

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.
NMNM132062

6. If Indian, Allottee or Tribe Name

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

SUBMIT IN TRIPLICATE - Other instructions on page 28. Well Name and No.
BLACK RIVER 25 FED 3H9. API Well No.
30-015-43677-00-X110. Field and Pool or Exploratory Area
WILDCAT11. County or Parish, State
EDDY COUNTY, NM

1. Type of Well

☒ Oil Well ☐ Gas Well ☐ Other2. Name of Operator
CIMAREX ENERGY COMPANYContact: AMITHY E CRAWFORD
E-Mail: acrawford@cimarex.com3a. Address
202 S CHEYENNE AVE SUITE 1000
TULSA, OK 74103.4346

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

Sec 25 T24S R26E SWSE 85FSL 1640FEL

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

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

13. Describe Proposed or Completed Operation: Clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or 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 there by changing the directional plan. No additional disturbance is required for the well pad.

Approved:
BHL: 330 FNL & 1980 FEL Sec 25 24S 26E

Proposed
BHL: 330 FNL & 1980 FEL Sec 24 24S 26E

Cimarex also respectfully requests approval to drill the well as a wolfcamp therefore changing the directional plan.

Please see attached plat, directional prelim, Drilling plan and BOP diagrams for changes.

Accepted For Record RECEIVED
NMOCD

JUL 11 2018

DISTRICT II-ARTESIA O.C.D.

11 previous COPs still apply. Liner excess cement calculates to -37%.

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

Electronic Submission #420353 verified by the BLM Well Information System
For CIMAREX ENERGY COMPANY, sent to the Carlsbad
Committed to AFMSS for processing by PRISCILLA PEREZ on 05/21/2018 (18PP1779SE)

Name (Printed/Typed) AMITHY E CRAWFORD

Title REGULATORY ANALYST

Signature (Electronic Submission)

Date 05/16/2018

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By ZOTIA STEVENS

Title PETROLEUM ENGINEER

Date 07/10/2018

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 ****

Rw.

1. Geological Formations

TVD of target 8,763

Pilot Hole TD N/A

MD at TD 18,785

Deepest expected fresh water

Formation	Depth (TVD) from KB	Water/Mineral Bearing/Target Zone	Hazards
Salado (top Salt)	1322	N/A	
Castille (Base Salt)	1887	N/A	
Bell Canyon (top Delaware)	2096	Hydrocarbons	
Cherry Canyon	3023	Hydrocarbons	
Brushy Canyon	4049	Hydrocarbons	
Bone Spring	5609	Hydrocarbons	
1st Bone Spring Sand	6575	Hydrocarbons	
2nd Bone Spring Sand	7023	Hydrocarbons	
Harkey Sandstone	7723	Hydrocarbons	
Base Harkey Sandstone	7916	Hydrocarbons	
3rd bone Spring Sand	8336	Hydrocarbons	
3rd Bone Spring Carb	8336	Hydrocarbons	
Top Wolfcamp	8664	Hydrocarbons	
Wolfcamp Target	8763	Hydrocarbons	
Top Wolfcamp A Shale	8887	Hydrocarbons	

2. Casing Program

Hole Size	Casing Depth From	Casing Depth To	Casing Size	Weight (lb/ft)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
17 1/2	0	400	13-3/8"	48.00	H-40/J-55 Hybrid	ST&C	4.04	9.45	16.77
12 1/4	0	2076	9-5/8"	36.00	J-55	LT&C	1.83	3.20	6.06
8 3/4	0	8041	7"	26.00	N-80	LT&C	1.44	1.92	2.28
8 3/4	8041	9392	7"	26.00	N-80	BT&C	1.32	1.77	32.18
6	8041	18785	4-1/2"	11.60	P-110	BT&C	1.54	2.18	43.82
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

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, Artesia, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

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

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

RECEIVED
JUL 11 2018

AMENDED REPORT

43677

WELL LOCATION AND ACREAGE DEDICATION PLAT

¹ API Number 30-015-39973	² Pool Code 98820	³ Pool Name Purple Sage, Wolfcamp (Gas)
⁴ Property Code 315262	⁵ Property Name BLACK RIVER 25 FEDERAL COM	⁶ Well Number 3H
⁷ OGRID No. 215099	⁸ Operator Name CIMAREX ENERGY CO.	⁹ Elevation 3354.3'

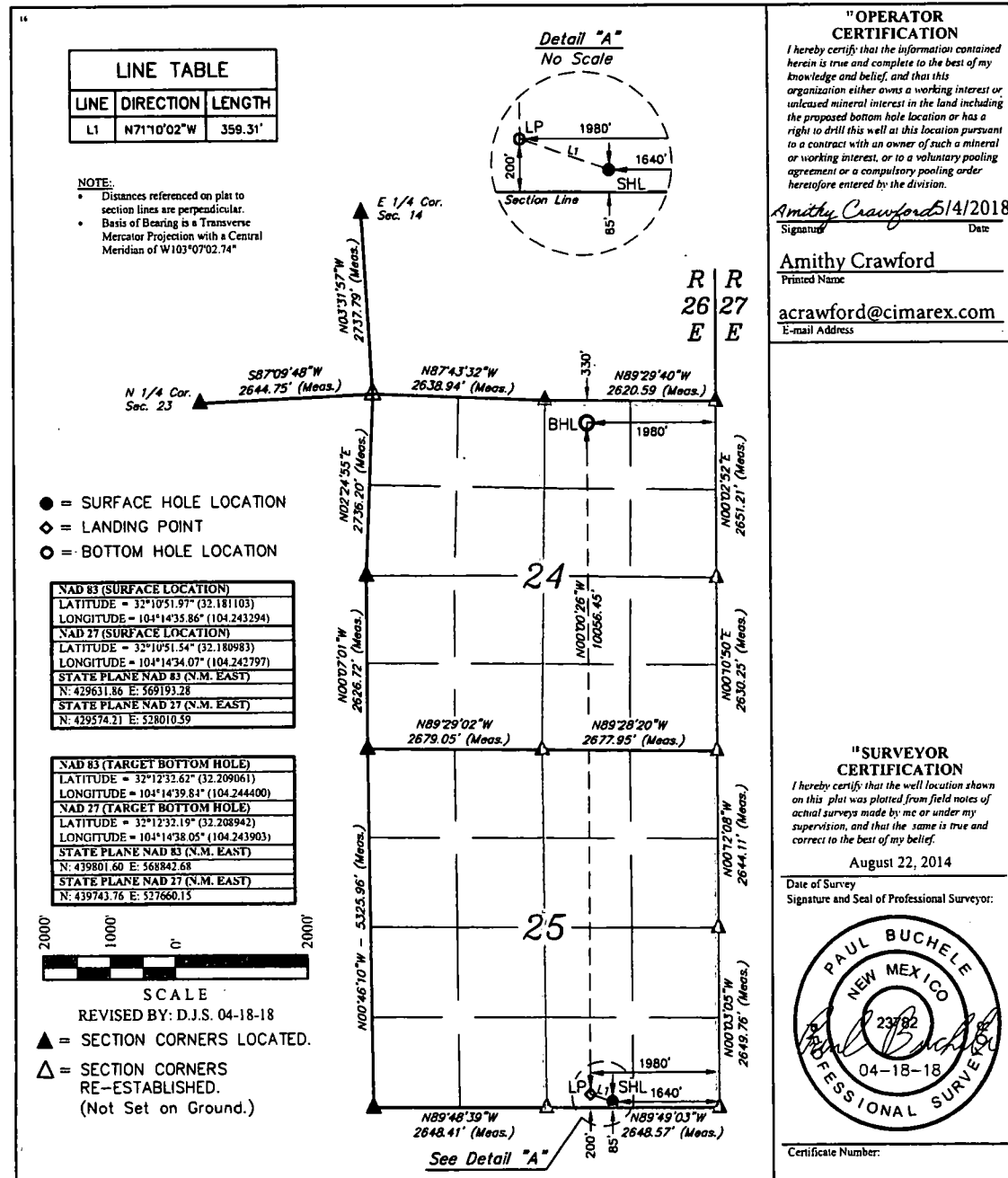
"Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Q	25	24 S	26 E		85	SOUTH	1640	EAST	EDDY

"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
B	24	24 S	26 E		330	NORTH	1980	EAST	EDDY
¹² Dedicated Acres 640	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.



Rw 9-6-18.

3. Cementing Program

Casing	# Sks	Wt. lb/gal	Yld ft ³ /sack	H ₂ O gal/sk	500# Comp. Strength (hours)	Slurry Description
Surface	78	14.80	1.34	6.32	9.5	Lead: Class C + LCM
	195	14.80	1.34	6.32	9.5	Tail: Class C + LCM
Intermediate	396	12.90	1.88	9.65	12	Lead: 35:65 (Poz:C) + Salt + Bentonite
	121	14.80	1.34	6.32	9.5	Tail: Class C + LCM
Production	318	10.30	3.64	22.18		Lead: Tuned Light + LCM
	173	14.20	1.30	5.86	14:30	Tail: 50:50 (Poz:H) + Salt + Bentonite + Fluid Loss + Dispersant + SMS
Completion System	683	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	1876	22
Completion System	9392	10

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		
6	13 5/8	5M	Annular	X	50% of working pressure
			Blind Ram		5M
			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.

X	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 2076'	Brine Water	9.70 - 10.20	30-32	N/C
2076' to 9392'	FW/Cut Brine	8.50 - 9.00	30-32	N/C
9392' to 18785'	Oil Based Mud	10.30 - 10.80	50-70	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
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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
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7. Drilling Conditions

Condition	
BH Pressure at deepest TVD	4921 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 5000 psi will be installed on the wellhead system and will be pressure tested to 250 psi low followed by a 5000 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 5000 psi.

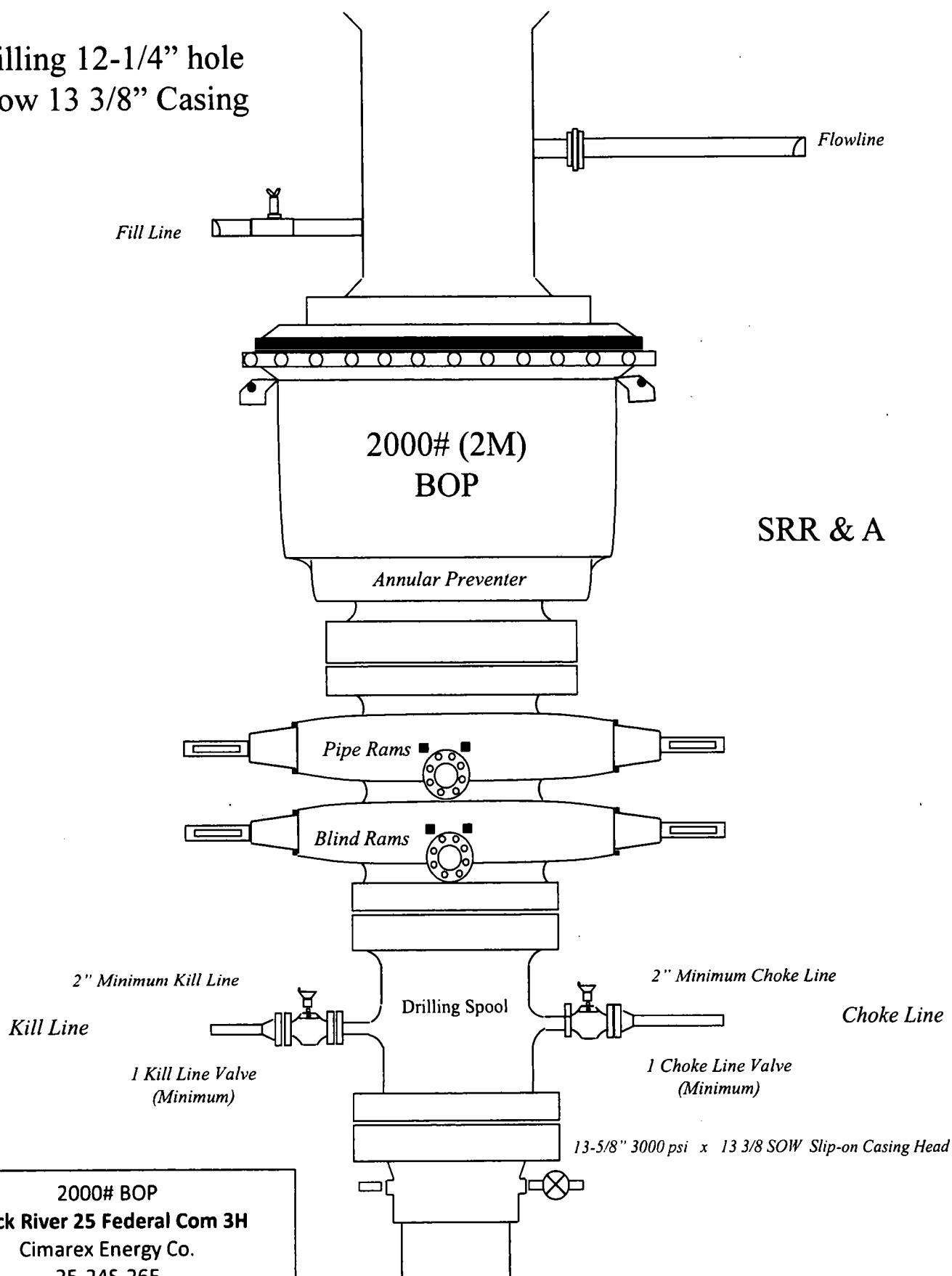
A solid steel body pack-off will be utilized after running and cementing the production casing. After installation the pack-off and lower flange will be pressure tested to 5000 psi.

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.

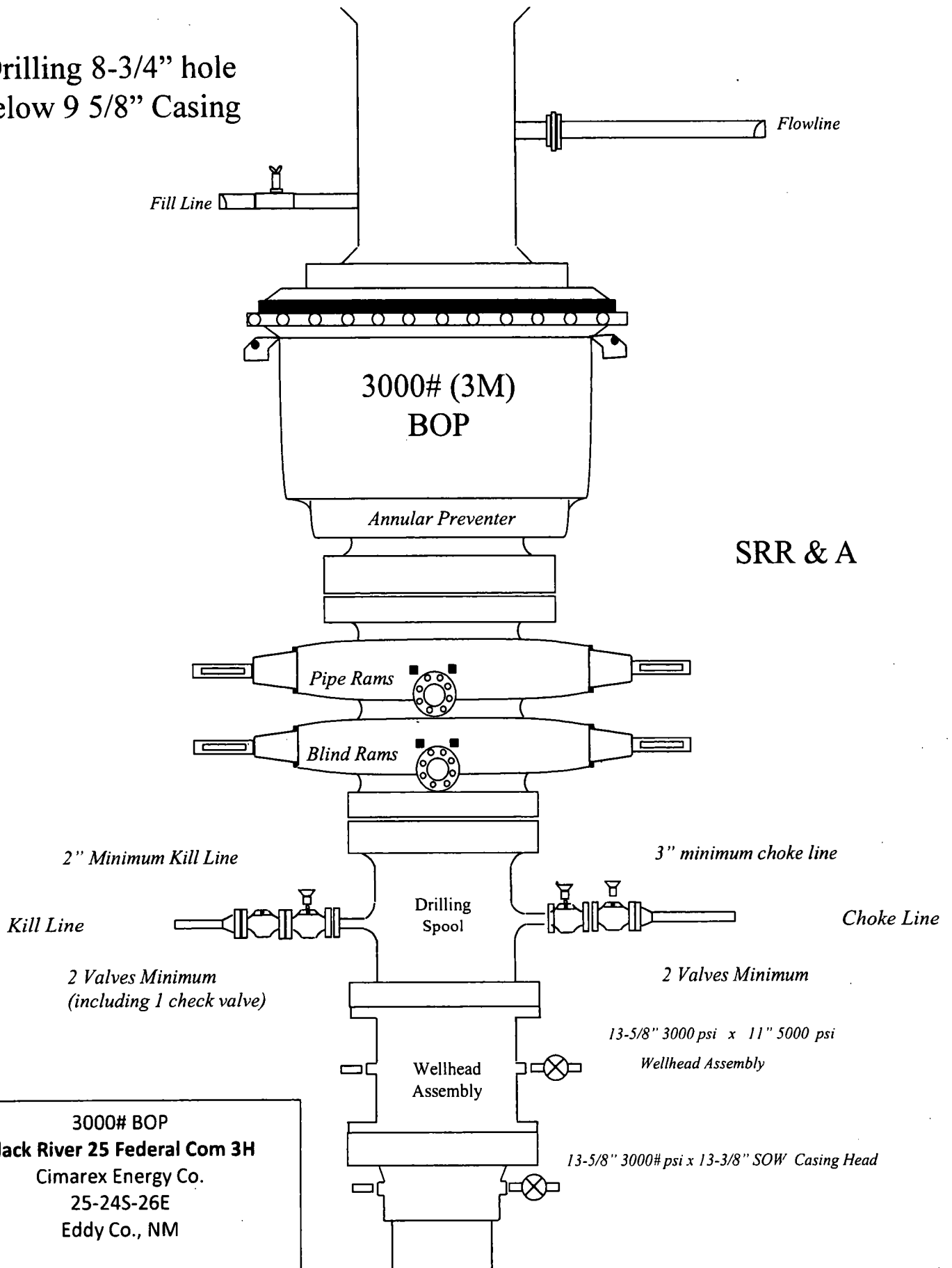
If well conditions dictate conventional slips will be set and BOPE will be tested to appropriate pressures based on permitted pressure requirements.

Drilling 12-1/4" hole
below 13 3/8" Casing



2000# BOP
Black River 25 Federal Com 3H
Cimarex Energy Co.
25-24S-26E
Eddy Co., NM

Drilling 8-3/4" hole
below 9 5/8" Casing



3000# BOP
Black River 25 Federal Com 3H
Cimarex Energy Co.
25-24S-26E
Eddy Co., NM

Drilling 6" hole below 7" Casing

Fill Line

Flowline

5000# (5M)
BOP

Annular Preventer

SRR & A

Pipe Rams

Blind Rams

2" Minimum Kill Line

Kill Line

2 Valves and a check valve

Drilling
Spool

3" minimum choke line

Choke Line

2 Valves Minimum
(HCR Required)

Wellhead
Assembly

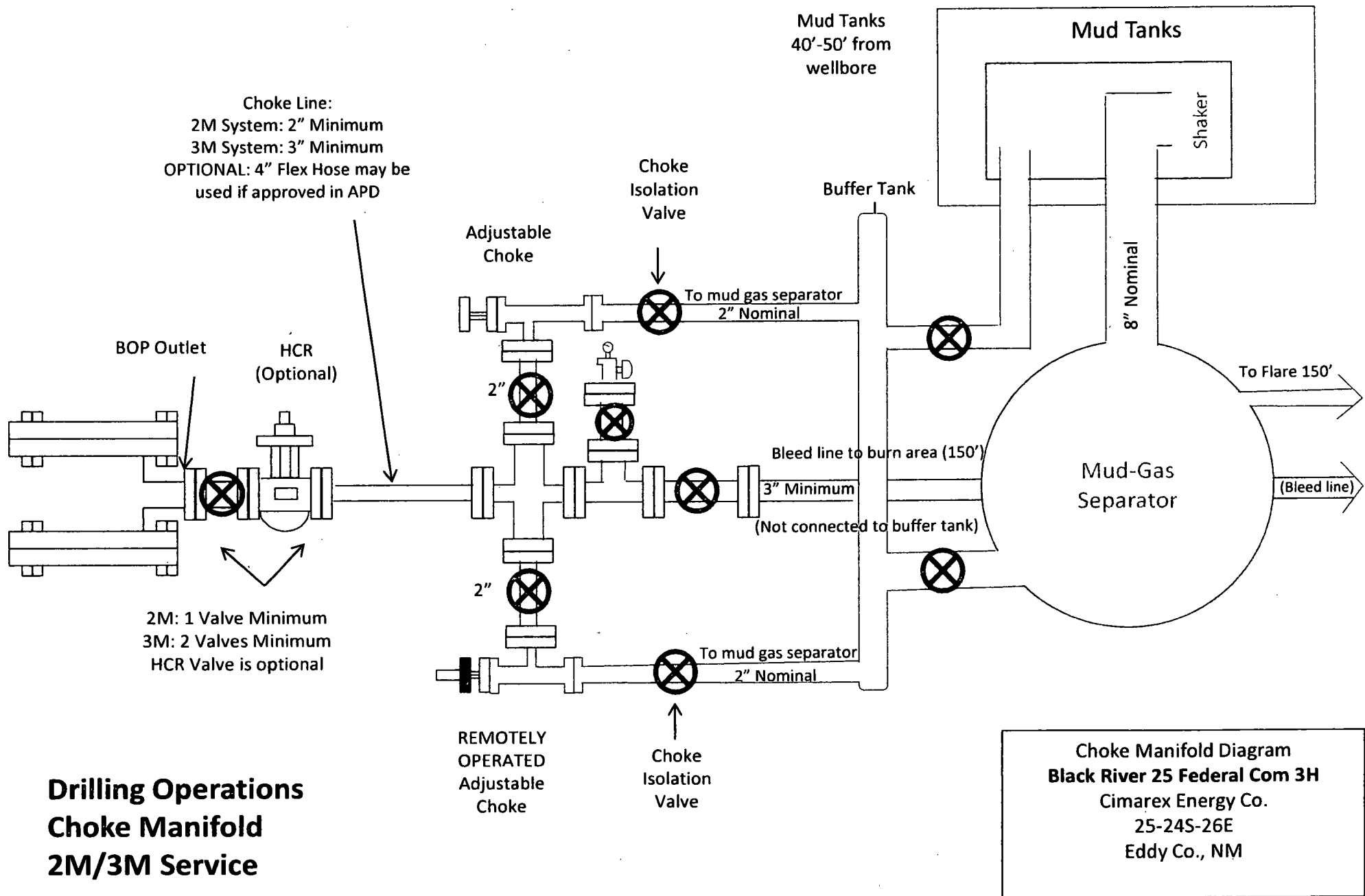
11" 5000 psi x 7-1/16" 10,000 psi
Wellhead Assembly

Wellhead
Assembly

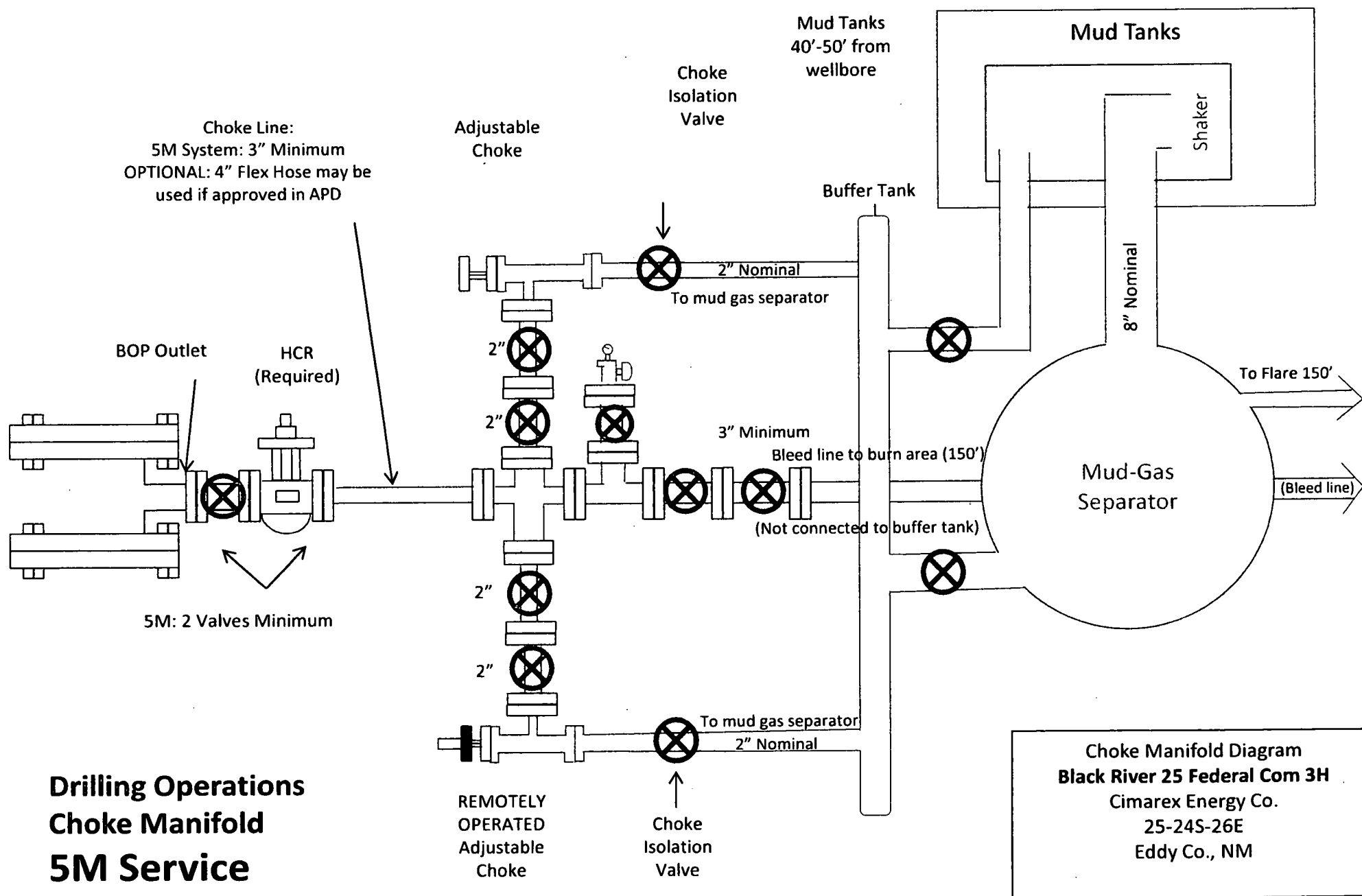
13-5/8" 3000 psi x 11" 5000 psi
Wellhead Assembly

13-5/8" 3000# psi x 13-3/8" SOIW Casing Head

5000# BOP
Black River 25 Federal Com 3H
Cimarex Energy Co.
25-24S-26E
Eddy Co., NM



Drilling Operations Choke Manifold 2M/3M Service



Drilling Operations Choke Manifold 5M Service

Prelim Cimarex Black River 25 Fed Com 3H Rev2 RM 7May18 Proposal Geodetic Report (Non-Def Plan)

Report Date: May 07, 2018 - 01:37 PM
Client: Cimarex
Field: NM Eddy County (NAD 83)
Structure / Slot: Cimarex Black River 25 Fed Com 3H / Cimarex Black River 25 Fed Com 3H
Well: Cimarex Black River 25 Fed Com 3H
Borehole: Original Borehole
UWI / API#: Unknown / Unknown
Survey Name: Prelim Cimarex Black River 25 Fed Com 3H Rev2 RM 7May18
Survey Date: May 07, 2018
Tort / AHD / DDI / ERD Ratio: 132.185 * / 10392.795 ft / 6.469 / 1.188
Coordinate Reference System: NAD83 New Mexico State Plane, Eastern Zone, US Feet
Location Lat / Long: N 32° 10' 51.97318", W 104° 14' 35.86238"
Location Grid N/E Y/X: N 429631.860 ftUS, E 569193.280 ftUS
CRS Grid Convergence Angle: 0.0480 *
Grid Scale Factor: 0.99990998
Version / Patch: 2.10.715.0

Survey / DLS Computation: Minimum Curvature / Lubinski
Vertical Section Azimuth: 0.163 * (Grid North)
Vertical Section Origin: 0.000 ft, 0.000 ft
TVD Reference Datum: RKB
TVD Reference Elevation: 3380.300 ft above MSL
Seabed / Ground Elevation: 3354.300 ft above MSL
Magnetic Declination: 7.395 *
Total Gravity Field Strength: 998.4350mgn (9.80665 Based)
Gravity Model: GARM
Total Magnetic Field Strength: 47929.316 nT
Magnetic Dip Angle: 59.882 *
Declination Date: May 07, 2018
Magnetic Declination Model: HDGM 2018
North Reference: Grid North
Grid Convergence Used: 0.0480 *
Total Corr Mag North->Grid North: 7.3468 *
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 [85' FSL, 1640' FEL]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	100.00	0.00	280.56	100.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	200.00	0.00	280.56	200.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	300.00	0.00	280.56	300.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	400.00	0.00	280.56	400.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	500.00	0.00	280.56	500.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	600.00	0.00	280.56	600.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	700.00	0.00	280.56	700.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	800.00	0.00	280.56	800.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	900.00	0.00	280.56	900.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	1000.00	0.00	280.56	1000.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	1100.00	0.00	280.56	1100.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	1200.00	0.00	280.56	1200.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	1300.00	0.00	280.56	1300.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
Top Salt (Salado)	1322.00	0.00	280.56	1322.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	1400.00	0.00	280.56	1400.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	1500.00	0.00	280.56	1500.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	1600.00	0.00	280.56	1600.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	1700.00	0.00	280.56	1700.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	1800.00	0.00	280.56	1800.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
Base Salt (Castile)	1887.00	0.00	280.56	1887.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	1900.00	0.00	280.56	1900.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	2000.00	0.00	280.56	2000.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
Bell Canyon (Top Delaware)	2096.00	0.00	280.56	2096.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	2100.00	0.00	280.56	2100.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	2200.00	0.00	280.56	2200.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	2300.00	0.00	280.56	2300.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	2400.00	0.00	280.56	2400.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	2500.00	0.00	280.56	2500.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	2600.00	0.00	280.56	2600.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	2700.00	0.00	280.56	2700.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	2800.00	0.00	280.56	2800.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	2900.00	0.00	280.56	2900.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	3000.00	0.00	280.56	3000.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
Cherry Canyon	3023.00	0.00	280.56	3023.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	3100.00	0.00	280.56	3100.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	3200.00	0.00	280.56	3200.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	3300.00	0.00	280.56	3300.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	3400.00	0.00	280.56	3400.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	3500.00	0.00	280.56	3500.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	3600.00	0.00	280.56	3600.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	3700.00	0.00	280.56	3700.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	3800.00	0.00	280.56	3800.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	3900.00	0.00	280.56	3900.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	4000.00	0.00	280.56	4000.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
Brushy Canyon	4049.00	0.00	280.56	4049.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	4100.00	0.00	280.56	4100.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	4200.00	0.00	280.56	4200.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	4300.00	0.00	280.56	4300.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	4400.00	0.00	280.56	4400.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	4500.00	0.00	280.56	4500.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	4600.00	0.00	280.56	4600.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	4700.00	0.00	280.56	4700.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	4800.00	0.00	280.56	4800.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	4900.00	0.00	280.56	4900.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	5000.00	0.00	280.56	5000.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	5100.00	0.00	280.56	5100.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	5200.00	0.00	280.56	5200.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	5300.00	0.00	280.56	5300.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	5400.00	0.00	280.56	5400.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	5500.00	0.00	280.56	5500.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	5600.00	0.00	280.56	5600.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
Bone Spring	5609.00	0.00	280.56	5609.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	5700.00	0.00	280.56	5700.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	5800.00	0.00	280.56	5800.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	5900.00	0.00	280.56	5900.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	6000.00	0.00	280.56	6000.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	6100.00	0.00	280.56	6100.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	6200.00	0.00	280.56	6200.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	6300.00	0.00	280.56	6300.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	6400.00	0.00	280.56	6400.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86
	6500.00	0.00	280.56	6500.00	0.00	0.00	0.00	0.00	429631.86	569193.28	N 32 10 51.97	W 104 14 35.86

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northings (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
1st Bone Spring Sand	8575.00	0.00	280.58	8575.00	0.00	0.00	0.00	0.00	429631.88	569193.28	N 32 10 51.97	W 104 14 35.88
	8600.00	0.00	280.58	8600.00	0.00	0.00	0.00	0.00	429631.88	569193.28	N 32 10 51.97	W 104 14 35.88
	8700.00	0.00	280.58	8700.00	0.00	0.00	0.00	0.00	429631.88	569193.28	N 32 10 51.97	W 104 14 35.88
	8800.00	0.00	280.58	8800.00	0.00	0.00	0.00	0.00	429631.88	569193.28	N 32 10 51.97	W 104 14 35.88
	8900.00	0.00	280.58	8900.00	0.00	0.00	0.00	0.00	429631.88	569193.28	N 32 10 51.97	W 104 14 35.88
	9000.00	0.00	280.58	9000.00	0.00	0.00	0.00	0.00	429631.88	569193.28	N 32 10 51.97	W 104 14 35.88
2nd Bone Spring Sand	7023.00	0.00	280.58	7023.00	0.00	0.00	0.00	0.00	429631.88	569193.28	N 32 10 51.97	W 104 14 35.88
	7100.00	0.00	280.58	7100.00	0.00	0.00	0.00	0.00	429631.88	569193.28	N 32 10 51.97	W 104 14 35.88
	7200.00	0.00	280.58	7200.00	0.00	0.00	0.00	0.00	429631.88	569193.28	N 32 10 51.97	W 104 14 35.88
	7300.00	0.00	280.58	7300.00	0.00	0.00	0.00	0.00	429631.88	569193.28	N 32 10 51.97	W 104 14 35.88
3rd Bone Spring Carb	7387.00	0.00	280.58	7387.00	0.00	0.00	0.00	0.00	429631.88	569193.28	N 32 10 51.97	W 104 14 35.88
	7400.00	0.00	280.58	7400.00	0.00	0.00	0.00	0.00	429631.88	569193.28	N 32 10 51.97	W 104 14 35.88
	7500.00	0.00	280.58	7500.00	0.00	0.00	0.00	0.00	429631.88	569193.28	N 32 10 51.97	W 104 14 35.88
	7600.00	0.00	280.58	7600.00	0.00	0.00	0.00	0.00	429631.88	569193.28	N 32 10 51.97	W 104 14 35.88
	7700.00	0.00	280.58	7700.00	0.00	0.00	0.00	0.00	429631.88	569193.28	N 32 10 51.97	W 104 14 35.88
Harkey Sandstone	7723.00	0.00	280.58	7723.00	0.00	0.00	0.00	0.00	429631.88	569193.28	N 32 10 51.97	W 104 14 35.88
	7800.00	0.00	280.58	7800.00	0.00	0.00	0.00	0.00	429631.88	569193.28	N 32 10 51.97	W 104 14 35.88
	7900.00	0.00	280.58	7900.00	0.00	0.00	0.00	0.00	429631.88	569193.28	N 32 10 51.97	W 104 14 35.88
Base Harkey Sand	7918.00	0.00	280.58	7918.00	0.00	0.00	0.00	0.00	429631.88	569193.28	N 32 10 51.97	W 104 14 35.88
	8000.00	0.00	280.58	8000.00	0.00	0.00	0.00	0.00	429631.88	569193.28	N 32 10 51.97	W 104 14 35.88
KOP - Build 12°/100' DLS	8040.48	0.00	280.58	8040.48	0.00	0.00	0.00	0.00	429631.88	569193.28	N 32 10 51.97	W 104 14 35.88
	8100.00	7.14	280.58	8099.85	0.87	0.68	-3.84	12.00	429832.54	569189.64	N 32 10 51.98	W 104 14 35.90
	8200.00	19.14	280.58	8197.05	4.76	4.84	-25.95	12.00	429836.70	569187.33	N 32 10 52.02	W 104 14 38.18
	8300.00	31.14	280.58	8287.41	12.42	12.61	-67.64	12.00	429844.47	569125.64	N 32 10 52.10	W 104 14 38.85
3rd Bone Spring Sand	8359.13	38.24	280.58	8339.00	18.49	18.77	-100.71	12.00	429850.63	569092.58	N 32 10 52.18	W 104 14 37.03
	8400.00	43.14	280.58	8388.98	23.29	23.86	-128.89	12.00	429855.51	569066.40	N 32 10 52.21	W 104 14 37.34
Build & Turn 12°/100' DLS	8415.48	45.00	280.58	8378.10	25.24	25.83	-137.48	12.00	429857.49	569055.81	N 32 10 52.23	W 104 14 37.48
	8500.00	45.26	294.88	8437.88	43.23	43.78	-194.23	12.00	429875.64	568999.06	N 32 10 52.41	W 104 14 38.12
	8600.00	47.80	8506.91	82.49	83.21	-254.60	12.00	429715.08	568938.71	N 32 10 52.80	W 104 14 38.82	
	8700.00	52.40	325.55	8571.24	130.56	140.43	-305.12	12.00	429772.27	568888.19	N 32 10 53.37	W 104 14 39.41
	8800.00	58.54	338.09	8628.05	211.65	212.93	-343.58	12.00	429844.77	568840.73	N 32 10 54.08	W 104 14 39.86
Top Wolfcamp	8874.50	63.62	348.33	8684.00	273.68	275.02	-363.38	12.00	429906.85	568829.83	N 32 10 54.70	W 104 14 40.09
	8900.00	65.74	348.97	8674.87	296.50	297.55	-388.31	12.00	429929.38	568825.01	N 32 10 54.92	W 104 14 40.14
	9000.00	73.62	358.62	8709.83	389.51	390.59	-378.22	12.00	430022.41	568815.09	N 32 10 55.84	W 104 14 40.28
Build 4°/100' DLS	9018.85	75.00	0.16	8714.19	405.73	406.81	-378.39	12.00	430038.83	568814.92	N 32 10 56.00	W 104 14 40.28
	9100.00	78.33	0.16	8733.37	488.83	487.70	-378.16	4.00	430119.52	568815.15	N 32 10 56.80	W 104 14 40.28
	9200.00	82.33	0.16	8750.17	585.18	586.26	-377.88	4.00	430218.07	568815.43	N 32 10 57.78	W 104 14 40.25
	9300.00	86.33	0.16	8760.08	684.67	685.75	-377.60	4.00	430317.55	568815.71	N 32 10 58.76	W 104 14 40.25
	9391.85	90.00	0.16	8763.00	776.48	777.54	-377.34	4.00	430406.33	568815.98	N 32 10 59.67	W 104 14 40.25
	9400.00	90.00	0.16	8763.00	784.61	785.69	-377.32	0.00	430417.47	568816.00	N 32 10 59.75	W 104 14 40.24
	9500.00	90.00	0.16	8763.00	884.61	885.69	-377.03	0.00	430517.46	568816.28	N 32 11 0.74	W 104 14 40.24
	9600.00	90.00	0.16	8763.00	984.61	985.69	-376.75	0.00	430617.46	568816.57	N 32 11 1.73	W 104 14 40.24
	9700.00	90.00	0.16	8763.00	1084.61	1085.69	-376.46	0.00	430717.45	568816.85	N 32 11 2.72	W 104 14 40.23
	9800.00	90.00	0.16	8763.00	1184.61	1185.69	-376.18	0.00	430817.44	568817.14	N 32 11 3.71	W 104 14 40.23
	9900.00	90.00	0.16	8763.00	1284.61	1285.68	-375.89	0.00	430917.43	568817.42	N 32 11 4.70	W 104 14 40.22
	10000.00	90.00	0.16	8763.00	1384.61	1385.68	-375.61	0.00	431017.42	568817.70	N 32 11 5.69	W 104 14 40.22
	10100.00	90.00	0.16	8763.00	1484.61	1485.68	-375.33	0.00	431117.41	568817.99	N 32 11 6.68	W 104 14 40.22
	10200.00	90.00	0.16	8763.00	1584.61	1585.68	-375.04	0.00	431217.40	568818.27	N 32 11 7.67	W 104 14 40.21
	10300.00	90.00	0.16	8763.00	1684.61	1685.68	-374.76	0.00	431317.39	568818.56	N 32 11 8.66	W 104 14 40.21
	10400.00	90.00	0.16	8763.00	1784.61	1785.68	-374.47	0.00	431417.38	568818.84	N 32 11 9.65	W 104 14 40.20
	10500.00	90.00	0.16	8763.00	1884.61	1885.68	-374.19	0.00	431517.37	568819.13	N 32 11 10.64	W 104 14 40.20
	10600.00	90.00	0.16	8763.00	1984.61	1985.68	-373.90	0.00	431617.36	568819.41	N 32 11 11.62	W 104 14 40.19
	10700.00	90.00	0.16	8763.00	2084.61	2085.68	-373.62	0.00	431717.35	568819.69	N 32 11 12.61	W 104 14 40.19
	10800.00	90.00	0.16	8763.00	2184.61	2185.68	-373.34	0.00	431817.34	568819.98	N 32 11 13.60	W 104 14 40.19
	10900.00	90.00	0.16	8763.00	2284.61	2285.68	-373.05	0.00	431917.33	568820.26	N 32 11 14.59	W 104 14 40.18
	11000.00	90.00	0.16	8763.00	2384.61	2385.68	-372.77	0.00	432017.32	568820.55	N 32 11 15.58	W 104 14 40.18
	11100.00	90.00	0.16	8763.00	2484.61	2485.68	-372.48	0.00	432117.31	568820.83	N 32 11 16.57	W 104 14 40.17
	11200.00	90.00	0.16	8763.00	2584.61	2585.68	-372.20	0.00	432217.30	568821.12	N 32 11 17.56	W 104 14 40.17
	11300.00	90.00	0.16	8763.00	2684.61	2685.68	-371.91	0.00	432317.29	568821.40	N 32 11 18.55	W 104 14 40.16
	11400.00	90.00	0.16	8763.00	2784.61	2785.68	-371.63	0.00	432417.28	568821.68	N 32 11 19.54	W 104 14 40.16
	11500.00	90.00	0.16	8763.00	2884.61	2885.68	-371.35	0.00	432517.27	568821.97	N 32 11 20.53	W 104 14 40.16
	11600.00	90.00	0.16	8763.00	2984.61	2985.68	-371.06	0.00	432617.26	568822.25	N 32 11 21.52	W 104 14 40.15
	11700.00	90.00	0.16	8763.00	3084.61	3085.68	-370.78	0.00	432717.25	568822.54	N 32 11 22.51	W 104 14 40.15
	11800.00	90.00	0.16	8763.00	3184.61	3185.68	-370.49	0.00	432817.24	568822.82	N 32 11 23.50	W 104 14 40.14
	11900.00	90.00	0.16	8763.00	3284.61	3285.68	-370.21	0.00	432917.23	568823.11	N 32 11 24.49	W 104 14 40.14
	12000.00	90.00	0.16	8763.00	3384.61	3385.68	-369.92	0.00	433017.22	568823.39	N 32 11 25.48	W 104 14 40.13
	12100.00	90.00	0.16	8763.00	3484.61	3485.68	-369.64	0.00	433117.21	568823.67	N 32 11 26.47	W 104 14 40.13
	12200.00	90.00	0.16	8763.00	3584.61	3585.68	-369.36	0.00	433217.21	568823.96	N 32 11 27.46	W 104 14 40.13
	12300.00	90.00	0.16	8763.00	3684.61	3685.67	-369.07	0.00	433317.20	568824.24	N 32 11 28.45	W 104 14 40.12
	12400.00	90.00	0.16	8763.00	3784.61	3785.67	-368.79	0.00	433417.19	568824.53	N 32 11 29.44	W 104 14 40.12
	12500.00	90.00	0.16	8763.00	3884.61	3885.67	-368.50	0.00	433517.18	568824.81	N 32 11 30.43	W 104 14 40.11
	12600.00	90.00	0.16	8763.00	3984.61	3985.67	-368.22	0.00	433617.17	568825.10	N 32 11 31.42	W 104 14 40.11
	12700.00	90.00	0.16	8763.00	4084.61	4085.67	-367.93	0.00	433717.16	568825.38	N 32 11 32.40	W 104 14 40.10
	12800.00	90.00	0.16	8763.00	4184.61	4185.67	-367.65	0.00	433817.15	568825.66	N 32 11 33.39	W 104 14 40.10
	12900.00	90.00	0.16	8763.00	4284.61	4285.67	-367.36	0.00	433917.14	568825.95	N 32 11 34.38	W 104 14 40.10
	13000.00	90.00	0.16	8763.00	4384.61	4385.67	-367.08	0.00	434017.13	568826.23	N 32 11 35.37	W 104 14 40.09
	13100.00	90.00	0.16	8763.00								

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 ° ° °)
	15500.00	90.00	0.16	8763.00	6884.61	6885.66	-359.97	0.00	436516.89	568833.34	N 32 12 0.11	W 104 14 39.88
	15600.00	90.00	0.16	8763.00	6984.61	6985.66	-359.69	0.00	436616.88	568833.63	N 32 12 1.10	W 104 14 39.88
	15700.00	90.00	0.16	8763.00	7084.61	7085.66	-359.40	0.00	436716.87	568833.91	N 32 12 2.09	W 104 14 39.88
	15800.00	90.00	0.16	8763.00	7184.61	7185.66	-359.12	0.00	436816.86	568834.19	N 32 12 3.08	W 104 14 39.87
	15900.00	90.00	0.16	8763.00	7284.61	7285.66	-358.84	0.00	436916.85	568834.48	N 32 12 4.07	W 104 14 39.87
	16000.00	90.00	0.16	8763.00	7384.61	7385.66	-358.55	0.00	437016.84	568834.76	N 32 12 5.06	W 104 14 39.86
	16100.00	90.00	0.16	8763.00	7484.61	7485.66	-358.27	0.00	437116.83	568835.05	N 32 12 6.05	W 104 14 39.86
	16200.00	90.00	0.16	8763.00	7584.61	7585.66	-357.98	0.00	437216.82	568835.33	N 32 12 7.04	W 104 14 39.85
	16300.00	90.00	0.16	8763.00	7684.61	7685.66	-357.70	0.00	437316.81	568835.62	N 32 12 8.03	W 104 14 39.85
	16400.00	90.00	0.16	8763.00	7784.61	7785.66	-357.41	0.00	437416.80	568835.90	N 32 12 9.02	W 104 14 39.85
	16500.00	90.00	0.16	8763.00	7884.61	7885.66	-357.13	0.00	437516.79	568836.18	N 32 12 10.01	W 104 14 39.84
	16600.00	90.00	0.16	8763.00	7984.61	7985.66	-356.84	0.00	437616.78	568836.47	N 32 12 11.00	W 104 14 39.84
	16700.00	90.00	0.16	8763.00	8084.61	8085.66	-356.56	0.00	437716.77	568836.75	N 32 12 11.99	W 104 14 39.83
	16800.00	90.00	0.16	8763.00	8184.61	8185.66	-356.28	0.00	437816.76	568837.04	N 32 12 12.97	W 104 14 39.83
	16900.00	90.00	0.16	8763.00	8284.61	8285.66	-355.99	0.00	437916.75	568837.32	N 32 12 13.96	W 104 14 39.82
	17000.00	90.00	0.16	8763.00	8384.61	8385.66	-355.71	0.00	438016.74	568837.61	N 32 12 14.95	W 104 14 39.82
	17100.00	90.00	0.16	8763.00	8484.61	8485.66	-355.42	0.00	438116.73	568837.89	N 32 12 15.94	W 104 14 39.82
	17200.00	90.00	0.16	8763.00	8584.61	8585.66	-355.14	0.00	438216.73	568838.17	N 32 12 16.93	W 104 14 39.81
	17300.00	90.00	0.16	8763.00	8684.61	8685.65	-354.85	0.00	438316.72	568838.46	N 32 12 17.92	W 104 14 39.81
	17400.00	90.00	0.16	8763.00	8784.61	8785.65	-354.57	0.00	438416.71	568838.74	N 32 12 18.91	W 104 14 39.80
	17500.00	90.00	0.16	8763.00	8884.61	8885.65	-354.29	0.00	438516.70	568839.03	N 32 12 19.90	W 104 14 39.80
	17600.00	90.00	0.16	8763.00	8984.61	8985.65	-354.00	0.00	438616.69	568839.31	N 32 12 20.89	W 104 14 39.80
	17700.00	90.00	0.16	8763.00	9084.61	9085.65	-353.72	0.00	438716.68	568839.60	N 32 12 21.88	W 104 14 39.80
	17800.00	90.00	0.16	8763.00	9184.61	9185.65	-353.43	0.00	438816.67	568839.88	N 32 12 22.87	W 104 14 39.80
	17900.00	90.00	0.16	8763.00	9284.61	9285.65	-353.15	0.00	438916.66	568840.16	N 32 12 23.86	W 104 14 39.80
	18000.00	90.00	0.16	8763.00	9384.61	9385.65	-352.86	0.00	439016.65	568840.45	N 32 12 24.85	W 104 14 39.80
	18100.00	90.00	0.16	8763.00	9484.61	9485.65	-352.58	0.00	439116.64	568840.73	N 32 12 25.84	W 104 14 39.80
	18200.00	90.00	0.16	8763.00	9584.61	9585.65	-352.30	0.00	439216.63	568841.02	N 32 12 26.83	W 104 14 39.80
	18300.00	90.00	0.16	8763.00	9684.61	9685.65	-352.01	0.00	439316.62	568841.30	N 32 12 27.82	W 104 14 39.80
	18400.00	90.00	0.16	8763.00	9784.61	9785.65	-351.73	0.00	439416.61	568841.59	N 32 12 28.81	W 104 14 39.80
	18500.00	90.00	0.16	8763.00	9884.61	9885.65	-351.44	0.00	439516.60	568841.87	N 32 12 29.80	W 104 14 39.80
	18600.00	90.00	0.16	8763.00	9984.61	9985.65	-351.16	0.00	439616.59	568842.15	N 32 12 30.79	W 104 14 39.80
	18700.00	90.00	0.16	8763.00	10084.61	10085.65	-350.87	0.00	439716.58	568842.44	N 32 12 31.78	W 104 14 39.80
Cimarex Black River 25 Fed Com 3H - PBHL [330' FNL, 1980' FEL]	18785.03	90.00	0.16	8763.00	10169.64	10170.68	-350.63	0.00	439801.60	568842.68	N 32 12 32.62	W 104 14 39.84

Survey Type: Non-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 / Prelim Cimarex Black River 25 Fed Com 3H Rev2 RM 7May18
	1	26.000	18785.027	1/100.000	30.000	30.000		NAL_MWD_IFR1+MS	Original Borehole / Prelim Cimarex Black River 25 Fed Com

Prelim Cimarex Black River 25 Fed Com 3H Rev2 RM 7May18 Proposal
Geodetic Report
 (Non-Def Plan)



Report Date:	May 07, 2018 - 01:38 PM	Survey / DLS Computation:	Minimum Curvature / Lubinski
Client:	Cimarex	Vertical Section Azimuth:	0.163 ° (Grid North)
Field:	NM Eddy County (NAD 83)	Vertical Section Origin:	0.000 ft, 0.000 ft
Structure / Slot:	Cimarex Black River 25 Fed Com 3H / Cimarex Black River 25 Fed Com 3H	TVD Reference Datum:	RKB
Well:	Cimarex Black River 25 Fed Com 3H	TVD Reference Elevation:	3380.300 ft above MSL
Borehole:	Original Borehole	Seabed / Ground Elevation:	3354.300 ft above MSL
UWI / API#:	Unknown / Unknown	Magnetic Declination:	7.395 °
Survey Name:	Prelim Cimarex Black River 25 Fed Com 3H Rev2 RM 7May18	Total Gravity Field Strength:	998.4350mgn (9.80665 Based)
Survey Date:	May 07, 2018	Gravity Model:	GARM
Tort / AHD / DDI / ERD Ratio:	132.165 ° / 10392.795 ft / 6.469 / 1.188	Total Magnetic Field Strength:	47929.316 nT
Coordinate Reference System:	NAD83 New Mexico State Plane, Eastern Zone, US Feet	Magnetic Dip Angle:	59.882 °
Location Lat / Long:	N 32° 10' 51.97318", W 104° 14' 35.86238"	Declination Date:	May 07, 2018
Location Grid N/E Y/X:	N 429831.860 NUS, E 569193.280 NUS	Magnetic Declination Model:	HDGM 2018
CRS Grid Convergence Angle:	0.0480 °	North Reference:	Grid North
Grid Scale Factor:	0.99990998	Grid Convergence Used:	0.0480 °
Version / Patch:	2.10.715.0	Total Corr Mag North->Grid North:	7.3466 °
		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 [85' FSL, 1640' FEL]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	429831.88	569193.28	N 32 10 51.97	W 104 14 35.88
KOP - Build 12"/100' DLS	8040.48	0.00	280.56	8040.48	0.00	0.00	0.00	0.00	429831.88	569193.28	N 32 10 51.97	W 104 14 35.88
Build & Turn 12"/100' DLS	8415.48	45.00	280.56	8378.10	25.24	25.63	-137.48	12.00	429857.49	569055.81	N 32 10 52.23	W 104 14 37.48
Build 4"/100' DLS	9016.85	75.00	0.16	8714.19	405.73	408.81	-378.39	12.00	430038.63	568814.92	N 32 10 56.00	W 104 14 40.26
Landing Point	9391.85	90.00	0.16	8763.00	778.48	777.54	-377.34	4.00	430409.33	568815.98	N 32 10 59.67	W 104 14 40.25
Cimarex Black River 25 Fed Com 3H - PBHL [330' FNL, 1980' FEL]	18785.03	90.00	0.16	8763.00	10169.64	10170.68	-350.63	0.00	439801.60	568842.68	N 32 12 32.62	W 104 14 39.84

Survey Type: Non-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)	EDU Freq (ft)	Hole Size (in)	Casing Diameter (in)	Expected Max Inclination (deg)	Survey Tool Type	Borehole / Survey
	1	0.000	28.000	1/100.000	30.000	30.000		NAL_MWD_IFR1+MS-Depth Only	Original Borehole / Prelim Cimarex Black River 25 Fed Com 3H Rev2 RM 7May18
	1	28.000	18785.027	1/100.000	30.000	30.000		NAL_MWD_IFR1+MS	Original Borehole / Prelim Cimarex Black River 25 Fed Com

Prelim Cimarex Black River 25 Fed Com 3H Rev2 RM 7May18 Anti-Collision Summary Report

Analysis Date-24hr Time: May 07, 2018 - 14:19

Client: Cimarex
 Field: NM Eddy County (NAD 83)
 Structure: Cimarex Black River 25 Fed Com 3H
 Slot: Cimarex Black River 25 Fed Com 3H
 Well: Cimarex Black River 25 Fed Com 3H
 Borehole: Original Borehole
 Scan MD Range: 0.00ft - 18785.03ft

Analysis Method: 3D Least Distance
 Reference Trajectory: Prelim Cimarex Black River 25 Fed Com 3H Rev2 RM 7May18 (Non-Def Plan)
 Depth Interval: Every 10.00 Measured Depth (ft)
 Rule Set: D&M AntiCollision Standard S002 v5.1/5.2
 Min Pts: All local minima indicated.
 Version / Patch: 2.10.715.0
 Database \ Project: US1153APP452.dir.slb.com/drilling-NM Eddy County 2.10

Trajectory Error Model: ISCWSA0 3-D 85.000% 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
	Cl-Ct (ft)	MAS (ft)	EOU (ft)				MD (ft)	TVD (ft)	Alert	Minor	Major		

Results highlighted: Sep-Factor separation <= 1.50 ft

Prelim Cimarex Black River 25
 Fed Com 4H Rev2 RM 7May18
 (Non-Def Plan)

1008.83	32.81	1004.10	1063.82	45178.32	MAS = 10.00 (m)	0.00	0.00	Pass
1008.83	32.81	1004.04	1063.82	13345.36	MAS = 10.00 (m)	26.00	26.00	Surface
1008.83	77.87	1043.88	1018.75	21.77	OSF1.50	8040.48	8040.48	WRP
1009.10	78.25	1048.17	1020.92	21.72	OSF1.50	8080.00	8089.91	MinPts
1509.80	87.31	1540.76	1512.49	28.25	OSF1.50	9391.85	8753.00	MinPt-O-SF
1509.83	259.55	1425.97	1340.28	9.32	OSF1.50	18785.03	8763.00	MinPt-CICI
								MinPts

Prelim Cimarex Black River 25
 Fed Com 2H Rev2 RM 7May18
 (Non-Def Plan)

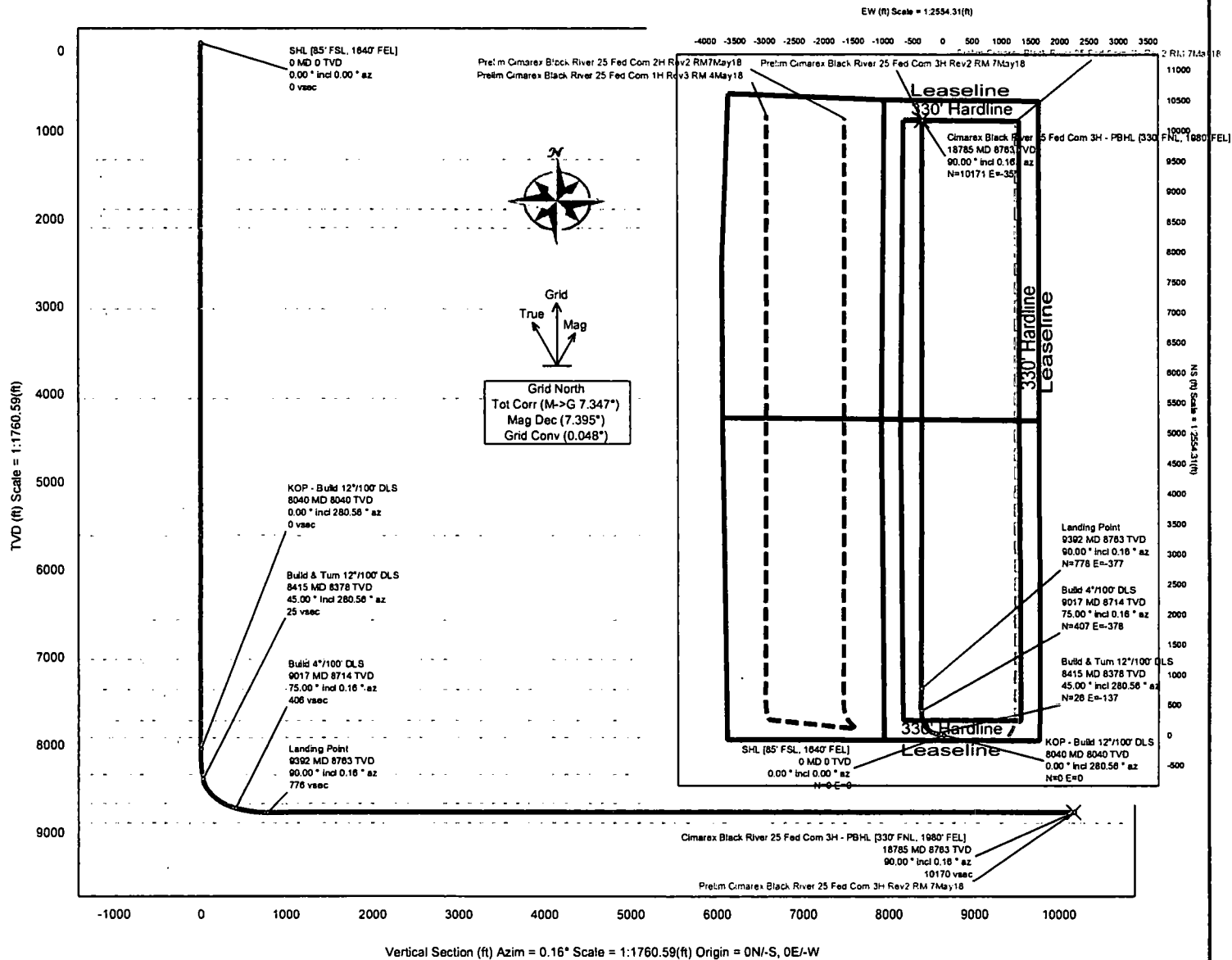
1497.10	32.81	1494.80	1464.29	N/A	MAS = 10.00 (m)	0.00	0.00	Pass
1498.88	32.81	1494.13	1463.87	29785.54	MAS = 10.00 (m)	20.00	20.00	Surface
1498.81	32.81	1494.06	1463.80	31777.64	MAS = 10.00 (m)	26.00	26.00	MinPt-O-SF
1204.36	79.20	1150.59	1125.16	23.82	OSF1.50	8870.00	8882.00	WRP
1205.15	79.28	1151.34	1125.87	23.81	OSF1.50	8900.00	8874.87	MinPts
1312.50	87.53	1253.19	1224.98	23.20	OSF1.50	9510.00	8763.00	MinPt-O-SF
1312.50	258.47	1139.24	1054.03	7.00	OSF1.50	18785.03	8763.00	MinPt-CICI
								MinPts

Prelim Cimarex Black River 25
 Fed Com 1H Rev3 RM 4May18
 (Non-Def Plan)

1536.93	32.81	1534.43	1504.13	N/A	MAS = 10.00 (m)	0.00	0.00	Pass
1536.53	32.81	1533.98	1503.72	31540.63	MAS = 10.00 (m)	20.00	20.00	Surface
1536.45	32.81	1533.91	1503.84	33711.00	MAS = 10.00 (m)	26.00	26.00	MinPt-O-SF
1536.38	32.81	1524.72	1503.87	167.59	MAS = 10.00 (m)	1540.00	1540.00	WRP
1536.42	32.81	1524.67	1503.81	165.97	MAS = 10.00 (m)	1560.00	1560.00	MinPts
2606.94	80.54	2552.41	2526.40	50.06	OSF1.50	8940.00	8890.32	MINPT-O-EOU
2606.97	80.00	2552.41	2526.36	50.02	OSF1.50	8950.00	8893.88	MinPt-CICI
2632.55	86.30	2574.18	2548.25	47.08	OSF1.50	9590.00	8763.00	MinPts
2632.55	251.99	2483.72	2380.50	15.81	OSF1.50	18785.03	8763.00	MinPt-CICI
								MinPts

Borehole:	Well:	Field:	Structure:
Original Borehole	Cimarex Black River 25 Fed Com 3H	NM Eddy County (NAD 83)	Cimarex Black River 25 Fed Com 3H

Gravity & Magnetic Parameters				Surface Location				NAD83 New Mexico State Plane, Eastern Zone, US Feet				Miscellaneous			
Model:	HQDM 2018	Dip:	59.532°	Date:	07-May-2018	Lat:	N 32 10 51.97	Northing:	42983.1867US	Grid Conv:	0.048°	Slot:	River 25 Fed	TVD Ref:	RKB(330.3H above MSL)
MagDec:	7.395°	F8:	47929.316nT	Gravity F8:	988.435gn (9.80665 Based)	Lon:	W 104 14 35.88	Easting:	569193.281US	Scale Fact:	0.99990998	Plan:	Com 3H	Prelim Cimarex Black River 25 Fed Com 3H Rev2 RM 7May18	



Critical Points

Critical Point	MD	INCL	AZIM	TVD	VSEC	N(+)/S(-)	E(+)/W(-)	DLS
SHL (85° FSL, 1640° FEL)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Top Salt (Salado)	1322.00	0.00	280.56	1322.00	0.00	0.00	0.00	0.00
Base Salt (Castile)	1887.00	0.00	280.56	1887.00	0.00	0.00	0.00	0.00
Bell Canyon (Top Delaware)	2096.00	0.00	280.56	2096.00	0.00	0.00	0.00	0.00
Cherry Canyon	3023.00	0.00	280.56	3023.00	0.00	0.00	0.00	0.00
Brushy Canyon	4049.00	0.00	280.56	4049.00	0.00	0.00	0.00	0.00
Bone Spring	5609.00	0.00	280.56	5609.00	0.00	0.00	0.00	0.00
1st Bone Spring Sand	6575.00	0.00	280.56	6575.00	0.00	0.00	0.00	0.00
2nd Bone Spring Sand	7023.00	0.00	280.56	7023.00	0.00	0.00	0.00	0.00
3rd Bone Spring Carb	7387.00	0.00	280.56	7387.00	0.00	0.00	0.00	0.00
Harkey Sandstone	7723.00	0.00	280.56	7723.00	0.00	0.00	0.00	0.00
Base Harkey Sand	7916.00	0.00	280.56	7916.00	0.00	0.00	0.00	0.00
KOP - Build 12°/100' DLS	8040.48	0.00	280.56	8040.48	0.00	0.00	0.00	0.00
3rd Bone Spring Sand	8359.13	38.24	280.56	8336.00	18.49	18.77	-100.71	12.00
Build & Turn 12°/100' DLS	8415.48	45.00	280.56	8378.10	25.24	25.63	-137.48	12.00
Top Wolfcamp	8674.50	63.82	346.33	8684.00	273.98	275.02	-383.38	12.00
Build 4°/100' DLS	9016.85	75.00	0.16	8714.19	405.73	406.61	-378.39	12.00
Landing Point	9391.85	90.00	0.16	8783.00	776.46	777.54	-377.34	4.00
Cimarex Black River 25 Fed Com 3H - PBHL (330° FNL, 1680° FEL)	18785.03	90.00	0.16	8783.00	10169.64	10170.68	-350.63	0.00
Top Wolfcamp A Shale	NaN			8887.00				

13 3/8	surface csg in a	17 1/2	inch hole.	Design Factors			SURFACE	
Segment	#/ft	Grade	Coupling	Joint	Collapse	Burst	Length	
"A"	48.00	H 40	ST&C	16.77	4.21	1.57	400	
"B"							0	
w/8.4#/g mud, 30min Sfc Csg Test psig: 1,036				Tail Cmt	does	circ to sfc.	Totals:	400
<u>Comparison of Proposed to Minimum Required Cement Volumes</u>								
Hole	Annular	1 Stage	1 Stage	Min	1 Stage	Drilling	Calc	Req'd
Size	Volume	Cmt Sx	CuFt Cmt	Cu Ft	% Excess	Mud Wt	MASP	BOPE
17 1/2	0.6946	273	366	333	10	8.80	643	2M

9 5/8 casing inside the 13 3/8						Design Factors		INTERMEDIATE
Segment	#/ft	Grade	Coupling	Joint	Collapse	Burst	Length	
"A"	36.00	J 55	LT&C	6.06	1.84	0.86	2,076	
"B"							0	
w/8.4#/g mud, 30min Sfc Csg Test psig: 1,500							Totals: 2,076	
The cement volume(s) are intended to achieve a top of					0	ft from surface or a		400
Hole Size	Annular Volume	1 Stage Cmt Sx	1 Stage CuFt Cmt	Min Cu Ft	1 Stage % Excess	Drilling Mud Wt	Calc MASP	Req'd BOPE
12 1/4	0.3132	517	907	695	31	10.20	2169	3M
Burst Frac Gradient(s) for Segment(s): A, B, C, D = 1.7, b, c, d All > 0.70, OK.								

7	casing inside the			9 5/8	Design Factors			PRODUCTION
Segment	#/ft	Grade	Coupling	Joint	Collapse	Burst	Length	
"A"	26.00	N 80	LT&C	2.28	1.44	1.45	8,041	
"B"	26.00	N 80	BUTT	5.16	1.21	1.45	1,351	
w/8.4#/g mud, 30min Sfc Csg Test psig: 1,244						Totals:	9,392	
B	Segment Design Factors would be:			32.17	1.32	if it were a vertical well		
No Pilot Hole Planned			MTD	Max VTD	Csg VD	Curve KOP	Dogleg°	Severity°
			9392	8763	8763	8041	90	9
The cement volume(s) are intended to achieve a top of				1876	ft from surface or a		200	
Hole	Annular	1 Stage	1 Stage	Min	1 Stage	Drilling	Calc	Req'd
Size	Volume	Cmt Sx	CuFt Cmt	Cu Ft	% Excess	Mud Wt	MASP	BOPE
8 3/4	0.1503	491	1382	1143	21	9.00	3031	5M

4 1/2 Liner w/top @ 8041					Design Factors			LINER	
Segment	#/ft	Grade	Coupling	Body	Collapse	Burst	Length		
"A"	11.60	P 110	BUTT	2.61	1.42	2.14	1,351		
"B"	11.60	P 110	BUTT	4.20	1.52	2.14	9,393		
w/8.4#/g mud, 30min Sfc Csg Test psig: 1,955						Totals:	10,744		
A Segment Design Factors would be:				3.73	1.52	if it were a vertical wellbore			
No Pilot Hole Planned				MTD	Max VTD	Csg VD	Curve KOP	Dogleg°	Severity°
				18785	8887	8887	8041	90	7
The cement volume(s) are intended to achieve a top of				8041	ft from surface or a		1351		
Hole	Annular	1 Stage	1 Stage	Min	1 Stage	Drilling	Calc	Req'd	
Size	Volume	Cmt Sx	CuFt Cmt	Cu Ft	% Excess	Mud Wt	MASP	BOPE	
6 3/4	0.1381	638	829	1311	-37	10.80			
Capitan Reef est top XXXX.									