

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

HOBBBS OCD

AUG 21 2019

FORM 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 abandoned well. Use form 3160-3 (APD) for such proposals.

RECEIVED

SUBMIT IN TRIPLICATE - Other Instructions on page 2

1. Type of Well ☐ Oil Well ☒ Gas Well ☐ Other		5. Lease Serial No. NMNM26394
2. Name of Operator CIMAREX ENERGY COMPANY Contact: TERRI STATHEM E-Mail: tstatthem@cimarex.com		6. If Indian, Allottee or Tribe Name
3a. Address 600 N. MARIENFELD SUITE 600 MIDLAND, TX 79701	3b. Phone No. (include area code) Ph: 432-620-1936	7. If Unit or CA/Agreement, Name and/or No.
4. Location of Well (Footage, Sec., T., R., M., or Survey Description) Sec 20 T25S R33E SESE 390FSL 350FEL 32.109894 N Lat, 103.586899 W Lon		8. Well Name and No. VACA DRAW 20-17 FEDERAL 72H
		9. API Well No. 30-025-46161-00-X1
		10. Field and Pool or Exploratory Area WILDCAT;WOLFCAMP WOLFCAMP
		11. County or Parish, State LEA COUNTY, NM

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

TYPE OF SUBMISSION	TYPE OF ACTION			
☒ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off
☐ Subsequent Report	☐ Alter Casing	☐ Hydraulic Fracturing	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☒ Other
	☐ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	Change to Original A
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	PD

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 recomplete 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 recompletion 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 Energy respectfully request approval to change the BHL for the referenced well and the target completion interval to Bone Spring.

C102 attached
Directional Plan attached

Drilling Plan attached - casing & cement design for the Bone Spring well.

TD: MD: 19226', TVD: 9360'

Carlsbad Field Office**OCD Hobbs**

All Previous COAs still Apply, Except for the Following:

14. I hereby certify that the foregoing is true and correct. Electronic Submission #471753 verified by the BLM Well Information System For CIMAREX ENERGY COMPANY, sent to the Hobbs Committed to AFMSS for processing by PRISCILLA PEREZ on 07/02/2019 (19PP2368SE)	
Name (Printed/Typed) TERRI STATHEM	Title MANAGER REGULATORY COMPLIANCE
Signature (Electronic Submission)	Date 07/01/2019

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By JEROMY PORTER	Title PETROLEUM ENGINEER	Date 07/02/2019
Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.		Office Hobbs

Title 18 U.S.C. Section 1001 and Title 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, fictitious 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 ****

Revisions to Operator-Submitted EC Data for Sundry Notice #471753

	Operator Submitted	BLM Revised (AFMSS)
Sundry Type:	APDCH NOI	APDCH NOI
Lease:	NMNM26394	NMNM26394
Agreement:		
Operator:	CIMAREX ENERGY COMPANY 600 N. MARIENFELD ST, STE 600 MIDLAND, TX 79701 Ph: 432-620-1936	CIMAREX ENERGY COMPANY 600 N. MARIENFELD SUITE 600 MIDLAND, TX 79701 Ph: 432.620.1938
Admin Contact:	TERRI STATHEM MANAGER REGULATORY COMPLIANCE E-Mail: tstathem@cimarex.com Ph: 432-620-1936	TERRI STATHEM MANAGER REGULATORY COMPLIANCE E-Mail: tstathem@cimarex.com Ph: 432-620-1936
Tech Contact:	TERRI STATHEM MANAGER REGULATORY COMPLIANCE E-Mail: tstathem@cimarex.com Ph: 432-620-1936	TERRI STATHEM MANAGER REGULATORY COMPLIANCE E-Mail: tstathem@cimarex.com Ph: 432-620-1936
Location:		
State:	NM	NM
County:	LEA	LEA
Field/Pool:	WILDCAT BONE SPRING	WILDCAT;WOLFCAMP WOLFCAMP
Well/Facility:	VACA DRAW 20-17 FEDERAL 72H Sec 20 T25S R33E Mer NMP SESE 390FSL 350FEL	VACA DRAW 20-17 FEDERAL 72H Sec 20 T25S R33E SESE 390FSL 350FEL 32.109894 N Lat, 103.586899 W Lon

1. Geological FormationsTVD of target 9,360
MD at TD 19,226Pilot Hole TD N/A
Deepest expected fresh water

Formation	Depth (TVD) from KB	Water/Mineral Bearing/Target Zone	Hazards
Rustler	935	N/A	
Top of Salt	1298	N/A	
Base of Salt	4714	N/A	
Lamar	4909	N/A	
Bell Canyon	4937	N/A	
Cherry Canyon	5990	N/A	
Brushy Canyon	7536	Hydrocarbons	
Bone Spring	9032	Hydrocarbons	
1st Bone Spring Sand	10011	Hydrocarbons	
2nd Bone Spring Sand	10583	Hydrocarbons	
3rd Bone Spring Sand	11722	Hydrocarbons	
Wolfcamp	12189	Hydrocarbons	
Wolfcamp	12430	Hydrocarbons	

2. Casing Program

Hole Size	Casing Depth From	Casing Depth To	Setting Depth TVD	Casing Size	Weight (lb/ft)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
17 1/2	0	1051	1051	13-3/8"	48.00	H-40/J-55 Hybrid	ST&C	1.54	3.60	6.38
12 1/4	0	4949	4949	9-5/8"	40.00	J-55	LT&C	1.55	1.50	2.63
8 3/4	0	8882	8882	7"	29.00	L-80	LT&C	1.69	1.96	3.69
8 3/4	8882	19226	9360	5-1/2"	17.00	L-80	BT&C	1.44	1.77	48.86
BLM Minimum Safety Factor								1.125	1	1.6 Dry 1.8 Wet

TVD was used on all calculations.

All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

	Y or N
Is casing new? If used, attach certification as required in Onshore Order #1	Y
Does casing meet API specifications? If no, attach casing specification sheet.	Y
Is premium or uncommon casing planned? If yes attach casing specification sheet.	N
Does the above casing design meet or exceed BLM's minimum standards? If not provide justification (loading assumptions, casing design criteria).	Y
Will the intermediate pipe be kept at a minimum 1/3 fluid filled to avoid approaching the collapse pressure rating of the casing?	Y
Is well located within Capitan Reef?	N
If yes, does production casing cement tie back a minimum of 50' above the Reef?	N
Is well within the designated 4 string boundary.	N
Is well located in SOPA but not in R-111-P?	N
If yes, are the first 2 strings cemented to surface and 3rd string cement tied back 500' into previous casing?	N
Is well located in R-111-P and SOPA?	N
If yes, are the first three strings cemented to surface?	N
Is 2nd string set 100' to 600' below the base of salt?	N
Is well located in high Cave/Karst?	N
If yes, are there two strings cemented to surface?	N
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	N
Is well located in critical Cave/Karst?	N
If yes, are there three strings cemented to surface?	N
Is AC Report included?	N

3. Cementing Program

Casing	# Sk	Wt. lb/gal	Yld ft ³ /ack	H ₂ O gal/sk	500# Comp. Strength (hours)	Slurry Description
Surface	509	13.50	1.72	9.15	15.5	Lead: Class C + Bentonite
	137	14.80	1.34	6.32	9.5	Tail: Class C + LCM
Intermediate	938	12.90	1.88	9.65	12	Lead: 35:65 (Poz:C) + Salt + Bentonite
	289	14.80	1.34	6.32	9.5	Tail: Class C + LCM
Production	212	10.30	3.64	22.18		Lead: Tuned Light + LCM
	1496	14.20	1.30	5.86	14:30	Tail: 50:50 (Poz:H) + Salt + Bentonite + Fluid Loss + Dispersant + SMS

Casing String	TOC	% Excess
Surface	0	45
Intermediate	0	50
Production	4749	25

4. Pressure Control Equipment

A variance is requested for the use of a diverter on the surface casing. See attached for schematic.

BOP Installed and tested before drilling which hole?	Size	Min. Required WP	Type		Tested To
12 1/4	13 5/8	2M	Annular	X	50% of working pressure
			Blind Ram		2M
			Pipe Ram		
			Double Ram	X	
			Other		
8 3/4	13 5/8	3M	Annular	X	50% of working pressure
			Blind Ram		3M
			Pipe Ram		
			Double Ram	X	
			Other		

BOP/BOPE will be tested by an independent service company to 250 psi low and the high pressure indicated above per Onshore Order 2 requirements. The System may be upgraded to a higher pressure but still tested to the working pressure listed in the table above. If the system is upgraded all the components installed will be functional and tested.

Pipe rams will be operationally checked each 24 hour period. Blind rams will be operationally checked on each trip out of the hole. These checks will be noted on the daily tour sheets. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold. See attached schematics.

Formation integrity test will be performed per Onshore Order #2.
On Exploratory wells or on that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Will be tested in accordance with Onshore Oil and Gas Order #2 IILB.1.i.

X A variance is requested for the use of a flexible choke line from the BOP to Choke Manifold. See attached for specs and hydrostatic test chart.

N Are anchors required by manufacturer?

5. Mud Program

Depth	Type	Weight (ppg)	Viscosity	Water Loss
0' to 1051'	FW Spud Mud	8.30 - 8.80	30-32	N/C
1051' to 4949'	Brine Water	9.70 - 10.20	30-32	N/C
4949' to 19226'	Cut Brine or OBM	8.50 - 9.00	27-70	N/C

Sufficient mud materials to maintain mud properties and meet minimum lost circulation and weight increase requirements will be kept on location at all times.

What will be used to monitor the loss or gain of fluid?

PVT/Pason/Visual Monitoring

6. Logging and Testing Procedures

Logging, Coring and Testing	
	Will run GR/CNL from TD to surface (horizontal well – vertical portion of hole). Stated logs run will be in the Completion Report and submitted to the BLM.
	No logs are planned based on well control or offset log information.
	Drill stem test?
	Coring?

Additional Logs Planned	Interval
-------------------------	----------

7. Drilling Conditions

Condition	
BH Pressure at deepest TVD	4380 psi
Abnormal Temperature	No

Hydrogen Sulfide (H₂S) monitors will be installed prior to drilling out the surface shoe. If H₂S is detected in concentrations greater than 100 ppm, the operator will comply with the provisions of Onshore Oil and Gas Order #6. If Hydrogen Sulfide is encountered, measured values and formations will be provided to the BLM.

X	H ₂ S is present
X	H ₂ S plan is attached

8. Other Facets of Operation**9. Wellhead**

A multi-bowl wellhead system will be utilized.

After running the 13-3/8" surface casing, a 13 5/8" BOP/BOPE system with a minimum working pressure of 3000 psi will be installed on the wellhead system and will be pressure tested to 250 psi low followed by a 3000 psi test. Annular will be tested to 50% of working pressure. The pressure test will be repeated at least every 30 days, as per Onshore Order No. 2.

The multi-bowl wellhead will be installed by vendor's representative. A copy of the installation instructions has been sent to the BLM field office.

The wellhead will be installed by a third-party welder while being monitored by the wellhead vendor representative.

All BOP equipment will be tested utilizing a conventional test plug. Not a cup or J-packer type.

A solid steel body pack-off will be utilized after running and cementing the intermediate casing and production casing. After installation the pack-off and lower flange will be pressure tested to 3000 psi.

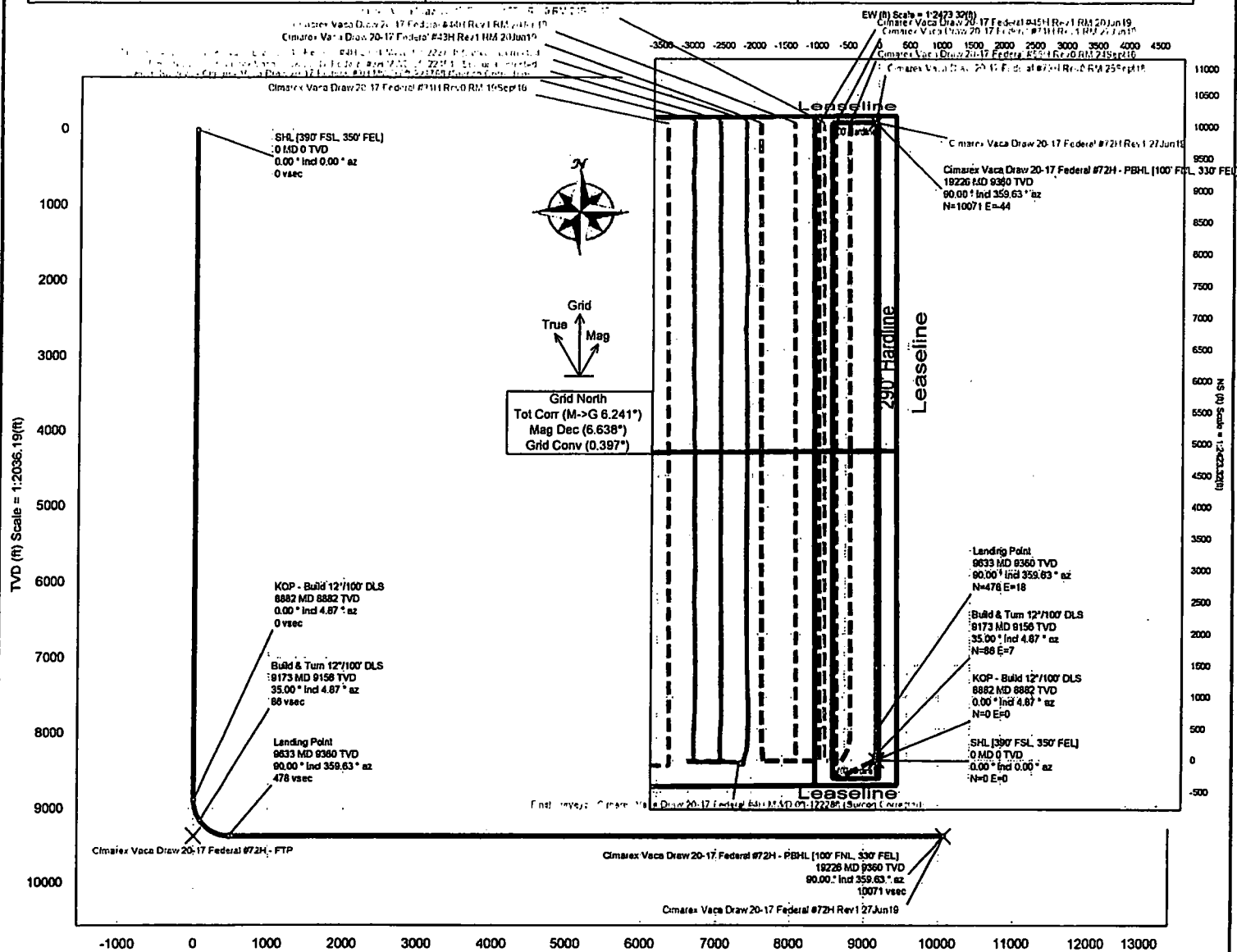
The surface casing string will be tested as per Onshore Order No. 2 to at least 0.22 psi/ft or 1500 psi, whichever is greater.

The casing string utilizing steel body pack-off will be tested to 70% of casing burst.

If well conditions dictate conventional slips will be set and BOPE will be tested to appropriate pressures based on permitted pressure requirements.

Borehole:	Well:	Field:	Structure:
Vaca Draw 20-17 Federal #72H	Vaca Draw 20-17 Federal #72H	NM Lea County (NAD 83)	Cimarex Vaca Draw 20-17 Federal #72H

Gravity & Magnetic Parameters	Surface Location	Miscellaneous
Model: HGM 2019 Dip: 68.718° Date: 27-Jun-2019	NAD83 New Mexico State Plane, Eastern Zone, US Feet	EW (ft) Scale = 1:2473.32(8)
MagDec: 6.638° FS: 47768.378mT Gravity FS: 898.432mgals (9.00665 Based)	Lat: 32° 58' 42" Northing: 404918.367US Grid Conv: 0.39189°	Plot: Cimarex Vaca Draw 20-17 Federal #72H Rev1 27-Jun-19
	Lon: 103° 35' 12.84" Easting: 772449.561US Scale Fact: 0.31997027	



Critical Points

Critical Point	MD	INCL	AZIM	TVD	VSEC	N(+)/S(-)	E(+)/W(-)	DLS
SHL (390' FSL, 350' FEL)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
KOP - Build 12°/100' DLS	8881.81	0.00	4.87	8881.81	0.00	0.00	0.00	0.00
Build & Turn 12°/100' DLS	9173.47	35.00	4.87	9155.67	85.99	86.04	7.33	12.00
Landing Point	9633.20	90.00	359.63	9360.00	477.80	478.03	17.86	12.00
Cimarex Vaca Draw 20-17 Federal #72H - PBHL (100' FNL, 330' FEL)	19226.45	90.00	359.63	9360.00	10071.15	10071.07	-44.41	0.00

Cimarex Vaca Draw 20-17 Federal #72H Rev1 27Jun19 Proposal Geodetic Report

(Def Plan)



Report Date: June 27, 2019 - 04:28 PM
Client: Cimarex Energy
Field: NM Lea County (NAD 83)
Structure / Slot: Cimarex Vaca Draw 20-17 Federal #72H / New Slot
Well: Vaca Draw 20-17 Federal #72H
Borehole: Vaca Draw 20-17 Federal #72H
UWI / API#: Unknown / Unknown
Survey Name: Cimarex Vaca Draw 20-17 Federal #72H Rev1 27Jun19
Survey Date: September 25, 2018
Tort / AHD / DDI / ERD Ratio: 90.168 ° / 10071.836 ft / 6.271 / 1.076
Coordinate Reference System: NAD83 New Mexico State Plane, Eastern Zone, US Feet
Location Lat / Long: N 32° 8' 35.62058", W 103° 35' 12.83796"
Location Grid N/E Y/X: N 404516.260 RUS, E 772449.560 RUS
CRS Grid Convergence Angle: 0.3968 °
Grid Scale Factor: 0.99997027
Version / Patch: 2.10.760.0

Survey / DLS Computation: Minimum Curvature / Lubinski
Vertical Section Azimuth: 359.628 ° (Grid North)
Vertical Section Origin: 0.000 ft, 0.000 ft
TVD Reference Datum: RKB
TVD Reference Elevation: 3421.300 ft above MSL
Seabed / Ground Elevation: 3395.300 ft above MSL
Magnetic Declination: 6.638 °
Total Gravity Field Strength: 998.4332mgn (9.80665 Based)
Gravity Model: GARM
Total Magnetic Field Strength: 47768.278 nT
Magnetic Dip Angle: 59.718 °
Declination Date: June 27, 2019
Magnetic Declination Model: HDGM 2019
North Reference: Grid North
Grid Convergence Used: 0.3968 °
Total Corr Mag North->Grid North: 6.2408 °
Local Coord Referenced To: Well Head

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
SHL [390' FSL, 350' FEL]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	100.00	0.00	4.87	100.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	200.00	0.00	4.87	200.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	300.00	0.00	4.87	300.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	400.00	0.00	4.87	400.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	500.00	0.00	4.87	500.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	600.00	0.00	4.87	600.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	700.00	0.00	4.87	700.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	800.00	0.00	4.87	800.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	900.00	0.00	4.87	900.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	1000.00	0.00	4.87	1000.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
Rustler	1001.00	0.00	4.87	1001.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	1100.00	0.00	4.87	1100.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	1200.00	0.00	4.87	1200.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	1300.00	0.00	4.87	1300.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
Top of Salt	1341.00	0.00	4.87	1341.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	1400.00	0.00	4.87	1400.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	1500.00	0.00	4.87	1500.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	1600.00	0.00	4.87	1600.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	1700.00	0.00	4.87	1700.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	1800.00	0.00	4.87	1800.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	1900.00	0.00	4.87	1900.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	2000.00	0.00	4.87	2000.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	2100.00	0.00	4.87	2100.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	2200.00	0.00	4.87	2200.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	2300.00	0.00	4.87	2300.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	2400.00	0.00	4.87	2400.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84

Comments	MD (ft)	Incl (°)	Azlm Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
	7900.00	0.00	4.87	7900.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	8000.00	0.00	4.87	8000.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	8100.00	0.00	4.87	8100.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	8200.00	0.00	4.87	8200.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	8300.00	0.00	4.87	8300.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	8400.00	0.00	4.87	8400.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	8500.00	0.00	4.87	8500.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	8600.00	0.00	4.87	8600.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	8700.00	0.00	4.87	8700.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	8800.00	0.00	4.87	8800.00	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
KOP - Build 12"/100' DLS	8881.81	0.00	4.87	8881.81	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62	W 103 35 12.84
	8900.00	2.18	4.87	8900.00	0.35	0.35	0.03	12.00	404516.61	772449.59	N 32 6 35.62	W 103 35 12.84
	9000.00	14.18	4.87	8998.80	14.49	14.50	1.24	12.00	404530.76	772450.80	N 32 6 35.76	W 103 35 12.82
	9100.00	28.18	4.87	9092.48	48.79	48.82	4.16	12.00	404585.07	772453.72	N 32 6 36.10	W 103 35 12.79
Bone Spring Leonard Shale	9124.29	29.10	4.87	9114.00	60.01	60.04	5.12	12.00	404576.30	772454.68	N 32 6 36.21	W 103 35 12.77
Build & Turn 12"/100' DLS	9166.59	34.17	4.87	9150.00	82.09	82.14	7.00	12.00	404598.40	772456.56	N 32 6 36.43	W 103 35 12.75
	9173.47	35.00	4.87	9155.67	85.99	86.04	7.33	12.00	404602.29	772456.89	N 32 6 36.47	W 103 35 12.75
	9200.00	38.16	4.30	9178.97	101.74	101.79	8.59	12.00	404618.05	772458.15	N 32 6 36.63	W 103 35 12.73
	9300.00	50.11	2.69	9248.81	171.09	171.18	12.72	12.00	404687.43	772462.28	N 32 6 37.31	W 103 35 12.68
	9400.00	62.08	1.57	9304.29	253.86	253.97	15.75	12.00	404770.22	772465.31	N 32 6 38.13	W 103 35 12.63
	9500.00	74.05	0.68	9341.58	348.42	348.54	17.53	12.00	404882.79	772467.09	N 32 6 39.05	W 103 35 12.61
	9600.00	86.02	359.86	9358.85	444.73	444.85	18.00	12.00	404961.10	772467.56	N 32 6 40.02	W 103 35 12.59
Avalon Shale Landing Point	9602.27	86.29	359.87	9359.00	446.99	447.11	17.99	12.00	404963.36	772467.55	N 32 6 40.04	W 103 35 12.59
	9633.20	90.00	359.63	9360.00	477.90	478.03	17.86	12.00	404994.27	772467.42	N 32 6 40.35	W 103 35 12.59
	9700.00	90.00	359.63	9360.00	544.70	544.82	17.42	0.00	405061.07	772466.98	N 32 6 41.01	W 103 35 12.59
	9800.00	90.00	359.63	9360.00	644.70	644.82	16.78	0.00	405161.06	772466.33	N 32 6 42.00	W 103 35 12.59
	9900.00	90.00	359.63	9360.00	744.70	744.82	16.13	0.00	405261.06	772465.69	N 32 6 42.99	W 103 35 12.59
	10000.00	90.00	359.63	9360.00	844.70	844.82	15.48	0.00	405361.05	772465.04	N 32 6 43.98	W 103 35 12.59
	10100.00	90.00	359.63	9360.00	944.70	944.82	14.83	0.00	405461.05	772464.39	N 32 6 44.97	W 103 35 12.59
	10200.00	90.00	359.63	9360.00	1044.70	1044.81	14.18	0.00	405561.04	772463.74	N 32 6 45.96	W 103 35 12.59
	10300.00	90.00	359.63	9360.00	1144.70	1144.81	13.53	0.00	405661.03	772463.09	N 32 6 46.95	W 103 35 12.59
	10400.00	90.00	359.63	9360.00	1244.70	1244.81	12.88	0.00	405761.03	772462.44	N 32 6 47.94	W 103 35 12.59
	10500.00	90.00	359.63	9360.00	1344.70	1344.81	12.23	0.00	405861.02	772461.79	N 32 6 48.93	W 103 35 12.59
	10600.00	90.00	359.63	9360.00	1444.70	1444.80	11.58	0.00	405961.02	772461.14	N 32 6 49.92	W 103 35 12.59
	10700.00	90.00	359.63	9360.00	1544.70	1544.80	10.93	0.00	406061.01	772460.49	N 32 6 50.91	W 103 35 12.59
	10800.00	90.00	359.63	9360.00	1644.70	1644.80	10.28	0.00	406161.01	772459.84	N 32 6 51.90	W 103 35 12.59
	10900.00	90.00	359.63	9360.00	1744.70	1744.80	9.64	0.00	406261.00	772459.19	N 32 6 52.88	W 103 35 12.59
	11000.00	90.00	359.63	9360.00	1844.70	1844.80	8.99	0.00	406361.00	772458.55	N 32 6 53.87	W 103 35 12.58
	11100.00	90.00	359.63	9360.00	1944.70	1944.79	8.34	0.00	406460.99	772457.90	N 32 6 54.86	W 103 35 12.58
	11200.00	90.00	359.63	9360.00	2044.70	2044.79	7.69	0.00	406560.99	772457.25	N 32 6 55.85	W 103 35 12.58
	11300.00	90.00	359.63	9360.00	2144.70	2144.79	7.04	0.00	406660.98	772456.60	N 32 6 56.84	W 103 35 12.58
	11400.00	90.00	359.63	9360.00	2244.70	2244.79	6.39	0.00	406760.98	772455.95	N 32 6 57.83	W 103 35 12.58
	11500.00	90.00	359.63	9360.00	2344.70	2344.79	5.74	0.00	406860.97	772455.30	N 32 6 58.82	W 103 35 12.58
	11600.00	90.00	359.63	9360.00	2444.70	2444.78	5.09	0.00	406960.97	772454.65	N 32 6 59.81	W 103 35 12.58
	11700.00	90.00	359.63	9360.00	2544.70	2544.78	4.44	0.00	407060.96	772454.00	N 32 7 0.80	W 103 35 12.58
	11800.00	90.00	359.63	9360.00	2644.70	2644.78	3.79	0.00	407160.96	772453.35	N 32 7 1.79	W 103 35 12.58
	11900.00	90.00	359.63	9360.00	2744.70	2744.78	3.14	0.00	407260.95	772452.70	N 32 7 2.78	W 103 35 12.58
	12000.00	90.00	359.63	9360.00	2844.70	2844.78	2.49	0.00	407360.94	772452.05	N 32 7 3.77	W 103 35 12.58
	12100.00	90.00	359.63	9360.00	2944.70	2944.77	1.85	0.00	407460.94	772451.41	N 32 7 4.76	W 103 35 12.58
	12200.00	90.00	359.63	9360.00	3044.70	3044.77	1.20	0.00	407560.93	772450.76	N 32 7 5.75	W 103 35 12.58
	12300.00	90.00	359.63	9360.00	3144.70	3144.77	0.55	0.00	407660.93	772450.11	N 32 7 6.74	W 103 35 12.58
	12400.00	90.00	359.63	9360.00	3244.70	3244.77	-0.10	0.00	407760.92	772449.46	N 32 7 7.73	W 103 35 12.58
	12500.00	90.00	359.63	9360.00	3344.70	3344.76	-0.75	0.00	407860.92	772448.81	N 32 7 8.72	W 103 35 12.58
	12600.00	90.00	359.63	9360.00	3444.70	3444.76	-1.40	0.00	407960.91	772448.16	N 32 7 9.71	W 103 35 12.58
	12700.00	90.00	359.63	9360.00	3544.70	3544.76	-2.05	0.00	408060.91	772447.51	N 32 7 10.70	W 103 35 12.58
	12800.00	90.00	359.63	9360.00	3644.70	3644.76	-2.70	0.00	408160.90	772446.86	N 32 7 11.69	W 103 35 12.58

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
	12900.00	90.00	359.63	9360.00	3744.70	3744.76	-3.35	0.00	408260.90	772446.21	N 32 7 12.68	W 103 35 12.58
	13000.00	90.00	359.63	9360.00	3844.70	3844.75	-4.00	0.00	408360.89	772445.56	N 32 7 13.67	W 103 35 12.57
	13100.00	90.00	359.63	9360.00	3944.70	3944.75	-4.65	0.00	408460.89	772444.92	N 32 7 14.65	W 103 35 12.57
	13200.00	90.00	359.63	9360.00	4044.70	4044.75	-5.29	0.00	408560.88	772444.27	N 32 7 15.64	W 103 35 12.57
	13300.00	90.00	359.63	9360.00	4144.70	4144.75	-5.94	0.00	408660.88	772443.62	N 32 7 16.63	W 103 35 12.57
	13400.00	90.00	359.63	9360.00	4244.70	4244.75	-6.59	0.00	408760.87	772442.97	N 32 7 17.62	W 103 35 12.57
	13500.00	90.00	359.63	9360.00	4344.70	4344.74	-7.24	0.00	408860.87	772442.32	N 32 7 18.61	W 103 35 12.57
	13600.00	90.00	359.63	9360.00	4444.70	4444.74	-7.89	0.00	408960.86	772441.67	N 32 7 19.60	W 103 35 12.57
	13700.00	90.00	359.63	9360.00	4544.70	4544.74	-8.54	0.00	409060.86	772441.02	N 32 7 20.59	W 103 35 12.57
	13800.00	90.00	359.63	9360.00	4644.70	4644.74	-9.19	0.00	409160.85	772440.37	N 32 7 21.58	W 103 35 12.57
	13900.00	90.00	359.63	9360.00	4744.70	4744.74	-9.84	0.00	409260.84	772439.72	N 32 7 22.57	W 103 35 12.57
	14000.00	90.00	359.63	9360.00	4844.70	4844.73	-10.49	0.00	409360.84	772439.07	N 32 7 23.56	W 103 35 12.57
	14100.00	90.00	359.63	9360.00	4944.70	4944.73	-11.14	0.00	409460.83	772438.42	N 32 7 24.55	W 103 35 12.57
	14200.00	90.00	359.63	9360.00	5044.70	5044.73	-11.79	0.00	409560.83	772437.78	N 32 7 25.54	W 103 35 12.57
	14300.00	90.00	359.63	9360.00	5144.70	5144.73	-12.43	0.00	409660.82	772437.13	N 32 7 26.53	W 103 35 12.57
	14400.00	90.00	359.63	9360.00	5244.70	5244.72	-13.08	0.00	409760.82	772436.48	N 32 7 27.52	W 103 35 12.57
	14500.00	90.00	359.63	9360.00	5344.70	5344.72	-13.73	0.00	409860.81	772435.83	N 32 7 28.51	W 103 35 12.57
	14600.00	90.00	359.63	9360.00	5444.70	5444.72	-14.38	0.00	409960.81	772435.18	N 32 7 29.50	W 103 35 12.57
	14700.00	90.00	359.63	9360.00	5544.70	5544.72	-15.03	0.00	410060.80	772434.53	N 32 7 30.49	W 103 35 12.57
	14800.00	90.00	359.63	9360.00	5644.70	5644.72	-15.68	0.00	410160.80	772433.88	N 32 7 31.48	W 103 35 12.57
	14900.00	90.00	359.63	9360.00	5744.70	5744.71	-16.33	0.00	410260.79	772433.23	N 32 7 32.47	W 103 35 12.57
	15000.00	90.00	359.63	9360.00	5844.70	5844.71	-16.98	0.00	410360.79	772432.58	N 32 7 33.46	W 103 35 12.56
	15100.00	90.00	359.63	9360.00	5944.70	5944.71	-17.63	0.00	410460.78	772431.93	N 32 7 34.45	W 103 35 12.56
	15200.00	90.00	359.63	9360.00	6044.70	6044.71	-18.28	0.00	410560.78	772431.28	N 32 7 35.43	W 103 35 12.56
	15300.00	90.00	359.63	9360.00	6144.70	6144.71	-18.93	0.00	410660.77	772430.64	N 32 7 36.42	W 103 35 12.56
	15400.00	90.00	359.63	9360.00	6244.70	6244.70	-19.57	0.00	410760.77	772429.99	N 32 7 37.41	W 103 35 12.56
	15500.00	90.00	359.63	9360.00	6344.70	6344.70	-20.22	0.00	410860.76	772429.34	N 32 7 38.40	W 103 35 12.56
	15600.00	90.00	359.63	9360.00	6444.70	6444.70	-20.87	0.00	410960.75	772428.69	N 32 7 39.39	W 103 35 12.56
	15700.00	90.00	359.63	9360.00	6544.70	6544.70	-21.52	0.00	411060.75	772428.04	N 32 7 40.38	W 103 35 12.56
	15800.00	90.00	359.63	9360.00	6644.70	6644.69	-22.17	0.00	411160.74	772427.39	N 32 7 41.37	W 103 35 12.56
	15900.00	90.00	359.63	9360.00	6744.70	6744.69	-22.82	0.00	411260.74	772426.74	N 32 7 42.36	W 103 35 12.56
	16000.00	90.00	359.63	9360.00	6844.70	6844.69	-23.47	0.00	411360.73	772426.09	N 32 7 43.35	W 103 35 12.56
	16100.00	90.00	359.63	9360.00	6944.70	6944.69	-24.12	0.00	411460.73	772425.44	N 32 7 44.34	W 103 35 12.56
	16200.00	90.00	359.63	9360.00	7044.70	7044.69	-24.77	0.00	411560.72	772424.79	N 32 7 45.33	W 103 35 12.56
	16300.00	90.00	359.63	9360.00	7144.70	7144.68	-25.42	0.00	411660.72	772424.14	N 32 7 46.32	W 103 35 12.56
	16400.00	90.00	359.63	9360.00	7244.70	7244.68	-26.07	0.00	411760.71	772423.50	N 32 7 47.31	W 103 35 12.56
	16500.00	90.00	359.63	9360.00	7344.70	7344.68	-26.71	0.00	411860.71	772422.85	N 32 7 48.30	W 103 35 12.56
	16600.00	90.00	359.63	9360.00	7444.70	7444.68	-27.36	0.00	411960.70	772422.20	N 32 7 49.29	W 103 35 12.56
	16700.00	90.00	359.63	9360.00	7544.70	7544.68	-28.01	0.00	412060.70	772421.55	N 32 7 50.28	W 103 35 12.56
	16800.00	90.00	359.63	9360.00	7644.70	7644.67	-28.66	0.00	412160.69	772420.90	N 32 7 51.27	W 103 35 12.56
	16900.00	90.00	359.63	9360.00	7744.70	7744.67	-29.31	0.00	412260.69	772420.25	N 32 7 52.26	W 103 35 12.55
	17000.00	90.00	359.63	9360.00	7844.70	7844.67	-29.96	0.00	412360.68	772419.60	N 32 7 53.25	W 103 35 12.55
	17100.00	90.00	359.63	9360.00	7944.70	7944.67	-30.61	0.00	412460.68	772418.95	N 32 7 54.24	W 103 35 12.55
	17200.00	90.00	359.63	9360.00	8044.70	8044.67	-31.26	0.00	412560.67	772418.30	N 32 7 55.23	W 103 35 12.55
	17300.00	90.00	359.63	9360.00	8144.70	8144.66	-31.91	0.00	412660.66	772417.65	N 32 7 56.21	W 103 35 12.55
	17400.00	90.00	359.63	9360.00	8244.70	8244.66	-32.56	0.00	412760.66	772417.00	N 32 7 57.20	W 103 35 12.55
	17500.00	90.00	359.63	9360.00	8344.70	8344.66	-33.21	0.00	412860.65	772416.36	N 32 7 58.19	W 103 35 12.55
	17600.00	90.00	359.63	9360.00	8444.70	8444.66	-33.85	0.00	412960.65	772415.71	N 32 7 59.18	W 103 35 12.55
	17700.00	90.00	359.63	9360.00	8544.70	8544.65	-34.50	0.00	413060.64	772415.06	N 32 8 0.17	W 103 35 12.55
	17800.00	90.00	359.63	9360.00	8644.70	8644.65	-35.15	0.00	413160.64	772414.41	N 32 8 1.16	W 103 35 12.55
	17900.00	90.00	359.63	9360.00	8744.70	8744.65	-35.80	0.00	413260.63	772413.76	N 32 8 2.15	W 103 35 12.55
	18000.00	90.00	359.63	9360.00	8844.70	8844.65	-36.45	0.00	413360.63	772413.11	N 32 8 3.14	W 103 35 12.55
	18100.00	90.00	359.63	9360.00	8944.70	8944.65	-37.10	0.00	413460.62	772412.46	N 32 8 4.13	W 103 35 12.55
	18200.00	90.00	359.63	9360.00	9044.70	9044.64	-37.75	0.00	413560.62	772411.81	N 32 8 5.12	W 103 35 12.55
	18300.00	90.00	359.63	9360.00	9144.70	9144.64	-38.40	0.00	413660.61	772411.16	N 32 8 6.11	W 103 35 12.55
	18400.00	90.00	359.63	9360.00	9244.70	9244.64	-39.05	0.00	413760.61	772410.51	N 32 8 7.10	W 103 35 12.55
	18500.00	90.00	359.63	9360.00	9344.70	9344.64	-39.70	0.00	413860.60	772409.87	N 32 8 8.09	W 103 35 12.55
	18600.00	90.00	359.63	9360.00	9444.70	9444.64	-40.35	0.00	413960.60	772409.22	N 32 8 9.08	W 103 35 12.55

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' '')	Longitude (E/W ° ' '')
	18700.00	90.00	359.63	9360.00	9544.70	9544.63	-40.99	0.00	414060.59	772408.57	N 32 8 10.07	W 103 35 12.55
	18800.00	90.00	359.63	9360.00	9844.70	9644.63	-41.64	0.00	414160.59	772407.92	N 32 8 11.06	W 103 35 12.55
	18900.00	90.00	359.63	9360.00	9744.70	9744.63	-42.29	0.00	414260.58	772407.27	N 32 8 12.05	W 103 35 12.54
	19000.00	90.00	359.63	9360.00	9844.70	9844.63	-42.94	0.00	414360.58	772406.62	N 32 8 13.04	W 103 35 12.54
	19100.00	90.00	359.63	9360.00	9944.70	9844.63	-43.59	0.00	414460.57	772405.97	N 32 8 14.03	W 103 35 12.54
	19200.00	90.00	359.63	9360.00	10044.70	10044.62	-44.24	0.00	414560.56	772405.32	N 32 8 15.02	W 103 35 12.54

Leonard Target
Cimarex Vaca
Draw 20-17
Federal #72H -
PBHL [100' FNL,
330' FEL]

19226.45 90.00 359.63 9360.00 10071.15 10071.07 -44.41 0.00 414587.01 772405.15 N 32 8 15.28 W 103 35 12.54

Survey Type: Def Plan

Survey Error Model: ISCWSA Rev 0 *** 3-D 95.000% Confidence 2.7955 sigma
Survey Program:

Description	Part	MD From (ft)	MD To (ft)	EOU Freq (ft)	Hole Size (in)	Casing Diameter (in)	Expected Max Inclination (deg)	Survey Tool Type	Borehole / Survey
	1	0.000	26.000	1/100.000	30.000	30.000		NAL_MWD_IFR1+MS-Depth Only	Vaca Draw 20-17 Federal #72H / Cimarex Vaca Draw 20-17 Federal #72H Rev1 27Jun19
	1	26.000	19226.447	1/100.000	30.000	30.000		NAL_MWD_IFR1+MS	Vaca Draw 20-17 Federal #72H / Cimarex Vaca Draw 20-17

Cimarex Vaca Draw 20-17 Federal #72H Rev1 27Jun19 Proposal Geodetic Report

(Def Plan)



Report Date: June 27, 2019 - 04:28 PM
 Client: Cimarex Energy
 Field: NM Lea County (NAD 83)
 Structure / Slot: Cimarex Vaca Draw 20-17 Federal #72H / New Slot
 Well: Vaca Draw 20-17 Federal #72H
 Borehole: Vaca Draw 20-17 Federal #72H
 UWI / API#: Unknown / Unknown
 Survey Name: Cimarex Vaca Draw 20-17 Federal #72H Rev1 27Jun19
 Survey Date: September 25, 2018
 Tort / AHD / DDI / ERD Ratio: 90.168 ° / 10071.836 ft / 6.271 / 1.076
 Coordinate Reference System: NAD83 New Mexico State Plane, Eastern Zone, US Feet
 Location Lat / Long: N 32° 6' 35.62058", W 103° 35' 12.83796"
 Location Grid N/E Y/X: N 404516.260 RUS, E 772449.560 RUS
 CRS Grid Convergence Angle: 0.3968 °
 Grid Scale Factor: 0.99997027
 Version / Patch: 2.10.760.0

Survey / DLS Computation: Minimum Curvature / Lubinski
 Vertical Section Azimuth: 359.628 ° (Grid North)
 Vertical Section Origin: 0.000 ft, 0.000 ft
 TVD Reference Datum: RKB
 TVD Reference Elevation: 3421.300 ft above MSL
 Seabed / Ground Elevation: 3395.300 ft above MSL
 Magnetic Declination: 6.638 °
 Total Gravity Field Strength: 998.4332mgn (9.80665 Based)
 Gravity Model: GARM
 Total Magnetic Field Strength: 47768.278 nT
 Magnetic Dip Angle: 59.718 °
 Declination Date: June 27, 2019
 Magnetic Declination Model: HDGM 2019
 North Reference: Grid North
 Grid Convergence Used: 0.3968 °
 Total Corr Mag North->Grid: 6.2408 °
 North:
 Local Coord Referenced To: Well Head

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
SHL [390' FSL, 350' FEL]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	404516.26	772449.56	N 32 6 35.62 W 103 35 12.84	
KOP - Build 12"/100' DLS	8881.81	0.00	4.87	8881.81	0.00	0.00	0.00	0.00	404516.26	772449.56	N 32 6 35.62 W 103 35 12.84	
Build & Turn 12"/100' DLS	9173.47	35.00	4.87	9155.67	85.99	86.04	7.33	12.00	404602.29	772456.89	N 32 6 36.47 W 103 35 12.75	
Landing Point Cimarex Vaca Draw 20-17	9633.20	90.00	359.63	9360.00	477.90	478.03	17.86	12.00	404994.27	772467.42	N 32 6 40.35 W 103 35 12.59	
Federal #72H - PBHL [100' FNL, 330' FEL]	19226.45	90.00	359.63	9360.00	10071.15	10071.07	-44.41	0.00	414587.01	772405.15	N 32 8 15.28 W 103 35 12.54	

Survey Type: Def Plan

Survey Error Model: ISCWSA Rev 0 *** 3-D 95.000% Confidence 2.7955 sigma
 Survey Program:

Description	Part	MD From (ft)	MD To (ft)	EOU Freq (ft)	Hole Size (in)	Casing Diameter (in)	Expected Max Inclination (deg)	Survey Tool Type	Borehole / Survey
	1	0.000	26.000	1/100.000	30.000	30.000		NAL_MWD_IFR1+MS-Depth Only	Vaca Draw 20-17 Federal #72H / Cimarex Vaca Draw 20-17 Federal #72H Rev1 27Jun19

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (RUS)	Easting (RUS)	Latitude (N/S ° ' '')	Longitude (E/W ° ' '')
		1	26.000	19228.447	1/100.000	30.000	30.000		NAL_MWD_IFR1+MS		Vaca Draw 20-17 Federal #72H / Cimarex Vaca Draw 20-17	

Cimarex Vaca Draw 20-17 Federal #72H Rev1 27Jun19 Anti-Collision Summary Report

Analysis Date-24hr Time: June 28, 2019 - 08:48

Client: Cimarex Energy

Field: NM Lea County (NAD 83)

Structure: Cimarex Vaca Draw 20-17 Federal #72H

Slot: New Slot

Well: Vaca Draw 20-17 Federal #72H

Borehole: Vaca Draw 20-17 Federal #72H

Scan MD Range: 0.00ft ~ 19226.45ft

Analysis Method:

Reference Trajectory:

Depth Interval:

Rule Set:

Min Pts:

Version / Patch:

Database \ Project:

3D Least Distance

Cimarex Vaca Draw 20-17 Federal #72H Rev1 27Jun19 (Def Plan)

Every 10.00 Measured Depth (ft)

NAL Procedure: D&M AntiCollision-Standard S002

All local minima indicated.

2.10.760.0

US1153APP452.dir.slb.com\drilling-NM Lea County 2.10

Trajectory Error Model: ISCWSA0 3-D 95.000% Confidence 2.7955 sigma, for subject well. For offset wells, error model version is specified with each well respectively.

Offset Trajectories Summary

Offset Selection Criteria

Wellhead distance scan: Not performed!

Selection filters: Definitive Surveys - Definitive Plans - Definitive surveys exclude definitive plans

- All Non-Def Surveys when no Def-Survey is set in a borehole - All Non-Def Plans when no Def-Plan is set in a borehole

Offset Trajectory	Separation			Allow Dev. (ft)	Sep. Fact.	Controlling Rule	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)				MD (ft)	TVD (ft)	Alert	Minor	Major		

Results highlighted: Sep-Factor separation <= 1.50 ft

Cimarex Vaca Draw 20-17
Federal #73H Rev0 RM
25Sept18 (Non-Def Plan)

20.00	18.50	17.50	3.50	N/A	MAS = 5.03 (m)	0.00	0.00	CtCt<=15m<15.00				Enter Alert	Fail Minor
20.00	18.50	17.50	3.50	78767.83	MAS = 5.03 (m)	26.00	26.00					WRP	
20.00	20.01	5.83	0.00	1.50	OSF1.50	1920.00	1920.00		OSF<1.50			Enter Minor	
20.00	20.76	5.33	-0.76	1.44	OSF1.50	2000.00	2000.00					MinPt-CtCt	
20.08	21.23	5.09	-1.15	1.41	OSF1.50	2100.00	2100.00					MinPts	
21.19	21.28	6.17	-0.08	1.49	OSF1.50	2200.00	2200.00		OSF>1.50			Exit Minor	
68.61	22.57	52.74	48.05	4.94	OSF1.50	2820.00	2820.00	OSF>5.00				Exit Alert	
290.61	64.35	246.88	226.26	6.99	OSF1.50	8881.81	8881.81					MinPts	
290.95	64.50	247.12	226.45	6.98	OSF1.50	8900.00	8900.00					MinPt-O-SF	
3069.90	315.35	2858.83	2754.55	14.71	OSF1.50	19226.45	9360.00					MinPts	

Cimarex Vaca Draw 20-17
Federal #71H Rev1 RM
27Jun19 (Def Plan)

20.00	16.36	18.19	3.64	N/A	MAS = 4.99 (m)	0.00	0.00	CtCt<=15m<15.00				Enter Alert	Fail Minor
20.00	16.36	18.19	3.64	16377.11	MAS = 4.99 (m)	26.00	26.00					WRP	
20.00	18.97	6.08	0.03	1.50	OSF1.50	1990.00	1990.00					MinPt-CtCt	
20.00	20.07	6.02	-0.07	1.49	OSF1.50	2000.00	2000.00		OSF<1.50			Enter Minor	
20.02	20.13	6.00	-0.11	1.49	OSF1.50	2010.00	2010.00					MINPT-O-EOU	
20.07	20.19	6.01	-0.12	1.49	OSF1.50	2020.00	2020.00					MinPts	
20.26	20.31	6.12	-0.05	1.50	OSF1.50	2040.00	2040.00		OSF>1.50			Exit Minor	
69.76	22.27	54.32	47.50	4.98	OSF1.50	2560.00	2560.00	OSF>5.00				Exit Alert	
690.32	68.64	643.95	621.68	15.45	OSF1.50	8890.00	8890.00					MinPts	
692.72	69.07	646.08	623.66	15.41	OSF1.50	8950.00	8949.77					MinPt-O-SF	
910.35	54.89	873.15	855.46	25.67	OSF1.50	9633.20	9360.00					MinPt-CtCt	
910.35	274.59	726.69	635.76	5.00	OSF1.50	17570.00	9360.00	OSF<5.00				Enter Alert	
910.35	326.26	692.24	584.09	4.20	OSF1.50	19226.45	9360.00					MinPts	

Offset Trajectory	Separation			Allow Dev. (ft)	Sep. Fact.	Controlling Rule	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)				MD (ft)	TVD (ft)	Alert	Minor	Major		
Cimarex Vaca Draw 20-17 Federal #58H Rev0 RM 24Sept18 (Non-Def Plan)													
	549.87	32.81	547.37	517.07	N/A	MAS = 10.00 (m)	0.00	0.00					Warning Alert
	549.87	32.81	547.37	517.07	70389.08	MAS = 10.00 (m)	26.00	26.00					Surface
	549.87	85.65	491.94	484.23	9.87	OSF1.50	8881.81	8881.81					WRP
	549.95	85.91	491.84	484.04	9.85	OSF1.50	8910.00	8909.98					MinPt-CtCt
	550.10	86.09	491.87	484.00	9.83	OSF1.50	8930.00	8929.92					MINPT-O-EOU
	553.80	87.27	494.78	486.53	9.76	OSF1.50	9060.00	9055.89					MinPt-O-ADP
	713.24	216.02	568.39	497.21	4.99	OSF1.50	15570.00	9360.00	OSF<5.00				MinPt-O-SF
	713.23	328.24	493.57	384.99	3.27	OSF1.50	19226.45	9360.00					Enter Alert
													MinPts
Cimarex Vaca Draw 20-17 Federal #57H Rev0 RM 24Sept18 (Non-Def Plan)													
	569.93	32.81	568.12	537.12	N/A	MAS = 10.00 (m)	0.00	0.00					Warning Alert
	569.93	32.81	568.11	537.12	79905.64	MAS = 10.00 (m)	26.00	26.00					Surface
	569.93	32.81	556.00	537.12	46.87	MAS = 10.00 (m)	1990.00	1990.00					WRP
	569.95	32.81	555.92	537.14	46.49	MAS = 10.00 (m)	2010.00	2010.00					MinPts
	816.30	43.38	786.78	772.92	29.39	OSF1.50	5130.00	5130.00					MINPT-O-EOU
	819.01	74.24	768.91	744.77	16.92	OSF1.50	8910.00	8909.98					MinPt-O-SF
	819.15	74.41	768.94	744.74	16.89	OSF1.50	8930.00	8929.92					MINPT-O-EOU
	827.74	76.16	776.36	751.58	16.66	OSF1.50	9140.00	9127.60					MinPt-O-ADP
	1018.87	307.17	813.49	711.71	5.00	OSF1.50	18330.00	9360.00	OSF<5.00				MinPt-O-SF
	1018.87	335.21	794.79	683.66	4.58	OSF1.50	19226.45	9360.00					Enter Alert
													MinPts
Cimarex Vaca Draw 20-17 Federal #45H Rev1 RM 20Jun19 (Def Plan)													
	1749.76	32.81	1747.26	1716.95	N/A	MAS = 10.00 (m)	0.00	0.00					Warning Alert
	1749.76	32.81	1747.23	1716.95	68982.86	MAS = 10.00 (m)	26.00	26.00					Surface
	898.91	76.20	846.90	822.71	18.51	OSF1.50	8881.81	8881.81					WRP
	898.98	76.40	846.84	822.59	18.46	OSF1.50	8910.00	8909.98					MinPt-CtCt
	899.05	76.46	846.86	822.58	18.44	OSF1.50	8920.00	8919.96					MINPT-O-EOU
	920.40	278.93	733.26	641.48	4.99	OSF1.50	17030.00	9360.00	OSF<5.00				MinPt-O-ADP
	920.40	348.07	687.16	572.33	3.99	OSF1.50	19226.45	9360.00					Enter Alert
													MinPts
Cimarex Vaca Draw 20-17 Federal #44H Rev1 RM 20Jun19 (Def Plan)													
	1769.76	32.81	1767.26	1736.95	N/A	MAS = 10.00 (m)	0.00	0.00					Pass
	1769.76	32.81	1767.23	1736.95	69772.50	MAS = 10.00 (m)	26.00	26.00					Surface
	1274.85	74.26	1224.32	1200.80	26.80	OSF1.50	8881.81	8881.81					WRP
	1274.93	74.50	1224.24	1200.43	26.72	OSF1.50	8910.00	8909.98					MinPt-CtCt
	1275.00	74.58	1224.25	1200.42	26.69	OSF1.50	8920.00	8919.96					MINPT-O-EOU
	1298.06	77.28	1243.54	1218.79	26.12	OSF1.50	9270.00	9228.66					MinPt-O-ADP
	1381.38	349.13	1147.78	1032.24	5.97	OSF1.50	19226.45	9360.00					MinPt-O-SF
													MinPts
Cimarex Vaca Draw 20-17 Federal #43H Rev1 RM 20Jun19 (Def Plan)													
	1789.75	32.81	1787.25	1756.94	N/A	MAS = 10.00 (m)	0.00	0.00					Pass
	1789.75	32.81	1787.22	1756.94	63841.59	MAS = 10.00 (m)	26.00	26.00					Surface
	1789.75	85.11	1732.18	1704.64	32.45	OSF1.50	8820.00	8820.00					WRP
	1789.84	85.43	1732.05	1704.41	32.33	OSF1.50	8860.00	8860.00					MinPt-CtCt
	1789.91	85.51	1732.07	1704.40	32.30	OSF1.50	8870.00	8870.00					MINPT-O-EOU
	1840.49	355.05	1602.95	1485.44	7.82	OSF1.50	19226.45	9360.00					MinPt-O-ADP
													MinPts

Offset Trajectory	Separation			Allow Dev. (ft)	Sep. Fact.	Controlling Rule	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)				MD (ft)	TVD (ft)	Alert	Minor	Major		

Final Surveys - Cimarex Vaca
Draw 20-17 Federal #4H ST01
MWD 0ft-22278ft (Surcon
Corrected) (Def Survey)

2988.54	32.81	2988.84	2955.73	N/A	MAS = 10.00 (m)	0.00	0.00					Pass	
2988.57	32.81	2988.83	2955.76	72589.10	MAS = 10.00 (m)	26.00	26.00					MinPts	
2988.62	32.81	2988.82	2955.82	28972.17	MAS = 10.00 (m)	50.00	50.00					WRP	
2067.38	65.33	2022.88	2002.05	49.54	OSF1.50	8970.00	8969.50					MINPT-O-EOU	
2067.41	65.39	2022.88	2002.02	49.49	OSF1.50	8980.00	8979.31					MinPt-CtCt	
2129.41	68.54	2082.85	2060.87	48.38	OSF1.50	9550.00	9352.78					MinPts	
3657.42	99.98	3590.28	3557.44	55.65	OSF1.50	12180.00	9360.00					MinPt-O-SF	
3658.37	102.75	3589.39	3555.62	54.14	OSF1.50	12300.00	9360.00					MinPt-CtCt	
3658.68	108.58	3585.82	3550.10	51.20	OSF1.50	12490.00	9360.00					MINPT-O-EOU	
3659.78	118.09	3580.57	3541.69	47.04	OSF1.50	12830.00	9360.00					MinPt-CtCt	
3659.53	126.88	3574.46	3532.65	43.74	OSF1.50	13140.00	9360.00					MinPt-CtCt	
3618.16	202.17	3482.91	3416.00	27.03	OSF1.50	15710.00	9360.00					MinPt-CtCt	
3618.80	204.21	3482.18	3414.59	28.76	OSF1.50	15800.00	9360.00					MINPT-O-EOU	
3619.73	205.33	3482.37	3414.41	26.62	OSF1.50	15850.00	9360.00					MinPt-O-ADP	
3625.46	216.24	3480.83	3409.23	25.31	OSF1.50	16190.00	9360.00					MinPt-CtCt	
3628.42	219.12	3479.86	3407.30	24.98	OSF1.50	16310.00	9360.00					MINPT-O-EOU	
3621.85	231.47	3467.06	3390.38	23.61	OSF1.50	16710.00	9360.00					MinPt-CtCt	
3623.95	237.06	3465.43	3386.89	23.06	OSF1.50	16920.00	9360.00					MINPT-O-EOU	
3625.16	238.50	3465.88	3386.66	22.93	OSF1.50	16980.00	9360.00					MinPt-O-ADP	
3647.03	253.60	3477.48	3393.43	21.69	OSF1.50	17480.00	9360.00					MINPT-O-EOU	
3647.01	268.58	3467.48	3378.43	20.47	OSF1.50	17950.00	9360.00					MinPt-CtCt	
3642.82	279.90	3455.75	3362.93	19.62	OSF1.50	18330.00	9360.00					MinPt-CtCt	
3645.34	286.94	3453.57	3358.40	19.14	OSF1.50	18590.00	9360.00					MINPT-O-EOU	
3644.66	306.80	3439.65	3337.86	17.90	OSF1.50	19228.45	9360.00					MinPts	

Final Surveys - Cimarex Vaca
Draw 20-17 Federal #4H MWD
0ft-12228ft (Surcon Corrected)
(Def Survey)

2988.54	32.81	2988.04	2955.73	N/A	MAS = 10.00 (m)	0.00	0.00					Pass	
2988.57	32.81	2988.03	2955.78	72569.61	MAS = 10.00 (m)	26.00	26.00					MinPts	
2988.82	32.81	2988.02	2955.82	28964.39	MAS = 10.00 (m)	50.00	50.00					WRP	
2067.38	66.28	2021.95	2001.10	49.51	OSF1.50	8970.00	8969.50					MINPT-O-EOU	
2067.41	66.34	2021.94	2001.07	49.46	OSF1.50	8980.00	8979.31					MinPt-CtCt	
2129.41	69.46	2081.92	2059.94	48.38	OSF1.50	9550.00	9352.78					MinPts	
10313.10	85.25	10255.43	10227.85	186.90	OSF1.50	19226.45	9360.00					MinPt-O-SF	
												TD	

Final Surveys - Cimarex Vaca
Draw 20-17 Federal #3H MWD
0ft-22454' (Surcon Corrected)
(Def Survey)

3008.48	32.81	3006.82	2975.67	605105.84	MAS = 10.00 (m)	0.00	0.00					Pass	
3008.42	32.81	3006.69	2975.61	39434.07	MAS = 10.00 (m)	26.00	26.00					Surface	
3005.99	32.81	3003.14	2973.18	2310.75	MAS = 10.00 (m)	310.00	310.00					WRP	
3006.02	32.81	3003.08	2973.21	2173.84	MAS = 10.00 (m)	330.00	330.00					MinPts	
3005.20	32.81	2997.19	2972.39	484.92	MAS = 10.00 (m)	1490.00	1490.00					MINPT-O-EOU	
2480.19	62.73	2437.60	2417.46	61.51	OSF1.50	8930.00	8929.92					MinPts	
2480.24	62.86	2437.57	2417.38	61.38	OSF1.50	8950.00	8949.77					MinPt-CtCt	
2480.31	62.93	2437.59	2417.38	61.31	OSF1.50	8960.00	8959.65					MINPT-O-EOU	
2631.46	69.31	2584.65	2562.14	58.43	OSF1.50	9960.00	9360.00					MinPt-O-ADP	
4050.00	106.86	3978.28	3943.14	57.61	OSF1.50	12400.00	9360.00					MinPt-O-SF	
												MINPT-O-EOU	

Offset Trajectory	Separation			Allow Dev. (ft)	Sep. Fact.	Controlling Rule	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)				MD (ft)	TVD (ft)	Alert	Minor	Major		
4052.52	110.78	3978.19	3941.75	55.58		OSF1.50	12540.00	9360.00				MINPT-O-EQU	
4053.87	112.41	3978.45	3941.46	54.78		OSF1.50	12610.00	9360.00				MinPt-O-ADP	
4055.43	116.10	3977.55	3939.33	53.03		OSF1.50	12710.00	9360.00				MinPt-CICl	
4057.69	122.51	3975.54	3935.18	50.25		OSF1.50	12960.00	9360.00				MINPT-O-EQU	
4058.87	123.91	3975.78	3934.96	49.69		OSF1.50	13020.00	9360.00				MinPt-O-ADP	
4062.92	130.94	3975.15	3931.99	47.04		OSF1.50	13260.00	9360.00				MINPT-O-EQU	
4062.92	140.77	3968.59	3922.15	43.73		OSF1.50	13580.00	9360.00				MinPt-CICl	
4056.42	155.25	3952.44	3901.17	39.55		OSF1.50	14080.00	9360.00				MinPt-CICl	
4050.73	173.99	3934.25	3876.74	35.20		OSF1.50	14720.00	9360.00				MinPt-CICl	
4051.50	177.14	3932.93	3874.38	34.58		OSF1.50	14850.00	9360.00				MINPT-O-EQU	
4052.42	178.27	3933.10	3874.15	34.36		OSF1.50	14900.00	9360.00				MinPt-O-ADP	
4047.36	188.98	3920.90	3858.39	32.36		OSF1.50	15230.00	9360.00				MinPt-CICl	
4048.43	192.13	3918.87	3856.31	31.83		OSF1.50	15360.00	9360.00				MINPT-O-EQU	
4048.44	196.95	3916.68	3851.49	31.05		OSF1.50	15500.00	9360.00				MinPt-CICl	
4048.46	209.97	3908.00	3838.49	28.11		OSF1.50	15940.00	9360.00				MinPt-CICl	
4050.27	240.62	3889.38	3809.65	25.39		OSF1.50	16970.00	9360.00				MinPt-CICl	
4051.81	246.66	3886.89	3805.14	24.78		OSF1.50	17200.00	9360.00				MINPT-O-EQU	
4054.41	249.80	3887.40	3804.61	24.48		OSF1.50	17320.00	9360.00				MinPt-O-ADP	
4060.38	255.58	3889.50	3804.78	23.96		OSF1.50	17510.00	9360.00				MINPT-O-EQU	
4061.11	256.37	3889.72	3804.75	23.89		OSF1.50	17540.00	9360.00				MinPt-O-ADP	
4050.03	270.74	3869.08	3779.29	22.55		OSF1.50	17980.00	9360.00				MinPt-CICl	
4049.75	282.08	3881.22	3767.67	21.84		OSF1.50	18360.00	9360.00				MinPt-CICl	
4048.36	291.65	3853.45	3756.71	20.92		OSF1.50	18680.00	9360.00				MinPt-CICl	
4049.95	296.21	3852.00	3753.74	20.60		OSF1.50	18860.00	9360.00				MINPT-O-EQU	
4052.99	303.43	3850.23	3749.56	20.12		OSF1.50	19100.00	9360.00				MINPT-O-EQU	
4055.60	308.57	3850.74	3749.03	19.93		OSF1.50	19220.00	9360.00				MinPt-O-ADP	
4055.77	308.74	3850.80	3749.04	19.92		OSF1.50	19226.45	9360.00				MinPt-O-SF	

Final Surveys - Cimarex Vaca
Draw 20-17 Federal #72H MWD
0ft-22179ft (Surcon Corrected)
(Def Survey)

										Pass
3028.51	32.81	3026.97	2995.70	N/A	MAS = 10.00 (m)	0.00	0.00			Surface
3028.50	32.81	3026.90	2895.69	54491.94	MAS = 10.00 (m)	26.00	26.00			WRP
3027.46	32.81	3022.76	2994.65	957.15	MAS = 10.00 (m)	760.00	760.00			MinPts
3028.01	32.81	3021.31	2995.20	587.64	MAS = 10.00 (m)	1220.00	1220.00			MinPts
2802.05	61.50	2860.47	2840.55	72.78	OSF1.50	8940.00	8939.86			MinPt-CtCl
2802.12	61.64	2860.45	2840.48	72.61	OSF1.50	8960.00	8959.65			MinPts
3173.25	72.32	3124.52	3100.93	67.22	OSF1.50	10390.00	9360.00			MinPt-O-SF
3189.12	72.68	3140.15	3116.44	67.22	OSF1.50	10430.00	9360.00			MinPt-O-SF
4167.50	103.75	4097.85	4063.75	61.08	OSF1.50	12190.00	9360.00			MINPT-O-EQU
4168.15	104.54	4097.98	4063.61	60.62	OSF1.50	12230.00	9360.00			MinPt-O-ADP
4171.02	112.08	4095.82	4058.93	56.53	OSF1.50	12480.00	9360.00			MinPt-CICl
4171.90	114.79	4094.89	4057.11	55.19	OSF1.50	12600.00	9360.00			MINPT-O-EQU
4173.75	116.91	4095.33	4058.84	54.20	OSF1.50	12690.00	9360.00			MinPt-O-ADP
4177.51	121.07	4096.32	4056.44	52.36	OSF1.50	12830.00	9360.00			MINPT-O-EQU
4182.08	129.38	4095.35	4052.70	49.01	OSF1.50	13100.00	9360.00			MinPt-CICl
4183.33	136.09	4092.12	4047.23	46.58	OSF1.50	13360.00	9360.00			MINPT-O-EQU
4178.80	154.99	4074.99	4023.81	40.81	OSF1.50	14000.00	9360.00			MinPt-CICl
4179.84	157.55	4074.13	4022.09	40.15	OSF1.50	14110.00	9360.00			MINPT-O-EQU
4180.79	158.95	4074.34	4021.84	39.80	OSF1.50	14170.00	9360.00			MinPt-O-ADP
4181.62	177.07	4063.10	4004.56	35.70	OSF1.50	14760.00	9360.00			MinPt-CICl
4182.37	179.32	4062.34	4003.05	35.26	OSF1.50	14860.00	9360.00			MINPT-O-EQU
4183.32	180.43	4062.55	4002.89	35.04	OSF1.50	14910.00	9360.00			MinPt-O-ADP
4185.83	183.71	4062.68	4002.12	34.44	OSF1.50	15010.00	9360.00			MINPT-O-EQU

Offset Trajectory	Separation			Allow Dev. (ft)	Sep. Fact.	Controlling Rule	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)				MD (ft)	TVD (ft)	Alert	Minor	Major		
4187.03	185.13	4063.14	4001.91	34.18		OSF1.50	15070.00	9360.00				MinPt-O-ADP	
4190.82	189.66	4063.91	4001.17	33.39		OSF1.50	15210.00	9360.00				MINPT-O-EOU	
4191.99	191.06	4064.14	4000.93	33.15		OSF1.50	15270.00	9360.00				MinPt-O-ADP	
4189.09	203.77	4052.77	3985.33	31.05		OSF1.50	15670.00	9360.00				MinPt-CtCt	
4189.60	205.22	4052.31	3984.38	30.83		OSF1.50	15740.00	9360.00				MINPT-O-EOU	
4190.11	205.83	4052.41	3984.28	30.74		OSF1.50	15770.00	9360.00				MinPt-O-ADP	
4194.20	210.20	4053.58	3984.00	30.13		OSF1.50	15930.00	9360.00				MinPt-O-ADP	
4198.21	214.54	4054.71	3983.67	29.54		OSF1.50	16070.00	9360.00				MINPT-O-EOU	
4194.20	228.59	4041.32	3965.60	27.69		OSF1.50	16510.00	9360.00				MinPt-CtCt	
4195.25	231.44	4040.47	3963.81	27.35		OSF1.50	16630.00	9360.00				MINPT-O-EOU	
4196.88	233.42	4040.76	3963.46	27.13		OSF1.50	16710.00	9360.00				MinPt-O-ADP	
4203.31	243.15	4040.73	3960.16	26.08		OSF1.50	17000.00	9360.00				MinPt-CtCt	
4181.83	273.53	3998.99	3908.30	23.05		OSF1.50	18020.00	9360.00				MinPt-CtCt	
4182.45	275.26	3998.47	3907.19	22.90		OSF1.50	18100.00	9360.00				MINPT-O-EOU	
4182.98	275.90	3998.57	3907.08	22.85		OSF1.50	18130.00	9360.00				MinPt-O-ADP	
4182.21	297.26	3963.55	3864.95	21.10		OSF1.50	18810.00	9360.00				MinPt-CtCt	
4155.30	310.17	3948.04	3845.13	20.18		OSF1.50	19226.45	9360.00				MinPts	

Cimarex Vaca Draw 20-17
Federal #31H Rev0 RM
19Sept18 (Non-Def Plan)

Pass												
3648.15	32.81	3645.65	3615.34	N/A	MAS = 10.00 (m)	0.00	0.00					Surface
3648.15	32.81	3645.59	3615.34	64599.62	MAS = 10.00 (m)	26.00	26.00					WRP
3313.09	74.48	3262.48	3238.60	69.32	OSF1.50	8881.81	8881.81					MinPt-CtCt
3313.18	74.72	3262.41	3238.46	69.09	OSF1.50	8910.00	8909.98					MINPT-O-EOU
3313.25	74.81	3262.43	3238.45	69.01	OSF1.50	8920.00	8919.96					MinPt-O-ADP
3379.33	351.72	3144.01	3027.62	14.51	OSF1.50	19226.45	9360.00					MinPts

Cimarex Vaca Draw 20-17
Federal #30H Rev0 RM
19Sept18 (Non-Def Plan)

Pass												
3688.13	32.81	3665.63	3635.32	N/A	MAS = 10.00 (m)	0.00	0.00					Surface
3688.13	32.81	3665.57	3635.32	63946.65	MAS = 10.00 (m)	26.00	26.00					WRP
3668.13	85.75	3610.13	3582.38	68.05	OSF1.50	8881.81	8881.81					MinPt-CtCt
3668.22	88.02	3610.04	3582.20	65.84	OSF1.50	8910.00	8909.98					MINPT-O-EOU
3668.29	86.11	3610.06	3582.19	65.77	OSF1.50	8920.00	8919.96					MinPt-O-ADP
3789.20	356.42	3550.76	3432.79	16.05	OSF1.50	19226.45	9360.00					MinPts

Cimarex Vaca Draw 20-17
Federal #29H Rev0 RM
19Sept18 (Non-Def Plan)

Pass												
3688.15	32.81	3685.65	3655.34	N/A	MAS = 10.00 (m)	0.00	0.00					Surface
3688.15	32.81	3685.59	3655.34	65308.40	MAS = 10.00 (m)	26.00	26.00					WRP
3688.15	32.81	3673.58	3655.34	305.50	MAS = 10.00 (m)	1970.00	1970.00					MinPts
3688.20	32.81	3673.51	3655.39	302.35	MAS = 10.00 (m)	2000.00	2000.00					MINPT-O-EOU
4143.00	58.41	4103.23	4084.58	111.08	OSF1.50	6820.00	6820.00					MinPt-O-SF
4143.88	73.88	4093.80	4070.01	87.03	OSF1.50	8910.00	8909.98					MINPT-O-EOU
4143.95	73.95	4093.82	4070.00	86.94	OSF1.50	8920.00	8919.96					MinPt-O-ADP
4201.17	348.20	3968.20	3852.97	18.22	OSF1.50	19226.45	9360.00					MinPts

Final Surveys - Cimarex Vaca
Draw 20-17 Federal #8H MWD
08-22-2018 (Surcon Corrected)
(Def Survey)

Pass												
4228.69	32.81	4227.03	4195.88	N/A	MAS = 10.00 (m)	0.00	0.00					MinPts
4228.70	32.81	4227.00	4195.90	78476.19	MAS = 10.00 (m)	26.00	26.00					WRP

Offset Trajectory	Separation			Allow Dev. (ft)	Sep. Fact.	Controlling Rule	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)				MD (ft)	TVD (ft)	Alert	Minor	Major		
4229.23	32.81	4226.49	4196.42	3878.62	MAS = 10.00 (m)	290.00	290.00					MinPts	
4230.12	32.81	4225.95	4197.31	1675.06	MAS = 10.00 (m)	590.00	590.00					MINPT-O-EOU	
4224.87	32.81	4216.47	4192.06	625.96	MAS = 10.00 (m)	1540.00	1540.00					MinPts	
4225.01	32.81	4218.32	4192.20	599.65	MAS = 10.00 (m)	1600.00	1600.00					MINPT-O-EOU	
4227.30	32.81	4217.66	4194.49	529.03	MAS = 10.00 (m)	1790.00	1790.00					MinPt-O-SF	
4074.62	32.81	4055.17	4041.81	230.24	MAS = 10.00 (m)	3920.00	3920.00					MinPt-O-SF	
3728.37	62.52	3685.91	3665.86	92.92	OSF1.50	8930.00	8929.82					MinPt-CtCt	
3728.39	62.58	3685.88	3665.81	92.82	OSF1.50	8940.00	8939.86					MINPT-O-EOU	
3728.44	62.65	3685.88	3665.79	92.72	OSF1.50	8950.00	8949.77					MinPt-O-ADP	
4328.51	81.56	4271.58	4244.95	81.19	OSF1.50	11250.00	9360.00					MinPt-O-SF	
4784.14	110.79	4709.81	4673.36	65.81	OSF1.50	12260.00	9360.00					MinPt-CtCt	
4783.68	119.75	4703.37	4663.93	60.63	OSF1.50	12590.00	9360.00					MinPt-CtCt	
4784.34	121.84	4702.84	4662.50	59.59	OSF1.50	12690.00	9360.00					MINPT-O-EOU	
4785.21	126.09	4700.87	4659.12	57.57	OSF1.50	12820.00	9360.00					MinPt-CtCt	
4779.20	142.03	4684.04	4637.17	50.97	OSF1.50	13390.00	9360.00					MinPt-CtCt	
4778.55	148.52	4680.39	4632.03	49.39	OSF1.50	13550.00	9360.00					MinPt-CtCt	
4778.66	152.46	4676.54	4626.20	47.45	OSF1.50	13760.00	9360.00					MinPt-CtCt	
4778.07	157.33	4672.71	4620.74	45.98	OSF1.50	13930.00	9360.00					MinPt-CtCt	
4778.68	159.19	4672.07	4619.49	45.43	OSF1.50	14020.00	9360.00					MINPT-O-EOU	
4779.54	160.22	4672.25	4619.32	45.14	OSF1.50	14070.00	9360.00					MinPt-O-ADP	
4782.30	163.43	4672.86	4618.86	44.27	OSF1.50	14180.00	9360.00					MINPT-O-EOU	
4780.77	172.38	4665.37	4608.39	41.94	OSF1.50	14450.00	9360.00					MinPt-CtCt	
4781.53	174.53	4664.70	4607.01	41.42	OSF1.50	14550.00	9360.00					MINPT-O-EOU	
4782.43	175.60	4664.88	4606.82	41.18	OSF1.50	14600.00	9360.00					MinPt-O-ADP	
4806.99	201.63	4672.09	4605.36	38.01	OSF1.50	15480.00	9360.00					MinPt-CtCt	
4807.75	204.38	4671.02	4603.38	35.53	OSF1.50	15580.00	9360.00					MINPT-O-EOU	
4808.64	205.45	4671.20	4603.20	35.35	OSF1.50	15630.00	9360.00					MinPt-O-ADP	
4793.26	223.97	4643.47	4569.29	32.30	OSF1.50	16220.00	9360.00					MinPt-CtCt	
4792.03	228.49	4639.23	4563.54	31.65	OSF1.50	16370.00	9360.00					MinPt-CtCt	
4792.61	230.37	4638.56	4562.25	31.39	OSF1.50	16460.00	9360.00					MINPT-O-EOU	
4793.48	231.40	4638.73	4562.08	31.26	OSF1.50	16510.00	9360.00					MinPt-O-ADP	
4796.93	235.07	4639.74	4561.87	30.79	OSF1.50	16640.00	9360.00					MinPt-O-ADP	
4806.56	241.53	4645.06	4565.03	30.02	OSF1.50	16890.00	9360.00					MinPt-O-ADP	
4770.88	298.72	4571.25	4472.16	24.07	OSF1.50	18730.00	9360.00					MinPt-CtCt	
4771.57	300.90	4570.49	4470.67	23.89	OSF1.50	18830.00	9360.00					MINPT-O-EOU	
4775.69	309.55	4568.84	4468.14	23.24	OSF1.50	19080.00	9360.00					MinPt-CtCt	
4776.58	312.85	4567.53	4463.72	23.00	OSF1.50	19226.45	9360.00					MinPts	

Final Surveys - Cimarex Vaca
Draw 20-17 Federal #7H MWD
0ft-22544ft (Surcon Corrected)
(Def Survey)

4248.70	32.81	4247.00	4215.89	N/A	MAS = 10.00 (m)	0.00	0.00					MinPts	Pass
4248.75	32.81	4247.01	4215.94	100147.16	MAS = 10.00 (m)	26.00	26.00					WRP	
4217.03	32.81	4199.52	4184.22	264.96	MAS = 10.00 (m)	3570.00	3570.00					MinPts	
4217.15	32.81	4199.39	4184.34	260.96	MAS = 10.00 (m)	3630.00	3630.00					MINPT-O-EOU	
4212.12	32.81	4192.79	4179.31	237.55	MAS = 10.00 (m)	3990.00	3990.00					MinPts	
4212.18	32.81	4192.72	4179.37	235.86	MAS = 10.00 (m)	4020.00	4020.00					MINPT-O-EOU	
4213.70	32.81	4192.90	4180.90	219.40	MAS = 10.00 (m)	4330.00	4330.00					MinPts	
4213.84	32.81	4192.78	4181.03	216.46	MAS = 10.00 (m)	4390.00	4390.00					MINPT-O-EOU	
4208.35	32.81	4185.98	4175.54	202.62	MAS = 10.00 (m)	4680.00	4680.00					MinPt-CtCt	
4208.41	32.95	4185.91	4175.46	201.37	OSF1.50	4710.00	4710.00					MINPT-O-EOU	
4208.46	33.01	4185.91	4175.45	200.96	OSF1.50	4720.00	4720.00					MinPt-O-ADP	
4146.87	52.95	4111.00	4093.92	121.35	OSF1.50	7710.00	7710.00					MinPt-CtCt	
4147.02	53.35	4110.88	4093.67	120.43	OSF1.50	7770.00	7770.00					MINPT-O-EOU	

Offset Trajectory	Separation			Allow Dev. (ft)	Sep. Fact.	Controlling Rule	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)				MD (ft)	TVD (ft)	Alert	Minor	Major		
4147.18	53.54	4110.92	4093.64	119.98		OSF1.50	7800.00	7800.00				MinPt-O-ADP	
4148.98	55.60	4111.34	4093.38	115.44		OSF1.50	8110.00	8110.00				MINPT-O-EOU	
4149.14	55.80	4111.37	4093.34	115.02		OSF1.50	8140.00	8140.00				MinPt-O-ADP	
4974.66	86.17	4916.69	4888.49	88.17		OSF1.50	11740.00	9360.00				MinPt-O-SF	
5210.38	126.80	5125.47	5083.75	62.42		OSF1.50	12810.00	9360.00				MinPt-CtCt	
5210.89	128.15	5124.98	5082.74	61.67		OSF1.50	12890.00	9360.00				MINPT-O-EOU	
5211.54	131.07	5123.68	5080.47	60.29		OSF1.50	12970.00	9360.00				MinPt-CtCt	
5211.10	139.01	5117.94	5072.08	56.80		OSF1.50	13250.00	9360.00				MinPt-CtCt	
5211.78	141.04	5117.27	5070.74	55.98		OSF1.50	13350.00	9360.00				MINPT-O-EOU	
5212.24	143.56	5116.05	5068.68	55.00		OSF1.50	13410.00	9360.00				MinPt-CtCt	
5212.75	145.09	5115.54	5067.65	54.41		OSF1.50	13490.00	9360.00				MINPT-O-EOU	
5213.39	145.86	5115.68	5067.54	54.13		OSF1.50	13530.00	9360.00				MinPt-O-ADP	
5233.00	206.21	5095.05	5026.79	38.32		OSF1.50	15580.00	9360.00				MinPt-CtCt	
5238.10	220.31	5090.74	5017.79	35.89		OSF1.50	16090.00	9360.00				MINPT-O-EOU	
5232.88	243.99	5069.74	4988.89	32.35		OSF1.50	16860.00	9360.00				MinPt-CtCt	
5234.96	261.23	5060.34	4973.74	30.22		OSF1.50	17440.00	9360.00				MinPt-CtCt	
5235.98	264.22	5059.36	4971.76	29.88		OSF1.50	17570.00	9360.00				MINPT-O-EOU	
5237.30	265.80	5059.62	4971.50	29.71		OSF1.50	17640.00	9360.00				MinPt-O-ADP	
5237.83	279.13	5051.26	4958.89	28.28		OSF1.50	18040.00	9360.00				MinPt-CtCt	
5231.54	291.66	5036.62	4939.88	27.03		OSF1.50	18460.00	9360.00				MinPt-CtCt	
5230.56	297.93	5031.46	4932.63	26.46		OSF1.50	18670.00	9360.00				MinPt-CtCt	
5231.34	300.36	5030.63	4930.99	26.24		OSF1.50	18780.00	9360.00				MINPT-O-EOU	
5232.42	301.66	5030.83	4930.76	26.14		OSF1.50	18840.00	9360.00				MinPt-O-ADP	
5237.08	311.13	5028.18	4925.95	25.36		OSF1.50	19110.00	9360.00				MinPt-CtCt	
5236.35	315.18	5025.75	4921.17	25.03		OSF1.50	19226.45	9360.00				MinPts	

Cimarex Vaca Draw 20-17
Federal #8H MWD
(Final(Surcon Corrected)) (Def
Survey)

Pass

4308.31	32.81	4305.79	4275.50	172596.46	MAS = 10.00 (m)	0.00	0.00	Surface
4308.24	32.81	4305.64	4275.43	42506.99	MAS = 10.00 (m)	26.00	26.00	WRP
4304.98	32.81	4289.55	4272.17	1465.87	MAS = 10.00 (m)	690.00	690.00	MinPts
4305.57	32.81	4289.25	4272.77	1124.20	MAS = 10.00 (m)	900.00	900.00	MINPT-O-EOU
4308.00	32.81	4289.83	4275.19	759.48	MAS = 10.00 (m)	1310.00	1310.00	MINPT-O-EOU
4283.84	32.81	4268.48	4250.83	338.62	MAS = 10.00 (m)	2830.00	2830.00	MinPts
4283.71	32.81	4268.43	4250.90	335.52	MAS = 10.00 (m)	2860.00	2860.00	MINPT-O-EOU
4287.25	32.81	4270.19	4254.44	294.51	MAS = 10.00 (m)	3240.00	3240.00	MINPT-O-EOU
4295.08	32.81	4274.74	4262.27	240.57	MAS = 10.00 (m)	4000.00	4000.00	MinPts
4295.20	32.81	4274.57	4262.39	236.82	MAS = 10.00 (m)	4070.00	4070.00	MINPT-O-EOU
4292.38	33.75	4269.05	4258.63	205.97	OSF1.50	4690.00	4690.00	MinPt-CtCt
4292.45	33.94	4268.99	4258.51	204.75	OSF1.50	4720.00	4720.00	MINPT-O-EOU
4292.55	34.06	4269.01	4258.49	203.96	OSF1.50	4740.00	4740.00	MinPt-O-ADP
4344.30	49.59	4310.41	4294.71	138.30	OSF1.50	7110.00	7110.00	MinPt-CtCt
4344.73	50.75	4310.07	4293.98	134.99	OSF1.50	7290.00	7290.00	MINPT-O-EOU
4345.63	51.88	4310.21	4293.75	131.94	OSF1.50	7460.00	7460.00	MinPt-O-ADP
4573.96	89.38	4513.55	4484.59	78.93	OSF1.50	10900.00	9360.00	MinPt-CtCt
4574.33	90.49	4513.17	4483.84	77.94	OSF1.50	10970.00	9360.00	MINPT-O-EOU
4574.73	90.98	4513.26	4483.77	77.53	OSF1.50	11000.00	9360.00	MinPt-O-ADP
4555.94	116.36	4477.54	4439.58	59.99	OSF1.50	12030.00	9360.00	MinPt-CtCt
4556.34	117.60	4477.11	4438.74	59.35	OSF1.50	12100.00	9360.00	MINPT-O-EOU
4556.78	118.13	4477.19	4438.65	59.08	OSF1.50	12130.00	9360.00	MinPt-O-ADP
4582.12	139.62	4488.21	4442.50	50.10	OSF1.50	12910.00	9360.00	MinPt-CtCt
4583.78	159.01	4476.94	4424.77	43.91	OSF1.50	13610.00	9360.00	MinPt-CtCt
4584.55	161.36	4476.14	4423.19	43.27	OSF1.50	13720.00	9360.00	MINPT-O-EOU
4585.45	162.40	4476.34	4423.04	42.99	OSF1.50	13770.00	9360.00	MinPt-O-ADP

Offset Trajectory	Separation			Allow	Sep. Fact.	Controlling Rule	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)				MD (ft)	TVD (ft)	Alert	Minor	Major		
4588.79	172.16	4473.18	4416.62	40.55		OSF1.50	14080.00	9360.00				MinPt-CICl	
4581.59	211.21	4439.95	4370.38	32.91		OSF1.50	15440.00	9360.00				MinPt-CICl	
4574.97	243.01	4412.13	4331.96	28.52		OSF1.50	16530.00	9360.00				MinPt-CICl	
4576.15	248.56	4410.95	4329.60	28.11		OSF1.50	16680.00	9360.00				MINPT-O-EOU	
4584.15	258.57	4410.94	4325.58	26.84		OSF1.50	17090.00	9360.00				MINPT-O-EOU	
4588.41	264.31	4411.37	4324.10	26.27		OSF1.50	17280.00	9360.00				MINPT-O-EOU	
4575.42	316.20	4363.78	4259.22	21.87		OSF1.50	19000.00	9360.00				MinPt-CICl	
4575.72	317.07	4363.51	4258.65	21.81		OSF1.50	19050.00	9360.00				MINPT-O-EOU	
4576.00	317.41	4363.56	4258.59	21.78		OSF1.50	19070.00	9360.00				MinPt-O-ADP	
4581.17	319.87	4367.08	4261.29	21.84		OSF1.50	19226.45	9360.00				MinPt-O-SF	

Cimarex Vaca Draw 20-17
Federal #5H Final
MWD(Surcon Corrected) (Def
Survey)

Pass												
4328.32	32.81	4325.81	4295.52	273856.23	MAS = 10.00 (m)	0.00	0.00					Surface
4328.28	32.81	4325.70	4295.48	51736.34	MAS = 10.00 (m)	26.00	26.00					WRP
4326.35	32.81	4321.70	4293.54	2008.78	MAS = 10.00 (m)	530.00	530.00					MinPts
4326.45	32.81	4320.86	4293.64	1448.42	MAS = 10.00 (m)	730.00	730.00					MinPts
4326.72	32.81	4320.57	4293.92	1183.84	MAS = 10.00 (m)	870.00	870.00					MINPT-O-EOU
4328.48	32.81	4318.86	4295.67	607.68	MAS = 10.00 (m)	1640.00	1640.00					MinPts
4328.60	32.81	4318.72	4295.79	586.53	MAS = 10.00 (m)	1700.00	1700.00					MINPT-O-EOU
4397.90	33.28	4374.88	4364.82	214.20	OSF1.50	4660.00	4660.00					MINPT-O-EOU
4398.17	33.61	4374.93	4364.56	211.93	OSF1.50	4710.00	4710.00					MinPt-O-ADP
4424.02	43.08	4394.46	4380.94	163.43	OSF1.50	6130.00	6130.00					MinPt-CICl
4424.11	43.34	4394.38	4380.77	162.38	OSF1.50	6170.00	6170.00					MINPT-O-EOU
4424.17	43.41	4394.40	4380.78	162.13	OSF1.50	6180.00	6180.00					MinPt-O-ADP
4444.79	57.76	4405.45	4387.03	120.58	OSF1.50	8330.00	8330.00					MinPt-CICl
4445.36	59.55	4404.83	4385.81	116.81	OSF1.50	8600.00	8600.00					MINPT-O-EOU
4445.82	60.14	4404.89	4385.67	115.83	OSF1.50	8690.00	8690.00					MinPt-O-ADP
4613.50	80.00	4559.34	4533.51	89.25	OSF1.50	10490.00	9360.00					MinPt-CICl
4613.86	81.02	4559.01	4532.84	88.09	OSF1.50	10580.00	9360.00					MINPT-O-EOU
4614.24	81.47	4559.10	4532.78	87.60	OSF1.50	10590.00	9360.00					MinPt-O-ADP
4614.26	98.30	4547.90	4515.96	72.21	OSF1.50	11340.00	9360.00					MinPt-CICl
4615.05	100.85	4546.99	4514.21	70.35	OSF1.50	11470.00	9360.00					MINPT-O-EOU
4615.67	101.57	4547.12	4514.10	69.84	OSF1.50	11510.00	9360.00					MinPt-O-ADP
4614.46	118.05	4534.92	4496.40	59.87	OSF1.50	12140.00	9360.00					MinPt-CICl
4614.73	121.42	4532.95	4493.31	58.18	OSF1.50	12270.00	9360.00					MinPt-CICl
4615.42	123.48	4532.27	4491.94	57.20	OSF1.50	12370.00	9360.00					MINPT-O-EOU
4616.26	124.50	4532.42	4491.75	56.72	OSF1.50	12420.00	9360.00					MinPt-O-ADP
4619.20	127.65	4533.27	4491.55	55.33	OSF1.50	12540.00	9360.00					MINPT-O-EOU
4613.05	163.36	4503.31	4449.69	42.99	OSF1.50	13800.00	9360.00					MinPt-CICl
4614.27	166.82	4502.22	4447.45	42.10	OSF1.50	13950.00	9360.00					MINPT-O-EOU
4614.70	169.28	4501.02	4445.42	41.48	OSF1.50	14010.00	9360.00					MinPt-CICl
4615.64	172.23	4499.99	4443.41	40.77	OSF1.50	14140.00	9360.00					MINPT-O-EOU
4606.85	206.08	4468.64	4400.78	33.93	OSF1.50	15280.00	9360.00					MinPt-CICl
4611.92	220.97	4463.77	4390.95	31.65	OSF1.50	15830.00	9360.00					MINPT-O-EOU
4616.61	229.13	4463.03	4387.48	30.54	OSF1.50	16110.00	9360.00					MINPT-O-EOU
4619.39	234.13	4462.48	4385.27	29.90	OSF1.50	16280.00	9360.00					MINPT-O-EOU
4620.34	237.97	4460.86	4382.37	29.42	OSF1.50	16380.00	9360.00					MinPt-CICl
4621.21	240.71	4459.90	4380.50	29.08	OSF1.50	16500.00	9360.00					MINPT-O-EOU
4610.71	282.86	4421.31	4327.85	24.66	OSF1.50	17900.00	9360.00					MinPt-CICl
4613.81	289.82	4419.76	4323.99	24.07	OSF1.50	18170.00	9360.00					MINPT-O-EOU
4621.32	299.91	4420.54	4321.40	23.29	OSF1.50	18510.00	9360.00					MINPT-O-EOU
4621.72	300.34	4420.66	4321.38	23.26	OSF1.50	18530.00	9360.00					MinPt-O-ADP
4613.04	315.53	4401.86	4297.51	22.09	OSF1.50	19000.00	9360.00					MinPt-CICl

Offset Trajectory	Separation			Allow Dev. (ft)	Sep. Fact.	Controlling Rule	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)				MD (ft)	TVD (ft)	Alert	Minor	Major		
4613.36	316.43	4401.57	4296.93	22.03		OSF1.50	19050.00	9360.00				MINPT-O-EQU	
4613.81	316.95	4401.67	4296.85	22.00		OSF1.50	19080.00	9360.00				MinPt-O-ADP	
4618.79	319.32	4405.08	4299.47	21.86		OSF1.50	19226.45	9360.00				MinPt-O-SF	

Cimarex Vaca Draw 20-17
Federal #1H ST01 MWD Off-
Update (Non-Def Survey)

4348.28	32.81	4345.74	4315.47	103869.72	MAS = 10.00 (m)	0.00	0.00	Surface
4348.15	32.81	4345.52	4315.34	33348.85	MAS = 10.00 (m)	26.00	26.00	WRP
4346.29	32.81	4342.61	4313.49	3668.76	MAS = 10.00 (m)	290.00	290.00	MinPts
4346.75	32.81	4342.23	4313.94	2144.28	MAS = 10.00 (m)	450.00	450.00	MINPT-O-EQU
4596.49	59.61	4555.91	4536.87	120.65	OSF1.50	8500.00	8500.00	MINPT-O-EQU
4597.03	60.27	4556.02	4536.76	119.30	OSF1.50	8610.00	8610.00	MinPt-O-ADP
5488.44	107.51	5415.93	5380.93	78.37	OSF1.50	12110.00	9360.00	MinPts
5463.58	136.74	5371.59	5326.84	61.02	OSF1.50	13100.00	9360.00	MinPt-CtCt
5464.40	139.05	5370.88	5325.35	60.00	OSF1.50	13210.00	9360.00	MINPT-O-EQU
5467.25	142.37	5371.50	5324.87	58.60	OSF1.50	13350.00	9360.00	MinPt-O-ADP
5469.18	147.41	5370.07	5321.76	56.59	OSF1.50	13510.00	9360.00	MINPT-O-EQU
5471.82	150.61	5370.59	5321.22	55.39	OSF1.50	13640.00	9360.00	MinPt-O-ADP
5488.11	166.54	5376.25	5321.56	50.16	OSF1.50	14150.00	9360.00	MinPt-CtCt
5490.33	174.60	5373.10	5315.73	47.83	OSF1.50	14460.00	9360.00	MINPT-O-EQU
5492.11	178.74	5373.45	5315.37	47.26	OSF1.50	14550.00	9360.00	MinPt-O-ADP
5470.23	206.52	5331.72	5263.71	40.20	OSF1.50	15530.00	9360.00	MinPt-CtCt
5470.88	208.37	5331.13	5262.51	39.84	OSF1.50	15620.00	9360.00	MINPT-O-EQU
5471.55	209.19	5331.26	5262.36	39.69	OSF1.50	15680.00	9360.00	MinPt-O-ADP
5504.42	228.13	5351.50	5276.29	36.58	OSF1.50	16260.00	9360.00	MinPt-CtCt
5504.82	229.45	5351.03	5275.38	36.37	OSF1.50	16330.00	9360.00	MINPT-O-EQU
5505.27	230.00	5351.10	5275.27	36.28	OSF1.50	16360.00	9360.00	MinPt-O-ADP
5662.06	247.66	5496.12	5414.40	34.63	OSF1.50	17590.00	9360.00	MinPt-O-SF
6251.33	255.87	6079.92	5995.46	36.99	OSF1.50	19226.45	9360.00	TD

Cimarex Vaca Draw 20-17
Federal #1H Surcon Off-12740
(Def Survey)

4348.28	32.81	4345.74	4315.47	103869.72	MAS = 10.00 (m)	0.00	0.00	Surface
4348.15	32.81	4345.52	4315.34	33348.85	MAS = 10.00 (m)	26.00	26.00	WRP
4346.29	32.81	4342.61	4313.49	3668.76	MAS = 10.00 (m)	290.00	290.00	MinPts
4346.75	32.81	4342.23	4313.94	2144.28	MAS = 10.00 (m)	450.00	450.00	MINPT-O-EQU
4596.49	59.61	4555.91	4536.87	120.65	OSF1.50	8500.00	8500.00	MINPT-O-EQU
4597.03	60.27	4556.02	4536.76	119.30	OSF1.50	8610.00	8610.00	MinPt-O-ADP
5582.98	94.28	5519.30	5488.70	91.20	OSF1.50	12280.00	9360.00	MinPt-O-SF
11087.23	121.66	11005.29	10965.57	139.54	OSF1.50	19226.45	9360.00	TD

Cimarex Vaca Draw 20-17
Federal #1H ST01 Rev1 RM
15Feb18 (Def Plan)

4348.28	32.81	4345.74	4315.47	103869.73	MAS = 10.00 (m)	0.00	0.00	Surface
4348.15	32.81	4345.52	4315.34	33348.85	MAS = 10.00 (m)	26.00	26.00	WRP
4346.29	32.81	4342.61	4313.49	3668.76	MAS = 10.00 (m)	290.00	290.00	MinPts
4346.75	32.81	4342.23	4313.94	2144.28	MAS = 10.00 (m)	450.00	450.00	MINPT-O-EQU
4596.49	59.61	4555.91	4536.87	120.65	OSF1.50	8500.00	8500.00	MINPT-O-EQU
4597.03	60.27	4556.02	4536.76	119.30	OSF1.50	8610.00	8610.00	MinPt-O-ADP
5473.37	324.05	5256.50	5149.32	25.52	OSF1.50	19000.00	9360.00	MinPt-CtCt
5473.73	325.11	5256.16	5148.62	25.44	OSF1.50	19060.00	9360.00	MINPT-O-EQU
5474.16	325.63	5256.24	5148.53	25.40	OSF1.50	19090.00	9360.00	MinPt-O-ADP
5478.19	327.88	5258.76	5150.30	25.24	OSF1.50	19226.45	9360.00	MinPt-O-SF

Offset Trajectory	Separation			Allow Dev. (ft)	Sep. Fact.	Controlling Rule	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)				MD (ft)	TVD (ft)	Alert	Minor	Major		
4229.23	32.81	4226.49	4196.42	3878.62	MAS = 10.00 (m)	290.00	290.00					MinPts	
4230.12	32.81	4225.95	4197.31	1875.06	MAS = 10.00 (m)	590.00	590.00					MINPT-O-EOU	
4224.87	32.81	4218.47	4192.08	625.96	MAS = 10.00 (m)	1540.00	1540.00					MinPts	
4225.01	32.81	4218.32	4192.20	599.65	MAS = 10.00 (m)	1600.00	1600.00					MINPT-O-EOU	
4227.30	32.81	4217.66	4194.49	529.03	MAS = 10.00 (m)	1790.00	1790.00					MinPt-O-SF	
4074.62	32.81	4055.17	4041.81	230.24	MAS = 10.00 (m)	3920.00	3920.00					MinPt-O-SF	
3728.37	62.52	3685.91	3665.88	92.92	OSF1.50	8930.00	8929.92					MinPt-CtCt	
3728.39	62.58	3685.88	3665.81	92.82	OSF1.50	8940.00	8939.86					MINPT-O-EOU	
3728.44	62.65	3685.88	3665.79	92.72	OSF1.50	8950.00	8949.77					MinPt-O-ADP	
4326.51	81.58	4271.58	4244.95	81.19	OSF1.50	11250.00	9360.00					MinPt-O-SF	
4784.14	110.79	4709.81	4673.36	65.81	OSF1.50	12260.00	9360.00					MinPt-CtCt	
4783.68	119.75	4703.37	4663.93	60.83	OSF1.50	12590.00	9360.00					MinPt-CtCt	
4784.34	121.84	4702.64	4662.50	59.59	OSF1.50	12690.00	9360.00					MINPT-O-EOU	
4785.21	126.09	4700.67	4659.12	57.57	OSF1.50	12820.00	9360.00					MinPt-CtCt	
4779.20	142.03	4684.04	4637.17	50.97	OSF1.50	13390.00	9360.00					MinPt-CtCt	
4778.55	146.52	4680.39	4632.03	49.39	OSF1.50	13550.00	9360.00					MinPt-CtCt	
4778.68	152.46	4676.54	4626.20	47.45	OSF1.50	13760.00	9360.00					MinPt-CtCt	
4778.07	157.33	4672.71	4620.74	45.96	OSF1.50	13930.00	9360.00					MinPt-CtCt	
4778.68	159.19	4672.07	4619.49	45.43	OSF1.50	14020.00	9360.00					MINPT-O-EOU	
4779.54	160.22	4672.25	4619.32	45.14	OSF1.50	14070.00	9360.00					MinPt-O-ADP	
4782.30	163.43	4672.86	4618.86	44.27	OSF1.50	14180.00	9360.00					MINPT-O-EOU	
4780.77	172.38	4665.37	4608.39	41.94	OSF1.50	14450.00	9360.00					MinPt-CtCt	
4781.53	174.53	4664.70	4607.01	41.42	OSF1.50	14550.00	9360.00					MINPT-O-EOU	
4782.43	175.60	4664.88	4606.82	41.18	OSF1.50	14600.00	9360.00					MinPt-O-ADP	
4806.99	201.83	4672.09	4605.36	38.01	OSF1.50	15460.00	9360.00					MinPt-CtCt	
4807.75	204.38	4671.02	4603.38	35.53	OSF1.50	15580.00	9360.00					MINPT-O-EOU	
4808.64	205.45	4671.20	4603.20	35.35	OSF1.50	15630.00	9360.00					MinPt-O-ADP	
4793.26	223.97	4643.47	4569.29	32.30	OSF1.50	16220.00	9360.00					MinPt-CtCt	
4792.03	228.49	4639.23	4563.54	31.65	OSF1.50	16370.00	9360.00					MinPt-CtCt	
4792.61	230.37	4638.56	4562.25	31.39	OSF1.50	16460.00	9360.00					MINPT-O-EOU	
4793.48	231.40	4638.73	4562.08	31.26	OSF1.50	16510.00	9360.00					MinPt-O-ADP	
4796.93	235.07	4639.74	4561.87	30.79	OSF1.50	16840.00	9360.00					MinPt-O-ADP	
4806.56	241.53	4645.06	4565.03	30.02	OSF1.50	16890.00	9360.00					MinPt-O-ADP	
4770.88	298.72	4571.25	4472.16	24.07	OSF1.50	18730.00	9360.00					MinPt-CtCt	
4771.57	300.90	4570.45	4470.87	23.89	OSF1.50	18830.00	9360.00					MINPT-O-EOU	
4775.69	309.55	4568.84	4468.14	23.24	OSF1.50	19090.00	9360.00					MinPt-CtCt	
4776.58	312.85	4567.53	4463.72	23.00	OSF1.50	19228.45	9360.00					MinPts	

Final Surveys - Cimarex Vaca
Draw 20-17 Federal #7H MWD
Off-22544ft (Surcon Corrected)
(Def Survey)

Pass												
4248.70	32.81	4247.00	4215.89	N/A	MAS = 10.00 (m)	0.00	0.00					MinPts
4248.75	32.81	4247.01	4215.94	100147.16	MAS = 10.00 (m)	26.00	26.00					WRP
4217.03	32.81	4199.52	4184.22	264.96	MAS = 10.00 (m)	3570.00	3570.00					MinPts
4217.15	32.81	4199.39	4184.34	260.96	MAS = 10.00 (m)	3630.00	3630.00					MINPT-O-EOU
4212.12	32.81	4192.79	4179.31	237.55	MAS = 10.00 (m)	3990.00	3990.00					MinPts
4212.18	32.81	4192.72	4179.37	235.86	MAS = 10.00 (m)	4020.00	4020.00					MINPT-O-EOU
4213.70	32.81	4192.90	4180.90	219.40	MAS = 10.00 (m)	4330.00	4330.00					MinPts
4213.84	32.81	4192.78	4181.03	216.46	MAS = 10.00 (m)	4390.00	4390.00					MINPT-O-EOU
4208.35	32.81	4185.98	4175.54	202.62	MAS = 10.00 (m)	4680.00	4680.00					MinPt-CtCt
4208.41	32.95	4185.91	4175.46	201.37	OSF1.50	4710.00	4710.00					MINPT-O-EOU
4208.46	33.01	4185.91	4175.45	200.96	OSF1.50	4720.00	4720.00					MinPt-O-ADP
4148.87	52.95	4111.00	4093.92	121.35	OSF1.50	7710.00	7710.00					MinPt-CtCt
4147.02	53.35	4110.88	4093.67	120.43	OSF1.50	7770.00	7770.00					MINPT-O-EOU

Offset Trajectory	Separation			Allow Dev. (ft)	Sep. Fact.	Controlling Rule	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)				MD (ft)	TVD (ft)	Alert	Minor	Major		
4588.78	172.16	4473.18	4416.62	40.55		OSF1.50	14080.00	9360.00				MinPt-CtCt	
4581.59	211.21	4439.95	4370.38	32.91		OSF1.50	15440.00	9360.00				MinPt-CtCt	
4574.97	243.01	4412.13	4331.96	28.52		OSF1.50	16530.00	9360.00				MinPt-CtCt	
4576.15	246.56	4410.95	4329.60	28.11		OSF1.50	16680.00	9360.00				MINPT-O-EOU	
4584.15	258.57	4410.94	4325.58	26.84		OSF1.50	17090.00	9360.00				MINPT-O-EOU	
4588.41	284.31	4411.37	4324.10	26.27		OSF1.50	17290.00	9360.00				MINPT-O-EOU	
4575.42	316.20	4363.78	4259.22	21.87		OSF1.50	19000.00	9360.00				MinPt-CtCt	
4575.72	317.07	4363.51	4258.65	21.81		OSF1.50	19050.00	9360.00				MINPT-O-EOU	
4576.00	317.41	4363.56	4258.59	21.78		OSF1.50	19070.00	9360.00				MinPt-O-ADP	
4581.17	319.87	4367.08	4261.29	21.64		OSF1.50	19226.45	9360.00				MinPt-O-SF	

Cimarex Vaca Draw 20-17
Federal #5H Final
MWD(Surcon Corrected) (Def Survey)

Pass												
4328.32	32.81	4325.81	4295.52	273856.23		MAS = 10.00 (m)	0.00	0.00				Surface
4328.28	32.81	4325.70	4295.48	51736.34		MAS = 10.00 (m)	26.00	26.00				WRP
4326.35	32.81	4321.70	4293.54	2008.78		MAS = 10.00 (m)	530.00	530.00				MinPts
4326.45	32.81	4320.86	4293.64	1448.42		MAS = 10.00 (m)	730.00	730.00				MinPts
4326.72	32.81	4320.57	4293.92	1183.84		MAS = 10.00 (m)	870.00	870.00				MINPT-O-EOU
4328.48	32.81	4318.86	4295.67	607.68		MAS = 10.00 (m)	1640.00	1640.00				MinPts
4328.60	32.81	4318.72	4295.79	586.53		MAS = 10.00 (m)	1700.00	1700.00				MINPT-O-EOU
4397.90	33.28	4374.88	4364.62	214.20		OSF1.50	4660.00	4660.00				MINPT-O-EOU
4398.17	33.61	4374.93	4364.56	211.93		OSF1.50	4710.00	4710.00				MinPt-O-ADP
4424.02	43.08	4394.48	4380.94	163.43		OSF1.50	6130.00	6130.00				MinPt-CtCt
4424.11	43.34	4394.38	4380.77	162.38		OSF1.50	6170.00	6170.00				MINPT-O-EOU
4424.17	43.41	4394.40	4380.76	162.13		OSF1.50	6180.00	6180.00				MinPt-O-ADP
4444.79	57.78	4405.45	4387.03	120.58		OSF1.50	8330.00	8330.00				MinPt-CtCt
4445.36	59.55	4404.83	4385.81	116.81		OSF1.50	8600.00	8600.00				MINPT-O-EOU
4445.82	60.14	4404.89	4385.87	115.63		OSF1.50	8690.00	8690.00				MinPt-O-ADP
4613.50	80.00	4559.34	4533.51	89.25		OSF1.50	10490.00	9360.00				MinPt-CtCt
4613.86	81.02	4559.01	4532.84	88.09		OSF1.50	10560.00	9360.00				MINPT-O-EOU
4614.24	81.47	4559.10	4532.78	87.60		OSF1.50	10590.00	9360.00				MinPt-O-ADP
4614.26	88.30	4547.90	4515.96	72.21		OSF1.50	11340.00	9360.00				MinPt-CtCt
4615.05	100.85	4546.99	4514.21	70.35		OSF1.50	11470.00	9360.00				MINPT-O-EOU
4615.67	101.57	4547.12	4514.10	69.84		OSF1.50	11510.00	9360.00				MinPt-O-ADP
4614.46	118.05	4534.92	4496.40	59.87		OSF1.50	12140.00	9360.00				MinPt-CtCt
4614.73	121.42	4532.95	4493.31	58.18		OSF1.50	12270.00	9360.00				MinPt-CtCt
4615.42	123.48	4532.27	4491.84	57.20		OSF1.50	12370.00	9360.00				MINPT-O-EOU
4616.26	124.50	4532.42	4491.75	56.72		OSF1.50	12420.00	9360.00				MinPt-O-ADP
4619.20	127.65	4533.27	4491.55	55.33		OSF1.50	12540.00	9360.00				MINPT-O-EOU
4613.05	163.36	4503.31	4449.69	42.99		OSF1.50	13800.00	9360.00				MinPt-CtCt
4614.27	166.82	4502.22	4447.45	42.10		OSF1.50	13950.00	9360.00				MINPT-O-EOU
4614.70	169.28	4501.02	4445.42	41.48		OSF1.50	14010.00	9360.00				MinPt-CtCt
4615.64	172.23	4499.99	4443.41	40.77		OSF1.50	14140.00	9360.00				MINPT-O-EOU
4606.85	206.08	4468.64	4400.78	33.93		OSF1.50	15280.00	9360.00				MinPt-CtCt
4611.82	220.97	4463.77	4390.95	31.65		OSF1.50	15830.00	9360.00				MINPT-O-EOU
4616.81	229.13	4463.03	4387.48	30.54		OSF1.50	16110.00	9360.00				MINPT-O-EOU
4619.39	234.13	4462.48	4385.27	29.90		OSF1.50	16280.00	9360.00				MINPT-O-EOU
4620.34	237.97	4460.86	4382.37	29.42		OSF1.50	16380.00	9360.00				MinPt-CtCt
4621.21	240.71	4459.90	4380.50	29.08		OSF1.50	16500.00	9360.00				MINPT-O-EOU
4610.71	282.86	4421.31	4327.85	24.66		OSF1.50	17900.00	9360.00				MinPt-CtCt
4613.81	289.82	4419.76	4323.99	24.07		OSF1.50	18170.00	9360.00				MINPT-O-EOU
4621.32	299.91	4420.54	4321.40	23.29		OSF1.50	18510.00	9360.00				MINPT-O-EOU
4621.72	300.34	4420.66	4321.38	23.28		OSF1.50	18530.00	9360.00				MinPt-O-ADP
4613.04	315.53	4401.86	4297.51	22.09		OSF1.50	19000.00	9360.00				MinPt-CtCt

PECOS DISTRICT DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME:	CIMAREX ENERGY COMPANY
LEASE NO.:	NMNM26394
WELL NAME & NO.:	VACA DRAW 20-17 FEDERAL 72H
SURFACE HOLE FOOTAGE:	390' FSL & 350' FEL
BOTTOM HOLE FOOTAGE:	100' FNL & 330' FEL
LOCATION:	Section 20, T. 25 S., R 33 E., NMPM
COUNTY:	LEA County, New Mexico

COA

H2S	☐ Yes	☒ No	
Potash	☒ None	☐ Secretary	☐ R-111-P
Cave/Karst Potential	☒ Low	☐ Medium	☐ High
Variance	☐ None	☒ Flex Hose	☐ Other
Wellhead	☐ Conventional	☒ Multibowl	☐ Both
Other	☐ 4 String Area	☐ Capitan Reef	☐ WIPP
Other	☒ Fluid Filled	☐ Cement Squeeze	☐ Pilot Hole
Special Requirements	☐ Water Disposal	☐ COM	☐ Unit

All Previous COAs Still Apply, Except for the Following:

A. CASING

1. The 13-3/8 inch surface casing shall be set at approximately **1040 feet** (a minimum of 25 feet (Lea County) into the Rustler Anhydrite and above the salt) and cemented to the surface.
 - a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with surface log readout will be used or a cement bond log shall be run to verify the top of the cement. Temperature survey will be run a minimum of six hours after pumping cement and ideally between 8-10 hours after completing the cement job.
 - b. Wait on cement (WOC) time for a primary cement job will be a minimum of **8 hours** or 500 pounds compressive strength, whichever is greater. (This is to include the lead cement)
 - c. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength, whichever is greater.
 - d. If cement falls back, remedial cementing will be done prior to drilling out that string.

Intermediate casing must be kept fluid filled to meet BLM minimum collapse requirement.

2. The minimum required fill of cement behind the 9-5/8 inch intermediate casing is:
 - Cement to surface. If cement does not circulate see B.1.a, c-d above.
3. The minimum required fill of cement behind the 7 X 5 ½ inch production casing is:
 - Cement should tie-back at least **200 feet** into previous casing string. Operator shall provide method of verification.

B. PRESSURE CONTROL

1. Variance approved to use flex line from BOP to choke manifold. Manufacturer's specification to be readily available. No external damage to flex line. Flex line to be installed as straight as possible (no hard bends).'
2. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **2000 (2M)** psi.
3. Operator has proposed a multi-bowl wellhead assembly. This assembly will only be tested when installed on the surface casing. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the intermediate casing shoe shall be **3000 (3M)** psi.
 - a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.
 - b. If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
 - c. Manufacturer representative shall install the test plug for the initial BOP test.
 - d. If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.
 - e. Whenever any seal subject to test pressure is broken, all the tests in OOGO2.III.A.2.i must be followed.

JJP07022019

GENERAL REQUIREMENTS

The BLM is to be notified in advance for a representative to witness:

- a. Spudding well (minimum of 24 hours)
- b. Setting and/or Cementing of all casing strings (minimum of 4 hours)
- c. BOPE tests (minimum of 4 hours)

☒ Chaves and Roosevelt Counties

Call the Roswell Field Office, 2909 West Second St., Roswell NM 88201.
During office hours call (575) 627-0272.
After office hours call (575)

☒ Eddy County

Call the Carlsbad Field Office, 620 East Greene St., Carlsbad, NM 88220,
(575) 361-2822

☒ Lea County

Call the Hobbs Field Station, 414 West Taylor, Hobbs NM 88240, (575)
393-3612

1. Unless the production casing has been run and cemented or the well has been properly plugged, the drilling rig shall not be removed from over the hole without prior approval.
 - a. In the event the operator has proposed to drill multiple wells utilizing a skid/walking rig. Operator shall secure the wellbore on the current well, after installing and testing the wellhead, by installing a blind flange of like pressure rating to the wellhead and a pressure gauge that can be monitored while drilling is performed on the other well(s).
 - b. When the operator proposes to set surface casing with Spudder Rig
 - Notify the BLM when moving in and removing the Spudder Rig.
 - Notify the BLM when moving in the 2nd Rig. Rig to be moved in within 90 days of notification that Spudder Rig has left the location.
 - BOP/BOPE test to be conducted per Onshore Oil and Gas Order No. 2 as soon as 2nd Rig is rigged up on well.
2. Floor controls are required for 3M or Greater systems. These controls will be on the rig floor, unobstructed, readily accessible to the driller and will be operational at all times during drilling and/or completion activities. Rig floor is defined as the area immediately around the rotary table; the area immediately above the substructure on which the draw works are located, this does not include the dog house or stairway area.

3. The record of the drilling rate along with the GR/N well log run from TD to surface (horizontal well – vertical portion of hole) shall be submitted to the BLM office as well as all other logs run on the borehole 30 days from completion. If available, a digital copy of the logs is to be submitted in addition to the paper copies. The Rustler top and top and bottom of Salt are to be recorded on the Completion Report.

A. CASING

1. Changes to the approved APD casing program need prior approval if the items substituted are of lesser grade or different casing size or are Non-API. The Operator can exchange the components of the proposal with that of superior strength (i.e. changing from J-55 to N-80, or from 36# to 40#). Changes to the approved cement program need prior approval if the altered cement plan has less volume or strength or if the changes are substantial (i.e. Multistage tool, ECP, etc.). The initial wellhead installed on the well will remain on the well with spools used as needed.
2. Wait on cement (WOC) for Potash Areas: After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi for all cement blends, 2) until cement has been in place at least 24 hours. WOC time will be recorded in the driller's log.
3. Wait on cement (WOC) for Water Basin: After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi at the shoe, 2) until cement has been in place at least 8 hours. WOC time will be recorded in the driller's log. See individual casing strings for details regarding lead cement slurry requirements.
4. Provide compressive strengths including hours to reach required 500 pounds compressive strength prior to cementing each casing string. Have well specific cement details onsite prior to pumping the cement for each casing string.
5. No pea gravel permitted for remedial or fall back remedial without prior authorization from the BLM engineer.
6. On that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Formation at the shoe shall be tested to a minimum of the mud weight equivalent anticipated to control the formation pressure to the next casing depth or at total depth of the well. This test shall be performed before drilling more than 20 feet of new hole.
7. If hardband drill pipe is rotated inside casing, returns will be monitored for metal. If metal is found in samples, drill pipe will be pulled and rubber protectors which have a larger diameter than the tool joints of the drill pipe will be installed prior to continuing drilling operations.

8. Whenever a casing string is cemented in the R-111-P potash area, the NMOCD requirements shall be followed.

B. PRESSURE CONTROL

1. All blowout preventer (BOP) and related equipment (BOPE) shall comply with well control requirements as described in Onshore Oil and Gas Order No. 2 and API RP 53 Sec. 17.
2. If a variance is approved for a flexible hose to be installed from the BOP to the choke manifold, the following requirements apply: Check condition of flexible line from BOP to choke manifold, replace if exterior is damaged or if line fails test. Line to be as straight as possible with no hard bends and is to be anchored according to Manufacturer's requirements. The flexible hose can be exchanged with a hose of equal size and equal or greater pressure rating. Anchor requirements, specification sheet and hydrostatic pressure test certification matching the hose in service, to be onsite for review. These documents shall be posted in the company man's trailer and on the rig floor.
3. 5M or higher system requires an HCR valve, remote kill line and annular to match. The remote kill line is to be installed prior to testing the system and tested to stack pressure.
4. If the operator has proposed a multi-bowl wellhead assembly in the APD. The following requirements must be met:
 - a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry..
 - b. If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
 - c. Manufacturer representative shall install the test plug for the initial BOP test.
 - d. Whenever any seal subject to test pressure is broken, all the tests in OOGO2.III.A.2.i must be followed.
 - e. If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.
5. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the tests.
 - a. In a water basin, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. The casing cut-off and BOP installation can be initiated four hours after installing the slips, which will be approximately six hours after bumping the

plug. For those casing strings not using slips, the minimum wait time before cut-off is eight hours after bumping the plug. BOP/BOPE testing can begin after cut-off or once cement reaches 500 psi compressive strength (including lead when specified), whichever is greater. However, if the float does not hold, cut-off cannot be initiated until cement reaches 500 psi compressive strength (including lead when specified).

- b. In potash areas, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. For all casing strings, casing cut-off and BOP installation can be initiated at twelve hours after bumping the plug. However, **no tests** shall commence until the cement has had a minimum of 24 hours setup time.
- c. The tests shall be done by an independent service company utilizing a test plug not a cup or J-packer. The operator also has the option of utilizing an independent tester to test without a plug (i.e. against the casing) pursuant to Onshore Order 2 with the pressure not to exceed 70% of the burst rating for the casing. Any test against the casing must meet the WOC time for water basin (8 hours) or potash (24 hours) or 500 pounds compressive strength, whichever is greater, prior to initiating the test (see casing segment as lead cement may be critical item).
- d. The test shall be run on a 5000 psi chart for a 2-3M BOP/BOP, on a 10000 psi chart for a 5M BOP/BOPE and on a 15000 psi chart for a 10M BOP/BOPE. If a linear chart is used, it shall be a one hour chart. A circular chart shall have a maximum 2 hour clock. If a twelve hour or twenty-four hour chart is used, tester shall make a notation that it is run with a two hour clock.
- e. The results of the test shall be reported to the appropriate BLM office.
- f. All tests are required to be recorded on a calibrated test chart. A copy of the BOP/BOPE test chart and a copy of independent service company test will be submitted to the appropriate BLM office.
- g. The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes if test is done with a test plug and 30 minutes without a test plug. This test shall be performed prior to the test at full stack pressure.
- h. BOP/BOPE must be tested by an independent service company within 500 feet of the top of the Wolfcamp formation if the time between the setting of the intermediate casing and reaching this depth exceeds 20 days. This test does not exclude the test prior to drilling out the casing shoe as per Onshore Order No. 2.