) Commingled Allocation Assessment in White City, Eddy County, NM”* (NMP0220), approved by BLM on July 6, 2016 (**Appendix A**). Based on this approach and the assessment of subsurface data, the recommended initial allocation factors are **74%** for the Wolfcamp and **26%** for the Cisco Canyon.

The support evidence for this application includes petrophysical assessment and recoverable reserves estimation for each proposed formation (Table 1) and a log section (**Appendix B**).

Proposed Recompletion

Cimarex plans to recomplete the ***Estill AD Federal #2*** well to the Cisco Canyon and Wolfcamp (Ciscamp) formations. This well is located within the BLM approved White City Ciscamp Field Study Area (see Exhibit 6A of the above referenced Field Study) and is currently completed in the upper part of the Cisco Canyon formation. The well has produced 85 MMCF of gas from this zone since November 2007 (see **Appendix C**). The company plans to add the Wolfcamp and the lower part of the Cisco Canyon to the current producing zone and downhole commingle all intervals. Within the first six months of commingling and frac load recovery, a Production Log Survey (PLS) will be conducted to further validate or adjust the initially established production allocation factors. These factors will be revised, if necessary, following the approved Field Study methodology for “Further Validation and Adjustment of Allocation Factors and Zonal Flowrates” described in Figure 2 of such field study, and will be re-submitted for approval along with the required BLM and NMOCDC documentation.

The proposed Ciscamp recompletion will be performed with a *multi-stage frac job*. The plan is to commingle Wolfcamp and Cisco Canyon streams downhole immediately after completion to allow faster flowback recovery and more efficient artificial lift. The synergy between both streams has shown to significantly improve liquid unloading in analog wells by maintaining higher and more stable critical gas velocities for a longer period. This in turn minimizes formation damage and increases reserves recovery by extending the life of the well.

A proposed recompletion and workover procedure is included in **Appendix D**.



Proposed Initial Production Allocation Factors

Based on BLM's approved Allocation Methodology and Cimarex's assessment, the "Initial Allocation Factors" for the New Completion Zones in subject well are estimated as follows:

$$\text{Wolfcamp \% Alloc. Factor} = \frac{\text{WC RGIP} - \text{WC Prev. Cum Gas}}{\text{Total RRGIP}}$$

$$\text{Cisco Canyon \% Alloc. Factor} = \frac{\text{CC RGIP} - \text{CC Prev. Cum Gas}}{\text{Total RRGIP}}$$

The Recoverable Gas in Place (RGIP) for subject well is **1378 MMCF** from the Wolfcamp and **563 MMCF** from the Cisco Canyon, for a total of 1,941 MMCF of gas (see Table 1). In this case, the Cisco Canyon has produced 85 MMCF, therefore Remaining RGIP (RRGIP) is equal to **1,856 MMCF** (1,941 – 85).

The resulting proposed allocation factors are calculated as follows:

$$\text{Wolfcamp \% Alloc. Factor} = \frac{1,378 - 0 \text{ MMCF}}{1,856 \text{ MMCF}} = 74\%$$

$$\text{Cisco Canyon \% Alloc. Factor} = \frac{563 - 85 \text{ MMCF}}{1,856 \text{ MMCF}} = 26\%$$

The RGIP for each zone is estimated using the Hydrocarbon Pore Volume (HCPV) assessment as shown in Table 1. The implemented net pay cut-offs are Average Porosity (PHI) > 6-10% and Average Sw < 25-45%. Total estimated oil reserves are 62 MBO.

Table 1: Summary of Reservoir Properties, Estimated Reserves and Resulting Allocation Factors

Estill AD Federal #2

Proposed AC Zone(s)	Avg. Depth, ft	Est. Reservoir Pressure, psi	Net Pay, h (ft)	Avg. PHI	Avg. Sw	HCPV (1-Sw)*PHI*h	OGIP, MMCF	Est. Recovery Factor	RGIP @RF, MMCF	Zone Prod. Start Date	Prev. Cum. Gas to Date, MMCF	Remaining RGIP (RRGIP), MMCF	Initial Alloc. Factors, % (based on RRGIP Ratio)
Wolfcamp TOT:	9,199	4,002	178	10.7%	25%	14.4	1,623	85%	1,378			1,378	74%
Cisco Canyon:	10,083	4,386	57	14.9%	14%	7.3	662	85%	563	11/2007	85	478	26%
Total:			235			21.7	2,285	85%	1,941		85	1,856	100%

In this well, the spacing for both formations is the same (160 acres), as well as, public interests: 50% working interest and 40% net revenue interest. Both formations are sweet.

Enclosed with this report are the C-107A, Downhole Commingle Worksheet, current and proposed wellbore diagrams, current gas, oil, and water analyses C-102, 3160-5.



CONFIDENTIAL. November 22, 2016
Production Operations – Carlsbad Region, Permian Basin
Estill AD Federal #2 - Cisco Canyon and Wolfcamp (Ciscamp)
Proposed Commingling Allocation Factors. Eddy County, NM

Appendix A: 2016 Downhole Commingling Field Study for the White City Area



United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Pecos District
Carlsbad Field Office
620 E. Greene
Carlsbad, New Mexico 88220-6292
www.blm.gov/bm



3180 (P0220)

July 6, 2016

Reference:
White City Area
2016 Downhole Commingling Field Study
Eddy County, New Mexico

Cimarex Energy Co. of Colorado
600 N. Marienfeld Street, Suite 600
Midland, TX 79701

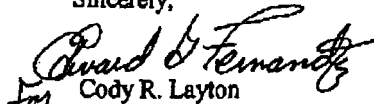
Gentlemen:

In reference to your 2016 Downhole Commingling Field Study for the White City Area; it is hereby approved, with the following conditions of approval:

1. All future NOI Sundries submitted to request approval to downhole commingle (DHC) the Lower Penn, Upper Penn and the Wolfcamp formation shall reference this Study and be mentioned in Exhibit 6A. A copy of this study does not need to be attached to the Sundry.
2. All future NOI Sundries submitted to request approval to DHC shall reference NMOCD approval order.
3. All future NOI Sundries submitted to request approval to DHC shall include the BLM's DHC worksheet.
4. All DHC approvals are subject to like approval by NMOCD.
5. The BLM may require an updated evaluation of the field study be done in the future.

Please contact Edward G. Fernandez, Petroleum Engineer at 575-234-2220 if you have any questions.

Sincerely,

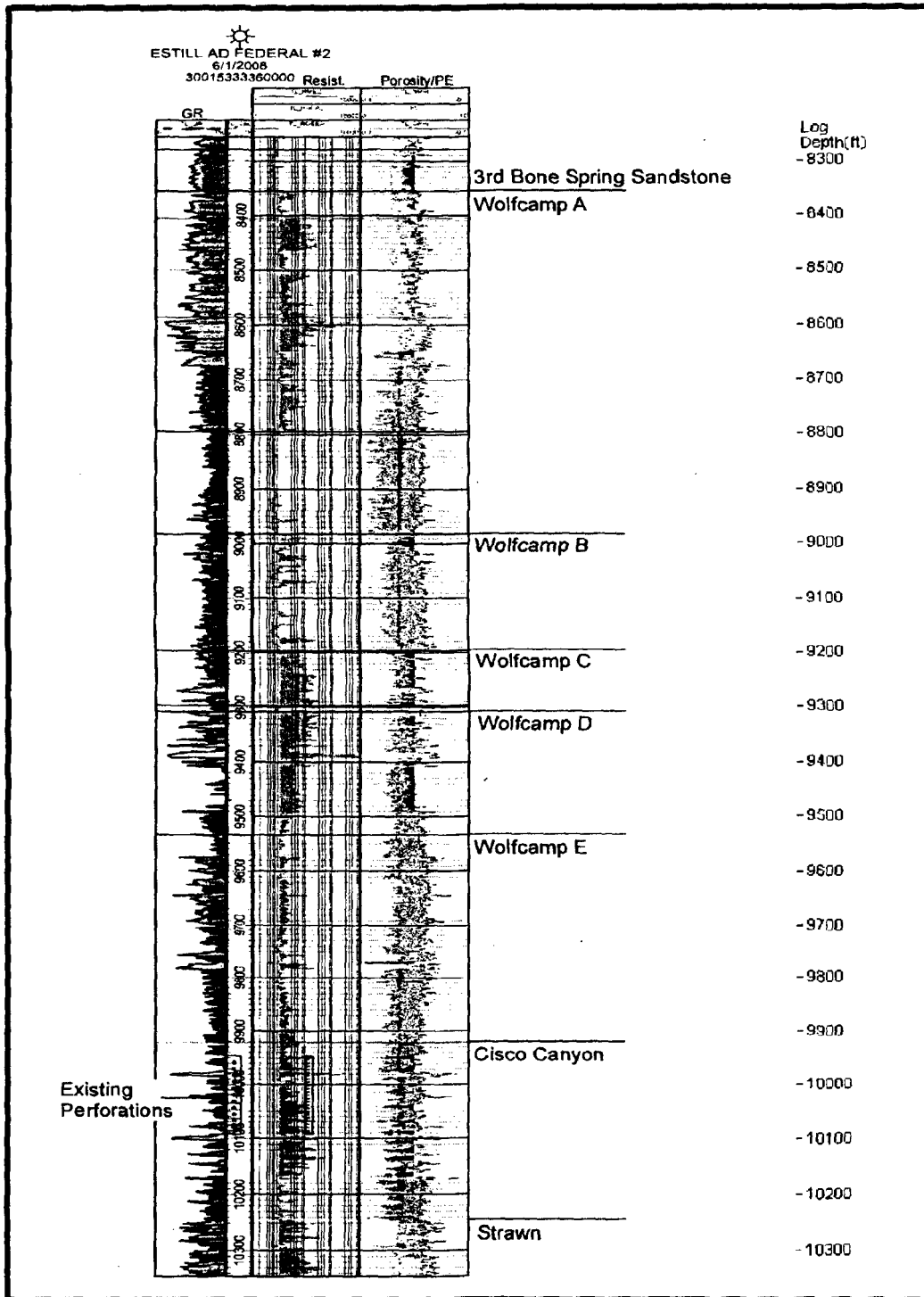

for Cody R. Layton
Assistant Field Manager,
Lands and Minerals

Enclosure
cc: NMP0220 (CFO I&E)



CONFIDENTIAL. November 22, 2016
Production Operations – Carlsbad Region, Permian Basin
Estill AD Federal #2 - Cisco Canyon and Wolfcamp (Ciscamp)
Proposed Commingling Allocation Factors. Eddy County, NM

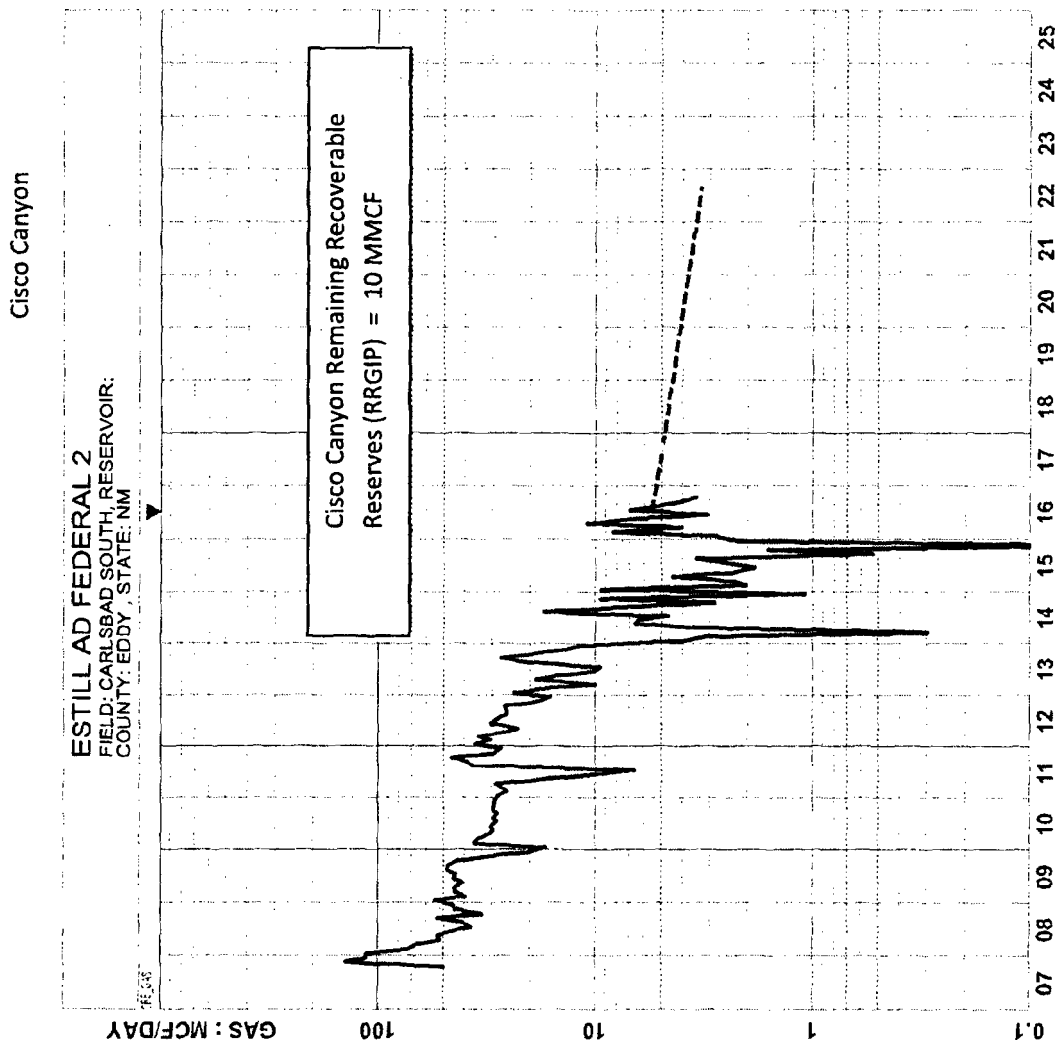
Appendix B: Log section from top of Wolfcamp to top of Strawn – Estill AD Federal #2





Appendix C: Current Completion – Estill AD Federal #2

GAS: MCF/DA	72016
Cum	84536
Rem	9584
EUR	94520
Yrs	6.167
Q	1500000
Dmin	8.876950
Qab	3.3



Estill Ad Federal 2
30-015-33336
Cimarex Energy Company of CO
February 27, 2017
Conditions of Approval

Notify BLM at 575-361-2822 a minimum of 24 hours prior to commencing work.
Work to be completed by May 27, 2017.

- 1. DHC approved as written by the operator.**
- 2. Must conduct a casing integrity test before perforating and fracturing. Submit results to BLM. The CIT is to be performed on the production casing to max treating pressure. Notify BLM if test fails.**
- 3. Before casing or a liner is added or replaced, prior BLM approval of the design is required. Use notice of intent Form 3160-5.**
- 4. Surface disturbance beyond the originally approved pad must have prior approval.**
- 5. Closed loop system required.**
- 6. All waste (i.e. drilling fluids, trash, salts, chemicals, sewage, gray water, etc.) created as a result of work over operations shall be safely contained and disposed of properly at a waste disposal facility. No waste material or fluid shall be disposed of on the well location or surrounding area. Porto-johns and trash containers will be on-location during fracturing operations or any other crew-intensive operations.**
- 7. Operator to have H2S monitoring equipment on location.**
- 8. A minimum of a 5000 (5M) BOP to be used. All blowout preventer (BOP) and related equipment (BOPE) shall comply with reasonable well control requirements. A two ram system with a blind ram and a pipe ram designed for the size of the work string shall be adequate. Tapered work strings will require an additional pipe ram. The manifold shall comply with Onshore Oil and Gas Order #2 Attachment I (5M Diagrams of Choke Manifold Equipment). The accumulator system shall have an immediately available power source to close the rams and retain 200 psi above pre-charge. The pre-charge test shall follow requirements in Onshore Order #2.**
- 9. Subsequent sundry required detailing work done and completion report for the new formations. Operator to include well bore schematic of current well condition when work is complete.**
- 10. See attached for general requirements.**

JAM 022717

BUREAU OF LAND MANAGEMENT
Carlsbad Field Office
620 East Greene Street
Carlsbad, New Mexico 88220
575-234-5972

General Requirements for Plug Backs

Failure to comply with the following Conditions of Approval may result in a Notice of Incidents of Noncompliance (INC) in accordance with 43 CFR 3163.1.

1. Plugging operations shall commence within ninety (90) days from this approval.

If you are unable to plug back the well by the 90th day provide this office, prior to the 90th day, with the reason for not meeting the deadline and a date when we can expect the well to be plugged back. Failure to do so will result in enforcement action.

2. **Notification:** Contact the appropriate BLM office at least 24 hours prior to the commencing of any plug back operations. For wells in Eddy County, call 575-361-2822.

3. **Blowout Preventers:** A blowout preventer (BOP), as appropriate, shall be installed before commencing any plugging operation. The BOP must be installed and maintained as per API and manufacturer recommendations. The minimum BOP requirement is a 2M system for a well not deeper than 9,090 feet; a 3M system for a well not deeper than 13,636 feet; and a 5M system for a well not deeper than 22,727 feet.

4. **Mud Requirement:** Mud shall be placed between all plugs. Minimum consistency of plugging mud shall be obtained by mixing at the rate of 25 sacks (50 pounds each) of gel per 100 barrels of brine water. Minimum nine (9) pounds per gallon.

5. **Cement Requirement:** Sufficient cement shall be used to bring any required plug to the specified depth and length. Any given cement volumes on the proposed plugging procedure are merely estimates and are not final. Unless specific approval is received, no plug except the surface plug shall be less than 25 sacks of cement. Any plug that requires a tag will have a minimum WOC time of 4 hours.

In lieu of a cement plug across perforations in a cased hole (not for any other plugs), a bridge plug set within 50 feet to 100 feet above the perforations shall be capped with 25 sacks of cement.

Before pumping cement on top of CIBP, tag will be required to verify depth. Based on depth, a tag of the cement may be deemed necessary.

Unless otherwise specified in the approved procedure, the cement plug shall consist of either Neat Class "C", for up to 7,500 feet of depth or Neat Class "H", for deeper than 7,500 feet plugs.

6. **Subsequent Plug back Reporting:** Within 30 days after plug back work is completed, file one original and three copies of the Subsequent Report, Form 3160-5 to BLM. The report should give in detail the manner in which the plug back work was carried out, the extent (by depths) of cement plugs placed, and the size and location (by depths) of casing left in the well. **Show date work was completed.**

7. **Trash:** All trash, junk and other waste material shall be contained in trash cages or bins to prevent scattering and will be removed and deposited in an approved sanitary landfill. Burial on site is not permitted.