Form 3160-5
(June 2015)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

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

HOBBS OCD

SUBMIT IN TRIPLICATE - Other instructions on page 2

AUG 21 2019

RECEIVED

5. Lease Serial No.
NMNM26394

6. If Indian, Allottee or Tribe Name

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

1. Type of Well
☐ Oil Well ☒ Gas Well ☐ Other

8. Well Name and No.
VACA DRAW 20-17 FEDERAL 45H

2. Name of Operator
CIMAREX ENERGY COMPANY
Contact: TERRI STATHEM
E-Mail: tstathem@cimarex.com

9. API Well No.
30-025-46118-00-X1

3a. Address
600 N. MARIENFELD SUITE 600
MIDLAND, TX 79701

3b. Phone No. (include area code)
Ph: 432-620-1936

10. Field and Pool or Exploratory Area
WILDCAT;WOLFCAMP

4. Location of Well *(Footage, Sec., T., R., M., or Survey Description)*
Sec 20 T25S R33E SWSE 390FSL 2100FEL
32.109901 N Lat, 103.592552 W Lon

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 to Original APD
	☐ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	
	☐ Convert to Injection	☐ Plug Back	☐ 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 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.

Carlsbad Field Office
OCD Hobbs

TD: MD: 19273', TVD: 9340'

SEE ATTACHED FOR
CONDITIONS OF APPROVAL

All Previous COAs Still Apply, Except for the Following:

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

Electronic Submission #471750 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 (19PP2365SE)

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 07/03/2019

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 #471750

	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: County:	 NM LEA	 NM LEA
Field/Pool:	WILDCAT BONE SPRING	WILDCAT;WOLFCAMP
Well/Facility:	VACA DRAW 20-17 FEDERAL 45H Sec 20 T25S R33E Mer NMP SWSE 390FSL 2100FEL	VACA DRAW 20-17 FEDERAL 45H Sec 20 T25S R33E SWSE 390FSL 2100FEL 32.109901 N Lat, 103.592552 W Lon

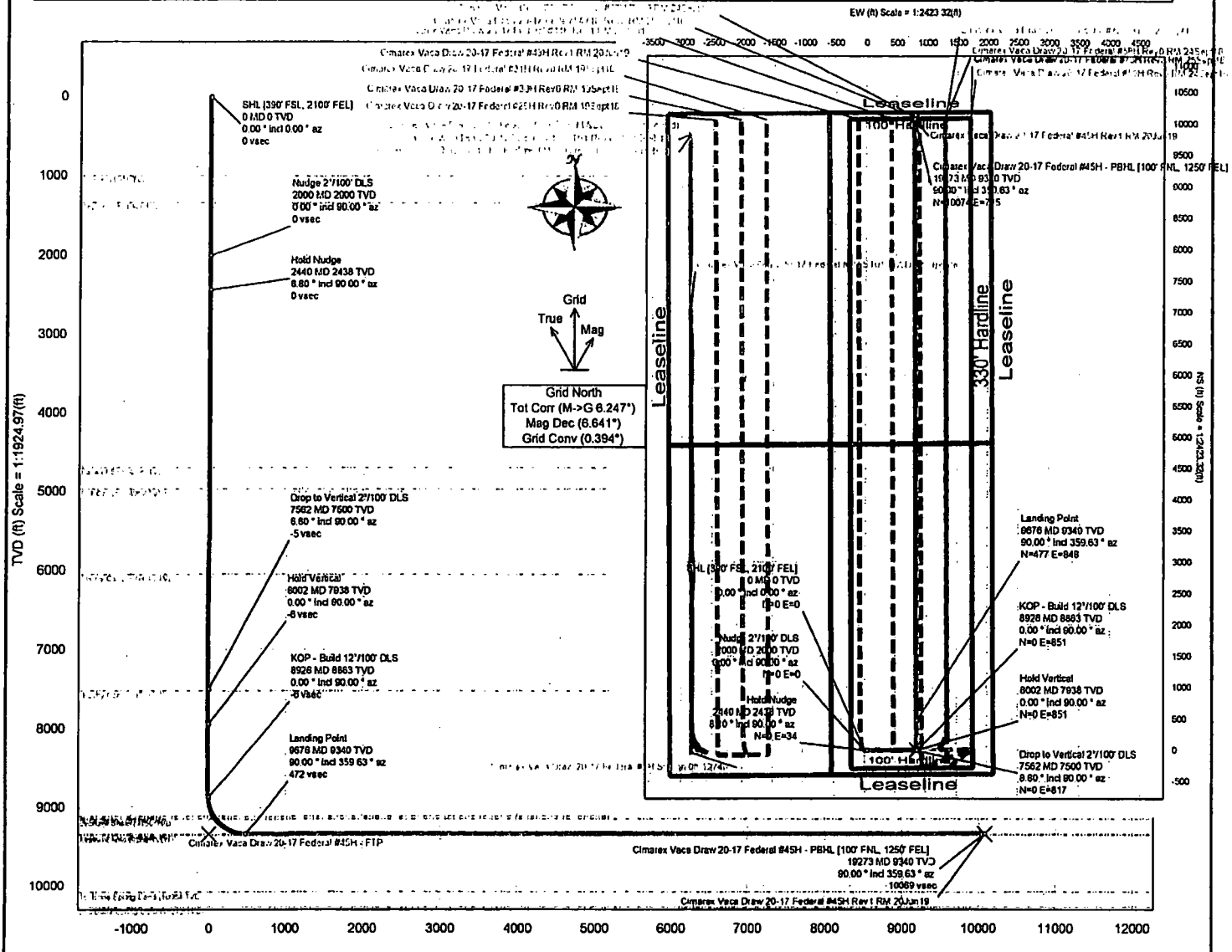
Schlumberger

Cimarex Energy Rev 1

CIMAREX

Borehole:	Well:	Field:	Structure:
Vaca Draw 20-17 Federal #45H	Vaca Draw 20-17 Federal #45H	NM Lea County (NAD 83)	Cimarex Vaca Draw 20-17 Federal #45H

Gravity & Magnetic Parameters					Surface Location	NAD83 New Mexico State Plane, Eastern Zone, US Feet				Miscellaneous			
Model:	HDGM 2019	Dip:	59.719°	Date:	20-Jun-2019	Lat:	N 32 8 26.68	Northing:	404507.31	Grid Conv.	0.3938°	Slot:	New Slot	TVD Ref:	RKB(3432.7ft above MSL)
MagDec:	6.641°	FS:	47770.721nT	Gravity FS:	998.432mgn (9.80665 Based)	Lon:	W 103 35 33.18	Easting:	710619.88	Scale Fact:	0.99996934	Plan:	Cimarex Vaca Draw 20-17 Federal #45H Rev1 RM 20Jun19		



Vertical Section (ft) Azim = 359.63° Scale = 1:1924.97(ft) Origin = 0N/-S, 0E/-W

Critical Points

Critical Point	MD	INCL	AZIM	TVD	VSEC	N(+)/S(-)	E(+)/W(-)	DLS
SHL [390' FSL, 2100' FEL]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Rustler	1001.00	0.00	90.00	1001.00	0.00	0.00	0.00	0.00
Top of Salt	1341.00	0.00	90.00	1341.00	0.00	0.00	0.00	0.00
Nudge 2°/100' DLS	2000.00	0.00	90.00	2000.00	0.00	0.00	0.00	0.00
Hold Nudge	2439.91	8.60	90.00	2438.18	-0.22	0.00	33.71	2.00
Base of Salt	4723.60	8.60	90.00	4695.00	-2.49	0.00	383.01	0.00
Bell Canyon	5000.86	8.60	90.00	4969.00	-2.76	0.00	425.42	0.00
Cherry Canyon	6092.71	8.60	90.00	6048.00	-3.85	0.00	592.42	0.00
Drop to Vertical 2°/100' DLS	7562.00	8.60	90.00	7500.00	-5.31	0.00	817.16	0.00
Brushy Canyon	7587.28	8.29	90.00	7525.00	-5.33	0.00	820.91	2.00
Hold Vertical	8001.91	0.00	90.00	7938.18	-5.52	0.00	850.87	2.00
KOP - Build 12°/100' DLS	8926.26	0.00	90.00	8862.54	-5.52	0.00	850.87	0.00
Bone Spring	9191.10	31.78	359.63	9114.00	66.06	71.58	850.40	12.00
Leonard Shale	9234.74	37.02	359.63	9150.00	90.71	98.23	850.24	12.00
Landing Point	9676.26	90.00	359.63	9340.00	471.94	477.45	847.77	12.00
Leonard Target	9676.26	90.00	359.63	9340.00	471.94	477.45	847.77	12.00
Cimarex Vaca Draw 20-17 Federal #45H - PBHL (100' FNL, 1250' FEL)	19273.08	90.00	359.63	9340.00	10068.76	10074.07	785.48	0.00
Avalon Shale	NaN			9359.00				
1st Bone Spring Sand	NaN			10084.00				
2nd Bone Spring Carb	NaN			10272.00				
2nd Bone Spring Sand	NaN			10638.00				
3rd Bone Spring Carb	NaN			11158.00				
3rd Bone Spring Sand	NaN			11798.00				
Top Wolfcamp	NaN			12269.00				
Wolfcamp X Sand	NaN			12294.00				
Wolfcamp Y Sand	NaN			12373.00				
Wolfcamp Upper A1	NaN			12415.00				

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 ° ' ")
Brushy Canyon	*7587.28*	*8.29*	*90.00*	*7525.00*	*-5.33*	*0.00*	*820.91*	*2.00*	*404507.31*	*771520.77*	*N 32 6 35.60*	*W 103 35 23.64*
	7600.00	8.04	90.00	7537.59	-5.34	0.00	822.72	2.00	404507.31	771522.57	N 32 6 35.60	W 103 35 23.62
	7700.00	6.04	90.00	7636.83	-5.42	0.00	834.97	2.00	404507.31	771534.83	N 32 6 35.59	W 103 35 23.47
	7800.00	4.04	90.00	7736.44	-5.48	0.00	843.75	2.00	404507.31	771543.61	N 32 6 35.59	W 103 35 23.37
	7900.00	2.04	90.00	7836.30	-5.51	0.00	849.05	2.00	404507.31	771548.91	N 32 6 35.59	W 103 35 23.31
	8000.00	0.04	90.00	7936.28	-5.52	0.00	850.87	2.00	404507.31	771550.72	N 32 6 35.59	W 103 35 23.29
Hold Vertical	8001.91	0.00	90.00	7938.18	-5.52	0.00	850.87	2.00	404507.31	771550.72	N 32 6 35.59	W 103 35 23.29
	8100.00	0.00	90.00	8036.28	-5.52	0.00	850.87	0.00	404507.31	771550.72	N 32 6 35.59	W 103 35 23.29
	8200.00	0.00	90.00	8136.28	-5.52	0.00	850.87	0.00	404507.31	771550.72	N 32 6 35.59	W 103 35 23.29
	8300.00	0.00	90.00	8236.28	-5.52	0.00	850.87	0.00	404507.31	771550.72	N 32 6 35.59	W 103 35 23.29
	8400.00	0.00	90.00	8336.28	-5.52	0.00	850.87	0.00	404507.31	771550.72	N 32 6 35.59	W 103 35 23.29
	8500.00	0.00	90.00	8436.28	-5.52	0.00	850.87	0.00	404507.31	771550.72	N 32 6 35.59	W 103 35 23.29
	8600.00	0.00	90.00	8536.28	-5.52	0.00	850.87	0.00	404507.31	771550.72	N 32 6 35.59	W 103 35 23.29
	8700.00	0.00	90.00	8636.28	-5.52	0.00	850.87	0.00	404507.31	771550.72	N 32 6 35.59	W 103 35 23.29
	8800.00	0.00	90.00	8736.28	-5.52	0.00	850.87	0.00	404507.31	771550.72	N 32 6 35.59	W 103 35 23.29
	8900.00	0.00	90.00	8836.28	-5.52	0.00	850.87	0.00	404507.31	771550.72	N 32 6 35.59	W 103 35 23.29
KOP - Build 12°/100' DLS	8926.26	0.00	90.00	8862.54	-5.52	0.00	850.87	0.00	404507.31	771550.72	N 32 6 35.59	W 103 35 23.29
	9000.00	8.85	359.63	8935.98	0.16	5.68	850.83	12.00	404512.99	771550.68	N 32 6 35.65	W 103 35 23.29
	9100.00	20.85	359.63	9032.47	25.74	31.26	850.66	12.00	404538.57	771550.52	N 32 6 35.90	W 103 35 23.29
Bone Spring	*9191.10*	*31.78*	*359.63*	*9114.00*	*66.06*	*71.58*	*850.40*	*12.00*	*404578.89*	*771550.25*	*N 32 6 36.30*	*W 103 35 23.29*
	9200.00	32.85	359.63	9121.52	70.82	76.34	850.37	12.00	404583.65	771550.22	N 32 6 36.35	W 103 35 23.29
Leonard Shale	*9234.74*	*37.02*	*359.63*	*9150.00*	*90.71*	*96.23*	*850.24*	*12.00*	*404603.54*	*771550.09*	*N 32 6 36.55*	*W 103 35 23.29*
	9300.00	44.85	359.63	9199.26	133.43	138.95	849.96	12.00	404646.26	771549.82	N 32 6 36.97	W 103 35 23.29
	9400.00	56.85	359.63	9262.28	210.84	216.36	849.46	12.00	404723.66	771549.31	N 32 6 37.73	W 103 35 23.29
	9500.00	68.85	359.63	9307.83	299.66	305.18	848.89	12.00	404812.48	771548.74	N 32 6 38.61	W 103 35 23.29
	9600.00	80.85	359.63	9333.92	396.00	401.52	848.26	12.00	404908.82	771548.11	N 32 6 39.57	W 103 35 23.29
Leonard Target Landing Point	9676.26	90.00	359.63	9340.00	471.94	477.45	847.77	12.00	404984.75	771547.62	N 32 6 40.32	W 103 35 23.29
	9700.00	90.00	359.63	9340.00	495.68	501.19	847.61	0.00	405008.49	771547.47	N 32 6 40.55	W 103 35 23.29
	9800.00	90.00	359.63	9340.00	595.68	601.19	846.96	0.00	405108.48	771546.82	N 32 6 41.54	W 103 35 23.29
	9900.00	90.00	359.63	9340.00	695.68	701.19	846.32	0.00	405208.48	771546.17	N 32 6 42.53	W 103 35 23.29
	10000.00	90.00	359.63	9340.00	795.68	801.19	845.67	0.00	405308.47	771545.52	N 32 6 43.52	W 103 35 23.29
	10100.00	90.00	359.63	9340.00	895.68	901.19	845.02	0.00	405408.47	771544.87	N 32 6 44.51	W 103 35 23.28
	10200.00	90.00	359.63	9340.00	995.68	1001.18	844.37	0.00	405508.46	771544.22	N 32 6 45.50	W 103 35 23.28
	10300.00	90.00	359.63	9340.00	1095.68	1101.18	843.72	0.00	405608.46	771543.57	N 32 6 46.49	W 103 35 23.28
	10400.00	90.00	359.63	9340.00	1195.68	1201.18	843.07	0.00	405708.45	771542.92	N 32 6 47.48	W 103 35 23.28
	10500.00	90.00	359.63	9340.00	1295.68	1301.18	842.42	0.00	405808.45	771542.27	N 32 6 48.47	W 103 35 23.28
	10600.00	90.00	359.63	9340.00	1395.68	1401.18	841.77	0.00	405908.44	771541.62	N 32 6 49.46	W 103 35 23.28
	10700.00	90.00	359.63	9340.00	1495.68	1501.17	841.12	0.00	406008.43	771540.98	N 32 6 50.45	W 103 35 23.28
	10800.00	90.00	359.63	9340.00	1595.68	1601.17	840.47	0.00	406108.43	771540.33	N 32 6 51.44	W 103 35 23.28
	10900.00	90.00	359.63	9340.00	1695.68	1701.17	839.82	0.00	406208.42	771539.68	N 32 6 52.43	W 103 35 23.28
	11000.00	90.00	359.63	9340.00	1795.68	1801.17	839.18	0.00	406308.42	771539.03	N 32 6 53.42	W 103 35 23.28
	11100.00	90.00	359.63	9340.00	1895.68	1901.17	838.53	0.00	406408.41	771538.38	N 32 6 54.41	W 103 35 23.28
	11200.00	90.00	359.63	9340.00	1995.68	2001.16	837.88	0.00	406508.41	771537.73	N 32 6 55.40	W 103 35 23.28
	11300.00	90.00	359.63	9340.00	2095.68	2101.16	837.23	0.00	406608.40	771537.08	N 32 6 56.39	W 103 35 23.28
	11400.00	90.00	359.63	9340.00	2195.68	2201.16	836.58	0.00	406708.40	771536.43	N 32 6 57.38	W 103 35 23.28
	11500.00	90.00	359.63	9340.00	2295.68	2301.16	835.93	0.00	406808.39	771535.78	N 32 6 58.36	W 103 35 23.28
	11600.00	90.00	359.63	9340.00	2395.68	2401.15	835.28	0.00	406908.39	771535.13	N 32 6 59.35	W 103 35 23.28
	11700.00	90.00	359.63	9340.00	2495.68	2501.15	834.63	0.00	407008.38	771534.48	N 32 7 0.34	W 103 35 23.28
	11800.00	90.00	359.63	9340.00	2595.68	2601.15	833.98	0.00	407108.38	771533.84	N 32 7 1.33	W 103 35 23.28
	11900.00	90.00	359.63	9340.00	2695.68	2701.15	833.33	0.00	407208.37	771533.19	N 32 7 2.32	W 103 35 23.28
	12000.00	90.00	359.63	9340.00	2795.68	2801.15	832.68	0.00	407308.36	771532.54	N 32 7 3.31	W 103 35 23.28
	12100.00	90.00	359.63	9340.00	2895.68	2901.14	832.04	0.00	407408.36	771531.89	N 32 7 4.30	W 103 35 23.28
	12200.00	90.00	359.63	9340.00	2995.68	3001.14	831.39	0.00	407508.35	771531.24	N 32 7 5.29	W 103 35 23.27
	12300.00	90.00	359.63	9340.00	3095.68	3101.14	830.74	0.00	407608.35	771530.59	N 32 7 6.28	W 103 35 23.27
	12400.00	90.00	359.63	9340.00	3195.68	3201.14	830.09	0.00	407708.34	771529.94	N 32 7 7.27	W 103 35 23.27
	12500.00	90.00	359.63	9340.00	3295.68	3301.14	829.44	0.00	407808.34	771529.29	N 32 7 8.26	W 103 35 23.27

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 ° ' ")
	12600.00	90.00	359.63	9340.00	3395.68	3401.13	828.79	0.00	407908.33	771528.64	N 32 7 9.25	W 103 35 23.27
	12700.00	90.00	359.63	9340.00	3495.68	3501.13	828.14	0.00	408008.33	771527.99	N 32 7 10.24	W 103 35 23.27
	12800.00	90.00	359.63	9340.00	3595.68	3601.13	827.49	0.00	408108.32	771527.34	N 32 7 11.23	W 103 35 23.27
	12900.00	90.00	359.63	9340.00	3695.68	3701.13	826.84	0.00	408208.32	771526.70	N 32 7 12.22	W 103 35 23.27
	13000.00	90.00	359.63	9340.00	3795.68	3801.13	826.19	0.00	408308.31	771526.05	N 32 7 13.21	W 103 35 23.27
	13100.00	90.00	359.63	9340.00	3895.68	3901.12	825.54	0.00	408408.31	771525.40	N 32 7 14.20	W 103 35 23.27
	13200.00	90.00	359.63	9340.00	3995.68	4001.12	824.90	0.00	408508.30	771524.75	N 32 7 15.19	W 103 35 23.27
	13300.00	90.00	359.63	9340.00	4095.68	4101.12	824.25	0.00	408608.30	771524.10	N 32 7 16.18	W 103 35 23.27
	13400.00	90.00	359.63	9340.00	4195.68	4201.12	823.60	0.00	408708.29	771523.45	N 32 7 17.17	W 103 35 23.27
	13500.00	90.00	359.63	9340.00	4295.68	4301.11	822.95	0.00	408808.28	771522.80	N 32 7 18.16	W 103 35 23.27
	13600.00	90.00	359.63	9340.00	4395.68	4401.11	822.30	0.00	408908.28	771522.15	N 32 7 19.14	W 103 35 23.27
	13700.00	90.00	359.63	9340.00	4495.68	4501.11	821.65	0.00	409008.27	771521.50	N 32 7 20.13	W 103 35 23.27
	13800.00	90.00	359.63	9340.00	4595.68	4601.11	821.00	0.00	409108.27	771520.85	N 32 7 21.12	W 103 35 23.27
	13900.00	90.00	359.63	9340.00	4695.68	4701.11	820.35	0.00	409208.26	771520.20	N 32 7 22.11	W 103 35 23.27
	14000.00	90.00	359.63	9340.00	4795.68	4801.10	819.70	0.00	409308.26	771519.56	N 32 7 23.10	W 103 35 23.27
	14100.00	90.00	359.63	9340.00	4895.68	4901.10	819.05	0.00	409408.25	771518.91	N 32 7 24.09	W 103 35 23.27
	14200.00	90.00	359.63	9340.00	4995.68	5001.10	818.40	0.00	409508.25	771518.26	N 32 7 25.08	W 103 35 23.27
	14300.00	90.00	359.63	9340.00	5095.68	5101.10	817.76	0.00	409608.24	771517.61	N 32 7 26.07	W 103 35 23.26
	14400.00	90.00	359.63	9340.00	5195.68	5201.10	817.11	0.00	409708.24	771516.96	N 32 7 27.06	W 103 35 23.26
	14500.00	90.00	359.63	9340.00	5295.68	5301.09	816.46	0.00	409808.23	771516.31	N 32 7 28.05	W 103 35 23.26
	14600.00	90.00	359.63	9340.00	5395.68	5401.09	815.81	0.00	409908.23	771515.66	N 32 7 29.04	W 103 35 23.26
	14700.00	90.00	359.63	9340.00	5495.68	5501.09	815.16	0.00	410008.22	771515.01	N 32 7 30.03	W 103 35 23.26
	14800.00	90.00	359.63	9340.00	5595.68	5601.09	814.51	0.00	410108.21	771514.36	N 32 7 31.02	W 103 35 23.26
	14900.00	90.00	359.63	9340.00	5695.68	5701.09	813.86	0.00	410208.21	771513.71	N 32 7 32.01	W 103 35 23.26
	15000.00	90.00	359.63	9340.00	5795.68	5801.08	813.21	0.00	410308.20	771513.07	N 32 7 33.00	W 103 35 23.26
	15100.00	90.00	359.63	9340.00	5895.68	5901.08	812.56	0.00	410408.20	771512.42	N 32 7 33.99	W 103 35 23.26
	15200.00	90.00	359.63	9340.00	5995.68	6001.08	811.91	0.00	410508.19	771511.77	N 32 7 34.98	W 103 35 23.26
	15300.00	90.00	359.63	9340.00	6095.68	6101.08	811.26	0.00	410608.19	771511.12	N 32 7 35.97	W 103 35 23.26
	15400.00	90.00	359.63	9340.00	6195.68	6201.07	810.62	0.00	410708.18	771510.47	N 32 7 36.96	W 103 35 23.26
	15500.00	90.00	359.63	9340.00	6295.68	6301.07	809.97	0.00	410808.18	771509.82	N 32 7 37.95	W 103 35 23.26
	15600.00	90.00	359.63	9340.00	6395.68	6401.07	809.32	0.00	410908.17	771509.17	N 32 7 38.94	W 103 35 23.26
	15700.00	90.00	359.63	9340.00	6495.68	6501.07	808.67	0.00	411008.17	771508.52	N 32 7 39.92	W 103 35 23.26
	15800.00	90.00	359.63	9340.00	6595.68	6601.07	808.02	0.00	411108.16	771507.87	N 32 7 40.91	W 103 35 23.26
	15900.00	90.00	359.63	9340.00	6695.68	6701.06	807.37	0.00	411208.16	771507.22	N 32 7 41.90	W 103 35 23.26
	16000.00	90.00	359.63	9340.00	6795.68	6801.06	806.72	0.00	411308.15	771506.57	N 32 7 42.89	W 103 35 23.26
	16100.00	90.00	359.63	9340.00	6895.68	6901.06	806.07	0.00	411408.14	771505.93	N 32 7 43.88	W 103 35 23.26
	16200.00	90.00	359.63	9340.00	6995.68	7001.06	805.42	0.00	411508.14	771505.28	N 32 7 44.87	W 103 35 23.26
	16300.00	90.00	359.63	9340.00	7095.68	7101.06	804.77	0.00	411608.13	771504.63	N 32 7 45.86	W 103 35 23.26
	16400.00	90.00	359.63	9340.00	7195.68	7201.05	804.12	0.00	411708.13	771503.98	N 32 7 46.85	W 103 35 23.25
	16500.00	90.00	359.63	9340.00	7295.68	7301.05	803.48	0.00	411808.12	771503.33	N 32 7 47.84	W 103 35 23.25
	16600.00	90.00	359.63	9340.00	7395.68	7401.05	802.83	0.00	411908.12	771502.68	N 32 7 48.83	W 103 35 23.25
	16700.00	90.00	359.63	9340.00	7495.68	7501.05	802.18	0.00	412008.11	771502.03	N 32 7 49.82	W 103 35 23.25
	16800.00	90.00	359.63	9340.00	7595.68	7601.05	801.53	0.00	412108.11	771501.38	N 32 7 50.81	W 103 35 23.25
	16900.00	90.00	359.63	9340.00	7695.68	7701.04	800.88	0.00	412208.10	771500.73	N 32 7 51.80	W 103 35 23.25
	17000.00	90.00	359.63	9340.00	7795.68	7801.04	800.23	0.00	412308.10	771500.08	N 32 7 52.79	W 103 35 23.25
	17100.00	90.00	359.63	9340.00	7895.68	7901.04	799.58	0.00	412408.09	771499.43	N 32 7 53.78	W 103 35 23.25
	17200.00	90.00	359.63	9340.00	7995.68	8001.04	798.93	0.00	412508.09	771498.79	N 32 7 54.77	W 103 35 23.25
	17300.00	90.00	359.63	9340.00	8095.68	8101.03	798.28	0.00	412608.08	771498.14	N 32 7 55.76	W 103 35 23.25
	17400.00	90.00	359.63	9340.00	8195.68	8201.03	797.63	0.00	412708.07	771497.49	N 32 7 56.75	W 103 35 23.25
	17500.00	90.00	359.63	9340.00	8295.68	8301.03	796.98	0.00	412808.07	771496.84	N 32 7 57.74	W 103 35 23.25
	17600.00	90.00	359.63	9340.00	8395.68	8401.03	796.34	0.00	412908.06	771496.19	N 32 7 58.73	W 103 35 23.25
	17700.00	90.00	359.63	9340.00	8495.68	8501.03	795.69	0.00	413008.06	771495.54	N 32 7 59.72	W 103 35 23.25
	17800.00	90.00	359.63	9340.00	8595.68	8601.02	795.04	0.00	413108.05	771494.89	N 32 8 0.71	W 103 35 23.25
	17900.00	90.00	359.63	9340.00	8695.68	8701.02	794.39	0.00	413208.05	771494.24	N 32 8 1.69	W 103 35 23.25
	18000.00	90.00	359.63	9340.00	8795.68	8801.02	793.74	0.00	413308.04	771493.59	N 32 8 2.68	W 103 35 23.25
	18100.00	90.00	359.63	9340.00	8895.68	8901.02	793.09	0.00	413408.04	771492.94	N 32 8 3.67	W 103 35 23.25
	18200.00	90.00	359.63	9340.00	8995.68	9001.02	792.44	0.00	413508.03	771492.29	N 32 8 4.66	W 103 35 23.25
	18300.00	90.00	359.63	9340.00	9095.68	9101.01	791.79	0.00	413608.03	771491.65	N 32 8 5.65	W 103 35 23.25

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 ° ' ")
	18400.00	90.00	359.63	9340.00	9195.68	9201.01	791.14	0.00	413708.02	771491.00	N 32 8 6.64	W 103 35 23.24
	18500.00	90.00	359.63	9340.00	9295.68	9301.01	790.49	0.00	413808.02	771490.35	N 32 8 7.63	W 103 35 23.24
	18600.00	90.00	359.63	9340.00	9395.68	9401.01	789.84	0.00	413908.01	771489.70	N 32 8 8.62	W 103 35 23.24
	18700.00	90.00	359.63	9340.00	9495.68	9501.01	789.20	0.00	414008.00	771489.05	N 32 8 9.61	W 103 35 23.24
	18800.00	90.00	359.63	9340.00	9595.68	9601.00	788.55	0.00	414108.00	771488.40	N 32 8 10.60	W 103 35 23.24
	18900.00	90.00	359.63	9340.00	9695.68	9701.00	787.90	0.00	414207.99	771487.75	N 32 8 11.59	W 103 35 23.24
	19000.00	90.00	359.63	9340.00	9795.68	9801.00	787.25	0.00	414307.99	771487.10	N 32 8 12.58	W 103 35 23.24
	19100.00	90.00	359.63	9340.00	9895.68	9901.00	786.60	0.00	414407.98	771486.45	N 32 8 13.57	W 103 35 23.24
	19200.00	90.00	359.63	9340.00	9995.68	10000.99	785.95	0.00	414507.98	771485.80	N 32 8 14.56	W 103 35 23.24
Cimarex Vaca Draw 20-17 Federal #45H - PBHL [100' FNL, 1250' FEL]	19273.08	90.00	359.63	9340.00	10068.76	10074.07	785.48	0.00	414581.05	771485.33	N 32 8 15.28	W 103 35 23.24

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 #45H / Cimarex Vaca Draw 20-17 Federal #45H Rev1 RM 20Jun19
	1	26.000	19273.076	1/100.000	30.000	30.000		NAL_MWD_IFR1+MS	Vaca Draw 20-17 Federal #45H / Cimarex Vaca Draw 20-17

Schlumberger

Cimarex Vaca Draw 20-17 Federal #45H Rev1 RM 20Jun19 Proposal
Geodetic Report
(Def Plan)

CIMAREX

Report Date:	June 20, 2019 - 04:55 PM	**Survey / DLS Computation:**	Minimum Curvature / Lubinski
Client:	Cimarex Energy	**Vertical Section Azimuth:**	359.628 ° (Grid North)
Field:	NM Lea County (NAD 83)	**Vertical Section Origin:**	0.000 ft, 0.000 ft
Structure / Slot:	Cimarex Vaca Draw 20-17 Federal #45H / New Slot	**TVD Reference Datum:**	RKB
Well:	Vaca Draw 20-17 Federal #45H	**TVD Reference Elevation:**	3432.700 ft above MSL
Borehole:	Vaca Draw 20-17 Federal #45H	**Seabed / Ground Elevation:**	3406.700 ft above MSL
UWI / API#:	Unknown / Unknown	**Magnetic Declination:**	6.641 °
Survey Name:	Cimarex Vaca Draw 20-17 Federal #45H Rev1 RM 20Jun19	**Total Gravity Field Strength:**	998.4316mgn (9.80665 Based)
Survey Date:	September 24, 2018	**Gravity Model:**	GARM
Tort / AHD / DDI / ERD Ratio:	107.596 ° / 10925.148 ft / 6.385 / 1.170	**Total Magnetic Field Strength:**	47770.721 nT
Coordinate Reference System:	NAD83 New Mexico State Plane, Eastern Zone, US Feet	**Magnetic Dip Angle:**	59.719 °
Location Lat / Long:	N 32° 6' 35.65147", W 103° 35' 33.18091"	**Declination Date:**	June 20, 2019
Location Grid N/E Y/X:	N 404507.310 ftUS, E 770699.880 ftUS	**Magnetic Declination Model:**	HDGM 2019
CRS Grid Convergence Angle:	0.3938 °	**North Reference:**	Grid North
Grid Scale Factor:	0.99996934	**Grid Convergence Used:**	0.3938 °
Version / Patch:	2.10.760.0	**Total Corr Mag North->Grid North:**	6.2471 °
		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, 2100' FEL]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	404507.31	770699.88	N 32 6 35.65	W 103 35 33.18
Nudge 2°/100' DLS	2000.00	0.00	90.00	2000.00	0.00	0.00	0.00	0.00	404507.31	770699.88	N 32 6 35.65	W 103 35 33.18
Hold Nudge	2439.91	8.80	90.00	2438.18	-0.22	0.00	33.71	2.00	404507.31	770733.59	N 32 6 35.65	W 103 35 32.79
Drop to Vertical 2°/100' DLS	7562.00	8.80	90.00	7500.00	-5.31	0.00	817.16	0.00	404507.31	771517.01	N 32 6 35.60	W 103 35 23.68
Hold Vertical	8001.91	0.00	90.00	7938.18	-5.52	0.00	850.87	2.00	404507.31	771550.72	N 32 6 35.59	W 103 35 23.29
KOP - Build 12°/100' DLS	8926.26	0.00	90.00	8862.54	-5.52	0.00	850.87	0.00	404507.31	771550.72	N 32 6 35.59	W 103 35 23.29
Landing Point	9676.26	90.00	359.63	9340.00	471.94	477.45	847.77	12.00	404984.75	771547.62	N 32 6 40.32	W 103 35 23.29
Cimarex Vaca Draw 20-17 Federal #45H - PBHL [100' FNL, 1250' FEL]	19273.08	90.00	359.63	9340.00	10068.76	10074.07	785.48	0.00	414581.05	771485.33	N 32 8 15.28	W 103 35 23.24

Survey Type: Def Plan

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

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 ° ' ")
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 #45H / Cimarex Vaca Draw 20-17 Federal #45H Rev1 RM 20Jun19	
		1	26.000	19273.076	1/100.000	30.000	30.000		NAL_MWD_IFR1+MS		Vaca Draw 20-17 Federal #45H / Cimarex Vaca Draw 20-17	

Schlumberger

CIMAREX

Cimarex Vaca Draw 20-17 Federal #45H Rev1 RM 20Jun19 Anti-Collision Summary Report

Analysis Date-24hr Time:	June 20, 2019 - 16:55	**Analysis Method:**	3D Least Distance
Client:	Cimarex Energy	**Reference Trajectory:**	Cimarex Vaca Draw 20-17 Federal #45H Rev1 RM 20Jun19 (Def Plan)
Field:	NM Lea County (NAD 83)	**Depth Interval:**	Every 10.00 Measured Depth (ft)
Structure:	Cimarex Vaca Draw 20-17 Federal #45H	**Rule Set:**	NAL Procedure: D&M AntiCollision Standard S002
Slot:	New Slot	**Min Pts:**	All local minima indicated.
Well:	Vaca Draw 20-17 Federal #45H	**Version / Patch:**	2.10.760.0
Borehole:	Vaca Draw 20-17 Federal #45H	**Database \ Project:**	US1153APP452.dir.slb.com\drilling-NM Lea County 2.10
Scan MD Range:	0.00ft ~ 19273.08ft		

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	Sep.	Controlling	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)	Dev. (ft)	Fact.	Rule	MD (ft)	TVD (ft)	Alert	Minor	Major		
Results highlighted: Sep-Factor separation <= 1.50 ft													
Cimarex Vaca Draw 20-17 Federal #44H Rev1 RM 20Jun19 (Def Plan)													Fail Minor
	20.00	16.50	17.50	3.50	N/A	MAS = 5.03 (m)	0.00	0.00	CtCt<=15m<15.00			Enter Alert	
	20.00	16.50	17.50	3.50	N/A	MAS = 5.03 (m)	26.00	26.00				WRP	
	20.00	20.00	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	
	20.02	20.83	5.30	-0.81	1.43	OSF1.50	2010.00	2010.00				MINPT-O-EOU	
	20.07	20.90	5.30	-0.83	1.43	OSF1.50	2020.00	2020.00				MinPts	
	21.12	21.33	6.07	-0.21	1.46	OSF1.50	2080.00	2079.99		OSF>1.50		Exit Minor	
	74.09	24.00	57.25	50.08	4.99	OSF1.50	2580.00	2576.62	OSF>5.00			Exit Alert	
	127.16	39.93	99.71	87.23	5.00	OSF1.50	5290.00	5254.74	OSF<5.00			Enter Alert	
	136.95	46.52	105.10	90.43	4.58	OSF1.50	6040.00	5995.91				MinPt-O-SF	
	150.85	47.19	118.56	103.66	4.98	OSF1.50	6280.00	6233.09	OSF>5.00			Exit Alert	
	375.95	61.06	334.41	314.89	9.57	OSF1.50	8970.00	8906.21				MinPt-CtCt	
	376.01	61.37	334.26	314.64	9.52	OSF1.50	9020.00	8955.67				MINPT-O-EOU	
	376.11	61.49	334.28	314.62	9.50	OSF1.50	9040.00	8975.20				MinPt-O-ADP	
	378.12	62.08	335.90	316.04	9.46	OSF1.50	9130.00	9060.15				MinPt-O-SF	
	633.59	192.13	504.67	441.46	4.99	OSF1.50	14560.00	9340.00	OSF<5.00			Enter Alert	
	633.59	338.24	407.26	295.35	2.82	OSF1.50	19273.08	9340.00				MinPts	
Cimarex Vaca Draw 20-17 Federal #43H Rev1 RM 20Jun19 (Def Plan)													Warning Alert
	39.99	32.49	37.49	7.50	N/A	MAS = 9.90 (m)	0.00	0.00	CtCt<=15m<15.00			Enter Alert	
	39.99	32.49	37.49	7.50	14061.88	MAS = 9.90 (m)	26.00	26.00				WRP	
	39.99	32.49	25.32	7.50	3.08	MAS = 9.90 (m)	2000.00	2000.00				MinPts	

Offset Trajectory	Separation			Allow	Sep.	Controlling	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)	Dev. (ft)	Fact.	Rule	MD (ft)	TVD (ft)	Alert	Minor	Major		
	40.01	32.49	25.29	7.52	3.07	MAS = 9.90 (m)	2010.00	2010.00				MINPT-O-EOU	
	40.27	32.49	25.40	7.78	3.05	MAS = 9.90 (m)	2040.00	2040.00				MinPt-O-SF	
	70.72	32.49	54.40	38.23	4.94	MAS = 9.90 (m)	2420.00	2418.50	OSF>5.00			Exit Alert	
	890.89	74.84	840.16	816.05	18.42	OSF1.50	8920.00	8856.28				MINPT-O-EOU	
	890.91	74.87	840.17	816.04	18.41	OSF1.50	8926.26	8862.54				MinPt-O-ADP	
	898.71	76.07	847.16	822.64	18.27	OSF1.50	9180.00	9104.50				MinPt-O-SF	
	920.11	277.78	734.09	642.33	5.00	OSF1.50	17070.00	9340.00	OSF<5.00			Enter Alert	
	920.11	347.15	687.84	572.96	3.99	OSF1.50	19273.08	9340.00				MinPts	
Cimarex Vaca Draw 20-17 Federal #57H Rev0 RM 24Sept18 (Non-Def Plan)													Warning Alert
	1179.86	32.81	1177.36	1147.05	N/A	MAS = 10.00 (m)	0.00	0.00				Surface	
	1179.83	32.81	1177.33	1147.03	N/A	MAS = 10.00 (m)	26.00	26.00				WRP	
	172.19	54.62	134.54	117.56	4.96	OSF1.50	7180.00	7122.50	OSF<5.00			Enter Alert	
	79.98	63.85	36.12	16.13	1.90	OSF1.50	9000.00	8935.98				MinPt-CtCt	
	80.00	63.90	36.11	16.10	1.90	OSF1.50	9010.00	8945.85				MinPts	
	210.10	65.66	165.45	144.44	4.94	OSF1.50	9380.00	9251.00	OSF>5.00			Exit Alert	
	613.44	185.94	488.65	427.50	5.00	OSF1.50	15150.00	9340.00	OSF<5.00			Enter Alert	
	613.44	312.32	404.39	301.12	2.96	OSF1.50	19273.08	9340.00				MinPts	
Cimarex Vaca Draw 20-17 Federal #58H Rev0 RM 24Sept18 (Non-Def Plan)													Warning Alert
	1199.91	32.81	1197.41	1167.10	N/A	MAS = 10.00 (m)	0.00	0.00				Surface	
	1199.89	32.81	1197.39	1167.08	N/A	MAS = 10.00 (m)	26.00	26.00				WRP	
	349.04	76.45	296.86	272.59	7.12	OSF1.50	8990.00	8926.09				MinPt-CtCt	
	349.11	76.72	296.76	272.39	7.09	OSF1.50	9030.00	8965.46				MINPT-O-EOU	
	349.17	76.79	296.77	272.38	7.08	OSF1.50	9040.00	8975.20				MinPt-O-ADP	
	350.10	77.17	297.45	272.94	7.07	OSF1.50	9100.00	9032.47				MinPt-O-SF	
	787.06	238.14	627.47	548.92	4.99	OSF1.50	16700.00	9340.00	OSF<5.00			Enter Alert	
	787.06	317.63	574.48	469.43	3.73	OSF1.50	19273.08	9340.00				MinPts	
Cimarex Vaca Draw 20-17 Federal #71H Rev0 RM 25Sept18 (Non-Def Plan)													Pass
	1729.79	32.81	1727.29	1696.99	N/A	MAS = 10.00 (m)	0.00	0.00				Surface	
	1729.76	32.81	1727.26	1696.95	N/A	MAS = 10.00 (m)	10.00	10.00				MinPts	
	1729.76	32.81	1727.26	1696.95	N/A	MAS = 10.00 (m)	26.00	26.00				WRP	
	1728.22	32.81	1713.36	1695.41	139.68	MAS = 10.00 (m)	2060.00	2060.00				MinPt-O-SF	
	294.59	64.88	250.37	229.71	7.06	OSF1.50	8600.00	8536.28				MinPt-CtCt	
	294.60	64.91	250.37	229.69	7.05	OSF1.50	8620.00	8556.28				MinPts	
	3101.93	320.01	2887.76	2781.92	14.64	OSF1.50	19273.08	9340.00				MinPts	
Cimarex Vaca Draw 20-17 Federal #72H Rev0 25Sept18 (Non-Def Plan)													Pass
	1749.80	32.81	1747.30	1716.99	N/A	MAS = 10.00 (m)	0.00	0.00				Surface	
	1749.76	32.81	1747.26	1716.95	N/A	MAS = 10.00 (m)	10.00	10.00				MinPts	
	1749.76	32.81	1747.26	1716.95	N/A	MAS = 10.00 (m)	26.00	26.00				WRP	
	1748.47	32.81	1733.64	1715.67	141.63	MAS = 10.00 (m)	2060.00	2060.00				MinPt-O-SF	
	580.54	53.71	543.49	526.83	17.31	OSF1.50	7830.00	7766.38				MinPt-O-SF	
	576.06	52.97	539.50	523.09	17.44	OSF1.50	7990.00	7926.28				MinPts	
	576.04	54.84	538.24	521.20	16.80	OSF1.50	8926.26	8862.54				MinPts	
	576.05	54.85	538.24	521.20	16.80	OSF1.50	8930.00	8866.28				MinPt-O-ADP	
	576.63	54.93	538.77	521.70	16.78	OSF1.50	8960.00	8896.25				MinPt-O-SF	
	3141.43	317.99	2928.61	2823.45	14.92	OSF1.50	19273.08	9340.00				MinPts	

Offset Trajectory	Separation			Allow	Sep.	Controlling	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)	Dev. (ft)	Fact.	Rule	MD (ft)	TVD (ft)	Alert	Minor	Major		
Cimarex Vaca Draw 20-17 Federal #59H Rev0 RM 24Sept18 (Non-Def Plan)													Pass
	1219.91	32.81	1217.41	1187.10	N/A	MAS = 10.00 (m)	0.00	0.00				Surface	
	1219.89	32.81	1217.39	1187.08	N/A	MAS = 10.00 (m)	26.00	26.00				WRP	
	920.67	58.26	880.84	862.40	24.88	OSF1.50	7900.00	7836.30				MinPt-O-SF	
	918.86	58.07	879.16	860.79	24.92	OSF1.50	8000.00	7936.28				MinPts	
	918.86	61.83	876.65	857.02	23.33	OSF1.50	8940.00	8876.27				MinPt-CtCt	
	918.92	62.24	876.44	856.68	23.17	OSF1.50	9030.00	8965.46				MINPT-O-EOU	
	918.99	62.33	876.45	856.66	23.14	OSF1.50	9050.00	8984.90				MinPt-O-ADP	
	924.18	63.11	881.14	861.07	22.96	OSF1.50	9240.00	9154.18				MinPt-O-SF	
	1102.70	318.44	889.57	784.25	5.22	OSF1.50	19273.08	9340.00				MinPts	
Cimarex Vaca Draw 20-17 Federal #73H Rev0 RM 25Sept18 (Non-Def Plan)													Pass
	1769.80	32.81	1767.30	1736.99	N/A	MAS = 10.00 (m)	0.00	0.00				Surface	
	1769.76	32.81	1767.26	1736.95	N/A	MAS = 10.00 (m)	10.00	10.00				MinPts	
	1769.76	32.81	1767.26	1736.95	N/A	MAS = 10.00 (m)	26.00	26.00				WRP	
	1767.65	32.81	1752.82	1734.84	143.11	MAS = 10.00 (m)	2110.00	2109.97				MinPt-O-SF	
	970.04	46.38	937.97	923.67	33.80	OSF1.50	7790.00	7726.47				MinPt-O-SF	
	962.57	45.72	930.92	916.85	34.07	OSF1.50	7990.00	7926.28				MinPt-O-ADP	
	962.55	45.69	930.92	916.86	34.10	OSF1.50	8000.00	7936.28				MINPT-O-EOU	
	962.55	49.72	928.24	912.83	31.12	OSF1.50	8926.26	8862.54				MinPt-CtCt	
	962.55	49.74	928.23	912.82	31.11	OSF1.50	8930.00	8866.28				MinPts	
	971.20	50.53	936.36	920.67	30.84	OSF1.50	9090.00	9023.09				MinPt-O-SF	
	3234.84	315.08	3023.96	2919.76	15.51	OSF1.50	19273.08	9340.00				MinPts	
Cimarex Vaca Draw 20-17 Federal #31H Rev0 RM 19Sept18 (Non-Def Plan)													Pass
	1898.88	32.81	1896.38	1866.07	N/A	MAS = 10.00 (m)	0.00	0.00				Surface	
	1898.88	32.81	1896.35	1866.07	60965.73	MAS = 10.00 (m)	26.00	26.00				WRP	
	1888.91	32.81	1873.78	1856.10	149.42	MAS = 10.00 (m)	2270.00	2269.60				MinPts	
	1888.91	32.81	1873.78	1856.11	149.30	MAS = 10.00 (m)	2280.00	2279.55				MINPT-O-EOU	
	2101.03	42.62	2071.78	2058.41	78.46	OSF1.50	5730.00	5689.58				MinPt-O-SF	
	2386.17	56.75	2347.50	2329.42	65.91	OSF1.50	7600.00	7537.59				MinPt-O-SF	
	2414.44	61.82	2372.39	2352.62	60.99	OSF1.50	9000.00	8935.98				MINPT-O-EOU	
	2414.59	62.00	2372.42	2352.59	60.81	OSF1.50	9030.00	8965.46				MinPt-O-ADP	
	2449.65	64.93	2405.53	2384.72	58.80	OSF1.50	9560.00	9325.92				MinPt-O-SF	
	2483.77	347.97	2250.95	2135.79	10.77	OSF1.50	19273.08	9340.00				MinPts	
Cimarex Vaca Draw 20-17 Federal #30H Rev0 RM 19Sept18 (Non-Def Plan)													Pass
	1918.85	32.81	1916.35	1886.05	N/A	MAS = 10.00 (m)	0.00	0.00				Surface	
	1918.85	32.81	1916.32	1886.05	59896.61	MAS = 10.00 (m)	26.00	26.00				WRP	
	1918.85	32.81	1904.14	1886.05	156.85	MAS = 10.00 (m)	2000.00	2000.00				MinPts	
	1918.87	32.81	1904.11	1886.06	156.24	MAS = 10.00 (m)	2010.00	2010.00				MINPT-O-EOU	
	2741.17	67.97	2695.02	2673.20	62.75	OSF1.50	7600.00	7537.59				MinPt-O-SF	
	2769.50	75.66	2718.22	2693.84	56.73	OSF1.50	9020.00	8955.67				MINPT-O-EOU	
	2769.73	75.94	2718.27	2693.79	56.52	OSF1.50	9060.00	8994.53				MinPt-O-ADP	
	2799.91	78.91	2746.48	2721.01	54.92	OSF1.50	9560.00	9325.92				MinPt-O-SF	
	2888.57	351.74	2653.24	2536.83	12.40	OSF1.50	19273.08	9340.00				MinPts	

Offset Trajectory	Separation			Allow	Sep.	Controlling	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)	Dev. (ft)	Fact.	Rule	MD (ft)	TVD (ft)	Alert	Minor	Major		
Cimarex Vaca Draw 20-17 Federal #29H Rev0 RM 19Sept18 (Non-Def Plan)													Pass
	1938.87	32.81	1936.37	1906.06	N/A	MAS = 10.00 (m)	0.00	0.00				Surface	
	1938.87	32.81	1936.33	1906.06	82251.25	MAS = 10.00 (m)	26.00	26.00				WRP	
	1938.87	32.81	1924.27	1906.06	160.15	MAS = 10.00 (m)	1980.00	1980.00				MinPts	
	1938.89	32.81	1924.20	1906.08	158.90	MAS = 10.00 (m)	2000.00	2000.00				MINPT-O-EOU	
	1946.47	32.81	1931.47	1913.66	155.52	MAS = 10.00 (m)	2160.00	2159.92				MinPt-O-SF	
	3100.82	52.40	3065.05	3048.42	93.13	OSF1.50	6840.00	6786.50				MinPt-O-SF	
	3216.80	57.27	3177.78	3159.53	88.03	OSF1.50	7600.00	7537.59				MinPt-O-SF	
	3245.09	61.30	3203.40	3183.80	82.72	OSF1.50	9020.00	8955.67				MINPT-O-EOU	
	3245.23	61.45	3203.42	3183.77	82.51	OSF1.50	9050.00	8984.90				MinPt-O-ADP	
	3297.03	342.83	3067.64	2954.20	14.52	OSF1.50	19273.08	9340.00				MinPts	
Cimarex Vaca Draw 20-17 Federal #6H MWD Final(Surcon Corrected) (Def Survey)													Pass
	2558.57	32.81	2556.07	2525.77	N/A	MAS = 10.00 (m)	0.00	0.00				Surface	
	2558.53	32.81	2555.98	2525.72	45954.31	MAS = 10.00 (m)	26.00	26.00				WRP	
	2555.24	32.81	2549.76	2522.43	857.55	MAS = 10.00 (m)	700.00	700.00				MinPts	
	2555.84	32.81	2549.47	2523.03	659.48	MAS = 10.00 (m)	910.00	910.00				MINPT-O-EOU	
	2558.27	32.81	2550.06	2525.46	447.73	MAS = 10.00 (m)	1320.00	1320.00				MINPT-O-EOU	
	2554.29	32.81	2542.96	2521.48	288.86	MAS = 10.00 (m)	2040.00	2040.00				MinPts	
	2554.31	32.81	2542.95	2521.51	287.90	MAS = 10.00 (m)	2050.00	2050.00				MINPT-O-EOU	
	2591.03	32.81	2578.73	2558.22	264.12	MAS = 10.00 (m)	2560.00	2556.86				MinPt-O-SF	
	3413.24	44.84	3382.52	3368.41	120.85	OSF1.50	7562.00	7500.00				MinPt-O-SF	
	3475.62	44.99	3444.79	3430.63	122.61	OSF1.50	9100.00	9032.47				MinPt-O-SF	
	3533.76	45.71	3502.45	3488.05	122.58	OSF1.50	9590.00	9332.23				MinPt-O-SF	
	3653.58	73.83	3603.52	3579.74	76.78	OSF1.50	10950.00	9340.00				MinPt-CtCt	
	3653.82	74.60	3603.26	3579.22	75.97	OSF1.50	11000.00	9340.00				MINPT-O-EOU	
	3654.20	75.06	3603.32	3579.13	75.49	OSF1.50	11030.00	9340.00				MinPt-O-ADP	
	3635.57	102.98	3566.08	3532.59	54.24	OSF1.50	12080.00	9340.00				MinPt-CtCt	
	3635.84	103.79	3565.81	3532.05	53.81	OSF1.50	12130.00	9340.00				MINPT-O-EOU	
	3636.26	104.27	3565.91	3531.98	53.56	OSF1.50	12160.00	9340.00				MinPt-O-ADP	
	3661.75	127.24	3576.09	3534.51	44.00	OSF1.50	12950.00	9340.00				MinPt-CtCt	
	3663.42	147.65	3564.15	3515.77	37.83	OSF1.50	13660.00	9340.00				MinPt-CtCt	
	3664.05	149.47	3563.57	3514.58	37.37	OSF1.50	13750.00	9340.00				MINPT-O-EOU	
	3664.73	150.27	3563.72	3514.47	37.18	OSF1.50	13790.00	9340.00				MinPt-O-ADP	
	3668.43	161.20	3560.13	3507.23	34.65	OSF1.50	14130.00	9340.00				MinPt-CtCt	
	3661.22	201.13	3526.30	3460.09	27.63	OSF1.50	15490.00	9340.00				MinPt-CtCt	
	3654.61	233.23	3498.29	3421.38	23.74	OSF1.50	16570.00	9340.00				MinPt-CtCt	
	3655.65	236.46	3497.17	3419.19	23.42	OSF1.50	16710.00	9340.00				MINPT-O-EOU	
	3663.64	248.62	3497.06	3415.02	22.31	OSF1.50	17120.00	9340.00				MINPT-O-EOU	
	3667.90	254.41	3497.46	3413.49	21.83	OSF1.50	17320.00	9340.00				MINPT-O-EOU	
	3655.06	307.31	3449.35	3347.75	17.97	OSF1.50	19040.00	9340.00				MinPt-CtCt	
	3655.24	307.85	3449.17	3347.39	17.94	OSF1.50	19080.00	9340.00				MINPT-O-EOU	
	3655.35	307.98	3449.20	3347.37	17.94	OSF1.50	19090.00	9340.00				MinPt-O-ADP	
	3662.25	309.98	3454.77	3352.27	17.85	OSF1.50	19273.08	9340.00				MinPt-O-SF	
Cimarex Vaca Draw 20-17 Federal #5H Final MWD(Surcon Corrected) (Def Survey)													Pass
	2578.58	32.81	2576.08	2545.77	N/A	MAS = 10.00 (m)	0.00	0.00				Surface	
	2578.55	32.81	2576.01	2545.74	54401.46	MAS = 10.00 (m)	26.00	26.00				WRP	
	2576.59	32.81	2571.90	2543.78	1172.42	MAS = 10.00 (m)	540.00	540.00				MinPts	

Offset Trajectory	Separation			Allow	Sep.	Controlling	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)	Dev. (ft)	Fact.	Rule	MD (ft)	TVD (ft)	Alert	Minor	Major		
	2576.69	32.81	2571.16	2543.88	849.87	MAS = 10.00 (m)	740.00	740.00				MinPts	
	2578.93	32.81	2570.78	2544.12	705.03	MAS = 10.00 (m)	870.00	870.00				MINPT-O-EOU	
	2578.72	32.81	2569.06	2545.91	359.68	MAS = 10.00 (m)	1650.00	1650.00				MinPts	
	2578.81	32.81	2568.93	2546.00	349.23	MAS = 10.00 (m)	1700.00	1700.00				MINPT-O-EOU	
	3514.57	44.83	3483.65	3469.74	124.45	OSF1.50	7562.00	7500.00				MinPt-O-SF	
	3548.84	43.13	3519.25	3505.71	130.92	OSF1.50	8030.00	7966.28				MinPt-O-SF	
	3545.69	43.77	3515.88	3502.13	128.80	OSF1.50	8410.00	8346.28				MinPt-CtCt	
	3545.90	43.78	3515.88	3502.11	128.75	OSF1.50	8420.00	8356.28				MINPT-O-EOU	
	3545.91	43.80	3515.88	3502.11	128.69	OSF1.50	8430.00	8366.28				MinPt-O-ADP	
	3546.10	44.13	3515.85	3501.97	127.68	OSF1.50	8560.00	8496.28				MINPT-O-EOU	
	3546.16	44.21	3515.86	3501.95	127.44	OSF1.50	8590.00	8526.28				MinPt-O-ADP	
	3708.11	66.05	3663.25	3642.06	87.47	OSF1.50	10530.00	9340.00				MinPt-CtCt	
	3708.38	66.99	3662.88	3641.39	86.19	OSF1.50	10590.00	9340.00				MINPT-O-EOU	
	3708.91	67.63	3662.99	3641.28	85.36	OSF1.50	10630.00	9340.00				MinPt-O-ADP	
	3709.09	86.78	3650.41	3622.31	65.97	OSF1.50	11390.00	9340.00				MinPt-CtCt	
	3709.77	89.07	3649.55	3620.70	64.23	OSF1.50	11500.00	9340.00				MINPT-O-EOU	
	3710.38	89.81	3649.67	3620.56	63.70	OSF1.50	11540.00	9340.00				MinPt-O-ADP	
	3709.59	107.90	3636.82	3601.69	52.76	OSF1.50	12180.00	9340.00				MinPt-CtCt	
	3710.09	111.54	3634.89	3598.55	51.00	OSF1.50	12310.00	9340.00				MinPt-CtCt	
	3710.79	113.61	3634.21	3597.18	50.06	OSF1.50	12410.00	9340.00				MINPT-O-EOU	
	3711.48	114.44	3634.36	3597.04	49.70	OSF1.50	12450.00	9340.00				MinPt-O-ADP	
	3708.21	155.37	3603.80	3552.84	36.36	OSF1.50	13840.00	9340.00				MinPt-CtCt	
	3709.31	158.56	3602.77	3550.75	35.63	OSF1.50	13980.00	9340.00				MINPT-O-EOU	
	3709.92	161.69	3601.30	3548.23	34.93	OSF1.50	14060.00	9340.00				MinPt-CtCt	
	3710.74	164.15	3600.47	3546.59	34.41	OSF1.50	14170.00	9340.00				MINPT-O-EOU	
	3711.60	165.36	3600.52	3546.23	34.16	OSF1.50	14220.00	9340.00				MINPT-O-EOU	
	3702.17	199.43	3568.39	3502.75	28.18	OSF1.50	15340.00	9340.00				MinPt-CtCt	
	3707.05	214.00	3563.55	3493.05	26.27	OSF1.50	15860.00	9340.00				MINPT-O-EOU	
	3711.70	222.28	3562.68	3489.42	25.32	OSF1.50	16140.00	9340.00				MINPT-O-EOU	
	3714.48	227.35	3562.08	3487.13	24.76	OSF1.50	16310.00	9340.00				MINPT-O-EOU	
	3715.50	231.89	3560.07	3483.61	24.28	OSF1.50	16430.00	9340.00				MinPt-CtCt	
	3716.20	234.07	3559.32	3482.13	24.06	OSF1.50	16530.00	9340.00				MINPT-O-EOU	
	3705.78	277.34	3520.05	3428.44	20.21	OSF1.50	17950.00	9340.00				MinPt-CtCt	
	3709.03	284.29	3518.67	3424.74	19.73	OSF1.50	18220.00	9340.00				MINPT-O-EOU	
	3715.85	293.62	3519.26	3422.22	19.13	OSF1.50	18530.00	9340.00				MINPT-O-EOU	
	3716.22	294.09	3519.33	3422.13	19.10	OSF1.50	18550.00	9340.00				MinPt-O-ADP	
	3707.81	310.09	3500.25	3397.72	18.07	OSF1.50	19040.00	9340.00				MinPt-CtCt	
	3708.00	310.67	3500.06	3397.33	18.04	OSF1.50	19080.00	9340.00				MINPT-O-EOU	
	3708.11	310.80	3500.08	3397.31	18.03	OSF1.50	19090.00	9340.00				MinPt-O-ADP	
	3714.96	312.94	3505.50	3402.02	17.94	OSF1.50	19273.08	9340.00				MinPt-O-SF	
Cimarex Vaca Draw 20-17 Federal #1H Surcon 0ft-12740 (Def Survey)													Pass
	2598.56	32.81	2596.06	2565.75	998755.76	MAS = 10.00 (m)	0.00	0.00				Surface	
	2598.48	32.81	2595.91	2565.67	37946.13	MAS = 10.00 (m)	26.00	26.00				WRP	
	2596.54	32.81	2592.82	2563.73	2123.82	MAS = 10.00 (m)	300.00	300.00				MinPts	
	2597.01	32.81	2592.44	2564.20	1254.00	MAS = 10.00 (m)	460.00	460.00				MINPT-O-EOU	
	2633.28	32.81	2621.80	2600.47	292.99	MAS = 10.00 (m)	2130.00	2129.96				MinPt-O-SF	
	2649.81	32.81	2638.22	2617.00	291.40	MAS = 10.00 (m)	2280.00	2279.55				MinPt-O-SF	
	2658.38	32.81	2646.74	2625.56	291.15	MAS = 10.00 (m)	2340.00	2339.20				MinPt-O-SF	
	3649.24	45.21	3618.27	3604.03	128.08	OSF1.50	7562.00	7500.00				MinPt-O-SF	
	3696.93	44.61	3666.36	3652.32	131.60	OSF1.50	8360.00	8296.28				MINPT-O-EOU	
	3697.01	44.68	3666.38	3652.32	131.37	OSF1.50	8390.00	8326.28				MinPt-O-ADP	
	4253.88	60.10	4212.99	4193.79	110.72	OSF1.50	11290.00	9340.00				MinPt-O-SF	
	4278.73	60.44	4237.60	4218.29	110.71	OSF1.50	11340.00	9340.00				MinPt-O-SF	

Offset Trajectory	Separation			Allow	Sep.	Controlling	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)	Dev. (ft)	Fact.	Rule	MD (ft)	TVD (ft)	Alert	Minor	Major		
	10736.42	79.25	10682.75	10657.17	209.77	OSF1.50	19273.08	9340.00				TD	
Cimarex Vaca Draw 20-17 Federal #1H ST01 MWD 08-Update (Non-Def Survey)													Pass
	2598.56	32.81	2596.06	2565.75	998755.76	MAS = 10.00 (m)	0.00	0.00				Surface	
	2598.48	32.81	2595.91	2565.67	37946.13	MAS = 10.00 (m)	26.00	26.00				WRP	
	2596.54	32.81	2592.82	2563.73	2123.82	MAS = 10.00 (m)	300.00	300.00				MinPts	
	2597.01	32.81	2592.44	2564.20	1254.00	MAS = 10.00 (m)	460.00	460.00				MINPT-O-EOU	
	2633.28	32.81	2621.80	2600.47	292.99	MAS = 10.00 (m)	2130.00	2129.98				MinPt-O-SF	
	2649.81	32.81	2638.22	2617.00	291.40	MAS = 10.00 (m)	2280.00	2279.55				MinPt-O-SF	
	2658.36	32.81	2646.74	2625.56	291.15	MAS = 10.00 (m)	2340.00	2339.20				MinPt-O-SF	
	3649.24	45.21	3618.27	3604.03	128.08	OSF1.50	7562.00	7500.00				MinPt-O-SF	
	3696.93	44.61	3666.36	3652.32	131.60	OSF1.50	8360.00	8296.28				MINPT-O-EOU	
	3697.01	44.68	3666.38	3652.32	131.37	OSF1.50	8390.00	8326.28				MinPt-O-ADP	
	4253.88	60.10	4212.99	4193.79	110.72	OSF1.50	11290.00	9340.00				MinPt-O-SF	
	4278.73	60.44	4237.60	4218.29	110.71	OSF1.50	11340.00	9340.00				MinPt-O-SF	
	4769.99	106.93	4697.87	4663.06	68.48	OSF1.50	12210.00	9340.00				MinPts	
	4742.91	136.74	4650.92	4606.17	52.97	OSF1.50	13140.00	9340.00				MinPt-CtCt	
	4743.54	138.61	4650.30	4604.93	52.25	OSF1.50	13230.00	9340.00				MINPT-O-EOU	
	4744.37	139.64	4650.45	4604.74	51.87	OSF1.50	13280.00	9340.00				MinPt-O-ADP	
	4747.02	142.45	4651.22	4604.57	50.85	OSF1.50	13390.00	9340.00				MinPt-O-ADP	
	4749.06	148.34	4649.34	4600.72	48.82	OSF1.50	13570.00	9340.00				MINPT-O-EOU	
	4751.10	150.79	4649.74	4600.31	48.03	OSF1.50	13670.00	9340.00				MinPt-O-ADP	
	4767.70	167.55	4655.16	4600.15	43.31	OSF1.50	14190.00	9340.00				MinPt-CtCt	
	4769.72	175.72	4651.74	4594.00	41.28	OSF1.50	14500.00	9340.00				MINPT-O-EOU	
	4771.53	177.87	4652.12	4593.67	40.79	OSF1.50	14590.00	9340.00				MinPt-O-ADP	
	4749.70	208.34	4609.97	4541.36	34.59	OSF1.50	15570.00	9340.00				MinPt-CtCt	
	4750.13	209.68	4609.51	4540.45	34.37	OSF1.50	15640.00	9340.00				MINPT-O-EOU	
	4750.75	210.44	4609.63	4540.32	34.25	OSF1.50	15680.00	9340.00				MinPt-O-ADP	
	4784.85	230.53	4630.33	4554.32	31.46	OSF1.50	16310.00	9340.00				MinPt-CtCt	
	4785.11	231.36	4630.04	4553.75	31.35	OSF1.50	16360.00	9340.00				MINPT-O-EOU	
	4785.52	231.85	4630.12	4553.67	31.28	OSF1.50	16390.00	9340.00				MinPt-O-ADP	
	4861.54	241.56	4699.67	4619.98	30.49	OSF1.50	17170.00	9340.00				MinPt-O-SF	
	5628.09	242.03	5465.91	5386.06	35.23	OSF1.50	19273.08	9340.00				TD	
Cimarex Vaca Draw 20-17 Federal #1H ST01 Rev1 RM 15Feb18 (Def Plan)													Pass
	2598.56	32.81	2596.06	2565.75	998755.76	MAS = 10.00 (m)	0.00	0.00				Surface	
	2598.48	32.81	2595.91	2565.67	37946.13	MAS = 10.00 (m)	26.00	26.00				WRP	
	2596.54	32.81	2592.82	2563.73	2123.82	MAS = 10.00 (m)	300.00	300.00				MinPts	
	2597.01	32.81	2592.44	2564.20	1254.00	MAS = 10.00 (m)	460.00	460.00				MINPT-O-EOU	
	2633.28	32.81	2621.80	2600.47	292.99	MAS = 10.00 (m)	2130.00	2129.96				MinPt-O-SF	
	2649.81	32.81	2638.22	2617.00	291.40	MAS = 10.00 (m)	2280.00	2279.55				MinPt-O-SF	
	2658.36	32.81	2646.74	2625.56	291.15	MAS = 10.00 (m)	2340.00	2339.20				MinPt-O-SF	
	3649.24	45.21	3618.27	3604.03	128.08	OSF1.50	7562.00	7500.00				MinPt-O-SF	
	3696.93	44.61	3666.36	3652.32	131.60	OSF1.50	8360.00	8296.28				MINPT-O-EOU	
	3697.01	44.68	3666.38	3652.32	131.37	OSF1.50	8390.00	8326.28				MinPt-O-ADP	
	4253.88	60.10	4212.99	4193.79	110.72	OSF1.50	11290.00	9340.00				MinPt-O-SF	
	4278.73	60.44	4237.60	4218.29	110.71	OSF1.50	11340.00	9340.00				MinPt-O-SF	
	4750.64	325.57	4532.76	4425.07	22.05	OSF1.50	19040.00	9340.00				MinPt-CtCt	
	4750.86	326.34	4532.47	4424.52	21.99	OSF1.50	19090.00	9340.00				MINPT-O-EOU	
	4751.10	326.64	4532.51	4424.46	21.97	OSF1.50	19110.00	9340.00				MinPt-O-ADP	
	4756.19	328.89	4536.09	4427.30	21.85	OSF1.50	19273.08	9340.00				MinPt-O-SF	

1. Geological Formations

TVD of target 9,340
MD at TD 19,273

Pilot 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	1.56	1.50	2.63
8 3/4	0	8926	8926	7"	29.00	L-80	LT&C	1.68	1.95	3.70
8 3/4	8926	19273	9340	5-1/2"	17.00	L-80	BT&C	1.44	1.77	56.41
						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	# Sks	Wt. lb/gal	Yld ft3/sack	H2O 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	215	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 III.B.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 19273'	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 fromTD 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	4371 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	H2S is present
X	H2S 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.

PECOS DISTRICT
DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME:	**CIMAREX ENERGY COMPANY**
LEASE NO.:	**NMNM26394**
WELL NAME & NO.:	**VACA DRAW 20-17 FEDERAL 45H**
SURFACE HOLE FOOTAGE:	**390' FSL & 2100' FEL**
BOTTOM HOLE FOOTAGE	**100' FNL & 1250' 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.

JJP07032019

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.