

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENTFORM APPROVED
OMB NO. 1004-0137
Expires: January 31, 2018**SUNDRY NOTICES AND REPORTS ON WELLS**
*Do not use this form for proposals to drill or to re-enter an abandoned well. Use form 3160-3 (APD) for such proposals.*5. Lease Serial No.
NMNM130854

6. If Indian, Allottee or Tribe Name

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

8. Well Name and No.
COTTONBERRY 20 FEDERAL 5H9. API Well No.
30-015-45148-00-X110. Field and Pool or Exploratory Area
COTTONWOOD DRAW-BONE SPRING11. County or Parish, State
EDDY COUNTY, NM**SUBMIT IN TRIPLICATE - Other instructions on page 2**

1. Type of Well

☒ Oil Well ☐ Gas Well ☐ Other2. Name of Operator
CIMAREX ENERGY COMPANYContact: ARICKA EASTERLING
E-Mail: aeasterling@cimarex.com3a. Address
600 N MARIENFELD STE 600
MIDLAND, TX 797033b. Phone No. (include area code)
Ph: 918-560-70604. Location of Well (Footage, Sec., T., R., M., or Survey Description)
Sec 20 T25S R27E NWNW 976FNL 639FWL
32.120064 N Lat, 104.218781 W Lon**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 APD
	☐ 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 recompleat 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 recompleat in a new interval, a Form 3160-4 must be filed once testing has been completed. Final Abandonment Notices must be filed only after all requirements, including reclamation, have been completed and the operator has determined that the site is ready for final inspection.

Cimarex respectfully requests approval to change the BHL.

Approved:
330 FSL & 700 FWL
Proposed:
100 FSL & 700 FWLCimarex also proposes to change the following:
Intermediate casing depth to 1935'
Production lead cement to 10.3 ppgCarlsbad Field Office
OCD ArtesiaNM OIL CONSERVATION
ARTESIA DISTRICT
NOV 28 2018

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

Electronic Submission #442905 verified by the BLM Well Information System
For CIMAREX ENERGY COMPANY, sent to the Carlsbad
Committed to AFMSS for processing by PRISCILLA PEREZ on 11/07/2018 (19PP0342SE)

RECEIVED

Name (Printed/Typed) ARICKA EASTERLING

Title REGULATORY ANALYST

Signature (Electronic Submission)

Date 11/07/2018

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By ZOTA STEVENS

Title PETROLEUM ENGINEER

Date 11/15/2018

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 Carlsbad

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 **

RP12-7-18

my

Additional data for EC transaction #442905 that would not fit on the form

32. Additional remarks, continued

Please see attached C102 plat, Directional Plan and Drilling Plan.

NOV 28 2018

PECOS DISTRICT DRILLING CONDITIONS OF APPROVAL

RECEIVED

OPERATOR'S NAME:	Cimarex Energy Company
LEASE NO.:	NMNM130854
WELL NAME & NO.:	Cottonberry 20 Federal 5H
SURFACE HOLE FOOTAGE:	976'/N & 639'/W
BOTTOM HOLE FOOTAGE:	330'/S & 700'/W
LOCATION:	Section 20, T.25 S., R.27 E., NMPM
COUNTY:	Eddy 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

All previous COAs still apply except for the following:

A. CASING

- The minimum required fill of cement behind the 9-5/8 inch intermediate casing, which shall be set at approximately 1935 feet, is:
 - Cement to surface. If cement does not circulate see B.1.a, c-d above.
 - ❖ In High Cave/Karst Areas if cement does not circulate to surface on the first two casing strings, the cement on the 3rd casing string must come to surface.
- The minimum required fill of cement behind the 5-1/2 inch production casing is: Cement should tie-back at least 200 feet into previous casing string. Operator shall provide method of verification. **Additional cement maybe required. Excess calculates to 18%.**

LV111518

District I
1625 N. French Dr., Hobbs, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-9720
District III
1000 Rio Brazos Road, Aztec, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

NM OIL CONSERVATION
ARTESIA DISTRICT
NOV 28 2018

Form C-102
Revised August 1, 2011
Submit one copy to appropriate
District Office

RECEIVED ☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

¹ API Number 30-015-45148	² Pool Code 97494	³ Pool Name Cottonwood Draw; Bone Spring
⁴ Property Code 322224	⁵ Property Name COTTONBERRY 20 FEDERAL	⁶ Well Number 5H
⁷ OGRID No. 215099	⁸ Operator Name CIMAREX ENERGY CO.	⁹ Elevation 3148.9'

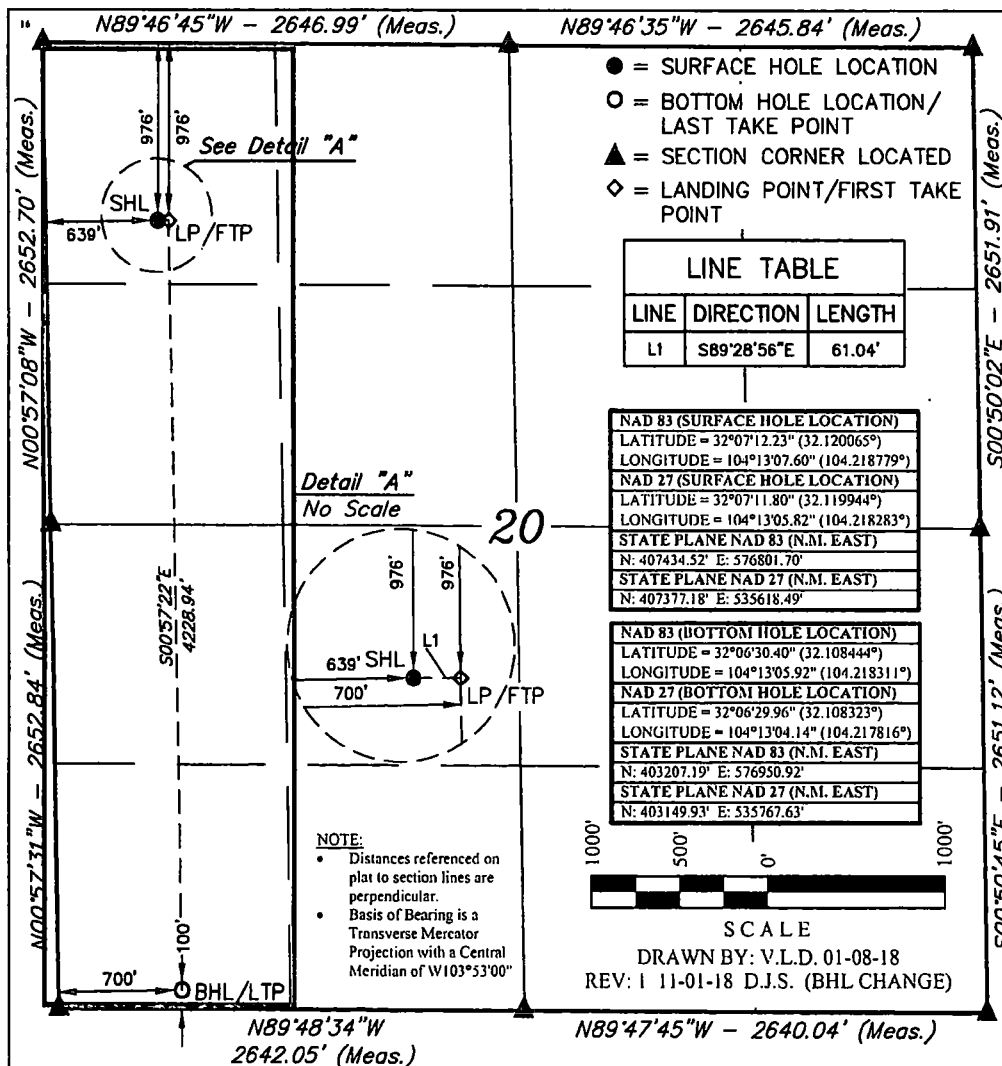
¹⁰ Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
D	20	25S	27E		976	NORTH	639	WEST	EDDY

¹¹ Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
M	20	25S	27E		100	SOUTH	700	WEST	EDDY
¹² Dedicated Acres 160	¹³ Joint or Infill	¹⁴ Consolidation Code	¹⁵ Order No.						

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.



¹¹ OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or a voluntary pooling agreement or a compulsory pooling order approved by the division.

Signature: *Aricka Easterling* Date: 11/6/18

Printed Name: Aricka Easterling

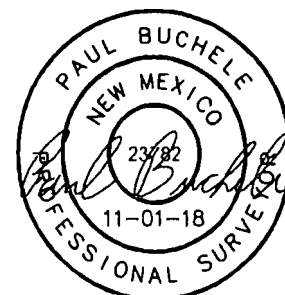
E-mail Address: aeasterling@cimarex.com

¹⁸ SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

December 21, 2018

Date of Survey
Signature and Seal of Professional Surveyor:



Certificate Number:

RUP/2-7-18

1. Geological Formations

TVD of target 7,920

Pilot Hole TD N/A

MD at TD 12,810

Deepest expected fresh water

Formation	Depth (TVD) from KB	Water/Mineral Bearing/Target Zone	Hazards
Rustler	0	N/A	
Top Salt	1270	N/A	
Castille	1867	N/A	
Bell Canyon	2061	N/A	
Cherry Canyon	3016	Hydrocarbons	
Brushy Canyon	4056	Hydrocarbons	
Bone Spring	5612	Hydrocarbons	
Bone Spring A Shale	5756	Hydrocarbons	
Bone Spring C Shale	6103	Hydrocarbons	
1st Bone Spring Ss	6618	Hydrocarbons	
2nd Bone Spring Ss	7120	Hydrocarbons	
3rd BS Limestone	7420	Hydrocarbons	
3rd Carb Sand	7700	Hydrocarbons	
3rd Card Sand Base	7900	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	400	400	13-3/8"	48.00	H-40/J-55 Hybrid	ST&C	4.04	9.45	16.77
12 1/4	0	1935	1935	9-5/8"	36.00	J-55	LT&C	1.97	3.43	6.50
8 3/4	0	7429	7429	5-1/2"	17.00	L-80	LT&C	1.81	2.23	2.51
8 3/4	7429	12810	7920	5-1/2"	17.00	L-80	BT&C	1.70	2.09	47.56
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?	N
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 ft ³ /sack	H ₂ O gal/sk	500# Comp. Strength (hours)	Slurry Description
Surface	61	13.50	1.72	9.15	15.5	Lead: Class C + Bentonite
	195	14.80	1.34	6.32	9.5	Tail: Class C + LCM
Intermediate	368	12.90	1.88	9.65	12	Lead: 35:65 (Poz:C) + Salt + Bentonite
	113	14.80	1.34	6.32	9.5	Tail: Class C + LCM
Production	492	10.30	3.64	22.18		Lead: Tuned Light + LCM
	1151	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	31
Intermediate	0	49
Production	1735	18

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 400'	FW Spud Mud	8.30 - 8.80	30-32	N/C
400' to 1935'	Brine Water	9.70 - 10.20	30-32	N/C
1935' to 12810'	FW/Cut Brine	8.50 - 9.00	30-32	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	
X	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	3706 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. 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.

Cimarex Cottonberry 20 Federal 5H Rev2 RM 06Nov18 Anti-Collision Summary Report

Analysis Date-24hr Time: November 06, 2018 - 10:33

Client: Cimarex

Field: NM Eddy County (NAD 83)

Structure: Cimarex Cottonberry 20 Federal 5H

Slot: Cimarex Cottonberry 20 Federal 5H

Well: Cimarex Cottonberry 20 Federal 5H

Borehole: Original Borehole

Scan MD Range: 0.00ft ~ 12809.59ft

Analysis Method:

3D Least Distance

Reference Trajectory:

Cimarex Cottonberry 20 Federal 5H Rev2 RM 06Nov18 (Def Plan)

Depth Interval:

Every 10.00 Measured Depth (ft)

Rule Set:

NAL Procedure: D&M AntiCollision Standard S002

Min Pts:

All local minima indicated.

Version / Patch:

2.10.740.0

Database \ Project:

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

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

Trajectory Error Model:

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 Trajectories Summary

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 Cottonberry 20
Federal 1H Rev2 RM 06Nov18
(Def Plan)

40.01	32.51	37.51	7.50	N/A	MAS = 9.91 (m)	0.00	0.00	CtCt<=15m<15.00				Enter Alert	
40.01	32.51	37.51	7.50	42211.31	MAS = 9.91 (m)	26.00	26.00					WRP	
32.46	32.51	14.52	-0.06	1.94	MAS = 9.91 (m)	2520.00	2519.33			SfcRd<9.91		Enter Major	
31.82	32.51	13.58	-0.69	1.86	MAS = 9.91 (m)	2570.00	2568.97					MinPts	
31.83	32.51	13.53	-0.68	1.86	MAS = 9.91 (m)	2580.00	2578.89					MINPT-O-EQU	
31.89	32.51	13.53	-0.62	1.85	MAS = 9.91 (m)	2590.00	2588.80					MinPt-O-SF	
32.47	32.51	13.92	-0.05	1.87	MAS = 9.91 (m)	2620.00	2618.50			SfcRd>9.91		Exit Major	
100.44	32.51	78.30	67.93	4.99	MAS = 9.91 (m)	3200.00	3183.02		OSF>5.00			Exit Alert	
109.87	34.75	85.86	75.11	4.99	OSF1.50	3510.00	3482.56		OSF<5.00			Enter Alert	
105.34	57.92	65.90	47.43	2.78	OSF1.50	5580.00	5482.67					MinPt-CtCt	
105.37	58.01	65.88	47.38	2.78	OSF1.50	5590.00	5492.33					MinPts	
105.41	58.04	65.88	47.37	2.78	OSF1.50	5597.94	5500.00					MinPt-O-SF	
107.11	57.49	67.96	49.63	2.85	OSF1.50	6970.00	6863.64					MinPts	
107.13	57.50	67.96	49.63	2.85	OSF1.50	6980.00	6873.64					MinPt-O-SF	
162.12	50.57	127.58	111.55	4.98	OSF1.50	7240.00	7133.64		OSF>5.00			Exit Alert	
454.72	32.51	434.53	422.21	25.56	MAS = 9.91 (m)	8280.00	7799.57					MinPts	
458.30	93.30	395.27	365.00	7.53	OSF1.50	10560.00	7790.59					MinPt-CtCt	
458.76	94.67	394.81	364.09	7.43	OSF1.50	10610.00	7792.07					MINPT-O-EQU	
459.45	95.50	394.95	363.93	7.37	OSF1.50	10640.00	7793.38					MinPt-O-ADP	
541.88	161.91	433.10	379.96	5.08	OSF1.50	12809.59	7920.00					MinPts	

Fail Major

Cimarex Cottonberry 20
Federal 2H Survey MWD 0ft to
12651ft (Def Survey)

2731.29	32.81	2728.79	2698.48	N/A	MAS = 10.00 (m)	0.00	0.00					Surface	
2731.26	32.81	2728.76	2698.45	N/A	MAS = 10.00 (m)	10.00	10.00					MinPt-O-SF	
2731.25	32.81	2728.75	2698.45	N/A	MAS = 10.00 (m)	26.00	26.00					WRP	

Pass

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		
2731.11	32.81	2728.20	2698.30	6693.26		MAS = 10.00 (m)	140.00	140.00				MinPts	
2731.15	32.81	2728.16	2698.34	5523.18		MAS = 10.00 (m)	160.00	160.00				MINPT-O-EOU	
2731.52	32.81	2726.26	2698.71	988.59		MAS = 10.00 (m)	660.00	660.00				MinPts	
2729.24	32.81	2721.21	2696.43	493.05		MAS = 10.00 (m)	1290.00	1290.00				MinPts	
2729.32	32.81	2721.09	2696.51	475.53		MAS = 10.00 (m)	1340.00	1340.00				MINPT-O-EOU	
2536.02	32.81	2513.96	2503.21	130.51		MAS = 10.00 (m)	4260.00	4207.23				MinPt-O-SF	
2336.64	41.48	2308.05	2295.17	90.57		OSF 1.50	5470.00	5376.38				MinPt-O-SF	
1417.26	54.73	1379.55	1362.53	41.52		OSF 1.50	7350.00	7243.64				MinPt-CtCt	
1417.27	54.76	1379.55	1362.51	41.50		OSF 1.50	7360.00	7253.64				MinPts	
1418.84	54.87	1381.05	1383.97	41.44		OSF 1.50	7420.00	7313.64				MinPt-O-SF	
1472.76	50.16	1438.19	1422.60	47.12		OSF 1.50	7950.00	7746.18				MinPt-O-SF	
1475.61	50.89	1440.55	1424.72	46.49		OSF 1.50	8140.00	7798.42				MinPt-O-SF	
1469.36	50.93	1434.24	1418.43	46.34		OSF 1.50	8340.00	7799.31				MinPt-CtCt	
1469.38	50.96	1434.24	1418.42	46.32		OSF 1.50	8350.00	7799.27				MinPts	
1393.77	135.79	1302.04	1257.98	15.78		OSF 1.50	10620.00	7792.47				MinPt-CtCt	
1354.22	176.61	1235.28	1177.61	11.71		OSF 1.50	11600.00	7849.33				MinPt-CtCt	
1354.28	176.84	1235.19	1177.44	11.70		OSF 1.50	11620.00	7850.50				MINPT-O-EOU	
1354.49	177.09	1235.22	1177.40	11.68		OSF 1.50	11640.00	7851.67				MinPt-O-ADP	
1368.88	194.35	1238.13	1174.53	10.73		OSF 1.50	12030.00	7874.45				MinPt-CtCt	
1372.13	211.71	1229.82	1160.42	9.86		OSF 1.50	12450.00	7898.99				MinPt-CtCt	
1372.74	216.59	1227.17	1156.15	9.64		OSF 1.50	12580.00	7906.59				MINPT-O-EOU	
1372.81	216.68	1227.18	1156.13	9.64		OSF 1.50	12590.00	7907.17				MinPts	
1392.56	211.03	1250.68	1181.53	10.04		OSF 1.50	12809.59	7920.00				TD	

Cimarex Cottonberry 20
Federal #3H MWD Off to
12324ft (Def Survey)

2662.55	32.81	2660.05	2629.74	N/A		MAS = 10.00 (m)	0.00	0.00				Surface	Pass
2662.51	32.81	2660.01	2629.70	905756.57		MAS = 10.00 (m)	10.00	10.00				MinPt-O-SF	
2662.51	32.81	2660.01	2629.70	N/A		MAS = 10.00 (m)	20.00	20.00				MinPts	
2662.51	32.81	2660.01	2629.70	N/A		MAS = 10.00 (m)	26.00	26.00				WRP	
2662.89	32.81	2659.85	2630.09	4885.03		MAS = 10.00 (m)	170.00	170.00				MINPT-O-EOU	
2661.45	32.81	2652.93	2628.64	441.69		MAS = 10.00 (m)	1400.00	1400.00				MinPts	
2661.65	32.81	2652.45	2628.84	397.40		MAS = 10.00 (m)	1550.00	1550.00				MINPT-O-EOU	
2444.51	42.74	2415.15	2401.77	91.29		OSF 1.50	5600.00	5501.99				MinPt-O-SF	
2402.70	41.83	2373.93	2360.86	91.86		OSF 1.50	6860.00	6753.64				MinPt-CtCt	
2402.70	41.89	2373.89	2360.81	91.72		OSF 1.50	6870.00	6763.64				MINPT-O-EOU	
2402.74	41.95	2373.90	2360.79	91.59		OSF 1.50	6880.00	6773.64				MinPt-O-ADP	
2457.27	44.41	2426.83	2412.85	87.85		OSF 1.50	7428.90	7322.54				MinPt-O-SF	
2681.62	69.76	2634.28	2611.87	59.75		OSF 1.50	8580.00	7798.27				MinPt-CtCt	
2683.03	74.54	2632.51	2608.50	55.82		OSF 1.50	8740.00	7797.58				MINPT-O-EOU	
2688.49	89.68	2627.88	2598.82	46.22		OSF 1.50	9090.00	7796.06				MINPT-O-EOU	
2625.31	189.38	2498.22	2435.93	21.05		OSF 1.50	10960.00	7811.94				MinPt-CtCt	
2646.15	319.17	2432.54	2326.98	12.52		OSF 1.50	12610.00	7908.34				MinPt-CtCt	
2646.18	319.27	2432.50	2326.91	12.52		OSF 1.50	12620.00	7908.92				MINPT-O-EOU	
2646.25	319.37	2432.50	2326.88	12.51		OSF 1.50	12630.00	7909.51				MinPt-O-ADP	
2649.03	320.14	2434.77	2328.89	12.50		OSF 1.50	12730.00	7915.35				MinPt-O-SF	
2653.94	320.45	2439.47	2333.49	12.51		OSF 1.50	12809.59	7920.00				TD	

Cimarex Cottonberry 20
Federal 4H MWD Off to 11975ft
(Def Survey)

3991.75	32.81	3989.25	3958.95	N/A		MAS = 10.00 (m)	0.00	0.00				Surface	Pass
3991.74	32.81	3989.24	3958.93	N/A		MAS = 10.00 (m)	26.00	26.00				WRP	
3982.57	32.81	3975.42	3949.76	855.77		MAS = 10.00 (m)	970.00	970.00				MinPts	
3982.65	32.81	3975.36	3949.84	830.48		MAS = 10.00 (m)	1030.00	1030.00				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		
3983.22	32.81	3974.61	3950.41	652.49		MAS = 10.00 (m)	1320.00	1320.00				MINPT-O-EOU	
3882.73	42.16	3853.77	3840.56	146.89		OSF1.50	5600.00	5501.99				MinPt-O-SF	
3878.58	40.91	3850.46	3837.66	151.49		OSF1.50	5890.00	5785.54				MinPt-O-ADP	
3877.26	40.14	3849.65	3837.11	154.53		OSF1.50	6050.00	5944.16				MinPt-O-ADP	
3877.17	40.04	3849.64	3837.13	154.94		OSF1.50	6070.00	5964.06				MINPT-O-EOU	
3877.14	39.94	3849.67	3837.20	155.35		OSF1.50	6090.00	5983.97				MinPt-CICt	
3886.89	42.66	3857.61	3844.23	145.13		OSF1.50	7100.00	6993.64				MinPt-CICt	
3886.96	42.90	3857.52	3844.06	144.28		OSF1.50	7140.00	7033.64				MINPT-O-EOU	
3887.06	43.01	3857.55	3844.05	143.87		OSF1.50	7160.00	7053.64				MinPt-O-ADP	
3896.07	44.53	3865.55	3851.54	138.97		OSF1.50	7428.90	7322.54				MinPt-O-SF	
3951.32	68.97	3904.51	3882.35	89.11		OSF1.50	9410.00	7794.67				MinPt-CICt	
3952.61	72.98	3903.13	3879.64	84.07		OSF1.50	9570.00	7793.98				MINPT-O-EOU	
3953.61	74.23	3903.29	3879.38	82.63		OSF1.50	9620.00	7793.76				MinPt-O-ADP	
3939.24	136.02	3847.72	3803.22	44.23		OSF1.50	11010.00	7814.86				MinPt-CICt	
3939.90	137.93	3847.11	3801.97	43.61		OSF1.50	11100.00	7820.12				MINPT-O-EOU	
3940.61	138.78	3847.26	3801.83	43.35		OSF1.50	11140.00	7822.45				MinPt-O-ADP	
3951.42	207.15	3812.48	3744.27	28.94		OSF1.50	12630.00	7909.51				MinPt-CICt	
3951.52	207.47	3812.38	3744.05	28.90		OSF1.50	12660.00	7911.26				MINPT-O-EOU	
3951.61	207.58	3812.39	3744.03	28.89		OSF1.50	12670.00	7911.84				MinPt-O-ADP	
3955.45	208.93	3815.33	3746.52	28.72		OSF1.50	12809.59	7920.00				MinPt-O-SF	

Cimarex Cottonberry 20 Federal 5H Rev2 RM 06Nov18 Proposal Geodetic Report (Def Plan)



Report Date: November 06, 2018 - 10:32 AM
Client: Cimarex
Field: NM Eddy County (NAD 83)
Structure / Slot: Cimarex Cottonberry 20 Federal 5H / Cimarex Cottonberry 20 Federal 5H
Well: Cimarex Cottonberry 20 Federal 5H
Borehole: Original Borehole
UWI / API#: Unknown / Unknown
Survey Name: Cimarex Cottonberry 20 Federal 5H Rev2 RM 06Nov18
Survey Date: October 29, 2018
Tort / AHD / DDI / ERD Ratio: 123.708 ° / 5980.971 ft / 6.078 / 0.755
Coordinate Reference System: NAD83 New Mexico State Plane, Eastern Zone, US Feet
Location Lat / Long: N 32° 7' 12.23312", W 104° 13' 7.60364"
Location Grid N/E Y/X: N 407434.520 ftUS, E 576801.700 ftUS
CRS Grid Convergence Angle: 0.0609 °
Grid Scale Factor: 0.99991053
Version / Patch: 2.10.740.0

Survey / DLS Computation: Minimum Curvature / Lubinski
Vertical Section Azimuth: 178.805 ° (Grid North)
Vertical Section Origin: 0.000 ft, 0.000 ft
TVD Reference Datum: RKB
TVD Reference Elevation: 3174.900 ft above MSL
Seabed / Ground Elevation: 3148.900 ft above MSL
Magnetic Declination: 7.323 °
Total Gravity Field Strength: 998.4466mgn (9.80665 Based)
Gravity Model: GARM
Total Magnetic Field Strength: 47861.046 nT
Magnetic Dip Angle: 59.793 °
Declination Date: November 06, 2018
Magnetic Declination Model: HDGM 2018
North Reference: Grid North
Grid Convergence Used: 0.0609 °
Total Corr Mag North→Grid North: 7.2618 °
Local Coord Referenced To: Structure Reference Point

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 [976' FNL, 639' FWL]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
	100.00	0.00	2.80	100.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
	200.00	0.00	2.80	200.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
	300.00	0.00	2.80	300.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
	400.00	0.00	2.80	400.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
	500.00	0.00	2.80	500.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
	600.00	0.00	2.80	600.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
	700.00	0.00	2.80	700.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
	800.00	0.00	2.80	800.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
	900.00	0.00	2.80	900.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
	1000.00	0.00	2.80	1000.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
	1100.00	0.00	2.80	1100.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
Top Salt	1198.00	0.00	2.80	1198.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
	1200.00	0.00	2.80	1200.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
	1300.00	0.00	2.80	1300.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
	1400.00	0.00	2.80	1400.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
	1500.00	0.00	2.80	1500.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
	1600.00	0.00	2.80	1600.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
	1700.00	0.00	2.80	1700.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
Base Salt	1761.00	0.00	2.80	1761.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
	1800.00	0.00	2.80	1800.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
	1900.00	0.00	2.80	1900.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
Bell Canyon (Top Delaware)	1955.00	0.00	2.80	1955.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
	2000.00	0.00	2.80	2000.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
	2100.00	0.00	2.80	2100.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60

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 ° ' ")
Nudge 2°/100' DLS	2200.00	0.00	2.80	2200.00	0.00	0.00	0.00	0.00	407434.52	576801.70	N 32 7 12.23 W 104 13	7.60
	2300.00	2.00	2.80	2299.98	-1.74	1.74	0.09	2.00	407436.26	576801.79	N 32 7 12.25 W 104 13	7.60
	2400.00	4.00	2.80	2399.84	-6.96	6.97	0.34	2.00	407441.49	576802.04	N 32 7 12.30 W 104 13	7.60
	2500.00	6.00	2.80	2499.45	-15.66	15.67	0.77	2.00	407450.19	576802.47	N 32 7 12.39 W 104 13	7.59
	2600.00	8.00	2.80	2598.70	-27.81	27.85	1.36	2.00	407462.36	576803.06	N 32 7 12.51 W 104 13	7.59
	2700.00	10.00	2.80	2697.47	-43.42	43.47	2.12	2.00	407477.99	576803.82	N 32 7 12.66 W 104 13	7.58
	2800.00	12.00	2.80	2795.62	-62.45	62.53	3.06	2.00	407497.04	576804.76	N 32 7 12.85 W 104 13	7.57
	2900.00	14.00	2.80	2893.06	-84.89	85.00	4.15	2.00	407519.51	576805.85	N 32 7 13.07 W 104 13	7.55
Hold Nudge Cherry Canyon	2946.55	14.93	2.80	2938.13	-96.49	96.61	4.72	2.00	407531.12	576806.42	N 32 7 13.19 W 104 13	7.55
	2950.56	14.93	2.80	2942.00	-97.52	97.64	4.77	0.00	407532.15	576806.47	N 32 7 13.20 W 104 13	7.55
	3000.00	14.93	2.80	2989.77	-110.23	110.36	5.39	0.00	407544.87	576807.09	N 32 7 13.33 W 104 13	7.54
	3100.00	14.93	2.80	3086.40	-135.93	136.10	6.65	0.00	407570.61	576808.35	N 32 7 13.58 W 104 13	7.52
	3200.00	14.93	2.80	3183.02	-161.63	161.83	7.91	0.00	407596.34	576809.61	N 32 7 13.83 W 104 13	7.51
	3300.00	14.93	2.80	3279.65	-187.34	187.57	9.17	0.00	407622.07	576810.86	N 32 7 14.09 W 104 13	7.49
	3400.00	14.93	2.80	3376.27	-213.04	213.30	10.42	0.00	407647.80	576812.12	N 32 7 14.34 W 104 13	7.48
	3500.00	14.93	2.80	3472.89	-238.74	239.04	11.68	0.00	407673.54	576813.38	N 32 7 14.60 W 104 13	7.46
	3600.00	14.93	2.80	3569.52	-264.45	264.77	12.94	0.00	407699.27	576814.64	N 32 7 14.85 W 104 13	7.45
	3700.00	14.93	2.80	3666.14	-290.15	290.51	14.20	0.00	407725.00	576815.89	N 32 7 15.11 W 104 13	7.43
	3800.00	14.93	2.80	3762.76	-315.85	316.24	15.45	0.00	407750.73	576817.15	N 32 7 15.36 W 104 13	7.42
	3900.00	14.93	2.80	3859.39	-341.56	341.98	16.71	0.00	407776.47	576818.41	N 32 7 15.62 W 104 13	7.41
	4000.00	14.93	2.80	3956.01	-367.26	367.71	17.97	0.00	407802.20	576819.67	N 32 7 15.87 W 104 13	7.39
Brushy Canyon	4007.23	14.93	2.80	3963.00	-369.12	369.57	18.06	0.00	407804.06	576819.76	N 32 7 15.89 W 104 13	7.39
	4100.00	14.93	2.80	4052.63	-392.96	393.45	19.23	0.00	407827.93	576820.92	N 32 7 16.13 W 104 13	7.38
	4200.00	14.93	2.80	4149.26	-418.66	419.18	20.48	0.00	407853.66	576822.18	N 32 7 16.38 W 104 13	7.36
	4300.00	14.93	2.80	4245.88	-444.37	444.92	21.74	0.00	407879.40	576823.44	N 32 7 16.64 W 104 13	7.35
	4400.00	14.93	2.80	4342.51	-470.07	440.65	23.00	0.00	407905.13	576824.70	N 32 7 16.89 W 104 13	7.33
	4500.00	14.93	2.80	4439.13	-495.77	496.39	24.26	0.00	407930.86	576825.95	N 32 7 17.14 W 104 13	7.32
	4600.00	14.93	2.80	4535.75	-521.48	522.12	25.51	0.00	407956.59	576827.21	N 32 7 17.40 W 104 13	7.30
	4700.00	14.93	2.80	4632.38	-547.18	547.86	26.77	0.00	407982.33	576828.47	N 32 7 17.65 W 104 13	7.29
	4800.00	14.93	2.80	4729.00	-572.88	573.59	28.03	0.00	408008.06	576829.73	N 32 7 17.91 W 104 13	7.27
	4900.00	14.93	2.80	4825.62	-598.59	599.33	29.29	0.00	408033.79	576830.98	N 32 7 18.16 W 104 13	7.26
	5000.00	14.93	2.80	4922.25	-624.29	625.06	30.54	0.00	408059.52	576832.24	N 32 7 18.42 W 104 13	7.24
	5100.00	14.93	2.80	5018.87	-649.99	650.80	31.80	0.00	408085.26	576833.50	N 32 7 18.67 W 104 13	7.23
	5200.00	14.93	2.80	5115.50	-675.69	676.53	33.06	0.00	408110.99	576834.76	N 32 7 18.93 W 104 13	7.21
	5300.00	14.93	2.80	5212.12	-701.40	702.27	34.32	0.00	408136.72	576836.01	N 32 7 19.18 W 104 13	7.20
	5400.00	14.93	2.80	5308.74	-727.10	728.00	35.57	0.00	408162.45	576837.27	N 32 7 19.44 W 104 13	7.18
	5500.00	14.93	2.80	5405.37	-752.80	753.74	36.83	0.00	408188.19	576838.53	N 32 7 19.69 W 104 13	7.17
Drop to Vertical 2°/100' DLS	5597.94	14.93	2.80	5500.00	-777.98	778.94	38.06	0.00	408213.39	576839.76	N 32 7 19.94 W 104 13	7.15
Bone Spring	5600.00	14.89	2.80	5501.99	-778.51	779.47	38.09	2.00	408213.92	576839.78	N 32 7 19.95 W 104 13	7.15
	5617.59	14.54	2.80	5519.00	-782.96	783.93	38.31	2.00	408218.38	576840.00	N 32 7 19.99 W 104 13	7.15
	5700.00	12.89	2.80	5599.06	-802.45	803.45	39.26	2.00	408237.89	576840.96	N 32 7 20.18 W 104 13	7.14
	5800.00	10.89	2.80	5696.91	-823.00	824.02	40.27	2.00	408258.47	576841.96	N 32 7 20.39 W 104 13	7.13
	5900.00	8.89	2.80	5795.42	-840.14	841.18	41.10	2.00	408275.62	576842.80	N 32 7 20.56 W 104 13	7.12
	6000.00	6.89	2.80	5894.47	-853.83	854.89	41.77	2.00	408289.33	576843.47	N 32 7 20.69 W 104 13	7.11
	6100.00	4.89	2.80	5993.94	-864.07	865.14	42.27	2.00	408299.58	576843.97	N 32 7 20.79 W 104 13	7.10
	6200.00	2.89	2.80	6093.70	-870.83	871.91	42.61	2.00	408306.35	576844.30	N 32 7 20.86 W 104 13	7.10
	6300.00	0.89	2.80	6193.64	-874.12	875.20	42.77	2.00	408309.64	576844.46	N 32 7 20.89 W 104 13	7.10
Hold Vertical	6344.49	0.00	2.80	6238.13	-874.47	875.55	42.78	2.00	408309.99	576844.48	N 32 7 20.90 W 104 13	7.10
	6400.00	0.00	2.80	6293.64	-874.47	875.55	42.78	0.00	408309.99	576844.48	N 32 7 20.90 W 104 13	7.10
	6500.00	0.00	2.80	6393.64	-874.47	875.55	42.78	0.00	408309.99	576844.48	N 32 7 20.90 W 104 13	7.10
	6600.00	0.00	2.80	6493.64	-874.47	875.55	42.78	0.00	408309.99	576844.48	N 32 7 20.90 W 104 13	7.10
1st Bone Spring Sand	6663.36	0.00	2.80	6557.00	-874.47	875.55	42.78	0.00	408309.99	576844.48	N 32 7 20.90 W 104 13	7.10
	6700.00	0.00	2.80	6593.64	-874.47	875.55	42.78	0.00	408309.99	576844.48	N 32 7 20.90 W 104 13	7.10
	6800.00	0.00	2.80	6693.64	-874.47	875.55	42.78	0.00	408309.99	576844.48	N 32 7 20.90 W 104 13	7.10
	6900.00	0.00	2.80	6793.64	-874.47	875.55	42.78	0.00	408309.99	576844.48	N 32 7 20.90 W 104 13	7.10
	7000.00	0.00	2.80	6893.64	-874.47	875.55	42.78	0.00	408309.99	576844.48	N 32 7 20.90 W 104 13	7.10

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 ° ' ")
2nd Bone Spring Sand	7095.36	0.00	2.80	6989.00	-874.47	875.55	42.78	0.00	408309.99	576844.48	N 32 7 20.90 W 104 13	7.10
	7100.00	0.00	2.80	6993.64	-874.47	875.55	42.78	0.00	408309.99	576844.48	N 32 7 20.90 W 104 13	7.10
	7200.00	0.00	2.80	7093.64	-874.47	875.55	42.78	0.00	408309.99	576844.48	N 32 7 20.90 W 104 13	7.10
	7300.00	0.00	2.80	7193.64	-874.47	875.55	42.78	0.00	408309.99	576844.48	N 32 7 20.90 W 104 13	7.10
	7400.00	0.00	2.80	7293.64	-874.47	875.55	42.78	0.00	408309.99	576844.48	N 32 7 20.90 W 104 13	7.10
KOP - Build 12°/100' DLS	7428.90	0.00	2.80	7322.54	-874.47	875.55	42.78	0.00	408309.99	576844.48	N 32 7 20.90 W 104 13	7.10
	7500.00	8.53	178.81	7393.38	-869.18	870.27	42.89	12.00	408304.71	576844.59	N 32 7 20.84 W 104 13	7.09
3rd Bone Sping Carb	7523.99	11.41	178.81	7417.00	-865.03	866.11	42.98	12.00	408300.56	576844.68	N 32 7 20.80 W 104 13	7.09
	7600.00	20.53	178.81	7490.00	-844.14	845.23	43.42	12.00	408279.67	576845.11	N 32 7 20.60 W 104 13	7.09
	7700.00	32.53	178.81	7579.31	-799.55	800.65	44.35	12.00	408235.10	576845.10	N 32 7 20.16 W 104 13	7.08
	7800.00	44.53	178.81	7657.39	-737.37	738.48	45.64	12.00	408172.93	576847.34	N 32 7 19.54 W 104 13	7.06
Harkey Sand	7893.12	55.71	178.81	7717.00	-666.03	667.15	47.13	12.00	408101.61	576848.83	N 32 7 18.83 W 104 13	7.05
	7900.00	56.53	178.81	7720.84	-660.31	661.44	47.25	12.00	408095.90	576848.95	N 32 7 18.78 W 104 13	7.05
	8000.00	68.53	178.81	7766.88	-571.75	572.90	49.10	12.00	408007.36	576850.79	N 32 7 17.90 W 104 13	7.03
	8100.00	80.53	178.81	7793.50	-475.54	476.71	51.10	12.00	407911.19	576852.80	N 32 7 16.95 W 104 13	7.00
Landing Point - Hold to 1912' VS	8180.97	90.25	178.81	7800.00	-394.93	396.12	52.78	12.00	407830.60	576854.48	N 32 7 16.15 W 104 13	6.98
	8200.00	90.25	178.81	7799.92	-375.90	377.09	53.18	0.00	407811.58	576854.88	N 32 7 15.96 W 104 13	6.98
	8300.00	90.25	178.81	7799.48	-275.90	277.12	55.27	0.00	407711.61	576856.96	N 32 7 14.97 W 104 13	6.96
	8400.00	90.25	178.81	7799.05	-175.91	177.14	57.35	0.00	407611.64	576859.05	N 32 7 13.99 W 104 13	6.93
	8500.00	90.25	178.81	7798.62	-75.91	77.16	59.44	0.00	407511.68	576861.13	N 32 7 13.00 W 104 13	6.91
	8600.00	90.25	178.81	7798.18	24.09	-22.81	61.52	0.00	407411.71	576863.22	N 32 7 12.01 W 104 13	6.89
	8700.00	90.25	178.81	7797.75	124.09	-122.79	63.61	0.00	407311.74	576865.30	N 32 7 11.02 W 104 13	6.87
	8800.00	90.25	178.81	7797.32	224.09	-222.77	65.69	0.00	407211.77	576867.39	N 32 7 10.03 W 104 13	6.84
	8900.00	90.25	178.81	7796.88	324.09	-322.75	67.78	0.00	407111.80	576869.47	N 32 7 9.04 W 104 13	6.82
	9000.00	90.25	178.81	7796.45	424.09	-422.72	69.86	0.00	407011.83	576871.56	N 32 7 8.05 W 104 13	6.80
	9100.00	90.25	178.81	7796.02	524.09	-522.70	71.95	0.00	406911.87	576873.64	N 32 7 7.06 W 104 13	6.77
	9200.00	90.25	178.81	7795.58	624.09	-622.68	74.04	0.00	406811.90	576875.73	N 32 7 6.07 W 104 13	6.75
	9300.00	90.25	178.81	7795.15	724.09	-722.66	76.12	0.00	406711.93	576877.81	N 32 7 5.08 W 104 13	6.73
	9400.00	90.25	178.81	7794.72	824.09	-822.63	78.21	0.00	406611.96	576879.90	N 32 7 4.09 W 104 13	6.70
	9500.00	90.25	178.81	7794.28	924.08	-922.61	80.29	0.00	406511.99	576881.98	N 32 7 3.10 W 104 13	6.68
	9600.00	90.25	178.81	7793.85	1024.08	-1022.59	82.38	0.00	406412.03	576884.07	N 32 7 2.11 W 104 13	6.66
	9700.00	90.25	178.81	7793.42	1124.08	-1122.56	84.46	0.00	406312.06	576886.16	N 32 7 1.12 W 104 13	6.64
	9800.00	90.25	178.81	7792.98	1224.08	-1222.54	86.55	0.00	406212.09	576888.24	N 32 7 0.13 W 104 13	6.61
	9900.00	90.25	178.81	7792.55	1324.08	-1322.52	88.63	0.00	406112.12	576890.33	N 32 6 59.15 W 104 13	6.59
	10000.00	90.25	178.81	7792.12	1424.08	-1422.50	90.72	0.00	406012.15	576892.41	N 32 6 58.16 W 104 13	6.57
	10100.00	90.25	178.81	7791.68	1524.08	-1522.47	92.80	0.00	405912.19	576894.50	N 32 6 57.17 W 104 13	6.54
	10200.00	90.25	178.81	7791.25	1624.08	-1622.45	94.89	0.00	405812.22	576896.58	N 32 6 56.18 W 104 13	6.52
	10300.00	90.25	178.81	7790.81	1724.08	-1722.43	96.98	0.00	405712.25	576898.67	N 32 6 55.19 W 104 13	6.50
	10400.00	90.25	178.81	7790.38	1824.08	-1822.41	99.06	0.00	405612.28	576900.75	N 32 6 54.20 W 104 13	6.47
Align to Target 2°/100' DLS	10487.92	90.25	178.81	7790.00	1912.00	-1910.31	100.90	0.00	405524.38	576902.59	N 32 6 53.33 W 104 13	6.45
	10500.00	90.01	178.81	7789.97	1924.07	-1922.38	101.15	2.00	405512.31	576902.84	N 32 6 53.21 W 104 13	6.45
	10600.00	88.01	178.81	7791.71	2024.05	-2022.34	103.23	2.00	405412.36	576904.92	N 32 6 52.22 W 104 13	6.43
Hold to Target	10667.81	86.65	178.81	7794.87	2091.79	-2090.06	104.64	2.00	405344.65	576906.33	N 32 6 51.55 W 104 13	6.41
	10700.00	86.65	178.81	7796.75	2123.92	-2122.19	105.31	0.00	405312.52	576907.01	N 32 6 51.23 W 104 13	6.41
	10800.00	86.65	178.81	7802.59	2223.75	-2222.00	107.40	0.00	405212.73	576909.09	N 32 6 50.24 W 104 13	6.38
	10900.00	86.65	178.81	7808.43	2323.58	-2321.80	109.48	0.00	405112.93	576911.17	N 32 6 49.26 W 104 13	6.36
	11000.00	86.65	178.81	7814.27	2423.41	-2421.61	111.56	0.00	405013.13	576913.25	N 32 6 48.27 W 104 13	6.34
	11100.00	86.65	178.81	7820.12	2523.24	-2521.42	113.64	0.00	404913.33	576915.33	N 32 6 47.28 W 104 13	6.31
	11200.00	86.65	178.81	7825.96	2623.07	-2621.23	115.72	0.00	404813.53	576917.41	N 32 6 46.29 W 104 13	6.29
	11300.00	86.65	178.81	7831.80	2722.90	-2721.03	117.81	0.00	404713.73	576919.50	N 32 6 45.31 W 104 13	6.27
	11400.00	86.65	178.81	7837.64	2822.73	-2820.84	119.89	0.00	404613.94	576921.58	N 32 6 44.32 W 104 13	6.24
	11500.00	86.65	178.81	7843.49	2922.56	-2920.65	121.97	0.00	404514.14	576923.66	N 32 6 43.33 W 104 13	6.22
	11600.00	86.65	178.81	7849.33	3022.39	-3020.46	124.05	0.00	404414.34	576925.74	N 32 6 42.34 W 104 13	6.20

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 ° ' ")
	11700.00	86.65	178.81	7855.17	3122.22	-3120.26	126.13	0.00	404314.54	576927.82	N 32 6 41.36 W 104 13 6.18	
	11800.00	86.65	178.81	7861.01	3222.05	-3220.07	128.22	0.00	404214.74	576929.90	N 32 6 40.37 W 104 13 6.15	
	11900.00	86.65	178.81	7866.86	3321.87	-3319.88	130.30	0.00	404114.94	576931.99	N 32 6 39.38 W 104 13 6.13	
	12000.00	86.65	178.81	7872.70	3421.70	-3419.69	132.38	0.00	404015.15	576934.07	N 32 6 38.39 W 104 13 6.11	
	12100.00	86.65	178.81	7878.54	3521.53	-3519.49	134.46	0.00	403915.35	576936.15	N 32 6 37.41 W 104 13 6.08	
	12200.00	86.65	178.81	7884.38	3621.36	-3619.30	136.54	0.00	403815.55	576938.23	N 32 6 36.42 W 104 13 6.06	
	12300.00	86.65	178.81	7890.23	3721.19	-3719.11	138.62	0.00	403715.75	576940.31	N 32 6 35.43 W 104 13 6.04	
	12400.00	86.65	178.81	7896.07	3821.02	-3818.92	140.71	0.00	403615.95	576942.39	N 32 6 34.44 W 104 13 6.01	
Base Harkey Sand	12450.15	86.65	178.81	7899.00	3871.09	-3868.97	141.75	0.00	403565.90	576943.44	N 32 6 33.95 W 104 13 6.00	
	12500.00	86.65	178.81	7901.91	3920.85	-3918.72	142.79	0.00	403516.15	576944.48	N 32 6 33.45 W 104 13 5.99	
	12600.00	86.65	178.81	7907.75	4020.68	-4018.53	144.87	0.00	403416.36	576946.56	N 32 6 32.47 W 104 13 5.97	
	12700.00	86.65	178.81	7913.60	4120.51	-4118.34	146.95	0.00	403316.56	576948.64	N 32 6 31.48 W 104 13 5.95	
	12800.00	86.65	178.81	7919.44	4220.34	-4218.15	149.03	0.00	403216.76	576950.72	N 32 6 30.49 W 104 13 5.92	
Cimarex Cottonberry 20 Federal 5H - PBHL [100' FSL, 700' FWL]	12809.59	86.65	178.81	7920.00	4229.91	-4227.72	149.23	0.00	403207.19	576950.92	N 32 6 30.40 W 104 13 5.92	

Survey Type: Def Plan

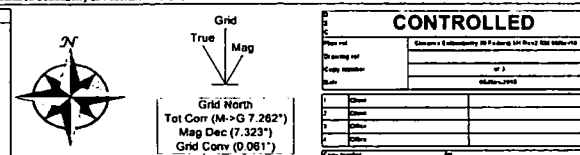
Survey Error Model: ISCWSA Rev 0 *** 3-D 95.000% Confidence 2.7955 sigma
Survey Program:

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	Original Borehole / Cimarex Cottonberry 20 Federal 5H Rev2 RM 06Nov18
	1	26.000	12809.589	1/100.000	30.000	30.000		NAL_MWD_IFR1+MS	Original Borehole / Cimarex Cottonberry 20 Federal 5H Rev2

Borehole:	Well:	Field:	Structure:
Original Borehole	Cimarex Cottonberry 20 Federal 5H	NM Eddy County (NAD 83)	Cimarex Cottonberry 20 Federal 5H

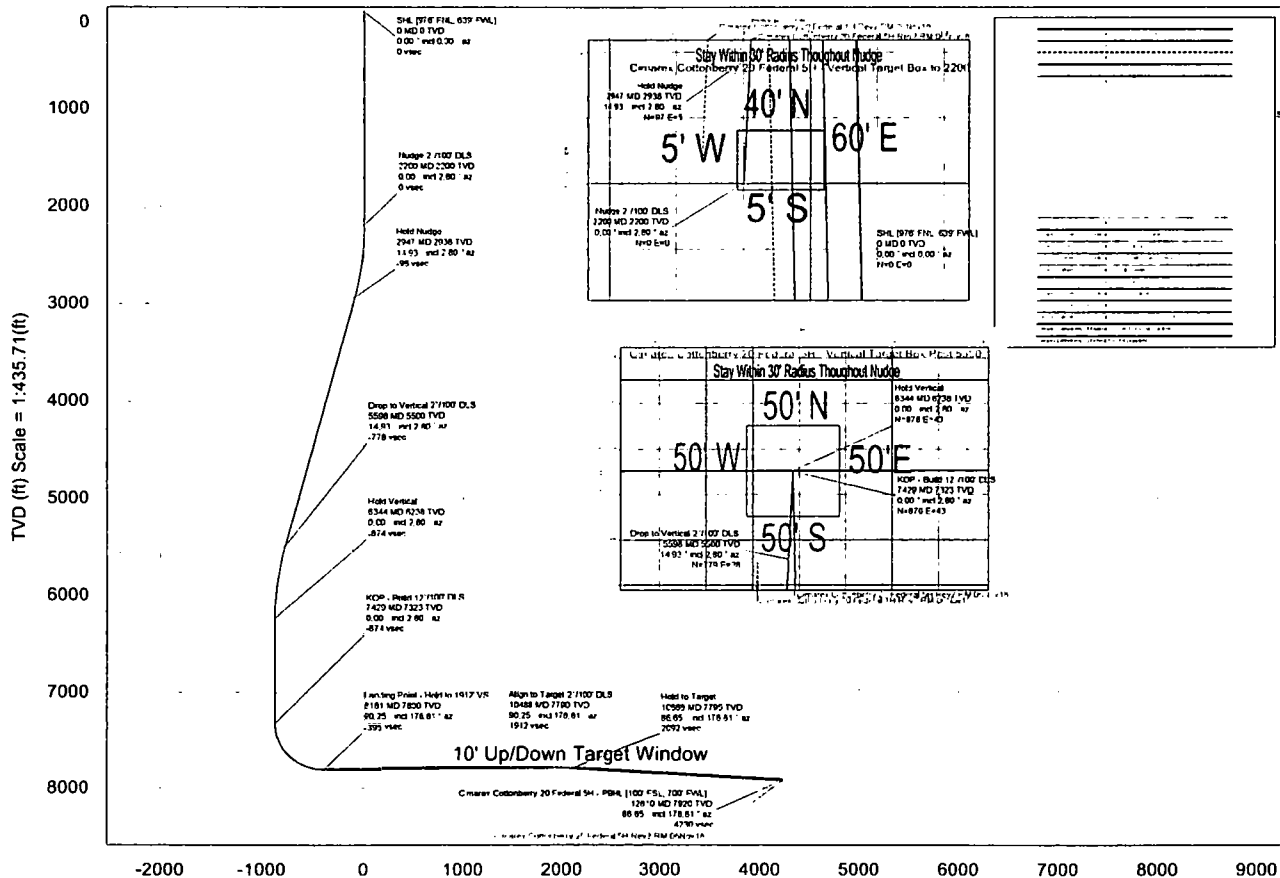
Gravity & Magnetic Parameters Model: HGM 2018 Mag Dec: 7.323°	Dip: 83.787° FS: 47861.04 mT	Date: 06-Nov-2018 Gravity FS: 980.647 mgn (9.80665 Based)	Surface Location Lat: N 32 7 12.23 Lon: W 104 13 7.80	NAD83 New Mexico State Plane, Southern Zone, US Feet Northing: 407434.527 US Easting: 578801.770 US	Grid Conv: 0.0029° Scale Fact: 0.99991083	Structure Cimarex Cottonberry 20 Federal 5H Cimarex Cottonberry 20 Federal 5H Rev2 RM 06Nov18	TVD Ref: R002(174.98 above MSL)
---	---------------------------------	--	---	---	--	--	---------------------------------

Critical Point	MD	INCL	AZIM	TVD	VSEC	N(+)/S(-)	E(+)/W(-)	DLS
SHL (776 FNL, 639 FNL)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Top Soil	1198.00	0.00	2.80	0.00	0.00	0.00	0.00	0.00
Base Soil	1781.00	0.00	2.80	1781.00	0.00	0.00	0.00	0.00
Bed Canyon (Top Deleware)	1955.00	0.00	2.80	1955.00	0.00	0.00	0.00	0.00
Hedge 2'1100 DLS	2200.00	0.00	2.80	2200.00	0.00	0.00	0.00	0.00
Hold Hedge	2946.55	14.93	2.80	2938.13	-96.49	96.81	4.72	2.00
Cherry Canyon	2950.56	14.93	2.80	2942.00	-97.52	97.64	4.77	0.00
Brushy Canyon	4007.23	14.93	2.80	3963.00	-369.12	369.57	18.08	0.00
Drop to Vertical 2'1100 DLS	5597.94	14.93	2.80	5500.00	-777.86	778.94	38.08	0.00
Bone Spring	5617.58	14.94	2.80	5519.00	-782.96	783.93	38.31	2.00
Hold Vertical	6344.49	0.00	2.80	6238.13	-874.47	875.35	42.78	2.00
1st Bone Spring Sand	6883.38	0.00	2.80	6857.00	-874.47	875.55	43.78	0.00
2nd Bone Spring Sand	7095.36	0.00	2.80	6888.00	-874.47	875.55	43.78	0.00
KOP - Build 12'1100 DLS	7428.80	0.00	2.80	7322.54	-874.47	875.55	43.78	0.00
3rd Bone Spring Core	7523.99	11.41	178.81	7417.00	-865.03	866.11	42.08	12.00
Harvey Sand	7893.12	55.71	178.81	7717.00	-668.03	667.15	47.13	12.00
Landing Point - Hold to 1912 VS	8180.97	90.25	178.81	7800.00	-394.83	396.12	52.78	12.00
Align to Target 2'1100 DLS	10487.92	90.25	178.81	7790.00	-1912.00	-1910.31	100.80	0.00
Hold to Target	10687.81	86.65	178.81	7784.87	-2091.79	-2090.08	104.64	2.00
Bone Spring Sand	12458.15	86.65	178.81	7879.00	-3869.97	-3868.97	141.75	0.00
Cimarex Cottonberry 20 Federal 5H - PBH (100 FSL, 100 FNL)	12809.59	86.65	178.81	7820.00	-4229.91	-4227.72	149.23	0.00

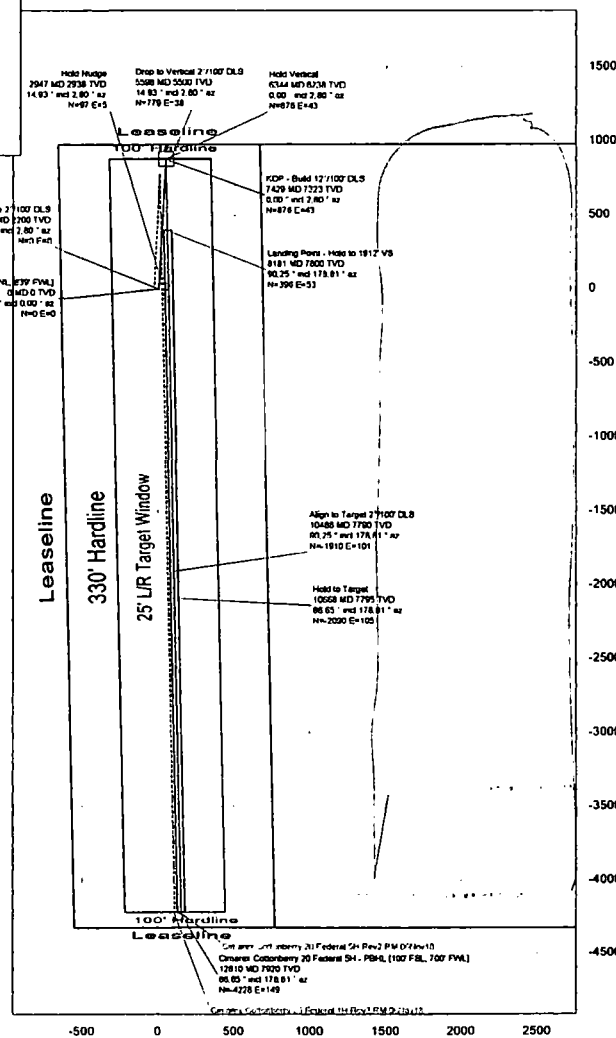


CONTROLLED

Drawn by	Cimarex Cottonberry 20 Federal 5H Rev2 RM 06Nov18
Checked by	
Scale	AS IS
Date	06-Nov-2018
Drawn by	
Checked by	
Scale	
Date	



NS (ft) Scale = 1:286.43(1)



EW (ft) Scale = 1:286.43(1)

Vertical Section (ft) Azim = 178.81° Scale = 1:435.71(ft) Origin = 0N/-S, 0E/-W